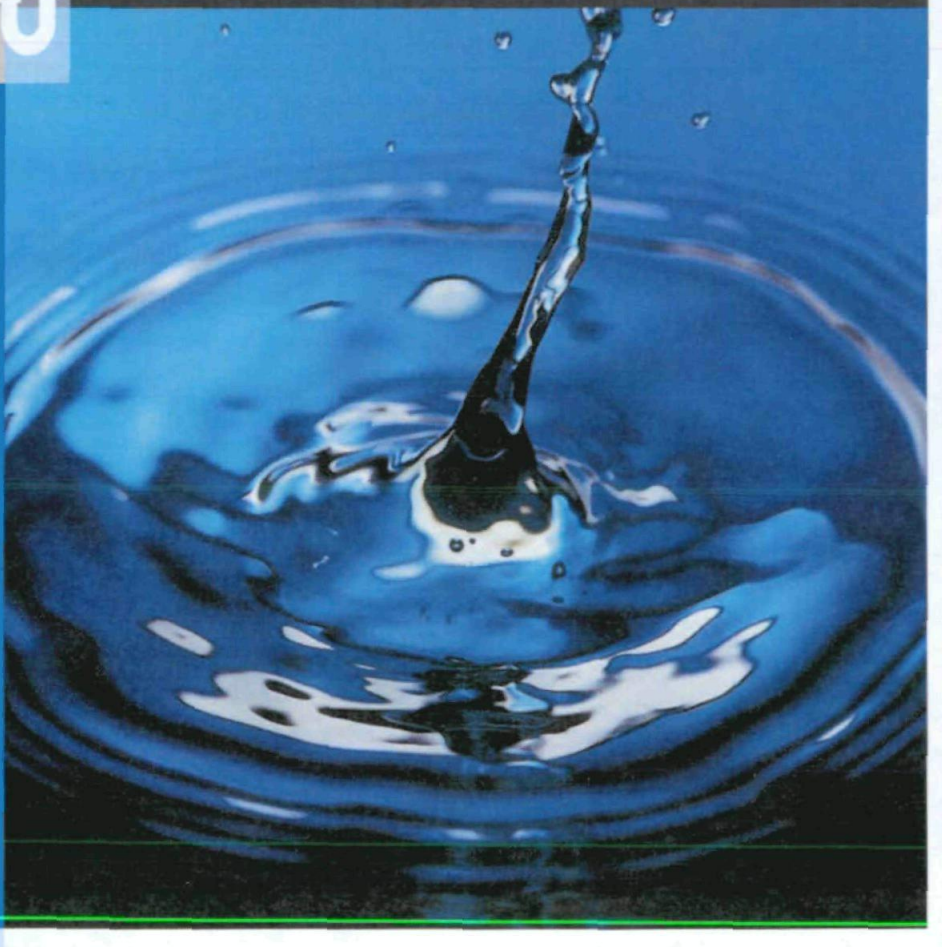
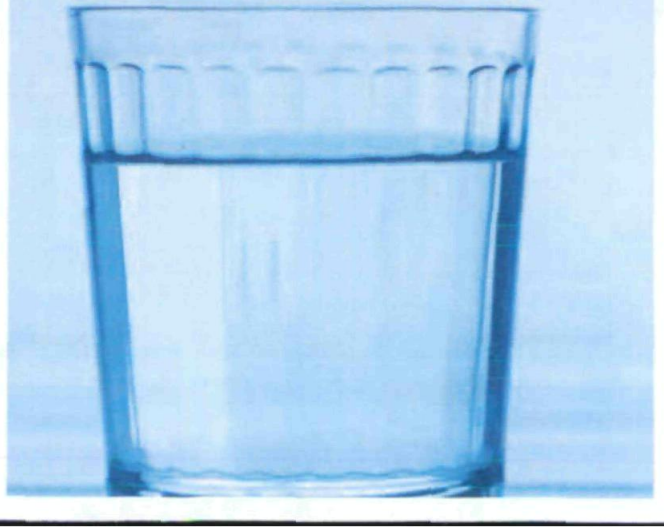
2005 UPDATED URBAN WATER MANAGEMENT PLAN





San Diego County
Water Authority

UPDATED 2005 URBAN WATER MANAGEMENT PLAN

Prepared by:

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2005 UWMP ABBREVIATIONS

2000 Plan	2000 Urban Water Management Plan
2005 Plan	2005 Urban Water Management Plan
AAC	All-American Canal
Act	Urban Water Management Planning Act
AF	acre-feet
AF/YR	acre-feet per year
Bay-Delta	San Francisco Bay/Sacramento-San Joaquin River Delta
BMPs	Best Management Practices (Water Conservation)
CC	Coachella Canal
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CII	Commercial, Industrial, and Institutional
CIMIS	California Irrigation Management Information System
CIP	Capital Improvement Program
CRA	Colorado River Aqueduct
CSP	Carryover Storage Project
CUWA	California Urban Water Agencies
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project (Federal)
CVWD	Coachella Valley Water District
CWA-MAIN	County Water Authority - Municipal and Industrial Needs
Delta	Sacramento - San Joaquin River Delta
DHS	Department of Health Services (State of California)
DIP	Delta Improvement Package
DMP	Drought Management Plan
DWR	Department of Water Resources (State of California)
EIR/EIS	Environmental Impact Report/Environmental Impact Statement
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
ESA	Endangered Species Act (Federal)
ESP	Emergency Storage Project
EWA	Environmental Water Account
EWDP	Emergency Water Delivery Plans
EWMPs	Efficient Water Management Practices
FAP	Financial Assistance Program
FFY	Federal Fiscal Year

Forum	Colorado River Basin Salinity Control Forum
FY	Fiscal Year
GRP	Groundwater Recovery Program
HEWs	high-efficiency clothes washers
IAWP	Interim Agricultural Water Program
IID	Imperial Irrigation District
IRP	Integrated Resources Plan
IRWMP	Integrated Regional Water Management Plan
lb/day	pounds per day
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
LRP	Local Resource Program
M&I	municipal & industrial
MAF	million acre-feet
MAF/YR	million acre-feet per year
MAIN	Institute for Water Resources - Municipal and Industrial Needs
MCB Camp Pendleton	Marine Corps Base Camp Pendleton
mg/l	milligrams per liter
mgd	million gallons per day
Metropolitan	Metropolitan Water District of Southern California
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding Regarding Urban Water Conservation in California
MTBE	Methyl Tertiary Butyl Ether
MWDOC	Municipal Water District of Orange County
NEPA	National Environmental Policy Act
OAEP	Operational Area Emergency Plan
Omnibus Act	Omnibus Appropriations Act
OM&R	Operation, Maintenance, and Repair
O&M	Operations and Maintenance
PEIR	Programmatic Environmental Impact Report
ppb	parts per billion
ppm	parts per million
QSA	Quantification Settlement Agreement
Regional Board	California Regional Water Quality Control Board
RO	reverse osmosis
ROD	Record of Decision
RUWMP	Regional Urban Water Management Plan
RWDF	Reclaimed Water Development Fund
RWFMP	Regional Water Facilities Master Plan
SANDAG	San Diego Association of Governments
SDP	Metropolitan Water District of Southern California's Seawater Desalination Program
SDCWA	San Diego County Water Authority
SDWA	Safe Drinking Water Act
SEMS	Standardized Emergency Management System
Skinner TP	Lake Skinner Water Treatment Plant
SONGS	San Onofre Nuclear Generating Station
SRF	State Revolving Fund
SSOA	Surface Storage Operating Agreement
SWA	Source Water Assessment
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
Transfer Agreement	Water Authority-Imperial Irrigation District Transfer Agreement
TOC	total organic carbon
TDS	total dissolved solids
ULFTs	ultra-low flush toilets
USBR	U.S. Bureau of Reclamation
USFWS	U.S. Fish and Wildlife Service
VIP	Voucher Incentive Program
Water Authority	San Diego County Water Authority
Water Use Plan	California's Colorado Water Use Plan
WRLP	Water Reclamation Loan Program
WSDM Plan	Water Surplus and Drought Management Plan

UPDATED UWMP

In accordance with the Urban Water Management Planning Act, the San Diego County Water Authority (Water Authority) Board of Directors adopted the 2005 Urban Water Management Plan (2005 Plan) in November 2005. Since November 2005, the Board of Directors has taken two significant actions that result in the need to update the 2005 Plan. These include a change on seawater desalination development within San Diego county from a regional supply project at the Encina Power Station to a local supply project (**Sections 4.3** and **5.4**), and adoption of the Water Authority's Drought Management Plan (**Section 9.2**). Updating the plan to address these changed conditions also provides an opportunity to make clarifying edits requested by Department of Water Resources staff after its review of the 2005 Plan.

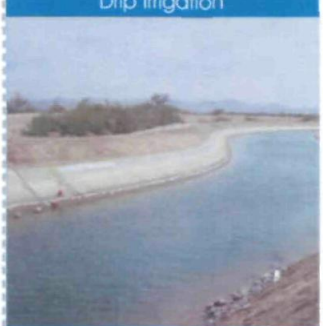
The Urban Water Management Planning Act requires an update of the plan every five years. This update is being done, prior to 2010, to maintain the Water Authority's eligibility for state grant funding and also provides updated information on the Water Authority's supplies. In accordance with its Administrative Code, the Water Authority will also prepare annual water supply reports commencing in 2008 to provide updated information on development of local and imported water supplies. The following is the Water Authority's Updated 2005 Plan:

SECTION 1 INTRODUCTION

The mission of the San Diego County Water Authority (Water Authority) is to provide a safe and reliable supply of water to its member agencies serving the San Diego region. This Updated 2005 Urban Water Management Plan (Updated 2005 Plan) identifies a diverse mix of water resources projected to be developed over the next 25 years to ensure long-term water supply reliability for the region.

Since adopting the 2000 Urban Water Management Plan (2000 Plan), the Water Authority and its member agencies have made great strides in conserving and diversifying its supplies. With an aggressive conservation program, the region has conserved an average of 40,500 acre-feet per year (AF/YR) over the last five years. In 2003, conserved agricultural transfer water from the Imperial Valley began flowing to the region, which will provide 200,000 AF/YR by 2021. In 2003, the Water Authority was assigned rights to 77,700 AF/YR of conserved water from projects that will line the All-American and Coachella Canals. Deliveries of this conserved water from the Coachella Canal reached the region in 2007, and deliveries from the All-American Canal are projected to reach the region in 2010.

Drip Irrigation



Coachella Canal

Recyled Water at Otay Ranch

Developing these supplies is key to diversifying the region's supply sources, but other factors are also important, such as member agencies implementing and managing local resources. Indeed, local surface water, groundwater, recycled water, and desalinated seawater are all important elements of a diverse water supply portfolio. Likewise, it is critical that the Metropolitan Water District of Southern California (Metropolitan) continue to provide a reliable supply of imported water to the region. The Water Authority, its member agencies, and Metropolitan must work together to ensure a diverse and reliable supply for the region.

This section of the Updated 2005 Plan describes the state laws that influence preparation of the plan, including the Urban Water Management Planning Act (Act) and Water Code Sections that were enacted with the passage of Senate Bills 610 and 221 in 2001. It also includes a discussion of the coordination that occurred in preparation of the Updated 2005 Plan as well as a general description of the Water Authority, with its physical water delivery system, service area characteristics, climate, and population projections.

SECTION 1.1 CALIFORNIA URBAN WATER MANAGEMENT PLANNING ACT

The California Water Code requires all urban water suppliers in the state to prepare urban water management plans and update them every five years. These plans satisfy the requirements of the Act of 1983, including amendments that have been made to the Act. Sections 10610 through 10657 of the California Water Code details the information that must be included in these plans, as well as who must file them.

Major amendments made to the Act since the Water Authority's 2000 Plan was prepared include:

- Description of specific water supply projects and implementation schedules to meet projected demands over the planning horizon;
- Description of the opportunities for the development of desalinated water;
- Additional information on groundwater, where groundwater is identified as an existing or planned water source;
- Description of water quality over the planning horizon; and
- Description of water management tools that maximize local resources and minimize imported water supplies.

In addition, the California Department of Water Resources (DWR) will consider whether the urban water supplier has submitted an updated plan when determining eligibility for funds made available pursuant to any program administered by the department.

According to the Act, "The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the

implementation of those plans can best be accomplished at the local level." The Act requires that each urban water supplier that provides water for municipal purposes either directly or indirectly to more than 3,000 customers or supplies more than 3,000 AF of water annually, shall prepare, update, and adopt its urban water management plan at least once every five years or before December 31, in years ending in five and zero. In accordance with the Act, the Water Authority is required to update and adopt its plan for submittal to the DWR by December 31, 2005. **Appendix A** contains the text of the Act.

SECTION 1.2 SENATE BILLS 610 AND 221

Water Code Sections 10910 through 10914 and Government Code Sections 65867.5, 66455.3, and 66473.7 (commonly referred to as SB 610 and SB 221) amended state law to improve the link between information on water supply availability and certain land use decisions made by cities and counties. SB 610 requires that the water purveyor of the public water system prepare a water supply assessment to be included in the environmental documentation of certain large proposed projects. SB 221 requires affirmative written verification from the water purveyor of the public water system that sufficient water supplies are available for certain large residential subdivisions of property prior to approval of a tentative map.

Section 4 of the Updated 2005 Plan contains documentation on the existing and planned water supplies being developed by the Water Authority. This documentation may be used by the Water Authority's member agencies in preparing the water supply assessments and written verifications required under state law. Specific documentation on member agency supplies and Metropolitan supplies may be found in their respective plans.

SECTION 1.3 WATER AUTHORITY'S UPDATED 2005 URBAN WATER MANAGEMENT PLAN

This report constitutes an update to the Water Authority's 2005 Plan. To adequately demonstrate how the region will be reliable over the next 25 years, the Updated 2005 Plan quantifies the regional mix of existing and projected local and imported supplies necessary to meet future retail demands within the Water Authority's service area. While the Updated 2005 Plan includes specific documentation on development of the Water Authority's supplies, the plans submitted by the member agencies and Metropolitan will provide details on their supplies that contribute to the diversification and reliability of supplies for the San Diego region.

Striving for consistency among the plans of Metropolitan, the Water Authority, and its member agencies is important to accurately reflect the projected supplies available to meet regional demands. In order to facilitate coordination within the Water Authority's service area, the Water Authority formed an Urban Water Management Plan Working Group made up of staff from the Water Authority and its member agencies. This group provided a forum for exchanging demand and supply information. In addition, DWR and the California Urban Water Conservation Council (CUWCC) hosted a special workshop to review the requirements of the Act. At a separate workshop, the Working Group received a briefing from Metropolitan on its regional plan, and participants discussed strategies for coordination between the supply agencies.

Some members of the UWMP working group

The Water Authority further coordinated its efforts by working with the appropriate wastewater agencies. These agencies helped prepare the water recycling element of the Updated 2005 Plan, which describes

the wastewater treatment requirements and water recycling potential. The Water Authority also coordinated with Metropolitan regarding projected needs for imported water deliveries. A member agency draft 2005 Plan was distributed for technical review by the Water Authority's member agencies and their comments incorporated.

In accordance with the Act, the Water Authority notified the land use jurisdictions within its service area that it was preparing an Updated 2005 Plan. Prior to adoption, the Water Authority mailed the Updated 2005 Plan to interested parties that included the Water Authority's member agencies, the San Diego Regional Chamber of Commerce, the Sierra Club, the County of San Diego, and cities within the Water Authority's service area. The Updated 2005 Plan was also available for public review at the Water Authority and on the Water Authority's internet homepage.

The Water Authority reviewed all of the comments received and revised the plan accordingly. The Water Authority Board of Directors held a public hearing on October 27, 2005, and adopted the Water Authority's Updated 2005 Plan on November 17, 2005. The Board of Directors adopted the Updated 2005 Plan on April 26, 2007. **Appendix B** contains a copy of the resolution adopting the Updated 2005 Plan and the Updated Updated 2005 Plan.

DWR prepared a checklist based on the Act of items that must be addressed in an agency's plan. This checklist allows an agency to identify where in its plan it has addressed each item. The Water Authority has completed the checklist, referencing the sections and page numbers included in the Updated 2005 Plan. The completed checklist is included in **Appendix C**.

SECTION 1.4 HISTORY AND DESCRIPTION OF THE WATER AUTHORITY

1.4.1 HISTORY

The Water Authority was established pursuant to legislation adopted by the California State Legislature in 1943 to provide a supplemental supply of water as the San Diego region's civilian and military population expanded to meet wartime activities. Due to the strong military presence, the federal government arranged for supplemental supplies from the Colorado River in the 1940s. In 1947, water began to be imported from the Colorado River via a single pipeline that connected to Metropolitan's Colorado River Aqueduct (CRA) located in Riverside County. To meet the water demand for a growing population and economy, the Water Authority constructed four additional pipelines between the 1950s and early 1980s that are all connected to Metropolitan's distribution system and deliver water to San Diego County. The Water Authority is now the county's predominant source of water, supplying from 75 to 95 percent of the region's needs depending upon weather conditions and yield from surface, recycled, and groundwater projects.

1.4.2 SERVICE AREA

The Water Authority's boundaries extend from the border with Mexico in the south, to Orange and Riverside counties in the north, and from the Pacific Ocean to the foothills that terminate the coastal plain in the east. With a total of 920,463 acres (1,438 square miles), the Water Authority's service area encompasses the western third of San Diego County. **Figure 1-1** shows the Water Authority's service area, its member agencies, and aqueducts.

In 1947 water began to be imported from the Colorado River.

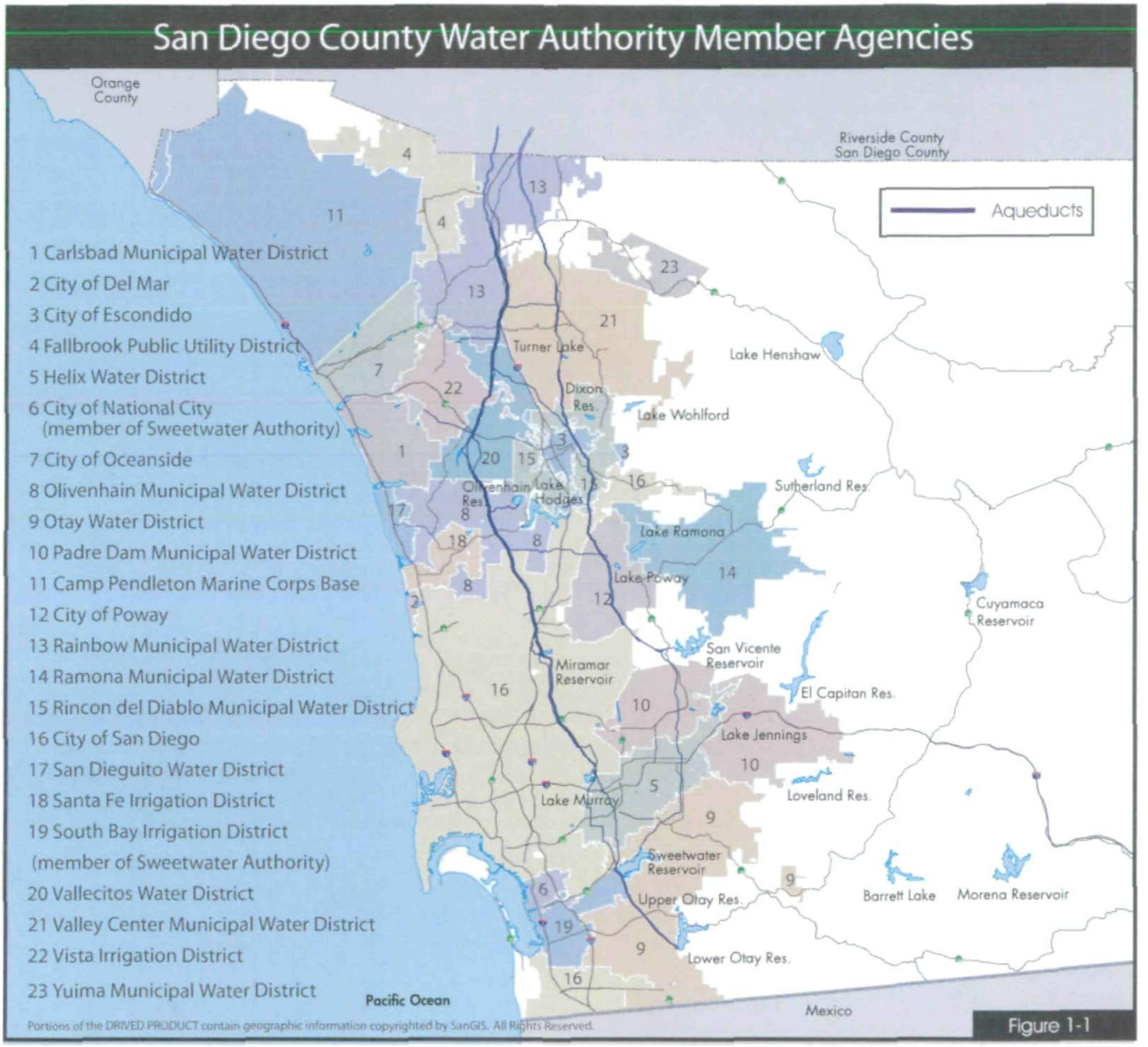


Figure 1-1

1.4.3 MEMBER AGENCIES

The Water Authority's 23 member agencies purchase water from the Water Authority for retail distribution within their service territories. A 34-member Board of Directors comprised of member agency representatives governs the Water Authority. The member agencies' six cities, four water districts, eight municipal water districts, three irrigation districts, a public utility district, and a federal military reservation have diverse and varying water needs.

In terms of land area, the City of San Diego is the largest member agency with 210,726 acres. The smallest is the City of Del Mar, with 1,159 acres. Some member agencies, such as the cities of National City and Del Mar, use water almost entirely for municipal and industrial purposes. Others, including Valley Center, Rainbow, and Yuima Municipal Water Districts, deliver water that is used mostly for agricultural production.

SECTION 1.5 WATER AUTHORITY PHYSICAL WATER DELIVERY SYSTEM

The Water Authority currently purchases water from Metropolitan and transferred water from the Imperial Irrigation District (IID). These supplies are delivered to its member agencies through two aqueducts containing five large-diameter pipelines. The aqueducts follow general north-to-south alignments, and the water is delivered largely by gravity, which allows the distribution system to operate during a power outage. The Water Authority has an exchange agreement with

Metropolitan, which allows delivery of the IID transfer water through Metropolitan's system. Delivery points from Metropolitan are located about six miles south of the Riverside/San Diego county line. The largest single-year of sales of imported water ever recorded by the Water Authority was 644,000 acre-feet (AF) in fiscal year (FY) 2004.

The First Aqueduct includes Pipelines 1 and 2, located in a common right-of-way. They share five common tunnels and are operated as a unit. They have a combined capacity of 180 cubic feet per second (cfs). Pipelines 3, 4, and 5 form the Second Aqueduct. These pipelines are operated independent of the First Aqueduct and are located in separate rights-of-way. Pipeline 3 has a capacity of 280 cfs; Pipeline 4 carries 470 cfs, and Pipeline 5 carries 500 cfs. **Figure 1-1** shows the locations of the Water Authority's aqueducts within San Diego County.

1.5.1 CAPITAL IMPROVEMENT PROGRAM (CIP)

The Water Authority completed a Regional Water Facilities Master Plan (RWFMP) process in 2004. The RWFMP defines the regional facilities needed to meet water demands within the Water Authority's service area through the year 2030. The Water Authority examined the changing water supply and demand forecast patterns using a probabilistic approach to facilities planning. A computer model analyzed various facility options under a range of supply and demand scenarios. This modeling resulted in an assessment of the reliability of the system measured in terms of the probability, frequency, and magnitude of water shortages for each facility option.

Table 1-1: CIP Cost Summary by Category (in $ millions)

PROJECT CATEGORY	PROJECT COST[2]
Pipeline Projects	$1,768.3
System-wide Improvements	$63.4
Emergency Storage Projects	$1,176.0
Water Supply Projects	$496.6
Flow Control & Pumping Facilities	$67.5
Reimbursable Projects–Total Cost	$13.9
Total Costs of Active & Future Projects	$3,585.7
Less All Reimbursable Costs[1]	$121.8
Net Water Authority Costs[3]	$3,463.9

1 There are project costs within the CIP that are considered reimbursable.
2 Project costs are from the recommended FY 08/09 Multi-Year Water Authority CIP Budget.
3 In June 2004, the Water Authority Board of Directors voted unanimously to select seawater desalination as the preferred RWFMP alternative and added it and 21 other major water facilities projects to the CIP. This action, the largest investment in water supply reliability and system infrastructure in the Water Authority's 60-year history, more than doubled the agency's CIP, from $1.3 billion to more than $3.19 billion. In July 2006, the Water Authority Board of Directors decided not to certify the final environmental impact report for the regional seawater desalination project and not to pursue the project further. The table reflects this change. See Sections 4.3 and 5.4 for more information.

The water supply and capital improvements currently under way and planned for the future are designed to serve the region's needs through 2030. They include new pipelines and pump stations to convey the water, a water treatment facility, improvements to the existing water delivery system, the All-American and Coachella Canal Lining Projects, and projects to increase storage capacity throughout the county (see **Table 1-1** for the CIP cost summary by category).

The timing for implementation of the CIP projects will be evaluated based on the reliability analysis prepared for the Updated 2005 Plan. If necessary, project schedules will be adjusted to accurately reflect when the project is needed for reliability purposes.

Table 1-2: Member Agency Treatment Plant Capacity

MEMBER AGENCY	WATER TREATMENT PLANT	CAPACITY*
Escondido, City of/ Vista Irrigation District	Escondido/Vista	65
Helix Water District	Levy	106
Olivenhain Municipal Water District	Olivenhain	34
Oceanside, City of	Weese	25
Poway, City of	Berglund	24
Ramona Municipal Water District	Bargar	4
San Diego, City of	Alvarado	150
San Diego, City of	Miramar	140
San Diego, City of	Lower Otay	40
San Dieguito Water District/ Santa Fe Irrigation District	Badger	40
Sweetwater Authority	Perdue	30

*million gallons/day

WATER AUTHORITY REGIONAL TREATMENT FACILITY

The treated water that serves the San Diego region is presently produced at local water treatment plants owned by several Water Authority member agencies, and is also imported from Metropolitan's Skinner Water Treatment Plant (Skinner TP) in Riverside County. The member agency treatment plants and capacity are shown in **Table 1-2**. A rapid increase in treated water demand over the last five years has produced significant strains on these treated water supply sources. During peak periods, local plants in the San Diego region typically operate at maximum capacity, and imported water from the Skinner TP meets the remaining demand.

To maintain an adequate level of capacity to meet increased retail customer demands throughout the San Diego region, in September 2005, the Water Authority's Board of Directors certified an environmental impact report for the Twin Oaks Valley Water Treatment Plant and awarded a design-build-operate contract to begin final design and construction of the plant. The plant will be the Water Authority's first water treatment plant and will produce 100-million gallons of drinking water per day beginning in 2008. The plant will help address the growing demand for additional treated water supplies in the region, especially during hot summer days.

EMERGENCY STORAGE PROJECT

Also part of the CIP, the Emergency Storage Project (ESP) is a $1,176 million system of reservoirs, pipelines, pump stations, and other facilities that will work together to store and move water around the county in case of a prolonged interruption of the region's imported water supply. The facilities that make up the ESP are located throughout San Diego County and are being constructed in phases. The initial phase includes the recently completed 318-foot-high Olivenhain Dam and accompanying 24,789 AF Olivenhain Reservoir. **Section 9.1.2** contains additional information on the ESP.

The Olivenhain Dam is an integral part of the Emergency Storage Project.

CARRYOVER STORAGE PROJECT

The CIP also includes budget for the Carryover Storage Project (CSP). The Water Authority's RWFMP identifies the need for additional water storage capacity to improve water supply reliability for the region. The Water Authority is currently conducting environmental reviews of project alternatives, including a possible expansion of the San Vicente Reservoir.

The Water Authority has identified three main needs for carryover storage:

1.) Enhance water supply reliability – Carryover storage provides a reliable and readily available source of water during periods of potential shortage, such as during dry years.

