The Regional Urban Water Management Plan *for the* Metropolitan Water District of Southern California


The Sacramento/San Joaquin Bay Delta


Parker Dam on the Colorado River


Sprinklers using recycled water at Loyola Marymount University


Metropolitan's newly completed Diamond Valley Lake

December 2000

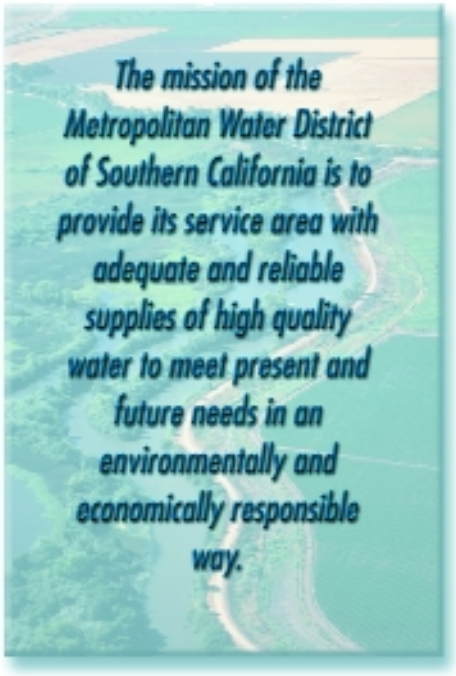
The Regional Urban Water Management Plan

for the

Metropolitan Water District

of

Southern California



December 2000

§7550 disclosure: Agreement 22829, Vendor 91391, $185,000

Table of Contents

Table of Contents

Table of Contents

Table of Contents

List of Tables

List of Tables

List of Figures

DWR Urban Water Management Plan Checklist

Section or Page Number in Plan	Section of Code	Items to Address
A.5	10642	Make plan available for public inspection before its adoption.
A.5		Provide proof of public hearing held to discuss the plan before its adoption.
A.5		Provide a copy of adoption resolution.
II-1, A.5-1 A.5-2	10620 (d)(2)	Coordinate the preparation of its plan with other appropriate agencies, including direct and indirect suppliers, wastewater, groundwater, and planning agencies (refer to Section 10633).
A.1-7	10631(a)	Provide current and projected population in 5-year increments to 20 years.
I-11,12 A.1-2, 3, 7, 8		Describe the climate and other demographic factors.
II-8	10631(b)	Identify and quantify the existing and planned sources of water available in 5-year increments to 20 years.
III-43 thru 45, III-48 thru 61	10631(d)	Describe opportunities for exchanges or transfers water on short-term or long-term basis.
A.2-2, A.2-4	10631(e)(1)	Quantify current and past water use in 5-year increments to 20 years.
A.1-9 thru 14	10631(e)(2)	Identify projected water uses among water use sectors in 5-year increments to 20 years.
II-14	10631(c)	Describe average, single dry and multiple dry water year data.

Section or Page Number in Plan	Section of Code	Items to Address
II-9 thru 11 Much of Section III		Describe any plans to replace inconsistent water sources.
II-8	10632(b)	Provide minimum water supply estimates.
II-11 thru 15 III-47 and 48, III-63, 69, A.2-6 thru 14	10631(c)	Describe the reliability of water supply.
I-11 thru 13 III-47 and 48, III-63, 65, A.2-6 thru 13		Describe the vulnerability of water supply to seasonal or climatic shortage.
III-17 thru 19	10633(a)	Describe the wastewater collection and treatment systems in the supplier's service area.
III-18		Quantify the amount of wastewater collected and treated in the supplier's service area.
III-18 thru 19		Describe the methods of wastewater disposal in the supplier's service area.
III-22 thru 26	10633(b)	Describe the type, place, and quantity of recycled water currently used in the supplier's service area.
III-17, III-20 thru 26	10633(c)(d)	Describe and quantify potential uses of recycled water in 5-year increments to 20 years.
III-26 thru 29		Determine the technical and economic feasibility of serving the potential users of recycled water.
III-19 thru 21	10633(e)	Describe the actions that may be taken to encourage recycled water use.

Section or Page Number in Plan	Section of Code	Items to Address
III-17, III-22 thru III-25, III-32	10633(e)	Provide the projected acre-feet results of recycled water used per year.
III-19 thru 21	10633(f)	Provide a plan for optimizing the use of recycled water in the supplier's service area.
III-19 thru 21		Provide actions to facilitate the installation of dual distribution systems and to promote recirculating uses.
II-14	10635(a)	Provide an assessment of the reliability of the water supplier's water service to its customers during normal, single dry, and multiple dry water years.
II-8		Compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in 5-year increments (refer to 10631 (c)).
II-14		Compare normal, single dry, and multiple dry water year projected water supply sources available to the water supplier with the normal, single dry, multiple dry water year projected water uses (refer to 10631 (c)).
II-16	10632(c)	Provide actions a water supplier will take to prepare for a catastrophe.
II-11 thru 15*	10632(h)	Provide a copy of a draft water shortage contingency resolution or ordinance.
Sect. II.2, *esp.* II-10 thru II-14	10632(a)	Provide water shortage stages of action, including up to a 50 percent reduction outlining specific water supply conditions at each stage.

* II-14 reports Metropolitan decision-making process for evaluating and declaring a shortage. Pages II-10 thru II-12 show planned actions in times of shortage and surplus.

Section or Page Number in Plan	Section of Code	Items to Address
II-12	10632(d)	Provide mandatory prohibitions.
II-12	10632(f)	Provide penalties or charges.
II-11 thru 13	10632(e)	Provide consumption reduction methods.
II-15, 16	10632(g)	Provide an analysis of the impacts on the water supplier revenues and expenditures.
II-15, 16		Provide measures to overcome revenue and expenditure impacts.
II-9, II-12	10632(i)	Provide a mechanism for determining actual reductions in water use.
	10644(a)	File a copy of the plan with the Department of Water Resources no later than 30 days after adoption.

I. INTRODUCTION TO METROPOLITAN

The Metropolitan Water District of Southern California

Formation and Purpose

The Metropolitan Water District of Southern California (Metropolitan) is a public agency organized in 1928 by a vote of the electorates of 13 Southern California cities. The agency was enabled by the adoption of the original Metropolitan Water District Act (Metropolitan Act) by the California Legislature "for the purpose of developing, storing, and distributing water" to the residents of Southern California. The Metropolitan Act also allows Metropolitan to sell additional water, if available, for other beneficial uses. In 1992, the Metropolitan Board of Directors adopted as their mission "to provide its service area with adequate and reliable supplies of high quality water to meet present and future needs in an environmentally and economically responsible way."

The first function of Metropolitan was building the Colorado River Aqueduct to import water from the Colorado River. Water deliveries through the aqueduct began in the early 1940s, and this imported water supplemented the local water supplies of the original 13 Southern California member cities. To meet growing water demands in its service area, Metropolitan started receiving additional water supplies from the State Water Project in 1972. The State Water Project is owned and operated by the State of California Department of Water Resources (DWR). Metropolitan currently imports water from these two sources: (1) the Colorado River water via the Colorado River Aqueduct and (2) the State Water Project via the California Aqueduct.

Service Area

Metropolitan's service area spreads across the Southern California coastal plain. It extends about 200 miles along the Pacific Ocean from the city of Oxnard on the north to the Mexican border on the south, and it reaches 70 miles inland from the coast (Figure I-1). The total area served is nearly 5,200 square miles (or approximately 5 percent of the state's land area). The service area includes portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. Table I-1 shows that although only 13 percent of the land area of the 6 Southern California counties is within Metropolitan's service area, nearly 90 percent of the populations of those counties reside within Metropolitan's boundaries.

Member Agencies

Metropolitan is currently composed of 27 member agencies, including 14 cities, 12 municipal water districts, and one county water authority. In 2001, the Municipal Water District of Orange County and the Coastal Municipal Water District will merge into a single agency. No new agencies have been annexed to Metropolitan's service area since 1971. Metropolitan's member agencies serve residents in more than 145 cities and 94 unincorporated communities. The member agencies of Metropolitan, as well as the cities and communities served by those member agencies, are shown in Table I-2.

Table I-1
1999 Area and Population In the
Six Counties of Metropolitan's Service Area

County	Total County	In MWD Service Area	Percent In MWD
Land Area (Square Miles)			
Los Angeles	4,080	1,405	34
Orange	786	699	89
Riverside	7,249	1,049	14
San Bernardino	20,154	242	1
San Diego	4,314	1,420	33
Ventura	1,865	363	19
Total	**38,448**	**5,178**	**13**
Population (Thousands)			
Los Angeles	9,758	8,974	92
Orange	2,776	2,774	100
Riverside	1,473	1,043	71
San Bernardino	1,654	648	39
San Diego	2,853	2,710	95
Ventura	742	500	67
Total	**19,256**	**16,649**	**87**

Source: California Department of Finance and Metropolitan-developed statistics.

Figure I-1 shows the geographical area the member agencies serve.

Currently, member agencies receive water from Metropolitan at various delivery points on its system, and they pay for it at uniform rates for each class of service established by the Board. To aid in planning future water needs, member agencies advise the General Manager annually (in April of each year) of how much water they anticipate they will need during the next five years.

As a water wholesaler, Metropolitan has no retail customers. It provides treated and untreated water directly to its member agencies. Metropolitan's 27 member agencies deliver to their customers a combination of local groundwater, local surface water, recycled water, and imported water purchased from Metropolitan. For some member agencies, Metropolitan supplies all of the water used within that agency's service area, while others obtain varying amounts of water from Metropolitan to supplement local supplies. In recent years, Metropolitan has provided between 45 and 60 percent of the municipal, industrial, and agricultural water used in its nearly 5,200-square-mile service area.

The remaining water supply for the region comes from local wells, local surface water,

Table I-2

Agencies Served By The Metropolitan Water District Of Southern California

Municipal Water Districts (12)

Calleguas	Las Virgenes
Central Basin	Orange County
Inland Empire	Three Valleys
Coastal	West Basin
Eastern	Upper San Gabriel Valley
Foothill	Western

Member Cities (14)

Anaheim	Glendale	San Marino
Beverly Hills	Long Beach	Santa Ana
Burbank	Los Angeles	Santa Monica
Compton	Pasadena	Torrance
Fullerton	San Fernando	

County Water Authorities (1)

San Diego

Cities Within Member Agencies

CALLEGUAS MWD
- Camarillo
- Camarillo Heights*
- Fairview*
- Las Posas Valley*
- Moorpark
- Oak Park*
- Oxnard
- Santa Rosa Valley*
- Simi Valley
- Thousand Oaks

CENTRAL BASIN MWD
- Artesia
- Bell
- Bellflower
- Cerritos
- Commerce
- Cudahy
- Downey
- East Compton*
- East La Mirada*
- East Los Angeles*
- Florence*
- Graham*
- Hawaiian Gardens
- Huntington Gardens
- La Habra Heights
- Lakewood
- Los Nietos*
- La Mirada
- Lynwood
- Maywood
- Montebello
- Norwalk
- Paramount
- Pico Rivera
- Santa Fe Springs
- Signal Hill
- South Gate
- South Whittier*
- Vernon
- Walnut Park*
- West Compton*
- West Whittier*
- Whittier
- Willowbrook*

INLAND EMPIRE
- Chino
- Chino Hills
- Fontana
- Monclair
- Ontario
- Rancho Cucamonga
- Upland

COASTAL MWD
- Capistrano Beach*
- Corona del Mar
- Costa Mesa
- Dana Point*
- Laguna Beach
- Newport Beach
- San Clemente
- South Laguna*

EASTERN MWD
- East Hemet*
- Good Hope*
- Hemet
- Homeland*
- Lakeview-Nuevo*
- Mead Valley*
- Moreno Valley
- Murrieta Hot Springs*
- Perris
- Quail Valley*
- Romoland*
- San Jacinto
- Sun City*
- Sunnymead*
- Temecula
- Valle Vista*
- Winchester*

FOOTHILL MWD
- Altadena*
- La Canada
- La Crescenta*
- Montrose*

LAS VIRGENES MWD
- Agoura Hills
- Calabasas
- Chatsworth Lake Manor*
- Hidden Hills
- Malibu Lake*
- Monte Nido
- Westlake Village

MWD OF ORANGE COUNTY
- Brea
- Buena Park
- Cypress
- Fountain Valley
- Garden Grove
- Huntington Beach
- Irvine
- Laguna Hills
- Laguna Niguel
- Laguna Woods
- La Habra
- Lake Forest
- La Palma
- Los Alamitos
- Mission Viejo
- Orange
- Placentia
- Rancho Santa Margarita
- Rossmoor*
- San Juan Capistrano
- Seal Beach
- Stanton
- Tustin
- Tustin Foothills*
- Villa Park
- Westminster
- Yorba Linda

THREE VALLEYS MWD
- Charter Oak*
- Claremont
- Covina Knolls*
- Diamond Bar
- Glendora
- Industry
- La Verne
- Pomona
- Rowland Heights*
- San Dimas
- So. San Jose Hills*
- Walnut

UPPER SAN GABRIEL VALLEY MWD
- Arcadia
- Avocado Heights*
- Baldwin Park
- Bradbury
- Citrus*
- Covina
- Duarte
- El Monte
- Hacienda Heights*
- Irwindale
- La Puente
- Mayflower Village*
- Monrovia
- Rosemead
- San Gabriel
- South El Monte
- South Pasadena
- South San Gabriel
- Temple City
- Valinda*
- West Covina
- West Puente Village*

WEST BASIN MWD
- Alondra Park*
- Angeles Mesa*
- Carson
- Culver City
- Del Aire*
- El Nido-Clifton*
- El Segundo
- Gardena
- Hawthorne
- Inglewood
- Ladera Heights*
- Lawndale
- Lennox*
- Lomita
- Malibu
- Manhattan Beach
- Marina del Rey*
- Palos Verdes Estates
- Point Dume*
- Rancho Palos Verdes
- Redondo Beach
- Rolling Hills

WEST BASIN MWD (cont.)
- Rolling Hills Estates
- Ross Sexton*
- Topanga Canyon*
- Victor
- View Park*
- West Athens*
- West Carson*
- West Hollywood
- Westmost
- Windsor Hills*
- National Military Home*
- Wiseburn

WESTERN MWD OF RIVERSIDE COUNTY
- Bedford Heights*
- Corona
- Eagle Valley*
- El Sobrante*
- Green River*
- Lake Elsinore
- Norco
- Riverside
- Temescal
- Woodcrest*
- March AFB*

SAN DIEGO CWA
- Alpine*
- Bonita*
- Camp Pendleton*
- Carlsbad
- Casa De Oro*
- Castle Park*
- Chula Vista
- Del Mar
- El Cajon
- Encinitas
- Escondido
- Fallbrook*
- Lakeside*
- La Mesa
- Lemon Grove
- Mount Helix*
- National City
- Oceanside
- Otay*
- Poway
- Rainbow*
- Ramona*
- Rancho Santa Fe*
- San Diego
- San Marcos
- Santee
- Solana Beach
- Spring Valley*
- Valley Center*
- Vista

* Denotes unincorporated areas

recycling, and from the city of Los Angeles' aqueduct from the eastern Sierra Nevada.

Some member agencies provide retail water service, while others are the local wholesalers of Metropolitan's supplies. As shown on Table 1-3, 15 member agencies provide retail service to customers; 10 provide only wholesale service; and 2 provide a combination of both. Throughout Metropolitan's service area, there are approximately 250 retail water supply agencies directly serving the population.

Board of Directors and Management Team

Metropolitan's Board of Directors currently consists of 51 directors. Metropolitan does not compensate the directors for their service. The Board consists of at least one representative from each member agency, with each agency's assessed valuation determining its additional representation and voting rights. In July 1998, Metropolitan's Board approved a proposal to modify the Metropolitan Water District Act to decrease the size of the current 51-member Board to 37 by January 1, 2001. All member agencies will maintain at least one seat on the Board under the new plan. On September 22, 1998, Governor Pete Wilson signed this measure into law.

The Board administers its policies through the Metropolitan Water District Administrative Code (Administrative Code), which was adopted by the Board in 1977. The Administrative Code is periodically amended to reflect new policies or changes in existing policies that occur from time to time. The policies established by the Board are subject to all applicable laws and regulations. The management of Metropolitan is under the direction of its General Manager, who serves at the discretion of the Board, as do Metropolitan's General Auditor and General Counsel.

Regional Historical Information

Population

In 1990, the population of Metropolitan's service area was approximately 14.8 million people. By 2000, it had grown to 16.9 million, which represents about 50 percent of the state's population. In the past, annual growth has varied from about 200,000 annually in the 1970s and early-to-mid-1980s to more than 300,000 annually in the late 1980s. Population growth slowed during the mid-1990s, to about 110,000 in 1995, before again rising to more than 230,000 in the late 1990's. The current and historic population estimates are shown in Figure I-2.

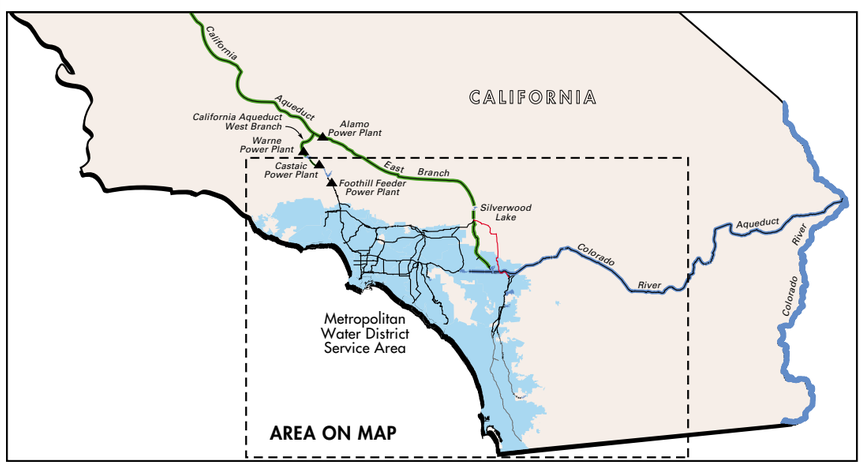
The most populated cities within Metropolitan's service area are the cities of Los Angeles (largest city in the state), San Diego (second largest in the state), Long Beach, Anaheim, Santa Ana and Riverside. Between 1995 and 1999, the largest population increases occurred in the city of Los Angeles and in the service area of the San Diego County Water Authority. However, the over 325,000-person increase in population estimated for Los Angeles County over the time period only represents a 0.9 percent average annual population growth rate, as shown in Figure I-3. In Riverside County, the average annual population growth rate was 2 percent. Between 1990 and 1999, Riverside County experienced the fastest rate of growth at 2.7 percent annually.

Figure I-1
THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

MAP SHOWING METROPOLITAN'S MEMBER AGENCIES AND FACILITIES
FOR THE DISTRIBUTION OF COLORADO RIVER WATER AND STATE PROJECT WATER

LEGEND

- Metropolitan's Water Distribution System
- MWD Tunnels
- Department of Water Resources' California Aqueduct
- MWD projects under construction
- Outside MWD Service Area
- Power Plants
- Pumping Plants
- Water Filtration Plants



MWD
http://www.mwd.dst.ca.us/
REVISED TO NOVEMBER 1998
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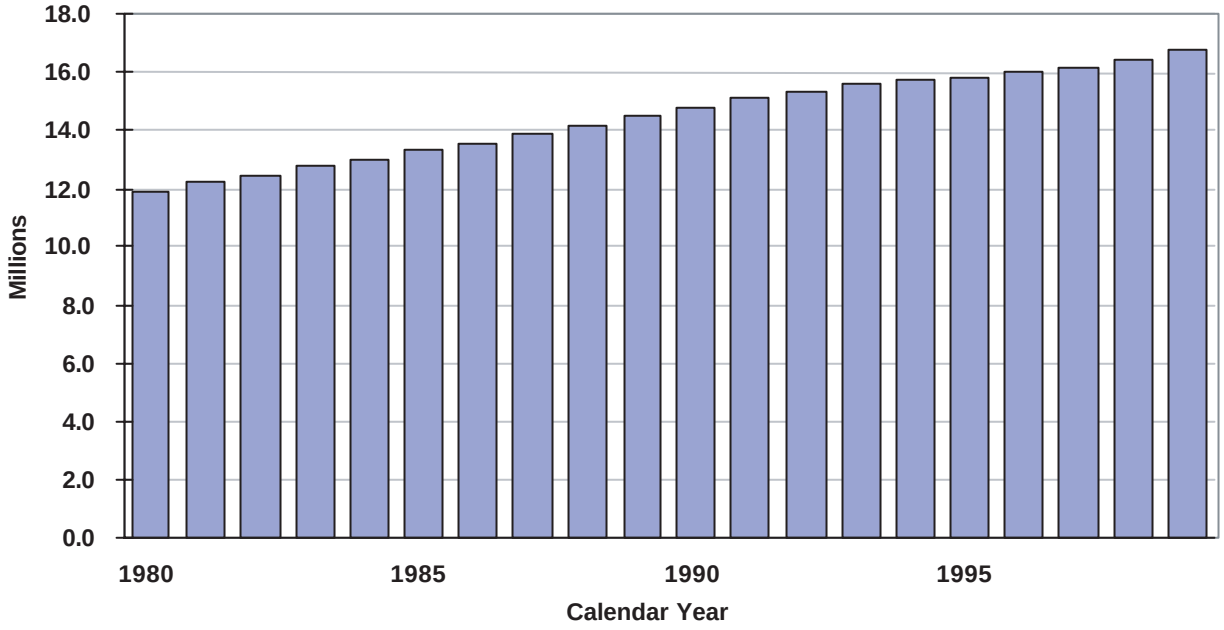
Table I-3
Type of Water Service Provided
by Metropolitan's Member Agencies

	Retail or Wholesale
Los Angeles County	
Beverly Hills	Retail
Burbank	Retail
Central Basin MWD	Wholesale
Compton	Retail
Foothill MWD	Wholesale
Glendale	Retail
Las Virgenes MWD	Retail
Long Beach	Retail
Los Angeles	Retail
Pasadena	Retail
San Fernando	Retail
San Marino	Retail
Santa Monica	Retail
Three Valleys MWD	Wholesale
Torrance	Retail
Upper San Gabriel MWD	Wholesale
West Basin MWD	Wholesale
Orange County	
Anaheim	Retail
Coastal MWD	Wholesale
Fullerton	Retail
MWD of Orange County	Wholesale
Santa Ana	Retail
Riverside	
Eastern MWD	Retail & Wholesale
Western MWD	Retail & Wholesale
San Bernardino County	
Inland Empire Utilities Agency	Wholesale
Ventura County	
Calleguas MWD	Wholesale
San Diego County	
San Diego County Water Authority	Wholesale

Figure I-2
Population In Metropolitan's Service Area



Water Supplies

Historically, Metropolitan has been responsible for importing water into the region through its Colorado River Aqueduct and the State Water Project. Recently, Metropolitan has increased its ability to supply water, particularly in dry years, through the implementation of storage and transfer programs. Figure I-4 presents historical total annual regional water supplies. Historical Metropolitan annual imported water supplies are shown on Figure I-5.

Historical Retail Water Demands

Historical retail water demands on a calendar year basis in Metropolitan's service area are presented in Figure I-6. Retail water demands have varied from 3.0 million acre-feet (maf) in 1983 to 4.0 maf in 1989. Due to the economic recession, wetter than normal weather, lingering drought impacts, and conservation, water use declined to 3.2 maf in 1991. From 1995 to 1999, the region's retail water demands varied from 3.4 maf to 3.8 maf.

Of the 3.5 maf used in 1998, 3.2 maf (92 percent) were used for municipal and industrial purposes (M&I), and 0.3 maf (8 percent) were used for agricultural purposes. As a proportion of total water use, M&I's share has increased as agricultural water use has declined. This change is due to urbanization and market factors, including the regional price of water. Agricultural water use, which accounted for 19 percent of total regional water demand in 1970, has decreased steadily to 11 percent in 1990, and 8 percent in 1998.

Figure I-3
Average Annual Population Growth Rate in Metropolitan's Service Area

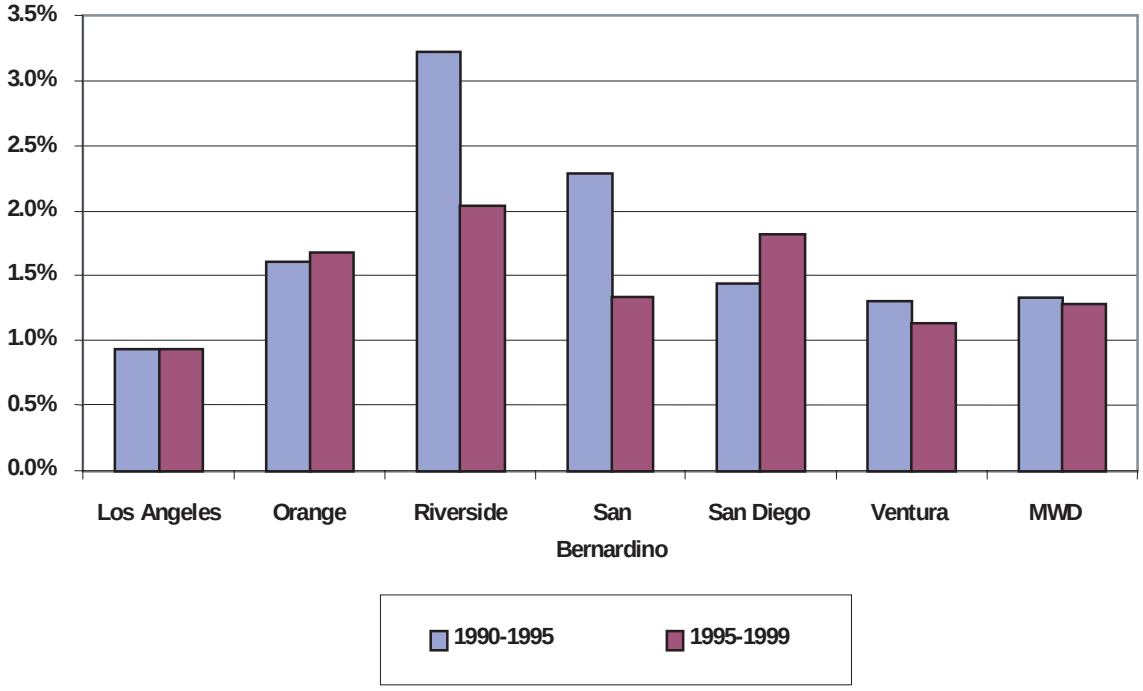
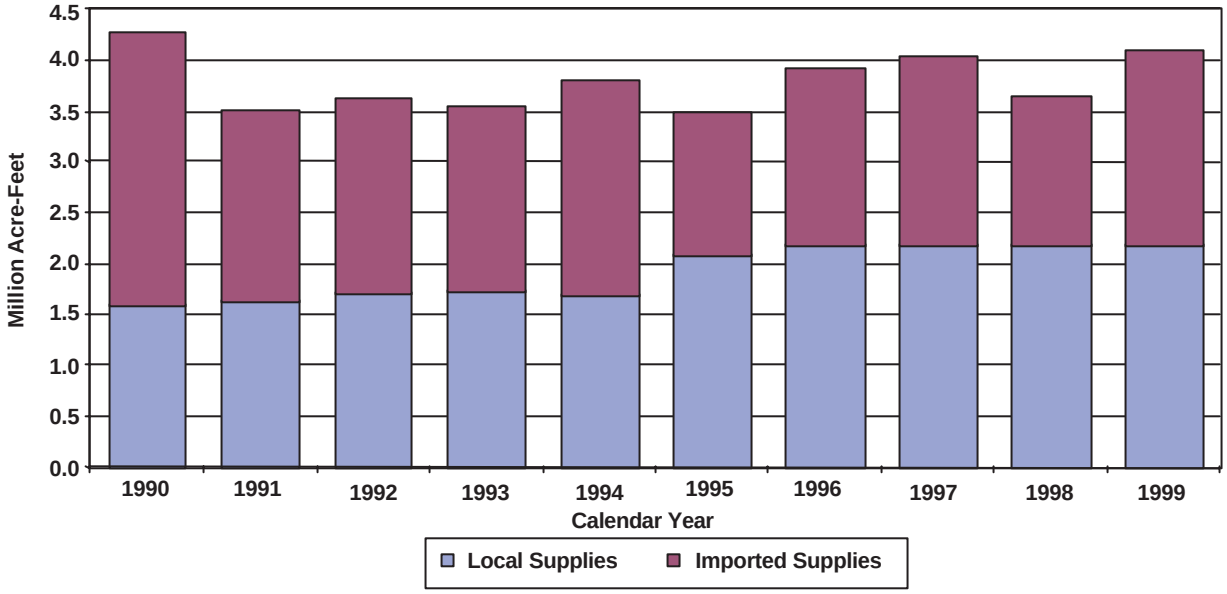
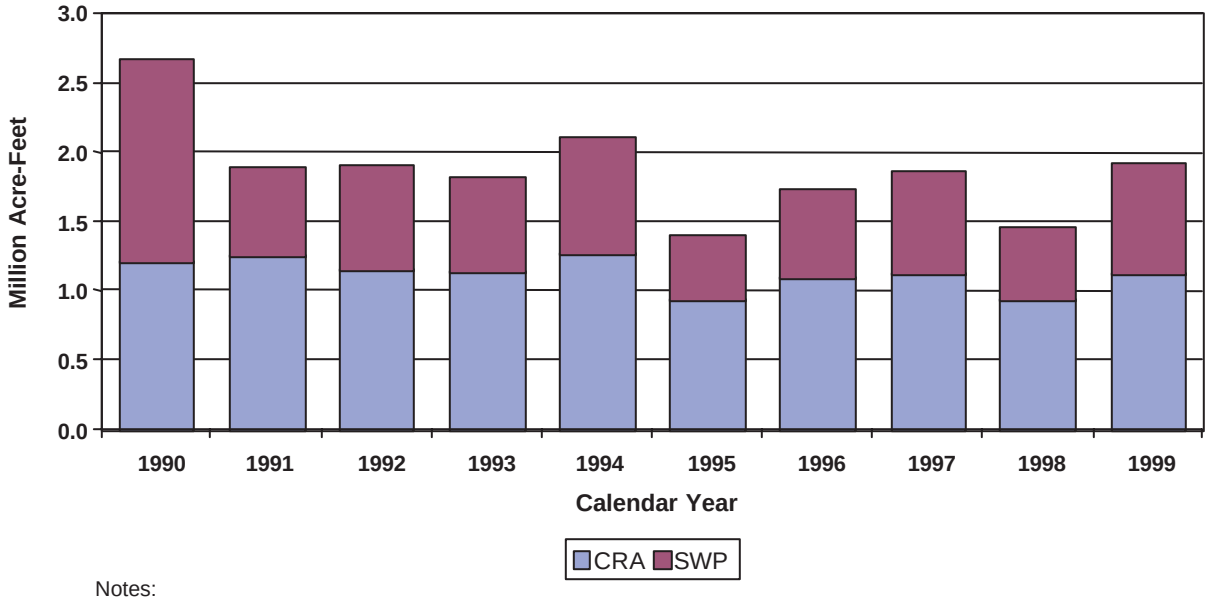


Figure I-4
Annual Regional Water Supplies to Metropolitan's Service Area



Note: Does not include deliveries to Desert Water Agency and Coachella Valley Water District

Figure I-5
Historic Metropolitan Annual Imported Supplies

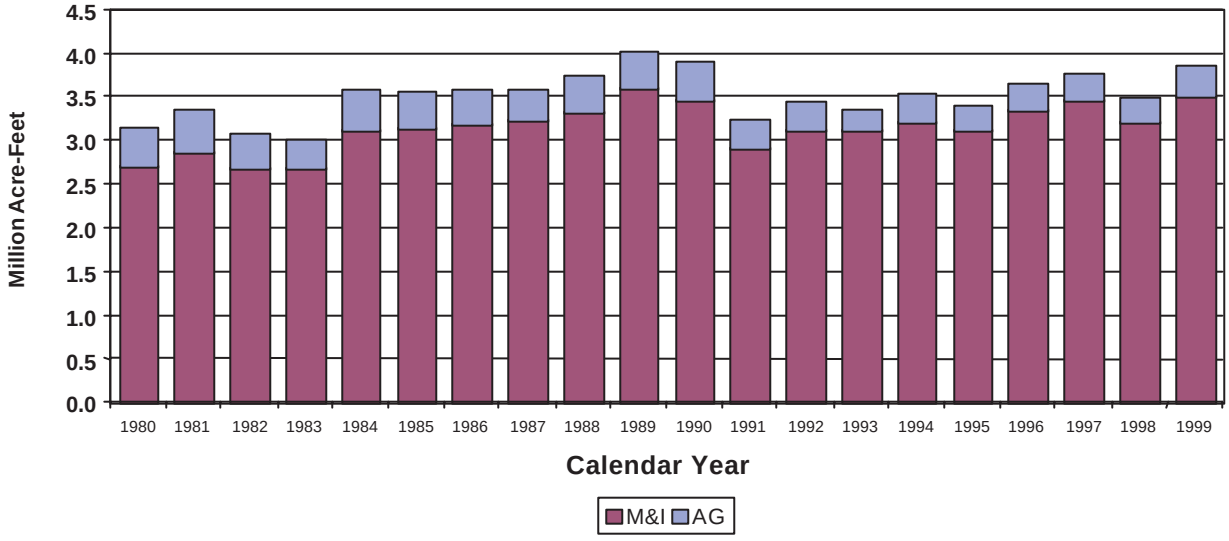


Notes:
Colorado River Aqueduct (CRA) supplies are total Colorado River Aqueduct deliveries less deliveries to Desert Water Agency and Coachella Valley Water District.

State Water Project (SWP) includes all deliveries on the East and West Branches of the SWP System into Metropolitan's service area including Entitlement, Exchanges, Wheeling, Carryover, Drought Bank, etc. Excludes wheeling to Castaic Lake Water Agency and deliveries to storage outside of Metropolitan's service area.

Includes supplies used for storage within Metropolitan's service area.

Figure I-6
Retail Demand in Metropolitan Service Area



Note: 1999 values are forecasts.

Per Capita Water Use

Per capita water use (total water use divided by total population) by county within Metropolitan's service area is presented in Table I-4. Water use varies widely between counties. Per capita water use does not express the amount of water actually used by an individual, because it includes all categories of urban water use, including residential, commercial, industrial, fire fighting and other uses. Furthermore, per capita water use is not a good measure of water use efficiency. A number of factors affect per capita water use, including the relative share of residential versus nonresidential water use in an area, the number and type of housing units, the types of businesses, persons per household, lot sizes, income levels, and climate. In Southern California, many of the differences in per capita water use among the counties can be attributed to climate differences (Figure I-7). Within Metropolitan's service area, the inland counties of Riverside and San Bernardino account for the greatest levels of M&I per capita water use, and the coastal plain counties – Los Angeles, Orange, San Diego, and Ventura – have lower M&I per capita water use.

Climate and Rainfall

Metropolitan's service area encompasses three major climate zones, as shown in Figure I-7. Annual rainfall also varies within the region: average annual rainfall in Pasadena from 1980 through 1998 was more than double the 11 inches received at the San Diego airport. Regionwide, annual rainfall routinely varies by more than 100% from year to year.

Figure I-8 shows the annual rainfall total at the Los Angeles Civic Center. Note that in five of the eight years from 1992 through 1999, annual rainfall has been greater than the 30-year normal.

Table I-4
Municipal and Industrial Per Capita Water Use
Calendar Year
(Gallons per person per day)

Served County	1980	1985	1990	1995	1998
Los Angeles	191	197	188	164	158
Orange	224	229	233	197	191
Riverside	275	262	304	226	225
San Bernardino	325	318	281	221	234
San Diego	186	213	209	164	164
Ventura	206	211	228	179	181
Metropolitan	203	212	210	176	172

Note: 1990 was a dry year. 1995 and 1998 were very wet years. Metropolitan's current normal weather per-capita demands are between 185 gpcd and 195 gpcd.

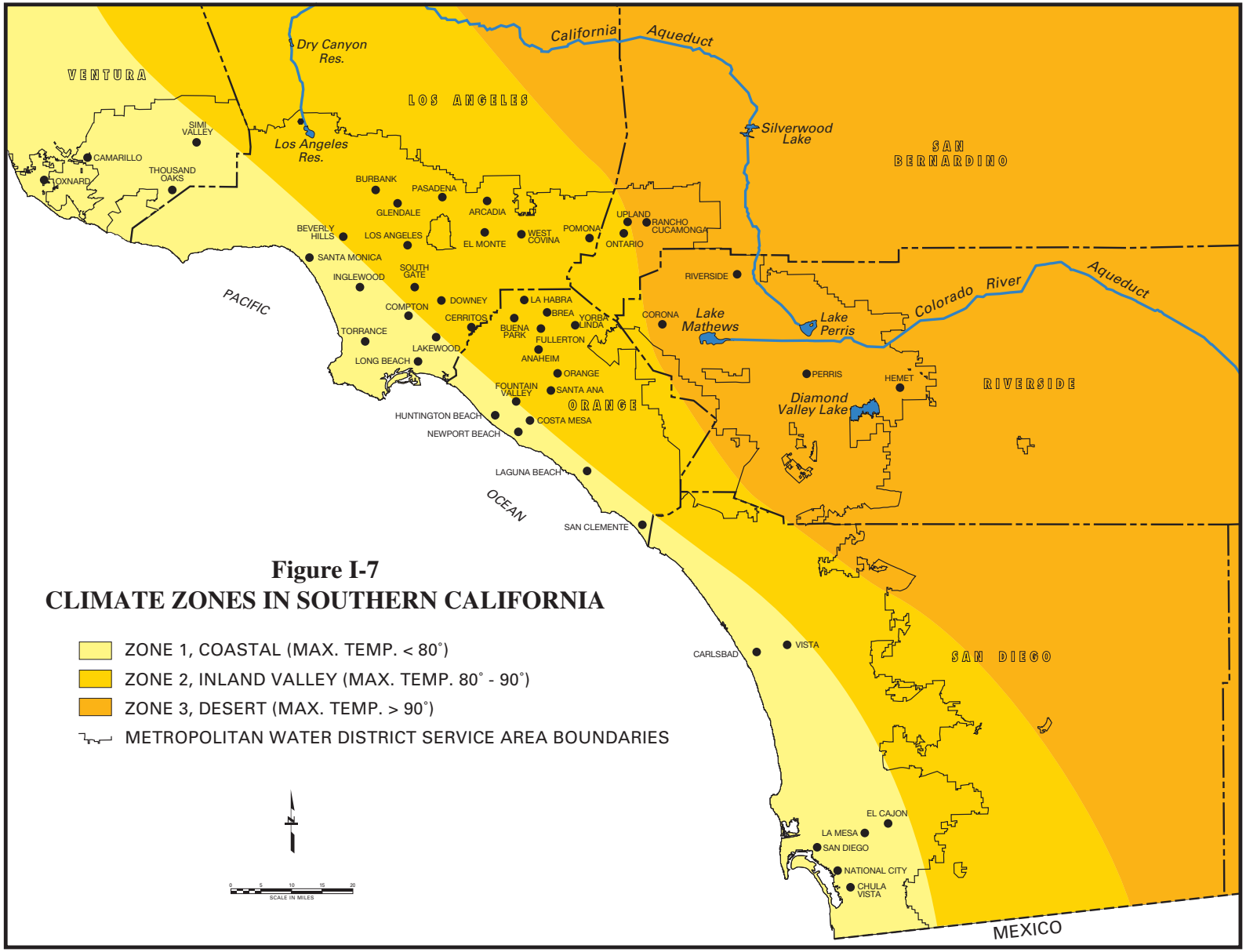
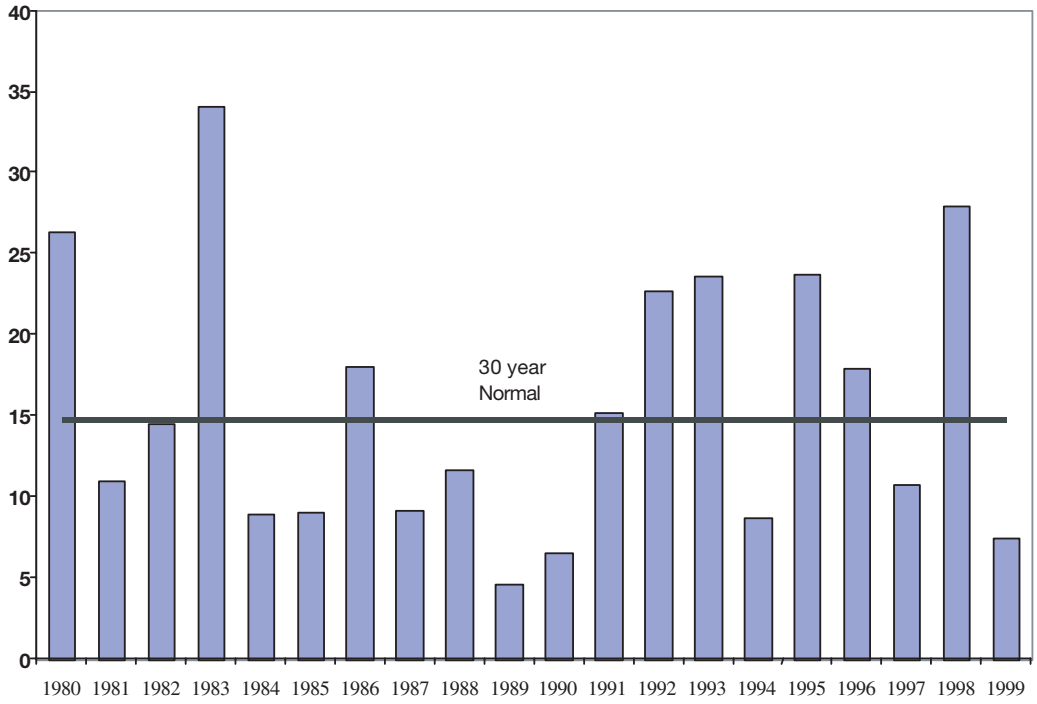


Figure I-7
CLIMATE ZONES IN SOUTHERN CALIFORNIA

- ZONE 1, COASTAL (MAX. TEMP. < 80˚)
- ZONE 2, INLAND VALLEY (MAX. TEMP. 80˚ - 90˚)
- ZONE 3, DESERT (MAX. TEMP. > 90˚)
- METROPOLITAN WATER DISTRICT SERVICE AREA BOUNDARIES

Figure 1-8
Annual Rainfall at Los Angeles Civic Center



Introduction to Metropolitan's Regional Urban Water Management Plan

Urban Water Management Planning Act

This document has been prepared in response to the California Urban Water Management Planning Act (Act), Water Code Sections 10610 through 10656 enacted in 1983. The Act requires that every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually prepare and adopt an urban water management plan. The Act requires urban water suppliers to prepare plans that describe and evaluate reasonable and practical efficient water uses, recycling, and conservation activities. These plans must be filed with the California Department of Water Resources (DWR) every five years. Year 2000 urban water management plans are due to DWR by December 31, 2000.

Since its passage in 1983, several amendments have been added to the Act, the most recent coming in 2000. Some of the amendments provided for additional emphasis on metering, drought contingency planning, and water recycling.

Metropolitan's Responsibilities Under the Act

Metropolitan prepared urban water management plans in 1985, 1990, and 1995. The 2000 Regional Urban Water Management Plan (Plan) is an update of the 1995 Plan, and it includes a number of changes resulting from Metropolitan's water planning and management activities. For example, the Integrated

Resources Planning process, which was not yet completed in 1995, has yielded an Integrated Resources Plan (IRP) that is currently guiding Metropolitan's operations into the future.

As with Metropolitan's previous plans, the specific activities being undertaken by member agencies are not explicitly discussed unless they relate to one of Metropolitan's water demand or supply management programs. Presumably, these activities will be discussed in the plans developed by each member agency, and information from this Plan will likely be used by many of the local water suppliers as they prepare their own plans. Elements of this Plan do not necessarily have to be adopted by the urban water suppliers or the public agencies directly providing retail water because participation in any regional planning activity is voluntary (pursuant to Water Code Section 10620). By law, an urban water supplier that provides water indirectly (such as Metropolitan) may not include planning elements in its water management plan that would be applicable to agencies that provide water directly, without the consent of those agencies.

Metropolitan's member agencies will be preparing their own urban water management plans. Metropolitan worked with its member agencies in the development of their plans to encourage adoption of consistent planning assumptions and supply goals.

DWR Guidance

DWR has provided guidance materials to aid water districts in developing year 2000 urban water management plans. These materials are intended both to help water districts comply with the law and to help DWR staff review submitted plans for regulatory compliance. The guidance materials consist of a series of worksheets detailing acceptable responses to the requirements set forth in the Act. DWR also provides a checklist for cross-referencing sections of the respondent water agency's Plan with the relevant sections of the water code, ensuring that all relevant provisions of the Act are addressed. DWR provides two versions of the checklist: one organized by water code section and the other by subject. Metropolitan has used these materials in the development of this plan; the checklist organized by water code section is included after the Table of Figures in the front of this document.

Organization of this Document

This document is divided into five sections. The first section is this introduction. The second section describes the planning efforts that Metropolitan has undertaken to ensure appropriate management of the region's water supplies. The third section describes the actions Metropolitan has taken to implement these plans. The fourth section addresses the issue of water quality and the fifth section contains the appendices. This report concentrates on Metropolitan's planning processes, water supply issues identified, and plans to address these issues. Historic data and demand forecasts are provided in the appendices.

This "water droplet" icon will appear in the margins next to those sections of the report whose conclusions may change as a result of planning efforts that are currently underway. Metropolitan is engaged in two major planning efforts: the Strategic Planning Process including rate structure development, and the IRP update. While the 1996 IRP and the 1999 Water Surplus and Drought Management (WSDM) Plan provided solid frameworks and resource development goals and targets, planning for the future is and will always be a dynamic process.

II. PLANNING FOR THE FUTURE

Southern California's water community is facing increasing challenges in its role as steward of the region's water resources. The region faces a growing gap between its water requirements and its firm water supplies. Increased environmental regulations and the attendant competition for water from outside the region have resulted in projected decreases in reliability for supplies of imported water. At the same time, demand is rising within the region because of continued population and economic growth.

As described in the previous chapter, the water used in Southern California comes from a number of sources. About one-third of water supplies are from local sources. The rest of the region's water is imported from three sources: the Colorado River, the Sacramento-San Joaquin River Delta (via the State Water Project), and the Owens Valley and Mono Basin (through the Los Angeles Aqueducts).[1]

Because of competing needs and uses on all of the water resources, and because of issues regarding regional water operations, Metropolitan has undertaken a number of planning processes over the past five years. In addition to this Regional Urban Water Management Plan, the Integrated Resources Planning (IRP) Process, the Water Surplus and Drought Management (WSDM) Plan, and the Strategic Planning Process provide a framework and guideline for Metropolitan to follow into the future.

[1]Although the water from the LAA is imported, from Metropolitan's perspective, it is a local source because it is managed by the Los Angeles Department of Water and Power, a member agency, and not by Metropolitan.

As part of their ongoing planning efforts, Metropolitan and its member agencies have started a process to update the 1996 IRP. The outcome of this process will be to adopt new goals that reflect changing circumstances. The preparation of the member agencies' urban water management plans is an integral part of this process. Metropolitan held meetings with its member agencies in the spring of 2000 to review its development of the regional plan, and to provide data and analyses that the member agencies could use in the development of their plans. The meetings also marked the beginning of a cooperative effort to update the IRP that will continue after the urban water management plans have been filed with the Department of Water Resources. Each meeting addressed only a small number of agencies to encourage meaningful discussions between the attendees and to ensure that local issues were addressed appropriately. Table II-1 below summarizes the dates of the meetings and the member agencies that attended.

Table II-1
Regional Urban Water Management Plan Meeting Schedule

Date of Meeting	Member Agencies Attending
April 19	Western MWD, Eastern, Inland Empire
May 3	Foothill MWD, Calleguas, Glendale, Pasadena, Las Virgenes, Burbank, Three Valleys
May 4	Los Angeles DWP, Long Beach
May 10	Central and West Basin, Torrance, Compton
May 11	MWD Orange County, Coastal, Anaheim, Santa Ana, Fullerton
May 18	San Diego County Water Authority

II.1 INTEGRATED RESOURCES PLANNING

The overall objective of the IRP Process was to develop a comprehensive water resources strategy that would provide the region with a reliable and affordable water supply for the next 25 years. The IRP addressed the threat of predicted periodic shortages, and provided Southern California with an essential building block in the foundation of a strong economy and a healthy quality of life.

Through the implementation of the resource targets identified in the IRP, the region's water supply reliability is expected to increase over time. This will come as a result of a balanced mix of local and imported water supply investments. Once the IRP is fully implemented, water shortages similar to those experienced in 1991 are expected to occur with a frequency of less than 1 in 50 years, based on historical hydrologic and weather conditions.

The most important outcome of the IRP was that it resulted in a regional planning framework for making future decisions on resource development. It recognized that periodic updates of the overall resource mix would be necessary to adjust for changes and conditions that could not be known at the time. For the update that is scheduled for 2001, and for future updates, Metropolitan and the region will use the IRP framework as a tool to maximize the implementation of cost-effective water supplies, water management programs, and water use efficiency measures.

Metropolitan's Integrated Resources Planning Process

The purpose of the IRP was to identify and implement a Preferred Resource Mix, consisting of complementary investments in local water resources, imported supplies, and demand-side management that meet the region's reliability goal in a cost-effective and environmentally sound manner. Metropolitan's IRP process sought to answer some critical questions related to future water supply planning and management:

1. What level of water supply reliability does the region require?
2. What is the most desirable means of achieving reliability given the range of potential water supply options?
3. How large an investment in resource development can the region afford?
4. What needs to happen to accomplish the desired outcome?

These questions are important because as the degree of supply reliability increases, the cost for resource system improvements also increases.

Metropolitan's IRP was developed in a two-phase process. Phase 1 entailed data-gathering, analysis, and decision-making. The major tasks accomplished during Phase 1 included defining resource management and business principles, determining the reliability target for the region, projecting water demands, identifying resource options, and examining different mixes of the identified resource options. Phase 2 focused on developing the Preferred Resource Mix and evaluating coordinated local water management efforts. This examination guided the development and implementation of revised water management programs.

