Chapter 5.3 Water Recycling

Summary

The Recycled Water Pillar chapter reviews water reuse activities in the Santa Ana River (SAR) Watershed, including agricultural and landscape irrigation, creating groundwater barriers against seawater intrusion, habitat creation, environmental enhancement, and lake stabilization. In addition, the "greenhouse effect" of recycled water is evaluated.

Fifteen of 18 water reclamation/recycling agencies identified within the SAR Watershed provided detailed information including current and projected treatment plant capacities, plant flows, amounts of water recycled and disposed, how recycled water is used, and recycled water storage facility volumes. The agencies and their facilities are described in the chapter. Projections in the same categories also are provided in five-year increments through 2030.

Water recycling will be an increasingly important part of California's sustainable water future. However, challenges related to recycled water projects are varied and range from regulatory issues, ability to handle storage/seasonal variability, water quality impacts, salinity management to public acceptance, perception, and policy issues.

Strategies to address water quality impacts are being addressed by the Emerging Constituents Work Group which is made up of stakeholders and the Regional Water Quality Control Board, Santa Ana Region (Regional Board). In some management zones, the maximum benefit process is being used to set maximum benefit objectives.

Additional storage for recycled water is planned, but a more comprehensive effort needs to be developed.

Desalination of brackish groundwater addresses salinity management issues. Also, some agencies are conducting investigations relating to zero liquid discharge from desalters to further refine the process.

Orange County Water District (OCWD) is putting high quality, treated recycled water into the basin thereby improving water quality by lessening overall salinity.

In addition, some agencies are making recycled water available to individual residences for yard irrigation and toilet flushing; and meeting water quality specifications through specialized treatment improving user confidence and acceptance with specialized user advice and user support groups, promoting public acceptance, improving public perception, and working to develop potentially favorable policies.

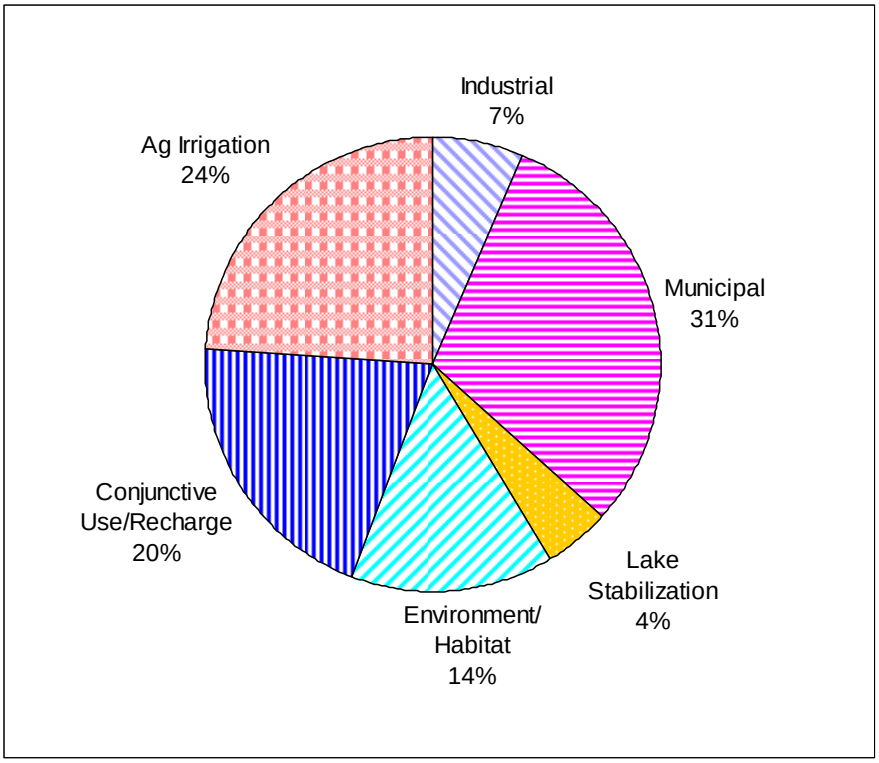
Introduction

Water recycling, also known as water reclamation or water reuse, is a reliable, economically feasible, and environmentally sensitive means to preserve the State's potable water resources, assist with drought mitigation, and reduce the demand on potable water supplies.

Statewide, over 525,000 acre-feet (AF) of wastewater is recycled each year according to the California Department of Water Resources. Currently, recycled water is used to: 1) irrigate crops, landscaped areas, golf courses, and freeway medians; 2) replenish groundwater basins; 3) flush toilets and urinals; and 4) act as a barrier to sea water intrusion into freshwater groundwater basins. In addition, it also is increasingly used by industry in cooling processes, in new home and other construction, and for other purposes. In the future, the level of recycling will increase to help meet the needs of the State's burgeoning population.

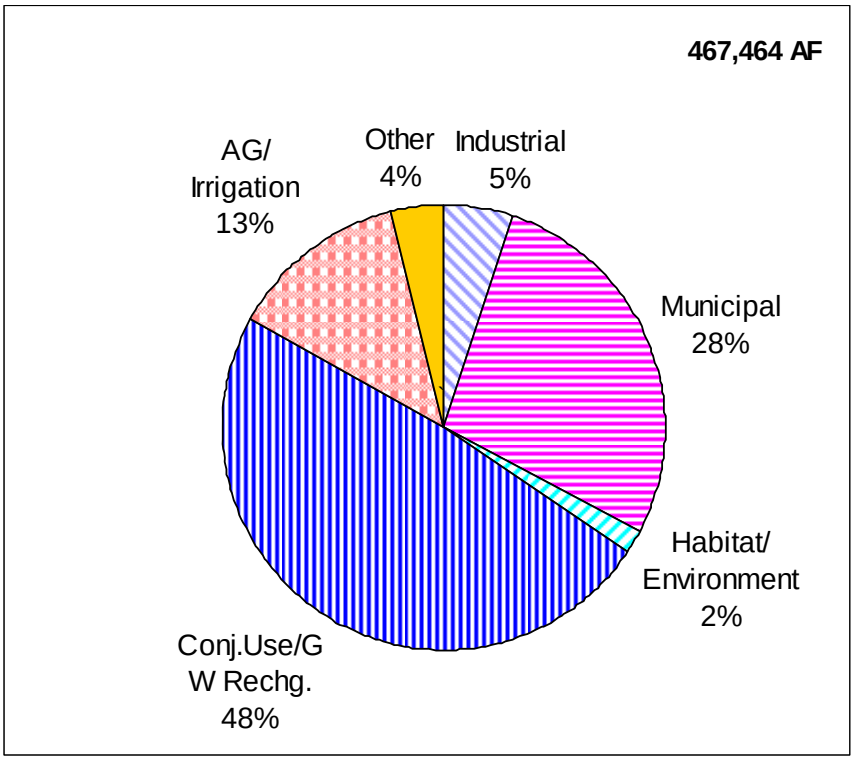
The SAR Watershed is dependent on imported water sources due to a variety of factors including the geographic location of the region, limited local water supplies, a growing population, and the prospect of future sustained drought years. In addition, the area is now faced with reductions in the amount of imported water supplies it can obtain from both the Colorado River and the State Water Project. The long-term transfer of Arizona's and New Mexico's allocations of Colorado River water to southern California have been eliminated to meet increased demands for water in Arizona and Nevada, which are now requiring their full share of water. Southern California's allocation of State Water Project water has been reduced to meet environmental needs in the San Francisco Bay/Sacramento-San Joaquin Delta and its tributaries. This reduction in imported supplies, along with population growth in the region, make identifying new water sources as well as reducing water use through water conservation measures, imperative for the region.

Figure 5.3-1 Current Rate of Recycled Water Use within the Watershed



Currently, agencies within the Watershed have the capacity to treat nearly 800,000 acre-feet per year (AFY). Current plant flows total nearly 550,000 AFY and approximately 101,500 AFY of recycled water is used to meet

Figure 5.3-2 Estimated Distribution of the 467,000 AF in 2030



water needs such as industrial and municipal uses, habitat creation and environmental enhancement, conjunctive use and groundwater recharge, landscape and agricultural irrigation, and conjunctive use/recharge within the SAR Watershed. The 101,500 AFY figure does not include recycled water discharged to the SAR that is subsequently captured and recharged. **Figure 5.3-1** depicts the current fate of recycled water use within the Watershed.

As urban and suburban growth and development in the Watershed continue, an increasing amount of recycled water will be available while the traditional demand by agricultural customers will decrease. This creates a challenge to establish a growing recycled water market for commercial, industrial, and institutional customers as well as developing innovative and creative markets elsewhere.

Current projections for 2030 indicate wastewater treatment plant flows of more than 750,000 AFY with more than 467,000 AFY of those flows recycled. **Figure 5.3-2** depicts the estimated distribution of the 467,000 AF in 2030.

Recycled water supplies are fairly constant year round, but demands are seasonal in many areas; therefore, storage plays an important role in recycled water management. Currently, agencies within the Watershed maintain more than 58,000 AF of storage capacity in ponds, reservoirs, and other impoundments. More storage is planned for the future.

Recycled water plays an important role in each of the other One Water One Watershed Pillars and is interlinked with them. It is an important element in increasing water supply reliability while also addressing other Pillars' issues. Recycled water has been successfully shown to be an ideal water source for environmental enhancement and habitat creation. Adding disadvantaged communities to sewer systems not only improves groundwater quality, it also increases the amount of recycled water available as a resource that can be used in lieu of potable water in many situations.

The *Collaboration and Integration with Other Pillars* section contains a table outlining linkages between the Recycled Water Pillar and the other Pillars.

Today, recycled water is more important than ever and is a critical element in water resources management. Water recycling is one of many effective ways to conserve potable water. Water recycling involves the use of water that normally would be discharged as treated wastewater to inland or coastal bodies of water. Wastewater was once a liability, something to be disposed of or thrown away. Today it is an asset, every gallon of water that can be reused at least once means that one more gallon can remain underground or need not be imported from northern California or the Colorado River. Promoting the use of reclaimed or recycled water, providing for the conservation and reuse of all water resources, and utilizing reclaimed or other non-potable water for any approved purpose to the maximum extent possible under the laws of the State of California makes sense. It makes sense to reclaim and recycle what was once "wastewater" by turning it into an asset that extends the potable water supply, generates revenue, and provides irrigation water for arid and semi-arid water-scarce areas. This liability is now an asset to be maximized and wisely utilized wherever and whenever possible.

Current Conditions

Recycled water has been used in the Watershed for many years to supplement local and imported potable supplies. Water reclamation involves treating wastewater to State standards and safe for State-approved non-potable applications. Approximately 101,500 AFY of recycled water currently is being used to meet water needs such as municipal (31%), agricultural irrigation (24%), groundwater recharge (20%), habitat and environmental (14%), industrial (7%), and lake stabilization (4%) applications within the SAR Watershed (see **Figure 5.3-1**).

The above percentages do not include the treated wastewater discharged into the SAR in San Bernardino and Riverside Counties that is subsequently put to use by OCWD. Except during periods of high storm flow, OCWD currently recharges all the flow in the SAR using surface recharge basins in Anaheim and Orange. The Orange County Judgment imposes a physical solution that requires parties above Riverside Narrows to deliver a minimum quantity (12,420 AF) and quality of water downstream. The cumulative requirement is 42,000 AFY at Prado Dam. However, since upstream recycling is just becoming economical in the upper and middle watershed, OCWD has received considerably more than this minimum flow for many years. From 1997 to 2007, the amount of SAR baseflow (SAR flows excluding baseflow and non-tributary flows) recharged in Orange County averaged 150,000 AFY. Including these figures in the above percentages would result in groundwater recharge being the major use of recycled water. Over time, much of the treated wastewater that is currently flowing in the SAR will be recycled upstream, thereby reducing the treated wastewater flow in the river. When this occurs, OCWD will replace these "lost" flows by recycling more of the wastewater that flows into the ocean, importing more water, desalting the ocean, or some other new source of supply.

In the past decade, a number of varied and large recycling projects have been completed or initiated. Irvine Ranch Water District's (IRWD) innovative dual-plumbed water system, which supplies recycled water to commercial buildings for use in flushing toilets and urinals, pioneered such use. Today, over 40 such commercial buildings using disinfected tertiary recycled water exist. Elsinore Valley Municipal Water District (EVMWD) uses recycled water to help replenish and enhance Lake Elsinore, a natural recreational lake long-plagued with severe seasonal evaporation losses. The focus of the program is to stabilize lake levels, improve water quality, and enhance Lake Elsinore as a regional aesthetic and recreational resource.