2.) Increase system efficiency – Carryover storage provides operational flexibility to serve above-normal demands, such as those occurring in dry years, from storage rather than by the over-sizing of the Water Authority's imported water transmission facilities.

3.) Better management of water supplies – Carryover storage allows the Water Authority to accept additional imported deliveries during periods of availability, such as during wet years, to ensure water availability during dry years. As described in **Section 6**, the Water Authority receives delivery of State Water Project (SWP) supplies from Metropolitan, which can be significantly influenced by the need to protect environmental resources in the Sacramento-San Joaquin Bay-Delta region. This protection requires that the SWP reduce deliveries in dry years, but similarly allows for increased deliveries during wet years. Efficient management of this system therefore requires carryover storage to absorb the annual fluctuations in supply.

SECTION 1.6 SERVICE AREA CHARACTERISTICS

The Water Authority's service area characteristics have undergone dramatic changes over the last several decades. The region's population grew on average by 50,000 people per year, resulting in a shifting of large amounts of rural land to urban uses. This shift in land use has resulted in the region's prominent urban and suburban character. San Diego County also has a rich history of agriculture, beginning with the large cattle ranches established in the 18th century and continuing through the diverse range of crops and products grown today. Although the total number of agricultural acres under production has declined, the region maintains a significant number of high value crops, such as flowers, vegetables, nursery plants, turf grass, avocados, and citrus.

Based on the last survey conducted by DWR, irrigated agricultural land in the Water Authority's service area totaled 73,769 acres. San Diego County agriculture is a $1.3 billion per year industry, eighth in farm production value in the state. Shifting market forces, including the increasing cost of water, may

cause a change in agricultural practices and ultimately result in the retirement of some economically marginal lands.

1.6.1 REGIONAL ECONOMY AND DEMOGRAPHICS

Historically, defense-related contracting and manufacturing – particularly the aerospace industry – drove the local economy. This pattern peaked in the 1980s as federal spending fueled economic growth, and local defense-related expenditures surged to $9.6 billion in 1987. When this level of federal spending experienced sharp cuts in the early 1990s, widespread layoffs resulted and triggered a recession that lasted until 1995.

San Diego County has since rebounded, due in part to the emergence of a diversified employment base that includes telecommunications, electronics, computers, software, and biotechnology. High technology and bioscience related employment now exceeds 160,000 jobs. San Diego's gross regional product is forecast to reach $151.1 billion in 2005, a 6.6 percent increase over 2004's $141.7 billion estimate. The number of people actively working averaged 1.42 million in 2004, and that number is forecast to rise by 2.1 percent in 2005, to 1.45 million. Compared to the pace of expansion recorded in the 1980s, the current growth is more moderate, and perhaps more healthy and sustainable.

1.6.2 CLIMATE

Climatic conditions within the county area are characteristically Mediterranean along the coast, with mild temperatures year-round. Inland area weather patterns are more extreme, with summer temperatures often exceeding 90 degrees Fahrenheit and winter temperatures occasionally dipping below freezing. Average annual rainfall is approximately 10 inches per year on the coast and in excess of 33 inches per year in the inland mountains. More than 80 percent of the region's rainfall occurs between December and March.

Variations in weather patterns affect regional short-term water requirements, causing reductions in water use during wet cycles and demand spikes during hot, dry periods. Over the last seven years, San Diego has experienced the latter event. Since 1999, local

Rainfall – Evapotranspiration – Temperature Comparison

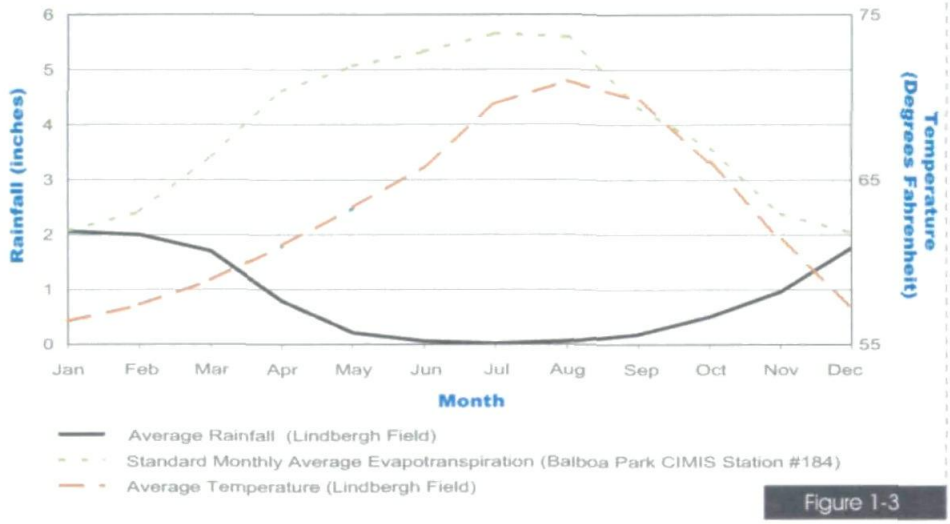


Figure 1-3

Annual Rainfall (Lindbergh Field Station)

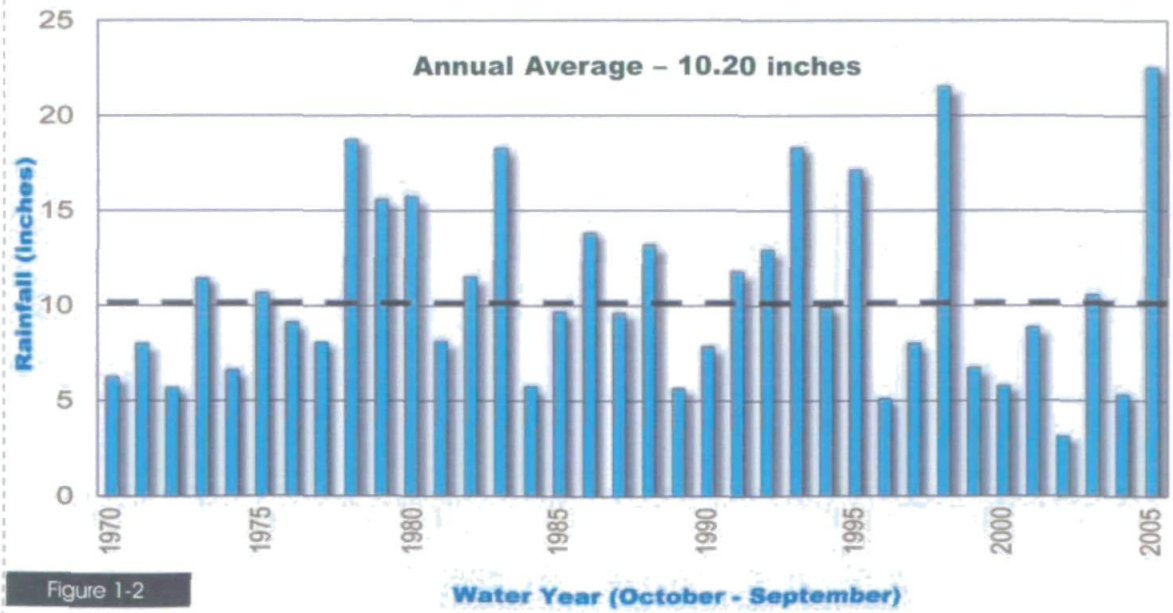


Figure 1-2

rainfall exceeded the historic annual average only twice (**Figure 1-2**). These conditions resulted in record level demands during FY 2004, with total local and imported water use surpassing 715,700 AF. With record rainfall in FY 2005, total demands decreased to 642,152 AF. On a monthly basis, water requirements tend to increase during the summer months when a decrease in rainfall combines with an increase in temperatures and an increase in evapotranspiration levels (**Figure 1-3**).

1.6.3 POPULATION

When the Water Authority was formed in 1944, the population of San Diego County totaled roughly 260,000 people. In 2004, total population within the service area reached 2.8 million. The City of San Diego represents the largest population of any member agency, with approximately 1.3 million people. The Yuima Municipal Water District has the smallest population, at just under 2,000 people. The average population density in 2004 was 3.43 people per acre, with National City having the highest density (9.32/acre) and Yuima Municipal Water District the lowest (0.15/acre).

The population of San Diego County is projected to increase by 842,300 people between 2005 and 2030, for a total county population in excess of 3.8 million. This change represents an average annual increase of about 33,700 people, for an annual growth rate of roughly 1.1 percent. These regional growth projections are based on the San Diego Association of Governments (SANDAG) 2030 Cities/County Forecast.

The Water Authority's service area population projections are also based on SANDAG's 2030 Cities/ County Forecast and appear in **Table 1-3**. Water Authority member agencies are projected to have varying future growth. Some, such as the Santa Fe Irrigation District and the City of Del Mar, are expected to experience relatively little growth. Others, including the Otay and Vallecitos water districts, anticipate large increases in both population and water demand.

Table 1-3: Population Forecast – Water Authority Service Area (2005-2030)

YEAR	POPULATION
2005	2,947,262
2010	3,113,498
2015	3,261,691
2020	3,414,068
2025	3,554,815
2030	3,703,243
Average Annual Growth	30,239

Source: SANDAG 2030 Cities/County Forecast

SECTION 2 WATER DEMANDS

Demand for water in the Water Authority's service area falls into two basic categories: municipal and industrial (M&I), and agricultural. M&I uses currently constitute about 80 to 85 percent of regional water consumption. Agricultural water, used mostly for irrigating groves and crops, accounts for the remaining 15 to 20 percent of demand. This section describes these use categories along with the total historic, current, and projected water demands. By 2030, total normal water demands are projected to reach 829,030 AF (includes projected near-term annexation demands), which represents about a 29 percent increase from the 642,152 AF of demand that occurred in FY 2005.

SECTION 2.1 MUNICIPAL AND INDUSTRIAL WATER DEMAND

M&I demand can be subdivided into residential demand (water used for human consumption in the home, domestic purposes, and residential landscaping) and water used for commercial and industrial purposes.

2.1.1 RESIDENTIAL DEMAND

Residential water consumption covers both indoor and outdoor uses. Indoor water uses include sanitation, bathing, laundry, cooking, and drinking. Most outdoor water use entails landscaping irrigation requirements. Other minor outdoor uses include car washing, surface cleaning, and similar activities. For single-family homes and rural areas, outdoor demands may be as high as 60 percent of total residential use.

Outdoor residential water consumption includes car washing.

Based on SANDAG data, the 2004 composition of San Diego regional housing stock was approximately 61 percent single-family homes, 35 percent multi-family homes, and 4 percent mobile homes. Single-family residences generally contain larger landscaped areas, predominantly planted in turf, and require more water for outdoor application in comparison to other types of housing. The general characteristics of multi-family and mobile homes limit outdoor landscaping and water use, although some condominium and apartment developments do contain green belt areas.

Single-family homes often have more turf.

2.1.2 COMMERCIAL AND INDUSTRIAL DEMAND

Commercial water demands generally consist of incidental uses, but are necessary for the operation of a business or institution, such as drinking, sanitation, and landscape irrigation. Major commercial water users include service industries, such as restaurants, car washes, laundries, hotels, and golf courses. Economic statistics developed by the San Diego Regional Chamber of Commerce indicate that almost half of San Diego's residents are employed in commercial (trade and service) industries.

Industrial water consumption consists of a wide range of uses, including product processing and small-scale equipment cooling, sanitation, and air conditioning. Water-intensive industrial uses in the City of San Diego, such as electronics manufacturing and aerospace manufacturing, typically require smaller amounts of water when compared to other water-intensive industries found elsewhere in Southern California, such as petroleum refineries, smelters, chemical processors, and canneries.

The tourism industry in San Diego County affects water usage within the Water Authority's service area not only by the number of visitors, but also through expansion of service industries and attractions,

which tend to be larger outdoor water users. Tourism is primarily concentrated in the summer months and affects seasonal demands and peaking. SANDAG regional population forecasts do not specifically account for tourism, but tourism is reflected in the economic forecasts, and it causes per capita use to increase.

SECTION 2.2 AGRICULTURAL WATER DEMAND

The coastal and inland valley areas of the county possess a moderate and virtually frost-free climate able to support a variety of sub-tropical crops, making the San Diego area a unique agricultural region.

Citrus is a common crop for the area.

The primary crops grown for the national and international markets are avocados, citrus, cut flowers, and nursery products. To a lesser extent, local fresh market crops and livestock are produced in the Water Authority's service area. In recent years, agriculture has accounted for 10 to 20 percent of the Water Authority's total water demand depending on weather conditions.

The Water Authority is the largest consumer of agricultural water within Metropolitan's service area, accounting for over 65 percent of Metropolitan's total agricultural water demands in FY 2004. Agricultural water use within the Water Authority's service area is concentrated mainly in the north county, and includes member agencies such as the Rainbow, Valley Center, Ramona, and Yuima Municipal Water Districts, the Fallbrook Public Utility District, and the City of Escondido.

SECTION 2.3 TOTAL CURRENT AND HISTORIC WATER USE

Water use in the San Diego area is closely linked to the local economy, population, and weather. Over the last half-century a prosperous local economy has stimulated population growth, which in turn produced a relatively steady increase in water demand. By 1999, a new combination of natural population increases and job creation surfaced as the primary drivers of long-term water consumption increases.

In FY 2004, water demand in the Water Authority's service area reached a record level of 715,763 AF, only to drop to 642,152 AF in FY 2005 due to above average rainfall. **Table 2-1** shows the historic water demand within the Water Authority's service area.

Table 2-1: Historic Water Demand within Water Authority Service Area (1995 - 2005)

FISCAL YEAR	WATER USE (AF)
1995	526,053
1996	615,900
1997	621,739
1998	562,225
1999	619,409
2000	694,995
2001	646,387
2002	686,530
2003	649,622
2004	715,763
2005	642,152

Figures 2-1 and **2-2** show the estimated and projected relative percentages of various categories of water demand within the Water Authority's service area for FY 2005 and FY 2030. In these figures, residential demand includes single-family residential and multi-family residential.

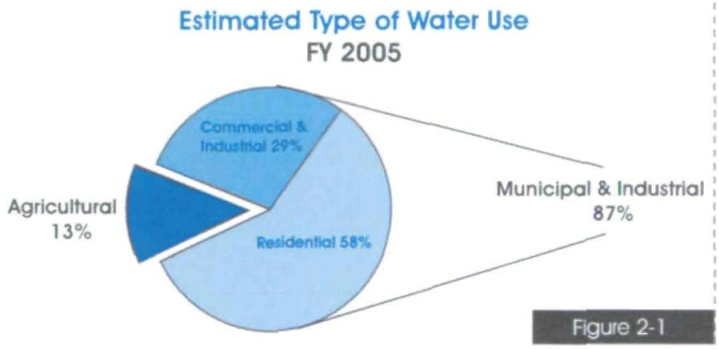


Figure 2-1

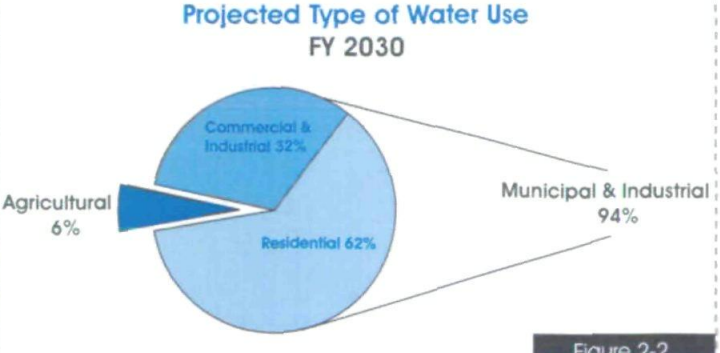


Figure 2-2

SECTION 2.4 PROJECTED WATER DEMANDS

In 1994, the Water Authority selected the Institute for Water Resources – Municipal And Industrial Needs (MAIN) computer model to forecast M&I water use for the San Diego region. The MAIN model uses demographic and economic data to project sector-level water demands (i.e. residential and non-residential demands). This econometric model has over a quarter of a century of practical application and is used by many cities and water agencies throughout the United States. The Water Authority's version of the MAIN model was modified to reflect the San Diego region's unique parameters and is known as CWA-MAIN.

As stated, the foundation of the water demand forecast is the underlying demographic and economic projections. This was a primary reason why, in 1992, the Water Authority and SANDAG entered into a Memorandum of Agreement (MOA), in which the Water Authority agreed to use SANDAG's current regional growth forecast for water supply planning purposes. In addition, the MOA recognizes that water supply reliability must be a component of San Diego County's regional growth management strategy as required in Proposition C (passed by San Diego County voters in 1988). The MOA ensures a strong linkage between local general plan land use forecasts and water demand projections for the San Diego region.

Consistent with previous CWA-MAIN modeling efforts, the 2005 water demand forecast update utilized the latest official SANDAG demographic projections. The new SANDAG 2030 Forecast, released in December 2003, extended the projection horizon an additional ten years to 2030. Member agency-level demographic and economic projections were compiled from this SANDAG forecast and incorporated into the MAIN model. Demand projections for the Marine Corps Base Camp Pendleton (MCB Camp Pendleton) were forecast outside of the MAIN model due to uncertainty regarding future land use development. Water-use projections for the various developments within the MCB Camp Pendleton area were based on historic demand trends, which were then added to the baseline forecast.

The M&I forecast also included an updated accounting of projected conservation savings based on projected regional implementation of the CUWCC Best Management Practices and SANDAG demographic information for the period 2005 through 2030. These savings estimates were then factored into the baseline M&I forecast. **Section 3.3** discusses the derivation of the estimated savings.

A separate agricultural model, also used in prior modeling efforts, was used to forecast water demands within the Water Authority service area. This model estimates agricultural demand met by the Water Authority's member agencies based on agricultural acreage projections provided by SANDAG, crop distribution data derived from the DWR and the California Avocado Commission, and average crop-type watering requirements based on California Irrigation Management Information System (CIMIS) data.

Demographic and economic data is used to project water demand.

Utilizing SANDAG's most recent growth forecast to project future water demands is an important link to the land use plans of the cities and the county. This process ensures supplies are being planned to meet future growth. Any revisions to the land use plans are captured in SANDAG's updated forecasts. The Water Authority will update its demand forecast based on SANDAG's most recent forecast approximately every five years to coincide with preparation of the urban water management plan. Prior to the next forecast update, local jurisdictions may require water supply availability reports under Senate Bills 610 and 221 for proposed land use developments that have a higher density than reflected in the existing growth forecast. The increased density could result in a higher demand for the parcel than originally anticipated. In evaluating the availability of supply, the Water

Authority's member agency can determine if "offset" supplies are available as a result of other land use decisions which lower water use within their service area. In addition, Metropolitan's draft 2005 Regional Urban Water Management Plan identified potential reserve supplies in the supply capability analysis (Tables II-7, II-8, II-9), which could be available to meet the unanticipated demands. The Water Authority's next forecast and other supply planning documents would then capture this increase in demands.

To fully quantify probable demands served by the Water Authority, lands with impending applications for annexation to the Water Authority's service area were identified. Working with its member agencies, the Water Authority identified potential near-term annexations as being parcels that may be annexed to the Water Authority within the next five years. Estimated water demands for those parcels were provided to the Water Authority by the member agency or project proponent and then added to the forecast. Including the demands provides no assurance of annexation; approval by the Water Authority Board would be required before water service is provided to these lands. It is difficult to know exactly which parcels will be annexed and when, but including this additional demand will provide for more comprehen-

Table 2-2: Normal Year Water Demand Forecast Adjusted for Water Conservation (2010-2030)

Year	2010	2015	2020	2025	2030
M&I Baseline Forecast (AF)	699,250	739,020	780,350	830,550	877,740
Esimated Conservation Savings (AF)	79,960	87,310	94,170	101,950	108,400
M&I Forecast Reduced by Conservation (AF)[1]	619,290	651,710	686,180	728,600	769,340
Agricultural Forecast (AF)[2]	89,700	83,130	77,270	58,980	51,630
Total Projected Demand (AF)	708,990	734,840	763,450	787,580	820,970
Total Projected Demand with pending Annexations[3]	715,450	742,900	771,510	795,640	829,030

Source: CWA-MAIN Forecast (August 2005)
1 Includes M&I demands for Camp Pendleton area customers.
2 Includes certified IAWP agricultural water and non-credited agricultural water.
3 Estimated near-term annexation demands are 6,455 AF/YR in 2010, and 8,060 AF/YR in years 2015, 2020, 2025, and 2030. The potential near-term annexations used to calculate the estimate include Otay Ranch Village 13 (1,961 AF), Peaceful Valley Ranch (51 AF), Syeuan Reservation (392 AF), San Luis Rey MWD (includes the Meadowood development) (4,217 AF), and four potential annexations to Yuima MWD (1,435 AF). Including the demands for these parcels does not limit the Board's discretion to deny or approve these or other annexations not contemplated at this time.

2.4.1 PROJECTED NORMAL WATER DEMANDS

Table 2-2 shows projected normal water demand for the Water Authority through 2030. The baseline M&I demand forecast reflects an adjustment for estimated water conservation, MCB Camp Pendleton area demands, and forecasted agricultural water use, to produce total projected demand. Water conservation measures are expected to reduce total M&I demands by approximately 12 percent in 2030, with an estimated savings of 108,400 AF. Agricultural water use is projected to decrease by approximately 42 percent between 2010 and 2030, to an estimated 51,630 AF, primarily due to the conversion of agricultural land to residential use.

Regional Historic and Projected Normal Water Demands

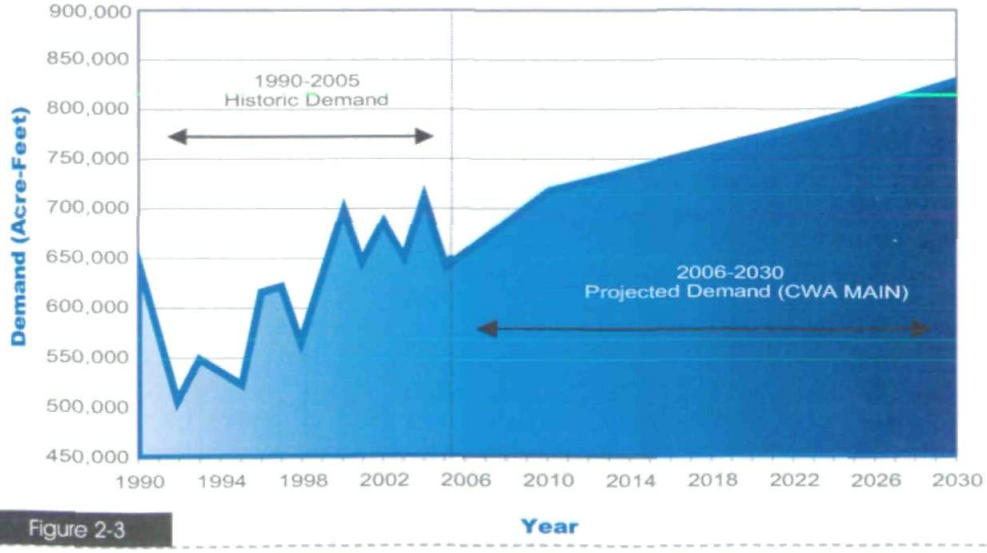


Figure 2-3

sive supply planning and assist member agencies in complying with Senate Bills 610 and 221.

Figure 2-3 illustrates the projected trend in water demands over the 2005 to 2030 time frame. This figure combines historic water use and forecasted CWA-MAIN model demands based on SANDAG 2030 demographic and economic projections.

2.4.2 PROJECTED DRY-YEAR WATER DEMANDS

To assess water service reliability during dry-year events, the Act requires single dry-year and multiple dry-year demand projections in five-year increments. Based on observed historic demand impacts associated with each of these events, separate approaches were taken to project single and multiple dry-year conditions.

Since the CWA-MAIN model was constructed to project water demands over discrete twelve-month periods and it utilizes weather as a predictive variable, it was utilized to forecast single dry-year demands for the region. By inserting annual dry-year weather data into the model and holding all non-weather related predictive variables constant for a given year, the model produces an annual forecast of weather-driven demand. An analysis of historic dry-year events was performed to select a representative year. This analysis evaluated the relative impact of weather (e.g. high temperature and low rainfall) to resulting total water demand, and also the availability of local supplies. Using this criterion, 1989 was selected as the representative single dry-year event. Weather data for 1989 was then run through the model for each five year increment. Projected single dry-year demands are shown in **Table 2-3**.

The Act requires agencies to prepare multiple dry-year demand scenarios every five years for at least 20 years. An analysis of historic water demands reveals that multiple dry-year events may have a compounding effect on demands that is not captured through the modeling of discrete yearly weather patterns. For this reason, the CWA-MAIN model was not directly used to project multiple dry-year demands. Instead, an alternative method which utilized a 7% annual increase in demands was used to develop the multiple dry-year scenarios. This value is supported by the projected yearly increase in demands generated from the CWA-MAIN model single dry-year forecast. The annual 7% factor was applied to the normal year demand estimates to generate the multiple dry-year demand projections shown in **Tables 2-4, 2-5, 2-6, 2-7,** and **2-8.**

Table 2-3: Single Dry-Year Total Water Demand Forecast (5-Year Increments)

NORMAL YEAR	AF/YR
2010	767,650
2015	795,970
2020	825,560
2025	848,610
2030	883,030

Multiple Dry-Year Total Water Demand Forecast
(5-Year Increments)

Table 2-4

YEAR	TOTAL ESTIMATED DEMANDS AF/YR
2006	744,520
2007	749,780
2008	755,030

Table 2-5

YEAR	TOTAL ESTIMATED DEMANDS AF/YR
2011	771,410
2012	777,280
2013	783,150

Table 2-6

YEAR	TOTAL ESTIMATED DEMANDS AF/YR
2116	801,030
2017	807,150
2018	813,270

Table 2-7

YEAR	TOTAL ESTIMATED DEMANDS AF/YR
2121	830,680
2022	835,840
2023	841,010

Table 2-8

YEAR	TOTAL ESTIMATED DEMANDS AF/YR
2026	858,480
2027	865,630
2028	872,770

2.4.3 MEMBER AGENCY IMPORTED DEMAND ON THE WATER AUTHORITY

Table 2-9 shows the Water Authority's historical, current, and projected imported water demands (sales) by member agency. The projected demands were calculated from the baseline demands for each member agency, as forecasted in **Section 2.4**, minus the projected local supplies and conservation savings. Therefore, the projected imported demands (sales) are directly tied to the success of local supply development (**Section 5**) and water conservation savings (**Section 2**). The forecasted sales figures in **Table 2-9**, should not be considered a member agency's allocation of supplies from the Water Authority.

