



THE REGIONAL URBAN WATER MANAGEMENT PLAN

NOVEMBER 2010

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

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REGIONAL URBAN WATER MANAGEMENT PLAN

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TABLE OF CONTENTS

Section **Page**

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

Section **Page**

Tables

TABLE OF CONTENTS

TABLE OF CONTENTS

Section **Page**

Figures

LIST OF ABBREVIATIONS

Abbreviation	Terms
AF	Acre-Feet
TAF	Thousand Acre-Feet
MAF	Million Acre-Feet
cfs	Cubic feet per second
GPCD	Gallon Per Capita per Day
KWH	Kilowatt-hours
μg/L	Micrograms per liter
mg/L	Milligrams per liter
pCi/L	Picocuries per liter
AGWA	Association of Ground Water Agencies
AMPAC	American Pacific Corporation
ARRA	American Recovery and Reinvestment Act
BDCP	Bay Delta Conservation Plan
BIOp	Biological Opinion
BLM	U.S. Department of Interior Bureau of Land Management
BMP	Best Management Practices
CAWCD	Central Arizona Water Conservation District
CBSC	California Building Standards Commission
CCL3	Contaminant Candidate List 3
CCP	Conservation Credits Program
CCWD	Contra Costa Water District
CDPH	California Department of Public Health
CEQA	California Environmental Quality Act
CII	Commercial, Industrial, and Institutional
CIMIS	California Irrigation Management Information System
CPE	Comprehensive Program Evaluation
CRA	California River Aqueduct
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CVWD	Coachella Valley Water District
D/DBP	Disinfectants/Disinfection Byproduct
DBP	Disinfection Byproduct
DFG	Department of Fish & Game
DLR	Detection Level for purposes of Reporting
DOE	U.S. Department of Energy
DPC	Delta Protection Commission
DVL	Diamond Valley Lake
DWCV	Desert Water Agency/Coachella Valley Water District
DWR	Department of Water Resources
EDC	Endocrine Disruptor Chemical
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ELPH	Equivalent Level of Public Health Protection
EMRS	Energy Management & Reliability Study
ESA	Endangered Species Act
FBR	Fluidized Bed Reactors
FWU	Friant Water Users Authority

LIST OF ABBREVIATIONS

Abbreviation	Terms
GRP	Groundwater Recovery Program
HECW	High Efficiency Clothes Washers
IAWP	Interim Agricultural Water Program
ICS	Intentionally Created Surplus
IICP	Incremental Interruption and Conservation Plan
IID	Imperial Irrigation District
IRP	Integrated Water Resources Plan
LAA	Los Angeles Aqueduct
LPP	Local Projects Program
LRP	Local Resources Program
M&I	Municipal & Industrial
MCL	Maximum Contaminant Level
MOU	Memorandum of Understanding
MTBE	Methyl Tertiary-Butyl Ether
NASA	National Aeronautics and Space Administration
NCCPA	Natural Community Conservation Planning Act
NDEP	Nevada Division of Environmental Protection
NDMA	N-nitrosodimethylamine
NMFS	National Marine Fisheries Services
NOAA	National Oceanic and Atmosphere Administration
OEHHA	Office of Environmental Health Hazard Assessment
PG&E	Pacific Gas & Electric
PHG	Public Health Goal
PPCP	Pharmaceutical/Personal Care Product
PPR	Present Perfected Rights
PVID	Palo Verde Irrigation District
QMCP	Quagga Mussel Control Plan
QSA	Quantification Settlement Agreement
RDM	Robust Decision Making
RFP	Request for Proposals
RTS	Readiness-to-Serve
RUWMP	Regional Urban Water Management Plan
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SAR	System Access Rate
SARI	Santa Ana Regional Interceptor
SBX7-7	Senate Bill 7, Water Use Reduction Target
SCAG	Southern California Association of Governments
SCCWRRS	Southern California Comprehensive Wastewater Recycling and Reclamation Project
SDCWA	San Diego County Water Authority
SDP	Seawater Desalination Program
SNWA	Southern Nevada Water Agency
SPR	System Power Rate
SWC	State Water Contractors
SWP	State Water Project
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids

LIST OF ABBREVIATIONS

Abbreviation	Terms
TOC	Total Organic Carbon
UCMR2	Unregulated Contaminant Monitoring Regulation 2
USBR	U.S. Department of Interior, Bureau of Reclamation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Services
UWMP	Urban Water Management Plan
VOC	Volatile Organic Compounds
WBIC	Weather-Based Irrigation Controllers
WSAP	Water Supply Allocation Plan
WSDM	Water Surplus and Drought Management
WSR	Water Stewardship Rate
WUCA	Water Utility Climate Alliance
YCWA	Yuba County Water Agency
Act	Urban Water Management Planning Act
Arvin-Edison	Arvin-Edison Water Storage District
Bay-Delta	San Francisco Bay/Sacramento-San Joaquin Delta
Calleguas	Calleguas Municipal Water District
Code	Metropolitan's Administrative Code
Conservancy	Sacramento-San Joaquin Delta Conservancy
Council	Delta Stewardship Council
Forum	Colorado River Basin Salinity Control Forum
Kern Delta	Kern Delta Water District
Metropolitan	The Metropolitan Water District of Southern California
Policy	State Recycled Water Policy
Regional Board	Santa Ana Regional Water Quality Control Board
Science Board	Delta Independent Science Board
Semitropic	Semitropic Water Storage District
Urban MOU	California Urban Water Conservation Council Memorandum of Understanding Regarding Water Conservation in California
Valley District	San Bernardino Valley Municipal Water District

SUMMARY OF METROPOLITAN COMPLIANCE UNDER THE DWR GUIDELINES

In 2005, DWR provided guidance materials to aid water districts in developing their urban water management plans. These materials both helped water districts comply with the law and DWR staff review submitted plans for regulatory compliance. The guidance materials consisted of a series of worksheets detailing acceptable responses to the requirements set forth in the Urban Water Management Planning Act (Act), as per the California Water Code. At that time, DWR also provided a checklist for cross referencing sections of the respondent water agency's Plan with the relevant sections of the Water Code to be sure that it addresses all relevant provisions of the Act.

Since the revised guidebook and checklist for the 2010 Urban Water Management Plan will not be released until DWR completes the development of new reporting methodologies for retail agencies, Metropolitan used the 2005 guideline materials in the development of this plan. In addition, Metropolitan also closely monitored changes in the reporting requirements brought about by new legislation and changes to the Act. Presented below is a compliance checklist reflective of these changes. This compliance checklist is organized by Water Code section and summarizes Metropolitan's compliance to the reporting requirements of the Act in the Water Code.

Agency Coordination

Water Code § 10620 (d)(1)(2) Coordination with Appropriate Agencies

Participated in areawide, regional, watershed or basinwide urban water management planning

- See Section 5.

Describe the coordination of the plan preparation and anticipated benefits.

- See Section 5.

Water Code §10620 (f) - Describe resource maximization / import minimization plan

Discuss how water management tools and options are used to maximize resources and minimize the need to import water.

- Metropolitan's planning strategy within the IRP and adaptive implementation approach is discussed in Section 2 and provides an overview of the water management tools and options. See pages 2-1 through 2-11.
- Further details are provided in Sections 3.4 (conservation, pages 3-28 through 3-39) and 3-5 (recycling, groundwater recovery and desalination, pages 3-40 through 3-55.)

Water Code § 10621 (b) - City and County Notification and Participation

Notify any city or county within service area of UWMP of plan review & revision. Consult and obtain comments from cities and counties within service area.

- Notification is discussed in Section 5, pages 5-7 thru 5-11.

Water Code § 10631 (a) - Service Area Information

Describe service area of supplier

- Service area is discussed on pages 1-6 through 1-10.

Include current and projected population

- Population analysis is discussed in Appendix A.1, page A.1-2. Projections are on page A.1-8, Table A.1-2.

Population projections were based on data from state, regional or local agency

- See footnote Table A.1-2, page A.1-8.

Describe climate characteristics that affect water management

- See Page I-15 through I-17.

Describe other demographic factors affecting water management

- See Page I-14.

Contents of UWMP

Water Code § 10631 (b) - Water Sources

Identify existing and planned water supply sources, Provide current water supply quantities, Provide planned water supply quantities

- Historic and current water supplies are described in Appendix A.2. Planned water supplies are discussed in Section 2, and details are provided in Appendix A.3, and particularly in Table A.3-7, pages A.3-43 through A.3-55.

Water Code §10631 (b)(1-4) - If Groundwater identified as existing or planned source

- Metropolitan does not supply groundwater. However, Metropolitan does use groundwater basins for groundwater banking.
- See Section 3.6 and Appendix A.2 (pages A.2-5 through A.2.6) and Appendix A.3 (pages A.3-36 through A.3-42) for discussions of issues related to groundwater basins.

Water Code §10631 (c) (1) - Reliability of Supply

Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage

- Section 2, pages 2-15 though 2-19 and the discussions presented under the CRA and SWP Sections 3-1 and 3-2.

Basis of Water Year data

- Section 2, Tables 2-9 through 2-11, pages 2-17 though 2-19.

Water Code §10631 (c) (2) - Water Sources Not Available on a Consistent Basis

Describe plans to supplement or replace inconsistent sources with alternative sources or water Demand Management Measures (DMMs)

- For a discussion on alternative sources, see adaptive management planning in Section 2 on pages 2-3 through 2-8.
- For a discussion on water demand management measures, see Sections 2 and 3, in particular, pages 2-2, 2-29, and 3-34.

Water Code §10631 (d) - Transfer or Exchange Opportunities

Describe short term and long term exchange or transfer opportunities

- Section 3.1 (pages 3-2 through 3-9) describes plans for banking, exchange and transfer opportunities along the Colorado River and Aqueduct.
- Section 3.2 (pages 3-10 through 3-22) describes plans for banking, exchange and transfer opportunities within the State Water Project.
- Section 3.3 (pages 3-22 through 3-27) describes plans for banking, exchange and transfer opportunities within the Central Valley.
- Section 3.6 (pages 3-56 through 3-60) describes plans for banking, exchange and transfer opportunities within the local region.
- Further details including dry year supply projections are provided in Appendix A.3, particularly Table A.3.7 on pages A.3-43 through A.3-55.

Water Code §10631 (e)(1)(2) - Water Use Provisions

Quantify past water use by sector, current water use by sector, Project future water use by sector

- Past, current, and future water uses are shown in Table A.1-13 on page A.1-12. Water uses by sector and county are shown in Tables A.1-6 through A.1-11 on pages A.1-10 through A.1-12.

Identify and quantify sales to other agencies

- Historic sales are presented in Table A.2-2 on page A.2-4. Metropolitan does not project sales by individual agency. However, total projected sales/demands to other agencies are shown in Section 2.

Water Code §10631 (f) - 2010 Urban Water Management Plan "Review of DMMs for Completeness" Form

- See CUWCC filings in Appendix A.6.

Water Code §10631 (g) - Planned Water Supply Projects and Programs, including non-implemented Demand Management Measures

- See discussion on the conservation credits program and implementation approach, Section 3.4, pages 3-28 through 3-39.

Water Code §10631 (h) - **Planned Water Supply Projects and Programs**

Detailed description of expected future supply projects & programs
Timeline for each proposed project
Quantification of each projects normal yield (AFY)
Quantification of each projects single dry-year yield (AFY)
Quantification of each projects multiple dry-year yield (AFY)

- Section 3.1 (pages 3-2 through 3-9) describes plans for banking, exchange and transfer opportunities along the Colorado River and Aqueduct.
- Section 3.2 (pages 3-10 through 3-22) describes plans for banking, exchange and transfer opportunities within the State Water Project.
- Section 3.3 (pages 3-23 through 3-27) describes plans for banking, exchange and transfer opportunities within the Central Valley.
- Section 3.6 (pages 3-56 through 3-60) describes plans for banking, exchange and transfer opportunities within the local region.
- Further details including dry year supply projections are provided in Appendix A.3, particularly Table A.3.7 on pages A.3-43 through A.3-55.

Water Code §10631 (i) - Opportunities for development of desalinated water

Describes opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply

- See discussion in Section 3.5 on groundwater recovery and seawater desalination, pages 3-47 through 3-55.
- See Appendix A.5, Table A.5-1 on pages A.5-1 through A.5-3 for a list of existing and conceptual groundwater recovery projects and their ultimate yield/capacity.
- See Appendix A.5, Table A.5-3 on page A.5-10 for a list of conceptual, planned, and under construction seawater desalination projects.

Determination of Demand Management Measures Implementation

Water Code § 10631 (j) - District is a CUWCC signatory

Agency is a CUWCC member
2005-08 annual updates are attached to plan
annual updates are considered completed by CUWCC website

- See Section 3.4 and attached documents in Appendix A.6.

Water Code § 10631 (k) – If supplier receives or projects receiving water from a wholesale supplier

Provided written availability projections, by source, to member agencies

- See Appendix A.3, Table A.3-7.

Water Code § 10631.1 - Projected Water Use for Low-Income Housing

Water use projections for single-family and multi-family residential housing for low-income housing

- This is incorporated with the retail demand forecast, as reflected in the discussions in Section 2.

Water Code § 10631.5 - Implementing water demand management demand measures
Compliance on a regional basis

- In determining its supply reliability, Metropolitan estimates total retail demands for its regional service areas and factors out water savings attributed to conservation, as discussed in section 2.2 (pages 2-9 though 2-14) and shown in tables 2-6 through 2-8.
- Metropolitan has invested over $268 million through a nearly 20-year period in regional conservation programs as discussed in Section 3.4 (pages 3-28 through 3-39).
- Metropolitan's "Water Stewardship Rate" element of its rate structure recovers the cost of providing financial incentives in conservation and water recycling and is identified as a demand management service function of the cost of service process, as discussed in Section 2.7 on page 2-29.
- Metropolitan's Conservation Credits Program provides the basis for financial incentives and funding for urban BMP and other demand management related activities, as discussed in Section 3.4, pages 3-28 though 3-39.
- Metropolitan's conservation related achievements are discussed in Section 3.4 and are shown in Tables 3-7 through 3-10.

Water Shortage Contingency Plan

Water Code § 10632 - Water Shortage Contingency Plan Section
Water Code § 10632 (a) - Stages of Action
Provide stages of action
Provide the water supply conditions for each stage
Includes plan for 50 percent supply shortage

- Documentation of the stages of actions Metropolitan would undertake to address up to 50 percent reduction in its water supplies and a catastrophic interruption in water supplies is included in its Water Surplus and Drought Management and Water Supply Allocation Plans and in the discussion of its Emergency Storage Requirement developed under its catastrophic supply interruption plan. See discussion on Section 2, pages 2-20 through 2-23.

Water Code §10632 (b) - **Three-Year Minimum Water Supply**
Identifies driest 3-year period
Minimum water supply available by source for the next three years

- Metropolitan has projected its supply capabilities for the next three years 2011 through 2013 under a multiple dry year hydrology (based on a repeat of 1990-1992 hydrology, which represents the three years of shortest supplies). See Table 1-6, page 1-24.

Water Code §10632 (c) - **Preparation for catastrophic water supply interruption**
Provided catastrophic supply interruption plan
Regional power outage
Earthquake
Delta levee failure
Aqueduct failure

- See Section 2, pages 2-20 through 2-28.

Water Code § 10632 (d) - **Prohibitions**
List the mandatory prohibitions against specific water use practices during water shortages

- Not applicable.

Water Code § 10632 (e) - Consumption Reduction Methods
List the consumption reduction methods the water supplier will use to reduce water use in the most restrictive stages with up to a 50% reduction.
- See Section 2, especially page 2-22 and Appendix A.4.

Water Code § 10632 (f) - **Penalties**
List excessive use penalties or charges for excessive use
- See Section 2 and Appendix A.4.

Water Code § 10632 (g) - Revenue and Expenditure Impacts
Describe how actions and conditions impact revenues
Describe how actions and conditions impact expenditures
Describe measures to overcome the revenue and expenditure impacts
- See Section 2-7, pages 2-29 through 2-35.

Water Code § 10632 (h) - Water Shortage Contingency Ordinance/Resolution
Attach a copy of the draft water shortage contingency resolution or ordinance.
- Not applicable to Metropolitan. The WSDM and WSAP plans adopted to deal with shortages are discussed in Section 2, pages 2-20 through 2-23. The WSAP is also included as Appendix A.4.

Water Code § 10632 (i) - Reduction Measuring Mechanism
Provided mechanisms for determining actual reductions
- Metropolitan's water sales are metered. See Section 2.

Recycled Water Plan

Water Code § 10633 - Recycling Plan Agency Coordination
Describe the coordination of the recycling plan preparation information to the extent available.
- See Section 3-5, pages 3-40 through 3-55, Table 3-15 on page 3-54, Table 3-16 on page 3-55, and in Appendix A.5, Table A.5-2.

Water Code § 10633 (a) - **Wastewater System Description**
Describe the wastewater collection and treatment systems in the supplier's service area
Quantify the volume of wastewater collected and treated
- See Section 3-5, pages 3-40 through 3-55, Table 3-15 on page 3-54, Table 3-16 on page 3-55, and in Appendix A.5, Table A.5-2.

Water Code § 10633 (a - d) - Wastewater Disposal and Recycled Water Uses
Describes methods of wastewater disposal
- See Section 3-5, page 3-40.

Describe the current type, place and use of recycled water
- See Section 3-5, page 3-42, and Table A.5-2.

Describe and quantify potential uses of recycled water
- See Section 3-5, page 3-42, and Table A.5-2.

Determination of technical and economic feasibility of serving the potential uses
- See Section 3-5, pages 3-42 through 3-47.

Water Code § 10633 (e) - Projected Uses of Recycled Water
Projected use of recycled water, 20 years

- See Section 2, Tables 2-6 through Table 2-8, pages 2-12 through 2-14 and Section 3-5.

Compare UWMP 2005 projections with UWMP 2010 actual

- The 2005 RUWMP, Tables II-4, II-5, and II-6, included the following projections for recycled water use in 2010: 310,000 AF for a single dry year; 300,000 AF for a multiple dry year; and 316,000 AF for an average year. In 2009, actual recycled water use is estimated at 310,000 AF, as discussed in Appendix A.2, page A.2-8 of this 2010 RUWMP.

Water Code § 10633 (f) - Plan to Optimize Use of Recycled Water
Describe actions that might be taken to encourage recycled water uses
Describe projected results of these actions in terms of acre-feet of recycled water used per year
Provide a recycled water use optimization plan which includes actions to facilitate the use of recycled water (dual distribution systems, promote recirculating uses)

- See Section 3-5, pages 3-40 through 3-55, Table 3-15 on page 3-54, Table 3-16 on page 3-55, and in Appendix A.5, Table A.5-2.

Water Quality Impacts on Reliability

Water Code §10634 - Water quality impacts on availability of supply
Discusses water quality impacts (by source) upon water management strategies and supply reliability

- See Section 4, Water Quality, pages 4-1 through 4-17.

Water Service Reliability

Water Code § 10635 (a) - Supply and Demand Comparison to 20 Years
Compare the projected normal water supply to projected normal water use over the next 20 years, in 5-year increments.

- See Section 2, Tables 2-6 to 2-8, pages 2-12 through 2-14, for projected water use and Table A.3-7 in Appendix A.3, pages A.3-43 through A.3-55 for projected water supply.

Water Code § 10635 (a) - Supply and Demand Comparison: Single-dry Year Scenario
Compare the projected single-dry year water supply to projected single-dry year water use over the next 20 years, in 5-year increments.

- See Section 2, Tables 2-6 to 2-8, pages 2-12 through 2-14, for projected water use and Table A.3-7 in Appendix A.3, pages A.3-43 through A.3-55 for projected water supply.

Water Code § 10635 (a) - Supply and Demand Comparison: Multiple-dry Year Scenario
Project a multiple-dry year period occurring between 2011-2015 and compare projected supply and demand during those years
Project a multiple-dry year period occurring between 2016-2020 and compare projected supply and demand during those years
Project a multiple-dry year period occurring between 2021-2025 and compare projected supply and demand during those years
Project a multiple-dry year period occurring between 2026-2030 and compare projected supply and demand during those years

- Metropolitan has projected multiple dry year periods for years ending in "0" or "5". Its planning for multiple dry years is based on the three years of shortest supplies (1990-1992 hydrology). The results presented in Section 2 for multiple dry years are for an average of three years with this extreme hydrology. See Section 2, Tables 2-6 to 2-8, pages 2-12 through 2-14, for projected water use and Table A.3-7 in Appendix A.3, pages A.3-43 through A.3-55 for projected water supply.

Water Code § 10642 – Does the plan include public participation and plan adoption?
Attach a copy of adoption resolution

- See Section 5, page 5-11.

Encourage involvement of social, cultural & economic community groups

- See Section 5, pages 5-7 through 5-8.

Plan available for public inspection

- See Section 5, pages 5-9 and 5-10.

Provide proof of public hearing

- See Section 5, page 5-10.

Provided meeting notice to local governments

- See Section 5, page 5-9.

Water Code § 10643 – Review of implementation of 2005 uwmp
Reviewed implementation plan and schedule of 2005 UWMP
implemented in accordance with the schedule set forth in the plan

- Metropolitan has conducted a review of its planning progress through the IRP Update, discussed in Section 2.I. In addition, in each section, Metropolitan has included a "Achievement to Date" that discusses progress towards its planning goals, and discussion on current issues and potential problems with continued implementation of the plan.

DMM Programs

- Metropolitan is a member of CUWCC, and has submitted its recent DMM reports to the CUWCC to comply with the UWMP requirements. In addition, Metropolitan has discussed its conservation plan and approach in Section 3-4. Individual conservation programs are discussed on pages 3-28 through 3-39.

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EXECUTIVE SUMMARY

Metropolitan's 2010 Regional Urban Water Management Plan (RUWMP) has been prepared in compliance with Water Code Sections 10608.36 and 10610 through 10656 of the Urban Water Management Planning Act (Act), which were added by Statute 1983, Chapter 1009, and became effective on January 1, 1984. This 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, in accordance with prescribed requirements, an urban water management plan."*

The Urban Water Management Planning Act (Act) requires urban water suppliers to describe and evaluate sources of water supply, efficient uses of water, demand management measures, implementation strategy and schedule, and other relevant information and programs. Urban water suppliers are required by the Act to update their Urban Water Management Plan (UWMP) and submit a complete plan to California Department of Water Resources (DWR) every five years. An UWMP is required in order for a water supplier to be eligible for DWR administered state grants and loans and drought assistance.

As with Metropolitan's previous plans, the 2010 RUWMP does not explicitly discuss specific activities undertaken by its member agencies unless it relates to one of Metropolitan's water demand or supply management programs. Each member agency will discuss these activities in its UWMP. Information from Metropolitan's 2010 RUWMP may be used by many of the local water suppliers in the preparation of their own plans, although it is not mandatory for local agencies to rely on Metropolitan's plan because participation in any regional planning activity is voluntary (pursuant to Water Code § 10620).

The information included in the 2010 RUWMP represents the most current available planning projections of supply capability and demand developed through a collaborative process with the member agencies. Metropolitan is in the process of completing its 2010 Integrated Water Resources Plan Update (2010 IRP Update), which represents Metropolitan's comprehensive planning process and will serve as Metropolitan's blueprint for long-term water reliability, including key supply development and water use efficiency goals.

Factors of Consideration

The Act requires reporting agencies to describe its water reliability under a single dry-year, multiple dry-year, and average year conditions, with projected information in five-year increments for 20 years. The factors of consideration used to evaluate Metropolitan's supply and demand balance for the 2010 RUWMP are presented below. Some of the considerations and resulting projections may change as Metropolitan's planning process is finalized. These changes may be reflected in future preparations of the RUWMP.

Demand Projections

Within Metropolitan's service area, retail water demands can be met with local supplies or imported supplies. Metropolitan's long-term plan focuses on the future demands for Metropolitan's imported supplies. The expected firm demand on Metropolitan is the difference between total demands, adjusted for conservation, and projected total local supplies. Thus, in order to project the regional need for imported water, Metropolitan starts with a projection of total demand including retail Municipal and Industrial (M&I), retail agricultural, seawater barrier, and replenishment demands, determines the adjustments from total conservation, and subtracts the total local supplies that are available to meet a portion of those demands.

Total Demands

Metropolitan updates its retail M&I projection periodically based on the release of official regional demographic and economic projections. The projections of retail M&I water demands used in the 2010 RUWMP are based on data from the following reports:

- Southern California Association of Governments (SCAG) 2007 Regional Transportation Plan
- San Diego Association of Governments (SANDAG) Series 12: 2050 Regional Growth Forecast Update

The SCAG and SANDAG regional growth forecasts are the core assumptions that drive the estimating equations in Metropolitan's MWD-MAIN demand forecasting model. SCAG and SANDAG's projections undergo extensive local review and incorporate zoning information from city and county general plans and are backed by Environmental Impact Reports.

Retail agricultural demands consist of water use for irrigating crops. Metropolitan's member agencies estimate agricultural water use based on many factors, including farm acreage, crop types, historical water use, and land use conversion. Each member agency estimates its agricultural demands differently, depending on availability of information. Metropolitan relies on member agencies' estimates of agricultural demands for the 2010 RUWMP.

Metropolitan also includes in its assessment of total demands the local groundwater requirements for seawater barrier and basin replenishment. Seawater barrier demands represent the amount of water needed to hold back seawater intrusion into the coastal groundwater basins, and are considered firm demands. Replenishment demands represent the amount of water that member agencies plan to use to replenish the groundwater basins as available. Metropolitan relies on member and groundwater management agencies' projections for these demands. For the 2010 RUWMP, replenishment deliveries are not included as part of firm demands.

Total Conservation

Projected regional water demand is adjusted to account for water conserved by Best Management Practices from active, code-based, and price-effect conservation. Active conservation levels are derived by calculating water savings from all active program device-based savings installed to date. Code-based conservation levels are derived by calculating water savings from devices covered by existing water conservation ordinances and plumbing codes, with replacement and new construction rates driven by demographic growth consistent with those used to derive retail demand. Price-effect conservation is derived by calculating water savings by retail customers attributable to the effect of changes in the real (inflation adjusted) price of water.

Water use reduction under Senate Bill 7 (SBX7-7) is factored into regional local water supplies. This has been done to recognize the fact that one method of compliance with SBX7-7 is the development of recycled water in addition to conservation.

Total Local Supplies

Projections of local supplies are based on information gathered from a number of sources including past urban water management plans, Metropolitan's annual local production surveys, and communications between Metropolitan and member agency staff. The projections include groundwater and surface water production, recycled water and recovery of contaminated or degraded groundwater (funded under the Metropolitan's Local Resources Program as wells as local agency funded programs) and seawater desalination. The local supply projections presented in demand tables for the 2010 RUWMP include existing projects that are currently producing water and projects that are under construction.

The total local supplies presented in the 2010 RUWMP also include Los Angeles Aqueduct deliveries and non-Metropolitan water supplies imported by member agencies from sources outside of Metropolitan service area.

Water Use Reduction Target

On November 10, 2009, the state Legislature passed Senate Bill 7 as part of the Seventh Extraordinary Session, referred to as SBX7-7. This new law is the water conservation component to the historic Delta legislative package, and seeks to achieve a 20 percent statewide reduction in urban per capita water use in California by December 31, 2020. According to Water Code §10608.36, wholesale agencies are required to include in their UWMPs an assessment of present and proposed future measures, programs, and policies that would help achieve the water use reductions required under SBX7-7. Urban wholesale water suppliers are not required to comply with the target-setting and reporting requirements of SBX7-7.

Approximately 380 TAF of the additional conservation and/or recycling would be implemented as a result of full compliance by local water agencies with water reduction targets by 2020 at the retail level. This estimated amount is reflected in the projected demand for imported supply in the 2010 RUWMP and is further described in Section 2.2.

Supply Capabilities

The 2010 RUWMP reports on Metropolitan's water reliability and identifies projected supplies to meet the long-term demand within its service area. Metropolitan's supply capabilities are evaluated using the following assumptions:

Hydrologic Conditions and Reporting Period

The 2010 RUWMP presents Metropolitan's supply capabilities from 2015 through 2035 under the three hydrologic conditions specified in the Act: single dry-year (represented by a repeat of 1977 hydrology), multiple dry-year (represented by a repeat of 1990 to 1992 hydrologies) and average year (represented by the average of 1922 to 2004 hydrologies).

Colorado River Aqueduct Supplies

Colorado River Aqueduct supplies include supplies that would result from existing and committed programs and from implementation of the Quantification Settlement Agreement (QSA) and related agreements. The QSA, which is the subject of current litigation, is a component of the California Plan and establishes the baseline water use for each of the agreement parties and facilitates the transfer of water from agricultural agencies to urban uses. A detailed discussion of the QSA is included in Section 3. Colorado River transactions are potentially available to supply additional water up to the CRA capacity of 1.25 MAF on an as-needed basis.

State Water Project Supplies

State Water Project (SWP) supplies are estimated using the draft 2009 SWP Delivery Reliability Report distributed by DWR in December 2009. The draft 2009 reliability report presents the current DWR estimate of the amount of water deliveries for current

(2009) conditions and conditions 20 years in the future. These estimates incorporate restrictions on SWP and Central Valley Project (CVP) operations in accordance with the biological opinions of the U.S. Fish and Wildlife Service and National Marine Fishery Service issued on December 15, 2008, and June 4, 2009, respectively. Under the 2009 draft reliability report, the delivery estimates for the SWP for current (2009) conditions as percentage of maximum Table A amounts, are 7%, equivalent to 134 TAF, under a single dry-year (1977) condition and 60%, equivalent to 1.15 MAF, under long-term average condition.

In dry, below-normal conditions, Metropolitan has increased the supplies received from the California Aqueduct by developing flexible Central Valley/SWP storage and transfer programs. Over the last two years under the pumping restrictions of the SWP, Metropolitan has worked collaboratively with the other contractors to develop numerous voluntary Central Valley/SWP storage and transfer programs. The goal of this storage/transfer programs is to develop additional dry-year supplies that can be conveyed through the available Banks pumping capacity to maximize deliveries through the California Aqueduct during dry hydrologic conditions and regulatory restrictions.

Delta Improvements

The listing of several fish species as threatened or endangered under the federal or California Endangered Species Acts (ESAs) have adversely impacted operations and limited the flexibility of the SWP. In response to court decisions related to the Biological Opinions for fish species listed under the ESAs, DWR altered the operations of the SWP. This resulted in export restrictions and reduced SWP deliveries. In June 2007, Metropolitan's Board approved a Delta Action Plan that provides a framework for staff to pursue actions with other agencies and stakeholders to build a sustainable Delta and reduce conflicts between water supply conveyance and the environment. The Delta Action Plan aims to prioritize immediate short-term actions to stabilize the Delta while an ultimate solution is selected, and mid-term steps to maintain the Bay-Delta while the long-term solution is implemented.

In the near-term, the physical and operational actions in the Bay-Delta being developed include measures that protect fish species and reduce supply impacts with the goal of reducing conflicts between water supply conveyance and environmental needs. The potential for Increased supply due to these near-term fixes is included in the 2010 RUWMP as a 10 percent increase in water supplies obtained from the SWP allocation for the year. In evaluating the supply capabilities for the 2010 RUWMP, additional supplies from this interim fix are assumed to materialize by 2013. Also included as a possible near-term fix for the Bay-Delta is the proposed Two-Gate System demonstration program, which would provide movable barriers on the Old and Middle Rivers to modify flows and prevent fish from being drawn toward the Bay-Delta pumping plants. The Two-Gate System is anticipated to protect fish and increase SWP supplies.

Operational constraints likely will continue until a long-term solution to the problems in the Bay-Delta is identified and implemented. State and federal resource agencies and various environmental and water user entities are currently engaged in the development of the Bay Delta Conservation Plan (BDCP), which is aimed at addressing the basic elements that include the Delta ecosystem restoration, water supply conveyance, and flood control protection and storage development. In dealing with these basic issues, the ideal solutions sought are the ones that address both the physical changes required as well as the financing and governance. In evaluating the supply capabilities for the 2010 RUWMP, Metropolitan assumed a new Delta conveyance is fully operational by 2022 that would return supply reliability similar to 2005 condition, prior to supply restrictions imposed due to the Biological Opinions. This assumption is consistent with Metropolitan's long-term Delta Action Plan that recognizes the need for a global, comprehensive approach to the fundamental issues and conflicts to result in a sustainable Bay-Delta, sufficient to avoid biological opinion restrictions on planned SWP deliveries to Metropolitan and the other SWP Contractors. Further, recently passed state legislation included pathways for establishing governance structures and financing approaches to implement and manage the identified elements.

Storage

A key component of Metropolitan's water supply capability is the amount of water in Metropolitan's storage facilities. Storage is a major component of Metropolitan's dry-year resource management strategy. Metropolitan's likelihood of having adequate supply capability to meet projected demands, without implementing the Water Supply Allocation plan (WSAP), is dependent on its storage resources.

In developing the supply capabilities for the 2010 RUWMP, Metropolitan assumed a simulated median storage level going into each of five-year increments based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher than the assumption used, and a 50 percent probability that storage levels would be lower than the assumption used. All storage capability figures shown in the 2010 RUWMP reflect actual storage program conveyance constraints. It is important to note that under some conditions, Metropolitan may choose to implement the WSAP in order to preserve storage reserves for a future year, instead of using the full supply capability. This can result in impacts at the retail level even under conditions where there may be adequate supply capabilities to meet demands.

Findings of the 2010 Regional Urban Water Management Plan

The 2010 RUWMP provides a comprehensive summary of Metropolitan's demand and supply outlook through 2035. As a reporting document, the RUWMP will be updated every five years to reflect changes in water demand and supply projections.

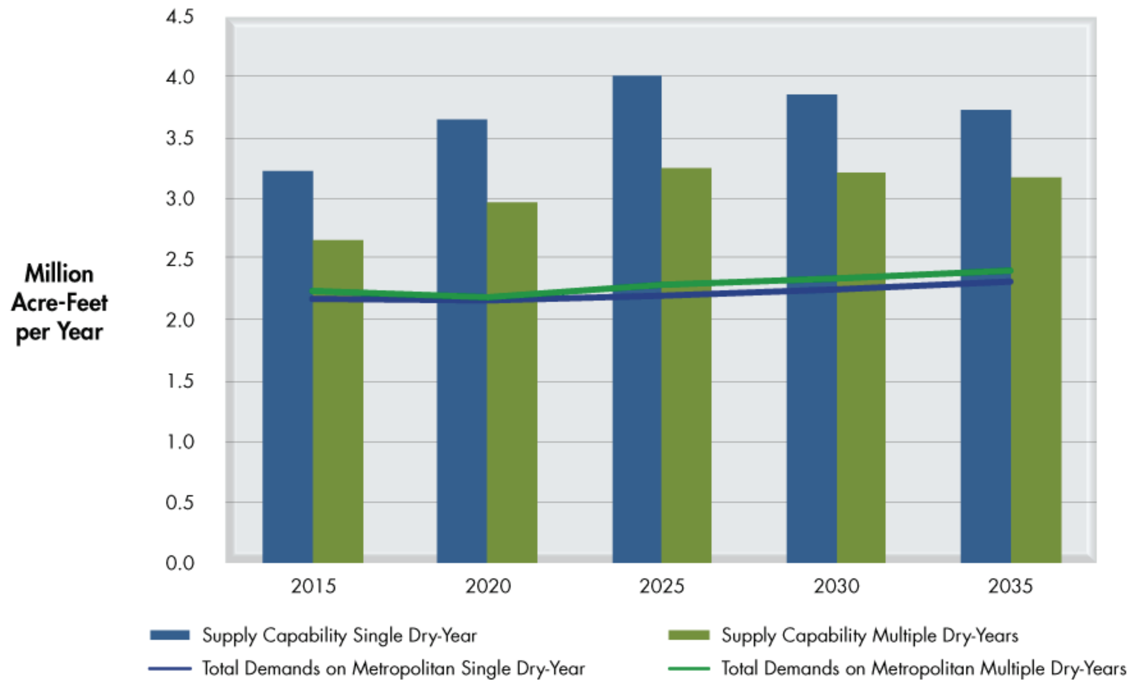
The 2010 RUWMP satisfies all the reporting requirements mandated by the Act. The key reporting points of this report are as follows:

- Metropolitan has supply capabilities that would be sufficient to meet expected demands from 2015 through 2035 under the single dry-year and multiple dry-year conditions, as presented in Figure ES-1.
- Metropolitan has comprehensive plans for stages of actions it would undertake to address up to 50 percent reduction in its water supplies and a catastrophic interruption in water supplies through its Water Surplus and Drought Management and Water Supply Allocation Plans. Metropolitan also developed an Emergency Storage Requirement to mitigate against potential interruption in water supplies resulting from catastrophic occurrences within the Southern California region, including seismic events along the San Andreas fault. In addition, Metropolitan is working with the State to implement a comprehensive improvement plan to address catastrophic occurrences that could occur outside of the Southern California region, such as a maximum probable seismic event in the Delta that would cause levee failure and disruption of SWP deliveries.
- Metropolitan has plans for supply implementation and continued development of a diversified resource

mix including programs in the CRA, SWP, Central Valley transfers, local resource projects, and in-region storage that enables the region to meet its water supply needs.

- Metropolitan has a collaborative process in its planning initiatives, including the preparation of the 2010 RUWMP.

Figure ES-1 Supply Capabilities under Single Dry-Year and Multiple Dry-Year Hydrologies



Note:

1. Supply capabilities are derived using simulated median storage level going into each of five-year increments based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher than the assumption used, and a 50 percent probability that storage levels would be lower than the assumption used.
2. Under some conditions, Metropolitan may choose to implement the WSAP in order to preserve storage reserves for a future year, instead of using the full supply capability. This can result in impacts at the retail level even under conditions where there may be adequate supply capabilities to meet firm demands.
3. All storage capability figures shown in the 2010 RUWMP reflect actual storage program conveyance constraints.

Introduction 1

1.1 Introduction to this Document and the Agency

Organization of this Document

This report complies with the Urban Water Management Planning Act of 1984. In addition to complying with the Act, this report details Metropolitan's current situation and how it will meet the challenges of the future. This document contains five sections. The first section is the introduction that defines Metropolitan in terms of governance, structure, and current water supply status. This section also outlines briefly how Metropolitan will meet current and future challenges. The second section describes Metropolitan's planning activities and explains how the agency will manage the region's water resources to ensure a reliable water supply for the region. The third section describes the actions Metropolitan has taken to implement the plans outlined in Section 2 and lists future programs and activities. The fourth section of this report addresses the issue of water quality and steps taken to deliver high-quality water to Metropolitan's service area. The last section details the public outreach component integrated with Metropolitan's planning processes. Appendices that include supporting documents for this report are at the conclusion of this report. The sections are further described in detail below:

Section 1 - Introduction

In addition to demonstrating how this report complies with the Act, the 2010 RUWMP details Metropolitan's current situation and outlines its plan for meeting the challenges of the future. The Introduction section includes:

- Discussion of the Act and Metropolitan's reporting responsibilities under the Act
- Introduction of Metropolitan and description of the formation, purpose, service area, member agencies and governance
- Historical and demographic information on Metropolitan's service area
- Discussion of Metropolitan's current condition, challenges, and resource planning strategies
- Evaluation of Metropolitan's supply capabilities for the next three years under multiple dry-year scenario

Section 2 - Planning for the Future

The Planning for the Future section discusses how Metropolitan plans to meet Southern California's water needs in the future. The section highlights the importance of Integrated Resource Planning by summarizing Metropolitan's planning processes over the years and emphasizes the need for Metropolitan to implement adaptive planning strategies that will prepare the region to deal with uncertainties. This section also includes:

- Evaluation of regional water demand under single dry-year, multiple dry-year, and average year condition for years 2015 through 2035
- Evaluation of supply capabilities under single dry-year, multiple dry-year, and average year condition for years 2015 through 2035
- Discussion of water shortage contingency analysis though the Water Surplus and Drought Management Plan and the Water Supply Allocation Plan

- Discussion of other supply reliability risks including climate change
- Discussion of the different elements of Metropolitan's rate structure and revenue management

Section 3 - Implementation Plan

The Implementation Plan section summarizes Metropolitan's progress in developing a diversified resource mix that enables the region to meet its water supply needs. The investments that Metropolitan has made and its continuing efforts in many different areas coalesce toward its goal of long-term supply reliability for the region. This section includes:

- Discussion of resources and program development within the CRA, SWP, Central Valley transfers programs, conservation, LRP (groundwater recovery, recycling, desalination), and groundwater
- Discussion of Metropolitan's action to meet the water reduction target (20 percent by 2020)

Section 4 - Water Quality

The Water Quality section identifies key regional water quality issues and provides discussion of the protection of the quality of source water and development of water management programs that maintain and enhance water quality. This section also includes:

- Discussion of water quality issues of concern, issues of decreasing concern, and actions that Metropolitan has undertaken to protect its water supplies.

Section 5 - Public Outreach

The Public Outreach section presents the processes undertaken in the development of the 2010 IRP Update, RUWMP, and Groundwater workshops with the stakeholders. It provides a list of all meetings and workshops accomplished to promote and achieve consensus and collaborative planning processes. Also included in this section are the public notification letters and announcements distributed by Metropolitan as required by the Act and a copy of the Metropolitan resolution adopting the 2010 RUWMP and approving it for submittal to DWR. This section also includes description of public processes for:

- IRP Update Process
- Groundwater Process
- 2010 Regional Urban Water Management Plan Process

<u>Appendices</u>

The appendices provided present detailed background on the information presented in the 2010 RUWMP.

- A.1 - Demand Forecasting
- A.2 - Evaluation of existing regional water supplies
- A.3 - Justifications for supply projections
- A.4 - Water Supply Allocation Plan
- A.5 - List of local projects
- A.6 - Recent CUWCC Filings

Urban Water Management Planning Act

This report has been prepared in compliance with Water Code Sections 10610 through 10656 of the Urban Water Management Planning Act (Act), which were added by Statute 1983, Chapter 1009, and became effective on January 1, 1984. This 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, in accordance with prescribed requirements, an urban water management plan.*" These plans must be filed with the California Department of Water Resources (DWR) every five years.[1] The Act's requirements include:

[1] UWMPs prepared by urban wholesale water suppliers are due to DWR by December 31, 2010; plans prepared by urban retail water suppliers were granted a six-month extension and are due to DWR by July 1, 2011.

- Detailed evaluation of the supplies necessary to meet demands over at least a 20-year period in a single year and multi-year droughts and during average year conditions,
- Documentation of the stages of actions it would undertake to address up to 50 percent reduction in its water supplies,
- Description of the actions to be undertaken in the event of a catastrophic interruption in water supplies, and
- Evaluation of reasonable and practical efficient water uses, recycling, and conservation activities.

In addition, Water Code § 10608.36 requires wholesale agencies to include in their UWMPs an assessment of present and proposed future measures, programs, and policies that would help achieve water use reduction targets.

Changes in the Act Since 2005

Since 2005, several amendments have been added to the Act. Some of the amendments provided for reporting on lower income and affordable household water projections, eligibility for state water management grants or loans, and reporting on the feasibility of serving recycled water demands. The following is a summary of the significant changes in the Act that have occurred from 2005 to the present:

- Clarifies that every urban water supplier preparing a plan must give at least 60 days advance notice to any city or county prior to the public hearing on the UWMP within which the supplier provides water supplies to allow opportunity for consultation on the proposed plan (Water Code § 10621(b)).
- Requires plan by retail water suppliers to include water use projections for single-family and multifamily residential housing needed for lower income and affordable households to assist with compliance with the existing requirement under Section 65589.7 of the Government Code that suppliers grant a priority for the provision of service to housing units affordable to lower income households (Water Code § 10631.1).
- Conditions eligibility for a water management grant or loan made to an urban water supplier and awarded or administered by DWR, the State Water Resources Control Board, or the California Bay-Delta Authority or its successor agency on the implementation of water demand management measures, including consideration of the extent of compliance with the conservation measures described in the California Urban Water Conservation Council's Memorandum of Understanding Regarding Urban Water Conservation in California (MOU) (Water Code § 10631.5).[2]
- Exempts projects funded by the American Recovery and Reinvestment Act of 2009 from the conditions placed on state funding for water management to urban water suppliers (Water Code § 10631.5(a)(2)).
- Requires DWR, in consultation with the State Water Resources Control Board and the California Bay-Delta Authority or its successor agency, to develop eligibility requirements to implement the foregoing grant and loan conditions (Water Code § 10631.5(b)).
- Repeals existing grant funding conditions of state water management grants or loans on July 1, 2016 if the UWMP is not extended or altered prior to this date (Water Code § 10631.5(f)).

[2] Although this section is included in the Act, it does not directly relate to the reporting required under the UWMPs. Instead, it is focused on eligibility for DWR grants and loans. Thus, there is no corresponding reporting section for this portion of the Act in this plan.

- Deems water suppliers that are members of the California Urban Water Conservation Council and comply with the MOU, as it may be amended, to be in compliance with the requirement to describe the supplier's water demand management measures in its urban water management plan (Water Code § 10631(j)).
- Required DWR, in consultation with the California Urban Water Conservation Council, to convene a technical panel, no later than January 1, 2009, to provide information and recommendations to the Department and the Legislature on new demand management measures, technologies, and approaches. The panel and DWR were to report to the Legislature on their findings no later than January 1, 2010 and each five years thereafter (Water Code § 10631.7).[3]
- Clarifies that "indirect potable reuse" of recycled water should be described and quantified in the plan, including a determination with regard to the technical and economic feasibility of serving those uses (Water Code § 10633(d)). Requires DWR to recognize exemplary efforts by water suppliers by obligating DWR to identify and report to the technical panel, described above, any "exemplary elements" of individual water suppliers' plans, meaning any water demand management measures adopted and implemented by specific urban water suppliers that achieve water savings significantly above the levels required to meet the conditions to state grant or loan funding (Water Code § 10644(c)).

[3] Due to subsequent changes in the law (see discussion of Senate Bill 7), DWR has not yet convened this technical panel or submitted a report to the Legislature.

Senate Bill 7 of the Seventh Extraordinary Session of 2009 Water Conservation in the Delta Legislative Package

In addition to changes to the Act, the state Legislature passed Senate Bill 7 as part of the Seventh Extraordinary Session, referred to as SBX7-7, on November 10, 2009, which became effective February 3, 2010. This new law was the water conservation component to the historic Delta legislative package, and seeks to achieve a 20 percent statewide reduction in urban per capita water use in California by December 31, 2020. This implements the governor's similar 2008 water use reduction goals. The law will require each urban retail water supplier to develop urban water use targets to help meet the 20 percent goal by 2020, and an interim urban water reduction target by 2015.

The bill states that the legislative intent is to require all water suppliers to increase the efficiency of use of water resources and to establish a framework to meet the state targets for urban water conservation called for by the governor. The bill establishes methods for urban retail water suppliers to determine targets to help achieve increased water use efficiency by the year 2020. The law is intended to promote urban water conservation standards consistent with the California Urban Water Conservation Council's adopted best management practices.

Additionally, the bill specifically includes reporting requirements in the upcoming UWMPs. Specifically, urban retail water suppliers must include in their 2010 UWMPs the following information from its target-setting process: (1) baseline daily per capita water use; (2) urban water use target; (3) interim water use target; and (4) compliance daily per capita water use, including technical bases and supporting data for those determinations. An urban retail water supplier may update its 2020 urban water use target in its 2015 UWMP (Water Code § 10608.20).

To give retail urban water suppliers time to conduct the additional required analyses, SBX7-7 grants an extension for submission of UWMPs due in 2010 to July 1, 2011. The bill does not expressly provide this same extension for wholesale water agencies such as Metropolitan (Water Code § 10608.20(j)).

Urban *wholesale* water suppliers are not required to perform all of the target-setting and reporting requirements of SBX7-7. However, wholesale agencies must include in UWMPs an assessment of present and proposed future measures, programs, and policies that would help achieve the water use reductions required under this bill (Water Code § 10608.36).

Metropolitan addresses the actions it is taking to help achieve the urban per capita water use reduction pursuant to the goals set forth in SBX7-7 in Section 3.7.

Metropolitan's Responsibilities Under the Urban Water Management Planning Act

As with Metropolitan's previous plans, this plan does not explicitly discuss specific activities undertaken by member agencies unless it relates to one of Metropolitan's water demand or supply management programs. Presumably, each member agency will discuss these activities in its Urban Water Management Plan. Information from this Plan may be used by many of the local water suppliers in the preparation of their own plans, but 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 § 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.

DWR Guidance

In 2005, DWR provided guidance materials to aid water districts in developing their urban water management plans. These materials both helped water districts comply with the law and DWR staff review submitted plans for regulatory compliance. The guidance materials consisted of a series of worksheets detailing acceptable responses to the requirements set forth in the Act. At that time, DWR also provided a checklist for cross referencing sections of the respondent water agency's Plan with the relevant sections of the Water Code to be sure that it addresses all relevant provisions of the Act.

Since the revised guidebook and checklist for the 2010 Urban Water Management Plan will not be released until DWR completes the development of new reporting methodologies for retail agencies, Metropolitan used the 2005 guideline materials in the development of this plan. In addition, Metropolitan also closely monitored changes in the reporting requirements brought about by new legislation and changes to the Act. Included in this plan is a compliance checklist at the beginning of this document, organized by Water Code section, which summarizes response to requirements of the Water Code.

1.2 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 the following mission statement:

> *"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 (CRA) to convey water from the Colorado River. Deliveries through the aqueduct began in the early 1940s and supplemented the local water supplies of the Southern California member cities. In 1960, to meet growing water demands in its service area, Metropolitan contracted for additional water supplies from the State Water Project (SWP) via the California Aqueduct, which is owned and operated by DWR. SWP deliveries began in 1972. Metropolitan currently receives imported water from both of these sources: (1) the Colorado River water via the CRA and (2) the SWP via the California Aqueduct.

Service Area

Metropolitan's service area covers the Southern California coastal plain. It extends about 200 miles along the Pacific Ocean from the city of Oxnard on the north to the international boundary with Mexico on the south, and it reaches as far as 70 miles inland from the coast (Figure 1-1). The total area served is nearly 5,200 square miles, and it includes portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. Table 1-1 shows that although only 14 percent of the land area of the six 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 26 member agencies, including 14 cities, 11 municipal water districts, and one county water authority. Metropolitan is a water wholesaler with no retail customers. It provides treated and untreated water directly to its member agencies.

Metropolitan's 26 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 the water used within that agency's service area, while others obtain varying amounts of water from Metropolitan to supplement local supplies. Metropolitan provided between 45 and 60 percent of the municipal, industrial, and agricultural water used in its service area. The remaining water supply comes from local wells, local surface water, recycling, the city of Los Angeles' aqueduct from the eastern Sierra Nevada, and the San Diego County Water Authority's water transfers from the Imperial Irrigation District delivered through an exchange of water supplies with Metropolitan. Member agencies also implement conservation programs that can be considered part of their supplies.

Some member agencies provide retail water service, while others provide water to the local area as wholesalers. Table 1-2 shows Metropolitan member agencies and the type of service that they provide. As shown in the table, 15 member agencies provide retail service to customers, nine provide only wholesale service, and two provide a combination of both. Throughout Metropolitan's service area, approximately 250 retail water supply agencies directly serve the population.

Metropolitan's member agencies serve residents in 152 cities and 89 unincorporated communities. Table 1-3 shows the member agencies of Metropolitan, as well as the cities and communities served by those member agencies. Figure 1-1 also shows the geographical area served by the member agencies.

Currently, member agencies receive water from Metropolitan at various delivery points, and pay for service through a rate structure made up of multiple components. The majority of these components consist of uniform volumetric rates, and the majority of the revenue is collected through a tiered volumetric supply charge. The second tier of this rate is set at the cost of developing new supplies. Metropolitan's pricing and rate structure are described in detail in Section 2.7.

To aid in planning future water needs, member agencies advise Metropolitan in April of each year how much water they anticipate they will need during the next five years. In addition, Metropolitan works with its member agencies to forecast future water demands.

Table 1-1
July 1, 2009 Area and Population in the Six Counties of Metropolitan's Service Area

County	Total County	In Metropolitan Service Area	Percent in Metropolitan
Land Area (Square Miles)			
Los Angeles County	4,061	1,408	35%
Orange County	789	699	89%
Riverside County	7,208	1,057	15%
San Bernardino County	20,052	242	1%
San Diego County	4,200	1,420	34%
Ventura County	1,845	365	20%
Metropolitan's Service Area	**38,155**	**5,191**	**14%**
Population (Persons)			
Los Angeles County	10,409,000	9,500,000	91%
Orange County	3,155,000	3,155,000	100%
Riverside County	2,128,000	1,520,000	71%
San Bernardino County	2,064,000	816,000	40%
San Diego County	3,208,000	3,076,000	96%
Ventura County	841,000	617,000	73%
Metropolitan's Service Area	**21,805,000**	**18,684,000**	**86%**

Table 1-2
Metropolitan's Member Agencies and Type of Water Service Provided

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

Table 1-3
Member Agencies

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA					
Municipal Water Districts (11)		**Member Cities (14)**			**County Water Authorities (1)**
Calleguas	Orange County	Anaheim	Glendale	San Marino	San Diego
Central Basin	Three Valleys	Beverly Hills	Long Beach	Santa Ana	
Foothill	Upper San Gabriel Valley	Burbank	Los Angeles	Santa Monica	
Inland Empire		Compton	Pasadena	Torrance	
Eastern	West Basin	Fullerton	San Fernando		
Las Virgenes	Western				

Cities within Member Agencies

Calleguas MWD
- *Camarillo*
- *Camarillo Heights*
- *Fairview*
- *Lake Sherwood Valley*
- *Las Posas*
- *Moorpark*
- *NAWS Point Mugu*
- *NCBC Port Hueneme*
- *Oak Park*
- *Oxnard*
- *Port Hueneme*
- *Santa Rosa Valley*
- *Simi Valley*
- *Somis*
- *Thousand Oaks*

Central Basin MWD
- *Artesia*
- *Bell*
- *Bellflower*
- *Bell Gardens*
- *Cerritos*
- *Commerce*
- *Cudahy*
- *Downey*
- *East Los Angeles*
- *Florence*
- *Hawaiian Gardens*
- *Huntington Park*
- *La Habra Heights*
- *Lakewood*
- *La Mirada*
- *Lynwood*
- *Maywood*
- *Montebello*
- *Norwalk*
- *Paramount*
- *Pico Rivera*
- *Santa Fe Springs*
- *Signal Hill*
- *South Gate*
- *South Whittier*
- *Vernon*
- *Whittier*

Foothill MWD
- *Altadena*
- *La Cañada Flintridge*
- *La Crescenta*
- *Montrose*

Inland Empire
- *Chino*
- *Chino Hills*
- *Fontana*
- *Montclair*
- *Ontario*
- *Rancho Cucamonga*
- *Upland*

Eastern MWD
- *Good Hope*
- *Hemet*
- *Homeland*
- *Juniper Flats*
- *Lakeview*
- *Mead Valley*
- *Menifee*
- *Moreno Valley*
- *Murrieta*
- *Murrieta Hot Springs*
- *Nuevo*
- *North Canyon Lake*
- *Perris*
- *Quail Valley*
- *Romoland*
- *San Jacinto*
- *Sun City*
- *Temecula*
- *Valle Vista*
- *Winchester*

Las Virgenes MWD
- *Agoura*
- *Agoura Hills*
- *Calabasas*
- *Chatsworth*
- *Hidden Hills*
- *Lake Manor*
- *Malibu Lake*
- *Monte Nido*
- *Westlake Village*
- *West Hills*

MWD of Orange County
- *Aliso Viejo*
- *Brea*
- *Buena Park*
- *Capistrano Beach*
- *Corona Del Mar*
- *Costa Mesa*
- *Coto De Caza*
- *Cypress*
- *Dana Point*
- *Fountain Valley*
- *Garden Grove*
- *Huntington Beach*
- *Irvine*
- *Laguna Beach*
- *Laguna Hills*
- *Laguna Niguel*
- *Laguna Woods*
- *La Habra*
- *Lake Forest*
- *La Palma*
- *Leisure World*
- *Los Alamitos*
- *Mission Viejo*
- *Monarch Beach*
- *Newport Beach*
- *Orange*
- *Placentia*
- *Rancho Santa Margarita*
- *San Clemente*

MWD of Orange County (cont.)
- *San Juan Capistrano*
- *Seal Beach*
- *Stanton*
- *Tustin*
- *Tustin Foothills*
- *Villa Park*
- *Westminster*
- *Yorba Linda*

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

Upper San Gabriel Valley MWD
- *Arcadia*
- *Avocado Heights*
- *Baldwin Park*
- *Bradbury*
- *Citrus*
- *Covina*
- *Duarte*
- *El Monte*
- *Glendora*
- *Hacienda Heights*
- *Industry*
- *Irwindale*
- *La Puente*
- *Mayflower Village*
- *Monrovia*
- *Rosemead*
- *San Gabriel*
- *South El Monte*
- *South Pasadena*
- *South San Gabriel*
- *Temple City*
- *Valinda*
- *West Covina*
- *West Puente Valley*

West Basin MWD
- *Alondra Park*
- *Carson*
- *Culver City*
- *El Segundo*
- *Gardena*
- *Hawthorne*
- *Hermosa Beach*
- *Inglewood*
- *Ladera Heights*
- *Lawndale*
- *Lennox*

West Basin MWD (cont.)
- *Lomita*
- *Malibu*
- *Manhattan Beach*
- *Marina Del Rey*
- *Palos Verdes Estates*
- *Rancho Palos Verdes*
- *Redondo Beach*
- *Rolling Hills*
- *Rolling Hills Estates*
- *Ross-Sexton*
- *Topanga Canyon*
- *West Athens*
- *West Hollywood*

Western MWD of Riverside County
- *Bedford Heights*
- *Canyon Lakes*
- *Corona*
- *Eagle Valley*
- *El Sobrante*
- *Jurupa*
- *Lake Elsinore*
- *Lake Mathews*
- *March AFB*
- *Murrieta*
- *Norco*
- *Riverside*
- *Rubidoux*
- *Temecula*
- *Temescal Canyon*
- *Woodcrest*

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

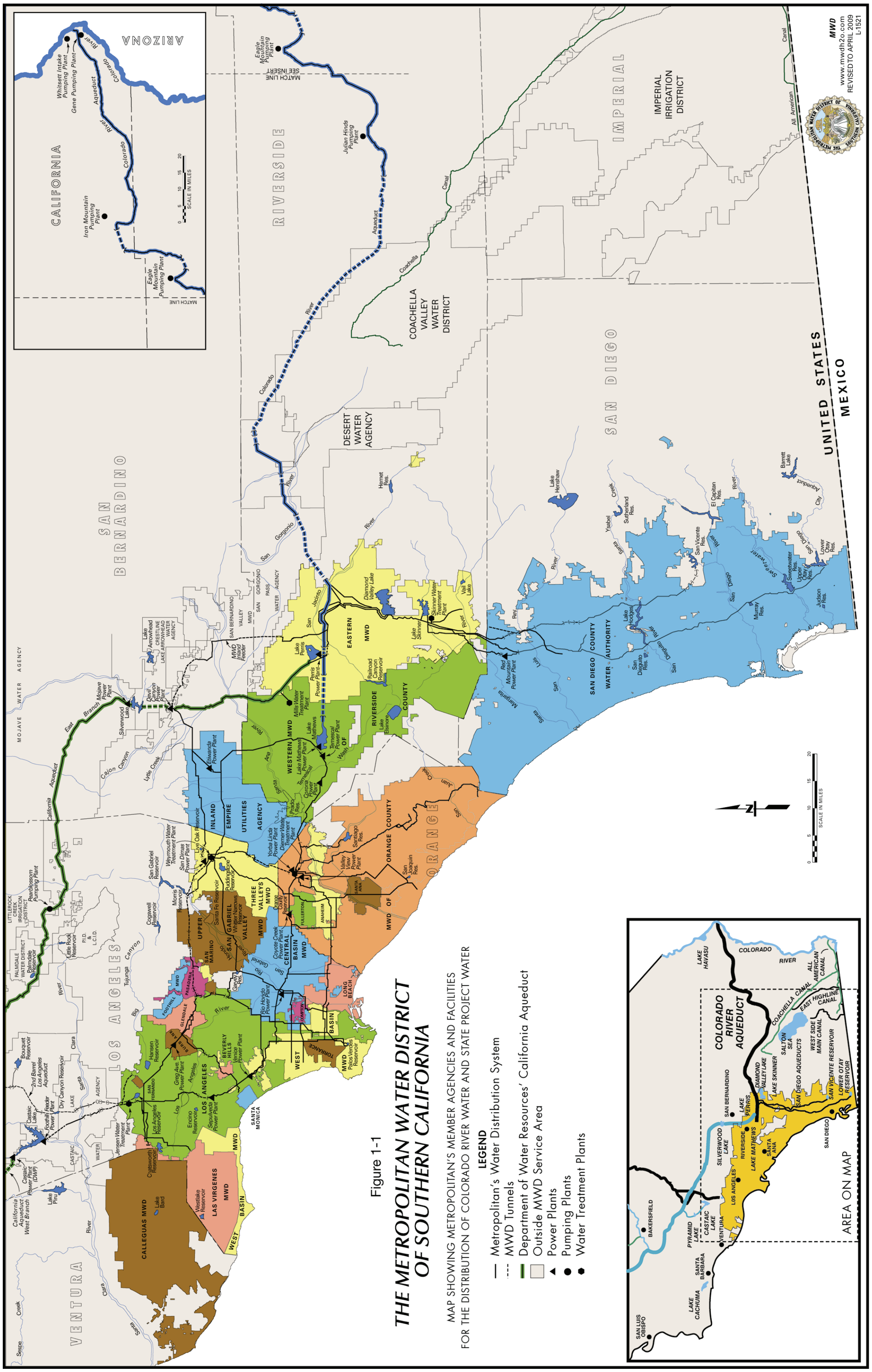


Figure 1-1

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
- Outside MWD Service Area
- Power Plants
- Pumping Plants
- Water Treatment Plants

Board of Directors and Management Team

Metropolitan's Board of Directors currently consists of 37 directors. 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. Directors can be appointed by the chief executive officer of the member agency or be elected by a majority vote of the governing body of the agency. Metropolitan does not compensate directors for their service. The Board includes business, professional and civic leaders. Board meetings are generally held on the second Tuesday of each month and are open to the public.

Throughout its history, the Board has delegated certain tasks to Metropolitan staff, which are codified in Metropolitan's Administrative Code (Code). In addition, Metropolitan has developed policy principles to help achieve its mission to provide adequate and reliable supplies of high-quality water in an environmentally and economically responsible way. These policies can be found in a variety of documents including: specific policy statements, the Administrative Code, Board-adopted policy principles, and letters submitted to the Board. Policy statements are also imbedded in formal Board meeting discussions and recorded in meeting minutes. 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, General Counsel, and Ethics Officer.

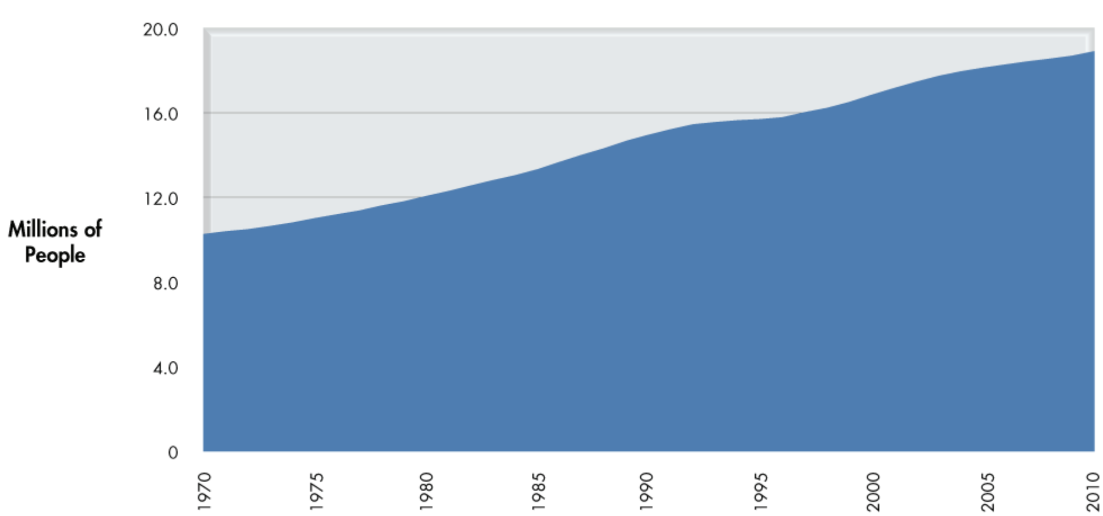
1.3 Metropolitan Service Area Historical Information

Population

In 1990, the population of Metropolitan's service area was approximately 14.8 million people. By 2010, it had reached an estimated 19.1 million, representing 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 early 1990s to just over 50,000 in 1995, before again rising to more than 300,000 per year in the period 1999 through 2002. Growth has generally oscillated around 200,000 persons per year since that time. Figure 1-2 shows the service area population growth from 1970-2010.