Orange County Sanitation District (OCSD) and OCWD developed a major Groundwater Replenishment System (GWRS) to treat wastewater usually discharged to the ocean using microfiltration, reverse osmosis, and ultraviolet disinfection. This purified water is equivalent to or better than the quality of drinking water and meets all State and Federal drinking water standards. The water is pumped to spreading ponds near the SAR for percolation into the groundwater basin, with some injected along the coast as a barrier to seawater intrusion. In addition, OCWD has a long history of success with its well-known Water Factory 21, a major program in which municipal wastewater was treated and injected into the groundwater basin to prevent seawater intrusion and protect and replenish local groundwater supplies.

The Inland Empire Utilities Agency (IEUA) is expanding water reuse within its service area through rapid implementation of a distribution network that will provide recycled water for direct non-potable use and groundwater replenishment. In 2005, IEUA and the Chino Basin Watermaster received the necessary permits to begin Phase 1 of their recycled water groundwater replenishment program. Phase 2, which more than doubles the capacity of the replenishment program, was permitted in June 2007. IEUA also has embarked on a massive effort to increase direct deliveries of recycled water to municipal and industrial customers, including power plants, golf courses, and agriculture.

The San Bernardino Valley Municipal Water District (Valley District) currently is working with other agencies within its service area to recycle more of the treated wastewater that currently flows into the SAR. Without recycling its wastewater, the Valley District service area will not have enough water resources to meet future demands. The City of San Bernardino Municipal Water Department (SBMWD) is investigating enhanced tertiary treatment methods at its secondary water reclamation plant. This enhanced treatment will allow the SBMWD to use this recycled water for groundwater recharge and direct delivery in the Upper SAR Basin. Numerous other water agencies have been proactive in water recycling efforts and/or projects; they are described in the *Facilities* section below.

Recycled water currently represents the fourth largest water supply source to the SAR Watershed, accounting for approximately four percent of total water demands. Including OCWD's recharge of SAR flows, the percentage of water demands met by water recycling or indirect recycling is approximately 14 percent. This figure includes only direct use applications such as landscape and agricultural irrigation as well as commercial and industrial uses. As infrastructure is developed, recycled water is projected to surpass surface water to become the third largest supply source for the Watershed.

Facilities

The agencies in the SAR Watershed engaged in wastewater treatment and/or water recycling, listed alphabetically, are discussed below.

Big Bear Area Regional Wastewater Agency (BBARWA)

In July 1973, individual subsurface sewage disposal systems (septic tank leach field systems) were found by the Regional Board to be no longer adequate to serve the growing needs of the Big Bear Valley.

The State Water Resources Control Board (SWRCB) and the California Department of Public Health (CDPH), along with the City of Big Bear Lake, Big Bear City Community Services District (BBCCSD), and the County of San Bernardino, determined that consolidating the region's wastewater treatment facilities would be the best approach to protecting the valley's abundant natural resources and handling wastewater treatment and disposal. BBARWA was formed to decide how this process would be achieved and to take advantage of Federal Clean Water Act funds. The regional wastewater treatment plant owned and operated by BBARWA began operation in March 1974. The treatment plant is located within 93.5 acres, adjacent to Baldwin Lake. It provides wastewater conveyance, treatment, and disposal for the residents of the Big Bear Valley.

The service area for BBARWA includes the entire Big Bear Valley (79,000 acres) and is served by three separate collection systems: the City of Big Bear Lake, representing approximately 47% of the total flow; BBCCSD, representing approximately 48% of the total flow; and the County of San Bernardino Service Area 53B, representing approximately 5% of the total. Each underlying agency maintains and operates its own wastewater collection system, and delivers wastewater to the BBARWA's interceptor system for transport to the regional plant.

City of Beaumont and Beaumont-Cherry Valley Water District (BCVWD)

Beaumont's wastewater treatment plant serves an area entirely within the service area of the BCVWD, but the City of Beaumont is responsible for the collection and treatment of wastewater. BCVWD and the City of Beaumont coordinate on recycled water projects for reuse of treated wastewater. The City of Beaumont presently is making modifications and enhancements to the plant to increase plant capacity. It is planned that the community of Cherry Valley will be sewered to the City of Beaumont's treatment plant through BCVWD's latent wastewater power. The City of Beaumont previously expanded and upgraded its treatment plant to a full reclamation facility. This was in response to a Regional Board request to upgrade the level of treatment to allow continued discharge to Cooper's Creek, a tributary to San Timoteo Creek. In lieu of discharging effluent to the creek, the City of Beaumont and BCVWD, through a two party cooperative agreement, agreed to implement a water recycling project, since the effluent limits for discharge to the creek currently are equivalent to that required for water recycling. The City of Beaumont will operate the treatment facility and deliver treated water to BCVWD for recycling.

City of Colton Public Works Department

An abundant local water supply is one of Colton's greatest assets. The City of Colton sits on one of the largest potable aquifers in the State of California; therefore, 100% of the City of Colton's water comes from deep water wells.

The Colton Water Reclamation Facility provides both primary and secondary treatment. The reclaimed water is then sent to the Rapid Infiltration and Extraction (RIX) Facility in San Bernardino (See below under City of San Bernardino). All of the City of Colton's flows are sent to RIX Facility for treatment, except when the river allows a 20:1 dilution for their secondary treated waters. No recycled water is sold by the City of Colton for use by customers.

City of Corona

The City of Corona owns and operates wastewater treatment plants with a combined treatment capacity of 15 million gallons per day (MGD). The original plant was constructed in 1968, and since then, two new treatment plants have been added with several million dollars in upgrades and modifications to meet growth and new regulatory requirements. The City of Corona is now reclaiming wastewater for irrigation of City parks, local golf courses, and landscape maintenance districts. Treated effluent not reclaimed is discharged to Temescal Creek or sent to percolation ponds for groundwater recharge.

The City of Corona has developed water recycling system supplies that will meet its projected growth to 2030. It already has constructed $44,000,000 worth of pumping and distribution facilities. The recycling system will provide non-potable service throughout a major portion of the City of Corona. The remaining portion of the construction program will provide greater flexibility in the distribution of recycled water and the ability to use an existing debris basin for groundwater recharge.

Wastewater Treatment Plant #1, consisting of Wastewater Treatment Plants #1A and #1B, and Wastewater Treatment Plant #3 are currently in operation. Wastewater Treatment Plant #1A discharges to local percolation ponds, and Wastewater Treatment Plant #1B discharges to the SAR and the recycled water distribution system.

City of Norco

The City of Norco's Sewer Maintenance Division provides for the continued maintenance and operation of the City of Norco's sanitary sewer system as well as for the annual cost of effluent treatment. This division has the primary responsibility of providing scheduled routine maintenance of the sanitary sewer system, operation and maintenance of the ten lift stations as well as providing for emergency maintenance repair response.

The City of Norco's Recycled Water Piping Project resulted in the installation of over seven miles of pipeline, a small reservoir, and pump station to create a new recycled water distribution system to deliver up to 895 AFY of recycled water.

The City of Norco does not operate a treatment plant; they are served by the Western Riverside County Wastewater Authority.

City of Redlands

Originally built in the early 1960's, the City of Redlands' Wastewater Treatment Facility operated for decades as a secondary treatment facility, percolating effluent into the groundwater basin. In 2000, a more stringent discharge requirement for total inorganic nitrogen (TIN) and the opportunity to offset potable water use spurred the City of Redlands to upgrade the plant to provide tertiary treatment. They negotiated with a local power generator to provide high quality recycled water that the power company would purchase for use as cooling water. After studying alternatives, the City of Redlands decided on an upgrade that resourcefully combines the solids separations process of submerged membranes with the biological nitrification/de-nitrification process to supply high quality recycled water, while using less expensive traditional secondary treatment technology to treat a portion of the flow for percolation.

To meet basin plan requirements, the upgraded facility removes nitrogen from 9.5 MGD of wastewater to a level of less than 10 mg/L of TIN. The membrane bioreactor (MBR) train treats up to six MGD of the total flow to meet or exceed Title 22 requirements for low-turbidity, disinfected effluent. The plant's conventional train can treat the remaining 3.5 MGD to a lower quality for percolation in existing ponds.

In 2004, the plant began producing high quality tertiary effluent as the largest MBR facility in the United States.

The new recycled water treatment facility allows the City of Redlands to recover some of the costs of treatment through the sale of effluent and provides the area with a new source of water, leaving the local groundwater and imported water supplies for domestic use.

City of Rialto

Serving the City of Rialto, the Rialto Wastewater Treatment Plant handles waste from a community of approximately 75,000 people – treating approximately two billion gallons of wastewater per year. The City of Rialto maintains over 150 miles of sewer mains. The new treatment plant is expected to be fully operational at the start of the new fiscal year. The plant soon will be powered by used kitchen grease, waste sludge, and a hydrogen fuel cell, making it the nation's first system to power a hydrogen fuel cell using methane gas from decomposing greases and sewage wastes.

City of Riverside

The Regional Water Quality Control Plant (RWQCP) is located on a 121-acre site in Riverside, south of the SAR. It consists of two secondary treatment plants, one tertiary treatment plant, and sludge handling facilities that treat wastewater from Riverside and three community service districts: Edgemont, Jurupa, and Rubidoux.

Effluent from Riverside's RWQCP is discharged through the Hidden Valley Wetlands Enhancement Project for nutrient removal and environmental enhancement at an average rate of 11,500 AFY. This water enters the SAR downstream of the wetlands with minimal loss to evaporation or transpiration.

City of San Bernardino

The SBMWD has operated its Water Reclamation Plant (WRP) since 1973. The WRP is a 33 MGD Regional Secondary Treatment facility that provides wastewater treatment services for the City of San Bernardino, Loma Linda, East Valley, San Bernardino International Airport, Patton State Hospital, and unincorporated San Bernardino County areas.

The RIX Facility receives approximately 33 MGD of secondary treated wastewater from the WRP and the City of Colton's Wastewater Reclamation Facility. Natural bio-filtration is employed through the use of percolation basins and ultra-violet disinfection is used to meet the State of California Title 22 tertiary standards in addition to the discharge standards specified in a separate NPDES permit issued to the RIX facility. RIX treated wastewater consistently meets or exceeds required discharge standards and is often superior in quality to effluent produced through conventional tertiary facilities.

The SBMWD is investigating alternatives to reduce the hydraulic loading to its RIX facility by utilizing enhanced tertiary treatment methods at its secondary water reclamation plant. This effort will allow the SBMWD to reuse a large portion of its recycled water for groundwater recharge and direct delivery uses in the Upper SAR Basin. The Upper SAR Basin is dependent upon the recycled water from this regional plant to meet future water demands.

Eastern Municipal Water District (EMWD)

EMWD has been treating wastewater within its service area since the 1960's. Originally, treated effluent was disposed of through on-site percolation/evaporation ponds. As flows increased, the District began marketing recycled water to local farmers for the irrigation of feed and fodder crops and began extending transmission facilities to deliver this recycled water to these new customers.

EMWD's five regional treatment plants today serve some 130,000 connections, including those originating with local water agencies and municipalities.

In 1991, EMWD applied for and received funding through the U.S. Bureau of Reclamation to develop a recycled water “backbone” transmission system, which greatly expanded the District's ability to deliver recycled water to a growing customer base. Subsequent facility improvements in the recycled water system are now in place linking all of the District's regional water reclamation facilities (RWRF). System pressurization projects also have been implemented to provide the level of service required for municipal and industrial customers throughout the majority of the recycled water system.

Within its 555-square mile service area, EMWD owns or operates five RWRFs, four of which are located in the SAR Watershed. These regional treatment plants today serve some 130,000 connections, including those originating with local water agencies and municipalities. A network of pipelines extends for nearly 1,200 miles, supported by 35 lift (pumping) stations. The nearly $50,000,000 “backbone” recycled water distribution system links the five RWRFs in order to move recycled water supplies to areas of demand. The RWRFs are:

- The ***San Jacinto Valley RWRF***, a 255-acre facility west of the City of San Jacinto, serves a growing population living within its 167-square mile service area. Recently converted to

tertiary treatment, the facility provides recycled water to dairies and other agricultural customers as well as the 10,000 acre California Department of Fish and Game's San Jacinto Wildlife Area (SJWA) adjacent to Lake Perris. The SJWA was the first state wildlife refuge to utilize reclaimed water for habitat development. In addition, EMWD's Hemet/San Jacinto Multipurpose Constructed Wetlands is located at the site. The wetlands were constructed to provide habitat and environmental enhancement, additional treatment of secondary treated wastewater, and opportunities for public education and other public benefits. One to three MGD of recycled water flow through the award-winning wetlands prior to entering EMWD's recycled water distribution system for subsequent reuse.