Metropolitan's IRP planning process was open and participatory, involving Metropolitan, member agencies, other water resource agencies, and the general public (in the refine-

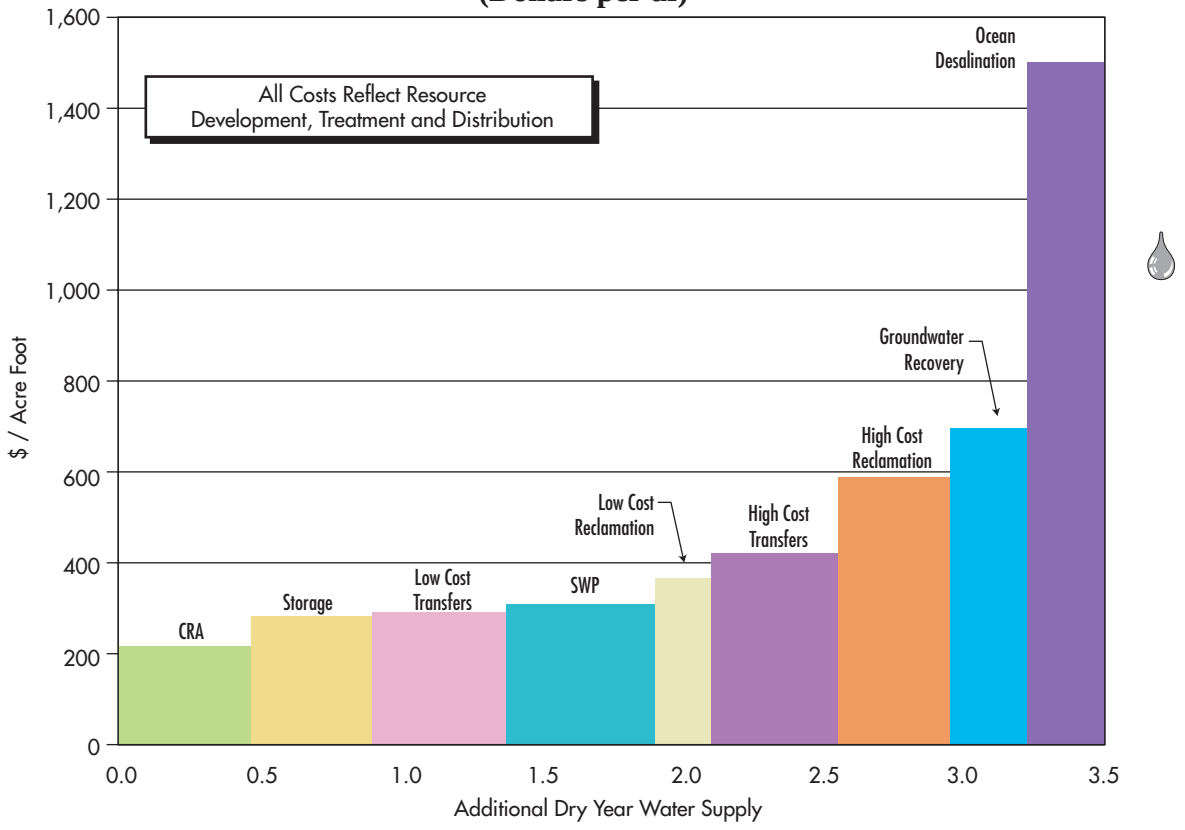
ment and decision-making phases). Review of the analytical methodology and results, as well as establishment of the technical framework, included the active involvement of the member agencies and groundwater agencies in the region. In addition, the IRP process was always intended to be ongoing and dynamic. Metropolitan and its member agencies plan to revisit these plans periodically into the future.

Stakeholder Development of Future Scenarios

Under Phase 1, the stakeholders decided that the IRP must include the assurance that retail-level demands can be satisfied under all foreseeable hydrologic conditions. The ability to achieve this level of service for Southern California's retail water customers provides a solid foundation for a strong and healthy economy. The IRP process identified resource options and grouped them into alternative resource "mixes". Because of the wide range of possible resource strategies, the process took an incremental approach to developing alternative resource mixes.

Through an iterative process, all identified feasible resource options (conservation, water recycling, groundwater, imported supplies, etc.) were examined and combined into various strategies or "mixes" that were measured against the desired objectives of reliability, affordability, reduced risk, and water quality, among others. Figure II-1 shows the average unit cost of the options considered during the process. These numbers are in 1995 dollars. The IRP update will re-examine unit costs of these operations.

Figure II-1
Average Unit Cost of Resource Options
(Dollars per af)*



* In 1995 Dollars

Three broad resource mixes resulted from Phase I:

1. an *Import Emphasis Mix*, which relied heavily on imported supplies to meet future demands

2. a *Local Emphasis Mix*, which relied primarily on the development of local supplies to meet future demands

3. an *Intermediate Resource Mix* which included investments in both local and imported supply development

Water conservation was an essential element in all three resource mixes. During the process, the stakeholders adopted a regional water conservation goal of 1 million acre-feet (af) in annual savings by 2020. Since 1980, conservation programs and plumbing codes have resulted in annual savings that reached an estimated 480,000 af per year in 1998. To fulfill the IRP goal, Metropolitan and the member agencies need to more than double these savings by 2020.

Evaluation of Resource Mixes

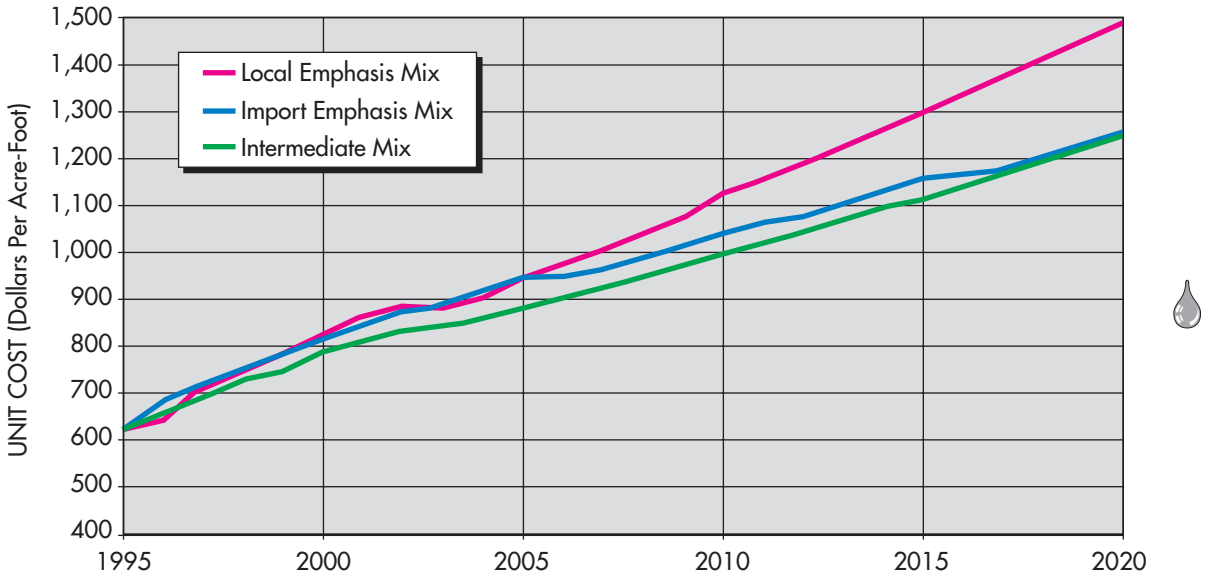
All three of the resource mixes were designed to meet the same level of supply reliability. They differed in the costs associated with meeting that reliability, the risks associated with the resources, and the impacts to water quality.

The average regional cost was used to evaluate the resource mixes, rather than using only Metropolitan's wholesale costs. These regional costs include Metropolitan's costs for resource development, regional infrastructure, and operating costs, as well as estimates of local resource development, infrastructure, and operating costs. The average unit cost of water for the region was derived by taking the total regional costs (Metropolitan and local) divided by the total retail-level demands served. This average unit cost served as the measurement of overall affordability for the region.

Figure II-2 summarizes the projected region-wide average unit cost of water (dollars per af) for the three alternative resource mixes.

Figure II-2

Average Regional Cost of Water (Escalated Dollars)



The *Local Emphasis Mix* had the greatest overall regional cost (in escalated dollars) because of its heavy reliance on more expensive water supplies such as recycling and ocean desalination projects. The *Import Emphasis Mix* was the second-most costly alternative, chiefly because of its heavy reliance on large scale regional infrastructure. In addition, the *Import Emphasis Mix* was perceived to carry a higher degree of risk because of the heavy reliance on out-of-region supplies. The *Intermediate Resource Mix* balanced the higher costs of local resources with the higher costs of regional infrastructure for imported supplies and created a resource plan to achieve the lowest possible regional costs while minimizing risk.

Development of the Preferred Resource Mix

The use of storage (both groundwater conjunctive use and surface storage) greatly reduces the potential for water shortages because water can be stored during wetter periods for later use during droughts. However, future investments still needed to be made in local supplies and in water transfers to meet the region's overall reliability goal. After accounting for storage, the remaining dry year shortages were expected to be 0.80 million af by year 2020. Based on a least-cost approach, and by limiting the water transfers that Metropolitan could reasonably obtain during severe droughts, local targets for water recycling and groundwater recovery were developed.

Supply Reliability Evaluation

To evaluate supply reliability, Metropolitan developed a computer model named IRPSIM. Based on 70 years of historical hydrology (from 1922 to 1991), and using reasonable assumptions known at the time, estimates of water surplus and shortage were determined over the 25-year planning horizon. The reliability evaluation played a key role in determining the least-cost combination of local resources and transfers. Specifically, the analysis helped to determine the appropriate targets for core and flexible water supplies.

Core water supplies provide a relatively fixed amount of water in every year, whether or not surplus supplies already exist. Examples of core supplies include recycled water projects and safe yield groundwater production. They provide the advantage of greater certainty with respect to the supply yield and cost. The major disadvantage of core supplies is that if they are developed solely to meet infrequent dry year supply needs, they become redundant in surplus years and result in higher costs. Flexible water supplies provide supply only when needed (such as a dry year) and do not result in increasing surplus water during years of plentiful supply. Examples of flexible supplies include voluntary water transfers and storage. The major advantage of flexible supplies is that they are generally more cost-effective than core supplies, given the high degree of variability of Metropolitan's existing supplies. The disadvantage of flexible supplies is that the supply yield may be less certain. Developing a resources strategy that balances both cost and risk requires a combination of core and flexible supplies.

The reliability evaluation revealed that without future investments in local and imported supplies, the region could experience a supply shortage of at least 0.79 million af about 50 percent of the time (or once every other year). With core supply improvements, supply shortages were expected to occur about 40 percent of the time, and a shortage of at least 0.79 million af could occur about 10 percent of the time. Core supply improvements also result in unused surplus water about 30 percent of the time. With investments

in storage, all retail water demands were met 80 percent of the time and the maximum amount of shortage was less than 1.05 million af. Storage also reduced the unused supply (surplus) by storing it for later use. Finally, voluntary option and storage agreements for water transfers eliminated all remaining retail water shortages in the year 2020.

Stakeholder Participation

Because of the diverse needs and institutional entities in the region, success of the IRP would only be achieved through an open and participatory process that involved the major stakeholders. The IRP process reached out to water managers, policy decision-makers, interest groups, and individuals to obtain valuable input and guidance regarding the preferred water resource strategy, as well as to review the technical analyses supporting the decision-making process.

IRP Workgroup: Much of the technical guidance and direction for the IRP was provided by the IRP Workgroup, composed of Metropolitan's staff, member agency and local retail agency managers, and the groundwater basin managers. This group served as the de facto technical steering committee for the IRP, providing crucial direction, establishing criteria for analyses, and reviewing resource evaluations. During the entire process, this group met more than 35 times and spent hundreds of hours evaluating detailed analyses.

Regional Assemblies: Major milestones in the process were established by a series of three regional assemblies. These assemblies, modeled after the American Assembly Process developed by Dwight D. Eisenhower at Columbia University in the 1950s, were used as a means to gain consensus on difficult policy issues. The three assemblies were held in October 1993, June 1994, and March 1995, and they were the first time that Metropolitan's senior management, Board of Directors, and member agency managers all convened to discuss regional water solutions. Participants at these assemblies also included general managers from the groundwater basin agencies and local retail water providers (sub-agencies), as well as invited public representatives. In total, more than 150 assembly participants (most of whom attended all three assemblies) provided input to the IRP process. Each assembly produced a written Assembly Statement documenting areas of consensus and identifying areas where divergent views remained unresolved.

Public Forums and Member Agency Sponsored Workshops: In addition to the IRP workgroup and the three regional assemblies, six public forums and several member agency workshops provided broader public input into the planning process. These forums and workshops were held throughout the region. Public forum attendees represented business, environmental, community, agricultural, and water interests from inside and outside the region. In total, 450 individuals participated in these forums.

Water Quality

One of the more decisive evaluations that took place during the IRP focused on water quality. Although many aspects of water quality are important to Southern California, one characteristic received the most attention during the IRP: salinity. Control of salinity, or the amount of total dissolved solids (TDS), is important to attaining IRP goals. Source water high in salinity cannot be used for groundwater recharge (due to basin water quality limitations) or certain industrial and irrigation uses. In addition, if source water high in salinity is recycled, the effluent contains even greater

amounts of TDS, potentially limiting the usefulness of supply produced through these local projects. The TDS of the CRA supply currently averages 650 mg/L and is expected to increase to over 700 mg/L, even with planned salinity control measures for the Colorado River. The SWP supply, by comparison, has a historical average TDS of about 250 mg/L.

Supply Plan Updates

In the period since the adoption of the IRP, Metropolitan and its member agencies have encountered a number of changing circumstances. Table II-2 provides the IRP adopted supply goals. In the years since the IRP was adopted, the demand forecast has been revised, and thus these goals may need to be revised. In addition, changes have occurred in the cost and reliability of supplies. Because of these changes, Metropolitan and its member agencies have begun a revision of the IRP to refine the resource goals. This process is expected to be completed during 2001.

Table II-2
Summary of Supplies Available During a Dry Year
Under the Preferred Resource Mix[1]

Dry Year Supply (Million Acre-Feet)	2000	2005	2010	2015	2020
Locally Developed Supplies:					
Local Production[2]	1.43	1.45	1.48	1.50	1.53
Water Recycling[3]	0.27	0.31	0.36	0.40	0.45
Groundwater Recovery	0.04	0.04	0.05	0.05	0.05
Local Groundwater Storage Production[4]	0.25	0.28	0.30	0.31	0.33
Metropolitan's Regional Supplies					
Colorado River Aqueduct	1.20	1.20	1.20	1.20	1.20
State Water Project	0.75	0.86	0.97	0.97	1.35
Metropolitan Storage And Water Transfers	0.34	0.34	0.49	0.46	0.46
Total Supplies	4.28	4.56	4.85	4.89	5.37
IRP Demand w/Conservation BMPs[5]	4.28	4.56	4.85	4.89	5.37
Recent Demand w/Conservation BMPs[6]	4.01	4.21	4.46	4.70	5.02

1. The IRP Assembly adopted a Preferred Resource Mix only for the years 2000, 2010, and 2020. Other years were obtained by interpolation.
2. Includes groundwater and surface production, and imported supplies from the Los Angeles Aqueduct.
3. Does not include upstream Santa Ana recharge (which is included in local production).
4. Represents the annual production, and not the storage capacity (which is about 1 million acre feet).
5. Retail water demand forecasts during the IRP under hot and dry weather conditions, assuming full implementation of conservation BMPs. Current forecasts are lower.
6. Year 2000 hot-weather sales forecast.

II.2 WATER SURPLUS AND DROUGHT MANAGEMENT PLAN

In April of 1999, Metropolitan's Board of Directors adopted the Water Surplus and Drought Management Plan (WSDM Plan). This plan will guide the management of regional water supplies to achieve the reliability goals of the IRP. Through effective management of its water supply, Metropolitan fully expects to be 100 percent reliable in meeting all non-discounted non-interruptible demands throughout the next ten years, under foreseeable hydrologic conditions.

Unlike Metropolitan's previous shortage management plans, the WSDM Plan recognizes the link between surpluses and shortages, and it integrates operational activities with respect to both conditions. The WSDM Plan continues Metropolitan's commitment to the regional planning approaches initiated in the IRP.

WSDM Plan Development

Metropolitan and its member agencies jointly developed the WSDM Plan during 1998 and 1999. This planning effort included more than a dozen half-day and full-day workshops and more than three dozen meetings of Metropolitan and member agency staff. The result of the planning effort is a consensus plan addressing a broad range of regional water management issues and concerns.

WSDM Plan Principles and Goals

The guiding principle of the current WSDM plan is to manage Metropolitan's water resources and water management programs to minimize adverse impacts of water shortages to retail customers.

From this guiding principle come the following supporting principles:

- Encourage efficient water use and economical local resource programs
- Coordinate operations with member agencies to make as much surplus water as possible available for use in dry years
- Pursue innovative transfer and banking programs to secure more imported water for use in dry years
- Increase public awareness about water supply issues

The current WSDM plan also declared that, should mandatory import water allocations be necessary, those allocations would be calculated on the basis of need, as opposed to any type of historical purchases. The WSDM plan contains the following considerations that would be included in an equitable allocation of imported water:

- Impact on retail consumers and regional economy
- Investments in local resources, including recycling and conservation
- Population growth
- Changes and/or losses in local supplies
- Participation in Metropolitan's non-firm (interruptible) programs
- Investment in Metropolitan's facilities

Ensuring Regional Reliability

To maximize the return on the investments made in conservation, water recycling, storage, and other supply, Metropolitan has

identified a resource management plan that would result in 100 percent reliability for non-discounted, non-interruptible demands through 2010 under all foreseeable hydrologic conditions and reasonable planning assumptions.

Metropolitan also recognizes the potential for shortages due to unexpected conditions. Some of these unexpected conditions include:

- More extreme climatic and hydrologic conditions than ever experienced in the past.
- Emergency conditions as a result of earthquakes, or failure of major conveyance and storage facilities.
- Higher population or economic growth than planned.
- Water quality issues, such as unexpected contamination of local or imported supplies, unexpectedly high levels of certain constituents, and more stringent water quality regulations than expected.
- Regulatory shortages from the enforcement of the Endangered Species Act, or unfavorable water rights allocations to the State Water Project or the Colorado River.

The current WSDM Plan guides the operations of resources to ensure short- and long-term regional reliability. It identifies the expected sequence of resource management actions Metropolitan will take during surpluses and shortages to minimize the probability of severe shortages and eliminate the possibility of extreme shortages and shortage allocations.

In addition to the WSDM Plan, the current Strategic Planning Process and the associated new rate structure (see Section II.3) are tools to mitigate the potential shortage due to unexpected situations described above.

Surplus and Shortage Stages

The WSDM Plan distinguishes between Surpluses, Shortages, Severe Shortages, and Extreme Shortages. Within the WSDM Plan, these terms have specific meanings relating to Metropolitan's capability to deliver water to its customers.

- Surplus: Metropolitan can meet full-service and interruptible program demands, and it can deliver water to local and regional storage.
- Shortage: Metropolitan can meet full-service demands and partially meet or fully meet interruptible demands, using stored water or water transfers as necessary.
- Severe Shortage: Metropolitan can meet full-service demands only by using stored water, transfers, and possibly calling for extraordinary conservation. In a Severe Shortage, Metropolitan may have to curtail Interim Agricultural Water Program deliveries.
- Extreme Shortage: Metropolitan must allocate available supply to full-service customers.

The WSDM Plan defines five surplus management stages and seven shortage management stages to guide resource management activities. These stages are not defined merely by shortfalls in imported water supply, but also by the water balances in Metropolitan's storage programs. For example, a 10 percent shortfall in imported supplies could be a stage one shortage if storage levels are high. If storage levels are already depleted, the same shortfall in imported supplies could potentially be

defined as a more severe shortage. Each year, Metropolitan evaluates the level of supplies available and existing levels of water in storage to determine the appropriate management stage for that year. Each stage is associated with specific resource management actions designed to (1) avoid an Extreme Shortage to the maximum extent possible and (2) minimize adverse impacts to retail customers should an Extreme Shortage occur. The current sequencing outlined in the WSDM Plan reflects anticipated responses based on detailed modeling of Metropolitan's existing and planned resource mix.

Storage Actions by Surplus Stage

Metropolitan's supply condition is considered to be in surplus as long as net annual deliveries can be made to water storage programs. Deliveries to storage in the Diamond Valley Lake and in the SWP terminal reservoirs continue through each surplus stage, provided that there is available storage capacity. Withdrawals from Diamond Valley Lake for regulatory purposes or to meet seasonal demands may occur in any stage. Deliveries to other storage facilities may be interrupted, depending on the amount of the surplus. The following section discusses the management actions to be taken under various levels of surplus, ranked from the smallest to the largest amount of surplus.

- Surplus Stage 1. Metropolitan may curtail or temporarily suspend (1) deliveries to regional groundwater basins under the Cyclic Storage Program; (2) deliveries to Semitropic and Arvin-Edison groundwater storage programs; (3) deliveries of SWP carryover water to SWP reservoirs; and (4) contractual groundwater storage deliveries.

- Surplus Stage 2. Metropolitan may curtail or temporarily suspend (1) deliveries to regional groundwater basins under the Cyclic Storage Program; (2) deliveries to Semitropic and Arvin-Edison groundwater storage programs; and (3) deliveries of SWP carryover water to SWP reservoirs.

- Surplus Stage 3. Metropolitan may curtail or temporarily suspend (1) deliveries to regional groundwater basins under the Cyclic Storage Program; and (2) deliveries to Semitropic and Arvin-Edison groundwater storage programs.

- Surplus Stage 4. Metropolitan may curtail or temporarily suspend deliveries to the Cyclic Storage Program. Metropolitan will continue deliveries to other storage resources.

- Surplus Stage 5. Metropolitan will make deliveries to all available in-region and out-of-region storage resources, including deliveries to the Cyclic Storage Program.

Shortage Actions by Shortage Stage

When Metropolitan must make net annual withdrawals from storage to meet demands, it is considered to be in a shortage condition. Under most of these stages, Metropolitan is still able to meet all firm consumptive demands for water. The following summaries describe water management actions to be taken under each of the seven shortage stages.

- Shortage Stage 1. Metropolitan may make withdrawals from Diamond Valley Lake.

- Shortage Stage 2. Metropolitan will continue Shortage Stage 1 actions and may make withdrawals from Semitropic and Arvin-Edison groundwater storage.

- Shortage Stage 3. Metropolitan will continue Shortage Stage 2 actions and may curtail or temporarily suspend deliveries to Long Term Seasonal and Replenishment Programs in accordance with their discounted rates.

- Shortage Stage 4. Metropolitan will continue Shortage Stage 3 actions and may draw from conjunctive use groundwater storage (such as the North Las Posas program) and the SWP terminal reservoirs (under the Monterey Agreement).

- Shortage Stage 5. Metropolitan will continue Shortage Stage 4 actions. Metropolitan's Board of Directors may call for extraordinary conservation through a coordinated outreach effort and may curtail Interim Agricultural Water Program (IAWP) deliveries in accordance with their discounted rates. In the event of a call for extraordinary conservation, Metropolitan's Drought Program Officer will coordinate public information activities with member agencies and monitor the effectiveness of ongoing conservation programs. The Drought Program Officer will implement monthly reporting on conservation program activities and progress and will provide quarterly estimates of conservation water savings.

- Shortage Stage 6. Metropolitan will continue Shortage Stage 5 actions and may exercise any and all water supply option contracts and/or buy water on the open market either for consumptive use or for delivery to regional storage facilities for later use during the shortage.

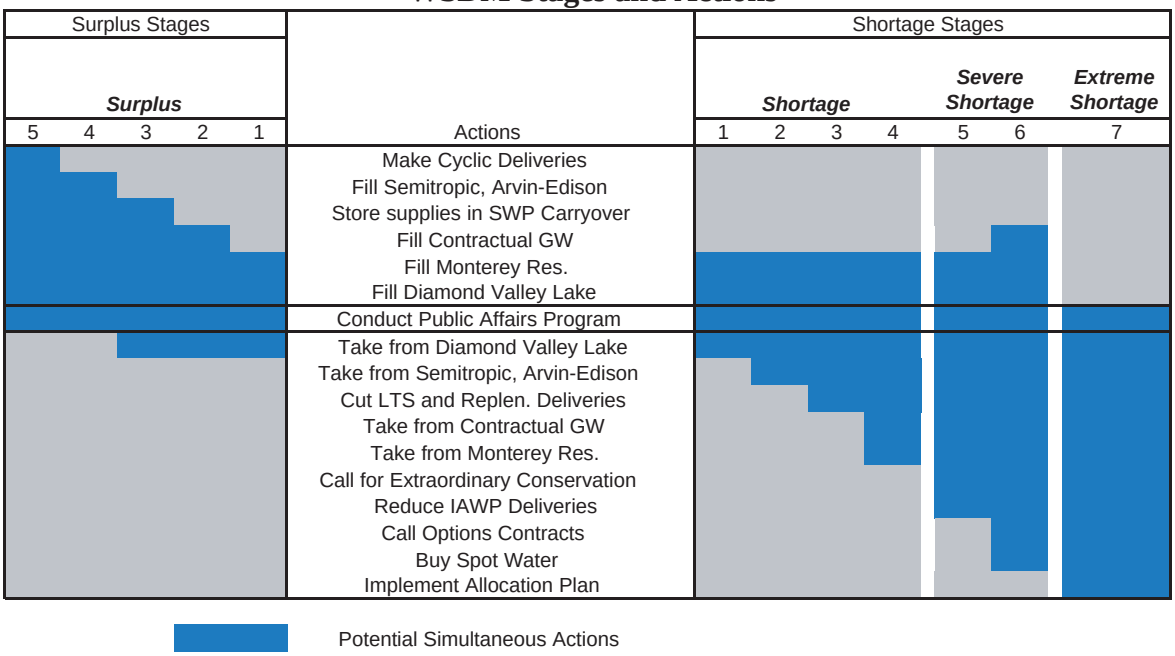
- Shortage Stage 7. Metropolitan will discontinue deliveries to regional storage facilities, except on a regulatory or seasonal basis, continue extraordinary conservation efforts, and develop a plan to allocate available supply fairly and efficiently to full-service customers. The allocation plan will be based on the Board-adopted principles for allocation listed previously. Metropolitan intends to enforce these allocations using rate surcharges. Under the current WSDM Plan, the surcharges will be set at a minimum of $175 per af for any deliveries exceeding a member agency's allotment. *Any deliveries exceeding 102 percent of the allotment will be assessed a surcharge equal to three times Metropolitan's full-service rate.*

Figure II-3 shows the actions under each surplus and shortage stage, as well as the transitions to each supply condition. Metropolitan will declare a shortage whenever water supply conditions require resource management activities included in Shortage Stages 1-4. Metropolitan will declare a Severe Shortage if supply conditions require undertaking actions in Shortage Stages 5-6. Finally, Metropolitan will declare an Extreme Shortage if Shortage Stage 7 actions are required. The overriding goal of the WSDM Plan is to never reach Shortage Stage 7, an Extreme Shortage. Given its present resources, Metropolitan expects to achieve this goal over the next 10 years.

Reliability Modeling

Using IRPSIM, the hydrologic resource simulation model developed during the IRP process, Metropolitan undertook an extensive analysis of system resources, forecasted demands, and probable hydrologic conditions to estimate the likelihood of reaching each Shortage Stage through 2010. The results of this analysis demonstrated the benefits of coordinated management of regional supply and storage resources. The expected occurrence of a Severe Shortage, calling for

Figure II-3
WSDM Stages and Actions



extraordinary conservation efforts and suspension of deliveries for certain interruptible consumptive uses, is 4 percent or less in most years through 2010, and it never exceeds 6 percent in any year. This equates to an expected severe shortage occurring once every 17 to 25 years. An Extreme Shortage did not occur in any simulation run. This analysis was extended through 2010 to match the effective dates of the current WSDM Plan.

Metropolitan also tested the WSDM Plan by analyzing its ability to meet forecasted demands given a repeat of the two most severe California droughts in recent history. Hydrologic conditions for the years 1923-1934 and 1980-1991 were used in combination with demographic projections to generate two hypothetical supply and demand forecasts for the period 1999-2010. Metropolitan then simulated operations to determine the extent of regional shortage, if any. The results again indicated 100 percent reliability for full-service non-discounted demands through the forecast period under foreseeable hydrologic conditions.

Table II-3 shows the demand/supply balances for three different scenarios and time periods. The first scenario in the table shows demands and supplies under a three-year multiple dry year period. To determine these data, Metropolitan examined the hydrologic record and its impacts on the supply/demand balance to find the three-year sequence that resulted in the worst situation for its service area. This was the historical hydrologic sequence of 1990-1991-1992. Using its resource simulation model IRPSIM, Metropolitan projected the 1990-1991-1992 water supply situation, including climate and watershed conditions, on the projected demands for 2001-2002-2003. The model simulated the supply, demands, and the operation of Metropolitan's system to determine its ability to meet those demands. The simulation showed that, despite using the worst three-year sequence of hydrology, Metropolitan would meet its

Table II-3
Metropolitan Demand/Supply Balance
Under Three Different Scenarios
(in million acre-feet)

	Near Term			Long Term			
Scenario	**2001**	**2002**	**2003**	**2005**	**2010**	**2015**	**2020**
Multiple Dry Years							
Demands							
Retail	4.19	4.05	3.99	4.16	4.40	4.65	4.94
GW Replenishment	0.18	0.17	0.16	0.17	0.17	0.17	0.18
Total	**4.37**	**4.22**	**4.15**	**4.33**	**4.57**	**4.82**	**5.12**
Supply							
Local	2.05	2.04	2.06	2.13	2.32	2.46	2.55
Metropolitan	2.32	2.18	2.09	2.20	2.25	2.36	2.57
Total	**4.37**	**4.22**	**4.15**	**4.33**	**4.57**	**4.82**	**5.12**
Single Dry Year	**2001**			**2005**	**2010**	**2015**	**2020**
Demands							
Retail	4.04			4.21	4.46	4.71	5.03
GW Replenishment	0.17			0.17	0.17	0.18	0.19
Total	**4.21**			**4.38**	**4.63**	**4.89**	**5.22**
Supply							
Local	2.28			2.47	2.66	2.80	2.90
Metropolitan	1.93			1.91	1.97	2.09	2.32
Total	**4.21**			**4.38**	**4.63**	**4.89**	**5.22**
Average Year							
Demands							
Retail	3.91			4.07	4.31	4.55	4.85
GW Replenishment	0.16			0.16	0.16	0.17	0.18
Total	**4.07**			**4.23**	**4.47**	**4.72**	**5.03**
Supply							
Local	2.18			2.33	2.52	2.64	2.73
Metropolitan	1.89			1.90	1.95	2.08	2.30
Total	**4.07**			**4.23**	**4.47**	**4.72**	**5.03**

Notes:
Metropolitan supplies include imported supplies, storage programs, and transfers

Multiple Dry Years for 2001-2003 are based on the worst three-year sequence from the historical hydrologic record (1990-1991-1992)

Multiple Dry Years for 2005-2020 are three-year annual average figures based on the worst three-year sequence from the historical hydrologic record (1990-1991-1992) ending in the year displayed

Single Dry Year is based on the single worst year from the historical hydrologic record (1977)

Average Year is based on the average over all years in the historical hydrologic record (1922-1998). In average years, Metropolitan will be adding water to storage, but the additional water supplies are not reported in this table

demands through a combination of imported supply, withdrawals from storage programs, and transfers.

The data shown for Multiple Dry Years under the 2005, 2010, 2015, and 2020 columns were calculated in a similar manner, but are reported as annual average figures. For example, to calculate the 2005 figures, the 1990-1991-1992 hydrologic sequence was used to simulate regional supply and demand conditions in 2003-2004-2005. The numbers listed in the table are the average of the simulated data in 2003-2004-2005. The second and third scenarios show the data for the single dry year and for the overall average. The single worst year in the hydrologic record in terms of supply/demand balance was 1977. Using the same computer model, Metropolitan projected the 1977 water supply condition on the projected demands for 2001 (and repeated the process for 2005, 2010, 2015, and 2020).

Again, the simulation predicts that Metropolitan would meet its demands under the single worst dry year scenario.

The data used for the average year reflected the average of the hydrologic conditions over the historical hydrologic record (1922-1998). The simulations showed that Metropolitan would be able to meet all full-service, non-discounted demands during the average condition. In fact, in average years Metropolitan would be adding water to storage, but the additional water supplies are not reported in this table.

The results under "Multiple Dry Years" in Table II-3 are somewhat counterintuitive. One would expect demands to increase and supplies to decrease progressively through a three-year dry period. This is not the case, however, because Metropolitan selected the worst actual three-year sequence in the hydrologic record in terms of impact on the supply/demand balance. In this particular three-year sequence (1990-1991-1992), the first year, 1990, was the worst of the three, so conditions improved over the next two years. No other three-year sequences in the 77-year hydrologic record had as great an impact on the supply/demand balance.

Annual Reporting Schedule on Supply/Demand Conditions

Managing Metropolitan's water supply resources to minimize the risk of shortages requires timely and accurate information on changing supply and demands conditions throughout the year. To facilitate effective resource management decisions, the WSDM Plan includes a monthly schedule for providing supply/demand information to Metropolitan's senior management and directors, and for making resource allocation decisions. This schedule is shown in Table II-4.

Revenue and Rate Management

Metropolitan has a water rate stabilization reserve policy to prevent a situation where an unexpected decrease in water rate revenues leads to a water rate increase. Due to either a period of low system demands (sales) caused by unusually wet and cool weather or extraordinary drought conservation required when there is a shortage of supplies, water rate revenue may decrease below the level required to cover fixed costs. In anticipation of these types of situations, Metropolitan maintains a water rate stabilization fund and revenue remainder

Table II-4
Schedule of Reporting and Resource Allocation Decision-Making

Month	Informational Report/Management Decision
Jan.	Initial supply/demand forecasts for year
Feb.-Mar.	Update supply/demand forecasts for year
Apr.-May	Finalize supply/demand forecasts Management decisions re: Contractual Groundwater and Option Transfer Programs Board decisions re: Need for Extraordinary Conservation
Oct.	Report on Supply and Carryover Storage
Nov.	Management decisions re: Long-Term Seasonal and Replenishment Groundwater Programs, Interruptible Agricultural Water Program

fund. A minimum and maximum reserve level governs the amount of money held in these funds. In an extreme situation where water rate revenues fall below minimum anticipated levels, the minimum reserve level ensures that the Board has adequate time to increase water rates if absolutely necessary and/or decrease operating costs. The maximum reserve level ensures that the rate stabilization reserve policy does not place an unnecessary burden on ratepayers. The maximum level limits the amount of total rate stabilization funds needed in two ways. First, reserves are only held to cover a period of lower revenues lasting 3½ years. Second, reserves are only held for the portion of water rate revenues that are reasonably subject to variations in sales as determined by past operating experience.

Planning for Catastrophe

Southern California's three imported water supplies (SWP, CRA, and Los Angeles Aqueduct) all cross the San Andreas Fault. Experts consider it likely that one or more of these supplies will be disrupted in the event of a major earthquake. Metropolitan estimates that restoring service on any of these aqueducts following a catastrophic outage could take up to six months. A six-month outage on either the CRA or SWP could reduce annual deliveries to Metropolitan by 0.5 to 1.0 million acre-feet, roughly up to 50 percent of the demand for Metropolitan-supplied water. The Urban Water Planning Act requires agencies to consider the effect of a 50 percent cutback in water supplies. This corresponds approximately to the degree of cutback contemplated by Metropolitan's earthquake disruption scenario.

To safeguard the region from catastrophic loss of water supply, Metropolitan has made substantial investments in emergency storage. Metropolitan's objective is to ensure that the region has sufficient local resources and storage to meet reduced retail demands under normal weather conditions for up to six months. The emergency plan assumes that retail demands are reduced by 25 percent from the 2020 baseline demand forecast through extraordinary conservation, and that local water supplies are largely undisrupted. Metropolitan has reserved half of Diamond Valley Lake storage (400,000 af) to meet such an emergency. In addition, Metropolitan has access to emergency storage at its other reservoirs, at the SWP terminal reservoirs, and in its groundwater conjunctive use program. With few exceptions, Metropolitan can deliver this emergency supply throughout its service area via gravity, thereby eliminating dependence on power sources that could also be disrupted by a major earthquake. The WSDM Plan shortage stages will guide Metropolitan's management of available supplies and resources during the emergency to minimize the impacts of a catastrophe.

II.3 STRATEGIC PLANNING PROCESS

The Strategic Planning Process is a comprehensive approach to how Metropolitan conducts business. The process has entailed a program of self-evaluation and operational alternatives directed at reorienting the organization. In concert with the essential ingredients of change, the Strategic Plan will serve to build the flexibility required for Metropolitan's platform for tomorrow.

At the heart of the Strategic Plan and the Board's vision is "choice" – the opportunity for member agencies to manage their supply and demand for water competitively while ensuring reliability, quality and fairness. Competitive choices, according to the board's vision, are anchored in responsible stewardship of water resources as mandated by the State Constitution. Public stewardship of water is to be managed by Metropolitan in a manner that helps customers manage market variations, emergencies and drought. In a region that is without sufficient native water supplies and that is dependent on aqueducts to convey water from hundreds of miles away, competitive choice will provide a framework to allow water quality, reliability and fairness to be maintained.

Metropolitan's Board is looking at a plan to change the way water is acquired, distributed and managed in Southern California. The Board is also evaluating the financial mechanisms related to water resource development and distribution. The plan will result in competitive choices for water resource development for the 27 member agencies, while assuring good water quality, reliability and fairness.

The Strategic Plan's components include a composite rate structure, a resource management plan, the determination of prices and a compatible board governance and management structure with comprehensive ethical standards.

Foundation of the Strategic Plan: Policy Principles

Metropolitan's Board of Directors approved the Strategic Plan Policy Principles on December 14, 1999. These policy principles define the way Metropolitan will do business in the future. They establish a new strategy for Metropolitan that will enable it to continue to be responsive to the diverse water reliability and quality needs of the region.

During the strategic planning process, the board identified a number of issues considered key to determining the district's future. These critical issues include:

- Choice of services for member agencies.
- Financial commitment to ensure Metropolitan can recover a greater portion of its fixed costs.
- Supply allocation that will ensure water is available to meet the needs of the public in a cost-effective and environmentally sound manner.
- Water reliability and quality.
- Rate structure that provides the fair allocation of costs and financial commitments for Metropolitan's current and future investments in supplies and infrastructure.
- Wheeling to allow fair access to Metropolitan's delivery system.
- Cost/benefit of regional programs.
- New growth.

Composite Rate Structure Framework

In coming to a vision of the future of water in Southern California, the Board recognized that the next step would be to revamp the rate structure in a manner that provides flexibility and incentives for competitive choices in water resource development. A process driven by stakeholders, including member agencies, the private sector and directors, developed four draft rate structure alternatives. At the direction of the Board, the four alternatives were crafted into a composite rate structure framework that addresses the common and beneficial elements of each.

The framework provides the flexibility necessary to afford choice for the member agencies. The framework includes tiers of service, providing a pricing incentive for the local development of water resources. The first tier of service is the least expensive and will provide a fixed amount of water from Metropolitan under a voluntary contract with the member agencies. The second tier is more expensive and is meant to provide a back-up plan in the event that a local community must deal with unanticipated circumstances such as unexpected changes in demand due to weather or the failure of local facilities. Pricing will also be used to encourage efficient resource management among alternative water sources such as water transfers, recycling, conservation and desalination.

III. IMPLEMENTING THE PLAN

The reliability evaluation conducted as part of the 1996 IRP revealed that without future investments in local and imported supplies, the region could experience a supply shortage of at least 0.79 million acre-feet about 50 percent of the time (or once every other year) by the year 2020. Since that time, staff at Metropolitan and local agencies have worked diligently to implement the goals identified in the IRP. These efforts have been rewarded by improved regional water supply reliability. Despite a growing economy, the regional water supply reliability situation has improved from the shortages of the early nineties to a situation where no shortages in non-discounted, non-interruptible demands are expected to occur within the next ten years, under foreseeable hydrologic conditions.

Metropolitan has been working in many different areas to bring about this improved supply reliability. The major drivers of this achievement have been:

- Conservation
- Water recycling and groundwater recovery
- Storage and groundwater management programs within the Southern California region
- Storage programs related to the State Water Project (SWP) and the Colorado River
- Other water supply management programs outside of the region

Many of these programs are already successfully implemented. Others, including institutional and facility changes on the Colorado River and the SWP, will take more time to execute.

The following sections discuss each of these programs, relating the successes to date and the programs that are still under way.

III.I CONSERVATION AND RELATED PROGRAMS

Planning Goals

Conservation is a basic element of Metropolitan's long-term water management strategy. Consistent with this objective, Metropolitan and its member agencies have invested more than $220 million in regional conservation programs during the last decade. Among other measures, this investment has resulted in the replacement of more than 1.6 million high-flush-volume toilets with new water conserving ultra-low-flush toilets (ULFTs) and the distribution of more than 3.2 million low-flow showerheads. Collectively, conservation programs assisted by Metropolitan will reduce Southern California's reliance on imported water by more than 65,000 acre-feet during 2000. Over their expected lives, the ULFT retrofits alone will save more than 1.8 million af of water.

Metropolitan's conservation policies and practices are largely shaped by two main factors. The first is the role assigned to conservation by Metropolitan's IRP. The second involves Metropolitan's obligations as a signatory to the statewide *Memorandum of Understanding Regarding Water Conservation in California*.

Conservation and Metropolitan's IRP

The IRP places equal emphasis on local and imported resource development. The IRP treats conservation as core local supply, on par with recycling and other resources. As described in the IRP, conservation savings result from both "active" and "passive" conservation efforts. "Active" conservation consists of water-agency funded programs; "passive" conservation is demand reductions attributable to conservation-oriented plumbing codes and usage reductions resulting from increases in the price of water; that is, the conservation will occur without any specific agency action targeted at conservation. Including regional pre-1990 conservation savings, Metropolitan's 2020 IRP total conservation target is approximately 1 million af per year. A large share of the target has already been achieved through pre-1990 savings, price effects, and continued savings accruing from the effect of plumbing codes. The remainder is expected to be achieved through agency-sponsored active conservation programs.

Metropolitan's Implementation of Conservation "Best Management Practices"

These agency-sponsored programs are closely linked to the efforts of the California Urban Water Conservation Council (CUWCC). As a signatory to the CUWCC's *Memorandum of Understanding Regarding Water Conservation in California* (Urban MOU), Metropolitan has pledged to make a good faith effort to implement a prescribed set of urban water conservation "Best Management Practices" (BMPs). Metropolitan is providing the technical and financial support needed to enable its member agencies to meet the terms of the Urban MOU. Table III-1 provides a list of the BMPs and how they apply to Metropolitan as a wholesaler compared to retail water agencies. Appendix A.6 contains a copy of the current Urban MOU and a sample Metropolitan filing with CUWCC.[1]

1 The urban MOU has been revised several times. Among other changes, the original set of 16 “best management practices” were reduced to 14 and a new reporting format was proposed. Since this revised reporting format was just recently developed, no BMP reports have been filed since the fiscal year 1997/98 reporting cycle.

Table III-1
Urban Water Conservation Best Management Practices

BMP Number	BMP Description	Applies to	
		Retailers	Wholesalers
1	Residential Water Surveys	Yes	No
2	Residential Plumbing Retrofits	Yes	No
3	System Water Audits, Leak Detection	Yes	Yes
4	Metering and Commodity Rates	Yes	No
5	Large Landscape	Yes	No
6	High Efficiency Washing Machines	Yes	No
7	Public Information	Yes	Yes
8	School Education	Yes	Yes
9	Commercial, Industrial, Institutional	Yes	No
10	Wholesale Agency Assistance	No	Yes
11	Conservation Pricing	Yes	Yes
12	Conservation Coordinator	Yes	Yes
13	Water Waste Prohibition	Yes	No
14	Residential ULFT Replacements	Yes	No

In addition to implementing all cost-effective BMPs, Metropolitan actively supports the CUWCC, the organization created to administer the Urban MOU. In addition to serving on CUWCC's governing body, Metropolitan has historically provided staff time and financial resources in support of CUWCC's ongoing efforts to document and increase the effectiveness of BMP-related conservation outcomes. Metropolitan staff sits on the following CUWCC governing committees: steering; plenary; landscape; commercial, industrial and institutional; measurement and evaluation; and reporting. Metropolitan also supports CUWCC operations and studies. Table III-2 lists some recent areas of support.

Table III-2
CUWCC Research Projects Supported by Metropolitan

Cost-Effectiveness Guidelines
Conservation Program Costs and Savings Document
BMP Conservation Potential
Prototype Cost-Effectiveness Assessment Framework
Conservation Rates Handbook
Landscape Evapotranspiration Study
Landscape BMP Handbook
Landscape BMP Symposium
CII BMP Handbook

Conservation Credits Program

Funding for urban BMP and other conservation-related activities is provided by Metropolitan's Conservation Credits Program (CCP). Established in 1988, this funding mechanism supports Metropolitan's commitment to conservation as a long-term water management strategy.

Under the CCP program, Metropolitan provides financial support to member agency conservation programs by paying either $154 per acre-foot of water conserved or one-half of the program cost, whichever is less.[2] To be eligible for CCP funds, water conservation project proposals submitted by a member agency must:

- Have demonstrable water savings.
- Reduce water demands on Metropolitan's system.
- Be technically sound and require Metropolitan's participation to make the project financially and economically feasible.

Conservation Activities and Administration

Metropolitan staff is responsible for developing and administering Metropolitan's water conservation policies and programs. Staff also serves as the primary liaison to Metropolitan's member agencies and to other pertinent agencies and organizations regarding Metropolitan's conservation programs and policies.

There are four main areas of focus regarding conservation: residential programs; large landscape programs; commercial, industrial and institutional programs; and measurement and evaluation. Principal activities and accomplishments to date are described in the following sections.

Residential Programs

Residential programs consist of ultra-low-flush toilet (ULFT) and high efficiency clothes washer (HECW) retrofit programs, and the Residential Water-Use Efficiency Surveys (Surveys).

Ultra-Low-Flush Toilet (ULFT) Program

This program addresses BMP 14: conserving water by replacing older, high-flush-volume toilets (3.5 gallons-per-flush and larger) with 1.6 gallons per flush ULFTs. Metropolitan began co-funding member agency-managed ULFT programs in 1988, and to date, 25 of Metropolitan's 27 member agencies have conducted ULFT programs. This activity is the largest of Metropolitan's Conservation Credits programs. Metropolitan funds ULFT retrofit programs at $60 per ULFT installed. As of June 2000, Metropolitan had contributed $95 million toward ULFT programs.

As of January 2000, the region had achieved an estimated 32 percent overall saturation of ULFTs. (See Figure III-1 for the geographic distribution of Metropolitan's saturation rates.) More than one-half of the saturation has been achieved though agency-sponsored retrofit programs. The balance is due to ULFT retrofits financed by customers independent of water agency ULFT programs. More than 200,000 ULFTs are installed each year through programs sponsored by Metropolitan and its member agencies. This level of activity is expected to continue for at least the next five years.

[2]The $154 per acre-foot represents Metropolitan's avoided cost of water attributable to conservation.

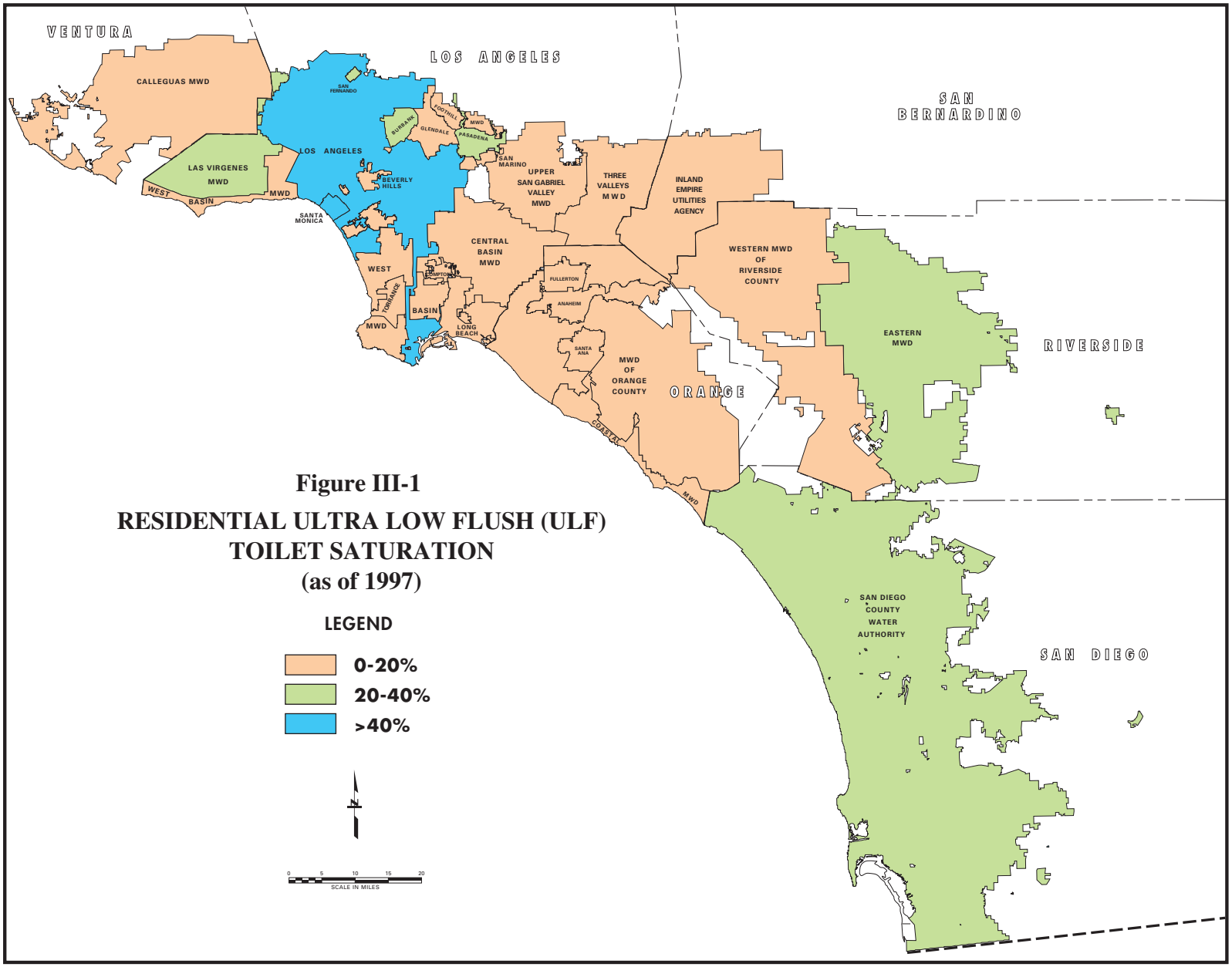


Figure III-1

RESIDENTIAL ULTRA LOW FLUSH (ULF) TOILET SATURATION (as of 1997)

Table III-3 shows the total cumulative savings from ULFT toilets. As of FY 1999/00, the annual savings are 60,000 af per year. By FY 2003-04, the estimated savings will be 90,000 af per year, translating into a lifetime savings of almost 2 million af.

High Efficiency Clothes Washer Rebate Program

High-efficiency clothes washers (HECWs) are relatively new to the list of urban water conservation BMPs. In September 1997, the California Urban Water Conservation Council adopted BMP 6 for HECWs. If a regional or municipal energy provider is offering a rebate program to promote the purchase of energy-efficient HECWs by its customers, then the water agencies serving those same customers are asked to join the energy program and offer a rebate based on water savings.

Prior to 1999, two of Metropolitan's member agencies sponsored rebates for HECWs: the San Diego County Water Authority (SDCWA) and the Los Angeles Department of Water and Power (LADWP).

The major incentive for this program has come from the energy utilities in the region. In the spring of 1998, LADWP initiated a major HECW rebate program, initially offering its customers a $350 rebate, including a Metropolitan contribution of $35 per rebate. In 1999, due to federal requirements that energy-efficient appliances be promoted and because a number of domestically-manufactured HECWs had been introduced, regional energy suppliers such as Southern California Edison (SCE) and San Diego Gas and Electric (SDG&E) launched major residential rebate programs. They promoted two different tiers of rebates ($50 and $100) based on different levels of energy savings per HECW. Metropolitan participated in these programs, adding $35 per rebate on behalf of its member agencies for the water savings generated by HECWs.