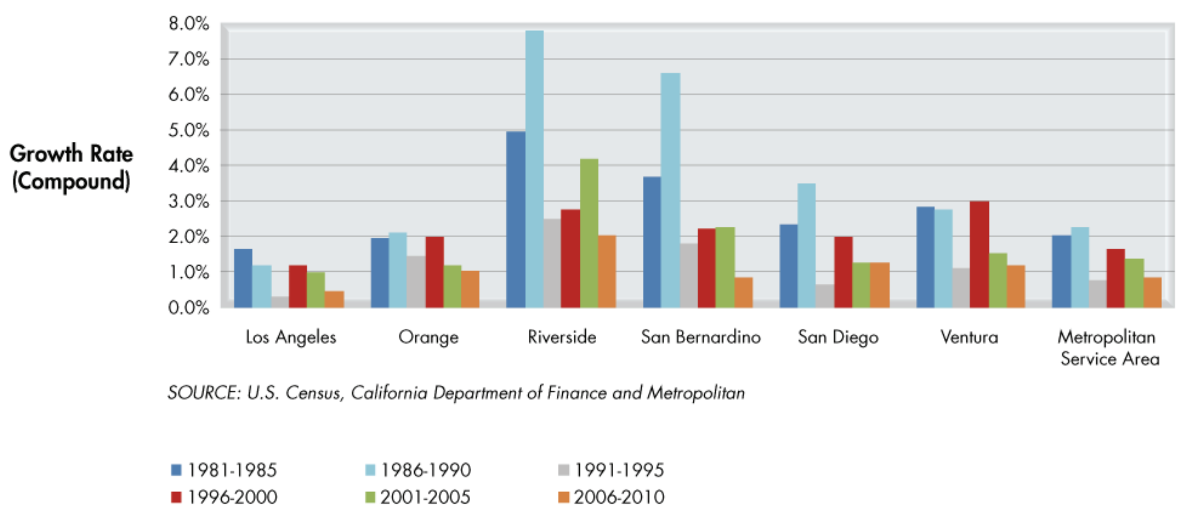
The most populated cities within Metropolitan's service area are Los Angeles (largest city in the state), San Diego (second largest in the state), Long Beach, Anaheim, Santa Ana and Riverside. Between 2006 and 2010 the largest population increases are estimated to have occurred in the city of Los Angeles and in the service area of the San Diego County Water Authority. While these two areas have increased by the largest numbers, Figure 1-3 shows that populations of Riverside and San Bernardino counties have historically increased at the fastest rates. As can also be seen from this figure, however, the rates of increase for Riverside and San Bernardino fell markedly between 2006 and 2010, evidencing the disproportionate effect of the housing "bust" and the economic recession of the late 2000s. Appendix A.1 presents a detailed discussion of the demographic trends in Southern California and their impacts on regional demand forecasts.

Figure 1-2 Service Area Population Growth 1970-2010



SOURCE: U.S. Census, California Department of Finance and Metropolitan

Figure 1-3 Average Annual Population Growth Rates in Metropolitan's Service Area

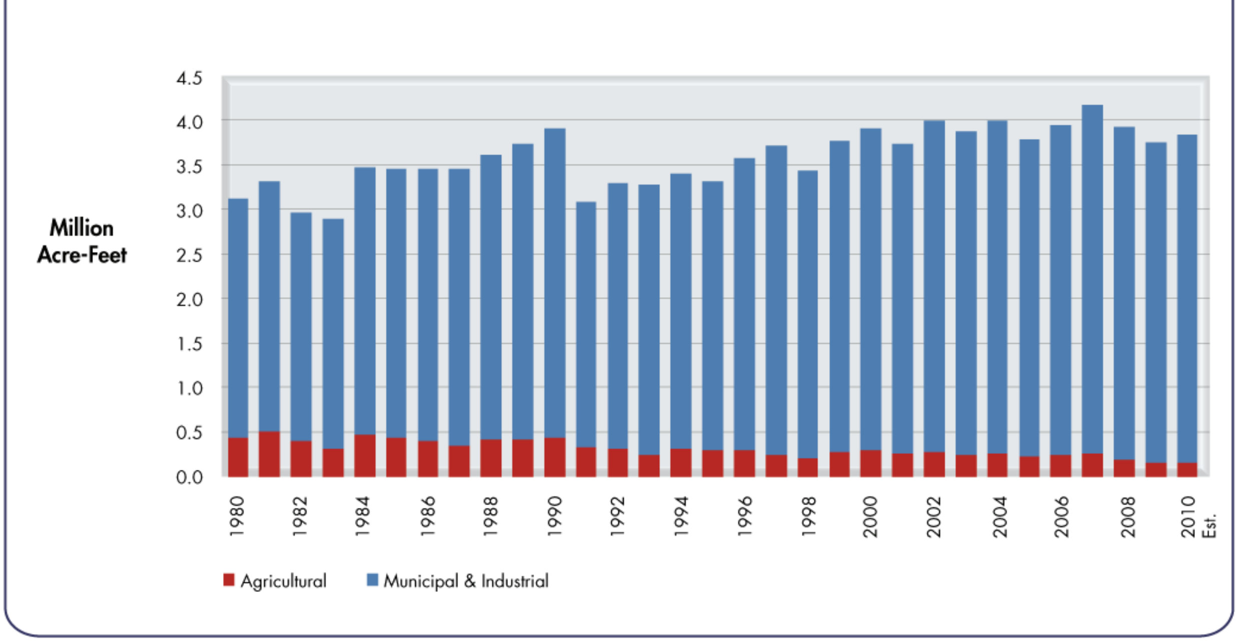


Historical Retail Water Demands

Figure 1-4 presents historical retail water demands on a calendar year basis in Metropolitan's service area. Since 1980, retail water demands varied from 2.9 million acre-feet (MAF) in 1983 to nearly 4.2 MAF in 2007. Due to the economic recession, drought impacts and conservation, water use declined to 3.1 MAF in 1991. Demand remained below the peak level as a result of continuing effects from the recession and the drought coupled with a number of wet years and ongoing conservation efforts. In 2000, retail demands reached 3.9 MAF surpassing the early peak level for the first time in a decade. Since 2000, retail demands reached a new peak level in 2007 with nearly 4.2 MAF. Calendar year 2007 was the driest year since 1989, with precipitation measured at 5.66 inches in the Los Angeles Civic Center.

Currently, about 93 percent of the retail demands are used for municipal and industrial purposes (M&I), and 7 percent 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 19 percent of total regional water demand in 1970, 16 percent in 1980, 12 percent in 1990 and five percent in 2008. Part of the reduction seen in 2008 was a 30 percent mandatory reduction in Metropolitan's Interim Agricultural Water Program (IAWP) deliveries, which continued into 2009 and is now a 25 percent reduction in 2010.

Figure 1-4 Retail Demand in Metropolitan's Service Area

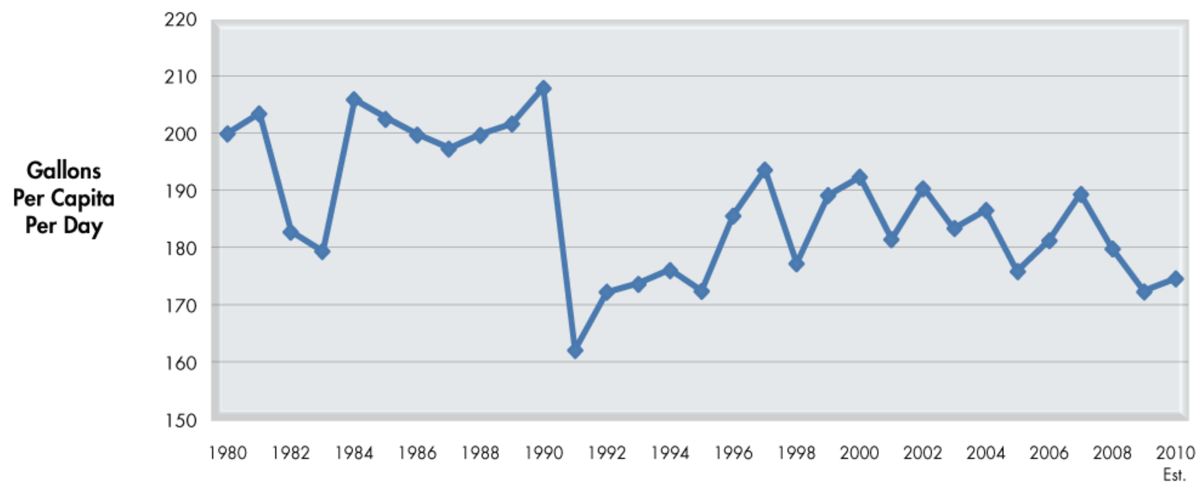


Per Capita Water Use

Per capita water use is defined by law as gross water use divided by population. 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 miscellaneous uses. Generally speaking, per capita water use is not a good measure of water use efficiency. For example, Southern California's per capita water-use may be high because it produces more than two-thirds of California's gross product. However, per capita water use can provide a general indication of how water use within a particular region is changing over time. Figure 1-5 shows the change in per capita water use within Metropolitan's service territory. This shows that per capita water use fell from a high of around 206 gallons per capita per day (GPCD) in 1990 and 1991 to a low of 162 GPCD as a result of water restrictions accompanying the drought of the late 1980s and early 1990s. Following recovery from that drought, per capita use has shown a general tendency to decrease and has remained noticeably lower than during the pre-1990 era.

A number of factors affect per capita water use in a particular location, including the relative share of residential versus nonresidential water use in an area, the number and type of housing units, the number of employees, the types of businesses, persons per household, lot sizes, income levels, and climate. Water use varies widely between counties. In Southern California, many of the differences in per capita water use among the counties can be attributed to climate differences. 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 while the coastal plain counties show lower M&I per capita water use. The historic and projected per capita M&I retail demands for the six counties within Metropolitan's service area are presented in Appendix A.1.

Figure 1-5 Per Capita Water Use in Metropolitan's Service Area



Climate and Rainfall

As Figure 1-6 shows, Metropolitan's service area encompasses three major climate zones. Table 1-4 reports the 30-year (1979-2009) average temperature, rainfall and evapotranspiration (expressed as Et_o) information for representative locations within those three zones. Annual rainfall also varies within the region: average annual rainfall in Pasadena from 1980 through 2003 was more than double the 11 inches received at the San Diego airport and Culver City. Region wide, annual rainfall routinely varies by more than 100 percent from year to year.

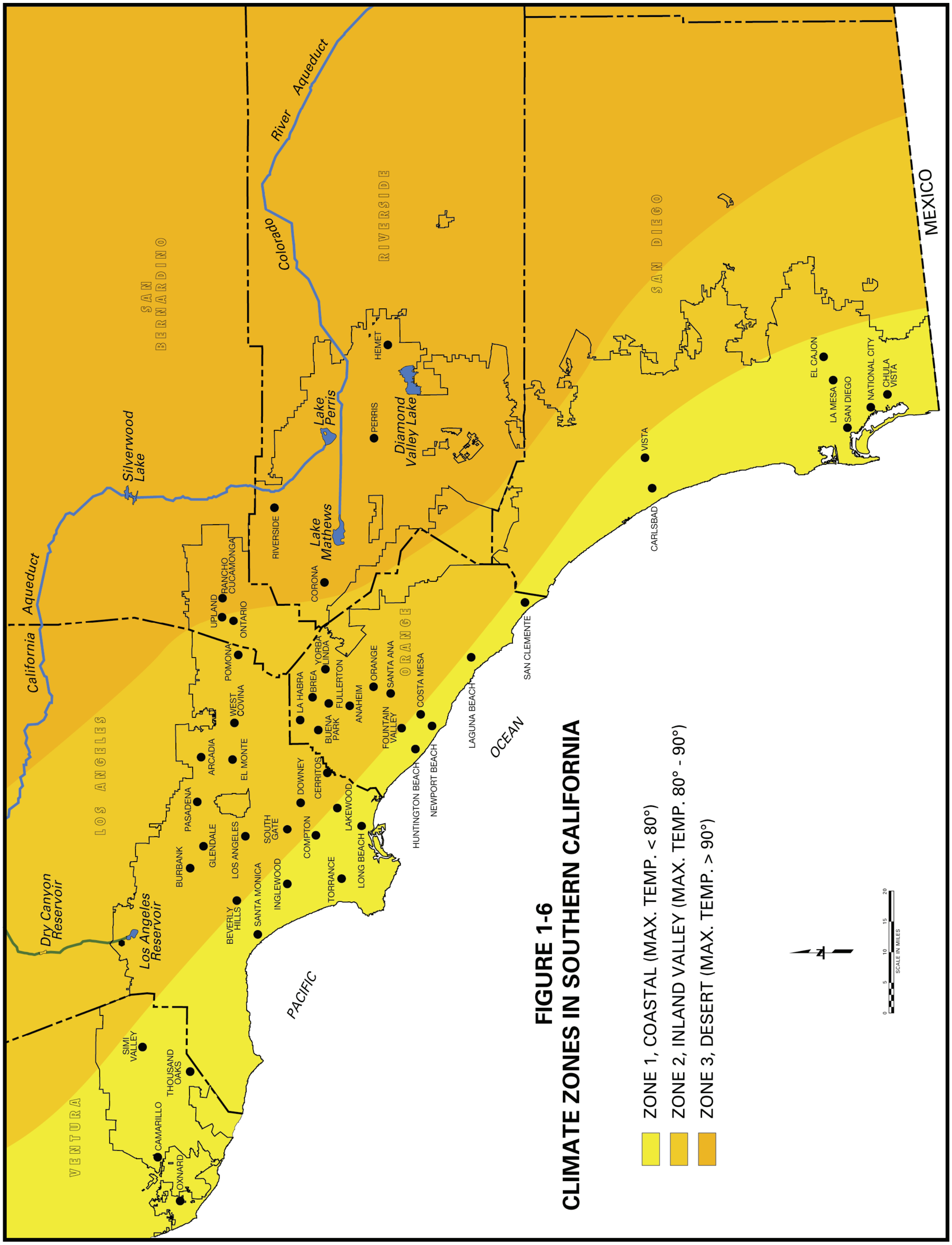


FIGURE 1-6
CLIMATE ZONES IN SOUTHERN CALIFORNIA

Table 1-4
Weather Variables in Three Zones in Metropolitan's Service Area

30-year Average (1979-2009)

Average Temperature	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Los Angeles County[1]	58.99	60.13	61.54	64.32	66.90	70.41	74.47	75.29	74.18	69.67	63.54	58.90	66.53
Riverside County[2]	54.91	56.17	58.44	62.41	67.09	72.09	77.83	78.48	75.37	67.95	59.95	54.67	65.45
San Diego County[3]	57.67	58.54	59.98	62.45	64.60	67.21	70.79	72.29	71.23	67.25	61.79	57.27	64.25

30-year Average (1979-2009)

Average Precipitation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Los Angeles County[1]	3.31	4.05	2.68	0.84	0.26	0.09	0.01	0.04	0.23	0.63	1.00	1.97	15.10
Riverside County[2]	2.35	2.52	1.91	0.62	0.20	0.09	0.04	0.09	0.15	0.40	0.79	1.12	10.26
San Diego County[3]	2.17	2.29	1.93	0.74	0.14	0.07	0.03	0.02	0.14	0.51	0.95	1.33	10.33

Et_o[4]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Los Angeles County	2.2	2.7	3.7	4.7	5.5	5.8	6.2	5.9	5.0	3.9	2.6	1.9	50.1
Riverside County	2.5	2.9	4.2	5.3	5.9	6.6	7.2	6.9	5.4	4.1	2.9	2.6	56.4
San Diego County	2.1	2.4	3.4	4.6	5.1	5.3	5.7	5.6	4.3	3.6	2.4	2.0	46.5

1 Temperature and Precipitation data from Western Regional Climate Center, Los Angeles Civic Center Station (045115). Data last updated April 5, 2010.

2 Temperature and Precipitation from Western Regional Climate Center, Riverside Citrus Experiment Station (047473). Data last updated April 5, 2010.

3 Temperature and Precipitation data from Western Regional Climate Center, San Diego WSO Airport Station (047740). Data last updated April 5, 2010.

4 ETo values from Model Water Efficient Landscape Ordinance (September 10, 2009), Appendix A- Reference Evapotranspiration (Eto) Table.
The ETo values were derived from: 1) California Irrigation Management Information System (CIMIS); 2) Reference EvapoTranspiration Zones Map, UC Dept. of Land, Air & Water Resources and California Dept of Water Resources 1999; and 3) Reference Evapotranspiration for California, University of California, Department of Agriculture and Natural Resources (1987) Bulletin 1922, and 4) Determining Daily Reference Evapotranspiration, Cooperative Extension UC Division of Agriculture and Natural Resources (1987), Publication Leaflet 21426

1.4 Current Conditions

Current Challenges

Metropolitan continues to face ongoing water supply challenges. This section offers a brief discussion of Metropolitan's current challenges, current available resources, short-term supply outlook, and short-term actions to meet these challenges. The dry hydrology experienced during the last three years has resulted in diminished snowmelt and runoff levels and additional environmental restrictions were imposed on water imports from the San Francisco Bay/Sacramento-San Joaquin Delta (Bay-Delta). By the end of 2009, mandatory conservation was in place across much of Metropolitan's service area. The restrictions on water use, however, also generated a record demand for water-saving rebates and refocused efforts to increase development of local water resources.

Delta Issues

The Bay-Delta is the hub of California's water supply and is critically important to the entire state. About 30 percent of Southern California's water supply moves across the Bay-Delta. The Bay-Delta's declining ecosystem, caused by a number of factors that include agricultural runoff and operation of water pumps that can alter flows, has led to historic restrictions in water supply deliveries.

Operational constraints likely will continue until a long-term solution to the problems in the Bay-Delta is identified and implemented. The Delta Vision process, established by Governor Schwarzenegger, is aimed at identifying long-term solutions to the conflicts in the Bay-Delta, including natural resource, infrastructure, land use, and governance issues. In addition, State and federal resource agencies and various environmental and water user entities are currently engaged in the development of the Bay Delta Conservation Plan (BDCP), which is aimed at addressing ecosystem needs and securing long-term operating permits for the SWP.

SWP operational requirements may be further modified under new biological opinions for listed species under the Federal Endangered Species Act (ESA) or by the California Department of Fish and Game's issuance of incidental take authorizations under the California ESA. Biological opinions or incidental take authorizations under the Federal ESA and California ESA might further adversely affect the SWP and Central Valley Project operations. Additionally, new litigation, listings of additional species or new regulatory requirements could further adversely affect SWP operations in the future by requiring additional export reductions, releases of additional water from storage or other operational changes impacting water supply operations. SWP delivery restrictions due to the biological opinions resulted in the loss of about one-third of the available SWP supplies in 2008, reducing the likelihood that regional storage can be refilled in the near-term. Impacts due to the biological opinions for a dry year 2009 were approximately 200,000 AF of SWP supplies.

Water Supply Conditions

The water conditions that the region faced in 2010 were shaped by supply conditions and resource actions that occurred in the preceding years, including several extraordinary events, such as:

- An extended ten year drought in the Colorado River watershed that has decreased storage levels in Lake Mead and Lake Powell below 50 percent of capacity in 2007 and early 2008 and keeping storage below surplus levels despite an ease in drought conditions in 2009;
- Groundwater basins and local reservoirs dropping to very low operating levels due to record-dry hydrology in Southern California;
- Restrictions of SWP deliveries by federal court orders due to endangered Delta smelt and salmon which resulted in the combined loss of approximately 700 TAF

of SWP supplies in 2008 and 2009, reducing the likelihood that regional storage can be refilled in the near term;

- End of year 2008 and 2009 SWP supplies in Lake Oroville were at their lowest and third lowest operating levels respectively since the reservoirs were first filled after consecutive dry years since 2006 and the driest spring of record in 2008;
- Supply availability in the Los Angeles Aqueduct system continues to be affected by environmental issues related to Owens Lake and the Lower Owens River.

These supply conditions, along with increasing firm demands on Metropolitan, have led to significant withdrawals from Metropolitan's storage reserves, including Diamond Valley Lake (DVL) and its groundwater banking and conjunctive use programs to meet scheduled water deliveries. To illustrate this point, an estimated 1.1 MAF of storage reserves were withdrawn to meet about one-quarter of wholesale demands from January 2007 through December 2008. In 2009, an additional 49 TAF were taken from storage reserves to meet firm demands within Metropolitan's service area.

In addition, new challenges such as the detection of the quagga mussel in the Metropolitan's CRA supplies and increasingly stringent water quality regulations to control disinfection byproducts exacerbate the water supply condition and underscore the importance of flexible and adaptive regional planning strategies.

Current Available Resources

Metropolitan's primary purpose is to provide a supplemental supply of water for domestic and municipal uses at wholesale rates to its member public agencies. Metropolitan's principal sources of water are the SWP and the Colorado River. Metropolitan's robust planning strategy continues to balance available local and imported water resources and member agencies demands within Metropolitan's service area.

A. Imported Supplies

Historically, Metropolitan has been responsible for obtaining imported water for the region through its operation of the CRA and its contract with the state for SWP supplies. Metropolitan receives water from the SWP through the California Aqueduct and the Colorado River through the CRA. Figure 1-7 shows the historic annual deliveries from the SWP and the CRA.

<u>Colorado River</u>

The Colorado River was Metropolitan's original source of water after Metropolitan's establishment in 1928. Metropolitan has a legal entitlement to receive water from the Colorado River under a permanent service contract with the Secretary of the Interior. The CRA, which is owned and operated by Metropolitan, transports water from Lake Havasu, at the border of the state of California and Arizona, approximately 242 miles to its terminus at Lake Mathews in Riverside County, with a capacity of 1.25 MAF a year.

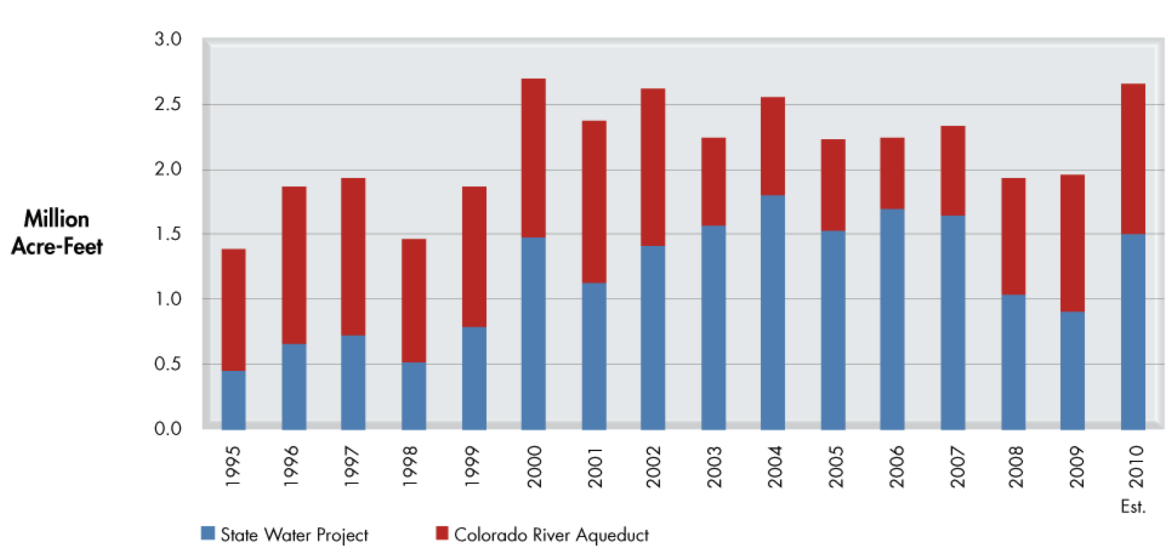
Over the years, Metropolitan increased reliable supply from the CRA through programs that it helped fund and implement including: farm and irrigation district conservation programs, improved reservoir system operations, land management programs, and water transfers and exchanges through arrangements with agricultural water districts in southern California and entities in Arizona and Nevada that use Colorado River water, and the U.S. Department of the Interior, Bureau of Reclamation (USBR). A detailed discussion of availability of Colorado River water for delivery to Metropolitan is described in Section 3.1.

<u>State Water Project</u>

Metropolitan imports water from the SWP, owned by the state of California and operated by the California Department of Water resources (DWR). This project transports Feather River water stored in and released from Oroville Dam and unregulated flows diverted directly from the Bay-Delta south via the California Aqueduct to four delivery points near the northern and eastern boundaries of Metropolitan's service area.

In 1960, Metropolitan signed a contract with DWR. Metropolitan is one of 29 agencies that have long-term contracts for water service from DWR, and is the largest agency in terms of the number of people it serves (19.1 million), the share of SWP water that it has contracted to receive (approximately 46 percent), and the percentage of total annual payments made to DWR by agencies with State water contracts (approximately 60 percent in 2008). A more detailed discussion of the SWP supplies is provided in Section 3.2.

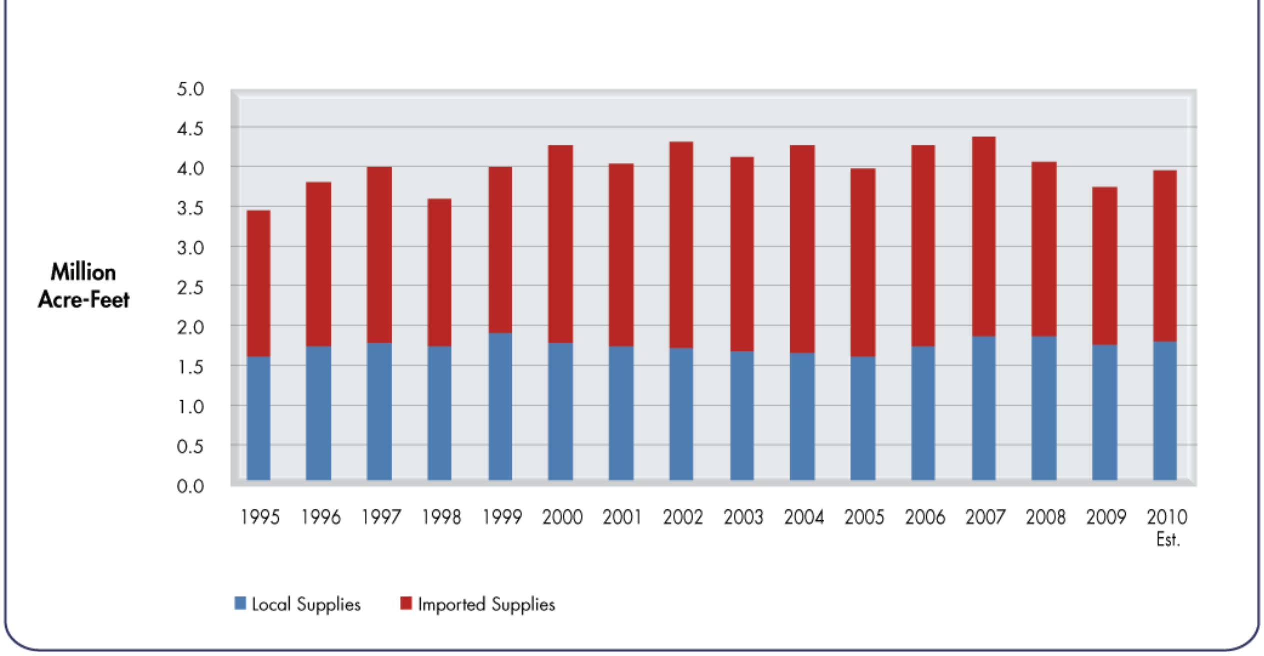
Figure 1-7 Imported Water Supplies in Metropolitan's Service Area



B. Local Supplies

Approximately 50 percent of the region's water supplies come from resources controlled or operated by local water agencies. These resources include water extracted from local groundwater basins, catchment of local surface water, non-Metropolitan imported water supplied through the Los Angeles Aqueduct, and Colorado River water exchanged for Metropolitan supplies. Figure 1-8 shows the historic annual use of local and imported water suppplies within Metropolitan's service area.

Figure 1-8 Annual Regional Water Supplies in Metropolitan's Service Area



Groundwater

The groundwater basins that underlie the region provide approximately 86 percent of the local water supply in Southern California. The major groundwater basins in the region provide an annual average supply of approximately 1.35 MAF. Most of this water recharges naturally, but approximately 200 thousand acre-feet (TAF) has historically been replenished each year through Metropolitan imported supplies. By 2025, estimates show that groundwater production will increase to 1.65 MAF.

Because the groundwater basins contain a large volume of stored water, it is possible to produce more than the natural recharge of 1.16 MAF and the imported replenishment amount for short periods of time. During a dry year, imported replenishment deliveries can be postponed, but doing so requires that the shortfall be restored in wet years. Similarly, in dry years the level of the groundwater basins can be drawn down, as long as the balance is restored to the natural recharge level by increasing replenishment in wet years. Thus, the groundwater basins can act as a water bank, allowing deposits in wet years and withdrawals in dry years.

Recycling and Groundwater Recovery

Recycling and groundwater recovery are regional resources that add balance to Southern California's diverse portfolio of resource options. Water recycling provides extensive treated wastewater for applicable municipal and industrial uses. Common uses of recycled water include landscape irrigation, agricultural irrigation, and commercial and industrial applications. Groundwater recovery employs additional treatment techniques to effectively use degraded groundwater supplies that were previously not considered viable due to high salinity or other contamination.

While water recycling and groundwater recovery projects in the Southern California region are primarily developed by local water agencies, many newer projects have been developed with financial incentives provided through Metropolitan's Local Resources Program (LRP). The LRP is a performance-based program that provides incentives to expand water recycling and support recovery of degraded groundwater. In 2009, the regional water production from water recycling and groundwater recovery totaled 353 TAF, of which 201 TAF was developed with Metropolitan funding assistance. A detailed discussion of recycling and groundwater recovery is presented in Section 3.5.

Seawater Desalination

Seawater desalination represents a significant opportunity to diversify the region's water resource mix with a new, locally-controlled, reliable potable supply. Metropolitan continues to pursue a target for seawater desalination of 150,000 acre-feet (AF) per year by 2025, and several local and retail water agencies have identified seawater desalination as an important component of their future water supply portfolio. The Carlsbad Seawater Desalination Project in San Diego has obtained all of the local, State, and Federal permits for necessary to begin construction, though as of May 2010, there are legal challenges to three of the permits. Project proponents anticipate the project will come on-line as early as 2012, providing the region with an additional 56 TAF of new local supplies.

Surface Water

In addition to the groundwater basins, local agencies maintain surface reservoir capacity to capture local runoff. The average yield captured from local watersheds is estimated at approximately 90 TAF per year. The majority of this supply comes from reservoirs within the service area of the San Diego County Water Authority.

Los Angeles Aqueduct

Although the Los Angeles Aqueduct (LAA) imports water from outside the region, Metropolitan classifies water provided by the LAA as a local resource because it is developed and imported by a local agency (the Los Angeles Department of Water and Power). This resource is estimated to provide approximately 256 TAF per year on average, which may be reduced to approximately 106 TAF during a historical dry period.

Imperial Irrigation District / San Diego County Water Authority Transfer

The San Diego County Water Authority (SDCWA) has executed an agreement with the Imperial Irrigation District (IID) under which IID is transferring water to SDCWA. Since this supply is developed and transferred through an agreement by a local agency (SDCWA), Metropolitan also classifies this water as a local resource. Currently, the water transferred by IID is made available by SDCWA to Metropolitan for diversion at Lake Havasu. Metropolitan provides a matching volume of water to SDCWA by exchange. Under the transfer, 60 TAF was transferred and exchanged with Metropolitan in 2009. The transfer volumes increase in accordance with an annual build-up schedule, reaching 100 TAF annually in 2013 and stabilizing at 200 TAF annually in 2023. Currently, the water is being conserved through land fallowing arrangements made by IID with its customers. Beginning in 2013, IID will begin replacing land fallowing with irrigation efficiency measures that will allow farming operations to continue with reduced amounts of applied water. By 2017, all of the transferred water should be made available through irrigation and distribution system efficiency measures.

Coachella and All-American Canal Lining Projects

The Coachella Canal Lining Project consists of a 35-mile concrete-lined canal, including siphons, which replaced an earthen canal. The project was completed in December 2006. The project is conserving 30,850 AF annually. The All-American Canal Lining Project consists of replacing 23 miles of earthen canal with a concrete-lined canal constructed parallel to the existing canal.

Two reaches of the project were placed in service in 2008 with the third reach placed in service in 2009. This project is conserving 67,700 AF annually beginning in 2010.

Pursuant to the QSA and related agreements, the total 98,550 AF of annual yield from these projects is allocated as follows in 2010: 16,000 AF to Metropolitan, 80,200 AF to SDCWA, and up to 2,350 AF for Coachella Canal Lining Project mitigation, with the amount not needed for mitigation becoming available to SDCWA. The water is made available at Lake Havasu for diversion by Metropolitan, and by exchange, Metropolitan delivers an equal volume of water to SDCWA. Metropolitan classifies the portion of the supply exchanged with SDCWA as local resources and evaluated its availability. Table 1-5 shows the projected local supplies estimate for the average and dry-years for 2015, 2025, and 2035.

Table 1-5
Local Supplies*
(Acre-Feet)

	2015		2025		2035	
	Average Year*	Dry Year	Average Year	Dry Year*	Average Year	Dry Year*
Local Groundwater						
From Natural Recharge	1,251,000	1,214,000	1,242,000	1,202,000	1,240,000	1,206,000
Replenishment	178,000	172,000	187,000	187,000	191,000	190,000
Local Projects						
Groundwater Recovery	*101,000*	100,000	114,000	113,000	126,000	125,000
Recycling	*264,000*	258,000	303,000	299,000	333,000	330,000
Seawater Desalination	*0*	0	0	0	0	0
Local Runoff Stored	103,000	91,000	102,000	91,000	102,000	91,000
Los Angeles Aqueduct	224,000	63,000	226,000	71,000	230,000	78,000
IID/SDCWA Transfer	100,000	100,000	200,000	200,000	200,000	200,000
Coachella & All American Canal Lining	80,000	80,000	80,000	80,000	80,000	80,000
Total	**2,301,000**	**2,078,000**	**2,454,000**	**2,243,000**	**2,502,000**	**2,300,000**

* Dry Year is based on Multiple Dry Years (1990-92)

Short-term Supply Outlook

Metropolitan evaluated the short-term supply outlook during each of the next three years from 2011 through 2013 and determined the minimum water supplies available based on the driest three-year historic sequence of 1990 through 1992. This analysis incorporates the actual storage levels at the beginning of 2010 and the forecasted supplies and demands under a multiple dry-year sequence. This evaluation of supply capabilities also takes into account the actual storage program conveyance constraints. Table 1-6 shows the projected yields of the in-region storage and imported supplies from the SWP and CRA, for both current programs and those under development. Detailed description of the current programs and programs under development are included in Appendix A.3.

For this supply capability evaluation, SWP supplies are estimated using the draft 2009 SWP Delivery Reliability Report distributed by

DWR in December 2009. The draft 2009 reliability report presents the current DWR estimate of the amount of water deliveries for current (2009) conditions and conditions 20 years in the future. These estimates incorporate restrictions on SWP and Central Valley Project (CVP) operations in accordance with the biological opinions of the U.S. Fish and Wildlife Service and National Marine Fishery Service issued on December 15, 2008, and June 4, 2009, respectively.

Metropolitan forecast shows that under a multi-dry year hydrology, Metropolitan could face depleted supply capability during the next three years. This places considerable emphasis on developing robust short-term actions that will increase supply reliability to Metropolitan service area.

Table 1-6

Multiple Dry-Year
Supply Capability[1]
Repeat of 1990-1992 Hydrologies
(acre-feet per year)

Forecast Year	2011	2012	2013
Current Programs			
In-Region Storage	351,000	50,000	17,000
California Aqueduct[2]	582,000	625,000	611,000
Colorado River Aqueduct[3]	998,000	932,000	937,000
Subtotal of Current Programs	***1,931,000***	***1,607,000***	***1,565,000***
Programs Under Development			
In-Region Storage	12,000	12,000	12,000
California Aqueduct	23,000	30,000	374,000
Colorado River Aqueduct	176,000	176,000	176,000
Subtotal of Proposed Programs	***211,000***	***218,000***	***562,000***
Maximum Metropolitan Supply Capability	**2,142,000**	**1,825,000**	**2,127,000**

[1] Represents Supply Capability for resource programs under listed year type.

[2] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.

[3] Colorado River Aqueduct includes water management programs, IID-SDCWA transfers and canal linings.

[3] Maximum CRA deliveries limited to 1.25 MAF including IID-SDCWA transfers and canal linings.

Metropolitan Actions over the Next 15 Years

Metropolitan endeavored to address the on-going challenges and current water supply condition with recent actions that include: (1) Metropolitan Board approval of a Delta Action Plan that provide a framework to help address Bay-Delta issues, (2) development of a Five-Year Supply Plan to identify specific resource and conservation actions to manage water supplies under drought and court ordered restrictions, (3) adoption of a Water Supply alert resolution in response to the proclamation of statewide drought in California, (4) development of the Water Supply Allocation Plan that will serve as the foundation for the urban water shortage contingency analysis and help the region allocate limited supplies, (5) development of the Quagga Mussel Control Plan to protect regional supplies through enhanced detection, surveillance, and mitigation strategies, and (6) continued improvement of Metropolitan facilities to handle increasing stringent water quality regulations and enhance flexibility to deliver supplies to meet region's growing demands.

A. Delta Strategy

In June 2007, Metropolitan's Board approved a Delta Action Plan that provides a framework for staff to pursue actions with other agencies and stakeholders to build a sustainable Delta and reduce conflicts between water supply conveyance and the environment. Building a sustainable Delta will require significant investment and will take decades. The Delta Action Plan aims to prioritize immediate short-term actions to stabilize the Delta while an ultimate solution is selected, and mid-term steps to maintain the Delta while the long-term solution is implemented. The water supply planning implications for the near- and mid-term are described below while the long-term action plan and the Bay Delta Conservation Plan (BDCP) are described in Section 3.2.

<u>Short-Term Action Plan</u>

While a course of action for the long-term restoration of Delta ecosystem and water supply reliability is being developed, short-term actions must be taken to stabilize the current situation. These actions include the following: securing state and federal Endangered Species Acts take authorization; emergency preparedness steps to prepare for possibility of catastrophic failure in the event of earthquake or flood; actions to enhance habitat for Delta smelt and other pelagic species; completion of the BDCP; and actions to begin work on ecosystem restoration projects that will help species regardless of which ultimate solution is selected (e.g., marsh restoration, island rebuilding.)

<u>Mid-Term Action Plan</u>

Upon selection and enactment of an ultimate Delta solution, it will likely take ten years or more to complete environmental documentation and construct new facilities. During this period, it will be necessary to maintain the stabilization process of the Delta through the following actions: continue implementation of the BDCP projects with selected habitat and fishery improvements to improve Delta native species; begin implementing flood control protections, including bypasses and levee improvements; finalize site selection and environmental documentation for new storage projects; implement new governance structures for managing the Delta; and undertake implementation of the long-term Delta solution.

B. Five-Year Supply Plan

Metropolitan staff prepared a Five-Year Supply Plan (Supply Plan) to identify the specific resource and conservation actions that would be implemented over the next five years to manage water deliveries under continued drought conditions and court ordered restrictions. Since April 2008, staff has been working with the member agencies through a series of meetings and workshops to develop and implement the Supply Plan. The Supply Plan was initiated in response to a number of extraordinary events, such as regulatory actions that reduced water supplies from the SWP to protect Delta smelt, as well as a record-dry hydrology that resulted in over 1.1 MAF of withdrawals from Metropolitan storage from January 2007 through December 2008.

The Supply Plan focuses on six categories of resource options to improve Metropolitan's reliability from 2009 through 2013. The individual projects included as part of the resource options are discussed in further detail in Appendix A.3. These six categories of Supply Plan resource options are as follows:

Water Conservation

The Supply Plan targets water conservation strategies to increase and accelerate conservation savings by increasing the use of water efficient devices, affecting water use practices in Southern California and identifying and reducing prohibited uses of water. Key components of this strategy include (1) increased outreach to heighten the public's awareness of the need to conserve, (2) increased resources and support for water use ordinances and conservation-based rate structures to motivate conservation, and (3) accelerated installation of water efficient devices due to Drought Ordinances discussed in this section.

Colorado River Transactions

Metropolitan is pursuing additional supplies such as the emergency short-term fallowing program within Palo Verde Irrigation District (PVID). Metropolitan's Board authorized participation with the Bureau of Reclamation in the pilot operation of the Yuma Desalting Plant that could yield up to 27 TAF in 2010. New initiatives also include expansion of the 2004 storage and interstate release agreement with Southern Nevada Water Agency (SNWA), an agreement with Coachella Valley water District (CVWD), a water exchange with Arizona, and a fallowing program with California Indian tribes. Metropolitan estimates that these programs on the Colorado River could provide an additional 185 TAF of CRA supply in 2010, with the potential to increase in the following years.

Near-Term Delta Actions

Near-term Delta actions being developed include measures that protect fish species and reduce supply impacts, such as habitat and hatchery projects, and physical and operational actions with the goal of reducing conflicts between water supply conveyance and environmental needs.

The proposed Two-Gate System would provide movable barriers on the Old and Middle Rivers to modify flows and prevent vulnerable fish from being drawn toward the Bay-Delta pumping plants. The Two-Gate System is anticipated to protect fish habitat while allowing up to an estimated additional 150 TAF per year of water supply export from the Bay-Delta in years when the allocation for State Water Project contractors exceeds 35 percent. The proposed Two-Gate System is subject to operational studies, monitoring, environmental documentation and compliance, acquisition of right-of-way and completion of design and construction.

State Water Project Transactions

The Supply Plan includes transfers from willing sellers located upstream of the Bay-Delta to buyers located downstream of the Bay-Delta through the State Water Project and Central Valley Project. Delivery of these transfers is contingent on sufficient capacity for export of this water through the Bay-Delta. Metropolitan took delivery of 29 TAF from the Drought Water Bank, a transfer program facilitated by DWR, in 2009.

The Supply Plan also includes additional transfers with entities within the Bay-Delta and investigations into the feasibility of crop rotation demonstration projects with Kern County agencies, as well as the return of existing transfers stored in Shasta Lake. In addition, Metropolitan may take up to 27.5 TAF of SWP supplies over the next three years available under a water transfer between North Kern Water Storage District and Desert. This water, along with approximately 8.5 TAF of water transferred to Metropolitan in 2008, will be returned to Desert in increments of 1.2 TAF per year over the next 30 years.

Groundwater Recovery

Groundwater that requires treatment and recovery for consumptive use is a resource that has the potential to yield significant amounts of supply. Based on groundwater inventories conducted by Metropolitan and the member agencies, it is estimated that there is over 300 TAF of groundwater that could be treated and recovered in Metropolitan's service area. Additionally, it is estimated that the Hayfield groundwater basin located adjacent to the Colorado River Aqueduct has 70 to 100 TAF that could be extracted over the next five to ten years. Also, more than 300 TAF of recovered groundwater accumulated from agricultural drainage in the San Joaquin Valley could be made available to Metropolitan if Metropolitan funds groundwater treatment facilities.

<u>Local Resources</u>

Metropolitan is working with its member agencies to determine which local projects could be expanded and/or accelerated with a potential to be on line by 2013. Local projects include recycled water treatment plants, groundwater recovery plants, desalination plants, and new hookups to existing recycled plants. Over 50 potential projects have been identified. The combined annual yield for these efforts has the potential to grow to approximately 60 to 120 TAF by 2014.

Metropolitan's estimate of the dry year yield of the above Supply Plan actions is shown in Table 1-7.

C. Drought Ordinances

In June 2008, following Governor Arnold Schwarzenegger's proclamation of a statewide drought, Metropolitan adopted a Water Supply Alert resolution. Among other provisions, the Alert encouraged cities, counties, and local public water agencies, to adopt and enforce local water conservation ordinances. To facilitate ordinance adoption, Metropolitan compiled a library of available local ordinances, developed a model water conservation ordinance and hosted several workshops. Approximately half of the 19 million residents in Metropolitan's service area are now covered by adopted ordinances, and an additional one-third resides in jurisdictions that have taken action toward adoption of ordinances. Metropolitan is projecting about 235 TAF of water savings in the next few years from adoption and enforcement of local water conservation ordinances.

Table 1-7
Estimated Yield of Five-Year Supply Plan Actions
(in Thousands of Acre-Feet)

	2010	2011	2012	2013	2014
Water Conservation	235	235	235	235	235
Colorado River Transactions	185	176	176	176	176
Near Term Delta Actions[1]	0	0	0	0	0
State Water Project Transactions	36	43	38	33	33
Groundwater Recovery	9	17	28	28	28
Local Resources	0	0	20	40	60
Total	**465**	**471**	**497**	**512**	**532**

[1] It is estimated that the proposed Two-Gate System would provide up to 150 TAF when the State Water Project allocation is greater than about 35 percent. Yield is shown at 0 because of this contingency.

D. Water Supply Allocation

Recent year introduced a number of water supply challenges for Metropolitan and its member agencies. Critically dry conditions in addition to the biological opinions that provided protective measures for the Delta smelt and Chinook salmon in the Sacramento-San Joaquin River Delta brought uncertainty to future supplies from the SWP. This uncertainty, along with the impacts of dry conditions that affected all of Metropolitan's main supply sources, raised the possibility that Metropolitan would not have access to the supplies necessary to meet total firm demands and would have to allocate shortages in supplies to the member agencies.

In preparing for this possibility, Metropolitan staff worked jointly with its member agency managers and staff to develop a Water Supply Allocation Plan (WSAP) that was adopted by the Board in February 2008. The WSAP includes the specific formulas for calculating member agency supply allocations and the key implementation elements needed for administering an allocation, should a shortage be declared. Ultimately, the WSAP will be the foundation for the urban water shortage contingency analysis required under Water Code § 10632.

On April 14, 2009, Metropolitan's Board voted to reduce firm water deliveries to its member agencies for the first time since 1991. In response to expected water supply conditions for the rest of 2009, Metropolitan implemented the WSAP to allocate available water supplies to its member agencies at a WSAP Regional Shortage Level 2. A resolution containing findings describing the water supply conditions in California and Metropolitan's service area and supporting the recommendation to implement the WSAP was also adopted by the Board at that time. On April 13, 2010, Metropolitan's Board approved continuing its member agencies water allocation at Shortage Level 2 for a second year. The unprecedented consecutive year water supply allocation was necessitated by continuing low SWP supplies due to continued environmental restrictions and low storage levels for Metropolitan. The approved allocation offers local water providers the flexibility to choose among various conservation strategies, from tiered pricing to limits on outdoor water use, to help ensure that demands stay in balance with limited supplies. Details of the WSAP are included as Appendix A.4.

E. Quagga Mussels Control

Zebra mussels (Dreissena polymorpha) were introduced into the Great Lakes area of North America in the mid-1980s in the fresh-water ballast of a transoceanic ship traveling from Eastern Europe. Quagga mussels (Dreissena bugensis), a related species to the better-known zebra mussels and indigenous to the Ukraine, were similarly introduced to the Great Lakes in the late 1980s. Although the introduction of these two species into drinking water supplies does not typically result in violation of drinking water standards, invasive mussel infestations can adversely impact aquatic environments. If unmanaged, invasive mussel infestations have been known to severely impact the aquatic ecology of lakes and rivers; clog intakes and raw water conveyance systems; reduce the recreational and aesthetic value of lakes and beaches; alter or destroy fish habitats; and render lakes more susceptible to deleterious algae blooms. These organisms currently infest much of the Great Lakes basin, the St. Lawrence Seaway, and much of the Mississippi River drainage system.

Invasive zebra and quagga mussels spread west of the 100th Meridian in 2007 and 2008. The 100th Meridian has historically been considered as the line of longitude in the United States that represented the boundary between the moist east and the arid west. The term has been adapted by the 100th Meridian Initiative which is a cooperative effort between state, provincial, and federal agencies to prevent the westward spread of zebra mussels and other aquatic nuisance species in North America. Quagga mussels were discovered in January of 2007 in Lake Mead and rapidly spread downstream to the Lower Colorado River. The presence and spawning of quagga mussels in the Lower Colorado River and in reservoirs located in southern California poses an immediate threat to water and power systems serving more than 25 million people in the southwestern United States. The recent spread of zebra mussels into a northern California lake and a Colorado lake further indicates that if these invasive mussels are not controlled, the entire western United States could be impacted.

Although a number of controls for invasive mussels have been reported in the literature, current drinking water and environmental regulations limit the options available for implementation. In 2007, Metropolitan developed a quagga mussel control plan (QMCP) incorporating enhanced detection, surveillance, and mitigation strategies. The QMCP will be conducted in at least three phases. Phase I addressed immediate quagga mussel detection, surveillance, and mitigation strategies for the first seven months of the mussel infestation. Phase I was completed in September of 2007. Phase II consists of infrastructure upgrades and a comprehensive, multi-year approach for mussel management, and Phase III will address long-term needs and cost minimization strategies.

The presence and spawning of quagga mussels in the lower Colorado River from Lake Mead through Lake Havasu poses a threat to Metropolitan and other Colorado River water users due to the potential to continuously seed water conveyance systems with mussel larvae. Chlorination is the most frequently used means to control mussel larvae entering water systems. To date, Metropolitan has appropriated $9.55 million to upgrade chlorination facilities in the aqueduct and at two additional locations in its system, the outlets of Lakes Mathews and Skinner. It is likely that additional upgrade costs will be incurred for these facilities. Chemical control (chlorination) at Copper Basin, Lake Mathews, and the Lake Skinner Outlet costs approximately $3.0-3.2 million per year depending on the amount of CRA moved through the aqueduct.

As part of the QMCP O&M activities, Metropolitan will be evaluating control measures aimed at: (1) Changing environmental conditions in the CRA or in Metropolitan's reservoirs that will promote a suboptimal or antagonistic environment for quagga mussel attachment, growth or proliferation; (2) Identifying physical or mechanical processes to deter attachment or remove quagga mussels from surfaces; (3) Promoting the use of biological controls such as predators, parasites or diseases targeted to suppress or kill larvae or adult quagga; and (4) Applying oxidative chemical controls (i.e., chlorine) or non-oxidative controls (i.e., molluscicides). Limnological and flow pattern studies will be conducted to assess the feasibility of modifying environmental conditions such as oxygen demand, temperature, and pH to control mussels in Metropolitan's reservoirs. In addition, studies of surface treatments which may deter attachment, and of molluscicide use, will be conducted under laboratory and field conditions. The results of these studies will be used to design infrastructure improvements for long-term management of quagga mussels.

F. Facility Improvements

Inland Feeder

The Inland Feeder's origins date to the district-wide Distribution System Overview Study completed in 1988. The study concluded that Southern California needed additional storage and conveyance facilities to reliably meet the region's growing demands and to respond to an emergency such as an earthquake. In response to the identified needs, Metropolitan developed the Diamond Valley Lake and the Inland Feeder.

The completion of the $1.2 billion Inland Feeder in September 2009 further integrated Metropolitan's distribution system, connecting SWP supplies from Northern California with Metropolitan's CRA and allows for delivery of SWP water into Diamond Valley Lake. The Inland Feeder significantly increased Metropolitan's water delivery capacity from the SWP's east branch at the Devil Canyon Power Plant. As the state identifies solutions to problems in the Sacramento-San Joaquin Delta, the operational flexibility offered by the Inland Feeder will ultimately help protect the Delta's fragile environment by allowing Metropolitan to deliver water during wet periods when water is available and then store it in Southern California's reservoirs and groundwater basins. In dry years, the region can rely on these reserves and reduce reliance on imported water sources. The Inland Feeder will also help Southern California deal with future weather uncertainties that may be brought on by climate change, including the possibility of less snowpack but more rain. The Inland Feeder will allow Metropolitan to capture storm related short-duration high-flow water supplies to store for dry times.

Oxidation Retrofit Project

Metropolitan is currently undertaking the Oxidation Retrofit Project for all five water treatment plants in its service area. In January 2002, new U.S. Environmental Protection Agency (USEPA) regulations became effective which balanced the risk of disinfection byproduct (DBP) exposure while more aggressively controlling pathogenic microorganisms. This rule, known as the Stage 1 Disinfectants/ Disinfection Byproducts (D/DBP) Rule, required water systems to comply with new maximum contaminant levels (MCLs) and with a treatment technique to improve control of DBPs. USEPA subsequently promulgated the Stage 2 D/DBP Rule in January 2006 that requires compliance with the MCL at individual distribution system locations, rather than on an averaged, system-wide basis. No further capital facilities are required for Metropolitan to comply with this second stage of the rule.

Prior to completion of its ozonation facilities, Metropolitan operates its treatment plants under interim strategies designed to comply with the regulations. These strategies include adding large amounts of treatment chemicals to reduce DBP precursors, limiting high blends of SWP supplies to reduce DBP formation, and constraining treatment plant flow rates to ensure adequate disinfection. Adverse impacts from these strategies include limited control of taste and odors, production of total dissolved solids (TDS) levels in excess of Metropolitan's goal of 500 mg/L, and potential limitations on plant capacity. In recent years, with less SWP supply available, Metropolitan has not been constrained by these interim strategies.

The addition of ozone as the primary disinfection process at Metropolitan's treatment plants allows treatment of any blend of its source waters and substantially lowers disinfection by-product levels for compliance with both D/DBP Rules. Use of ozone also enhances Metropolitan's ability to treat water with variable source-water quality, and provide critical operational flexibility to meet varying treatment challenges resulting from periodic occurrences such as drought and other source water limitations. Further, ozonation provides the capability to control taste- and odor-causing compounds that periodically affect the source waters. Ozone is also recognized to be effectively removing many pharmaceuticals/personal care products (PPCPs) and endocrine disruptor chemicals (EDCs), some of which have been detected in Metropolitan's raw water supplies.

The ozonation process is currently in use at the Mills, Jensen, and Skinner plants. Construction of ozone-related facilities are underway at the Diemer and Weymouth plants.

Energy Management Initiatives

Metropolitan is currently embarking on energy management initiatives aimed at working toward operating its facilities in the most energy-efficient and cost-effective manner, and enhancing its ability to provide long-term power reliability. To highlight a few recent accomplishments, Metropolitan completed the Energy Management & Reliability Study (EMRS) in December 2009, which is a roadmap to identify future actions and to serve as a blueprint for achieving energy reliability and cost control. Metropolitan also completed the audit and certification of its 2008 carbon footprint with the California Climate Action Registry as a registered member, and submitted emissions data to the Air Resources Board, which is the state agency mandating emissions reporting annually.

In May 2009, Metropolitan completed a 10-acre field of solar panels at the district's Robert A. Skinner Water Treatment Plant in the Temecula Valley of southwestern Riverside County. The 1-megawatt solar installation is designed to generate approximately 2.4 million kilowatt-hours (kWh) of clean, renewable energy a year, equal to the power used by about 250 homes annually. Metropolitan will receive more than $5 million in rebates during the first five years of the facility's operation. Based on projected power costs, the capital expenditure for this project will be recovered in approximately 10-12 years.

Metropolitan also started final design activities for a 2-megawatt solar installation at the Weymouth plant. This planned solar installation would meet up to 20 percent of the Weymouth plant's expected daily power consumption. A total of 10-megawatts of solar power generation is proposed for the Jensen, Weymouth, Mills and Skinner treatment plants, including the existing 1-megawattt at Skinner.

In August 2010, Metropolitan' s Board adopted Energy Management Policies, to provide Metropolitan staff with the necessary guidance in moving forward with cost-effective and environmentally responsible programs, projects, and initiatives. Projects would then be brought to the Board for authorization on a case-by-case basis. These policies recognize the upward pressure on costs caused by the expiration of Metropolitan's Hoover power contract in 2017, by evolving power markets, by increased direct and indirect regulatory pressure to reduce green house gas (GHG) emissions, and by the risk of reduced Colorado River hydropower supplies with climate change. The specific policies are as follows:

- Water/Energy Nexus: Identify collaborative programs and initiatives between the water and energy industries, constructing sustainable partnerships to reduce costs and provide enhanced reliability.
- Regulatory: Track federal and state greenhouse gas regulations and develop strategies to hedge against price and regulatory risks towards Metropolitan.
- Legislation: Pursue legislation to protect or enhance reliability of energy supply and mitigate energy cost risk.
- Contracts: Maintain maximum flexibility on existing and future contracts with Hoover and other energy contracts to hedge against cost and regulatory risks.
- Projects/Partnerships: Pursue cost-effective renewable energy projects and partnerships to hedge against energy price increases and regulatory risks, while reducing Metropolitan' s carbon footprint.

- Revenue Stream: Pursue revenue stream renewable energy facilities on operational lands to assist in cost containment.
- Economic & Environmental Stewardship: Based on projected economic and regulatory conditions, develop cost-effective programs, projects and initiatives to control operational costs and move Metropolitan towards energy independence. Implementation of proposed Energy Management Plan activities would result in substantial reductions in GHG emissions.
- Energy Management Updates: Staff will return to the Board on a regular basis to report on progress on the Energy Management Master Plan and the suitability of these policies, in light of changing regulatory and economic conditions.

Moving forward with these energy management initiatives will enhance Metropolitan's ability to provide long-term power reliability, to protect against energy market price volatility, and to hedge against overall cost risks for operation of Metropolitan's distribution system and the CRA.

1.5 Current Resource Planning

Metropolitan's Long-term Actions

As Metropolitan continues to face various water supply challenges, development of adaptable strategies for managing resources to meet the range of estimated demands into the future and for adjusting to changing resource conditions are on-going.

Resources Planning

Metropolitan's continued progress in developing a diverse resource mix enables the region to meet its water supply needs. The investments that Metropolitan has made and its on-going efforts in many different areas coalesce toward its goal of long-term regional water supply reliability. Metropolitan's actions have been focused on the following:

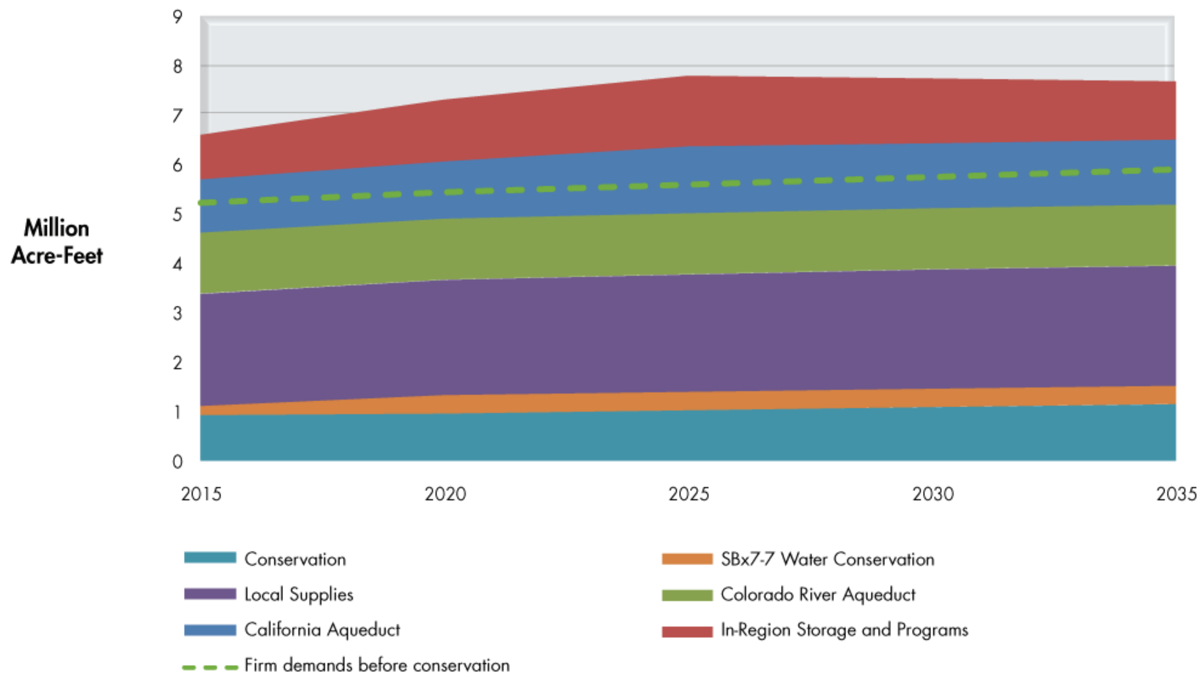
- Pursuing long-term solutions for Delta
- Developing storage programs related to the SWP and the Colorado River
- Developing storage and groundwater management programs within the Southern California region
- Increasing conservation
- Increasing water recycling, groundwater recovery, and seawater desalination
- Developing water supply management programs outside of the region

Many programs have already been successfully implemented through these actions. Others, including institutional and facility changes in the Colorado River region and the SWP, will take more time to execute. Considerations are also in place for emerging integrated supplies, which could augment sources of regional water supply from non-traditional sources. In addition, water demand reductions brought about by legislative mandates could also affect the landscape of future supply planning and implementation.

Metropolitan continues its commitment to regional long-term supply planning, with strategies for implementation discussed in detail in Section 3 of this report.

Figure 1-9 shows the various resources that are expected to be developed to meet the projected demands in Metropolitan service area under a dry-year scenario. The following sections of this report discuss each of these programs, presenting both achievements to date and future expectations for programs that are still under development.

Figure 1-9 Dry-Year Demand and Supplies



Planning for the Future

2

The purpose of this section is to show how Metropolitan plans to meet Southern California's water supply needs in the future. In its role as supplemental supplier to the Southern California water community, Metropolitan faces ongoing challenges in meeting the region's needs for water supply reliability and quality. Increased environmental regulations and competition for water from outside the region have resulted in changes in delivery patterns and timing of imported water supply availability. At the same time, the Colorado River watershed has experienced a protracted drought since 1999 while total water demand continues to rise within the region because of 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 comes from local sources, and the remainder 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 associated with these resources, and because of concerns related to regional water operations, Metropolitan has undertaken a number of planning initiatives over the past fifteen years. This Regional Urban Water Management Plan summarizes these efforts, which include the Integrated Resources Plan (IRP), two IRP Updates, the Water Surplus and Drought Management Plan, the Water Supply Allocation Plan, and the Long-term Conservation Plan. Collectively, they provide a policy framework with guidelines and resource targets for Metropolitan to follow into the future.

While Metropolitan coordinates regional water supply planning for the region through its inclusive integrated planning processes, Metropolitan's member agencies also conduct their own planning analyses – including their own urban water management plans – and may develop projects independently of Metropolitan. Appendix A.5 shows a list of these potential local projects provided to Metropolitan by its member agencies.

[1] Although the water from the Los Angeles Aqueduct is imported, Metropolitan considers it a local source because it is managed by the Los Angeles Department of Water and Power and not by Metropolitan.

2.1 Integrated Resource Planning

The 1996 IRP Process

Acknowledging the importance of water to the economic and social well-being of Southern California, Metropolitan has gradually shifted roles from an exclusive supplier of imported water to a regional water planner working in collaboration with its member agencies. After the drought of 1987-1992, Metropolitan recognized the changed conditions and the need to develop a long-term water resources strategy to fulfill the agency's mission of providing a high-quality reliable water supply to its service area. This planning process that was undertaken is now known as the Integrated Resources Plan (IRP). The first IRP was adopted by Metropolitan's Board in 1996 and guided by six objectives established early in the process:

1. Ensuring Reliability
2. Ensuring Affordability
3. Ensuring Water Quality
4. Maintaining Diversity
5. Ensuring Flexibility
6. Acknowledging Environmental and Institutional Constraints.

One of the fundamental outcomes of the IRP was the recognition that regional water supply reliability could be achieved through the implementation of a diverse portfolio of resource investments and conservation measures. The resulting IRP strategy was a balance between demand management and supply augmentation. For example, in its dry year profile, the resource framework counted on almost equal proportion of water conservation and recycled water as withdrawal from storage and water transfers. The IRP also balanced between the use of local resources and imported supplies. In a dry year, about 55 percent of the region's water resources come from local resources and conservation. Additionally, through the IRP process Metropolitan found solutions that offer long-term reliability at the lowest possible cost to the region as a whole.

The 1996 IRP, as a blueprint to resource program implementation, also established the "Preferred Resource Mix that would provide the Metropolitan region with reliable and affordable water supplies through 2020.