- The ***Moreno Valley RWRF*** provides water reclamation for most of the ever-expanding Moreno Valley. In addition to providing recycled water for agriculture, this plant provides recycled water for greenbelt and median strip irrigation at the Moreno Valley Ranch development.
- The ***Perris Valley RWRF***, centrally located in EMWD's service area, receives sewage from a 120-square mile area including Perris, Sun City, Romoland, Homeland, and a portion of Moreno Valley. The recycled water is sold for agricultural irrigation and to duck clubs.
- The ***Sun City RWRF*** redirects wastewater from residents living within a 57-square mile area and sends it to the Perris Valley RWRF for processing. Although this plant processes no wastewater on-site at this time, wastewater treatment could begin again in a few years. Two desalters, the Menifee Desalter and the Perris I Desalter, are used to desalinate brackish groundwater are located at the site. A brine line was constructed from the RWRF downstream to Temescal Canyon for eventual disposal into the Santa Ana Regional Interceptor (SARI), a larger brine line that follows the SAR. A third desalter, the Perris II Desalter, is in the design stage and will also be located at the same facility.
- Although located in the Santa Margarita River Watershed, the ***Temecula Valley RWRF*** does pump reclaimed water ten miles north to the Winchester Ponds in the San Jacinto Watershed when additional storage is required or for other operational reasons.

Elsinore Valley Municipal Water District (EVMWD)

Long plagued with severe seasonal evaporation losses, Lake Elsinore is a natural recreational lake that annually loses 14,000 AF of water to evaporation. In January 2002, the Regional Board granted EVMWD a permit to discharge recycled water via its Regional Wastewater Treatment Plant into Lake Elsinore for two years under a pilot project to research the effects of recycled water on the lake — the treatment plant already discharges four MGD of tertiary treated water into Temescal Creek. On June 28, 2002, members of the Recycled Water Task Force, the EVMWD Board of Directors and staff, and Lake Elsinore City officials joined to celebrate the first release of recycled water into Lake Elsinore. This was the first time that recycled water had been released into a recreational lake in California. About 2,000 AF of recycled water was released in the remaining six months of 2002.

In 1984, EVMWD purchased the City of Lake Elsinore's aging sewer system. That same year, they received State and Federal loans and grants to fund a new regional sewer system under the Clean Water Act. The Railroad Canyon Wastewater Treatment Plant was completed and online serving

the Canyon Lake Community the same year. In 1986, the Regional Wastewater Treatment Plant with a two MGD capacity was dedicated and in operation. In 2005, the facilities secondary biological process was upgraded to achieve a TIN of less than 10 mg/L.

Though currently operational, the Horsethief Canyon Wastewater Reclamation Plant is scheduled to be replaced in about 2012. Approximately 1.25 AF/day of recycled water from this is utilized in parks, green belts, and median strips throughout the community. The Alberhill Regional Wastewater Facility is to be constructed and on line in 2015 and will be expanded in 2-3 MGD phases.

Inland Empire Utilities Agency (IEUA)

IEUA currently operates five regional wastewater treatment plants, all producing tertiary treated water meeting full body contact recreation standards that is ultimately discharged to the SAR. They are:

- Regional Water Recycling Plant No. 1 (RP-1) has been in operation since 1948 and serves the cities of Ontario, Rancho Cucamonga, Upland, Montclair, Fontana and an unincorporated area of San Bernardino County.
- Regional Water Recycling Plant No. 2 (RP-2) has been in operation since 1960. In 2004, IEUA's RP-2 stopped processing wastewater, but continues to treat solids from Regional Water Recycling Plant No. 5 (RP-5) and the Carbon Canyon Wastewater Recycling Facility (CCWRF).
- Regional Water Recycling Plant No. 4 (RP-4) is located in the City of Rancho Cucamonga at the intersection of 6th Street and Etiwanda Avenue. The plant serves both the Cucamonga Valley Water District and the City of Fontana. An eight-mile, 30-inch pipeline transports the final effluent to the Cucamonga Flood Control Channel at Regional Plant No. 1. The flood control channel is tributary to the SAR.
- RP-5 is located immediately east of IEUA's Administrative Headquarters in the City of Chino and began operation in March 2004. Wastewater treatment at RP-2 was relocated to this facility that serves both the City of Chino and the City of Chino Hills.
- The CCWRF, located in the City of Chino, has been in operation since May 1992. The facility serves the areas of Chino, Chino Hills, Montclair, and Upland.

The five treatment plants provide the source of recycled water for rapidly increasing uses such as landscape irrigation, power generation and groundwater replenishment. In the recently completed IEUA platinum LEED headquarters building, recycled water is used for toilet flushing and landscape irrigation. Adjacent to the headquarters building, IEUA has constructed a water education park with wetlands that process recycled water.

An extensive network of piping has been installed by IEUA to allow distribution of recycled water to municipal and industrial customers and several recharge sites are now percolating recycled water for underground storage. The regional distribution network continues to be expanded and new customers are continually being added. Future projects call for additional piping, storage, and pumping capabilities.

Irvine Ranch Water District (IRWD)

Michelson Water Reclamation Plant in Irvine and the Los Alisos Water Reclamation Plant in Lake Forest treat wastewater collected within the IRWD using advanced, or tertiary, treatment. The recycled water distribution system, which is comprised of over 300 miles of pipeline and 15 storage facilities including three open reservoirs, provides recycled water to over 4,000 sites including fields and orchards planted with a variety of fruits, vegetables, and nursery products. Recycled water also is used to irrigate landscapes including parks, schools, golf courses, streetscapes, and open space managed by many community associations. About 300 estate-sized residential lots also use this water for front and backyard irrigation. Many water features such as the lake at Mason Park are filled with recycled water.

Wastewater flows from the Michelson Plant that are greater than what is needed for reuse or storage are sent to OCSD for treatment and ocean disposal. Flows from the Los Alisos Plant that are greater than what is needed for reuse are treated to secondary levels and discharged for ocean disposal through South Orange County Wastewater Authority's system. With minor exceptions, tertiary treated wastewater is not discharged to the ocean.

In 1991, IRWD became the first water district in the nation to obtain health department permits for the interior use of recycled water from a community system. Recycled water is used for toilet flushing in IRWD's facilities as well as over 40 commercial office buildings constructed with dual piping systems, and for cooling towers and industrial uses such as carpet dyeing. Potable demands in these buildings have dropped by as much as 75 percent due to the use of recycled water.

Lee Lake Water District (LLWD)

LLWD is a California Water District formed in 1965 in order to provide water and wastewater services to the residents of the Temescal Valley between the Cities of Lake Elsinore and Corona. LLWD is within the service area of the Western Municipal Water District (WMWD), who is a member of the Metropolitan Water District of Southern California (MWDSC). LLWD obtains its water from MWDSC, who imports it from northern California. The water then is treated at the Henry J. Mills Water Filtration Plant in Riverside.

LLWD operates the Lee Lake Water Reclamation Facility located just east of the Wild Rose Business Park. During the most recent expansion of the Reclamation Facility, the capacity was increased to treat 1.575 MGD of raw sewage and produce tertiary reclaimed water usable for landscape irrigation and other non-consumptive purposes. Currently, LLWD reclaims 100% of the plant flow during the summer months for the Retreat Golf Course irrigation demands and landscaping within the Wild Rose Business Park.

Orange County Sanitation District (OCSD)

OCSD operates the third largest wastewater agency west of the Mississippi River. For over 50 years, they have collected, treated, and disposed of and/or reclaimed the wastewater generated by 2.5 million people living and working in central and northwestern Orange County.

OCSD has two operating facilities that treat wastewater from residential, commercial, and industrial sources in central and northwest Orange County. OCSD releases treated water into the ocean through a 120-inch diameter offshore pipeline that extends 4.5 miles from shore to the discharge point approximately 200 feet below the ocean surface. A 78-inch diameter emergency standby pipeline stretches one mile from shore. An abundance of marine life has taken up residence along both pipelines.

In 2008, OCSD and OCWD began operation the Ground Water Replenishment System. This water supply project reuses 72,000 AFY of advanced treated wastewater. The project purifies highly-treated wastewater that was previously released to the ocean. Using advanced water treatment facilities, the water is purified through microfiltration, reverse osmosis and ultraviolet disinfection to levels that far exceed drinking water standards. The purified water is recharged into the Orange County Groundwater Basin either by injection along the coast as a barrier to protect the basin from seawater intrusion or by percolation in ponds in Anaheim.

Orange County Water District (OCWD)

OCWD's primary responsibility is managing the vast groundwater basin under north and central Orange County that supplies water to more than 20 cities and water agencies, serving more than two million Orange County residents. Since 1933, OCWD has replenished and maintained the groundwater basin at safe levels while more than doubling the basin's annual yield. This important source of water provides local groundwater producers with a reliable supply of high-quality water.

OCWD primarily recharges the basin with water from the SAR and to a lesser extent with imported water purchased from the MWDSC. Per the Orange County Judgment, the parties above Riverside Narrows must deliver a minimum quantity of baseflow (12,420 AFY) downstream. The cumulative requirement is 42,000 AFY at Prado Dam. This water along with stormflow enters the groundwater basin via settling or percolation ponds in the cities of Anaheim and Orange. Behind Prado Dam (constructed and owned by the U.S. Army Corps of Engineers for flood prevention), OCWD owns 2,400 acres in Riverside County, which OCWD uses for water conservation, water quality improvement, and environmental enhancement.

The GWRS discussed above is a joint project of OCSD and OCWD. Additionally, the Green Acres Project is a water recycling effort that provides recycled water for landscape irrigation at parks, schools and golf courses as well as for industrial uses. Since 1991, the Green Acres Project has provided an alternate source of water in the Cities of Costa Mesa, Fountain Valley, Huntington Beach, Newport Beach and Santa Ana.

Western Municipal Water District (WMWD)

WMWD provides wastewater service to areas of unincorporated Riverside County north and east of Lake Mathews within its retail water service boundary. This area is served by the Western Water Recycling Facility (WWRF), which currently is a one MGD wastewater treatment facility producing secondary treated recycled water. The plant is undergoing expansion to three MGD capacity with the capability of providing tertiary treated recycled water; completion is expected in mid-2010.

The WWRF currently provides recycled water to the Riverside National Cemetery and the General Archie J. Old Golf Course for landscape irrigation. With future tertiary treatment capability, the recycled service area will expand to the west providing recycled water for commercial and institutional irrigation use.

WMWD is a member agency of the Western Riverside County Regional Wastewater Authority (WRCRWA) and the contract operator of the WRCRWA Wastewater Treatment Plant, an eight MGD plant capable of producing tertiary treated recycled water. The plant currently operates with a live stream discharge to the SAR, but with a recycled water distribution system, can provide recycled water to the City of Norco and to the Jurupa Community Services District service area. The WRCRWA is in the early planning stages of an expansion project to 11-146 MGD capacity. They are in the final planning stages of providing recycled water to the City of Norco, but distribution infrastructure is required in the City (see City of Norco discussion above).

WMWD also operates a 3.5-mile pipeline and pump station capable of delivering up to 500 AFY of treated groundwater from the March Air Reserve Base Groundwater Recovery Project used to irrigate the Riverside National Cemetery and the General Archie J. Old Golf Course.

Yucaipa Valley Water District (YVWD)

The H. N. Wochholz Regional Water Recycling Facility (WRWRF) was originally constructed in 1986 with a capacity of three MGD. In 1992, YVWD expanded the treatment facility and added a tertiary treatment process. In 2008, the YVWD completed a treatment enhancement and expansion project that increased capacity at the facility to over six MGD with microfiltration and ultraviolet disinfection to produce high quality recycled water. The enhancement also included facilities necessary to meet YVWD's maximum benefit obligations implemented by the Regional Board in the 2004 Basin Plan. Recycled water from the WRWRF can be used to irrigate crops, orchards, and golf courses, in addition to being used as high quality water for cooling, boiler-feed, or other industrial process purposes.

The YVWD operates a Non-Potable Water Distribution System that currently provides over 1,000 AF of non-potable water per year. This system will be expanded in the future to provide individual homes with recycled water for front yard and rear yard irrigation. This program is expected to reduce the potable water demand at a new home by 50%-60%.

To further enhance the quality of the recycled water, the YVWD is in the process of constructing a brine line facility that will remove salinity in the recycled water supply from 500mg/L to about 300 mg/L. Additional treatment with reverse osmosis membranes will provide YVWD with the ability to perform groundwater injection of ultra-pure recycled water to augment long-term groundwater supplies.

Figure 5.3-3 shows the recycled water systems in the SAR Watershed. Included in the display are existing and proposed recycled water pipelines, existing and proposed wastewater treatment plants, existing and proposed storage tanks, existing storage ponds, and the SARI. Agencies that provided map information include BBARWA, City of Corona, City of Riverside, EMWD, EVMWD, IEUA, IRWD, LLWD, OCSD, OCWD, WMWD, and YVWD.