Table III-3
Projected ULFT Installations and Savings

Fiscal Year	Annual Installs Number of ULFTs[1]	Cumulative Installs Number of ULFTs	Accumulated ULFT Retrofit Savings		
			As of FY	Annual (AFY)	Lifetime[3] (AFY)
97/98		1,242,784	97/98	44,686	893,726
98/99	211,951	1,454,735	98/99	52,307	1,046,146
99/00	206,265	1,661,000	99/00	59,724	1,194,478
00/01[2]	216,000	1,877,000	00/01	67,491	1,349,811
01/02	216,000	2,093,000	01/02	75,257	1,505,143
02/03	216,000	2,309,000	02/03	83,024	1,660,476
03/04	216,000	2,525,000	03/04	90,790	1,815,808

[1] Number of ULFTs in FY 99/00 is based on records as of 8/10/2000
[2] Proposed ULFT activity in future is based on the 5 year Conservation budget projections.
[3] ULFT fixture life is estimated to be 20 years

The energy-driven programs continued in Year 2000, although rebates for the energy savings were reduced (to $75 for the SCE and SDG&E programs and to $150 for LADWP's program). As of June 2000, the number of rebates issued by all HECW rebate programs in Metropolitan's service area (including some commercial programs with a higher rebate amount) totaled 14,000, and Metropolitan had contributed $590,000.

Water-Use Efficiency Survey Program

The Residential Water-Use Efficiency Survey Program was designed to meet the requirements of BMP 1. The program was modified in 1996 with assistance from a number of member agencies and local retail agencies. The purpose was to develop a standard approach to the design and implementation of residential survey programs. The product was a "how-to" start-up kit for program managers and a training program for surveyors. A database was also developed to track the details of each survey.

In total, approximately 57,000 surveys have been performed in Metropolitan's service area to which Metropolitan contributed more than $3 million, including retrofits, since residential survey programs began.

Residential Research and Development

Metropolitan has funded several residential research and development projects. These include a leak repair project, a Evapotranspiration Controller Pilot project, a test of various targeting components for survey programs, and several other similar projects.

Large Landscape

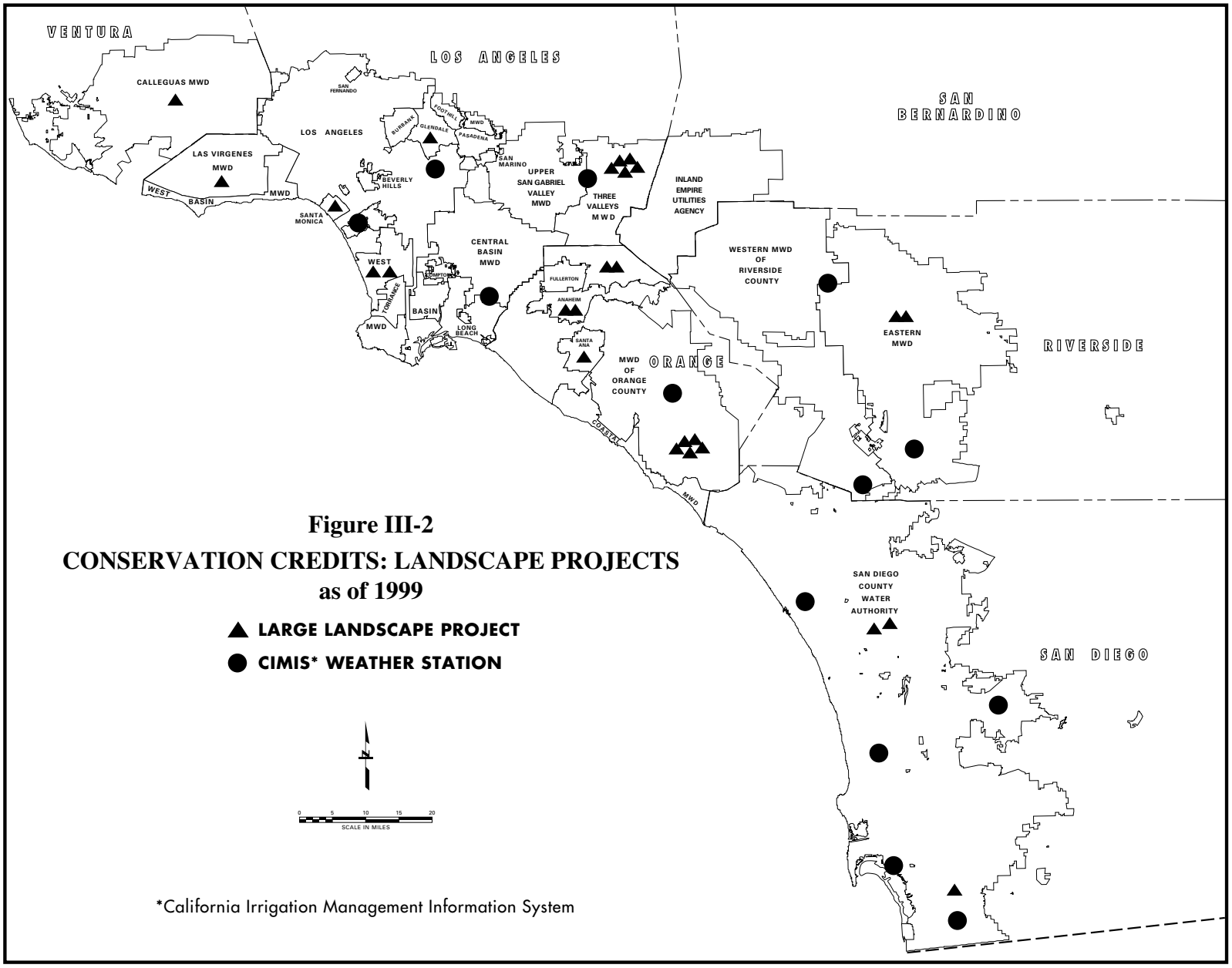
Prior to 1995, the Large Landscape initiative emphasized large landscape audits, education and training. Toward the end of 1994, several pilot projects began to test the concept of a pay-for-performance program. Under this concept, Metropolitan offers financial assistance to its member agencies for the purchase and installation of landscape retrofit equipment that saves water and improves irrigation efficiency. The landscape retrofits have included moisture sensors, controller upgrades, and centralized computer-controlled irrigation systems. Funding is provided based on verified water savings. Because outdoor water use is affected significantly by the behavior of the people controlling watering, a pay-for-performance structure guarantees that retrofits will not only be installed, but will also be used properly. Twenty-six of these projects have been completed by 11 member agencies. Figure III-2 shows the location of these landscape projects.

In support of the retrofit program, Metropolitan funds, develops, and coordinates training and education programs for landscape workers and professionals. Metropolitan also collects and disseminates information about the effectiveness of landscape water conservation programs and strategies, participates in landscape research projects, and investigates and tests promising new technologies.

Metropolitan staff participated on the committee that developed the BMP 5 Handbook, which outlines implementation methods, and it continues to develop and test projects to meet the requirements of BMP 5 – Landscape Water Conservation Programs and Incentives.

Landscape Training and Education

Metropolitan and its member agencies have conducted a training course known as "Protector del Agua" for landscape maintenance technicians. In keeping with the original goal of providing technical information to


VENTURA
LOS ANGELES
SAN BERNARDINO
RIVERSIDE
ORANGE
SAN DIEGO
CALLEGUAS MWD
LAS VIRGENES MWD
WEST BASIN MWD
SAN FERNANDO
LOS ANGELES
BURBANK
GLENDALE
FOOTHILL MWD
PASADENA
SAN MARINO
BEVERLY HILLS
SANTA MONICA
UPPER SAN GABRIEL VALLEY MWD
THREE VALLEYS M W D
INLAND EMPIRE UTILITIES AGENCY
CENTRAL BASIN MWD
WEST COMPTON
COMPTON
LONG BEACH
FULLERTON
ANAHEIM
SANTA ANA
MWD OF ORANGE COUNTY
WESTERN MWD OF RIVERSIDE COUNTY
EASTERN MWD
SAN DIEGO COUNTY WATER AUTHORITY
Figure III-2
CONSERVATION CREDITS: LANDSCAPE PROJECTS
as of 1999
LARGE LANDSCAPE PROJECT
CIMIS* WEATHER STATION
N
0 5 10 15 20
SCALE IN MILES
*California Irrigation Management Information System

Spanish-speaking participants, approximately 28 percent of the classes held during fiscal year 1998-99 were taught in Spanish. This course is now certified through the Irrigation Association, which allows participants to earn up to 21 Continuing Education Units for attending. To date, more than 5,000 participants have completed the course.

A survey of participants was completed in 1998 to assess participant satisfaction with the program. Almost 90 percent of the participants surveyed stated that they would highly recommend it to others.

In response to requests from member agencies and participants, a new "plant class" was added to the training program. This class provides landscape technicians with information about low-water-using plants suitable for use in Southern California. Participants receive a reference booklet, which includes color photos and maintenance information, as well as water-use guidelines for various landscape species. To address residential outdoor water use, Metropolitan offers a Saturday morning workshop for home gardeners.

From 1993 through 1998, Metropolitan provided funding for the "Circuit Rider" Program. This program was developed by Central Basin Municipal Water District and West Basin Municipal Water District to assist cities in the implementation of the State Landscape Ordinance AB 325, or their local landscape ordinance. Once established, the program was run in the service areas of Central Basin Municipal Water District and West Basin Municipal Water District, Foothill Municipal Water District, Three Valleys Municipal Water District, and Upper San Gabriel Valley Municipal Water District.

Metropolitan has funded several landscape education projects managed by member agencies, including workshops held by Eastern Municipal Water District and by the Municipal Water District of Orange County, and two demonstration garden projects with San Diego County Water Authority.

Landscape Research and Development

Metropolitan also provides support for landscape research programs. Results of these programs provide a better understanding of landscape water use requirements and techniques for applying the proper amount of water in the landscape. Following is a list of Metropolitan-funded research:[3]

- Evaluation of irrigation needs of mixed landscape plantings
- Study of efficient turfgrass management
- Performance of 30 non-native tree species under two different irrigation regimes
- Evaluation of water-budget-based rate structure
- Studies to test different area measurement methods (a component of developing water budgets)
- CIMIS research to calculate evapotranspiration in non-ideal environments
- Irrigation water banking study for tall fescue grass
- Irrigation scheduling for bermuda and zoysia grass during warm seasons

[3]Some of this research has been co-funded by Metropolitan. Some has been fully funded by Metropolitan.

Commercial, Industrial and Institutional Programs

The Commercial, Industrial, and Institutional (CII) community is motivated by and reached through an array of outreach and financial incentives different from other programs. In addressing BMP 9, Metropolitan currently manages two types of financial incentives programs with participating member agencies. The first involves a "menu" arrangement under which Metropolitan offers financial incentives for the replacement of specific water efficient equipment. Rebate levels are as follows:

- $60 per ultra-low-flush toilet
- $60 per ultra-low-flush urinal
- $500 per cooling tower conductivity controller
- $100 per coin-operated high efficiency washing machine

These incentives are based on the results of nearly 1,000 commercial audits conducted by Metropolitan and its member agencies. The most frequently identified retrofits formed the basis for the current CII Menu Program.

In addition to the CII Menu Program, Metropolitan offers financial incentives for capital improvements that increase the efficiency of large water using processes. Metropolitan pays up to $154 per acre-foot for water saved, or up to one-half of the project cost over a five-year period. Since each industrial process change is unique, Metropolitan works closely with member agencies and industrial customers to custom-tailor three-way contracts specifying performance requirements for each project.

Regional CII Program

Metropolitan is currently in the process of signing a three-year agreement with a vendor to manage a $2.5 million dollar CII program. This new program represents an improved version of the CII Menu Program. Co-funded by the United States Bureau of Reclamation, the Regional CII Program addresses the need for more streamlined program administration, targeted marketing, and an expanded menu of rebate-eligible fixtures. The objective of this new program is to encourage the replacement of fixtures commonly found at commercial sites that have the greatest potential water savings.

Hotel Laundry Reduction Program

Metropolitan, in partnership with the Municipal Water District of Orange County and the Orange County Water District, has cooperated in creating a water conservation program tailored to hotels and motels. This simple and successful program, started in 1999, provides hotels and motels in Orange County with free tent cards to offer guests the option of not having their towels and linens washed each night, and a video for instructing staff on the protocols of implementing this program. It has been very popular with tourist hotels in Orange County.

Workshops and Seminars

Metropolitan has sponsored and/or developed a variety of workshops and seminars for member agency staff. Session topics have included cooling tower performance, flushometer valve performance, water auditing procedures, and the market potential of high efficiency washers.

CII Research and Development

CII Research and Development includes leak detection analysis reports, Reclaimed Water Handbook development, a fixture installation

pilot project in a skilled nursing facility, and a hotel/motel towel reuse trial program.

Measurement and Evaluation

The Measurement and Evaluation effort has four primary functions:

- Providing a means to measure and evaluate the effectiveness of current and potential conservation programs
- Developing reliable estimates of various conservation programs and assessing the relative benefits and costs of these interventions
- Providing technical assistance and support to member agencies in the areas of research methods, statistics and program evaluation
- Documenting the results and the effectiveness of Metropolitan-assisted conservation efforts

Metropolitan's staff has served as technical advisors for a number of state and national studies involving the quantification and valuation of water savings.

Other Conservation-Related Activities at Metropolitan

Conservation activities are closely coordinated with Metropolitan's External Affairs Group. Table III-4 summarizes the major conserva-

Table III-4
External Affairs Group:
Conservation-Related Activities

Program or Activity	Description
Public Speaking Services	Provides speakers for organizations, service clubs, churches, business and other community groups and associations. It is estimated that these presentations attract between 15,000 and 20,000 people annually.
Community Relations	Organizes and conducts inspection trips of Metropolitan's distribution system for elected officials, community leaders and members of the public. Several hundred people learn about Metropolitan's conservation and water management policies and practices each year through these inspection trips.
Media and Publications	Conducts editorial briefings and media field trips; assembles press packets; prepares and disseminates news releases, speeches, videos, fact sheets, brochures, articles, editorials, and an internet site describing Metropolitan's water management objectives and programs.
Government Relations	Provides elected officials, public agencies, businesses and organizations with information about Metropolitan's water management objectives and programs.

tion-related activities of BMP 7 (public information) administered by External Affairs. Table III-5 shows Metropolitan's extensive commitment to BMP 8's (school education) conservation-related education programs.

Water System Operations Group

Metropolitan's Water System Operations Group works to fulfill BMP 3 (System Water Audits, Leak Detection, and Repair) and BMP 4 (Metering With Commodity Rates for All New Connections and Retrofit of Existing Connections).

Leak Detection

Metropolitan has a variety of ongoing system-wide leak detection programs. Each month, a mathematical algorithm compares inflow with outflow for Metropolitan's entire system. Major control structures and hydroelectric plants are inspected weekly. Field crews patrol Metropolitan's pipelines daily, visually inspecting for leaks. The 242-mile Colorado River Aqueduct is also patrolled daily by both air and ground crews. All below-ground structures are checked every six months as part of a continuous preventive maintenance program.

Metering

As a wholesale water supplier, Metropolitan has no retail customers. However, all inter-agency water service connections are metered. Any new water agency supplied by Metropolitan would likewise be metered.

Conservation Pricing

Metropolitan currently charges a unit price per acre-foot. The unit price does not decline with the amount of water supplied. This commodity-based rate structure complies with BMP 11.

Achievements to Date

Conservation is an integral part of water supply planning and operations at Metropolitan. Metropolitan works to improve the understanding of the costs and benefits of conservation so that investment decisions are both efficient and effective at meeting program goals. As a cooperative member of California's water conservation community, Metropolitan has made significant contributions to the development and coordination of conservation activities throughout the state. These contributions have been recognized in the form of "Gold Star" certification from the Association of California Water Agencies and numerous awards from the U.S. Bureau of Reclamation.

Table III-6 summarizes the conservation activities that Metropolitan has helped to implement in its service area in the past decade. This help was in the form of financial assistance, administrative assistance, or both. This table reflects only Metropolitan-funded conservation activities.

Table III-5
BMP 8: School Education Programs

Program or Activity	Date Initiated	Current Status	Grades	Description
All About Water	1990	Ongoing	K-3	Activities to teach young students about droughts, conservation, water quality and physical properties of water.
California Smith, Water Investigator	1993	Ongoing	Grade 6	A fictitious character – California Smith, Water Investigator – teaches students about current and future water supply options, environmental issues, and conservation.
Geography of Water	Revised 1997	Ongoing	Grades 4-8	A curriculum module on the relationship between population, precipitation, geography, economics, and water distribution.
Water Ways	1995	Ongoing	Grade 5	This fifth-grade supplement uses a collection of inter-disciplinary activities to encourage student participation in examining the role of water in the history of the United States.
Water Politics	1994	Ongoing	Grades 9-12	A set of nine role-playing case studies focusing on a variety of contemporary water issues, including water rights, groundwater contamination, Bay/Delta, Colorado River and endangered species.
Water Quality: The Qualities and Science of Water	1999	Ongoing	Grades 7-12	A hands-on, inquiry-based approach to teaching contemporary water quality issues. The unit has interactive lab activities and case studies, that encourage students to think about the importance of water quality in Southern California.
Water Works: School-to-Career Education Program	1999	Ongoing	Grades 6-12	A student-centered, problem-solving, job-specific program that is designed to increase student awareness of career tracks in the water industry. The unit includes: a CD-ROM, a water industry video, career activities and career profiles.
Thinking More About Using Less	2001	New!	Grades 6-12	This water and energy conservation program contains two activity-oriented modules – *Water Supply and Demand* and *Home/School Water-Use Audits*. The goal is for students to develop a conservation ethic by developing personal decision-making skills with regard to the wise use of water and energy resources.

Table III-6 Status of Metropolitan Conservation Programs

BMP Number	BMP Name	Metropolitan Program Description	Regional Program Status	Quantities and Dollars Through 6/30/2000	
1	Residential Water Surveys	financial support for surveys, retrofits,	SF Surveys	55,925	$1,654,387
		and research & development	MF Surveys	1,809	$75,623
			Flappers	1,362	$6,129
			Toilet Displacement Devices installed	16,885	$53,638
			Toilet Displacement Devices distributed	752,410	$1,222,666
			Toilet Leak Detection, Dye Tablets Distributed	356,337	$17,817
			Residential R&D (projects)	8	$299,799
2	Residential Plumbing Retrofits	financial support for retrofits and	Low Flow Showerheads installed	101,791	$487,547
		distributions	Low Flow Showerheads distributed	2,856,836	$11,879,583
			Faucet Aerators installed	7,082	$7,082
			Faucet Aerators distributed	197,710	$197,710
3	System Water Audits, Leak Detection	Distribution System Leak Detection Audits	MWD surveys own pipes & aqueducts	annually	$2,800,000
			MWD surveys pipes & aqueducts for member agencies	6	$280,000
4	Metering and Commodity Rates	all connections metered		N/A	yes
5	Large Landscape	financial support for retrofits, surveys,	Audits Conducted	1,305	$613,379
		education, and research & development	Moisture Sensors	499	$132,329
			Irrigation Controllers	45	$279,406
			Central Controllers	4	$462,664
			Protector del Agua Graduates	5,020	$574,874
			PDA: Plant Class Graduates	1,160	$34,920
			PDA: Residential Graduates	2,275	$25,407
			Landscape Education	24	$45,485
			Circuit Rider Program (cities)	240	$162,250
			Landscape R&D (projects)	10	$278,558
6	High Efficiency Washing Machines	financial support for rebates	Machines Placed - Member Agencies	9,141	$296,680
			Machines Placed - Energy Utilities	3,125	$109,375
7	Public Information	materials & programs provided		N/A	$10,678,160
8	School Education	full range of school curricula		N/A	$6,034,157
9	Commercial, Industrial, Institutional	financial support for retrofits, surveys,	ULFTs	26,000	$1,560,000
		workshops, and research & development	Urinals	500	$37,556
			Flush Valve Kits	185	$2,775
			Cooling Tower Retrofits	167	$83,500
			Clothes Washer Rebates	1,852	$185,200
			Surveys	905	$650,000
			Workshops on Com. Retrofits	7	$7,000
			CII R&D (projects)	10	$325,071
10	Wholesale Agency Assistance	financial support and assistance provided for BMPs 1-9 and 11-14		N/A	See Total Below
11	Conservation Pricing	Commodity rate structure in place		N/A	yes
12	Conservation Coordinator	staff size has varied from 12 to 23 people		N/A	$8,000,000
13	Water Waste Prohibition	Exempt, but acts as clearinghouse for information and example ordinances for its member agencies		N/A	N/A
14	Residential ULFT Replacements	financial support for retrofits and rebates	Toilets installed	1,618,481	$94,579,438
			Total Spent by Metropolitan Water District >>		**$144,140,165**

III.2 LOCAL RESOURCES PROGRAM: RECYCLING & GROUNDWATER RECOVERY

Planning Goals

With the adoption of the 1996 IRP, Metropolitan's member agencies and Board set resource goals for Metropolitan to achieve during the next 25 years to meet its supply reliability and water quality objectives in a cost-effective manner. These goals called for strong reliance on local water management options, including the increased use of local resources. The IRP set a year 2020 target production for combined water recycling and groundwater recovery elements totaling 500,000 af per year. Of that amount, about 238,000 af per year are already being produced: 202,000 af per year from recycling and 36,000 af per year from groundwater recovery. The IRP goals for these water supplies are provided in Table III-7.

Table III-7
Forecast Water Supplies from Recycling and Groundwater Recovery

Year	Expected Deliveries (af)
2000	238,000
2005	355,000
2010	410,000
2015	455,000
2020	500,000

Water recycling has proven to be an effective drought-proof supply, and it helps local agencies comply with environmental regulations. Currently, more than half of the water recycling in California occurs in Metropolitan's service area. Desalination of brackish groundwater is also an important element in the continued supply reliability of the region.

Metropolitan has committed to provide financial support to 53 water recycling projects and 22 groundwater recovery projects with a financial investment that currently exceeds $82 million. Local projects not receiving assistance from Metropolitan currently provide 132,000 af of recycled water and 19,000 af of recovered groundwater. Table III-7 includes regional recycled water and groundwater, both from programs assisted and not assisted by Metropolitan. In the future, Metropolitan will not distinguish between water recycling and groundwater recovery programs.

Water Recycling

Water recycling projects involve the collection of wastewater that is currently discharged within the service area, treating that water to a suitable standard for specific uses, and using the recycled water in lieu of potable supplies. This section provides a description of the wastewater sources that potentially could be used for recycled water.

Description of the Methods of Wastewater Disposal in the Service Area

As part of the regional planning that encourages the collection and use of recycled water, a database has been developed to catalogue the name of each wastewater treatment facility, the operating agency, the location and elevation of the facility, the extent of wastewater treatment, capacity and anticipated production, method of effluent disposal, and influent and effluent water qualities. This database identifies 89 wastewater treatment plants within Metropolitan's service area. Existing and projected total effluent capacity for these 89 wastewater treatment plants is shown in Table III-8.

Table III-8
Existing and Projected Total Effluent Capacity
Wastewater Treatment Plants within Metropolitan's Service Area

Treatment Level	Existing Capacity(MGD)	2010 Capacity (MGD)	2040 Capacity (MGD)
Primary	2120	2668	3139
Secondary	1546	2232	2708
Tertiary	607	1080	1464
Advanced	34	184	229

This data was compiled as part of the SCCWRRS study and is included in the Phase IB Summary Report – December 1998.

Secondary treatment capacity provides an indication of the amount of wastewater being generated and disposed of within Metropolitan's service area. Virtually all wastewater plants in the service area treat wastewater to at least a secondary level, generally using an activated sludge process. This level of treatment is required to comply with the Clean Water Act. Inland wastewater plants provide additional tertiary treatment for effluent disposal to a stream or other water body, or for beneficial reuse. A small percentage of wastewater is further treated, generally with reverse osmosis or electrodialysis reversal processes, to produce suitable-quality recycled water for groundwater recharge, industrial use, and municipal irrigation.

Within Metropolitan's service area, many local agencies collect and treat the wastewater. Some of the largest include:

- County Sanitation Districts of Los Angeles County
- Orange County Sanitation District
- City of Los Angeles Bureau of Sanitation
- San Diego Metropolitan Wastewater Department

In addition to these large wastewater agencies, many smaller special purpose wastewater agencies, dual-purpose (water and wastewater) special districts, and municipal wastewater agencies operate within the service area.

Generally, wastewater is collected in a sewer collection system. It flows by gravity to a centrally located treatment plant. Once treated, the wastewater within the service area is disposed of through three mechanisms:

1. Ocean Outfalls – Treated wastewater is either disposed of directly through an ocean outfall, or it is conveyed to the ocean outfall via a land pipeline.

2. Reuse – About 200,000 af per year is currently being beneficially reused for irrigation, industrial processes, and groundwater recharge applications. A few inland treatment plants (in Riverside and San Bernardino counties) over-irrigate feed and fodder crops with recycled water. While this is beneficial reuse, the activity is primarily engaged in as an effluent disposal mechanism because water reuse markets have not yet developed. As agricultural lands are converted to urban uses, it is expected that the recycled water uses will continue.

3. Live Stream Discharge – A number of inland plants pump their treated effluent into local streams and rivers. Subsequently the discharge may be diverted downstream for beneficial uses, or flow to the ocean. The rivers (or ephemeral streams) that are primarily affected include:

    - Los Angeles River
    - Santa Ana River
    - Calleguas Creek
    - Rio Hondo & San Gabriel Rivers
    - Santa Margarita River

Regional Planning for Optimal Recycling

The U.S. Bureau of Reclamation, in conjunction with eight Southern California water agencies, initiated a study to evaluate the feasibility of regional water recycling in Southern California. The Southern California Comprehensive Water Reclamation and Reuse Study (SCCWRRS) planning effort is designed to find practical uses of treated wastewater that could serve water recycling needs in areas throughout the region. The study area encompasses the South Coastal Hydrologic region, including portions of Ventura, Los Angeles, Orange, San Diego, San Bernardino, and Riverside counties.

The study consists of a three-part, six-year comprehensive effort to identify regional water recycling systems. The ultimate goal of the SCCWRRS project is to promote efficient use of total water resources by increasing the use of recycled water and identifying opportunities for and constraints on maximizing water reuse in Southern California.

The intent of SCCWRRS is to develop a Plan of Study that will bring together the variety of local and regional interests in Southern California water recycling. A nonfederal partnership of seven local water agencies and the State of California has made the financial commitment to conduct this comprehensive regional planning effort. The eight agencies that represent the water recycling interests in Southern California are:

- California Department of Water Resources
- Central Basin MWD and West Basin MWD
- City of Los Angeles
- City of San Diego
- Metropolitan Water District of Southern California
- San Diego County Water Authority
- Santa Ana Watershed Project Authority
- South Orange County Reclamation Authority

SCCWRRS defines regional recycled water needs and attempts to match those needs with available resources, including methods for conveying water. SCCWRRS has generated baseline information for total water supply and demand, recycled water supply and demand, environmental enhancement opportunities, and groundwater recharge potential. An allocation and distribution model has been developed to evaluate various regional recycled water alternatives.

Based upon the study findings, a regional water recycling system that spans the entire study area is not practical or feasible; however, subregional systems warrant further evaluation. Combining subregions into geographic regions facilitates the development of recycling systems that meet regional recycling goals while preserving the benefits of subregional analysis, including the following:

- Maximize the opportunities for area-wide water recycling systems
- Encompass areas with similar regulatory requirements for basin plans and water quality
- Avoid conveyance and water quality improvement costs of connecting coastal supplies with inland demands

The study area has been divided into four geographic regions with boundaries that approximate county lines and defined hydrologic basins:

- Inland Empire: San Bernardino and Riverside counties
- Los Angeles: Los Angeles County and portions of Ventura County
- San Diego County
- Orange County

The study's analytical work is complete and a report to Congress is being prepared. SCCWRRS has identified 34 regional projects and their sponsors. These projects have the potential to produce about 450,000 af per year of new recycled water supply.

Programs to Meet Goals

Local Projects Program

The IRP Preferred Resource Mix provides Metropolitan with an optimum strategy to meet future water supply reliability needs. Developing locally owned water recycling and groundwater recovery projects allows Metropolitan to reduce its capital improvements and its O&M costs for water importation, treatment and distribution. Metropolitan's financial assistance for these types of projects is timed to conform to expanding regional needs for imported water.

Metropolitan's Board of Directors approved the Local Projects Program (LPP) in 1982 to assist the development of recycled water supply projects. At that time, the Board recognized that water recycling generally costs more than buying imported water from Metropolitan. Since then, the LPP has been modified to continue the development of water recycling projects in Southern California. The basic purpose of the LPP is to provide financial support to local agencies developing recycled water projects that cost more than Metropolitan's imported supplies, thus reducing the demand for imported water and improving regional water supply reliability.

Metropolitan's programs are predicated on a pay-for-performance principle. Incentive payments are provided on a contractual basis for yield developed by local agencies and applied to beneficial uses. Between 1986 and 1990, the LPP contribution for a project was $75 per af, which roughly equaled Metropolitan's avoided energy cost for pumping an equivalent amount of water through the State Water Project. In April 1990, Metropolitan's Board modified the LPP contribution to $154 per af. In August 1995, Metropolitan's Board adopted a revised

contribution schedule for existing LPP projects. The contribution for a project ranged from $0 to a maximum of $250 per af, based on the difference between the project's unit cost and Metropolitan's treated water rate. Existing participants in the LPP had a choice of remaining at the flat rate of $154 per af or converting to the revised contribution methodology.

New Competitive Local Resources Program

In June 1998, following extensive coordination and endorsement from Metropolitan's member agencies, Metropolitan's Board retired the LPP and established the Local Resources Program (LRP) in its place. The primary objective of the LRP is similar to the LPP: to support the development of cost-effective water recycling and groundwater recovery projects that reduce demands for imported supplies. The LRP uses a competitive Request for Proposals (RFP) process to encourage the development of cost-effective recycled water and groundwater recovery projects.

With the adoption of the LRP, Metropolitan issued an RFP to meet the 2010 IRP goal of obtaining an additional 53,000 af per year of local resource production. Metropolitan intends to issue additional RFPs under the LRP as necessary to achieve the IRP goals.

To qualify for inclusion in the LRP, a project must be selected through the competitive RFP process. A review committee provides an objective evaluation of project proposals and identifies the mix of project proposals that best meets the region's needs consistent with the objectives of the IRP. Qualifying and scoring criteria were developed to guide the review committee in its ranking of LRP project proposals. The qualifying criteria set basic standards to ensure that the proposed project provides an increased level of recycled water and is capable of being implemented. Projects that passed the qualifying criteria were then given a numerical score based on the following categories:

- Readiness to proceed
- Diversity of input discharges
- Regional water supply benefits
- Water quality benefits
- Metropolitan facility benefits (will the project postpone or delay new facilities?)
- Operational reliability and probability of success
- Technical innovation or public information benefits
- Cost to Metropolitan

In response to the RFP issued in 1998, a total of 28 proposals with an ultimate yield of more than 140,000 af per year were received. Fourteen projects with a combined total yield of 51,498 af per year were selected for inclusion in the LRP, and contracts for Metropolitan to provide financial assistance have been executed. Metropolitan will continue to assist in the development of recycled water projects in Southern California as Metropolitan's ongoing planning processes identify water recycling needs.

Achievements to Date

Since 1982 Metropolitan has committed to providing financial assistance to the development of water recycling projects throughout its service area. Since the IRP was adopted in 1996, Metropolitan and its member agencies have made significant progress in achieving regional targets for recycling and groundwater

recovery. Metropolitan currently provides funding to 53 recycled water projects with a current annual yield of 70,400 af. These projects are shown in Table III-9. The location of these recycled water projects is shown in Figure III-3. An additional 132,000 af of recycled water is provided within the region by local projects not receiving funding from Metropolitan.

Uses of Recycled Water

Currently, about 202,000 af per year of planned, permitted use of recycled water is taking place throughout Metropolitan's service area. These uses include landscape irrigation, industrial process water, seawater intrusion barriers, and groundwater recharge applications. A number of projects are expected to go on-line within the next five years, including:

- Los Angeles Department of Water and Power's (LADWP) Terminal Island project
- Upper San Gabriel Valley Municipal Water District's (USGVMWD) Phase I project
- City of San Diego's South Bay Water Reclamation Plant

Other projects are in their formative planning stages, and their development will depend on influences related to cost, financing, regulatory actions and water supply demands.

Groundwater Recharge and Seawater Intrusion Barriers

A significant percentage (about 30%) of recycled water use in the Metropolitan service area is for groundwater replenishment and seawater barrier injection. A summary of this recycled water use is presented in Table III-10.

The Metropolitan service area overlies numerous groundwater basins, many of which have existing recharge facilities and seawater intrusion injection barriers. Currently, about 70,000 af per year of recycled water is permitted for recharge and seawater intrusion barrier injection into the Orange County, San Fernando Central and West Coast groundwater basins.

Four seawater intrusion barriers recharge approximately 45,000 af per year along the Los Angeles and Orange county coastline with mostly potable water. Within the next decade, it is projected that 90 percent of the seawater intrusion barrier supplies will be supplied with recycled water treated with microfiltration followed by reverse osmosis.

Large-scale groundwater replenishment projects require case-by-case review by the California Department of Health Services (CDHS). The greater the percentage of recycled water in the total replenishment water, the more stringent the CDHS requirements.

Typically, a groundwater recharge project must provide for the construction of new wells if the goal of the project is to increase the basin's yield and offset an agency's demand for imported water. This conjunctive use element of groundwater recharge projects adds the cost of groundwater extraction facilities and energy to the project's total cost. New wells cost between $500,000 and $1 million.

One potential concern with the use of recycled water for groundwater recharge is adverse impacts on groundwater quality from organic contaminants, metals, or salts. CDHS has proposed regulations for the use of recycled water for recharge into an aquifer that is used for domestic supply. The proposed regulations are restrictive, limiting the amount of recycled

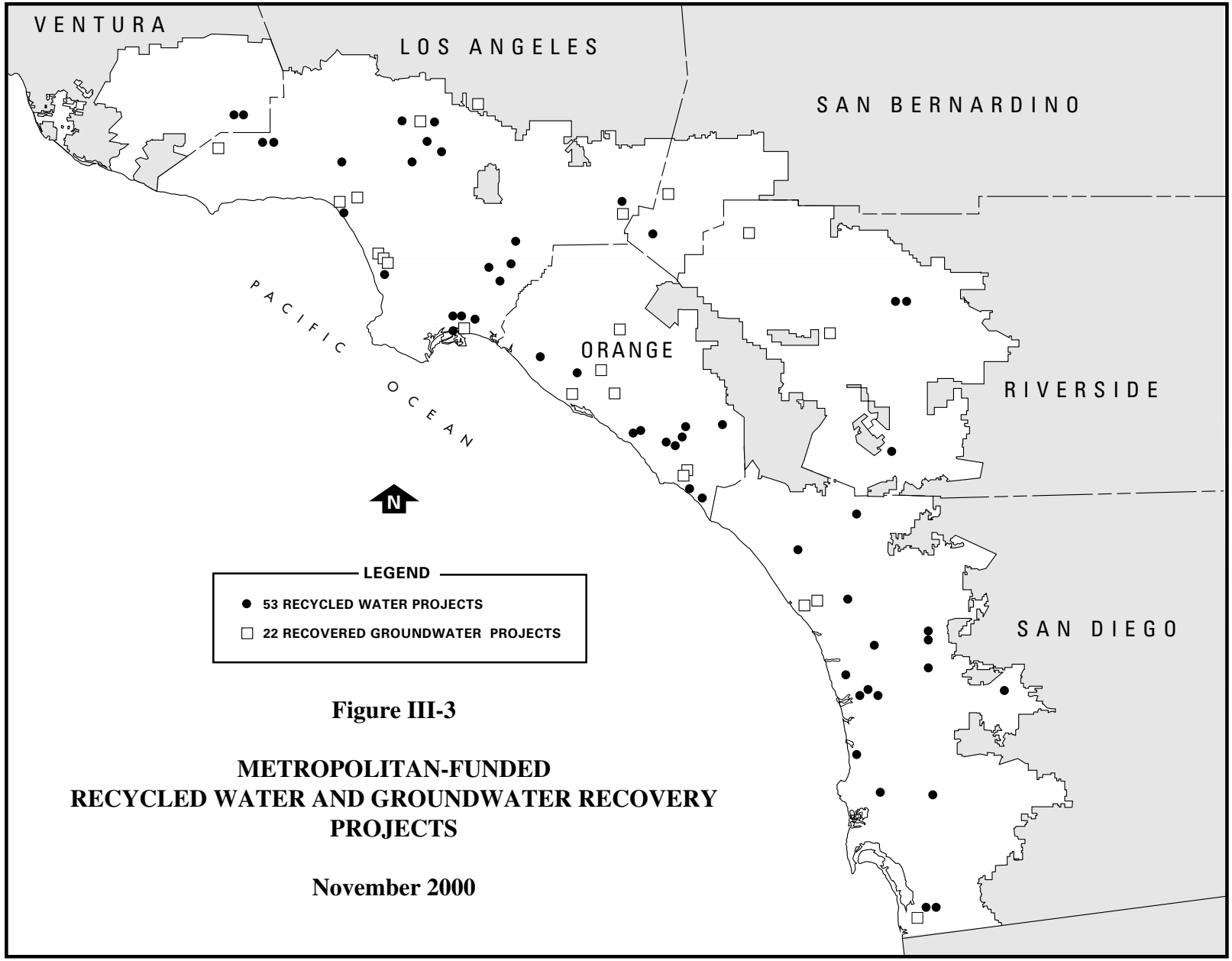


Figure III-3

METROPOLITAN-FUNDED RECYCLED WATER AND GROUNDWATER RECOVERY PROJECTS

November 2000

TABLE III-9

Water Recycling Projects with Metropolitan Program Funding

MEMBER AGENCY		PROJECT	CONTRACT YIELD (AFY)	FY 98-99[1] YIELD (AFY)	FY 99-00[1] YIELD (AFY)	TOTAL TO DATE[1] YIELD (AF)	TOTAL TO DATE[1] Contribution ($)
LOCAL PROJECTS PROGRAM:							
Calleguas MWD	1.	Oak Park/North Ranch Reclaimed Water Dist. System	1,300	1,136	1,300	5,110	786,894
	2.	Conejo Creek Diversion Project	14,000	0	0	0	0
Central Basin MWD	3.	Cerritos Reclaimed Water Extension Project	260	260	260	1,651	254,285
	4.	Lakewood Water Reclamation Project	440	422	440	4,505	693,785
Coastal MWD	5.	San Clemente Water Reclamation Project	4,000	378	462	3,594	553,538
	6.	South Laguna Reclamation Expansion Project	700	0	0	54	8,239
	7.	South Laguna Reclamation Project	860	673	352	10,706	610,167
Eastern MWD	8.	Rancho California Reclamation Expansion Project	6,000	2,037	2,156	11,913	1,834,648
	9.	Eastern Regional Reclaimed Water System	4,830	0	0	0	0
	10.	Eastern Reach 1, Phase II Water Reclamation Project	1,700	0	0	0	0
City of Glendale	11.	Glendale Water Reclamation Expansion Project	600	191	200	2,320	357,311
Inland Empire Utility	12.	Carbon Canyon Reclamation Project	13,500	100	2,156	2,256	347,424
Las Virgenes MWD	13.	Calabasas Reclaimed Water System Extension Project	700	429	553	4,297	661,800
	14.	Las Virgenes Reclamation Project	2,700	2,700	3,770	40,592	2,806,369
City of Long Beach	15.	Long Beach Reclamation Project	1,700	1,700	1,455	15,507	2,291,458
	16.	Long Beach Reclaimed Water Master Plan Phase I	2,750	0	0	0	0
City of Los Angeles	17.	Los Angeles Greenbelt Project	1,610	747	652	5,141	791,760
	18.	Sepulveda Basin Water Reclamation Project	1,900	0	0	0	0
MWD of Orange County	19.	Irvine Reclamation Project	10,000	10,000	10,000	96,524	13,567,275
	20.	Moulton Niguel Water Reclamation Project	8,000	2,918	5,907	16,042	2,470,453
	21.	Santa Margarita Water Reclamation Project	3,600	1,892	2,676	18,191	2,727,353
	22.	Trabuco Canyon Reclamation Expansion Project	800	249	358	2,294	353,245
San Diego County Water Authority	23.	Encina Water Pollution Control Reclamation Project[4]	165	165	165	1,064	113,098
	24.	Oceanside Water Reclamation Project	300	32	130	269	41,472
	25.	Rancho Santa Fe Reclaimed Water System	220	0	0	0	0
	26.	Santa Maria Water Reclamation Project	1,600	0	153	153	23,562
	27.	Shadowridge Water Reclamation Project	375	214	246	2,298	353,830
Three Valleys MWD	28.	Walnut Valley Water Reclamation Expansion Project[4]	500	500	500	2,630	240,117
		Subtotal	85,110	26,742	33,891	247,110	31,888,082
LOCAL RESOURCE PROGRAM CONVERSIONS:							
City of Burbank	29.	Burbank Reclaimed Water System Expansion Project	850	433	483	2,019	504,435
Central Basin MWD	30.	Century Reclamation Program[3]	5,500	2,859	0		
	31.	Rio Hondo Water Reclamation Program[3]	5,000	241	3,683	20,346	4,613,172
Coastal MWD	32.	Green Acres Reclamation Project (Coastal MWD)[2]	800	54	299	353	88,325
City of Glendale	33.	Glendale Brand Park Reclaimed Water Project[3]	225	73	0		
	34.	Glendale Verdugo-Scholl Reclaimed Water Project[3]	2,000	496	1,084	2,911	707,334
MWD of Orange County		Green Acres Reclamation Project (MWDOC)[2]	5,400	1,604	1,717	9,018	2,015,556
San Diego County Water Authority	35.	Encina Basin Water Reclamation Project Phase I	2,050	1,197	1,396	8,456	1,565,750
	36.	Escondido Regional Reclaimed Water Project	2,800	0	0	0	0
	37.	Fallbrook Public Utility District Water Reclamation Project	1,200	642	679	4,269	950,719
	38.	North City Water Reclamation Project	17,500	2,809	3,324	6,133	1,533,200
	39.	Otay Water Reclamation Project Phase I	1,500	897	944	6,734	1,416,331
	40.	Padre Dam MWD Reclaimed Water System Phase I	850	234	453	701	175,150
	41.	San Elijo Water Reclamation System	1,600	0	0	0	0
	42.	San Pasqual Water Reclamation Project	1,100	239	253	1,315	316,543
City of Santa Ana		Green Acres Reclamation Project (Santa Ana)[2]	800	385	451	1,861	452,259
West Basin MWD	43.	West Basin Water Reclamation Program	70,000	18,864	21,775	84,593	20,962,450
		Subtotal	119,175	31,027	36,540	148,709	35,301,222

TABLE III-9 (continued)
Water Recycling Projects with Metropolitan Program Funding

MEMBER AGENCY		PROJECT	CONTRACT YIELD (AFY)	FY 98-99[1] YIELD (AFY)	FY 99-00[1] YIELD (AFY)	TOTAL TO DATE[1] YIELD (AF)	TOTAL TO DATE[1] Contribution ($)
COMPETITIVE LOCAL RESOURCES PROGRAM:							
San Diego County Water Authority	44.	Olivenhain Recycled Project - Southeast Quadrant	1,788	0.0	0.0	0.0	0.0
	45.	Otay Recycled Water Distribution Expansion Project	8,515	0.0	0.0	0.0	0.0
City of Santa Monica	46.	Dry Weather Runoff Reclamation Facility	280	0.0	0.0	0.0	0.0
Central Basin MWD	47.	Alamitos Barrier Reclaimed Water Project	3,024	0.0	0.0	0.0	0.0
City of Los Angeles	48.	Harbor Water Recycling Project	5,000	0.0	0.0	0.0	0.0
MWD of Orange County	49.	Capistrano Valley Non-Domestic Water System Expansion	2,895	0.0	0.0	0.0	0.0
	50.	Moulton Niguel Phase 4 Reclamation System Expansion	1,276	0.0	0.0	0.0	0.0
	51.	Development of Non-Domestic Water System Expansion in Ladera Ranch and Talega Valley	2,772	0.0	0.0	0.0	0.0
San Diego County Water Authority	52.	Encina Basin Water Reclamation Program - Phase 2	2,950	0.0	0.0	0.0	0.0
	53.	Rincon del Diablo Recycled Water Program	648	0.0	0.0	0.0	0.0
		Subtotal	29,148	0.0	0.0	0.0	0.0
Operating Projects: 35		**Total**	**233,433**	**57,768**	**70,431**	**395,819**	**67,189,304**

1. Totals through June 2000 as reported to date - not all information is complete.
2. Green Acres Reclamation Project is approved as one project to deliver water to Coastal MWD, MWDOC, and Santa Ana.
3. Projects operate separately, but are administered as one agreement for the respective agency as of July 1, 1999.
4. Expired agreements. Project production, which is not reported, is assumed to be consistent with historic yield.

Table III-10
Existing Groundwater Replenishment and Seawater Barrier Injection Projects and their Yields
(af per year)

Project	Yield
OCWD Water Factory 21	2,700
West Basin Barrier	7,500
Central Basin Spreading	50,000
East Valley Project	10,000
Total	70,200

water that can be recharged to a 20 percent blend with potable water at the nearest production well, unless additional treatment processes are used. A large market exists for the use of recycled water for groundwater recharge. A significant amount of the projected demand for recycled water depends on meeting regulations based on future studies on the health effects of recycled water.

Industrial Uses

Industrial users represent a large potential market for recycled water, particularly in areas of the Metropolitan service area that are heavily industrialized, such as the cities of Vernon, Commerce, Industry and the Wilmington area of Los Angeles. Additionally, refineries in El Segundo in the West Basin MWD service area and in the city of Torrance use approximately 8,000 af per year of recycled water. Typical industrial uses include cooling tower makeup water, boiler feed water, paper manufacturing, carpet dying, and process water. Industrial users are desirable because they are high demand, continuous flow customers, allowing plants to baseload operations rather than contend with seasonal and daily variations.

Irrigation Uses

Irrigation of golf courses, parks, schoolyards, cemeteries and greenbelts is one of the staple recycled water markets. Currently, about 86,000 af per year of recycled water is used to irrigate landscapes throughout Southern California. Replacing irrigation demands for imported water with recycled water reduces the need for imported water during the critical summer months and in drought situations when water supplies are scarce.

Technical and Economic Feasibility of Serving Recycled Water

Recycled water is the fastest growing local water supply source in Metropolitan's service area. Expanded recycled water use will depend on making progress in the areas of research, regulatory change, and public acceptance, as well as finding ways to finance local projects that have regional benefits. Metropolitan supports:

- Increased water recycling in California and the Colorado River Basin.
- Funding assistance by parties that benefit both directly and indirectly.
- Expansion of the types of recycled water uses consistent with the protection of public health.
- Continuous review of regulations of recycled water use to ensure streamlined administration, public health and environmental protection.
- Regional and statewide planning efforts and voluntary cooperation and partnerships.
- Research efforts that address public acceptance, new technologies and health effects assessments.

Determining the technical and economic feasibility of a recycled water project requires a relative comparison to alternative water supply options. This comparison requires a detailed analysis of the costs and benefits of each alternative supply. The relative cost-effectiveness of alternative supply options is very sensitive to the assumptions used in the analysis. For example, the estimates of capital costs, future energy prices, operation and maintenance (including future replacement of equipment), financing costs and discount rates can affect the outcome of the analysis. Likewise identifying all benefits of the recycled water project and the alternative supplies

is equally important. Both costs and benefits vary by the perspective of the entities involved in reviewing the projects. Examples of these entities are the:

1) Local agency responsible for wastewater treatment and disposal

2) Local agency responsible for delivery of the water supply to the customer

3) Regional wholesale water supplier

4) State and Federal government regulatory and water resource interests

5) Society as a whole

Funding

Capital risk is a significant constraint to increasing recycled water project development. Recycled water projects usually require significant capital investments in treatment and distribution systems that are separate from the potable water system. The variability of demand for the recycled water also lengthens the time needed to fully develop markets. This variability can affect project economics by increasing unit costs during the early years of operation. Uncertainty of market demand creates a risk to the cost recovery required for repayment of capital debt.

It is estimated that $2.6 billion of capital costs are needed for near-term projects to develop 450,000 af per year of recycled water from additional identified projects. This funding could come from many sources, including water agencies, wastewater agencies, and federal and state funding programs. However, the large capital risk may deter agencies from undertaking these projects.

Metropolitan developed the LPP and subsequently the LRP to assist member agencies in overcoming this obstacle. In its role as the regional water supplier, Metropolitan is able to allocate its costs for financial assistance to participating projects to all agencies within its service area because benefits are shared by all agencies.

In addition to the LPP and LRP, many water agencies are partnering with wastewater agencies to provide needed financial resources. The San Diego County Water Authority has a funding program, the Reclaimed Water Development Fund, which assists local agencies in developing recycling projects in San Diego County. Wastewater agencies understand that beneficial reuse may be a cost-effective alternative to regulatory and disposal issues. Implementing a reuse program can defer or eliminate the need for ocean outfall expansions and extensions. Also, a recent trend by the regulatory community to require zero discharge during certain periods is forcing wastewater agencies to consider water reuse more proactively. Project partnerships between water supply and wastewater treatment agencies have led to projects in which both entities contribute financial resources and share multiple benefits.

Another major source of funding is the Bureau of Reclamation's Title XVI program. Title XVI was authorized in 1992, and approximately $157 million has been appropriated to Los Angeles, San Gabriel Valley and San Diego area projects.

Proposition 204 (1996 bond measure) provided $60 million for water recycling loans, but the SWRCB has not yet funded any loans through their program. Proposition 13, approved by the voters in 2000, has supplemented Proposition 204 funds with $40 million in grants and low interest funding. Proposition 13 funding also provided

$235 million to the Santa Ana Project Water Authority for local projects, a portion of which will likely be used to fund recycled water projects.

In the recent *Framework For Action*, CALFED staff recommended that state and federal governments spend $1.5 billion over the next seven years on water use efficiency (water conservation and recycling) – along with local matching funds.

Regulatory Issues

Two state agencies are involved in regulating water recycling projects. The Regional Water Quality Control Board is the permitting authority, and the CDHS advises with regard to health concerns and standards. Combining water quality concerns and health effects requires meeting stringent goals and standards. Title 22 of the California Administrative Code provides specific guidelines for treatment levels and the corresponding reuse opportunities. However, there are no uniform criteria for groundwater recharge applications. Currently, state regulatory agencies review and determine requirements for recharge projects on a case-by-case basis. In many instances, CDHS is required to make interpretations regarding Title 22. Local basin objectives for TDS and chloride may also constrain the use or discharge of recycled water.

Institutional Issues

Often, multiple local agencies are involved in a proposed water recycling project. For example, recycled water from a single wastewater source may be used by a number of recycled water distributors, or the recycled water may be treated and delivered by an agency in one service area and used in another. Also, an agency responsible for wastewater collection and treatment may wish to deliver recycled water within a water district's service area. Projects that involve groundwater recharge require close coordination with groundwater managers. In most instances, these projects require a committed agency that is willing to negotiate with other affected agencies to develop water recycling projects.

Water Quality

Water quality requirements for various types of irrigation and industrial purposes are a critical issue when evaluating whether recycled water will be an acceptable supply. The water chemistry of recycled water has to be carefully analyzed to determine whether there are any constituents (such as TDS, chloride, pH, or ammonia) that may cause a problem for a specific application of recycled water. Also, each urban use of water adds 200-400 mg/L TDS. Progressive buildup often limits application and regulatory compliance of recycled water.