The IRP provided details on the Preferred Resource Mix and guidelines to established broad resource targets for each of the major supplies available to the region including:

- Conservation
- Local Resources - Water Recycling, Groundwater Recovery and Desalination
- Colorado River Supplies and Transfers
- State Water Project Improvement
- In-Region Surface Reservoir Storage
- In-Region Groundwater Storage

The 2004 IRP Update

In 2004, the Metropolitan Board adopted an updated IRP. Various legislative issues concerning population growth and water supply called for further planning considerations of these changed conditions. This IRP Update had three objectives:

1. Review the goals and achievements of the 1996 IRP
2. Identify the changed conditions for water resource development
3. Update resource development targets through 2025

The 2004 IRP process fulfilled the new objectives and updated the long-term plan to account for new water planning legislation. The updated plan contained resource development targets through 2025, which reflected changed conditions; particularly increased conservation savings, planned increases in local supplies and uncertainties. The 2004 IRP also explicitly recognized the need to handle uncertainties inherent in any planning process. For the water industry, some of these uncertainties are the level of population and economic growth which directly drive water demands, water quality regulations, new chemicals found to be unhealthful, endangered species affecting sources of supplies, and periodic and new changes in climate and hydrology. As a result, a key component of the Updated Plan was the addition of a 10 percent planning buffer. The planning buffer provided for the identification of additional supplies, both imported and locally developed, that can be implemented to address uncertainty in future supplies and demands.

2010 Integrated Water Resources Plan Update

Metropolitan and its member agencies face increasing uncertainties and challenges as they plan for future water supplies. The 1996 and 2004 IRP resource strategies emphasized the need for a diverse and adaptable water supply strategy to cope with changing circumstances and conditions. Recent history and events have highlighted several emerging trends that need to be addressed in the context of the region's water supply planning and reliability. These trends cover a wide range of considerations including climate change, energy use and greenhouse gas emissions, endangered species protection and conveyance needs in the Sacramento-San Joaquin River Delta system. These trends point strongly to the importance of updating the region's Integrated Resources Plan, and to the need to solidify adaptive strategies to address additional challenges into the long-term future.

The basic objectives of the current IRP process are to:

1. Review the achievements of the 1996 IRP and the 2004 Update
2. Identify changing conditions affecting water resource development
   - Attention will be given to emerging factors and considerations, such as the current drought, climate change, energy use, and changes in Delta pumping operations
3. Update resource development targets through 2030
   - Discussion will focus on adaptation to future uncertainties, and potential alternatives for further diversifying Metropolitan's water resource portfolio and increasing supply reliability in the face of changing circumstances

Public Process

The current IRP Update process has sought input from member agencies, retail water agencies, other water and wastewater managers, environmental, business and community interests. In the fall of 2008, Metropolitan's senior management, Board of directors, member agency managers, elected officials, and community groups collectively discussed strategic direction and regional water solutions at a series of four stakeholder forums; nearly 600 stakeholders participated in the forums.

Similar types of ideas and issues were raised by the participants at all the forums, emphasizing the importance of local resources development and resolving issues with the Delta. Participants suggested that Metropolitan should take a leadership position in several areas including:

- Providing outreach to legislators concerning needs for water supply reliability and quality improvements
- Developing brine lines to enhance recycled water use
- Fostering partnerships with energy utilities
- Building relationships with environmental community
- Participating in research and development of new technologies
- Providing assistance to retail agencies in designing "correct" tiered rate structures

Technical Workgroup Process

Following the stakeholder forums, Metropolitan embarked upon a Technical Workgroup Process to further explore some of the issues and opportunities identified by forum participants. To facilitate the workgroup process, the technical discussions were grouped into six resource areas:

- Conservation
- Graywater
- Groundwater
- Recycled water
- Stormwater / Urban Runoff
- Seawater Desalination

The Technical Workgroup process provided a forum for review of the issues associated with each area, and in-depth discussions with area experts. The workgroups included member agency and retail agency staff, other non-governmental organizations, and staff from wastewater and stormwater management agencies, as well as Metropolitan staff and consultants.

Strategic Policy Review

As part of the current IRP update process, Metropolitan's Board initiated a Strategic Policy Review. This Review examined the ramifications of alternative roles for Metropolitan, member agencies and local retail agencies in future development of water resources. The process explored three alternative policy cases:

1. Current approach – continuation of IRP policies and partnerships with member agencies
2. Imported focus – Metropolitan focuses on addressing Delta issues, imported supplies and water transfers and leaves local supply development entirely to member agencies
3. Enhanced Regional focus – Metropolitan examines new approaches, up to and including development and ownership for implementing large regional scale water recycling, groundwater recharge and seawater desalination

A study of water supply reliability and cost impacts associated with these approaches found that it is in the region's best interest for Metropolitan to continue to explore ways of increasing regional reliability and not limiting itself to singular areas like addressing Delta issues. The study results under this process was a broader view of Metropolitan's role in comprehensive planning and implementation for regional reliability; adopting an adaptive resource development plan for the future may provide the most benefit for the region. In this adaptive approach, Metropolitan may need to take on an enhanced role in local supply development, in order to best adapt and respond to changing regional conditions and lay a solid foundation for future reliability. This role could include the creation of partnership with local agencies or Metropolitan's direct ownership of local projects to ensure regional reliability. The adaptive approach would be incorporated into the 2010 IRP for Board consideration.

Uncertainty Analysis

A major component of the current IRP update effort is to explicitly reflect uncertainty in Metropolitan's future water management environment. This involves evaluating a wider range of water management strategies, and seeking robust and adaptive plans that respond to uncertain conditions as they evolve over time, and that ultimately will perform adequately under a wide range of future conditions. The potential impacts and risks associated with climate change, as well as other major uncertainties and vulnerabilities, will be incorporated in to the update and accounted for. A key evolution from the 2004 IRP will be the identification of vulnerabilities and contingency actions that will extend the concept of a Planning Buffer into tangible actions that will enable construction and implementation of contingency supplies if they are needed.

Adaptive Planning Implementation

Regional water supply reliability largely depends on Metropolitan's preparedness to adapt to supply uncertainties. An adaptive management approach was utilized in developing a strategy that will prepare the region to deal with unforeseen supply shortages. An important step in this approach is identifying where additional water supply will come from. Four local water sources were considered:

- Stormwater
- Recycled Water
- Graywater
- Seawater

The stakeholder groups established during the IRP process evaluated the viability of using one or more of these resources to supplement existing water supply in the region. The stakeholders (e.g., member agencies, retail agencies, and industry experts) gathered important information on each resource such as regional development status, yield potential, and implementation challenges.

Another key aspect of this strategy is determining what actions are required to eliminate or mitigate the implementation challenges in developing these resources. The adaptive approach essentially provides a blueprint on how to address these challenges and develop supply within each resource.

The most important aspect of this strategy is the adaptive management approach used in responding to potential water supply shortage. The implementation elements identified within each blueprint can be executed at varying levels of urgency. Under the adaptive approach, Metropolitan developed three alternative implementation schedules for each resource:

- Status Quo
- Proactive
- Aggressive

Status Quo entails delaying action until a trigger is met. A trigger sets the point in time at which a potential shortage is identified and when deliberate action is taken to mitigate that shortage. The Proactive schedule implements low-risk actions early-on regardless of whether a trigger occurs. Implementing these low-risk actions shortens the overall time required to complete the implementation schedule. The Aggressive option implements both low-risk and medium-to-high risk actions that may require significant investment (e.g. land acquisition). By initiating these actions early-on, the overall implementation time can be shortened significantly. Table 2-1 highlights the differences between each schedule.

Table 2-1
Schedule Options

Schedule Option	Brief Description	Timeframe from Trigger to Production Yield	Financial Risk
Status Quo	Delay action until the adaptive management trigger occurs	Long	Low
Proactive	Begin planning actions (generally lower cost) before the adaptive management trigger occurs	Medium	Medium
Aggressive	Perform project implementation actions, such as land acquisition, before the adaptive management trigger occurs	Short	High

This strategy also utilizes an adaptive approach for determining an optimal project mix, or portfolio, used to meet a supply gap. The portfolio can comprise of projects from any of the four resources. Project drivers such as cost, yield, implementation time, and location of the project will be used to create customized portfolios that could address specific needs. For example, if a water supply shortage is occurring in a specific area, the portfolio could contain projects that serve that area. Another example might entail selecting projects that have the shortest implementation time in order to expedite supply development. Yet another example might involve selecting the most cost-efficient projects ($/AF) regardless of implementation time or location if minimizing costs is of highest priority. Furthermore, the number of projects within a portfolio is scalable based on the level of shortage at hand. This comprehensive approach is illustrated in Figure 2-1.

Metropolitan's adaptive approach is basically organized into four individual sections referred to as Foundational Studies. These individual studies discuss in detail the implementation challenges and recommended action for each resource. The first step in developing planning actions is categorizing the implementation challenges within each resource. In most cases the categories represent common themes such as establishing funding projects (Funding) or garnering legislative support (Legislative). The next step in developing planning actions is identifying implementation elements that mitigate the implementation challenges. This step involves identifying specific actions that are needed to support each implementation element. The last step in this process is developing of timelines and implementation schedules. Three alternative implementation schedules are developed for each resource.

Tables 2-2 through 2-5 summarize the categories and implementation elements for each resource. Detailed actions and schedules can be found in the foundational studies.

Figure 2-1 Comprehensive Approach

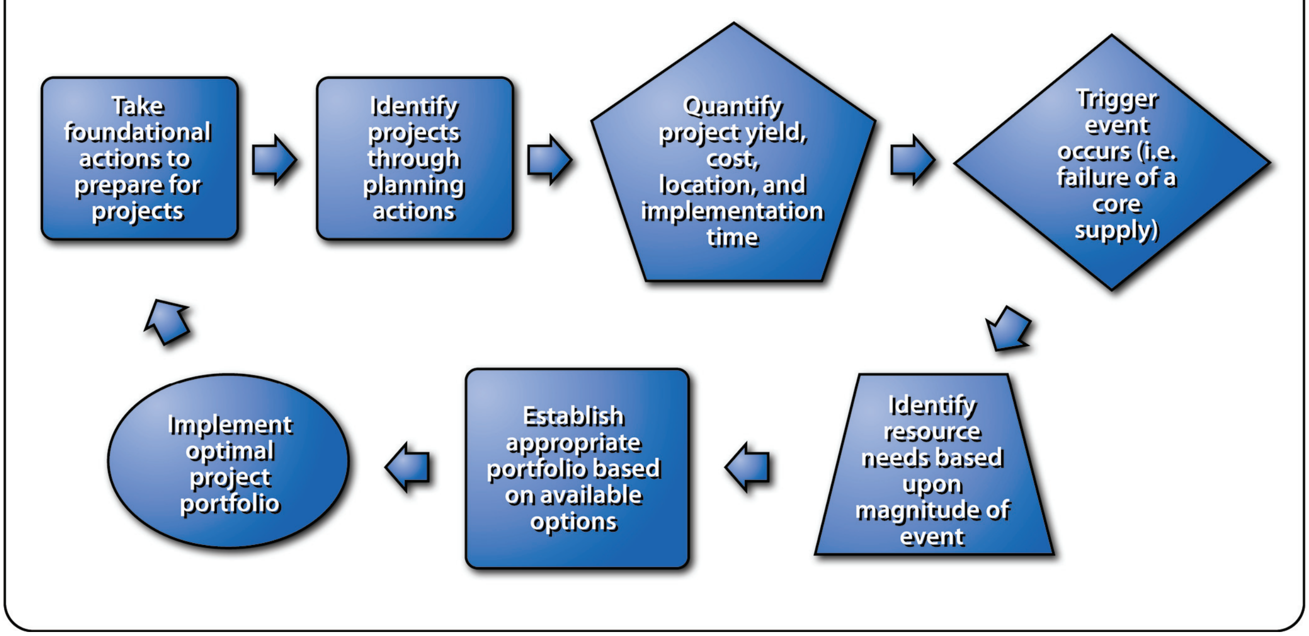


Table 2-2
Stormwater Issue Categories and Implementation Elements

Category	Implementation Element
Data Management	Regional Water Supply Project Database
Legislative/Regulatory/Education	Regional Synergy Task Force
Procedural	Regional Implementation Partnerships
Technical	Regional Feasibility Study
Funding	Funding Strategy Plan
Operational	Local Resource Baseline Plan
Implementation Planning	Alternatives Analysis Plan
Project Implementation	Incentive Programs Land Acquisition Advanced Planning Design Construction
Post Construction	O&M Performance Monitoring

Table 2-3
Recycled Water Issue Categories and Implementation Elements

Category	Implementation Element
Public Perception	Recycled Marketing Campaign Recycled Water Educational Campaign
Legislative	Recycled Water Legislative Task Force
Funding	Regional Recycled Water Finance Committee
Procedural	Regional Recycled Water Permitting and Inspection JPA Regional Recycled Water Policy Task Force
Operational	Regional Salt Management Plan Regional Basin Management Plan Recycled Water Blue Ribbon Panel (SWRCB) Regional Recycled Water Facility Plan
Facility	Regional Project (CIP) Implementation Joint Groundwater Replenishment Project

Table 2-4
Graywater Issue Categories and Implementation Elements

Category	Implementation Element
Public Perception	Graywater Marketing Campaign Graywater Educational Campaign
Legislative	Graywater Legislative Task Force
Technical	Regional Graywater Feasibility Study
Funding	Regional Graywater Finance Committee
Procedural	Regional Graywater Permitting and Inspection Regional Graywater Policy Task Force
Operational	Regional Graywater Management Plan
Construction	Regional Project Implementation

Table 2-5
Desalination Issue Categories and Implementation Elements

Category	Implementation Element
Data Management	Regional Water Supply Project Database
Legislative/Regulatory/Education	Regional Synergy Task Force
Procedural	Regional Implementation Partnerships
Technical	Regional Feasibility Study
Funding	Funding Strategy Plan
Operational	Local Resource Baseline Plan
Project Implementation	Incentive Programs Alternatives Analysis Plan Land Acquisition Advanced Planning Design Construction
Post Construction	O&M Performance Monitoring

Innovative approaches are critical to meeting the water supply needs of Southern California. Maintaining reliable water supplies given regulatory uncertainty, competing uses of groundwater and surface water, and overall variability in water supply is a growing challenge. An adaptive regional approach that develop, promote, and practice integrated regional water management of both traditional and emerging supplies may be the key to continued regional reliability.

2.2 Evaluating Supply Reliability

The Urban Water Management Plan Act requires that three basic planning analyses be conducted to evaluate supply reliability. The first is a water supply reliability assessment requiring development of a detailed evaluation of the supplies necessary to meet projected demands over at least a 20-year period. This analysis is to consider average, single-year and multi-year drought conditions. The second is a water shortage contingency plan which documents the actions that would be implemented in addressing up to a 50 percent reduction in an agency's supplies. Finally, a plan must be developed specifying the steps that would be taken under a catastrophic interruption in water supplies.

To address these three requirements, Metropolitan developed estimates of future demands and supplies from local sources and from Metropolitan. Supply and demand analyses for the single- and multi-year drought cases were based on conditions affecting the SWP. For this supply source, the single driest year was 1977 and the three-year dry period was 1990-1992. The SWP is the appropriate point of reference for these analyses since it is Metropolitan's largest and most variable supply. For the "average" year analysis 83 years of historic hydrology (1922-2004) were used to estimate supply and demand.

Estimating Demands on Metropolitan

Metropolitan developed its demand forecast by first estimating total retail demands for its service area and then factoring out water savings attributed to conservation.[2] Projections of local supplies then were derived using data on current and expected local supply programs and the IRP Local Resource Program Target. The resulting difference between total demands net of conservation and local supplies is the expected regional demands on Metropolitan supplies. These various estimates are shown in Tables 2-6 through 2-8. Major categories used in these tables are defined below.

Total Demands

Total demand is the sum of retail demand for M&I and agricultural, seawater barrier demand, and replenishment demand. Total demand represents the total amount of water needed by the member agencies. Total demands include:

- <u>Retail Municipal and Industrial (M&I)</u> — Retail Municipal and Industrial (M&I) demands represent the full spectrum of urban water use within the region. These include residential, commercial, industrial, institutional and un-metered water uses. To forecast urban water demands Metropolitan used the MWD-MAIN Water Use Forecasting System (MWD-Main), consisting of econometric models that have been adapted for conditions in Southern California. The demographic and economic data used in developing these forecasts were taken from the Southern California Association of Government's (SCAG) 2007 Regional Transportation Plan and from the San Diego County Association of Government's (SANDAG) Series 12: 2050 Regional Growth Forecast (Feb 2010). The SCAG and SANDAG regional growth forecasts are the core assumptions that drive the estimating equations in Metropolitan's MWD-MAIN demand forecasting model. SCAG and SANDAG's projections undergo extensive local review and incorporate zoning information from city and county general plans and are backed by Environmental Impact Reports.

  Impacts of potential annexation are not included in the demand projections for the 2010 RUWMP. However, Metropolitan's Review of Annexation Procedures concluded that the impacts of annexation within the service area beyond 2020 would not exceed 2 percent of overall demands.

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[2] Information generated as part of this analysis are contained in Appendix A-1.

- Retail Agricultural Demand — Retail agricultural demands consist of water use for irrigating crops. Member agencies estimate agricultural water use based on many factors, including farm acreage, crop types, historical water use, and land use conversion. Each member agency estimates their agricultural demand differently, depending on the availability of information. Metropolitan relies on member agencies' estimates of agricultural demands for the 2010 RUWMP
- Seawater Barrier Demand — Seawater barrier demands represent the amount of water needed to hold back seawater intrusion into the coastal groundwater basins. Groundwater management agencies determine the barrier requirements based on groundwater levels, injection wells, and regulatory permits.
- Replenishment Demand — Replenishment demands represent the amount of water member agencies plan to use to replenish their groundwater basins. For the 2010 RUWMP, replenishment deliveries are not included as part of firm demands.

Conservation Adjustment

The conservation adjustment subtracts estimated conservation from total retail demand. The conservation estimates consist of three types:

- Code-Based Conservation — Water savings resulting from plumbing codes and other institutionalized water efficiency measures.
- Active Conservation — Water saved as a direct result of programs and practices directly funded by a water utility (e.g., measures outlined by the California Urban Water Conservation Council's "Best Management Practices"). Water savings from active conservation currently completed will decline to zero as the lifetime of those devices is reached. This will be offset by an increase in water savings for those devices that are mandated by law, plumbing codes or other efficiency standards.
- Price Effect Conservation — Reductions in customer use attributable to changes in the real (inflation adjusted) cost of water.

Water Use Reduction Target

On November 10, 2009, the state Legislature passed Senate Bill 7 as part of the Seventh Extraordinary Session, referred to as SBX7-7. This new law is the water conservation component of the historic Delta legislative package, and seeks to achieve a 20 percent statewide reduction in urban per capita water use in California by December 31, 2020. According to Water Code §10608.36, wholesale agencies are required to include in their UWMPs an assessment of present and proposed future measures, programs, and policies that would help achieve the water use reductions required under SBX7-7. Urban wholesale water suppliers are not required to comply with the target-setting and reporting requirements of SBX7-7. Additional discussion of the water reduction target is included in Section 3.7.

Based on Metropolitan' s analysis of population and demand and the methodologies for setting targets described in the legislation, compliance with 20x2020 on an individual agency basis throughout the region would result in reduced potable demand of 380 TAF in 2020 through additional conservation and/or recycling. This estimated amount is reflected in the projected demand tables under 20x2020 Retail Compliance.

Local Supplies

Local supplies represent a spectrum of water produced by the member agencies to meet their total demands. Local supplies are a key component in determining how much Metropolitan supply is needed to supplement member agencies local supplies to meet their total demand. Projections of local supplies relied on information gathered from a number of sources including past urban water management plans, Metropolitan's annual local production surveys, and communications between Metropolitan and member agency staff. Local supplies include:

- Groundwater and Surface Water — Groundwater production consists of extractions from local groundwater basins. Surface water comes from stream diversions and rainwater captured in reservoirs.
- The Los Angeles Aqueduct — A major source of imported water is conveyed from the Owens Valley via the Los Angeles Aqueduct (LAA) by LADWP. Although LADWP imports water from outside of Metropolitan's service area, Metropolitan classifies water provided by the LAA as a local resource because it is developed and controlled by a local agency.
- Seawater desalination — Seawater desalinated for potable use.
- Groundwater Recovery and Recycled Water — Locally developed and operated, groundwater recovery projects treat contaminated groundwater to meet potable use standards. Recycled water projects recycle wastewater for municipal and industrial use.
- Non-Metropolitan Imports — Water supplies imported by member agencies from sources outside of the Metropolitan service area.

The local supply projections presented in demand tables include existing projects that are currently producing water and projects that are under construction. Appendix A.5 contains a complete list of existing, under construction, fully designed with appropriated funds, feasibility, and conceptual projects that are within the service area.

Firm Demands

After calculating the expected regional demands on Metropolitan supplies, projected firm demands were calculated based on Metropolitan's established reliability goal. For the purposes of reliability planning, the 1996 IRP established a reliability goal that states that full service demands at the retail level would be satisfied under all "foreseeable hydrologic" conditions through 2020. This principle has been retained in the current update.

This goal allows for intermittent interruptions to non-firm, discounted rate supplies sold under the Replenishment and Interim Agricultural Water Programs. Thus, firm demand on Metropolitan equals Full Service demands (Tier I and Tier II). For the purpose of analysis, "foreseeable hydrologic conditions" is understood to mean under "historical hydrology," which presently covers the range of historical hydrology spanning the years 1922 through 2004. Tables 2-6 through 2-8 show estimates of firm demands on Metropolitan for single dry-year, multiple dry-year, and average year.

Table 2-6
Metropolitan Regional Water Demands
Single Dry Year
(Acre-Feet)

		2015	2020	2025	2030	2035
A.	**Total Demands[1]**	**5,480,000**	**5,662,000**	**5,804,000**	**5,961,000**	**6,101,000**
	Retail Municipal and Industrial	5,000,000	5,194,000	5,354,000	5,515,000	5,653,000
	Retail Agricultural	231,000	213,000	193,000	186,000	186,000
	Seawater Barrier	71,000	72,000	72,000	72,000	72,000
	Groundwater Replenishment	177,000	184,000	186,000	188,000	191,000
B.	**Total Conservation**	**936,000**	**967,000**	**1,033,000**	**1,096,000**	**1,156,000**
	Existing Active (through 2009)[2]	97,000	46,000	16,000	2,000	0
	Code-based and Price-Effect	589,000	671,000	766,000	844,000	906,000
	Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000
C.	**SBx7-7 Water Conservation**	**190,000**	**380,000**	**380,000**	**380,000**	**380,000**
	20% by 2020 Retail-Level Compliance	190,000	380,000	380,000	380,000	380,000
D.	**Total Local Supplies**	**2,260,000**	**2,322,000**	**2,366,000**	**2,405,000**	**2,419,000**
	Groundwater	1,457,000	1,395,000	1,407,000	1,423,000	1,416,000
	Surface Water	98,000	97,000	97,000	97,000	97,000
	Los Angeles Aqueduct	66,000	66,000	66,000	66,000	66,000
	Groundwater Recovery	101,000	108,000	114,000	120,000	126,000
	Total Recycling	348,000	375,000	394,000	410,000	426,000
	Other Imported Supplies	190,000	281,000	288,000	288,000	288,000
E.	**Total Metropolitan Demands (E=A-B-C-D)**	**2,094,000**	**1,993,000**	**2,025,000**	**2,080,000**	**2,146,000**
	Full Service (Tier I and Tier II)	1,991,000	1,889,000	1,921,000	1,974,000	2,039,000
	Replenishment Service[3]	103,000	103,000	104,000	106,000	107,000
	Interim Agricultural Water Program[4]	0	0	0	0	0
3	**Firm Demands on Metropolitan[5]**	**1,991,000**	**1,889,000**	**1,921,000**	**1,974,000**	**2,039,000**

Notes:
All units are acre-feet unless specified, rounded the nearest thousand.
Totals may not sum due to rounding.
[1] Growth projections are based on SCAG 2007 Regional Transportation Plan and SANDAG Series 12 2050 Regional Growth Forecast (Feb 2010).
[2] Includes code-based, price-effect and existing active savings through 2009; does not include future active conservation savings. 1990 is base year.
[3] Replenishment Service as defined in MWD Administrative Code Section 4114. Replenishment service includes direct and in-lieu replenishment.
[4] IAWP deliveries will be phased out by 2013.
[5] Firm demand on Metropolitan equals Full Service demands plus 70% of the Interim Agricultural Water Program demands.

Table 2-7
Metropolitan Regional Water Demands
Multiple Dry Year
(Acre-Feet)

		2015	2020	2025	2030	2035
A.	**Total Demands[1]**	**5,478,000**	**5,702,000**	**5,862,000**	**6,017,000**	**6,161,000**
	Retail Municipal and Industrial	5,004,000	5,232,000	5,409,000	5,572,000	5,715,000
	Retail Agricultural	231,000	214,000	195,000	185,000	184,000
	Seawater Barrier	71,000	71,000	72,000	72,000	72,000
	Groundwater Replenishment	172,000	184,000	187,000	188,000	190,000
B.	**Total Conservation**	**936,000**	**967,000**	**1,033,000**	**1,096,000**	**1,156,000**
	Existing Active (through 2009)[2]	97,000	46,000	16,000	2,000	0
	Code-based and Price-Effect	589,000	671,000	766,000	844,000	906,000
	Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000
C.	**SBx7-7 Water Conservation**	**190,000**	**380,000**	**380,000**	**380,000**	**380,000**
	20% by 2020 Retail-Level Compliance	190,000	380,000	380,000	380,000	380,000
D.	**Total Local Supplies**	**2,171,000**	**2,305,000**	**2,343,000**	**2,378,000**	**2,402,000**
	Groundwater	1,386,000	1,389,000	1,389,000	1,397,000	1,396,000
	Surface Water	91,000	91,000	91,000	91,000	91,000
	Los Angeles Aqueduct	63,000	67,000	71,000	75,000	78,000
	Groundwater Recovery	100,000	107,000	113,000	119,000	125,000
	Total Recycling	340,000	370,000	390,000	407,000	423,000
	Other Imported Supplies	191,000	282,000	288,000	288,000	288,000
E.	**Total Metropolitan Demands (E=A-B-C-D)**	**2,154,000**	**2,049,000**	**2,106,000**	**2,163,000**	**2,224,000**
	Full Service (Tier I and Tier II)	2,056,000	1,947,000	2,003,000	2,059,000	2,119,000
	Replenishment Service[3]	97,000	102,000	103,000	104,000	104,000
	Interim Agricultural Water Program[4]	0	0	0	0	0
F.	**Firm Demands on Metropolitan[5]**	**2,056,000**	**1,947,000**	**2,003,000**	**2,059,000**	**2,119,000**

Notes:
All units are acre-feet unless specified, rounded the nearest thousand.
Totals may not sum due to rounding.
[1]Growth projections are based on SCAG 2007 Regional Transportation Plan and SANDAG Series 12 2050 Regional Growth Forecast (Feb 2010).
[2]Includes code-based, price-effect and existing active savings through 2009; does not include future active conservation savings. 1990 is base year.
[3]Replenishment Service as defined in MWD Administrative Code Section 4114. Replenishment service includes direct and in-lieu replenishment.
[4]IAWP deliveries will be phased out by 2013.
[5]Firm demand on Metropolitan equals Full Service demands plus 70% of the Interim Agricultural Water Program demands.

Table 2-8
Metropolitan Regional Water Demands
Average Year
(Acre-Feet)

		2015	2020	2025	2030	2035
A.	**Total Demands[1]**	**5,449,000**	**5,632,000**	**5,774,000**	**5,930,000**	**6,069,000**
	Retail Municipal and Industrial	4,978,000	5,170,000	5,330,000	5,491,000	5,627,000
	Retail Agricultural	222,000	205,000	186,000	179,000	180,000
	Seawater Barrier	71,000	72,000	72,000	72,000	72,000
	Groundwater Replenishment	178,000	185,000	187,000	189,000	191,000
B.	**Total Conservation**	**936,000**	**967,000**	**1,033,000**	**1,096,000**	**1,156,000**
	Existing Active (through 2009)[2]	97,000	46,000	16,000	2,000	0
	Code-based and Price-Effect	589,000	671,000	766,000	844,000	906,000
	Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000
C.	**SBx7-7 Water Conservation**	**190,000**	**380,000**	**380,000**	**380,000**	**380,000**
	20% by 2020 Retail-Level Compliance	190,000	380,000	380,000	380,000	380,000
D.	**Total Local Supplies**	**2,395,000**	**2,522,000**	**2,553,000**	**2,581,000**	**2,603,000**
	Groundwater	1,429,000	1,430,000	1,429,000	1,431,000	1,431,000
	Surface Water	103,000	102,000	102,000	102,000	102,000
	Los Angeles Aqueduct	224,000	225,000	226,000	229,000	230,000
	Groundwater Recovery	101,000	108,000	114,000	120,000	126,000
	Total Recycling	348,000	375,000	394,000	410,000	426,000
	Other Imported Supplies	190,000	281,000	288,000	288,000	288,000
E.	**Total Metropolitan Demands (E=A-B-C-D)**	**1,928,000**	**1,763,000**	**1,808,000**	**1,874,000**	**1,931,000**
	Full Service (Tier I and Tier II)	1,826,000	1,660,000	1,705,000	1,769,000	1,826,000
	Replenishment Service[3]	102,000	103,000	103,000	104,000	105,000
	Interim Agricultural Water Program[4]	0	0	0	0	0
F.	**Firm Demands on Metropolitan[5]**	**1,826,000**	**1,660,000**	**1,705,000**	**1,769,000**	**1,826,000**

Notes:
All units are acre-feet unless specified, rounded the nearest thousand.
Totals may not sum due to rounding.
[1] Growth projections are based on SCAG 2007 Regional Transportation Plan and SANDAG Series 12 2050 Regional Growth Forecast (Feb 2010).
[2] Includes code-based, price-effect and existing active savings through 2009; does not include future active conservation savings. 1990 is base year.
[3] Replenishment Service as defined in MWD Administrative Code Section 4114. Replenishment service includes direct and in-lieu replenishment.
[4] IAWP deliveries will be phased out by 2013.
[5] Firm demand on Metropolitan equals Full Service demands plus 70% of the Interim Agricultural Water Program demands.

2.3 Water Supply Reliability

After estimating demands for single dry year, multiple dry years, and average years the water reliability analysis requires urban water suppliers to identify projected supplies to meet these demands. Table 2-9 summarizes the sources of supply for the single dry year (1977 hydrology), while Table 2-10 shows the region's ability to respond in future years under a repeat of the 1990-92 hydrology. Table 2-10 provides results for the average of the three dry years rather than a year-by-year detail, because most of Metropolitan's dry-year supplies are designed to provide equal amounts of water over each year of a three-year period. These tables show that the region can provide reliable water supplies under both the single driest year and the multiple dry year hydrologies. Table 2-11 reports the expected situation on average over all of the historic hydrologies. Appendix A.3 contains detailed justifications for the sources of supply used for this analysis.

Metropolitan' s supply capabilities are evaluated using the following assumptions:

Colorado River Aqueduct Supplies

Colorado River Aqueduct supplies include supplies that would result from existing and committed programs and from implementation of the Quantification Settlement Agreement (QSA) and related agreements. The QSA, which is the subject of current litigation, is a component of the California Plan and establishes the baseline water use for each of the agreement parties and facilitates the transfer of water from agricultural agencies to urban uses. A detailed discussion of the QSA is included in Section 3. Colorado River transactions are potentially available to supply additional water up to the CRA capacity of 1.25 MAF on an as-needed basis.

State Water Project Supplies

State Water Project (SWP) supplies are estimated using the draft 2009 SWP Delivery Reliability Report distributed by DWR in December 2009. The draft 2009 reliability report presents the current DWR estimate of the amount of water deliveries for current (2009) conditions and conditions 20 years in the future. These estimates incorporate restrictions on SWP and Central Valley Project (CVP) operations in accordance with the biological opinions of the U.S. Fish and Wildlife Service and National Marine Fishery Service issued on December 15, 2008, and June 4, 2009, respectively. Under the 2009 draft reliability report, the delivery estimates for the SWP for current (2009) conditions as percentage of maximum Table A amounts, are seven percent, equivalent to 134 TAF, under a single dry-year (1977) condition and 60%, equivalent to 1.15 MAF, under long-term average condition.

In dry, below-normal conditions, Metropolitan has increased the supplies received from the California Aqueduct by developing flexible Central Valley storage and transfer programs. Over the last two years under the pumping restrictions of the SWP, Metropolitan has worked collaboratively with the other contractors to develop numerous voluntary Central Valley storage and transfer programs. The goal of this storage/transfer programs is to develop additional dry-year supplies that can be conveyed through the available Banks pumping capacity to maximize deliveries through the California Aqueduct during dry hydrologic conditions and regulatory restrictions.

Delta Improvements

The listing of several fish species as threatened or endangered under the federal or California Endangered Species Acts (ESAs) have adversely impacted operations and limited the flexibility of the SWP. In response to court decisions related to the Biological Opinions for fish species listed under the ESAs, DWR altered the operations of the SWP. This resulted in export restrictions and reduced SWP deliveries. In June 2007, Metropolitan's Board approved a Delta Action Plan that provides a framework for staff to pursue actions with other agencies and stakeholders to build a sustainable Delta and reduce conflicts between water supply conveyance and the environment. The Delta Action Plan aims to prioritize immediate short-term actions to stabilize the Delta while an ultimate solution is selected, and mid-term steps to maintain the Bay-Delta while the long-term solution is implemented.

In the near-term, the physical and operational actions in the Bay-Delta being developed include measures that protect fish species and reduce supply impacts with the goal of reducing conflicts between water supply conveyance and environmental needs. The potential for Increased supply due to these near-term fixes is included in the 2010 RUWMP as a 10 percent increase in water supplies obtained from the SWP allocation for the year. In evaluating the supply capabilities for the 2010 RUWMP, additional supplies from this interim fix are assumed to materialize by 2013. Also included as a possible near-term fix for the Bay-Delta is the proposed Two-Gate System demonstration program, which would provide movable barriers on the Old and Middle Rivers to modify flows and prevent fish from being drawn toward the Bay-Delta pumping plants. The Two-Gate System is anticipated to protect fish and increase SWP supplies.

Operational constraints likely will continue until a long-term solution to the problems in the Bay-Delta is identified and implemented. State and federal resource agencies and various environmental and water user entities are currently engaged in the development of the Bay Delta Conservation Plan (BDCP), which is aimed at addressing the basic elements that include the Delta ecosystem restoration, water supply conveyance, and flood control protection and storage development. In dealing with these basic issues, the ideal solutions sought are the ones that address both the physical changes required as well as the financing and governance. In evaluating the supply capabilities for the 2010 RUWMP, Metropolitan assumed a new Delta conveyance is fully operational by 2022 that would return supply reliability similar to 2005 condition, prior to supply restrictions imposed due to the Biological Opinions. This assumption is consistent with Metropolitan's long-term Delta Action Plan that recognizes the need for a global, comprehensive approach to the fundamental issues and conflicts to result in a sustainable Bay-Delta, sufficient to avoid biological opinion restrictions on planned SWP deliveries to Metropolitan and the other SWP Contractors. Further, recently passed state legislation included pathways for establishing governance structures and financing approaches to implement and manage the identified elements.

Storage

A key component of Metropolitan's water supply capability is the amount of water in Metropolitan's storage facilities. Storage is a major component of Metropolitan's dry-year resource management strategy. Metropolitan's likelihood of having adequate supply capability to meet projected demands, without implementing the Water Supply Allocation plan (WSAP), is dependent on its storage resources.

In developing the supply capabilities for the 2010 RUWMP, Metropolitan assumed a simulated median storage level going into each of five-year increments based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher than the assumption used, and a 50 percent probability that storage levels would be lower than the assumption used. All storage capability figures shown in the 2010 RUWMP reflect actual storage program conveyance constraints. It is important to note that under some conditions, Metropolitan may choose to implement the WSAP in order to preserve storage reserves for a future year, instead of using the full supply capability. This can result in impacts at the retail level even under conditions where there may be adequate supply capabilities to meet demands.

Table 2-9
Single Dry-Year
Supply Capability[1] and Projected Demands
Repeat of 1977 Hydrology
(acre-feet per year)

Forecast Year	2015	2020	2025	2030	2035
Current Programs					
In-Region Storage and Programs	685,000	931,000	1,076,000	964,000	830,000
California Aqueduct[2]	522,000	601,000	651,000	609,000	610,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	1,416,000	1,824,000	1,669,000	1,419,000	1,419,000
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Capability of Current Programs	**2,457,000**	**2,782,000**	**2,977,000**	**2,823,000**	**2,690,000**
Demands					
Firm Demands of Metropolitan	1,991,000	1,889,000	1,921,000	1,974,000	2,039,000
IID-SDCWA Transfers and Canal Linings	180,000	273,000	280,000	280,000	280,000
Total Demands on Metropolitan[5]	**2,171,000**	**2,162,000**	**2,201,000**	**2,254,000**	**2,319,000**
Surplus	**286,000**	**620,000**	**776,000**	**569,000**	**371,000**
Programs Under Development					
In-Region Storage and Programs	206,000	306,000	336,000	336,000	336,000
California Aqueduct	556,000	556,000	700,000	700,000	700,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	187,000	187,000	187,000	182,000	182,000
Aqueduct Capacity Limit[4]	*0*	*0*	*0*	*0*	*0*
Colorado River Aqueduct Capability	0	0	0	0	0
Capability of Proposed Programs	**762,000**	**862,000**	**1,036,000**	**1,036,000**	**1,036,000**
Potential Surplus	**1,048,000**	**1,482,000**	**1,812,000**	**1,605,000**	**1,407,000**

[1] Represents Supply Capability for resource programs under listed year type.

[2] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.

[3] Colorado River Aqueduct includes water management programs, IID-SDCWA transfers and canal linings conveyed by the aqueduct.

[4] Maximum CRA deliveries limited to 1.25 MAF including IID-SDCWA transfers and canal linings.

[5] Firm demands are adjusted to include IID-SDCWA transfers and canal linings. These supplies are calculated as local supply, but need to be shown for the purposes of CRA capacity limit calculations without double counting.

Table 2-10
Multiple Dry-Year
Supply Capability[1] and Projected Demands
Repeat of 1990-1992 Hydrology
(acre-feet per year)

Forecast Year	2015	2020	2025	2030	2035
Current Programs					
In-Region Storage and Programs	246,000	373,000	435,000	398,000	353,000
California Aqueduct[2]	752,000	794,000	835,000	811,000	812,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	1,318,000	1,600,000	1,417,000	1,416,000	1,416,000
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Capability of Current Programs	**2,248,000**	**2,417,000**	**2,520,000**	**2,459,000**	**2,415,000**
Demands					
Firm Demands of Metropolitan	2,056,000	1,947,000	2,003,000	2,059,000	2,119,000
IID-SDCWA Transfers and Canal Linings	180,000	241,000	280,000	280,000	280,000
Total Demands on Metropolitan[5]	**2,236,000**	**2,188,000**	**2,283,000**	**2,339,000**	**2,399,000**
Surplus	**12,000**	**229,000**	**237,000**	**120,000**	**16,000**
Programs Under Development					
In-Region Storage and Programs	162,000	280,000	314,000	336,000	336,000
California Aqueduct	242,000	273,000	419,000	419,000	419,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	187,000	187,000	187,000	182,000	182,000
Aqueduct Capacity Limit[4]	*0*	*0*	*0*	*0*	*0*
Colorado River Aqueduct Capability	0	0	0	0	0
Capability of Proposed Programs	**404,000**	**553,000**	**733,000**	**755,000**	**755,000**
Potential Surplus	**416,000**	**782,000**	**970,000**	**875,000**	**771,000**

[1] Represents Supply Capability for resource programs under listed year type.

[2] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.

[3] Colorado River Aqueduct includes water management programs, IID-SDCWA transfers and canal linings conveyed by the aqueduct.

[4] Maximum CRA deliveries limited to 1.25 MAF including IID-SDCWA transfers and canal linings.

[5] Firm demands are adjusted to include IID-SDCWA transfers and canal linings. These supplies are calculated as local supply, but need to be shown for the purposes of CRA capacity limit calculations without double counting.

Table 2-11
AverageYear
Supply Capability[1] and Projected Demands
Average of 1922-2004 Hydrologies
(acre-feet per year)

Forecast Year	2015	2020	2025	2030	2035
Current Programs					
In-Region Storage and Programs	685,000	931,000	1,076,000	964,000	830,000
California Aqueduct[2]	1,550,000	1,629,000	1,763,000	1,733,000	1,734,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	1,507,000	1,529,000	1,472,000	1,432,000	1,429,000
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Capability of Current Programs	**3,485,000**	**3,810,000**	**4,089,000**	**3,947,000**	**3,814,000**
Demands					
Firm Demands of Metropolitan	1,826,000	1,660,000	1,705,000	1,769,000	1,826,000
IID-SDCWA Transfers and Canal Linings	180,000	273,000	280,000	280,000	280,000
Total Demands on Metropolitan[5]	**2,006,000**	**1,933,000**	**1,985,000**	**2,049,000**	**2,106,000**
Surplus	**1,479,000**	**1,877,000**	**2,104,000**	**1,898,000**	**1,708,000**
Programs Under Development					
In-Region Storage and Programs	206,000	306,000	336,000	336,000	336,000
California Aqueduct	382,000	383,000	715,000	715,000	715,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	187,000	187,000	187,000	182,000	182,000
Aqueduct Capacity Limit[4]	*0*	*0*	*0*	*0*	*0*
Colorado River Aqueduct Capability	0	0	0	0	0
Capability of Proposed Programs	**588,000**	**689,000**	**1,051,000**	**1,051,000**	**1,051,000**
Potential Surplus	**2,067,000**	**2,566,000**	**3,155,000**	**2,949,000**	**2,759,000**

[1] Represents Supply Capability for resource programs under listed year type.

[2] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.

[3] Colorado River Aqueduct includes water management programs, IID-SDCWA transfers and canal linings conveyed by the aqueduct.

[4] Maximum CRA deliveries limited to 1.25 MAF including IID-SDCWA transfers and canal linings.

[5] Firm demands are adjusted to include IID-SDCWA transfers and canal linings. These supplies are calculated as local supply, but need to be shown for the purposes of CRA capacity limit calculations without double counting.

2.4 Water Shortage Contingency Analysis

In addition to the Water Supply Reliability analysis addressing average year and drought conditions, the Act requires agencies to document the stages of actions that it would undertake in response to water supply shortages, including up to a 50 percent reduction in its water supplies. Metropolitan has captured this planning in its Water Surplus and Drought Management Plan (WSDM Plan) which guides Metropolitan's planning and operations during both shortage and surplus conditions. Furthermore, Metropolitan developed the WSAP which provides a standardized methodology for allocating supplies during times of shortage.

Water Surplus and Drought Management Plan

In April 1999, Metropolitan's Board adopted the Water Surplus and Drought Management Plan (WSDM Plan) [3], included in Appendix A.4. It provides policy guidance for managing regional water supplies to achieve the reliability goals of the IRP and identifies the expected sequence of resource management actions that Metropolitan will execute during surpluses and shortages to minimize the probability of severe shortages and reduce the possibility of extreme shortages and shortage allocations. Unlike Metropolitan's previous shortage management plans, the WSDM Plan recognizes the link between surpluses and shortages, and it integrates planned operational actions with respect to both conditions.

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 between Metropolitan and member agency staff. The result of the planning effort is a consensus plan that addresses a broad range of regional water management actions and strategies.

WSDM Plan Principles and Goals

The guiding principle of the WSDM plan is to manage Metropolitan's water resources and management programs to maximize management of wet year supplies and minimize adverse impacts of water shortages to retail customers. From this guiding principle came 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 WSDM plan also declared that if mandatory import water allocations become necessary, they 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 go into 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

WSDM Plan Implementation

Each year, Metropolitan evaluates the level of supplies available and existing levels of water in storage to determine the appropriate management stage. Each stage is associated with specific resource

[3] Metropolitan Water District of Southern California. *Water Surplus and Drought Management Plan,* Report No. 1150, August, 1999.

management actions designed to (1) avoid an Extreme Shortage to the maximum extent possible and (2) minimize adverse impacts to retail customers if an Extreme Shortage occurs. The current sequencing outlined in the WSDM Plan reflects anticipated responses based on detailed modeling of Metropolitan's existing and expected resource mix.

Surplus Stages

Metropolitan's supply situation is considered to be in surplus as long as net annual deliveries can be made to water storage programs. The WSDM Plan further defines five surplus management stages that guide the storage of surplus supplies in Metropolitan's storage portfolio. Deliveries for storage in the DVL and in the SWP terminal reservoirs continue through each surplus stage provided there is available storage capacity. Withdrawals from DVL 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.

Shortage Stages

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

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 also defines 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. Thus, a ten 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.

When Metropolitan must make net withdrawals from storage to meet demands, it is considered to be in a shortage condition. Under most of these stages, it is still able to meet all end-use demands for water. For shortage stages 1 through 4, Metropolitan will meet demands by withdrawing water from storage. At shortage stages 5 through 7, Metropolitan may undertake additional shortage management steps, including issuing public calls for extraordinary conservation, considering curtailment of Interim Agricultural Water Program deliveries in accordance with their discounted rates, exercising water transfer options, or purchasing water on the open market.

Figure 2-2 shows the actions under surplus and shortage stages when an allocation plan would be necessary to enforce mandatory cutbacks. The overriding goal of the WSDM Plan is to never reach Shortage Stage 7, an Extreme Shortage.

At shortage stage 7 Metropolitan will implement its Water Supply Allocation Plan[4] (WSAP) to allocate available supply fairly and efficiently to full-service customers.

Water Supply Allocation Plan

In February 2008 Metropolitan's Board adopted the WSAP. The WSAP includes the specific formula for calculating member agency supply allocations and the key implementation elements needed for administering an allocation.

The WSAP was developed in consideration of the principles and guidelines described in the

[4] Metropolitan Water District of Southern California, Water Supply Allocation Plan, June 2009.

WSDM Plan, with the objective of creating an equitable needs-based allocation. The WSAP formula seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level for shortages of Metropolitan supplies of up to 50 percent. The formula takes into account growth, local investments, changes in supply conditions and the demand hardening aspects of non-potable recycled water use and the implementation of conservation savings programs.

Water Supply Allocation Plan Development

Between July 2007 and February 2008, Metropolitan staff worked jointly with Metropolitan's member agencies to develop the WSAP. Throughout the development process Metropolitan's Board was provided with regular progress reports on the status of the WSAP The WSAP was adopted at the February 12, 2008 Board meeting.

The WSAP Formula

The WSAP formula is calculated in three steps: base period calculations, allocation year calculations, and supply allocation calculations. The first two steps involve standard computations, while the third step contains specific methodology developed for the WSAP.

Step 1: Base Period Calculations

The first step in calculating a water supply allocation is to estimate water supply and demand using a historical base period with established water supply and delivery data. The base period for each of the different categories of demand and supply is calculated using data from the three most recent non-shortage years, 2004-2006.

Step 2: Allocation Year Calculations

The next step in calculating the water supply allocation is estimating water needs in the allocation year. This is done by adjusting the base period estimates of retail demand for population or economic growth and changes in local supplies.

Step 3: Supply Allocation Calculations

The final step is calculating the water supply allocation for each member agency based on the allocation year water needs identified in Step 2. Each element and its application in the allocation formula is discussed in detail in Metropolitan's Water Supply Allocation Plan.[5]

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 demand 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 Board, and for making resource allocation decisions. Table 2-12 shows this schedule.

[5] Metropolitan Water District of Southern California, Water Supply Allocation Plan, June 2009.

Figure 2-2 Resource Stages, Anticipated Actions, And Supply Declarations

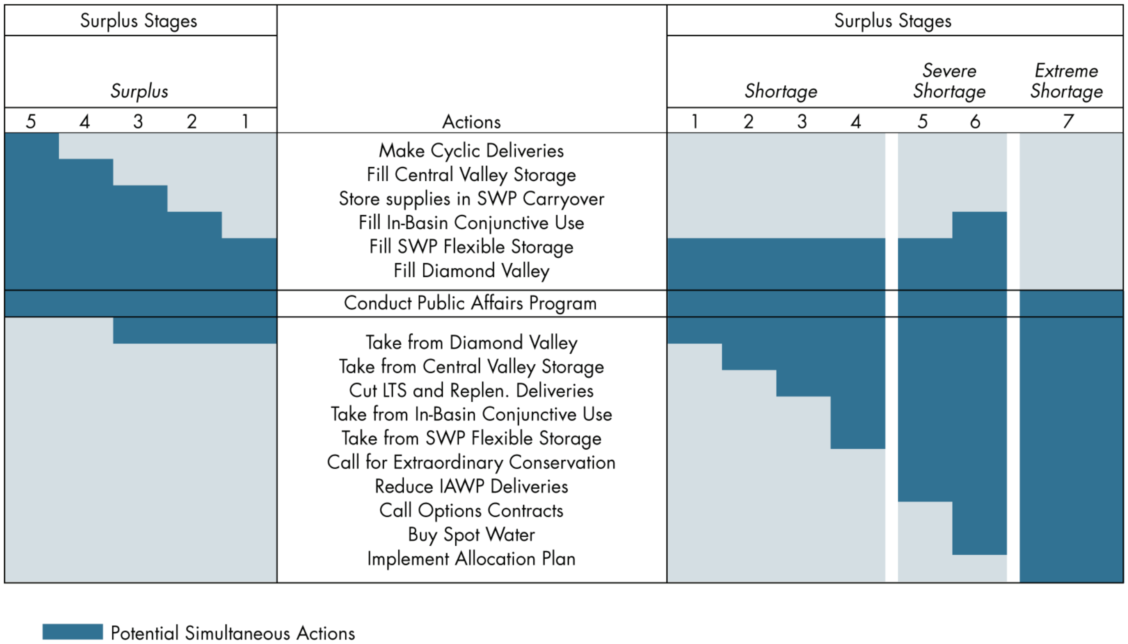

Table 2-12
Schedule of Reporting and Resource Allocation Decision-Making

Month	Information Report/Management Decision
January	Initial supply/demand forecasts for year
February - March	Update supply/demand forecasts for year
April - May	Finalize supply/demand forecasts Management decisions re: Contractual Groundwater and Option Transfer Programs Board decision re: Need for Extraordinary Conservation
October - December	Report on Supply and Carryover Storage
October	Management decisions re: Delivery Interruptions for the Replenishment and Interim Agricultural Water Programs

2.5 Catastrophic Supply Interruption Planning

The third type of planning needed to evaluate supply reliability is a catastrophic supply interruption plan that documents the actions necessary for a catastrophic interruption in water supplies. For Metropolitan this planning is captured in the analysis that went into developing the Emergency Storage Requirements.

Emergency Storage Requirements

Metropolitan established its criteria for determining emergency storage requirements in the October 1991 Final Environmental Impact Report for the Eastside Reservoir, which is now named Diamond Valley Lake. These criteria were again discussed in the 1996 IRP. Metropolitan's Board has approved both of these documents.

Emergency storage requirements are based on the potential of a major earthquake damaging the aqueducts that transport Southern California's imported water supplies (SWP, CRA, and Los Angeles Aqueduct). The adopted criteria assume that damage from such an event could render the aqueducts out of service for six months. Therefore, Metropolitan has based its planning on a 100 percent reduction in its supplies for a period of six months, which is a greater shortage than required by the Act.

To safeguard the region from catastrophic loss of water supply, Metropolitan has made substantial investments in emergency storage. The emergency plan outlines that under such a catastrophe, non-firm service deliveries would be suspended, and firm supplies to member agencies would be restricted by a mandatory cutback of 25 percent from normal-year demand levels. At the same time, water stored in surface reservoirs and groundwater basins under Metropolitan's interruptible program would be made available, and Metropolitan would draw on its emergency storage, as well as other available storage. Metropolitan has reserved up to half of DVL storage to meet such an emergency, while the remainder is available for dry-year and seasonal supplies. In addition, Metropolitan has access to emergency storage at its other reservoirs, at the SWP terminal reservoirs, and in its groundwater conjunctive use storage accounts. 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 the catastrophe.

Electrical Outages

Metropolitan has also developed contingency plans that enable it to deal with both planned and unplanned electrical outages. These plans include the following key points:

- In event of power outages, water supply can be maintained by gravity feed from regional reservoirs such as DVL, Lake Mathews, Castaic Lake and Silverwood Lake.
- Maintaining water treatment operations is a key concern. As a result, all Metropolitan treatment plants have backup generation sufficient to continue operating in event of supply failure on the main electrical grid.
- Valves at Lake Skinner can be operated by the backup generation at the Lake Skinner treatment plant.
- Metropolitan owns mobile generators that can be transported quickly to key locations if necessary.

2.6 Other Supply Reliability Risks

Metropolitan provides water to a broad and heterogeneous service area with water supplies from a variety of sources and geographic regions. Each of these demand areas and supplies has its own unique set of benefits and challenges. Among the challenges Metropolitan faces are the following:

Supplies

- The region and Colorado River Basin have been experiencing drought conditions for multiple years.
- Endangered species protections and conveyance needs in the Sacramento-San Joaquin River Delta System have resulted in operational constraints particularly important because pumping restrictions impact many water resource programs – SWP supplies and additional voluntary transfers, Central Valley storage and transfers, in-region groundwater storage and in-region surface water storage.
- Changing climate patterns are predicted to shift precipitation patterns and possibly affect water supply.
- Difficulty and implications of environmental review, documentation, and permitting for multi-year transfer agreements, recycled water projects and seawater desalination plants.
- Public perception of recycled water use for replenishment.

Operations and Water Quality

- The cost and use of energy and greenhouse gas emissions.
- Water quality regulations and issues like the quagga mussels within the Colorado River Aqueduct. Controlling the spread and impacts of the quagga mussels will require more extensive maintenance and reduced operational flexibility.
- Salt and concentrate balance from variety of sources.

Demand

- Uncertain population and economic growth
- Uncertain location of growth
- Uncertain housing stock and density

The challenges posed by continued population growth, environmental constraints on the reliability of imported supplies, and new uncertainties imposed by climate change demand that Metropolitan assert the same level of leadership and commitment to taking on large-scale regional solutions to providing water supply reliability. New solutions are available in the form of dramatically improved water-use efficiency, indirect potable use of recycled water, and large-scale application of ocean desalinization.

Climate Change

Climate change adds its own new uncertainties to the challenges of planning. Metropolitan's water supply planning has been fortunate in having almost one-hundred years of hydrological data regarding weather and water supply. This history of rainfall data has provided a sound foundation for forecasting both the frequency and the severity of future drought conditions, as well as the frequency and abundance of above-normal rainfall. But, weather patterns can be expected to shift dramatically and unpredictably in a climate driven by increased concentrations of carbon dioxide in the atmosphere, as experienced in Australia. These changes in weather significantly affect water supply planning, irrespective of the debate associated with the sources and cause of increasing concentrations of greenhouse gasses. As a major steward of the region's water supply resources, Metropolitan is committed to performing its due diligence with respect to climate change.

Potential Impacts

While uncertainties remain regarding the exact timing, magnitude, and regional impacts of these temperature and precipitation changes, researchers have identified several areas of concern for California water planners. These include:

- Reduction in Sierra Nevada snowpack;
- Increased intensity and frequency of extreme weather events; and
- Rising sea levels resulting in
  - Increased risk of damage from storms, high-tide events, and the erosion of levees; and
  - Potential pumping cutbacks on the SWP and Central Valley Project (CVP).

Other important issues of concern due to global climate change include:

- Effects on local supplies such as groundwater;
- Changes in urban and agricultural demand levels and patterns ;
- Impacts to human health from water-borne pathogens and water quality degradation;
- Declines in ecosystem health and function; and
- Alterations to power generation and pumping regimes.

Metropolitan's Activities Related to Climate Change Concerns

An extended Colorado River drought put climate change on Metropolitan's radar screen in the mid-1990s. In 2000, Metropolitan's Board received a briefing on the potential impacts of climate change on water supply by leading experts in the field. Metropolitan then hosted a California Water Plan meeting on climate change and a held Drought Preparedness Workshop on similar issues. In March 2002, the Board adopted policy principles on global climate change as related to water resource planning. The Principles stated in part that 'Metropolitan supports further research into the potential water resource and quality effects of global climate change, and supports flexible "no regret" solutions that provide water supply and quality benefits while increasing the ability to manage future climate change impacts.'

<u>Knowledge Sharing and Research Support</u>
Metropolitan is an active and founding member of the Water Utility Climate Alliance (WUCA). WUCA consists of ten nationwide water providers collaborating on climate change adaptation and green house gas mitigation issues. As a part of this effort, WUCA pursues a variety of activities on multiple fronts.

WUCA monitors development of climate change-related research, technology, programs and federal legislation. Activities to date include such things as:

- Letter of support for Western Water Assessment's continued funding as a Regional Integrated Sciences and Assessments team under the National Oceanic and Atmospheric Administration (NOAA)
- Letter of support for the 2009 Kerry-Boxer Water Utilities Mitigation and Adaptation Partnerships congressional bill addendum
- Regular communication and consultations with federal agencies on the U.S. Environmental Protection Agency's Climate Ready Water Utility Working Group
- NOAA Climate Service and January 2010 International Climate Change Forum

In addition to supporting federal and regional efforts, WUCA released a white paper entitled "Options for Improving Climate Modeling to Assist Water Utility Planning for Climate Change" in January 2010. The purpose of this paper was to assess Global Circulation Models, identify key aspects for water utility planning and make seven initial recommendations for how climate modeling and downscaling techniques can be improved so that these tools and techniques can be more useful for the water sector.

In order to address water provider-specific needs, WUCA has focused not only on climate change science and Global Circulation Models, but on how best to incorporate that knowledge into water planning. This was explored more thoroughly in a second January 2010 white paper on decision support methods for incorporating climate change uncertainty into water planning. This paper assessed five known decision support approaches for applicability in incorporating Climate Change uncertainty in water utility planning and identified additional research needs in the area of decision support methodologies.

In addition to these efforts, the member agencies of WUCA annually share individual agency actions to mitigate greenhouse gas emissions to facilitate further implementation of these programs. At a September 2009 summit at the Aspen Global Change Institute WUCA, members met with global climate modelers, along with federal agencies, academic scientists, and climate researchers to establish collaborative directions to progress climate science and modeling efforts. WUCA continues to pursue these opportunities and partnerships with water providers, climate scientists, federal agencies, research centers, academia and key stakeholders.

Metropolitan also continues to pursue knowledge sharing and research support activities outside of WUCA. Metropolitan regularly provides input and direction on California legislation related to climate change issues. Metropolitan is active in collaborating with other state and federal agencies, as well as non-governmental organizations on climate change related planning issues. The following list provides a sampling of entities that Metropolitan has recently worked with on a collaborative basis:

- U.S. Bureau of Reclamation
- U.S. Army Corps of Engineers
- American Water Works Association Research Foundation
- National Center for Atmospheric Research
- California Energy Commission
- California Department of Water Resources

Quantification of Current Research

Metropolitan continues to incorporate current climate change science into its planning efforts. A major component of the current IRP update effort is to explicitly reflect uncertainty in Metropolitan's future water management environment. This involves evaluating a wider range of water management strategies, and seeking robust and adaptive plans that respond to uncertain conditions as they evolve over time, and that ultimately will perform adequately under a wide range of future conditions. The potential impacts and risks associated with climate change, as well as other major uncertainties and vulnerabilities, will be incorporated into the update and accounted. Overall, Metropolitan's planning activities strive to support the Board adopted policy principles on climate change by:

- Supporting reasonable, economically viable, and technologically feasible management strategies for reducing impacts on water supply
- Supporting flexible "no regret" solutions that provide water supply and quality benefits while increasing the ability to manage future climate change impacts, and

- Evaluating staff recommendations regarding climate change and water resources against the California Environmental Quality Act (CEQA) to avoid adverse effects on the environment.

Implementation of Programs and Policies
Metropolitan has made great efforts to implement greenhouse gas mitigation programs and policies for its facilities and operations. To date, these programs and policies have focused on:

- Exploring water supply/energy relationships and opportunities to increase efficiencies;
- Joining the California Climate Action Registry;
- Acquiring "green" fleet vehicles, and supporting an employee Rideshare program;
- Developing solar power at the Skinner water treatment plant; and
- Identifying and pursuing development of "green" renewable water and energy programs that support the efficient and sustainable use of water.

Metropolitan also continues to be a leader in efforts to increase regional water use efficiency. Metropolitan has worked to increase the availability of incentives for local conservation and recycling projects, as well as supporting conservation Best Management Practices for industry and commercial businesses.

2.7 Pricing and Rate Structures

Revenue Management

A high proportion of Metropolitan's revenues come from volumetric water rates; during the last five fiscal years through 2008-09, water sales revenues were approximately 75 percent of Metropolitan's total revenues. As a result, Metropolitan's revenues vary according to regional weather and the availability of statewide water supplies. In dry years, local demands increase and Metropolitan may receive higher than anticipated revenues due to increased sales volumes. In contrast, in wet years demands decrease, and revenues drop due to lower sales volumes. In addition, statewide supply shortages such as those in 1991 and 2009 also affect Metropolitan's revenues. Such revenue surpluses and shortages could cause instability in water rates. To mitigate this risk, Metropolitan maintains financial reserves, with a minimum and maximum balance, to stabilize water rates during times of reduced water sales. The reserves hold revenues collected during times of high water sales and are used to offset the need for revenues during times of low sales.

Another way to mitigate rate increases is by generating a larger portion of revenues from fixed sources. Metropolitan currently has two fixed charges, the Readiness-to-Serve Charge and the Capacity Charge. Metropolitan also collects tax revenue from taxable property within its boundaries. For the last five fiscal years the revenues from fixed charges generated almost 18 percent of all Metropolitan revenues. RTS revenues have been increasing gradually, from $80 million in 2007, to $114 million in 2010, $125 million in 2011, and $146 million in 2012.

Finally, Metropolitan generates a significant amount of revenue from interest income, hydroelectric power sales, and miscellaneous income such as rents and leases. For the last five fiscal years, these averaged almost 7 percent of all Metropolitan revenues. These internally generated revenues are referred to as revenue offsets and reduce the amount of revenue that has to be collected from rates and charges.

Elements of Rate Structure

This section provides an overview of Metropolitan's rate structure. The different elements of the rate structure are discussed below and summarized in Table 2-13.

System Access Rate (SAR)

The SAR is a volumetric system-wide rate levied on each acre-foot of water that moves through the Metropolitan system. All system users (member agency or third party) pay the SAR to use Metropolitan's conveyance and distribution system. The SAR recovers the cost of providing conveyance and distribution capacity to meet average annual demands.

Water Stewardship Rate (WSR)

The WSR recovers the costs of providing financial incentives for existing and future investments in local resources including conservation and recycled water. These investments or incentive payments are identified as the "demand management" service function in the cost of service process. The WSR is a volumetric rate levied on each acre-foot of water that moves through the Metropolitan system.

System Power Rate (SPR)

The SPR recovers the costs of energy required to pump water to Southern California through the SWP and Colorado River Aqueduct. The cost of power is recovered through a uniform volumetric rate. The SPR is applied to all deliveries to member agencies.

Treatment Surcharge

The treatment surcharge recovers the costs of providing treated water service through a uniform, volumetric rate. The treatment surcharge recovers all costs associated with providing treated water service, including commodity, demand and standby related costs.

Capacity Charge

The capacity charge is levied on the maximum summer day demand placed on the system between May 1 and September 30 for a three-calendar year period. Demands measured for the purposes of billing the capacity charge include all firm demand and agricultural demand, including wheeling service and exchanges. Replenishment service is not included in the measurement of peak day demand for purposes of billing the capacity charge.

The capacity charge is intended to pay for the cost of peaking capacity on Metropolitan's system, while providing an incentive for local agencies to decrease their use of the Metropolitan system to meet peak day demands and to shift demands into lower use time periods. Over time, a member agency will benefit from local supply investments and operational strategies that reduce its peak day demand on the system in the form of a lower total capacity charge.

Readiness-To-Serve Charge (RTS)

The costs of providing standby service, including emergency storage and those standby costs related to the conveyance and aqueduct system, are recovered by the RTS.

The RTS is allocated to the member agencies based on each agency's proportional share of a ten-year rolling average of all firm deliveries (including water transfers and exchanges that use Metropolitan system capacity). The ten-year rolling average does not include replenishment service and interim agricultural deliveries because these deliveries will be the first to be curtailed in the event of an emergency. A ten-year rolling average leads to a relatively stable RTS allocation that reasonably represents an agency's potential long-term need for standby service under different demand conditions. Member agencies may choose to have a portion of their total RTS obligation offset by standby charge collections levied by Metropolitan on behalf of the member agency. These standby charges are assessed on parcels of land within the boundaries of a given member agency.