Table 2-9: Member Agency Imported Demand (Sales) on Water Authority (AF) [1,2] (2000 – 2030) Normal Year Forecast

	2000	2005	2010	2015	2020	2025	2030
Carlsbad M.W.D.[3]	19,952	20,155	19,093	0	0	0	0
Del Mar, City of	1,556	1,324	1,370	1,317	1,312	1,321	1,342
Escondido, City of	26,977	25,103	26,122	25,063	25,456	25,942	26,669
Fallbrook P.U.D.	16,824	15,809	16,239	16,276	16,586	17,056	17,402
Helix W.D.	38,483	32,060	35,050	35,533	36,274	37,284	38,348
Oceanside, City of	32,073	31,181	30,088	31,310	31,501	33,039	35,473
Olivenhain M.W.D.	19,433	21,052	19,401	21,059	22,740	25,268	26,606
Otay W.D.	29,901	37,787	43,761	50,337	57,787	64,547	73,097
Padre Dam M.W.D.	21,824	19,246	21,266	22,542	23,690	25,656	27,491
Pendleton MCB	105	834	850	850	850	850	850
Poway, City of	15,625	13,975	16,372	16,890	17,448	17,986	18,317
Rainbow M.W.D.	29,929	25,252	27,146	26,427	26,352	22,878	22,822
Ramona M.W.D.	8,267	10,359	11,858	12,198	12,438	12,638	13,650
Rincon del Diablo M.W.D.	9,119	7,732	8,968	5,471	5,939	6,401	6,905
San Diego, City of	206,433	204,039	197,320	201,109	207,584	217,449	226,821
San Dieguito W.D.	5,112	5,605	4,703	4,730	4,910	5,063	5,118
Santa Fe I.D.	8,056	9,737	11,473	11,437	11,703	12,000	12,103
Sweetwater Authority	5,520	11,331	12,398	10,136	10,546	10,999	12,180
Vallecitos W.D.	16,409	18,150	19,409	19,741	20,365	21,317	22,903
Valley Center M.W.D.	48,550	38,105	43,850	35,751	35,019	30,417	28,212
Vista I.D.	17,123	21,229	17,417	18,389	19,617	21,412	23,197
Yuima M.W.D.	2,849	2,984	2,949	2,929	2,895	2,984	3,053
SUB-TOTAL	580,120	573,049	587,103	569,493	591,012	612,508	642,559
Near-term annexation area demands[4]	0	0	6,455	8,062	8,062	8,062	8,062
TOTAL	580,120	573,049	574,465	577,555	599,074	620,570	650,621

1 Based on SANDAG 2030 Cities/County Forecast.
2 Includes water conservation.
3 For years 2015 – 2030, the Water Authority demand forecast assumes that Carlsbad MWD total demands will be met by local supplies (desalinated seawater and recycled water).
4 Near-term annexation area demands are listed for planning purposes and are not assigned to any specific member agency.

SECTION 3 DEMAND MANAGEMENT

SECTION 3.1 DESCRIPTION

Demand management, or water conservation, is frequently the lowest-cost resource available to the Water Authority and its member agencies. Water conservation is a critical part of the Water Authority's Updated 2005 Plan and long-term strategy for meeting water supply needs of the San Diego region.

The goals of the Water Authority's water conservation program are to:

- Reduce demand for more expensive, imported water;
- Demonstrate continued commitment to the Best Management Practices (BMPs) and Agricultural Efficient Water Management Practices (EWMPs);
- Ensure a reliable future water supply; and
- Reduce consumption during periods of high treated-water demand.

SECTION 3.2 BEST MANAGEMENT PRACTICES

The California Urban Water Conservation Council (CUWCC) was formed in 1991 through a Memorandum of Understanding Regarding Urban Water Conservation in California (MOU). The urban Best Management Practices, or BMPs, for water conservation included in the MOU are intended to reduce California's long-term urban water demands.

Table 3-1 provides an overview of the Water Authority and its member agencies' progress in the implementation of the BMPs. Most member agencies are signatories to the MOU and submit biennial BMP reports to show compliance with the appropriate BMPs. **Appendix D** shows the Water Authority's FY 01, 02, 03, and 04 BMP Reports, as well as the Coverage Reports for FY 04. Major Water Authority activities include actively participating to develop and implement statewide BMPs; participating with member agencies, Metropolitan, the CUWCC, and the American Water Works Association Research Foundation in research and development activities; and implementing public information and education programs.

IMPLEMENTATION OF BMPS

The Water Authority began implementing its aggressive conservation program in 1990. Some of the early programs to address the BMPs provided financial incentives for retrofitting high-water-use toilets with ultra-low-flush models and distributing low-flow showerheads to consumers. Since the program's inception, the Water Authority and its member agencies have provided incentives for the installation of over 528,000 ultra-low-flush toilets (ULFTs). In addition, financial incentives have been provided for the installation of more than 45,100 residential high-efficiency clothes washers (HEWs), 7,600 coin-operated HEWs, 355 cooling tower conductivity controllers, and 3,200 pre-rinse spray valves. The Water Authority, its member agencies, and San Diego Gas & Electric also distributed over half-a-million showerheads to customers.

Since 1990, the Water Authority has invested more than $12 million to help implement these and other conservation programs. In addition, the Water Authority's member agencies have invested a similar amount to co-fund these conservation programs.

The Water Authority's FY 05 budget included $972,000 for conservation programs that are anticipated to save 68,000 AF/YR over the useful life of the measures. The Water Authority's member agencies, Metropolitan, and the DWR augment this funding. In FY 05, this additional funding totaled $4.74 million, bringing the total FY 05 amount budgeted for all conservation programs to $5.7 million.

Financial incentives are offered for commercial high-efficiency washers

The Water Authority provides approximately 20 percent of all conservation funding and manages most of the programs for its member agencies. The Water Authority also administers the Agriculture Water Management Program and CIMIS for agricultural use. **Appendix D**, the CUWCC BMP Reports for FY 01, 02, 03, and 04, contains additional information on implementation of the BMPs by the Water Authority.

Table 3-1: Best Management Practices for Urban Water Conservation in California

BMP	DESCRIPTION	CONSERVATION PROGRAMS	COMPLIANCE [1]	SDCWA Assistance [2]
1	Residential Water Surveys	Residential Survey Program	Yes	Yes
2	Residential Plumbing Retrofit	Showerhead distribution	Yes	Yes
3	Distribution System Water Audits	Water Authority and member agencies independently operate separate system audits	Yes	
4	Metering with Commodity Rates	Member agencies operate	Yes	
5	Large Landscape Programs and Incentives	• Commercial Landscape Incentive Program • Landscape Assistance Program for Business and Home • Protector Del Agua	Yes	Yes
6	High Efficiency Washing Machine (HEW) Rebate Programs	• Residential HEW Voucher Program	Yes	Yes
7	Public Information Program	• Media Coverage • Xeriscape Awards • WebSite • Water Conservation Literature	Yes	
8	School Education Programs	• Classroom Presentations • Splash Science Mobile Lab • Youth Merit Badge Program • Assembly Program • Teaching Garden • Mini-grants of up to $250	Yes	
9	Commercial, Industrial & Institutional (CII) Water Conservation Programs	• CII Voucher Program • Industrial Process Improvement Program	Yes	Yes
10	Wholesale Agency Assistance Programs	Ongoing	Yes	
11	Conservation Pricing	Member agencies operate	Yes	
12	Water Conservation Coordinator	Water Resources staff	Yes	
13	Water Waste Prohibition	Member agencies operate	Yes	
14	Residential Ultra-Low-Flush Toilet (ULFT) Replacement Programs	Residential ULFT Voucher Program	Yes	Yes

1 The Water Authority and one or more of its member agencies comply with the statewide BMPs listed.
2 The Water Authority provides financial assistance to its member agencies to implement conservation programs.

REVENUE IMPACTS

Water conservation is a well-established practice in ensuring that there will be a reliable water supply in the future for the increasing population and commerce of our local region. However, conservation occasionally suffers from the perception that it reduces revenues. Over the long-term, conservation measures actually serve to defer or limit rate increases by reducing the region's need for other, more expensive supplies and increased infrastructure. The Water Authority's FY 05 budget included $972,000 for conservation programs, which represents an average cost of $1.74 per acre-foot of projected water sales during FY 05. Conservation programs also reduce imported water demand that in turn allows the Water Authority to purchase less of Metropolitan's more expensive Tier 2 water. Tier 2 water is more expensive since it represents Metropolitan's cost to develop additional supplies.

SECTION 3.3 FUTURE WATER CONSERVATION SAVINGS

Projected water savings and effectiveness provided in the Updated 2005 Plan are based on industry standard methodologies for calculating savings, as defined by the CUWCC. The Water Authority assists the CUWCC in conducting pilot programs and analyzing ways to increase the accuracy of savings calculation methodologies. Projections show that implementing existing and proposed urban BMPs would produce water savings of approximately 108,396 AF/YR by the year 2030 within the Water Authority's service area (**Table 3-2**).

This conservation target is appropriate to implement the BMPs and fulfill the Water Authority's commitment to the MOU. Additionally, this target coincides with the availability of anticipated funds from member agencies, the Water Authority, and/or Metropolitan. The estimates presented in **Table 3-2** are based on savings projections from implementing various conservation measures and the result of state and national efficiency standards. The table represents a projection of the amount of water that will be conserved based on the best information available at this time.

Future water conservation savings are based on historical activity for Residential Surveys, Residential Retrofits, High-Efficiency Clothes Washer Incentives, and Toilet Incentives. Efficiency Standards include water-saving devices installed in new residential construction as part of state-required codes, as well as toilets replaced through natural replacement

Table 3-2: Potential Water Conservation Savings Through 2030 within the Water Authority Service Area (AF)

Best Management Practices	2005	2010	2015	2020	2025	2030
Existing BMPs						
Residential Surveys	1,620	1,620	1,620	1,620	1,620	1,620
Residential Retrofits	8,100	8,100	8,100	8,100	8,100	8,100
Landscape[1]	3,524	18,484	21,793	24,783	27,744	30,718
Clothes Washer Incentives	495	1,281	1,672	1,672	1,672	1,672
Commercial/Industrial/Institutional	2,260	3,328	5,056	6,801	8,533	10,272
Toilet Incentives	17,553	23,616	23,616	23,616	23,616	23,616
Subtotal	33,551	56,792	61,857	66,593	71,286	75,998
Potential BMPs and Efficiency Standards						
Efficiency Standards[2]	19,837	23,137	25,409	27,526	30,598	32,323
Graywater	0	25	30	40	50	50
On Demand Water Heaters	0	5	10	15	20	25
Subtotal	19,837	23,167	25,449	27,581	30,668	32,398
TOTAL[3]	**53,389**	**79,960**	**87,306**	**94,174**	**101,954**	**108,396**

1 Includes savings from Audits, Artificial Turf, WBIC (residential & commercial), Water Budget, and CLIP programs.
2 Code Compliance: new construction, ULFT natural replacement @ 4%, commercial HEWs natural replacement.
3 Values may not add to exact total due to rounding.

outside of the toilet incentive. Updated SANDAG demographic information is utilized to determine savings for new construction through BMP implementation.

On average, more than 50 percent of the water used in San Diego County goes to outdoor watering, and the savings potential from this irrigation is significant. Landscape savings are based on full implementation of BMP 5, through water budgets, large landscape audits, and irrigation hardware replacements.

Weather-based irrigation controllers provide landscape water savings.

Some of these measures are labor intensive and may be a challenge to achieve due to the limited resources of member agencies.

Water savings in the Commercial, Industrial, and Institutional (CII) sector are based on both historical activity and anticipated new water-efficient products that will experience expanded use. These products include multi-load commercial HEWs, food steamers, commercial dishwashers, and waterless urinals.

Some of the BMPs that are not quantified in **Table 3-2,** such as public information and school education, do not directly result in water savings. Instead, these BMPs result in a decision by a water user to take an action that will result in savings. For example, a water user may learn about the availability of HEWs through a public information program, but water will not be saved until the user installs a new HEW. To avoid double counting, the projected savings from the machine is reflected only in the high-efficiency washing machine BMP.

The Water Authority is a statewide leader of innovative programs in water conservation. Efforts have been so successful, however, that many of the conservation programs implemented in the early 1990s are maturing. Additional measures are now being taken to achieve further water savings, particularly in the CII and landscape sectors.

3.3.1 LANDSCAPE

Additional landscape water savings can potentially be achieved through incentives, regulations, and rates. In 2004, new programs included financial incentives for purchasing and installing self-adjusting, weather-based irrigation controllers, financial incentives to purchase improved efficiency irrigation devices, additional conservation literature, expanded water user efficient irrigation training programs, an artificial turf incentive program, and support for the Water Conservation Garden.

As a result of the passage of the Water Authority-sponsored Assembly Bill 2717, the Landscape Water Conservation Task Force has convened a stakeholders workgroup to evaluate and recommend proposals for improving the efficiency of water use in new and existing urban irrigated landscapes. Potential regulations include the requirement that residential sites have a dedicated water meter for outdoor use and a dedicated water meter for indoor use. Another potential regulation would require homeowners associations to allow water-efficient landscape if desired by the homeowner.

3.3.2 COMMERCIAL, INDUSTRIAL, & INSTITUTIONAL

For the past decade, the Water Authority has used its extensive relationships with manufacturers, suppliers, and contractors to increase participation in the CII Voucher Incentive Program (VIP) with a point-of-purchase service to customers. A number of new water-saving devices have recently been incorporated into the CII Program, including a hospital x-ray processor recirculating system that can save up to 3.2 acre-feet per year per system; water pressurized brooms, which save as much as 50,000 gallons per year per location; and pre-rinse spray valves, which can save up to 50,000 gallons of water annually.

The Industrial Process Improvement Program offers financial assistance to local industries to encourage investment in water saving process improvements. In the future, the Water Authority may consider providing additional funds to qualified projects to maximize water saving possibilities in the commercial, industrial, and institutional sectors. Ever-advancing technologies coupled with an aggressive marketing

plan provides solid foundations for these growing programs.

3.3.3 RESIDENTIAL

Programs, such as the HEW and ULFT VIP that target residential customers, have been highly effective in achieving conservation savings. The Residential ULFT VIP has been effective in encouraging toilet retrofits and is being expanded to serve other markets such as new residential construction. The current program focuses on multi-family sites and incentives for dual-flush toilets to maximize the water savings. Dual-flush toilets have two flushing mechanisms, one for liquid waste (0.8-1.1 gallons per flush) and one for solid matter (1.6 gallons per flush). Each of these toilets saves 2,250 gallons per year more than standard ULFTs.

Dual-flush toilets save 2,250 gallons per year more than standard ULFTs.

The Residential HEW VIP has evolved to encourage consumers to purchase the most water efficient models. Clothes washers eligible for incentives use 65 percent less water than standard washers. This savings will be expanded by further limiting the amount of water used in the washers that are eligible for vouchers. Effective in July 2005, only HEWs with a water efficiency factor of 6.0 or less are eligible for incentives. The water efficiency factor is determined by the amount of water it takes to wash a cubic foot of laundry. The lower the water efficiency factor, the greater the water efficiency of the clothes washer.

Studies for hot-water-on-demand systems are proceeding, and the outcome of those studies will help determine appropriate programs for encouraging the use of these systems in new homes.

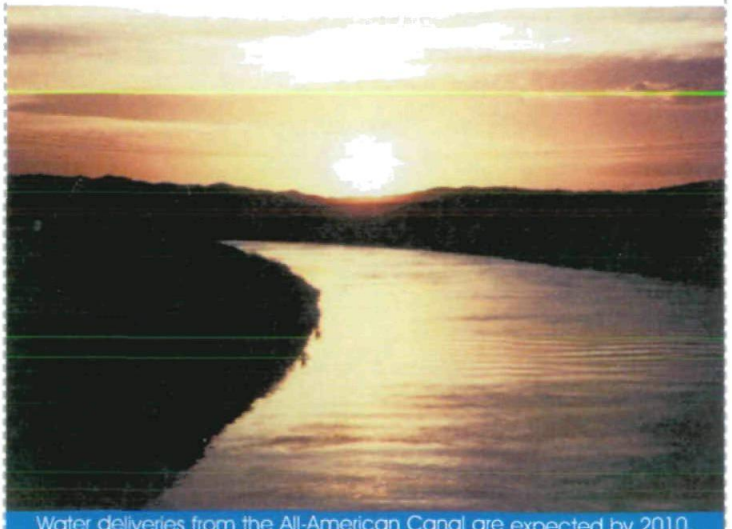
Finally, the Water Authority and its member agencies will continue to cooperate with the CUWCC and Metropolitan to identify future opportunities for water conservation savings.

SECTION 4 SAN DIEGO COUNTY WATER AUTHORITY SUPPLIES

Historically, the Water Authority relied on imported water supplies purchased from Metropolitan to meet the needs of its member agencies. Metropolitan's supplies come from two primary sources, the State Water Project (SWP) and the Colorado River. After experiencing severe shortages from Metropolitan during the 1987-1992 drought, the Water Authority began aggressively pursuing actions to diversify the region's supply sources. Comprehensive supply and facility planning over the last 12 years provided the direction for implementation of these actions.

A Water Resources Plan developed in 1993 and updated in 1997 emphasized the development of local supplies and core water transfers. Consistent with the direction provided in the 1997 Water Resources Plan, the Water Authority entered into a Water Conservation and Transfer Agreement with IID, an agricultural district in neighboring Imperial County, in 1998. Through the transfer agreement, the Water Authority will receive 30,000 AF in 2005, with the volume increasing annually until it reaches 200,000 AF/YR in 2021.

To further diversify regional supplies, the Water Authority's 2000 Plan identified seawater desalination as a potential supply for meeting future demands. In response to the direction provided in the 2000 Plan, the Water Authority Board of Directors approved a Seawater Desalination Action Plan in 2001. More recently, in October 2006, the Water Authority Board of Directors approved the 2006 Desalination Action Plan, which reflects seawater desalination development, including a local supply program of participating Water Authority member agencies rather than an exclusively regional program of the Water Authority (**see Section 4.3.2**).



Water deliveries from the All-American Canal are expected by 2010.

The 2000 Plan identified the need for other competitive imported water sources to meet the demands of the region. In 2003, as part of the execution of the Quantification Settlement Agreement (QSA) on the Colorado River, the Water Authority was assigned rights to 77,700 AF/YR of conserved water from projects to line the All-American and Coachella Canals. Deliveries of this conserved water from the Coachella Canal reached the region in 2007, and deliveries from the All-American Canal are expected to begin by 2010. This section provides specific documentation on the existing and projected supply sources being implemented by the Water Authority.

Construction on the Coachella Canal.

SECTION 4.1 WATER AUTHORITY - IID WATER CONSERVATION AND TRANSFER AGREEMENT

On April 29, 1998, the Water Authority signed a historic agreement with IID for the long-term transfer of conserved Colorado River water to San Diego County. The Water Authority-IID Water Conservation and Transfer Agreement (Transfer Agreement) is the largest agriculture-to-urban water transfer in United States history. Colorado River water will be conserved by Imperial Valley farmers who voluntarily participate in the program and then transferred to the Water Authority for use in San Diego County.

4.1.1 IMPLEMENTATION STATUS

On October 10, 2003, the Water Authority and IID executed an amendment to the original 1998 Transfer Agreement. This amendment modified

certain aspects of the 1998 Agreement to be consistent with the terms and conditions of the QSA and related agreements. It also modified other aspects of the agreement to lessen the environmental impacts of the transfer of conserved water. The amendment was expressly contingent on the approval and implementation of the QSA, which was also executed on October 10, 2003. **Section 6.2.1** contains details on the QSA.

In 2003, the QSA was finalized at a signing ceremony at the Hoover Dam.

On November 5, 2003, IID filed a complaint in Imperial County Superior Court seeking validation of 13 contracts associated with the Transfer Agreement and the QSA. Imperial County and various private parties filed additional suits in Superior Court, alleging violations of the California Environmental Quality Act (CEQA), the California Water Code, and other laws related to the approval of the QSA, the water transfer, and related agreements. The lawsuits have been coordinated for trial. The IID, Coachella Valley Water District, Metropolitan, the Water Authority, and State are defending these suits and coordinating to seek validation of the contracts. Implementation of the transfer provisions is proceeding during litigation. For further information regarding the litigation, please contact the Water Authority's General Counsel.

4.1.2 EXPECTED SUPPLY

Deliveries into San Diego County from the transfer began in 2003 with an initial transfer of 10,000 AF. The Water Authority received 20,000 AF in 2004, 30,000 in 2005, and 40,000 in 2006. The quantities will increase annually to 200,000 AF by 2021, then remain fixed for the duration of the transfer agreement. The initial term of the Transfer Agreement is 45 years, with a provision that either agency may extend the agreement for an additional 30-year term.


Transfer water comes from the Imperial Valley.

During dry years, when water availability is low, the conserved water will be transferred under IID's Colorado River rights, which are among the most senior in the Lower Colorado River Basin. Without the protection of these rights, the Water Authority could suffer delivery cutbacks. In recognition for the value of such reliability, the 1998 contract required the Water Authority to pay a premium on transfer water under defined regional shortage circumstances.

The shortage premium period duration is the period of consecutive days during which any of the following exist:

- a Water Authority shortage;
- a shortage condition for the Lower Colorado River as declared by the Secretary; and
- a Critical Year.

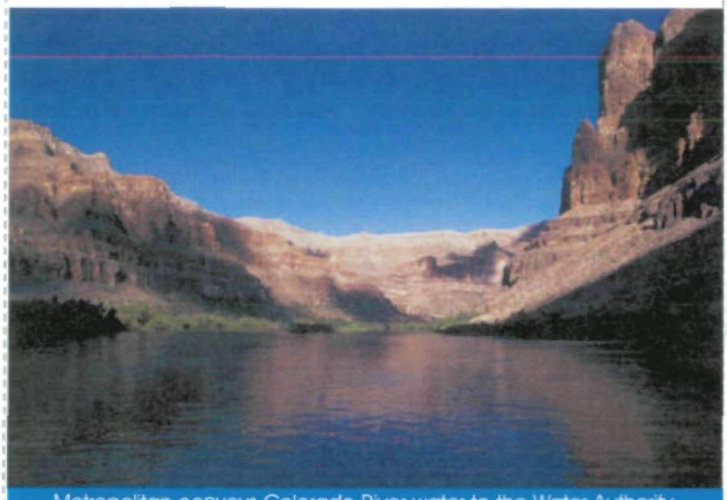
Under terms of the October 2003 amendment, the shortage premium will not be included in the cost formula until Agreement Year 16.

4.1.3 TRANSPORTATION

The Water Authority entered into a water exchange agreement with Metropolitan on October 10, 2003, to transport the Water Authority-IID transfer water from the Colorado River to San Diego County. Under the exchange agreement, Metropolitan will take delivery of the transfer water through its Colorado River Aqueduct. In exchange, Metropolitan will deliver to the Water Authority a like quantity and quality of water. The Water Authority will pay Metropolitan's applicable wheeling rate for each acre-foot of exchange water delivered. According to the water exchange agreement, Metropolitan will make delivery of the transfer water for 35 years, unless the Water Authority elects to extend the agreement another 10 years for a total of 45 years.

4.1.4 COST/FINANCING

The costs associated with the transfer are proposed to be financed through the Water Authority's rates and charges. In the agreement between the Water Authority and IID, the price for the transfer water started at $258/AF and increases by a set amount for the first five years. The 2005 price for transfer water is $276/AF. Procedures are in place to evaluate and determine market-based rates following the first five-year period.



Metropolitan conveys Colorado River water to the Water Authority.

In accordance with the October 2003 amended exchange agreement between Metropolitan and the Water Authority, the initial cost to transport the conserved water was $253/AF. Thereafter, the price would be equal to the charge or charges set by Metropolitan's Board of Directors pursuant to applicable laws and regulation, and generally applicable to the conveyance of water by Metropolitan on behalf of its member agencies. The transportation charge in 2005 is $258/AF.

The Water Authority is providing $10 million to help offset potential socioeconomic impacts associated with temporary land fallowing. IID will credit the Water Authority for these funds during years 16 through 45. At the end of the fifth year of the transfer agreement (2007), the Water Authority will prepay IID an additional $10 million for future deliveries of water. IID will credit the Water Authority for this up-front payment during years 16 through 30.

As part of implementation of the QSA and water transfer, the Water Authority also entered into an environmental cost-sharing agreement. The agreement specifies that the Water Authority will contribute $64 million for the purpose of funding environmental mitigation costs and contributing to the Salton Sea Restoration Fund..

4.1.5 WRITTEN CONTRACTS OR OTHER PROOF

Appendix E contains a list of the specific written contracts, agreements, and environmental permits associated with implementation of the Water Authority-IID Transfer.

4.1.6 EXISTING AND FUTURE SUPPLIES

Based on the terms and conditions in the Transfer Agreement, **Table 4-1** shows the anticipated delivery schedule of the conserved transfer water in 5-year increments. There is adequate documentation to demonstrate the availability of this supply, and therefore, the supply yields shown in **Table 4-1** will be included in the reliability analysis found in **Section 8** of this Updated 2005 Plan.

SECTION 4.2 ALL-AMERICAN CANAL AND COACHELLA CANAL LINING PROJECTS

As part of the QSA and related contracts, the Water Authority was assigned Metropolitan's rights to 77,700 AF/YR of conserved water from projects that will line the All-American Canal (AAC) and Coachella Canal (CC). The projects will reduce the loss of water that currently occurs through seepage, and the conserved water will be delivered to the Water Authority. This conserved water will provide the San Diego region with an additional 8.5 million acre-feet over the 110-year life of the agreement.

Table 4-1: Existing and Projected Water Authority – IID Transfer Supplies

YEAR	AF/YR
2005	30,000
2010	70,000
2015	100,000
2020	190,000
2025	200,000
2030	200,000

4.2.1 IMPLMENTATION STATUS

Earthwork for the Coachella Canal lining project began in November 2004, and involves approximately 37 miles of canal. National Environmental Policy Act (NEPA) and CEQA documentation is complete, including an amended Record of Decision by the U.S. Bureau of Reclamation (USBR). The amendment was required after revising the project design: instead of

lining the canal in place, the project entailed the construction of a parallel canal. The project was completed in 2006, and deliveries of conserved water started in 2007.

Construction on the All-American Canal lining project began in 2007.

Preliminary design-related activities have begun on the AAC lining project, including ground and aerial surveying, mapping cultural resources, and geotechnical investigations. The lining project consists of constructing a concrete-lined canal parallel to 24 miles of the existing AAC from Pilot Knob to Drop 3. NEPA and CEQA documentation is complete, environmental mitigation measures have been identified, and Endangered Species Act consultations are pending. Construction of the project is expected to be completed in 2010.

Coachella Canal lining construction

In July 2005, a lawsuit (*CDEM v United States*, Case No. CV-S-05-0870-KJD-PAL) was filed in the U. S. District Court for the District of Nevada on behalf of U.S. and Mexican groups challenging the lining of the AAC. The lawsuit, which names the Secretary of the Interior as a defendant, claims that seepage water from the canal belongs to water users in Mexico. California water agencies note that the seepage water is actually part of California's Colorado River allocation and not part of Mexico's allocation. The plaintiffs also allege a failure by the United States to comply with environmental laws. Federal officials have stated that they intend to vigorously defend the case.

4.2.2 EXPECTED SUPPLY

The AAC lining project will yield 67,700 AF of Colorado River water per year for allocation upon completion of construction. The CC lining project will yield 26,000 AF of Colorado River water each year available for allocation upon completion of construction. The October 10, 2003 Allocation Agreement states that 16,000 AF/YR of conserved canal lining water will be allocated to the San Luis Rey Indian Water Rights Settlement Parties. The remaining amount, 77,700 AF/YR, will be available to the Water Authority. According to the Allocation Agreement, IID has call rights to a portion (5,000 AF/YR) of the conserved water upon termination of the QSA for the remainder of the 110 years of the Allocation Agreement and upon satisfying certain conditions. The term of the QSA is for up to 75 years.

4.2.3 TRANSPORTATION

The October 10, 2003, Exchange Agreement between the Water Authority and Metropolitan also provides for the delivery of the conserved water from the canal lining projects. The Water Authority will pay Metropolitan's applicable wheeling rate for each acre-foot of exchange water delivered. In the Exchange Agreement, Metropolitan will deliver the canal lining water for the term of the Allocation Agreement (110 years).

4.2.4 COST/FINANCING

Under California Water Code Section 12560 et seq., the Water Authority will receive $200 million in state funds for construction of the projects. In addition, under California Water Code Section 79567, $20 million from Proposition 50 is also available for the lining projects. Additionally, the Water Authority will receive $35 million for groundwater conjunctive use projects as part of the agreement. The Water Authority would be responsible for additional expenses above the funds provided by the state.

The rate to be paid to transport the canal lining water will be equal to the charge or charges set by Metropolitan's Board of Directors pursuant to applicable law and regulation and generally applicable to the conveyance of water by Metropolitan on behalf of its member agencies.

In accordance with the Allocation Agreement, the Water Authority will also be responsible for a portion of the net additional Operation, Maintenance, and Repair (OM&R) costs for the lined canals. Any costs associated with the lining projects as proposed, are to be financed through the Water Authority's rates and charges.

4.2.5 WRITTEN CONTRACTS OR OTHER PROOF

Appendix E contains a list of the specific written contracts, agreements, and environmental permits associated with implementation of the canal lining projects.