Seasonal Storage

Production of wastewater at a water recycling plant is typically uniform year round since the indoor use at a home does not vary much from winter to summer. (Flows may be higher in the winter at the wastewater recycling plant from stormwater inflow into the sewers.) However, the irrigation uses of recycled water (parks, golf courses, etc.) require more than 60 percent of their supply during the summer months (May through September). Therefore, some recycled water projects have needed to store surplus production of recycled water in the winter for later use during the summer months to optimize recycling. Agencies like Las Virgenes Municipal Water District and Irvine Ranch Water District have required extensive engineering and operational studies to manage their seasonal supply variations. Construction of storage reservoirs is very expensive in the urban areas.

Brine Disposal

The disposal of salty brines is a critical issue facing Southern California in the further development of recycled water projects. Metropolitan and the U.S. Bureau of Reclamation prepared a Salinity Management Study that resulted in Metropolitan's adoption of a Salinity Management Action Plan. The study identified the need for approximately $200 million in additional brine sewer lines to export salts from the watersheds to the ocean. The study recommended that these brine lines be built to maintain the long-term salt balance of the groundwater basins and to maintain the quality of the recycled water supplies at water recycling plants. Both state and federal financial assistance is being advocated by the Southern California Salinity Coalition, a coalition of water and wastewater agencies, to build the regional brine lines.

Public Acceptance

Most agencies find that they need to implement a public education program along with their recycled water projects. Education programs inform recycled water users and the general public about the benefits of using recycled water, and provide reassurance on the safety of recycled water use. To encourage public acceptance, Metropolitan supports continuous review of regulations of recycled water use to ensure streamlined administration, public health and environmental protection, and research efforts that address public acceptance, new technologies and health effects assessments.

Groundwater Recovery

All of the groundwater basins in Southern California experience varying degrees of water quality problems as a result of urban and agricultural uses. Accumulation of high-salinity water, as well as degradation from volatile organics, are common constraints to the economic use of groundwater for urban applications. In some cases, the threat of increased salt buildup can complicate conjunctive use of groundwater basins and imported supplies.

In limited instances, recovering degraded groundwater can cost less than purchasing water from Metropolitan, so some projects have moved forward without Metropolitan assistance. In many cases, particularly where TDS is the constituent of concern, more expensive membrane processes are required and agencies are more reluctant to make capital investments necessary to recover the degraded water. In those cases, agencies typically seek financial assistance to offset the costs and provide a regional benefit.

Use of degraded groundwater normally requires very high levels of treatment. Membrane processes that are normally used to recover the majority of severely degraded water have a high capital cost and incur a very high operational cost for power. Once treated, the recovered groundwater may be delivered to potable water systems. The market for the treated water supply is also readily available where it can replace Metropolitan's imported supplies or where demands for potable supplies are expanding.

All processes that recover degraded groundwater also produce concentrated waste flows for which disposal can be problematic. Most importantly, membrane processes produce significant volumes of brine – about 15 percent of the treated water – that require disposal to an ocean outfall or sanitary sewer system. Since discharge to sewers only exacerbates the salinity problems that challenge wastewater recycling projects, expensive ocean outfall pipelines must be built for brine disposal.

Most of the groundwater basins in Southern California are regulated by basin managers. As a result, the production of groundwater must comply with a fixed set of rules. Where the safe yield of a groundwater basin is being fully utilized, these rules might require that operation of recovered groundwater projects include replenishment with supplemental water.

Programs to Meet Goals

Groundwater Recovery Program

Following on the success of its LPP – which included two projects to recover degraded groundwater – Metropolitan initiated its Groundwater Recovery Program (GRP) in 1991 to encourage local agencies to treat and use degraded groundwater for municipal purposes. The GRP supported member agency efforts to improve regional water supply reliability through conjunctive use and the development of additional local sources of supply.

Similar to the LPP, financial assistance was provided to the local agencies by Metropolitan for the construction and operation of project facilities used to recover degraded groundwater that will cost the implementing agency more than purchasing that water supply from Metropolitan. Metropolitan provided financial assistance based on the difference between the project unit cost and Metropolitan's treated water rate, up to a maximum of $250 per af. The GRP was open to all technologies that recovered and used degraded groundwater. Its qualifying criteria were:

- The project must recover groundwater that was recognized as not meeting existing California health standards.
- Project costs must exceed Metropolitan's applicable water rate.
- The produced water must be used within Metropolitan's service area.
- Each project must result in increased annual groundwater production.
- Each project must be able to sustain production during a three-year shortage period without receiving replenishment water from Metropolitan.
- Each project must contribute to sound basin management.
- Each project must comply with CEQA.
- Each member agency's participation was limited to the greater of (a) 5,000 af per year or (b) 10 percent of the agency's total annual consumer demand. Total GRP participation was limited to 200,000 af per year.

Participation in projects required approval by Metropolitan's Board of Directors.

The GRP was retired in 1998 with the initiation of the LRP. Metropolitan now encourages development and recovery of local groundwater through participation in the competitive LRP process. (See the earlier discussion under the section on wastewater recycling.)

Achievements to Date

Between 1991 and 2000, Metropolitan executed GRP and LRP contracts for 22 recovered groundwater projects that produced about 16,000 af per year in 2000. These projects range in size from 500 af per year to 11,000 af per year, and are summarized in Table III-11. The location of the recovered groundwater projects is shown in Figure III-4. The projects use a variety of treatment technologies to

remove nitrates, VOCs, perchlorate, color and salt. The increases in groundwater production in some cases require additional artificial replenishment and may not be sustainable on an annual basis. All of these projects clearly assist in the ability to produce more groundwater during future droughts (or emergency outages on the Metropolitan imported water system), and therefore, they increase the effective availability of local supplies.

In addition to the projects under Metropolitan's programs, about 19,000 af per year of degraded groundwater is recovered by agencies in Metropolitan's service area without Metropolitan's financial assistance.

Forecast of Recovered Groundwater Supplies

As noted previously, Metropolitan has combined the goals for recycling and recovered groundwater and has established an aggregate goal of 500,000 af per year to meet 2020 needs. Current contractual commitments are likely to meet Metropolitan's IRP goals through the year 2012. The projected 2020 production of recovered groundwater in Metropolitan's service area is about 97,000 af per year.

Desalination Research and Innovation Partnership

Recognizing that improved technology is critical to taking full advantage of degraded groundwater, several California water agencies have been pursuing a regional effort to examine improved technologies for coping with removal of salt from source supplies. The Desalination Research and Innovation Partnership (DRIP) is a public/private consortium formed in 1997 to advance the development and implementation of cost-effective desalination technologies. DRIP currently consists of fourteen participants:

- Metropolitan and three Southern California water agencies: Orange County Water District, San Diego County Water Authority, and West Basin Municipal Water District
- Northern California water agencies: Alameda County Water District, Santa Clara Valley Water District, and Sonoma County Water Agency
- Federal agencies: U.S. Bureau of Reclamation and U.S. Environmental Protection Agency
- State entities: California Department of Water Resources, California Energy Commission and the University of California
- Industry research groups: American Water Works Association Research Foundation and Electric Power Research Institute

This partnership is in its fourth year of a planned eight-year applied research program. It is expected that results from this program will be available in 2005 and could contribute to the second phase of the Bay-Delta program. While Metropolitan is focusing on problems with Colorado River water, other participants are addressing brackish groundwater, urban wastewater, and agricultural drainage water.

Table III-11
Groundwater Recovery Projects
with Metropolitan Program Funding

Member	Project	Contract Yield[1] (afy)	FY 98-99 Yield (af)	FY 99-00 Yield (af)	Total To Date[2] Yield (af)	Total To Date[2] Contribution ($)
Groundwater Recovery Program:						
City of Beverly Hills	1 Beverly Hills Desalter	2,600	0	0	0	0
City of Burbank	2 Burbank Lake St. GAC Treatment Plant	2,744	1,406	1,335	13,634	761,119
Coastal MWD	3 Capistrano Beach Desalter	1,300	0	0	0	0
Eastern MWD	4 Menifee Basin Desalter	3,360	0	0	0	0
MWD of Orange County	5 Tustin Desalter	3,271	2,778	2,583	9,999	1,095,443
	6 Irvine Desalter	6,700	0	0	0	0
	7 San Juan Basin Desalter	4,800	0	0	0	0
San Diego CWA	8 Oceanside Desalter Phase	2,000	2,258	2,399	13,860	1,966,565
	9 Oceanside Desalter Phase	4,500	0	0	0	0
	10 Lower Sweetwater Desalter Phase I	3,600	0	2,098	2,098	524,600
City of Santa Monica	11 Santa Monica Groundwater Treatment Plant[3]	1,800	1,800	1,800	14,170	0
Three Valleys MWD	12 Rowland Desalter	516	0	0	0	0.0
City of Torrance	13 Madrona Desalination	2,400	0	0	0	0.0
West Basin	14 West Basin Desalter	1,524	1,576	1,017	9,151	2,044,034
	15 Sepulveda Desalination	2,400	0	0	0	0
Western MWD/ Inland Empire Utility	16 Chino Basin Desalter Phase I	8,000	0	0	0	0
	Subtotal	51,515	9,818	11,231	62,911	6,391,761
Local Projects Program:						
Foothill MWD	17 Glenwood Nitrate Water	1,600	816	357	5,676	874,097
Western MWD	18 Arlington Desalter	6,100	2,351	4,995	35,825	7,877,357
	Subtotal	7,700	3,168	5,352	41,501	8,751,455
Competitive Local Resources Program:						
Central Basin MWD	19 Juan Well Filter Facility	900	0	0	0	0
MWD of Orange County	20 Colored Water Treatment Facility	11,300	0	0	0	0
Las Virgenes MWD	21 Westlake Wells – Tapia WRF Intertie Project	150	0	0	0	0
Western MWD	22 Temescal Basin Desalting Facility	10,000	0	0	0	0
	Subtotal	22,350	0	0	0	0
Operating Proj. 8	**Total**	**81,565**	**12,986**	**16,583**	**104,412**	**15,143,217**

1. Most contracts allow an additional 20% production.
2. Totals through June 2000 reported to date - not all information is complete.
3. Project production is not reported, however Project operates at contract yield.

III.3 STORAGE AND GROUNDWATER MANAGEMENT PROGRAMS: WITHIN THE REGION

Planning Goals

Groundwater basins within Metropolitan's service area are the foundation of the water supply system in Southern California, and conjunctive use is an important part of maintaining and enhancing the reliability of the basins. Conjunctive use refers to the use and storage of imported surface water supplies in groundwater basins and reservoirs during periods of supply abundance for use during times of need. Water years in California tend to be either wet or dry, with very few "average" years. Conjunctive use takes advantage of this by recharging basins during wet years and pumping during dry years. Basins are recharged with imported surface water supplies using spreading basins and injection wells, or by substituting imported water for pumping (in-lieu storage).

Local water management in Metropolitan's service area has included the conjunctive use of surface water and groundwater sources since the 1950's. Conjunctive use will be an even more important part of Metropolitan's water supply reliability as Metropolitan looks to the future. As populations grow and water demands increase, the ability to more effectively use existing supplies will enable Metropolitan to maintain its current high level of reliability. More than 70 recharge facilities in Southern California are currently being used to replenish the groundwater basins.

Many local groundwater storage programs have been implemented over the years to make maximum use of local water supplies. These programs have included the collection of local runoff in surface storage reservoirs and the diversion of water flows into percolation ponds for artificially recharging groundwater basins. These measures can increase the overall yield of a groundwater basin, but the region must do more to take advantage of available water during wet years. Contractual conjunctive use programs will be an additional step toward more effective use of existing water supplies. Under a contractual storage arrangement with a groundwater basin, Metropolitan will store its available water supplies in a basin during wet years. During dry years, Metropolitan will notify the entities overlying the basin to either shut off completely or reduce the amount of imported surface water deliveries. The entities overlying the basin will then use facilities funded by Metropolitan to pump previously stored water to meet its demands. The surface water that Metropolitan would have delivered to the entities overlying the basin then becomes available for its other customers.

A number of significant developments both within the State and Metropolitan's service area will promote conjunctive use programs into the future. First, in March 2000, 65 percent of California voters approved Proposition 13, authorizing the state of California to sell $1.97 billion in general obligation bonds for water-related projects throughout the State. The Governor's Annual Budget Revision document in May 2000 included $763.3 million in expenditures from Proposition 13. In June 2000, the State Senate and Assembly approved a budget bill for fiscal year 2000-01, which earmarked $45 million to fund conjunctive use programs within Metropolitan's service area. Metropolitan has sent out a Request for Proposals to its member agencies to submit conjunctive use programs for funding. Metropolitan hopes to build on the success of this initial funding to garner

additional monies from Proposition 13 to fund conjunctive use.

Second, after many years of developing conjunctive use programs, Metropolitan used its collective experience to develop a set of principles that would govern the development of conjunctive use programs into the future. In January 2000, Metropolitan's Board of Directors approved the Principle for Developing Groundwater Storage Programs. The Principles are as follows:

- Regional Benefit – Groundwater storage programs must provide regional benefits to increase dry-year supply (in accordance with the Board's Water Surplus and Drought Management Plan) and reduce capital costs associated with Metropolitan's distribution system. Benefits must outweigh the risks involved with developing the program.

- Partnership – Groundwater storage programs must have strong local support in order to be successful. Partnership might also involve coordination of funds from other sources (e.g., state/federal funds).

- Address Local Needs – When developing groundwater storage programs, Metropolitan must consider the individual needs of the groundwater basin and local communities. Programs should consider issues such as water quality, reliability of supply, financial benefits, and groundwater levels.

- No Negative Water Supply or Water Quality Impact – Groundwater storage programs should be designed so there are no negative water quality or supply reliability impacts to Metropolitan's member agencies.

- Financial Integrity – Programs should ensure the financial integrity of Metropolitan and its member agencies consistent with the Strategic Plan Policy Principles (Principles) which were approved by the Board on December 14, 1999. The Principles will be included in a new Strategic Plan to be adopted next year. Investments made by Metropolitan for storage will not be used by local agencies to reduce their demands for Metropolitan's imported supply in a manner that threatens Metropolitan's financial integrity. Participating member agencies would commit to the purchase of fixed amounts of imported water from Metropolitan.

- Phased Approach – Groundwater storage programs should be implemented in phases. At first, smaller-scale programs should be designed to meet overlying demand in lieu of Metropolitan's surface deliveries. As the programs are operated, levels of trust can be established and technical issues resolved. If successful, these programs can be expanded to the point where groundwater can be exported to other parts of the service area.

- Shared Risk – There are risks associated with developing any water resource program, including groundwater storage. Metropolitan should be willing to share the appropriate risk of implementing groundwater storage programs with local entities to the extent benefits outweigh the risks.

Metropolitan expects that these Principles will be a solid foundation for future development of conjunctive use programs.

Metropolitan has not been the only agency active in trying to develop conjunctive use within the southern California region. The Association of Ground Water Agencies (AGWA) also has been very active in promoting conjunctive use. In December of 1995, AGWA released the report "Defining Conjunctive Use Programs for Southern California's Groundwater Basins and Metropolitan's Imported Supplies." This report identifies approximately 1.5 million acre-feet of storage available for conjunctive use in southern California. The report outlines opportunities for storage of 100,000 acre-feet or greater in the Orange County, Raymond, San Fernando, Main San Gabriel, Central, West, North Las Posas and Chino basins. Metropolitan will need to form partnerships with these basins to develop conjunctive use programs. The information from AGWA's studies will be a valuable source of information for the IRP update.

Existing Programs

Over the years, Metropolitan has encouraged and implemented conjunctive use through various incentive programs. In addition, federal and other forms of funding have assisted in the recovery of existing groundwater in the region.

Basin Remediation

A decade ago, water quality problems raised serious concerns about the ability to sustain the average annual production from the groundwater basins. Now the federal Superfund program is beginning to show significant progress toward maintaining and increasing groundwater basin production. Metropolitan and its member agencies have encouraged the recharge of groundwater basins and the recovery of degraded groundwater. These projects have increased production in all year types. To increase supplies in dry years, Metropolitan has undertaken a number of local storage projects with its member agencies. Cleanups of Superfund sites have increased production in the San Fernando, Raymond, and Main San Gabriel basins. In other basins (West Coast, Central, and Orange) local groundwater treatment projects have increased groundwater production capacity by over 50,000 af per year during the past decade. In the Chino Basin, the Optimum Basin Management Program was approved in the summer of 2000, and desalter projects described in that program are now moving forward. Due to Metropolitan and member agency efforts, groundwater production is expected to increase over the next twenty years. Table III-12 identifies the expected locations and amounts of these increases.

Table III-12
Forecast Increases in Annual Groundwater Production by Basin
(AF/YR)

San Fernando[1]	40,000
Orange	60,000
Chino	50,000
West Coast	20,000
Central	25,000
Main San Gabriel	30,000
SDCWA[2]	37,000
Total	262,000

[1] Based on conversations with Mel Blevins, Watermaster for San Fernando.
[2] Increases in all basins in the SDCWA service area by 2020
The above estimates, except for SDCWA, have been reviewed and approved by the Association of Groundwater Agencies.

Local Storage Programs

Metropolitan has developed a number of local programs to work with its member agencies to increase storage and assist in the efficient use of the groundwater basins. The following section describes the programs and their success to date in achieving IRP goals. Although the incentive structure associated with these programs may be modified as a result of the Strategic Planning Process and the

implementation of the new rate structure, it is expected that the regional benefits associated with these programs will be encouraged to continue.

Seasonal Storage Service
The Seasonal Storage Service (SSS) program has three major goals:

- Achieve greater water supply reliability through increased conjunctive use of imported and local water supplies
- Encourage the construction of additional local production facilities
- Reduce member agencies' dependence on deliveries from Metropolitan during summer months and times of shortage

There are several service categories in the SSS program. They vary both by the method of delivery and by the time-period for which the water is stored. These variations are:

- Direct deliveries to storage – Metropolitan delivers SSS water directly to water storage facilities, including local reservoirs owned and operated by member agencies, spreading sites for groundwater replenishment, and injection wells for groundwater replenishment.
- In-lieu deliveries to storage – SSS deliveries are made directly to the member agency's distribution system. The member agency then delivers this water rather than producing water from local sources. The deferred local production results in water remaining in local storage (surface or groundwater) for future use.
- Seasonal shift storage – Stored water is withdrawn (or deferred water production takes place) during the following summer. As a result, the seasonal mix of supplies changes while Metropolitan's annual deliveries to the member agency (and the member agency's annual local production) remain unchanged by the agreement.
- Long-term storage – Deliveries under this category may be interrupted in the event of a shortage or other operational constraint. There are two types of long-term storage. In the first type, SSS water remains stored for longer than 12 months. Total annual deliveries of Metropolitan supplies increase under this concept. In the second type, deliveries are used to increase the operating yield of a groundwater basin. After an interruption, SSS water is taken to refill the overproduction in the basin.

Consistent with the goal of reducing water deliveries over the summer, seasonal shift storage water is only offered from October 1 through April 30. Long-term storage is available at the discretion of the General Manager, and is based upon balancing supplies and demands. Direct deliveries for long-term storage may be activated or terminated upon immediate notice. In-lieu deliveries may be activated upon immediate notice and terminated upon 15 days' notice.

To encourage member agencies to participate in this program, Metropolitan offers SSS water at reduced rates. To show the incentive provided by these rates, Table III-13 presents the SSS water rates contrasted with the rates for full-service supplies for 1997-98 to 2000-01.

Cyclic Storage Agreements
The Cyclic Storage Program was developed to increase Metropolitan's operational flexibility. It gives Metropolitan the ability to deliver replenishment water when it is available in wet periods and the ability to stop

Table III-13
Selected Metropolitan Water Rates, 1997-1998 to 2000-2001
(per af)

Rate category	July — December	January — June
Full Service		
Untreated full service	$349	$349
Treated full service	$431	$431
Seasonal Storage Service		
Untreated shift storage	$266	$277
Treated shift storage	$323	$334
Untreated long-term storage	$233	$233
Treated long-term storage	$290	$290

the delivery of replenishment water when supplies are restricted. The goal of the program is to avoid losing available water by increasing groundwater basin levels above what they would otherwise be.

The cyclic storage agreements instituted to date are shown in Table III-14. This program cannot be applied to all aquifers within Metropolitan's service area. The program only applies where groundwater basins have ongoing basin management programs that require replenishment water and where additional storage can allow for later withdrawals above safe yield.

This program provides some limited drought benefits to participating agencies. Water in cyclic storage increases the length of time over which normal groundwater replenishment supplies can be interrupted during a drought. Basin managers have stated that, without cyclic storage, replenishment deliveries to groundwater basins could be interrupted for three years. After that time, deliveries would have to resume to protect groundwater quality and to prevent severe overdraft. Cyclic storage agreements extend this period of interruption to four or five years, depending on the size of the agreement. The drought benefit has no impact until the fourth year after replenishment deliveries have been suspended.

Where agreements are in place, Metropolitan may make deliveries to the basin over and above an agency's normal replenishment demand, providing an additional place for Metropolitan to store water. These additional deliveries are not billed to the member agency, but are credited to that agency's cyclic storage account. When conditions prevent Metropolitan from meeting physical replenishment deliveries, the water is debited from the cyclic storage account and credited to the replenishment account of the same agency. This strategy maintains the member agency's replenishment requirements at a time when replenishment deliveries would not otherwise be made. At this time, the agency is billed for the credited water, providing additional revenue to Metropolitan at a time when other revenue would likely be reduced by supply shortages.

Table III-14
Summary of Cyclic Storage Agreements
(af)

Agency	Maximum Account Level	Current[1] Storage Level
Inland Empire Utilities Agency	n/a	36,000
MWD of Orange County	70,000	53,000
Three Valleys MWD	25,000	13,000
Upper San Gabriel Valley MWD	100,000	54,000
Total	195,000	156,000

[1] As of August 2000.

Metropolitan's operating objective is to store two years' worth of replenishment requirements within the basins. The goal is to balance the accounts over a short time-period, typically about three years, thus optimizing the operating flexibility objective of the accounts.

Demonstration Local Storage Programs
In 1993, Metropolitan instituted two demonstration storage programs in conjunction with the city of Anaheim and the Calleguas MWD. Water was placed in storage in 1993 and 1994. The water remains in storage until called for by Metropolitan's General Manager.

When the water is called for, agencies document that the stored water has been produced by comparing their operations to an agency-specific 1992 baseline, with adjustments to reflect demand growth and local supply changes. If the agencies are unable to produce this stored water on request, they incur a penalty rate equal to the full-service untreated water rate. This penalty would be added to whatever other water charges applied at the time of Metropolitan's request. For these demonstration projects, Metropolitan is only able to call for water until April 2003. After that time, the water reverts to the ownership of the storage operator. The goal of these programs is to demonstrate the feasibility of cooperative storage programs, rather than to gain long-term water storage. As a result, the amount of water stored does not count toward the IRP goals for storage.

Contractual Storage Program
In the IRP, Metropolitan estimated that the Seasonal Storage Program encouraged the production of an additional 100,000 af of groundwater per year. The Preferred Resource Mix calls for an additional 200,000 af of dry-year production from groundwater storage by 2020. To achieve this goal, the IRP identified the need for additional dedicated storage in the local groundwater basins.

- *Calleguas MWD/Metropolitan Groundwater Storage Program*: In 1995, Metropolitan and the Calleguas Municipal Water District (Calleguas) signed a groundwater storage agreement. The agreement gives Metropolitan the right to store up to 210,000 af of water in the North Las Posas Groundwater Basin. Metropolitan will fund up to 30 aquifer storage and recovery wells in the basin. These wells will ultimately be able to pump 70,000 af of water from the basin.

  When Metropolitan needs additional water supplies, it will notify Calleguas, which will reduce its deliveries of Metropolitan's

surface supplies. To meets its demand, Calleguas will pump Metropolitan's previously stored water from the groundwater basin. The surface water that would have been delivered to Calleguas will then be available for Metropolitan's other member agencies. Calleguas pays the firm water rate, and Metropolitan pays the pumping cost.

Calleguas has completed the construction of four wells and a connecting pipeline. An additional 14 wells and connecting pipeline are under construction. This agreement will terminate in 2035, unless otherwise agreed to by the participants.

- *Foothill MWD and City of Pasadena:* Metropolitan has executed an Interim Conjunctive Use Program with the Foothill Municipal Water District and the city of Pasadena. The Interim Conjunctive Use Programs with these two member agencies result from the phasing out of Metropolitan's Cooperative Storage Program. The water held on behalf of Metropolitan in the Raymond Basin by the Foothill Municipal Water District and the city of Pasadena was transferred into the Interim Conjunctive Use Program to be produced if needed or until a long term dry-year yield program is established. Under the Interim Conjunctive Use Program, Foothill Municipal Water District and the city of Pasadena would produce the water from the account as needed and reduce deliveries of surface water.

Table III-15 details the maximum capacity and current storage levels under the local contractual storage programs. Metropolitan is currently negotiating with a number of other agencies for groundwater basin storage programs. Figure III-4 shows the current and projected in-basin storage necessary to meet the IRP goals. It also shows that most of the needed capacity is already contracted, but also that a lesser amount of capacity must still be procured.

Salt Water Barriers

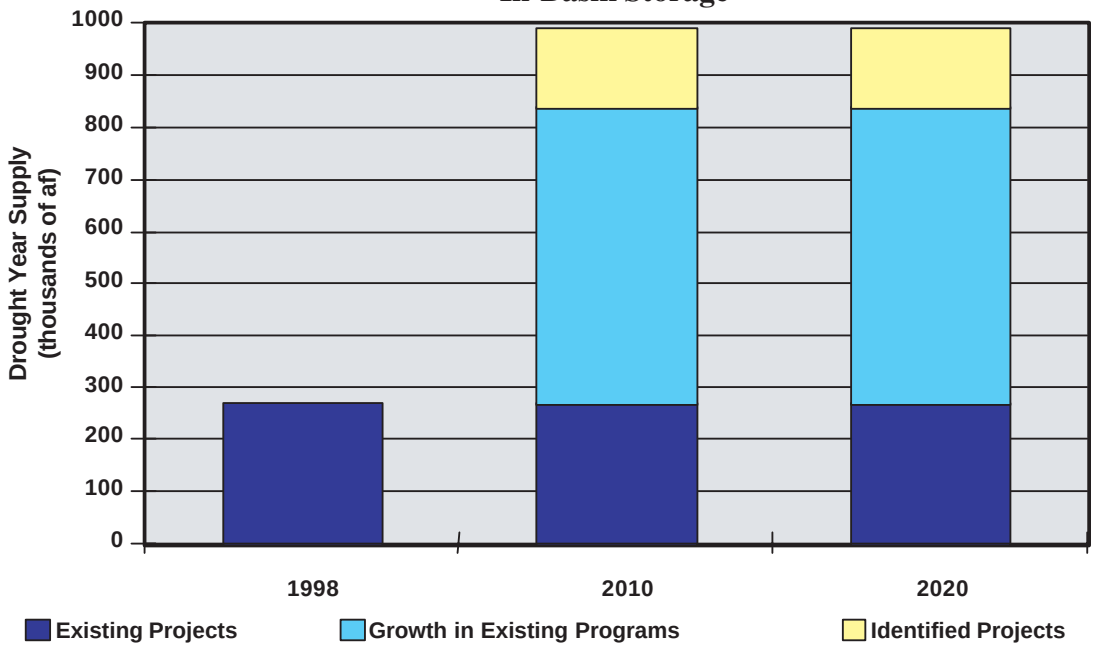
These deliveries are not part of Metropolitan's storage programs. The barriers are built by injecting water into the basins at strategic locations, and they help protect aquifers in the West Coast, Central and Orange County basins. These deliveries are not managed to provide storage, but they must be continued except under the most severe shortage conditions.

Table III-15
Summary of Contractual Storage Agreements
(af)

Agency	Maximum Account Level[1]	Current[2] Storage Level
Foothill Municipal Water District		1,991
City of Pasadena		21,967
Calleguas MWD	210,000	34,342
Total	210,000	58,300

[1] The Foothill and Pasadena agreements do not specify maximum account levels.
[2.] As of August 2000.

Figure III-4
In-Basin Storage



Surface Storage

Since the beginning of the IRP process, two significant changes have occurred regarding regional surface storage:

Diamond Valley Lake

In early 2000, Metropolitan began filling its newly completed Diamond Valley Lake (formerly known as the Eastside Reservoir Project). Diamond Valley Lake is an 800,000 af reservoir that nearly doubles Southern California's total surface storage capacity. Half of the capacity of Diamond Valley Lake is reserved for use in emergencies (see Section II.2 – Planning for Catastrophe). The other half of the capacity is intended for carryover and regulatory storage operations. By the end of 2000, Metropolitan will have delivered slightly over 400,000 af into the reservoir. Assuming normal to wet hydrologic conditions and reasonable water quality in 2001, Diamond Valley Lake should be full by the end of 2001. Original estimates for the time of initial fill ranged from two to five years.

A fully operational Diamond Valley Lake will significantly improve Metropolitan's water management operations. In addition to providing important carryover and emergency storage benefits for Southern California, Diamond Valley Lake will provide a vast improvement in the region's ability to regulate imported supplies and maximize the effectiveness of the groundwater basins. In the past, imported water intended for storage in groundwater basins was generally available in the winter months, when the region's spreading and percolation facilities were already full with natural runoff. With Diamond Valley Lake, large quantities of imported water can be stored until those facilities are available. The IRP identified the joint operations of Diamond Valley Lake and the groundwater basins as a strategy that would greatly leverage the benefits of both types of storage.

SWP Terminal Reservoirs

Under the 1994 Monterey Agreement, Metropolitan was given operational control of 218,940 af in the reservoirs at the southern terminals of the California Aqueduct. This control gives Metropolitan greater flexibility in handling supply shortages.

Achievements to Date

Table III-16 summarizes the local groundwater storage identified and contracted for under the local storage programs. This table shows that Metropolitan has identified about 400,000 af of local groundwater storage. With the completion of the Diamond Valley Lake, Metropolitan will have achieved its surface storage goals for the 2020 time frame. In the five years since the IRP was adopted, Metropolitan is approaching the half-way mark in achieving its 2020 goals for local storage.

Table III-16
Summary of Local Storage Programs
(af)

Program	Capacity
Cyclic Storage	195,000
Contractual Storage	210,000
Total	405,000

III.4 WATER SUPPLY MANAGEMENT PROGRAMS: SWP STORAGE OUTSIDE THE REGION

Planning Goals

The SWP delivers water to Southern California through the California Aqueduct, and is a major source of water for Metropolitan's service area. The potential deliveries from this source have decreased over time because of increased SWP demands by other contracting agencies and because of environmental stresses in the source watersheds. A major goal of the IRP is to develop additional reliability of supply through the California Aqueduct by purchasing out-of-region storage for SWP water and SWP water transfers for Metropolitan. In total, the IRP called for developing a total of 340,000 acre-feet (af) of dry-year storage and water transfer deliveries by 2000 and a total of 460,000 af by 2020.

Programs to Meet Goals

This section describes the two water banking programs that Metropolitan has partnered in to help meet the IRP goal of developing additional reliability of supply through the California Aqueduct.

Semitropic Water Storage District

This agreement is between Metropolitan, the Semitropic Water Storage District (Semitropic) and its member agencies: the Semitropic Improvement District, Buttonwillow Improvement District, and Pond-Poso Improvement District. Semitropic obtains water from the SWP through its contracts with the Kern County Water Agency. An area of 136,370 acres within Semitropic's service territory is irrigated by water obtained from the SWP. An additional 24,500 acres receives SWP water from Semitropic on an as-available basis. When this surface water is not available, farmers withdraw water from an underlying aquifer.

The contract between Semitropic and Metropolitan extends current operations to allow Metropolitan (and other banking partners) to make use of the additional storage in Semitropic's groundwater basin. In years of plentiful supply, Metropolitan will deliver SWP supplies to Semitropic through the California Aqueduct. This water will be conveyed to Semitropic farmers through a pre-existing distribution system, plus improvements to that system financed by the initial payments from Metropolitan. Because the farmers would otherwise have used water from the underlying groundwater basin, in-lieu use becomes the mechanism for storing water within the aquifer.

During dry years, Metropolitan will be able to withdraw the stored water. Semitropic built a 78-inch pumpback pipe that is capable of delivering 90,000 af per year directly to the California Aqueduct. In addition, Semitropic agreed to divert any of its SWP entitlement in excess of 25,000 af per year to meet withdrawals of stored water.

The program has a defined total storage capacity of 1 million af. Metropolitan's initial contract is for up to 350,000 af of storage capacity. Semitropic has sold the remaining 650,000 af to other water districts: Santa Clara Valley Water District, Alameda County Water District, Zone 7 Water District, and Vidler Water Company (a private water company located near La Jolla).

Annual withdrawal amounts are restricted by the size of the pumpback facility (90,000 af), contemporaneous scheduled SWP deliveries to Semitropic (above the reserved 25,000 af), and the proportion of the total program capacity that has been contracted to other banking partners. If all of the capacity has been contracted, and the SWP is scheduling 25,000 af or less to Semitropic, Metropolitan would be able to recover the minimum level of 31,500 af per year (which is derived by dividing Metropolitan's contracted storage capacity of 350,000 af by total program capacity of 1 million af multiplied by the pumpback capacity of 90,000 af). If additional water is available from the SWP, Metropolitan could achieve a maximum withdrawal of 170,000 af per year.

The agreement extends from December 1994 through November 4, 2035. The charges under this contract (in 1994 dollars) are as follows:

Initial payment schedule (before full vesting)
To store: $90 per af
An additional $20 per af is charged for water left in long-term storage (more than 5 years)
To recover: $40 per af

When payments made by Metropolitan equal its proportion of the total capital costs of the program (full vesting), these rates decrease to the following levels.

Subsequent payment schedule
To store: $50 per af, with no long-term storage charge
To recover: $50 per af

All of these rates are adjusted annually by the western cities consumer price index.

In addition to these charges, Metropolitan must pay power costs, calculated by multiplying the amount of energy used to operate the program in any month by Semitropic's average unit power costs in the same month.

Semitropic has recently proposed construction of an additional pumpback facility that would provide an additional 200,000 af per year of capacity. The construction of this facility depends on the agreement of the participating agencies to pay for a share of the facility.

Arvin Edison Water Management Program
The Arvin-Edison Water Storage District (Arvin-Edison) manages the delivery of local groundwater and of water imported into its service area from the Central Valley Project's (CVP) Millerton Reservoir via the Friant-Kern Canal. The surface water service area consists of 132,000 acres of predominantly agricultural land, and to a minor degree, municipal and industrial uses. It is situated in Kern County. Arvin-Edison operates its supplies conjunctively, storing water in the underlying aquifer when imported supplies are plentiful and withdrawing that water when the availability of imported supplies are reduced. In the 1970s, Arvin-Edison entered into a number of agreements, jointly known as the Cross Valley Canal Exchange. This allows Arvin-Edison to schedule water deliveries through the California Aqueduct.

The contract between Arvin-Edison and Metropolitan extends the current operations to allow Metropolitan to make use of the additional storage capacity in Arvin-Edison's groundwater basin. In years of plentiful supply, Metropolitan can deliver SWP supplies to Arvin-Edison through the California Aqueduct. Some of this water is stored in the aquifer through spreading basins, and the remainder is delivered directly to Arvin-

Edison farmers. The farmers would otherwise have used water from the groundwater basin, so this in-lieu use is another mechanism for storing water within the aquifer. During dry years, a portion of Arvin-Edison's CVP entitlements can be diverted for delivery to Metropolitan through the California Aqueduct.

The agreement extends from December 1997 through December 2022. While the initial goal is to make more efficient use of SWP supplies, water available from other sources may also be stored in the aquifer. Metropolitan's initial contract is for up to 250,000 af of regulated water, but the contract contains an option for the maximum storage to be increased to 385,000 af of regulated water. For operational reasons, withdrawal amounts are restricted to 40,000 to 75,000 af per year.

To facilitate the additional storage within Arvin-Edison's aquifer, Arvin Edison is extending its distribution system. To finance this expenditure, Metropolitan paid an up-front fee to Arvin-Edison. The additional charges (expressed in 1996 dollars) for operation of this program are as follows:

(1) First 250,000 af (Regulated Water)
To store: $90 per af (less $35 per af credit for the advance payment)
To recover: $40 per af (less $9.11 per af credit in recognition of Metropolitan's advance payment of $12,000,000)

(2) Beyond 250,000 af (Regulated Water)
To store: $70 per af
To recover: $30 per af

In addition to these charges, Metropolitan must pay the average unit power and energy costs for operating the program, plus pre-determined operation, maintenance and replacement fees. This requirement is pursuant to the "Agreement between Arvin-Edison Water Storage District and the Metropolitan Water District of Southern California for a Water Management Program," dated December 19, 1997.

Achievements to Date

The total capacity and current storage situation for these two programs to store SWP water are summarized in the Table III-17.

During 2000, Metropolitan plans to deliver an additional 120,000 af of Regulated Water for a year-end storage goal of about 662,700 af. This shows that Metropolitan has not yet achieved its year 2000 goal of 340,000 af per year of dry-year supplies, but is progressing towards its year 2020 goal of 460,000 af.

Table III-17
Metropolitan's Out-of-Region Storage
For SWP Water
(af)

Agreement	Storage Capacity	Current Storage Level	Contractual Annual Deliveries	
			Minimum	Maximum
Semitropic	392,192	392,192[1]	31,000	170,000
Arvin-Edison	385,000	231,561[2]	40,000	75,000
Total	777,192	623,753	71,000	245,000

[1] As of December 2000
[2] As of September 2000.

III.5 MANAGEMENT OF COLORADO RIVER SUPPLIES

Planning Goals

Water from the Colorado River is delivered to Metropolitan's service area via the Colorado River Aqueduct (CRA). Metropolitan's policy is to maintain a full CRA at the lowest possible cost to member agencies. The cost of water obtained through the aqueduct will vary, however, as a result of market, legal, and policy factors.

Rights to Colorado River Water

Under a normal condition, California has a basic apportionment of 4.4 million acre-feet (af) per year. The Secretary of the Interior (Secretary) may also make available for use within a Lower Division State (Arizona, California and Nevada) any water that was apportioned to but unused by another Lower Division State. In addition, surplus water, which is defined as water in excess of the 7.5 million af of the normal Lower Division State's apportionments, could be made available to the three states collectively. California is entitled to 50 percent of this surplus water. Metropolitan has a specific contract to 180,000 af of surplus water when it is available.

Metropolitan's water delivery contracts are with the U.S. Department of the Interior, and they incorporate provisions of the 1931 Seven-Party Agreement. Under this agreement, the Palo Verde Irrigation District (PVID), the Yuma Project (Reservation Division), Imperial Irrigation District (IID), and Coachella Valley Water District (CVWD) have the first three priorities to use no more than 3.85 million af per year. Metropolitan was allotted 550,000 af per year under a fourth priority right and 662,000 af per year under a fifth priority right. These priorities are further discussed in Appendix A.2.

Currently, there is no further division of the rights of the holders of the first three priorities to use no more than 3.85 million af per year under the priority provisions of the Seven-Party Agreement. This lack of further quantification, other than by priority, makes developing and implementing cooperative water supply programs difficult, and it casts uncertainty on water supply reliability.

Reduced Availability of Colorado River Supplies

Over the years, a number of factors have reduced the reliability of Colorado River water available to California. These are discussed in more detail in Appendix A.2 to this report, but are summarized below:

- The 1964 U.S. Supreme Court Decree in Arizona v. California reduced Metropolitan's dependable supply of Colorado River water to 550,000 af per year. The reduction in dependable supply occurred with the commencement of Colorado River water deliveries to the Central Arizona Project in 1985.
- In 1979, present perfected rights (PPRs) to the use of Colorado River water by certain Indian reservations and other users in California were recognized and quantified. Since 1985, these PPR holders have used less than 20,000 af annually. Because normal flows on the Colorado River were already allocated, it has not been clear which agency's supplies would be reduced in order to allow for these PPRs to be satisfied. However, the proposed

Quantification Settlement Agreement (Page III-53) would require that the responsibility for satisfying the demands of miscellaneous and Indian PPRs be divided among IID, CVWD, and Metropolitan, thus reducing Colorado River supplies to these agencies.

- As a result of increased diversions by both Arizona and Nevada, Metropolitan's total diversions could decline to its fourth priority right of 550,000 af per year plus any apportioned water left unused by other California contractors with a higher priority than Metropolitan in the amount of water conserved by IID for Metropolitan under the 1988 and 1989 agreements. Between 1986 and 1999, the amount of unused agricultural water available to Metropolitan has varied from zero to more than 500,000 af per year. That variability will continue in the future, depending on agricultural economics, type of crops grown, acreage irrigated, and water-use efficiency.

In addition, the Secretary could allow Metropolitan to divert surplus water and water that is unused by Arizona and Nevada. In years in which a surplus is available, Metropolitan would have the highest priority of any California contractor to that water by virtue of its fifth priority right. However, there are currently no formal guidelines to determine when such surpluses would be available.

Programs to Meet Goals

To increase supplies, Metropolitan has executed a number of agreements with agencies that have Colorado River entitlements or who are in proximity to the CRA. Figure III-5 identifies four of the programs designed to maximize the availability of Colorado River supplies to Metropolitan.

Groundwater Storage Program in Upper Coachella Valley

The Desert Water Agency (DWA) and CVWD, both in Riverside County, have entitlements to State Water Project (SWP) water, but they don't have any physical connection to SWP facilities. Both agencies, however, are adjacent to the CRA. To enable them to obtain water equal to their SWP entitlement, Metropolitan has agreed to exchange an equal quantity of its Colorado River water for DWA and CVWD's SWP water. DWA has a SWP entitlement of 38,100 af per year, and CVWD has a SWP entitlement of 23,100 af per year, for a total of 61,200 af per year.

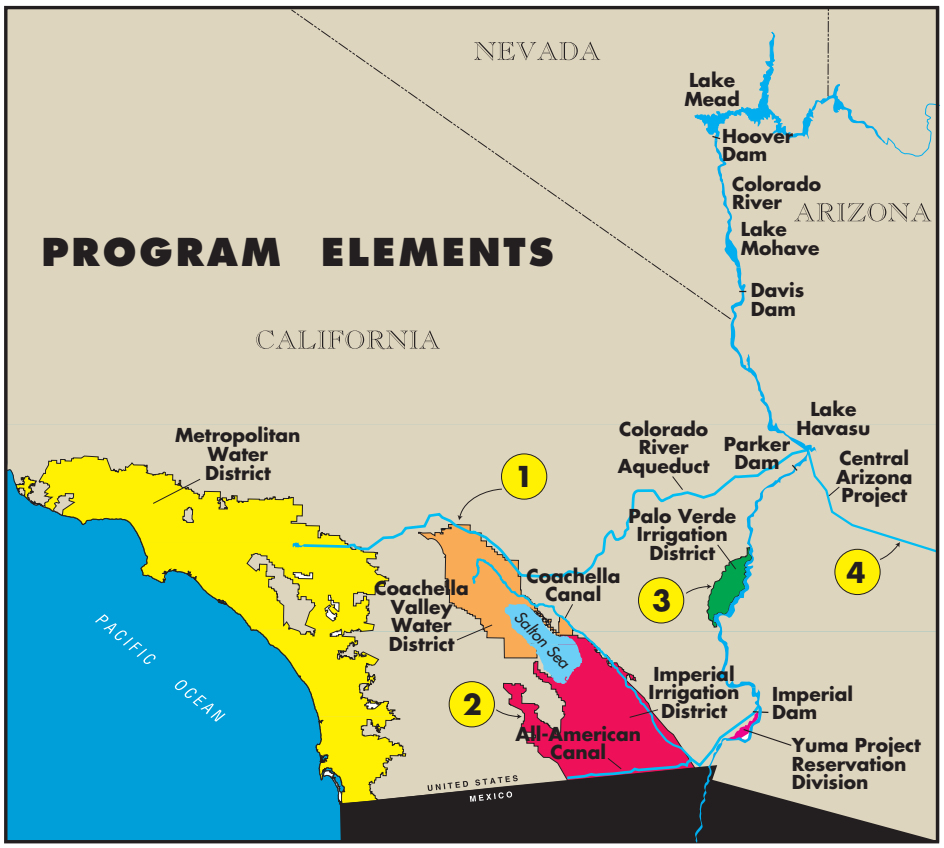
In addition, DWA and CVWD have historically contracted for Pool B water from the SWP, and Metropolitan has agreed to a similar method of exchange for deliveries of Pool B water.[1] These exchanges provide water to Metropolitan with a lower concentration of total dissolved solids than it would otherwise receive, and they allow DWA and CVWD to obtain imported water supplies they could not otherwise access.

The original exchange contracts were to be in effect from 1967 through January 1, 1990. In 1983, however, they were extended through 2035.

In 1984, Metropolitan executed an Advance Delivery Agreement with these two agencies. It allows Metropolitan to supply DWA and CVWD with Colorado River water in advance of the time they are entitled to receive water under the exchange contracts. In future years, Metropolitan can recover this water by reducing its deliveries under the exchange contracts.

[1] Pool B water is a program administered by DWR to allow a participating State Water Project contractor to sell allocated but unused entitlement water to another participating State Water Project contractor.

Figure III-5
Colorado River Resources Management Programs



Key

1. Groundwater Storage Program in the Upper Coachella Valley,
2. Water Conservation Program in the Imperial Valley,
3. Test Land Fallowing Program in the Palo Verde Valley,
4. Demonstration Groundwater Storage Program in Central Arizona.

As of November 2000, 261,600 af are available under this agreement. The maximum amount that can be stored under this agreement is 600,000 af, and the maximum annual withdrawal is currently 61,200 af plus the amount of SWP Pool B water available.

Water Conservation Program in the Imperial Valley

IID uses the largest amount of California's apportionment of Colorado River water. Under a 1988 agreement, Metropolitan has funded water efficiency improvements within IID's service area in return for the right to divert the water conserved by those investments for a period of time. The program implemented structural and non-structural measures, including the lining of existing canals with concrete, constructing local reservoirs and spill-interceptor canals, installing non-leak gates, and automating the distribution system. Other implemented programs include the delivery of water to farmers on a 12-hour rather than a 24-hour basis and improvements in on-farm water management through the installation of tailwater pumpback systems, drip irrigation systems, and linear-move irrigation systems. With program implementation

completed in 1998, Metropolitan has an additional 109,460 af per year of Colorado River water available in 2000. This water may be diverted each year, or it may be stored in a reservoir for future use pursuant to a valid banking agreement. The initial term of the agreement is 44 years, from 1990 to 2033.

The proposed Quantification Settlement Agreement (Page III-53) will change this program to a degree. The proposed settlement contemplates that approximately 90,000 af per year of water obtained through this program would continue to be available to Metropolitan for an extended term of up to approximately 75 years. The remainder of the conserved water from this program (20,000 af per year) would be available to CVWD.

Test Land Fallowing Program in the Palo Verde Valley

Land fallowing is an option that provides a way to obtain needed water supplies during dry years. From 1992 to 1994, Metropolitan conducted a test program involving 63 landowners and lessees in the Palo Verde Valley. Metropolitan paid the lessees (or landowners if the land was not leased), to fallow 20,215 acres of farmland within PVID. The program saved 185,978 af over a two-year period. This amount was stored in Lake Mead for use by Metropolitan by the year 2000. This test land fallowing program investigated the mechanisms required to implement this type of option and provided Metropolitan with the ability to use the saved water if it were needed. In 1997, however, Lake Mead filled to a level that required the water to be released for flood control purposes.

Demonstration Groundwater Storage Program in Central Arizona

In 1992, Metropolitan entered into an agreement with the Central Arizona Water Conservation District (CAWCD) that allowed unused Colorado River water to be stored in central Arizona aquifers, thus reducing the potential for future flood control releases from Lake Mead. The Southern Nevada Water Authority also participates in the program.

When Metropolitan wishes to recover the stored water, CAWCD will reduce its Central Arizona Project (CAP) diversions, and the Secretary will allocate the unused CAP apportionment to Metropolitan. This mechanism can be exercised in a year when Arizona's Colorado River supply is at least 2.8 million af. The maximum amount recoverable is 15,000 af per month. When Metropolitan recovers any of the water stored under this program, Metropolitan's water balance will be debited by 110 percent of the water recovered. This factor is applied to conform to Arizona state law, which requires that a portion of any stored water be left underground.

A maximum of 300,000 af may be stored under this program through December 31, 2000. As of October 2000, Metropolitan had stored 89,000 af. Metropolitan paid the cost of transporting the water through the CAP; CAWCD is responsible for the recovery costs.

Potential Programs

The California Plan

For a number of years, Metropolitan has been engaged in discussions with other California entities, federal representatives, and entities representing the other Colorado River Basin states regarding California's use of Colorado River water. The Secretary and the Bureau of Reclamation (Reclamation) are considering guidelines to determine under what conditions surplus water would be made available to California. Although the Secretary made surplus water available from 1996 through 2000, adoption of guidelines would provide greater predictability of the availability of these supplies for Metropolitan. The guidelines would be used under the authority of the Boulder Canyon Project Act, the 1964 U.S. Supreme Court Decree in *Arizona v California*, and the Criteria for the Coordinated Long-Range Operation of the Colorado River Reservoirs in the development of the Annual Operating Plan for the Colorado River System Reservoirs.

In 1996, the Arizona Legislature created the Arizona Water Banking Authority to protect Arizona's supply of Colorado River water and to provide opportunities for interstate banking by California and Nevada. By diverting otherwise unused water and storing it underground, Arizona has reduced California's use of water from this source.

In December 1996, the other six Colorado River Basin states expressed in writing their concern that California agencies appeared to be assuming that the Secretary would continue to approve the use of surplus water for the foreseeable future. They requested that California develop a plan to reduce its dependence on Colorado River water over its normal apportionment in a way that avoids undue risk of shortage to the other basin states.

In that same year, the Secretary deferred further consideration of any Colorado River interim surplus guidelines until California put in place a realistic strategy to ensure that it will either be able to 1) limit its annual use of Colorado River water to 4.4 million af when necessary or 2) meet its needs from sources that do not jeopardize the entitlements of others. The Secretary considered the clarification of agricultural water rights subject to the Seven-Party Agreement to be a prerequisite for the approval of any new cooperative Colorado River water transfers between California agencies.

In response to these concerns, the Colorado River Board of California developed "California's Colorado River Water Use Plan" (Plan). The Colorado River Board of California protects California's rights and interests in the resources provided by the Colorado River and represents California in interstate discussions and negotiations regarding the Colorado River and its management. The overall purpose of the Plan is to provide California's Colorado River water users with a framework by which programs, projects, and other activities will be coordinated and implemented cooperatively. This cooperation will allow California to satisfy its annual water supply needs within its annual apportionment of Colorado River water in the most effective manner possible. The framework specifies how California will transition and live within its basic apportionment of Colorado River water when necessary. It is aimed at reducing California's reliance on Colorado River water.

The Plan framework encompasses and relies on:

- Further quantification of California's rights and uses of Colorado River water, where helpful, to facilitate the optimum use of California's Colorado River resources.
- Cooperative core water supply programs and voluntary transfers.
- Increased efficiencies in water conveyance and use.
- Water storage and conjunctive use programs to increase normal and dry-year water supplies.
- Water exchanges.
- Administrative actions necessary for effective use and management of water supplies.
- Improved reservoir management and operations.
- Drought and surplus water management plans.
- Coordinated project operations for increased water supply yield.
- Groundwater management.
- Colorado River salinity control and watershed protection.

Other key associated resource management concepts that the agencies are pursuing include:

- Lower Colorado River Multi-Species Conservation Program
- Water demand management (seasonal shift in deliveries, water scheduling changes, peaking modification, etc.)
- Additional water conservation
- Groundwater and surface water recovery
- Interstate offstream water banking
- Additional local projects
- Water reuse
- Other voluntary water transfers and water purchases

The California Plan includes the following programs:

- Conservation in the Imperial Valley
- A water transfer between the IID and the San Diego County Water Authority (SDCWA), and a water exchange between Metropolitan and SDCWA
- Recovery of seepage from portions of the All American and Coachella canals
- Storage of water in groundwater basins along the CRA, in the Coachella Valley and possibly in Arizona
- Periodic arrangements to fallow land

It also addresses the manner in which 16,000 af of water will be made available annually for the San Luis Rey Indian Water Rights Settlement.