Plant Capacities & Recycled Water Use

Water reclamation facilities operating in the Watershed are shown in **Table 5.3-1** along with effluent water quality [Total Dissolved Solids (TDS) and Total Nitrogen) and sources of supply. Sources of supply indicated in the table include State Project Water (SPW), Colorado Aqueduct (CA), local groundwater (LGW), and others (OT). The data were provided by the agencies listed in the table.

In the watershed, recycled water is used for industrial and municipal uses; lake stabilization; habitat creation, enhancement, and other environmental uses; conjunctive use and groundwater recharge; and agricultural irrigation. In the City of Riverside, recycled water is used in the Hidden Valley Wetlands prior to live stream discharge into the SAR.

Figure 5.3-3 Santa Ana River Watershed Recycled Water Systems

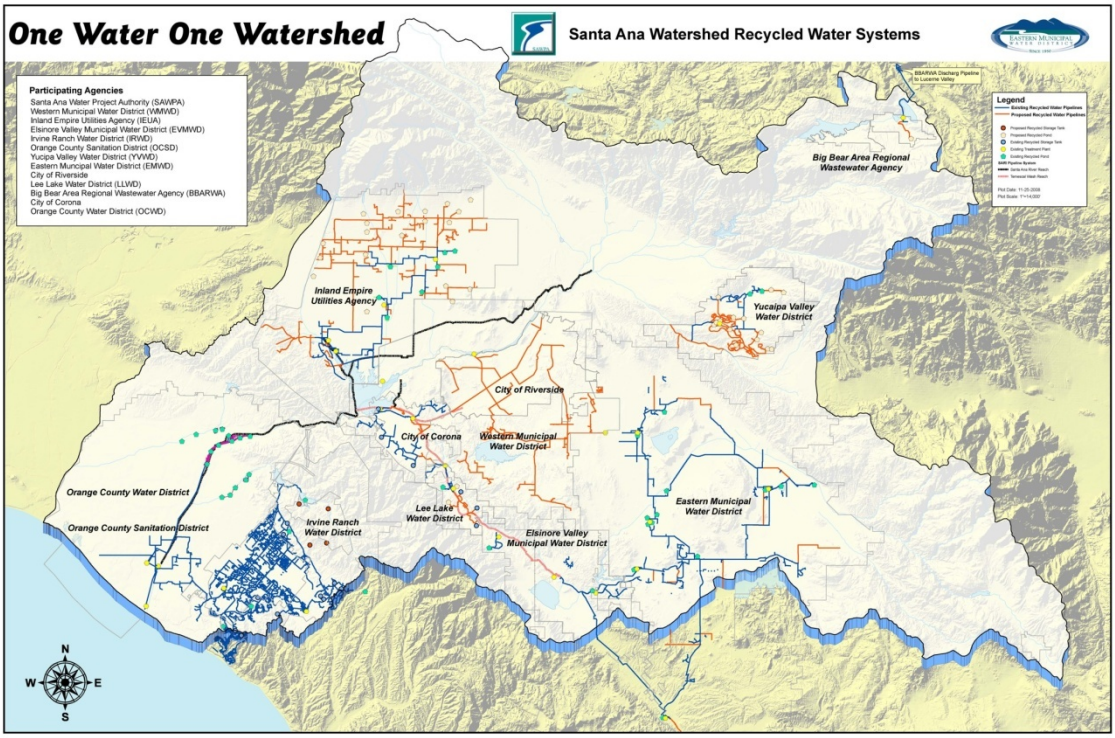


Table 5.3-1 Current (2005) Reclamation Plant Capacities, Flows, and Water Quality

Agency/Facility	Plant Capacity AFY	Plant Flow AFY	Quality mg/L		Source(s) of Supply
			TDS	TIN	
BBARWA	5,489	3,317	475	4.5	LGW
City of Beaumont WWTP #1	4,480	No Data Received			
City of Colton WRF	11,648				
City of Corona WWTP #1	12,876	10,237	748	4.6	SPW, CA, LGW
City of Corona WWTP #3	1,120	455	806	4.1	SPW, CA, LGW
City of Redlands WWTP	6,720	4,704	410	5.0	
City of Rialto WWTP	13,104				
City of Riverside RWQCP	44,840	38,100	600	11.5	LGW
City of San Bernardino WRP	37,000	29,000	550	13.0	LGW
EMWD – Moreno Valley RWRF	17,900	14,092	481	10.5	SWP, LGW
EMWD – Perris Valley RWRF	12,300	11,802	712	14.4	SPW, CA, LGW
EMWD – San Jacinto Valley RWRF	12,300	9,347	563	13.6	SPW, CA, LGW
EMWD – Temecula Valley RWRF	15,700	13,646	713	9.1	CA, LGW
EVMWD – Regional WWTP	8,964	5,782	700	4.5	SPW, CA, LGW
EVMWD – Railroad Canyon WWRP	1,457	872		5.0	SPW, CA, LGW
EVMWD – Horsethief Canyon WWRP	560	468	700	25.0	SWP
EVMWD – Alberhill RWWF	---	---	---	---	---
IEUA – all treatment plants combined	86,700	71,800	500	8.0	LGW, SWP
IRWD – all plants	22,965	19,733	625	10.0	SPW, CA, LGW, OT
LLWD	1,759	1,008	580	7.0	SPW
OCSD Plant No. 1	228,480	98,560	950	DNM*	
OCSD Plant No. 2	188,160	173,600	1,250	DNM*	
San Bernardino/Colton RIX Facility	45,000	33,000	510	7.0	LGW
Western Water Recycling Facility	1,120	560	550	<1.0	SPW
WRCRWA WWTP	8,950	5,000	600	<10.0	SPW, LGW
YVWD H. N. Wochholz RWRF	7,500	4,200	495	10.0	SPW, LGW
Totals	797,092	549,283	AFY		

NOTES:

** OCSD/OCWD GWR System – Plant Capacity and Flows will each total 72,000 AFY in 2008

* San Bernardino/Colton RIX – 43,000 AFY Plant Flow includes over-extraction

DNM = Do Not Measure

Table 5.3-2 demonstrates how the different agencies in the watershed dispose of recycled water. The types of disposal indicated in the table include:

- LSD = Live Stream Discharge
- OD = Ocean Discharge
- DP = Disposal Pond
- OT = Other

In addition, flows from the City of Colton Water Reclamation Facility and San Bernardino Water Reclamation plant go to the San Bernardino/Colton RIX Facility.

Table 5.3-2 Current (2005) Recycled Water Uses

Agency/Facility:	Amount Recycled (AFY)								
	Industrial Use	Municipal Use	Lake Stabilization	Habitat/ Environ.	Conjunctive Use/GW Recharge	AG Irrigation	Total Recycled	Total Disposal	Type Disposal ***
Big Bear A. R. W. Agency	---	---	---	---	13	3,304	3,317	---	None
City of Beaumont WWTP #1	No data received								
City of Colton Water Rec.Fac.	San Bernardino/Colton RIX Facility								
City of Corona WWTP #1 ****	66	1,903	---	---	---	97	2,066	8,171	LSD, DP, OT
City of Corona WWTP #3 ****	---	40	---	---	---	415	455	0	LSD, OT
City of Redlands WWTP	2,016	---	---	---	2,688	---	4,704	---	---
City of Rialto Wastewater TP	No data received								
City of Riv. Reg. WQCP *	---	300	---	11,500	---	---	11,800	26,300	LSD
City of San Bernardino WRP	---	---	---	---	---	---	---	29,000	To RIX Facility
EMWD – all treatment plants	461	3,245	---	1,950	11,970	14,987	32,613	16,274	LSD
EVMWD Reg. WW Recl. Plant	---	---	4,549	1,233	---	---	5,782	---	none
EVMWD – Railroad Canyon	---	872	---	---	---	---	872	---	none
EVMWD –Horsethief Canyon	---	468	---	---	---	---	468	---	none
EVMWD – Alberhill	---	---	---	---	---	---	---	---	none
IEUA – all treatment plants	1,000	3,700	---	---	1,000	2,200	7,900	63,900	LSD
IRWD – all treatment plants	68	18,992	---	---	---	673	19,733	---	OD
Lee Lake Water District	---	40	---	---	---	---	40	968	LSD
OCSD Plant No. 1	---	---	---	---	---	---	---	88,560	OD
OCSD/OCWD GW Replen.Sys.**	---	---	---	---	5,000	---	5,000	---	none
OCWD Green Acres Proj.	3,000	---	---	---	---	2,000	5,000	---	none
OCSD Plant No. 2	---	---	---	---	---	---	---	173,600	
San Bern./Colton RIX Facility	---	---	---	---	---	---	---	33,000	LSD
Western Water Recycling Facility	---	---	---	---	---	560	560	---	---
W. Riv. Co. Reg. WW Auth.	---	---	---	---	---	---	---	5,000	LSD
Yucaipa Valley Water District		1,180	---	---	---	50	1,230	2,970	LSD
Totals	6,611	30,740	4,549	14,683	20,671	24,286	101,540	447,743	

Notes:
* Disposal includes 11,500 AFY used for habitat at Hidden Valley Wetlands prior to Live Stream Discharge
** Will be 72,000 F/Y in 2008.
*** Types of Disposal: Live Stream Discharge (LSD), Ocean Discharge (OD), Disposal Pond (DP), Other (OT).
**** Values are calculated based on total recycled water used and plant flows

Projected Plant Capacities & Recycled Water Use

There are numerous demands on water in the Watershed. The area is rich in agriculture, and still contains concentrations of citrus, dairy, and other crops and livestock that demand significant quantities of water. The area also has a large industrial/commercial base, and its rapidly expanding population requires, and will continue to require, a large quantity of water, now and in the future. In the year 2000, the Watershed required 1.4 million acre-feet (MAF) of water (467 billion gallons) to meet demand. Projections are that this demand will increase 47% in the next 40 years, so that, in 2050, the Watershed will require 2.1 MAF (687 billion gallons) of water to meet demands.

Future water supply projections indicate a shift from reliance on groundwater and imported water to increases in the use of recycled water and surface water. Given the imbalance between water pumped and water recharged, it should not be surprising that, under such intense settlement pressures and water demands, future water supplies will depend upon increased groundwater recharge. Future water supply planning includes increased groundwater recharge and measures to reduce impacts to native aquatic communities, while meeting increased water demands due to regional population growth.

Table 5.3-3 provides projections for reclamation facility capacities and flows in the years 2010, 2015, 2020, 2025, and 2030, and **Table 5.3-4** provides water quality projections and sources of supply for those same years. **Tables 5.3-5** to **5.3-9** provide projections for types of recycled water use.

Table 5.3-3 Projected Treatment Plant Capacities and Flows

Agency/Facility	Design Capacity AFY					Flow AF				
Years	2010	2015	2020	2025	2030	2010	2015	2020	2025	2030
Big Bear ARWA	5,489	5,489	5,489	5,489	5,489	2,100	2,100	2,100	2,100	2,100
Beaumont, City	No data received					No data received				
Colton, City	All flows go to the San Bernardino/Colton RIX Facility					6,800	7,300	7,885	8,500	9,150
Corona WWTP 1	12,875	16,235	16,235	16,235	16,235	10,304	12,992	12,992	12,992	12,992
Corona WWTP 2	1,120	1,120	1,120	1,120	1,120	507	896	896	896	896
Redlands, City	No projections available					No projections available				
Rialto, City	No data received					No data received				
Riverside RWQCP	44,800	58,300	58,300	58,300	67,400	42,400	47,300	51,300	55,377	67,400
San Bernardino	37,000	37,000	37,000	37,000	54,000	30,800	33,200	35,750	38,520	41,500
EMWD MVRWRF	17,900	20,170	20,170	20,170	20,170	16,696	18,590	19,935	20,865	21,145
EMWD PVRWRF	12,300	24,652	24,652	24,652	24,652	17,469	22,758	26,030	28,103	29,762
EMWD SJRWRF	12,300	15,688	15,688	15,688	15,688	10,768	12,292	13,424	14,220	14,847
EMWD TVRWRF *	15,700	15,700	25,773	25,773	25,773	15,990	16,909	17,974	19,072	20,159
EVMWD RWRC	8,964	13,447	13,447	17,929	17,929	7,933	10,455	12,404	14,197	16,808
EVMWD RCWRP	1,457	1,457	2,241	2,241	2,241	872	1,457	1,782	2,219	2,241
EVMWD HCWRP	560	Plant to be replaced in 2015				475				
EVMWD AWRP		2,241	2,241	5,603	5,603		1,188	2,219	3,362	5,042
IEUA	94,500	97,900	112,470	112,470	119,200	78,400	85,100	90,700	96,300	100,800
IRWD	37,527	37,527	43,128	43,128	43,128	26,203	26,091	27,948	29,251	29,615
Lee Lake WD	2,520	2,520	2,520	2,520	2,520	952	1,120	1,344	1,456	1,568
OCSD No. 1	228,480	201,600	201,600	201,600	201,600	103,264	122,080	138,880	154,560	168,000
OCSD No. 2	188,160	188,160	188,160	188,160	188,160	161,280	161,280	161,280	161,280	161,280
SB/Colton RIX	45,000	45,000	45,000	45,000	45,000	34,800	30,600	26,635	22,920	19,450
WWRF	3,360	3,360	5,600	5,600	5,600	1,500	1,500	3,000	4,000	4,000
WRCRWA	8,950	13,440	13,440	15,700	15,700	8,000	11,000	13,000	14,000	15,000
YVWD	7,500	10,000	12,300	12,300	12,300	5,500	7,500	9,175	9,900	10,620
Totals	786,462	808,765	844,333	851,075	883,905	583,013	633,708	676,653	714,090	754,375