Tier 1 Supply Rate

The costs of maintaining existing supplies and developing additional supplies are recovered through a two-tiered pricing approach. The Tier 1 Supply Rate recovers the majority of the supply costs and reflects the cost of existing supplies. Each member agency has a predetermined amount of water that can be purchased at the lower Tier 1 Supply Rate in a calendar year. Purchases in excess of this limit will be made at the higher Tier 2 Supply Rate.

The Tier 1 Supply rate includes a Delta Supply Surcharge of $69 per AF in 2010, $51 per AF in 2011 and $58 per AF in 2012. This surcharge reflects the impact on Metropolitan's water supply rates due to lower deliveries from the SWP as a result of pumping restrictions designed to protect endangered fish species. The Delta Supply Surcharge will remain in effect until a long-term solution for the delta was achieved or until interim facility improvements restore SWP yield.

Tier 2 Supply Rate

The Tier 2 Supply Rate reflects Metropolitan's cost of developing long-term firm supplies. The Tier 2 Supply Rate recovers a greater proportion of the cost of developing additional supplies from member agencies that have increasing demands on the Metropolitan system.

Replenishment Program and Agricultural Water Program

Metropolitan currently administers two pricing programs that make surplus system supplies (system supplies in excess of what is needed to meet consumptive municipal and industrial demands) available to the member agencies at a discounted water rate. The Replenishment Program provides supplies, when available, for the purpose of replenishing local storage. The Interim Agricultural Water Program (IAWP) makes surplus water available for agricultural purposes. In October 2008, the Board approved a phase out of the IAWP by 2013. Because of the critically dry conditions and uncertainty about future supply, discounted replenishment deliveries have been curtailed for the past three years. If water supply conditions improve and surplus water becomes available, Metropolitan could make Replenishment service available to its member agencies at discounted rates, subject to meeting Metropolitan's storage objectives to meet full service demands.

Table 2-13
Rate Structure Components

Rate Design Elements	Service Provided/ Costs Recovered	Type of Charge
System Access Rate	Conveyance/Distribution (Average Capacity)	Volumetric ($/AF)
Water Stewardship Rate	Conservation/Local Resources	Volumetric ($/AF)
System Power Rate	Power	Volumetric ($/AF)
Treatment Surcharge	Treatment	Volumetric ($/AF)
Capacity Charge	Peak Distribution Capacity	Fixed/Volumetric ($/cfs)
Readiness-To-Serve Charge	Conveyance/Distribution/Emergency Storage(Standby Capacity)	Fixed ($Million)
Tier 1 Supply Rate	Supply	Volumetric/Fixed ($/AF)
Tier 2 Supply Rate	Supply	Volumetric ($/AF)
Surplus Water Rates	Replenishment/Agriculture	Volumetric ($/AF)

The following tables provide further information regarding Metropolitan's rates. Table 2-14 summarizes the rates and charges effective January 1, 2010, January 1, 2011, and January 1, 2012. Average costs by member agency will vary depending upon an agency's RTS allocation, Capacity Charge and relative proportions of treated and untreated Tier 1, Tier 2, replenishment, and agricultural water purchases. Table 2-15 provides the details of the Capacity Charge, calculated for calendar year 2011.

Table 2-16 provides the details of the Readiness-to-Serve Charge calculation for calendar year 2011 broken down by member agency. Table 2-17 provides the current Purchase Order commitment quantities that member agencies will purchase from Metropolitan over the 10-year period starting January 2003 through December 2012. Tier 1 limits for each member agency are also shown in this table.

Table 2-14
Metropolitan Water Rates and Charges

Effective	Jan 1, 2010	Jan 1, 2011	Jan 1, 2012
Tier 1 Supply Rate ($/AF)	$101	$104	$106
Delta Supply Surcharge ($/AF)	$69	$51	$58
Tier 2 Supply Rate ($/AF)	$280	$280	$290
System Access Rate ($/AF)	$154	$204	$217
Water Stewardship Rate ($/AF)	$41	$41	$43
System Power Rate ($/AF)	$119	$127	$136
Full Service Untreated Volumetric Cost ($/AF)			
Tier 1	$484	$527	$560
Tier 2	$594	$652	$686
Replenishment Water Rate Untreated ($/AF)	$366	$409	$442
Interim Agricultural Water Program Untreated ($/AF)	$416	$482	$537
Treatment Surcharge ($/AF)	$217	$217	$234
Full Service Treated Volumetric Cost ($/AF)			
Tier 1	$701	$744	$794
Tier 2	$811	$869	$920
Treated Replenishment Water Rate ($/AF)	$558	$601	$651
Treated Interim Agricultural Water Program ($/AF)	$615	$687	$765
Readiness-to-Serve Charge ($M)	$114	$125	$146
Capacity Charge ($/cfs)	$7,200	$7,200	$7,400

Table 2-15
Capacity Charge Detail

Agency	Peak Day Demand (cfs) (May 1 through September 30) Calendar Year 2007	2008	2009	3-Year Peak	Calendar Year 2011 Capacity Charge ($7,200/cfs)
Anaheim	37.9	36.1	40.7	40.7	$ 293,040
Beverly Hills	33.9	32.9	31.0	33.9	244,080
Burbank	33.7	34.2	21.6	34.2	246,240
Calleguas	260.8	250.0	192.8	260.8	1,877,760
Central Basin	125.9	102.7	94.7	125.9	906,480
Compton	7.1	4.9	5.9	7.1	51,120
Eastern	303.0	263.1	227.8	303.0	2,181,600
Foothill	25.4	21.5	24.3	25.4	182,880
Fullerton	36.9	27.1	37.4	37.4	269,280
Glendale	54.6	55.7	56.0	56.0	403,200
Inland Empire	176.2	125.8	106.1	176.2	1,268,640
Las Virgenes	45.3	45.3	42.7	45.3	326,160
Long Beach	61.3	68.1	67.2	68.1	490,320
Los Angeles	768.5	821.9	698.2	821.9	5,917,680
MWDOC	469.2	453.7	489.5	489.5	3,524,400
Pasadena	58.5	55.6	50.2	58.5	$421,200
San Diego [1]	1278.4	1039.9	1055.3	1278.4	9,204,480
San Fernando	6.5	0.1	0.0	6.5	$46,800
San Marino	5.2	5.2	3.5	5.2	$37,440
Santa Ana	29.7	14.5	16.4	29.7	213,840
Santa Monica	27.6	26.2	25.0	27.6	198,720
Three Valleys	171.4	168.1	132.7	171.4	1,234,080
Torrance	41.6	35.5	39.3	41.6	299,520
Upper San Gabriel	63.8	36.9	27.6	63.8	459,360
West Basin	262.3	243.3	221.3	262.3	1,888,560
Western	289.1	271.4	219.9	289.1	2,081,520
Total	**4,673.8**	**4,239.7**	**3,927.1**	**4,759.5**	**$ 34,268,400**

Totals may not foot due to rounding

Table 2-16
Readiness-to-Serve Charge (by Member Agency)
Calendar Year 2011 RTS charge

Member Agency	Rolling Ten-Year Average Firm Deliveries (Acre-Feet) FY1999/00 - FY2008/09	RTS Share	12 months @ $125 million per year (1/11-12/11)
Anaheim	20,966	1.11%	$ 1,382,122
Beverly Hills	12,737	0.67%	839,692
Burbank	12,908	0.68%	850,938
Calleguas MWD	113,610	5.99%	7,489,554
Central Basin MWD	63,256	3.34%	4,170,058
Compton	3,146	0.17%	207,408
Eastern MWD	92,013	4.85%	6,065,789
Foothill MWD	11,570	0.61%	762,706
Fullerton	9,694	0.51%	639,087
Glendale	24,150	1.27%	1,592,015
Inland Empire Utilities Agency	61,205	3.23%	4,034,823
Las Virgenes MWD	23,282	1.23%	1,534,813
Long Beach	36,970	1.95%	2,437,211
Los Angeles	314,757	16.60%	20,749,798
Municipal Water District of Orange County	231,692	12.22%	15,273,878
Pasadena	23,397	1.23%	1,542,428
San Diego County Water Authority	491,238	25.91%	32,384,010
San Fernando	119	0.01%	7,819
San Marino	1,001	0.05%	65,963
Santa Ana	12,743	0.67%	840,028
Santa Monica	12,794	0.67%	843,429
Three Valleys MWD	73,095	3.85%	4,818,678
Torrance	20,742	1.09%	1,367,401
Upper San Gabriel Valley MWD	15,631	0.82%	1,030,447
West Basin MWD	141,522	7.46%	9,329,606
Western MWD	71,906	3.79%	4,740,301
MWD Total	**1,896,143**	**100.00%**	**$ 125,000,000**

Totals may not foot due to rounding

Table 2-17
Purchase Order Commitments and Tier 1 Limits
(by Member Agency)

	2011 Tier 1 Limit with Opt-outs	Purchase Order Commitment (acre-feet)
Anaheim	22,240	148,268
Beverly Hills	13,380	89,202
Burbank	16,336	108,910
Calleguas	110,249	692,003
Central Basin	72,361	482,405
Compton	5,058	33,721
Eastern	87,740	504,664
Foothill	10,997	73,312
Fullerton	11,298	75,322
Glendale	26,221	174,809
Inland Empire	59,792	398,348
Las Virgenes	21,087	137,103
Long Beach	39,471	263,143
Los Angeles	304,970	2,033,132
MWDOC	228,130	1,486,161
Pasadena	21,180	141,197
San Diego	547,239	3,342,571
San Fernando	630	-
San Marino	1,199	-
Santa Ana	12,129	80,858
Santa Monica	11,515	74,062
Three Valleys	70,474	469,331
Torrance	20,967	139,780
Upper San Gabriel	16,512	110,077
West Basin	156,874	1,045,825
Western	69,720	391,791
Total	**1,957,768**	**12,495,995**

Totals may not foot due to rounding.

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Implementing the Plan

3

The result of the recent strategic review process reveals a broader view of Metropolitan's role in comprehensive planning and implementation for regional reliability. As Metropolitan continues to deal with current and emerging concerns on changing trends in climate, cost and use of energy, endangered species protections, and conveyance issues in the Sacramento-San Joaquin River Delta System , the need for a robust and flexible water supply planning and implementation that can quickly adapt to variations in future trends becomes evident. Metropolitan's current strategy of implementing an adaptive resource development plan for the future will provide the most benefit for the region. What emanates from this adaptive strategy is a Metropolitan that can adopt alternative roles, including that of an enhanced water importer, local supply funder, and project developer; and a Metropolitan that can respond to changing regional conditions that ultimately will perform efficiently under a wide range of possible future conditions.

This section summarizes Metropolitan's implementation plans and continued progress in developing a diversified resource mix that enables the region to meet its water supply needs. The investments that Metropolitan has made and its on-going efforts in many different areas coalesce toward its goal of long-term regional water supply reliability. Many of the resource programs discussed are already successfully implemented. Others, including institutional and facility changes in the Colorado River region and the SWP, will take more time to execute. Considerations are also in place for emerging integrated supplies, which could augment sources of regional water supply from non-traditional sources. In addition, water demand reductions brought about by legislative mandates could also affect the landscape of future supply planning and implementation. The following sections discuss each of these programs, presenting both successes to date and the programs that are still under way.

3.1 Colorado River Aqueduct

Metropolitan continues to pursue Colorado River Aqueduct (CRA) supplies of 1.2 MAF per year. However, over the years, a number of constraints have developed that restrict Metropolitan's access to Colorado River supplies. As a result, Metropolitan adopted a revised policy of utilizing the full capacity of the CRA when needed through the basic apportionment and various water banking and acquisition programs. This water will help Metropolitan manage regional storage conditions and water quality.

Metropolitan was established to obtain an allotment of Colorado River water, and its first mission was to construct and operate the CRA. Under its contracts with the federal government, Metropolitan has a basic entitlement of 550 TAF per year of Colorado River water. Metropolitan also holds a fifth priority for an additional 662 TAF per year that exceeds California's 4.4 MAF per year basic apportionment, and another 180 TAF per year when surplus flows are available. Metropolitan can obtain water under the fifth priority from:

- Water unused by the California holders of priorities 1 through 3
- Water saved by the Palo Verde land management, crop rotation, and water supply program, or
- When the U.S. Secretary of the Interior makes available either or both:
  - Surplus water, and
  - Water apportioned to, but unused by, Arizona and/or Nevada.

Background

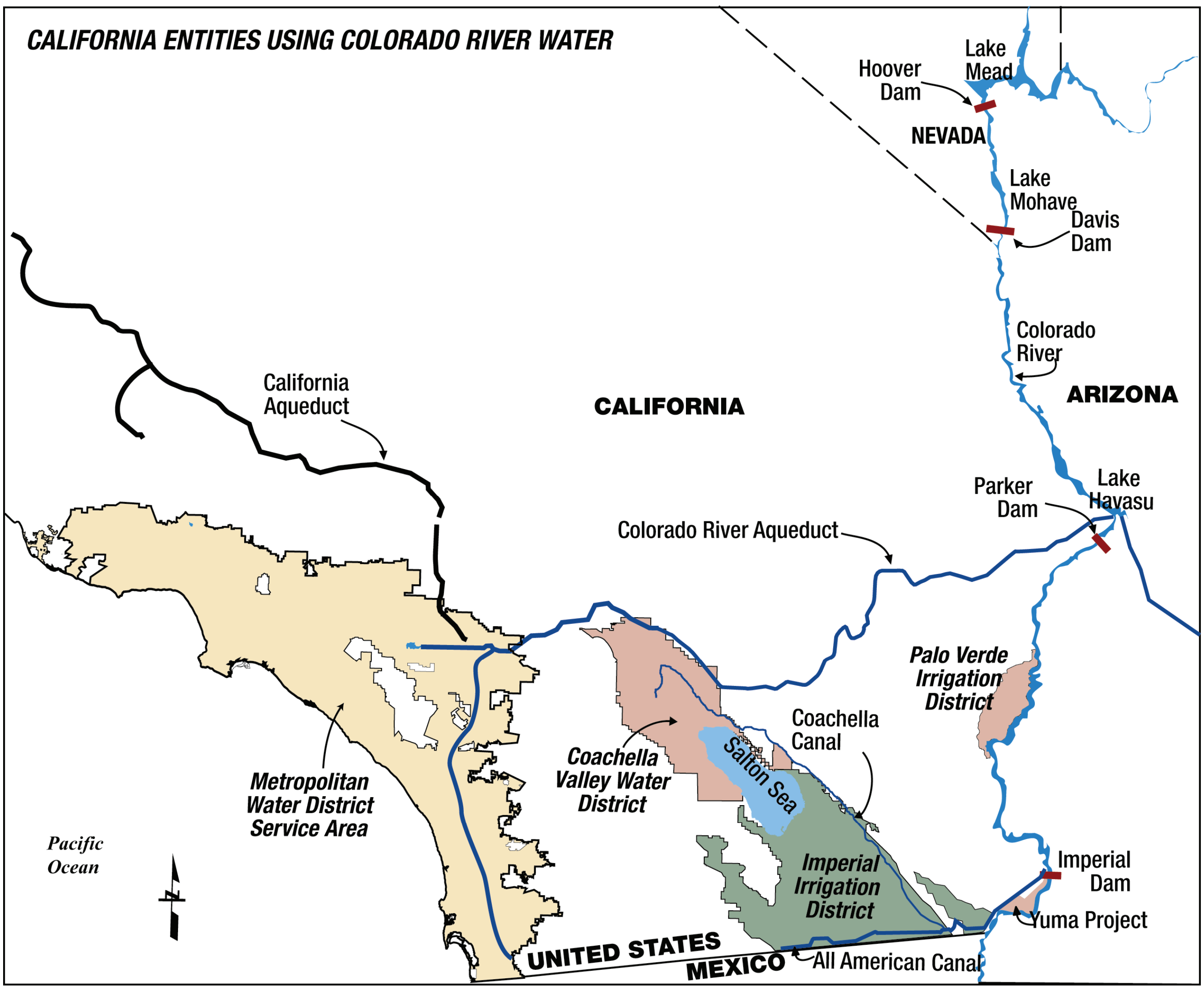
To satisfy a condition imposed by Congress in the Boulder Canyon Project Act, California's legislature enacted the Limitation Act in 1929 agreeing to limit consumptive use of Colorado River water to 4.4 MAF per year, plus not more than one-half of any excess or surplus waters unapportioned by the Colorado River Compact. The 1931 Seven Party Agreement provides the basis for the priorities among California's contractors to use of Colorado River water made available to California. Palo Verde Irrigation District (PVID), the Yuma Project (Reservation Division), Imperial Irrigation District (IID), and Coachella Valley Water District (CVWD), collectively the "agricultural entities"), and Metropolitan are the entities that currently hold the priorities. These priorities are included in the contracts that the Department of the Interior executed with the California agencies in the 1930s for delivery of water from Lake Mead. The first four priorities total the 4.4 MAF per year available to California. Metropolitan has the fourth priority to California's basic apportionment and the fifth priority to 662 TAF per year. Under Priorities 1 through 3, an amount not to exceed 3.85 MAF was apportioned to the agricultural entities for beneficial consumptive use. The Seven Party Agreement did not specify individual quantities for each of the first three priorities; rather, the amount of water available under the third priority was limited to the amount unused by the holders of priorities 1 and 2 on designated areas of land. This lack of quantification among the agricultural priorities posed an obstacle to the acquisition of water from the agricultural entities for use in Metropolitan's service area.

The Consolidated Decree of the U.S. Supreme Court in Arizona v. California, preceded by a 1964 decree, confirmed the allocation of 4.4 MAF per year to California. This limit reduced Metropolitan's dependable supply of Colorado River water to its fourth priority amount of 550 TAF per year. For a period following the Court's ruling, Metropolitan's fifth priority rights were satisfied with water allocated to Arizona and Nevada which they did not use. With the commencement of Colorado River water deliveries to the Central Arizona Project in 1985, the availability of Colorado River water to meet Metropolitan's Consolidated Decree, preceded by a 1979 decree, also quantifies present perfected rights (PPRs) to the use of Colorado River water by certain Indian reservations, federal wildlife refuges, and other users. Since 1985, these PPR holders have used less than 20 TAF annually. Some but not all of these PPR's are encompassed by the Seven Party Agreement. Consumptive use under these non-encompassed PPRs, known as "Miscellaneous and Indian PPRs," could reach as much as 61 TAF annually. Because over 5.362 MAF of Colorado River water were already allocated by California's Seven Party Agreement, it was not clear which rights would be affected by the use of these non-encompassed PPRs.

At that time, no formal guidelines existed to determine whether surplus water would be available. Decisions regarding surplus water availability were to be made at the discretion of the Secretary of the Interior. As a result, the year-to-year availability of Colorado River water to Metropolitan was uncertain beginning in 1985.

Figure 3-1 shows the major aqueducts within southern California including those from the Colorado River, and the entities within the state having rights to the use of more than 5.362 MAF of water from the Colorado River.

Figure 3-1



Changed Conditions

Metropolitan and the State of California acknowledged that Metropolitan would obtain less water from the Colorado River in the future than Metropolitan had in the past, but the lack of clearly quantified water rights hindered efforts to promote water management projects. The Secretary of the Interior asserted that California's users of Colorado River water had to limit their use to a total of 4.4 MAF per year, plus any available surplus water. Under the auspices of the state's Colorado River Board, these users developed a draft plan to resolve the problem, which was known as "California's Colorado River Water Use Plan" or the "California Plan." It characterized how California would develop a combination of programs to allow the state to limit its annual use of Colorado River water to 4.4 MAF per year plus any available surplus water. The 2003 Quantification Settlement Agreement (QSA) among IID, CVWD and Metropolitan is a critical component of the California Plan. It establishes the baseline water use for each of the agencies and facilitates the transfer of water from agricultural agencies to urban uses, and specifies that IID, CVWD, and Metropolitan would forbear use of water to permit the Secretary of the Interior to satisfy the uses of the non-encompassed PPRs.

On November 5, 2003, IID filed a validation action in Imperial County Superior Court, seeking a judicial determination that thirteen agreements associated with the IID/SDCWA water transfer and the QSA are valid, legal and binding. Other lawsuits also were filed challenging the execution, approval and subsequent implementation of the QSA on various grounds. All of the QSA cases were coordinated in Sacramento County Superior Court. After a number of pleading challenges, appeal of rulings dismissing one Imperial County case and dismissing portions of another, and pretrial rulings, the first phase of trial began on November 9, 2009, and concluded on December 2, 2009. One of the key issues was the constitutionality of the QSA Joint Powers Authority Agreement, pursuant to which IID, CVWD, and SDCWA agreed to commit $133 million toward certain mitigation costs associated with implementation of the transfer of 300 TAF of water conserved by IID pursuant to the QSA, and the State agreed to be responsible for any mitigation costs exceeding this amount. A final judgment was issued on February 11, 2010, holding that the State's commitment was unconditional in nature and, as such, violated the State's debt limitation under the California Constitution, and that eleven other agreements, including the QSA, also are invalid because they are inextricably interrelated with the QSA Joint Powers Authority Agreement and the funding mechanism it established to cover such mitigation costs. The court also ruled that all other claims raised by the parties, including CEQA claims related to the QSA Programmatic EIR and the IID Transfer Project EIR, are moot.

Metropolitan, CVWD and SDCWA have filed appeals of the court's decision, which will stay the ruling pending outcome of the appeal. If the ruling stands, it could delay the implementation of programs authorized under the QSA or result in increased costs or other adverse impacts. The impact, if any, that the ruling might have on Metropolitan's water supplies cannot be adequately determined at this time.

Runoff in the Colorado River Basin above Lake Powell from 2000 through 2007 was the lowest eight-year runoff on record bringing Colorado River system storage down to 50 percent of capacity. Runoff returned to near normal during 2008 through 2010 but the system storage remained slightly above 50 percent of capacity.

SDCWA is participating in two projects that are providing additional water supplies to that agency.[1] These projects are resulting in increased amounts of Colorado River water

[1] These projects, the San Diego County Water Authority/Imperial Irrigation District transfer and the Coachella and All-American canal lining projects will be discussed in that Authority's Urban Water Management Plan.

being diverted into the CRA. In exchange, Metropolitan is delivering an amount of water equal to the amount conserved for SDCWA. Federal law allocates a portion of the water available as a result of the Coachella and All-American Canal lining projects for the benefit of parties, including five Indian Bands, involved in litigation over water rights to the San Luis Rey River in San Diego County once certain conditions have been satisfied. Metropolitan has agreed to exchange that water and provide an equal amount of water to the United States for use by the San Luis Rey Settlement Parties, and SDCWA has agreed to convey the water when capacity is available for use within the Settlement Parties' service areas. As the Settlement Parties had not satisfied the conditions required to receive the benefit of those supplies through 2009, Metropolitan has utilized this water. The remainder of the water available as a result of the canal lining projects is exchanged with SDCWA and decreases San Diego's demands on Metropolitan water supplies.

In 2005, Metropolitan entered into a settlement agreement in *Arizona v. California* with the Quechan Indian Tribe and other parties. The Tribe uses Colorado River water on the Fort Yuma Indian Reservation. Under the settlement agreement, the Tribe, in addition to the amounts of water decreed for the benefit of the Reservation in the 1964 decree, is entitled to (a) an additional 20,000 acre-feet of diversions from the Colorado River or (b) the amount necessary to supply the consumptive use required for irrigation of a specified number of acres, and for the satisfaction of related uses, whichever is less. Of the additional water, 13,000 acre-feet became available to the Tribe in 2006. An additional 7,000 acre-feet becomes available to the Tribe in 2035. Metropolitan and the Tribe agreed that if the Tribe chooses to limit proposed development and utilization of their farm lands, which would require the diversion of any of the additional water in a year, and instead allows the water which would otherwise be used to be diverted by Metropolitan, Metropolitan provides an incentive payment to the Tribe to avoid or reduce a loss of supply.

Implementation Approach

Metropolitan's planning strategy recognized explicitly that program development would play an important part in reaching the target level of deliveries from the CRA. The implementation approach explored a number of water conservation programs with water agencies that received water from the Colorado River or were located in close proximity to the CRA. Negotiating the QSA was a necessary first step for all of these programs. On October 10, 2003, after lengthy negotiations, representatives from Metropolitan, IID, and CVWD executed the QSA and other related agreements. Parties involved also included the SDCWA, the California Department of Water Resources (DWR), the California Department of Fish and Game, the U.S. Department of the Interior, and the San Luis Rey Settlement Parties. One of those related agreements was the Colorado River Water Delivery Agreement: Federal Quantification Settlement Agreement which specifies to which agencies water will be delivered under priorities 3a and 6a of the Seven Party Agreement during its term.

Metropolitan has identified a number of programs that could be used to achieve the regional long-term development targets for the CRA, as shown in Table 3-1. Metropolitan has entered into or is exploring agreements with a number of agencies as described in this section. In addition, Appendix A.3 provides a detailed discussion of these programs and describes whether the programs are being implemented, are deferred, or under investigation. In developing these supply capabilities, Metropolitan assumed a simulated median storage level going into year 2030 based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher and a 50 percent probability that storage levels would be lower than the assumption used. In addition, the storage capability used in this evaluation reflects actual storage program conveyance constraints.

Colorado River Water Management Programs

Imperial Irrigation District / Metropolitan Water District Conservation Program

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. Under this program, IID implemented a number of structural and non-structural measures, including the lining of existing earthen 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, and drip irrigation systems. Through this program, Metropolitan obtained an additional 105 TAF per year, on average upon completion of program implementation. Execution of the QSA and amendments to the 1988 and 1989 agreements resulted in changes in the availability of water under the program, extending the term to 2078 if the term of the QSA extends through 2077 and guaranteeing Metropolitan at least 85 TAF per year. The remainder of the conserved water is available to CVWD.

Palo Verde Land Management, Crop Rotation, and Water Supply Program

In May 2004, Metropolitan's Board authorized a 35-year land management, crop rotation, and water supply program with PVID. Under the program, participating farmers in PVID are paid to reduce their water use by not irrigating a portion of their land. A maximum of 29 percent of the lands within the Palo Verde Valley can be fallowed in any given year. Under the terms of the QSA, water savings within the PVID service area are made available to Metropolitan. This program provides up to 133 TAF of water to be available to Metropolitan in certain years, and a minimum of 33 TAF per year. In 2005, 2006, 2007, 2008, and 2009 approximately 108.7, 105.0, 72.3, 94.3, and 120.2 TAF of water, respectively, were saved and made available to Metropolitan. In March 2009, Metropolitan and PVID entered into a one-year supplemental fallowing program within PVID that provides for the fallowing of additional acreage, with savings projected to be as much as 62 TAF. Of that total, 24.1 TAF of water was saved in 2009, with the balance to be made available in 2010.

Southern Nevada Water Authority and Metropolitan Storage and Interstate Release Agreement

Southern Nevada Water Authority (SNWA) has undertaken extraordinary water conservation measures to maintain its consumptive use within Nevada's basic apportionment of 300 TAF. The success of the conservation program has resulted in unused basic apportionment for Nevada. As SNWA expressed interest in storing a portion of the water with Metropolitan, the agencies along with the United States and the Colorado River Commission of Nevada entered into a storage and interstate release agreement in October 2004. Under the agreement, additional Colorado River water supplies are made available to Metropolitan when there is space available in the CRA to receive the water. Metropolitan has received 70 TAF through 2009. SNWA may call on Metropolitan to reduce its Colorado River water order to return this water no earlier than 2019, unless Metropolitan agrees otherwise.

Lower Colorado Water Supply Project

In March 2007, Metropolitan, the City of Needles, and the USBR executed a Lower Colorado Water Supply Project contract. Under the contract, Metropolitan receives, on an annual basis, Lower Colorado Water Supply Project water unused by Needles and other entities with no rights or insufficient rights to use of Colorado River water in California, the beneficiaries of the project. A portion of the payments made by Metropolitan to Needles are placed in a trust fund for potentially acquiring a new water supply for Needles and other users of the Project should the groundwater pumped from the project's wells become too saline for use. In 2009, Metropolitan received 2.3 TAF from this project.

Lake Mead Storage Program

In May 2006, Metropolitan and the USBR executed an agreement for a demonstration program that allowed Metropolitan to leave conserved water in Lake Mead that Metropolitan would otherwise have used in 2006 and 2007. USBR would normally make unused water available to other Colorado River water users, so the program included a provision that water left in Lake Mead must be conserved through extraordinary conservation measures and not simply be water that was not needed by Metropolitan in the year it was stored. This extraordinary conservation was accomplished through savings realized under the Palo Verde Land Management, Crop Rotation, and Water Supply Program. Through the two-year demonstration program, Metropolitan created 44.8 TAF of "Intentionally Created Surplus" (ICS) water. In December 2007, Metropolitan entered into agreements to set forth the rules under which ICS water is developed, and stored in and delivered from Lake Mead. The amount of water stored in Lake Mead, created through extraordinary conservation, that is available for delivery in a subsequent year is reduced by a one-time deduction of five percent, resulting in additional system water in storage in the lake, and an annual evaporation loss, beginning in the year following the year the water is stored. Metropolitan created 55.8 TAF of ICS water through the Palo Verde Land Management, Crop Rotation, and Water Supply Program in 2009. As of January 1, 2010, Metropolitan had a total of 79.8 TAF of Extraordinary Conservation ICS water in Lake Mead.

The December 2007 federal guidelines concerning the operation of the Colorado River system reservoirs provided the ability for agencies to create "System Efficiency ICS" through the development and funding of system efficiency projects that save water that would otherwise be lost from the Colorado River. To that end, in 2008 the Central Arizona Water Conservation District (CAWCD), SNWA, and Metropolitan contributed funds for the construction of the Drop 2 Reservoir by the USBR. The purpose of the Drop 2 Reservoir is to increase the capacity to regulate deliveries of Colorado River water at Imperial Dam reducing the amount of excess flow downstream of the dam by approximately 70 TAF annually. In return for its $28.7 million contribution toward construction[2], 100 TAF of water that remains stored in Lake Mead was assigned to Metropolitan as System Efficiency ICS. As of January 1, 2010, Metropolitan had 66 TAF of System Efficiency ICS water in Lake Mead.

In 2009, Metropolitan entered into an agreement with the United States, SNWA, the Colorado River Commission of Nevada, and CAWCD to have USBR conduct a one-year pilot operation of the Yuma Desalting Plant at one-third capacity. The pilot operation began in May 2010 and is providing data for future decision making regarding long-term operation of the Plant and developing a near-term water supply. Metropolitan's contribution toward plant operating costs is expected to secure 23.2 TAF of System Efficiency ICS by 2011.

Hayfield Groundwater Storage Program

The Hayfield Groundwater Storage Program will allow CRA water to be stored in the Hayfield Groundwater Basin in east Riverside County (about 50 miles east of Palm Springs) for future withdrawal and delivery to the CRA. In June 2000, the Metropolitan Board approved the implementation of the Hayfield program and authorized storage of 800 TAF of

[2] As of April 2010, $1.6 million is being returned to Metropolitan as construction costs are lower than estimated.

CRA supplies when available. As of 2003, there were over 70 TAF in storage. At that time, construction of facilities for extracting the stored water began, but it was then deferred because drought conditions in the Colorado River watershed resulted in a lack of surplus supplies for storage. A prototype well was completed in August 2009. Hydrogeologic investigations indicate that conversion of the prototype well into a production well could extract as much as 5 TAF per year of previously stored water. When water supplies become more plentiful, Metropolitan may pursue this program and develop storage capacity of about 400 TAF.

Achievements to Date

Metropolitan recognizes that in the short-term, programs are not yet in place to provide the full targeted amount, even with the programs adopted under the QSA and the opportunities to store conserved water in Lake Mead. The December 2007 federal guidelines concerning the operation of the Colorado River system reservoirs provide more certainty to Metropolitan with respect to the determination of a shortage, normal, or surplus condition for the operation of Lake Mead.

Table 3-1
Colorado River Aqueduct
Program Capabilities
Year 2030
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Basic Apportionment – Priority 4	550,000	550,000	550,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	0	0	13,000
PVID Land Management, Crop Rotation, and Water Supply Program	133,000	133,000	133,000
Lower Colorado Water Supply Project	5,000	5,000	5,000
Lake Mead Storage Program	400,000	400,000	400,000
Quechan Settlement Agreement Supply	7,000	7,000	7,000
Forbearance for Present Perfected Rights	(47,000)	(47,000)	(47,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(77,000)	(60,000)	(155,000)
DWCV SWP Table A Transfer Callback	41,000	32,000	82,000
DWCV Advance Delivery Account	36,000	28,000	73,000
Drop 2 Reservoir Funding	22,000	25,000	25,000
SNWA Agreement	0	0	0
Expand SNWA Agreement	0	0	0
Subtotal of Current Programs	***1,120,000***	***1,123,000***	***1,136,000***
Programs Under Development			
Additional PVID Transfers (Crop Stressing/Fallowing)	62,000	62,000	62,000
Arizona Programs - CAP	50,000	50,000	50,000
California Indians / Other Ag	10,000	10,000	10,000
ICS Exchange	25,000	25,000	25,000
Agreements with CVWD	35,000	35,000	35,000
Hayfield Groundwater Extraction Project	0	0	0
Subtotal of Proposed Programs	***182,000***	***182,000***	***182,000***
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	200,000	200,000	200,000
Coachella & All-American Canal Lining			
To SDCWA	80,000	80,000	80,000
To San Luis Rey Settlement Parties1	16,000	16,000	16,000
Subtotal of Non-Metropolitan Supplies	***296,000***	***296,000***	***296,000***
Maximum CRA Supply Capability[2]	**1,598,000**	**1,601,000**	**1,614,000**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(348,000)*	*(351,000)*	*(364,000)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**
Less Non-Metropolitan Supplies[4]	*(296,000)*	*(296,000)*	*(296,000)*
Maximum Metropolitan Supply Capability[5]	**954,000**	**954,000**	**954,000**

[1] Subject to satisfaction of conditions specified in agreement among Metropolitan, the United States, and the San Luis Rey Settlement Parties
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The Colorado River Aqueduct delivery capacity is 1.250 MAF annually.
[4] Exchange obligation for the SDCWA-IID transfer and the Coachella and All American Canal Lining projects.
[5] The amount of CRA water available to Metropolitan after meeting its exchange obligations.

3.2 State Water Project

Much of the SWP water supply passes through the San Francisco-San Joaquin Bay-Delta (Bay-Delta). More than two-thirds of California's residents obtain some of their drinking water from the Bay-Delta system. For decades, the Bay-Delta has experienced water quality and supply reliability challenges and conflicts due to variable hydrology and environmental standards that limit pumping operations.

The SWP consists of a series of pump stations, reservoirs, aqueducts, tunnels, and power plants operated by DWR. Figure 3-2 shows SWP facilities. This statewide water supply infrastructure provides water to 29 urban and agricultural agencies throughout California. The original State Water Contract called for an ultimate delivery capacity of 4.2 MAF, with Metropolitan holding a contract for 1,911 TAF.

Prior to the 1994 Bay-Delta Accord, the reliability of SWP deliveries was deteriorating rapidly. Based on an analysis of the State Water Resources Control Board's (SWRCB) draft water rights decision 1630, Metropolitan estimated that by 2005 its SWP delivery would be reduced to 171 TAF – about 8.9 percent of its SWP contract – under hydrologic conditions comparable to 1977, the driest year on record for the SWP. The SWRCB subsequently withdrew draft water rights decision 1630, and the Bay-Delta Accord, through SWRCB water rights decision 1641, established new operating criteria for the SWP. Under these new criteria, DWR projects that in critically dry years, SWP delivery would be 418 TAF or about 22 percent of Metropolitan's SWP contractual amounts. Consequently, Metropolitan's key concern is the continual deterioration of water supply reliability.

Another important concern for Metropolitan is sustained improvement in SWP water quality. Metropolitan must be able to meet the increasingly stringent drinking water regulations that are expected for disinfection by-products and pathogens in order to protect public health. Meeting these regulations will require improving the Bay-Delta water supply by cost effectively combining alternative source waters, source improvement, and treatment facilities. Additionally, Metropolitan requires water quality improvements of Bay-Delta water supplies to meet its 500 mg/L salinity blending objective in a cost-effective manner, while minimizing resource losses and helping to ensure the viability of regional recycling and groundwater management programs.

Background

The listing of several fish species as threatened or endangered under the federal or California Endangered Species Acts (respectively, the "Federal ESA" and the "California ESA" and, collectively, the "ESAs") have adversely impacted operations and limited the flexibility of the SWP. An annual environmental water account established under the Bay-Delta Program as a means of meeting environmental flow requirements and export limitations has helped to mitigate these impacts. Currently, five species (the winter-run and spring-run Chinook salmon, Delta smelt, North American green sturgeon, and Central Valley steelhead) are listed under the ESAs. In addition, on June 25, 2009, the California Fish and Game Commission declared the longfin smelt a threatened species under the California ESA.

In 2004 and 2005, the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) issued biological opinions and incidental take statements that govern operations of the SWP and the CVP with respect to the Delta smelt, the winter-run and spring-run Chinook salmon, and the Central Valley steelhead. In July 2006, the USBR reinitiated consultation with the USFWS and NMFS with respect to the 2004 and 2005 biological opinions (with the addition of the North American green sturgeon, which was listed in April 2006) following the filing of legal challenges to those biological opinions and incidental take statements.

Figure 3-2
Current and Projected Facilities of the State Water Project

Litigation filed by several environmental interest groups alleged that the 2004 and 2005 biological opinions and incidental take statements inadequately analyzed impacts on listed species under the Federal ESA. On May 25, 2007, Federal District Judge Wanger issued a decision on summary judgment in *NRDC v. Kempthorne*, finding the USFWS biological opinion for Delta smelt to be invalid. On December 14, 2007, Judge Wanger issued his Interim Remedial Order requiring that the SWP and CVP operate according to certain specified criteria until a new biological opinion for the Delta smelt is issued. Under the Interim Remedial Order, SWP operations were constrained in the winter and spring of 2007-08 by prevailing conditions and the status of the Delta smelt. Export restrictions resulting from the Interim Remedial Order during the winter and spring of 2007-08 reduced SWP deliveries to Metropolitan by approximately 250 TAF, as water that otherwise could have been diverted for delivery through the California Aqueduct bypassed the SWP pumps.

The USFWS released a new biological opinion on the impacts of the SWP and CVP on Delta smelt on December 15, 2008. Metropolitan, The San Luis & Delta Mendota Water Authority, Westlands Water District, Kern County Water Agency, Coalition for a Sustainable Delta and State Water Contractors, a California nonprofit corporation formed by agencies contracting with DWR for water from the SWP (the "State Water Contractors"), the Family Farm Alliance and the Pacific Legal Foundation on behalf of several owners of small farms in California's Central Valley have filed separate lawsuits in federal district court challenging the biological opinion.

The federal court consolidated the six lawsuits challenging the Delta smelt biological opinion under the caption Delta Smelt Consolidated Cases.

On April 16, 2008, the court granted the plaintiffs' motion for summary judgment in *Pacific Coast Federation of Fishermen's Associations v. Gutierrez* and invalidated the 2004 NMFS's biological opinion for the salmon and other fish species that spawn in rivers flowing into the Bay-Delta. The NMFS released its new biological opinion for salmonid species on June 4, 2009. The salmonid species biological opinion contains additional restrictions on SWP and CVP operations. The NMFS calculated that these restrictions will reduce the amount of water the SWP and CVP combined will be able to export from the Bay-Delta by 5 to 7 percent, in addition to restriction due to biological opinion for Delta smelt. DWR estimated a 10 percent average water loss, expected to begin in 2010, under this biological opinion. Six lawsuits have been filed challenging the 2009 salmon biological opinion which the court has consolidated under the caption *Consolidated Salmon Cases.* The court held a multiple-day hearing on motions for preliminary injunction in both the *Delta Smelt Consolidated Cases* and the *Consolidated Salmon Cases. [Discussion to be updated for the Final RUWMP since ruling is expected by May 2010.]*

The impact on SWP deliveries attributable to the Delta smelt and salmonid species biological opinions combined is estimated to be 1.0 MAF in an average year, reducing SWP deliveries from approximately 3.3 MAF to approximately 2.3 MAF for the year under average hydrology.

In addition to the litigation under the Federal ESA, other environmental groups sued DWR on October 4, 2006 in the Superior Court of the State of California for Alameda County alleging that DWR was "taking" listed species without authorization under the California ESA. On April 18, 2007, the Alameda County Superior Court issued its Statement of Decision in this litigation (*Watershed Enforcers v. California Department of Water Resources*), which found that DWR was illegally "taking" listed fish through operation of the SWP export facilities. The Superior Court ordered DWR to "cease and desist from further operation" of those facilities within 60 days unless it obtains take authorization from the California Department of Fish and Game.

DWR appealed the Alameda County Superior Court's order on May 7, 2007. DWR applied for incidental take authorization for the Delta smelt and salmon under the California ESA, based on the consistency of the federal biological opinions with California ESA requirements ("Consistency Determinations"). The California Department of Fish & Game subsequently issued Consistency Determinations under the California ESA authorizing the incidental take of both Delta smelt and salmon. The State Water Contractors and Kern County Water Agency have filed suit in state court challenging the Consistency Determinations under the California ESA that have been issued for both Delta smelt and salmon.

The California Fish and Game Commission's issued its declaration of the longfin smelt as a threatened species on June 25, 2009. On February 23, 2009, in anticipation of the listing action, the California Department of Fish and Game issued a California ESA section 2081 incidental take permit to DWR authorizing the incidental take of longfin smelt by the SWP. This permit authorizes continued operation of the SWP under the conditions specified in the section 2081 permit. The State Water Contractors filed suit against the California Department of Fish and Game on March 25, 2009, alleging that the export restrictions imposed by the section 2081 permit have no reasonable relationship to any harm to longfin smelt caused by SWP operations, are arbitrary and capricious and are not supported by the best available science.

DWR has altered the operations of the SWP to accommodate species of fish listed under the ESAs. These changes in project operations have adversely affected SWP deliveries. Restrictions on Bay-Delta pumping under the Interim Remedial Order in *NRDC v. Kempthorne* reduced deliveries of SWP water to Metropolitan by approximately 250 TAF in 2008. Based on the Water Allocation Analysis released by DWR on March 22, 2010, which incorporated the Delta smelt biological opinion's effects on SWP operations, export restrictions could reduce deliveries to Metropolitan by 150 to 200 TAF for 2010 under median hydrologic conditions. DWR has reported that as of April 21, 2010, real time measurements indicate approximately 520,000 acre-feet have been lost to the SWP for calendar year 2010, of which nearly 240 TAF would have been made available to Metropolitan.

Operational constraints likely will continue until a long-term solution to the problems in the Bay-Delta is identified and implemented. The Delta Vision process, established by Governor Schwarzenegger, was aimed at identifying long-term solutions to the conflicts in the Bay-Delta, including natural resource, infrastructure, land use, and governance issues. In addition, State and federal resource agencies and various environmental and water user entities are currently engaged in the development of the Bay Delta Conservation Plan (BDCP), which is aimed at addressing ecosystem needs and securing long-term operating permits for the SWP.

Other issues, such as the recent decline of some fish populations in the Bay-Delta and surrounding regions and certain operational actions in the Bay-Delta, may significantly reduce Metropolitan's water supply from the Bay-Delta. SWP operational requirements may be further modified under new biological opinions for listed species under the Federal ESA or by the California Department of Fish and Game's issuance of incidental take authorizations under the California ESA. Biological opinions or incidental take authorizations under the Federal ESA and California ESA might further adversely affect SWP and CVP operations. Additionally, new litigation, listings of additional species or new regulatory requirements could further adversely affect SWP operations in the future by requiring additional export reductions, releases of additional water from storage or other operational changes impacting water supply operations. Metropolitan cannot predict the ultimate outcome of any of the litigation or regulatory processes described above but believes they could have an adverse impact on the operation of the SWP pumps, Metropolitan's SWP supplies and Metropolitan's water reserves.

Changed Conditions

In August 2008, DWR issued its 2007 biannual SWP Delivery Reliability Report (Reliability Report). In projecting SWP delivery reliability, DWR incorporated the court-ordered interim operating rules to protect Delta smelt. The Reliability Report identified three areas of reliability uncertainty including pelagic organism decline, climate change and sea level rise, and vulnerability of Delta levees for failure. DWR estimated that with current facilities and regulatory requirements, the SWP will deliver 3.0 MAF per year on average. SWP single dry year and wet year delivery capability was reported to be 0.243 TAF and 3.848 TAF, respectively. Under its contract Metropolitan may use 46 percent of this quantity.

In December 2009, DWR released a draft of the biannual update. The report shows that future SWP deliveries will be impacted by two significant factors. The first is the significant restrictions on SWP and CVP Delta pumping required by the biological opinions issued by the USFWS (December 2008) and NMFS (June 2009). The second is climate change, which is altering the hydrologic conditions in the State. The 2009 draft Reliability Report shows greater reductions in water deliveries on average when compared to the 2007 report. Over multiple-year dry periods, average annual Table A deliveries vary from 32% to 34% of the maximum Table A amount, while average annual deliveries over multiple-year wet periods range from 72 to 94 percent of the maximum Table A amount. Under future conditions, annual SWP Article 21 deliveries average 62 TAF, ranging from 1 TAF to 550 TAF over the 82-year simulation period.

In evaluating the supply outlook for the 2010 RUWMP, Metropolitan used the draft 2009 reliability report as this presents DWR's current estimate of the amount of SWP water deliveries for current (2009) conditions and conditions 20 years in the future.

Implementation Approach

Metropolitan's implementation approach for the SWP depends on the full use of the current State Water Contract provisions, including its basic contractual amounts, Article 21 interruptible supplies, and Turnback Pool supply provisions. In addition, it requires successful negotiation and implementation of a number of agreements, including the Sacramento Valley Water Management (Phase 8 Settlement) Agreement, and the BDCP. Each of these stakeholder processes or agreements involves substantial Metropolitan and member agency staff involvement to represent regional interests. Metropolitan is committed to working collaboratively with DWR, SWP contractors, and other stakeholders to ensure the success of these extended negotiations and programs.

SWP Reliability

This discussion provides details of the major actions Metropolitan is undertaking to improve SWP reliability. The BDCP is being prepared through a collaboration of state, federal, and local water agencies, state and federal fish agencies, environmental organizations, and other interested parties. These organizations have formed the BDCP Steering Committee. The plan will identify a set of water flow and habitat restoration actions that contribute to the recovery of endangered and sensitive species and their habitats in California's Bay-Delta. The goal of the BDCP is to provide for both species/habitat protection and improved reliability of water supplies.

In order to select the most appropriate elements of the final conservation plan, the BDCP will consider a range of options for accomplishing these goals using information developed as part of an environmental review process. Potential habitat restoration and water supply conveyance options included in the BDCP will be assessed through an Environmental Impact Report (EIR)/ Environmental Impact Statement (EIS). The BDCP planning process and the supporting EIR/EIS process is being funded by state and federal water contractors.

Lead agencies for the EIR/EIS are DWR, USBR, the USFWS, and NOAA's NMFS, in cooperation with the California Department of Fish and Game, the U.S. Environmental Protection Agency (USEPA), and the U.S. Army Corps of Engineers.

Metropolitan also has been working with Bay-Delta watershed users toward settlement on how all Bay-Delta water users would bear some of the responsibility of meeting flow requirements. In December 2002, all of the parties signed a settlement agreement known as "The Sacramento Valley Water Management Agreement" or "Phase 8 Settlement Agreement." The agreement resulted from the SWRCB Bay-Delta Water Rights Phase 8 proceedings. It includes work plans to develop and manage water resources to meet Sacramento Valley in-basin needs, environmental needs under the SWRCB's Water Quality Control Plan, and export supply needs for both water demands and water quality. The agreement specifies about 60 water supply and system improvement projects by 16 different entities in the Sacramento Valley. Its various conjunctive use projects will yield approximately 185 TAF per year in the Sacramento Valley, and approximately 55 TAF of this water would come to Metropolitan through its SWP allocation. The Agreement specifies a supply breakdown of 110 TAF (60 percent) to the SWP and 75 TAF (40 percent) to the CVP.

Based on the Sacramento Valley Management Agreement, potential annual and dry-year supply capabilities are projected to be 55 TAF in 2010, 55 TAF in 2015, and 110 TAF beyond 2015.

Monterey Amendment

The Monterey Amendment originated from disputes between the urban and agricultural SWP contractors over how contract supplies are to be allocated in times of shortage. In 1994, in settlement discussions in Monterey, the contractors and the DWR reached agreement to settle their disputes by amending certain provisions the long-term water supply contracts. These changes, known as the Monterey Amendment, altered the water allocation procedures such that both shortages and surpluses would be shared in the same manner for all contractors, eliminating the prior "agriculture first" shortage provision. In turn, the agricultural contractors agreed to permanently transfer 130 TAF to urban contractors and permanently retire 45 TAF of their contracted supply. The amendment facilitated several important water supply management practices including ground water banking, voluntary water marketing, and more flexible and efficient use of SWP facilities including borrowing from Castaic Lake and Lake Perris and use of carryover storage in San Luis Reservoir to enhance dry-year supplies. It also provided for the transfer of DWR land to the Kern County Water Agency for development of the Kern Water Bank. The Monterey Amendment was challenged in court and the original Environmental Impact Report (EIR) invalidated. Following a settlement, a new EIR was completed and the CEQA process concluded in May 2010. However, the project has been challenged again in a new round of lawsuits.

SWP Terminal Storage

Metropolitan has contractual rights to 65 TAF of flexible storage at Lake Perris (East Branch terminal reservoir) and 153.94 TAF of flexible storage at Castaic Lake (West Branch terminal reservoir). This storage provides Metropolitan with additional options for managing SWP deliveries to maximize yield from the project. Over multiple dry years it can provide Metropolitan with 73 TAF of additional supply. In a single dry year like 1977 it can provide up to 219 TAF of additional supply to Southern California.

Yuba Dry Year Water Purchase Program

In December 2007, Metropolitan entered into an agreement with DWR providing for Metropolitan's participation in the Yuba Dry Year Water Purchase Program between Yuba County Water Agency and DWR. This program provides for transfers of water from the Yuba County Water Agency during dry years through 2025.

Desert Water Agency/Coachella Valley WD SWP Table A Transfer

Under the transfer agreement, Metropolitan transferred 100 TAF of its SWP Table A contractual amount to Desert Water Agency/Coachella Valley Water District

(DWCV). Under the terms of the agreement, DWCV pays all SWP charges for this water, including capital costs associated with capacity in the California Aqueduct to transport this water to Perris Reservoir as well as the associated variable costs. The amount of water actually delivered in any given year depends on that year's SWP allocation. Water is delivered through the existing exchange agreements between Metropolitan and DWCV. While Metropolitan transferred 100 TAF of its Table A amount, it retained other rights, including interruptible water service; its full carryover amounts in San Luis Reservoir; its full use of flexible storage in Castaic and Perris Reservoirs; and any rate management credits associated with the 100 TAF. In addition, Metropolitan is able to recall the SWP transfer water in years in which Metropolitan determines it needs the water to meet its water management goals. The main benefit of the agreement is to reduce Metropolitan's SWP fixed costs in wetter years when there are more than sufficient supplies to meet Metropolitan's water management goals, while at the same time preserving its dry-year SWP supply. In a single critically dry-year like 1977 the call-back provision of the entitlement transfer can provide Metropolitan about 5 TAF of SWP supply. In multiple dry years like 1990-1992 it can provide Metropolitan about 26 TAF of SWP supply.

<u>Desert Water Agency/Coachella Valley WD Advance Delivery Program</u>

Under this program, Metropolitan delivers Colorado River water to the Desert Water Agency and Coachella Valley WD in advance of the exchange for their SWP Contract Table A allocations. In addition to their Table A supplies, Desert Water Agency and Coachella Valley WD, subject to Metropolitan's written consent, may take delivery of SWP supplies available under Article 21, the Turn-back Pool Program. By delivering enough water in advance to cover Metropolitan's exchange obligations, Metropolitan is able to receive Desert Water Agency and Coachella Valley WD's available SWP supplies in years in which Metropolitan's supplies are insufficient without having to deliver an equivalent amount of Colorado River water. This program allows Metropolitan to maximize delivery of SWP and Colorado River water in such years. These Table A deliveries are incorporated into the estimate of SWP Deliveries under Current Programs shown in Table 3-2.[1]

<u>Desert Water Agency/Coachella Valley WD Other SWP deliveries</u>

Since 2008, Metropolitan has provided Desert Water Agency and Coachella Valley WD written consent to take delivery from the SWP facilities non-SWP supplies separately acquired by each agency. These deliveries include water acquired from the Yuba Dry Year Water Purchase Program and the 2009 Drought Water Bank. Metropolitan has also consented to,

- 10 TAF of exchange deliveries to CVWD for non-SWP water acquired from the San Joaquin Valley from 2008 through 2010, and
- 36 TAF of exchange deliveries to DWA for non-SWP water acquired from the San Joaquin Valley from 2008 through 2015.

Table 3-2 summarizes Metropolitan's SWP supply range for 2030. In developing the program capabilities shown in this table, Metropolitan assumed a simulated median storage level going into year 2030 based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher than the assumption used, and a 50 percent probability that storage levels would be lower than the assumption used. In addition, the supply capabilities shown reflect actual storage program conveyance constraints.

[1] 18 TAF out of a total of 509 TAF SWP annual delivery for a multiple dry-year event similar to the period 1990-1992 are due to the DWCV advance delivery provision. For a single-dry year similar to 1977, 6 TAF out of a total of 175 TAF are due to the advance delivery provision.

Table 3-2
California Aqueduct Program Capabilities
Year 2030
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
MWD Table A	469,000	107,000	1,026,000
DWCV Table A	77,000	60,000	155,000
San Luis Carryover [1]	69,000	208,000	208,000
Article 21 Supplies	0	0	52,000
Yuba River Accord Purchase	0	0	0
Subtotal of Current Programs	***615,000***	***375,000***	***1,441,000***
Programs Under Development			
Delta Improvements	341,000	628,000	605,000
IRP SWP Target [2]	0	0	0
Subtotal of Proposed Programs	***341,000***	***628,000***	***605,000***
Maximum Supply Capability	**956,000**	**1,003,000**	**2,046,000**

[1] Includes DWCV carryover.
[2] Remaining supply needed to meet IRP target.

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 one of Metropolitan's top priorities. Metropolitan also requires a SWP supply that is consistently low in salinity - Total Dissolved Solids (TDS) - so it can blend SWP water with higher-salinity Colorado River water to achieve salinity goals for its member agencies. In addition, Metropolitan needs consistently low-salinity SWP water to increase in-basin water recycling and groundwater management programs. These programs require that blended water supplied to the member agencies meets the TDS goals adopted by Metropolitan's Board, which specify a salinity objective of 500 mg/L for blended imported water.

Metropolitan is actively involved in DWR's Municipal Water Quality Investigations Program. The highly variable quality of State Water Project water influences the operation of Metropolitan's system and its water treatment process. Increasingly restrictive State and Federal drinking water standards, concerns over emerging contaminants such as personal care products and pharmaceuticals, algal taste and odors, and Delta ecosystem fisheries issues are critical variables. DWR's MWQI program strives to monitor, protect, and improve drinking water quality of Delta water deliveries to the urban State Water Contractors and other users of Delta water. The program focuses on issues related to drinking water quality through regular water quality monitoring, special field and laboratory studies, the use of forecasting tools such as computer models and data management systems, and reporting. While the program has developed extensive monitoring in the Delta including real-time monitoring, increased monitoring along the California Aqueduct is the next major step.

Levee modifications at Franks Tract and other source control actions may significantly reduce ocean salinity concentrations in Delta water, which would benefit Delta water users and export interests alike.

Franks Tract is an island located in the central Delta that was actively farmed until levee breaches in 1936 and 1938. Since 1938, the tract has remained a flooded island and its levees remain in disrepair. Tidal flows in the Delta entrap saline ocean water in the flooded tract, resulting in degraded water quality for both in-delta and export users. Recent computer modeling analyses by Metropolitan, DWR, and the US Geological Survey indicate that reducing this salinity intrusion by partially closing existing levee breach openings and/or building radial gate flow control structures will significantly reduce TDS and bromide[2] concentrations in water from the Delta during the summer and fall months and in drought years. Based on Metropolitan's analysis, improvements to Franks Tract alone could reduce peak bromide concentrations in the summer and fall months by about 33 percent at Contra Costa Water District's (CCWD) Rock Slough intake, by 27 percent at CCWD's Old River intake, and by 24 percent at the SWP intake in the South Delta.

DWR and USBR proposed to implement the Franks Tract Project to improve water quality and fisheries conditions in the Bay-Delta. DWR and USBR are evaluating installing operable gates to control the flow of water at key locations (Three mile Slough and/or West False River) to reduce sea water intrusion, and to positively influence movement of fish species of concern to areas that provide favorable habitat conditions. By protecting fish resources, this project also would improve operational reliability of the SWP and CVP because curtailments in water exports (pumping restrictions) are likely to be less frequent.

The state has adopted an "equivalent level of public health protection" (ELPH) program that targets water quality actions outside the Delta. The Bay-Delta Program is coordinating a feasibility study on water quality improvement in the California Aqueduct.

Metropolitan and the Friant Water Users Authority (FWUA) have entered into a partnership to investigate the potential of enhancing the quantity and affordability of the eastern San Joaquin Valley's water supply while improving Southern California's water quality. The FWUA and Metropolitan studied projects that benefited both regions. Using Proposition 13 funds, an existing canal belonging to the Arvin-Edison Water Storage District was enlarged, enabling greater volumes of water to be exchanged between their groundwater and the California Aqueduct.

SWP System Outage and Capacity Constraints

As its infrastructure ages, the SWP becomes increasingly vulnerable to natural disasters, particularly the Delta levee system and the California Aqueduct, which are both susceptible to floods and earthquakes. In June 2004, a levee in the Jones Tract of the Delta failed, resulting in total inundation of the island and disrupting SWP operations. Catastrophic loss of either the Delta levee system or the aqueduct would shut down the project, affecting the welfare of millions. While Metropolitan has made substantial investments in local resources and in-basin storage to insulate Southern California against loss of its imported water supplies, additional investment is needed in the at-risk infrastructure.

The Bay-Delta Levees Program coordinates Delta levee maintenance and improvement activities. Its goal is to protect water supplies needed for the environment, agriculture and urban uses by reducing the threat of levee failure and seawater intrusion. Over the next two to three years, DWR and other agencies will carry out a Comprehensive Program Evaluation (CPE). It will incorporate the risk study that has been commissioned by DWR, including the currently-proposed expanded scope of that study. The CPE will:
(a) supplement the DWR risk study to ensure

[2] The importance of bromides is discussed in the Water Quality chapter.

that it considers all relevant levee risks, (b) include the development of a formal strategic plan that contains a description of any proposed future program changes, and (c) recommend priorities and estimate funding needs for the Levees Program. For example, the Army Corps of Engineers (P.L. 84-99 ROD) target will be reevaluated as part of the CPE using information from the Risk Study.

The California Aqueduct remains susceptible to floods at several points as it travels from the Delta along the west side of the San Joaquin Valley. Key among these is where the aqueduct crosses the Arroyo Pasajero, an alluvial fan located near Coalinga, California. At that spot, the aqueduct effectively forms a barrier to Arroyo flood flows. Although flood control facilities were built to protect the aqueduct, the volumes of runoff and sediment deposition are much greater than originally estimated, so a significant flood risk remains. The aqueduct was severely damaged during March of 1995 when a flood overwhelmed control facilities and overtopped the aqueduct with 10 TAF of floodwater and an estimated 800,000 cubic yards of sediment. Impacts to downstream water users lasted through the summer of 1995. In December of 2004, DWR began construction of "Phase I" improvements to the aqueduct where it crosses the Arroyo. These improvements will increase the size of the detention basins west of the aqueduct to protect it against a 50-year storm event.

DWR is also investing in the replacement of aging SWP infrastructure critical to SWP operations. It is midway into its Turbine Rehabilitation Program at Oroville Reservoir's Hyatt-Thermalito complex. In 2004, DWR awarded a contract to replace four pumps at the Edmonston Pumping Plant. Moreover, improved maintenance procedures have decreased the amount of time pumps at Edmonston come off-line for maintenance to less than 10 percent of the time.

Because of the risk of a prolonged shutdown of the SWP caused by seismic or hydrologic events either within the Delta or along the California Aqueduct, Metropolitan has acted decisively to ensure that Southern California has adequate emergency storage. Diamond Valley Lake and SWP terminal reservoir storage, combined with member-agency emergency storage, are jointly capable of providing the region with a six-month supply of water if combined with a temporary 25 percent reduction in demand. Metropolitan engineering studies indicate this would provide sufficient time to repair the SWP and resume delivery.

Metropolitan is investigating the potential for carbon sequestration in the Delta islands to create a revenue source for Delta landowners. Farming the Delta peat soils generates a large amount of carbon dioxide, and growing native vegetation not only stops those emissions, but actually sequesters an even larger amount of carbon dioxide while rebuilding the peat soils. With the soils rebuilding to their historic elevations, the risk of levee failure would decrease, and may eventually be eliminated.

Achievements to Date

SWP Reliability

<u>Delta Vision</u>

The Delta has suffered from multiple crises for years – ecosystem, water supply, levee stability, water quality, policy, program and litigation. The ecosystem condition continues to deteriorate, with record-low reports of fish populations, Delta smelt and other species on the brink of extinction, and the commercial salmon season shut down completely for two years in a row. Continued drought conditions and court-ordered restrictions on water exports have led to reductions in water deliveries to contractors. Deteriorating levees, land subsidence, earthquake risk and climate change all contribute to growing concerns about mass Delta levee failure. Delta water quality also continues to decline, as the freshwater barrier that keeps salinity from the bay from moving upstream becomes more difficult to maintain, and both agricultural and urban communities contribute contaminants to the system. Finally, the litigation crisis grows as more than 25 lawsuits now stand on Delta-related issues.

Metropolitan's Long-Term Action Plan

Besides the short- and mid-term actions described earlier in Section 1.4, Metropolitan's adopted Delta action plan in June 2007 includes a long-term Delta Plan. The long-term action plan recognizes the need for a global, comprehensive approach to the fundamental issues and conflicts in the Delta to result in a truly sustainable Delta. A piecemeal approach cannot satisfy the many stakeholders that have an interest in the Delta and will fail; there must be a holistic approach that deals with all issues simultaneously. In dealing with the basic issues of the Delta, solutions must address the physical changes required, as well as the financing and governance. There are three basic elements that must be addressed: Delta ecosystem restoration, water supply conveyance, and flood control protection and storage development. In addition, the state needs to establish governance structures and financing approaches to implement and manage the three identified elements.

Governor's Delta Vision Process

Through this enduring Delta crisis, the Legislature and the Governor initiated, in 2006, a process to develop a new long-term vision for the Delta. SB 1574 (Kuehl/2006) required a cabinet committee to present recommendations for a Delta strategic vision. The governor created a Delta Vision Blue-Ribbon Task Force to advise the Cabinet Committee. The Task Force produced an October 2008 Strategic Plan, which the Cabinet Committee largely adopted and submitted, with its recommendations, to the Legislature on January 3, 2009. Metropolitan, as a stakeholder to the process, provided input to the Task Force.

The 2009 Delta Legislation

After delivery of the Delta Vision recommendations, the Legislature held informational hearings from Delta experts, Task Force members, and the Schwarzenegger Administration, as well as the public at large, and engaged in vigorous water policy discussions. Following the informational hearings, several legislators began developing detailed legislation which culminated in pre-print proposals being issued in early August of 2009 for public review and discussion over the summer recess. The Assembly Water, Parks and Wildlife Committee and the Senate Natural Resources and Water Committee then held joint informational hearings on the pre-print proposals and received extensive public comment. Thereafter, legislative leadership appointed a conference committee, which convened and held additional public hearings, with further legislator discussions on key issues. That work continued into the 7th Extraordinary Session, which was called by the governor specifically to address the pending Delta and water issues, and culminated in the signing of a historic package of bills. One of the keystones of that package was SB 1 X7, which reformed Delta policy and governance. Specifically, SB 1 X7:

- Establishes a new legal framework for Delta management, emphasizing the coequal goals of "providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem" as foundation for state decisions as to Delta management.
- Reconstitutes and redefines role of the Delta Protection Commission (DPC), to narrow membership to focus on local representation and to expand DPC role in economic sustainability.
- Creates a new Sacramento-San Joaquin Delta Conservancy (Conservancy), to support efforts that advance environmental protection and the economic well-being of Delta residents.