<u>Imperial Irrigation District-San Diego County Water Authority Transfer and Metropolitan-San Diego County Water Authority Exchange</u>
In April 1998, IID and SDCWA executed an agreement to transfer between 130,000 and 200,000 af per year from IID for use in the SDCWA service area for an initial term of 45 years with the option to renew for an additional 30 years. The transfer is subject to a number of conditions including environmental

compliance and state and federal approvals. In November 1998, Metropolitan and SDCWA reached a 30-year exchange agreement. Under the agreement, SDCWA will make up to 200,000 af of conserved water available to Metropolitan annually, and Metropolitan will deliver an equal amount of exchange water to SDWCA. Performance of obligations under the agreement is subject to specific conditions, including:

- Completion of a process that resolves the quantification of agricultural water entitlements, thus assuring that water conserved from reasonable and beneficial uses can be transferred from an agricultural to an urban agency.
- Application by the Secretary of surplus guidelines for Lake Mead that are sufficient, together with those other supplies that are under the control of Metropolitan, to assure that the CRA is full at least through 2015.
- The use of $235 million from the State General Fund to assist in implementing the California Plan, of which $200 million would be used for lining portions of the All American Canal and Coachella Canal and $35 million would be utilized for groundwater conjunctive use programs.

All American Canal and Coachella Canal Lining

In 1988, Public Law 100-675 authorized the Secretary to construct a concrete-lined canal parallel to the existing earthen All American Canal from the vicinity of Pilot Knob to Drop 4, and to concrete line the earthen Coachella Canal from Siphon 7 to Siphon 32. It also authorized the Secretary to enter into a construction or funding agreement with one or more of the California contractors holding a delivery contract for Colorado River water. Reclamation released a Revised and Updated Draft Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) for the Coachella Canal Lining Project in September 2000. The preferred alternative is to build a lined canal in the existing cross section (while bypassing the canal flow using temporary pipelines). This alternative is estimated to conserve approximately 26,000 af per year.

Reclamation released the Final EIS/EIR for the All American Canal Lining Project in March 1994. The preferred alternative is the construction of a parallel concrete-lined canal from Pilot Knob to Drop 3 (a length of about 23 miles) that would conserve approximately 67,700 af per year.

The Proposed Quantification Settlement

The Quantification Settlement (Settlement) proposed by the California agencies represents an important recent development in the management of Colorado River supplies. On October 18, 1999, the respective boards of CVWD, IID, Metropolitan, (collectively, the districts) and the State of California released the Key Terms for Quantification Settlement (Key Terms) as the basis for obtaining public input and completing a Quantification Settlement among the districts.

Currently, there is no further division of the first three priorities' rights to use no more than 3.85 million af per year. Quantification of rights and uses of Colorado River water with respect to Priorities 3a and 6a of the 1931 California Seven-Party Agreement will help facilitate the implementation of cooperative water supply programs, and it will provide a needed baseline by which conservation and transfer programs can be measured. The settlement would help California reduce its reliance on Colorado River water above its normal

apportionment. In addition, it would further quantify the rights and uses of Colorado River water by designating base entitlements. The base entitlements would be 3.1 million af per year for IID, and 0.33 million af per year for CVWD. These would combine with the 0.42 million af per year average use by PVID and the Yuma Project (Reservation Division) to equal 3.85 million af.

The Settlement proposes that when California is limited to 4.4 million af per year, Metropolitan, under the 3rd, 4th, and 5th priorities, will be able to receive from 771,000 to 851,000 af per year with transfers and other adjustments. In years when there are insufficient Colorado River supplies available to divert 1.25 million af into the Colorado River Aqueduct (Aqueduct) from Lake Havasu, other supplies will be substituted to permit delivery of this amount of water through the Aqueduct. Use of Priority 1 and 2 water by the Palo Verde Irrigation District and the Yuma Project (Reservation Division) will continue unchanged.

Further aspects of the draft settlement are outlined below:

1. It provides for a shift of 380,000 af per year from agriculture to urban use on the coastal plain of Southern California. This water will be provided to Metropolitan, SDCWA, and the San Luis Rey Indian Water Rights Settlement parties through conservation, reducing the amount of water needed by IID and CVWD. It also entails forbearance of the utilization of 38,000 af per year of Priority 6a water by IID and CVWD for Metropolitan's use.

2. It provides the districts the ability to acquire Colorado River water from entities other than the districts without objection, as long as the acquisition does not materially reduce the water available to the districts under the proposed Settlement.

3. It caps the use of water by IID and CVWD under the 3a Priority.

4. It has a term of up to 75 years, which may be extended.

5. It provides Metropolitan with the exclusive right to use all water below 420,000 af per year that is unused by PVID and the Yuma Project (Reservation Division) collectively. It also assigns responsibility for reducing the use of Colorado River water to Metropolitan if use by these two entities collectively exceeds this long-term average.

6. It provides Metropolitan the first opportunity to be the transferee under any defensive transfer agreement proposed by IID. Such a defensive transfer could occur if IID were threatened with loss of part of its entitlement through federal or state action and were permitted to enter into a conservation-based transfer to defend that entitlement.

7. It permits Metropolitan to challenge a proposed IID transfer, other than a transfer of up to 30,000 af per year within Imperial County, on any grounds, as long as that challenge is limited in scope as to whether the proposed transfer can or cannot be made.

8. It provides a permanent water supply of 16,000 af per year for the San Luis Rey Indian Water Rights Settlement that will come from the All American and Coachella Canal Lining Projects.

9. It addresses deductions from IID, CVWD, and Metropolitan's supplies to permit the

Secretary to satisfy the use of miscellaneous and Indian PPRs by holders of those rights. Those rights were not quantified until 1979, and thus were not addressed in the 1931 Seven-Party Agreement.

10. It provides that Metropolitan may not: a) pursue any legislative, administrative, or judicial proceeding, or take any other action that would reduce IID's consumptive use entitlement, or b) divert any water that IID is ordered to conserve as the result of a challenge to IID's water supply before year 21 of the quantification period.

A number of conditions need to be satisfied prior to the Settlement becoming effective. These include:

1. Completion of appropriate environmental reviews and arrangements made for any required mitigation.

2. Receipt of a "no surprises" assurance with respect to Endangered Species Act compliance for the 200,000 af per year of water to be conserved by IID for SDCWA, and for the 100,000 af per year of water to be acquired by CVWD from IID, and for which Metropolitan has an option to use if such water is not utilized by CVWD.

3. Appointment of an independent panel to provide recommendations to the Secretary regarding whether use on the Yuma Island is charged to the 2nd Priority.

4. Adoption and implementation of standards and procedures for decree accounting by Reclamation for annual consumptive use by Priorities 1, 2, and 3b that uses a 25-year running average or an actual annual consumptive use.

5. Adoption and implementation of standards and procedures for an inadvertent consumptive use overrun and payback program by Reclamation that is acceptable to IID, CVWD, and Metropolitan.

6. Agreement by Reclamation to develop a process for establishing a statistically significant trend test for increases in use by the holders of the 1st, 2nd, and 3b Priorities.

7. Recognition that the 1998 IID/SDCWA Transfer Agreement must go forward.

8. Waiver by SDCWA of any rights under the 1998 IID/SDCWA Transfer Agreement with respect to conserved water that may be acquired by Metropolitan.

9. Concurrence that should IID transfer less than 200,000 af per year to SDCWA, but later make available additional conserved water for transfer to SDCWA, Metropolitan agrees to exchange such water up to a total of 200,000 af per year.

10. Continuation of the interim period under the Colorado River Basin Salinity Control Act.

11. Implementation of Lake Mead interim surplus guidelines acceptable to Metropolitan.

12. Completion of negotiation of San Luis Rey Indian Water Rights Settlement water arrangements.

13. Agreement with PVID relative to the use of a) conserved water from the lining of the All American and Coachella Canals, b) expansion of use on the Palo Verde Mesa, and c) rights to 6th Priority water.

14. Receipt of state and federal approvals and permits required for the implementation of all of the Quantification Settlement water budget components.

15. Ratification, execution, and delivery by the districts of all legal documents and agreements necessary to implement the Quantification Settlement.

16. Execution by IID and CVWD of an agreement regarding the sharing of liability in Salton Sea flooding cases.

Surplus Guidelines

Currently, the Secretary determines the availability of surplus water on a year-to-year basis, based on a recommendation by the Commissioner of Reclamation. In recent years, requests for Colorado River water in Arizona, California, and Nevada have exceeded the collective normal apportionments of 7.5 million af. Surplus determinations allow the use of water above the 7.5-million acre-foot normal apportionment. Through the Annual Operating Plans for the Colorado River System Reservoirs, surplus determinations have been made from 1996 through 2000, and Reclamation is currently considering a surplus declaration for calendar year 2001. Surplus water is projected to be available in the future from time to time.

A need has existed for specific guidelines to direct the Secretary's annual decision regarding the availability and quantity of surplus Colorado River water. These surplus guidelines would allow more flexible and efficient use of water from Lake Mead, while contributing to the capture of additional water from above normal runoff years and reducing Colorado River salinity concentrations in Lake Mead. Reclamation estimates that salinity concentration in Lake Mead will decrease up to 7 milligrams per liter by 2005, depending on the alternative analyzed. The guidelines would afford entities that have contracted for surplus water a greater degree of predictability with respect to the annual existence of surplus water available for diversion, which would help them manage their water resources.

In July 2000 Reclamation released for public comment a draft environmental impact statement (DEIS) for the proposed adoption of Colorado River interim surplus guidelines. These guidelines would guide the determination of the availability of surplus water for use in Arizona, California, and Nevada during a 15 year period. The DEIS presents four possible alternatives for implementation, plus a "no action" alternative:

1. "Flood Control Alternative," which would provide surplus water only when flood control releases from Lake Mead are needed, based on the current criteria for making such releases.

2. "Six States Alternative" and

3. "California Alternative." Both of these allow for different levels of surplus to be declared. The alternatives specify various Lake Mead water surface elevations to be used as "triggers" to indicate when each surplus condition or a normal condition exists.

4. "Shortage Protection Alternative," which would permit a surplus condition to be determined when water levels are above a specific elevation. This elevation is adequate to ensure that enough water remains in Lake Mead to provide a one-year water supply to Arizona, California, Nevada, and Mexico, and to protect against the water level of the lake dropping below a specified minimum elevation.

Alternative 4 represents the most liberal alternative, and it makes the most water available.

After the release of the DEIS, a fifth alternative was submitted by the Colorado River Basin states in the "Interim Surplus Guidelines – Working Draft." This alternative also determines the amount of surplus water available based on Lake Mead water surface elevations and other conditions. Potential effects of this alternative fall within the range bounded by the Six States Alternative and the California Alternative. A Record of Decision on interim surplus guidelines is expected in January 2001.

Conjunctive Use

The California Plan recognizes the need for California to enhance its water supply through conjunctive use programs. Opportunities to use ground and surface water conjunctively are being explored using the Coachella groundwater basin, other groundwater basins near the CRA, and the Arizona Water Bank.

Desert Water Agency and Coachella Valley Water District

As part of the Quantification Settlement, Metropolitan would transfer 35,000 af per year of its SWP water to CVWD. To receive the additional water, CVWD would exchange that water for an equal quantity of Metropolitan's Colorado River water.

Metropolitan is also exploring additional programs with DWA and CVWD. Under the current Advance Delivery Program, Metropolitan delivers water near the Whitewater Recharge Area for the upper Coachella Valley groundwater basin underlying the DWA service area. The upper basin is nearing capacity and the lower basin is overdrafted. The hydraulic relationship between the upper and lower basins has yet to be determined. Metropolitan's board has authorized $750,000 for feasibility studies for a conjunctive use program that would store water in the lower basin. This new program could provide Metropolitan with the right to receive 100,000 to 150,000 af per year, over a 10-year cycle. In addition, Metropolitan is considering the transfer of 100,000 af per year of its SWP entitlement to DWA and CVWD. DWA and CVWD would provide additional water supplies to Metropolitan when the SWP reduces deliveries to Metropolitan. This proposal is currently undergoing an environmental impact review.

Other Conjunctive Use Projects

Three groundwater basins near Metropolitan's Colorado River Aqueduct in the Mojave Desert east of Palm Springs have been under consideration for conjunctive use projects. In 1998, Metropolitan's board of directors authorized demonstration projects, environmental review, and technical studies for these basins. One of these was the CVWD program for recharge of the lower basin outlined above. Two additional projects being considered for storage are the Cadiz Valley and the Hayfield and Chuckwalla groundwater basins.

Cadiz Groundwater Storage and Dry-Year Supply Program

This proposed program is between Metropolitan and Cadiz Inc, a publicly traded agricultural and water development company. The proposed project is located in the Mojave Desert in eastern San Bernardino County, about 30 miles north of Metropolitan's Iron Mountain Pumping Plant. With this project, Metropolitan proposes to utilize the groundwater basins underlying a portion of the Cadiz and Fenner Valleys to store Colorado River water conveyed through the CRA during periods when the water is available. When needed, the stored water and indigenous groundwater would be extracted by wells and returned to the CRA for use within Metropolitan's service area. All Cadiz Project operations would be governed by the

provisions of a groundwater monitoring and management plan (management plan). An annual maximum of 150,000 af of Colorado River water could be delivered and stored in the basin. Up to 1 million af of Colorado River water could be stored at any one time. In addition, indigenous groundwater would be transferred to Metropolitan to meet dry-year needs, subject to the provisions of the management plan. Up to 150,000 af of stored and/or indigenous water could be withdrawn annually and delivered to the CRA.

Metropolitan and the Bureau of Land Management (BLM) are jointly preparing required environmental documentation for the proposed project. In November 1999, Metropolitan and the BLM released a Draft EIR/EIS for the project. A Supplement to the Draft EIR/EIS was circulated for public review in October 2000. Final environmental documentation for the project will be completed in 2001. The proposed project ultimately will require Metropolitan Board approval.

Hayfield and Chuckwalla Groundwater Storage Programs

When Metropolitan was building the CRA, it acquired land for a small surface reservoir adjoining the pumping plant at Hayfield, between Palm Springs and Desert Center. When this natural basin adjoining the pumping plant was filled with water in 1939, it failed to retain that water. Investigations showed that the bottom of the reservoir was too porous to hold water, and the planned surface reservoir was cancelled. However the land was retained.

Metropolitan is now implementing a groundwater storage program in the Hayfield basin. Metropolitan's Board has authorized $9.6 million to begin implementing this program. Metropolitan's Board has also authorized a feasibility investigation of the Upper Chuckwalla Groundwater Basin for a similar program. These two valleys are located in the Mojave Desert near the Julian Hinds Pumping Plant and the Eagle Mountain Pumping Plant respectively. The aquifers are estimated to provide up to 1 million af of underground storage capacity, with recharge and withdrawal capacity of up to 150,000 af per year. Approximately 58,600 af were stored in the Hayfield Groundwater Basin during the demonstration program.

Spreading facilities and extraction wells will be constructed during implementation of the full-scale project. In addition, Metropolitan will monitor evaporation, water quality, and water level information during the life of these programs.

Arizona Water Bank

Interstate offstream water banking of unused basic and/or surplus Colorado River water apportionments provides an added water management opportunity for meeting the water supply needs of the Lower Division states. On November 1, 1999, the Department of the Interior issued a Final Rule to facilitate voluntary interstate offstream storage of Colorado River water among Arizona, California and Nevada. The Final Rule establishes a framework for the Secretary to follow in considering, participating in, and administering storage and interstate release agreements among entities in Arizona, California, and Nevada. The final rule will permit state-authorized entities in Nevada and California to store Colorado River water offstream in groundwater basins in Arizona, develop intentionally created unused apportionment (ICUA), and make ICUA available to the Secretary for release and use in another Lower Division state that is party to a storage and interstate release agreement. The Department's stated intent of the rule is to increase the efficiency, flexibility, and certainty in Colorado River management.

In 1996, the Arizona Legislature created the Arizona Water Banking Authority (AWBA). It was created specifically to protect Arizona's supply of Colorado River water and to provide opportunities for interstate banking. Its major objective is to store Arizona's unused Colorado River water entitlement in western, central, and southern Arizona to develop long-term storage credits to: (1) firm existing water supplies for Arizona's municipal and industrial users during Colorado River shortages or CAP service interruptions; (2) help meet the water management objectives of the Arizona Groundwater Code; and (3) assist in the settlement of Indian water rights claims in Arizona. The statute provides a role for interstate storage programs, limiting the annual recovery amount to no more than 100,000 af in total for entities in California and Nevada.

Each year, the AWBA pays the delivery and storage costs to convey what would otherwise be unused Arizona Colorado River water into central and southern Arizona through the CAP. The water is stored underground in aquifers (direct recharge), or it is used by water agencies in lieu of pumping groundwater (indirect storage). For each acre-foot stored, AWBA accrues a credit that can be redeemed in the future.

Both the Southern Nevada Water Authority (SNWA) and Metropolitan are currently in discussions with AWBA regarding participation in the Arizona water bank to make more effective use of Colorado River apportionments and surplus water in meeting future water needs. SNWA is seeking to accumulate 1.2 million af of unused apportionment or surplus Colorado River water during the interim surplus guidelines period. This and the storage of future surplus Colorado River water are part of its program to meet future needs.

Metropolitan is seeking to use the Arizona water bank to store surplus Colorado River water for a number of reasons:

- To assist in its transition to its basic apportionment
- To help mitigate incremental impacts caused by the use of interim surplus guidelines
- To guard against critical year hydrology
- To make more effective use of surplus Colorado River water to meet long-term needs

Metropolitan may accumulate up to 2 million af of stored water collectively in the Arizona water bank and the lower Coachella Valley, with an annual storage and extraction of up to 200,000 af per year.

Environmental Protection

In 1994 the U.S. Fish and Wildlife Service (USFWS) designated critical habitat for three endangered fish species that occur in the Colorado River below Glen Canyon Dam. This designation requires federal agencies to consult with USFWS on the potential impact on those species of any project actions within the critical habitat area. The river and its shoreline are also habitat for other species of concern.

To protect both the wildlife in the area and the federal projects' ability to operate with minimum restrictions, a regional partnership has been formed. Known as the Lower Colorado River Multi-Species Conservation Program, its goal is to protect more than 50 federal and state listed and sensitive species in the region. It has implemented critical interim conservation measures and is currently developing a plan for the next 50 years.

Achievements to Date

Metropolitan is developing a range of programs to enhance the reliability of CRA deliveries. The capacity and current storage utilization for these existing and other potential programs are summarized in Table III-18. Once the proposed programs are instituted, Metropolitan will potentially have enough storage and withdrawal capacity to assure a full aqueduct for a number of decades. However, without implementation of the proposed programs, sufficient supplies would not be available to keep the aqueduct full when surplus water is not available. Adoption of surplus guidelines for Lake Mead could resolve this issue for the next 15 years.

Table III-18
Projects for
Management of Colorado River Water Supplies
(acre-feet)

Agreement	Storage Capacity[1]	Current Storage Level[2]	Actual or Potential Annual Deliveries (af)[1]
Dry-year deliveries			
DWA/CVWD Advance Delivery	600,000	261,600	61,200
Proposed CVWD Groundwater Storage Program	CN	NA	CN
Proposed Metropolitan/DWA/CVWD Entitlement Transfer Program	100,000	NA	CN
Proposed PVID Land Fallowing Program	NA	NA	100,000
Arizona Groundwater Demonstration Storage Program	300,000	89,000	80,000[3]
Proposed Cadiz[4] Groundwater Storage Program	1,000,000	NA	150,000
Proposed Hayfield/Chuckwalla Groundwater Storage Program	1,000,000	58,600	150,000
Total Dry Year			541,200
All-year deliveries			
IID-Metropolitan Water Conservation Program	NA	NA	109,460[5]
Proposed IID-SDCWA Transfer and SDCWA-Metropolitan Exchange	NA	NA	200,000
Proposed All-American Canal Lining Program	NA	NA	67,700[6]
Proposed Coachella Canal Lining Program	NA	NA	26,000[6]
Total all-year deliveries			403,160

[1]CN= under contract negotiations, NA= currently not applicable. Not applicable, either because the program is proposed or because the program does not currently have a storage component.
[2]As of November 2000.
[3]Amount of water that can be recovered when Arizona's Colorado River supply is at least 2.8 million af.
[4]The Cadiz Program includes a water transfer component, as well as a storage component.
[5]Under the proposed Quantification Settlement, 90,000 af would be available to Metropolitan.
[6]Of the potential annual deliveries, under the proposed Quantification Settlement, 16,000 af of water from the proposed lining projects would be made available annually to facilitate implementation of the San Luis Rey Indian Water Rights Settlement.

III.6 STATE WATER PROJECT

Planning Goals

Improving the water supply reliability of the State Water Project (SWP) is a primary focus of Metropolitan's long-term planning efforts. Restoring and stabilizing the health of the Bay-Delta through the implementation of CALFED's Bay-Delta Program is a necessary step to accomplishing this objective. These improvements will provide the regulatory certainty needed to better manage Bay-Delta supplies for the benefit of all its users. They are essential if Metropolitan is to attain its supply goals of 650,000 af in dry years and an average of 1.5 maf over all year types as described in its policy statements regarding the Bay-Delta and CALFED. This section describes the SWP programs Metropolitan has instituted to attain its goals for SWP supplies.

Deteriorating reliability and quality of SWP supplies require that decisive actions be taken to resolve Bay-Delta conflicts and begin programs to "fix the Delta." In August of 2000, CALFED's Bay-Delta Program laid out final implementation plans for the first phase – the first seven years – of what is conceived to be up to 30 years of improvements in the Bay-Delta. Metropolitan's strategy is to reduce its dependence on SWP supplies during dry years, when risks to the Bay-Delta ecosystem are greatest. This strategy depends on successful implementation of the CALFED program to provide regulatory stability, improvements in drinking water quality, salinity control, and water supply reliability. Meeting these objectives will enable Metropolitan to better utilize SWP surplus supplies, increase conjunctive use programs, and advance local resource programs.

SWP Supply Reliability

The SWP conveys water from the western slope of the Sierra Nevada mountains to water users both north and south of the Bay-Delta through a series of reservoirs, pumping plants, and aqueducts. Figure III-6 shows the major facilities of the SWP. Owned and operated by the California Department of Water Resources (DWR), the SWP provides municipal and agricultural water to 29 State Water Contractors. Annual deliveries for the total SWP average about 2.5 maf. Municipal uses account for about 60 percent of annual deliveries, with the remaining 40 percent going to agriculture.

Simulation studies done by DWR indicate that existing SWP facilities have only a 60 percent chance of meeting full delivery requests based on 1995-level demands, and only a 15 percent chance of delivering Metropolitan's 2 maf entitlement in any given year (DWR Bulletin 160-98, page 3-33). These estimates are far below contractor entitlements, and by not accounting for export restrictions due to Endangered Species Act take limits, they probably overstate expected reliability for the current project status.

Improving SWP supply reliability is fundamental to Metropolitan's overall water management objectives. Metropolitan has made a number of strategic investments and agreements in this regard. Most notable among these are the groundwater banking programs with Semitropic and Arvin-Edison Water Storage Districts (discussed in Section III.4) and the SWP terminal reservoir re-operation agreements authorized under the Monterey Amendment to Metropolitan's SWP contract (discussed in Section III.3). These programs are essential components of Metropolitan's overall strategy to reduce dry-year SWP dependency by obtaining additional SWP surplus water during wet years.

Figure III-6
The State Water Project
Major Facilities

SWP Water Quality

Metropolitan requires a safe drinking water supply from the Bay-Delta to meet current and future regulatory requirements for public health protection. Finding cost-effective ways to reduce total organic carbon (TOC), bromide concentrations, pathogenic microbes, and other unknown contaminants from Bay-Delta water supply is a top priority.

Metropolitan also requires a SWP supply that is consistently low in salinity – Total Dissolved Solids (TDS) – to blend with the higher salinity Colorado River water to achieve salinity goals for its member agencies. In addition, a consistently low-salinity SWP is required for Metropolitan to increase in-basin water recycling and groundwater management programs. These programs, essential to successful implementation of Metropolitan's planning goals, are contingent upon meeting blended water TDS thresholds.

Water Quality Objectives

Metropolitan has outlined a number of objectives to improve Bay-Delta water quality. In this regard, Metropolitan will work vigorously to ensure the following outcomes:

- The ability to meet increasingly stringent public health regulation of disinfection by-products and water-borne pathogens through a cost-effective combination of source water quality improvements, source water blending, and treatment facility upgrades.
- The implementation of CALFED's Framework Agreement projects, which are designed to meet agreed-to water quality performance milestones capable of meeting anticipated safe drinking water requirements.
- The implementation of projects to meet agreed-to salinity management milestones enabling Metropolitan to cost-effectively meet a 500 mg/L salinity threshold for blended SWP and CRA water supply.
- Procure funding for research into advanced treatment and ultraviolet (UV) disinfection that may be necessary for meeting safe drinking water and salinity management objectives.
- Achieve the most cost-effective mix of investments in source water quality improvements and post-diversion treatment to meet stated water quality and salinity control objectives.
- Execute water quality exchanges in the San Joaquin Valley that provides Metropolitan with high quality Sierra water from the east side of the San Joaquin Valley.

SWP System Outage

The SWP is increasingly vulnerable to natural disasters as its infrastructure ages. This is particularly true of the Delta levee system and the California Aqueduct, both susceptible to floods and earthquakes, and both key project elements. The loss of either would shut down the SWP, affecting the welfare of millions. Additionally, interruptions in East Branch service caused by aging infrastructure are becoming more frequent and more difficult to manage. While Metropolitan has made substantial investments in local resources and in-basin storage to insulate Southern California against loss of its imported water supplies, renewed investment in the infrastructure is also needed.

Specific Metropolitan objectives include:

- Delta Levee System. The SWP is vulnerable to Bay-Delta levee failures. Many levees are structurally weak or not properly maintained. They present a high risk of failure, particularly during an earthquake or during periods of high runoff. Levee failures could result in rapid seawater intrusion into the Delta, contaminating the SWP supply and potentially interrupting deliveries to millions of water users. Metropolitan will continue to support DWR's Delta Levee Maintenance and Subventions Program and Special Flood Protection Projects, as well as CALFED's Long-term Levee Protection Plan, as described in the Framework Agreement.

- Arroyo Pasajero. The California Aqueduct traverses the Arroyo Pasajero's alluvial fan along its alignment in the San Joaquin Valley. The Aqueduct effectively forms a barrier to Arroyo flood flows. While flood control facilities were developed to protect the Aqueduct, the volumes of runoff and sediment deposition are much greater than originally estimated, and a significant flood risk remains. The Aqueduct was severely damaged during March of 1995, when a significant flood overwhelmed flood control facilities and overtopped the Aqueduct with 10,000 af of flood water and an estimated 800,000 cubic yards of sediment. Impacts to downstream water users lasted through the summer of 1995. The Corps of Engineers has recently completed studying alternative flood control measures for the Arroyo Pasajero. Both of the proposed alternatives were considered unacceptable, so another alternative is being proposed for study to reduce flood risks along this stretch of the Aqueduct. Additional measures may be required to address several other stream groups that also pose risks to the Aqueduct. Metropolitan is working closely with other State Water Contractors and DWR to identify cost-effective options to reduce flood risks and to share costs equitably among local, state, and federal project beneficiaries.

- East Branch Preventive Maintenance. Metropolitan is working closely with DWR to develop preventive maintenance programs along the East Branch of the SWP that will help to reduce the number of unplanned outages and improve the scheduling of routine maintenance. The goal of these programs is to minimize disruptions to deliveries during peak demand periods to the greatest extent possible.

Programs to Meet Goals

Metropolitan continues to work on a number of fronts to secure both near-term improvements in SWP reliability and long-term solutions to Bay-Delta issues that directly affect SWP delivery capability. These activities include:

Vernalis Adaptive Management Program (VAMP)

By improving habitat conditions for San Joaquin River fall-run salmon and providing real-time monitoring of SWP and CVP operations on San Joaquin River salmon fisheries, the VAMP is expected to provide a more stable regulatory environment for Bay-Delta exporters, thereby allowing more flexible SWP and CVP operations. Metropolitan is currently working with VAMP stakeholders to address concerns of Delta water users and gain approval by the SWRCB.

Bay-Delta Water Rights Proceedings

Along with other SWP contractors, Metropolitan is working to ensure that the burden of meeting flow requirements set out by the 1995 Water Quality Control Plan is fairly shared across all Bay-Delta water users. Currently, the SWP and CVP are voluntarily meeting the full burden of these standards. Following the conclusion of the current State Board hearing process, Metropolitan anticipates that a more equitable distribution of responsibility will result in measurable improvements in SWP supply reliability.

CALFED Bay-Delta Program

Metropolitan has worked cooperatively with CALFED and other stakeholders for five years in the CALFED process to develop solutions for Bay-Delta problems that meet CALFED objectives in a balanced and cost-effective manner. On August 28, 2000, the CALFED agencies approved the Bay-Delta Program, concluding the environmental review process. The approved program calls for implementation over the next seven years of many actions identified during the CALFED planning process. It provides the foundation for a new entity to implement a far-reaching program in the Bay-Delta watershed designed to restore the environment, improve water quality, and increase supply reliability over the next 20 to 30 years.

The program promises to link the achievement of environmental benefits with water quality and water supply improvements. It requires annual reports to the U.S. Secretary of the Interior, the Governor of California, and the State Legislature to assure that all interests are realizing benefits. The following sections summarize the key components of the Bay-Delta Program.

Water Quality: The Bay-Delta Program

The program commits to a mix of strategies to improve water quality, including actions to allow the capture of water during periods of higher quality, source control of salinity and other contaminants, and treatment technologies. Specific actions include:

- Implement programs to manage salt loadings in the San Joaquin Valley
- Implement source control programs to reduce contaminants from Delta and upstream sources
- Invest in water treatment technology demonstration projects for UV disinfection and desalination
- Control runoff into the California Aqueduct with the construction of necessary physical improvements

The Bay-Delta Program contains an aggressive mix of water quality improvement actions. Metropolitan's main concern is to assure timely implementation of program elements that will maximize water quality benefits and support efforts to fully comply with future drinking water standards at the lowest possible cost.

Ecosystem Restoration

The goal of the ecosystem restoration element is to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta system. Improvements in the ecosystem health will reduce the conflict between environmental water use and other beneficial uses, and they will allow more flexibility in water management decisions.

Water Supply Reliability

Metropolitan is focused on stabilizing the reliability of current water delivery levels by implementing measures that add operational flexibility. The Bay-Delta Program includes regulatory assurances and actions to protect near-term reliability. For the SWP, the program promises no near-term reductions in supply and specifies future actions for moderate supply increases.

The Bay-Delta Program provides near-term reliability, but it contemplates only modest increases in export supplies in the future. Instead, it relies to a much greater extent on local investments to promote reliability. If the intended assurances are implemented, and assuming reasonable operating rules for the proposed new facilities, this package of actions would likely allow Metropolitan to meet its 2020 State Water Project minimum supply goals of 650,000 af during a repeat of critical drought years such as 1977 or 1991, an average annual delivery of 1.5 million af over all years, and supply improvement of at least 200,000 af per year in less-extreme dry years. Meeting these reliability goals will depend to a great degree on CALFED's commitment to regulatory assurances.

Storage and Conveyance

The Bay-Delta Program acknowledges that additional storage is essential to the successful implementation of all aspects of the CALFED Program. It provides for the development of up to 950,000 af of new surface storage capacity and up to 1 maf of new groundwater storage capacity in Stage 1. Altogether, it envisions up to 4.75 million af of new storage capacity in the long term, with up to 2 million af of new surface and groundwater storage capacity in operation or under construction before the end of Stage 1.

The Bay-Delta Program also commits to through-delta conveyance improvements, such as channel enlargements, the possibility of a screened Sacramento River water diversion to the Central Delta, and South of Delta programs.

Environmental Water Account

The establishment and implementation of a workable Environmental Water Account (EWA) would help alleviate the frequent conflict between SWP/CVP project operations and fishery protection goals. The EWA is also a key element of the Program's proposed regulatory assurance commitments. CALFED agencies have approached Metropolitan regarding a partnership agreement where CALFED would compensate Metropolitan for needed EWA services, such as SWP demand shifting or temporary storage leasing.

Water Use Efficiency

The Bay-Delta Program proposes significant investments in water-use efficiency during the first years of Stage 1, with 25 percent from federal sources, 25 percent from state sources and 50 percent from local matching funds. It also establishes the following annual targets: urban conservation savings of 520,000 to 680,000 af; agricultural savings of 260,000 to 350,000 af; and savings from water recycling of 225,000 to 310,000 af.

The Bay-Delta Program emphasizes incentives to encourage voluntary conservation and proposes to provide supplemental funding for urban and agricultural water use efficiency measures and water recycling projects through a combination of "competitive" loans and grants. Loans would primarily be used to assist conservation program start-up and capital costs. Grants would be used to assist conservation measures that, while not locally cost-effective, would prove beneficial from a statewide perspective.

Water Transfers
The Bay-Delta Program encourages a more effective water transfer market by streamlining regulatory approvals and by creating an Internet-based (online) Water Transfers Information Clearinghouse. It also calls for increasing the availability of existing transportation facilities for water transfers.

Levees
The Bay-Delta Program provides for the stabilization and improvement of Delta levees to protect in-Delta as well as export users. The levee element includes four main components: (1) Base level protection, (2) Special improvement projects, (3) Levee subsidence control plan, and (4) Emergency response. These actions should increase supply reliability by providing safeguards against system failure and help ensure protection of water quality.

Science
The Bay-Delta Program commits to a science program to guide adaptive management decisions. The program includes the appointment of an eminent lead scientist to be assisted by an Independent Science Board. The Board will issue annual reports regarding the status and effectiveness of program measures and will recommend adjustments. CALFED has already appointed a lead scientist to serve in this capacity on an interim basis for 18 months, until a permanent lead scientist can be appointed through a nationwide search program.

Governance
The Bay-Delta Program envisions legislation to create a new public agency with implementation powers, headed by an Executive Director who will report directly to the Governor and Secretary of the Interior. The Program also envisions a 12-member, high-level federal-state commission to assure effective, balanced and coordinated implementation, with four state, four federal and four stakeholder representatives, including an urban water user representative. In addition, the proposed governance structure includes appointment by the Governor and Secretary of Interior of a Stakeholder Technical Advisory Committee, a Lead Scientist, an Independent Scientific Review Board and Panel, and the appointment of a Governor's Drought Contingency Panel.

Finance
The Bay-Delta Program envisions over $8 billion of investments to implement the first seven years of program actions. On a gross scale, the overall cost-share assumptions assume an equal distribution of the program costs among state, federal, and user/local funds. Final cost-share arrangements will depend on the specific projects that are implemented, and they will vary year by year. Initial years will be heavily funded by federal and state dollars. This initial funding will not include the cost of constructing the major storage or conveyance elements. Final cost shares, including reimbursement of up-front funding, are intended to be based upon a "beneficiaries pay" principle.

IV. WATER QUALITY

Planning Goals

All of Metropolitan's recent planning efforts, including the IRP, have emphasized the central importance of water quality. In addition to health and safety considerations, water quality also has supply quantity implications for Metropolitan. The overall message of Metropolitan's Water Quality Initiative is, "protecting it at the source so you can trust it at the tap."

The following factors demonstrate the influence of water quality on the level of supplies needed for Metropolitan's member agencies:

1. If a groundwater basin becomes contaminated and cannot be used, more water will be required from other sources.

2. Imported water from the Colorado River must be blended (mixed) with lower-salinity water from the SWP. Higher salinity levels in either Colorado River water or groundwater would increase the proportion of SWP supplies required to meet the adopted imported water salinity objectives.

3. High total dissolved solids (TDS) in water supplies leads to high TDS in wastewater, which lowers the usefulness of the water and increases the cost of recycled water.

4. If diminished water quality causes a need for membrane treatment, this process typically results in losses of up to 25 percent of the water processed. These losses result in an increased requirement for additional water supplies. In addition, the process is costly.

5. Degradation of imported water supply quality could limit the use of local groundwater basins for storage because of standards controlling the quality of water added to the basins.

Implementing the major components of Metropolitan's planning efforts – groundwater storage, recycled water, and minimized impacts on the Delta – requires meeting specific water quality targets for imported water supply. Changes in drinking water quality standards (such as tightening of standards for arsenic or radon) may also impact the usefulness of groundwater supplies and ultimately increase demands on imported water supplies.

In addition to the link between water supply and water quality, Metropolitan has identified economic benefits from reductions in the TDS levels of water supplies. A simultaneous reduction in salinity levels of 100 milligrams per liter (mg/L) in both the Colorado River and SWP supplies is estimated to have economic benefits of $95 million per year within Metropolitan's service territory. This estimate has added to Metropolitan's incentives to reduce salinity levels in the region's water supplies.

For all of these reasons, Metropolitan's Board approved a Salinity Management Policy in April 1999 that will be effective through

Calendar Year 2004. The goal of this policy is to achieve salinity levels less than 500 mg/L TDS. At the same time, the Board adopted an Action Plan consisting of the following four components:

1. Imported water source control and salinity reduction actions
2. Distribution system salinity management actions
3. Collaborative actions with other agencies
4. Local salinity management actions to protect groundwater and recycled water supplies

In addition to these general concerns over TDS levels, health issues have been raised over particular contaminants in drinking water. For Metropolitan's supplies, the major concerns have been associated with the following:

- Bromide and total organic carbon (TOC) in SWP water
- Methyl tertiary butyl ether (MTBE) in groundwater and local surface reservoirs
- N-nitrosodimethylamine (NDMA) in groundwater and treated surface waters
- Hexavalent chromium in groundwater
- Perchlorate in Colorado River and local groundwater supplies
- Arsenic and radon

Water Quality Initiative

Metropolitan has developed a "Water Quality Initiative" to improve water quality for our customers. This initiative serves as an umbrella for a series of issues that directly impact water quality in Southern California in the present, near-term, and long-term future. This initiative is also a key component of Metropolitan's supply reliability efforts. At the center of this initiative is a checklist of water quality needs that will drive specific programs, activities, and actions, including:

- Salinity in the Delta and Colorado River.
- Accelerated banning of Methyl Tertiary Butyl Ether (MTBE).
- Clean up of radioactive mine tailings seeping into the Colorado River at Moab, Utah.
- Protecting and maintaining source water quality.

These water quality needs are discussed in greater detail below. These four needs will be the focus and feature of Metropolitan external communications tailored to educate legislators, opinion leaders, and the public about the direct impacts of poor water quality on our customers and on water reliability.

The following sections discuss Metropolitan's major water quality issues and its approaches to ensuring acceptable water quality.

Salinity

Within Metropolitan's service area, local sources account for approximately half of the salt loading, and imported water accounts for the remainder. All sources must be managed appropriately to sustain water quality and suply reliability goals. The following sections discuss the current salinity situation for each of Metropolitan's major supply sources.

Colorado River

Water imported via the CRA has the highest level of salinity of all of Metropolitan's sources of supply, averaging around 700 mg/L during normal water years. Concern over salinity levels in the Colorado River has existed for many years. To deal with the concern, in 1973 the International Boundary and Water Commission approved Minute 242, Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River, and the President approved the Colorado River Basin Salinity Control Act in 1974. These initial actions were driven by high TDS in the Colorado River as it entered Mexico, as well as the concerns of the seven basin states regarding the quality of Colorado River water in the United States. To foster interstate cooperation on this issue, the seven basin states formed the Colorado River Basin Salinity Control Forum (Forum).

The salts in the Colorado River System are indigenous and pervasive. Most of these salts result from saline sediments in the Basin that were deposited in prehistoric marine environments. They are easily eroded, dissolved, and transported into the river system. The Colorado River Basin Salinity Control Program is designed to prevent a portion of this abundant salt supply from moving into the river system. The program targets the interception and control of non-point sources, such as surface runoff, as well as wastewater and saline hot springs.

The Forum proposed, the states adopted, and the Environmental Protection Agency approved water quality standards in 1975, including numeric criteria and a plan for controlling salinity increases. The standards require that the plan ensure that the flow-weighted average annual salinity remain at or below the 1972 levels, while the Basin states continue to develop their 1922 Colorado River Compact apportioned water supply. The Forum selected three stations on the main stream of the lower Colorado River as appropriate points to measure the river's salinity. These stations and numeric criteria are (1) below Hoover Dam, 723 mg/l; (2) below Parker Dam, 747 mg/l; and (3) at Imperial Dam, 879 mg/l. The numeric criteria are flow-weighted average annual salinity values.

During the high water flows of 1983-1986, salinity levels in the CRA dropped to a historic low of 525 mg/L. However, during the 1987-1992 drought, higher salinity levels returned. During an extreme drought, CRA supplies could exceed 900 mg/L.

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.[1]

Because of its lower salinity, SWP water is used for blending with high salinity CRA water to reduce the total salinity levels of delivered water. However, both the supply and the TDS levels of SWP water can vary significantly due to hydrologic conditions in the Sacramento-San Joaquin watersheds.

The TDS levels of SWP water can also vary widely over short time periods. These variations reflect seasonal and tidal flow patterns, and they pose an additional problem for use of blending as a management tool to lower the higher TDS from the CRA supply. For example, in the 1977 drought, the salinity of

[1]The higher salinity in the West Branch deliveries is due to salt loadings from local streams, operational conditions and evaporation at Pyramid and Castaic Lakes.

SWP water delivered to Metropolitan increased to 400 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 objective 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 actions are taken to reduce salinity levels of the source supplies.

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 10-year average of 220 mg/L and a maximum monthly average of 440 mg/L. However, 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 is no longer sufficient, and 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."

Recycled Water

Wastewater flows always experience significantly higher salinity levels than the potable water supply. Typically, each cycle of urban water use adds 250 to 400 mg/L of TDS to the wastewater. Salinity increases tend to be higher where specific commercial or industrial processes add brines to the discharge stream or where brackish groundwater is infiltrating into the sewer system.

Where wastewater flows have high salinity levels, the use of recycled water may be limited or require more expensive treatment. Landscape irrigation and industrial reuse become problematic at TDS levels of over 1,000 mg/L. Some crops are particularly sensitive to high TDS levels, and the use of high-salinity recycled water may reduce yields of these crops. In addition, concern for the water quality in groundwater basins may lead to restrictions on the application of recycled water on lands overlying those basins.

These issues are exacerbated during times of drought, when the salinity of imported water supplies increases, causing increased salinity in wastewater flows and recycled water. Basin management plans and recycled water customers may restrict the use of recycled water at a time when its use would be most valuable. For effective use of recycled water projects, it is important to control the salinity level of the region's potable water sources and wastewater flows.

Groundwater Basins

Increased TDS in groundwater basins occurs either when basins near the ocean are overdrafted, leading to seawater intrusion, or when agricultural and urban 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. In addition, wastewater discharges in inland regions may lead to salt buildup from fertilizer and dairy waste. In the 50s and 60s, Colorado River water was used to recharge severely overdrafted aquifers and prevent saltwater intrusion. As a result, more than 3 million af of this high-TDS imported water was added to groundwater basins in the region, significantly impacting salt loadings.

In the past, high salinity levels have caused some basins within Metropolitan's service area to be unsuitable for municipal uses. The Arlington Basin in Riverside and the Mission Basin in San Diego were only recently returned to municipal service after the implementation of demineralization projects. The capacity of the larger groundwater basins made them better able to dilute the impact of increasing salinity. However, approximately 600,000 tons of salts per year accumulate within the region, leading to ever-increasing salinity levels in many groundwater basins. While the majority of groundwater wells within the region still produce water of acceptable quality, this resource must be managed carefully to minimize further degradation. Table IV-1 shows the salinity from existing productive groundwater wells within the region, and Figure IV-1 shows the distribution of those salinity levels.

To protect the quality of these basins, regional water quality control boards often place 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.

Table IV-1
Salinity Levels at Productive Groundwater Wells

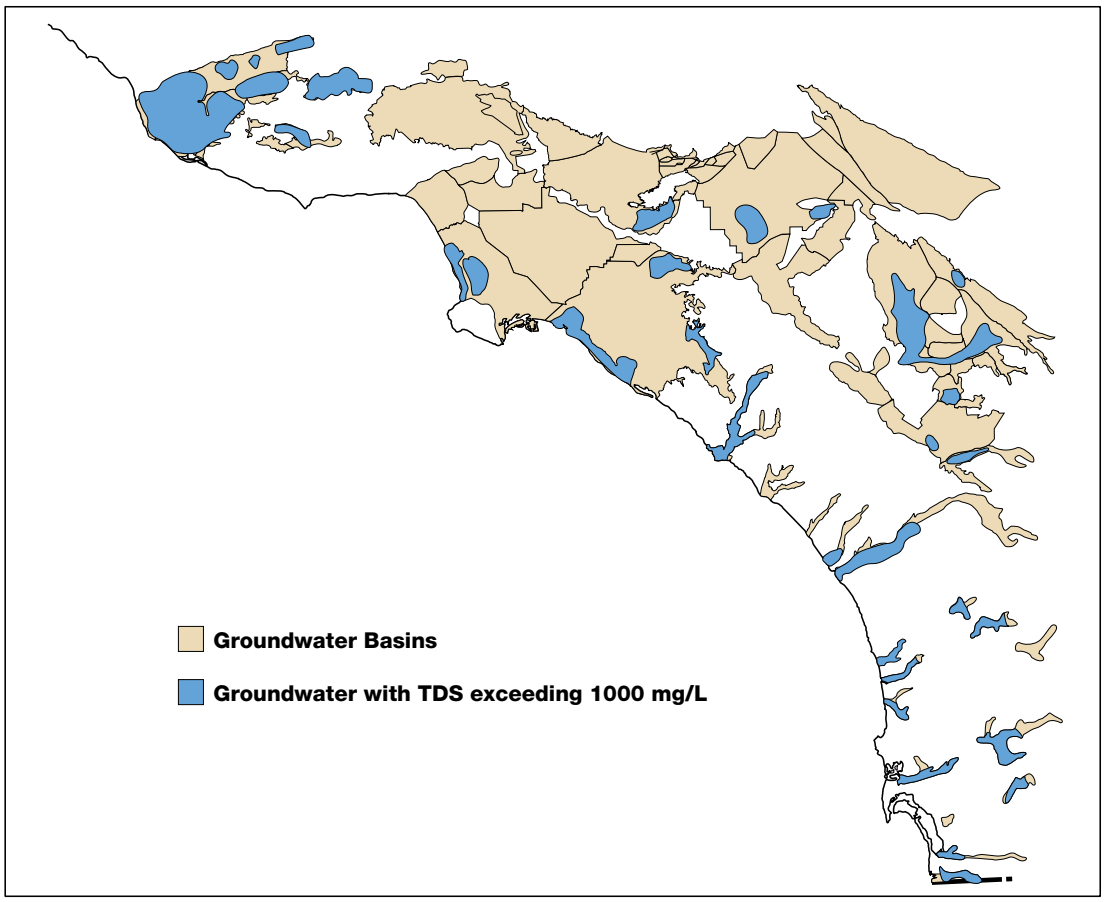
TDS Concentration (mg/L)	Annual Production (Million Acre-Feet	Percent of Production
Less than 500	1.06	78
500 to 1,000	0.15	11
Greater than 1,000	0.15	11
Total	1.36	100
Source: Metropolitan Water District of Southern California, Salinity Management Study, Final Report, June 1999.		

The Salinity Action Plan

Metropolitan's Board has adopted a salinity objective of 500 mg/L for blended imported water. It has also identified the need for both local and imported water sources to be managed comprehensively to maintain the ability to use recycled water and groundwater storage. To achieve this target, the Board adopted an Action Plan that relies in part on blending SWP water with supplies from the Colorado River. Using this approach, the salinity target could be met in seven out of 10 years. In the other three years, hydrologic conditions would result in increased salinity and reduced volume of SWP supplies. Metropolitan has alerted its local agencies that such conditions are inevitable, and that despite its best efforts, high salinity could be a concern at such times. Metropolitan has also urged its member agencies to structure the operation of their local projects and groundwater so they are prepared to mitigate the effect of the higher salinity levels in imported waters. In addition, Metropolitan will concentrate on obtaining higher water quality in the spring/summer months (April through September) to maximize the ability for agriculture to make use of recycled water supplies.

In the near term, Proposition 13 and the CALFED Bay-Delta Program provide funding to improve the quality of water originating in the Bay-Delta. Proposition 13 (Water Bond 2000), approved in March 2000, authorizes the State of California to sell $1.97 billion in general obligation bonds to support safe drinking water, water quality, flood protection, and water reliability projects throughout the state. Of these funds, $355 million are earmarked for statewide clean water and water recycling programs, and $155 million for water conservation programs.

Figure IV-1
Distribution of Groundwater Salinity Levels in Metropolitan's Service Area



Metropolitan is seeking to obtain Proposition 13 funding for three programs:

- The Water Supply Reliability Program. The $45 million applied for will be used to help finance groundwater storage projects within the Metropolitan service area. These projects will enhance wet-year storage of imported water for use in dry years when there is limited supply and more competing needs.

- The Water Quality Exchange Partnership. The $20 million applied for will be used to develop new water infrastructure to enhance and optimize the water supply, water quality and water management capabilities of agricultural and urban interests throughout the eastern San Joaquin Valley and urban Southern California.

- The Desalination Research and Innovation Partnership (DRIP). The $4 million applied for will help develop cost-effective advanced water treatment technologies for desalination of Colorado River water, brackish groundwater, municipal wastewater and agricultural drainage water.

Actions during the first seven years of the CALFED Bay-Delta Program include: improved salt management in the San Joaquin Valley, upstream source control, demonstration projects for ultraviolet disinfection, other desalination demonstration projects, and measures to control storm runoff into the California Aqueduct.

In the longer term, implementation of the CALFED Bay-Delta Program over the next 30 years are intended to result in reductions in both the long-term average and short-term salinity in SWP water supplies. If these reductions are not achieved, Metropolitan may need to consider desalination of Colorado River water. Given current technologies, this option is very expensive. It also would cause a reduction in the amount of water that could be delivered from the Colorado River, because part of the treated water supply would be lost in the concentrated waste brine. In addition, there would be significant cost and environmental issues related to the disposal of this brine. For these reasons, large-scale desalination of imported supply is not a viable alternative at this time. The uncertainties, however, are such that the Salinity Management Action Plan calls for an aggressive research and development program into the development of a more efficient and cost-effective desalination technology. This research is already underway through DRIP, a consortium of California water agencies and other interested parties.

Developing the Plan

The release of Metropolitan's Salinity Management Action Plan marked the culmination of a three-year process that began in August 1996. At that time, Metropolitan and the U.S. Bureau of Reclamation agreed to cooperate on and jointly fund a study of the sources of salinity in the water supply, problems associated with that salinity, and management options to overcome these problems. To ensure a broad level of input into the analysis, Metropolitan formed a task force of interested water, groundwater and wastewater agencies, state and local government agencies, and interested associations.

The Salinity Summit

As the Salinity Management Study neared completion, a Salinity Summit was held in January 1999. At this conference, 100 senior managers and technical experts representing 60 agencies discussed regional salinity issues. They considered implementation issues surrounding a regional salinity management plan, and they discussed how the region's agencies could work together to attain salinity management goals.