* EMWD's TVRWRF is in the Santa Margarita Watershed, but some recycled water is used in the Santa Ana Watershed

Table 5.3-4 Projected Treatment Plant Water Quality and Sources of Supply

Agency/Facility	Water Quality - TDS mg/L					Water Quality - TIN mg/L					Source(s) of
Years	2010	2015	2020	2025	2030	2010	2015	2020	2025	2030	Supply **
Big Bear ARWA	600	600	600	600	600	4.5	4.5	4.5	4.5	4.5	LGW
Beaumont, City											
Colton, City											
Corona WWTP 1	780	780	780	780	780	4.6	4.6	4.6	4.6	4.6	SWP, CA. LGW
Corona WWTP 2	866	866	866	866	866	4.1	4.1	4.1	4.1	4.1	SWP, CA. LGW
Redlands, City											
Rialto, City											
Riverside RWQCP	600	600	600	600	600	10.0	10.0	10.0	10.0	10.0	LGW
San Bernardino	550	550	550	550	550	13.0	13.0	13.0	13.0	13.0	LGW
EMWD MVRWRF	401	500	500	500	500	16.7	8.0	8.0	8.0	8.0	SWP, LGW
EMWD PVRWRF	665	650	650	650	650	10.9	8.0	8.0	8.0	8.0	SWP, CA. LGW
EMWD SJRWRF	584	600	600	600	600	10.0	8.0	8.0	8.0	8.0	SWP, LGW
EMWD TVRWRF *	679	700	700	700	700	8.0	8.0	8.0	8.0	8.0	CA, LGW
EVMWD RWRC	700	700	700	700	700	4.5	4.5	4.5	4.5	4.5	SWP, CA. LGW
EVMWD RCWRP	Data not available					5.0	5.0	5.0	5.0	5.0	SWP, CA. LGW
EVMWD HCWRP	700					25.0					SWP
EVMWD AWRP		700	700	700	700		5.0	5.0	5.0	5.0	SWP
IEUA	500	500	500	500	500	8.0	8.0	8.0	8.0	8.0	SWP, LGW
IRWD	625	625	625	625	625	10.0	10.0	10.0	10.0	10.0	SWP,CA,LGW,OT
Lee Lake WD	600	640	660	680	700	<13.0	<13.0	<13.0	<13.0	<13.0	SWP, LGW
OCSD No. 1	950	950	950	950	950	Not measured					
OCSD No. 2	2,000	2,100	2,200	2,300	2,400	Not measured					Secondary Effluent
OCSD/OCWD GWRS	70	70	70	70	70	2.8	2.8	2.8	2.8	2.8	Combination
OCWD Green Acres	950	950	950	950	950	20.0	20.0	20.0	20.0	20.0	Combination
SB/Colton RIX	510	510	510	510	510	7.0	7.0	7.0	7.0	7.0	LGW
WWRF	550	550	550	550	550	<10.0	<10.0	<10.0	<10.0	<10.0	SWP
WRCRWA	600	600	600	600	600	<10.0	<10.0	<10.0	<10.0	<10.0	Combination
YVWD	500	325	325	325	325	10.0	5.0	5.0	5.0	5.0	LGW, SWP

Notes:
* EMWD's TVRWRF is in the Santa Margarita Watershed, but some recycled water is used in the Santa Ana Watershed
** SPW = State Project Water; CA = Colorado River Aqueduct; LGW = Local Groundwater

Table 5.3-5 Projected 2010 Plant Flows, Recycled Water Use, and Disposal (AF)

Facility:	2010	Recycled Water Use							Disposal	
	Plant Flows	Industrial	Municipal	Habitat/ Environ.	Conj Use/GW Rechg	AG/ Irrigation	Other ***	Total Recycled	Total Disposal (*)	Type of Disposal (**)
Big Bear ARWA	**2,100**				500	1,600		**2,100**		None
City of Beaumont										
City of Colton	**6,800**								**6,800**	to RIX
City of Corona WWTP 1	**10,304**	52	1,903		1,120	5,549		**8,624**	**1,680**	LSD, DP, OT
City of Corona WWTP 2	**507**	40				467		**507**		None
City of Redlands								**0**		
City of Rialto								**0**		
City of Riverside RWQCP	**42,400**		3,000			10,000		**13,000**	**29,400**	LSD
City of San Bernardino	**30,800**					2,800		**2,800**	**28,000**	to RIX
EMWD	**60,923**	5,000	7,700	4,300	17,000	13,400		**47,400**	**13,523**	LSD
EVMWD RWRC	**7,933**			1,120			6,813	**7,933**		None
EVMWD RCWRP	**872**		872					**872**		None
EVMWD HCWRP	**475**		475					**475**		None
EVMWD AWRP								**0**		None
IEUA	**78,400**	7,000	18,000	50	15,000	10,000		**50,050**	**28,350**	LSD
IRWD	**26,203**	315	20,088			5,800		**26,203**		OD
Lee Lake WD	**952**	100	600	20				**720**	**232**	LSD
OCSD No. 1/OCWD	**103,264**	3,000			72,000	2,000		**77,000**	**26,264**	OD
OCSD No. 2	**161,280**							**0**	**161,280**	OD
SB/Colton RIX	**34,800**						2,800	**2,800**	**32,000**	LSD
WWRF	**1,500**				500	1,000		**1,500**		
WRCRWA	**8,000**					1,000		**1,000**	**7,000**	LSD
YVWD	**5,500**		3,200	1,680				**4,880**	**620**	LSD
Totals	**583,013**	**15,507**	**55,838**	**7,170**	**106,120**	**53,616**	**9,613**	**247,864**	**335,149**	

* Includes 16,000 AF from City of San Bernardino that goes to the RIX Facility
** Types of Disposal: Live Stream Discharge (LSD), Ocean Discharge (OD), Disposal Pond (DP), Other (OT).
*** Other Uses: San Bernardino/Colton RIX - Excess flows sold to other agencies for reuse

Table 5.3-6 Projected 2015 Plant Flows, Recycled Water Use, and Disposal (AF)

Facility:	2015	Recycled Water Use							Disposal	
	Plant Flows	Industrial	Municipal	Habitat/ Environ.	Conj Use/GW Rechg	AG/ Irrigation	Other ***	Total Recycled	Total Disposal (*)	Type of Disposal (**)
Big Bear ARWA	**2,100**				500	1,600		**2,100**		None
City of Beaumont										
City of Colton	**7,300**								**7,300**	to RIX
City of Corona WWTP 1	**12,992**	57	1,903		2,239	7,113		**11,312**	**1,680**	LSD, DP, OT
City of Corona WWTP 2	**896**	40				856		**896**		None
City of Redlands								**0**		
City of Rialto								**0**		
City of Riverside RWQCP	**47,300**		7,500			12,000		**19,500**	**27,800**	LSD
City of San Bernardino	**33,200**				6,985	2,915		**9,900**	**23,300**	to RIX
EMWD	**70,549**	5,000	10,950	4,300	18,250	13,200		**51,700**	**18,849**	LSD
EVMWD RWRC	**10,455**			1,120			9,335	**10,455**		None
EVMWD RCWRP	**1,457**		1,457					**1,457**		None
EVMWD HCWRP								**0**		None
EVMWD AWRP	**1,188**		1,188					**1,188**		None
IEUA	**85,100**	8,000	25,500	50	15,000	10,000		**58,550**	**26,550**	LSD
IRWD	**26,091**	297	23,114			2,680		**26,091**		OD
Lee Lake WD	**1,120**	110	700	25				**835**	**285**	LSD
OCSD No. 1/OCWD	**122,080**	3,000			97,000	2,000		**102,000**	**20,080**	OD
OCSD No. 2	**161,280**							**0**	**161,280**	OD
SB/Colton RIX	**30,600**						2,800	**2,800**	**27,800**	LSD
WWRF	**1,500**				500	1,000		**1,500**		
WRCRWA	**11,000**					3,000		**3,000**	**8,000**	LSD
YVWD	**7,500**		4,000	1,680	1,820			**7,500**		
Totals	**633,708**	**16,504**	**76,312**	**7,175**	**142,294**	**56,364**	**12,135**	**310,784**	**322,924**	

* Includes 16,000 AF from City of San Bernardino that goes to the RIX Facility

** Types of Disposal: Live Stream Discharge (LSD), Ocean Discharge (OD), Disposal Pond (DP), Other (OT).

*** Other Uses: San Bernardino/Colton RIX - Excess flows sold to other agencies for reuse

Table 5.3-7 Projected 2020 Plant Flows, Recycled Water Use, and Disposal (AF)

Facility:	2020	Recycled Water Use							Disposal	
	Plant Flows	Industrial	Municipal	Habitat/ Environ.	Conj Use/GW Rechg	AG/ Irrigation	Other ***	Total Recycled	Total Disposal (*)	Type of Disposal (**)
Big Bear ARWA	**2,100**			32	1,000	1,068		**2,100**		None
City of Beaumont										
City of Colton	**7,885**								**7,885**	to RIX
City of Corona WWTP 1	**12,992**	63	1,903		3,359	5,987		**11,312**	**1,680**	LSD, DP, OT
City of Corona WWTP 2	**896**	40				856		**896**		None
City of Redlands										
City of Rialto										
City of Riverside RWQCP	**51,300**		10,000			15,000		**25,000**	**26,300**	LSD
City of San Bernardino	**35,750**				13,070	3,930		**17,000**	**18,750**	to RIX
EMWD	**77,363**	5,000	13,200	4,300	19,500	13,200		**55,200**	**22,163**	LSD
EVMWD RWRC	**12,404**			1,120			11,284	**12,404**		None
EVMWD RCWRP	**1,782**		1,782					**1,782**		None
EVMWD HCWRP										None
EVMWD AWRP	**2,219**		2,219					**2,219**		None
IEUA	**90,700**	9,000	38,000	50	15,000	6,000		**68,050**	**22,650**	LSD
IRWD	**27,948**	300	25,048			2,600		**27,948**		OD
Lee Lake WD	**1,344**	120	800	30				**950**	**394**	LSD
OCSD No. 1/OCWD	**138,880**	3,000			133,880	2,000		**138,880**	**0**	OD
OCSD No. 2	**161,280**								**161,280**	OD
SB/Colton RIX	**26,635**						2,800	**2,800**	**23,835**	LSD
WWRF	**3,000**				1,500	1,500		**3,000**		
WRCRWA	**13,000**					4,000		**4,000**	**9,000**	LSD
YVWD	**9,175**		5,000	1,680	2,495			**9,175**		
Totals	**676,653**	**17,523**	**97,952**	**7,212**	**189,804**	**56,141**	**14,084**	**382,716**	**293,937**	

* Includes 16,000 AF from City of San Bernardino that goes to the RIX Facility

** Types of Disposal: Live Stream Discharge (LSD), Ocean Discharge (OD), Disposal Pond (DP), Other (OT).

*** Other Uses: San Bernardino/Colton RIX - Excess flows sold to other agencies for reuse

Table 5.3-8 Projected 2025 Plant Flows, Recycled Water Use, and Disposal (AF)