- Creates the Delta Stewardship Council (Council) as an independent state agency to guide actions in the Delta that furthers the coequal goals of Delta restoration and water supply reliability.
- Repeals the CALFED Bay-Delta Authority Act and transfers existing staff, contracts, etc. to the Council.
- Creates Delta Independent Science Board (Science Board) and Delta Science Program.
- Requires the State Water Resources Control Board (SWRCB), by August 12, 2010, to develop new flow criteria for the Delta ecosystem necessary to protect public trust resources.
- Requires the Department of Fish and Game (DFG), by December 31, 2010, to develop and recommend to the SWRCB flow criteria and quantifiable biological objectives for aquatic and terrestrial species.
- Creates a Delta Watermaster as the enforcement officer for SWRCB in the Delta.
- Requires the Council to develop, adopt, and commence implementation of the "Delta Plan" by January 1, 2012, with a report to the Legislature by March 31, 2012.
- Requires the DPC to develop a proposal to protect, enhance, and sustain the unique cultural, historical, recreational, agricultural, and economic values of the Delta as an evolving place.
- Requires Delta Plan to further the coequal goals of Delta ecosystem restoration and a reliable water supply.
- Requires the Delta Plan to promote statewide water conservation, water use efficiency, and sustainable use of water, as well as improvements to water conveyance/storage and operation of both to achieve the coequal goals.
- Requires the Delta Plan to attempt to reduce risks to people, property, and state interests in the Delta by promoting effective emergency preparedness, appropriate land uses, and strategic levee investments.
- Requires the Council to consider including the Bay Delta Conservation Plan (BDCP) in the Delta Plan and makes the BDCP eligible for state funding if:
  - The BDCP complies with Natural Community Conservation Planning Act (NCCPA).
  - The BDCP complies with the California Environmental Quality Act and includes a full range of alternatives, including a reasonable range of flow criteria, rates of diversion, and other operational criteria.
  - DWR consults with the Council and Science Board during development of the BDCP.
  - The BDCP incorporates a transparent, real-time operational decision making process in which the fishery agencies ensure that applicable biological performance measures are achieved in a timely manner.

SWP Water Quality

The most significant achievement for SWP water quality has been continued definition and advancement of the Delta Improvement Package. Most notably, the Franks Tract studies identified cost-effective ways to achieve significant improvements in the quality of Delta export water.

Progress was also made on the Southern California-San Joaquin Regional Water Quality Exchange Project. In 2009, Metropolitan and Arvin Edison Water Storage District enlarge their South Canal to enable exchanging more water between their groundwater basins and the California Aqueduct. Their relatively pure water allows Metropolitan to improve source water, and increase quantities, during times when quality and quantity are relatively poor. This project also allows MWD better access to water it has stored in the Arvin Edison Groundwater Storage Project.

SWP System Reliability

The completion and filling of Diamond Valley Lake marked the most important achievement with respect to protecting Southern California against an SWP system outage. Water began pouring into the reservoir in November 1999 and the lake was filled by early 2003. The lake can hold up to 810 TAF that provides Southern California with a six-month emergency water supply as well as carryover and regulatory storage.

<u>The Inland Feeder Project</u>

The Inland Feeder project is a high-capacity water delivery system designed to increase Southern California's water supply reliability in the face of future weather pattern uncertainties, while minimizing the impact on the San Francisco Bay/Sacramento-San Joaquin Delta environment in northern California. The massive water project will take advantage of large volumes of water when available from northern California, depositing it in surface storage reservoirs, such as Diamond Valley Lake, and local groundwater basins for use during dry periods and emergencies. The project also will improve the quality of the Southland's drinking water by allowing more uniform blending of better quality water from the state project with Colorado River supplies, which have a higher mineral content.

3.3 Central Valley/State Water Project Storage and Transfer Programs

Metropolitan endeavors to increase the reliability of supplies received from the California Aqueduct by developing flexible Central Valley storage and transfer programs. Over the years, Metropolitan has developed numerous voluntary Central Valley storage and transfer programs, aiming to develop additional dry-year water supplies.

To date, Metropolitan's Central Valley/SWP storage programs consist of partnerships with Central Valley agricultural districts. These partnerships allow Metropolitan to store its State Water Project (SWP) supplies during wetter years for return in future drier years. Metropolitan's Central Valley transfer programs include partnerships with Sacramento Valley Central Valley Project (CVP) and SWP settlement contractors. They allow Metropolitan to purchase water in drier years for delivery via the California Aqueduct to Metropolitan's service area.

Background

Before the 1994 Bay-Delta Accord, SWP delivery reliability was deteriorating rapidly. To gain a clearer picture of the extent of the deterioration, Metropolitan carried out an analysis based on the State Water Resources Control Board's (SWRCB) draft water rights decision 1630. This analysis showed that by 2005, if the hydrologic conditions were comparable to those of the driest year on record, 1977, Metropolitan's SWP delivery would be reduced to 171 TAF, which is only about 8.9 percent of its SWP contract entitlement.

The SWRCB later withdrew draft water rights decision 1630 and the Bay-Delta Accord established new operating criteria for the SWP. Metropolitan again analyzed these new criteria to estimate the potential water deliveries in critically dry years. Under these criteria, SWP deliveries to Metropolitan, not counting carryover storage, increased to 418 TAF, which is about 22 percent of its SWP contract entitlement. Metropolitan's Board determined that while the new criteria established by the Bay-Delta Accord represented an improvement in SWP reliability, they were not, of themselves, sufficient to meet Metropolitan's overall supply reliability objectives.

Moreover, DWR's most recent estimates of SWP delivery capability, which they released to SWP contractors in August 2008, show that SWP reliability under conditions similar to 1977 could be far worse than earlier modeling indicated. Based on these new DWR reliability projections, Metropolitan estimates that in a single-dry year similar to 1977, SWP deliveries to its service area would be about 134 TAF rather than 418 TAF of Table A water. Metropolitan estimates another 280 TAF of carryover storage could be delivered, for a total delivery of 414 TAF.

Metropolitan believes that it now has in place Central Valley/SWP storage and transfer programs capable of reaching its planning target, and it has several other programs under development. Because yields from individual programs can vary widely depending on hydrologic conditions and CVP/SWP operations, the dry-year yields for the various programs reported in this section are expected values only. In any given year, actual yields could depart from the expected values. Despite that uncertainty, Metropolitan's models of these programs indicate that in the aggregate, they can meet the resource target under a wide range of hydrologic conditions and CVP/SWP operations.

The Central Valley/SWP storage and transfer programs have served to demonstrate the value of partnering, and increasingly, Central Valley agricultural interests see partnering with Metropolitan as a sensible business practice beneficial to their local district and regional economy. In addition, Metropolitan staff has demonstrated the ability to work with DWR and USBR staff to facilitate Central Valley storage and transfer programs. Taken together, these positive changes enabled Metropolitan to reach the 2010 resource target by 2003.

Implementation Approach

Metropolitan currently has several Central Valley/SWP storage programs in operation that serve to increase the reliability of supplies received from the California Aqueduct. Metropolitan is also pursuing a new storage program with Mojave Water Agency, and it is currently under development. In addition, Metropolitan pursues Central Valley water transfers on an as needed basis. Table 3-3 lists the expected yields from these programs. Figure 3-3 shows the location of Metropolitan's statewide groundwater banking programs.

Storage and Transfer Programs

Semitropic Storage Program

Metropolitan has a groundwater storage program with Semitropic Water Storage District located in the southern part of the San Joaquin Valley. The maximum storage capacity of the program is 350 TAF. The specific amount of water Metropolitan can store in and subsequently expect to receive from the programs depends upon hydrologic conditions, any regulatory requirements restricting Metropolitan's ability to export water for storage, and the demands placed on the Semitropic Program by other program participants. During the recent dry year of 2008, the storage program delivered 125 TAF to Metropolitan. During wet years, Metropolitan has the discretion to use the program to store portions of its SWP entitlement water that are in excess of the amounts needed to meet Metropolitan's service area demand. In Semitropic, the water is delivered to district farmers who use the water in-lieu of pumping groundwater. During dry years, the districts return Metropolitan's previously stored water to Metropolitan by direct groundwater pump-in return and the exchange of State Water Project entitlement water.

Arvin-Edison Storage Program

Metropolitan amended the groundwater storage program with Arvin-Edison Water Storage District in 2008 to include the South Canal Improvement Project. The project increases the reliability of Arvin-Edison returning higher water quality to the California Aqueduct. The program storage capacity is 350 TAF. The specific amount of water Metropolitan can expect to store in and subsequently receive from the programs depends upon hydrologic conditions and any regulatory requirements restricting Metropolitan's ability to export water for storage. The storage program is estimated to deliver 75 TAF. During wet years, Metropolitan has the discretion to use the program to store portions of its SWP Table A supplies which are in excess of the amounts needed to meet Metropolitan's service area demand. The water can be either directly recharged into the groundwater basin or delivered to district farmers who use the water in-lieu of pumping groundwater. During dry years, the district returns Metropolitan's previously stored water to Metropolitan by direct groundwater pump-in return or by exchange of surface water supplies.

Table 3-3 summarizes Metropolitan's Central Valley/SWP transfer programs supply range for 2030. In developing the program capabilities shown in this table, Metropolitan assumed a simulated median storage level going into year 2030 based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher than the assumption used, and a 50 percent probability that storage levels would be lower than the assumption used. The supply capabilities shown reflect actual storage program conveyance constraints. In addition, SWP supplies are estimated using the draft 2009 SWP Delivery Reliability Report distributed by DWR in December 2009. The draft 2009 reliability report presents the current DWR estimate of the amount of water deliveries for current (2009) conditions and conditions 20 years in the future. These estimates incorporate restrictions on SWP and Central Valley Project (CVP) operations in accordance with the biological opinions of the U.S. Fish and Wildlife Service and National Marine Fishery Service

Table 3-3
Central Valley/State Water Project Storage and Transfer Programs
Supply Projection
Year 2030
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
San Bernardino Valley MWD Minimum Purchase	12,000	8,000	20,000
San Bernardino Valley MWD Option Purchase	12,000	11,000	29,000
Central Valley Storage and Transfers			
Semitropic Program	46,000	41,000	69,000
Arvin Edison Program	63,000	75,000	75,000
San Bernardino Valley MWD Program	16,000	49,000	49,000
Kern Delta Program	47,000	50,000	50,000
Subtotal of Current Programs	***196,000***	***234,000***	***292,000***
Programs Under Development			
Mojave Groundwater Storage Program	11,000	5,000	43,000
North of Delta/In-Delta Transfers	33,000	33,000	33,000
SBVMWD Central Feeder	5,000	5,000	5,000
Shasta Return	18,000	18,000	18,000
Semitropic Agricultural Water Reuse Demonstration	11,000	11,000	11,000
Subtotal of Proposed Programs	***78,000***	***72,000***	***110,000***
Maximum Supply Capability	**274,000**	**306,000**	**402,000**

issued on December 15, 2008, and June 4, 2009, respectively.

San Bernardino Valley MWD Storage Program

The San Bernardino Valley MWD Storage program allows for the purchase of a portion of San Bernardino Valley Municipal Water District's State Water Project supply. The program includes a minimum purchase provision of 20 TAF and the option of purchasing additional supplies when available. This program can deliver between 20 TAF and 70 TAF in dry years, depending on hydrologic conditions. The expected delivery for a single dry year similar to 1977 is 70 TAF. The agreement with San Bernardino Valley MWD also allows Metropolitan to store up to 50 TAF of transfer water for use in dry years.

Kern-Delta Water District Storage Program

This groundwater storage program has 250 TAF of storage capacity. When fully developed, it will be capable of providing 50 TAF of dry-year supply. The water can be either directly recharged into the groundwater basin or delivered to district farmers who use the water in-lieu of pumping groundwater. During dry years, the districts returns Metropolitan's previously stored water to Metropolitan by direct groundwater pump-in return or by exchange of surface water supplies.

Mojave Storage Program

Currently operated as a demonstration program, the program will store SWP supply delivered in wet years for subsequent withdrawal during dry years. When fully developed, the program is expected to have a dry-year yield of 35 TAF depending on hydrologic conditions.

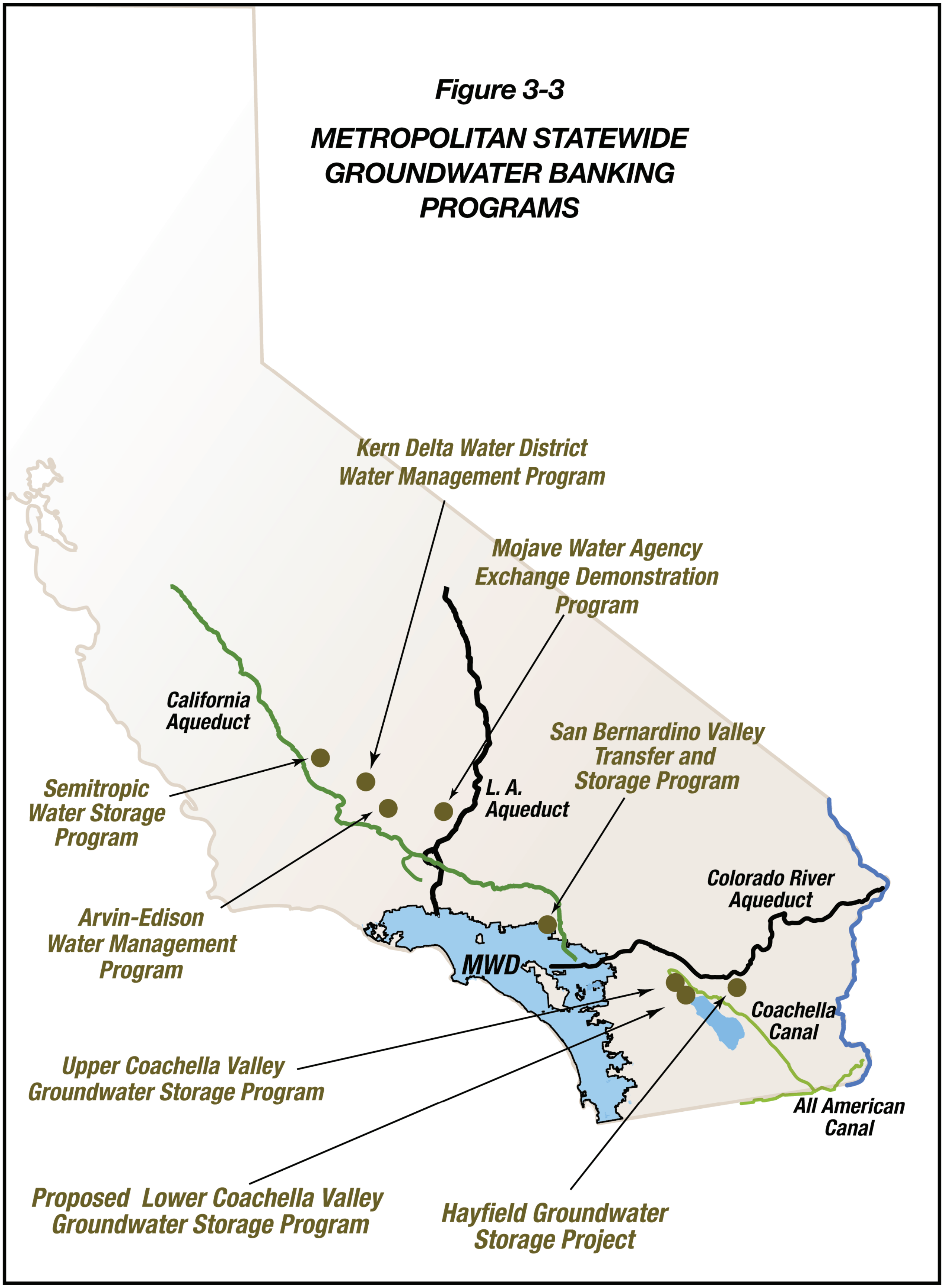


Figure 3-3
METROPOLITAN STATEWIDE GROUNDWATER BANKING PROGRAMS
Kern Delta Water District Water Management Program
Mojave Water Agency Exchange Demonstration Program
California Aqueduct
San Bernardino Valley Transfer and Storage Program
Semitropic Water Storage Program
L. A. Aqueduct
Colorado River Aqueduct
Arvin-Edison Water Management Program
MWD
Coachella Canal
Upper Coachella Valley Groundwater Storage Program
All American Canal
Proposed Lower Coachella Valley Groundwater Storage Program
Hayfield Groundwater Storage Project

Central Valley Transfer Programs

Metropolitan expects to secure Central Valley water transfer supplies via spot markets and option contracts to meet its service area demands when necessary. Hydrologic and market conditions, and regulatory measures governing Delta pumping plant operations will determine the amount of water transfer activity occurring in any year. Transfer market activity in 2003, 2005, 2008, and 2009 provide examples of how Metropolitan has secured water transfer supplies as a resource to fill anticipated supply shortfalls needed to meet Metropolitan's service area demands.

In 2003, Metropolitan secured options to purchase approximately 145 TAF of water from willing sellers in the Sacramento Valley during the irrigation season. These options protected against potential shortages of up to 650 TAF within Metropolitan's service area that might have arisen from a decrease in Colorado River supply or as a result of drier-than-expected hydrologic conditions. Using these options, Metropolitan purchased approximately 125 TAF of water for delivery to the California Aqueduct.

In 2005, Metropolitan, in partnership with seven other State Water Contractors, secured options to purchase approximately 130 TAF of water from willing sellers in the Sacramento Valley, of which Metropolitan's share was 113 TAF. Metropolitan also had the right to assume the options of the other State Water Contractors if they chose not to purchase the transfer water. Due to improved hydrologic conditions, Metropolitan and the other State Water Contractors did not exercise these options.

In 2008, Metropolitan in partnership with seven other State Water Contractors, secured approximately 40 TAF of water from willing sellers in the Sacramento Valley, of which Metropolitan's share was approximately 27 TAF.

In 2009, Metropolitan in partnership with eight other buyers and 21 sellers participated in a statewide Drought Water Bank, which secured approximately 74 TAF, of which Metropolitan's share was approximately 37 TAF.

Metropolitan's recent water transfer activities in have demonstrated Metropolitan's ability to develop and negotiate water transfer agreements either working directly with the agricultural districts who are selling the water or through a statewide Drought Water Bank. Because of the complexity of cross-Delta transfers and the need to optimize the use of both CVP and SWP facilities, DWR and USBR are critical players in the water transfer process, especially when shortage conditions increase the general level of demand for transfers and amplify ecosystem and water quality issues associated with through-Delta conveyance of water. Therefore, Metropolitan views state and federal cooperation to facilitate voluntary, market-based exchanges and sales of water as a critical component of its overall water transfer strategy.

Achievements to Date

Metropolitan has made rapid progress to date developing Central Valley/SWP storage and transfer programs. Most notably, by 2003, it was able to put in place sufficient storage and transfer programs to meet its 2010 dry-year resource target of 300 TAF. This rapid progress may be attributed to several factors, including Metropolitan dedicating additional staff to identify, develop, and implement Central Valley/SWP storage and transfer programs; increased willingness of Central Valley agricultural interests to enter into storage and transfer programs with Metropolitan; and Metropolitan staff's ability to work with DWR and USBR staff to facilitate Central Valley storage and transfer programs.

3.4 Conservation and Public Affairs

Conservation is a core element of Metropolitan's long-term water management strategy. Metropolitan continues to build on a nearly 20-year investment in conservation of more than $268 million, reflecting a long-term commitment to water conservation. Among other measures, this investment has resulted in the retrofit of more than 2.7 million toilets with more water efficient models and the distribution of more than 334,000 high efficiency clothes washers (HECWs). Collectively, Metropolitan's conservation programs and other conservation in the region will reduce Southern California's reliance on imported water by more than 1.033 MAF per year from 1980 through 2025.

Metropolitan's conservation policies and practices are shaped largely by two factors: Metropolitan's planning strategy and the California Urban Water Conservation Council Memorandum of Understanding Regarding Water Conservation in California (Urban MOU). As a signatory to the Urban MOU, Metropolitan pledged to make a good faith attempt to implement a prescribed set of urban water conservation Best Management Practices (BMPs).

Metropolitan's planning strategy places equal emphasis on local and imported resource development and treats conservation as a core local supply, on par with other resources such as water recycling and storage. Conservation savings result from active, code-based, and price-effect conservation efforts. Active conservation consists of water-agency funded programs such as rebates, installations, and education. Code-based and price-based conservation, formerly described as passive conservation, consists of demand reductions attributable to conservation-oriented plumbing codes and usage reductions resulting from increases in the price of water. Including regional pre-1990 conservation savings, Metropolitan continues to pursue a 2025 total conservation target of approximately 1.033 MAF per year. A large share of the target has already been achieved through existing Metropolitan and member agency programs, pre-1990 savings, price-effects, and continued savings that accrue from plumbing codes. The remainder is expected to be achieved through additional agency-sponsored active conservation programs, code changes, and price-effects.

Background

Unlike traditional water supplies, conservation reduces water demand in ways that are quantified indirectly. Demand is reduced through changes in consumer behavior and savings from water-efficient fixtures like toilets and showerheads. Quantifying and projecting conservation savings requires specially designed estimating models. Such models were used during Metropolitan's planning process.

Conservation savings are commonly estimated from a base-year water-use profile. Metropolitan uses 1980 as the base year because it marked the effective date of a new plumbing code in California requiring toilets in new construction be rated at 3.5 gallons per flush or less. Between 1980 and 1990, the region saved an estimated 250 TAF per year as the result of this 1980 plumbing code and unrelated water rate increases. These savings are referred to as "pre-1990 savings." Metropolitan's resource planning target combines pre-1990 savings and estimates of more recently achieved savings.

Distinguishing between active, code-based and price-effect conservation can be analytically complex when, for example, active programs for fixtures are concurrent with conservation-related plumbing codes. This plan combines active, code-based, and price-effect conservation savings using methods that avoid double counting.

Metropolitan does not currently assign a savings value for public awareness campaigns and conservation education because any initial effect on demand reduction and the longevity of the effect is difficult to measure. It is generally accepted that these programs prompt consumers to install water saving fixtures and change water-use behavior thereby creating a residual benefit of increasing the effectiveness of companion conservation programs.

Implementation Approach

Metropolitan's implementation approach for achieving the conservation target includes support to member agencies in developing cost-effective BMP-oriented active conservation programs and new, innovative programs that address regional water uses. The stewardship charge in Metropolitan's rate structure provides the funding mechanism for active programs and non-incentive strategies. Metropolitan continues to seek supplemental state and federal funding in coordination with the member agencies.

Implementation of Conservation "Best Management Practices"

Metropolitan's conservation programs are closely linked to the efforts of the California Urban Water Conservation Council (CUWCC), the organization created to administer the Urban MOU. As a signatory to the Urban MOU, Metropolitan has pledged to make a good faith effort to implement a prescribed set of urban water conservation BMPs. Metropolitan provides technical and financial support needed by member agencies in meeting the terms of the Urban MOU. Table 3-4 provides a list of the BMPs and compares how they apply to Metropolitan, which is a water wholesaler, versus retail water agencies. Enclosed with this report, as Appendix A.7, are copies of the BMP reports Metropolitan has filed with the CUWCC.

Table 3-4
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 Audits	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 December 2008, the Urban MOU was amended and the BMPs were revised. The revision reorganized the Council's 14 BMPs into five categories. Two categories, Utility Operations and Education, are referred to as "Foundational BMPs," because they are considered to be essential water conservation activities by any utility and are adopted for implementation by all signatories to the Urban MOU as ongoing practices with no time limits. The remaining BMPs are "Programmatic BMPs" and are organized into Residential; Commercial, Industrial, and Institutional (CII); and Landscape categories.

A mapping from the old BMPs to the new BMPs is shown in Table 3-5.

Table 3-5
Mapping of Prior BMPs to New BMPs

Prior BMP Number & Name	New BMP category
Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers	Programmatic: Residential
Residential Plumbing Retrofit	Programmatic: Residential
System Water Audits, Leak Detection and Repair	Foundational: Utility Operations – Water Loss Control
Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections	Foundational: Utility Operations – Metering
Large Landscape Conservation Programs and Incentives	Programmatic: Landscape
High-Efficiency Clothes Washing Machine Financial Incentive Programs	Programmatic: Residential
Public Information Programs	Foundational: Education – Public Information Programs
School Education Programs	Foundational: Education – School Education Programs
Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts	Programmatic: Commercial, Industrial, and Institutional
Wholesale Agency Assistance Programs	Foundational: Utility Operations – Operations
Retail Conservation Pricing	Foundational: Utility Operations – Pricing
Conservation Coordinator	Foundational: Utility Operations – Operations
Water Waste Prohibition	Foundational: Utility Operations – Operations
Residential ULFT Replacement Programs	Programmatic: Residential

In addition to implementing cost-effective BMPs, Metropolitan actively supports many CUWCC committee and research activities. For example, Metropolitan has historically assisted in CUWCC's ongoing efforts to document and increase the effectiveness of BMP-related conservation efforts. Presently, Metropolitan is represented on the following CUWCC committees:

- Board (formerly Steering Committee)
- Commercial, Industrial, and Institutional Committee
- Residential Committee
- Landscape Committee
- Research and Evaluation Committee
- Utility Operations Committee
- Education Committee
- BMP Reporting Committee

The following sections describe Metropolitan's conservation programs.

Regional Conservation Programs

Metropolitan's conservation programs focus on two main areas: residential programs, and commercial, industrial and institutional programs.

Residential Programs

Metropolitan's residential conservation consists of three major programs:

SoCal Water$mart

In July 2008, Metropolitan initiated a new region-wide residential program named SoCal Water$mart. During its first year of operation, rebate activity exceeded expectations as many residential customers became increasingly aware of the financial incentives available to them to help offset the purchase of water-efficient devices. Metropolitan issued a record 54,000 rebates for residential fixtures totaling $10 million in fiscal year 2008/09, resulting in approximately 2.3 TAF of water to be saved annually.

Save Water, Save A Buck (Multi-Family)

Metropolitan's regional Save-A-Buck program extends rebates to multi-family dwellings. More than 40,000 rebates were issued fiscal year 2008/09 for high-efficiency toilets and washers for multi-family units within Southern California.

Member Agency Residential Programs

In addition to regional programs implemented by Metropolitan, member and retail agencies also implement local water conservation programs within their respective service areas and receive Metropolitan incentives for qualified retrofits and other water-saving actions. Typical projects include toilet replacements, locally administered clothes washer rebate programs, and residential water audits.

Metropolitan provides incentives on a variety of water efficient devices for the residential sector. The following is a brief description of current and past devices that contribute to projected conservation savings:

High-Efficiency Clothes Washers

High-efficiency clothes washers (HECWs) is a growing segment in water conservation. Metropolitan has supplemented its HECW rebate using state or federal grants whenever possible. The water efficiency of clothes washers is represented by the "water factor," which is a measure of the amount of water used to wash a standard load of laundry. Washers with a lower water factor save more water. Metropolitan has continued to move the market by changing its program requirement to lower water factors. The program eligibility requirement is currently set at water factor 4.0, which saves over 10,000 gallons per year per washer over a conventional top loading washer.

High-Efficiency Toilets and Ultra-Low-Flush Toilets

Metropolitan has provided incentives for toilet programs since 1988. Currently, Metropolitan only provides funding for high-efficiency toilets (1.28 gallons per flush or less), which use

20 percent less than ultra-low-flush toilets (1.6 gallons per flush). Ultra-low-flush toilets are the current standard defined by the plumbing code. Metropolitan uses the EPA's WaterSense list of tested toilets in its programs as qualifying models.

Irrigation Evaluations and Residential Surveys

Metropolitan provides funding to its member agencies that choose to implement irrigation evaluations and indoor surveys for residents. Irrigation evaluations provide customers with a recommended irrigation schedule and suggested improvements for irrigation systems. Indoor residential surveys provide customers with information on identifying leaks and making changes to water-using devices in the home.

Rotating Nozzles for Sprinklers

Pop-up spray heads with multi-stream, multi-trajectory rotating nozzles represent a new alternative to the irrigation of landscapes. Field tests demonstrate these devices apply water more evenly than traditional nozzles with fixed conical spray patterns, offering the potential for significant water savings. Low precipitation rates associated with these nozzles can reduce run-off and related pollution, thereby offering a significant value-added benefit when irrigating sloping landscapes.

Weather-Based Irrigation Controllers

Weather-based irrigation controllers (WBIC) are a rapidly evolving conservation technology. Rather than relying on periodic manual adjustments, WBICs adjust irrigation schedules based on rain, temperature, sunlight, soil moisture, or some combination of indicators. Metropolitan began funding WBIC incentives in homes after conducting a pilot study that evaluated potential savings and ease of use.

Synthetic Turf

From July 2007 through June 2010, Metropolitan offered an incentive for synthetic turf based on a pilot project conducted with financial assistance from the United States Bureau of Reclamation (USBR). Synthetic turf provides water savings benefits as a replacement for irrigated turf and lawn areas.

Commercial, Industrial and Institutional Programs

Metropolitan's commercial industrial and institutional (CII) conservation consists of three major programs:

Save Water, Save-A-Buck Program

The majority of the CII conservation activity comes from Metropolitan's regional Save-A-Buck program. The Save-A-Buck program had its largest year in fiscal year 2008/09, providing about $8.8 million in rebates for approximately 145,000 device retrofits.

Water Savings Performance Program

The Water Savings Performance Program is a component of the commercial program and provides financial incentives for documented water savings for landscape irrigation and industrial process improvements. This program allows large-scale water users to customize conservation projects and receive incentives for five years of water savings for capital water-use efficiency improvements.

Member Agency Commercial Programs

Member and retail agencies also implement local commercial water conservation programs using Metropolitan incentives. Projects target specific commercial sectors, with many programs also receiving assistance from state or federal grant programs. Metropolitan incentives are used as the basis for meeting cost-share requirements.

Accelerated Public Sector Water Efficiency Partnership Demonstration Program

A fourth program, the Public Sector Demonstration Program, also contributes to the savings. From August 2007 through 2008, Metropolitan offered a one-time program to provide up-front funding to increase water use efficiency in public buildings and landscapes within its service area. The program was designed to reinforce the region's conservation message by demonstrating willingness for public agencies to respond to the call to save water. Participants included various special districts, school districts, state colleges and universities, municipalities, counties and other government agencies. There were four components of the program:

1. Water audits
2. Enhanced incentives
3. Pay-for-performance
4. Recycled water hook-up

Free water audits were provided to assess current indoor and outdoor water use and make specific recommendations for practical solutions and improvements for public facility and landscape areas. Water use experts created an equipment inventory list and made recommendations for replacements or upgrades. A written report was provided as a guide to initiating equipment upgrades.

Enhanced incentives were provided to replace high water-use equipment including toilets, urinals, and irrigation controllers. Program incentives were often sufficient to cover the total cost of the equipment, capped at the manufacturer's suggested retail price.

Pay-for-performance incentives were also offered to reduce landscape irrigation water use by at least 10 percent through behavioral modifications.

Metropolitan' s CII programs provide rebates for water-saving plumbing fixtures, landscaping equipment, food-service equipment, cleaning equipment, HVAC (heating, ventilating, air conditioning) and medical equipment. Following is a list of current and past devices that contribute to projected conservation savings:

- Connectionless Food Steamer
- Cooling Tower Conductivity Meter
- Dry Vacuum Pump
- High-Efficiency Clothes Washers
- High-Efficiency Toilet
- High-Efficiency Urinal
- Large Rotors - High Efficiency Nozzle
- Multi Stream Rotating Nozzles
- pH Cooling Tower Controller
- Pre-rinse Spray Head
- Steam Sterilizer
- Synthetic Turf
- Ultra-Low-Flush Toilet
- Ultra-Low-Flush Urinals
- Water Broom
- Weather-Based Irrigation Controller
- X-ray Processor
- Zero Water Urinal

Research and Development Programs

Metropolitan encourages research and development of new and creative ways to conserve water. The Innovative Conservation Program provides funding to individuals and organizations to test new technologies. The Enhanced Conservation Program provides funding directly to Metropolitan's member agencies to encourage new and creative approaches to implement urban water conservation.

Water Conservation Ordinances

In June 2008, Metropolitan adopted a Water Supply Alert resolution following Governor Arnold Schwarzenegger's proclamation of a statewide drought. Among other provisions, the Alert encouraged cities, counties, and local public water agencies to adopt and enforce local water conservation ordinances. To facilitate ordinance adoption, Metropolitan compiled a library of available local ordinances, developed a model water conservation ordinance, and hosted several workshops. Approximately half of the 19 million residents in Metropolitan's service area are now covered by adopted ordinances, and an additional one-third reside in jurisdictions that have taken action toward adoption of ordinances.

New Construction Programs

With grants from the USBR and the State of California, Metropolitan offered financial incentives through the California Friendly® New Home Program. Builders of new single-family model homes and multi-family developments are encouraged to incorporate water efficient fixtures and landscapes, including high-efficiency toilets and clothes washers, smart irrigation controllers, and landscapes designed with appropriate plant palettes and efficient irrigation systems. California Friendly model homes showcase residential water efficiency, helping to increase consumer awareness of water-conserving features and provide inspiration for water-conserving landscapes.

Since program inception in 2003, Metropolitan has provided incentives to eight homebuilders for more than 220 new homes with over 300,000 square feet of landscape.

Conservation Funding

Metropolitan's Conservation Credits Program (CCP) provides the basis for financial incentives and funding for urban BMP and other demand management related activities. Established in 1988, this funding mechanism supports Metropolitan's commitment to conservation as a long-term water management strategy.

The basis of Metropolitan financial support to member agency conservation efforts is estimated as the lesser of $195 per acre-foot of water saved or one-half of average device cost. In general, CCP funded water conservation project proposals must:

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

Grant Programs

Additional funding for conservation programs has been made available through government agencies. Metropolitan has worked to obtain a share of this funding to enhance the region's water conservation investments. Table 3-6 and the following summaries describe briefly past sources and uses of these funds.

Measurement and Evaluation

Measurement and evaluation is an important component of Metropolitan's conservation program. These serve 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 3-7 summarizes the major conservation-related activities for the public information BMP administered by External Affairs. Table 3-8 shows Metropolitan's extensive commitment to the BMP for conservation-related education programs.

Conservation Outreach Campaign

Metropolitan has conducted annual advertising, education, and community outreach campaigns since 2003 under its bewaterwise.com® and California Friendly® brands to urge Southern California consumers and business owners to make permanent changes in their everyday uses of water. From 2007 through 2010, the Board authorized an expansion of these efforts in order to meet the critical water supply crisis facing the state. Outreach campaigns in the latter part of the decade reflected these unprecedented challenges with more urgent calls for water conservation behavior. Creative such as "Time to Get Serious" and "Cut Your Water Use" were seen and heard across more media outlets at higher frequency levels and over longer periods of time than pre-2007 campaigns. Metropolitan was a lead sponsor of the "California's Water: A Crisis We Can't Ignore" statewide campaign with the Association of California Water Agencies in fall 2007. Leading up to the summer of 2009, Metropolitan's "Move the Needle" outreach campaign (featuring a water supply gauge nearing empty) communicated the change from voluntary to mandatory water conservation in many Southern California cities and communities.

Other activities include:

- Annual reports to the Legislature (SB 60)
- Maintaining and updating the bewaterwise.com® website in English and Spanish (more than 1.7 million individuals have visited bewaterwise.com® for information on water conservation from 2005 to 2010)
- Maintaining 9 California Irrigation Management Information System (CIMIS) stations
- Conducting consumer focus groups and surveys to measure effectiveness of outreach efforts
- Participating in workshops and local fairs regarding conservation outreach

California Friendly Landscape Training Program

Metropolitan's California Friendly Landscape Training Program, formerly known as Professional Protector del Agua, offers in-person and online courses in irrigation efficiency and water-wise garden design. Nearly 9,000 landscape maintenance professionals and residents attended the workshops in fiscal year 2008/09. Courses are conducted in English and Spanish.

Achievements to Date

Conservation is an integral part of water supply planning at Metropolitan. The Regional Supply Unit within Metropolitan works to improve understanding of costs and benefits of water conservation so 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 awards from the USBR and California Municipal Utilities Association.

Table 3-9 summarizes Conservation Credits Program savings and investments.
Table 3-10 summarizes activities Metropolitan implemented in its service area beginning fiscal year 1990-91 and shows the achievements the region has made in implementing these programs.

Conservation continues to be an important part of Metropolitan's water supply planning. Continued investment in cost-effective conservation remains a key component of Metropolitan's resource goals

Table 3-6
Grant Program Funding

Funding Source	Program/Project	Funding Amount ($1,000s)	Description	Status
CALFED				
	Residential HECW	$925	Increase rebate amount	Completed
	Protector del Agua	$100	Course development	Completed
Prop 13 Grants				
	HECW	$2,500	Increase rebate amount	Completed
	ET Controllers	$1,800	Initiate rebates	Completed
CPUC (w/CUWCC)				
2003	Pre-Rinse Spray Valves: Phase 1	$1,600[1]	12,000 direct installations[1]	Completed
2004	Pre-Rinse Spray Valves: Phase 2	$2,200[1]	17,000 direct installations[1]	Completed
USBR				
2003	CA-Friendly Landscapes	$182	New home landscapes	Completed
2003	Data Loggers	$50	Software error analysis	Deferred
2004	CA-Friendly Landscapes	$60	New home landscapes	Completed
2004	Synthetic Turf pilot	$220	Provide incentives	Completed
2004	World Forum	$50	College/university grants	Completed
2004	CII Region wide	$250	Add $ to rebate amounts and for administration	Completed
2005	Protector del Agua	$50	Develop web classes	Completed
2005	Landscape Market Analysis	$50	Analyze landscape conservation opportunities	Completed
2005	City Makeover	$50	Public landscapes	Completed
2006	Innovative Conservation Program	$300	Support research projects	Completed
2008	Innovative Conservation Program	$300	Support research projects	In Progress
Water for the West				
	Protector del Agua	$25	Develop web classes	Completed
Prop 50				
	Residential HECW	$1,660	Increase rebate amount	Completed
	CA-Friendly Landscapes	$423	Common area landscapes	In Process
	High Efficiency Toilets	$1,000	Increase rebate amount	Completed
	Protector del Agua	$78	Develop on-line classes	Completed
2008	Residential HECW	$2,000	Increase rebate amount	In Process

[1] This is the funding amount and number of installations that represents Metropolitan's share of the project.

Table 3-7
External Affairs Group
Conservation-Related Activities

Program or Activity	Description
Paid and public service advertising	Metropolitan has conducted annual water conservation advertising and education campaigns since 2003 using television, radio, online, event sponsorship and outdoor billboards.
Speaker's Bureau	Provides speakers for organizations, service clubs, churches, business and other community groups and associations. An estimated 15,000 – 20,000 people attend these presentations annually.
Community Relations	Organizes and conducts an average of 65 to 70 Board of Director-sponsored inspection trips of Metropolitan's distribution system per year for elected officials, community leaders and members of the public. Approximately 3,000 people learn about Metropolitan's conservation and water management policies and practices each year through these trips. Additionally, Metropolitan's education curriculum and program activities engage an average of 100,000 students per year. Metropolitan partners with community-based organizations and others to promote water education through event sponsorships and cost-sharing of educational materials.
Media and Publications	Conducts editorial briefings and media field trips; assembles press packets; prepares and disseminates news releases, speeches, videos, fact sheets, brochures, articles, and editorials 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.

Table 3-8
School Education Programs

Program or Activity	Date Initiated	Date Updated	Current Status	Grades	Description
Admiral Splash	1983	2006	Ongoing	Grade 4	A two-week program focusing on Southern California history, the water cycle, supply and the distribution system, water uses and conservation.
All About Water	1991	2008	Ongoing	K-3	Activities to teach young students about droughts, conservation, water quality and physical properties of water.
Geography of Water	1993	1998	Ongoing	Grades 4-8	A curriculum module on the relationship between population, precipitation, geography, economics, and water distribution.
Water Politics	1994	2004	Ongoing	Grades 9-12	A case study-based exploration of water supply issues facing Southern California, the Colorado River Basin, and the Middle East.
Water Ways	1995	2006	Ongoing	Grade 5	A supplement integrated into fifth-grade U.S. History curricula regarding water use, sources, ethics, and environment issues selected from three historical periods. This includes historical attitudes towards the stewardship of water.
Water Quality	2001	-	Ongoing	Grades 7-12	Hands-on activities to investigate water quality issues, with conservation as an element of the overall picture.
Water Works	2001	-	Ongoing	Grades 7-12	A school-to-career, job-specific program featuring activities and profiles on a variety of water-related careers, including conservation specialist.
Water Times	2005	-	Ongoing	Grade 6	An age-appropriate newspaper that provides interdisciplinary concepts, tools, and calculations related to water conservation, and that conveys an overall ethic of water stewardship.
Conservation Connection: Water and Energy Use in Southern California	2010	-	Ongoing	Grades 5-9	An activity-focused unit designed to engage students in finding solutions to conserve both water and energy at school and home. The curriculum also contains an online water and energy survey for students and their families.

Table 3-9
Conservation Credits Program

Fiscal Year	New Annual Water Savings	Investment
2008 – 2009	134,000	$44.5 million
2007 – 2008	118,000	$15.4 million
2006 – 2007	116,000	$10.6 million

Table 3-10
Conservation Achievements in Metropolitan's Service Area

	Qty	Units
CII Rebated Devices (FY 1990-91 to FY 2008-09)		
Audits/Surveys	6,353	ea
Connectionless Food Steamers	26	ea
Cooling Tower Conductivity Controllers	1,028	ea
Dry Vacuum Pump	20	ea
Toilets	107,265	ea
Urinals	20,084	ea
High Efficiency Washers	35,664	ea
pH Conductivity Controllers	103	ea
Pre-Rinse Spray Heads	17,171	ea
Multi-Stream Rotating Nozzles	77,505	ea
Steam Sterilizers	25	ea
Water Brooms	5,942	ea
Weather Based Irrigation Controllers	12,929	acres
X-Ray Processors	185	ea
High Efficiency Nozzles	19,476	ea
Synthetic Turf	5,570,848	sq. ft.
California Friendly Landscape	295,230	sq. ft.
Residential Rebated Devices (FY 1990-91 to FY 2008-09)		
Aerators	158,814	ea
Audits/Surveys	111,199	ea
High Efficiency Clothes Washers	285,903	ea
Toilets	2,629,047	ea
Multi-Stream Rotating Nozzles	65,960	ea
Showerheads	1,735,436	ea
Weather Based Irrigation Controllers	2,203	acres

3.5 Recycling, Groundwater Recovery, and Desalination

Metropolitan continues to support local resources development including water recycling, groundwater recovery, and seawater desalination to meet its supply reliability and water quality objectives in a cost effective manner.

Water recycling has proven to be a reliable core supply, and it helps local agencies comply with environmental regulations. Metropolitan continues to pursue a 2025 target for combined water recycling, groundwater recovery, and seawater desalination elements totaling 500 TAF per year of committed development and 250 TAF per year of planning buffer to address uncertainties and implementation risks. Currently, more than half of the water recycling in California occurs in Metropolitan's service area. Previous regional planning highlighted that a significant amount of future water recycling will be used for groundwater replenishment and seawater intrusion barrier purposes.

In addition, local agencies have implemented several projects to recover contaminated or degraded groundwater for potable uses that help meet the region's current or future water demand. Groundwater recovery projects use a variety of treatment technologies to remove undesirable constituents such as nitrates, volatile organic compounds (VOCs), perchlorate, color, and salt. Desalination of brackish groundwater and other local supplies enhances the continued supply reliability of the region by maximizing local groundwater resources. Furthermore, several agencies are progressively pursuing development of seawater desalination projects.

Background

A. Recycling

Local water recycling projects involve further treatment of secondary treated wastewater that is currently discharged to the ocean or streams and lands and use it for direct non-potable uses such as landscape and agricultural irrigation, commercial and industrial purpose and for indirect potable uses such as groundwater recharge, seawater intrusion barriers, and surface water augmentation. This section provides a description of the wastewater sources that potentially could be used for recycled water.

<u>Wastewater Disposal in the Service Area</u>

As part of regional planning that encourages use of recycled water, a database has been developed that include the name of each wastewater treatment facility, operating agency, location and elevation of the facility, extent of wastewater treatment, capacity and anticipated production, method of effluent disposal, and influent and effluent water qualities. Shown in Table 3-11 are the existing and projected total effluent capacities of the wastewater treatment plants from a database of 89 plants identified within Metropolitan's service area.

Wastewater treatment capacity provides an indication of the amount of wastewater being generated and disposed in Metropolitan's service area. Most wastewater plants in the service area provide secondary treatment, a level of treatment that complies with the Clean Water Act. Inland wastewater plants generally provide treatment to tertiary levels so the effluent may be disposed of in a stream or other water body or for beneficial reuse. A small percentage of tertiary treated effluent undergoes reverse osmosis or electrodialysis reversal processes, producing high-quality recycled water for groundwater recharge, industrial uses, or, in some instances, municipal uses.

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

- Los Angeles County Sanitation Districts
- Orange County Sanitation District

Table 3-11
Existing and Projected Total Effluent Capacity
Wastewater Treatment Plants within Metropolitan's Service Area

Treatment Level	Existing Capacity (MGD)	2040 Capacity (MGD)
Primary	2,120	3,139
Secondary	1,546	2,708
Tertiary	607	1,464
Advanced	34	229

This data was compiled as part of the Southern California Comprehensive Water Reclamation and Reuse Study.

- City of Los Angeles Bureau of Sanitation
- San Diego Metropolitan Wastewater Department
- Eastern Municipal Water District
- Inland Empire Utilities Agency

Many small special-purpose wastewater agencies, dual-purpose (water and wastewater) special districts, and municipal wastewater agencies also provide wastewater treatment and disposal services within Metropolitan's service area.

As a rule, wastewater is collected in a sewer collection system. From there, it flows to a wastewater treatment plant. Once treated, wastewater is disposed of through one of three mechanisms:

1. *Ocean Outfalls* – Treated wastewater is either disposed of directly through an ocean outfall or conveyed to the ocean outfall via a land pipeline.
2. *Reuse* – Currently, about 308 TAF per year of recycled water is used for irrigation, industrial processes, and groundwater recharge applications. A few inland treatment plants (in Riverside and San Bernardino counties) irrigate feed and fodder crops with recycled water. While this use is considered beneficial, it is not necessarily the highest and best use for recycled water. Higher value uses such as landscape or agricultural irrigation and industrial applications, however, will require more developed markets.
3. *Live Stream Discharge* – A number of inland plants discharge treated effluent into local streams and rivers. That water is then used downstream for beneficial uses, eventually flowing to the ocean. Some of the affected rivers (or ephemeral streams) include:

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

Regional Planning for Optimal Recycling

In the 1990s, the United States Bureau of Reclamation, in cooperation with Metropolitan, the California Department of Water Resources, and six other Southern California water agencies, studied the feasibility of regional water reclamation projects in Southern California.[1] This study identified 34 potential regional projects within Metropolitan's service area with an estimated yield of 450 TAF per year. Metropolitan and its member agencies continue to explore these and other projects and develop updated plans on a regular basis.

[1] This was the Southern California Comprehensive Wastewater Recycling and Reclamation Project (SCCWRRS).

Metropolitan has identified a potential for more than 1.0 MAF of recycled water to be developed by 2050. The majority of these projects are currently in conceptual planning phases.

Uses of Recycled Water

There are about 335 TAF per year of planned and permitted uses of recycled water throughout Metropolitan's service area. These include landscape irrigation, commercial and industrial use, seawater intrusion barriers, and groundwater recharge applications. It is anticipated that about 458 TAF per year of new recycled water could be developed in Metropolitan's service area by the year 2035. A number of these projects are currently being implemented and will go on-line within the next five years. Other projects are in various stages of planning, and their development will depend on cost, financing, regulatory actions, and water supply demands.

1. *Industrial* – Industrial users represent a large potential market for recycled water, particularly in heavily industrialized areas, such as the cities of Vernon, Commerce, Industry and the Wilmington area of Los Angeles. Additionally, refineries in West Basin MWD's service area and the city of Torrance use recycled water. Typical industrial uses include cooling tower makeup water, boiler feed water, paper manufacturing, carpet dying, and process water. In 2009, approximately 15 TAF of recycled water was used for industrial purposes. Industrial users are high-demand, continuous-flow customers, which allows greater operational flexibility by allowing plants to base load operations rather than contend with seasonal and diurnal flow variations. Because of these operational benefits, industrial users reduce the need for storage and other peak demand facilities and management.
2. *Irrigation* – Currently, about 132 TAF per year of recycled water is used to irrigate golf courses, parks, schoolyards, cemeteries, greenbelts, and agricultural purposes throughout Southern California. Using recycled water for irrigation reduces the need for imported water during the critical summer months and in drought situations when water supplies are scarce.
3. *Indirect Potable* – Indirect Potable Reuse refers to the use of recycled water for groundwater recharge, and surface water reservoir augmentation purposes.
    a. *Groundwater Recharge* – Metropolitan's service area overlies numerous groundwater basins, some of which are over-drafted, and some of which are threatened by seawater intrusion. Water agencies along the Los Angeles and Orange county coastline inject water into the underlying groundwater basins to create a barrier against this seawater intrusion. The use of recycled water for seawater intrusion barrier projects is increasing and is replacing imported water used for this purpose. Increasing the proportion of recycled water can free imported water for direct consumption. Currently, approximately 118 TAF per year of recycled water is "permitted" for recharge and seawater barrier injection into the Orange County, Central and West Coast groundwater basins.

       About 38 percent of the recycled water in Metropolitan's service area is used for groundwater replenishment and seawater barriers. Table 3-12 presents a summary of this recycled water use.

Table 3-12
2009 Groundwater Replenishment and Seawater Barrier Injection Projects Using Recycled Water
(TAF per year)

Project	Recycled Water Use
OCWD GWRS	56.0
West Coast Barrier	10.9
Central Basin Spreading	41.8
Alamitos Barrier	2.2
Inland Empire Utilities Agency	2.2
Los Angeles Harbor	2.7
Camp Pendleton and other smaller projects	2.2
Total	**118.0**

Current groundwater recharge regulations require that recycled water be blended with specified percentages of imported water or other local water. With technological advancements, the percentage of recycled water is increasing. It is anticipated that some projects will soon be able to use 100 percent recycled water for seawater barrier and groundwater replenishment projects, thereby increasing recycled water use and further reducing a demand on imported supplies.

Large-scale groundwater replenishment projects utilizing recycled water require case-by-case review by the California Department of Public Health (CDPH). The greater the percentage of recycled water used for replenishment, the more stringent CDPH requirements.

One potential concern related to the use of recycled water for groundwater recharge is adverse impacts to groundwater quality from organic contaminants, metals, and salts. CDPH has proposed regulations for groundwater recharge with recycled water in aquifers used as a domestic supply source. Advanced treatment of recycled water (reverse osmosis, micro/ultra filtration, ultraviolet light, and hydrogen peroxide) is beginning to address many of these concerns and allow for greater flexibility for future recycled water use.

b. *Reservoir Augmentation* – Reservoir augmentation includes use of advanced treated recycled water to augment a surface water reservoir. Blended water from the reservoir is then treated at a conventional water treatment plant for potable purposes. There is currently no Reservoir augmentation with recycled water in Metropolitan's service area. In continuation of its effort, the City of San Diego recently approved construction of a demonstration project to test the feasibility and design requirements of a full-scale reservoir augmentation project.

Technical and Economic Issues of Recycled Water

Recycled water use is growing rapidly in Metropolitan's service area. Further expansion depends on progress in research, regulatory change, public acceptance, and financing of local projects. Metropolitan supports:

- Increasing water recycling in California and the Colorado River Basin
- Advocating funding assistance by parties that benefit both directly and indirectly from the use of recycled water
- Expanding recycled water uses
- Reviewing recycled water regulations to ensure streamlined administration, public health and environmental protection
- Planning efforts and voluntary cooperative partnerships at the local and statewide levels
- Conducting research and studies to address public acceptance, new technologies and health effects assessments
- Increasing cooperation between agencies to serve recycled water in other agency service areas

Metropolitan is actively involved with other agencies and organizations such as WateReuse Foundation to support research and to further expand the use of recycled water. Metropolitan is also working with the WateReuse Association and other agencies on legislative and regulatory issues to streamline permitting processes and provide needed funding and support for increased use of the recycled water.

Recycled Water Task Force

Pursuant to AB 331 in 2002, the Department of Water Resources (DWR) convened a Task Force consisting of 40 water and wastewater agency managers, water recycling experts, environmental organizations, public health officials, researchers, and the public to evaluate the framework of State and local rules, regulations, ordinances, and permits to identify the opportunities for and obstacles to increasing the safe use of recycled water. The Task Force provided a list of recommendations and overarching issues discussed below.

1. *Funding* – Capital funding is a significant constraint to increased recycled water project development. Recycled water systems are separate from potable systems, so projects require significant capital investments in treatment and distribution. Variability in demand for recycled water lengthens the time needed to fully develop markets, which can affect project economics by increasing unit costs during early years of operation. Uncertainty of market demands creates a risk to cost recovery required for the repayment of capital debt.

   Estimates show the need for about $4 billion in capital improvements for near-term projects to develop 450 TAF per year of recycled water from future 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's Local Resources Program (LRP) assists member agencies in overcoming this obstacle. In its role as the regional water supplier, Metropolitan provides financial assistance up to $250 per AF to participating projects that displace a demand on its imported water supplies.

   In addition to the LRP, many water agencies partner with wastewater agencies to provide needed financial resources. The San Diego County Water Authority's Reclaimed Water Development Fund 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 encourages wastewater agencies to consider water reuse as a supply option. Project partnerships between water supply and wastewater treatment agencies have led to projects in which both entities contribute financial resources and share multiple benefits.

The USBR's Title XVI program Authorized by congress in 1992 represents another major funding source. To date, approximately $94 million grants has been provided to projects in Metropolitan's service area.

Proposition 50, passed in 2002, includes funding for the development of local projects including water recycling. It is expected to be an important source of funding for local projects.

The proposed bond under the Safe, Clean, and Reliable Drinking Water Supply Act of 2010, if passed by voters in November 2010, could provide an additional one billion dollars of grants and loans for development of water recycling projects.

The State Water Resources Control Board's (SWRCB) State Revolving Fund program continues to provide low interest loans for capital funding of water recycling projects. Loan payment proceeds go back to the Fund to provide loans to other projects.

2. <u>Regulatory Issues</u> – Two state agencies are involved in regulating water recycling projects. The Regional Water Quality Control Board (RWQCB) is the permitting authority and the CDPH oversees public 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 corresponding reuse opportunities. Currently, state regulatory agencies review and determine requirements for recharge projects on a case-by-case basis.

   a. *SWRCB Recycled Water Policy* – SWRCB adopted the State Recycled Water Policy (Policy) in February 2009 after several years of negotiation. The Policy supports the SWRCB 2008-2001 Strategic Plan to promote sustainable local water supplies and establishes a mandate to increase the use of recycled water in California by 200 TAF per year by 2020 and by an additional 300 TAF per year by 2030. The Policy is organized into recycled water goals, roles of agencies, salt and nutrient management plans, landscape irrigation, groundwater recharge, anti-degradation, emerging constituents, and recycled water incentives.

      Due to incomplete knowledge of emerging contaminants analytical methods and public health impacts, the SWRCB has established a technical blue ribbon advisory panel to evaluate the current situation and provide recommendations to the SWRCB.

   b. *SWRCB General Permit for Landscape Irrigation Use of Municipal Recycled Water* – Pursuant to California Water Code § 13552.5, (Assembly Bill 1481, De La Torre, 2007) the SWRCB adopted a general permit for landscape irrigation uses of recycled water for which CDPH has established uniform statewide recycling criteria pursuant to Section 13521. The General Permit for Landscape Irrigation Uses of Municipal Recycled Water allows the use of recycled water for landscape irrigation including uses for parks, greenbelts, playgrounds, cemeteries, commercial landscaping, and freeway and highway landscaping.

The general permit's intent was to develop a uniform interpretation of state standards that ensures the safe, reliable use of recycled water for landscape irrigation uses, consistent with state and federal water quality law. The general permit would be for uses where CDPH has established uniform statewide standards. The general permit is also intended to reduce costs to producers and users of recycled water by streamlining the permitting process for its use in landscape irrigation.

In addition, Metropolitan continue to work with other agencies and provide comments on the proposed revisions to CDPH's Draft Title 22 Code of Groundwater Recharge Regulations, California Department of Housing and Community Development's Graywater standards, and DWR's proposed Dual Plumbing design standards.

Draft Title 22 Groundwater Recharge Reuse Regulations were proposed by the CDPH on August 5, 2009. The regulations proposed changes the level of treatment, retention time, and dilution of groundwater recharge projects. Additional public comments periods are anticipated in 2010.

The emergency graywater regulations, which added Chapter 16A "Nonpotable Water Reuse Systems" into the 2007 California Plumbing Code, were approved by the California Building Standards Commission (CBSC) on July 30, 2009. The emergency regulations were subsequently filed with the Secretary of State on August 4, 2009 and became effective immediately upon filing.

Assembly Bill 371 (Goldberg 2006) and Senate Bill 283 (DeSaulnier, 2009) directed the DWR, in consultation with the State Department of Health Services, to adopt and submit to the California Building Standards Commission regulations to establish a state version of Appendix J (renamed Chapter 16 Part 2) of the Uniform Plumbing Code to provide design standards to safely plumb buildings with both potable and recycled water systems.

On November 18, 2009 the Building Standards Commission unanimously voted to approve the California Dual Plumbing Code that establishes statewide standards for installing both potable and recycled water plumbing systems in commercial, retail, and office buildings, theaters, auditoriums, condominiums, schools, hotels, apartments, barracks, dormitories, jails, prisons, and reformatories. The code is scheduled to be published in July 2010 with an effective date of January 1, 2011.

3. *Institutional Issues* – Multiple local agencies are often involved in the development of local water recycling projects. For example, recycled water from a single wastewater source may be used by a number of agencies that provide recycled water service, 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 deliver recycled water within a water district's service area. If recycled water is used for groundwater recharge, local agencies must coordinate 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.

4. *Water Quality* – Water quality requirements for various types of irrigation and industrial uses are critical when evaluating whether recycled water will be an acceptable supply. Possible

constituents in recycled water, such as TDS, chloride, pH, or ammonia, may cause problems for specific applications. Several golf courses and other users have complained about the high salt content in recycled water and expressed reluctance to its use on their property or crops. Also, groundwater basin managers are concern with increasing salt load in groundwater due to use of high salinity recycled water. Therefore, agencies, locally and on regional basis, are engaged in addressing the high salinity in recycled water and plan for salinity management control to accommodate the water quality needs of customers and to reduce salt accumulation in underlying groundwater where recycled water is used.

5. <u>Seasonal Storage</u> – Production of wastewater at a water reclamation plant is relatively uniform year round since indoor residential use does not vary much from winter to summer. Flows may be somewhat higher in the winter at the wastewater reclamation plant from stormwater inflow into the sewers, but more than 60 percent of irrigation demand on recycled water (parks, golf courses, etc.) occurs in summer (May through September). Therefore, some projects store surplus recycled water in the winter for later use during the dry summer months to optimize recycling. Agencies such as Las Virgenes Municipal Water District and Irvine Ranch Water District have undertaken extensive engineering and operational studies to manage their seasonal supply variations. Operational storage is also needed because regulations only allow watering at night to reduce opportunities for direct public contact. Current practice is to use supplement recycled water with potable water or other water to meet peak demand in summer which outpace available recycled water supplies.

6. <u>Public Acceptance</u> – Public education programs are an integral part of recycled water project implementation. Recycled water users and the general public need to be educated on recycled water benefits and need to be reassured of the safety of recycled water. To encourage public acceptance, Metropolitan supports a continuous review of recycled water use regulations to ensure streamlined administration, public health, environmental protection, and research efforts that address public acceptance, new technologies, and health effects assessments.

B. Groundwater Recovery

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

In limited instances, recovering degraded groundwater costs less than purchasing imported water from Metropolitan. As a result, these projects have moved forward on their own because they make economic sense. In many cases, particularly where total dissolved solids are the constituent of concern, more expensive membrane processes are required, and agencies are more reluctant to make the capital investments necessary to recover the degraded water. In those cases, agencies typically seek financial assistance to offset costs.

Metropolitan initiated its Groundwater Recovery Program (GRP) in 1991 to encourage local agencies to treat and use degraded groundwater for municipal purposes. Under the GRP, Metropolitan provided financial assistance of up to $250 per AF to local agencies 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. The GRP was open to all technologies that recovered and used degraded groundwater. It was retired in 1998 folded into Metropolitan's Local Resources Program, which now includes both recycled water and groundwater recovery projects.

Use of degraded groundwater normally requires high levels of treatment. Membrane processes used to recover the majority of severely degraded water have a high capital cost and incur a high operational cost for power. Once treated, however, recovered groundwater may be integrated to potable water systems.

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. Since discharge to sewers only exacerbates the salinity problems that challenge downstream water recycling projects, brine disposal requires separate and expensive ocean outfalls.

Lastly, most of the groundwater basins in Southern California are regulated by basin managers through adjudication or groundwater management plans. Where recovery of contaminated groundwater exceeds the limitations on production of groundwater specified in the basin adjudication or management plan groundwater recovery projects may include groundwater replenishment with supplemental water.

<u>Brine Disposal</u>

All processes that recover degraded groundwater also produce concentrated waste flows for which disposal can be problematic. Most importantly, membrane processes such as reverse osmosis – the predominant desalting technology used in Southern California – produce significant volumes of brine that can account for about 15 percent of the treated water. In Southern California, brines generated from brackish water desalination are typically disposed through dedicated brine lines to ocean outfalls or sanitary sewers. Advanced wastewater treatment with membrane also generates a high salinity brine.

Brine disposal is a critical issue facing Southern California in the further development of brackish groundwater projects and recycled water supplies, since introducing high-salinity brines into sanitary sewers impacts the ability to recycle waste water. The U.S. Bureau of Reclamation, partnering with Metropolitan and 13 other water, waste water and groundwater agencies, recently completed a study of the Region's brine disposal current and future needs. The Southern California Regional Brine-Concentrate Management Study, Phase I, found that brine generation from brackish groundwater desalters is expected to grow from 15 mgd in 2008 to 76 mgd by 2035. Over the same period, brines produced by advanced treatment of wastewater for recycled uses will grow from 17 mgd in 2008 to 60 mgd by 2035. Total local supplies of about 500 mgd would be supported by brine producing projects and necessary disposal by 2035.

The management of existing regional brine lines and the development of new brine line systems will be a critical factor in the continued growth in brackish groundwater desalination and recycled water supplies in Southern California. The region currently has one operating brine line, the Santa Ana Regional Interceptor (SARI line). The SARI line collects brine from desalters in San Bernardino, Riverside, and Orange counties. A key benefit of the SARI line is that it has allowed inland water agencies to recover impaired groundwater resources which would otherwise be unusable. A second brine line – the Calleguas Regional Salinity Management Project is under construction in Ventura County, and will collect brine from existing and planned groundwater desalters and wastewater treatment plants. A third regional line is in the planning phase in San Diego County. The Southern California Salinity Coalition, a coalition of water and wastewater agencies, has advocated for state and federal financial assistance to build these regional brine lines.

C. Seawater Desalination

Seawater desalination represents a significant opportunity to diversify the region's water resource mix with a new, locally controlled, reliable potable supply. Like conservation, recycling, and other new local supplies, seawater desalination will increase regional supply reliability by offsetting existing and future demands for imported water. Metropolitan continues to pursue a target for seawater desalination of 150,000 AF per year by 2025, and several local and retail water agencies have identified seawater desalination as an important component of their water supply portfolio in their Urban Water Management Plans.

The implementation of large-scale seawater desalination plants in California offers many opportunities and challenges. In the past decade, advances in energy efficiency and membrane technology have reduced the cost of seawater desalination relative to the costs for imported water supplies and other supply alternatives. Challenges to seawater desalination include high capital and operation costs, pre-treatment design, addressing environmental issues, system integration, and navigating an uncertain permitting process. Metropolitan's member agencies are actively pursuing research into alternative intake and outfall technologies, process designs, and treatment alternatives that could minimize some of the environmental issues and lower unit costs.

Changed Conditions

The status of locally planned recycling and groundwater recovery projects changes from year to year. Metropolitan periodically surveys its member agencies for planned projects to coordinate local supply projections and plans. Changes in long-term strategies, regulations, funding priorities, and new opportunities contribute to changing outcomes.

Other changes include the following:

- Decreases in the seawater desalination costs;
- Accelerated development of groundwater recovery projects;
- Increases in recycled water use for groundwater replenishment and seawater barriers.

Implementation Approach

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

Since 1982, Metropolitan has implemented several programs to provide financial assistance to its member agencies and subagencies for developing local water supplies. Metropolitan's incentive programs are based on a pay-for-performance principle, with incentive payments provided on a contractual basis for yield developed by local agencies and applied to beneficial uses. These incentive programs have been instrumental in helping the region implement Metropolitan's local resource targets. Since the inception of the program, Metropolitan has invested more than $347 million and partnered with member agencies on 62 recycling projects and 22 groundwater recovery projects. Member and retail agencies have also funded a significant number of local projects without Metropolitan funding, many of which pre-date Metropolitan's incentive programs. The following is a brief summary of the evolution of Metropolitan's investment in water recycling and groundwater recharge implementation.