Other Issues of Concern

Four chemicals have been identified as being of concern in Metropolitan's water supplies. These are total organic carbon (TOC), bromide, MTBE, and perchlorate. The following sections detail the reasons for Metropolitan's concerns and the plans for overcoming these potential problems. Two other chemicals (arsenic and radon) are of potential concern because of pending regulations. Other emerging contaminants such as N-nitrosodimethylamine (NDMA) and hexavalent chromium could impact the region's water supplies; they have been identified, but the full extent of problems associated with them is uncertain.

Total Organic Carbon and Bromide

When source water containing high levels of total organic carbon (TOC) and bromide is treated with disinfectants such as chlorine or ozone, disinfection byproducts (DBPs) are formed. Some of the DBPs are suspected carcinogens, and some have been linked to higher incidences of miscarriages and other reproductive health effects. In December 1998, the U.S. Environmental Protection Agency (EPA) adopted more stringent regulations for DBPs, which water agencies must comply with by January 2002. EPA is also expected to promulgate even more stringent regulations in May 2002 and possibly again in 2006.

Existing levels of TOC and bromide in Delta water supplies are a significant concern for Metropolitan's ability to maintain safe drinking water supplies. Levels of these constituents in SWP water increase several fold as water moves through the Delta, due to agricultural drainage and seawater intrusion. One of Metropolitan's primary objectives for the CALFED Bay-Delta process is protection and improvement of the water quality of its SWP supplies to ensure compliance with current and future drinking water regulations. Although exact future drinking water standards are unknown, significant source water protection of SWP water supplies will almost certainly be a necessary component of meeting these requirements.

On August 17, 1999, Metropolitan's Board of Directors adopted a Statement of Needs for the CALFED Bay Delta Program. The drinking water quality and salinity targets component states that Metropolitan requires a safe drinking water supply from the Bay-Delta to meet current and future regulatory requirements for public health protection. This objective is to be achieved through reduced levels of TOC, bromide, pathogens, and other as yet unknown constituents in SWP water supplies. Further, implementation of the CALFED program should:

- Ensure the ability to meet anticipated more stringent regulations on disinfectant byproducts and pathogens to protect public health, either through water quality improvements for Delta water supplies or through a cost-effective combination of alternative source waters, source improvement, and treatment facilities. Water quality improvements need to be implemented in a timely manner to allow compliance with the effective date of the regulations.
- As an element of Stage 1 of CALFED's implementation plan, identify and commit to projects tied to the establishment of water quality performance milestones to ensure compliance with anticipated and future more stringent regulations.

CALFED's Bay-Delta Program calls for a wide array of actions to improve Bay-Delta water quality, ranging from improvements in treatment technology to safeguarding water quality at the source. These include conveyance improvements, alternative sources of supply, changes in storage and operations, and advanced treatment by water supply agencies. These conceptual actions do not completely conform to the specific requirements as outlined by Metropolitan's Board. Future adoption by CALFED of water quality improvement milestones that would assure Southern California's ability to comply with pending more stringent regulations is of particular interest to Metropolitan.

Source water quality improvements must be combined with cost-effective water treatment technologies to ensure safe drinking water at a reasonable cost. Metropolitan is currently moving forward with plans to upgrade two water treatment facilities that treat only SWP water. These plants will be upgraded to include ozone treatment at a cost of $263 million.

Methyl Tertiary Butyl Ether

MTBE is the primary oxygenate in virtually all the gasoline used in California. The use of MTBE in gasoline was mandated to achieve reductions in air pollution, including emissions of benzene, a known human carcinogen. However, this reduction in air pollution has been achieved at the expense of creating a serious groundwater and surface water contaminant. MTBE is very soluble in water and has low affinity for soil particles, thus

allowing the chemical to move quickly in the groundwater. It is introduced into surface water bodies from the motor exhausts of recreational watercraft. MTBE is also resistant to chemical and microbial degradation in water, making treatment more difficult than the treatment of other gasoline components.

The California Department of Health Services (CDHS) has adopted a primary maximum contaminant level (MCL) of 13 µg/L (micrograms/liter) for MTBE based on carcinogenicity studies in animals. MTBE also has a California Secondary Drinking Water Standard of 5 µg/L, which was established based on taste and odor concerns. Metropolitan regularly monitors its water supply for MTBE contamination. MTBE has been detected in the past years at levels of non-detect to as high as 3.9 µg/L in the treatment plant effluents, and as high as 6.4 µg/L in the source water effluents.

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. One gallon of gasoline (11% MTBE by volume) is enough to contaminate about 16.5 million gallons of water at 5 µg/L. Within Metropolitan's service area, local groundwater producers have been forced to close some of their wells due to MTBE. For example, the city of Santa Monica lost about 50 percent of its production wells as a result of MTBE contamination.

For the new Diamond Valley Lake, Metropolitan has taken steps to reduce the potential for MTBE contamination from recreational watercraft. The Board has authorized a non-polluting boating program for the Diamond Valley Lake that calls for a monitoring program to help ensure that neither MTBE nor any other gasoline contaminant from motorboat fuels are found at the lake. Until such time as MTBE is eliminated from the fuel supply or non-polluting marine engines are available, no gasoline-powered boating will be permitted.

Metropolitan has supported federal and state legislation aimed at reducing the impacts of MTBE in its drinking water supply, and it is investigating treatment options. In 1999, Governor Gray Davis issued Executive Order D-5-99, which will phase out MTBE as a gasoline additive by December 31, 2002. However, there are political issues that will need to be resolved with the Federal Clean Air Act and the requirement for mandatory use of oxygenates. Until the use of MTBE is phased out, MTBE will continue to be a problem at SWP reservoirs that permit gasoline-powered boating and jet skiing.

The most likely impact of MTBE on Metropolitan is through local problems that may directly impact its member agencies. If the contamination causes reduced groundwater production, it will decrease the yield of local water supplies and increase demand for Metropolitan imported water deliveries. Member agencies that rely on groundwater aquifers that are near the surface are the most likely ones to be impacted. 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. However, it is difficult to estimate the magnitude of the problem because a small amount of MTBE can contaminate such a large volume of water.

Perchlorate

Perchlorate is a strong oxidizer used as a main component in solid rocket propellant, and it can also be found in some types of munitions and fireworks. Perchlorate salts are readily soluble in water, dissociating into the perchlorate ion (ClO_4) which is highly mobile in the groundwater. The perchlorate ion 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 interferes with the thyroid gland's ability to produce hormones required for normal growth and development. Currently CDHS has adopted an action level of 18 µg/L for perchlorate. If the action level is exceeded, CDHS recommends that utilities inform its consumers of its presence in the drinking water supply and the associated potential adverse health effects. CDHS recommends that the source supplies be removed if perchlorate levels exceed 40 µg/L.

Perchlorate has been detected in Metropolitan's CRA water supply and in some of the regional groundwater basins. No perchlorate has been detected in Metropolitan's SWP supply. Metropolitan regularly monitors perchlorate levels in its source and finished waters and select sites in the distribution system. Measured perchlorate levels in the Metropolitan system range from no detection to about 9 µg/L, well below the current action level developed by CDHS. A state Public Health Goal (PHG) for perchlorate is currently being developed for possible future regulatory consideration.

The following sections provide more details of the areas where perchlorate has been detected.

Colorado River

Metropolitan first detected very low concentrations of perchlorate in its CRA supply in 1997. Once perchlorate was detected, Metropolitan took immediate action to determine the source by conducting extensive water quality testing upstream of Lake Havasu. As a result of the testing, Metropolitan identified the Las Vegas Wash that flows into Lake Mead as a significant source of the perchlorate. Concentrations exceeding 1,000 µg/L have been measured in this wash. The source of this perchlorate is thought to be the ammonium perchlorate manufacturing facilities located upgradient in Henderson, Nevada. Since locating this source, Metropolitan staff have met with the U.S. Environmental Protection Agency and the Nevada Division of Environmental Protection to find ways to reduce the levels of perchlorate entering Metropolitan's CRA supply. Remediation efforts at Henderson, Nevada, are currently under way, and a reduction of perchlorate in the Las Vegas Wash has been observed. However, additional remediation efforts are required to further reduce perchlorate contamination of the CRA supply.

Groundwater Basins

Perchlorate has also been detected in local groundwater basins. Some drinking water supply wells in the Raymond and Main San Gabriel Basins have been closed because concentrations exceeded the California action level. Perchlorate in these basins is thought to be from local sources that tested and manufactured solid rocket engines. The closed wells are typically located near rocket testing and manufacturing facilities (for example, Aerojet in Azusa in the Main San Gabriel Basin and the Jet Propulsion Laboratory/NASA (JPL) in Raymond Basin). In the case of the Raymond Basin, one City of Pasadena well has been shut down because of perchlorate

concentrations of approximately 100 to 125 µg/L. In the Main San Gabriel Basin several wells have been shut down; La Puente County Water District has the highest concentrations in the Main San Gabriel Basin at approximately 200 µg/L.

Perchlorate is still being manufactured. Ammonium perchlorate is used as the solid rocket fuel in the space shuttle and nuclear defense missiles. The handling of perchlorate has improved substantially over the years. Collection and treatment systems are now commonly used when handling the perchlorate, so the risk from future spills is minimized. However, the amount of perchlorate that is already in groundwater or the overlying soil may provide an enormous source of contamination today and long into the future. Perchlorate moves relatively easy with the groundwater, so it is possible that over time, existing plumes will expand and impact other wells. However, potentially affected wells will probably be in localized areas because few facilities use perchlorate.

Metropolitan is also conducting research and development to investigate technologies to mitigate perchlorate contamination. To date, Metropolitan staff has learned that perchlorate cannot be treated using conventional water treatment. Nanofiltration and reverse osmosis work, but at a very high cost. Local companies have also conducted work on this topic. Aerojet has implemented biological treatment in Rancho Cordova and is re-injecting the treated water into the ground. CDHS has yet to approve biological treatment for a drinking water end use, so the usefulness of this technology is limited to recharge projects. Calgon has developed an ion exchange process that does remove perchlorate, but creates a hazardous waste brine. This ion exchange process is called the ISEP continuous ion exchange system. This ISEP system has been successfully piloted at JPL and at a location in the Main San Gabriel Basin. The treatment cost for the Calgon process is about $300 per af excluding the cost to dispose of the waste brine. The La Puente County Water District is initiating construction of the Calgon ISEP ion exchange treatment unit (2,500 gpm) for its affected supplies.

Arsenic

The current state and federal MCL for arsenic in domestic water supplies is 50 µg/L. The USEPA has proposed to lower the arsenic standard to 5 µg/L and asked for comments on regulation at 3, 10 and 20 µg/L. Current data suggests that western states have higher naturally occurring incidences of arsenic in water sources. The standard will impact both groundwater and surface water supplies.

Initial studies indicate that Metropolitan's water supplies have low levels of this contaminant and could likely be brought into compliance with expected standards at a minimal cost. However, some member agencies may face greater problems with compliance. A 1992 study by Central Basin Municipal Water District indicated that some of the Central Basin wells could have difficulty in complying with a lowered standard. Presumably, other basins could face similar problems. Wellhead removal of arsenic could be expensive, so member agencies might increase their use of imported water to avoid this treatment cost. Water supplies imported via the Los Angeles Aqueduct also contain some arsenic. The cost of arsenic removal from these supplies could vary significantly depending on the adopted MCL.

A study conducted by the Association of California Water Agencies (ACWA) found that an adopted MCL of 5 µg/L would require

treatment at approximately 20 percent of the water sources in California, while an MCL of 10 µg/L would require treatment at approximately 6 percent of these sources.[2] Treatment for water from groundwater basins is likely to be least economic because of the need for small-scale individual treatment facilities at wellheads.

Radon

USEPA has proposed a radon MCL at 300 pCi/L, with an alternative standard of 4000 pCi/L if the state has an approved Multimedia Mitigation program to reduce the indoor radon risk from soil and rocks underneath homes and buildings. Aeration is widely recognized as the most appropriate treatment to remove radon, but Southern California has stringent air-quality regulations that may complicate or even prevent the use of air-stripping towers. Because of the uncertainty surrounding this proposed rule, the effect on Southern California water supplies is unclear.

Uranium Mill Tailings Site Near the Colorado River

A 10.5-ton pile of uranium mill tailings in Moab, Utah, is located adjacent to the Colorado River and could potentially contaminate the river in the future. The mill was owned by the Atlas Corporation, which has declared bankruptcy. Metropolitan has supported efforts to move the pile away from the river or to implement an alternative equivalent to moving the pile. Legislation to that effect has been signed by President Clinton as part of next year's defense appropriation bill. In the meantime, PriceWaterhouseCooper has been appointed trustee for the Atlas Corporation uranium mill tailings site as part of the Atlas Corporation bankruptcy proceedings. They are coordinating work to begin dewatering the pile, a first step before covering or moving it.

[2]Extracted from the ACWA study: *Cost of Compliance With Potential Arsenic MCLs*, conducted by Kennedy/Jenks, March 1997.

Other Emerging Contaminants

NDMA and hexavalent chromium (chromium VI) are emerging contaminants that may possibly impact groundwater supplies. NDMA contamination of groundwater was initially believed to be the result of chemical contamination from liquid rocket fuels. It was detected in some California groundwaters at concentrations exceeding California's temporary action level of 0.02 µg/L. Further investigations have shown NDMA to be a disinfection by-product of some water and wastewater treatments. The formation mechanisms are unknown, but additional NDMA removal technologies may be required to avoid impacts on Southern California drinking water supplies. Current levels of NDMA in Metropolitan's system range from non-detect (reporting limit of 0.002 µg/L) to 0.007 µg/L. The presence of NDMA is not limited to Metropolitan waters and is believed to be relatively widespread.

Chromium VI is a possible contaminant in groundwater and surface water. Chromium is an inorganic chemical used in electroplating, leather tanning, wood treatment, pigments manufacture, and cooling tower treatment for corrosion control. It can enter drinking water sources through discharges from industries, leaching from hazardous waste sites, and erosion of natural deposits. The California Office of Health Hazard Assessment adopted a public health goal for total chromium at 2.5 µg/L. The MCL for total chromium is 0.05 mg/L, but is currently under review by the CDHS. The CDHS will likely add chromium VI to the list of unregulated chemicals for which monitoring will be required.

Watershed Management

Metropolitan has a significant interest in addressing water quality problems and

solutions on a regional or watershed basis due to the growing emphasis on drinking water source protection. Watershed management involves a comprehensive, fully integrated approach to watershed protection and restoration and water quality improvement. Metropolitan's interest in watershed management is to pursue source water quality improvement and water supply reliability objectives in the Bay-Delta system and the Colorado River basin. Additionally, water quality protection in watersheds, including those in Southern California, is essential for the success of groundwater conjunctive use programs. Metropolitan recently established legislative policy principles on watershed management. Metropolitan is also currently involved in watershed management planning efforts and is monitoring the impacts of recent decisions regarding urban storm water flows.

Legislative Policy Principles on Watershed Management

In January, 1995, Metropolitan's Board adopted legislative policy principles on watershed management addressing the following areas: the incorporation of source water quality improvement and supply reliability objectives into watershed management plans; the development of watershed management plans that recognized local authorities and conditions in the watershed; and participation as a stakeholder in watershed planning activities. Legislation considered by the State Legislature in 1999 and introduced in 2000 addressed funding mechanisms to support watershed management activities and the assessment of watershed funding needs. As a result, Metropolitan's Board adopted updated legislative policy principles on watershed management in April 2000. The adopted legislative policy principles provide direction to Metropolitan staff in the following areas:

Funding for Watershed Management

- Support public funding for watershed restoration and management programs that provide broad public benefits, including water quality, water supply reliability and environmental improvements. Public funding mechanisms include voter-approved State General Obligation Bonds and federal and state budget appropriations.
- Public agencies that administer watershed management funding programs and allocate public funds for specific watershed projects should: (1) develop well-defined criteria for the distribution of funds; (2) justify that funding levels represent actual needs; (3) provide oversight for the funding program; and (4) specify monitoring and reporting requirements for watershed project proponents receiving funding.
- Support watershed management funding methods that promote watershed responsibility and fairly allocate costs to those entities responsible for water quality degradation in the watershed.
- Watershed management programs funded by fees on water exporters or on residential, commercial and industrial users of water on a case by case basis. Such fees must meet the following criteria: (1) the purpose and use of the fee must be clearly identified; and (2) a determination must be made that there is a reasonable relationship between the fee and the benefit to be derived. These criteria are consistent with Government Code Section 66001 concerning fees for development projects.

Watershed Management Plans

- Support legislation that provides for the development of watershed management plans, in both the southern California

region and the Bay-Delta watershed, that are consistent with the following criteria:

- Watershed management plans should address all water resources management objectives for the watershed, including source water quality improvement, groundwater protection, water supply reliability, flood protection and ecosystem restoration objectives.
- To achieve water quality improvement objectives for surface waters and groundwater basins, watershed management plans should address all sources of pollutants within the watershed and consider the relative impact of each source when developing and implementing control measures.
- Watershed management plans should recognize local primacy in basin management and land-use planning, consider local conditions, needs and objectives, and encourage joint cooperation in watershed management activities.
- Watershed planning processes should have a public participation process that includes public drinking water suppliers as a stakeholder and facilitates cooperative working relationships among all watershed stakeholders.
- Watershed management plans should be consistent and coordinated with the authority of the State to manage allocation of water supplies within its jurisdiction.

Participation in Watershed Planning Processes

- Support Metropolitan's involvement as a stakeholder in watershed planning and management processes for imported sources of supply (i.e., the Bay-Delta watershed and the multi-state Colorado River watershed), to work in cooperation with other watershed stakeholders, and ensure consideration of drinking water quality and water supply reliability objectives.
- Support Metropolitan's involvement as a stakeholder working cooperatively with the member agencies and others on watershed planning efforts for local water supplies and potential local water supplies, to ensure consideration of drinking water quality and water supply reliability objectives.

Recent Activities

Regulations on Storm Water Flows

Metropolitan monitors developments in the regulations regarding storm water flows including those set by the Los Angeles Regional Water Quality Control Board (LARWQCB). The LARWQCB adopted a Standard Urban Storm Water Mitigation Plan (SUSMP) for Los Angeles County and its cities.[3] The LARWQCB found that, "Storm water runoff will normally convey a disproportionate loading of pollutants in the initial period runoff generated during a storm event. Storm events generating up to 0.75 inches of precipitation, measured over a 24-hour period, constitute 85 percent of the total amount of runoff that can be expected during an average wet season."[4] The SUSMP does include related design standards for structural or treatment control Best Management Practices for mitigation of storm water runoff.

[3]Final Approved Standard Urban Storm Water Mitigation Plan for Los Angeles County and Cities in Los Angeles County, March 8, 2000

[4]State of California, California Regional Water Quality Control Board, Los Angeles Region, Resolution No. R-00-02, Approving the Standard Urban Water Mitigation Plan for Municipal Storm Water and Urban Runoff Management Programs in Los Angeles County, January 26, 2000.

Water Augmentation Study

Metropolitan has an interest in quality and quantity implications of the SUSMP and is currently participating in a Water Augmentation Study initiated by the Los Angeles and San Gabriel Rivers Watershed Council (Watershed Council.) The Watershed Council is a non-profit organization that brings together community groups, government agencies, businesses, and academia to solve problems in the watershed. The Watershed Council has initiated the study on how to both augment water quantity and improve water quality in the watershed. Metropolitan is part of the Memorandum of Understanding for the funding of Phase 1 of the Water Augmentation Study, along with other federal, state, and local agencies. Phase 1 of the study will focus on defining the quality of stormwater runoff and prioritizing the quality of the runoff. Later phases will define the quantity of water in the watershed that could be developed to augment local water resources, define watershed benefits of watershed activities (best management practices), and ensure there are no negative water quality impacts to the groundwater resources.

Watershed Conference

Metropolitan hosted a Watershed Decision Makers Dialogue Conference in November 2000 at its headquarters building. A unique aspect of the two-day conference was that it brought land use and water decision makers, elected officials, and top appointees together to discuss mutually beneficial solutions to some of the challenges in their respective areas. The conference featured legislative perspectives, statewide resource agency programs, success stories from both Northern and Southern California watersheds, and practical ways to meet the emerging stormwater pollution regulations. The goal of the conference was to discover areas of common interest and mutual opportunity for cost effective, multi-benefit solutions, while restoring and protecting our natural resources.

APPENDIX A.1
DEMAND FORECAST

A.1 DEMAND FORECAST

Forecast Overview

Water demand in the Metropolitan service area has experienced several discernable trends in the past five years. Southern California emerged from a regional economic recession in the mid-1990s. Despite the robust economy, the sustained development of long-term conservation programs and increases in pricing have succeeded in suppressing growth in demands. Metropolitan projects that aggregate water demand will continue along this trend; per capita water demand will not return to its pre-drought highs, with conservation programs and water pricing offsetting water demand growth.

To forecast urban water demands, Metropolitan uses the MWD-MAIN Water Use Forecasting System. MWD-MAIN is a model combining statistical and end-use methods that has been adapted to conditions in Southern California. The statistical portion of the model incorporates projections of demographic and economic variables from regional planning agencies (the Southern California Association of Governments, or SCAG, and the San Diego Association of Governments, or SANDAG) into statistically estimated water demand models to produce forecasts of water demand. The end-use portion of the model derives estimates of conservation by adding additional information on how that water is used – the end uses.

The MWD-MAIN system features a separate unique model for each sector. Table A.1-1 depicts these key relationships in the MWD-MAIN model. In the residential sector, the forecasts of water demand per dwelling unit

Table A.1-1
MWD-MAIN Relationships by Demand Sector

Demand Sector	Dependent Variable	Key Explanatory Variables
Single Family Residential	Demand per household	Service area location Household size Weather conditions Household income Price and conservation
Multifamily Residential	Demand per household	Service area location Household size Weather Household income Price and conservation
Industrial Commercial, Institutional	Demand per employee	Employment by S.I.C grouping Price and conservation Service area location
System Losses/Other		Percentage of total use

are ultimately combined with the forecasts of dwelling units from the regional planning agencies to yield an estimate of total sector water demand. Similarly, in the nonresidential sector, water use per employee is combined with forecasts of employment to yield an estimate of total non-residential water demand.

In addition to accounting for future demographic trends, Metropolitan's water demand forecasts incorporate current and future water demand management (conservation) efforts. In 1991, Metropolitan signed a *Memorandum of Understanding Regarding Urban Water Conservation in California* (MOU). The MOU commits Metropolitan to implement a number of long-term water conservation measures referred to as Best Management Practices (BMPs). (A more detailed discussion of Metropolitan's efforts in implementing the BMPs is presented in Section III.1.)

The MWDMAIN model embeds a detailed accounting of water conservation, distinguishing between:

- *Passive Conservation* – Water saved as a result of changes in water efficiency requirements for plumbing fixtures in plumbing codes. This form of conservation would occur without any water agency action.
- *Active Conservation* – Water saved directly as a result of conservation programs by water agencies (including implementation of Best Management Practices). This form of conservation is unlikely to occur without agency action.
- *Price-effect Conservation* – Water saved by retail customers attributable to the effect of changes in the real (inflation-adjusted) price of water. There may be some overlap between this form of conservation and the previous two. For example, increased water prices might induce a consumer to take part in one of the active conservation programs run by the providing agency.

Metropolitan's demand projections account for the effects of the conservation BMPs, including projected changes in the price of water. The forecast is based on expected BMP participation, recognizing that some of the region's retail agencies are not BMP signatories and that some BMPs are not cost effective in Metropolitan's service area.

Trends in Southern California

Population

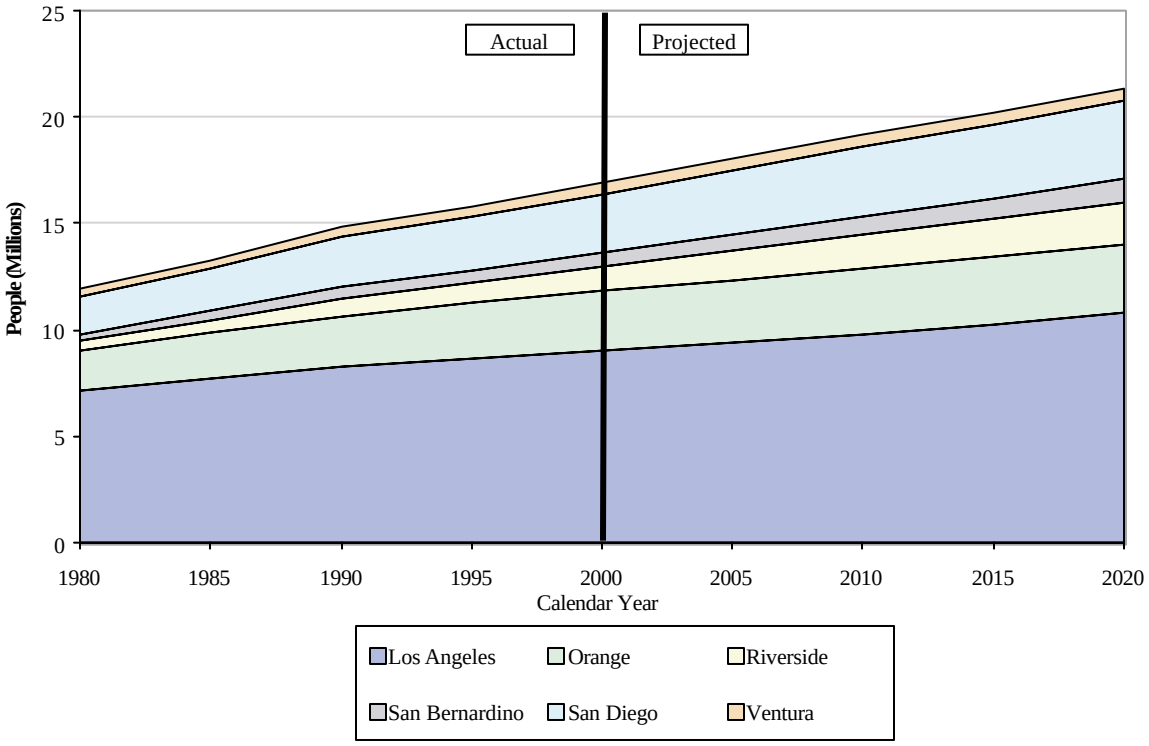
The population of Metropolitan's service area was approximately 15.8 million in 1995 and has grown to approximately 16.9 million in 2000. This represents an annual addition over this five-year period of about 211,000 people per year. The historic and projected population growth by county within Metropolitan's service is shown in Figure A.1-1 and Table A.1-2. The population in the entire service area is projected to be approximately 21.3 million by the year 2020, constituting an average annual increase of about 223,000 people per year.

Industrial and Commercial

Southern California accounts for a significant portion of the state's economy, accounting for approximately 54% of the state's total personal income. In 1999, total personal income in Southern California was estimated to be $535 billion.[1]

[1]Center for Continuing Study of the California Economy, California County Projections, 2000 Edition

Figure A.1-1
Actual and Projected Population



Employment growth will not occur at the same rate across the six counties (Table A.1-3). Over the 20-year period, 2000-2020, the greatest employment increases are expected to occur in Los Angeles County (with more than one million additional jobs expected). Relative to existing employment, Riverside and San Bernardino counties are expected to have the fastest rates of growth (104 and 91 percent), followed by Ventura and Orange counties (64 and 41 percent), and San Diego and Los Angeles counties (29 and 25 percent).

Table A.1-3 and Figure A.1-2 summarize the projections of commercial/institutional and industrial employment in Metropolitan's service area. The number of people employed is expected to increase from 7.8 million in 2000 to about 10.5 million in 2020. This increase of about 35 percent is greater than the projected population (26 percent) and housing growth (30 percent), suggesting that a somewhat greater proportion of the population will be employed over time.

Residential Consumers

Regional planning agencies – SCAG and SANDAG – have forecast growth in residential housing in all geographic areas of the Metropolitan service area (Figure A.1-3 and Table A.1-4). The total occupied housing stock is expected to increase more than 30 percent from 2000 to 2020 (from 5.4 to 7.1 million housing units). Much of this growth is forecasted to occur in inland areas. No increase in the area served is expected at this time. Within the service area, the household occupancy size (household population divided by total occupied dwelling units) is forecasted to remain at around three persons per household.

Figure A.1-2
Actual and Projected Employment

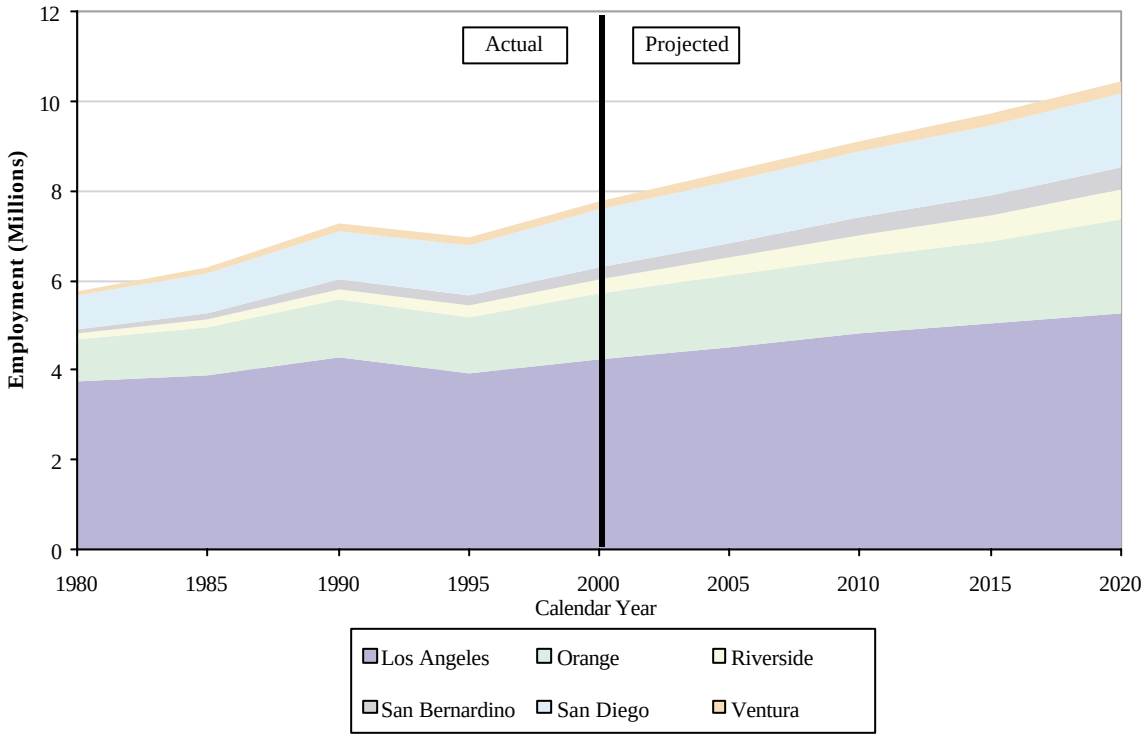
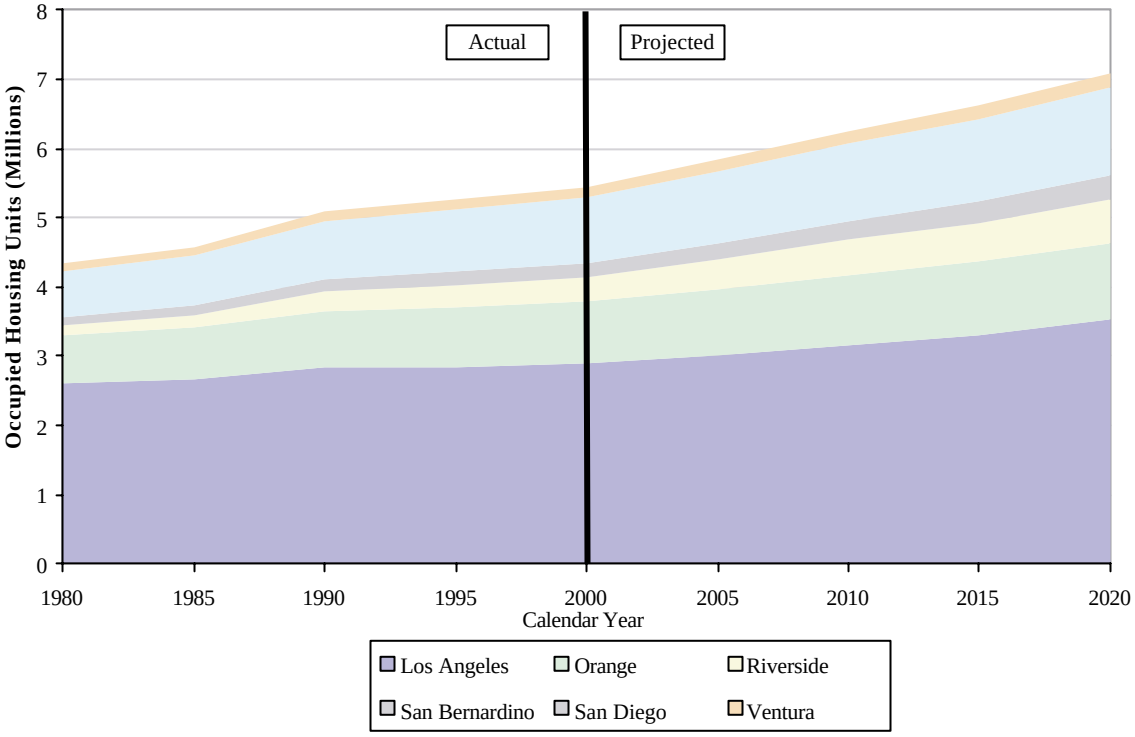


Figure A.1-3
Actual and Projected Housing



Water Demands

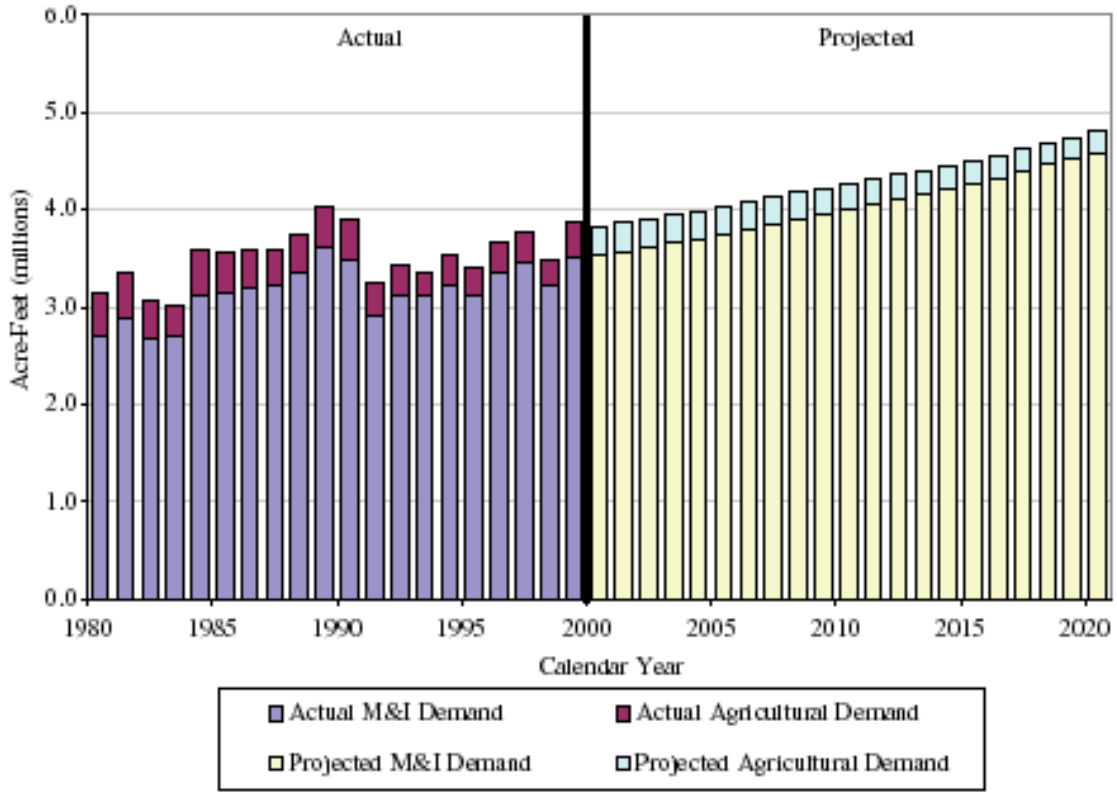
Historical retail water demands in Metropolitan's service area have increased from 3.1 million acre-feet (af) in 1980 to 3.9 million af in 1990 (Figure A.1-4 and Table A.1-5). Due to the recession, wet weather, unprecedented conservation efforts, and lingering drought impacts, water use was lower for several years in the mid-nineties. Of the 3.5 million af used in 1998, 3.2 million af (91 percent) were used for municipal and industrial purposes (M&I), and 0.3 million af (9 percent) were used for agricultural purposes. The relative share of M&I water use to total water use has been increasing over time as agricultural water use has declined due to urbanization and market factors, including the price of water. Agricultural water use accounted for 14 percent in 1980, 11 percent in 1990, 9 percent in 1995, and 8.3 percent in 1997.

Total water use is projected to grow from a projected 3.8 million af in 2000 to 4.8 million af in 2020 (Table A.1-5). All water demand projections begin in the year 2000 and reflect demands under normal weather conditions. The water demand forecasts account for water savings resulting from plumbing codes, price effects, and actual and projected implementation of Best Management Practices. Per capita water demand is forecast to remain relatively constant over the 20-year forecast horizon (Table A.1-13).

By County – Total retail water demand is not expected to grow uniformly across counties. Following the pattern of the demographic projections, the greatest increase in urban water demands is expected to occur in Los Angeles, Riverside, and San Diego counties. The largest absolute increase in water demand is expected

Figure A.1-4

Actual and Projected Retail Water Demand



to occur in Los Angeles County, an increase of 380,000 af per year between 2000 and 2020. Relative to current water demands, demands in Riverside County are expected to increase at the fastest rate (51 percent between 2000 and 2020). The counties with the smallest percent increases in population are also projected to experience the smallest percent increase in water demand (Los Angeles and Orange).

By Sector – Water use can also be broken down by sector. Between 2000 and 2020, single-family residential water use is expected to increase by 27 percent (Table A.1-8), while multifamily water use is expected to increase by 43 percent (Table A.1-9). Nonresidential water use between 2000 and 2020 is expected to increase by 27 percent (Table A.1-10). Water use projections for the nonresidential sector generally follow the employment projections shown in Table A.1-3. There is an additional sector needed to account for system losses and any other retail demand; these residual demands are identified in Table A.1-11.

Residential Water Use

Although single-family homes account for about 55 percent of the total occupied housing stock, they account for about 70 percent of total residential water demands. This variation occurs because single-family households tend to use more water than households in a multi-family structure (such as apartment buildings) on a per housing-unit basis. Single-family households tend to have more persons living in the household; they are likely to have more water-using appliances and fixtures; and they tend to have more landscaping per home.

Nonresidential Water Use

Nonresidential water use represents about 25 percent of the total M&I demands in Metropolitan's service area. The nonresidential sector represents water that is used by businesses, services, government, institutions (such as hospitals and schools), and industrial (or manufacturing) establishments. Within the commercial/institutional category, the top water users include schools, hospitals, hotels, amusement parks, colleges, laundries, and restaurants. In Southern California, the major industrial users include electronics, aircraft, petroleum refining, beverages, food processing, and other industries that use water as a major component of the manufacturing process.

Agricultural Water Use

Agricultural water use currently constitutes about 8 percent of total regional water demand in Metropolitan's service area. Metropolitan has historically provided water supplies to meet 30 to 50 percent of total agricultural water demand. Remaining agricultural water demands are met by local water supplies. Table A.1-7 depicts historical and projected agricultural water demands by county.

MWD Sales

Historical and projected MWD sales by category of sale are shown in Table A.1-15. Categories of sales in the future may change due to the strategic planning process and the related rate restructuring.

Table A.1-2 Estimated and Projected Population in Metropolitan's Service Area

County	Estimated 1980	1985	1990	1995	Projected 2000	2005	2010	2015	2020	Percent Change 2000-2020
Los Angeles County	7,097,600	7,720,200	8,251,900	8,646,400	9,045,400	9,400,000	9,754,700	10,233,700	10,778,500	19.2%
Orange County	1,918,400	2,142,500	2,397,000	2,595,900	2,804,100	2,954,000	3,103,800	3,164,000	3,242,700	15.6%
Riverside County	458,000	592,500	821,400	962,500	1,095,400	1,356,600	1,617,900	1,805,000	2,000,300	82.6%
San Bernardino County	339,700	422,500	548,200	613,800	667,000	764,800	862,600	955,000	1,045,900	56.8%
San Diego County	1,751,800	1,969,600	2,348,000	2,522,000	2,761,000	3,015,400	3,269,700	3,457,600	3,667,600	32.8%
Ventura County	334,500	397,400	448,000	478,000	502,800	517,200	531,500	563,700	603,400	20.0%
Metropolitan Total	**11,900,000**	**13,244,700**	**14,814,500**	**15,818,600**	**16,875,700**	**18,008,000**	**19,140,200**	**20,179,000**	**21,338,400**	**26.4%**

Estimated: Based on DOF January Estimates and SCAG/SANDAG information.

Projected: Based on SCAG RTP (1997) and SANDAG 2020 (1998) projections.

Table A.1-3 Estimated and Projected Urban (M&I) Employment in Metropolitan's Service Area

County	Estimated 1980	1985	1990	1995	Projected 2000	2005	2010	2015	2020	Percent Change 2000-2020
Los Angeles County	3,752,100	3,902,100	4,298,600	3,922,500	4,229,800	4,520,500	4,811,500	5,030,000	5,267,000	24.5%
Orange County	910,500	1,068,000	1,287,000	1,273,500	1,483,500	1,588,700	1,693,700	1,857,400	2,089,300	40.8%
Riverside County	137,000	167,400	236,000	260,100	325,500	414,800	504,100	576,400	663,700	103.9%
San Bernardino County	107,400	131,800	190,000	221,400	265,300	324,900	384,500	442,200	506,900	91.1%
San Diego County	767,100	890,600	1,097,400	1,117,700	1,274,100	1,377,100	1,480,100	1,548,300	1,643,300	29.0%
Ventura County	95,400	119,600	158,000	165,300	186,000	214,200	242,300	272,300	305,100	64.0%
Metropolitan Total	**5,769,500**	**6,279,500**	**7,267,000**	**6,960,500**	**7,764,200**	**8,440,200**	**9,116,200**	**9,726,600**	**10,475,300**	**34.9%**

Estimated: Based on EDD Data and SCAG/SANDAG information.

Projected: Based on SCAG RTP (1997) and SANDAG 2020 (1998) projections.

Table A.1-4 Estimated and Projected Occupied Housing in Metropolitan's Service Area

County	Estimated 1980	1985	1990	1995	Projected 2000	2005	2010	2015	2020	Percent Change 2000-2020
Los Angeles County	2,607,200	2,670,100	2,821,500	2,845,600	2,882,500	3,014,200	3,145,900	3,293,300	3,525,700	22.3%
Orange County	685,900	736,000	823,200	864,500	910,200	961,200	1,012,300	1,063,700	1,101,500	21.0%
Riverside County	166,000	196,400	278,300	316,300	348,800	434,400	519,900	573,500	644,100	84.7%
San Bernardino County	111,400	129,700	174,500	186,900	198,200	230,800	263,300	293,400	326,000	64.5%
San Diego County	660,700	710,700	849,300	896,500	944,700	1,035,600	1,126,400	1,197,400	1,275,200	35.0%
Ventura County	105,200	121,000	141,200	148,500	155,400	165,200	175,000	187,800	204,000	31.3%
Metropolitan Total	**4,336,400**	**4,563,900**	**5,088,000**	**5,258,300**	**5,439,800**	**5,841,400**	**6,242,800**	**6,609,100**	**7,076,500**	**30.1%**

Estimated: Based on DOF January Estimates and SCAG/SANDAG information.
Projected: Based on SCAG RTP (1997) and SANDAG 2020 (1998) projections.

Table A.1-5 Total Retail Water Demand in Metropolitan's Service Area (Acre-Feet)

County	Reported 1980	1985	1990	1995	Projected 2000	2005	2010	2015	2020	Percent Change 2000-2020
Los Angeles County	1,527,700	1,707,500	1,743,500	1,593,200	1,692,300	1,756,900	1,838,600	1,938,200	2,070,900	22.4%
Orange County	520,200	593,900	651,400	587,900	665,600	685,100	709,200	737,700	774,200	16.3%
Riverside County	348,000	375,600	480,200	403,700	488,500	540,100	593,600	629,500	679,500	39.1%
San Bernardino County	169,700	188,000	209,700	184,300	214,100	239,400	265,900	292,900	322,500	50.6%
San Diego County	476,400	579,600	678,400	522,000	637,300	669,600	715,600	748,300	790,800	24.1%
Ventura County	96,500	115,800	142,000	110,300	132,900	138,500	145,000	154,800	167,300	25.9%
Metropolitan Total	**3,138,500**	**3,560,400**	**3,905,200**	**3,401,400**	**3,830,700**	**4,029,600**	**4,267,900**	**4,501,400**	**4,805,200**	**25.4%**

Note: Includes total Agricultural and M&I use.

Table A.1-6 Retail Municipal and Industrial (M&I) Water Demand in Metropolitan's Service Area (Acre-Feet)

County	Reported 1980	1985	1990	1995	Projected 2000	2005	2010	2015	2020	Percent Change 2000-2020
Los Angeles County	1,521,300	1,702,300	1,739,800	1,583,800	1,690,600	1,755,400	1,837,300	1,937,000	2,069,900	22.4%
Orange County	481,100	549,400	625,200	571,400	647,900	669,200	695,200	725,600	763,800	17.9%
Riverside County	141,000	173,600	279,400	243,500	313,000	381,200	451,300	503,800	569,300	81.9%
San Bernardino County	123,600	150,300	172,500	152,100	186,300	214,400	243,700	273,500	305,800	64.1%
San Diego County	364,600	469,200	549,000	463,300	565,400	598,800	645,800	679,600	723,100	27.9%
Ventura County	77,100	93,800	114,500	96,000	119,700	126,300	133,800	144,600	158,000	32.0%
Metropolitan Total	**2,708,700**	**3,138,600**	**3,480,400**	**3,110,100**	**3,522,900**	**3,745,300**	**4,007,100**	**4,264,100**	**4,589,900**	**30.3%**

Reported: Metropolitan Estimates.

Projected: 2000 Sales Forecast - Retail M&I Projections.

Table A.1-7 Retail Agricultural Water Demand in Metropolitan's Service Area (Acre-Feet)

County	Reported 1980	1985	1990	1995	Projected 2000	2005	2010	2015	2020	Percent Change 2000-2020
Los Angeles County	6,300	5,300	3,700	9,400	1,700	1,500	1,300	1,200	1,000	-41.2%
Orange County	39,000	44,500	26,300	16,500	17,700	15,900	14,000	12,100	10,400	-41.2%
Riverside County	207,000	202,000	200,800	160,200	175,500	158,900	142,300	125,700	110,200	-37.2%
San Bernardino County	46,100	37,700	37,200	32,200	27,800	25,000	22,200	19,400	16,700	-39.9%
San Diego County	111,800	110,400	129,400	58,700	71,900	70,800	69,800	68,700	67,700	-5.8%
Ventura County	19,400	22,000	27,400	14,300	13,200	12,200	11,200	10,200	9,300	-29.5%
Metropolitan Total	**429,600**	**421,900**	**424,800**	**291,300**	**307,800**	**284,300**	**260,800**	**237,300**	**215,300**	**-30.1%**

Reported: Metropolitan Estimates.

Projected: 2000 Sales Forecast - Retail Agricultural Projections.

Table A.1-8 Single-Family Retail Demands in Metropolitan's Service Area (Acre-Feet)

Member Agency	Model Estimates * 1990	Model Estimates * FY97	Projected 2000	Projected 2005	Projected 2010	Projected 2015	Projected 2020	Percent Change 2000-2020
Los Angeles County	712,900	713,900	693,800	710,000	726,100	753,300	793,400	14.4%
Orange County	290,000	305,800	309,900	319,500	331,500	341,100	353,500	14.1%
Riverside County	149,900	176,700	182,500	223,000	265,300	294,400	329,800	80.7%
San Bernardino County	90,700	102,700	99,700	112,100	124,800	137,300	149,200	49.6%
San Diego County	252,300	271,500	282,100	304,400	324,800	342,700	364,700	29.3%
Ventura County	66,400	72,200	66,700	69,100	72,000	76,900	83,300	24.9%
Metropolitan Total	**1,562,200**	**1,642,800**	**1,634,700**	**1,738,100**	**1,844,500**	**1,945,700**	**2,073,900**	**26.9%**

* Values for 1990 and FY97 are model estimates, and may not agree with reported retail demands.

Table A.1-9 Multifamily Retail Demands in Metropolitan's Service Area (Acre-Feet)

Member Agency	Model Estimates * 1990	Model Estimates * FY97	Projected 2000	Projected 2005	Projected 2010	Projected 2015	Projected 2020	Percent Change 2000-2020
Los Angeles County	391,800	377,100	384,100	400,600	429,200	467,000	519,100	35.1%
Orange County	117,700	118,600	123,400	130,300	138,800	147,800	157,500	27.6%
Riverside County	39,100	42,400	46,200	57,700	70,300	80,200	92,300	99.8%
San Bernardino County	22,400	24,200	25,800	30,700	36,500	42,100	49,700	92.6%
San Diego County	103,500	105,400	108,700	118,100	133,800	148,800	165,700	52.4%
Ventura County	13,700	14,500	15,000	15,700	16,500	18,000	19,900	32.7%
Metropolitan Total	**688,200**	**682,200**	**703,200**	**753,100**	**825,100**	**903,900**	**1,004,200**	**42.8%**

* Values for 1990 and FY97 are model estimates, and may not agree with reported retail demands.

Table A.1-10 Non-Residential Retail Demands in Metropolitan's Service Area (Acre-Feet)

Member Agency	Model Estimates * 1990	Model Estimates * FY97	Projected 2000	Projected 2005	Projected 2010	Projected 2015	Projected 2020	Percent Change 2000-2020
Los Angeles County	493,600	450,500	461,200	487,700	517,700	543,900	573,100	24.3%
Orange County	162,900	164,300	164,000	167,100	170,700	180,100	193,200	17.8%
Riverside County	41,600	51,000	56,400	66,800	76,100	85,100	97,400	72.7%
San Bernardino County	32,500	34,200	37,900	45,200	52,500	60,400	69,300	82.8%
San Diego County	127,700	136,100	130,500	129,700	136,800	135,100	136,300	4.4%
Ventura County	25,200	28,500	28,600	31,600	34,900	38,400	42,500	48.6%
Metropolitan Total	**883,500**	**864,600**	**878,600**	**928,100**	**988,700**	**1,043,000**	**1,111,800**	**26.5%**

* Values for 1990 and FY97 are model estimates, and may not agree with reported retail demands.

Table A.1-11 System Losses and Other Uses in Metropolitan's Service Area (Acre-Feet)

Member Agency	Model Estimates * 1990	Model Estimates * FY97	Projected 2000	Projected 2005	Projected 2010	Projected 2015	Projected 2020	Percent Change 2000-2020
Los Angeles County	156,200	151,200	151,400	157,100	164,300	172,900	184,300	21.7%
Orange County	48,300	49,800	50,500	52,200	54,200	56,600	59,600	18.0%
Riverside County	22,700	26,400	27,800	33,700	39,700	44,200	49,800	79.1%
San Bernardino County	20,400	22,600	22,900	26,400	30,000	33,600	37,600	64.2%
San Diego County	40,900	43,400	44,100	46,700	50,400	53,000	56,400	27.9%
Ventura County	8,900	9,700	9,300	9,900	10,400	11,300	12,300	32.3%
Metropolitan Total	**297,400**	**303,100**	**306,000**	**326,000**	**349,000**	**371,600**	**400,000**	**30.7%**

* Values for 1990 and FY97 are model estimates, and may not agree with reported retail demands.