4.2.6 FUTURE SUPPLIES

Table 4-2 shows the anticipated delivery schedule of conserved supplies from the canal lining projects in 5-year increments. Adequate documentation exists to demonstrate the availability of this supply, and therefore, the reliability analysis found in **Section 8** of this Updated 2005 Plan will show the supply yields shown in **Table 4-2**.

Table 4-2: Projected Supply from Canal Lining Projects (AF/YR)

Year	CC Lining Project[1]	AAC Lining Project[2]	TOTAL
2005	0	0	0
2010	21,500	56,200	77,700
2015	21,500	56,200	77,700
2020	21,500	56,200	77,700
2025	21,500	56,200	77,700
2030	21,500	56,200	77,700

1 The project was completed in 2006, and deliveries started in 2007.
2 The estimated completion date is 2010.

SECTION 4.3 WATER AUTHORITY SEAWATER DESALINATION PROGRAM

The development of seawater desalination in San Diego County will assist the region in diversifying its water resources, reducing dependence on imported supplies, and providing a new drought-proof treated water supply.

The Water Authority has been evaluating seawater desalination as a potential highly reliable local water resource since the early 1990s. From 1991 to 1993, the Water Authority conducted detailed studies on the feasibility of developing a seawater desalination facility at the South Bay Power Plant in the City of Chula Vista and the Encina Power Station in the City of Carlsbad. During that period, the Water Authority also participated in a study for a desalination plant that would be sited at a power plant in Rosarito Beach, Mexico. The studies concluded that the environmental, regulatory, and cost issues combined to make desalinated seawater more expensive than other available water resources options.

Seawater desalination is a potential supply for meeting water demands.

Data gathered from recently completed projects worldwide seem to indicate that the cost of seawater desalination has decreased since the Water Authority completed its last study in 1993. This decrease is mainly due to significant technological advances in the development and manufacture of membranes. The reverse osmosis (RO) membranes used in the desalination process cost approximately half the price and are twice as productive as membranes produced ten to fifteen years ago.

Based on the potential reduction in project costs, the Water Authority's 2000 Plan identified seawater desalination as a potential supply for meeting future demands. In response to the direction provided in the 2000 Plan, the Water Authority's Board approved a Seawater Desalination Action Plan in January 2001. The 2001 Action Plan covered activities related to the evaluation of seawater desalination opportunities along the San Diego County coastline.

In June 2004, following the Water Authority's RWFMP process, the Water Authority Board of Directors approved adding $668 million to the CIP to develop a desalinated seawater supply at the Encina Power Station. However, due to uncertainties regarding the site owner's facility plans at the Encina Power Station and disparity in negotiations with the plant's private

developer, the Water Authority Board of Directors, in July 2006, decided not to certify the final environmental impact report for the regional project and not to pursue the project further.

4.3.1 REGIONAL SEAWATER DESALINATION

Even with the Water Authority Board of Director's action in July 2006, seawater desalination remains a key component of the Water Authority's diversification strategy. This Plan includes a goal of 56,000 acre-feet of local seawater desalination (see **Section 5.4**) that is expected to come from the local project at the Encina Power Station beginning in 2011, as well as a long-term regional goal of an additional 33,600 acre-feet by 2020.

In October 2006, the Water Authority Board of Directors approved the 2006 Desalination Action Plan. The plan focuses on quantifying and evaluating other local and regional water supply opportunities that can help to meet the anticipated goal of 89,000 acre-feet of new local and regional seawater desalination supplies by 2030. Given the importance of seawater desalination to San Diego county, the action plan also requires that the Water Authority stay actively engaged in the pursuit of external funding for desalination and the statewide policy debate regarding the implementation of seawater desalination as a significant new water supply for California.

4.3.2 DESALINATION ACTION PLAN

The 2006 Desalination Action Plan consists of the following elements:

COMPLETE SAN ONOFRE/ CAMP PENDLETON REGIONAL DESALINATION FEASIBILITY STUDY

The Water Authority is currently preparing a detailed feasibility study of a 50-100 mgd desalination facility located along the coastline of Marine Corps Base Camp Pendleton. The majority of the cost of the study is being funded by federal appropriation grant funding and Proposition 50 state grant funding. The study scope of work is being modified in response to changes in site conditions.

The San Onofre Nuclear Generating Station

EVALUATE OTHER POTENTIAL REGIONAL SEAWATER DESALINATION PROJECTS

In addition to Encina and Camp Pendleton, there are other potential regional project sites that could warrant further evaluation such as South County. With the South Bay Power Plant currently planned to be replaced with an air-cooled power plant and the environmental sensitivity of south San Diego Bay, it is unlikely that a desalination plant could be sited adjacent to the bay. However, other projects identified in the Feasibility Study of Seawater Desalination Development Opportunities for the San Diego/ Tijuana Region, completed by the Water Authority in March 2005, may warrant further attention. These projects include a site located adjacent to the International Boundary and Water Commission Treatment Plant on the U.S. side of the border that would utilize the International Outfall for concentrate discharge. The project could potentially provide up to 25 mgd to serve demand in the South County. The study also identified a potential project in Mexico located at the Rosarito Power Plant. There are planning activities occurring in Mexico related to a project at that location.

Environmental impacts are being studied.

EXPLORE AND QUANTIFY THE POTENTIAL TO DEVELOP SMALLER LOCAL SEAWATER DESALINATION AND BRACKISH WATER DESALINATION PROJECTS

Until now, the focus of the Water Authority's effort to implement desalination has been the development of larger, regional projects, with a capacity greater than 25 mgd. This is due to the economies of scale present at larger desalination facility sizes. However, smaller member agency-driven brackish and seawater desalination projects could also help to meet the regional need for new water supplies.

For example, the city of Oceanside recently released a request for proposals for a seawater desalination

pilot facility and feasibility study. The purpose of the study is to develop accurate production and treatment data to facilitate the implementation of a 5-10 mgd seawater desalination project at the Mission Basin Groundwater Purification Facility Site. Feedwater for the project would come from extraction wells located at the mouth of the San Luis Rey River. Another local project example would be the development of a new, brackish desalination project in South County. The Sweetwater Authority was recently awarded Proposition 50 funds to study the feasibility of an Otay River brackish groundwater desalination project. With Proposition 50 funds also recently awarded to the Water Authority to study a regional concentrate conveyance pipeline in the South County, the opportunity exists to consider potential integration of these facilities with a proposed regional seawater desalination facility at the border.

Both of these potential projects highlight the potential to integrate local seawater desalination projects with existing or proposed groundwater desalination projects. By integrating these facilities together, the potential joint use of product water conveyance and concentrate discharge pipelines could significantly improve the economics of these facilities.

CONTINUE WATER AUTHORITY'S EFFORTS TO SECURE OUTSIDE FUNDING FOR SEAWATER DESALINATION PROJECTS

Past experience in developing local supplies illustrates the importance of external funding as a catalyst to project implementation. Through federal, state, and local funding partnerships, the risk of project development is shared along with the benefits of new supplies for California. These partnerships also minimize the cost to local ratepayers. For example, almost $95 million in federal Title XVI funds have gone to water recycling projects in San Diego County and have been instrumental in their implementation. To date, the Water Authority has received $985,026 in federal grant funding for its seawater desalination program, as well as $250,000 in state funding through Proposition 50.

The Water Authority is actively working to secure external funding from Metropolitan's Seawater Desalination Program. The funding would provide a $250 per AF incentive for its member agencies that have contracted for water purchases from the privately-owned Carlsbad Desalination Project currently being developed at the Encina Power Station. The Water Authority is also a member of the New Water Supply Coalition, formerly the U.S. Desalination Coalition. The purpose of the coalition is to pass federal legislation that would provide for the issuance of federal tax credit bonds for desalination, water recycling, and groundwater remediation projects.

Seawater desalination will play an important role in San Diego's future.

CONTINUE TO ADVOCATE FOR SEAWATER DESALINATION AT THE STATEWIDE LEVEL

Development of new supplies in California has always had a significant regulatory and legislative component in order to create a climate conducive to project implementation. Since the Water Authority first renewed its pursuit of seawater desalination as a water supply for San Diego County in 2001, it has been engaged in efforts both locally and statewide to facilitate the implementation of seawater desalination in California.

The Water Authority is working to facilitate the development of the privately-owned Carlsbad Desalination Project, including supporting the permitting of the project through state regulatory agencies such as the California Coastal Commission and the State Lands Commission. The Water Authority also participated on the State Desalination Task Force and currently is working with other Metropolitan member agencies developing seawater desalination projects to advocate for science-based and site-specific regulation for seawater desalination projects. This effort is focused on key state

permitting agencies including the State Water Resources Control Board and the California Coastal Commission. The Water Authority is also working with the Association of California Water Agencies (ACWA) Desalination Subcommittee to ensure that its policies are properly focused on ensuring the successful implementation of seawater and brackish water desalination projects in California. Continuation of this effort is important to assuring that the Water Authority maintains its options and flexibility with regard to future desalination project intake configuration.

4.3.3 WATER AUTHORITY SEAWATER DESALINATION PROGRAM GOAL

The Water Authority is currently focusing its efforts on the actions outlined in the Desalination Action Plan. Because seawater desalination will play an important role in both the near-term and long-term, the Water Authority established a long-term goal for future development of this supply. The goal for the Water Authority's Regional Seawater Desalination Program is 33,600 AF/YR starting in 2020, and continuing at this level through the 2030 planning period.

SECTION 4.4 SUMMARY OF WATER AUTHORITY SUPPLIES

Table 4-3 shows the documented Water Authority supplies existing and currently planned to assist in meeting future demands within the Water Authority's service area. In 2005, the Water Authority's IID transfer water accounted for 30,000 AF of supply. By 2030, deliveries of water from the IID transfer and AAC and CC Lining Projects will provide an expected supply of 277,700 AF/YR. The expected Water Authority supplies from **Table 4-3** are utilized in the reliability analysis included in **Section 8**.

Table 4-3: Projected Water Authority Supplies (AF/YR)

	2005	2010	2015	2020	2025	2030
IID Water Transfer	30,000	70,000	100,000	190,000	200,000	200,000
All-American Canal Lining Project	0	56,200	56,200	56,200	56,200	56,200
Coachella Canal Lining Project	0	21,500	21,500	21,500	21,500	21,500
TOTAL WATER AUTHORITY SUPPLIES	**30,000**	**147,700**	**177,700**	**267,700**	**277,700**	**277,700**

SECTION 5 MEMBER AGENCY SUPPLIES

Local resources developed and managed by the Water Authority's member agencies are critical to securing a diverse and reliable supply for the region. Local projects, such as recycled water and groundwater recovery, reduce demands for imported water and often provide agencies with a drought-proof supply. This section provides general information on the local resources being developed and managed by the member agencies. These supplies include surface water, groundwater, recycled water, and desalinated seawater.

The Water Authority, working closely with its member agencies, took the following steps to update the anticipated yields from the member agencies' local supplies:

1. Provided the member agencies with the projected supply numbers included in the Water Authority's 2000 Plan and requested they update the figures for their specific project(s);
2. Prepared revised projections based on input from agencies;
3. Separated the recycled water, groundwater, and seawater desalination projects into two categories, "verifiable" and "other potential projects," based on the likelihood of development. "Verifiable" projects are those with adequate documentation regarding implementation and supply utilization. "Other potential projects" are not far enough along in the planning process, but they are included with the verifiable projects to form an Updated 2005 Plan water supply goal;
4. Presented revised supply numbers to member agencies at several meetings and requested input; and
5. Distributed administrative draft of the 2005 Plan to member agencies for their review, providing them another opportunity to review and revise the updated local supply figures prior to the Water Authority's Board of Directors' approval.

Before 1947, the San Diego region relied on local surface water runoff in normal and wet weather years and on groundwater pumped from local aquifers during dry years when stream flows were reduced. As the economy and population grew, local resources became insufficient to meet the region's water supply needs. From the 1950s onward, the region became increasingly reliant on imported water supplies. Since 1980, a range of 5 to 36 percent of the water used within the Water Authority's service area has come from local sources, primarily from surface water reservoirs with yields that vary directly with annual rainfall. A small but growing share of local supply comes from recycled water and groundwater recovery projects, with additional local supply planned from seawater desalination. Yield from these projects are considered drought-proof since they are primarily independent of precipitation. In FY 2005, total local water sources provided eleven percent of the water used in the Water Authority's service area.

SECTION 5.1 SURFACE WATER

5.1.1 DESCRIPTION

Seven watersheds in San Diego County contain water supply reservoirs. These watersheds start at the crest of the Peninsular Range and drain into the Pacific Ocean. Runoff within these watersheds is largely developed. The oldest functional reservoir in the county, Cuyamaca Reservoir, was completed in 1887. The Olivenhain Reservoir, completed in 2003, is the region's newest. It is part of the Water Authority's ESP and has a storage capacity of 24,789 AF. Twenty-five surface reservoirs with a combined capacity of 593,915 AF are located in the Water Authority's service area (**Table 5-1**). **Figure 5-1** shows the location of local reservoirs.

5.1.2 ISSUES

MANAGEMENT

Managing the region's reservoir system to achieve the optimal use of local and imported water is an important element of resources planning. Local surface water supplies can offset dry-year shortfalls in imported water. However, water use records indicate that local reservoirs are generally operated to maximize the use of local supplies in wet and normal years in order to reduce the need for imported water purchases. While this mode of reservoir operation reduces losses due to evaporation and spills, it also results in increased demands for imported water during dry years when imported water is more likely to be in short supply. Most member agencies also maintain a portion of their storage capacity for emergency storage. Many local reservoirs could be operated to maintain carryover storage, but this practice would tend to decrease their average annual yield. An environmental analysis of dedicated carryover storage capacity is being evaluated as part of the expansion of the San Vicente Reservoir, which is being implemented under the ESP. The RWFMP identified carryover storage as necessary to supplement supplies during dry weather events and to maximize the efficient use of existing and planned infrastructure.

Major San Diego County Reservoirs

Figure 5-1

Table 5-1: Major San Diego County Reservoirs

MEMBER AGENCY		RESERVOIR	CAPACITY(AF)
Carlsbad M.W.D.	♦	Maerkle	600
Escondido, City of	♦	Dixon	2,606
Escondido, City of		Wohlford	6,506
Fallbrook P.U.D.	♦	Red Mountain	1,335
Helix W.D.		Cuyamaca	8,195
Helix W.D.	♦	Jennings	9,790
Poway, City of	♦	Poway	3,330
Rainbow M.W.D.	♦	Beck	625
Rainbow M.W.D.	♦	Morro Hill	465
Ramona M.W.D.	♦	Ramona	12,000
San Diego, City of		Barrett	37,947
San Diego, City of[1]	♦	El Capitan	112,807
San Diego, City of[2]		Hodges	33,550
San Diego, City of	♦	Lower Otay	49,510
San Diego, City of	♦	Miramar	7,185
San Diego, City of		Morena	50,207
San Diego, City of	♦	Murray	4,818
San Diego, City of	♦	San Vicente	90,230
San Diego, City of		Sutherland	29,685
San Dieguito W.D./ Santa Fe I.D.	♦	San Dieguito	883
SDCWA/Olivenhain M.W.D.	♦	Olivenhain	24,789
Sweetwater Authority		Loveland	25,387
Sweetwater Authority	♦	Sweetwater	28,079
Valley Center M.W.D.		Turner	1,612
Vista I.D.		Henshaw	51,774
TOTAL CAPACITY			593,915

♦Connected to Water Authority's aqueduct system.

1 Imported water can be delivered via San Vicente.
2 System connection is part of the Emergency Storage Project.

WATER QUALITY

See **Section 7** for water quality information.

5.1.3 ENCOURAGING OPTIMIZATION OF LOCAL SURFACE WATER RESERVOIRS

To optimize the use of local storage, the Water Authority and its member agencies participate in Metropolitan's Surface Storage Operating Agreement (SSOA). The SSOA, initiated in October 2003, allows Metropolitan to store up to 70,000 AF/YR of water in the Water Authority's member agency reservoirs. The water is placed into storage in the winter months when demand is low and pipeline capacity is available, and withdrawn by the member agencies in the summer months when demand increases and pipeline capacity is restricted due to increased demands. Benefits of the SSOA include decreased peak demands on the Skinner Treatment Plant, enhancement of local storage operations, and a credit on the member agency's invoice when water is withdrawn from the reservoir by the member agency. Up to 32 percent of the regional water demands have been met in the peak demand months utilizing SSOA water.

5.1.4 PROJECTED SURFACE WATER SUPPLIES

Surface water supplies represent the largest single local resource in the Water Authority's service area. However, annual surface water yields can vary substantially due to fluctuating hydrologic cycles. Since 1980, annual surface water yields have ranged from a low of 24,000 AF to a high of 174,000 AF. Planned ESP projects are expected to increase local yield due to the more efficient use of local reservoirs; the volume has not been determined. Based on information provided by the Water Authority's member agencies, the local surface water supplies are assumed to have an average annual yield of 59,649 AF.

A list of the individual reservoirs, expected yield and basis for the supply figure can be found in **Appendix F, Table F-1. Table 5-2** shows the projected average surface water supply within the Water Authority's service area. Specific information on the projected yields from local reservoirs is expected to be included in the member agencies' 2005 Plans.

Table 5-2: Projected Water Supply (Normal Year – AF/YR)

YEAR	WATER SUPPLY AF/YR
2005[1]	45,521
2010	59,649
2015	59,649
2020	59,649
2025	59,649
2030	59,649

1 Based on FY 2005 totals.

SECTION 5.2 GROUNDWATER

Groundwater is being used to meet demands throughout the Water Authority's service area, from the City of Oceanside in the north to National City in the south. This section provides a general description of groundwater development within the Water Authority's service area, the issues associated with development of this supply, and projected regional yield. Specific information required under the Act on groundwater basins and projects is expected to be included in the member agencies' 2005 Plans.

5.2.1 DESCRIPTION

Agencies within the Water Authority's service area used approximately 17,844 AF of groundwater in FY 2005, which is lower than the average due to an extended period of low rainfall, which resulted in limited natural recharge into the basins. In fact, over the last five years groundwater production used to meet potable demands has been below average at about 17,000 AF/YR. Many private well owners also draw on groundwater to help meet their domestic water needs, which helps to offset demand for imported water. The amount of groundwater pumped by private wells is significant, but to date has not been accurately quantified.

Groundwater production in the Water Authority's service area is limited by a number of elements, including lack of storage capacity in local aquifers, availability of groundwater recharge, and degraded water quality. Narrow river valleys filled with shallow sand and gravel deposits are characteristic of the most productive groundwater basins in the San Diego region. Outside of the principal alluvial aquifers and farther inland, groundwater occurs in fractured crystalline bedrock and semi-consolidated sedimentary deposits where yield and storage are limited and the aquifers are best suited for lower-yielding domestic water supply wells. **Figure 5-2** shows the location of the principal alluvial groundwater basins located within the Water Authority's service area.

Although groundwater supplies are less plentiful in the San Diego region than in some other areas of California, such as the Los Angeles Basin in Southern California and the Central Valley in Northern

Figure 5-2

California, the Water Authority believes that sufficient undeveloped supplies exist that could help meet a greater portion of the region's future water supply and storage needs. Several agencies within the Water Authority's service area have documented potential projects that could provide an additional 21,400 AF/YR of groundwater production in the coming years. Existing, planned and potential projects can be grouped into the following three categories:

GROUNDWATER EXTRACTION AND DISINFECTION PROJECTS

These projects are generally located in basins with higher water quality levels, where extracted groundwater requires minimal treatment for use as a potable water supply. Examples of this type of groundwater project include projects currently operated by MCB Camp Pendleton, Yuima MWD, and the Sweetwater Authority (National City Well Field). Another high yielding basin is the upper San Luis Rey, which provides groundwater supplies to the Vista Irrigation District and City of Escondido and is operated in conjunction with surface water supplies. The unit cost of water produced from simple groundwater extraction and disinfection projects is generally well below the cost of imported water. Because most of the higher quality groundwater within the Water Authority's service area is already being fully utilized, a relatively small amount of this "least cost" groundwater is available for new supplies. However, these basins are good candidates for conjunctive-use operations, which can significantly increase the average annual production rate of groundwater.

BRACKISH GROUNDWATER RECOVERY PROJECTS

Groundwater that is high in Total Dissolved Solids (TDS) is typically found in basins that have been impacted by imported-water irrigation or by seawater intrusion resulting from the historical overdraft of coastal basins. Brackish groundwater recovery projects use desalination technologies, principally reverse osmosis, to treat extracted groundwater to potable water standards. The City of Oceanside's 6.37-mgd capacity Mission Basin Desalter and the Sweetwater Authority's existing 4.0-mgd Richard A. Reynolds Groundwater Desalination Facility are two currently operating brackish groundwater recovery projects in the Water Authority's service area. Unit costs for brackish groundwater recovery projects are considerably higher than those for simple groundwater extraction projects due to the additional treatment requirements, including concentrate disposal needs. However, where economical options exist for disposal of brine, this type of groundwater project has proven to be an economically sound water supply option.

GROUNDWATER RECHARGE AND RECOVERY PROJECTS

Artificial recharge and recovery projects, or conjunctive-use projects, improve groundwater basin yields by supplementing natural recharge sources with potable or recycled water, and/or inducing additional natural recharge. These projects can supply stored water to the region if imported deliveries are limited due to supply and facility constraints. The Water Authority and City of Oceanside completed a study in 2005 that evaluated the potential for a conjunctive-use project in the Mission Basin. Results from the study indicate that use of the basin for recharge and recovery may be limited due to the impact on sensitive riparian habitat and costs for recharge facilities. Oceanside plans to complete expansion of its existing demineralization facility and then monitor groundwater levels in the basin prior to proposing development of a potential conjunctive-use project. The study approach and information generated by this conjunctive-use study is being made available to other agencies within the Water Authority's service area considering development of such a project. Refer to **Section 5.2.3** for additional information on the study.

The City of Oceanside's groundwater desalter

5.2.2 ISSUES

Local agencies must consider a number of issues when developing groundwater projects, including economic and financial considerations, legal, institutional, regulatory, environmental, and water quality issues. These issues can limit the amount of groundwater development in San Diego County.

Please see **Section 5.3.4** for information on the Water Authority's Financial Assistance Program funding opportunities for facility planning, feasibility investigations, preliminary engineering studies, environmental impact reports, and research projects related to groundwater development.

ECONOMIC AND FINANCIAL CONSIDERATIONS

Because of the saline nature of the groundwater basins in San Diego County, the cost of groundwater development usually includes demineralization, which can be costly to construct and operate. One of the more costly elements is the facility necessary to dispose of the brine generated from the treatment process. To address this element, the United States Bureau of Reclamation (USBR), in coordination with numerous public agencies including the Water Authority, is conducting a multiyear planning study to evaluate brine concentrate management and disposal technologies.

INSTITUTIONAL, LEGAL, AND REGULATORY ISSUES

Institutional and legal issues can also impact project development. Because most basins involve multiple water agencies and numerous private wells, water rights are a concern. Agencies are often reluctant to implement groundwater development projects unless jurisdiction and water rights issues are resolved beforehand.

Uncertainty over future regulatory requirements for drinking water supplies can pose another barrier to project development. When developing facilities and compliance plans for groundwater recharge projects, agencies must take into account proposed or potential regulatory changes related to water quality issues. Some of the regulations for which changes are expected over the next decade include state and federal drinking water standards and California Department of Health Services groundwater recharge regulations.

ENVIRONMENTAL REGULATORY CONSTRAINTS

Regulatory issues related to environmental protection are common to many of the groundwater projects proposed within the Water Authority's service area. These issues include potential impacts to endangered species and groundwater-dependent vegetation. Impacts may occur if a project results in seasonal or long-term increases in the depth of the groundwater. Although potential environmental impacts can generally be mitigated, mitigation costs can reduce the cost-effectiveness of a project. Concentrate disposal requirements for brackish groundwater recovery projects can also constrain projects sited in inland basins without access to an ocean outfall.

Sweetwater Authority's demineralization facility

WATER QUALITY

See **Section 7** for water quality information.

5.2.3 PROJECTED GROUNDWATER SUPPLIES

The Water Authority worked closely with its member agencies to determine the projected yield from existing and planned groundwater projects. **Table 5-3** shows the estimated annual yield from groundwater projects in 5-year increments, based on the implementation schedules provided by the member agencies and the likelihood of development. The reliability analysis found in **Section 8** of this Updated 2005 Plan includes these projected supply yields. **Table F-2, Appendix F,** contains a detailed list of the projects and projected supplies.

Table 5-3: Projected Groundwater Supply (Normal Year – AF/YR)

YEAR	WATER SUPPLY AF/YR
2005[1]	17,844
2010	28,575
2015	30,345
2020	31,175
2025	31,175
2030	31,175

1 Based on FY 2005 totals.

Table 5-3 shows the increase in groundwater production from the current yield of 17,844 AF/YR resulting from the expansion of projects operated by the Sweetwater Authority and the City of Oceanside. To achieve this increase in groundwater yield, funding assistance is critical, as is overcoming the regulatory constraints associated with development.

The City of Oceanside anticipates that its proposed 6.37 mgd Mission Basin Desalter (4.0-mgd expansion) will be completed by the end of the year 2006. The project will include the development of the estimated remaining "safe yield" of the basin through expansion of the existing demineralization facility. The Sweetwater Authority is participating in studies with the United States Geological Survey to evaluate the San Diego Formation Aquifer and make safe use of the available yield from the aquifer.

REGIONAL GROUNDWATER GOAL

Maximizing groundwater development is critical to diversifying the region's water supply portfolio. Beyond the verifiable yield included in **Table 5-3**, the member agencies are considering developing an estimated 21,400 AF/YR of additional yield by 2030. These projects are generally not expansions of existing projects and are still in the planning and/or conceptual stage. Funding assistance and overcoming regulatory constraints is critical to the development of this additional supply. **Table F-2, Appendix F,** includes a list of the projects. When these projects become more certain, they will be included in future updates of the Water Authority's Urban Water Management Plan.

To highlight the importance of maximizing groundwater supplies within the region, a regional groundwater goal has been established: 52,575 AF/YR by 2030, in combination with the yields shown in **Table 5-3**.

CONJUNCTIVE-USE

As mentioned above, conjunctive-use projects can supply stored water to the region if imported deliveries are limited due to supply and/or facility constraints. The City of San Diego, Otay Water District, Olivenhain Municipal Water District, and the City of Oceanside are considering developing conjunctive-use projects in the future. **Table F-2, Appendix F,** includes the estimated potential storage yield from these projects. If developed, they could provide 17,450 AF/YR of storage yield for the region by 2030.

Because the imported conjunctive-use projects produce minimum amounts of new yield, the regional reliability analysis in **Section 8** does not include the supply figures. In addition, the projects are still in the conceptual and/or planning stages.

Results from the Lower San Luis Rey River Valley Groundwater Storage and Recovery Feasibility Study, prepared by the Water Authority in conjunction with the City of Oceanside, also identifies significant constraints to the development of groundwater conjunctive-use projects in San Diego County.

These constraints relate to the following:

- Cost to install infrastructure to deliver and extract the recharge water;
- Injecting higher quality imported water into brackish basins and then having to demineralize the water when it is extracted;
- Potential impact on sensitive riparian habitat; and
- Lack of opportunities for spreading basins.

SECTION 5.3 WATER RECYCLING

A fundamental element to developing a diverse supply mix for the region and to using existing water supplies more efficiently is through implementation of water recycling projects. This section provides a general description of recycled water development within the Water Authority's service area, the issues associated with developing this supply, and projected regional yield. Documentation on specific existing and future recycling projects is expected to be in the 2005 Plans for those agencies that include water recycling as a supply. The Water Authority coordinated the preparation of this section with its member agencies and those wastewater agencies that operate water recycling facilities within the Water Authority's service area.

5.3.1 DESCRIPTION

Water recycling is the treatment and disinfection of municipal wastewater to provide a water supply suitable for non-drinking purposes. Agencies in San Diego County use recycled water to fill lakes, ponds, and ornamental fountains; to irrigate parks, campgrounds, golf courses, freeway medians, community greenbelts, school athletic fields, food crops, and nursery stock; and to control dust at construction sites. Recycled water can also be used in certain industrial processes and for flushing toilets and urinals in non-residential buildings. As an example, the detention facility in the Otay Mesa area of San Diego County is dual-plumbed to allow use of recycled water for toilet and urinal flushing. However, current regulations allow only new buildings to be dual-plumbed for this specific use. Additional uses for recycled water are being identified and approved as local agencies and regulators become comfortable with its use.