Water Recycling and Groundwater Recovery

1981 The Local Projects Program (LPP) was initiated and designed to facilitate the development of water reclamation projects. Under the original program, Metropolitan contributed a negotiated amount to help finance project capital costs. Two projects were constructed under this approach for a collective yield of 3,560 AF per year.

1986 The LPP was revised such that Metropolitan contributed its avoided energy costs of State Water Project pumping in the form of a rebate per acre-foot of recycled water delivered to end-use customers. This change was based on the assumption that local projects resulted in the avoidance of water importation pumping costs. Under the 1986 revisions, 14 projects with a combined ultimate yield of 31 TAF per year were approved for LPP assistance.

1990 Metropolitan's Board increased the LPP contribution to $154 per AF, which was calculated based on Metropolitan's avoided capital and operational costs to convey, treat, and distribute water, and included considerations of reliability and service area needs. In 1990, the LPP goal was to achieve an additional 150 TAF of recycled water use by the year 2000.

Attributes of the LPP included a relatively simple program administration where participating agencies could depend on receiving a fixed level of contribution per acre-foot of recycled water delivered, and payments were tied to performance. Disadvantages of the LPP were that fixed contribution payments may not provide sufficient incentives during the early years of a project to encourage development of economical projects. In addition LPP contributions were based on preliminary, feasibility level cost estimates made prior to construction which could result in over payment by Metropolitan.

1991 The Groundwater Recovery Program (GRP) established in 1991, was designed to improve water supply reliability through the recovery of otherwise unusable groundwater that has been degraded by minerals and other contaminants and provide access to the storage assets of the degraded groundwater. An ancillary benefit was maintaining the quality of groundwater resources by reducing the spread of degraded plumes. In 1991, the GRP goal was to implement projects to recover 200 TAF per year of groundwater for domestic purposes.

The GRP was similar to the LPP in that Metropolitan entered into agreements to pay for water produced by each individual project for 20-year terms. However, the GRP contribution was paid based on a sliding scale from $0 to a maximum of $250 per AF. To receive a contribution, project unit costs must have exceeded Metropolitan's non-interruptible treated water rate. When the project unit cost of the GRP project equaled the current applicable Metropolitan water rate, the incentive was zero. Agencies are required to submit annual project costs and production data at the conclusion of each fiscal year of operation in order to determine the appropriate incentive.

The main advantage of the GRP over the LPP was that variable rate contributions provided a greater financial incentive in the early years of project operation, when project unit costs were higher. Further, GRP contributions were based on actual incurred construction, operation and replacement costs, and water production values reported after the end of the fiscal year. These costs and production values are subject to audit. However, program administration under the GRP is more difficult than the LPP because project costs must be verified annually, and discrepancies involving payment adjustments have to be resolved.

1995 During development of the Local Resources Program (LRP), Metropolitan's board allowed the immediate conversion of existing projects under the LPP to include proposed GRP-type incentive terms. The proposal was made to 40 approved LPP projects at the time, of which 37 projects had already executed agreements and three were in the process of final execution. Conversion of projects from the existing LPP to LRP was voluntary and was accomplished through the amendment of existing agreements. The proposal was extended to seven additional LPP projects whose applications were under review at the time.

By June 1999, new agreements were executed that converted 15 LPP projects to include new LRP terms similar to sliding scale incentives paid under the GRP.

1996 Metropolitan's IRP identified goals for a diverse mix of six local and imported water resource elements optimized to meet future supply reliability in a cost-effective manner. The IRP set initial targets for resource development that the region must achieve for water supply reliability through the year 2020. Studies showed reduced long-term costs to the region when local resources were developed due to downsizing or deferral of Metropolitan's capital improvements, reduction in operating costs for importation, treatment and distribution, and reduction in costs for developing alternative regional supplies. Encouraging water recycling and groundwater recovery projects by providing financial assistance was consistent with the IRP goals approved by Metropolitan's board as a strategy to meet future water supply reliability needs of Metropolitan's service area in a cost-effective manner.

1998 Metropolitan established the competitive Local Resources Program, which encourages local development of recycled water and recovered groundwater through a process that emphasizes cost-efficiency to Metropolitan, timing new production according to regional need, and minimizing administrative cost and complexity. The LRP replaced the LPP and GRP with uniform criteria for financial assistance to local projects that contribute to regional water supply reliability. Under the competitive program, agencies requested fixed financial assistance payments up to $250 per AF of production for agreement terms up to 25 years. Proposals that requested lower financial assistance and terms scored higher under the competitive process. Under the LRP, Metropolitan issues a request for proposals for a specified regional quantity of water to achieve production targets identified under the IRP. A review panel evaluates proposals using scoring criteria adopted by Metropolitan's board and identifies the mix of project proposals that best meet the region's needs consistent with the RFP.

In June 1998, Metropolitan issued a Request for Proposals (RFP) for the development of 53,000 AF per year of new water recycling and groundwater recovery projects under the LRP to help achieve regional water supply reliability goals identified by the IRP. Fourteen projects were selected through the competitive process and agreements were executed with the local agencies by April 2000 to provide financial assistance for up to 25 years.

In April 2003, Metropolitan issued the second competitive RFP for the development of an additional 65,000 AF of new recycled water and recovered groundwater under the LRP. Thirteen projects were competitively selected and agreements for ten local projects were executed by December 2005. Three projects did not meet the deadline for inclusion in the LRP.

Under the competitive RFP process the weighted average incentive payment for 27 projects is about $115 per AF of yield, and is below the maximum contribution of $250 per AF. Additionally, some proposals resulted in shorter duration agreements compared to the maximum of 25 years.

2004 The Board approved the IRP Update that refined regional supply development targets based on the identified changed conditions and provided a long-term resources plan to 2025. These targets, specified in five-year intervals, set development schedules needed to ensure regional supply reliability, allowing for compliance with current applicable water code provisions and growth legislation. The IRP Update also established the concept of a 10 percent water supply planning buffer, which set total resource development targets above forecasted water demands for planning purposes, and identified resources in advance of need.

2007 Metropolitan updated the policies and procedures for the LRP and established a goal of financing additional 174 TAF per year of new water recycling and groundwater recovery under the LRP. The program shifts from a competitive selection process to a first-come-first served bases with priorities given to projects that are ready to proceed. Under the new program, LRP incentive are on a sliding scale of up to $250 per AF, calculated annually based on actual project unit cost above Metropolitan's prevailing water rate. Project applications are accepted on a continuous basis until the IRP target is achieved. So far, Metropolitan has approved five projects totaling 57,150 AF per year under the 2007 LRP. Since then, Metropolitan has entered into agreements with local agencies for implementation of five projects with an ultimate yield of 57 TAF of recycled water. Metropolitan is currently reviewing LRP applications for nine water recycling and groundwater recovery projects, which would collectively produce 40 TAF of new water.

Seawater Desalination Program

Metropolitan's Seawater Desalination Program (SDP) was created in 2001 to encourage the development of seawater desalination by local agencies and was modeled after the LRP. Like the LRP, it offers sliding-scale incentives to member and local agencies that provide up to $250 per AF for produced supplies. The incentive is designed accelerate the development of expensive local supply projects by local agencies by lowering their cost. Metropolitan has entered into four SDP agreements, while a fifth potential project is currently on hold.[2] Of the four SDP projects, the Carlsbad Seawater Desalination project is the farthest along. This project has obtained all of the local, State, and Federal permits for necessary to begin construction, though as of May 2010, there are legal challenges to three of the permits. Project proponents anticipate the project will

[2] LADWP's 28,000 AF per year seawater desalination project.

come on-line as early as 2012, providing the region with an additional 56 TAF of new local supplies. Table 3-13 provides a summary of the status of the four SDP projects. Local agencies are also considering three projects independent of the SDP with the potential to produce up to 280,000 AF per year if developed. Table 3-14 provides a summary of these local agency projects.

Table 3-13
Seawater Desalination Program Project Status

Project	Member Agency Service Area	AF per Year	Status	Executed Incentives Contract
Long Beach Seawater Desalination Project	Long Beach Water Department	10,000	Pilot study	Yes
South Orange Coastal Ocean Desalination Project	Municipal Water District of Orange County	16,000-28,000	Pilot study	Yes
Carlsbad Seawater Desalination Project	San Diego County Water Authority	56,000	Permitting	Yes
West Basin Seawater Desalination Project	West Basin Municipal Water District	20,000	Pilot study	Yes
Total: Seawater Desalination Projects		**102,000-114,000**		

Table 3-14
Other Potential Seawater Desalination Projects in Metropolitan's Service Area

Project	Member Agency Service Area	AF per Year	Status
Huntington Beach Seawater Desalination Project	Municipal Water District of Orange County	56,000	Permitting
Camp Pendleton Seawater Desalination Project	San Diego County Water Authority	56,000 to 168,000	Planning
Rosarito Beach Seawater Desalination Feasibility Study	San Diego County Water Authority	28,000 to 56,000[1]	Feasibility study
Total: Other Potential Projects		**140,000 to 280,000**	

[1] Metropolitan's service area would receive a share of the total supply produced by the project.

To promote the development of local seawater desalination projects, Metropolitan provides regional facilitation by supporting member agency projects during permit hearings and other proceedings, coordinating responses to potential legislation and regulations, and working with the member agencies to resolve related issues such as greenhouse gas emission standards and seawater intake regulations that could impact seawater desalination projects. Metropolitan has also formed a special Board Committee to find additional ways to promote potential projects and explore opportunities for developing regional seawater desalination supplies.

Achievements to Date

Metropolitan is committed to providing financial assistance to the development of water recycling projects throughout its service area. Since adopting the IRP in 1996, Metropolitan and its 26 member agencies, have made significant progress in achieving regional targets for recycling and groundwater recovery. Since 1982, Metropolitan executed LRP contracts for 62 recycled water projects, of which 59 produced about 161 TAF in 2009. Local projects not receiving funding from Metropolitan provide an additional 147 TAF of recycled water to the region.

Since 1991, Metropolitan executed GRP and LRP contracts for 23 recovered groundwater projects, of which 22 produced about 62 TAF in 2009. In addition to the projects under Metropolitan's programs, about 35 TAF of degraded groundwater is recovered by agencies in Metropolitan's service area without Metropolitan's financial assistance.

Table 3-15 provides a summary of the current level of regional production from these local projects. To date, Metropolitan has invested $244 million in recycling programs and $102 million for groundwater recovery. Table 3-16 provides a summary of the groundwater and recycled water production and incentive payment under Metropolitan's programs to date.

Metropolitan has continued to develop and refine its programs to encourage the involvement of its member agencies in water recycling, groundwater recovery, and desalination. Developing and managing these programs requires considerable coordination and refinement. Changing conditions over the last five years have reduced the costs of these options and allow Metropolitan to rely on these sources for future water supply.

Table 3-15
2009 Water Production From Recycling and Groundwater Recovery
(TAF)

Type of Project	With Metropolitan Funding	Without Metropolitan Funding	Total
Recycled Water	161	147	308
Groundwater Recovery	62	35	97
Total	**223**	**182**	**405**

Table 3-16
Local Resources Program[1]

	Recovered Groundwater	Recycled Water	Total
Projects			
Planned	22	62	84
In Operation	21	59	80
Ultimate Yield (TAF)	86	335	421
Deliveries (AF)			
FY 2008/2009	62	161	223
Since Inception	545	1,323	1,868
Payments ($ millions)			
FY 20082009	$12.6	$26.7	$39.3
Since Inception	$102.4	$244.3	$346.7

[1]Including Chino II Desalter

3.6 Storage and Groundwater Management Programs: Within the Region

Since the 1950s, local water management in Metropolitan's service area has included the conjunctive use of groundwater and surface water. Conjunctive use of water refers to the use and storage of imported surface water supplies in groundwater basins and reservoirs during periods of abundance. This stored water is available for use during periods of low surface water supplies as a way of augmenting seasonal and multiyear shortages.

Storage capacity in the region's groundwater basins allows for conjunctive use programs. In 2000, the Association of Ground Water Agencies (AGWA) published Groundwater and Surface Water in Southern California: A Guide to Conjunctive Use that estimated the potential for dry-year or long term conjunctive use in Metropolitan's service area at approximately 4.0 MAF. In 2007, Metropolitan published the Groundwater Assessment Study that estimated 3.2 MAF of space in groundwater basins available for storage within Metropolitan's service area.

To prepare for supply disruptions, Metropolitan and its member agencies have adopted goals for water storage within the region. Metropolitan has identified in-region storage that should be set aside for use in emergencies, such as a disruption to the California Aqueduct. In addition, Metropolitan's planning process calls for dry-year storage that can be called on at times of supply shortage due to drought.

Background

Metropolitan established general long-term storage guidelines in its WSDM plan. The WSDM plan provides for flexibility during dry years, allowing Metropolitan to use storage for managing water quality, hydrology, SWP, and CRA issues. Dry-year surface storage yields have been characterized in several ways, including delivery capabilities over two- and three-year dry periods. The approach used in the Metropolitan's resource planning assumes that dry-year surface storage can be used as needed and as available within the WSDM planning framework. Metropolitan had identified an in-region surface water target of 620 TAF of dry-year storage for year 2020. Metropolitan had achieved this target and aims to sustain this level of storage in Diamond Valley Lake (DVL) and in the SWP terminal reservoirs (Castaic and Perris) made available through the Monterey Amendment to the SWP contract.

Metropolitan has also refined its characterization of the flexible storage available in the SWP terminal reservoirs. Previous planning studies assumed that up to 50 percent of the available SWP flexible storage could be used in a repeat of a single dry-year event, such as the 1977 hydrology. In its current planning strategy, Metropolitan's dry-year surface production, including Monterey storage, is not limited in this way. Instead, Metropolitan's reliability modeling determines the availability of stored surface water supplies in each forecast year based on historical hydrology.

Implementation Approach

A. Surface Storage

Since the beginning of the Metropolitan's planning process, two significant changes have occurred to regional surface storage.

<u>Diamond Valley Lake</u>

Construction of Southern California's newest and largest reservoir nearly doubled the area's surface water storage capacity. Transport of imported water to the lake began in November 1999, and the lake reached capacity in early 2003. DVL holds up to 810 TAF, some of which is for dry-year and seasonal storage, and the remainder for emergency storage.

<u>SWP Terminal Reservoirs</u>

Under the 1994 Monterey Agreement, Metropolitan received operational control of 218,940 AF in the reservoirs at the southern terminals of the California Aqueduct. Control of this storage capacity in Castaic Lake and Lake Perris gives Metropolitan greater flexibility in handling supply shortages. In 2005, seismic concerns arose regarding Perris dam. In response, DWR reduced the storage amount at Lake Perris by half until those concerns can be studied and addressed; however, Metropolitan operational storage remained the same. Since then, Metropolitan has continued to withdraw and replace water from the reservoir operating from the lower level. In January 2010, DWR issued a Draft Environmental Impact Report for the repair of the dam at Lake Perris. Discussions are ongoing regarding the ultimate disposition of reservoir as it relates to costs allocated to the SWP contractors.

B. Groundwater Storage

Many local groundwater storage programs have been implemented over the years to maximize the use of local water supplies. These programs have included the diversion of water flows into percolation ponds for recharging groundwater basins and the recovery of degraded groundwater.

- For many years, flood control agencies within Metropolitan's service area have captured and spread stormwater for groundwater replenishment. Local runoff and reclaimed water have been conserved via spreading grounds, injection wells, reservoirs, and unlined river channels. In addition, flood control agencies have operated seawater barrier projects in Los Angeles and Orange Counties to prevent seawater intrusion into the coastal groundwater basins.
- Growing water quality problems have raised serious concerns about the ability to sustain average annual production levels. The federal Superfund program, although slow to implement clean-up projects, has helped maintain or increase the usable groundwater. These increased levels have been augmented by groundwater water recovery projects discussed in Section 3.5.

Conjunctive use of the aquifers offers an even more important source of dry year supplies. Unused capacity in Southern California groundwater basins can be used to optimize imported water supplies, and the development of groundwater storage projects allows effective management and regulation of the region's major imported supplies from the Colorado River and SWP. To meet the adopted targets for dry year storage, Metropolitan and its member agencies have encouraged the recharge of the groundwater basins. Over the years, Metropolitan has implemented conjunctive water use through various incentive programs. Typically this storage takes place in one of two ways:

- Direct deliveries to storage – Metropolitan delivers replenishment water directly to water storage facilities, including spreading sites and injection wells.
- In-lieu deliveries to storage – Metropolitan delivers additional water directly to the member agency's distribution system. The member agency then uses this water rather than pumping the groundwater it otherwise would have taken out of storage. The deferred local production results in water being left in local storage (surface or groundwater) for future use.

Metropolitan has developed a number of local programs to work with its member agencies to increase storage in groundwater basins. Metropolitan has encouraged storage through its replenishment, cyclic, and conjunctive use storage programs. These programs allow Metropolitan to deliver water into a groundwater basin in advance of agency demands. Discounted replenishment service water is delivered when Metropolitan has surplus imported water supply and is for use after one year. Cyclic storage agreements allowed pre-delivery of surplus imported water for recharge into groundwater basins in excess of an agency's planned and budgeted deliveries. This water is then purchased at a later time when the agency has need for groundwater replenishment deliveries. Conjunctive use agreements provide for storage of imported water that can be called for use by Metropolitan during dry, drought, or emergency conditions. During a dry period, Metropolitan has the option to call water stored in the groundwater basins pursuant to its contractual conjunctive use agreements. At the time of the call, the member agency pays Metropolitan the prevailing rate for that water. Since 2007, Metropolitan has drawn on dry-year supply from cyclic storage accounts with several member agencies, long-term replenishment programs, and ten contractual conjunctive use storage programs to address shortages from the State Water Project.

Achievements to Date

In 2000, Metropolitan entered an agreement with the State of California Department of Water Resources to administer $45 million of Proposition 13 state bond funds for Metropolitan's Southern California Water Supply Reliability Projects Program. Metropolitan paired the $45 million of state funds with $35 million of Metropolitan capital funds to develop nine groundwater storage programs in partnership with member and retail agencies and groundwater basin managers. These nine contractual storage programs combined with one additional conjunctive use program previously developed provide for storage of up to 422 TAF and dry-year yield of up to 117 TAF. These programs are summarized in Table 3-17.

In 2007, Metropolitan prepared the Groundwater Assessment Study Report in collaboration with its member agencies and with groundwater basin managers. The report finds that while there is substantial storage space in service area groundwater basins that could be used for conjunctive use, that there are significant challenges that must be overcome in order to implement additional storage programs. Use of additional storage opportunity requires:

- capture, delivery and recharge of additional local and imported surface supplies;
- improved capability to store available of surplus surface supplies with adequate conveyance and recharge capacity; and
- resolution of constraints including: remediation of contamination, institutional and legal issues, funding for significant investment in capital infrastructure, and incongruity between aquifer capability with overlying demand for water supplies.

To follow up on the findings of the Groundwater Assessment Study Report, Metropolitan initiated a series of seven groundwater workshops beginning in July 2008 among Metropolitan, member agencies, groundwater basin managers, and stakeholders to discuss challenges for increasing conjunctive use and to develop recommendations for addressing the challenges. The workgroup's recommendations were submitted as a Board Report to Metropolitan's Board of Directors and provided as input to Metropolitan's current planning process. The recommendations are as follows:

1. Enhance groundwater recharge with increased storm water and recycled water recharge and imported replenishment water when it is available.
2. Streamline requirements, remove policy constraints, clarify procedures, increase coordination and sharing of information to accomplish recharge goals.
3. Develop flexible regional policies and programs that can be tailored to meet

specific local needs of each groundwater basin.

4. Increase integration of local groundwater and regional water supplies with proposal for a comprehensive modeling study to initiate review of innovative opportunities.
5. Use appropriate price signals to encourage conjunctive use and investments for storage.
6. Increase coordination among Metropolitan, member agencies, basin managers, groundwater producers and stakeholders inclusive of collaboration for legislative, regulatory, and educational efforts in support of specific initiatives and funding needed for sound groundwater management.

As an initial effort toward comprehensive modeling for increased integration of local and regional water supplies recommended in the workshop process, Metropolitan worked with groundwater basin managers to develop groundwater basin modules for five key groundwater basins in its service area. The modules are run with Metropolitan's regional supply model, RPSIM, to evaluate conjunctive use opportunities and changes to groundwater basin water levels under a variety of local and regional supply scenarios.

In 2010, Metropolitan entered into an agreement with the Los Angeles County Sanitation District to conduct a feasibility study for developing a regional recharge project using recycled water.

Other Identified Contractual Groundwater Storage Programs

Metropolitan continues to discuss opportunities to expand groundwater conjunctive use storage programs throughout its service area. The use of the supplemental storage program in 2005 provides one example of these opportunities. The state's wet winter of 2004-05 provided Metropolitan with abundant water supplies. To encourage maximized storage in the region, Metropolitan offered discount rates to its member agencies that allowed more storage of surplus imported water supplies than previously planned. The stored water was produced at Metropolitan's call in 2008-09 and 2009-10 to offset imported water demands. Identified potential programs include:

- Chino Basin Storage Program Expansion
- Orange County Basin Storage Program Expansion
- Pasadena Groundwater Storage Program
- North Las Posas Phase 3
- Central Basin Storage Program
- West Basin Storage Program
- San Fernando Basin Storage Program
- San Jacinto Basin Storage Program
- City of San Diego Storage Program

Table 3-17
Contractual Conjunctive Groundwater Projects

Project and Project Proponents	**Storage Capacity** (TAF)	**Dry-Year Yield** (TAF/Year)	**Balance as of July 1, 2007** (TAF)	**Storage Account Balance as of 12/31/2009** (TAF)
LOS ANGELES COUNTY				
Long Beach Conjunctive Use Project Long Beach	13.0	4.3	13.0	6.4
Foothill Area GW Storage Project Foothill MWD	9.0	3.0	3.3	0.6
Long Beach CUP: Expansion in Lakewood Long Beach	3.6	1.2	1.8	1.8
City of Compton Conjunctive Use Program City of Compton	2.3	0.8	1.1	0
Upper Claremont Heights Conjunctive Use Three Valleys MWD	3.0	1.0	0	0
ORANGE COUNTY				
Orange County GW Conjunctive Use Program OCWD, MWDOC	66.0	22.0	47.9	8.6
SAN BERNARDINO COUNTY				
Chino Basin Programs IEUA, TVMWD, Chino Basin Watermaster	100.0	33.0	80.6	23.0
Live Oak Basin Conjunctive Use Project Three Valleys MWD	3.0	1.0	0.70	0.7
RIVERSIDE COUNTY				
Elsinore Groundwater Storage Program Western MWD, Elsinore Valley MWD	12.0	4.0	0.4	0
VENTURA COUNTY				
North Las Posas Groundwater Storage Program Calleguas MWD	210.0	47.0	60.6	43.5
Total	**421.9**	**117.3**	**209.4**	**84.6**

3.7 20x2020 Water Reduction Target

In November 2009, Governor Arnold Schwarzenegger signed the Water Conservation Act of 2009 (SB 7) into law as part of the historic comprehensive water package designed to address the State's growing water challenges. The Act represented the culmination of efforts by water industry leaders (including Metropolitan), the environmental community, and the Legislature to enact legislation that would answer the governor's call for the state to reduce per capita water use 20 percent by the year 2020 (referred to as "20x2020") as part of a larger effort to ensure reliable water supplies for future generations and restore the Bay-Delta.

The 20X2020 legislation requires urban retail water suppliers to develop urban water use targets to help meet the 20 percent reduction in water use by 2020, with interim targets for 2015. The legislation provides flexibility in how targets are established and achieved. Per capita reductions can be accomplished through any combination of increased water conservation, improved water use efficiency, and increased use of recycled water to offset potable demand. Potable demand offsets can occur through direct reuse of recycled water, such as for irrigation, or indirect potable reuse through groundwater recharge and reservoir augmentation. Retail water suppliers receive partial credit for past efforts in conservation and recycled water; therefore, not all agencies need to reduce demand by 20 percent in order to comply with the new law.

The legislation provides additional flexibility by allowing compliance on an individual agency basis or through collaboration with other agencies in a region. Based on Metropolitan's analysis of population and demand and the methodologies for setting targets described in the legislation, compliance with 20x2020 on an individual agency basis throughout the region would result in reduced potable demand of 380 TAF in 2020. The additional conservation and/or recycling that local water agencies would implement at the retail level to attain the 380 TAF target in 2020 and an interim target of 190 TAF by 2015 are reflected in the 2010 RUWMP demand projections.

Achieving regional consistency with the legislative goal – a 20 percent reduction for the region as a whole – would result in additional savings of 200 TAF for a total of 580 TAF. This additional 200 TAF savings target for 2020 could be an important part of the region's future supplies and is included in the Programs under Development in the water supply forecast tables presented in Appendix A.3. For the region, the baseline water demand is estimated to be 178 gallons per capita per day (GPCD). A 20 percent reduction would reduce this to 142 GPCD. Achieving an annual demand reduction of 580 TAF by 2020 will require additional local and regional investments in both conservation and recycled water.

The policies and programs to address the water reduction target will be consistent to Metropolitan's conservation measured described in Sections 3.4 and the water recycling efforts described in Section 3.5.

Metropolitan's 2004 IRP Update includes a goal of 10 TAF per year for active water conservation programs and a recycling goal of 135 TAF of annual recycled water. These two goals combined with measures taken by retail water agencies would be the means to achieve the regional 20x2020 goal.

Over the next five years, Metropolitan will periodically assess water supply conditions and trends in per capita demand within its service area and evaluate potential programs to ensure attainment of the goal. Metropolitan also continues to provide support for retail agency efforts through technical assistance, legislation, code and standards updates, and potential financial incentives where needed for market transformation to increase water use efficiency.

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Water Quality

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Metropolitan's planning efforts have recognized the importance of the quality of its water supplies. To the extent possible, Metropolitan responds to water quality concerns by concentrating on protecting the quality of the source water and developing water management programs that maintain and enhance water quality. Contaminants that cannot be sufficiently controlled through protection of source waters must be handled through changed water treatment protocols or blending. These practices can increase costs and/or reduce operating flexibility and safety margins. In addition, Metropolitan has developed enhanced security practices and policies in response to national security concerns.

Background

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. Metropolitan has two major sources of water: the Colorado River and the State Water Project (SWP). Groundwater inflows are also received into the SWP through groundwater banking programs in the Central Valley. Each source has specific quality issues, which are summarized in this section. To date, Metropolitan has not identified any water quality risks that cannot be mitigated. As described in this section, the only potential effect of water quality on the level of water supplies based on current knowledge could result from increases in the salinity of water resources. If diminished water quality caused a need for membrane treatment, Metropolitan could experience losses of up to 15 percent of the water processed. However, Metropolitan would only process a small proportion of the affected water and would reduce total salinity by blending the processed water with the remaining unprocessed water. Thus, Metropolitan anticipates no significant reductions in water supply availability from these sources due to water quality concerns over the study period.

Colorado River

High salinity levels represent a significant issue associated with Colorado River supplies. In addition, Metropolitan has been engaged in efforts to protect its Colorado River supplies from threats of uranium, perchlorate and Chromium VI, which are discussed later in this chapter. Metropolitan has also been active in efforts to protect these supplies from potential increases in nutrient loading due to urbanization, as well as investigating the sources and occurrence of constituents of emerging concern, such as N-nitrosodimethylamine (NDMA) and pharmaceuticals and personal care products (PPCPs). Metropolitan fully expects its source water protection efforts to be successful, so the only foreseeable water quality constraint to the use of Colorado River water will be the need to blend (mix) it with SWP supplies to meet the adopted salinity standards.

State Water Project

The key water quality issues on the SWP are disinfection byproduct precursors, in particular, total organic carbon and bromide. Metropolitan is working to protect the water quality of this source, but it has needed to upgrade its water treatment plants to deal adequately with disinfection byproducts. Disinfection byproducts result from total organic carbon and bromide in the source water reacting with disinfectants at the water treatment plant, and they may place some near term restrictions on Metropolitan's ability to use SWP water. Metropolitan expects these treatment restrictions to be overcome through the addition of ozone disinfection at its treatment plants. Arsenic is also of concern in some groundwater storage programs. Groundwater inflows into the California Aqueduct are managed to comply with regulations and protect downstream water quality while meeting supply targets. Additionally, nutrient levels are significantly higher in the SWP system than within the Colorado River, leading to the potential for algal related concerns that can affect water management strategies. Metropolitan is engaged in efforts to protect the quality of SWP water from potential increases in nutrient loading from wastewater treatment plants. Also, as in the Colorado River watershed, Metropolitan is active in studies on the occurrence, sources, and fate and transport of constituents of emerging concern, such as NDMA and PPCPs.

Local Agency Supplies and Groundwater Storage

New standards for contaminants, such as arsenic, and other emerging standards may add costs to the use of groundwater storage and may affect the availability of local agency groundwater sources. These contaminants are not expected to affect the availability of Metropolitan supplies, but they may affect the availability of local agency supplies, which could in turn affect the level of demands on Metropolitan supplies if local agencies abandon supplies in lieu of treatment options. Metropolitan has not analyzed the effect that many of these water quality issues could have on local agency supply availability. There have, however, been some investigations into the supply impacts of perchlorate groundwater contamination as indicated later in this section.

In summary, the major regional concerns include the following:

- Salinity
- Perchlorate
- Total organic carbon and bromide (disinfection byproduct precursors)
- Nutrients (as it relates to algal productivity)
- Arsenic
- Uranium
- Chromium VI
- N-nitrosodimethylamine (NDMA)
- Pharmaceuticals and personal care products (PPCPs)

Metropolitan has taken several actions and adopted programs to address these contaminants and ensure a safe and reliable water supply. These actions, organized by contaminant, are discussed below. Another constituent previously identified in the 2005 RUWMP as a regional concern, methyl tertiary-butyl ether (MTBE), is now a decreasing concern due to the elimination of this chemical as a gasoline additive in California. This is also further discussed below, along with other water quality programs that Metropolitan has been engaged in to protect its water supplies.

Issues of Concern

Salinity

Imported water from the Colorado River has high salinity levels, so it must be blended (mixed) with lower-salinity water from the SWP to meet salinity management goals. 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. Metropolitan adopted an imported water salinity goal because higher salinity could increase costs and reduce operating flexibility. For example,

1. If diminished water quality causes a need for membrane treatment, the process typically results in losses of up to 15 percent of the water processed. These losses result both in an increased requirement for additional water supplies and environmental constraints related to brine disposal. In addition, the process is costly. However, only a portion of the imported water would need to be processed, so the possible loss in supplies is small.
2. High total dissolved solids (TDS) in water supplies leads to high TDS in wastewater, which lowers the usefulness and increases the cost of recycled water.
3. 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.

In addition to the link between water supply and water quality, Metropolitan has identified economic benefits from reducing the TDS concentrations of water supplies. Estimates show that a simultaneous reduction in salinity concentrations of 100 milligrams per liter (mg/L) in both the Colorado River and SWP supplies will yield economic benefits of $95 million per year within Metropolitan's service territory.[1] This estimate has added to Metropolitan's incentives to reduce salinity concentrations within the region's water supplies.

For all of these reasons, Metropolitan's Board approved a Salinity Management Policy on April 13, 1999. The policy set a goal of achieving salinity concentrations in delivered water of less than 500 mg/L TDS. The Salinity Management Policy is further discussed later in this section.

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

Colorado River

Water imported via the Colorado River Aqueduct (CRA) has the highest level of salinity of all of Metropolitan's sources of supply, averaging around 630 mg/L since 1976. Concern over salinity levels in the Colorado River has existed for many years. To deal with the concern, the International Boundary and Water Commission approved Minute No. 242, Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River in 1973, and the President approved the Colorado River Basin Salinity Control Act in 1974. High TDS in the Colorado River as it entered Mexico and the concerns of the seven basin states regarding the quality of Colorado River water in the United States drove these initial actions. 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, mostly resulting from saline sediments in the Basin that were deposited in prehistoric marine environments. They are easily eroded, dissolved, and transported into the river system. 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 U. S. Environmental Protection Agency (USEPA) 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,

[1] Metropolitan Water District of Southern California and U.S. Bureau of Reclamation, Salinity Management Study: Final Report (June 1999)

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.

By some estimates, concentrations of salts in the Colorado River cause approximately $353 million in quantified damages in the lower Basin each year. The salinity control program has proven to be very successful and cost-effective. Salinity control projects have reduced salinity concentrations of Colorado River water on average by over 100 mg/L or $264 million per year (2005 dollars) in avoided damages.

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 of 600 to 650 mg/L returned. TDS in Lake Havasu was measured at 628 mg/L in November 2009.

State Water Project

Water supplies from the SWP have significantly lower TDS concentrations than the Colorado River, averaging approximately 250 mg/L in water supplied through the East Branch and 325 mg/L on the West Branch over the long-term, with short term variability as a result of hydrologic conditions.[2] Because of this lower salinity, Metropolitan blends SWP water with high salinity CRA water to reduce the salinity concentrations of delivered water. However, both the supply and the TDS concentrations of SWP water can vary significantly in response to hydrologic conditions in the Sacramento-San Joaquin watersheds.

As indicated above, the TDS concentrations of SWP water can vary widely over short periods of time. 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 SWP water reaching Metropolitan increased to 430 mg/L, and supplies became limited. During this same event, salinity at the SWP's 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 always be possible to maintain both the salinity objective and water supply reliability unless salinity concentrations of source supplies can be reduced.

A federal court ruling and a resulting biological opinion issued through consultation with U.S. Fish and Wildlife Service addressing the effects of the water supply pumping operations on Delta smelt has limited SWP exports at specified times of the year since December 2007. These restrictions have increased reliance on higher salinity Colorado River water, impacting the ability at times to meet Metropolitan's goal of 500 mg/L TDS at its blend plants. Drought conditions leading to lower SWP water supply allocations in recent years also affects Metropolitan's ability to meet its salinity goal.

TDS objectives in Article 19 of the SWP Water Service Contract specify a ten-year average of 220 mg/L and a maximum monthly average of 440 mg/L. These objectives have not been met, and Metropolitan is working with DWR and other agencies on programs aimed at reducing salinity in Delta supplies. These programs aim to improve salinity on the San Joaquin River through modifying agricultural drainage and developing comprehensive basin plans. In addition, studies are underway to evaluate the benefits in reduced salinity of modifying levees in Franks Tract and other flooded islands in the Delta, or by placing operable gates in

[2] 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.

strategic locations to impede transport of seawater derived salt.

Recycled Water

Wastewater flows always experience significantly higher salinity concentrations 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 infiltrates into the sewer system.

Where wastewater flows have high salinity concentrations, the use of recycled water may be limited or require more expensive treatment. Landscape irrigation and industrial reuse become problematic at TDS concentrations of over 1,000 mg/L. Some crops are particularly sensitive to high TDS concentrations, 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 use of recycled water on lands overlying those basins.

These issues are exacerbated during times of drought, when the salinity of imported water supplies increases because of 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. To maintain the cost-effectiveness of recycled water, therefore, the salinity level of the region's potable water sources and wastewater flows must be controlled.

In May 2009, the State Water Resources Control Board (SWRCB) adopted a Recycled Water Policy[3] to help streamline the permitting process and help establish uniform statewide criteria for recycled water projects. This policy promotes the development of watershed- or basin-wide salt management plans (to then be adopted by the respective Regional Boards) to meet water quality objectives and protect beneficial uses, rather than imposing project-by-project restrictions. The Recycled Water Policy identifies several criteria to guide recycled water irrigation or groundwater recharge project proponents in developing a salt (and nutrient) management plan.

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 irrigation water is high in TDS 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 1950s and 1960s, Colorado River water was used to recharge severely overdrafted aquifers and prevent saltwater intrusion. As a result, the region's groundwater basins received more than 3.0 MAF of this high-TDS imported water, significantly impacting salt loadings.

In the past, these high salt concentrations have caused some basins within Metropolitan's service area to be unsuitable for municipal uses if left untreated. The Arlington Basin in Riverside and the Mission Basin in San Diego required demineralization before they could be returned to municipal service. The capacity of the larger groundwater basins makes them better able to dilute the impact of increasing salinity. While most groundwater basins within the region still produce water of acceptable quality, this resource must be managed carefully to minimize further degradation. Even with today' s more heightened concern regarding salinity, approximately 600,000 tons of salts per year accumulate within the region, leading to ever-increasing salinity concentrations in many groundwater basins.

3 http://www.swrcb.ca.gov/water_issues/programs/water_recycling_policy/docs/recycledwaterpolicy_approved.pdf

Table 4-1 shows the salinity from existing productive groundwater wells within the region, and Figure 4-1 shows the distribution of those salinity concentrations. To protect the quality of these basins, regional water quality control boards often place restrictions on the salinity concentrations of water used for basin recharge or for irrigation of lands overlying the aquifers. Those situations may restrict water reuse and aquifer recharge, or they may require expensive mitigation measures.

Metropolitan has participated with water and wastewater agencies and the Santa Ana Regional Water Quality Control Board (Regional Board) in a coordinated program to develop water quality data for local and imported supplies used to recharge groundwater basins in the Santa Ana River watershed.[4] In January 2008, this workgroup submitted its "Cooperative Agreement to Protect Water Quality and Encourage the Conjunctive Uses of Imported Water in the Santa Ana River Basin" to the Santa Ana Regional Board. This initial agreement addresses nitrogen and TDS and includes the following tasks:

1. Prepare a projection of ambient water quality in each groundwater management zone at six-year intervals for the subsequent 20 years.
2. Determine the impacts of foreseeable recharge projects and compare to baseline ambient water quality with salinity objectives.
3. Compare current water quality in each groundwater management zone with the ambient water quality projection made six years earlier, together with an evaluation of the reason(s) for any differences.

The Salinity Management Policy

The Salinity Management Policy adopted by Metropolitan's Board specified a salinity objective of 500 mg/L for blended imported water. It 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. To achieve these targets, SWP water supplies are blended with Colorado River supplies. Using this approach, the salinity target could be met in seven out of ten 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 higher salinity levels in imported waters. In addition, Metropolitan will concentrate on obtaining better quality water in the spring/summer months (April through September) to maximize the use of recycled water in agriculture.

Table 4-1
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.

[4] http://www.swrcb.ca.gov/rwqcb8/board_ decisions/adopted_orders/orders/2008/08_019.pdf

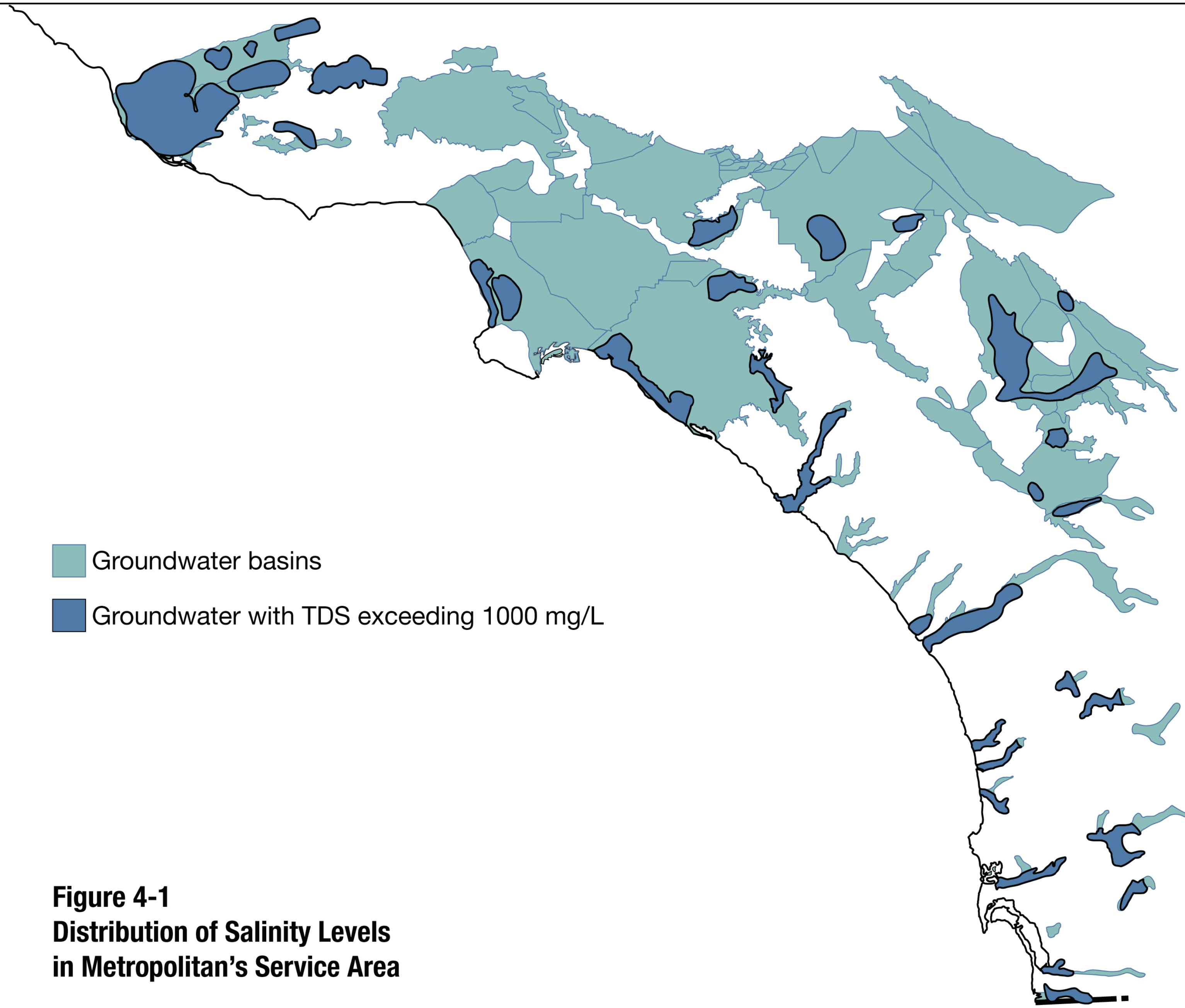

Figure 4-1
Distribution of Salinity Levels in Metropolitan's Service Area

Perchlorate

Perchlorate compounds are used as a main component in solid rocket propellant, and are also found in some types of munitions and fireworks. Perchlorate compounds quickly dissolve and become highly mobile in groundwater. Unlike many other groundwater contaminants, perchlorate neither readily interacts with the soil matrix nor degrades in the environment. Conventional drinking water treatment (as utilized at Metropolitan's water treatment plants) is not effective in removing perchlorate.

The primary human health concern related to perchlorate is its effects on the thyroid. Perchlorate interferes with the thyroid's ability to produce hormones required for normal growth and development. Pregnant women who are iodine deficient and their fetuses, infants and small children with low dietary iodide intake and individuals with hypothyroidism may be more sensitive to the effects of perchlorate.

The California Department of Public Health (CDPH) established a primary drinking water standard for perchlorate with an MCL of 6 micrograms per liter (μg/L)[5] effective October 18, 2007. There is currently no federal drinking water standard for perchlorate, but the USEPA is in the process of making its final regulatory determination for this contaminant. A regulatory determination would be the first step toward developing a national drinking water standard. Metropolitan has offered comments to USEPA during this regulatory process, focusing on the need to protect the Colorado River and to address cleanup of impacted water supplies as a result of federal institutions within its service area. In essence, Metropolitan urged for necessary actions to ensure expedited cleanup in areas that a California drinking water standard could not be enforced.

Perchlorate was first detected in Colorado River water in June 1997 and was traced back to Las Vegas Wash. The source of contamination was found to be emanating from a chemical manufacturing facility in Henderson, Nevada, now owned by Tronox, Inc. Tronox is currently responsible for the ongoing perchlorate remediation of the site. Another large perchlorate groundwater plume is also present in the Henderson area from a second industrial site, and although not known to have reached Las Vegas Wash yet, remediation activities are ongoing for cleanup of that plume by American Pacific Corporation (AMPAC).

Following the detection of perchlorate in the Colorado River, Metropolitan, along with USEPA and agencies in Nevada including the Nevada Division of Environmental Protection (NDEP), organized the forces necessary to successfully treat and decrease the sources of perchlorate loading. Under NDEP oversight, remediation efforts began in 1998 and treatment operations became fully operational in 2004. These efforts have reduced perchlorate loading into Las Vegas Wash from over 1000 lbs/day (prior to treatment) to 60-90 lbs/day since early 2007. This has resulted in over 90 percent reduction of the perchlorate loading entering the Colorado River system. In January 2009, Tronox filed for Chapter 11 bankruptcy protection citing significant environmental liabilities taken from the previous site owner. Tronox has continued operating its remediation system during the bankruptcy proceedings.

Perchlorate levels in Colorado River water at Lake Havasu have decreased significantly in recent years from its peak of 9 μg/L in May 1998 as a result of the aggressive clean-up efforts. Levels have remained less than 6 μg/L since October 2002, and have been typically less than 2 μg/L since June 2006. Metropolitan routinely monitors perchlorate at 34 locations within its system and levels currently remain at non-detectable levels (below 2 μg/L). Metropolitan has not detected perchlorate in the SWP since monitoring began in 1997.

[5] 1 microgram per liter is equivalent to 1 part per billion

Perchlorate has also been found in groundwater basins within Metropolitan's service area, largely from local sources. The vast majority of locations where perchlorate has been detected in the groundwater are associated with the manufacturing or testing of solid rocket fuels for the Department of Defense and the National Aeronautics and Space Administration (NASA), or with the manufacture, storage, handling, or disposal of perchlorate (such as Aerojet in Azusa in the Main San Gabriel Basin and the Jet Propulsion Laboratory/NASA in the Raymond Basin). Past agricultural practices using fertilizers laden with naturally occurring perchlorate have also been implicated in some areas.

Metropolitan has conducted several surveys to determine the impact of perchlorate on its member and retail agencies. As of October 2007, 18 member agencies have detected perchlorate in their service areas at levels greater than 4 μg/L, while 11 have detected levels greater than 6 μg/L in at least 101 out of 1337 wells (7.6 percent). Member and retail agencies have shut down 32 wells over the years due to perchlorate contamination, losing more than 52.5 TAF per year of their groundwater production. Many of these agencies have built new wells, blended their water, or installed ion exchange treatment systems to reduce perchlorate levels, thus lowering their potential additional demand for Metropolitan water supplies to about 15 TAF per year.

Metropolitan has investigated technologies to mitigate perchlorate contamination. Perchlorate cannot be removed using conventional water treatment. Nanofiltration and reverse osmosis do work effectively but at a very high cost. Aerojet has implemented biological treatment through fluidized bed reactors (FBR) in Rancho Cordova and is re-injecting the treated water into the ground. Tronox also utilizes an FBR process train for the cleanup of their Henderson site. A number of sites in Southern California have successfully installed ion exchange systems to treat perchlorate impacted groundwater. The city of Pasadena has been using ion exchange treatment at one well site and, in November 2009, completed a study of biological treatment for perchlorate removal in groundwater. Funding for this study was provided through a Congressional mandate from USEPA to Metropolitan.

Treatment options are available to recover groundwater supplies contaminated with perchlorate. However, it is very difficult to predict whether treatment will be pursued to recover all lost production because local agencies will make decisions based largely on cost considerations, ability to identify potentially responsible parties for cleanup, and the availability of alternative supplies.

Total Organic Carbon and Bromide

Disinfection byproducts (DBPs) form when source water containing high levels of total organic carbon (TOC) and bromide is treated with disinfectants such as chlorine or ozone. Studies have shown a link between certain cancers and DBP exposure. In addition, some studies have shown an association between reproductive and developmental effects and chlorinated water. While many DBPs have been identified and some are regulated under the Safe Drinking Water Act, there are others that are not yet known. Even for those that are known, the potential adverse health effects may not be fully characterized.

Water agencies began complying with new regulations to protect against the risk of DBP exposure in January 2002. This rule, known as the Stage 1 Disinfectants and Disinfection Byproducts (D/DBP) Rule, required water systems to comply with new MCLs and a treatment technique to improve control of DBPs. USEPA then promulgated the Stage 2 D/DBP Rule in January 2006 that makes regulatory compliance more challenging as compliance is based on a locational basis, rather than on a distribution system-wide basis.

Existing levels of TOC and bromide in Delta water supplies present significant concern for Metropolitan's ability to maintain safe drinking water supplies and comply with regulations. Levels of these constituents in SWP water increase several fold due to agricultural drainage and seawater intrusion as water moves through the Delta. 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. Source water protection of SWP water supplies is a necessary component of meeting these requirements cost effectively.

The CALFED Record of Decision released in August 2000 adopted the following water quality goals for TOC and bromide:

- Average concentrations at Clifton Court Forebay and other southern and central Delta drinking water intakes of 50 µg/L bromide and 3.0 mg/L total organic carbon, or
- An equivalent level of public health protection using a cost-effective combination of alternative source waters, source control, and treatment technologies.

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 actions include conveyance improvements, alternative sources of supply, changes in storage and operations, and advanced treatment by water supply agencies.

Source water quality improvements must be combined with cost-effective water treatment technologies to ensure safe drinking water at a reasonable cost. Metropolitan has five treatment plants: two that receive SWP water exclusively, and three that receive a blend of SWP and Colorado River water. In 2003 and 2005, Metropolitan completed upgrades to its SWP-exclusive water treatment plants, Mills and Jensen, respectively, to utilize ozone as its primary disinfectant. This ozonation process avoids the production of certain regulated disinfection byproducts that would otherwise form in the chlorine treatment of SWP water. The non-ozone plants utilizing blended water have met federal guidelines for these byproducts through managing the blend of SWP and Colorado River water. To maintain the byproducts at a level consistent with federal law, Metropolitan limits the percentage of water from the SWP used in each plant. In mid 2010, Metropolitan anticipates ozone at the Skinner water treatment plant to come online. Metropolitan's Board has also adopted plans to install ozonation at its other two blend plants with a total estimated ozone retrofit program cost of $1.2 billion for all five plants.

Nutrients

Elevated levels of nutrients (phosphorus and nitrogen compounds) can stimulate nuisance algal and aquatic weed growth that affects consumer acceptability, including the production of noxious taste and odor compounds and algal toxins. In addition to taste and odor toxin concerns, increases in algal and aquatic weed biomass can impede flow in conveyances, shorten filter run times and increase solids production at drinking water treatment plants, and add to organic carbon loading. Further, nutrients can provide an increasing food source that may lead to the proliferation of quagga and zebra mussels, and other invasive biological species. Studies have shown phosphorus to be the limiting nutrient in both SWP and Colorado River supplies. Therefore, any increase in phosphorus loading has the potential to stimulate algal growth, leading to the concerns identified above.

SWP supplies have significantly higher nutrient levels than Colorado River supplies. Wastewater discharges, agricultural drainage, and nutrient-rich soils in the Delta are primary sources of nutrient loading to the SWP. Metropolitan and other drinking water agencies receiving Delta water have been engaged in efforts to minimize the effects of nutrient loading from Delta wastewater plants. Metropolitan reservoirs receiving SWP water have experienced numerous taste and odor episodes in recent years. For example, in 2005, Metropolitan reservoirs experienced 12 taste and odor events requiring treatment. A taste and odor event can cause a reservoir to be bypassed and potentially have a short-term effect on the availability of that supply. Metropolitan has a comprehensive program to monitor and manage algae in its source water reservoirs. This program was developed to provide an early warning of algae related problems and taste and odor events to best manage water quality in the system.[6]

Although phosphorus levels are much lower in the Colorado River than the SWP, this nutrient is still of concern. Despite relatively low concentrations (Colorado River has been considered an oligotrophic, or low-productivity, system), any additions of phosphorus to Colorado River water can result in increased algal growth. In addition, low nutrient Colorado River water is relied upon by Metropolitan to blend down the high nutrient SWP water in Metropolitan's blend reservoirs. With population growth expected to continue in the future (e.g., Las Vegas area), ensuring high levels of treatment at wastewater treatment plants to maintain existing phosphorus levels will be critical in minimizing the operational, financial, and public health impacts associated with excessive algal growth and protect downstream drinking water uses. In addition, Metropolitan continues its involvement with entities along the lower Colorado River seeking to enhance wastewater management (and therefore better manage nutrient impacts) within river communities.

Although current nutrient loading is of concern for Metropolitan and is anticipated to have cost implications, with its comprehensive monitoring program and response actions to manage algal related issues, there should be no impact on availability of water supplies. Metropolitan's source water protection program will continue to focus on preventing increases in future nutrient loading as a result of urban and agricultural sources.

Arsenic

Arsenic is a naturally occurring element found in rocks, soil, water, and air. It is used in wood preservatives, alloying agents, certain agricultural applications, semi-conductors, paints, dyes, and soaps. Arsenic can get into water from the natural erosion of rocks, dissolution of ores and minerals, runoff from agricultural fields, and discharges from industrial processes. Long-term exposure to elevated levels of arsenic in drinking water has been linked to certain cancers, skin pigmentation changes, and hyperkeratosis (skin thickening).

The MCL for arsenic in domestic water supplies was lowered to 10 μg/L, with an effective date of January 2006 in the federal regulations, and an effective date of November 2008 in the California regulations. The standard impacts both groundwater and surface water supplies. Historically, Metropolitan's water supplies have had low levels of this contaminant and would not require treatment changes or capital investment to comply with this new standard. However, some of Metropolitan's water supplies from groundwater storage programs are at levels near the MCL. These groundwater storage projects are called upon to supplement flow only during low SWP allocation years. Metropolitan has had to restrict flow from one program to limit arsenic increases in the SWP. Implementation of a pilot arsenic treatment facility by one groundwater banking partner has also resulted in increased cost. Moreover, Metropolitan has invested in solids handling facilities and implemented operational changes to manage arsenic in the solids resulting from the treatment process.

In April 2004, California's Office of Environmental Health Hazard Assessment (OEHHA) set a public health goal for arsenic

[6] William D. Taylor et al., *Early Warning and Management of Surface Water Taste-and-Odor Events*, Project No. 2614 (Denver, CO: American Water Works Association Research Foundation, 2006)

of 0.004 μg/L, based on lung and urinary bladder cancer risk. Monitoring results submitted to CDPH in 2001-2003 showed that arsenic is ubiquitous in drinking water sources, reflecting its natural occurrence. They also showed that many sources have arsenic detections above the 10 μg/L MCL. Southern California drinking water sources that contain concentrations of arsenic over 10 μg/L include San Bernardino (64 sources), Los Angeles (48 sources), Riverside (26 sources), Orange (4 sources), and San Diego (5 sources).[7]

The state detection level for purposes of reporting (DLR) of arsenic is 2 μg/L. Between 2001 and 2008, arsenic levels in Metropolitan's water treatment plant effluents ranged from not detected (< 2 μg/L) to 2.9 μg/L. For Metropolitan's source waters, levels in Colorado River water have ranged from not detected to 3.5 μg/L, while levels in SWP water have ranged from not detected to 4.0 μg/L. Increasing coagulant doses at water treatment plants can reduce arsenic levels for delivered water.

Some member agencies may face greater problems with arsenic compliance. A 1992 study for Central Basin Municipal Water District, for example, indicated that some of the Central Basin wells could have difficulty in complying with a lowered standard.[8] Water supplies imported by the Los Angeles Department of Water and Power may also contain arsenic above the MCL. The cost of arsenic removal from these supplies could vary significantly.

Uranium

A 16-million-ton pile of uranium mill tailings near Moab, Utah lies approximately 750 feet from the Colorado River. Due to the proximity of the pile to the Colorado River, there is a potential for the tailings to enter the river as a result of a catastrophic flood event or other natural disaster. In addition, contaminated groundwater from the site is slowly seeping into the river. The U.S. Department of Energy (DOE) is responsible for remediating the site, which includes removal and offsite disposal of the tailings and onsite groundwater remediation.

Previous investigations have shown uranium concentrations contained within the pile at levels significantly above the California MCL of 20 picocuries per liter (pCi/L). Metropolitan has been monitoring for uranium in the Colorado River Aqueduct and at its treatment plants since 1986. Monitoring at Lake Powell began in 1998. Uranium levels measured at Metropolitan's intake have ranged from 1-6 pCi/L, well below the California MCL. Conventional drinking water treatment, as employed at Metropolitan's water treatment plants, can remove low levels of uranium, however these processes would not be protective if a catastrophic event washed large volumes of tailings into the Colorado River. Public perception of drinking water safety is also of particular concern concerning uranium.

Remedial actions at the site since 1999 have focused on removing contaminated water from the pile and groundwater. Through 2009, over 2,700 pounds of uranium in contaminated groundwater have been removed. In July 2005, DOE issued its Final Environmental Impact Statement with the preferred alternative of permanent offsite disposal by rail to a disposal cell at Crescent Junction, Utah, located approximately 30 miles northwest of the Moab site.

Rail shipment and disposal of the uranium mill tailings pile from the Moab, Utah site began in April 2009. Through March 2010, DOE has shipped over 1 million tons of mill tailings to the Crescent Junction disposal cell. Using American Recovery and Reinvestment Act (ARRA) 2009 funding, DOE has increased shipments in order to meet its ARRA project

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7 From the CDPH web site: http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Arsenic.aspx . Note that the numbers reported there may change because the website is frequently updated.

8 *Summary Review on the Occurrence of Arsenic in the Central Groundwater Basin, Los Angeles County, California*, prepared by Richard C. Slade & Associates, Sept. 7, 1993.

commitment to ship an additional 2 million tons of mill tailings by September 2011 and accelerate overall clean-up of the site. DOE estimates completing movement of the tailings pile by 2025, with a goal of 2019 should additional funding be secured. Metropolitan continues to track progress of the remediation efforts, provide the necessary legislative support for rapid cleanup, and work with Congressional representatives to support increased annual appropriations for this effort.

Another uranium-related issue began receiving attention in 2008 due to a renewed worldwide interest in nuclear energy and the resulting increase in uranium mining claims filed throughout the western United States. Of particular interest were thousands of mining claims filed near Grand Canyon National Park and the Colorado River. Metropolitan has since sent letters to the Secretary of Interior to highlight source water protection and consumer confidence concerns related to uranium exploration and mining activities near the Colorado River, and advocate for close federal oversight over these activities. In 2009, Secretary of Interior Ken Salazar announced the two-year hold on new mining claims on 1 million acres adjacent to the Grand Canyon to allow necessary scientific studies and environmental analyses to be conducted. In 2009, H.R. 644 – Grand Canyon Watersheds Protection Act was introduced and if enacted, would permanently withdraw areas around the Grand Canyon from new mining activities.

Chromium VI

Chromium is a naturally occurring element found in rocks, soil, plants, and animals. Chromium III is typically the form found in soils and is an essential nutrient that helps the body use sugar, protein, and fat. Chromium VI is used in electroplating, stainless steel production, leather tanning, textile manufacturing, dyes and pigments, wood preservation and as an anti-corrosion agent. Chromium occurs naturally in deep aquifers and can also enter drinking water through discharges of dye and paint pigments, wood preservatives, chrome plating liquid wastes, and leaching from hazardous waste sites. In drinking water, Chromium VI is very stable and soluble in water, whereas chromium III is not very soluble. Chromium VI is the more toxic species and is known to cause lung cancer in humans when inhaled, but the health effects in humans from ingestion are still in question. There is evidence that when Chromium VI enters the stomach, gastric acids may reduce it to chromium III. However, recent studies conducted by the National Toxicology Program have shown that Chromium VI can cause cancer in animals when administered orally.

Currently, there are no drinking water standards for Chromium VI. Total chromium (including chromium III and Chromium VI) is regulated in California with an MCL of 50 μg/L. On August 20, 2009, OEHHA released a draft public health goal (PHG) of 0.06 μg/L for Chromium VI in drinking water. The PHG is a health-protective, non-regulatory level that will be used by CDPH in its development of an MCL. CDPH will set the MCL as close to the PHG as technically and economically feasible.

Metropolitan utilizes an analytical method with a minimum reporting level of 0.03 μg/L, which is less than the State detection level for purposes of reporting (DLR) of 1 μg/L. The results from all of Metropolitan's source and treated waters are less than the State DLR of 1 μg/L (except for one detection of 1 μg/L at the influent to the Mills water treatment plant). The following summarizes Chromium VI levels found in Metropolitan's system:

- In the past 10 years, results of source and treated water monitoring for Chromium VI indicate: Levels in Colorado River water are mostly not detected (<0.03 μg/L) but when detected range from 0.03 – 0.08 μg/L. SWP levels range from 0.03 – 0.8 μg/L. Treated water levels range from 0.03 – 0.7 μg/L.

- There is a slight increase in Chromium VI in the treated water from the oxidation (chlorination and ozonation) of natural background chromium (total) to Chromium VI.
- Colorado River monitoring results upstream and downstream of the Topock site (discussed below) have ranged from not detected (<0.03 μg/L) to 0.06 μg/L.
- Chromium VI in Metropolitan's groundwater pump-in storage programs in the Central Valley has ranged from not detected (< 1 μg/L) to 9.1 μg/L with the average for the different programs from 1.4 to 5.0 μg/L.
- Chromium VI has been detected in a groundwater aquifer on the site of a Pacific Gas and Electric (PG&E) gas compressor station located along the Colorado River near Topock, Arizona.

PG&E used Chromium VI as an anti-corrosion agent in its cooling towers from 1951 to 1985. Wastewater from the cooling towers was discharged from 1951 to 1968 into a dry wash next to the station. Monitoring wells show the plume concentration has peaked as high as 16,000 μg/L. PG&E operates an interim groundwater extraction and treatment system that is protecting the Colorado River. Quarterly monitoring of the river has shown levels of Chromium VI less than 1 μg/L, which are considered background levels. The California Department of Toxic Substances Control and the U. S. Department of Interior are the lead state and federal agencies overseeing the cleanup efforts. Metropolitan participates through various stakeholder workgroups and partnerships that include state and federal regulators, Indian tribes, and other stakeholders (e.g., Colorado River Board) involved in the corrective action process. In 2010, it is anticipated that a final treatment alternative will be selected, and an Environmental Impact Report will be released for the recommended cleanup alternative.

The federal- and state-approved technologies for removing total chromium from drinking water include coagulation/filtration, ion exchange, reverse osmosis, and lime softening. Potential treatment technologies for Chromium VI in drinking water may include reduction/chemical precipitation, an ion exchange, or reverse osmosis. For several years, the cities of Glendale, Burbank, and Los Angeles have been voluntarily limiting Chromium VI levels in their drinking water to 5 μg/L, an order of magnitude lower than the current statewide total chromium standard of 50 μg/L. The experience of these agencies in the treatment of water containing Chromium VI will be helpful in CDPH's evaluations of treatment technologies and associated costs, which are required as part of a proposed MCL regulation package.

N-Nitrosodimethylamine

N-Nitrosodimethylamine (NDMA) is part of a family of organic chemicals called nitrosamines and is a byproduct of the disinfection of some natural waters with chloramines. Metropolitan utilizes chloramines as a secondary disinfectant at its treatment plants. Wastewater treatment plant effluent and agricultural runoff can contribute organic material into source waters which react to form NDMA at water treatment plants. Certain polymers can also contribute NDMA precursor materials. Some NDMA control measures or removal technologies may be required to avoid adverse impacts on Southern California drinking water supplies. Metropolitan is involved in several projects to understand the watershed sources and occurrence of NDMA precursors in Metropolitan source waters, and to develop treatment strategies to minimize NDMA formation in drinking water treatment plants and distribution systems. Special studies conducted at Metropolitan have shown removal of NDMA using advanced oxidation processes. Other treatment process such as biological, membrane, and carbon adsorption need to be evaluated for NDMA removal.

USEPA considers NDMA to be a probable human carcinogen. USEPA placed NDMA in the Unregulated Contaminant Monitoring

Regulation 2 (UCMR2) and on the Contaminant Candidate List 3 (CCL3). CDPH also considers NDMA to be a probable human carcinogen. CDPH has not established a MCL for NDMA. However, in 1998 CDPH established a notification level of 0.01 μg/L. Occurrences of NDMA in treated water supplies at concentrations greater than 0.01 μg/L are recommended to be included in the utility's annual Consumer Confidence Report. In December 2006, OEHHA set a public health goal for NDMA of 0.003 μg/L. Metropolitan has monitored its source waters (at treatment plant influents) and treated waters on a quarterly basis since 1999. Test results for the presence of NDMA in Metropolitan's system have ranged from non-detect (reporting limit of 0.002 μg/L) to 0.014 μg/L. Preliminary data from UCMR2 confirm that the presence of NDMA is not limited to Metropolitan waters, but is widespread. NDMA, or a broader class of nitrosamines, may likely be the next disinfection byproduct(s) to be regulated by USEPA.