Table A.1-12 Estimated and Projected Conservation Savings in Metropolitan's Service Area (Acre-Feet)

	Model Estimates *		Projected				
Member Agency	**1990**	**FY97**	**2000**	**2005**	**2010**	**2015**	**2020**
Los Angeles County	0	64,000	100,200	154,200	197,000	231,500	266,700
Orange County	0	19,100	36,600	57,600	75,500	89,300	99,700
Riverside County	0	7,000	12,400	23,900	34,700	42,700	51,300
San Bernardino County	0	4,300	7,400	13,600	19,300	24,400	29,400
San Diego County	0	24,100	40,500	63,700	79,800	90,800	101,700
Ventura County	0	3,000	5,100	8,300	10,900	13,500	16,100
Metropolitan Total Active & Passive	**0**	**121,500**	**202,200**	**321,300**	**417,200**	**492,200**	**564,900**
Savings due to Price	*0*	*208,700*	*210,200*	*217,700*	*219,800*	*214,600*	*205,100*
Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Total Conservation All Sources	**250,000**	**580,200**	**662,400**	**789,000**	**887,000**	**956,800**	**1,020,000**

Table A.1-13 Per-Capita Demands in Metropolitan's Service Area (Gallons per Person per Day)

	Reported				Projected				
County	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
Los Angeles County	191	197	188	164	167	167	168	169	171
Orange County	224	229	233	196	206	202	200	205	210
Riverside County	275	262	304	226	255	251	249	249	254
San Bernardino County	325	318	281	221	249	250	252	256	261
San Diego County	186	213	209	164	183	177	176	175	176
Ventura County	206	211	228	179	213	218	225	229	234
Metropolitan Weighted	**203**	**212**	**210**	**176**	**186**	**186**	**187**	**189**	**192**

Note: Per-Capita water use projections are an output Metropolitan's water demand forecast, not an input.

Table A.1-14 Projected Municipal and Industrial Demands by Sector (Acre-Feet)

Sector	Model Estimates * 1990	Model Estimates * FY97	Projected 2000	Projected 2005	Projected 2010	Projected 2015	Projected 2020	Percent Change 2000-2020
Single-Family	1,562,200	1,642,600	1,634,700	1,738,100	1,844,500	1,945,700	2,073,900	26.9%
Multifamily	688,300	682,100	703,200	753,100	825,100	903,900	1,004,200	42.8%
Non-Residential	883,400	864,500	878,600	928,100	988,700	1,043,000	1,111,800	26.5%
System Losses/Other	297,200	303,000	306,000	326,000	349,000	371,600	400,000	30.7%
MWD Total	**3,431,100**	**3,492,200**	**3,522,500**	**3,745,300**	**4,007,300**	**4,264,200**	**4,589,900**	**30.3%**
Single-Family	45.5%	47.0%	46.4%	46.4%	46.0%	45.6%	45.2%	
Multifamily	20.1%	19.5%	20.0%	20.1%	20.6%	21.2%	21.9%	
Non-Residential	25.7%	24.8%	24.9%	24.8%	24.7%	24.5%	24.2%	
System Losses/Other	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%	
MWD Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	

Table A.1-15 Actual and Projected Demands on Metropolitan

Program	Actual 1980	Actual 1985	Actual 1990	Actual 1995	Estimate 2000	2000 Sales Forecast - Projected 2005	2010	2015	2020
Agricultural	179,963	176,810	205,653	89,551	125,687	91,020	80,977	71,146	61,886
Full Service	947,856	1,060,689	1,605,061	1,195,558	1,705,008	1,618,972	1,689,550	1,827,681	2,057,114
Long Term	-	-	-	-	265,065	134,213	126,047	120,286	118,779
Seasonal Shift	-	-	-	-	129,034	119,409	119,771	120,066	120,221
Seasonal Unclassified	-	-	404,568	94,464	-	-	-	-	-
Other *	174,892	422,350	400,695	50,000	37,813	-	-	-	-
MWD Total	**1,302,711**	**1,659,849**	**2,615,978**	**1,429,573**	**2,262,607**	**1,963,614**	**2,016,345**	**2,139,179**	**2,358,001**

* Includes Bank, Cooperative Storage, Cyclic Storage, Demonstration Storage, Local Storage, Reimbursable Construction, Pre-deliveries and/or Wheeling

Notes: Sales forecast does not include SDCWA/IID Transfer and Eastern Seepage Water
1980 and 1995 are wet years
1985, 1990, and 2000 are dry years

APPENDIX A.2
WATER SUPPLIES

A.2 WATER SUPPLIES

Water used in Metropolitan's service area comes from both local and imported sources. Local sources include local groundwater, surface water, and recycled wastewater. Sources of imported water include the Colorado River, the facilities of State Water Project (SWP), and water from the Owens Valley/Mono Basin.

The city of Los Angeles imports water from the eastern Owens Valley/Mono Basin in the Sierra Nevada through the Los Angeles Aqueducts (LAA). This water currently meets over 10 percent of the region's water needs. Other supplies come from local sources, and Metropolitan provides imported water supplies to meet the remaining 45 percent (historically) of the region's water needs. These imported supplies are received from Metropolitan's Colorado River Aqueduct (CRA) and the SWP's California Aqueduct. The historical use of the various local and imported supplies within Metropolitan's service area is detailed in Table A.2-1 and shown in Figure A.2-1.

Table A.2-2 shows the quantities of local and imported water used by member agencies during calendar year 1998. Metropolitan's largest water customers are the San Diego County Water Authority (29 percent of Metropolitan's supplies in 1998), the Municipal Water District of Orange County (13 percent), and West Basin MWD (10 percent). The reliance on Metropolitan's water supplies varies by agency. For example, in 1998, Upper San Gabriel received only 4 percent of its total water supply from Metropolitan, while Beverly Hills received 100 percent. However, the relative share of local and imported supplies varies from year to year based on supply and demand conditions.

The following sections describe the current supply sources in more detail. Planned future supplies are described in the main body of this document.

Local Water Supplies

Local sources of water available to the region include surface water, groundwater, and recycled water. Some of the major river systems in Southern California have been developed into systems of dams, flood control channels, and percolation ponds for supplying local water and recharging groundwater basins. For example, the San Gabriel and Santa Ana rivers capture over 80 percent of all the runoff in their watersheds. The Los Angeles River system, however, is not as efficient in capturing its runoff. In its upper reaches, which make up 25 percent of the watershed, most runoff is captured with recharge facilities. But in its lower reaches, comprising the other 75 percent of the watershed, the river and its tributaries are lined, and there are no recharge facilities. The Santa Clara River in Ventura County is outside of Metropolitan's service area, but it replenishes groundwater basins that are used by water agencies within Metropolitan's service area. Other rivers in Metropolitan's service area, such as the Santa Margarita and San Luis Rey, are essentially natural systems.

Local supplies fluctuate in response to variations in rainfall. During prolonged periods of below-normal rainfall, local water supplies decrease. Conversely, prolonged periods of

Table A.2-1
Sources of Water Supply in the Metropolitan Service Area
(Acre-Feet)

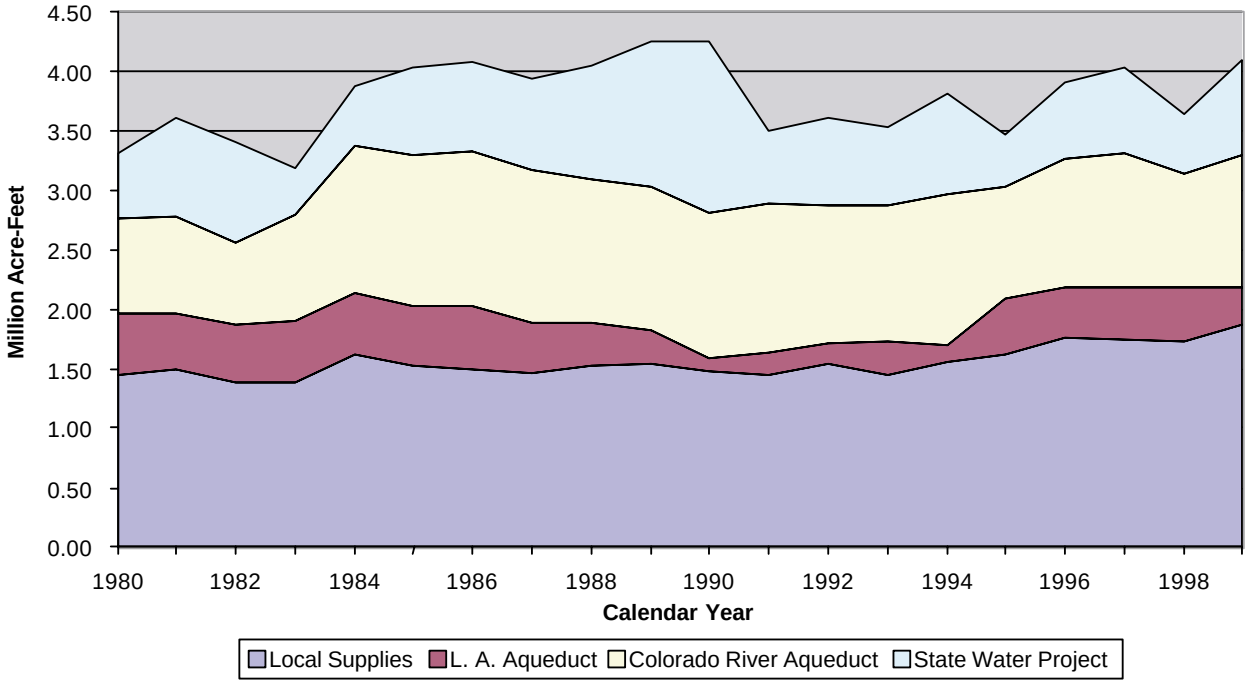
Calendar Year	Local Supplies	L. A. Aqueduct	Colorado River Aqueduct[1]	State Water Project[2]	Totals
1971	1,400,000	441,266	1,212,000	0	3,053,266
1972	1,333,333	465,948	1,212,000	71,938	3,083,219
1973	1,266,667	467,485	1,170,140	174,683	3,078,975
1974	1,200,000	453,363	1,121,788	294,117	3,069,268
1975	755,397	474,798	778,495	544,957	2,553,647
1976	1,365,639	430,305	794,620	638,051	3,228,615
1977	1,369,735	275,363	1,280,598	189,755	3,115,451
1978	1,251,051	472,330	713,816	575,545	3,012,742
1979	1,415,949	492,671	787,415	532,137	3,228,172
1980	1,446,520	514,636	794,824	559,611	3,315,591
1981	1,492,595	465,069	824,101	826,951	3,608,716
1982	1,384,712	482,953	689,516	856,996	3,414,177
1983	1,379,543	518,503	895,515	385,308	3,178,869
1984	1,616,253	516,258	1,237,230	501,682	3,871,423
1985	1,528,685	495,800	1,273,236	740,410	4,038,131
1986	1,505,120	520,565	1,303,276	756,142	4,085,103
1987	1,461,380	428,018	1,282,277	769,603	3,941,278
1988	1,519,197	369,439	1,203,571	957,276	4,049,483
1989	1,539,455	288,224	1,203,934	1,215,139	4,246,752
1990	1,481,724	106,188	1,218,321	1,457,676	4,263,909
1991	1,443,831	186,445	1,255,720	624,861	3,510,857
1992	1,539,424	176,918	1,156,687	746,991	3,620,020
1993	1,437,745	289,279	1,144,956	663,390	3,535,370
1994	1,561,649	132,541	1,266,439	845,305	3,805,934
1995	1,623,271	464,102	936,097	451,305	3,474,775
1996	1,749,198	424,994	1,092,089	642,871	3,909,152
1997	1,745,964	435,786	1,128,145	724,404	4,034,299
1998	1,725,420	466,836	943,841	510,233	3,646,330
1999	1,871,328 [3]	309,038	1,124,624	793,279	4,098,268

[1] Colorado River Aqueduct supplies are total Colorado River Aqueduct deliveries less deliveries to Desert Water Agency and Coachella Valley Water Agency (DWCV).

[2] Entitlement, Exchanges, Wheeling, Carryover, Drought Bank, etc. Excludes wheeling to Castaic Lake Water Agency and deliveries to storage outside of Metropolitan's service area.

[3] 1999 Local Supplies value is forecast.

Figure A.2-1
Sources of Water Supply in the Metropolitan Service Area



Notes
Colorado River Aqueduct supplies are total Colorado River Aqueduct deliveries less deliveries to Desert Water Agency and Coachella Valley Water District..
State Water Project includes all deliveries on the East and West Branches of the SWP System into Metropolitan's service area including Entitlement, Exchanges, Wheeling, Carryover, Drought Bank, etc. Excludes wheeling to Castaic Lake Water Agency and deliveries to storage outside of Metropolitan's service area.
1999 local supplies value is forecast.

above-normal rainfall increase local supplies. The sources of groundwater basin replenishment are local precipitation, runoff from the coastal ranges, and artificial recharge with imported water supplies. In addition to runoff, recycled water is an increasingly important source of replenishment water for the region.

Major Groundwater Basins

Groundwater sources account for about 90 percent of the native local water supplies. (The locations of the major groundwater basins are shown in Figure A.2-2.) These supplies are found in many basins throughout the Southern California region and provide an annual average total production that ranges from 1.2 to 1.4 million acre-feet (af) per year. The majority of the groundwater yield comes from natural recharge. Natural recharge of groundwater basins happens through the natural percolation of rainfall and stream runoff. In addition, runoff in certain areas is retained in flood control reservoirs in major drainage areas and released into spreading basins or ponds for percolation into the ground. The Los Angeles County Department of Public Works operates many groundwater recharge facilities that are located at the upper reaches of the Los Angeles River and San Gabriel River systems. In addition, the Orange County Water District operates a system of diversion structures and recharge basins along the Santa Ana River that captures

Table A.2-2
Water Use by Metropolitan's Member Agencies - Calendar Year 1998
(Acre-Feet)

Member Agency	Local Production Use	Metropolitan Direct Deliveries	Metropolitan Replenishment Deliveries	Metropolitan Total Deliveries	Total Water Use	Metropolitan Direct Deliveries % of Total Water Use
Anaheim	54,716	15,534	-	15,534	70,250	22%
Beverly Hills	-	13,124	-	13,124	13,124	100%
Burbank	4,138	18,180	-	18,180	22,318	81%
Calleguas MWD	17,835	94,365	1,294	95,659	112,200	84%
Central Basin MWD	178,182	58,136	6,290	64,426	236,318	25%
Coastal MWD	19,563	25,289	-	25,289	44,852	56%
Compton	4,705	4,747	-	4,747	9,452	50%
Eastern MWD	122,591	46,874	4,629	51,503	169,465	28%
Foothill MWD	8,451	7,247	296	7,543	15,698	46%
Fullerton	23,615	5,649	-	5,649	29,264	19%
Glendale	4,626	25,379	-	25,379	30,005	85%
Inland Empire Utilities Agency	157,464	43,119	8,458	51,577	200,583	21%
Las Virgenes MWD	3,080	17,418	-	17,418	20,498	85%
Long Beach	26,901	43,888	-	43,888	70,789	62%
Los Angeles	548,284	53,315	-	53,315	601,599	9%
MWD of Orange County	245,265	175,659	10,606	186,265	420,924	42%
Pasadena	20,893	14,146	-	14,146	35,039	40%
San Diego CWA	147,716	407,316	-	407,316	555,032	73%
San Fernando	3,324	-	-	-	3,324	0%
San Marino	5,557	1,004	-	1,004	6,561	15%
Santa Ana	35,996	12,066	-	12,066	48,062	25%
Santa Monica	2,641	10,759	659	11,418	13,400	80%
Three Valleys MWD	68,092	53,959	-	53,959	122,051	44%
Torrance	10,798	20,696	-	20,696	31,494	66%
Upper San Gabriel MWD	167,764	6,285	8,403	14,688	174,049	4%
West Basin MWD	66,708	125,780	11,035	136,815	192,488	65%
Western MWD	198,967	55,513	-	55,513	254,480	22%
Total	2,147,872	1,355,447	51,670	1,407,117	3,503,319	39%

Notes: Local Production Use is all local production, including recycled wastewater, Los Angeles Aqueduct supplies, and any use of Metropolitan's replenishment deliveries. This value is adjusted to reflect inter-member agency transfers and locally produced water for groundwater replenishment

most of the storm runoff, as well as recycled water from reclamation facilities in Riverside and San Bernardino counties. This water, which would otherwise flow into the Pacific Ocean, is allowed to percolate into the underlying aquifers so it may be pumped for local use when needed. Groundwater basins are also recharged with imported supplies and recycled water, either by injection or by percolation in spreading basins.

Almost all major groundwater basins in Southern California are either adjudicated or managed by special districts or agencies. The adjudicated basins in the region include: Raymond Basin, San Fernando Basin, Main San Gabriel Basin, Central Basin, West Coast Basin, Six Basins, Chino Basin, Cucamonga Basin, Rialto Basin, Colton Basin, and Bunker Hill Basin. The Orange County Groundwater Basin is managed by the Orange County Water District, portions of the Ventura County Basins are managed by the Fox Canyon Groundwater Management Agency and the United Water Conservation District, and San Jacinto Basin is managed by Eastern Municipal Water District.

When the safe yield of the basin or other groundwater management criteria are being exceeded, extractions are either limited, or the water is replenished using imported supplies. In general, basin management plans include protection from seawater intrusion, water quality deterioration, and excessive lowering of water levels. The Groundwater Management Act (Assembly Bill 3030, 1992) authorizes local water agencies that provide water service (and whose water service area includes a groundwater basin or part of a groundwater basin that is not subject to groundwater management) to adopt and implement a groundwater management plan. An agency that adopts a resolution of intention to adopt a groundwater management plan has two years

Figure A.2-2
Major Groundwater Basins
In Metropolitan's Service Area

to prepare the plan. Upon adopting a groundwater management plan, the local agency is authorized to impose fees and assessments for the purpose of groundwater management, subject to certain exceptions.

Major River Systems and Reservoirs

Local surface water consists of runoff, which is captured in storage reservoirs and held for later direct use, and diversions from streams, which are delivered directly to local water systems. Local water agency-owned and operated reservoirs are listed in Table A.2-3. These reservoirs provide a storage capacity of 717,300 af. The historic average yield of these local surface supplies, which comes from reservoir releases and stream diversions, is about 130,000 af per year. The annual yield varies widely between wet and dry years, and most reservoirs that capture local surface runoff are operated with minimal carry-over storage. San Diego County has the most storage capacity for these types of reservoirs, with approximately two-thirds of the total local agency storage capacity in Metropolitan's service area.

In addition to the storage that is owned and operated by local agencies, Metropolitan has just completed construction of Diamond Valley Lake. This reservoir will store water imported during wet years. The reservoir began filling in early 2000 and has a capacity of 800,000 af. Metropolitan also has existing reservoirs at Lake Skinner and Lake Mathews that are largely used for system operations rather than seasonal storage. Metropolitan-owned reservoirs are listed in Table A.2-4.

Water Recycling

To supplement imported water supplies, recycled water has been used in Metropolitan's service area for many years. Water recycling projects treat wastewater to a level that is acceptable and safe for many nonpotable applications. This resource is providing an increasing level of local water supply. Figure A.2-3 demonstrates the increase in this supply, from just over 15,000 af in 1980 to more than 191,000 af in 1999.

Since 1982 Metropolitan has committed to provide financial assistance to the development of 75 water recycling and groundwater recovery programs throughout its service area. Since the IRP was adopted in 1996, Metropolitan and its 27 member agencies have made significant progress in achieving regional targets for recycling and groundwater recovery. Currently, Metropolitan has contracts to participate in 53 recycled water projects and 22 groundwater recovery projects. Desalination of brackish groundwater is also critical for continued supply reliability for the Southern California region.

Imported Water

Most member agencies and retail water suppliers depend on imported water for a portion of their water supply. For example, the city of Los Angeles and the city of San Diego (the largest and second largest cities in the state) have historically (1979-98) obtained about 83 percent of their water from imported sources. The magnitude of these imported water requirements is similar to that in other metropolitan areas of the state, such as San Francisco and East San Francisco Bay. The conveyance facilities for the imported water supplies are shown in Figure A.2-4. Each of the imported sources of water available to Metropolitan's service area is described below.

Colorado River

A number of water agencies within California have rights to divert water from the

Table A-2.3
Major Local Storage Reservoirs
In Metropolitan's Service Area

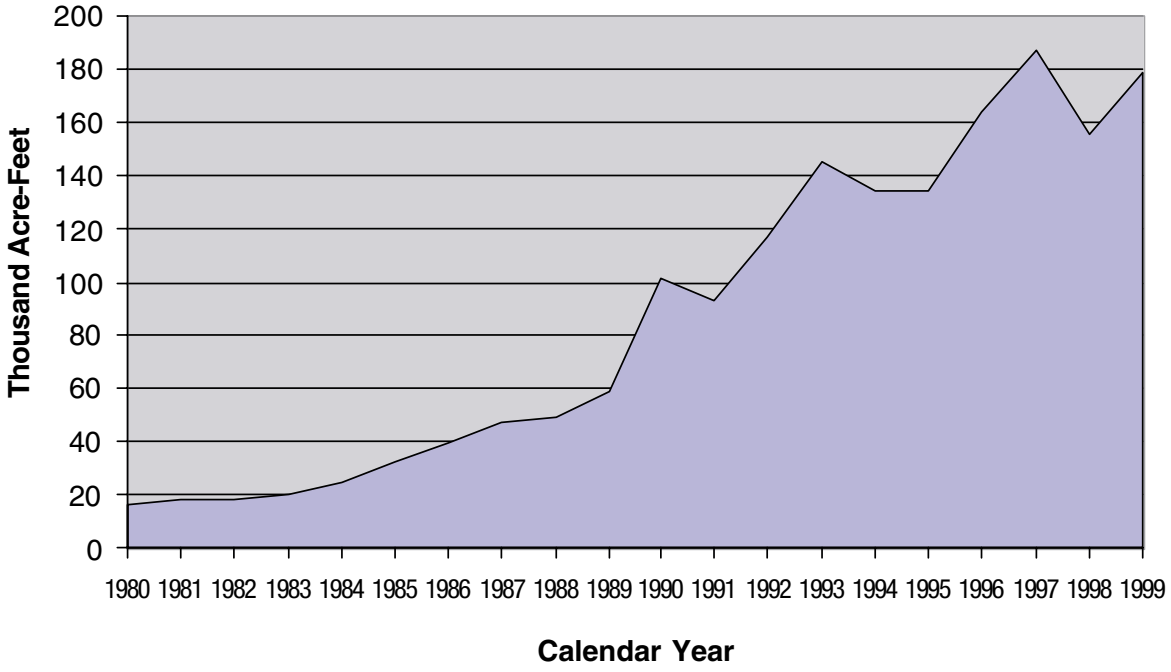
Member Agency/Subagency	Reservoir	Storage Capacity (1,000 af)
Calleguas MWD	Lake Bard	10.0
Eastern MWD		
Rancho California WD	Vail Lake	51.0
Lake Hemet MWD	Lake Hemet	14.0
Las Virgenes MWD	Westlake Reservoir	10.0
City of Los Angeles	Los Angeles	10.2
	Encino	9.8
	Stone Canyon	10.8
	Hollywood	4.2
MWD of Orange County		
Irvine Ranch WD & Serrano ID	Santiago	25.0
San Diego CWA		
Vista Irrigation District	Henshaw	51.7
Escondido	Lake Wohlford and Dixon	9.5
Helix WD	Cuyamaca Dam and Lake Jennings	18.0
City of San Diego	Barrett	38.0
	El Capitan	112.8
	Lake Hodges	33.6
	Morena	50.2
	Lower Otay	49.5
	San Vicente	90.2
	Sutherland	29.7
	Miramar	7.2
	Murray	4.8
Sweetwater Authority	Lake Loveland	25.4
	Sweetwater	27.7
Ramona MWD	Lake Ramona	12.0
Western MWD of Riverside		
Temescal Water Company	Railroad Canyon	12.0
Total		717.3

Table A.2-4
Metropolitan-Owned Regional Reservoirs

Reservoir	Capacity (1,000 af)
Diamond Valley	800
Lake Mathews [1]	182
Lake Skinner [1]	44

[1] These are used for operations and not primarily for storage.

Figure A.2-3
Historical Contributions of Recycled Water Supplies



Colorado River. Through the 1931 Seven-Party Agreement, seven agencies recommended the allocation of California's share of Colorado River water within the state. The allocations and the priority accorded those allocations are presented in Table A.2-5. The water is delivered to Metropolitan's service area by way of the Colorado River Aqueduct (CRA), which has a capacity of 1,800 cubic feet per second, or 1.3 million af per year.

The CRA conveys water 242 miles from its Lake Havasu intake to its terminal reservoir, Lake Mathews, near the city of Riverside. Since the original contract, several events have occurred to change the firm yield that Metropolitan can expect from the CRA. The most significant event was the 1964 U.S. Supreme Court Decree in *Arizona v. California* that reduced Metropolitan's dependable supply of Colorado River water to 550,000 af per year. The reduction in dependable supply occurred with the commencement of Colorado River water deliveries to the Central Arizona Project.

Future decisions could further reduce the dependable supply to Metropolitan. Such parties as Indian reservations, towns, and

Table A.2-5
Priorities in Seven-Party Agreement and Water Delivery Contracts

Priority	Description	Acre-Feet Annually
1	Palo Verde Irrigation District gross area of 104,500 acres of land in the Palo Verde Valley	
2	Yuma Project (Reservation Division) not exceeding a gross area of 25,000 acres in California	
3(a)	Imperial Irrigation District and land in Imperial and Coachella Valleys[1] to be served by All American Canal	3,850,000
3(b)	Palo Verde Irrigation District—16,000 acres of land on the Lower Palo Verde Mesa	
4	Metropolitan Water District of Southern California for use on coastal plain	550,000
	Subtotal	4,400,000
5(a)	Metropolitan Water District of Southern California for use on coastal plain	550,000
5(b)	Metropolitan Water District of Southern California for use on coastal plain[2]	112,000
6(a)	Imperial Irrigation District and land in Imperial and Coachella Valleys[1] to be served by the All American Canal	
6(b)	Palo Verde Irrigation District—16,000 acres of land on the Lower Palo Verde Mesa	300,000
7	Agricultural Use in the Colorado River Basin in California	--
	Total	**5,362,000**

[1] The Coachella Valley Water District now serves Coachella Valley.

[2] In 1946, the City of San Diego, the San Diego County Water Authority, Metropolitan, and the Secretary of the Interior entered into a contract that merged and added the City of San Diego's rights to storage and delivery of Colorado River water to the rights of Metropolitan. The conditions of that agreement have since been satisfied.

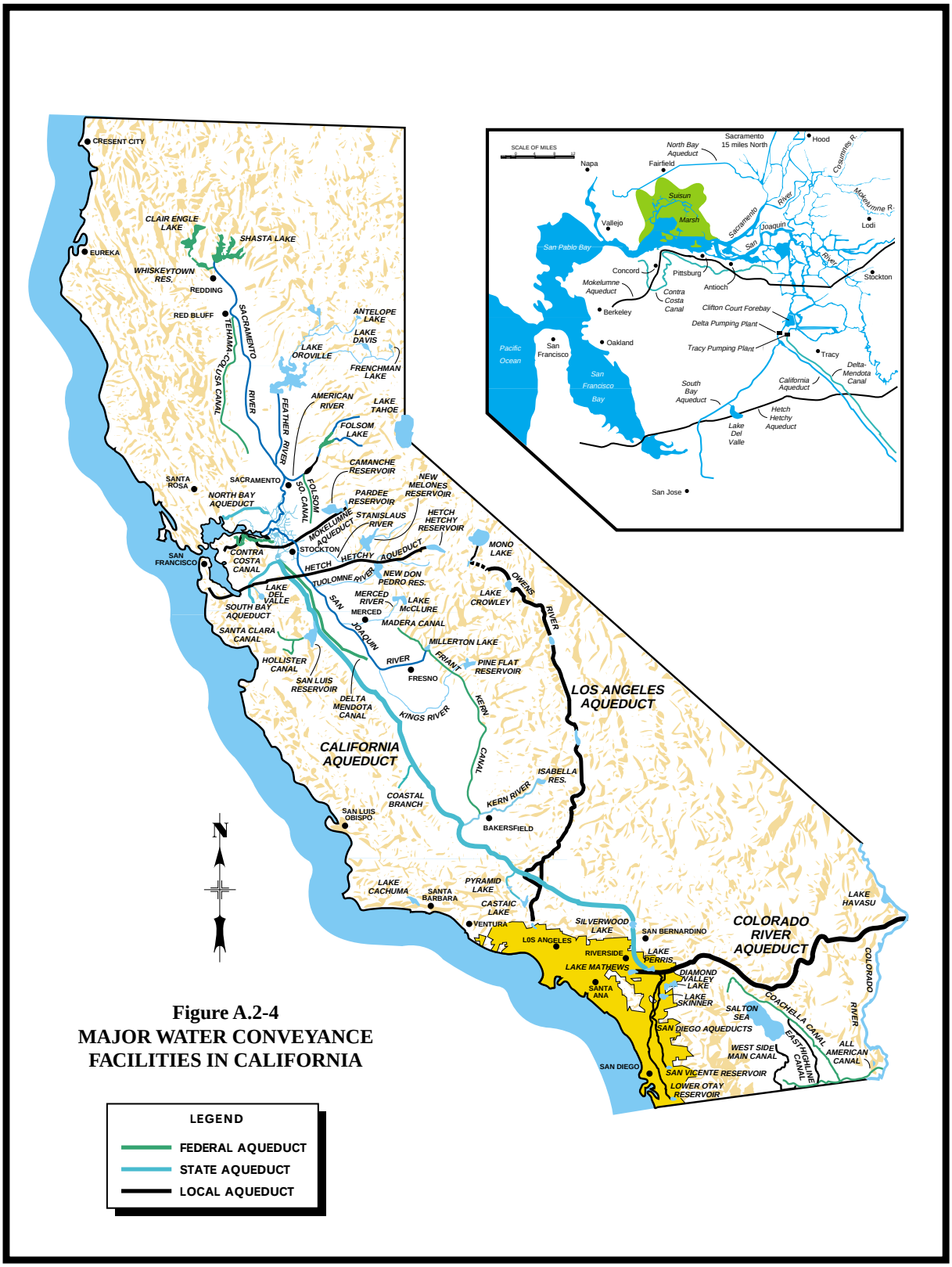


Figure A.2-4
MAJOR WATER CONVEYANCE FACILITIES IN CALIFORNIA

other individuals along the Colorado River hold present perfected water rights (PPRs) that predate the Seven-Party Agreement. Since 1985, certain Indian reservations and other users in California holding PPRs to the use of Colorado River water have used less than 20,000 af annually of Colorado River water. These rights holders were not included in the Seven-Party Agreement prioritizing California's apportionment of Colorado River water.

In the proposed Quantification Settlement Agreement with the U.S. Department of the Interior (discussed in Section III.5), Metropolitan has taken actions to counteract future reductions in water diversions. In 1987, Metropolitan entered into a contract with the U.S. Department of the Interior for an additional 180,000 af per year of surplus water. In addition, Metropolitan has obtained additional Colorado River water through a conservation program with the Imperial Irrigation District (109,460 af per year in 2000) and a demonstration groundwater storage program in Central Arizona.

On October 18, 1999, the respective boards of Coachella Valley Water District (CVWD), Imperial Irrigation District (IID), Metropolitan (collectively, the districts), and the State of California released the Key Terms for Quantification Settlement. These terms serve as the basis for obtaining public input and completing the proposed Quantification Settlement Agreement among the districts.

Quantification of rights and uses of Colorado River water with respect to Priorities 3a and 6a of the 1931 California Seven-Party Agreement will help facilitate the implementation of cooperative water supply programs. In addition, they will provide a needed numeric baseline from which conservation and transfer programs may be measured. The Quantification Settlement Agreement would help California reduce its reliance on Colorado River water above its normal apportionment. It would further quantify the rights and uses of Colorado River water by designating water budgets for CVWD, IID, and Metropolitan.

Under the Quantification Settlement Agreement, when California is limited to 4.4 million af per year, Metropolitan (under the 3rd, 4th, and 5th Priorities) will be able to receive between 771,000 and 851,000 af per year with transfers and other adjustments. In years when there are insufficient Colorado River supplies available to divert 1.25 million af into the Colorado River Aqueduct (Aqueduct) from Lake Havasu, Metropolitan proposes to substitute other supplies to permit delivery of 1.25 million af through the Aqueduct. The Palo Verde Irrigation District and the Yuma Project (Reservation Division) will continue their use of Priority 1 and 2 water.

In 1999, the Colorado River Board of California developed "California's Colorado River Water Use Plan" (Plan). The Colorado River Board of California protects California's rights and interests in the resources provided by the Colorado River and represents California in interstate discussions and negotiations regarding the Colorado River and its management. The overall purpose of the Plan is to provide Colorado River water users with a framework by which programs, projects, and other activities will be coordinated and cooperatively implemented. This coordination will allow California to satisfy its annual water supply needs within its annual apportionment of Colorado River water. This framework specifies how California will make the transition to living within its normal apportionment.

State Water Project

A second source of imported water for Metropolitan is the State Water Project (SWP), which is owned by the state and operated by the California Department of Water Resources (DWR). SWP facilities comprise 32 storage facilities (reservoirs and lakes), 662 miles of aqueduct, and 25 power and pumping plants.

The SWP conveys water from Northern California to areas south of the Bay-Delta region. Water from the SWP originates at Lake Oroville, which is located on the Feather River in Northern California. That water, along with all additional unused water from the watershed flows into the Sacramento/San Joaquin Bay-Delta. Water from the Bay-Delta is then either pumped to water users in the San Francisco Bay area or transported through the California Aqueduct to water users in Central and Southern California.

DWR contracted to deliver water in stages to 32 SWP contractors, with an ultimate delivery of 4.23 million af per year. Currently, DWR is delivering water to 29 of these SWP contractors. Metropolitan is the largest contractor, with a contracted entitlement of 2,011,500 af per year (approximately 48 percent of the total contracted entitlement). Metropolitan receives deliveries of SWP supplies via the California Aqueduct at Castaic Lake in Los Angeles County, Devil Canyon Afterbay in San Bernardino County, and Box Springs Turnout and Lake Perris in Riverside County. The first delivery of SWP water to Metropolitan occurred in 1972.

The initial facilities of the SWP, completed in the early 1970s, were designed to meet the original needs of the SWP contractors. It was intended that additional SWP facilities would be built over time to meet projected increases in contractors' delivery needs. Each contractor's SWP contract provided for a buildup in entitlement over time, with most contractors reaching their maximum annual entitlement by 1990. Since the completion of the initial SWP facilities in the early 1970s, major improvements to the system have included: four new pumps added to the Banks Pumping Plant at the Delta, the completion of the Coastal Branch, and the East Branch enlargement. Even with these improvements, however, there are still significant capacity constraints within the SWP that limit the delivery capability of the full contracted entitlement. During the same time, the contractors' needs for water from the SWP have increased. As a result, the contractors' demands for SWP water currently exceed the dependable yield.[1] It should be noted that Metropolitan has developed groundwater storage programs with Semitropic Water Storage District and Arvin-Edison Water Storage District to enhance the current water supply reliability.

The amount of entitlement that DWR approves for delivery varies annually with contractor demands and projected water supplies from tributary sources to the Delta, which are based on snowpack in the Sierra Nevada, reservoir storage, and operational constraints. Historically, the SWP has been able to meet all contractors' requests for entitlement water except during the drought years of 1977, 1990-92, and 1994. In many years, surplus water has been delivered to contractors. Deliveries to Metropolitan reached a high of 1,396,000 af in calendar year 1990. Metropolitan experienced shortages in SWP supplies in calendar years 1991 and 1992, with reduced deliveries of 391,000 af and 710,000 af, respectively.[2]

[1] The dependable yield of the existing SWP facilities is considered to be the delivery capability during a critically dry seven-year period.

[2] These numbers are Metropolitan's allocated entitlement. Total water deliveries to Metropolitan's service area are shown in Table A.2-1.

Continued investments in conservation and recycling have allowed Metropolitan to reduce its requirements for SWP water. In recent years the listing of several fish species in the Sacramento/San Joaquin Delta (Delta) under both state and federal Endangered Species Acts has constrained SWP operations and created more uncertainty in SWP supply reliability. These listed species include Delta smelt, winter-run Chinook salmon, spring-run Chinook salmon, and splittail. On August 28, 2000, the CALFED agencies concluded the CALFED planning process and launched a seven-year set of actions that, among other objectives, aims to improve water supply reliability.

In addition to the immediate reduction in regulatory uncertainty included in the consensus agreement on the Delta, a separate agreement was reached on December 1, 1994 that would provide opportunities for SWP contractors to improve their water supply reliability in the short-term. This agreement, known as the Monterey Agreement, was reached by DWR and the agricultural and urban SWP contractors. It consists of a set of principles to significantly amend the contractors' SWP contracts with DWR. These principles, along with subsequent contract amendments, cover a number of issues, including the ability for SWP contractors to improve their water management through greater and more flexible use of existing SWP storage and water conveyance facilities, as well as through the opportunity for urban contractors to purchase agricultural water entitlements.

Los Angeles Aqueducts

The city of Los Angeles imports water from the eastern Sierra Nevada through the Los Angeles Aqueducts (LAA). The original Los Angeles Aqueduct was completed in 1913, and it imported water from the Owens Valley. In 1940, the aqueduct was extended to the Mono Basin. A second aqueduct, which parallels the original, was completed in 1970.

With the completion of the aqueduct system in 1970, an average of 470,000 af of water was delivered annually through the LAA. Of this total, 380,000 af originated from surface water and groundwater in the Owens Valley, while 90,000 af came from surface water in the Mono Basin. In 1983, the aqueduct delivered a record 534,000 af of water.

In the late 1980s, a series of court injunctions limited the amount of water that Los Angeles could receive from its aqueduct system. In 1990, these limitations, along with the persistent drought, limited the delivery from the aqueduct to only 130,000 af. The Mono Lake Water Rights Decision (Decision) in September of 1994 ended the litigation in the Mono Basin, while negotiations continue with Inyo County regarding the Owens Valley water supply. In the Decision, the state ruled that Mono Lake should rise 17 feet over the next 25 years. During this time, Los Angeles would be permitted to divert water on a sliding scale based on lake levels, up to 16,000 af per year. After the lake level has risen the required 17 feet, the City of Los Angeles would be allowed to divert all water in excess of the stream flows required by the Decision. Recent precipitation levels have allowed the City of Los Angeles to make diversions of 16,000 af per year from the Mono Basin earlier than was expected at the time of the Decision.

Historical Total Regional Water Supplies

The previous sections have presented the various sources of Metropolitan's water supply. The amount of water supplied by each local and imported source from 1971 through 1999 was presented in Table A.2-1. The

imported supplies represent the amount of water imported into Metropolitan's service area, not the amount delivered to member agencies (as shown in Table A.2-2). The difference between Metropolitan's imports and deliveries is water placed into storage. The fluctuation in water supplies that occurred during this 1971-99 period is the result of a number of factors. California experienced an extended drought during this period, which was particularly severe in 1991 and 1992. The long duration of this drought, which began in 1987, resulted in a decline in local supplies over the period due primarily to a reduction in groundwater availability. In addition, shortages in SWP supplies in 1991 and 1992 resulted in significant efforts to increase water conservation activities and, for part of that time, the imposition of water rationing. Water conservation activities in the region were already considerable before the 1991-92 shortage years, but these efforts were greatly expanded during those years. Even though adequate supplies have been available in the years since the shortage, these efforts have stayed at levels similar to those of the shortage years. Efforts at increasing water recycling have also continued. As a result of these efforts, consumers in Metropolitan's service area have reduced their use of imported and local supplies.

APPENDIX A.3
PRICING AND RATE STRUCTURES

A.3 PRICING AND RATE STRUCTURES

General Overview of MWD Rate Structure

Metropolitan's rate structure is currently being revisited as part of the strategic planning process (see Section II.3 – Composite Rate Structure Framework). At this time, the rates that will result from this process are unknown. This appendix discusses the current rate structure, which is made up of commodity rates and fixed charges. Commodity rates and charges recovered 82 percent of total costs in FY1998-99. The remaining costs were recovered from property taxes, interest income and other sources of revenue. The major components of Metropolitan's rate structure are summarized in Table A.3-1.

Water Rates

Seventy-five percent of Metropolitan's revenues are generated by the sale of water. In FY1998-99, these sales amounted to $605 million. Metropolitan's water rate is a uniform (postage stamp) system-wide commodity charge set to recover costs not covered by other charges and sources of income. Because Metropolitan provides the marginal source of supply for many of its agencies, water rate revenues can vary as local supply and demand conditions fluctuate due to weather and hydrology.

Metropolitan's raw water rates vary by classes of service. Agencies that purchase water during the off-peak season (October-April), for example, can participate in the seasonal storage service program and receive water at a discount. In addition, agricultural water users can buy surplus water at a discount under the Interim Agricultural Service Program. A portion of the discounted agricultural service is interruptible during times of shortage. However, the majority of water provided falls under the full service rate.

Table A.3-1
Adopted Water Service Charges
For Fiscal Year 1999-2000

Type of Charge	Payees	Unit
Water rates	Member agencies	$/af of delivered water
Treated water surcharge	Member agencies	$/af of treated water delivered
Readiness-to-serve charge	Member agencies	$/year or $/af of historical demand
Standby charge (property tax)	Property Owners	$/parcel
New demand charge	Member agencies	$/af above historical demand

Treated Water Surcharge

Agencies receiving treated water pay a uniform treatment surcharge per acre foot to cover the cost of treatment. Treated water delivered under the Seasonal Storage Service Program and the Interim Agricultural Program is also sold with a discounted treatment surcharge. Like water rate revenues, treatment surcharge revenues vary significantly with water sales. This treatment surcharge recovered about 11 percent ($91M) of Metropolitan's costs for FY 1998-99.

Readiness-to-Serve Charge

The Readiness-to-Serve (RTS) charge is a fixed charge that recovers a portion of the principal and interest payments on Metropolitan's non-tax-supported debt service. It helps pay the debt service that has been or will be issued to fund capital improvements needed to meet the continuing reliability and water quality needs associated with the current level of demand. The revenues to be collected through this RTS charge do not vary with sales volumes in a given year.

The RTS charge provides a firm revenue source that helps stabilize revenues during times of drought or low water sales. This financial security helps preserve Metropolitan's historically high credit rating, allowing Metropolitan to borrow money at lower interest rates.

The RTS charge ensures that agencies that only occasionally purchase water from Metropolitan help pay a share of the fixed costs associated with the water quality and reliability benefits provided by Metropolitan's system. The RTS charge is allocated among member agencies based on average adjusted sales for the three fiscal years ending June 30, 1996. In Fiscal Year 1998-99, RTS charge revenues accounted for about 10 percent ($80M) of total revenues. Metropolitan expects that the RTS charge will continue to increase gradually over time, following the capital improvement expenditures that will be needed to maintain a high level of reliability and water quality throughout the system.

Standby Charge

For 23 of the 27 member agencies, Metropolitan collects a Standby Charge on property tax bills for parcels of land in the agency's service area. These Standby Charges offset all or a portion of the member agencies' RTS obligation. Rather than being reflected on a member agency's water bill, it appears on the property owner's tax bill.

New Demand Charge

The New Demand Charge (NDC) was designed to recover the capital costs associated with meeting new demands on Metropolitan's system. New demands are defined as incremental demands above 2.18 million acre-feet per year of "normal" demands. The NDC was structured to permit member agencies and their sub-agencies to establish mechanisms to collect the NDC, such as connection fees.

In approving the recommendations of Phase I of the Rate Refinement Process (RRP) in July 1996, Metropolitan's Board of Directors suspended collection of the NDC beginning with FY 1996-97. The Board, at its March meetings, will continue to determine the status of the NDC as part of the annual rate setting process.

Metropolitan is now exploring alternative methods of assigning the costs associated with new growth. Collection of the NDC, however,

will be reinstated at the time normal system demands exceed 2.18 million acre-feet, if no other charge has been implemented. The portion of water demands for each agency exceeding the NDC base and occurring during the suspension period will not be retroactively subject to the NDC. As of this date Metropolitan has not collected any revenues through the NDC.

Connection Maintenance Charge

The Connection Maintenance Charge (CMC) recovers a portion of the costs associated with operating and maintaining service connections. In FY1998-99, Metropolitan's Board approved a CMC of $50 per cubic feet per second (cfs) of connected capacity per month per connection, with a maximum charge of $5,000 per month per connection. The total charge to each member agency is based on the number of connections to which the CMC applies and the adjusted flow capacity of each connection (measured in cubic feet per second). As long as a connection is maintained, the CMC will be billed, whether or not water is delivered through the connection on a monthly basis. The CMC accounted for approximately $3 million in revenues in FY1998-99.

Historical Rates

Table A.3-2 presents Metropolitan's wholesale water rates for the period FY1991 to 2000. Historically, Metropolitan has used geographically uniform rates, sometimes referred to as "postage stamp pricing." Metropolitan's networked water delivery system has numerous interconnections within its service area. A policy for separating the cost of wheeling water within the region and establishing appropriate charges is being developed.

From fiscal years 1990 to 1996, the price of noninterruptible service increased each year, leveling off thereafter. Interruptible service was discontinued in 1991 and replaced by a new class of service: seasonal storage. In 1998, the level of seasonal storage service was further refined to distinguish long-term (year to year) and shift (within year) storage service.

General Overview of Pricing Incentive Programs

Metropolitan maintains four programs that provide economic incentives to encourage member agencies to maximize the use of regional resources, to increase local storage of imported supplies, and to implement long-term water conservation programs. These four programs are described below.

Local Projects Program

Started in 1982, this program encourages local agencies to develop water reclamation projects. Under this program, Metropolitan currently provides a financial contribution of $154 per acre-foot of new water from a local reclamation project that replaces a demand on Metropolitan. See Section III.2 for a full description of the program.

Groundwater Recovery Program

Initiated in 1991, this program encourages the treatment and production of contaminated groundwater within Metropolitan's service area. See Section III.3 for a full description of the program. Local agencies receive financial assistance for the construction and operation of local facilities used to recover contaminated groundwater. The level of Metropolitan's participation is based on the project water supply yield and the project's per unit cost, with a maximum financial incentive of $250 per acre-foot of firm yield.

Conservation Credits Program

Metropolitan is a signatory to the Urban Water Conservation Best Management Practices (BMPs) Memorandum of Understanding (MOU). The Conservation Credits Program, established in 1988, provides financial and technical assistance to member agencies for implementing the water conservation measures, or BMPs listed in the MOU, as well as other programs. See Section III.1 for a full description of the program. Metropolitan pays the lesser of one-half the program cost or the equivalent of $154 per acre-foot of water saved. A variation of this policy provides funding for ULF toilet replacement programs at a flat rate of $60 per toilet.

Seasonal Storage Service

Under the Seasonal Storage Service, Metropolitan delivers water at a discount to be used for groundwater replenishment by spreading or injection in-lieu groundwater replenishment, in-lieu reservoir storage, or direct reservoir storage. See Section III.3 for a full description of the program. The stored water is then used during a peak demand period or in times of supply shortage.

Table A.3-2
Trends In Metropolitan's Wholesale Water Rates: 1990-1999
(Dollars per Acre-Foot)

Type of Service		Fiscal Year								
		90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99
Full Service (noninterruptible)	***Untreated***	197	222	269	318	335	344	344/ 349	349	349
	Treated	230	261	322	385	412	426	426/ 431	431	431
Interruptible	***Untreated***	153/ 197	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Treated	186/ 230	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Interim Agricultural Program	***Untreated***	N/A	N/A	N/A	205	222	231	236	236	236
	Treated	N/A	N/A	N/A	248	275	289	294	294	294
Long Term Seasonal Storage Service	***Untreated***	115	130	168	208	222	229	229/ 233	233	233
	Treated	135	154	203	253	275	286	286/ 290	290	290
Shift Seasonal Storage Service	***Untreated***	115	130	168	208	222	229	229/ 233	233/ 244	244/ 255
	Treated	135	154	203	253	275	286	286/ 290	290/ 301	301/ 312
Reclaimed		84	84	84	113	113	113	113	113	113

(4/1/91) Interruptible discount eliminated.
(5/1/94) Interim Agricultural Water Program implemented.

APPENDIX A.4
URBAN WATER MANAGEMENT PLANNING ACT

Urban Water Management Planning Act

Established: AB 797, Klehs, 1983
Amended: AB 2661, Klehs, 1990
AB 11X, Filante, 1991
AB 1869, Speier, 1991
AB 892, Frazee, 1993
SB 1017, McCorquodale, 1994
AB 2853, Cortese, 1994
AB 1845, Cortese, 1995
SB 1011, Polanco, 1995
SB 553, Kelley, 2000

CALIFORNIA WATER CODE DIVISION 6
PART 2.6. URBAN WATER MANAGEMENT PLANNING

CHAPTER 1. GENERAL DECLARATION AND POLICY

10610. This part shall be known and may be cited as the "Urban Water Management Planning Act."

10610.2. The Legislature finds and declares as follows:

(a) The waters of the state are a limited and renewable resource subject to ever increasing demands.

(b) 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.

(c) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.

(d) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.

(e) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet the needs of both existing customers and future demands for water.

10610.4. The Legislature finds and declares that it is the policy of the state as follows:

(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.

(b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.

CHAPTER 2. DEFINITIONS

10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.

10611.5. "Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.

10612. "Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.

10613. "Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

10614. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.

10615. "Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

10616. "Public agency" means any board, commission, county, city and county, city, regional agency, district, or other public entity.

10616.5. "Recycled water" means the reclamation and reuse of wastewater for beneficial use.

10617. "Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 7 (commencing with Section 4010) of Part 1 of Division 5 of the Health and Safety Code.

CHAPTER 3. URBAN WATER MANAGEMENT PLANS

Article 1. General Provisions

10620.

(a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

(b) Every person that becomes an urban water supplier after December 31, 1984, shall adopt an urban water management plan within one year after it has become an urban water supplier.

c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.

(d)

(1) An urban water supplier may satisfy the requirements of this part by participation in areawide, regional, watershed, or basinwide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

(2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies,to the extent practicable.

(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.

10621.

(a) Each urban water supplier shall update its plan at least once every five years on or before December 31, in years ending in five and zero.

(b) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

Article 2. Contents of Plans

10630. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments as described in subdivision (a).

(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(1) An average water year.
(2) A single dry water year.
(3) Multiple dry water years.

For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to replace that source with alternative sources or water demand management measures, to the extent practicable.

(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(e)

(1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:

(A) Single-family residential.
(B) Multifamily.
(C) Commercial.
(D) Industrial.
(E) Institutional and governmental.
(F) Landscape.
(G) Sales to other agencies.
(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.
(I) Agricultural.

(2) The water use projections shall be in the same five-year increments as described in subdivision (a).

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

(A) Water survey programs for single-family residential and multifamily residential customers.
(B) Residential plumbing retrofit.
(C) System water audits, leak detection, and repair.
(D) Metering with commodity rates for all new connections and retrofit of existing connections.
(E) Large landscape conservation programs and incentives.
(F) High-efficiency washing machine rebate programs.
(G) Public information programs.
(H) School education programs.
(I) Conservation programs for commercial, industrial, and institutional accounts.
(J) Wholesale agency programs.
(K) Conservation pricing.
(L) Water conservation coordinator.
(M) Water waste prohibition.
(N) Residential ultra-low-flush toilet replacement programs.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the

effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of such savings on the supplier's ability to further reduce demand.