5.3.2 ISSUES

Local agencies must consider a number of issues when developing recycled water projects, including economic and financial considerations, regulatory, institutional, public acceptance, and water quality concerns related to unknown or perceived health and environmental risks. These issues, if unresolved, can limit the amount of wastewater recycled in San Diego County. In fact, the impact from the challenges associated with recycled water are apparent when comparing the 2005 recycled water projections from the Water Authority's 2000 Plan (33,400 AF) to actual FY 2005 recycled water demand (11,479 AF). The following sections discuss some of the specific challenges associated with recycled water development.

General Atomics uses recycled water in its pond.

ECONOMIC AND FINANCIAL CONSIDERATIONS

The capital-intensive cost of constructing recycled water projects has traditionally been a barrier to project implementation. The up-front capital costs for construction of treatment facilities and recycled water distribution systems can be high, while full market implementation is usually phased in over a number of years, resulting in very high initial unit costs that affect cash flow in the early project years.

Costs associated with converting existing potable water customers to recycled water customers have also proved challenging. This situation is compounded by the seasonal nature of recycled water demands and the lack of large industrial water users in San Diego County that can use recycled water. The lack of sizeable opportunities for groundwater recharge storage compounds this situation. Recycled water demands tend to peak during the hot summer months and drop off during the winter

months when landscape irrigation demands are low. Projects that serve a large portion of irrigation demands, like the majority of the projects in the Water Authority's service area, often use only half of their annual production capacity due to these seasonal demand patterns. The costs of these projects tend to be higher than those of projects that serve year-round demands, since the project facilities must be sized to accommodate seasonal peaking. Projects that serve mostly irrigation demands also tend to have less stable revenue bases since irrigation demands are heavily influenced by hydrologic conditions.

To be financially feasible, a project's benefits must offset or exceed its associated costs.

Project benefits can take the form of:

- Revenues from the sale of recycled water;
- increased supply reliability;
- increased control over the cost of future water supplies; and
- avoided water and wastewater treatment, storage, and conveyance costs.

Agencies developing recycled water projects must be able to quantify these benefits in order to determine the financial feasibility of a project. In addition, financial incentives and grant funding from the Water Authority, Metropolitan, and federal and state agencies are critical to offsetting project costs and project implementation.

REGULATORY

Two state agencies have primary responsibility for regulating the application and use of recycled water: the Department of Health Services (DHS) and the California Regional Water Quality Control Board (Regional Board). Planning and implementing water recycling projects entail numerous interactions with these regulatory agencies prior to project approval.

The DHS establishes the statewide effluent bacteriological and treatment reliability standards for recycled water uses in Title 22 of the California Administrative Code. Under Title 22, the standards are established for each general type of use based on the potential for human contact with recycled water. The highest degree of standards for recycled water is for unrestricted body contact.

The Regional Board is charged with establishing and enforcing requirements for the application and use of recycled water within the state. Permits are required

The City of San Diego's South Bay Reclamation Plant

from the Regional Board for each water recycling operation. As part of the permit application process, applicants are required to demonstrate that the proposed recycled water operation will not exceed the ground and surface water quality objectives in the basin management plan, and that it is in compliance with Title 22 requirements.

Coordination between the regulatory agencies responsible for monitoring development of recycled water is important, along with the development of a reasonable and consistent application of regulations. Regulatory agencies also need to work closely and cooperatively with project proponents in their efforts to satisfy the regulations and still be able to develop a much needed, cost-effective water-recycling project.

A regulatory issue that may hinder development of projects is the DHS groundwater recharge rule that requires treatment prior to injection of recycled water in order to reduce the total organic carbon (TOC) concentration to less than 2.0 mg/l. This requirement may increase the cost and reduce the ability to develop the limited opportunities for groundwater recharge in San Diego County.

INSTITUTIONAL

The primary institutional issue related to the development of water recycling in San Diego County is interagency coordination, such as when the wastewater agency that produces the recycled water is not the water purveyor within the reuse area. At those times, effective communication and cooperation between both agencies regarding the distribution of recycled water and providing service to the water customer is vital and should begin early in the planning process.

These institutional arrangements require contracts and/or agreements between the parties and/or agencies involved, the terms of which must be established on a case-by-case basis. The agreements usually define the reporting and compliance responsibilities, the amount of recycled water deliveries, water pricing, and a financing plan that identifies which agency will receive the financial incentives.

PUBLIC ACCEPTANCE

Without public acceptance, siting, financing, constructing, and operating a water-recycling project becomes increasingly difficult. The most successful means to obtaining public acceptance is through education and involvement. Agencies in the San Diego region have formed citizens' advisory groups and held public workshops in an effort to increase public involvement in projects. In the Water Authority's service area, the Regional Public Information and Customer Marketing Program is being developed to promote the increased use of recycled water.

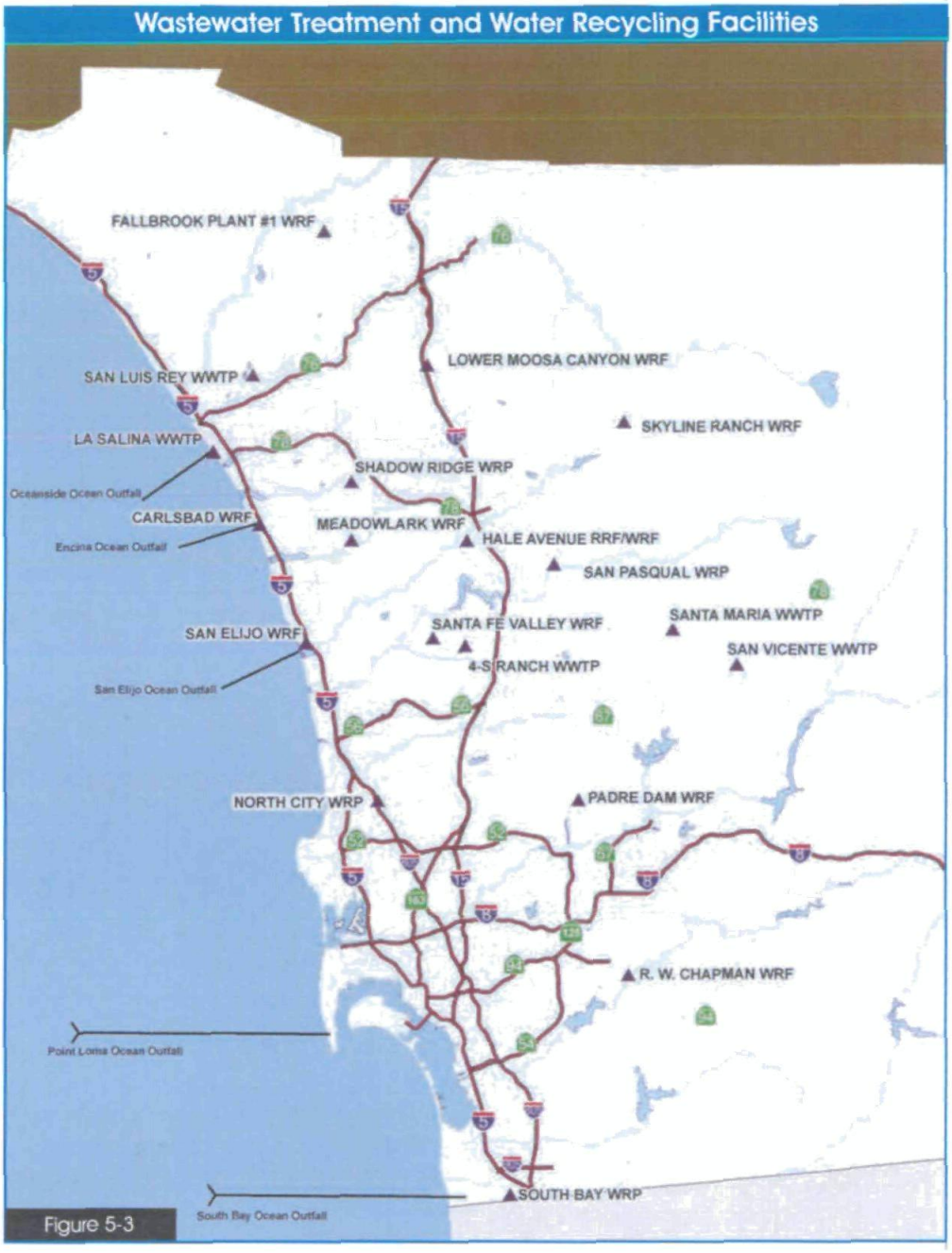


Figure 5-3

5.3.3 WASTEWATER GENERATION, COLLECTION, TREATMENT, AND DISPOSAL

Approximately 300-mgd of wastewater is currently being generated, collected, treated, and disposed of within the Water Authority's service area. Most of the large wastewater treatment plants are located along the coast for easy and convenient access to an ocean outfall. These plants serve most of the San Diego region's highly urbanized areas. **Figure 5-3** identifies the location of the wastewater treatment plants and the associated outfall systems. The coastal location of the plants is not always conducive to development of recycled water. Most of the market for recycled water is located at higher elevations, making distribution systems costly. **Table F-3, Appendix F,** shows a detailed list of the wastewater treatment plants within the county, their capacities at various levels of treatment, and the type of disposal. In addition, approximately 10- to 15-mgd of wastewater within the Water Authority's service area is generated and disposed of through private systems, such as septic tanks.

5.3.4 ENCOURAGING RECYCLED WATER DEVELOPMENT

The Act requires agencies to describe in their plan the actions, including financial incentives, that

Table 5-4: Programs to Encourage Recycled Water Use
Incentive Programs
Reclaimed Water Development Fund (Water Authority) Local Resources Program (Metropolitan)
Grants
Title XVI Funding Program (US Bureau of Reclamation) Proposition 13 Grant (State of California) Proposition 50 Grant (State of California)
Low -Interest Loans
Financial Assistance Program (Water Authority) State Revolving Fund (State of California) Water Reclamation Loan Program (State of California) Proposition 13 Loan (State of California)
Long-Term Contracts
Ensure price and reliability
Funding assistance to State Water Resources Control Board to fund staff position to expedite water recycling projects.
Rate Discounts
Public Education/Information
Regional Planning
Model Water Reclamation Ordinance and Implementation Handbook
Dual Plumbing Standards Prohibits Specific Potable Water Uses

agencies may take to encourage the use of recycled water. **Table 5-4** summarizes the programs used by the Water Authority's member agencies. The water-recycling agencies develop some of the programs, while others are developed or funded by the water providers, such as the Water Authority, Metropolitan, and state and federal agencies.

FUNDING PROGRAMS

Another important component of a successful recycling project is securing diversified funding and establishing funding partnerships. The Water Authority has focused on providing and facilitating the acquisition of outside funding for water-recycling projects.

A number of financial assistance programs available to San Diego County agencies include: the Water Authority's Financial Assistance Program (FAP) and Reclaimed Water Development Fund (RWDF); Metropolitan's Local Resources Program (LRP); the USBR Title XVI Grant Program; and the State Water Resources Control Board (SWRCB) low-interest loan programs. Together, these programs offer funding assistance for all project phases, from initial planning and design to construction and operation. Financial assistance programs administered by the Water Authority, Metropolitan, and the USBR provided $10.4 million to San Diego County agencies during FY 04. It is anticipated that approximately $7.9 million will be awarded in 2005 from these funding sources. These programs are projected to ultimately reuse approximately 54,000 AF/YR.

Financial Assistance Program. The Water Authority offers FAP funding to encourage facility planning; feasibility investigations; preliminary engineering studies; environmental impact reports; and research projects related to water recycling, groundwater development, and seawater desalination. Since its inception in June 1988, the FAP has provided local agencies with more than $1.8 million for water recycling studies, $797,000 for groundwater development studies, and over $200,000 for seawater desalination studies. Agencies may apply for FAP funding through either a loan or a grant. FAP funds are distributed on a loan basis for feasibility studies, master plans, facility plans, and environmental reports. Repayment of the

loan is required when the project has satisfactorily met CEQA requirements, or when the planned project is complete. Grant funding is also distributed through the FAP for research and development projects. To receive funding as a grant, the agency must have already secured partial funding for the project from another source.

Reclaimed Water Development Fund. To aid agencies in overcoming financial constraints associated with development of water-recycling projects, the Water Authority's Board of Directors adopted the RWDF program in April 1991, which provided incentive funding of up to $100/AF for beneficial reuse for recycling projects that demonstrated a financial need. Recently, the incentive level was increased to $147/AF. This incentive contribution offsets costs, especially in the early years of project start-up. In order to qualify, project expenses must exceed project revenues. To date, the Water Authority has entered into RWDF agreements with nine agencies for a combined project yield of 29,857 AF/YR. In FY 04, the Water Authority provided local agencies with $880,500 in RWDF incentives.

Local Resources Program. Metropolitan also has a program that currently underwrites local projects during the initial years of operation. The LRP provides incentives of up to $250 AF/YR for recycled water and groundwater recovery projects. Currently, fifteen water-recycling projects in San Diego County have agreements for LRP funding. Metropolitan provided $2,111,752 in FY 04, and $1,796,642 in FY 05, for LRP funding. Metropolitan also provided funding through its Groundwater Recovery Program (GRP) for two groundwater recovery projects in the amounts of $1,292,686 in FY 04, and $709,105 in FY 05.

The Reclamation Wastewater and Groundwater Study and Facilities Act – Title XVI. The Title XVI Grant Program is a significant source of funding for San Diego-area recycling projects. Title XVI of Public Law 102-575, the Reclamation Wastewater and Groundwater Study and Facilities Act, authorizes the federal government to fund up to 25 percent of the capital cost of authorized recycling projects, including the San Diego Area Water Reclamation Program, an inter-connected system of recycling projects serving the Metropolitan Sewage System service area. PL104-266, the Reclamation Recycling and Water Conservation Act of 1996, authorized two additional projects in northern San Diego County: the North San Diego County Area Water Recycling Project and the Mission Basin Brackish Groundwater Desalting Demonstration Project. To date, San Diego agencies have been authorized to receive more than $195 million under the Title XVI grant program, including more than $7.3 million obligated during Federal Fiscal Year (FFY) 04. A total of $94,591,000 has been received from this funding source to date. It is critical that funding from this program be maintained each year.

State Revolving Fund/Water Reclamation Loan Program. The SWRCB, through the Division of Financial Assistance, provides financial assistance for water-recycling projects in the form of low-interest loans and/or grants for project construction and grants for project planning. The State Revolving Fund (SRF) and the Water Reclamation Loan Program (WRLP) provides agencies with low-interest construction loans for water recycling and groundwater projects. This below-market interest rate can result in substantial savings on debt service. The SRF and WRLP loans carry an interest rate equal to 50 percent of the state's general obligation bond interest rate. Approximately $42 million was appropriated to the SWRCB in FY 03 and 04 for the funding of water-recycling projects. Additional funding for FY 03 from the SWRCB included $4 million from Proposition 13 and the 2000 Bond Law for San Diego-area water recycling projects. In FY 04, an additional $75,000 was awarded to local water-recycling projects through SWRCB funding sources. An example of funding recently awarded to one of the Water Authority's member agencies was the $1.08 million grant given to the Olivenhain Municipal Water District.

Drillers work at the Mission Basin Brackish Groundwater Desalting site.

California voters passed Proposition 50, known as the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002 on November 5, 2002. In spring 2005, more than $10 million was earmarked from this bond measure for San Diego area water- recycling projects. It is anticipated that disbursements will begin in late-2005.

POLICIES, ORDINANCES AND GUIDANCE DOCUMENTS

The Water Authority has adopted a number of policies, guidance documents, and a model ordinance to assist local agencies with water-recycling project implementation. Many local agencies have adopted the Water Authority-sponsored ordinance, which includes provisions that typically require new development projects to install recycled water systems. The ordinance also states that where allowed by law and available in sufficient quantities at a reasonable cost and quality, recycled water shall be the sole water supply delivered for non-potable uses.

TRAINING

The Water Authority, in partnership with other water agencies, offers a one-day course designed to provide irrigation supervisors with a basic understanding of recycled water. Completion of the Recycled Water Site Supervisor Training fulfills the training requirement as mandated by regulatory authorities. The class provides information to supervisors on the water recycling process, recycled water quality and safety issues, the duties and responsibilities of the supervisor, landscape irrigation fundamentals, maintenance and management, and cross connection control shut-down tests and inspections. Understanding similarities and differences between recycled and potable water is important to the successful operation of a recycled water system. The first class started in 1993 with 14 participants. At this time, more than 1,000 participants have been certified. Instructors include a state registered environmental health specialist, environmental assessor, water quality chemist/reclamation specialist, and landscape specialists.

The Water Authority's one-day recycled water training class

OPTIMIZING THE USE OF RECYCLED WATER - REGIONAL PERSPECTIVE

While local agencies typically expand and develop their respective recycled water projects independently based on local interests, the Water Authority is conducting studies that will identify opportunities to expand the region's use of recycled water. These studies, namely, the San Diego County Water Authority Regional Recycled Water System Study, completed in March 2002, and the Regional Recycled Water Study – Phase II, scheduled for completion in December 2005, took a regional approach to water recycling project planning and development. Primary tasks to be completed under the Regional Recycling Water Study – Phase II include: developing strategies to overcome identified obstacles to water recycling; developing a marketing plan and regional strategies to market recycled water to target industries and customers; investigating and examining to what extent — and levels — TDS in source water affect the use and application of recycled water for local end-users; researching and identifying the impediments to the implementation of water repurification projects; and funneling planning grant funding to regional agencies to further expand the use of recycled water.

The Water Authority also participated in the California Recycled Water Task Force. This legislated task force identified constraints, impediments, and opportunities for the increased use of recycled water, and reported its findings to the California Legislature by July 1, 2003. Many of the recommendations identified in the completed report entitled, "Water Recycling 2030: Recommendations of California's Recycled Water Task Force," dated June 2003, have been regionally supported and adopted. Six of the key issue areas identified in the report are currently being addressed via the Phase II Study efforts and through legislative means either supported or initiated by the Water Authority. These areas include: (1) Funding for water recycling; (2) Public dialogue/ Public outreach; (3) Plumbing Code/Cross-connection control; (4) Regulations and permitting; (5) Economics of water recycling; and (6) Science and health/Indirect potable reuse.

5.3.5 PROJECTED RECYCLED WATER USE

The Water Authority worked closely with its member agencies to determine the projected yield from existing and planned recycled water projects. **Table 5-5** shows the estimated annual yield from the projects in 5-year increments, based on the implementation

schedules provided by the member agencies and the likelihood of development. These projected supply yields will be included in the reliability analysis found in **Section 8** of this Updated 2005 Plan. **Table F-4, Appendix F,** contains a detailed list of the projects and projected supplies.

Table 5-5: Projected Recycled Water Use (AF/YR)

YEAR	AF/YR
2005[1]	11,479
2010	33,668
2015	40,662
2020	45,548
2025	46,492
2030	47,584

1 Based on FY 2005 totals.

The increase in recycled water use shown in **Table 5-5**, from the current use of 11,479 AF/YR, is primarily from the expansion of existing facilities. The City of Carlsbad is constructing a new treatment and distribution system to deliver close to 3,000 AF/YR of recycled water. The Otay Water District is constructing a distribution system to deliver an estimated 5,000 AF/YR of recycled water by 2030 purchased from the City of San Diego's South Bay Water Reclamation Plant.

REGIONAL WATER RECYCLING GOAL

Maximizing recycled water development is critical to diversifying the region's water supply portfolio. Beyond the verifiable yield included in **Table 5-5**, the member agencies are considering development of an additional 6,829 AF/YR by 2030. These projects are still in the planning and/or conceptual stage. Funding assistance and overcoming regulatory constraints is critical to the development of this additional supply. **Table F-4, Appendix F,** contains a list of the projects. When development of these projects becomes more certain, they will be included in future updates of the Water Authority's Updated 2005 Plan. In order to highlight the importance of maximizing recycled water use within the region, a regional water recycling goal has been established. In combination with the figures shown in **Table 5-5**, the regional water-recycling goal is 54,413 AF/YR by 2030.

SECTION 5.4 SEAWATER DESALINATION

The development of local seawater desalination provides a number of benefits to the San Diego region. Seawater desalination will assist the region in diversifying its water resources, reduce dependence on imported supplies, and provide a new drought-proof, treated local water supply.

5.4.1 DESCRIPTION

Poseidon Resources is pursuing the development of a local, privately-owned desalination project located adjacent to the Encina Power Station. The project will consist of a reverse osmosis desalination treatment facility as well as ancillary intake, discharge, and product water distribution pipelines and facilities. Poseidon has executed water purchase agreements with the following Water Authority member agencies: Carlsbad Municipal Water District; Valley Center Municipal Water District; Rincon del Diablo Municipal Water District; and Sweetwater Authority; *and is pursuing water purchase agreements with* other member agencies. The facility is projected to ultimately produce 56,000 AF/YR of desalinated seawater by 2011. The major planning items completed to date include certification of an environmental impact report by the City of Carlsbad, approval of a concentrate discharge permit by the San Diego Regional Water Control Board, and submittal of a Coastal Development Permit application to the California Coastal Commission.

A local, privately owned desalination project is in the planning stages.

5.4.2 ISSUES

No large-scale seawater desalination facility has ever been permitted/constructed in California. Perhaps the most significant issue facing this desalination project as well as others proposed along the California coastline is the ability to permit the facility, including obtaining a Coastal Development Permit from the California Coastal Commission. This project must also secure arrangements for the delivery of product water from the facility to the local water agencies. These arrangements are currently in the planning stage.

5.4.3 PROJECTED SEAWATER DESALINATION SUPPLIES

Seawater desalination supplies represent a significant future local resource in the Water Authority's service area. To date, the local, privately-owned seawater desalination project has contracted with the Carlsbad Municipal Water District (up to 28,000 AF/YR depending on demands), Valley Center Municipal Water District (7,500 AF/YR), Rincon Del Diablo Municipal Water District (4,000 AF/YR), and Sweetwater Authority (2,400 AF/YR) to supply up to 41,900 AF/YR of desalinated seawater. The verifiable seawater desalination figure to be used in the Updated 2005 Plan will be based on the contract amounts and projected seawater desalination deliveries to Carlsbad MWD. As shown in **Table 5-6**, the verifiable projected local seawater desalination supplies vary each year based on Carlsbad MWD's demands (which are less than their desalinated seawater contract amount of 28,000 AF/YR). These projected supply yields will be included in the reliability analysis found in **Section 8** of this Updated 2005 Plan. There are several contingencies related to Poseidon's agreements with the member agencies that must be satisfied before implementation of the project and its ultimate yield can be determined. These contingencies include obtaining legal entitlements for construction of the project, determination of a mutually acceptable delivery interconnection point and delivery charge, and engagement of a third party exchange agency partner where physical delivery to the contracting agency is not practical.

Table 5-6: Projected Local Seawater Desalination Water Supplies[1]
(Normal Year – AF/YR)

YEAR	AF/YR
2005	0
2010	0
2015	34,689
2020	36,064
2025	37,754
2030	40,000

1 Deliveries to Carlsbad MWD will vary based on their actual demands and local use of recycled water. See Appendix F-4 for information on Carlsbad MWD's projected recycled water use.

LOCAL SEAWATER DESALINATION GOAL

In order to highlight the importance of maximizing the supply of seawater desalination used within the region, a local seawater desalination goal has been established. The project proponent, Poseidon Resources, is pursuing additional agreements with other local water agencies for the remaining 16,000 AF of annual production. When the 16,000 AF/YR is combined with a verifiable maximum local supply of 40,000 AF/YR, a local seawater desalination goal of 56,000 AF/YR is established.

SECTION 5.5 SUMMARY OF MEMBER AGENCY SUPPLIES

Table 5-6 shows the projected supply figures for existing and projected local resources for the Water Authority's service area based on input from the member agencies. These supplies are considered verifiable and will be used in the regional reliability analysis included in **Section 8**.

The estimates for projected member agency local supplies included in **Table 5-7** could be even greater with increased funding opportunities, technological advances, and by successfully addressing regulatory and environmental issues. Maximizing groundwater, recycled water, and desalinated seawater development can provide further diversification of regional supplies. In order to highlight the importance of maximizing these supplies, a local resources goal has been established. In combination with the figures shown in **Table 5-7**, the total regional local resources goal, excluding supply from conjunctive use projects using imported or recycled water, is 220,683 AF/YR by 2030.

Table 5-7: Projected Member Agency Local Supplies (Normal Year - AF/YR)

Local Supply	2005[1]	2010	2015	2020	2025	2030
Surface Water	45,521	59,649	59,649	59,649	59,649	59,649
Groundwater	17,844	28,575	30,345	31,175	31,175	31,175
Recycled Water	11,479	33,668	40,662	45,548	46,492	47,584
Desalinated Seawater	0	0	34,689	36,064	37,754	40,000
Total Member Agency Supplies	**74,844**	**121,892**	**165,345**	**172,436**	**175,070**	**178,408**

1 Based on FY 2005 totals.

SECTION 6 METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

SECTION 6.1 DESCRIPTION

Metropolitan was formed in 1928 to develop, store, and distribute supplemental water in Southern California for domestic and municipal purposes. Metropolitan supplies water to approximately 18 million people in a service area that includes portions of Ventura, Los Angeles, Orange, San Bernardino, Riverside, and San Diego counties. The Metropolitan service area, shown in **Figure 6-1**, covers a 70-mile-wide strip of the Southern California coastal plain, extending from the city of Oxnard on the north to the Mexican border. Close to half of the water used in this 5,200-square-mile region is supplied by Metropolitan, and about 90 percent of its population receives at least some of its water from Metropolitan.

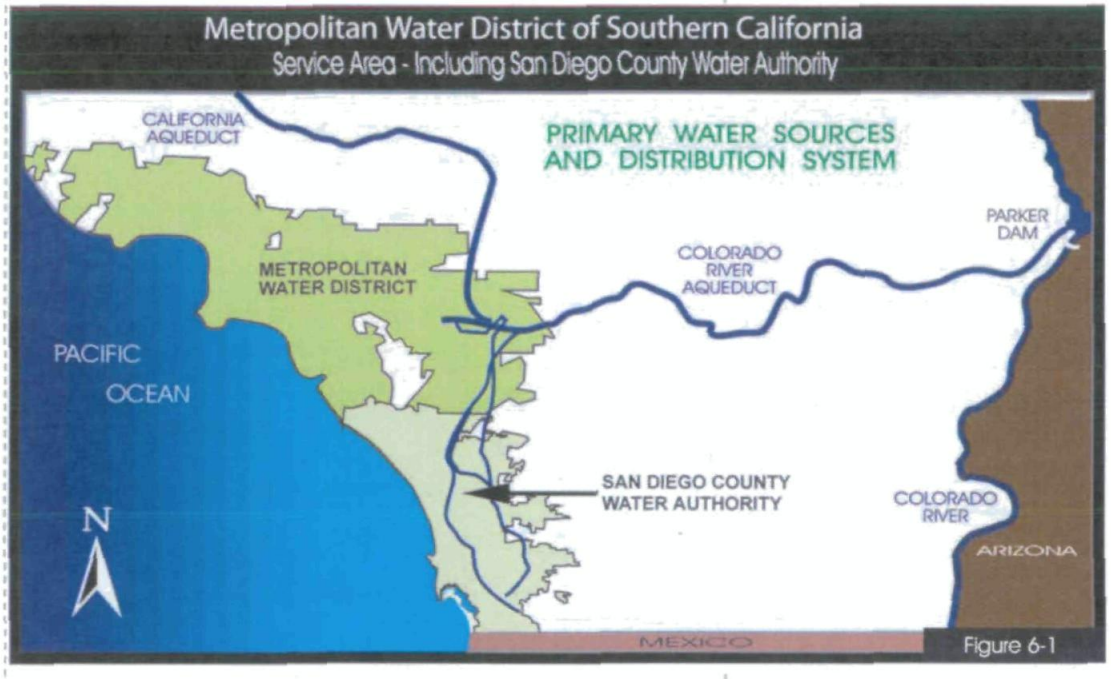


Figure 6-1

The Water Authority, one of 27 Metropolitan member agencies, is the largest agency in terms of deliveries, purchasing 518,625 AF, about 25 percent of all the water Metropolitan delivered in FY 05. The extent to which Metropolitan's member agencies rely upon Metropolitan supplies varies by the amount of local supplies available.