Pharmaceuticals and Personal Care Products

Pharmaceuticals and personal care products (PPCPs) are a growing concern to the water industry. Numerous studies have reported the occurrence of these emerging contaminants in treated wastewater, surface water, and sometimes, in finished drinking water in the United States and around the world. The sources of PPCPs in the aquatic environment include (but may not be limited to) treated wastewater and industrial discharge, agricultural run-off, and leaching of municipal landfills. Currently, there is no evidence of human health risks from long-term exposure to the low concentrations (low ng/L; parts per trillion) of PPCPs found in some drinking water. Furthermore, there are no regulatory requirements for PPCPs in drinking water. In October 2009, USEPA included 13 PPCPs on the CCL3; however, currently there are no standardized analytical methods for these compounds.

In 2007, Metropolitan implemented a monitoring program to determine the occurrence of PPCPs and other organic wastewater contaminants in Metropolitan's treatment plant effluents and selected source water locations within the Colorado River and SWP watersheds. Some PPCPs have been detected at very low ng/L levels, which is consistent with reports from other utilities. However, analytical methods are still being refined and more work is required to fully understand occurrence issues. Metropolitan has been actively involved in various studies related to PPCPs, including analytical methods improvements, and characterization of drinking water sources in California.

Metropolitan has participated with water and wastewater agencies and the Santa Ana Regional Board in a coordinated program to address emerging constituents relevant to local and imported supplies used to recharge groundwater basins in the Santa Ana River watershed. As part of the Regional Board-adopted "Cooperative Agreement to Protect Water Quality and Encourage the Conjunctive Uses of Imported Water in the Santa Ana River Basin", there are provisions for the workgroup to initiate development of monitoring for emerging unregulated constituents. Metropolitan, Orange County Water District, and the National Water Research Institute provided substantial input to the workgroup through its two-year monitoring study of emerging constituents in waters found throughout watersheds of the SWP, Colorado River, and Santa Ana River. In April 2009, the workgroup completed its Phase I Report summarizing its findings and recommendations regarding investigation into emerging constituents in water supplies. In December 2009, the workgroup submitted its proposed 2010/11 plan for monitoring of emerging constituents in imported and local waters. The workgroup also provided input to a Blue Ribbon Panel convened by the State Water Resources Control Board to review the emerging science of unregulated chemicals as it relates to the use of recycled water for irrigation and groundwater recharge.

Decreasing Concerns

Methyl Tertiary-Butyl Ether

Methyl tertiary-butyl ether (MTBE) was the primary oxygenate in virtually all the gasoline used in California, prior to the discovery that MTBE had contaminated groundwater supplies and was also found in surface water supplies. MTBE was banned in California as of December 31, 2003, although the concentration of MTBE in gasoline blends was voluntarily reduced beginning in January 2003. MTBE has subsequently been replaced by ethanol which is now the primary oxygenate in use. CDPH has adopted a primary MCL of 13 μg/L for MTBE based on carcinogenicity studies in animals. MTBE also has a California secondary MCL of 5 μg/L, which was established based on taste and odor concerns.

MTBE was introduced into surface water bodies from the motor exhausts of recreational watercraft. At Diamond Valley Lake and Lake Skinner, Metropolitan has taken steps to reduce the potential for MTBE contamination. In 2003, Metropolitan's Board authorized a non-polluting boating program for these reservoirs that calls for specific boat requirements (MTBE-free fuel and clean burning engines) and a monitoring program that will show if MTBE or other gasoline contaminants appear at the lake. Metropolitan regularly monitors its water supply for contamination from MTBE and other oxygenates. In recent years, MTBE testing results in source waters have remained at non-detectable levels (below 3 μg/L).

MTBE still presents a significant problem to local groundwater basins. Leaking underground storage tanks and poor fuel-handling practices in the past at local gas stations may provide a large source of MTBE. MTBE is very soluble in water and has low affinity for soil particles, so it moves quickly into the groundwater. Within Metropolitan's service area, local groundwater producers have been forced to close some of their wells due to MTBE contamination. MTBE is also resistant to chemical and microbial degradation in water, making treatment more difficult than the treatment of other gasoline components. A combination of an advanced oxidation process (typically ozone and hydrogen peroxide) followed by granular activated carbon has been found to be effective in reducing the levels of these contaminants.

Although some groundwater supplies remain contaminated with this highly soluble chemical, contamination of Metropolitan's surface water supplies are no longer a problem. Further, improved underground storage tank requirements and monitoring, and the phase-out of MTBE as a fuel additive, will decrease the likelihood of MTBE groundwater problems in the future.

Other Water Quality Programs

In addition to monitoring for and controlling specific identified chemicals in the water supply, Metropolitan has undertaken a number of programs to protect the quality of its water supplies. These programs are summarized below.

Source Water Protection

Source water protection is the first step in a multi-barrier approach to provide safe and reliable drinking water. In accordance with California's Surface Water Treatment Rule, Title 22 of the California Code of Regulations, CDPH requires large utilities delivering surface water to complete a Watershed Sanitary Survey every five years to identify possible sources of drinking water contamination, evaluate source and treated water quality, and recommend watershed management activities that will protect and improve source water quality. The most recent sanitary surveys for Metropolitan's water sources were completed in 2005 and 2006.[9] The next Sanitary Surveys for the watersheds of the

9 Metropolitan Water District of Southern California, *Colorado River Watershed Sanitary Survey, 2005 Update*. For the State Water Project, the sanitary survey report was prepared on behalf of the State Water Project Contractors Authority, in 2006, and was titled *California State Water Project Watershed Sanitary Survey, 2006 Update*.

Colorado River and the SWP will report on water quality issues and monitoring data through 2010. Metropolitan has an active source water protection program and continues to advocate on behalf of numerous SWP and Colorado River water quality protection issues.

Support SWP Water Quality Programs

Metropolitan supports DWR policies and programs aimed at maintaining or improving the quality of SWP water delivered to Metropolitan. In particular, Metropolitan supported the DWR policy to govern the quality of non-project water conveyed by the California Aqueduct. In addition, Metropolitan has supported the expansion of DWR's Municipal Water Quality Investigations Program beyond its Bay-Delta core water quality monitoring and studies to include enhanced water quality monitoring and forecasting of the Delta and SWP. These programs are designed to provide early warning of water quality changes that will affect treatment plant operations both in the short-term (hours to weeks) and up to seasonally. The forecasting model is currently suitable for use in a planning mode. It is expected that with experience and model refinement, it will be suitable to use as a tool in operational decision making.

Water Quality Exchanges

Metropolitan has implemented selective withdrawals from the Arvin-Edison storage program and exchanges with the Kern Water Bank to improve water quality. Although these programs were initially designed to provide dry-year supply reliability, they can also be used to store SWP water at periods of better water quality so the stored water may be withdrawn at times of lower water quality, thus diluting SWP water deliveries. Although elevated arsenic levels has been a particular concern in one groundwater banking program, there are also short-term water quality benefits that can be realized through other storage programs, such as groundwater pump-ins into the California Aqueduct with lower TOC levels (as well as lower bromide and TDS, in some programs).

Water Supply Security

The change in the national and international security situation has led to increased concerns about protecting the nation's water supply. In coordination with its member agencies, Metropolitan added new security measures in 2001 and continues to upgrade and refine procedures. Changes have included an increase in the number of water quality tests conducted each year (Metropolitan now conducts over 300,000 analytical tests on samples collected within our service area and source waters), as well as contingency plans that coordinate with the Homeland Security Office's multicolored tiered risk alert system.

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Public Outreach 5

Integrated Resources Plan Process Outreach Component

The Integrated Resources Plan is Metropolitan's blueprint for long-term water reliability. It was first adopted in the early 1996 and is updated periodically to reflect Metropolitan's planning strategies. Because of the diverse needs, interests, and institutional entities within the region, Metropolitan's planning goals are achieved through an open and participatory process that involves the major stakeholders. The collaborative planning process sought input from member agencies, retail water agencies, other water and wastewater managers, policy decision-makers, interest groups, environmental, business and community interests. Each interest group provided valuable input and guidance regarding the preferred water resource strategy and carefully reviewed the technical analyses supporting the decision-making process. Collectively, Metropolitan and the regionwide stakeholders analyzed available resources and updated the preferred strategy for resource development. The overall process involved two main components - a technical component (discussed in Section 2 of this report) and an outreach component.

During September and October 2008, Metropolitan's executive management, Board, member agency managers, elected officials, and community groups collectively discussed strategic direction and regional water solutions at these forums. Nearly 600 stakeholders participated in the first round of forums. Similar types of ideas and issues were raised by the participants at all the forums, emphasizing the importance of local resources development and resolving issue with the Bay-Delta. Participants suggested that Metropolitan should take a leadership position in several areas including:

- Outreach to legislators concerning needs for water supply reliability and quality improvements.
- Development of brine lines to enhance recycled water use.
- Foster partnerships with energy utilities.
- Build relationships with environmental community.
- Research and development in new technologies.
- Assist retail agencies in designing "correct" tiered rate structures.
- Review the achievements of the 1996 IRP and 2004 Update.
- Identify changing conditions affecting water resource development.
- Update resource development targets through 2035.

During a second round of workshops in October 2009, participants discussed technical assessments of various resource options, alternate approaches to water supply reliability, recommendations of a preferred approach, and implementation strategies.

In order to have a cooperative and effective outreach effort between Metropolitan, its member agencies, and the interested general public, Metropolitan staff made presentations to city and local governments, associations, and other parties throughout the region. This open and participatory process has allowed for valuable input, guidance and data exchange in which statewide business, environmental, community, agricultural and water interests were represented. Table 5-1 lists the major meetings comprising the 2009 IRP Update outreach process.

Table 5-1
Stakeholder Participation in IRP Update

Year	Month	Meeting
2008	June	IRP Board Workshop: Review and discuss IRP Update process
	July	IRP Steering Committee: Review June Board Workshop and discuss Committee objectives and responsibilities.
	August	IRP Steering Committee: Prepare for September IRP Stakeholder Forums.
	September	IRP Stakeholder Forums: Review and discuss IRP goals and prior resource targets, breakout discussion groups with stakeholders IRP Stakeholder Forum #1 – Newport Beach IRP Stakeholder Forum #2 – Ontario IRP Stakeholder Forum #3 – Los Angeles IRP Steering Committee: Mid-point status briefing of IRP Stakeholder Forums
	October	IRP Stakeholder Forums Continued: Review and discuss IRP goals and prior resource targets, breakout discussion groups with stakeholders IRP Stakeholder Forum #4 – San Diego IRP Technical Oversight Committee: Review of IRP Update process, role of IRP Technical Workgroups, current status of existing and planned projects/programs, and draft evaluation criteria
	December	Stormwater/Urban Runoff Technical Workgroup: Review IRP process and begin work on Stormwater Issue Paper Desalination Technical Workgroup: Review IRP Update process and begin work on Seawater Desalination Issue Paper Conservation Technical Workgroup: Review IRP Update process and begin work on Conservation Issue Paper Graywater Technical Workgroup: Review IRP Update process and begin work on Graywater Issue Paper Recycled Water Technical Workgroup: Review IRP Update process and begin work on Recycled Water Issue Paper

Table 5-1 (Contd)
Stakeholder Participation in IRP Update

Year	Month	Meeting
2009	January	Stormwater/Urban Runoff Technical Workgroup: Review work on draft Stormwater Issue Paper. Graywater Technical Workgroup: Review work on draft Graywater Issue Paper. Recycled Water Technical Workgroup: Review work on draft Recycled Water Issue Paper. IRP Technical Oversight Committee: Review IRP Update schedule, draft evaluation criteria, Technical Workgroup activities, and analytical approach for modeling uncertainty
	February	Stormwater/Urban Runoff Technical Workgroup: Review draft Stormwater Issue Paper Conservation Technical Workgroup: Review draft Conservation Issue Paper Recycled Water Technical Workgroup: Review draft Recycled Water Issue Paper IRP Technical Oversight Committee: Review and discuss updated IRP evaluation criteria
	March	Conservation Technical Workgroup: Review and discuss draft Conservation Issue Paper. Recycled Water Technical Workgroup: Review and discuss draft Recycled Water Issue Paper Stormwater/Urban Runoff Technical Workgroup: Review and discuss draft Stormwater Issue Paper Graywater Technical Workgroup: Review and discuss draft Graywater Issue Paper IRP Steering Committee: Review and discuss status of technical workgroups and IRP schedule
	April	Recycled Water Technical Workgroup: Review and discuss draft Recycled Water Issue Paper Conservation Technical Workgroup: Review and discuss draft Conservation Issue Paper. Graywater Technical Workgroup: Review and discuss draft Graywater Issue Paper Groundwater Study Meeting: Review and discuss groundwater modeling in Orange County Basin Synergy Workshop: Discussion between stakeholders from the groundwater, stormwater and recycled water IRP Update technical workgroups IRP Technical Oversight Committee: Review and discuss IRP Update schedule and status of IRP Update technical workgroups, preliminary supply and demand estimates, climate change data, and analytical models

Table 5-1 (Contd)
Stakeholder Participation in IRP Update

Year	Month	Meeting
2009	May	Member Agency Managers Meeting: Update on activities of the IRP Update technical workgroups, Technical Oversight Committee IRP Steering Committee: Review and discuss IRP Update schedule, supply and demand estimates, and technical workgroup findings
	June	IRP Technical Oversight Committee and Member Agency Managers Meeting: Review and discuss IRP Update schedule, gap analysis, technical workgroup findings, and the Robust Decision Making (RDM) analytical approach
	July	IRP Board Workshop: Review and discuss status of resource development and IRP policy alternatives and provided board members with Issue Paper 1 - IRP Implementation Status and Potential Development Needs and Issue Paper 2 - Metropolitan Involvement in Water Resources Development
	August	Board Transmittal - Supplemental Tables for IRP Issue Paper with the following attachments: 1. Identified project list for recycling and groundwater recovery 2. Tables on CRA supplies 3. Table showing balance of groundwater programs Seawater Desalination Technical Workgroup: Review and discuss draft of the desalination IRP Issue Paper Strategic Policy Review Board Workshop: Review and discuss IRP Update process and schedule, guiding principles and evaluation criteria, and alternatives for new regional supplies
	September	Stormwater/Urban Runoff Technical Workgroup: Review and discuss Stormwater Issue Paper IRP Steering Committee: Review and discuss IRP Update process and schedule, potential policy approaches, and work schedule
	October	Strategic Policy Review Board Workshop: Review and discuss evaluation criteria and alternatives and presentation of the dynamic gap
	November	Strategic Policy Review Board Workshop: Review and discuss cost and reliability under various approaches and key policy questions
2010	February	IRP Steering Committee: Strategic Policy Review, IRP Adaptive Management Approach and Adaptive Resource Options – Conservation
	April	IRP Steering Committee: Adaptive Resource Options - Groundwater and Stormwater IRP Steering Committee: Adaptive Resource Options – Graywater and Recycled Water

Table 5-1 (Contd)
Stakeholder Participation in IRP Update

Year	Month	Meeting
2010	May	IRP Steering Committee: Adaptive Resource Options - Seawater Desalination, overview of minimum/no regrets actions in each adaptive resource area
	June	IRP Steering Committee: Member agency panel discussion on resource options for the future, review of 2010 Update schedule and preliminary overview of Draft IRP Update
	July	IRP Steering Committee, Member Agency Managers Meeting and Board Workshop: Overview of Draft IRP Update
	August	IRP Stakeholder Forums: Review and discuss Draft IRP Update IRP Stakeholder Forum #1 – Orange IRP Stakeholder Forum #2 – Ontario IRP Stakeholder Forum #3 – San Diego IRP Stakeholder Forum #4 – Los Angeles

Groundwater Outreach Component

In 2007, Metropolitan prepared the Groundwater Assessment Study Report in collaboration with its member agencies and with groundwater basin managers. This study evaluated the potential for groundwater storage and identified the challenges in developing additional storage programs. To follow up on the findings of the Groundwater Assessment Study Report, Metropolitan initiated a series of seven groundwater workshops in July 2008 among Metropolitan, member agencies, groundwater basin managers, and stakeholders to discuss challenges for increasing conjunctive use and to develop recommendations for addressing the challenges. Summarized in Table 5-2 are the workshops and meetings which comprised the outreach components for the groundwater strategic process.

Table 5-2
Stakeholder Participation in Groundwater Process

Year	Month	Meeting
2008	July	Groundwater Workshop #1– Initiate process, set ground rules and identify discussion topics
	August	Groundwater Workshop #2 – Review IRP context, review availability of surplus imported water for groundwater recharge
	September	Groundwater Workshop #3 – Continued review of availability of surplus imported water for groundwater recharge; discussion of groundwater basin production capabilities
	October	Groundwater Workshop #4 – Continued discussion of groundwater basin production capabilities
	December	Groundwater Workshop #5 – Review of opportunities; discussion of Groundwater Workgroup policy recommendations for IRP Update
2009	February	Groundwater Workshop #6 – Continued discussion of policy recommendations for IRP Update
	April	Synergy Workshop among Groundwater, Stormwater, and Recycled Water Technical Workgroups Groundwater Basin Module Meeting with Orange Co Basin
	September	Groundwater Basin Module Meeting with Orange Co Basin Groundwater Basin Module Meeting with Central and West Coast basins
	November	Groundwater Basin Module Meeting with Main San Gabriel Basin Groundwater Basin Module Meeting with Chino Basin
2010	January	Groundwater Workshop #7 – Review initial modeling outcomes using groundwater basin modules; Finalize Groundwater Workgroup policy recommendations for the IRP Update
	March	Groundwater Basin Module Meeting with Main San Gabriel Basin

Regional Urban Water Management Program Outreach Component

Public involvement in Metropolitan's planning process continues to be an integral part of the development of this UWMP report. In October 2009, Metropolitan kicked off the update of its Regional Urban Water Management Plan with a meeting at Metropolitan's headquarters. An initial draft data set of demographics, total demands after conservation, local supplies, and demands on Metropolitan at the member agency and regional levels was distributed. In addition, Metropolitan staff held numerous coordination meetings, workshops, and conference calls with the member agencies to review the initial draft data set and address various issues associated with the report preparation. Based on these meetings, Metropolitan finalized the draft data set and developed the draft RUWMP. Simultaneously, Metropolitan developed preliminary estimates of its existing and planned water sources in five-year increments under single-dry, multi-dry, and average-year conditions as required under the Act.

These demand and supply estimates were included in the draft copy of the RUWMP distributed to the member agencies in June 8, 2010. Following the distribution, Metropolitan sponsored a workshop on June 21, 2010, with the member agencies and sanitation districts within the service area to discuss the contents of the draft RUWMP. Table 5-3 lists all the meetings and workshops held during the preparation of the 2010 RUWMP report.

The public review draft was posted prominently on Metropolitan's website on August 9, 2010. The notice of availability of the document was sent to the member agencies, as well as cities and counties in the Metropolitan service area. The announcement is in compliance with Water Code § 10621(b)), which requires that every urban water supplier preparing a plan give at least 60 days advance notice prior to the public hearing on the UWMP to any city or county within which the supplier provides water supplies to allow opportunity for consultation on the proposed plan. Included in this chapter is a copy of the letter of notification sent to cities and counties in Metropolitan's service area. Also included is a copy of the Public Notice advertising the meeting as published in six Southern California newspapers on August 9 and 16, 2010.

Metropolitan held the publicly-noticed meeting, as required by the Act, as part of the Water Planning and Stewardship Committee Meeting of its Board of Directors held on October 11, 2010. On November 9, 2010, Metropolitan's Board determined that the 2010 RUWMP is consistent with the Act and an accurate representation of the water resources plan for the Metropolitan service area. As prescribed in Resolution 9117, the Board approved the 2010 RUWMP for submission to the State of California. Included in this section is a copy of Resolution 9117 approved by the Metropolitan Board.

In summary, this Urban Water Management Plan involved a number of agencies and groups in its preparation:

Water Agencies assisted in plan development, received a copy of draft documents, commented on those documents, were invited to and attended the public meeting, and received notice of the intention to adopt.

Relevant Public Agencies such as cities and counties received notice that the document was available, were invited to comment on those documents, were invited to attend the public meeting, and received notice of the intention to adopt.

Website Posting: The public review draft was posted prominently on Metropolitan's website on August 9, 2010.

Table 5-3 summarizes the workshops and meetings held to satisfy the outreach requirement for completing the 2010 Regional Urban Water Management Plan.

Table 5-3
Stakeholder Participation and Outreach for the 2010 Regional Urban Water Management Plan

Year	Month	Meeting
2009	October	*RUWMP Kick-off Meeting*: Start of the 2010 RUWMP process, discuss schedule and milestones to complete the report, and distribute data on demographics, total demands after conservation, local supplies, and demands on Metropolitan
2010	January	*Coordination Meeting with Inland Empire Utilities Agency:* Review and refinement of demand projections *Coordination Meeting with San Diego County Water Authority:* Review and refinement of demand projections *Coordination Meeting with Eastern MWD:* Review and refinement of demand projections
	February	*Coordination Meeting with City of Santa Monica:* Review and refinement of demand projections *Conference call with Calleguas MWD:* Discuss RUWMP issues, impacts of new legislation, report outline, schedule, and milestones *Coordination Meeting with Calleguas MWD:* Review of demographic assumptions and refine demand projections *Coordination Meeting with City of Pasadena*
	May	RUWMP presentation at the Member Agency Managers Meeting
	June	RUWMP Coordination Workshop with Member Agencies and Sanitation Districts *RUWMP Presentation:* Discussion of the status, contents, and assumptions of the Draft RUWMP at the Member Agency Managers Meeting.
	August	Notification (60-day) for Public Hearing to local publications Sent letters to Cities and Counties within Metropolitan service area RUWMP presentation at the Metropolitan Board of Directors meeting of the Water Planning and Stewardship Committee *Co-hosted Meeting of Southern California Water Committee Urban Task Force*: Discussion of technical and legal aspects of preparing an Urban Water Management Plan with various agencies and stakeholders in Southern California *Coordination Meeting*: Discussion of RUWMP and IRP with Orange County member and retail agencies
	October	*Public Hearing:* Public review and comments on the 2010 Regional Urban Water Management Plan held as part of the Water Planning and Stewardship Committee meeting of Metropolitan's Board of Directors.
	November	*Metropolitan Board of Director's Meeting:* Adopt 2010 Regional Urban Water Management Plan

Letter Notifying Cities and Counties

July 30, 2010

To Whom It May Concern:

This letter serves as notification that The Metropolitan Water District of Southern California (Metropolitan) will be holding a public hearing at the Water Planning and Stewardship Committee Board meeting to receive input on the draft 2010 Regional Urban Water Management Plan (RUWMP). The RUWMP presents Metropolitan's long-term plans for ensuring the reliability and quality of water resources for the region. The RUWMP complies with California state law requiring urban water suppliers to prepare and update Urban Water Management Plans every five years. Public Input is encouraged, appreciated, and will be considered during finalization of the 2010 RUWMP.

Public Hearing will be held on:
Monday, October 11, 2010
Committee Room US 2-456 at 1:30 p.m.
Metropolitan Water District Headquarters Building
700 North Alameda Street
Los Angeles, Ca 90012

The draft Plan will be posted on Metropolitan's web site at www.mwdh2o.com beginning August 9, 2010. Please check on the website for updated room and time information. Written comments are due by **October 11, 2010**. Please send comments to:

Metropolitan Water District
700 North Alameda Street
Los Angeles, Ca 90012
Attn: Edgar Fandialan

If you would like more information or have any questions, please contact Edgar Fandialan at (213) 217-6764 or via email at efandialan@mwdh2o.com.

Very Truly Yours,

Devendra Upadhyay
Manager, Water Resource Management

PUBLIC HEARING SCHEDULED ON
DRAFT REGIONAL URBAN WATER MANAGEMENT PLAN

The Metropolitan Water District of Southern California (Metropolitan) will hold a public hearing on **Monday, October 11, 2010** to receive comments on the draft 2010 Regional Urban Water Management Plan (RUWMP).

The hearing will be held at 1:30 p.m. in the Committee Room US 2-456 of Metropolitan's Headquarters Building at 700 North Alameda Street, Los Angeles, California before the Water Planning and Stewardship Committee of Metropolitan's Board of Directors.

The RUWMP presents Metropolitan's long-term plans for ensuring the reliability and quality of water resources for the region. The RUWMP complies with California State law requiring urban water suppliers to prepare and update urban water management plans every five years. The draft plan is posted on Metropolitan's Web site at www.mwdh2o.com.

Public input is encouraged, appreciated, and will be considered during finalization of the 2010 RUWMP. In addition to the public hearing, Metropolitan will accept written comments on the draft plan. All written comments must be received by **October 11, 2010** to:

The Metropolitan Water District of Southern California
P.O. Box 54153
Los Angeles, CA 90054-0153
Attn: Edgar Fandialan

For more information on the draft RUWMP, please call Edgar Fandialan of Metropolitan's Water Resource Management Group at (213) 217-6764.

RESOLUTION 9117

RESOLUTION
OF THE BOARD OF DIRECTORS
OF THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
ADOPTING THE 2010 REGIONAL URBAN WATER MANAGEMENT PLAN

WHEREAS, the California Urban Water Management Planning Act requires urban water suppliers 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, in accordance with prescribed requirements, an urban water management plan every five years; 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 2010 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 November 9, 2010 this District hereby adopts this 2010 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 November 9, 2010.

Dawn Chin

Board Executive Secretary
The Metropolitan Water District
of Southern California

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APPENDIX A.1
Demand Forecast

A.1 DEMAND FORECAST

Forecast Overview

Retail Municipal and Industrial (M&I) demands represent the full spectrum of urban water use within a region, including residential, commercial, industrial, institutional and unmetered uses. Within the water industry, numerous approaches exist for projecting future retail M&I water demands. These include per capita projections, trend extrapolation, land use build-out estimates, and econometric models.

To forecast urban water demands, Metropolitan uses the MWD-MAIN Water Use Forecasting framework, an implementation of the original IWR-MAIN Water Use Forecasting Model. The MWD-MAIN framework includes statistical models that have been adapted to conditions in Southern California. The model incorporates projections of demographic and economic variables developed by Southern California's two regional planning agencies – the Southern California Association of Governments (SCAG) and the San Diego Association of Governments (SANDAG) – into statistical models of water demand, yielding forecasts of gross retail urban M&I water demand. This estimate of gross retail demand is then adjusted for conservation savings and local agency supplies to obtain an estimate of retail demands needing to be met by Metropolitan.

The MWD-MAIN framework uses separate models for each of three sectors—single-family residential, multi-family residential, and nonresidential. Demand forecast for the two residential sectors are obtained by multiplying model-based estimates of water demand per occupied dwelling unit by SCAG and SANDAG estimates of the future number of occupied units. For the non-residential sector, water use per employee is multiplied by estimates of future employment patterns. The basic relationships involved are shown in Table A.1-1.

In addition to accounting for future demographic trends, Metropolitan's water demand forecasts also account for conservation savings. As a signatory to the 1991 *Memorandum of Understanding (MOU) Regarding Urban Water Conservation*,[1] Metropolitan's efforts to promote water use efficiency are largely informed by the California Urban Water Conservation Council's "Best Management Practices" (BMPs) concerning urban water conservation.[2]

The range of activities intended to promote water conservation within Metropolitan's service area are accounted for in Metropolitan's Conservation Model. This model distinguishes between the following components of regional conservation:

- *Code-Based Conservation* – Water saved as a result of legislative changes in water efficiency requirements as reflected in more efficient plumbing codes and water using devices.

[1] A copy of the MOU can be found at http://www.cuwcc.org/.

[2] Section 3.1 contains a more complete accounting of Metropolitan's efforts in this area.

- *Active Conservation* – Water saved directly as a result of conservation programs funded by water agencies (includes implementation of the Best Management Practices). The form and extent of such conservation is unlikely to result without agency encouragement.
- *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 motivate consumers to participate in one or more active conservation programs
- *Reductions in Distribution System Losses* – To the extent that conservation efforts result in less water traveling through the distribution system, system losses will be reduced.

Table A.1-1
MWD-MAIN Demand Model Variables

Demand Sector	Projected Demographic	Dependent Variable	Explanatory Variables
Single Family Residential	Number of Single Family Households	Water use per household	Climate Household Size Income Price and Conservation Housing Density Service Area Location
Multifamily Residential	Number of Multifamily Households	Water use per household	Climate Household Size Income Price and Conservation Housing Density Service Area Location
Commercial, Industrial, Institutional (CII)	Total Urban Employment	Water use per employee	Climate Price and Conservation Industrial / Service employment Share
Unmetered Use			Percentage of total use

Estimates obtained from Metropolitan's Conservation Model are subtracted from gross estimates of retail urban water demand. Following this, adjustments are made for local agency supplies, system losses, and price effects. This results in an estimate of total regional M&I demands facing Metropolitan.

Trends in Southern California

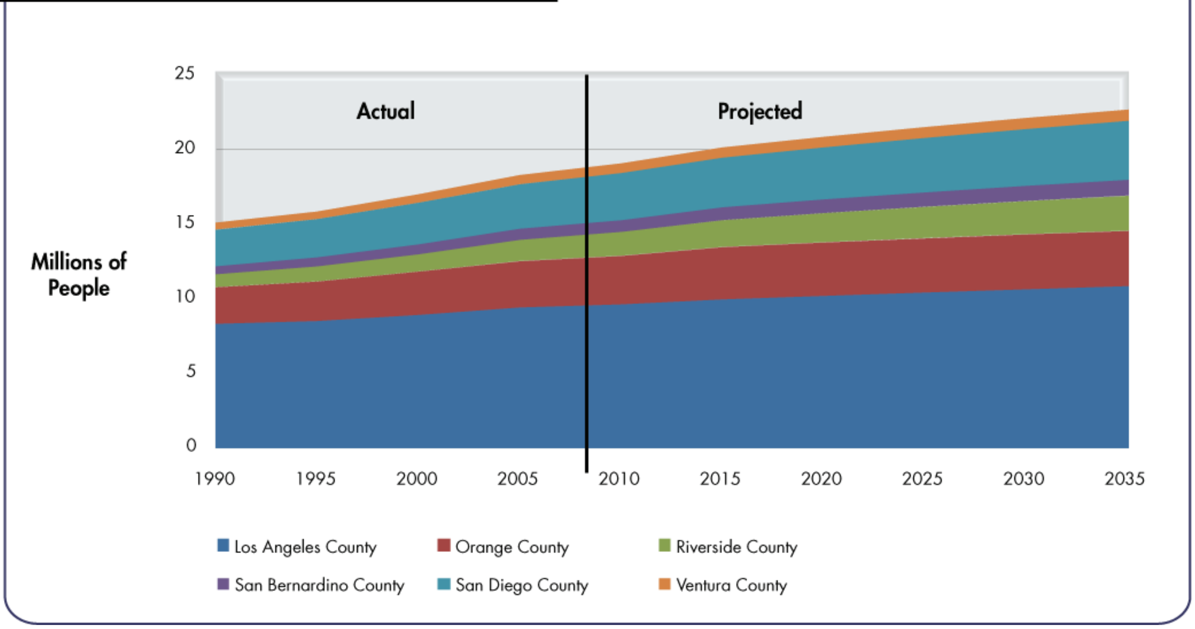
Population

According to SCAG and SANDAG estimates, the population in Metropolitan's service area will reach 18.9 million in 2010, 21.3 million in 2025, and 22.5 million by 2035.[3] While

[3] The most recent calendar year for which actual data are available is 2008. Data for 2009 and later are model-based estimates.

Los Angeles County leads in total population, the inland areas of Riverside and San Bernardino counties are projected to grow at the fastest rates over the next ten years. Generally speaking, however, annual growth rates will slow for all counties between 2010 and 2035. In part this is due to changing patterns of migration. It also reflects the effects of the recession of the late 2000s and the ongoing restructuring of the Southern California economy.

Figure A. 1-1 Actual and Projected Population



Employment

Economic trends are important drivers of water demand. Metropolitan captures economic trends by tracking regional employment growth and the changing mix of industries comprising the Southern California economy.

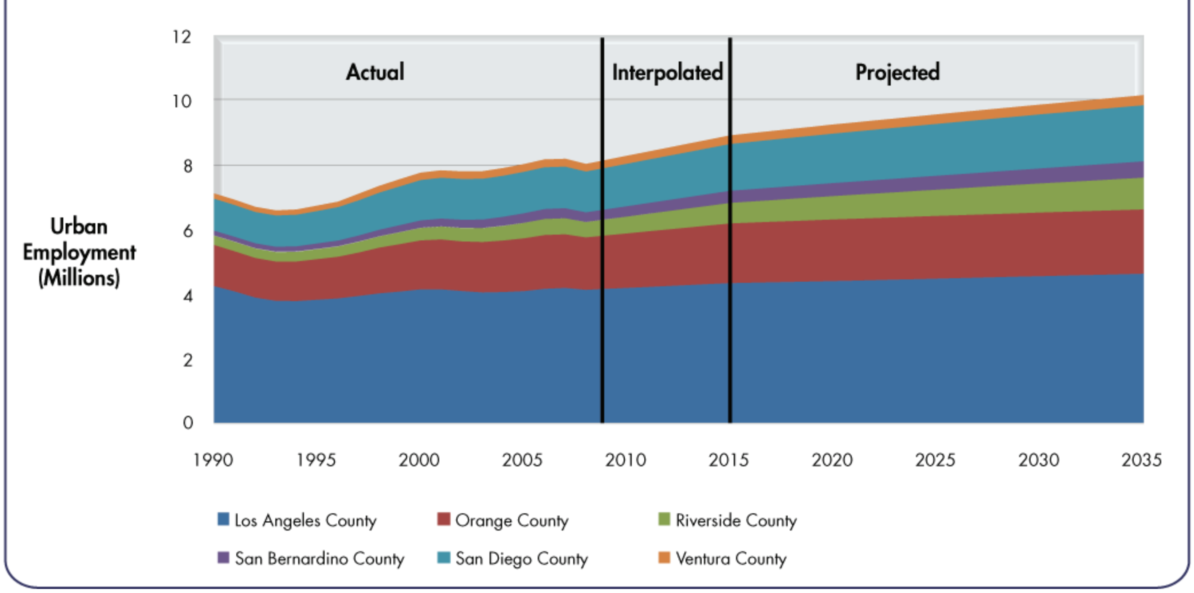
Recession during the 1990s cost Southern California around 400,000 jobs and caused a major shift in the region's industry base. Almost 300,000 manufacturing jobs were lost by 1995, many of them in the aerospace and defense industries. Los Angeles and Orange counties were especially hard hit by these changes. While manufacturing and other sectors of the economy suffered, service employment held steady and experienced modest growth in Riverside and San Bernardino counties.

The economic recovery of the late 1990s included growth in high-tech and computer-related industries and a rapid expansion of the service economy. Job growth in the late 1990s approached levels of the late 1980s. But regional job growth slowed once again during the early 2000s as the result a mild economic downturn and then fell again in response to the economic recession beginning in 2007. Southern California suffered more than most regions during this period due to the combination of housing and economic declines occurring during the post-2007 period.

Within Metropolitan's service area, employment growth is likely to occur unevenly across the six counties. Over the 25-year period between 2010 and 2035, the greatest employment increases are expected to occur in Riverside, San Diego, and Los Angeles counties with estimated increases of 469,000 TAF, 461,000 TAF, and 432,000 TAF jobs respectively. Relative to existing employment, Riverside and San Bernardino counties are expected to have the highest rates of employment growth.

Figure A.1-2 and Table A.1-3 summarize the projected growth of commercial, industrial and institutional employment in Metropolitan's service area. The number of people employed in commerce and industry is expected to increase from 8.3 million in 2010 to about 10.2 million in 2035. This increase of about 23 percent is greater than the projected population increase (19 percent), suggesting that an increased share of the population will be employed over time.

Figure A. 1-2 Actual and Projected Urban Employment



Residential Consumers

Southern California's regional planning agencies have forecast residential housing growth in all parts of the Metropolitan service area. These forecasts are shown in Figure A.1-3 and Table A.1 4. The total occupied housing stock is expected to increase more than 19 percent between 2010 and 2035, growing from 6.1 to around 7.3 million housing units. Much of this growth will likely occur in hotter inland areas of Southern California. Although small changes in geographic service area are expected to occur as the results of annexations, no major increase in the total geographic service area is expected. Within the service territory, the household occupancy size (household population divided by total occupied dwelling units) is projected to decline slightly from about 3.05 persons per unit currently to 3.03 persons per unit by 2035.

Permits for new residential housing construction are another indicator of the future growth in water demand. Figure A.1-4 shows the pattern of historical growth in residential housing permits between 1970 and 2009.[4]

[4] 2009 is the last year for which complete data are available.

Figure A. 1-3 Actual and Projected Households

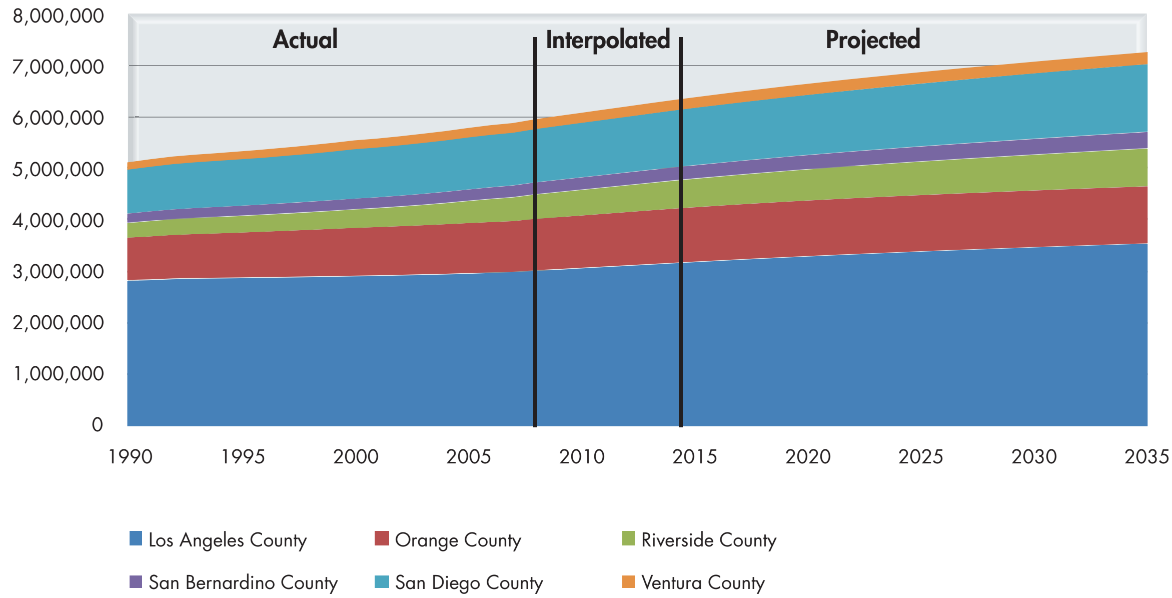
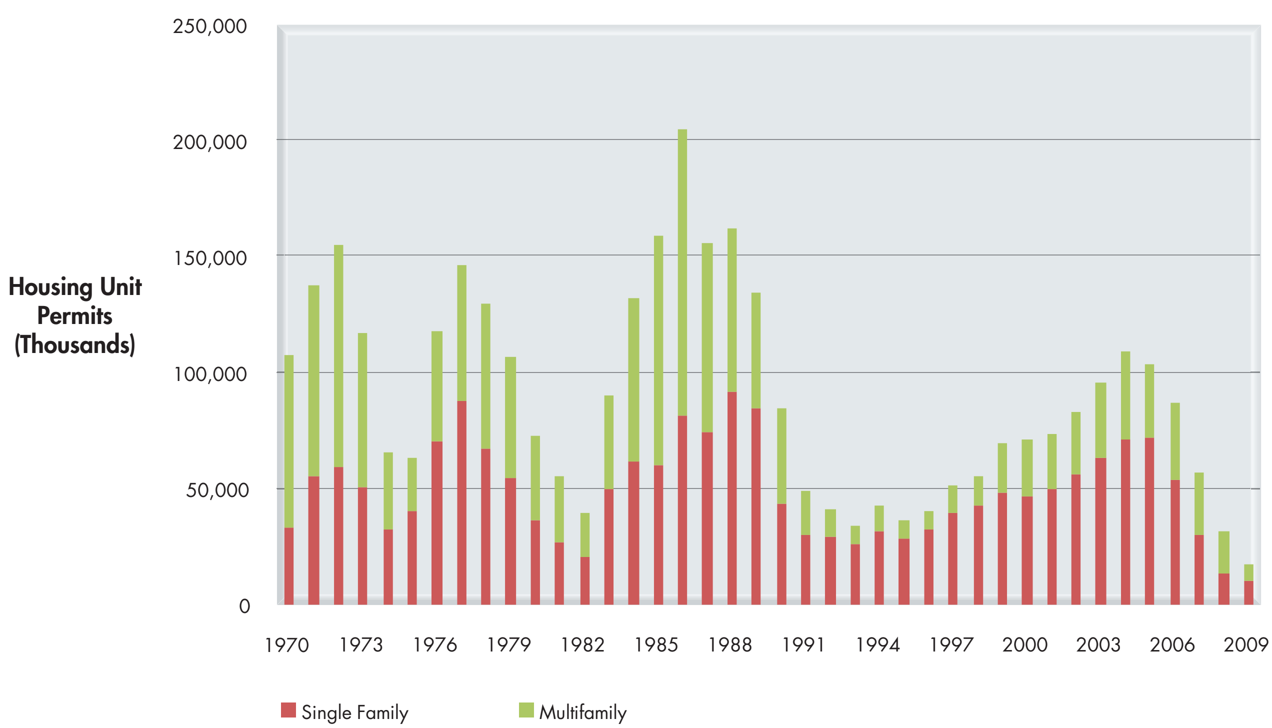


Figure A. 1-4 Residential Housing Permits in Six-County Region



The effect of economic cycles can clearly be seen over time with the precipitous fall in housing construction accompanying the 2007 recession being most notable.

Water Demands

As shown in Figure A.1-5 and Table A.1-5, actual retail water demands within Metropolitan's service area have increased from 3.1 million acre-feet (MAF) in 1980 to a projected 4.0 MAF in 2010.[5] This represents an estimated annual increase of about 1.0 percent. A similar gradual increase in estimated total retail water demand is expected between 2010 and 2035.

Of the estimated 4.0 MAF of total retail water use in 2010, 93 percent is due to M&I use with agriculture accounting for the other 7 percent. The relative share of M&I water use has increased over time at the expense of agricultural use which has declined due to urbanization and market factors. By 2035, it is estimated that agriculture will account for only about 4 percent of total Metropolitan retail demands.

Retail Demand

It is estimated that total M&I water use will grow from an annual average of 4.0 MAF in 2010 to 4.7 MAF in 2035. All water demand projections assume normal weather conditions. Future changes in estimated water demand assume continued water savings due to conservation measures such as water savings resulting from plumbing codes, price effects, and the continuing implementation of utility-funded conservation BMPs.

By County

M&I water demand is not expected to grow uniformly across counties. Consistent with the general pattern of future demographic distributions, the largest absolute increases in urban water demands are expected to occur in Los Angeles and Riverside counties, with respective estimated increases of about 178,300 and 230,700 AF per year between 2010 and 2035.

By Sector

Water use can also be broken down by sector. Between 2010 and 2035, single-family residential water use is expected to increase by 17.5 percent (Table A.1-8), while multifamily water use is estimated to increase by 29.4 percent (Table A.1-9). In contrast, Table A.1-10 shows a relatively flat trend in estimated nonresidential water use between 2010 and 2035.

Residential Water Use

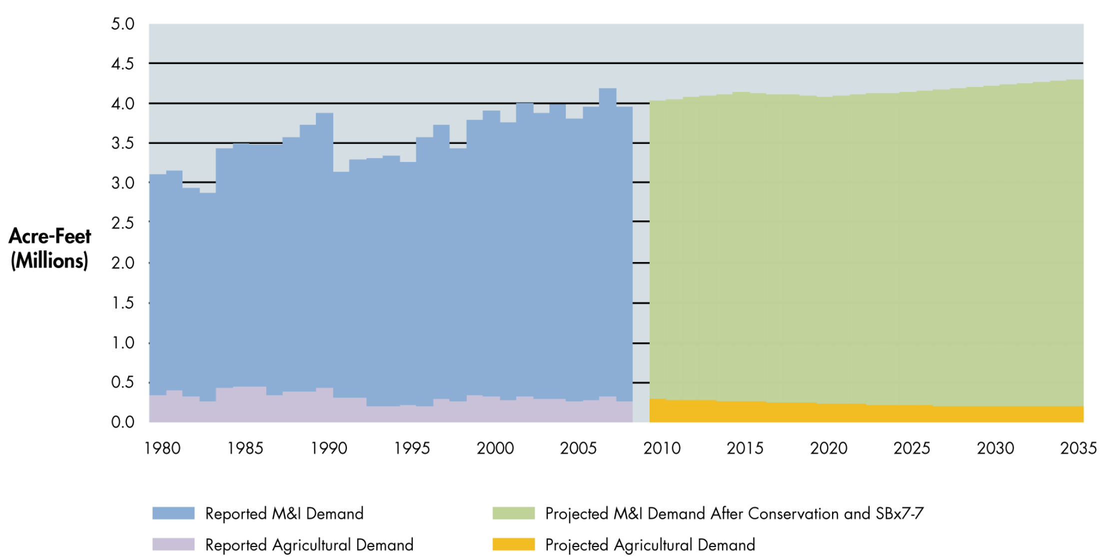
While single-family homes are estimated to account for about 61 percent of the total occupied housing stock in 2010, they are responsible for about 74 percent of total residential water demands (Tables A.1-8 and A.1-9). This is consistent with the fact that single-family households are known to use more water than multifamily households (e.g., those residing in duplexes, triplexes, apartment buildings and condo developments) on a per housing-unit basis. This is because 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.

Nonresidential Water Use

Nonresidential water use represents an approximately 25 percent of the total M&I demands in Metropolitan's service area (Table A.1-10). This includes 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

[5] Complete information for 2010 are not available. The figure given is a model-based estimate.

Figure A. 1-5 Actual and Projected Retail Water Demand



water users include schools, hospitals, hotels, amusement parks, colleges, laundries, and restaurants. In Southern California, 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.

Conservation Savings

Table A.1-12 shows estimated conservation savings resulting from active conservation programs ("Active"), ongoing conservation from natural replacement of plumbing fixtures ("Code-Based"), and conservation induced by projected increases in the real price of water ("Price"). Code-Based savings account for the largest share of total conservation. However, aggressive utility-funded conservation programs have made a significant contribution in this area. For example, Metropolitan-assisted programs were responsible for an estimated 134,000 acre-feet in savings during FY 2008/09 and nearly 1.3 MAF in cumulative conservation savings since FY 1990/91.[6]

Projected M&I Demand by Sector

Table A.1-13 provides a summary of municipal and industrial demands, broken down by sector, along with each sector's share of total retail demand. In 2010, residential use accounted for about two-thirds (68 percent) of total projected M&I demand while non-residential use constituted nearly one-fourth (24 percent) of projected M&I demand. These shares are expected to change slightly in 2035 with estimated residential use at 71 percent and non-residential use accounting for approximately 21 percent of total M&I use. System losses and unmetered use are expected to remain relatively constant over this period at about 8.1 percent.

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[6] Metropolitan Water District of Southern California. Annual Progress Report to the California State Legislature: Achievements in Conservation, Recycling and Groundwater Recharge. February 2010.

Table A.1-2 Population Growth in Metropolitan' s Service Area (July)

(Persons)

	Actual					Projected				
County	1990	1995	2000	2005	2010*	2015	2020	2025	2030	2035
Los Angeles County	8,268,000	8,458,000	8,860,000	9,364,000	9,567,000	9,900,000	10,132,000	10,356,000	10,574,000	10,781,000
Orange County	2,412,000	2,604,000	2,863,000	3,057,000	3,205,000	3,452,000	3,534,000	3,586,000	3,630,000	3,654,000
Riverside County	851,000	994,000	1,129,000	1,381,000	1,559,000	1,756,000	1,909,000	2,049,000	2,173,000	2,292,000
San Bernardino County	565,000	637,000	707,000	792,000	832,000	915,000	968,000	1,020,000	1,070,000	1,117,000
San Diego County	2,407,000	2,519,000	2,737,000	2,934,000	3,109,000	3,274,000	3,439,000	3,599,000	3,759,000	3,899,000
Ventura County	451,000	478,000	542,000	588,000	624,000	659,000	683,000	702,000	720,000	731,000
Metropolitan's Service Area	**14,954,000**	**15,690,000**	**16,838,000**	**18,116,000**	**18,896,000**	**19,956,000**	**20,665,000**	**21,312,000**	**21,926,000**	**22,474,000**

Source: US Census, CA Department of Finance, SCAG RTP-07, SANDAG Series 12 2050 Regional Growth Forecast (Feb 2010)

* Interpolated

Table A.1-3 Urban Employment Growth in Metropolitan' s Service Area (July)

	Actual					Projected				
County	1990	1995	2000	2005	2010*	2015	2020	2025	2030	2035
Los Angeles County	4,236,000	3,820,000	4,135,000	4,082,000	4,179,000	4,328,000	4,389,000	4,461,000	4,538,000	4,611,000
Orange County	1,260,000	1,240,000	1,500,000	1,616,000	1,671,000	1,830,000	1,890,000	1,925,000	1,953,000	1,974,000
Riverside County	277,000	297,000	373,000	465,000	507,000	622,000	714,000	804,000	895,000	976,000
San Bernardino County	164,000	186,000	246,000	308,000	334,000	387,000	411,000	438,000	469,000	510,000
San Diego County	1,001,000	1,017,000	1,254,000	1,288,000	1,318,000	1,446,000	1,529,000	1,601,000	1,665,000	1,728,000
Ventura County	151,000	156,000	218,000	229,000	235,000	255,000	269,000	281,000	291,000	300,000
Metropolitan's Service Area	**7,089,000**	**6,716,000**	**7,726,000**	**7,988,000**	**8,244,000**	**8,868,000**	**9,202,000**	**9,510,000**	**9,811,000**	**10,099,000**

Source: US Census, CA Department of Finance, SCAG RTP-07, SANDAG Series 12 2050 Regional Growth Forecast (Feb 2010)

* Interpolated

Table A.1-4 Occupied Housing Growth in Metropolitan's Service Area

(Households)

	Actual					Projected				
County	1990	1995	2000	2005	2010*	2015	2020	2025	2030	2035
Los Angeles County	2,825,000	2,875,000	2,911,000	2,961,000	3,064,000	3,185,000	3,299,000	3,389,000	3,475,000	3,545,000
Orange County	832,000	881,000	938,000	981,000	1,027,000	1,072,000	1,088,000	1,102,000	1,111,000	1,118,000
Riverside County	283,000	322,000	357,000	427,000	496,000	552,000	605,000	650,000	692,000	733,000
San Bernardino County	175,000	190,000	203,000	216,000	234,000	253,000	269,000	285,000	300,000	314,000
San Diego County	863,000	913,000	965,000	1,016,000	1,062,000	1,116,000	1,168,000	1,220,000	1,271,000	1,312,000
Ventura County	143,000	151,000	170,000	184,000	197,000	208,000	215,000	221,000	227,000	232,000
Metropolitan's Service Area	**5,121,000**	**5,332,000**	**5,544,000**	**5,785,000**	**6,080,000**	**6,386,000**	**6,644,000**	**6,867,000**	**7,076,000**	**7,254,000**

Source: US Census, CA Department of Finance, SCAG RTP-07, SANDAG Series 12 2050 Regional Growth Forecast (Feb 2010)

* Interpolated

Table A.1-5 Total Retail Demand in Metropolitan's Service Area with Conservation and SBx7-7

(Acre-Feet)

	Actual							Projected				
County	1980	1985	1990	1995	2000	2005	2010*	2015	2020	2025	2030	2035
Los Angeles County	1,528,000	1,703,000	1,734,000	1,558,000	1,739,000	1,643,000	1,762,000	1,704,000	1,664,000	1,676,000	1,694,000	1,705,000
Orange County	521,000	596,000	673,000	577,000	660,000	629,000	624,000	651,000	634,000	635,000	637,000	637,000
Riverside County	348,000	376,000	480,000	404,000	492,000	495,000	544,000	603,000	626,000	664,000	701,000	736,000
San Bernardino County	166,000	188,000	210,000	184,000	251,000	264,000	268,000	259,000	252,000	263,000	275,000	286,000
San Diego County	481,000	487,000	686,000	502,000	661,000	614,000	668,000	687,000	682,000	691,000	709,000	728,000
Ventura County	96,000	113,000	145,000	108,000	132,000	158,000	166,000	170,000	170,000	174,000	178,000	181,000
Metropolitan's Service Area	**3,140,000**	**3,463,000**	**3,928,000**	**3,333,000**	**3,935,000**	**3,803,000**	**4,032,000**	**4,074,000**	**4,028,000**	**4,103,000**	**4,194,000**	**4,273,000**

Table A.1-6 Total Retail M&I Demand in Metropolitan's Service Area with Conservation and SBx7-7

(Acre-Feet)

	Actual							Projected				
County	1980	1985	1990	1995	2000	2005	2010*	2015	2020	2025	2030	2035
Los Angeles County	1,522,000	1,698,000	1,732,000	1,550,000	1,738,000	1,643,000	1,761,000	1,703,000	1,664,000	1,676,000	1,693,000	1,704,000
Orange County	481,000	547,000	646,000	559,000	643,000	619,000	613,000	644,000	630,000	633,000	634,000	634,000
Riverside County	141,000	174,000	279,000	245,000	357,000	413,000	454,000	508,000	532,000	570,000	606,000	641,000
San Bernardino County	120,000	150,000	172,000	152,000	221,000	236,000	242,000	243,000	245,000	256,000	268,000	279,000
San Diego County	365,000	370,000	548,000	438,000	556,000	523,000	596,000	603,000	604,000	631,000	657,000	675,000
Ventura County	77,000	91,000	118,000	94,000	125,000	145,000	151,000	149,000	149,000	152,000	156,000	158,000
Metropolitan's Service Area	**2,706,000**	**3,030,000**	**3,495,000**	**3,038,000**	**3,640,000**	**3,579,000**	**3,817,000**	**3,850,000**	**3,824,000**	**3,918,000**	**4,014,000**	**4,091,000**

Table A.1-7 Total Retail Agricultural Demand in Metropolitan' s Service Area

(Acre-Feet)

	Actual							Projected				
County	1980	1985	1990	1995	2000	2005	2010*	2015	2020	2025	2030	2035
Los Angeles County	6,300	5,300	2,800	7,500	500	400	500	400	400	400	400	400
Orange County	40,300	48,400	26,900	17,700	17,300	9,800	10,900	6,800	3,800	2,900	2,900	2,900
Riverside County	207,000	202,000	200,800	158,700	134,100	81,700	89,600	94,200	94,200	94,200	94,200	94,200
San Bernardino County	46,100	37,700	37,200	32,200	29,800	27,500	26,500	15,200	7,100	7,100	7,100	7,100
San Diego County	116,200	117,400	138,600	64,400	105,600	91,300	72,000	84,300	78,300	59,800	52,300	52,300
Ventura County	19,400	22,000	27,400	14,300	7,500	12,600	14,700	20,900	21,300	21,700	22,300	22,900
Metropolitan's Service Area	**435,300**	**432,800**	**433,700**	**294,800**	**294,800**	**223,300**	**214,200**	**221,800**	**205,100**	**186,100**	**179,200**	**179,800**

* Data not available - estimated based on prior years.

Table A.1-8 Single Family Retail Demand in Metropolitan' s Service Area*

(Acre-Feet)

County	2010	2015	2020	2025	2030	2035
	Projected					
Los Angeles County	778,000	831,000	857,000	866,000	878,000	885,000
Orange County	300,000	325,000	334,000	337,000	339,000	341,000
Riverside County	329,000	376,000	411,000	439,000	465,000	490,000
San Bernardino County	138,000	148,000	154,000	159,000	165,000	168,000
San Diego County	265,000	282,000	295,000	303,000	311,000	315,000
Ventura County	91,000	99,000	103,000	105,000	107,000	108,000
Metropolitan's Service Area	**1,901,000**	**2,061,000**	**2,154,000**	**2,209,000**	**2,265,000**	**2,307,000**

* Projections do not include savings estimates to meet SBx7-7.

Table A. 1-9 Multifamily Retail Demand in Metropolitan's Service Area*

Average Year (Acre-Feet)

County	2010	2015	2020	2025	2030	2035
	Projected					
Los Angeles County	318,000	349,000	364,000	373,000	384,000	393,000
Orange County	111,000	125,000	129,000	131,000	133,000	135,000
Riverside County	54,000	62,000	68,000	74,000	79,000	86,000
San Bernardino County	31,000	35,000	38,000	42,000	46,000	50,000
San Diego County	125,000	140,000	154,000	170,000	186,000	201,000
Ventura County	12,000	13,000	14,000	15,000	16,000	16,000
Metropolitan's Service Area	**651,000**	**724,000**	**767,000**	**805,000**	**844,000**	**881,000**

* Projections do not include savings estimates to meet SBx7-7.

Table A. 1-10 Commercial, Industrial and Institutional Retail Demand in Metropolitan's Service Area*

Average Year (Acre-Feet)

County	2010	2015	2020	2025	2030	2035
	Projected					
Los Angeles County	456,000	470,000	467,000	457,000	449,000	441,000
Orange County	169,000	182,000	185,000	182,000	178,000	173,000
Riverside County	47,000	52,000	58,000	62,000	66,000	69,000
San Bernardino County	37,000	44,000	46,000	47,000	49,000	52,000
San Diego County	148,000	164,000	166,000	169,000	169,000	168,000
Ventura County	33,000	33,000	34,000	35,000	35,000	35,000
Metropolitan's Service Area	**890,000**	**945,000**	**956,000**	**952,000**	**946,000**	**938,000**

* Projections do not include savings estimates to meet SBx7-7.

Table A. 1-11 Unmetered Use in Metropolitan's Service Area*

Average Year (Acre-Feet)

	Projected					
County	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Los Angeles County	135,000	143,000	146,000	147,000	148,000	149,000
Orange County	41,000	45,000	46,000	46,000	46,000	46,000
Riverside County	42,000	47,000	52,000	55,000	59,000	62,000
San Bernardino County	28,000	31,000	33,000	34,000	35,000	37,000
Table 2-7	45,000	50,000	52,000	54,000	56,000	58,000
Ventura County	12,000	12,000	13,000	13,000	13,000	14,000
Metropolitan's Service Area	**303,000**	**328,000**	**342,000**	**349,000**	**357,000**	**366,000**

* Projections do not include savings estimates to meet SBx7-7.

Table A.1-12 Conservation Savings in Metropolitan's Service Area - 1980 Base Year

(Acre-Feet)

	Estimated				Projected					
County	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Los Angeles County	0	98,000	194,000	279,000	328,000	347,000	358,000	388,000	416,000	441,000
Orange County	0	29,000	64,000	95,000	116,000	120,000	120,000	128,000	135,000	142,000
Riverside County	0	11,000	23,000	38,000	56,000	65,000	71,000	82,000	92,000	102,000
San Bernardino County	0	4,000	8,000	13,000	21,000	25,000	28,000	32,000	36,000	40,000
San Diego County	0	25,000	56,000	77,000	98,000	109,000	118,000	130,000	142,000	153,000
Ventura County	0	4,000	9,000	13,000	17,000	19,000	21,000	23,000	25,000	27,000
Active, Code and Price	**0**	**171,000**	**355,000**	**515,000**	**636,000**	**686,000**	**717,000**	**783,000**	**846,000**	**906,000**
Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Total Conservation	**250,000**	**421,000**	**605,000**	**765,000**	**886,000**	**936,000**	**967,000**	**1,033,000**	**1,096,000**	**1,156,000**

Note:

* Estimated conservation savings with active savings installed as of calendar year 2009.
Savings projections do not include savings derived from SB7x7.

Table A.1-13 Projected Municipal and Industrial Demands by Sector

(Acre-Feet)

	Historical[1]				Projection[2]					
Sector	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Single-Family	1,754,000	1,529,000	1,837,000	1,812,000	1,901,000	2,061,000	2,154,000	2,209,000	2,264,000	2,307,000
Multifamily	545,000	487,000	600,000	606,000	650,000	724,000	769,000	805,000	844,000	880,000
Non-Residential	915,000	777,000	910,000	874,000	890,000	945,000	956,000	952,000	946,000	938,000
System Losses/Unmetered	282,000	245,000	294,000	289,000	303,000	328,000	342,000	350,000	358,000	365,000
Metropolitan Total	**3,495,000**	**3,038,000**	**3,640,000**	**3,580,000**	**3,744,000**	**4,058,000**	**4,221,000**	**4,315,000**	**4,413,000**	**4,490,000**
Single-Family	50.2%	50.3%	50.5%	50.6%	50.8%	50.8%	51.0%	51.2%	51.3%	51.4%
Multifamily	15.6%	16.0%	16.5%	16.9%	17.4%	17.8%	18.2%	18.7%	19.1%	19.6%
Non-Residential	26.2%	25.6%	25.0%	24.4%	23.8%	23.3%	22.7%	22.1%	21.4%	20.9%
System Losses/Unmetered	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%
Metropolitan Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

[1] Estimates of historical water use by sector are prorated using percentages from projected demands and actual water use.

[2] Projected demand are weather normalized and do not include savings estimates to meet SBx7-7.

APPENDIX A.2
EXISTING REGIONAL WATER SUPPLIES

A.2 EXISTING REGIONAL WATER SUPPLIES

Water used in Metropolitan's service area comes from both local and imported sources. Local sources include groundwater, surface water, and recycled water. Sources of imported water include the Colorado River, the State Water Project (SWP), and the Owens Valley/Mono Basin. Local sources meet about 45 percent of the water needs in Metropolitan's service area, while imported sources supply the remaining 55 percent.

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 about 7 percent of the region's water needs based on a five-year average from 2005-2009, but is dedicated for use by the city of Los Angeles. Contractually and for planning purposes, Metropolitan treats the LAA as a local supply, although physically its water is imported from outside the region. Other supplies come from local sources, and Metropolitan provides imported water supplies to meet the remaining 47 percent of the region's water needs based on the same five-year period. These imported supplies are received from Metropolitan's Colorado River Aqueduct (CRA) and the SWP's California Aqueduct. Table A.2-1 and Figure A.2-1 show the historical use of local and imported supplies within Metropolitan's service area.

Table A.2-2 shows the quantities of Metropolitan water used by member agencies during the last ten years. Metropolitan's largest water customers are the San Diego County Water Authority (28 percent of Metropolitan's supplies based on 2005-2009 average), city of Los Angeles (15 percent) and Municipal Water District of Orange County (13 percent).[1] The reliance on Metropolitan's water supplies varies by agency. For example, in recent years, Upper San Gabriel received as little as 5 percent (in fiscal year 2008/09) of its total water supply from Metropolitan, while Beverly Hills received over 93 percent. However, this 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. The main body of the Urban Water Management plan contains descriptions of planned future supplies.

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 the runoff in their watersheds. The Los Angeles River system, however, is not as efficient in capturing runoff. In its upper reaches, which make up 25 percent of the watershed, most runoff is captured with recharge facilities. In its lower

[1] Metropolitan Fiscal Annual Report 2008-09.

reaches, which comprise the remaining 75 percent of the watershed, the river and its tributaries are lined with concrete, so there are no recharge facilities. The Santa Clara River in Ventura County is outside of Metropolitan's service area, but it replenishes groundwater basins 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 replenishment systems.