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, which offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors.

(2) Include a cost-benefit analysis, identifying total benefits and total costs.

(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.

(4) Include a description of the water supplier's legal authority to implement

the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

(h) Urban water suppliers that are members of the California Urban Water Conservation Council and submit annual reports to the council in accordance with the "Memorandum of Understanding Regarding Urban Water Conservation in California," dated September 1991, may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g).

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

(a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.

(b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

(c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

(d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

(e) Consumption reduction methods in the most restrictive stages. Each urban water supplier

may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

(f) Penalties or charges for excessive use, where applicable.

(g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

(h) A draft water shortage contingency resolution or ordinance.

(i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(c) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(d) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years.

(e) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(f) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems and to promote recirculating uses.

Article 2.5 Water Service Reliability

10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total

water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from the state, regional, or local agency population projections within the service area of the urban water supplier.

(b) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies within 60 days of the submission of its urban water management plan.

(c) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

(d) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any future, potential customers.

Article 3. Adoption and Implementation of Plans

10640. Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630).

The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

10641. An urban water supplier required to prepare a plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.

10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

10644.

(a) An urban water supplier shall file with the department a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be filed with the department within 30 days after adoption.

(b) The department shall prepare and submit to the Legislature, on or before December 31, in the years ending in six and one, a report summarizing the status of the plans adopted pursuant to this part. The report prepared by the department shall identify the outstanding elements of individual plans. The department shall provide a copy of the report to each urban

water supplier that has filed its plan with the department. The department shall also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans submitted pursuant to this part.

10645. Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

CHAPTER 4. MISCELLANEOUS PROVISIONS

10650. Any actions or proceedings to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:

(a) An action or proceeding alleging failure to adopt a plan shall be commenced within 18 months after that adoption is required by this part.

(b) Any action or proceeding alleging that a plan, or action taken pursuant to the plan, does not comply with this part shall be commenced within 90 days after filing of the plan or amendment thereto pursuant to Section 10644 or the taking of that action.

10651. In any action or proceeding to attack, review, set aside, void, or annul a plan, or an action taken pursuant to the plan by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.

10652. The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

10653. The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the State Water Resources Control Board and the Public Utilities Commission, for the preparation of water management plans or conservation plans; provided, that if the State Water Resources Control Board or the Public Utilities Commission requires additional information concerning water conservation to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan prepared to meet federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

10654. An urban water supplier may recover in its rates the costs incurred in preparing its plan and implementing the reasonable water conservation measures included in the plan. Any best water management practice that is included in the plan that is identified in the "Memorandum of Understanding Regarding Urban Water Conservation in California" is deemed to be reasonable

for the purposes of this section.

10655. If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.

10656. An urban water supplier that does not prepare, adopt, and submit its urban water management plan to the department in accordance with this part, is ineligible to receive drought assistance from the state until the urban water management plan is submitted pursuant to Article 3 (commencing with Section 10640) of Chapter 3.

SEC. 2. No appropriation is made and no reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution or Section 2231 or 2234 of the Revenue and Taxation Code because the local agency or school district has the authority to levy service charges, fees, or assessments sufficient to pay for the program or level of service mandated by this act.

APPENDIX A.5
PUBLIC INVOLVEMENT

A.5 PUBLIC INVOLVEMENT

In developing this plan, Metropolitan involved its member agencies and their retail agencies through a series of interagency meetings. The items discussed at those meetings included the development of this plan and the process for revising the Integrated Resource Plan (IRP). Table II-1 summarizes the schedule for and attendees at these meetings. Metropolitan later provided its member agencies with copies of the draft report and invited those agencies to comment on it.

Metropolitan revised the draft in response to these comments and issued a second draft. This draft was distributed to member agencies and made available to the general public for additional comments. In addition, Metropolitan's Board scheduled a public hearing, which was held on November 13, 2000. Notices for the hearing appeared in Metropolitan's Board minutes, in service-area-wide newspaper advertisements, and on Metropolitan's website. A second public hearing was held on November 28, 2000, to provide an evening opportunity for public input. Notices for this hearing appeared in service-area-wide newspaper advertisements and on Metropolitan's website. This appendix includes copies of both notices.

Following these hearings, additional comments were incorporated into a final draft, which was adopted by Metropolitan's Board on December 12, 2000. This appendix includes a copy of the resolution adopting the plan.

Much of the information used in the development of this plan came from Metropolitan's ongoing planning studies. Metropolitan conducts these planning studies with broad participation from other individuals and groups, particularly its member agencies. A brief identification of these major planning efforts follows:

- Integrated Resource Planning: Metropolitan conducted a broad public planning effort from 1992 – 1995 to develop the currently adopted IRP. The IRP examined water supply issues through the next twenty years and developed goals to assure reliable, safe, and economical supplies. This process is documented in Section II.1. Metropolitan and its member agencies have started to revise this plan, beginning with the development of this document. Initial meetings to discuss this plan and begin work on the new IRP are summarized in Section II.1.

- Water Surplus and Demand Management Plan: This plan was developed in conjunction with the member agencies to determine how Metropolitan's operations should be conducted during times of surplus and shortage to minimize the likelihood and impact of shortages. The development of this plan is discussed in Section II.2.

- Strategic Plan: Currently, Metropolitan is working with its member agencies and other entities to develop this plan. It addresses the contractual relationships between Metropolitan and its member agencies, as well as rate structures reflecting those relationships. The current status of this effort is described in Section II.3.

- Conservation Programs: Through its Conservation Credits Program, Metropolitan works with its member agencies to develop and implement conservation programs that comply with the Memorandum of Understanding (MOU) on Urban Water Conservation. Metropolitan also works with and supports efforts to encourage urban water conservation, particularly through its participation in the California Urban Water Conservation Council (CUWCC). These efforts are discussed in Section III.1. Appendix A.6 contains the MOU and Metropolitan's reports to the CUWCC.

- Southern California Comprehensive Water Reclamation and Reuse Study: Metropolitan has worked with water agencies, wastewater agencies, and state and federal government entities to conduct this study. Section III-2 contains a list of the participants in the study and a discussion of the study results to date.

- Desalination Research and Innovation Partnership: Metropolitan is working with a broad range of entities to develop improved technologies and practices to protect and enhance water quality. This program is discussed in Section III.2.

- Groundwater Management Programs: Metropolitan has worked with its member agencies and groundwater basin management entities to protect and extend supplies in regional groundwater basins. The programs used in this cooperative effort are described in Section III.3.

- Colorado River Management: Metropolitan has worked with other California agencies that obtain water from the Colorado River to develop a proposed quantification settlement to better manage these supplies. In addition, Metropolitan has worked with federal entities and representatives from other states to develop operating rules and environmental protection programs to enhance Colorado River supplies. These programs are discussed in Section III.5.

- CALFED Process: Metropolitan has contributed vigorously to the CALFED process, which has involved water agencies, federal and state agencies, environmental groups, and other entities. The goals of the CALFED process are to provide water supply reliability, flood protection, environmental protection, and water quality. This process is discussed in Section III-6.

- The Salinity Action Plan and the Salinity Summit: These programs included involvement from a broad range of interested entities in the development of a program to protect the quality of the region's water resources from rising salinity levels. The programs are described in Section IV.

- Other Water Quality Programs: Metropolitan is involved in a broad range of cooperative programs to address particular water quality issues that are described in Section IV.

NOTICE OF PUBLIC HEARING

The Metropolitan Water District of Southern California will hold a PUBLIC HEARING at which interested parties may present their views regarding its 2000 Draft Regional Urban Water Management Plan (Draft Plan) on Monday, November 13, 2000.

This Draft Plan was prepared, and the PUBLIC HEARING will be held, in accordance with Water Code Sections 10610 through 10656 and MWD Act § 130.5. The State Department of Water Resources requires that urban water suppliers submit an urban water management plan every five years. The 2000 plans are due December 31, 2000. Metropolitan's Draft Plan illustrates the projected regional water demands, expected water supply, and plans for efficient use of water for the next 20 years. The plan will also be reviewed with regard to emphasis on sustainable, environmentally sound, and cost effective water conservation, recycling, and groundwater storage and replenishment measures.

Date:	November 13, 2000
Time:	2:30 PM
Place:	Metropolitan Water District Headquarters (Adjacent to Union Station) Board Room 700 North Alameda Street Los Angeles, CA 90012

To obtain a copy of the 2000 Draft Plan prior to the PUBLIC HEARING, contact Ms. Alyce Shigg at 213-217-6392 or by E-mail at ashigg@mwd.dst.ca.us. If you cannot attend the PUBLIC HEARING, you may submit written comments by Monday, November 13, 2000 at 5 p.m. to Mr. Don Bentley at the Metropolitan Water District, P.O. Box 54153, Los Angeles, CA 90054-0153, or by Fax at 213-217-6119.

NOTICE OF PUBLIC HEARING

The Metropolitan Water District of Southern California will hold an additional PUBLIC HEARING at which interested parties may present their views regarding its 2000 Draft Regional Urban Water Management Plan (Draft Plan) on Tuesday, November 28, 2000.

This Draft Plan was prepared, and the PUBLIC HEARING will be held, in accordance with Water Code Sections 10610 through 10656. The State Department of Water Resources requires that urban water suppliers submit an urban water management plan every five years. The 2000 plans are due December 31, 2000. Metropolitan's Draft Plan illustrates the projected regional water demands, expected water supply, and plans for efficient use of water for the next 20 years.

Date:	November 28, 2000
Time:	6 p.m. – 8 p.m.
Place:	Metropolitan Water District Headquarters (Adjacent to Union Station) Room 1-102 700 North Alameda Street Los Angeles, CA 90012

To obtain a copy of the 2000 Draft Plan prior to the PUBLIC HEARING, contact Ms. Alyce Shigg at 213-217-6392 or by E-mail at ashigg@mwd.dst.ca.us. If you cannot attend the additional PUBLIC HEARING, you may submit written comments by Tuesday, November 28, 2000 to Mr. Don Bentley at the Metropolitan Water District, P.O. Box 54153, Los Angeles, CA 90054-0153, or by Fax at 213-217-6119.

RESOLUTION 8723

RESOLUTION OF THE BOARD OF DIRECTORS OF THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA APPROVING THE 2000 REGIONAL URBAN WATER MANAGEMENT PLAN

WHEREAS, the California Urban Water Management Planning Act requires urban water suppliers to prepare and adopt an Urban Water Management Plan every five years on or before December 31, in years ending in five and zero; and

WHEREAS, the California Urban Water Management Planning Act specifies the requirements and procedures for adopting such Urban Water Management Plans; and

WHEREAS, the Board of Directors of The Metropolitan Water District of Southern California has duly reviewed, discussed, and considered such Urban Water Management Plan and has determined the 2000 Regional Urban Water Management Plan to be consistent with the California Urban Water Management Planning Act and to be an accurate representation of the water resources plan for the Metropolitan Water District of Southern California.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of The Metropolitan Water District of Southern California that, on December 12, 2000, this District hereby adopts this 2000 Regional Urban Water Management Plan for submittal to the State of California.

I HEREBY CERTIFY that the foregoing is a full, true and correct copy of a resolution adopted by the Board of Directors of The Metropolitan Water District of Southern California, at its meeting held on December 12, 2000.

Executive Secretary
The Metropolitan Water District
of Southern California

APPENDIX A.6
MEMORANDUM OF UNDERSTANDING AND SAMPLE CUWCC FILING

MEMORANDUM OF UNDERSTANDING

REGARDING

URBAN WATER CONSERVATION

IN CALIFORNIA

As Amended September 21, 2000

MEMORANDUM OF UNDERSTANDING REGARDING URBAN WATER CONSERVATION IN CALIFORNIA

TABLE OF CONTENTS

MEMORANDUM OF UNDERSTANDING
REGARDING
URBAN WATER CONSERVATION IN CALIFORNIA

This **Memorandum of Understanding Regarding Urban Water Conservation in California ("MOU")** is made and entered into on the dates set forth below among the undersigned parties ("signatories"). The signatories represent urban water suppliers, public advocacy organizations and other interested groups as defined in Section 1 of this MOU.

AMENDED
September, 1991
February 10, 1993
March 9, 1994
September 30, 1997
April 8, 1998
December 9, 1998 (By-Laws only)
September 16, 1999
September 21, 2000

RECITALS

A. The signatories to this MOU recognize that California's economy, quality of life and environment depend in large part upon the water resources of the State. The signatories also recognize the need to provide reliable urban water supplies and to protect the environment. Increasing demands for urban, agricultural and environmental water uses call for conservation and the elimination of waste as important elements in the overall management of water resources. Many organizations and groups in California have an interest in urban water conservation, and this MOU is intended to gain much needed consensus on a complex issue.

B. The urban water conservation practices included in this MOU (referred to as "Best Management Practices" or "BMPs") are intended to reduce long-term urban demands from what they would have been without implementation of these practices and are in addition to programs which may be instituted during occasional water supply shortages.

C. The combination of BMPs and urban growth, unless properly accounted for in water management planning, could make reductions in urban demands during short-term emergencies such as droughts or earthquakes more difficult to achieve. However, notwithstanding such difficulties, the signatory water suppliers will carry out the urban water conservation BMP process as described in this MOU.

D. The signatories recognize that means other than urban water conservation may be needed to provide long-term reliability for urban water suppliers and long-term protection of the environment. However, the signatories may have differing views on what additional measures might be appropriate to provide for these needs. Accordingly, this MOU is not intended to address these issues.

E. A major benefit of this MOU is to conserve water which could be used for the protection of streams, wetlands and estuaries and/or urban water supply reliability. This MOU leaves to other forums the issue of how conserved water will be used.

F. It is the intent of this MOU that individual signatory water suppliers (1) develop comprehensive conservation BMP programs using sound economic criteria and (2) consider water conservation on an equal basis with other water management options.

G. It is recognized that present urban water use throughout the State varies according to many factors including, but not limited to, climate, types of housing and landscaping, amounts and kinds of commercial, industrial and recreational development, and the extent to which conservation measures have already been implemented. It is further recognized that many of the BMPs identified in Exhibit 1 to this MOU have already been implemented in some areas and that even with broader employment of BMPs, future urban water use will continue to vary from area to area. Therefore, this MOU is not intended to establish uniform per capita water use allotments throughout the urban areas of the State. This MOU is also not intended to limit the amount or types of conservation a water supplier can pursue or to limit a water supplier's more rapid implementation of BMPs.

H. It is recognized that projections of future water demand should include estimates of anticipated demand reductions due to changes in the real price of water.

TERMS

SECTION 1. DEFINITIONS

For purposes of this MOU, the following definitions apply:

1.1 **Best Management Practices.** A Best Management Practice ("BMP") means a policy, program, practice, rule, regulation or ordinance or the use of devices, equipment or facilities which meets either of the following criteria:

(a) An established and generally accepted practice among water suppliers that results in more efficient use or conservation of water;

(b) A practice for which sufficient data are available from existing water conservation projects to indicate that significant conservation or conservation related benefits can be achieved; that the practice is technically and economically reasonable and not environmentally or socially unacceptable; and that the practice is not otherwise unreasonable for most water suppliers to carry out.

Although the term "Best Management Practices" has been used in various statutes and regulations, the definitions and interpretations of that term in those statutes and regulations do not apply to this MOU. The term "Best Management Practices" or "BMPs" has an independent and special meaning in this MOU and is to be applied for purposes of this MOU only as defined above.

1.2 **Implementation.** "Implementation" means achieving and maintaining the staffing, funding, and in general, the priority levels necessary to achieve the level of activity called for in the descriptions of the various BMPs and to satisfy the commitment by the signatories to use good faith efforts to optimize savings from implementing BMPs as described in Section 4.4 of this MOU. Section B of Exhibit 1 to this MOU establishes the schedule for initial implementation of BMPs.

1.3 **Signatory Groups.** For purposes of this MOU, signatories will be divided into three groups as follows:

(a) Group 1 will consist of water suppliers. A "water supplier" is defined as any entity, including a city, which delivers or supplies water for urban use at the wholesale or retail level.

(b) Group 2 will consist of public advocacy organizations. A "public advocacy organization" is defined as a non profit organization:

(i) whose primary function is not the representation of trade, industrial, or utility entities, and

(ii) whose prime mission is the protection of the environment or who has a clear interest in advancing the BMP process.

(c) Group 3 will consist of other interested groups. "Other interested groups" is defined as any other group which does not fall into one of the two groups above.

1.4 **California Urban Water Conservation Council**. The California Urban Water Conservation Council or "Council" will have responsibility for monitoring the implementation of this MOU and will be comprised of signatories to this MOU grouped according to the definitions in Section 1.3 above. The duties of the Council are set forth in Section 6 and in Exhibit 2 to this MOU.

SECTION 2. PURPOSES

2.1 **This MOU has two primary purposes:**

(1) to expedite implementation of reasonable water conservation measures in urban areas; and

(2) pursuant to Section 5 of this MOU, to establish assumptions for use in calculating estimates of reliable future water conservation savings resulting from proven and reasonable conservation measures. Estimates of reliable savings are the water conservation savings which can be achieved with a high degree of confidence in a given service area. The signatories have agreed upon the initial assumptions to be used in calculating estimates of reliable savings. These assumptions are included in Exhibit 1 to this MOU. It is probable that average savings achieved by water suppliers will exceed the estimates of reliable savings.

SECTION 3. LIMITS TO APPLICABILITY OF MOU

3.1 **Relationship Between Water Suppliers.** No rights, obligations or authorities between wholesale suppliers, retail agencies, cities or other water suppliers are created or expanded by this MOU. Moreover, wholesale water suppliers are not obligated to implement BMPs at the retail customer level except within their own retail service area, if any.

3.2 **Agriculture.** This MOU is intended to apply only to the delivery of water for domestic, municipal and industrial uses. This MOU is not intended to apply directly or indirectly to the use of water for irrigated agriculture.

3.3 **Reclamation**. The signatory water suppliers support the reclamation and reuse of wastewater wherever technically and economically reasonable and not environmentally or socially unacceptable, and agree to prepare feasibility studies on water reclamation for their respective service areas. However, this MOU does not apply to that aspect of water management, except where the use of reclaimed water may otherwise qualify as a BMP as defined above.

3.4 **Land Use Planning** . This MOU does not deal with the question of growth management. However, each signatory water supplier will inform all relevant land planning agencies at least annually of the impacts that planning decisions involving projected growth would have

upon the reliability of its water supplies for the water supplier's service area and other areas being considered for annexation.

3.5 **Use of Conserved Water.** A major benefit of this MOU is to conserve water which could be used for the protection of streams, wetlands and estuaries and/or urban water supply reliability. This MOU leaves to other forums the issue of how conserved water will be used.

SECTION 4. IMPLEMENTATION OF BEST MANAGEMENT PRACTICES

4.1 **The Best Management Practices List, Schedule of Implementation and Assumptions.** Exhibit 1 to this MOU contains:

(a) In Section A: A list identifying those practices which the signatories believe presently meet the definition of a BMP as set forth in Section 1.1 of this MOU.

(b) In Section B: A schedule for implementing the BMPs to be followed by signatory water suppliers unless exempted under Section 4.5 of this MOU or an alternative schedule is prepared pursuant to Section 4.6 of this MOU.

(c) In Section C: Coverage requirements for implementing BMPs. Coverage requirements are the expected level of implementation necessary to achieve full implementation of BMPs. Coverage requirements may be expressed either in terms of activity levels by water suppliers or as water savings achieved.

(d) In Section D: Reporting Requirements for Documenting BMP Implementation. These requirements vary by BMP, are considered the minimum record keeping and reporting requirements for water suppliers to document BMP implementation levels, and will provide the basic data used evaluate BMP implementation progress by water suppliers.

(e) In Section E: Criteria to determine BMP implementation status of water suppliers. These criteria will be used to evaluate BMP implementation progress. Evaluation criteria vary by BMP, and are derived from the implementation guidelines and schedules presented in Sections A, B, and C.

(f) In Section F: Assumptions for use in developing estimates of reliable savings from the implementation of BMPs. Estimates of reliable savings are the water conservation savings which can be achieved with a high degree of confidence in a given service area. The estimate of reliable savings for each BMP depends upon the nature of the BMP and upon the amount of data available to evaluate potential savings. For some BMPs (e.g., public information) estimates of reliable savings may never be generated. For others, additional data may lead to significant changes in the estimate of reliable savings. It is probable that average savings achieved by water suppliers will exceed the estimates of reliable savings.

(g) In Section G: A list of "Potential Best Management Practices" ("PBMPs"). PBMPs are possible conservation practices which have not been promoted to the BMP list.

4.2 **Initial BMPs, PBMPs, Schedules, and Estimates of Reliable Savings.** The initial position of conservation practices on the BMP and PBMP lists, the initial schedule of implementation and study for the BMP list, the initial schedule of study for the PBMP list, and the initial estimates of reliable savings represent compromises by the signatories to move the process forward both for purposes of the present Bay/Delta proceedings as defined in Section 5 and to promote water conservation generally. The signatories agree that as more and better data are collected in the future, the lists, the schedules, and the estimates of reliable savings will be refined and revised based upon the most objective criteria available. However, the signatories agree that the measures included as initial BMPs in Section A of Exhibit 1 are economically justified on a statewide basis.

4.3 **Future Revision of BMPs, PBMPs, Schedules, and Estimates of Reliable Savings.** After the beginning of the initial term of the MOU as provided in Section 7.1, the California Urban Water Conservation Council ("Council") will, pursuant to Section 6 of this MOU and Exhibit 2, alter the composition of the BMP and PBMP lists, redefine individual BMPs, alter the schedules of implementation, and update the assumptions of reliable savings as more data becomes available. This dynamic BMP assessment process includes the following specific commitments:

(a) The assumptions of reliable savings will be updated at least every 3 years.

(b) The economic reasonableness of a BMP or PBMP will be assessed by the Council using the economic principles in Sections 3 and 4 of Exhibit 3.

(c) A BMP will be removed from the BMP list if, after review of data developed during implementation, the Council determines that the BMP cannot be made economically reasonable or determines that the BMP otherwise fails to conform to the definition of BMPs in Section 1.1.

(c) A PBMP will be moved to the BMP list and assigned a schedule of implementation if, after review of data developed during research, and/or demonstration projects, the Council determines that the PBMP is economically reasonable and otherwise conforms to the definition of BMPs in Section 1.1.

[Note: In 1997, the Council substantially revised the BMP list, definitions, and schedules contained in Exhibit 1. These revisions were adopted by the Council September 30, 1997.].

4.4 **Good Faith Effort.** While specific BMPs and results may differ because of varying local conditions among the areas served by the signatory water suppliers, a good faith effort to implement BMPs will be required of all signatory water suppliers. The following are included within the meaning of "good faith effort to implement BMPs":

(a) The proactive use by a signatory water supplier of legal authorities and administrative prerogatives available to the water supplier as necessary and reasonable for the implementation of BMPs.

(b) Where implementation of a particular BMP is not within the legal authority of a signatory water supplier, encouraging timely implementation of the BMP by other

entities that have the legal authority to carry out the BMP within that water supplier's service area pursuant to existing legal authority. This encouragement may include, but is not limited to, financial incentives as appropriate.

(c) Cooperating with and encouraging cooperation between other water suppliers and other relevant entities whenever possible and within existing legal authority to promote the implementation of BMPS.

(d) Optimizing savings from implementing BMPs.

(d) For each signatory water supplier and all signatory public advocacy organizations, encouraging the removal of institutional barriers to the implementation of BMPs within that water supplier's service area. Examples of good faith efforts to remove institutional barriers include formal presentations and/or written requests to entities requesting approval of, or amendment to, local ordinances, administrative policies or legislation which will promote BMP implementation.

4.5 **Exemptions.** A signatory water supplier will be exempt from the implementation of specific BMPs for as long as the supplier substantiates each reporting period that based upon then prevailing local conditions, one or more of the following findings applies:

(a) A full cost-benefit analysis, performed in accordance with the principles set forth in Exhibit 3, demonstrates that either the program (i) would not be cost-effective overall when total program benefits and costs are considered; OR (ii) would not be cost-effective to the individual water supplier even after the water supplier has made a good faith effort to share costs with other program beneficiaries.

(b) Adequate funds are not and cannot reasonably be made available from sources accessible to the water supplier including funds from other entities. However, this exemption cannot be used if a new, less cost-effective water management option would be implemented instead of the BMP for which the water supplier is seeking this exemption.

(c) Implementation of the BMP is (i) not within the legal authority of the water supplier; and (ii) the water supplier has made a good faith effort to work with other entities that have the legal authority to carry out the BMP; and (iii) the water supplier has made a good faith effort to work with other relevant entities to encourage the removal of institutional barriers to the implementation of BMPs within its service area.

Signatory water suppliers shall submit exemptions to the Council within two months following the start of the reporting period for which the exemptions are being claimed.

4.6 **Schedule of Implementation.** The schedule of implementation for BMPs is set forth in Section B of Exhibit 1 to this MOU. However, it is recognized by the signatories that deviations from this schedule by water suppliers may be necessary. Therefore, a water supplier may modify, to the minimum extent necessary, the schedule for implementation of BMPs if the water supplier substantiates one or more of the following findings:

(a) That after a good faith effort to implement the BMP within the time prescribed, implementation is not feasible pursuant to the schedule. However, implementation of this BMP is still required as soon as feasible within the initial term of this MOU as defined in Section 7.1.

(b) That implementation of one or more BMPs prior to other BMPs will have a more positive effect on conservation or water supplies than will adherence to the schedule.

(c) That implementation of one or more Potential BMPs or other conservation measures prior to one or more BMPs will have a more positive effect on conservation or water supplies than will adherence to the schedule.

SECTION 5. BAY/DELTA PROCEEDINGS

[Note: The following section was adopted with the initial MOU and has been retained in subsequent revisions. The "present proceedings" refers to the State Water Resources Control Board water rights process then underway to implement new Bay-Delta flow and export standards. As of the date this note was adopted (April 8, 1998), proceedings to implement updated standards are still underway. Therefore, the joint recommendations of the signatories to the SWRCB contained in this letter continue to apply.]

5.1 **Use of MOU for Bay/Delta Proceedings.** The BMPs, the estimates of reliable savings and the processes established by this MOU are agreed to by the signatories for purposes of the present proceedings on the San Francisco Bay/Sacramento-San Joaquin Delta Estuary ("Bay/Delta") and in order to move the water conservation process forward. "Present Bay/Delta proceedings" is intended to mean those Bay/Delta proceedings presently underway and those conducted until a final water rights decision is reached by the State Water Resources Control Board ("State Board"). The willingness of the signatories to enter into this MOU for purposes of the present Bay/Delta proceedings in no way limits the signatories' ability to propose different conservation practices, different estimates of savings, or different processes in a forum other than the present Bay/Delta proceedings, or for non-urban water suppliers or for other water management issues. By signing this MOU, public advocacy organization signatories are not agreeing to use the initial assumptions of reliable conservation savings in proceedings other than the present Bay/Delta proceedings. The signatories may present other assumptions of reliable conservation savings for non-signatory water suppliers in the present Bay/Delta proceedings, provided that such assumptions could not have adverse impacts upon the water supplies of any signatory water supplier. Furthermore, the signatories retain the right to advocate any particular level of protection for the Bay/Delta Estuary, including levels of freshwater flows, and do not necessarily agree on population projections for California. This MOU is not intended to address any authority or obligation of the State Board to establish freshwater flow protections or set water quality objectives for the Estuary, or to address any authority of the Environmental Protection Agency.

5.2 **Recommendations for Bay/Delta Proceedings.** The signatories will make the following recommendations to the State Board in conjunction with the present Bay/Delta proceedings and to the EPA to the extent the EPA concerns itself with the proceedings:

(a) That for purposes of the present Bay/Delta proceedings, implementation of the BMP process set forth in this MOU represents a sufficient long-term water conservation program by the signatory water suppliers, recognizing that additional programs may be required during occasional water supply shortages;

(b) That for purposes of the present Bay/Delta proceedings only, the State Board and EPA should base their estimates of future urban water conservation savings on the implementation of all of the BMPs included in Section A of Exhibit 1 to this MOU for the entire service area of the signatory water suppliers and only on those BMPs, except for (I) the conservation potential for water supplied by urban agencies for agricultural purposes, or (ii) in cases where higher levels of conservation have been mandated;.

(c) That for the purposes of the present Bay/Delta proceedings, the State Board and EPA should make their estimates of future urban water conservation savings by employing the reliable savings assumptions associated with those BMPs set forth in Section C of Exhibit 1 to this MOU;

(d) That the State Board should include a policy statement in the water rights phase of the Bay/Delta proceedings supporting the BMP process described in this MOU and that the BMP process should be considered in any documents prepared by the State Board pursuant to the California Environmental Quality Act as part of the present Bay/Delta proceedings.

5.3 **Letter to State Board.** Within 30 days of signing this MOU, each signatory will jointly or individually convey the principles set forth in Sections 5.1 and 5.2 above by sending a letter to the State Board, copied to the EPA, in the form attached to this MOU as Exhibit 4.

5.4 **Withdrawal from MOU.** If during the present Bay/Delta proceedings, the State Board or EPA uses future urban water conservation savings that are inconsistent with the use of BMPs as provided in this MOU, any signatory shall have the right to withdraw from the MOU by providing written notice to the Council as described in Section 7.4(a)(I) below.

SECTION 6. CALIFORNIA URBAN WATER CONSERVATION COUNCIL

6.1 **Organization.** The California Urban Water Conservation Council ("Council") will be comprised of all signatories to this MOU grouped according to the definition in Section 1. The signatories agree to the necessary organization and duties of the Council as specified in Exhibit 2 to this MOU. Within 30 days of the effective date of this MOU, the Council will hold its first meeting.

6.2 **BMP Implementation Reports.** The signatory water suppliers will submit standardized reports every other year to the Council providing sufficient information to inform the Council on the progress being made towards implementing the BMP process. The Council will make annual reports to the State Board. An outline for the Council's annual report to the State Board is attached as Exhibit 5 to this MOU.

SECTION 7. GENERAL PROVISIONS

7.1 **Initial Term of MOU.** The initial term of this MOU shall be for a period of 10 years. This initial term shall commence on September 1, 1991.

7.2 **Signatories.** Signatories shall consist of three groups: water suppliers, public advocacy organizations and other interested groups, arranged according to the definition in Section 1.3. Such arrangement will be made by a Council membership committee comprised of three representatives from the water suppliers' group and three representatives from the public advocacy organizations' group.

7.3 **Renewal of MOU.** The MOU shall be automatically renewed after the initial term of 10 years on an annual basis as to all signatories unless a signatory withdraws as described below in Section 7.4.

7.4 **Withdrawal from MOU.** Signatories to the MOU may withdraw from the MOU in three separate ways as described in sections (a), (b) and 8 below.

(a) **Withdrawal prior to expiration of initial term.** Before the expiration of the initial term of 10 years, a signatory may withdraw by providing written notice to the Council declaring its intent to withdraw. This written notice must include a substantiated finding that one of the two provisions (i) or (ii) below applies:

(i) During the present Bay/Delta proceedings, the State Board or EPA used future urban water conservation savings that are inconsistent with the use of BMPs as provided in this MOU; OR

(ii) After a period of 5 years from the commencement of the initial term of the MOU:

(1) Specific signatory water suppliers representing more than 10 percent of the population included within the combined service areas of the signatory water suppliers have failed to act in good faith pursuant to Section 4.4 of the MOU; and

(2) The signatory wishing to withdraw has attached findings to its past two annual reports to the Council beginning no earlier than the fourth annual report identifying these same signatory water suppliers and giving evidence based upon the information required to be submitted in the annual reports to the Council to support the allegations of failure to act in good faith; and

(3) The State Board has failed to require conservation efforts by the specific water suppliers adequate to satisfy the requirements of this MOU; and

(4) Discussions between the signatory wishing to withdraw and the specific signatories named have failed to satisfy the objections of the signatory wishing to withdraw.

After a signatory declares an intent to withdraw under Section 7.4(a), the MOU shall remain in effect as to that signatory for 180 days.

(b) **Withdrawal after expiration of initial term.** After the initial term of 10 years, any signatory may declare its intent to withdraw from the MOU unconditionally by providing written notice to the Council. After a signatory has declared its intent to withdraw as provided in this section, the MOU will remain in effect as to that signatory for 180 days.

(c) **Immediate withdrawal.** Any signatory who does not sign a modification to the MOU requiring a 2/3 vote as described in Exhibit 2 of this MOU may withdraw from the MOU by providing written notice to the Council. The withdrawing signatory's duties under this MOU will be terminated effective immediately upon providing such written notice.

If a signatory withdraws from the MOU under any of the above methods, the MOU shall remain in effect as to all other signatories.

7.5 **Additional Parties.** Additional parties may sign the MOU after September 1, 1991 by providing written notice to and upon approval by the Council. Additional parties will be assigned by the Council to one of the three signatory groups defined in Section 1.3 before entry into the Council. All additional signatory water suppliers shall be subject to the schedule of implementation provided in Exhibit 1.

7.6 **Legal Authority.** Nothing in this MOU is intended to give any signatory, agency, entity or organization expansion of any existing authority. No organization formed pursuant to this MOU has authority beyond that specified in this MOU.

7.7 **Non-Contractual Agreement.** This MOU is intended to embody general principles agreed upon between and among the signatories and is not intended to create contractual relationships, rights, obligations, duties or remedies in a court of law between or among the signatories.

7.8 **Modifications.** The signatories agree that this writing constitutes the entire understanding between and among the signatories. The general manager, chief executive officer or executive director of each signatory or their designee shall have the authority to vote on any modifications to this MOU and its exhibits. Any modifications to the MOU itself and to its exhibits shall be made by the Council as described in Exhibit 2.

Note: The Memorandum of Understanding Regarding Urban Water Conservation in California, As Amended September 21, 2000, also includes seven Exhibits, which can be accessed at the California Urban Water Conservation Council web site:

http://www.cuwcc.org/mou.htm

CUWCC ANNUAL REPORT - 1997-98

The purpose of this report is to:

Gather information about how the BMPs are being implemented and to summarize the statewide activities for a report to the California Water Resources Control Board.

To find the areas of need and provide information that will help signatories as they work to fulfill the BMPs.

In order to achieve our goals, we need to have your completed report. If you are in need of information as you work on it, please call a committee member. We are all working toward the same goal - water conservation - and are cognizant of the difficulties that can arise when we are asked to fill out a report of this magnitude.

Your completed report will be read by a member of the committee, and the results and your comments will be noted. **Your report is important** to the summary for the California Water Resources Control Board, and to the CUWCC. We need your input to determine our future goals, and to help you and other agencies to implement the BMPs.

IMPLEMENTATION AND REPORTING COMMITTEE MEMBERS WHO CAN ASSIST YOU WITH THIS REPORT			
NAME	**CATEGORY**	**AGENCY**	**PHONE NUMBER**
Lynn Anderson	Wholesaler	Santa Barbara County Water Agency	(805) 568-3545
Dawn Argula	Privately Owned	California Water Service Company	408-367-8230
Roberta Borgonova	Group 2	League of Women Voters	415-931-4605
Kirk Brewer	Privately Owned	Southern California Water Company	909-394-3608
Mary Lou Cotton	Special District	Kern County Water Agency	805-634-1405
Don Flowers	Municipality	City of Sacramento	916-264-7898
Cindy Hansen	Wholesalers	San Diego County Water Authority	619-574-1286
Denise Phelps	General	California Urban Water Conservation Council	916-552-5885
Barbara Sarkis	USBR	Contra Costa Water District	510-688-8136
Gregg Smith	DWR	California Department of Water Resources	(916) 327-1619
Dave Todd	Municipality	City of Fresno	(209) 498-4133

CALIFORNIA URBAN WATER CONSERVATION COUNCIL
BEST MANAGEMENT PRACTICES
WHOLESALE WATER AGENCY ANNUAL REPORT -- 1997-98

REPORT PERIOD JULY 1, 1997 TO JUNE 30, 1998
SUBMITTAL DATE: NOVEMBER 30, 1998

RETURN COMPLETED FORM TO:
CUWCC **455 CAPITOL MALL, SUITE 705** **SACRAMENTO, CA 95814-4408**

SECTION 1 - WATER AGENCY AND SERVICE AREA INFORMATION

1. **Agency Name:** The Metropolitan Water District of Southern California

2. **Address:** 700 North Alameda Street

3. **City, State Zip:** Los Angeles California 90012-2944

4. **Name of Conservation Coordinator:** Barbara Nadon

5. **Phone:** 213-217-7206 **Fax:** 213-217-7159 **E-mail address:** bnadon@mwd.dst.ca.us

6. **Name of Person Preparing this Report:** Michael Hollis

7. **Phone:** 213-217-7228 **Fax:** 213-217-7159 **E-mail address:** mhollis@mwd.dst.ca.us

8. **Year Agency Signed the MOU** 1991 **Date of This Report:** November 30, 1998

9. **This Agency is a** (check one) **MUNICIPALITY:** _____ **SPECIAL DISTRICT:**____**X**_
INVESTOR OWNED: _____

10. **Does this Wholesale Agency also Sell Directly to End Users?** **YES** _____ **NO**__**X**_____

➔ ***If "YES", Please Also Complete a Retail Agency Annual Report.***

11. **In Addition to Water, Utility Services Provided by This Agency Include** (check all that apply)**:**

SEWER ____ **ELECTRICITY** _____ **GAS** _____ **WATER** __**X**___ **RECLAIMED WATER**_____ **OTHER** _____

12. **Is This Agency a Bureau of Reclamation Contractor?** **YES**____**X**____**NO**_____

13. **Is This Agency a State Water Project Contractor?** **YES**____**X**_____**NO**_____

14. **List Communities/Regions Served:** Metropolitan consists of 27 member agencies that include 14 cities, 12municipal water districts, and 1 county water authority. Metropolitan's service area comprises 5,155 square miles and includes portions of the six counties of Los Angeles, Orange, Riverside, San Bernardino, San Diego and Ventura. Metropolitan provides nearly 60 percent of the water used by the 16 million residents residing in its service territory.

15. **Direct Financial Contributions to CUWCC During Report Period:** $35,900.

AGENCY: Metropolitan Water District of Southern California

SECTION 2 -- BUDGET

AGENCY EXPENDITURES AND PROPOSED BUDGET				
		Prior Year (Actual)	**Report Year (Actual)**	**Following Year (Proposed)**
1.	**Operations**	$209,277,300	$246,554,000	$232,462,700
2.	**Capital**	$1,123,744,700	$1,067,562,000	$994,337,300
3.	**Total**	$1,333,022,000	$1,314,116,000	$1,226,800,000
4.	**CONSERVATION -1***	$11,123,399	$11,046,047	$11,259,890
5.	**CONSERVATION -2****			
6.	**Total CONSERVATION 3*****	$12,408,438	$12,432,144	$12,616,181

1* If conservation expenditures or proposed budget is included in "total" (No. 3) line above, then show that amount on line 4. (exclude your agency's own employee staffing cost)**

2 If conservation expenditures or proposed budget is not included in "total" (no. 3) line above, then show conservation expenditures/proposed budget on line 5. (exclude staffing)**

3* Total for conservation including staffing costs (Line No. 6).**

SECTION 3-- ANNUAL SUPPLY

Specify wholesalers or sources of supply with quantities during this report year:

ALL SOURCES OF ANNUAL SUPPLY		
Signatory to MOU✓	**List Each Source Separately**	**Acre-Feet**
N/A.	Colorado River Aqueduct	1,092,624
N/A.	State Water Project	724,628
N/A.	Local Projects	51,108
	Total Water into the System	1,868,360

AGENCY: Metropolitan Water District of Southern California

SECTION 4 -- LIST OF PURCHASERS

Please List Retail Agencies That Purchase Water from This Agency

WATER PURCHASERS			
Signed MOU √*	**Name of Agency**	**Retailer or Wholesaler**	**Acre Feet Supplied to Member Agency During Report Year**
√	Anaheim, City of	Retailer	17,566.40 AF
√	Beverly Hills, City of	Retailer	13,138.90 AF
√	Burbank, City of	Retailer	14,714.90 AF
√	Calleguas Municipal Water District	Wholesaler	92,934.80 AF
√	Central Basin Municipal Water District	Wholesaler	71,172.10 AF
√	Coastal Municipal Water District	Wholesaler	53,451.40 AF
√	Compton, City of	Retailer	3,910.00AF
√	Eastern Municipal Water District	Wholesaler	50,199.80 AF
√	Foothill Municipal Water District	Wholesaler	9,342.90 AF
√	Fullerton, City of	Retailer	5,713.00 AF
√	Glendale, City of	Retailer	26,387.90 AF
√	Inland Empire Utilities Agency	Wholesaler	51,299.50 AF
√	Las Virgenes Municipal Water District	Wholesaler	20,257.30 AF
√	Long Beach, City of	Retailer	44,814.30 AF
√	Los Angeles, City of	Retailer	99,728.20 AF
√	Municipal Water District of Orange County	Wholesaler	177,354.50 AF
√	Pasadena, City of	Retailer	16,115.30 AF
√	San Diego County Water Authority	Wholesaler	441,176.20 AF
√	San Fernando, City of	Retailer	0.20 AF
	San Marino, City of (California American Water Co.)	Retailer	1,357.20 AF
	Santa Ana, City of	Retailer	12,440.03 AF
√	Santa Monica, City of	Retailer	11,243.70 AF
√	Three Valleys Municipal Water District	Wholesaler	57,342.90 AF
√	Torrance, City of	Retailer	20,071.50 AF
√	Upper San Gabriel Valley	Wholesaler	41,377.40 AF
√	West Basin Municipal Water District	Wholesaler	159,372.70 AF
√	Western Municipal Water District of Riverside County	Wholesaler	60,728.40 AF
		TOTAL	1,573,211.70 AF

AGENCY: Metropolitan Water District of Southern California

WATER PURCHASERS -- CONTINUED			
Signed MOU √*	**Name of Agency**	**Retailer or Wholesaler**	**Acre Feet Supplied to Member Agency During Report Year**

*If wholesaler signed for agency listed, please indicate with a "W"

SECTION 5 -- WATER REUSE SURVEY

Has this Wholesale Agency Prepare a Feasibility Study on Water Reclamation? YES _X_ NO____

Year Study Completed: 1996[1]

ANNUAL RECLAMATION SUMMARY [2]	
Current Amount of Water Recycling (1997-98)	225,000 AF/YR
Total 2020 Potential Uses Identified[3]	500,000 AF/YR
Projected Reuse of Recycled Water in the Year 2000	285,000 AF/YR
Projected Reuse of Recycled Water in the Year 2010	430,000 AF/YR

If no reuse is planned, please explain why on a separate sheet.

[1] Included in Metropolitan's 1996 *Integrated Resources Plan.*
[2] Includes supplies developed both with and without Metropolitan financial assistance. Reclamation totals include recovery of degraded groundwater and recycled wastewater.
[3] Potential uses as identified in Metropolitan's 1996 *Integrated Resources Plan*. These estimates are subject to revision based on ongoing review of Metropolitan's IRP.

AGENCY: Metropolitan Water District of Southern California

PLEASE CHECK THE APPROPRIATE BOXES INDICATING EFFORTS WHOLESALE AGENCY HAS MADE TO IMPLEMENT THE BMPs DURING THIS REPORT YEAR. INDICATE WHETHER THE PROGRAM IS A PILOT WITH THE LETTER "P" IN THE "PROGRAMS" CATEGORY. A CHECK WILL INDICATE THAT THE PROGRAM IS ONGOING.

IMPLEMENTATION OR SUPPORT OF BMPs 1996-97

REPORTING AGENCY	PROVIDES						
BEST MANAGEMENT PRACTICES	PROGRAMS	MATERIALS	MONETARY **	SUPPORT	OTHER	EXEMPT*	EXPENDITURES	NUMBER COMPLETED
1. Interior and Exterior Audits	•	•	P				$107,275.	8,582
2. Plumbing Retrofit	•	•	P				$116,710.	See page 7.
3. System Water Audits	•		F				$350,000.	Daily monitoring.
4. Metering and Commodity Rates	•		F		•[4]		N/A	
5. Landscape Water Audits	•	•	P				$245,995.	See page 7.
6. Non-Residential Landscape	•	•	P		•[5]		$37,592.	See page 7.
7. Public Information	•	•	F				$354,668[6]	
8. School Education	•	•	F				$632,925[6]	
9. Commercial and Industrial Audits	•	•	P				$223,600.	See page 7.
10. New Commercial/Industrial Audits		•	P			•[7]		See page 9.
11. Conservation Pricing - Water	•				•[8]			
12. Residential Landscape	•	•	P				See BMPs 1 and 2.	
13. Water Waste Prohibition						•[9]		
14. Conservation Coordinator	•	•	F				$1,317,642.[10]	
15. Financial Incentives	•	•	F				$11,648,640.[11]	N/A
16. Toilet Replacement	•	•	P				$11,119,908.	183,333

* Exemptions require a cost benefit analysis. Please attach.

** Code "F" = Fully Funded by Wholesaler, Code "P" = Partially Funded by Wholesaler.

[4] See page 9.

[5] See page 9.

[6] Consists of funds, equipment, materials and in-kind services provided by Metropolitan.

[7] See page 9.

[8] See page 10.

[9] See page 10.

[10] Conservation Branch staff and operating budget for FY 97-98.

[11] Consists of co-payments made to assist member agency conservation activity under Metropolitan's Conservation Credits Program. This includes, but is not limited to, activities reported under BMPs 1, 2, 5, 6, 9, 10, 12 and 16. Estimates are for activity actually undertaken during FY 97-98 which is less than Metropolitan's actually level of spending for the fiscal year (i.e., some program activity occurring during FY 98-99 is paid for using funds from the FY 97-98 budget).

AGENCY Metropolitan Water District of Southern California

IMPLEMENTATION OR SUPPORT OF BMPs 1996-97
(continued)

A. Give a brief description of program efforts.

The following descriptions summarize activity not described in the preceding table.

BMP 2: Plumbing, New and Retrofits	
Device or Activity	**Number Installed/Administered**
Low-flow showerheads	3,082
Aerators	1,400
Toilet dams	5,212
Toilet flappers	534
Residential landscape audits with timer	833
Residential landscape audits without timer	3,483

BMP 5: Large Landscape Water Audits and Incentives	
Activity	**Number Administered**
Audits	289
Bilingual training classes for landscape workers	45

BMP 6: Non-Residential Landscape – New and Existing Developments	
Activity	**Number Administered**
"Circuit Rider" model landscape ordinance development and implementation assistance program	7

BMP 9: Commercial and Industrial Water Conservation	
Device or Equipment	**Number Installed**
Toilets	3,374
Urinals	22
High-efficiency washers	29
Cooling tower controllers	34

B. If you have any data regarding water savings for these BMPs, please attach.

The following estimates are for conservation activities funded by Metropolitan during FY 1997-98 for which empirically-based, device- or activity-specific water savings estimates are available. Because they do not include water savings attributable to residential, water system, landscape or CII audits, or from public information and education programs, these estimates likely understate actual water savings attributable to Metropolitan-supported water efficiency measures.

Estimated First-Year Water Savings for FY 1997-98 BMP-Related Activity: Activities for Which Empirically-Based Savings Estimates Are Available[12]

Device/Activity	Number	Estimated First-Year Savings	
		Gallons/Day	AF/Year
Single-family ULFT retrofit	107,975	23.9	2,890.6
Multi-family ULFT retrofit	71,984	44.4	3,580.1
CII ULFT retrofit	3,374	71.0	268.3
Residential Low-flow showerhead	3,374	5.5	20.8
Residential aerators	1,400	1.5	2.4
Residential toilet displacement devices	5,212	1.5	8.8
Total			**6,771.0**

[12] Unless noted otherwise, all savings estimates are based on studies discussed in Metropolitan's *Reference Document: Program Design Tool and Savings Estimates: Version 1.3*, prepared by A&N Technical Services, July 7, 1997.

Explanations for "Other" Activity and "Exemption" Claims

AGENCY NAME: Metropolitan Water District of Southern California

PLEASE USE THIS AS A COVER SHEET FOR EACH BMP THAT REQUIRES AN EXCEPTION. ATTACH EXPLANATION OF HOW AGENCY IMPLEMENTS THIS BMP DIFFERENTLY, AND INCLUDE JUSTIFICATION FOR THIS DIFFERENCE TO DEMONSTRATE THAT THIS METHOD IS "AS LEAST AS EFFECTIVE AS" THE REQUIREMENT IN THE BMP.

BMP 4 "Other" Explanation:

FOR REPORT YEAR FY **1997-98** THIS AGENCY IMPLEMENTED
IN A MANNER DIFFERENT THAN THE DEFINITION IN THE MOU.

As a wholesaler, Metropolitan has no end-use customers and, therefore, does not meter end-uses. It does, however, meter the service connections of all agencies for which it serves as a wholesaler. In addition, Metropolitan's rate structure is designed to recover approximately 70% of its total revenue requirement through commodity charges. As such, Metropolitan's charges are directly tied to volume of use.

BMP 5 "Other" Explanation

FOR REPORT YEAR FY **1997-98** THIS AGENCY IMPLEMENTED
IN A MANNER DIFFERENT THAN THE DEFINITION IN THE MOU.

As a wholesaler, Metropolitan does not have the legal authority to enact or enforce municipal ordinances. Metropolitan does, however, provide financial assistance to its member agencies for the "Circuit Rider" program. This program assists cities develop and implement the ordinances specified in AB325.

BMP 9 "Other" Explanation

FOR REPORT YEAR FY **1997-98** THIS AGENCY IMPLEMENTED
IN A MANNER DIFFERENT THAN THE DEFINITION IN THE MOU.

Agencies for whom Metropolitan serves as a wholesaler supplier can request financial assistance for Commercial and Industrial audits targeting their retail customers under Metropolitan's Conservation Credits Program. Additionally, Metropolitan Conservation Branch Staff are available to provide technical and program assistance in this area. During FY 1997-98 Metropolitan did not receive any requests for financial or technical assistance relating to this BMP.

BMP 10 Exemption Claim

FOR REPORT YEAR FY **1997-98** THIS AGENCY CONTENDS THAT IT IS EXEMPT
FROM THE PROVISIONS OF THIS BMP *ON GROUNDS OTHER THAN COST-EFFECTIVENESS*.

As a wholesaler, Metropolitan does not have the legal or statutory authority to intervene in the municipal building permit process. Agencies for whom Metropolitan serves as a wholesaler supplier can request financial assistance for performing Commercial and Industrial Water Use Reviews under Metropolitan's Conservation Credits Program. Additionally, Metropolitan Conservation Branch Staff are available to provide technical and program assistance in this area. During FY 1997-98 Metropolitan did not receive any requests for financial or technical assistance relating to this BMP.

BMP 11 "Other" Explanation

FOR REPORT YEAR FY **1997-98** THIS AGENCY IMPLEMENTED
IN A MANNER DIFFERENT THAN THE DEFINITION IN THE MOU.

Metropolitan's wholesale rate structure reflects conservation pricing principles since rates are designed to recover approximately 70% of it's total revenue requirement through commodity charges.

Metropolitan does not operate wastewater treatment facilities and therefore has no sewer service charges.

BMP 13 Exemption Claim

FOR REPORT YEAR FY **1997-98** THIS AGENCY CONTENDS THAT IT IS EXEMPT
FROM THE PROVISIONS OF THIS BMP *ON GROUNDS OTHER THAN COST-EFFECTIVENESS*.

As a wholesaler supplier, Metropolitan does not have the legal or statutory authority to enact ordinances.