6.1.1 METROPOLITAN ACT SECTION 135; PREFERENTIAL RIGHT TO WATER

Under Section 135 of the Metropolitan Act, preferential rights are determined by each agency's total historic payments to Metropolitan from property taxes, stand-by charges, readiness-to-serve charges, and other revenue. Revenue resulting from the purchase of Metropolitan water is excluded, even though a portion of such revenues is used to pay for capital projects. While the Water Authority had a preferential right to 15.8 percent of Metropolitan's water in FY 04, it purchased about 25 percent of Metropolitan's available supply. At any time under preferential rights rules, Metropolitan may allocate water without regard to historic water use or dependence on Metropolitan. **Figure 6-2** shows the Water Authority's projected preferential rights for the years 2005 through 2030.

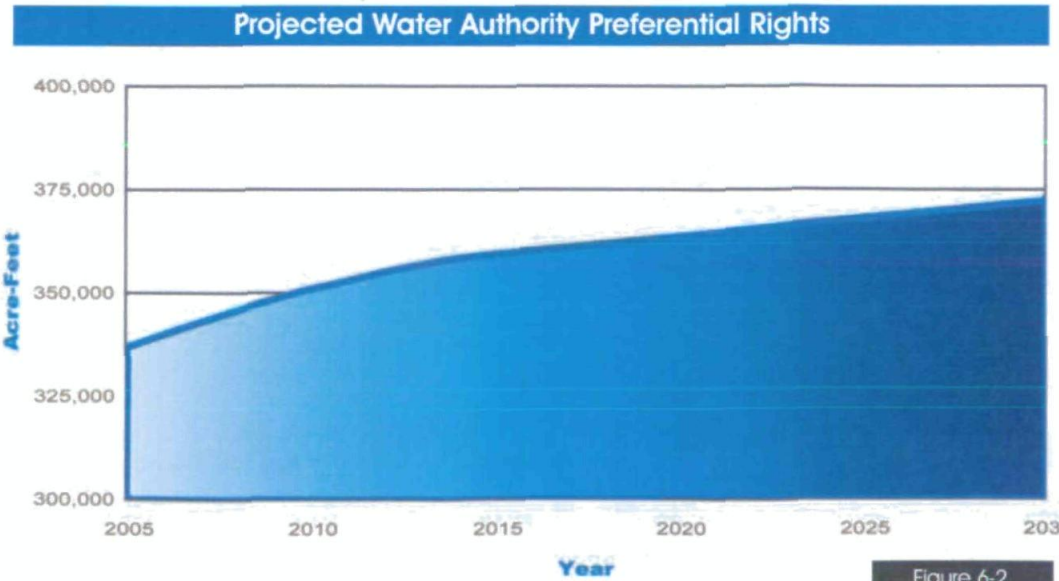


Figure 6-2

To seek clarification regarding the current application and legality of Section 135, the Water Authority Board of Directors voted in April 2004 to appeal an appellate court ruling that preserves Metropolitan's preferential right process. In July 2004, the State Supreme Court denied the Water Authority's appeal of an appellate court decision that Metropolitan might continue to exclude water purchases from the preferential rights calculation. The decision makes clear how much water the Water Authority may count on from Metropolitan should a member agency invoke its preferential right.

Metropolitan stated, consistent with Section 4202 of its Administrative Code, that it is prepared to provide the Water Authority's service area with adequate supplies of water to meet expanding and increasing needs in the years ahead. When, and as additional water resources are required to meet increasing needs, Metropolitan stated that it will be prepared to deliver such supplies. In their 2005 Regional Urban Water Management Plan (RUWMP), Section II.2, Metropolitan presents its supply availability at the regional level, rather than at the member agency level. With that, the Water Authority is not able to quantify the availability of imported supplies from Metropolitan specifically for the Water Authority. However, in its plan (Section II.2, *Evaluating Supply Reliability*), Metropolitan stated that it can maintain 100% reliability in meeting direct consumptive demand under the conditions that represent normal, single-dry, and multiple-dry years through 2030.

Inferring from the supply reliability finding stated by Metropolitan, the Water Authority concludes that Metropolitan is capable of supplying imported water to meet projected demands by the Water Authority under various hydrologic conditions if the supply targets identified in their 2005 RUWMP are met. Implementation risks exist in local supply development and imported supply projects and programs. The Water Authority is working with its counterparts at Metropolitan to help ensure that Metropolitan's planning is realized, and that the necessary programs and projects are implemented.

6.1.2 METROPOLITAN'S INTEGRATED RESOURCES PLAN

The Integrated Resources Plan (IRP) identifies a mix of resources (imported and local) that when implemented will provide 100 percent reliability for full-service demands through the attainment of regional targets set for conservation, local supplies, SWP supplies, Colorado River supplies, groundwater banking, and water transfers. The 2004 update to the IRP now includes a planning buffer supply to mitigate against the risks associated with implementation of local and imported supply programs. The planning buffer identifies an additional increment of water that could potentially be developed if other supplies are not implemented as planned. As part of implementation of the planning buffer, Metropolitan periodically evaluates supply development to ensure that the region is not over-developing supplies. If managed properly, the planning buffer will help ensure that the Southern California region, including San Diego County, will have adequate supplies to meet future demands. Specific information on Metropolitan's IRP and Water Surplus and Drought Management Plan (WSDM Plan) are contained in their 2005 RUWMP.

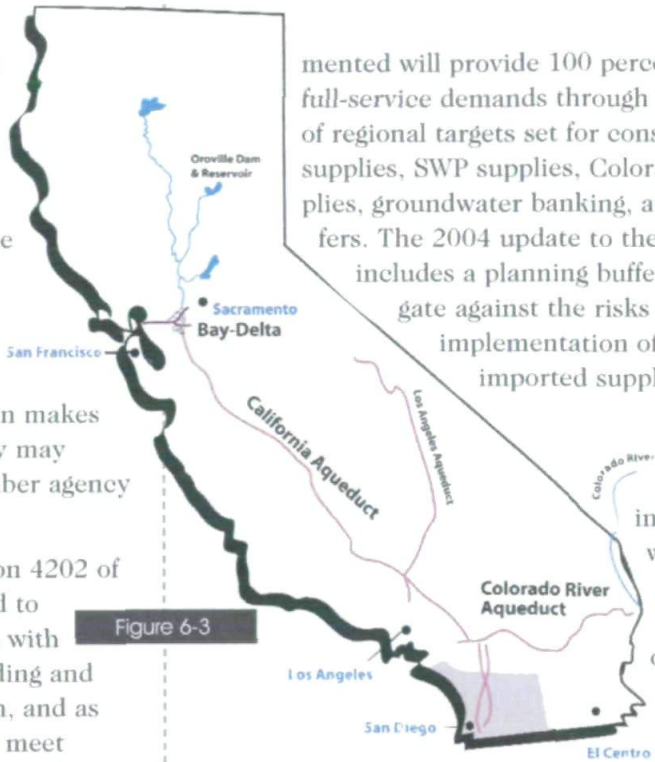


Figure 6-3

SECTION 6.2 METROPOLITAN'S WATER SUPPLIES

Metropolitan obtains its water from two sources: the CRA, which it owns and operates, and the SWP. **Figure 6-3** shows these imported water supply sources, and they are described below. Detailed documentation on Metropolitan's supplies can be found in its 2005 RUWMP.

6.2.1 COLORADO RIVER

Metropolitan was formed to import water from the Colorado River. During the 1930s, Metropolitan built the CRA to convey this water. Metropolitan's member agencies received the first deliveries in 1941. The aqueduct is more than 240 miles long, beginning at Lake Havasu on the Arizona/California border and ending at Lake Mathews in Riverside County. The aqueduct has capacity to deliver up to 1.3 million acre-feet per year (MAF/YR). **Figure 6-3** shows the location of the aqueduct.

RELIABILITY ISSUES

Before 1964, Metropolitan had a firm annual allocation of 1.212 million acre-feet (MAF) of Colorado River water through contracts with the U.S. Department of the Interior, which was enough to keep Metropolitan's aqueduct full. However, as a result of the U.S. Supreme Court decision in Arizona vs. California, Metropolitan's firm supply fell to 550,000 AF. Due to growth in demand from the other states and drought conditions, since 2003, Metropolitan's deliveries have been limited to their base apportionment plus water from a conservation program with IID.

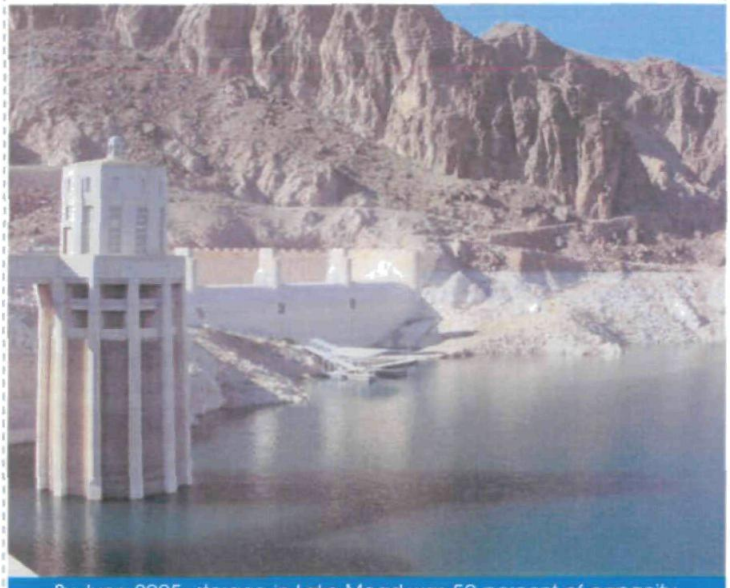
Water availability from the Colorado River is governed by a system of priorities and water rights that has been established over many years. The Colorado River Lower Basin states (California, Arizona, and Nevada) have an annual apportionment of 7.5 MAF of water divided as follows: (1) California, 4.4 MAF; (2) Arizona, 2.8 MAF; and (3) Nevada, 300,000 AF. The 1931 Seven Party Agreement established California's priorities for water. As shown in **Table 6-1**, Metropolitan's 4th priority of 550,000 AF is junior to that of the first three priorities, 3.85 MAF to California agricultural agencies. Water used to satisfy priorities 5(a)-6(b) must come from unused allocations within California, Arizona, or Nevada, or from surplus.

Table 6-1: Seven Party Agreement Priorities

PRIORITY	DESCRIPTION	ACRE-FEET/YEAR
1	Palo Verde Irrigation District	Priorities 1, 2, and 3 shall not exceed 3,850,000
2	Yuma Project Reservation Division	Same as above
3(a)	Imperial Irrigation District and lands in Imperial and Coachella valleys to be served by All-American Canal	Same as above
3(b)	Palo Verde Irrigation District	Same as above
4	Metropolitan Water District	550,000
5(a)	Metropolitan Water District	550,000
5(b)	City/County of San Diego[1]	112,000
6(a)	Imperial Irrigation District	
6(b)	Palo Verde Irrigation District	300,000
	TOTAL	5,362,000

1 In 1946, San Diego's rights were merged with and added to the rights of Metropolitan as one condition of the Water Authority's annexation to Metropolitan.

In recent years, Arizona and Nevada have increased water demand to near-apportionment levels, limiting the availability of unused apportionments to Metropolitan. Arizona's demand has been substantially increased by deliveries to an in-state groundwater banking program. Nevada began banking water under an interstate water banking rule established by the Department of Interior in 1999, which allows Nevada to bank water in Arizona for Nevada's future use.



By June 2005, storage in Lake Mead was 59 percent of capacity.

Five consecutive years of drought conditions throughout the Colorado River Basin were somewhat relieved during the winter of 2004-05, and water storage levels in the main reservoirs rebounded from a rapid and steep decline. Inflow into Lake Powell was above average for water year 2005 and for the first time since 1999, the water surface elevation in Lake Powell increased. As of the end of June 2005, storage in Lake Powell was 51 percent of capacity; storage in Lake Mead was 59 percent of capacity. The draft U.S. Bureau of Reclamation Annual Operating Plan for Colorado River System Reservoirs anticipates a "partial domestic surplus" condition for calendar year 2006, which provides limited surplus water for Metropolitan. However, since the Interim Surplus Guidelines were implemented in 2001, Metropolitan has not taken any surplus water, and instead has left those supplies as system storage in Lake Mead. It is not yet clear whether Metropolitan will take any available surplus water in calendar year 2006.

ENVIRONMENTAL CONSIDERATIONS

In 1994, the U.S. Fish and Wildlife Service (USFWS) designated 1,980 miles of the Colorado River and its tributaries in Colorado, Utah, New Mexico, Arizona, California, and Nevada as critical habitat for four endangered species of native fish. In response to the 1994 designation, the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) was formed. The program is a partnership of federal agencies; state and local agencies in Arizona, California, and Nevada, including the Water Authority; Native American tribes; and other non-federal participants. The partnership is responding to the need to balance the legal use of lower Colorado River water resources and the conservation of threatened and endangered species and their habitats in compliance with the federal Endangered Species Act (ESA). Taking over ten years to develop, the LCR MSCP was approved in April 2005. The program is designed to benefit at least 26 species and restore a range of habitats along the lower Colorado River, including 8,132 acres of riparian, marsh, and backwater habitat. The $626 million program will be cooperatively funded and implemented by the partnership over the next 50 years. By meeting the needs of fish and wildlife under the ESA and preventing the listing of additional species, the program provides greater certainty of continued water and power supplies from the river for Nevada, California, and Arizona.

The "endangered" Humpback chub

CURRENT SUPPLIES

Metropolitan currently has a firm supply from two sources: its fourth priority of 550,000 AF/YR, and the yield of a conservation program that Metropolitan completed with IID in 1988. This program currently yields about 106,000 AF/YR, giving Metropolitan a total supply of approximately 656,000 AF/YR. Under certain conditions, however, Metropolitan must provide 50,000 AF/YR of the conservation program water to the Coachella Valley Water District (CVWD). Thus, Metropolitan's firm supply is now about 606,000 AF/YR. The remaining 600,000 AF/YR of water needed to fill the CRA must come from the unused apportionments of other states or from surplus water.

QUANTIFICATION SETTLEMENT AGREEMENT AND FUTURE SUPPLIES

The Water Authority, together with CVWD, IID, and Metropolitan, entered into the QSA in October 2003. The QSA resolved longstanding disputes regarding Colorado River water use among the agencies, and established a water budget for the agricultural agencies. This permitted the implementation of several water conservation and transfer agreements, including the Water Authority's transfer agreement with IID.

Transfers from IID began in late-2003 with the signing of the QSA. The Water Authority will receive up to 200,000 AF of water per year after an initial 19-year ramp-up in the water deliveries. Other supplies include about 77,700 AF/YR from conservation projects to line the AAC and CC, located in Imperial and Coachella valleys.


The SWP's Banks Pumping Plant lifts water to the California Aqueduct.

6.2.2 STATE WATER PROJECT

Metropolitan's other water source, the SWP, is owned by the State of California and operated by the DWR. The project stretches more than 600 miles, from Lake Oroville in the north to Lake Perris in the south. Water is stored at Lake Oroville and released when needed into the Feather River, which flows into the Sacramento River and to the Sacramento-San Joaquin River Delta (Delta). In the north Delta, water is pumped into the North Bay Aqueduct for delivery to

Napa and Solano counties. In the south Delta, water is diverted into the SWP's Banks Pumping Plant, where it is lifted into the 444 mile-long California Aqueduct. Some of this water flows into the South Bay Aqueduct to serve areas in Alameda and Santa Clara counties. The remainder flows southward to cities and farms in central and southern California. In the winter, when demands are lower, water is stored at the San Luis Reservoir located south of the Delta. SWP facilities provide drinking water to 23 million Californians and 755,000 acres of irrigated farmland. **Figure 6-3** *(on page 6-2)* shows the California Aqueduct.

A big portion of the county's imported water moves through the Delta.

RELIABILITY ISSUES

The reliability of SWP supplies is limited by both the level of SWP supply development and pumping restrictions due to state and federal environmental regulations. Actions taken by the CALFED Bay-Delta Program have improved the situation. *(See below for more on the impact of CALFED on SWP supplies.)*

When approved by the voters in the 1960s, the SWP was planned to deliver 4.2 MAF to 32 contracting agencies. Subsequent contract amendments reduced total contracted deliveries to 4.13 MAF and the number of contracting agencies to 29. Metropolitan's contracted entitlement is 2,011,500 AF/YR, or almost 49 percent of the annual total. It is important to note that when voters approved construction of the SWP in 1960, state planners did not expect the full amount of contracted water to be needed for at least the first 20 years of the project. As such, the planners anticipated that the facilities needed to produce the full contracted amount would be constructed over time as demands on the system increased. However, decisions about these additional facilities were repeatedly deferred as public attitudes and environmental regulations changed and costs increased. New state and federal environmental laws put some potential water supply sources off limits to development. More stringent water quality standards adopted by the SWRCB to protect the San Francisco Bay/Sacramento-San Joaquin River Delta (Bay-Delta) have also reduced the amount of water available for diversion. At the same time, California's population and water demand continued to grow.

By the late 1980s, the SWP could not meet contractor demands during drought periods. During the initial years of the 1987 – 1992 drought, DWR maintained SWP deliveries using water stored at Lake Oroville and the San Luis Reservoir. In 1991, however, the SWP delivered only 549,113 AF of entitlement water. Of this amount, Metropolitan received 381,070 AF, or about 20 percent of its annual entitlement.

DWR's *Draft 2005 State Water Project Delivery Reliability Report* projected average SWP deliveries to increase slightly, and multiple dry-year deliveries to remain generally unchanged. Minimum SWP deliveries may be as low as 4% to 5% of the full Table A basic contract amount in the single driest year (1977 hydrology). However, DWR has suggested that adjustments would be made to reflect more realistic operations where carryover storage and other provisions would enhance SWP dry-year deliveries to a level that is comparable in quantity to the previous reliability report from DWR.

ENVIRONMENTAL CONSIDERATIONS

In recent years, actions taken to protect the ecosystem of the Bay-Delta have placed additional restrictions on SWP operations. The Bay-Delta is the largest estuary on the west coast and supports more than 750 plant and animal species. However, 150 years of human activity, dating back to 19th century gold mining, has taken its toll on the Bay-Delta ecosystem and the fish that live there. Between 1989 and 1999, the winter-run Chinook salmon was designated, or "listed," as an endangered species

The "threatened" Chinook salmon

under the federal ESA and the Delta smelt, steelhead trout, and spring-run Chinook salmon were placed on the list of threatened species.

The degradation of the Bay-Delta ecosystem and the decline of Delta fisheries can be traced to numerous factors, including habitat loss, water diversions, pollution, over-fishing, and the introduction of non-native species. Regulatory protection efforts have nevertheless tended to focus on the operations of the SWP and the federal Central Valley Project (CVP).

For example, in 1999, the SWP was forced to reduce pumping by about 500,000 AF to protect Delta smelt and spring-run Chinook salmon. These pumping reductions were in addition to fish protection measures built into the water quality standards established by the SWRCB. Actions taken by CALFED have stabilized this situation over the past four years, but this situation is temporary unless further actions are taken to extend it over the longer-term.

Protecting habitats is part of the Bay-Delta Plan.

WATER QUALITY CONSIDERATIONS

Please see **Section 7** for water quality information.

CURRENT SUPPLIES

SWP delivery contracts were amended in 1995 to reflect principles developed under the December 1994 Monterey Agreement. Under the Monterey amendments, all SWP supplies are allocated to contractors in proportion to their contractual entitlements. Metropolitan's approximately 49 percent share of total SWP contract entitlements, entitles it to a proportionate share of SWP supplies. According to Metropolitan's RUWMP, Metropolitan received an average of 1.04 million AF/YR from the SWP from 1995-2004. From 2000-2004, the annual average was 1.46 MAF.

DWR's implementation of the Monterey Agreement was successfully challenged in court by the Planning and Conservation League and others. On September 15, 2000, the Third District Court of Appeal reversed a trial court ruling for DWR and ordered a new environmental impact report (EIR) and a trial on the validity of the agreement. DWR is conducting the new environmental review, which is due for completion in 2005.

A CALFED Bay-Delta Program goal is levee system integrity.

FUTURE SUPPLIES AND THE CALFED BAY-DELTA PROGRAM

Metropolitan's Integrated Water Resources Plan Update (IRP Update), adopted by the Metropolitan Board of Directors in July 2004, indicates that Metropolitan's SWP target for a dry year (based on 1977 hydrology) is 463,000 AF in 2010, and 650,000 AF in 2020. The IRP Update also estimates that in the 2020-2025 period, Metropolitan's annual supply range from the SWP will be between 418,000 AF and 1.74 MAF. This figure does not include another 75,000 to 200,000 AF estimated from San Luis Reservoir carryover storage, 200,000 AF from planned CALFED projects, and 45,000 AF from the Sacramento Valley Water Management Agreement (the latter two programs are still in development and subject to change). The 2005 RUWMP estimates that the SWP will be capable of serving 1.5 MAF to Metropolitan through 2030 in an average year.

Work being done by the CALFED Bay-Delta Program, which is administered by the California Bay-Delta Authority, is expected to provide the greatest opportunity for SWP supply reliability and water quality improvements. However, the outcome of this process remains uncertain. The state and federal governments organized the CALFED Program in 1995 to develop and implement a balanced, comprehensive, and long-term plan to restore the Bay-Delta's ecological health and improve water management for beneficial uses of the estuary. CALFED is working in four inter-related, over-arching categories: ecosystem restoration, levee stability, water

quality improvement, and water supply reliability. The CALFED Program made the transition from planning to implementation in 2000 with the release of the Record Of Decision, final programmatic environmental EIS/EIR and *California's Water Future: A Framework for Action*.

The elements of the CALFED Program that have the greatest potential for increasing the reliability and quality of SWP supplies are included in the Delta Improvements Package (DIP), approved by the California Bay-Delta Authority in 2004 as the first major action by CALFED to implement its long-term Bay-Delta plan. Among the activities in the DIP, the most important are improvements to the existing Delta conveyance system, including expansion of the permitted capacity of the SWP pumping plant from its current level of 6,680 cfs to 8,500 cfs (and ultimately to 10,300 cfs subject to certain conditions). The conveyance system improvements would improve the reliability and quality of SWP supplies by allowing the SWP to increase pumping during those times of the year when additional water is available and when water quality is highest, and they would reduce pumping when endangered fish are migrating through the Delta. The improvements will also increase the amount of pumping capacity available for other purposes, such as water transfers.

CALFED has a long-term Bay-Delta plan.

The ability of CALFED to work with its member agencies to implement the DIP and other projects was called into question by a state appellate court decision issued on October 7, 2005, concerning CALFED's programmatic environmental impact report (PEIR), which served as the foundation of the Bay-Delta Program record of decision. While the court upheld the PEIR on a number of issues in the case, it concluded that the PEIR should have analyzed an alternative that reduced water exports from the Delta. The court also found that the PEIR inadequately discussed the environmental impacts of diverting water to meet CALFED's goals and did not include sufficient information about the Environmental Water Account. The state attorney general has asked the court for a rehearing of its ruling. If the decision stands, CALFED will have to draft a supplement to its PEIR that considers the "reduced exports" alternative, at the very least. It is currently unclear how much the ruling may affect programs and projects involving the Bay-Delta that are being undertaken by CALFED member agencies.

Another essential element of the CALFED Program is the Environmental Water Account (EWA), a pilot program that provides water at critical times for meeting ecosystem needs while minimizing water supply impacts on water-users. In addition, new surface and groundwater storage could also enhance the reliability and quality of SWP supplies. The CALFED framework calls for the construction of up to 4.75 MAF of new surface and groundwater storage over the life of the CALFED Program; however, it is not known whether any of the new storage would be constructed as part of the SWP.

The amount of water produced through the proposed conveyance improvements will depend on how the individual facilities are operated and on the level of assurances provided by the state and federal regulatory agencies. The EWA provides the SWP and CVP with regulatory assurances intended to ensure that the projects will not face additional water supply impacts due to regulatory actions taken under the federal ESA or other federal or state laws or regulations. However, while the EWA has been extended as a pilot program through 2007, it has not yet been made permanent. If CALFED succeeds in its mission of restoring stability to the Bay-Delta system, and the EWA, and the regulatory assurances, are extended beyond the initial four-year period, then the improvements described in the DIP have the potential to increase Metropolitan's share of average SWP supplies by between 93,000 and 168,000 AF/YR. If CALFED is not successful, and the Bay-Delta system continues to decline, Metropolitan's SWP supplies could even decrease in size and quality relative to existing levels.

SECTION 7 WATER QUALITY

The Act requires that the Updated 2005 Plan include information, to the extent practicable, on the quality of existing supply sources and the manner in which water quality affects water supply reliability. This section summarizes water quality issues associated with supplies serving the San Diego region. Information on Colorado River and SWP supplies came in part from Metropolitan's 2005 RUWMP.

The Colorado River

SECTION 7.1 COLORADO RIVER

High salinity levels and perchlorate contamination represent two areas of concern regarding the quality of Colorado River supplies. In Moab, Utah, a pile of radioactive waste near the Colorado River is also considered to be a potential threat to the Colorado River's water quality. Research on the potential impact to water quality is inconclusive, but removal of the radioactive waste is being investigated.

SALINITY

The salts in the Colorado River System are indigenous and pervasive, mostly resulting from saline sediments in the basin that were deposited in prehistoric marine environments. They are easily eroded, dissolved, and transported into the river system. Agricultural development and water diversions over the past 50 years increase the already high naturally occurring levels of TDS.

Water imported via the CRA has a TDS averaging around 650 mg/l during normal water years. During the high water flows of 1983-1986, salinity levels in the CRA dropped to a historic low of 525 milligrams per liter (mg/l). However, during the 1987-1990 drought, higher salinity levels returned. During an extreme drought, CRA supplies could exceed 900 mg/l. High TDS in water supplies leads to high TDS in wastewater, which lowers the usefulness of the water and increases the cost of recycled water. (Refer to **Section 7.5** for details on salinity impacts to water recycling.) In addition to the link between water supply and water quality, high levels of TDS in water supplies can damage water delivery systems and home appliances.

To reduce the effects of high TDS levels on water supply reliability, Metropolitan approved a Salinity Management Policy in April 1999. One of the policy goals is to blend Colorado River supplies with lower-salinity water from the SWP to achieve delivered water salinity levels less than 500 mg/l TDS. In addition, to foster interstate cooperation on this issue, the seven basin states formed the Colorado River Basin Salinity Control Forum (Forum). To lower TDS levels in Colorado River supplies, the Forum develops programs designed to prevent a portion of the abundant salt supply from moving into the river system. The Colorado River Basin Salinity Control Program targets the interception and control of non-point sources, such as surface runoff, as well as wastewater and saline hot springs.

PERCHLORATE

Ammonium perchlorate is used as the main component in solid rocket propellant, and it can also be found in some types of munitions and fireworks. Ammonium perchlorate and other perchlorate salts are readily soluble in water, dissociating into the perchlorate ion, which does not readily interact with the soil matrix or degrade in the environment. The primary human health concern related to perchlorate is its effects on the thyroid. Perchlorate has been detected at low levels in Metropolitan's CRA water supply.

Because of the growing concerns over perchlorate levels in drinking water, in 2002 Metropolitan adopted a Perchlorate Action Plan. Objectives include expanded monitoring and reporting programs and continued tracking of remediation efforts in the Las Vegas Wash. Metropolitan has been conducting monthly monitoring of Colorado River supplies. The perchlorate originates in the Las Vegas Wash, and the most likely source was a chemical manufacturing site located in Henderson, Nevada. The Nevada Department of Environmental Protection manages a comprehensive groundwater remediation program in

the Henderson area. As of December 2004, the amount of perchlorate entering the Colorado River system from Henderson has been reduced from approximately 900 pounds per day (lb/day) to less than 150 lb/day.