Facility:	2025	Recycled Water Use							Disposal	
	Plant Flows	Industrial	Municipal	Habitat/ Environ.	Conj Use/GW Rechg	AG/ Irrigation	Other ***	Total Recycled	Total Disposal (*)	Type of Disposal (**)
Big Bear ARWA	**2,100**			32	1,000	1,068		**2,100**		None
City of Beaumont										
City of Colton	**8,500**								**8,500**	to RIX
City of Corona WWTP 1	**12,992**	63	1,903		4,479	4,867		**11,312**	**1,680**	LSD, DP, OT
City of Corona WWTP 2	**896**	40				856		**896**		None
City of Redlands										
City of Rialto										
City of Riverside RWQCP	**55,377**		15,000			15,000		**30,000**	**25,377**	LSD
City of San Bernardino	**38,520**				19,640	4,460		**24,100**	**14,420**	to RIX
EMWD	**82,260**	5,000	15,750	4,300	20,750	13,200		**59,000**	**23,260**	LSD
EVMWD RWRC	**14,197**			1,120			13,077	**14,197**		None
EVMWD RCWRP	**2,219**		2,219					**2,219**		None
EVMWD HCWRP										None
EVMWD AWRP	**3,362**		3,362					**3,362**		None
IEUA	**96,300**	11,000	45,000	250	20,000	5,000		**81,250**	**15,050**	LSD
IRWD	**29,251**	310	26,441			2,500		**29,251**		OD
Lee Lake WD	**1,456**	130	900	35				**1,065**	**391**	LSD
OCSD No. 1/OCWD	**154,560**	3,000			146,000	2,000		**151,000**	**3,560**	OD
OCSD No. 2	**161,280**								**161,280**	OD
SB/Colton RIX	**22,920**						2,800	**2,800**	**20,120**	LSD
WWRF	**4,000**				2,000	2,000		**4,000**		
WRCRWA	**15,000**					5,000		**5,000**	**10,000**	LSD
YVWD	**9,900**		5,500	1,680	2,720			**9,900**		
Totals	**715,090**	**19,543**	**116,075**	**7,417**	**216,589**	**55,951**	**15,877**	**431,452**	**283,638**	

* Includes 16,000 AF from City of San Bernardino that goes to the RIX Facility

** Types of Disposal: Live Stream Discharge (LSD), Ocean Discharge (OD), Disposal Pond (DP), Other (OT).

*** Other Uses: San Bernardino/Colton RIX - Excess flows sold to other agencies for reuse

Table 5.3-9 Projected 2030 Plant Flows, Recycled Water Use, and Disposal (AF)

Facility:	2030	Recycled Water Use							Disposal	
	Plant Flows	Industrial	Municipal	Habitat/ Environ.	Conj Use/GW Rechg	AG/ Irrigation	Other ***	Total Recycled	Total Disposal (*)	Type of Disposal (**)
Big Bear ARWA	**2,100**			32	1,500	568		**2,100**		None
City of Beaumont										
City of Colton	**9,150**								**9,150**	to RIX
City of Corona WWTP 1	**12,992**	63	1,903		4,479	4,867		**11,312**	**1,680**	LSD, DP, OT
City of Corona WWTP 2	**896**	40				856		**896**		None
City of Redlands										
City of Rialto										
City of Riverside RWQCP	**67,400**		21,400			20,000		**41,400**	**26,000**	LSD
City of San Bernardino	**41,500**				25,500	5,700		**31,200**	**10,300**	to RIX
EMWD	**85,913**	5,000	17,500	4,300	22,000	13,200		**62,000**	**23,913**	LSD
EVMWD RWRC	**16,808**			1,120			15,688	**16,808**		None
EVMWD RCWRP	**2,241**		2,241					**2,241**		None
EVMWD HCWRP										None
EVMWD AWRP	**5,042**		5,042					**5,042**		None
IEUA	**100,800**	15,000	48,000	250	23,000	4,000		**90,250**	**10,550**	LSD
IRWD	**29,615**	310	26,805			2,500		**29,615**		OD
Lee Lake WD	**1,568**	140	1,000	40				**1,180**	**388**	LSD
OCSD No. 1/OCWD	**168,000**	3,000			146,000	2,000		**151,000**	**17,000**	OD
OCSD No. 2	**161,280**								**161,280**	OD
SB/Colton RIX	**19,450**						2,800	**2,800**	**16,650**	LSD
WWRF	**4,000**				2,000	2,000		**4,000**		
WRCRWA	**15,000**					5,000		**5,000**	**9,000**	LSD
YVWD	**10,620**		6,000	1,680	2,940			**10,620**		LSD
Totals	**754,375**	**23,553**	**129,891**	**7,422**	**227,419**	**60,691**	**18,488**	**467,464**	**285,911**	

* Includes 16,000 AF from City of San Bernardino that goes to the RIX Facility

** Types of Disposal: Live Stream Discharge (LSD), Ocean Discharge (OD), Disposal Pond (DP), Other (OT).

*** Other Uses: San Bernardino/Colton RIX - Excess flows sold to other agencies for reuse

Current Management Strategies

Recycled water has been used in the Watershed for many years to offset potable demands. Water reclamation projects involve treating wastewater to State-defined standards and a level that is safe for State-approved non-potable applications. Approximately 101,500 AFY of recycled water is currently used to meet water needs such as landscape irrigation, agricultural irrigation, groundwater recharge, and commercial and industrial applications within the Watershed. In addition, many golf courses, cemeteries, schoolyards, parks, street medians, and freeway landscapes in the watershed are irrigated with recycled water. When OCWD's recharge of SAR baseflow is included, the figure greatly increases.

Overall, the largest use of recycled water in the Watershed is for groundwater recharge. During non-storm periods, the SAR flow primarily becomes treated effluent. This effluent or recycled water coming from upstream water reclamation facilities meets the upper watershed's 42,000 AFY annual obligation at Prado Dam that is diverted to river recharge basins in Orange County.

Current Efforts

Current management strategies in addition to those mentioned elsewhere include planning efforts as demonstrated by planned and conceptual recycled water projects as described below.

EMWD has entered into a cooperative agreement with the U.S. Army Corps of Engineers for the San Jacinto River Ecosystem Restoration Feasibility Study. This study will evaluate and determine the feasibility of restoring the river ecosystem and the use of different water supply sources including recycled water for ecosystem restoration in conjunction with groundwater recharge.

EMWD is participating in a Demineralization and Non-Potable Water Conversion Feasibility Study with Rancho California Water District. The study is investigating the feasibility of demineralization of recycled water, and the feasibility of conversion of agricultural demands, such as avocado groves and other crops, to this non-potable water source.

City of Riverside – On May 20, 2008, the SWRCB approved a wastewater change petition filed by the City of Riverside to ultimately reduce the amount of treated wastewater currently discharged to the SAR by approximately 11,000 AFY. This would allow the City of Riverside to expand its current recycled water program from 290 AFY to 41,400 AFY by 2025. It is estimated that the City of Riverside's water use is projected to increase to approximately 105,000 AFY by 2020. To be able to meet these future projected needs without increasing the City of Riverside's reliance upon imported State Water purchases, it will be critical for the City of Riverside to significantly expand its use of the recycled water recently made available.

IEUA recently developed a Three Year Business Plan to rapidly expand the recycled water distribution system and increase recycled water use by 35,000 AFY. The capital program emphasizes increased system storage as well as distribution system piping and piping to reach high capacity recharge sites. The business strategy, while regional in nature, is founded on the principle of partnerships

with IEUA member agencies, both from a water marketing standpoint and a capital facilities standpoint. The partnerships are having the effect of "supercharging" the capital program through conversion of member agency owned local potable water facilities to regional recycled water facilities.

LLWD has completed a recycled water master plan that will allow for the connection of the local parks and schools in the near future. They also have partnered with the City Of Corona in its Ground Water Management Plan for the basins underlying LLWD's boundaries. LLWD currently is investigating potential groundwater recharge options.

OCWD also is evaluating future phases of the joint OCSD/OCWD GWRS. Phase 1 of the GWRS has been completed to produce 72,000 AFY of purified water. Phases 2 and 3 could produce up to 48,000 AFY additional supplies. Implementation of Phases 2 and 3 would further reduce the amount of effluent discharged to the ocean. Because they would reduce the amount of water discharged to the ocean, Phases 2 and 3 are a new regional water source that would increase the net overall supply of water to the watershed.

SBVMWD does not own or operate a wastewater treatment plant within its service area. However, recycled water is a foundational part of the region's water budget as they move toward the future. As a result, SBVMWD has begun working with the owners of the wastewater treatment plants within its service area on the concept of a recycled water master plan. The goal of the recycled water master plan is to recycle approximately 34,000 AF.

WMWD continues to expand its recycled water production capabilities through the WWRF Phase 2 expansion project. When completed in 2010, the plant will be capable of producing up to three MGD of tertiary-treated recycled water. Plans call for eventually expanding to five MGD.

WMWD possesses an extensive non-potable distribution system that includes both storage and pumping capabilities. They will employ this system as the backbone distribution system to expand use of recycled water (for irrigation) within its service area. One major commercial area (Meridian Business Center) and one large residential community already are dual-piped for recycled water use and a new Riverside Unified School District (RUSD) high school has been retrofitted to allow recycled water use. Two new large residential projects (including a golf course development) will be conditioned to install dual plumbing. WMWD also will work with RUSD to dual plumb new campuses, including a new middle school west of the Orangecrest area.

WMWD and the City of Riverside currently are conducting joint planning for recycled water use. The intent is to allow maximum use of recycled/non-potable water in the City of Riverside's greenbelt area that will take advantage of elevation differences, thus reducing energy (pumping) costs. The system also will distribute non-potable groundwater through the legacy canal system thereby maximizing use of local water resources.

WMWD is working with the Riverside County Ben Clark Training Center to site a large recycled water storage impoundment on their facility located just south of Van Buren Boulevard and west of I-215. This proposed 600 AF impoundment would serve the County as a dive/water training facility while providing wet weather storage for recycled water produced by the WWRF, a truly unique and innovative use of recycled water.

Finally, WMWD is in the early stages of evaluating the use of recycled water to recharge local groundwater basins as a new source of supply. As total summer irrigation demands likely will exceed recycled water supply, recharge will probably be limited to winter months. Close coordination with the Regional Board and CDPH will be required.

YVWD adopted a Strategic Plan in August 2008, which outlines the methods used to maximize the use of recycled water to meet future water demands. This policy requires new homes to install dual water meters to provide potable water and non-potable water to each property. The use of recycled water delivered to residential and commercial properties for irrigation is expected to reduce future potable water demands by 50%-60% per equivalent dwelling unit. This policy will require YVWD to implement a salinity control program which will provide extremely high quality recycled water to new neighborhoods providing a sustainable water supply for the future.

Other reclamation projects in the Watershed include innovative uses such as toilet flushing in high-rise buildings and residential landscaping irrigation, as evidenced by recycled water programs in IRWD.

Barriers and Constraints

Challenges related to recycling projects include: regulatory requirements, brine line constraints, storage/seasonal constraints, financial constraints, water quality management, and public perception. They are discussed below.

Regulatory Requirements

Regulations for the use of recycled water come from several sources:

- CDPH (Title 22 and Title 17).
- Memoranda per addendums from the CDPH.
- EPA Guidelines.
- Regional Board requirements.
- Individual agencies Best Management Practices.

Some of the regulatory restrictions and best management practices relating to the use of recycled water include:

- Recycled water must not be used in areas that are tributary to a potable drinking water source.
- Recycled water must not be used within 50 feet of a domestic well.
- Recycled water must not spray on drinking fountains, eating areas, walkways, passing vehicles, buildings, domestic water facilities, sitting areas or areas not under control of the user.
- Recycled water irrigation can only occur during non-public access hours if access to the site is unrestricted.
- Controls must be in place to minimize run off and ponding of water.
- No hose bibs are allowed in public access areas.

- All recycled water uses must follow a detailed plan check and inspection process which may include cross-connection shutdown testing.
- Required annual site inspection and every four year cross-connection testing.
- Adequate signage must be posted to inform public, employees, and others of recycled water use.
- Adequate measures should be taken to prevent body contact activities, such as wading and/or swimming, at restricted recreational impoundments with secondary-treated recycled water.
- Limited use of secondary-treated recycled water for crop irrigation.

In 2009, The SWRCB developed a statewide Recycled Water Policy to establish more uniform requirements for recycled water projects.

Table 5.3-10 shows uses allowed for Disinfected Tertiary Recycled Water, Disinfected Secondary-2.2 Recycled Water, Disinfected Secondary-23 Recycled Water, and Undisinfected Secondary Recycled Water. Types of uses are divided into four categories: irrigation, impoundments, cooling/air conditioning, and other uses.
The Air Resources Board of the EPA has developed a Scoping Plan for AB32 that contains the main strategies California will use to reduce the greenhouse gases (GHG) that cause climate change. The Scoping Plan has a range of GHG reduction actions which include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, and market-based mechanisms such as a cap-and-trade system.

The *Climate Change Draft Scoping Plan, June 2008 Discussion Draft* requires that "National Pollution Discharge Elimination System (NPDES) permits be amended to require preparation and implementation of water recycling plans at wastewater treatment plants in communities that rely on imported water supplies and communities where water recycling would otherwise require less energy than current water supplies." The aim of the proposal is to reduce GHG emissions by reducing the use of energy to transport water throughout the State. In some cases, increasing water recycling will result in a net decrease in GHG emissions.