SECTION 7.2 STATE WATER PROJECT


The Delta

The quality of SWP water as a drinking water source is affected by a number of factors, most notably seawater intrusion and agricultural drainage from peat soil islands in the Delta. SWP water contains relatively high levels of bromide and total organic carbon, two elements that are of particular concern to drinking water agencies. Bromide and total organic carbon combine with chemicals used in the water treatment process to form disinfection by-products that are strictly regulated under the federal Safe Drinking Water Act (SDWA). Wastewater discharges from cities and towns surrounding the Delta also add salts and pathogens to Delta water, and they reduce its suitability for drinking and recycling.

MEETING WATER STANDARDS

Water agencies treat all water to meet stringent state and federal drinking water standards before delivering it to customers. However, source water of poor quality will make it increasingly expensive and difficult to meet such standards. The California Urban Water Agencies (CUWA) retained the assistance of a panel of drinking water quality and treatment experts to evaluate the source water quality necessary to allow agencies treating Delta water to comply with future drinking water regulations under a plausibly conservative regulatory scenario. The expert panel identified target bromide and total organic carbon concentrations of 50 parts per billion (ppb) and 3 parts per million (ppm), respectively. These targets were written into the Record Of Decision (ROD) adopted by CALFED in 2000.

The ROD states that CALFED will either achieve these targets at Clifton Court Forebay and drinking water intakes in the south and central Delta, or it will achieve an "equivalent level of public health protection using a cost-effective combination of alternative source waters, source control, and treatment technologies." CALFED did not establish a similar target for the salinity of Delta water, a particular concern in Southern California, because of the high salinity levels in Colorado River water, but the 2004 CALFED Drinking Water Quality Program Plan lists two "numeric targets," less than 220 ppm over a 10-year average and less than 440 ppm as a monthly average.

Actions to protect Delta fisheries have exacerbated existing water quality problems by forcing the SWP to shift its diversions from the springtime to the fall, when salinity and bromide levels are higher. Closure of the Delta Cross-Channel gates to protect migrating fish has also degraded SWP water quality by reducing the flow of higher quality Sacramento River water to the SWP pumps at critical times.


The State Water Project

Water supplies from the SWP have significantly lower TDS levels than the Colorado River, averaging 250 mg/l in water supplied through the East Branch and 325 mg/l on the West Branch. Because of this lower salinity, Metropolitan blends SWP water with high salinity CRA water to reduce the salinity levels of delivered water. However, both the supply and the TDS levels of SWP water can vary significantly in response to hydrologic conditions in the Sacramento-San Joaquin watersheds.

The TDS levels of SWP water can also vary widely over short periods of time. These variations reflect seasonal and tidal flow patterns, and they pose an

additional problem to blending as a management tool to lower the higher TDS from the CRA supply. For example, in the 1977 drought, the salinity of SWP water reaching Metropolitan increased to 430 mg/l, and supplies became limited. During this same event, salinity at the Banks pumping plant exceeded 700 mg/l. Under similar circumstances, Metropolitan's 500 mg/l salinity objectives could only be achieved by reducing imported water from the CRA. Thus, it may not be possible to maintain both salinity standards and water supply reliability unless salinity levels of source supplies can be reduced.

The CALFED Bay-Delta Program's EIS/EIR, Technical Appendix, July 2000 Water Quality Program Plan identified targets that are consistent with TDS objectives in Article 19 of the SWP Water Service Contract: a ten-year average of 220 mg/l and a maximum monthly average of 440 mg/l. These objectives were set in the 1960s when Metropolitan expected to obtain a greater proportion of its total supplies from the SWP. Because of reductions in expected SWP deliveries, Metropolitan's Board believes that this standard is no longer appropriate, so it has adopted a statement of needs from the Bay-Delta. Under the drinking water quality and salinity targets element, the Board states its need "to meet Metropolitan's 500 mg/l salinity-by-blending objective in a cost-effective manner while minimizing resource losses and ensuring the viability of recycling and groundwater management programs."

SECTION 7.3 SURFACE WATER

The region's water quality is influenced by a variety of factors depending on its source. As stated above, water from the Colorado River and from Northern California are vulnerable to a number of contributors to water quality degradation. Regional surface and groundwater are primarily vulnerable to increasing urbanization in the watershed, agriculture, recreational uses, wildlife, and fires.

Source water protection is fundamentally important to all of California. The DHS requires large utilities delivering surface water to complete a Watershed Sanitary Survey every five years to examine possible sources of drinking water contamination. The survey includes suggestions for how to protect water quality at the source.

A similar requirement from the United States Environmental Protection Agency (EPA) calls for utilities to complete a Source Water Assessment (SWA). Information collected in SWAs is used to evaluate changes in potential sources of contamination and to help determine if more protection measures are needed. The EPA requires utilities to complete a SWA that uses information collected in the sanitary surveys. The SWA is also used to evaluate the vulnerability of water sources to contamination and also helps determine whether more protective measures are needed.

The monitoring of key constituents in source waters is critical in helping to identify constituents that should be controlled at the source and to determine the best ways to operate the water system so as to improve the quality of water delivered to the consumer. The effect of urban runoff on receiving water quality is a recently recognized problem. Most of the work up to the present has centered on characterizing urban runoff: measuring concentrations of various constituents, attempting to relate these concentrations to such factors as land use type and rainfall intensity, and studying the effects of these constituents on street surfaces.

It appears that considerable quantities of contaminants, heavy metals in particular, may enter the receiving waters through urban runoff. The federal Water Pollution Control Act Amendments of 1972 stress future "control of treatment of all-point and non-point sources of pollution." Thus, the federal government has concluded that non-point sources, such as urban runoff, are indeed harmful to the aquatic environment and that measures should be taken to control such emissions.

There are four basic approaches to controlling pollution from urban runoff:

- Prevent contaminants from reaching urban land surfaces;
- Improve street cleaning and cleaning of other areas where contaminants may be present;
- Treat runoff prior to discharge to receiving waters; and
- Control land use and development.

Which approach or combination of approaches is most effective or economical has not yet been studied extensively. Thus, only the basic characteristics of each approach can be discussed. In addition to these direct approaches, measures to reduce the volume of runoff from urban areas are also available.

The fourth approach, control land use and development, is to encourage controls on urbanization in order to reduce the volume of runoff. The usual pattern is that increased urbanization leads to higher runoff coefficients, reflecting the many impervious surfaces associated with development. Roof drains to storm sewers, paved parking lots and streets, installation of storm sewers, filling of natural recharge areas, and increased efficiency in realigned and resurfaced stream channels all are characteristics of urban growth.

Urban growth impacts surface water.

Development near streams and on steep slopes harms water resources. It is less disruptive to develop the lower portions of a watershed than the headwater areas, both from the standpoint of the length of channel affected and the extent of channel enlargement necessary to convey storm water. Use of porous pavements and less reliance on roof connections to storm drains and more emphasis on local recharge would reduce the peak volume of runoff from storms. An area's mass emissions of urban drainage constituents should be quantified. Urban planning should be more cognizant of land constraints to permit greater natural recharge where possible and feasible, and to discourage intensive development of steep land, particularly in headwater areas.

To address the issues associated with surface water quality, the Water Authority, the City of San Diego, and the County of San Diego formed a Regional Water Management Group to coordinate development of an Integrated Regional Water Management Plan (IRWMP) for the San Diego region. An important element in the IRWMP is to protect and enhance the region's local surface water quality. As part of this process, projects will be identified and implemented to assist in watershed protection, and thereby protect the quality of surface water supplies.

Integrated Regional Water Management Plan

In the past, regional surface water quality has been considered good to excellent. Water quality can vary with imported water inflows and surface water contamination. Source water protection is considered a key element in regional water quality. The Water Authority and its member agencies are working together to improve watershed awareness and management. Currently, the most significant water quality issue that affects the public is algae blooms, which can create taste and odor problems.

In San Diego County, DHS has primacy over the implementation of the SDWA. The SDWA regulates source water protection to ensure public health through the multiple barrier approach, an approach that anticipates that the public will participate in source water protection. Member agencies in the Water Authority's service area that have surface water have a good, long-standing, working relationship with DHS.

SECTION 7.4 GROUNDWATER

Two water quality parameters that can affect reliability of groundwater resources in San Diego County are contamination from Methyl Tertiary Butyl Ether (MTBE) and high salinity levels.

SALINITY

Increased TDS in groundwater basins occurs either when basins near the ocean are over drafted, leading to seawater intrusion, or when agricultural and urban


Groundwater demineralization facility

return flows add salts to the basins. Much of the water used for agricultural or urban irrigation infiltrates into the aquifer, so where high TDS irrigation water is used or where the water transports salts from overlying soil, the infiltrating water will increase the salinity of the aquifer. Using this resource requires costly demineralization projects. (Refer to **Section 5.2.1** for discussion on groundwater recovery projects.)

To protect the quality of these basins, the Regional Board often places restrictions on the salinity levels of water used for basin recharge or for irrigation of lands overlying the aquifers. Where these restrictions are in place, water reuse and aquifer recharge may be restricted, or expensive mitigation measures may be required.

METHYL TERTIARY BUTYL ETHER

Until recently, MTBE was the primary oxygenate in virtually all the gasoline used in California. In January 2004, the Governor's executive order to remove MTBE from gasoline became effective, and now ethanol is the primary oxygenate. MTBE is very soluble in water and has low affinity for soil particles, thus allowing the chemical to move quickly in the groundwater. MTBE is also resistant to chemical and microbial degradation in water, making treatment more difficult than the treatment of other gasoline components.

MTBE presents a significant problem to local groundwater basins. Leaking underground storage tanks and poor fuel-handling practices at local gas stations may provide a large source of MTBE. Improved underground storage tank requirements and monitoring, and the phase-out of MTBE as a fuel additive, will probably decrease the likelihood of MTBE groundwater problems in the future.

SECTION 7.5 RECYCLED WATER

Water quality, as it pertains to high salinity supplies, is a significant implementation issue for recycled water projects. High TDS source water poses a special problem for water recycling facilities because conventional treatment processes are designed to remove suspended particles, but not dissolved particles. 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. Self-regenerating water softeners can add another 60 to 100 mg/l. Infiltration of brackish groundwater into sewer lines can also cause an increase in TDS. If an area receives a water supply with 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 higher.

Figure 7-1 shows the average TDS at several of the existing and projected water recycling treatment plants. In general, TDS concentrations over 1,000

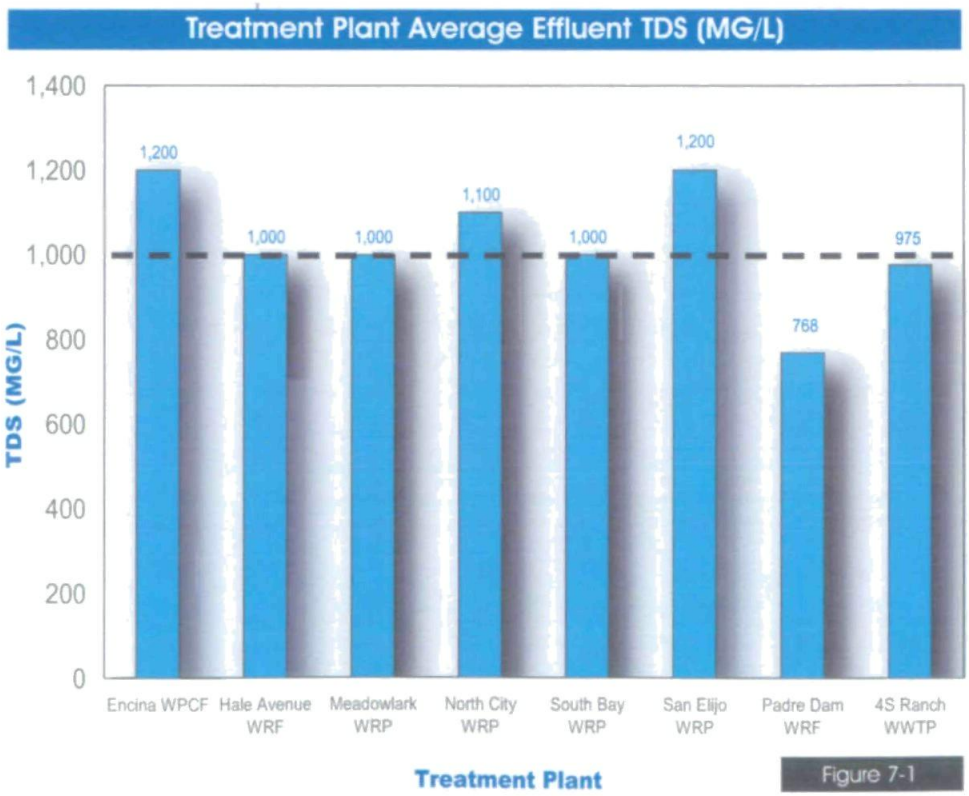
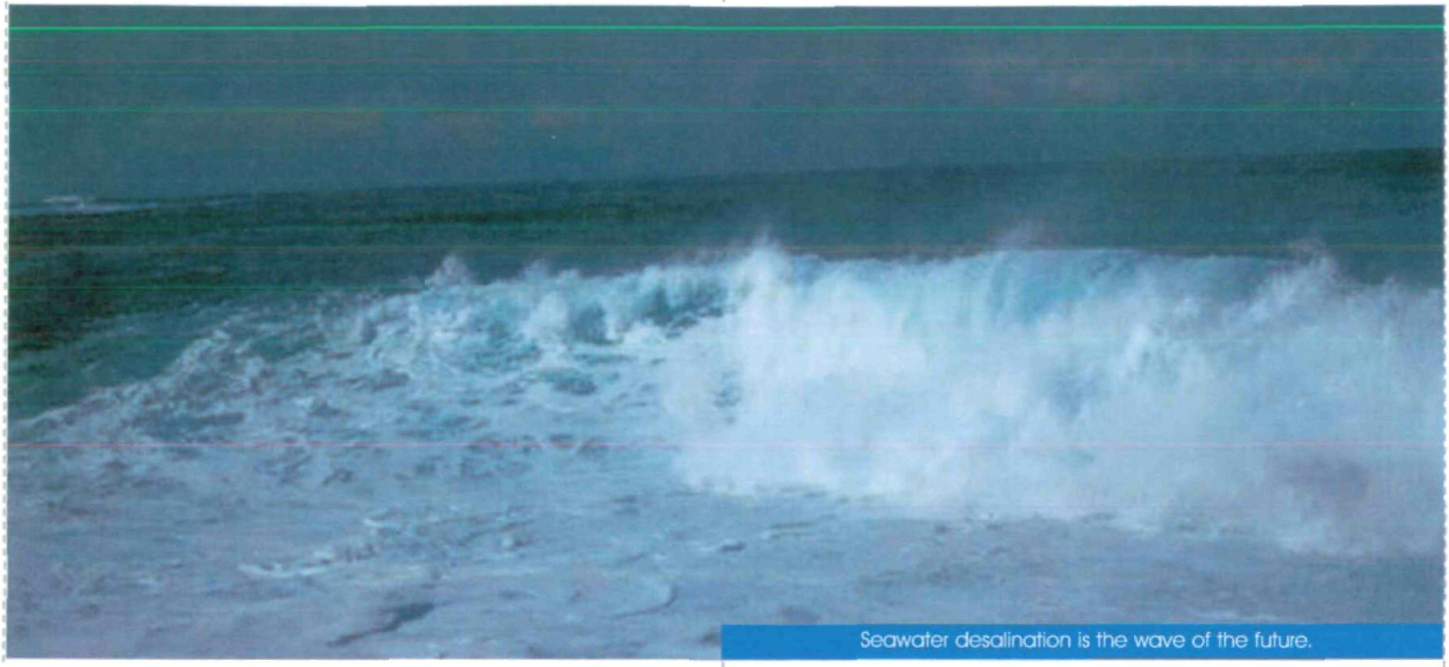


Figure 7-1



Seawater desalination is the wave of the future.

mg/l become problematic for irrigation and industrial reuse customers. This problem greatly limits the potential uses and marketability of recycled water, particularly for agricultural purposes, because certain crops and nursery stock cannot be irrigated with high-TDS water.

SECTION 7.6 SEAWATER DESALINATION

The feedwater source for the proposed regional seawater desalination project at the Encina Power Station in Carlsbad is the Pacific Ocean. The salinity of the Pacific Ocean in San Diego County is fairly stable, with a TDS concentration around 34,000 mg/l. To address TDS concentrations at this level, the desalination facility will use a RO membrane treatment process to reduce the TDS to less than 350 mg/l, resulting in approximately 99 percent removal of TDS and a supply that meets drinking water standards.

Prior to the RO process, the feedwater will be pretreated to remove suspended solids, including organic material. The RO process will then remove the dissolved solids. Next, the product water will be post-treated to prevent corrosion in the distribution system and improve the aesthetic quality of the water. This process generally involves adding alkalinity to the treated water. The final step, a disinfection process, provides a disinfection residual in the treated water.

A single-pass RO process of seawater generally results in about 50 percent recovery of treated water. The remaining 50 percent is discharged as concentrate, with about twice the salinity of the original feedwater. The concentrate will be diluted to avoid negative impacts to the marine environment from the elevated salinity levels at the point of discharge.

SECTION 8 WATER SUPPLY RELIABILITY

As stated in the Act, every urban water supplier shall include, as part of its plan, an assessment of the reliability of its water supply. The water supply and demand assessment must compare the total projected water use with the expected water supply over the next 20 years in 5-year increments. This reliability assessment is required for normal, single dry-year, and multiple dry water years. The assessment contained in the Updated 2005 Plan projects reliability through the next 25 years to correspond with the growth forecast developed by SANDAG and ensure compliance with Senate Bills 610 and 221. In addition to the expected mix of resources utilized in the reliability assessment, a resources goal has been established. The goal includes the expected supplies plus other potential projects that are important to maximizing development of local resources, but are still in the conceptual phase. This section presents a summary of the water demands and supplies within the Water Authority's service area along with the reliability assessment and resources goal.

SECTION 8.1 DEVELOPMENT OF PROJECTED WATER RESOURCES MIX

In summary, development of the projected mix of resources to meet future demands was based on the following factors:

I. Local agency information on projected water recycling, groundwater, surface water, and local seawater desalination supplies (**Section 5**);

II. Update of the Water Authority's 2000 Plan to reflect Board action taken over the last five years related to the following items:

a. Adoption of QSA related agreements (**Section 6.2.1**);
b. Fourth Amendment to the Transfer Agreement (**Section 4.1**); and
c. Agreement between Metropolitan and the Water Authority regarding assignment of agreements related to the AAC and CC Lining Projects (**Section 4.2**).

SECTION 8.2 NORMAL WATER YEAR ASSESSMENT

Table 8-1 shows the normal year assessment, summarizing the total water demands for the Water Authority through the year 2030, along with the supplies necessary to meet demands under normal conditions. **Section 2** contains a discussion of the normal year water demands in the Water Authority's service area. If the Water Authority and member agency supplies are developed as planned, along with implementation of Metropolitan's IRP, no shortages are anticipated within the Water Authority's service area in a normal year through 2030.

Table 8-1: Normal Water Year Supply and Demand Assessment (AF/YR)[1]

	2010	2015	2020	2025	2030
Water Authority Supplies					
IID Water Transfer	70,000	100,000	190,000	200,000	200,000
AAC and CC Lining Projects	77,700	77,700	77,700	77,700	77,700
Subtotal	147,700	177,700	267,700	277,700	277,700
Member Agency Supplies					
Surface Water	59,649	59,649	59,649	59,649	59,649
Water Recycling	33,668	40,662	45,548	46,492	47,584
Groundwater	17,175	18,945	19,775	19,775	19,775
Groundwater Recovery	11,400	11,400	11,400	11,400	11,400
Seawater Desalination	0	34,689	36,064	37,754	40,000
Subtotal	121,892	165,345	172,436	175,070	178,408
Metropolitan Water District Supplies	445,858	399,855	311,374	342,870	372,922
TOTAL PROJECTED SUPPLIES	715,450	742,900	771,510	795,640	829,030
TOTAL ESTIMATED DEMANDS w/Conservation	715,450	742,900	771,510	795,640	829,030

1 Normal water year demands based on 1960 – 2002 hydrology.

SECTION 8.3 DRY WATER YEAR ASSESSMENT

In addition to a normal water year assessment, the Act requires an assessment to compare supply and demands under single dry and multiple dry water years over the next 20 years, in five-year increments. **Section 2** describes the derivation of the dry water year demands. **Table 8-2** shows the single dry-year assessment. The projected groundwater and surface water yields shown in the table are based on historic 1991 supplies during the 1987-1992 drought years. The supplies available from projected recycling and groundwater recovery projects are assumed to experience little, if any, reduction in a dry-year. The Water Authority's existing and planned supplies from the IID transfer, canal lining projects, and seawater desalination are also considered "drought-proof" supplies as discussed in **Section 4**. Therefore, estimated normal yields from these supplies are also included in the analysis.

In accordance with the Act, **Tables 8-3, 8-4, 8-5, 8-6,** and **8-7** show the multiple dry water year assessments in five-year increments. The member agencies' surface and groundwater yields shown in these tables are reflective of supplies available during the 1987-92 drought in years 1990, 1991 and 1992.

As shown in the above tables, if the projected Water Authority and member agency supplies are developed as planned, along with implementation of Metropoli-

Table 8-2: Single Dry Water Year Supply and Demand Assessment
Five Year Increments (AF/YR)

	2010	2015	2020	2025	2030
Water Authority Supplies					
IID Water Transfer	70,000	100,000	190,000	200,000	200,000
AAC and CC Lining Projects	77,700	77,700	77,700	77,700	77,700
Subtotal	147,700	177,700	267,700	277,700	277,700
Member Agency Supplies					
Surface Water	22,284	22,284	22,284	22,284	22,284
Water Recycling	33,668	40,662	45,548	46,492	47,584
Groundwater	10,838	10,838	10,838	10,838	10,838
Groundwater Recovery	11,400	11,400	11,400	11,400	11,400
Seawater Desalination	0	34,698	36,064	37,754	40,000
Subtotal	78,190	119,882	126,134	128,768	132,106
Metropolitan Water District Supplies	541,760	498,388	431,726	442,142	473,224
TOTAL PROJECTED SUPPLIES	767,650	795,970	825,560	848,610	883,030
TOTAL ESTIMATED DEMANDS w/Conservation	767,650	795,970	825,560	848,610	883,030

Multiple Dry Water Year Supply and Demand Assessment
5-Year Increments (AF/YR)

Table 8-3

	2006	2007	2008
Water Authority Supplies	40,000	71,500	71,500
Member Agencies	56,670	60,230	80,900
Metropolitan Supplies	647,850	618,050	602,630
TOTAL ESTIMATED SUPPLIES	744,520	749,780	755,030
TOTAL ESTIMATED DEMANDS	744,520	749,780	755,030

Table 8-4

	2011	2012	2013
Water Authority Supplies	157,700	167,700	177,700
Member Agencies	101,012	100,431	116,970
Metropolitan Supplies	512,698	500,149	488,480
TOTAL ESTIMATED SUPPLIES	771,410	777,280	783,150
TOTAL ESTIMATED DEMANDS	771,410	777,280	783,150

Table 8-5			
	2016	2017	2018
Water Authority Supplies	177,700	177,700	207,700
Member Agencies	109,214	108,149	124,194
Metropolitan Supplies	514,116	521,301	481,376
TOTAL ESTIMATED SUPPLIES	801,030	807,150	813,270
TOTAL ESTIMATED DEMANDS	801,030	807,150	813,270

Table 8-6			
	2021	2022	2023
Water Authority Supplies	277,700	277,700	277,700
Member Agencies	114,752	112,960	128,288
Metropolitan Supplies	438,228	445,180	435,022
TOTAL ESTIMATED SUPPLIES	830,680	835,840	841,010
TOTAL ESTIMATED DEMANDS	830,680	835,840	841,010

Table 8-7			
	2026	2027	2028
Water Authority Supplies	277,700	277,700	277,700
Member Agencies	117,524	115,873	131,343
Metropolitan Supplies	463,256	472,057	463,727
TOTAL ESTIMATED SUPPLIES	858,480	865,630	872,770
TOTAL ESTIMATED DEMANDS	858,480	865,630	872,770

tan's IRP, no shortages are anticipated within the Water Authority's service area under single dry-year or multiple dry water years through 2030. However, the Water Authority is at risk for shortages should the supplies identified in Metropolitan's IRP not be developed as planned or a Metropolitan member agency such as the City of Los Angeles invoke its Section 135, Preferential Right to Water (discussed in **Section 6.1.1**). To alleviate this risk, the Water Authority is pursuing the following options: 1) the development of additional storage; and 2) development of additional seawater desalination. Storage opportunities include local carryover storage facilities to accumulate and store water during periods of availability, as well as the acquisition of out-of-the-region conjunctive-use facilities to develop additional groundwater storage (refer to **Section 1.5.1** for discussion on the Water Authority's proposed carryover storage project). A combination of storage and new supply appears to provide the most reliable solution to alleviating risks during a dry period.

SECTION 8.4 RELIABILITY OF SUPPLY

The previous sections identify the diverse mix of resources planned to meet future demands in both a normal and dry-year. Implementation of this regional resource mix will require development of projects and programs by the Water Authority, its member agencies, and Metropolitan. The Water Authority coordinated with its member agencies and Metropolitan during preparation of the Updated 2005 Plan on the future demands and supplies projected for the region. The steps being taken by the member agencies and Metropolitan to develop supplies are addressed in their respective urban water management plans. **Section 4** contains the steps taken and remaining actions necessary to develop and maintain the Water Authority supplies.

The Act requires that, for any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, that the agency describe, to the extent practicable, plans to replace that source with alternative sources or water demand management measures. As stated throughout the Updated 2005 Plan, the Water Authority and its member agencies are planning to develop a diverse supply of resources. The unavailability of any one supply source will be buffered because of the diversity of the supplies; the region is not reliant on a single source. To replace or supplement an existing supply, the Water Authority could take steps to increase development of transfers or seawater desalination. Member agencies could also further maximize development of recycled water, groundwater, and seawater desalination. With a successful conservation program already in place, the Water Authority and its member agencies could effectively implement extraordinary conservation measures to assist in ensuring reliability. Another element of reliability is Metropolitan's IRP planning buffer, described in **Section 6.1.2**, which identifies an additional increment of water that could be potentially developed if other supplies are not implemented as planned. A combination of these resources would be necessary to ensure a reliable supply.

Quail Botanical Gardens irrigates with recycled water.

As stated in **Section 4.3.1** and **5.3**, seawater desalination remains a key component of the region's diversification strategy. However, because there are a number of factors that could affect implementation of seawater desalination, alternative options are being considered. This includes accelerating construction of an additional imported water conveyance pipeline, Pipeline 6, that would allow for additional supply deliveries from Metropolitan. With a regional seawater desalination project in place, Pipeline 6 would not be needed until approximately 2023. To meet demands without seawater desalination, preliminary results from Metropolitan's draft System Overview Study show that Pipeline 6 would be needed by 2018 and that it would take an estimated nine years to construct. A decision on implementation of a seawater desalination project prior to 2009 would allow adequate time to construct the facility.

Activities associated with implementation of Pipeline 6 include the following:

- Coordination between Metropolitan and the Water Authority regarding planning and design of the pipeline is ongoing; and
- An alignment for the entire approximately 30-mile pipeline was identified in the original 1993 Environmental Impact Report. Metropolitan is conducting a feasibility study to re-visit the 1993 alignment and evaluate alternative alignments north of the San Luis Rey River in light of changed conditions since 1993. The Water Authority plans to conduct a similar feasibility study of Pipeline 6 alignments south of the San Luis Rey River. Based on these updated feasibility studies, an updated environmental analysis for the project is also planned.

SECTION 8.5 REGIONAL WATER SUPPLY GOALS

As stated in **Sections 4 and 5**, those projects with adequate documentation regarding implementation and supply utilization or existing projects already planned for expansion were considered for inclusion in the assessments discussed in **Sections 8.2 and 8.3**. In addition to these verifiable projects, the Water Authority and its member agencies have conceptually identified other potential projects. Combining the verifiable projects and these conceptual projects forms the regional water supply goals.

These supply goals are critical to the region for a number of reasons. The Water Authority and member agencies must continue to strive to develop cost-effective local resources that can further diversify

2030 Water Supply Goals

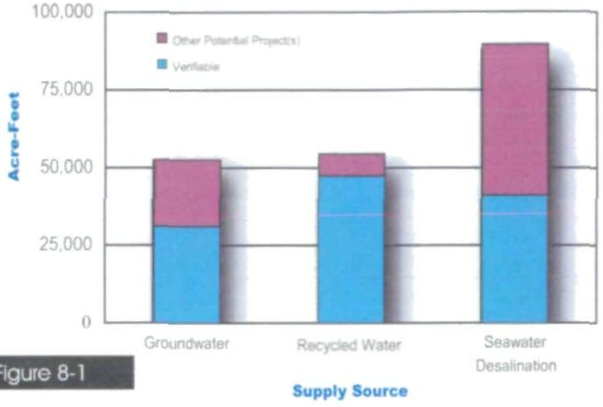


Figure 8-1

the region's supplies and reduce demands for imported water from Metropolitan. They provide objectives for the region to work towards by resolving any funding, regulatory, and other constraints associated with implementation. **Figure 8-1** shows the water supply goals for groundwater, recycled water, and seawater desalination.

The Water Authority worked with its member agencies to determine the verifiable supplies to be included in the assessment and those projects to be included in the supply goals. Including the verifiable supplies contained in the assessment, the regional groundwater production goal is 52,575 AF/YR by 2030. The recycled water goal is 54,413 AF/YR by 2030. The specific local projects are listed in **Table F-2** and **F-4** in **Appendix F**.

The total regional seawater desalination goal for 2030 is 89,600 AF/YR. The goal is achieved through implementation of 40,000 AF/YR of verifiable supply from the local project at the Encina Power Station, based on the contracted amounts and supply utilization, 16,000 AF/YR of additional local supply from the same project, and 33,600 AF/YR of regional supply (Water Authority goal). Refer to **Sections 4.3** and **5.4** for additional information on the derivation of the verifiable and goal supply figures.

SECTION 9 SHORTAGE CONTINGENCY ANALYSIS

The Act requires that urban water agencies conduct a water shortage contingency analysis as part of their Updated 2005 plan. This section includes the Water Authority's analysis, which addresses a catastrophic shortage situation and drought management.

SECTION 9.1 CATASTROPHIC WATER SHORTAGE

A catastrophic water shortage occurs when a disaster, such as an earthquake, results in insufficient available water to meet the region's needs or eliminates access to imported water supplies. The following section describes the Water Authority's Emergency Response Plan (ERP) and the ESP, both developed to protect public health and safety and to prevent or limit economic damage that could occur from a severe shortage of water supplies.

9.1.1 EMERGENCY RESPONSE PLAN

The Water Authority's ERP provides staff with the information necessary to respond to an emergency that causes severe damage to the Water Authority's water distribution system or impedes the Water Authority's ability to provide reliable water service to its member agencies. The ERP describes the situations and incidents that will trigger the activation of the Water Authority's ERP and Emergency Operations Center (EOC). It also provides direction and strategies for responding to a crisis.

The Water Authority's ERP includes:

- Authorities, policies, and procedures associated with emergency response activities;
- EOC activities – including EOC activation and deactivation guidelines;
- Multi-agency and multi-jurisdictional coordination, particularly between the Water Authority, its member agencies, and Metropolitan in accordance with Standardized Emergency Management System (SEMS) guidelines;
- Emergency staffing, management, and organization required to assist in mitigating any significant emergency or disaster;
- Mutual Aid Agreements and covenants that outline the terms and conditions under which mutual aid assistance will be provided;
- Pre-emergency planning and emergency operations procedures.

In addition, the Water Authority's ERP Manual uses a step-by-step approach to emergency response planning by providing such procedural tools as action checklists, resource and information lists, personnel rosters, and listings of established policies and procedures. The Water Authority's plan parallels many of the same plan components contained in the Unified San Diego County Emergency Services Organization's "Operational Area Emergency Plan" (OAEP). In turn, the OAEP serves to support and supplement the Water Authority's ERP.

The San Vicente Reservoir is important to the next phase of the ESP.

9.1.2 WATER AUTHORITY'S EMERGENCY STORAGE PROJECT

In June, 1998, the Water Authority's Board authorized implementation of the ESP to reduce the risk of potential catastrophic damage that could result from a prolonged interruption of imported water due to earthquake, drought, or other disasters.

The ESP is a system of reservoirs, pipelines, and other facilities that will work together to store and move water around the county in the event of a natural disaster. The facilities are located throughout San Diego County and are being constructed in phases. The entire project is expected to be complete by 2012. Its initial phase includes the recently completed 318-foot-high Olivenhain Dam and accompanying 24,789 AF Olivenhain Reservoir. When completed, the ESP will provide 90,100 AF of stored water for emergency purposes to meet the county's needs through at least 2030.

In sizing the ESP, the Water Authority assumed a 75 percent level of service to all Water Authority

member agencies during an outage and full implementation of the water conservation BMPs.

The following steps from the final draft of the August 2002 Emergency Water Delivery Plans show the methodology for calculating the allocation of ESP supplies to member agencies in a prolonged outage situation without imported supplies:

1. Estimate the duration of the emergency (i.e. time needed to repair damaged pipelines);
2. Determine each member agency's net demand during the emergency period by adding M&I water demands and agricultural water demands and then subtracting recycled water supplies;
3. Determine each member agency's useable local supplies during the emergency period (local supplies include surface water and groundwater);
4. Determine each member agency's level of service based on usable local supplies and net demand;
5. Adjust the allocation of ESP supplies based on a member agency's participation in the IAWP. IAWP customers will be required to take a reduction in deliveries during a water shortage due to an emergency at double the system-wide reduction up to a maximum of 90%. Water not delivered to IAWP customers will be redistributed to member agencies based on the "system-wide" level of service targets;
6. Determine the amount of local supplies that can be transferred between member agencies, with transfers occurring only after a member agency has a level of service greater than 75% based on their usable local supplies; and
7. Allocate delivery of useable ESP storage supplies and Metropolitan supplies to member agencies with the goal of equalizing the level of service among the member agencies.

The Board of Directors may authorize that supplies from the ESP be used in a prolonged drought situation where imported and local supplies do not meet 75 percent of the Water Authority's member agencies M&I demands.

SECTION 9.2 DROUGHT MANAGEMENT PLANNING

9.2.1 INTRODUCTION

The last major drought in California occurred between 1987 and 1992 and caused severe water supply shortages throughout the state. During early March 1991, at the peak of the drought, Metropolitan's SWP supplies were reduced by 90 percent. Subsequently, Metropolitan voted to impose a 50 percent reduction in imported deliveries to the Water Authority. The results of Metropolitan's cutback would have been devastating to the Water Authority's businesses and residents except for the miracle March rainfall that occurred later that month. These rains allowed the SWP to reduce its level of cutback to 80 percent, and Metropolitan later rolled back its call for reduction from 50 to 31 percent. Even at this level the Water Authority was impacted more than other Metropolitan members because of its high dependence upon imported supplies from Metropolitan.

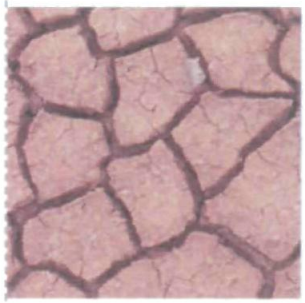
Since the 1987-1992 drought, the Water Authority and its member agencies have developed plans and implemented projects to reduce reliance on a single supply source. As mentioned in **Section 8**, if projected supplies are developed as planned and Metropolitan's IRP is fully implemented, no shortages are anticipated within the Water Authority's service area through 2030. While the region has plans to provide a high level of reliability, there will always be some level of uncertainty associated with maintaining and developing local and imported supplies. Therefore, the Water Authority developed a comprehensive Drought Management Plan (DMP) in the event that the region faces supply shortages due to drought conditions. The sections below describe the development of the DMP. A copy of the DMP is included in this Updated 2005 Plan as **Appendix G**.


Drought-tolerant plants thrive if water is scarce.

In 1999, Metropolitan adopted the Water Surplus and Drought Management Plan (WSDM Plan) to integrate planned operational actions with respect to both surplus and shortage situations. (For further details on the WSDM Plan actions, refer to Metropolitan's 2005 RUWMP.) The WSDM Plan's final action, to be taken in an extreme shortage stage, is the implementation of an allocation plan. An allocation plan was not developed as part of the WSDM Plan, and it

is not known when Metropolitan will consider and adopt such a plan. During development of the DMP, the Water Authority made assumptions regarding the Metropolitan supplies available during drought stages. The Water Authority will adjust the DMP as necessary following Metropolitan's adoption of an allocation plan.

One of the requirements of the shortage contingency analysis included in the Act is an estimate of the minimum supplies available during each of the next three years. **Table 8-3** of **Section 8.3** shows this estimate. The sections below address other requirements of the Act applicable to the Water Authority.



9.2.2 DMP PURPOSE

The DMP provides the Water Authority and its member agencies with a series of actions to take when faced with a shortage of imported water supplies from Metropolitan due to drought conditions. The potential actions will help the region minimize the impacts of shortages and ensure an equitable allocation of supplies.

The DMP includes a drought response matrix containing actions to be taken by the Water Authority at different drought stages. One of the actions, if warranted, is an allocation of available supplies. The Water Authority developed an allocation methodology to include in the DMP. This methodology determines the supplies available to member agencies and how local resources will be handled. A communication strategy was also prepared to help the Water Authority and its member agencies implement the DMP actions. When ultimately faced with a supply shortage, there may be factors unknown at this time that could influence the actions taken. The DMP will provide guidance on how to move forward and minimize the impacts of a shortage situation.

9.2.3 DMP TECHNICAL ADVISORY COMMITTEE

Preparing and implementing a DMP for the San Diego region required input and support from the Water Authority's member agencies. Recognizing the importance of member agency involvement, the Water Authority formed a TAC – Technical Advisory Committee – to provide input on development of the DMP. The TAC included a representative from each of the member agencies. The meetings were facilitated to ensure full involvement from all participants.

To gain an initial understanding of the TAC members' positions on the DMP elements, each member completed a questionnaire. Results from this questionnaire provided valuable information used to develop a set of principles for preparing the DMP.

Proposed elements of the DMP that were developed through the DMP TAC meetings are presented in **Sections 9.2.4, 9.2.5,** and **9.2.6**.

9.2.4 DMP PRINCIPLES

The TAC developed principles to provide guidance to the Water Authority and its member agencies in developing and implementing the DMP. The principles are grouped under elements of the DMP.

Overall Plan

1. The DMP will be developed in cooperation with the member agencies and include all aspects of drought planning - including steps to avoid rationing, drought response stages, allocation methodology, pricing, and communication strategy.

Communication Strategy

2. An on-going, coordinated and regional public outreach program shall be developed by the Water Authority that provides a clear and consistent message to the public regarding water supplies and specific conservation measures. The outreach program will also recognize and support member agency communication efforts that address specific retail level allocations.
3. A Drought Coordination Team, made up of one representative from each member agency, will be established to assist the Water Authority in implementation of the DMP. This includes items such as formulation and implementation of the public outreach program, timing of drought stages, selection of drought supply actions, and addressing potential issues surrounding implementation of the shortage allocation methodology.
4. The drought management plan should specify actions and timing of communications.

Drought Supply Enhancement

5. The Water Authority and its member agencies will work cooperatively to avoid and/or minimize rationing during droughts through supply enhancement and voluntary demand reduction measures.

6. Future Water Authority carryover storage supplies will be managed and utilized to assist in meeting demands during drought periods. Member agencies will be encouraged to develop carryover storage.
7. The Water Authority will consider securing option and/or spot water transfers to meet the reliability goal set by the Board. The cost of this regional supply will be melded into the Water Authority's supply costs for all classes of service that benefit.
8. Subject to the Water Authority's wheeling policy, if a member agency purchases transfer water from a source other than the Water Authority, the full cost of the transfer, including, but not limited to, purchase costs, wheeling costs, and administrative costs, will be borne by said member agency.
9. ESP supplies may be available when any member agency's non-interruptible firm demands drop below a 75 percent service level.
10. The quantities of supplies from the ESP to be removed from storage will be based on a minimum amount necessary to meet essential health, safety, and firefighting needs, and maximum amount based on the need to ensure adequate supplies remain for a catastrophic event (e.g. earthquake).

Drought Response Stages

11. Develop drought response stages, which at a minimum, accomplish the following:
    - Can be easily communicated to the public;
    - Flexible to handle unexpected changes in demand and supply conditions;
    - Includes percent reduction (voluntary or mandatory) per stage; and
    - Includes both supply augmentation and emergency demand reduction methods.
12. Targets for achieving the emergency demand reduction measures should take into account the region's already aggressive long-term water conservation program.
13. The decision on when, and in which sequence drought augmentation supplies will be utilized during different stages will include consideration of the following factors:
    - Location – Out-of-region supplies will be utilized in the earlier stages, prior to in-county storage, because these supplies are more vulnerable to implementation risks such as seismic events;
    - Cost – Priority will be given to maximizing supply reliability and at the same time using the most cost-effective supplies; and
    - Limitations – Potential restrictions on the use of drought augmentation supplies is a factor in determining supply availability (e.g. potential restrictions on ESP supplies).

Allocation Methodology

14. The allocation methodology will be equitable, easy to administer, contain financial penalties and pricing signals, and a communication strategy to ensure member agencies and the public are informed and understand the need to conserve.
15. In order to protect the economic health of the entire region, it is very important for the allocation methodology to avoid large, uneven retail impacts across the region. The methodology should include a minimum level of retail agency reliability to ensure equitable allocation among the member agencies.
16. With the exception of allocating water from the ESP, the Water Authority shall make no distinction among customers paying the same M&I rate (e.g. non-Interim Agricultural Water Program (IAWP) agriculture, residential, commercial, and industrial).
17. Additional IAWP cutbacks beyond the initial 30 percent faced by IAWP customers should be equally applied to both IAWP and M&I customers.
18. A member agency that has developed local projects and instituted conservation measures should not be penalized in the computation of allocations.
19. To help balance out the financial costs and risks associated with development of local resources, the shortage allocation methodology should provide an incentive to those member agencies that have developed local supplies.
20. The base-year, upon which allocations will be derived, will be based on historic demands. Adjustments to the base-year will be made for demographic changes, growth, local supplies, demand hardening, and supplies allocated under interruptible service programs.
21. A member agency's base-year will be adjusted to reflect the regional financial contribution from the Water Authority for development of local projects. The adjustment will take into account the risks associated with developing the local projects.
22. A member agency will not be able to market its unused allocation to other agencies within the Water Authority's service area at a cost higher than the Water Authority's charges for those supplies.
23. Penalty rates, along with other demand reduction measures, will be used by the Water Authority to encourage conservation during a drought.

9.2.5 DROUGHT RESPONSE MATRIX

The Act requires information on the stages of action to be undertaken in response to water supply shortages, including up to a 50 percent reduction in water supply. To meet the requirements, the Water Authority, with input from the TAC, developed a regional drought response matrix. The matrix provides guidance to the Water Authority and member agencies in selecting potential regional actions to lessen the severity of shortage conditions. Member agencies will independently adopt retail-level actions to manage potential shortages.

As shown in **Table 9-1**, the matrix proposes three main stages and identifies potential actions available to the Water Authority at each stage. To determine the specific actions that should be taken at each stage, the Water Authority and its member agencies will evaluate conditions specific to the timing and supply availability along with other pertinent variables. Numerous variables can influence the reduction levels adopted during a drought. These variables include, but are not limited to, SWP allocation, conditions on the Colorado River, Water Authority supplies, local storage, local demands, and timing.

MATRIX STAGES AND ACTIONS

Three drought stages have been identified in the matrix. The first stage of the drought response matrix is considered voluntary. The voluntary stage would likely occur when Metropolitan has been experiencing shortages in its imported water supply (from either the Colorado River or the SWP, or both) and is withdrawing water from storage due to the drought conditions to meet normal demands. Actions initiated at this stage include monitoring supply conditions and storage levels, calling for voluntary conservation, and utilizing a prudent amount of supplies from Water Authority planned carryover storage. These actions would continue throughout the drought stages.

The second stage, supply enhancement, could occur in year three or four of a dry period and represents that point in time when Metropolitan reduces water deliveries to its member agencies. The Water Authority's Board of Directors will then consider the potential actions in this stage, or others that may surface, to eliminate any cutbacks to the member agencies from the reduction in Metropolitan supplies.

The final stage follows once both Metropolitan and the Water Authority Board have exhausted all supply enhancement options due to lack of supplies and/or increasing costs, and mandatory cutbacks are required. The actions taken at this stage include implementation of the allocation methodology and potential utilization of ESP supplies. As stated in the DMP Principles, ESP supplies may be available when any member agency's non-interruptible firm demands drop below a 75 percent service level. In addition, the quantities of supplies utilized from ESP storage will be based on a minimum amount necessary to meet essential health, safety, and

Table 9-1: Drought Response Matrix — Firm Demands

	STAGES		
Potential SDCWA Drought Actions	Voluntary	SDCWA Supply Enhancement	Mandatory Cutbacks
Ongoing BMP implementation	X	X	X
Communication strategy	X	X	X
Monitoring supply conditions & storage levels	X	X	X
Call for voluntary conservation	X	X	X
Draw from SDCWA carryover storage	X	X	X
Secure transfer option contracts	X	X	X
Buy phase 1 spot transfers (cost at or below Tier 2 rate)		X	X
Call transfer options		X	X
Buy phase 2 spot transfers (cost at or above Tier 2 rate)		X	X
Implement allocation methodology			X
Utilize ESP Supplies			X

firefighting needs, and maximum amount based on the need to ensure adequate supplies remain for a catastrophic event (e.g. earthquake).

9.2.6 SUPPLY ALLOCATION METHODOLOGY

With the implementation of the member agencies' local projects, the Water Authority's core supplies, and potential drought supply enhancement supplies, the impact from supply shortages from Metropolitan on M&I customers will be reduced and potentially avoided. Preparing a supply allocation methodology is important in order to be prepared for situations that warrant an allocation of supplies to the member agencies. Implementing a supply allocation plan is part of the Water Authority's drought response matrix.

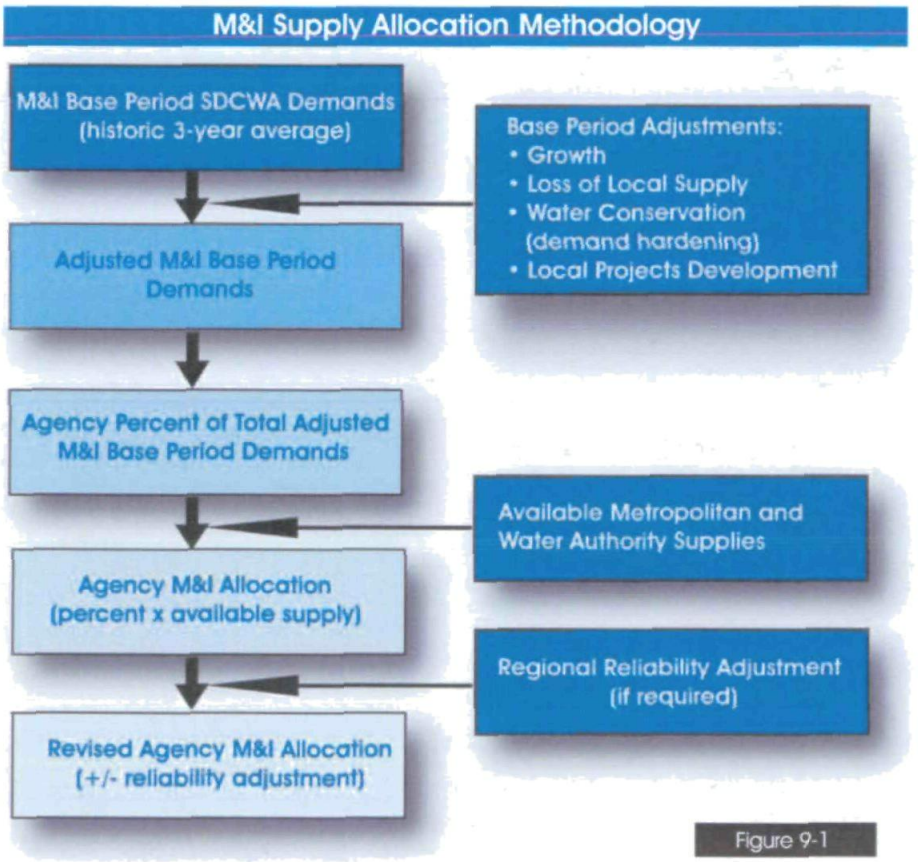


Figure 9-1

Starting with the accepted principles listed in **Section 9.2.4,** the Water Authority worked with the TAC to develop a methodology that is equitable and that recognizes the investments made by agencies that have developed local supplies. The Water Authority's current rate structure notes two classes of service, M&I and IAWP. They receive different levels of service based on the rate paid and are managed separately in the allocation methodology.

IAWP customers have agreed to a reduced level of service in exchange for a discounted supply rate from Metropolitan. Metropolitan prepared draft IAWP Reduction Guidelines that state that IAWP customers will be cut by 30 percent prior to cutbacks to M&I customers. The guidelines do not specify stages and/or levels of cutbacks beyond 30 percent. Based on the guidelines and Principle 17, up to a 30 percent cut will be made to the IAWP base prior to M&I cutbacks. Beyond 30 percent, supplies will be allocated equally between IAWP and M&I. In preparing the allocation methodology for the DMP, the Water Authority incorporated the conditions included in the guidelines.

The Water Authority developed a separate allocation methodology for those customers paying the M&I rate. They include residential, commercial, industrial, and non-IAWP agricultural customers. **Figure 9-1** provides the general approach to allocate supplies to M&I customers in a shortage situation.

The elements of the proposed allocation methodology:

HISTORICAL BASE PERIOD

A historic base period demand is required to establish an agency's pre-allocation demand on the Water Authority. Base period M&I demands are calculated using data from the three most recently completed fiscal years immediately preceding the year in which an allocation process is needed due to supply shortages. Each agency's base period M&I demand is established by calculating their three-year average of demand.

Base period demands for agriculture are certified through Metropolitan's IAWP program and are calculated using a different approach. For IAWP demands, only the most recently completed single fiscal year prior to the imposition of an allocation is considered. This calculation is required by Metropolitan's Draft IAWP Reduction Guidelines.

ADJUSTMENTS

M&I adjustments to be applied to the base period were developed to equitably account for relevant factors in calculating each agency's allocation. Such factors include growth, demand hardening levels due to conservation, local supply availability from groundwater and surface reservoirs, and efforts taken by local agencies to develop reliable local projects such as recycled water, groundwater recovery, and seawater desalination. The adjustments are intended to acknowledge unique agency characteristics and provide an incentive for agencies to decrease their reliance on imported supplies over the long-term. Consistent with the Draft IAWP Reduction Guidelines, no adjustments are made to the IAWP base demand.

ADJUSTED BASE PERIOD

An agency's adjusted base period M&I demand is calculated by adding the applicable adjustments to their initial base period M&I demand. The adjusted base period M&I demand amount is then used to generate an agency's pro-rata percent share of the total adjusted base period M&I demand. It is this percentage that is used to calculate an agency's imported M&I supply allocation volume.

ALLOCATION OF AVAILABLE SUPPLIES

To determine the amount of the Water Authority and Metropolitan supplies that will be available to each member agency, a member agency's percent share of the total M&I adjusted base period is calculated. This percent is then applied to supplies available for M&I demands to derive an allocation for each member agency. For IAWP customers, a percent share of the total IAWP base-year demands is calculated. This percent is applied to the IAWP supplies available following the initial 30 percent cutback and subsequent cutbacks to calculate an allocation of IAWP supplies for each member agency.

REGIONAL RELIABILITY ADJUSTMENT (IF NEEDED)

In accordance with Principle 15, which states, "*In order to protect the economic health of the entire region, it is very important for the allocation methodology to avoid large, uneven retail impacts across the region. The methodology should include a minimum level of retail agency reliability to ensure equitable allocation among the member agencies,*" a regional M&I reliability floor was established. The floor, if needed, is set at 5% below the region's total M&I level of service and is triggered when the net cutback to total Water Authority supplies reaches or exceeds 30 percent. Taking into account the supply development by the Water Authority, its member agencies, and Metropolitan, this level of cutback is very unlikely.

9.2.7 REVENUE IMPACTS

The Water Authority has taken significant steps to reduce potential revenue impacts resulting from fluctuating water sales. In FY 1990, the Water Authority created a Rate Stabilization Fund (RSF) to provide funds that would mitigate the need for rate increases in the event of an unexpected decline in water sales. The RSF is structured in accordance with Board policy to maintain a minimum balance of at least 25 percent of the Water Authority's net water sales revenue. RSF is constrained by a maximum balance of 100 percent of the average annual water sales projected over a four-year period. As a result, the RSF is a crucial water rate management tool.

Additionally, on January 1, 2003, the Water Authority implemented a new rate structure that substantially increased the percentage of water revenues generated from fixed charges. This increase replaced the previous variable "postage stamp" rate, which historically generated as much as 80 percent or more of total annual revenues, with two fixed charges, and one variable rate. These new fixed charges – Customer Service and Storage – are key components to the Water Authority's future revenue stability.

9.2.8 MANDATORY WATER USE PROHIBITIONS

The Water Authority's powers to enforce restrictions on use are constrained by the provision of the County Water Authority Act, which states, "If available supplies become inadequate to fully meet the needs of its member agencies, the board shall adopt reasonable rules, regulations, and restrictions so that the available supplies are allocated among its member agencies for the greatest public interest and benefit." (West's Cal. Wat. C, Append. § 45-5, para. (11).) Pursuant to this authority, the Water Authority developed a drought management plan that includes rules and regulations for water allocation among its member agencies during a water shortage. These rules take into consideration whether its member agencies have developed shortage management plans to meet targeted reductions

in total water demand during a shortage. Because the Water Authority's member agencies, not the Water Authority, have the direct customer service relationship with water users, the member agencies have responsibility to address mandatory use prohibitions during water shortages in their individual urban water management plans.

9.2.9 PENALTIES FOR EXCESSIVE WATER USE

Should the Water Authority have to allocate imported water supplies from Metropolitan due to drought conditions, as identified in Section 5 of the Water Authority's DMP (**Appendix G**), Metropolitan can impose surcharges (penalty pricing) on water consumption in excess of the Water Authority's imported water allocation from Metropolitan. Penalties are expected to be severe, as much as three times Metropolitan's full service water rate. See **Appendix G, page D-9**, for more information on Metropolitan's Water Surplus and Drought Management Plan (WSDM Plan).

The Water Authority's Board of Directors has the authority to adjust water rates to reflect any penalties imposed by Metropolitan under Metropolitan's WSDM Plan or other allocation programs as determined necessary by the Board of Directors. Rates may also be adjusted based on any other allocation program implemented by the Water Authority as determined necessary by the Board of Directors. The Water Authority may also reduce the amount of water it allocates to a member agency if the member agency fails to adopt or implement water use restrictions.

SECTION 9.3 SUMMARY

The shortage contingency analysis included in this section and in **Appendix G** demonstrates that the Water Authority and its member agencies, through the ERP and ESP, are taking actions to prepare for and appropriately handle a catastrophic interruption of water supplies. The analysis also described the coordinated development of a DMP for the San Diego region. The DMP identifies the actions to be taken by the Water Authority to minimize the impacts of a supply shortage due to a drought and includes an allocation methodology to be used if cutbacks are necessary. The analysis and **Appendix G** address the appropriate requirements of the Act that are applicable to the Water Authority.