State efforts aimed at reducing GHG emissions through water recycling requirements in NPDES permits should be implemented in a manner consistent with the California Water Plan. Focusing on recycling may contribute to significant GHG emission reductions.

Table 5.3-10 Summary of Recycled Water Uses Allowed in California

	Type of Recycled Water Use:	Disinfected Tertiary Recycled Water	Disinfected Secondary-2.2 Recycled Water	Disinfected Secondary-23 Recycled Water	Undisinfected Secondary Recycled Water
Irrigation	Food Crops - recycled water contacts the edible portion of the crop, including root crops	Yes	No	No	No
	Parks, playgrounds, school yards, unrestricted-access golf courses	Yes	No	No	No
	Residential landscaping	Yes	No	No	No
	Any other irrigation uses not prohibited by other provisions of the Calif. Code of Regulations	Yes	No	No	No
	Food crops, surface-irrigated, above ground edible portion, and not in contact with recycled water	Yes	Yes	No	No
	Cemeteries	Yes	Yes	Yes	No
	Freeway landscaping	Yes	Yes	Yes	No
	Restricted-access golf courses	Yes	Yes	Yes	No
	Ornamental nursery stock and sod farms with unrestricted public access	Yes	Yes	Yes	No
	Pasture for milk animals for human consumption	Yes	Yes	Yes	No
	Non-edible vegetation with access control to prevent use as park, playground, or school yard	Yes	Yes	Yes	No
	Orchards with no contact between edible portion and recycled water	Yes	Yes	Yes	Yes
	Vineyards with no contact between edible portion and recycled water	Yes	Yes	Yes	Yes
	Non-food bearing trees, including Christmas trees, not irrigated less than 14 days before harvest	Yes	Yes	Yes	Yes
	Fodder and fiber crops and pasture for animals not producing milk for human consumption	Yes	Yes	Yes	Yes
	Seed crops not eaten by humans	Yes	Yes	Yes	Yes
	Food crops undergoing commercial pathogen destroying processing before consumption by humans	Yes	Yes	Yes	Yes
Impoundments	Non-restricted recreational impoundments, with supplemental monitoring for pathogenic organisms	Yes	No	No	No
	Restricted recreational impoundments and publicly accessible fish hatcheries	Yes	Yes	No	No
	Landscape impoundments without decorative fountains	Yes	Yes	Yes	No
Cooling/AC	Industrial or commercial cooling or air conditioning involving cooling towers, evaporative condensers, or spraying that creates a mist	Yes	No	No	No
	Industrial or commercial cooling or air conditioning not involving cooling towers, evaporative condensers, or spraying that creates a mist	Yes	Yes	Yes	No
Other Uses	Groundwater recharge	Allowed under special RWQCB permit			
	Flushing toilets and urinals	Yes	No	No	No
	Priming drain taps	Yes	No	No	No
	Industrial process water that may contact workers	Yes	No	No	No
	Structural fire fighting	Yes	No	No	No
	Decorative fountains	Yes	No	No	No
	Commercial laundries	Yes	No	No	No
	Consolidation of backfill material around potable water pipelines	Yes	No	No	No
	Artificial snow making for commercial outdoor uses	Yes	No	No	No
	Commercial car washes, not heating the water, excluding the general public from the washing process	Yes	No	No	No
	Industrial boiler feed	Yes	Yes	Yes	No
	Non-structural fire fighting	Yes	Yes	Yes	No
	Backfill consolidation around nonpotable piping	Yes	Yes	Yes	No
	Soil compaction	Yes	Yes	Yes	No
	Mixing concrete	Yes	Yes	Yes	No
	Dust control on roads and streets	Yes	Yes	Yes	No
	Cleaning roads, sidewalks, and outdoor work areas	Yes	Yes	Yes	No
	Flushing sanitary sewers	Yes	Yes	Yes	Yes

Legal Agreements

Orange County Judgment – In 1963, OCWD filed suit against substantially all water users in the area tributary to Prado Dam seeking adjudication of water rights on the SAR. The litigation ultimately involved over 4,000 served water users and water agencies, the four largest of which were OCWD, Valley District, WMWD, and the Chino Basin Municipal Water District (now IEUA). Given the magnitude of the potential litigation, these four districts and other parties developed a settlement that was approved by the Orange County Superior Court in a stipulated judgment entered on April 17, 1969 (Orange County Judgment). The Orange County Judgment imposes a physical solution that requires parties above Riverside Narrows to deliver a minimum quantity (12,420 AF) and quality of water downstream. The cumulative requirement is 42,000 AFY at Prado Dam. A provision of the Orange County Judgment related to water recycling establishes that once the minimum flow requirements are met, the upper area parties "…may engage in unlimited water conservation activities, including spreading, impounding, and other methods, in the area above Prado reservoir..." It goes on to say that OCWD is "…restrained from pumping, producing and exporting or directly or indirectly causing water to flow…" from the upstream areas into OCWD except to "salvage evapo-transpiration losses…" which is limited to 5,000 AFY. The Orange County Judgment is administered by the five-member SAR Watermaster that reports annually to the court and the four representative agencies. Valley District, IEUA, and WMWD nominate one member each to the Watermaster; OCWD nominates two members; and members then are appointed by the court.

Brine Line Constraints

The SARI was first envisioned in the early 1970s and is a critical component of salt management in the Watershed. The SARI line provides a vital system to remove salt (TDS) from the upper watershed and to collect and transport non-reclaimable industrial brine from industrial processes and desalters that cannot be effectively treated at local treatment facilities. These high TDS wastes are subject to stringent discharge limits as part of the Basin Plan Objectives and are included in the NPDES limits for Santa Ana discharging POTWs.

The SARI line was constructed by the Santa Ana Watershed Project Authority (SAWPA), who owns capacity rights in or owns outright approximately 93 miles of 16" to 84" pipeline. SAWPA shares in the cost of maintaining the SARI in Orange County and is solely responsible for operation and maintenance activities in Riverside and San Bernardino Counties. Most of the pipeline was constructed during 20 years in a series of reaches or sections. Reaches I, II, and III, owned by OCSD, are located in Orange County and are parallel to the SAR. In these reaches, parts of the pipeline lie beneath the low flow channel of the River and may be subject to erosion damage. OCSD uses grade stabilizers and other methods to protect the SARI line. Above the Riverside County line, Reaches IV and V are owned and operated by SAWPA. Reach IV (which is subdivided into Reaches IV-A through IV-E) provides service to areas roughly bounded by the Cities of Riverside, Chino, and San Bernardino. Reach V lies along Temescal Wash and terminates near the City of Lake Elsinore. The SARI line then conveys the wastes to OCSD Plant No. 2 in Huntington Beach for treatment and ocean discharge.

Excess capacity has been available in the SARI line, and domestic wastewater was added to the SARI line. In the future, it will be important to have the flexibility to redirect the domestic wastewater

currently conveyed in the SARI line to wastewater treatment facilities. Treated SARI line flow may be recyclable when it is not commingled with domestic wastewater. However, even with advanced treatment, such as reverse osmosis to remove the elevated levels of TDS, it is unclear what additional steps might be required to make this waste stream recyclable.

Storage/Seasonal Constraints

The recycled water supply is not dependent on weather patterns; supply is fairly constant throughout the year. For these reasons, recycled water is viewed as one of the most reliable sources of water in the Watershed. However, because recycled water is used primarily for irrigation purposes and associated seasonal demands, recycled water demands can be variable and are often affected by weather and the season. In some areas, demands increase in dry years. However, wet years generally pose a greater operational challenge as customer demand decreases and storage facilities fill. Storage during periods of low demand is necessary to meet high demand during other times of the year. The amount of available recycled water storage varies greatly between agencies. Some have little or no storage and others have thousands of AF of storage. Each agency's existing and proposed recycled water storage facility capacities are shown on **Table 5.3-11**.

Financial Constraints

The cost of infrastructure to produce, store, and distribute recycled water is expensive. Given that demands for recycled water are more scattered throughout communities, recycled water distribution pipelines are built only where demands justify the expense and where customers agree to use recycled water. This is especially true where sites need to be retrofitted to use recycled water as opposed to newly constructed sites where rules may dictate its use. Other issues include the cost of recycled water use to the customers as well as administration of the recycled water system by both the distributor and user. Because of the cost, there are sites where there may be willing customers but no infrastructure to serve them. Grant funds and other forms of financial aid can help make some projects viable, but other projects still may not be financially viable.

Other issues include the cost of recycled water use to the customers as well as administration of the recycled water system by both the distributor and user.

Costs associated with recycled water use could include retrofitting of existing systems, required inspections and cross-connection shutdown testing, employee training, and use site maintenance. Administrative requirements include extensive permitting, recordkeeping, and reporting requirements.

Each use area also must have a Site Supervisor knowledgeable of the use area system and recycled water use restrictions. The Site Supervisor must be available at all times to correct any condition that does not conform to use area requirements specified by regulations and the recycled water distributor.

Table 5.3-11 Recycled Water Storage Facility Capacity

Agency Owning and/or Operating Storage Ponds	Existing Storage (AF)	Proposed Storage (AF)
Big Bear Area Reg. Wastewater Agency	---	---
City of Beaumont	No Data Received	
City of Colton	---	---
City of Corona	21.40	---
City of Redlands	---	---
City of Rialto	---	---
City of Riverside	---	---
City of San Bernardino	---	---
Eastern Municipal Water District	7,300.00	---
Elsinore Valley Municipal Water District	30.70	---
Inland Empire Utilities Agency	1.84	350.59
Irvine Ranch Water District	23,619.00	13.20
Lee Lake Water District	1.00	15.00
Orange County Sanitation District	---	---
Orange County Water District *	26,000.00	---
San Bernardino/Colton RIX Facility	---	---
Western Municipal Water District	40.00	650.00
Western Riverside County Regional WWTP	---	---
Yucaipa Valley Water District	18.42	65.24
Total Recycled Water Storage Capacity (AF)	57,032.36	1,094.03

* Water in OCWD's storage ponds could include SAR water, imported MWDSC water, or recycled water from the GWRS. In general terms, OCWD does not intentionally store MWDSC or GWRS water, since they would rather recharge it; however, when they put water into the recharge facilities, some of the water is temporarily in storage before it is recharged.

Water Quality Management

Increases in groundwater TDS are a function of the recharge of saline water resulting from agricultural activities, urban runoff, imported water, septic tanks, and recycled water activities. They also are attributed in part to the legacy of salt contamination from past land use practices. The TDS impacts of agriculture on groundwater usually originate from fertilizer use on crops, consumptive use, and dairy waste disposal.

Water quality, as it pertains to higher salinity supplies, is another significant issue. On average, approximately 80 percent of water delivered to the Watershed from MWDSC comes from the Colorado River, which has high salinity content, expressed in terms of TDS. In 2007, the Colorado River water had an average TDS of 650 mg/L while SPW averaged about 260 mg/L. Water with TDS greater than 500 mg/L is problematic to many of the crops grown in the region.

Higher TDS source water also poses a special problem for water recycling facilities because conventional treatment processes are designed to remove suspended particles, but not dissolved salts. TDS removal, or demineralization, requires an advanced treatment process, which can increase project costs significantly. Residential use of water typically adds 200 to 300 mg/L of TDS to the wastewater stream, and self-regenerating water softeners can add another 60 to 100 mg/L. If an area receives a water supply that has a TDS of more than 700 mg/L, and residents add 300 mg/L or more through normal use, the recycling facility will produce recycled water with a TDS concentration of 1,000 mg/L or more.

In general, TDS over 1,000 mg/L becomes problematic for industrial reuse customers and virtually unusable for many agricultural customers. This greatly limits the potential uses and marketability of recycled water. Nutrients such as nitrate present similar issues as TDS.

Salinity management for expanded use of recycled water and protection of the adjacent high-quality groundwater basins is a continuing issue.

Public Perception

Some attempts to reintroduce purified wastewater into the aquifers, rivers, and reservoirs from which water agencies draw their supplies have generally met opposition from citizens' groups with the result being stalled water recycling projects in cities from San Diego to Tampa, Florida. This opposition comes more from a knee-jerk response to wastewater—the "yuck" factor—than from concerns about the water's chemical composition. This reaction ignores the reality that water reuse is as old as time. The water cycle guarantees that nature uses the same supply of water over and over again; people have been reusing water for centuries.

Other uses of recycled water also may encounter public resistance where there is a perception of health risk from direct contact or incidental ingestion, especially with regard to potentially sensitive populations. For example, irrigation of a public golf course might be considered acceptable while irrigation of an elementary school playground unacceptable because of the potential exposure of children.

A successful example is OCWD's GWRS where treated recycled water undergoes an advanced treatment process that includes two membrane filtration systems – microfiltration and reverse osmosis, and treatment by ultraviolet light and hydrogen peroxide. Once purified, the water is sent to spreading basins. The newly purified water seeps into the ground, like rain, and blends with groundwater. The GWRS provides a new drought-proof water source for northern and central Orange County, reducing reliance on imported water. Additionally, the GWRS will save additional funds in the future by improving the quality of the water in the Orange County groundwater basin. This successful effort utilized widespread public outreach activities involving the scientific,

political, and other communities to assist in informing the public and addressing potential public perception issues.

Every time we take a drink, we're consuming water that has been used many times before. Furthermore, as southern California struggles with climate change, continuing Colorado River drought, San Joaquin Delta vulnerability, and population growth, water reuse will become even more important — perhaps enough to make the thought of drinking purified recycled water more acceptable to the general public.

Concepts and Ideas for the Future

Concepts, ideas, and/or suggestions for future types of recycled water projects were received from IEUA, EMWD, OCWD, and SAWPA and are summarized in the sections below.

Increase Direct Reuse

Direct reuse of recycled water for industrial use, irrigation, and agriculture can be increased by:

- Expanding and strengthening recycled water distribution, storage, and pumping facilities, including local laterals.
- Assisting with on-site retrofit costs.
- Making recycled water available to individual residences for yard irrigation and toilet flushing.
- Meeting custom recycled water, water quality specifications for select customers and uses through specialized treatment.
- Improving user confidence and acceptance with specialized user advice and user support groups.
- Expanding recycling opportunities through advanced treatment.
- Conducting geographic analysis of demands and supplies.
- Exploring possible multi-beneficial projects working with other pillars.
- Investigate and promote increasing public and regulatory acceptance for new uses for recycled water.
- Reviewing backflow protection requirements.

Increase Recycled Water Recharge

Recycled water recharge can be increased by:

- Implementing river flow recharge projects.
- Increasing groundwater recharge with recycled water.
- Resolving limitations on water recycling created by the use of the SARI to convey both non-reclaimable waste and domestic wastewater.
- Utilizing recycled water for habitat creation/enhancement and groundwater recharge.
- Initiating long term plans for treating recycled water to a high level for local recharge similar to OCSD/OCWD GWRS project.

Increase Recycled Water/Energy Savings

Recycled water and energy savings can be increased by:

- Reducing recycled water energy demands with additional distribution system pressure zones.
- Evaluating possible interagency agreements to accept recycled water from another agency's upstream Publicly Owned Treatment Works (POTW) to take advantage of gravity flow and accompanying energy savings.
- Investigating ways to increase recycling of water flowing to the ocean during wetter years.
- Encouraging industries, such as large commercial facilities, to segregate wastewaters to discharge as much as practical to the local, reclaimable sewer rather than to non-reclaimable waste lines (SARI).
- Investigating/implementing brine concentrate management utilizing secondary desalination.
- Investigating the energy saving potential of satellite treatment plants.
- Providing additional treatment to hazardous waste flow in the SARI to allow local non-potable reuse of the flow and to increase overall supply.
- Decreasing the amount of water lost to the ocean to increase the overall water supply to the Watershed.

Concepts Requiring Further Investigation

The OWOW process provided a forum to discuss new concepts. Due to time constraints, some of these concepts could not be adequately investigated and accepted prior to completion of the OWOW report. These concepts are being included in the document to stimulate further discussion and possible investigation.

Currently, during non-storm periods, nearly all the flow of the SAR from the upper and middle watersheds is treated wastewater effluent and the flow greatly exceeds the minimum flow requirements imposed on the upper and middle watershed by the 1969 Judgment. This water is currently used "downstream" via artificial recharge in the lower watershed. However, as seen in **Figures 5.1-23** and **5.1-24** in the *Water Supply Reliability* section of the OWOW report, the water budgets for the upper and middle watershed are dependent upon the future reuse of this recycled water within their respective areas. When this occurs, it will reduce flows into the river. When this happens, the lower watershed will have to "replace" this water by recycling more of their own wastewater which currently flows into the ocean, importing more water, desalting ocean or some other new source of water. Recycling in the upper and middle watersheds also will require a significant investment in infrastructure by the upper and middle watershed.

One of the goals of the OWOW process was to bring water agencies together in hopes of developing creative solutions to the various water management challenges. Through this process, a variety of recycled water concepts have been developed, some of which may prevent the need for the upper and middle watersheds to construct recycled water infrastructure while keeping the treated effluent in the SAR for use by the lower watershed. These concepts are generally outlined in **Table 5.3-12**.

Table 5.3-12 Proposed Recycled Water Concepts

Concept	Description	Advantages	Disadvantages
Closed Loop "Traditional"	Upper, middle and lower watersheds build infrastructure to reuse their treated wastewater within their respective areas.	Each area of the watershed benefits from the high reliability of treated wastewater (much more reliable than imported water) and disposal to the ocean is reduced significantly.	Requires construction of recycled water infrastructure in the upper, middle and lower watersheds.
Exchange Concept No. 1	Treated wastewater continues to flow from upper to middle to lower by gravity. The lower watershed provides imported water to the upper watershed to makeup for their loss of recycled water.	Reduced recycled water infrastructure cost in the watershed. Upper and middle watersheds use higher quality imported water.	Imported water is less reliable than recycled water. Thus, the upper and middle watersheds trade high reliability water for low reliability water.
Exchange Concept No. 2	SGPWA pays for a recycled water infrastructure in the upper watershed. In return, the upper watershed provides SGPWA a like amount of imported water. Treated wastewater continues to flow from the middle watershed to the lower watershed by gravity. In return, the lower watershed provides imported water to the middle watershed.	Helps SGPWA obtain needed water supply. Upper and lower watersheds benefit from highly reliable recycled water. Reduces the need for recycled water infrastructure in the middle watershed. Middle watershed uses higher quality imported water.	Cost of recycled water infrastructure in the upper watershed. Middle watershed trades high reliability recycled water for low reliability imported water. Significant quantities of recycled water are still discharged to the ocean.
Exchange Concept No. 3	SGPWA purchases imported water from the lower watershed equal to that of the amount of treated wastewater that flows from the upper watershed. The Upper and middle watershed continue to gravity flow treated wastewater to the lower watershed. The lower watershed provides imported water to upper and middle watershed.	Helps SGPWA obtain needed water supply. Less water infrastructure required in the watershed. Upper and middle watersheds use higher quality imported water.	Upper and middle watersheds continue use of imported water which is less reliable than recycled water.

While the "exchange" concepts may save the cost of recycled water infrastructure, they also could result in poorer water supply reliability for those areas that agree to take imported water in exchange. This reduced reliability may be mitigated by additional water or additional funding to the party that agrees to accept the more expensive and/or lower reliable water supply. It also could be mitigated by transferring imported water "real time" into a water bank to ensure that it is available when needed. There likely are many other ideas and variations that could be explored as part of this concept.

Due to the complexity of the issues, as well as legal constraints and other factors, it is recommended that discussions on these divergent views be initiated.

Collaboration and Integration with Other Pillars

The ten One Water One Watershed Pillars are interconnected and support each others' efforts. Examples of linkages are numerous and varied. For the Climate Change Pillar, the "Greenhouse Effect" can be reduced by using recycled water instead of energy-intensive imported water. Recycled water can be used for habitat creation, environmental enhancement, and river restoration benefiting the Environment and Habitat Pillar. Using recycled water benefits both the Water Supply Reliability and Water Use Efficiency Pillars in a myriad of ways when it is used to replace potable water from either groundwater or imported sources. Using recycled water for groundwater barriers against either seawater intrusion or groundwater contaminant plumes provides direct benefits to the Water Quality Improvement Pillar.

Table 5.3-13 shows in greater detail where the Water Recycling Pillar links with and supports the efforts of the other Pillars.

Table 5.3-13 Linkages between the Water Recycling Pillar and Other Pillars

Pillar	Benefits to Other Pillars
Climate Change	Reduce the "Greenhouse Effect" by using recycled water instead of energy-intensive imported water. Reduce recycled water energy demands with additional distribution system pressure zones. Institute inter-agency agreements to take advantage of gravity flows for energy savings. Investigate energy saving potential of satellite treatment plants.
Environmental Enhancement and Habitat	Use recycled water for habitat creation and environmental enhancement. Develop recycled water storage ponds in areas to increase waterfowl habitat. Use recycled water for river restoration and recharge.
Environmental Justice	Connect disadvantaged communities to sewer systems (investigate grant funding).
Flood Control and Stormwater Management	Harvest storm water to supplement recycled water uses. Harvest storm water for groundwater recharge.
Parks, Recreation, and Open-Space	Increase irrigation of parks and recreation areas with recycled water. Use recycled water for snow making at commercial ski areas. Use recycled water for snowmaking, let snow melt, run downstream, and recharge. Build recycled water storage ponds in areas for use as esthetic impoundments.
Water and Land Use	Convert agricultural groundwater pumpers to recycled water use whenever possible. Use recycled water for construction water where possible. Require new commercial establishments to use recycled water if appropriate.
Water Quality Improvement	Use recycled water for underground seawater or contaminant plume barriers. Eliminate septic systems by increasing sewer service to prevent groundwater contamination.
Water Supply Reliability	Increases water supply reliability since recycled water is the most reliable source of water in the Watershed. Increase potable supply by increasing recycled water uses. Change public perception of recycled water; overcome "yuck" factor to increase direct use. De-mineralize and treat recycled water for blending with other water sources for expanded uses. Convert agricultural groundwater pumpers to recycled water , i.e. groundwater exchange programs. Increase groundwater recharge using recycled water to increase potable supplies. Partner with CalTrans to use recycled water for freeway landscaping and for dust control on road and street construction to decrease potable water use. Coordinate with fire departments to use recycled water whenever possible; provide hydrants and connections to decrease potable water use.
Water Use Efficiency	Maximize programs to substitute recycled water for potable water whenever possible. Use of recycled water can lead to reduced runoff.

Data Collection Process

Inquiries were sent to each agency along with sample blank tables containing space for data similar to that found in this chapter. The agencies were requested to reply via email with their completed tables and maps of their facilities. For general information about each agency or facility, agency and city Websites were searched and a brief write up about the agency was generated. These then were sent to the individual agencies for their review and comments. Multiple opportunities for review of the chapter were provided during the process.

References

References used in the preparation of the Water Recycling Pillar include:

California Department of Water Resources, *Draft 2009 Update of the California Water Plan,* 2009

California Environmental Protection Agency, Air Resources Board, *Climate Change Draft Scoping Plan, June 2008 Discussion Draft*

Individual agency's and city's correspondence and webpages

Santa Ana Watershed Project Authority, *Santa Ana Integrated Watershed Plan 2005 Update*, June 2005

Santa Ana Watershed Project Authority's webpage (sawpa.org)

U.S. Bureau of Reclamation, *Southern California Comprehensive Water Reclamation and Reuse Study, Phase II, Executive Summary*, July 2002

Contributors

The following stakeholders provided data and information, reviewed and commented upon the text, and/or provided ideas and concepts for the development of the One Water One Watershed Water Recycling Pillar.

Joseph	Bernosky	Western Municipal Water District
Jim	Burror	Orange County Sanitation District
Cordell	Chavez	City of Corona
Christie	Crother	Eastern Municipal Water District
Ted	Eich	Elsinore Valley Municipal Water District
Linda	Garcia	Western Municipal Water District
Gary	Hackney	Inland Empire Utilities Agency
Valerie	Housel	City of San Bernardino
Chandra	Johannesson	City of Riverside
Linda	Kilday	Yucaipa Valley Water District
Lindy	Lewis	City of Corona
Wayne	McPherson	Big Bear Area Regional Wastewater Authority
Brenda	Meyer	Western Municipal Water District
Kevin	Milligan	City of Riverside
Behrooz	Mortazavi	Eastern Municipal Water District
Ben	Pak	Inland Empire Utilities Agency
Jeff R.	Pape	Lee Lake Water District
Jorge	Ramirez	City of Redlands
Max	Rasouli	City of Riverside
Carl	Reber	Eastern Municipal Water District
Steve	Schindler	Big Bear Area Regional Wastewater Authority
Rebecca	Schwartz	City of Redlands
Mark	Tettemer	Irvine Ranch Water District
Bob	Tincher	San Bernardino Valley Municipal Water District
Gordon	Treweek	Chino Basin Water Master
Dennis	White	City of Corona
Greg	Woodside	Orange County Water District
Ron	Young	Elsinore Valley Municipal Water District
Joe	Zoba	Yucaipa Valley Water District