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

Calendar Year	Local Supplies	L.A. Aqueduct	Colorado River Aqueduct[2]	State Water Project[3]	Total
1976	1,363,000	430,000	778,000	638,000	3,209,000
1977	1,370,000	275,000	1,277,000	209,000	3,131,000
1978	1,253,000	472,000	705,000	576,000	3,005,000
1979	1,419,000	493,000	784,000	532,000	3,227,000
1980	1,452,000	515,000	791,000	560,000	3,317,000
1981	1,500,000	465,000	791,000	827,000	3,583,000
1982	1,392,000	483,000	686,000	737,000	3,298,000
1983	1,385,000	519,000	850,000	410,000	3,163,000
1984	1,621,000	516,000	1,150,000	498,000	3,785,000
1985	1,535,000	496,000	1,018,000	728,000	3,776,000
1986	1,510,000	521,000	1,011,000	756,000	3,799,000
1987	1,465,000	428,000	1,175,000	763,000	3,831,000
1988	1,521,000	369,000	1,199,000	957,000	4,047,000
1989	1,542,000	288,000	1,189,000	1,215,000	4,234,000
1990	1,470,000	106,000	1,183,000	1,458,000	4,217,000
1991	1,426,000	186,000	1,252,000	625,000	3,490,000
1992	1,512,000	177,000	1,153,000	744,000	3,586,000
1993	1,408,000	289,000	1,142,000	663,000	3,502,000
1994	1,527,000	133,000	1,263,000	845,000	3,768,000
1995	1,590,000	464,000	933,000	451,000	3,438,000
1996	1,715,000	425,000	1,089,000	663,000	3,892,000
1997	1,759,000	436,000	1,125,000	724,000	4,044,000
1998	1,726,000	467,000	941,000	521,000	3,655,000
1999	1,887,000	309,000	1,072,000	792,000	4,060,000
2000	1,768,000	255,000	1,217,000	1,473,000	4,714,000
2001	1,708,000	267,000	1,245,000	1,119,000	4,340,000
2002	1,706,000	179,000	1,198,000	1,415,000	4,498,000
2003	1,659,000	252,000	676,000	1,561,000	4,148,000
2004	1,627,000	203,000	741,000	1,802,000	4,373,000
2005	1,590,000	369,000	685,000	1,525,000	4,168,000
2006	1,710,000	379,000	535,000	1,695,000	4,319,000
2007	1,852,000	129,000	696,000	1,648,000	4,326,000
2008	1,842,000	147,000	896,000	1,037,000	3,922,000
*2009	1,801,000	137,000	1,043,000	908,000	3,890,000
**2010	1,832,000	243,000	1,150,000	1,500,000	4,725,000

1. Not including system losses.
2. Colorado River Aqueduct deliveries to service area: gross Havasu diversions less return flows, deliveries to USBR, Mexico, and storage.
3. State Water Project deliveries to service area: includes Table A, Art. 21, Art. 14(b), Art. 12(d), Art. 55, draws from storage & carryover, DWCV & other exchanges, transfers, Drought Water Bank and Dry Year Pool Purchases, Pools A&B, Flood Water, wheeling, Port Hueneme lease, SBVMWD Purchases.

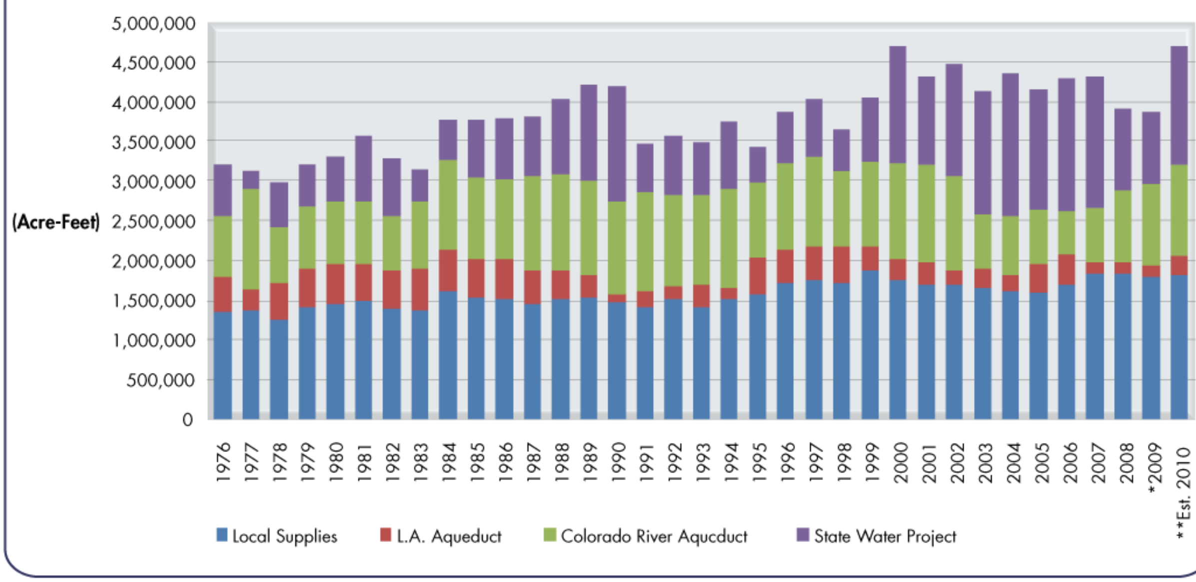
* 2009 local supplies are based 2006-08 averages.
** 2010 CRA and SWP are best estimates as of May 2010; LAA is based on actuals from January thru April plus projections for May thru December; Local Supplies are averages of prior years.

Table A. 2-2
Historic Metropolitan Water Deliveries to Member Agencies
(Acre-Feet)

Agency	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010*
City of Anaheim	25,000	16,000	23,000	21,000	26,000	33,000	25,000	21,000	16,000	21,000	21,000
City of Beverly Hills	14,000	13,000	14,000	12,000	12,000	12,000	12,000	12,000	12,000	11,000	11,000
City of Burbank	12,000	12,000	12,000	14,000	13,000	15,000	16,000	13,000	15,000	12,000	12,000
Calleguas Municipal Water District	120,000	110,000	127,000	118,000	128,000	120,000	126,000	131,000	121,000	101,000	101,000
Central Basin Municipal Water District	128,000	109,000	97,000	62,000	117,000	67,000	114,000	85,000	55,000	53,000	53,000
City of Compton	4,000	4,000	3,000	3,000	3,000	4,000	4,000	3,000	2,000	2,000	2,000
Eastern Municipal Water District	86,000	80,000	101,000	90,000	115,000	113,000	126,000	127,000	109,000	97,000	97,000
Foothill Municipal Water District	12,000	11,000	13,000	13,000	14,000	12,000	12,000	12,000	10,000	10,000	10,000
City of Fullerton	7,000	8,000	13,000	10,000	17,000	18,000	20,000	11,000	8,000	11,000	11,000
City of Glendale	29,000	28,000	23,000	23,000	24,000	22,000	22,000	23,000	21,000	19,000	19,000
Inland Empire Utilities Agency	70,000	67,000	76,000	81,000	84,000	93,000	112,000	75,000	58,000	36,000	36,000
Las Virgenes Municipal Water District	23,000	21,000	23,000	22,000	26,000	21,000	23,000	26,000	27,000	21,000	21,000
City of Long Beach	44,000	44,000	43,000	49,000	48,000	51,000	43,000	36,000	35,000	33,000	33,000
City of Los Angeles	330,000	304,000	403,000	318,000	392,000	184,000	185,000	441,000	430,000	352,000	352,000
Municipal Water District of Orange County	321,000	264,000	340,000	277,000	297,000	303,000	319,000	270,000	234,000	211,000	211,000
City of Pasadena	24,000	19,000	29,000	23,000	24,000	21,000	24,000	25,000	24,000	20,000	20,000
San Diego County Water Authority	593,000	589,000	663,000	652,000	679,000	547,000	598,000	698,000	566,000	540,000	540,000
City of San Fernando	0	0	0	1,000	1,000	1,000	0	1,000	0	0	0
City of San Marino	1,000	0	1,000	1,000	2,000	1,000	2,000	1,000	1,000	1,000	1,000
City of Santa Ana	11,000	13,000	19,000	13,000	20,000	22,000	22,000	12,000	8,000	7,000	7,000
City of Santa Monica	12,000	12,000	13,000	14,000	14,000	13,000	13,000	13,000	12,000	12,000	12,000
Three Valleys Municipal Water District	82,000	71,000	93,000	82,000	86,000	69,000	68,000	74,000	68,000	58,000	58,000
City of Torrance	21,000	22,000	21,000	21,000	21,000	21,000	21,000	20,000	19,000	18,000	18,000
Upper San Gabriel Valley Municipal Water District	60,000	31,000	54,000	72,000	45,000	45,000	48,000	23,000	13,000	6,000	6,000
West Basin Municipal Water District	151,000	141,000	147,000	145,000	147,000	145,000	144,000	142,000	130,000	120,000	120,000
Western Municipal Water District of Riverside County	85,000	82,000	99,000	97,000	106,000	91,000	103,000	120,000	99,000	88,000	88,000
Metropolitan Total	**2,265,000**	**2,071,000**	**2,450,000**	**2,234,000**	**2,461,000**	**2,044,000**	**2,202,000**	**2,415,000**	**2,093,000**	**1,860,000**	**1,860,000**

* Data not available. Assumed 2010 delivery is similar to 2009.

Figure A. 2-1 Sources of Water Supply to Metropolitan's Service Area



Local supplies fluctuate in response to variations in rainfall. During prolonged periods of below-normal rainfall, local water supplies decrease. Conversely, prolonged periods of above-normal rainfall increase local supplies. Sources of groundwater basin replenishment include local precipitation, runoff from the coastal ranges, and artificial recharge with imported water supplies. In addition to runoff, recycled water provides an increasingly important source of replenishment water for the region.

Major Groundwater Basins

Groundwater sources account for about 90 percent of the natural local water supplies, which are found in many basins throughout the Southern California region and provide an annual average total production of about 1.5 MAF per year. Figure A.2-2 shows the location of the major groundwater basins. The majority of groundwater yield comes from natural recharge, which is accomplished through the percolation of rainfall and stream runoff. In certain major drainage areas, runoff is retained in flood control reservoirs and released into spreading basins or ponds for additional percolation into the ground. The Los Angeles County Department of Public Works operates many groundwater recharge facilities located at the upper reaches of the Los Angeles River and San Gabriel River systems providing recharge to San Fernando, Raymond, Main San Gabriel, Central, and West Coast groundwater basins. In addition, the Orange County Water District operates a system of diversion structures and recharge basins along the Santa Ana River that captures much of the storm runoff, as well as water from reclamation facilities in Riverside and San Bernardino counties. Storm runoff is also diverted to recharge basins in the Chino Basin. 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, by percolation in spreading basins, or in-lieu storage.

Almost all major groundwater basins in Southern California are either adjudicated or managed by special districts or agencies. Over 90 percent of the groundwater used in Metropolitan's service area is produced from adjudicated or managed groundwater basins. Adjudicated basins in the region include: Raymond Basin, San Fernando Basins, Main San Gabriel Basin, Central Basin, West Coast Basin, Six Basins, Chino Basin, and Cucamonga Basin. The Orange County Groundwater Basin is managed by Orange County Water District; portions of the Ventura County Basins are managed by the Fox Canyon Groundwater Management Agency; and San Jacinto Basin is managed by Eastern Municipal Water District. In general, these basins have management plans that include protection from seawater intrusion, water quality deterioration, and excessive lowering of water levels.

Major River Systems and Reservoirs

Local surface water resources consist of runoff captured in storage reservoirs and diversions from streams. Reservoirs hold the runoff for later direct use, and diversions from streams are delivered directly to local water systems. As Table A2.3 shows, local water agencies currently own and operate 34 reservoirs. These reservoirs provide a storage capacity of 737 TAF. The historic average yield of these local surface supplies, which come from reservoir releases and stream diversions, is about 90 TAF per year (based on 2005-09 average). 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 greatest storage capacity for these types of reservoirs, with approximately 80 percent 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 operates DVL, Lake Skinner and Lake Mathews. DVL stores water imported during years of ample supply. Of DVL's 810 TAF capacity up to half is dedicated to emergency storage; the remainder is available to augment supplies during dry years and for seasonal storage. In contrast, Lake Skinner and Lake Mathews are largely used for system operations rather than dry year storage. Table A.2-4 lists Metropolitan-owned reservoirs.

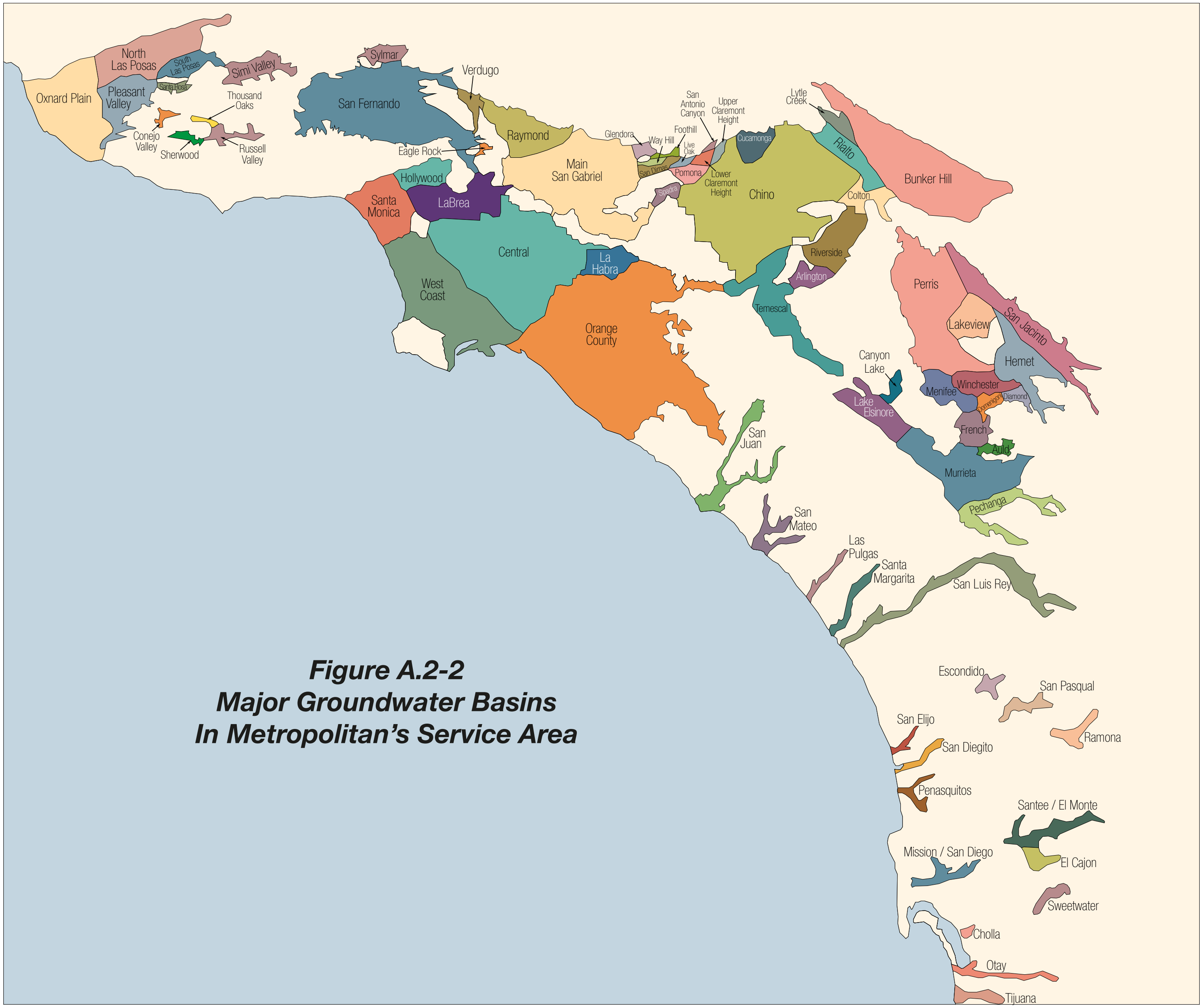


Figure A.2-2
Major Groundwater Basins
In Metropolitan's Service Area

Table A.2-3
Local Storage Reservoirs In Metropolitan's Service Area
(Thousand Acre-Feet

Member Agency/Subagency	Reservoir	Storage Capacity
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 Co.		
Irvine Ranch WD & Serrano ID	Santiago	25.0
San Diego County Water Authority		
Carlsbad MWD	Maerkle	0.6
Escondido, City of	Dixon	2.6
	Wohlford	6.5
Fallbrook PUD	Red Mountain	1.3
Helix WD	Cuyamaca	8.2
	Jennings	9.8
Poway, City of	Poway	3.3
Rainbow MWD	Beck	0.6
	Morro Hill	0.5
Ramona MWD	Ramona	12.0
San Diego County Water Authority	Olivenhain - CWA	24.8
San Diego, City of	Barrett	37.9
	El Capitan	112.8
	Hodges	30.3
	Lower Otay	49.5
	Miramar	7.2
	Morena	50.2
	Murray	4.8
	San Vicente	89.3
	Sutherland	29.7
San Dieguito WD	San Dieguito	0.9
Sweetwater Authority	Loveland	25.4
	Sweetwater	28.1
Valley Center M.WD	Turner	1.6
Vista Irrigation District	Henshaw	51.8
Western MWD of Riverside		
Temescal Water Company	Railroad Canyon	12.0
Total		**736.7**

Table A.2-4
Regional Reservoirs in Metropolitan's Service Area

Reservoir	Capacity (TAF)
Diamond Valley	810
Lake Skinner[1]	44
Lake Mathews[1]	182

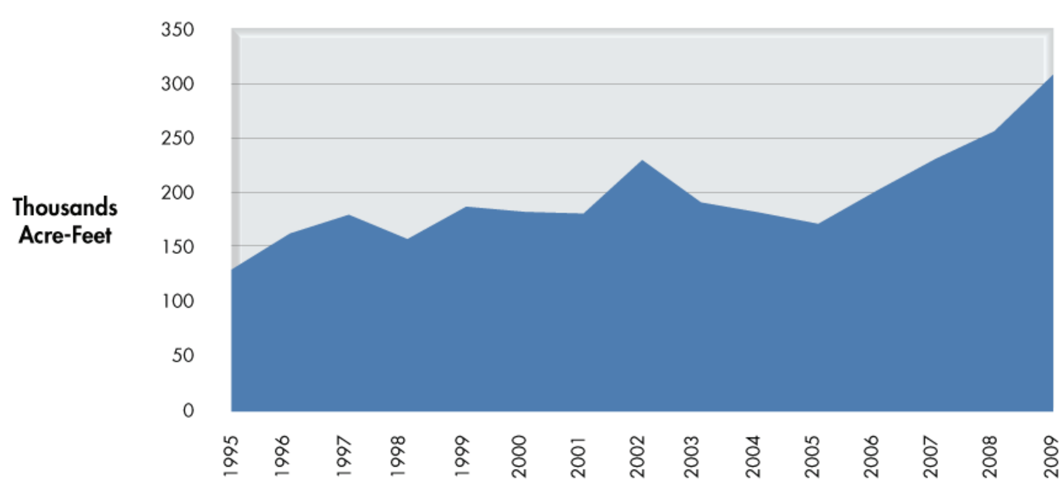
[1] These are used for operations and not primarily for dry year storage.

Lastly, Castaic Reservoir and Perris Reservoir are the terminal reservoirs to the West Branch and East Branch of the California Aqueduct operated by DWR. Through the Monterey Amendment to its SWP water service contract Metropolitan has access to 218.94 TAF of flexible storage capacity in these SWP terminal reservoirs.

Water Recycling and Groundwater Recovery

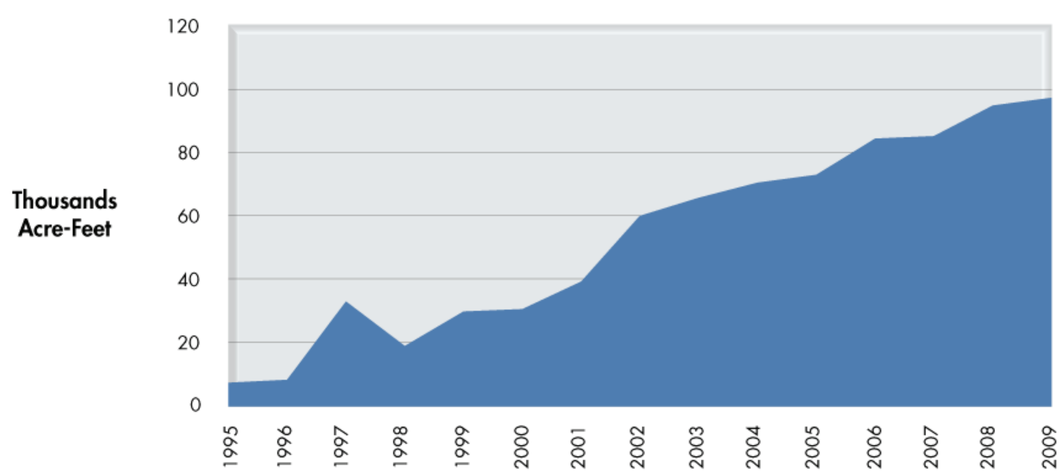
Water recycling projects involve treating wastewater to a level that is acceptable and safe for many nonpotable applications. This resource is providing an increasing level of local water. From 1995 to 2009, Metropolitan invested approximately $244 million in water recycling projects. In 2009, water recycling projects in which Metropolitan has invested produced 161 TAF. In addition, local agency projects that did not receive financial assistance from Metropolitan produced an additional 147 TAF, for a regional total of 308 TAF. Figure A.2-3 demonstrates the increase in this regional supply for direct use.

Figure A.2-3 Recycled Water



In addition, local agencies have implemented several projects to recover contaminated or degraded groundwater for potable uses. The groundwater recovery projects use a variety of treatment technologies to remove nitrates, volatile organic compounds, perchlorate, color and salt. In 1991, Metropolitan began helping to fund its member agencies' groundwater recovery projects. Since that time, Metropolitan has invested approximately $102 million. In 2009, these groundwater recovery projects produced 62 TAF. Other member agency projects that did not receive funding from Metropolitan produced another 35 TAF, for a regional total of 97 TAF. Figure A.2-4 shows this increase in supply.

Figure A.2-4 Groundwater Recovery



Imported Water

Most member agencies and retail water suppliers depend on imported water for a portion of their water supply. For example, Los Angeles and San Diego (the largest and second largest cities in the state) have historically (1995-2004) obtained about 85 percent of their water from imported sources. These imported water requirements are similar to those of other metropolitan areas within the state, such as San Francisco and other cities around the San Francisco Bay.

Figure A.2-5 shows the conveyance facilities for the state's imported water supplies. Descriptions of each of the imported sources of water available to Metropolitan's service area follow. Justification for projected water supplies from these sources, as required for retail water agencies to comply with Senate Bills 221 and 610, are provided in Appendix A.3.

Colorado River

A number of water agencies within California have rights to divert water from the Colorado River. Through the Seven Party Agreement (1931), seven agencies recommended apportionments of California's share of Colorado River water within the state. Table A.2-5 shows the historic apportionment of each agency, and the priority accorded that apportionment.

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

Priority	Description	TAF Annually
1	Palo Verde Irrigation District – gross area of 104,500 acres of land in the Palo Verde Valley	3,850
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(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 the coastal plain of Southern California	550
Subtotal		4,400
5(a)	Metropolitan Water District of Southern California for use on the coastal plain of Southern California	550
5(b)	Metropolitan Water District of Southern California for use on the coastal plain of Southern California[2]	112
6(a)	Imperial Irrigation District and land in Imperial and Coachella Valleys[1] to be served by the All American Canal	300
6(b)	Palo Verde Irrigation District—16,000 acres of land on the Lower Palo Verde Mesa	
7	Agricultural Use in the Colorado River Basin in California	
	Total Prioritized Apportionment	**5,362**

[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 store and deliver Colorado River water to the rights of Metropolitan. The conditions of that agreement have long since been satisfied.

Figure A.2-5
MAJOR WATER CONVEYANCE FACILITIES IN CALIFORNIA

The water is delivered to Metropolitan's service area by way of the Colorado River Aqueduct (CRA), which has a capacity of nearly 1,800 cubic feet per second or 1.3 MAF per year. The CRA conveys water 242 miles from its Lake Havasu intake to its terminal reservoir, Lake Mathews, near the city of Riverside. Conveyance losses along the Colorado River Aqueduct of 10 TAF per year reduce the amount of Colorado River water received in the coastal plain.

Since the date of the original contract, several events have occurred that changed the dependable supply that Metropolitan expects 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 TAF per year. The reduction in dependable supply occurred with the commencement of Colorado River water deliveries to the Central Arizona Project. In 1987, Metropolitan entered into a contract with the Bureau of Reclamation for an additional 180 TAF per year of surplus water. In addition, Metropolitan has obtained a minimum of 85 TAF per year of Colorado River water through a conservation program with the Imperial Irrigation District.

In 1979, the Present Perfected Rights (PPRs) of certain Indian reservations, cities, and individuals along the Colorado River were quantified. These PPRs predate the Seven-Party Agreement, but the rights holders were not included in the Seven Party Agreement prioritizing California's use and storage of Colorado River 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 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 may be coordinated and cooperatively implemented. This framework specified how California would make the transition from relying on surplus water supplies from the Colorado to living within its normal water supply apportionment.

To implement these plans, a number of agreements have been executed. In October 2003, representatives from Metropolitan, IID, and Coachella Valley Water District (CVWD) executed the Quantification Settlement Agreement (QSA) and several other related agreements. Parties involved include the San Diego County Water Authority (SDCWA), the California Department of Water Resources (DWR), the California Department of Fish and Game, the U.S. Department of the Interior and the San Luis Rey Indian Water Rights Settlement Parties. The QSA quantifies the use of water under the third priority of the Seven Party Agreement and allows for implementation of agricultural conservation, land management, and other programs identified in Metropolitan's 1996 IRP. Quantification of the third priority provides the needed numeric baseline from which conservation and transfer programs may be measured. The QSA has helped California reduce its reliance on Colorado River water above its normal apportionment.

The quantification of the agricultural priorities under the QSA provided for the water saved under the Palo Verde Land Management and Crop Rotation Program to be made available to Metropolitan. This program provides up to 133 TAF of water to be available to Metropolitan in certain years and will supply a minimum of 33 TAF per year.

In October 2004, SNWA and Metropolitan entered into a storage and interstate release agreement. Under this program, Nevada can request that Metropolitan store unused Nevada apportionment in Metropolitan's service area. The amount of water stored through 2009 under this agreement was approximately 70 TAF. In subsequent years, Nevada may request recovery of this stored water. As part of a recently executed amendment, it is expected that Nevada will not request return of this water until 2019. The stored water provides flexibility to Metropolitan for blending Colorado River water with State Water Project water and improves near-term water supply reliability.

In December 2007, the Secretary of the Interior approved the adoption of specific interim guidelines for reductions in Colorado River water deliveries during declared shortages and coordinated operations of Lake Powell and Lake Mead. These new guidelines provide water release criteria from Lake Powell and water storage and water release criteria from Lake Mead during shortage, normal, and surplus conditions in the Lower Basin, provide a mechanism for the storage and delivery of conserved system and non-system water in Lake Mead, and modify and extend interim surplus guidelines through 2026. The Record of Decision and accompanying agreement among the Colorado River Basin States protect reservoir levels by reducing deliveries during drought periods, encourage agencies to develop conservation programs and allow the states to develop and store new water supplies. The Colorado River Basin Project Act of 1968 insulates California from shortages in all but the most extreme hydrologic conditions.

In May 2006, Metropolitan and the USBR executed an agreement for a demonstration program that allowed Metropolitan to leave conserved water in Lake Mead that Metropolitan would otherwise have used in 2006 and 2007. The water left in Lake Mead must have been made available through extraordinary conservation measures, which was accomplished in 2006 and 2007 through savings realized under the Palo Verde Land Management, Crop Rotation, and Water Supply Program. This Demonstration program was an activity eligible for creation of Extraordinary Conservation Intentionally Created Surplus (ICS) under the provisions of the December 2007 federal guidelines for the operation of Lake Powell and Lake Mead. As of January 1, 2010, Metropolitan had nearly 80 TAF of extraordinary conservation ICS water in Lake Mead.

The December 2007 federal guidelines provided Colorado River contractors the ability to create System Efficiency ICS through development and funding of system efficiency projects. To that end, in 2008 the Central Arizona Conservation District, SNWA, and Metropolitan contributed funds for the construction of the Drop 2 Reservoir by the Bureau of Reclamation. The purpose of the Drop 2 reservoir is to increase the capacity to regulate deliveries of Colorado River water at Imperial Dam reducing the amount of released downstream by approximately 70 TAF annually. In return for funding one-sixth of the project cost, 100 TAF of water stored in Lake Mead was assigned to Metropolitan as System Efficiency ICS. As of January 1, 2010, Metropolitan had nearly 66 TAF of System Efficiency ICS water in Lake Mead.

Metropolitan is undertaking ongoing efforts to maintain and improve the flexibility and quality of its water supply from the Colorado. Section 3.7 of this report describes current programs and plans related to flexibility, and Chapter 4 describes water quality programs.

State Water Project

The State Water Project, which is owned by the state and operated by the

California Department of Water Resources (DWR), is the second source of Metropolitan's imported water supplies. The SWP comprises 32 storage facilities (reservoirs and lakes), 662 miles of aqueduct, and 25 power and pumping plants.

The SWP conveys water from Northern California to the north and south of the San Francisco Bay Area and 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 Delta. Water from the 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 4,172 TAF per year. Currently, DWR is delivering water to 29 of these SWP contractors. Metropolitan is the largest, with a contracted entitlement of 1,911 TAF per year, or approximately 46 percent of the total contracted amount. 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 the year 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.2 Metropolitan has developed groundwater storage programs with Semitropic Water Storage District, Arvin-Edison Water Storage District, and Kern Delta Water District to supplement the available water supply.

The amount of entitlement DWR approves for delivery varies annually with contractor demands and projected water supplies from tributary sources to the Delta, based on snowpack in the Sierra Nevada, reservoir storage, operational constraints, and demands of other water users. Historically, the SWP has been able to meet all contractors' requests for entitlement water except during the years of 1977, 1990-92, 1994, 2001-02, 2004, and 2007-09. In many years, surplus water has been delivered to contractors. Deliveries to Metropolitan reached a high of 1,802 TAF in calendar year 2004. Metropolitan experienced shortages in SWP supplies in fiscal years 1991 and 1992, with reduced deliveries of 391 TAF and 710 TAF, respectively.[3] More recently, SWP deliveries in 2008 and 2009 were limited to

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

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

35 percent and 40 percent of entitlements, respectively, resulting in drafts from storage of approximately 820 AF over this period to meet service area demands. 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. In January 2010, DWR released a draft of the biannual update of its Reliability Report. The report shows that future SWP deliveries will be impacted by two significant factors. The first is significant restrictions on SWP and Central Valley Project (CVP) Delta pumping required by the biological opinions issued by the U.S. Fish and Wildlife Service (December 2008) and National Marine Fisheries Service (June 2009). The second is climate change, which is altering the hydrologic conditions in the State. The 2009 draft report shows greater reductions in water deliveries on average when compared to the 2007 report. Over multiple-year dry periods, average annual Table A deliveries vary from 32 percent to 38 percent of the maximum Table A amount, while average annual deliveries over multiple-year wet periods range from 72 to 93 percent of the maximum Table A amount. Under future conditions, annual SWP Article 21 deliveries average 60 TAF, ranging from 1 TAF to 540 TAF over the 82-year simulation period.

Metropolitan is undertaking ongoing efforts to maintain and improve the reliability and quality of its water supply from the State Water Project. Sections 3.5 and 3-6 describe current programs and plans for reliability, and Chapter 4 addresses water quality issues.

Los Angeles Aqueducts

The city of Los Angeles imports water from the eastern Sierra Nevada through the Los Angeles Aqueduct (LAA). The original Los Angeles Aqueduct, completed in 1913, 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 TAF of water was delivered annually through the LAA. Of this total, 380 TAF originated from surface water and groundwater in the Owens Valley, while 90 TAF came from surface water in the Mono Basin. In 1986, the aqueduct delivered a record 520 TAF 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 a persistent drought, limited the delivery from the aqueduct to only 106 TAF. The Mono Lake Water Rights Decision (Decision) in September of 1994 ended the litigation in the Mono Basin, while negotiations continue with Inyo County on the fate of 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 only be permitted to divert a fraction of its historical amounts. After the lake had risen, the city of Los Angeles would still be allowed only significantly reduced diversions. However, the high precipitation during the nineties allowed increased diversions of water to the LAA to occur at a much earlier time frame than had been foreseen at the time of the Decision.

More recently, the LAA diversions of water from the Owens Valley came under additional pressure. A long history of diversions of water from the Owens River had led to the drying up of Owens Lake by the end of the 1920s. This dry lakebed became a major source of windblown dust, resulting in EPA pressure to develop a State Implementation Plan to bring the region into compliance with federal air quality standards. In 1998, the Los Angeles Department of Water and Power entered into a Memorandum of Agreement with the Great Basin Air Pollution Control District that specified actions needed to control the problem. These actions included shallow flooding and managed vegetation at various lakebed locations. An estimated 54 TAF per year will be required to maintain the dust control measures, further restricting the water available for diversion through the LAA. More recently, the city has been required to restore portions of the Owens River, which could further restrict the water that can be provided from this source.

Historic Total Regional Water Supplies

The previous sections have presented the various sources of Metropolitan and the region's water supply. The amount of water supplied by each local and imported source from 1976 through 2008 appears 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, which is shown in Table A.2-2. The difference between Metropolitan's imports and deliveries is water placed into or withdrawn from storage. The fluctuation in water supplies that occurred during this 1976-2008 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 and have stayed at similar levels even though adequate supplies have been available. 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 both imported and local supplies.

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Appendix A.3
Justifications for Supply Projections

A.3 JUSTIFICATIONS FOR SUPPLY PROJECTIONS

Legislation authored by Senator Sheila Kuehl (Senate Bill 221 – now Water Code §10613 *et seq.*) and Senator Jim Costa (Senate Bill 610 – now Water Code §66473.7) requires water retailers to demonstrate that their water supplies are sufficient for certain proposed subdivisions and large development projects subject to the California Environmental Quality Act (CEQA). Although Metropolitan and other wholesalers do not have verification responsibilities under this legislation, information provided by Metropolitan may be useful to retailers in complying with these responsibilities. This Appendix provides the basis for the water availability contained in this report, by major source of supply. Such bases and proofs are required for supply verification under the legislation. Links to copies of the legislation can be found at http://www.groundwater.water.ca.gov/water_laws/index.cfm#otherleg.

Throughout this appendix, references are made to Metropolitan's operating budget and its long-term capital investment plan. The most recent operating budget (for fiscal year 2009-10) was adopted at the April 14, 2009 Board Meeting. A copy of the budget summary and the Capital Investment Plan for FY 2009-10 can be found at http://www.mwdh2o.com/mwdh2o/pages/finance/budget/AB09_10web.pdf.

Another document of interest related to Metropolitan's water supply planning is its annual report to the state Legislature in compliance with Senate Bill 60 of 1999 (Hayden).[1] This requires that Metropolitan report on its progress in increasing its emphasis on cost-effective conservation, recycling, and groundwater recharge.

A.3.1 Colorado River Aqueduct Deliveries

A. Colorado River Supplies

Metropolitan obtains water from the Colorado River under a number of categories specified in its supplemental water storage and delivery contract with the Secretary of the Interior: its basic apportionment that is classified as Priority 4 water, unused and surplus water that is classified as Priority 5 and Priority 6(a) water, and water resulting from a number of conservation programs that is classified as Priority 3(a) water. Pursuant to a U.S. Supreme Court decree, and regulations and operating guidelines of the U.S. Bureau of Reclamation, Metropolitan may receive as unused apportionment, water supplies unused by agricultural districts, supplies unused by the states of Arizona and Nevada, and as Intentionally Created Surplus, supplies stored from previous years' extraordinary conservation and efficiency improvements to the operations of the Colorado River system. Subject to the terms of agreements, this stored water may be withdrawn as needed during years in which insufficient supplies are available. Appendix A.2 describes the history

[1] Metropolitan Water District of Southern California, *Annual Progress Report to the California State Legislature: Achievements in Conservation, Recycling and Groundwater Recharge* (February 2010), which can be found at http://www.mwdh2o.com/mwdh2o/pages/yourwater/SB60/SB60_2010.pdf. The legislation requiring this information can be found at http://www.leginfo.ca.gov/pub/99-00/bill/sen/sb_0051-0100/sb_60_bill_19990916_chaptered.pdf. Similar reports have been filed with the Legislature since 2000.

of water supplies and the expected availability from this source, and Section 3.1 describes the agreements for water supplies.

Rationale for Expected Supply

Historical Record

Water supply under Metropolitan's Priority 4 apportionment of Colorado River water has been delivered since 1939. By existing contract, it is expected to be available in perpetuity because of California's senior water rights to use of Colorado River water.

The historical record for available Colorado River water indicates that Metropolitan's fourth priority supply has been available in every year and can reasonably be expected to be available over the next 20 years.

Written Contracts or Other Proof

Metropolitan's entitlement to Colorado River water is based on a series of interstate compacts, federal laws, agreements, court decrees, and guidelines collectively known as "The Law of the River,"[2] which govern the distribution and management of Colorado River water. The following documents specifically determine Metropolitan's dependable supplies:

- 1931 Seven Party Agreement.[3] The 1931 Agreement recommended California's Colorado River use priorities and has no termination date. California's basic annual apportionment is 4.4 MAF. Palo Verde Irrigation District (PVID), Yuma Project (Reservation Division), Imperial Irrigation District (IID), Coachella Valley Water District (CVWD), and Metropolitan are the entities that hold the priorities. As shown in Appendix A.2, these priorities are included in the contracts that the Department of the Interior executed with the California agencies in the 1930s for water from Lake Mead. Metropolitan holds Priority 4 to California's basic apportionment of Colorado River water and utilizes this water – 550 TAF per year – every year. In addition, Metropolitan has access to additional Colorado River water – up to 662 and 38 TAF per year, respectively – through its Priority 5, and Priority 6(a) in the California apportionment. Appendix A.2 describes the current status of water available under this priority.
- Metropolitan's Basic Contracts.[4] Metropolitan's 1930, 1931, and 1946 basic contracts with the Secretary of the Interior permit the delivery of 1.212 MAF per year when sufficient water is available. Metropolitan's 1987 surplus flow contract with Reclamation permits the delivery of water to fill the remainder of the Colorado River Aqueduct when water is available.
- Consolidated Court Decree.[5] The 1964 U.S. Supreme Court Decree confirmed the Arizona, California, and Nevada basic apportionments of 2.8 MAF per year, 4.4 MAF per year and 300 TAF per year, respectively. The 1964 Decree also permits the Secretary of the Interior to make water available that is unused by one of the states for use in the other two states. In addition, it permits the Secretary of the Interior to make surplus water available. Several decrees were subsequently entered by the U.S. Supreme Court in the case *Arizona v. California et al* culminating in the Consolidated Decree entered on March 27, 2006.
- 2003 Quantification Settlement Agreement (QSA) and several other related agreements were executed in

[2] A description of many of these documents can be found at http://www.usbr.gov/lc/region/pao/lawofrvr.html.

[3] This agreement among the seven California agencies was dated August 18, 1931 and was codified in federal regulations promulgated by the Secretary of the Interior on September 28, 1931.

[4] Including contract number Ilr-645 dated 04-09-1930, supplemented 09-28-1931.

[5] The Consolidated decree entered by the U.S. Supreme Court on March 27, 2006, in *Arizona v. California et al,* can be found at http://www.usbr.gov/lc/region/pao/pdfiles/scconsolidateddecree2006.pdf

October 2003.[6] The QSA quantifies the use of water under the third priority of the Seven Party Agreement, and further allocates 38 TAF of the sixth priority to Metropolitan. The QSA provides the numeric baseline needed to measure conservation and transfer programs, and it allows for implementation of agricultural conservation, land fallowing, and other programs identified in the 1996 IRP. Although this agreement does not directly impact Metropolitan's entitlements, Metropolitan agreed to forbear consumptive use when necessary so that the Secretary of the Interior can satisfy the uses of holders of miscellaneous and Indian present perfected rights in excess of 14.5 TAF.

- <u>2005 Settlement Agreement with Quechan Indian Tribe.</u> In 2005, Metropolitan entered into a settlement agreement with the Quechan Indian Tribe (Tribe) and other parties. The Tribe uses Colorado River water on the Fort Yuma Indian Reservation. Under the settlement agreement, the Tribe, in addition to the amounts of water decreed for the benefit of the Reservation in 1964, is entitled to (a) an additional 20 TAF of diversions from the Colorado River or (b) the amount necessary to supply the consumptive use required for irrigation of a specified number of acres, and for the satisfaction of related uses, whichever is less. Of the additional water, 13 TAF became available to the Tribe in 2006. An additional 7 TAF becomes available to the Tribe in 2035. Metropolitan and the Tribe agreed that if the Tribe chooses to limit proposed development and utilization of their irrigable lands, which would require the diversion of any of the additional water in a year, and instead allows the water which would otherwise be used to be diverted by Metropolitan, Metropolitan provides an incentive payment to the Tribe to avoid or reduce a loss of supply.

- <u>Colorado River Interim Guidelines for Lower Basin Shortage and the Coordinated Operations for Lake Powell and Lake Mead.</u> In December 2007, the Secretary of the Interior approved a Record of Decision establishing specific interim guidelines for reductions in Colorado River water deliveries in the Lower Basin during declared shortages and coordinated operations of Lake Powell and Lake Mead. These new guidelines provide water release criteria from Lake Powell and water storage and water release criteria from Lake Mead during shortage, normal, and surplus conditions in the Lower Basin, and provide a mechanism for Metropolitan to store and take delivery of conserved system and non-system water in Lake Mead.

Financing

Metropolitan's operating budget (referenced at the beginning of this appendix) includes the cost of delivering Colorado River water and the payment to the Quechan Indian Tribe, which is paid from water sales revenue.

Federal, State, and Local Permits/Approvals

Metropolitan's fourth priority Colorado River water is currently available, and this priority assures delivery of the Basic apportionment.

B. IID - Metropolitan Conservation Program

Source of Supply

The IID-Metropolitan Conservation Program provides an annual supply that is delivered to Metropolitan's service area via its Colorado River Aqueduct (CRA). In 1988, Metropolitan executed a Conservation Agreement to fund water efficiency improvements within IID's service area in return for the right to divert the water conserved by those improvements. The program consists of structural and non-structural measures, including the concrete lining of existing canals, the construction of local reservoirs and spill-interceptor canals, installation of non-leak gates, and

[6] These agreements can be found at http://www.iid.com/Water/QSAAgreementsRelatedDocuments2003.

automation of the distribution system. Other implemented projects include the delivery of water to farmers on a 12-hour basis rather than a 24-hour basis and improvements in on-farm water management through the installation of tailwater pumpback systems and drip irrigation systems.

Expected Supply Capability

The IID-Metropolitan Conservation Program activity began in 1990, has been fully operational since 1998, and makes available 105 TAF of conserved water annually. The initial program agreement provided CVWD the option to call up to about 45 TAF per year if needed to meet its demands. Execution of the QSA has reduced CVWD's option to a maximum of 20 TAF. This water is available to Metropolitan if not required by CVWD, but the minimum supply to MWD has been increased to 85 TAF with continued operation of 24 tailwater pumpback systems through a second amendment to the agreement.

Rationale for Expected Supply

Historical Record

The IID-Metropolitan Conservation Program has been fully operational since 1998. Existing agreements have extended the initial term to at least 2041 or 270 days after the termination of the QSA, whichever is later, and they guarantee Metropolitan a minimum of 85 TAF per year.

With operations beginning in 1990, the program has conserved as much as 109.46 TAF per year to date. By an amendment to the program agreement beginning in 2007 the annual conserved water yield has and will be 105 TAF. The historical record indicates that Metropolitan's expected minimum supply of 85 TAF per year would be available over the next 31 years at least.

Written Contracts or Other Proof

Metropolitan's annual supply from the IID-Metropolitan Conservation Program is based on three agreements and amendments to the agreements.

- 1988 IID-Metropolitan Conservation and Use of Conserved Water Agreement. This Agreement was executed in December 1988 by IID and Metropolitan for a 35-year term following completion of program implementation (1998–2033).
- 1989 Approval Agreement. This Agreement secured the approval of the PVID and CVWD to not divert an amount of water equal to the amount conserved except under limited circumstances. The Agreement was executed in December 1989.
- 1989 Supplemental Approval Agreement. This Agreement was executed in December 1989 between Metropolitan and CVWD to coordinate Colorado River diversions and the use of the conserved water provided by the Program.
- 2003 Amendments to 1988 Agreement and 1989 Approval Agreement. These amendments revise Metropolitan's potential obligation to reduce its use of the conserved water yield in favor of its use by CVWD down to 20 TAF annually. Any of this water not used by CVWD would be available to Metropolitan.
- 2007 Amendments to 1988 Agreement and 1989 Approval Agreement. These amendments specify that beginning in 2007 the annual conserved water yield has and will be 105 TAF, of which up to 20 TAF would be made available to CVWD upon its request.

Financing

The water efficiency improvements under this Program have already been funded, constructed, and put into operation. Metropolitan's five-year financial forecast in the budget includes the cost of operating, maintaining, and delivering the conserved water under the IID-Metropolitan Conservation Program.

Federal, State, and Local Permits/Approvals

A comprehensive environmental review process supported implementation.

- EIR for Program. The IID Board certified the final Environmental Impact Report for the Program in December 1986.[7]
- EIR for Supplemental Program. The IID Board certified the final Environmental Impact Report for the Completion Program in June 1994.[8]
- Program EIR for Quantification Settlement Agreement. Metropolitan's Board certified the final Program Environmental Impact Report for the QSA in June 2002.[9]
- Addendums to the QSA Final Program EIR. Metropolitan's Board adopted the Addendum to the QSA Final Program Environmental Impact Report in December 2002 and a second addendum in September 2003. Metropolitan's Board also adopted the Findings of Fact and Statement of Overriding Considerations, and Mitigation and Monitoring and Reporting Program at that time.

C. Hayfield Groundwater Storage Project

Source of Supply

The Hayfield Groundwater Storage Project (Hayfield Project) is planned to supply up to 100 TAF per year during dry year or non-surplus Colorado River conditions. During wet and surplus years, Metropolitan would replenish the Hayfield Project from the CRA.

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[7] Imperial Irrigation District, *Final EIR, Proposed Water Conservation Program and Initial Water Transfer, Imperial Irrigaton District,* October, 1986. SCH Number: 1986012903.

[8] Imperial Irrigation District, *Final EIR for Modified East Lowline and Trifolium Interceptors, and Completion Projects*, May 1994. SCH Number: 1992071061.

[9] Coachella Valley Water District, Imperial Irrigation District, Metropolitan, San Diego County Water Authority, *Final Program EIR, Implementation of the Colorado River Quantification Settlement Agreement*, June 2002, SCH Number 2000061034.

Expected Supply Capability

It is estimated that the Hayfield aquifer can hold up to 400 TAF of additional CRA water. At buildout, this water could be extracted during dry year conditions at a rate of up to 100 TAF per year. This supply would be available to Metropolitan in any year, but delivery is constrained by the existing capacity of the CRA. Incremental deliveries of water to the CRA from the Hayfield Project can be made during wet or average years depending on operating conditions along the CRA. For example, the Hayfield Project may provide operational efficiencies in meeting delivery obligations at Whitewater or other locations along the CRA.

Rationale for Expected Supply

As an integral part of the Colorado River resource strategy for storage programs, the Hayfield Project could be used by Metropolitan in meeting its demands in future dry years.

Program Facilities

The Hayfield Program would consist of facilities in two general areas:

- 390 acres of spreading basins,
- A well field consisting of 40 new wells to extract water from the aquifer, and pumps to return the water to the Colorado River Aqueduct;

Historical Record

Metropolitan's Board of Directors authorized implementation of the Hayfield Project in April 1999. Over 70 TAF of water have been stored in the Hayfield aquifer since that time from historical CRA releases. A prototype extraction well was constructed in 2009.

Written Contracts or Other Proof

The Hayfield Project has been implemented as a component of California's Colorado River Water Use Plan. The following actions have occurred:

- 1998 Memorandum of Understanding (MOU) between Metropolitan and the

U. S. Department of the Interior Bureau of Land Management (BLM). This MOU describes the intent of both Metropolitan and the BLM to exchange properties overlying the Hayfield Basin in order to support the implementation of the Hayfield Project. Approximately 3,800 acres of federally owned property in the Hayfield Valley would be exchanged with like properties held by Metropolitan. The purpose of this exchange of properties is to manage the underlying groundwater resource and protect water quality.

- April 1999 Board of Directors Adoption of the CEQA Document. Metropolitan's Board of Directors adopted the Mitigated Negative Declaration for the Hayfield Project at its regularly scheduled Board of Directors meeting in April 1999.
- June 2000 Board of Directors Approval of the Hayfield Project. Metropolitan's Board of Directors approved the Hayfield Project and appropriated an additional $7.35 million for land acquisition, preliminary design, continued water quality monitoring, additional aquifer testing and other tasks. The Board authorized storage of up to 800 TAF of CRA water.
- December 2002 Board of Directors Appropriation of Design, Testing and Construction Funds. Metropolitan authorized expenditure of an additional $18 million to implement the Hayfield Project. This action increased the authorized funding to implement the Hayfield Project to more than $27 million.
- Because of the recent drought in the Colorado River basin, the storage portion of the Hayfield Program is currently on hold indefinitely.
- October 2008 Board of Directors Authorize Agreements for Final Design. Metropolitan authorized $3 million for the final design of the facilities to extract the previously stored water in three to four years. Facilities included 4 wells, 2.5 miles of pipeline and power lines. Total estimated cost to complete the project is $21 million.
- February 2009 Board of Directors Authorize Installation of Prototype Well for Hydrogeologic Investigations. Metropolitan authorized $1.9 million for the installation of a prototype well to evaluate the hydrogeologic constraints with the extraction of the stored water from Hayfield. This action was taken to address concerns with respect to water quality and well yield.
- March 2010 Authorize Final Design of Hayfield Groundwater Extraction Project. Metropolitan authorized final design for the equipping of the Prototype Well. The prototype well would have the ability to extract the stored water in 15 years. Estimated design and construction cost is $4 million.

Financing

The capital cost of the full-scale Hayfield Project is estimated to be approximately $75 million. A four-well configuration project for extraction only is estimated to cost approximately $21 million. This cost is included in Metropolitan's 10-year capital budget (referenced above) and would be financed through a combination of bonds and water sales revenue.

Federal, State and Local Permits/Approvals

Metropolitan has applied for and requested all appropriate federal, state and local permits for construction. Metropolitan anticipates the operating permit for the Hayfield groundwater recovery project to be issued by California Department of Public Health during the later potion of 2010. Monitoring wells and test wells were completed in accordance with Riverside County permitting procedures. Necessary environmental permits would be acquired as needed.

D. *Palo Verde Irrigation District Land Management, Crop Rotation And Water Supply Program*

Source of Supply

At its May 11, 2004 meeting, Metropolitan's Board authorized a 35-year land management, crop rotation, and water supply program with the PVID. Under the program, participating farmers in PVID are being paid to reduce their water use by not irrigating a portion of their land. A maximum of 29 percent of lands within PVID can be fallowed in any given year. Under the terms of the QSA, water savings within the PVID service area are made available to Metropolitan. PVID has the first priority for Colorado River water under the water delivery contracts with the U.S. Bureau of Reclamation. Implementation of the program began in January 2005. The program is estimated to provide up to 133 TAF per year. The agreement also specifies that the program will provide a minimum of 33 TAF per year.

Expected Supply Capability

It is estimated that the PVID/Metropolitan Program would provide up to 133 TAF per year of additional Colorado River water. This water would be available in any year as needed and in accordance with the provisions described in the agreements with Palo Verde Valley landowners and PVID.

Rationale for Expected Supply

Historical Record

Metropolitan and PVID tested the concept of developing a water supply for Metropolitan by entering into an agreement in 1992.[10] Agreements were signed with landowners and lessees in the Palo Verde Valley to forego irrigation for a two-year period from August 1992 to July 1994. Water unused by PVID, in the amount of 186 TAF, was stored in Lake Mead for Metropolitan. Both PVID and Metropolitan signed approved Principles of Agreement in 2001. PVID issued the Final Environmental Impact Report for the Proposed Palo Verde Irrigation District Land Management, Crop Rotation and Water Supply Program in September 2002.[11]

Implementation of the program began in January 2005. In 2005, 2006, 2007, 2008, and 2009, approximately 108.7, 105.0, 72.3, 94.3, and 120.2 TAF of water, respectively, were saved and made available to Metropolitan. In March 2009, Metropolitan and PVID entered into a one-year supplemental fallowing program within PVID that provides for the fallowing of additional acreage, with savings projected to be as much as 62 TAF. Of that total, 24.1 TAF of water was saved in 2009, with the balance to be made available in 2010.

Written Contracts or Other Proof

- August 2004 Forbearance and Fallowing Program Agreement. This agreement establishes the PVID/Metropolitan Program, which provides for a solicitation of and provisional approval of landowner participation offers, specifies the process for incorporating offers into agreements with landowners, and states the terms and conditions for fallowing, including payments made by Metropolitan.
- Landowner Agreements for Fallowing in the PVID. These agreements specify an escrow process to consummate the transaction, an easement deed to encumber land for fallowing, a tenant agreement to subordinate a tenant's lease to the agreement and easement, and an encumbrance agreement to subordinate any encumbrance (e.g., a mortgage) to the easement. These agreements also state the landowner's fallowing obligation, payments to be made by Metropolitan, and land management measures to be implemented.

[10] Presented to Metropolitan's Board at its regular meeting January 14, 1992.

[11] SCH Number 2001101149.

Financing

Metropolitan's annual O&M budget (referenced above) includes the cost of the PVID/Metropolitan Program.

Federal, State and Local Permits

A Notice of Preparation for the PVID/Metropolitan Program was published on October 29, 2001. PVID issued the Final Environmental Impact Report for the Proposed Palo Verde Irrigation District Land Management, Crop Rotation, and Water Supply Program in September 2002 (see reference above).

E. All-American and Coachella Canal Lining Projects

Source of Supply

Water is being conserved by the replacement of earthen portions of the Coachella Canal and the All-American Canal with concrete-lined canals. The concrete lining reduces the amount of water lost to seepage from the canals.

Expected Supply Capability

Pursuant to the October 10, 2003 Allocation Agreement, Metropolitan is entitled to delivery of 16 TAF annually until the San Luis Rey Settlement Parties[12] satisfy the conditions described in Section 104 of the San Luis Rey Indian Water Rights Settlement Act (Public Law 100-675 as amended). Once the statutory conditions have been met, Metropolitan will provide by exchange water to the United States for use by the Settlement Parties and San Diego County Water Authority will convey the water for use by the Settlement Parties'.

Rationale for Expected Supply

The All-American and Coachella canal lining projects were implemented pursuant to the authorization contained in Title II of Public Law 100-675. The allocation of the water resulting from these projects is provided under the Allocation Agreement. The Allocation Agreement is a QSA-related agreement. The USBR, on behalf of the Secretary of the Interior, has issued interim determinations for the Coachella Canal Lining Project (January 31, 2008) and the All-American Canal Lining Project (December 4, 2009) that results in the annual delivery to Metropolitan of 4.5 TAF and 11.5 TAF, respectively. Delivery of this water for Metropolitan's use continues until conditions described in Section 104 of Public Law 100-675 and the Allocation Agreement are satisfied.

Program Facilities

The Coachella Canal is owned by the United States and is operated by CVWD. The All-American Canal is owned by the United States and is operated by IID. The water is conveyed through existing CRA facilities from Lake Havasu to Metropolitan.

Historical Record

The Coachella Canal Lining Project began conserving water in 2006 and reached its full conservation yield in calendar year 2009. The All-American Canal Lining Project began conserving water in 2008 and will reach its full conservation yield in calendar year 2010. Actual annual deliveries to Metropolitan are as follows:

Calendar Year	**Volume Delivered to Metropolitan** (AF)
2006	172
2007	4,500
2008	6,013
2009	15,648
2010	16,000 (projected)

Written Contracts or Other Proof

- 2003 Allocation Agreement. This agreement among the United States, Metropolitan, CVWD, IID, San Diego County Water Authority, and the San Luis Rey Settlement Parties, provides for the determination by the Secretary of the

[12] The San Luis Rey Settlement Parties are the La Jolla, Pala, Pauma, Rincon and San Pasqual Bands of Mission Indians, the San Luis Rey River Indian Water Authority, and the City of Escondido and Vista Irrigation District.

Interior of the conserved water yield from the All-American Canal Lining Project and the Coachella Canal Lining Project, the allocation of that yield among IID, SDCWA, Metropolitan, and the Settlement Parties, and the delivery of the allocated amounts to the respective users by the Secretary of the Interior.

Financing

Under the Allocation Agreement, water resulting from the All-American and Coachella Canal lining projects is made available to Metropolitan until the conditions specified in Sections 7.2.1, 7.2.2, and 7.2.4 of the Allocation Agreement have been satisfied. Metropolitan and the San Luis Rey River Indian Water Authority have a dispute over the validity of Section 7[13] of the October 10, 2003 Agreement Relating to Supplemental Water among The Metropolitan Water District of Southern California, the San Luis Rey Settlement Parties, and the United States. Pending resolution of the dispute, Metropolitan sets aside funding for the portion of the conserved water it receives as part of its annual O&M budget.

Federal, State, and Local Permits/Approvals

A comprehensive environmental review process supported implementation.

- Program EIR for Quantification Settlement Agreement. Metropolitan's Board certified the final Program Environmental Impact Report for the QSA in June 2002.[14]
- Addendums to the QSA Final Program EIR. Metropolitan's Board adopted the Addendum to the QSA Final Program Environmental Impact Report in December 2002 and a second addendum in September 2003. Metropolitan's Board also adopted the Findings of Fact and Statement of Overriding Considerations, and Mitigation and Monitoring and Reporting Program at that time.
- EIR/EIS for the All-American Canal Lining Project. Reclamation approved the Record of Decision for the All American Canal Lining Project on July 29, 1994. IID certified the All American Canal Lining Project Final EIS/EIR and approved the project on August 16, 1994. Reclamation released a Supplemental Information Report on the All American Canal Lining Project, dated January 12, 2006.
- EIR/EIS for the Coachella Canal Lining Project. Reclamation approved the Record of Decision for the Coachella Canal Lining Project on March 27, 2002. CVWD certified the Coachella Canal Lining Project Final EIS/EIR and approved the project on May 15, 2001. Metropolitan certified that it had reviewed and considered the information contained in those two documents and adopted the Lead Agencies' findings on December 13, 1994, for the All American Canal Lining Project and on September 11, 2001, for the Coachella Canal Lining Project.
- Addendum to EIS/EIR for the Coachella Canal Lining Project. Addendum to the Coachella Canal Lining Project Final EIS/EIR was published on February 27, 2004. CVWD certified the Addendum and approved the project on March 2, 2004.

F. *Metropolitan-CVWD Delivery and Exchange Agreement for 35,000 Acre-Feet*

Source of Supply

Metropolitan delivers to CVWD up to 35 TAF from Metropolitan's available State Water Project (SWP) Table A supply without condition on the actual Department of Water Resources (DWR) allocation for that year. As CVWD does not have a connection to the SWP, the water is delivered to CVWD by an

[13] Payments from Metropolitan for Supplemental Water and Related Power Delivered Prior to Satisfaction of Section 104

[14] Coachella Valley Water District, Imperial Irrigation District, Metropolitan, San Diego County Water Authority, Final Program EIR, Implementation of the Colorado River Quantification Settlement Agreement, June 2002, SCH Number 2000061034.

exchange with Colorado River water. Metropolitan takes delivery of the Table A supply in conjunction with forgoing diversion of an equal volume of its Colorado River supply effectively leaving this water in the River for diversion by CVWD at Imperial Dam. Exchange deliveries may also be made at the CRA Whitewater service connection or through the Metropolitan-CVWD-Desert Water Agency Advance Delivery Agreement. This program represents a net debit to Metropolitan's supplies.

Expected Capability

Up to 35 TAF of Metropolitan's SWP Table A supply will be delivered annually to CVWD by exchange.

Rationale for the Expected Supply

This program is undertaken pursuant to the Delivery and Exchange Agreement between Metropolitan and Coachella for 35,000 AF dated October 10, 2003 and is a QSA-related agreement.

Program Facilities

Metropolitan takes delivery of the Table A supply from the East Branch of the California Aqueduct at Devil Canyon Afterbay. At Metropolitan's request the USBR releases a portion of Metropolitan's available Colorado River supply from Lake Mead for diversion by CVWD at Imperial Dam and conveyance through the All-American Canal System.

Historical Record

Since the 2003 execution of the QSA and the Delivery and Exchange Agreement, the following volumes of exchange water were delivered to CVWD at Imperial Dam:

Calendar Year	**Volume of Exchange Water** (AF)
2003	0
2004	0
2005	0
2006	34,958
2007	0
2008	0
2009	0
2010	10,000 (projected)

Written Contracts or Other Proof

- 2003 Delivery and Exchange Agreement. This agreement between Metropolitan and CVWD provides for the delivery of up to 35,000 AF of Metropolitan SWP Table A supply by exchange with Colorado River water.

Federal, State, and Local Permits/Approvals

- Program EIR for Quantification Settlement Agreement. Metropolitan's Board certified the final Program Environmental Impact Report for the QSA in June 2002.[15]
- Addendums to the QSA Final Program EIR. Metropolitan's Board adopted the Addendum to the QSA Final Program Environmental Impact Report in December 2002 and a second addendum in September 2003. Metropolitan's Board also adopted the Findings of Fact and Statement of Overriding Considerations, and Mitigation and Monitoring and Reporting Program at that time.
- September 2002 Final Program EIR for Coachella Valley Water Management Plan and State Water Project Entitlement Transfer as certified by the CVWD on October 8, 2002

[15] Coachella Valley Water District, Imperial Irrigation District, Metropolitan, San Diego County Water Authority, Final Program EIR, Implementation of the Colorado River Quantification Settlement Agreement, June 2002, SCH Number 2000061034.

G. SNWA and Metropolitan Storage and Interstate Release Agreement

Source of Supply

The source of supply is SNWA's intentionally created unused Nevada apportionment of Colorado River water made available to Metropolitan for diversion and storage. In later years Metropolitan would return this water through reduced diversions of Colorado River water made at the request of SNWA.

Expected Capability

Based on recent use patterns in Nevada as much as 60 TAF could be made available in a single year to Metropolitan from SNWA. As of January 1, 2010, 70 TAF has been diverted by Metropolitan.

Returns to SNWA are limited to no more than 30 TAF annually and SNWA has agreed to forgo requesting return of stored water through 2019. If the Secretary of the Interior apportions less than 280 TAF of basic apportionment for use in Nevada, SNWA may request the return of up to 50 TAF, 1 acre-foot for each acre-foot less than 280 TAF of basic apportionment apportioned for use in Nevada.

Rationale for the Expected Supply

Program Facilities

Water is diverted through the CRA by Metropolitan. To return the water to SNWA, Metropolitan would reduce its CRA diversions and the Secretary of the Interior would make water available to SNWA at Lake Mead.

Historical Record

The annual volumes of water diverted into the CRA by Metropolitan ares as follows:

Calendar Year	**Volume of Exchange Water (AF)**
2004	10,000
2005	10,000
2006	5,000
2007	0
2008	45,000
2009	0
2010	0 (estimated)

No water has been returned to SNWA.

Written Contracts or Other Proof

- 2004 Storage and Interstate Release Agreement. This agreement among Metropolitan, Colorado River Commission of Nevada, SNWA, and the United States provides for the Secretary of the Interior to make available to Metropolitan for diversion and storage unused Nevada apportionment. In subsequent years, the agreement provides for Metropolitan to make this water available to SNWA by forgoing diversion of a portion of its available Colorado River supply.
- Operational Agreement. As amended on August 11, 2009, the Operational Agreement specifies the conditions under which Metropolitan would divert and store unused Nevada apportionment through 2026 and the return of this water to SNWA to begin no earlier than 2019.

H. Lower Colorado Water Supply Project

Source of Supply

Groundwater is pumped by the Lower Colorado Water Supply Project near the All-American Canal and is discharged to the Canal. IID reduces its net diversions of Colorado River water by an amount equal to the amount of Project water discharged into the Canal, permitting entities along the Colorado River that do not have rights or have insufficient rights to divert Colorado River water to obtain a supply of water. In 2007, Metropolitan entered into a contract with the USBR and the City of Needles to utilize the unused Project capacity.

Expected Capability

The City of Needles projects that Metropolitan will receive 2.8 TAF of Lower Colorado Water Supply Project water in 2010. This is projected to increase to 5 TAF in future years should a new Project well be drilled.

Rationale for the Expected Supply

Program Facilities

Two Lower Colorado Water Supply Project wells pump water into the All-American Canal. The groundwater level in one of the wells has declined to the point that it cannot operate at capacity with existing equipment. Replacement equipment to restore pumping capacity is expected to be installed. A new Project well may be drilled to augment pumping capacity.

Historical Record

Metropolitan has received the following amounts of Lower Colorado Water Supply Project water:

Calendar Year	**Volume of Water** (AF)
2007	5,011
2008	6,300
2009	2,349
2010	3.000 (projected)

Written Contracts or Other Proof

- 2007 Lower Colorado Water Supply Project Contract among the United States, the City of Needles, and Metropolitan. This contract provides for the United States to deliver Colorado River water to Metropolitan, the availability of which results from the pumping of Lower Colorado Water Supply Project groundwater and the exchange of such water.

Financing

Metropolitan's budget includes the cost associated with receipt of Lower Colorado Water Supply Project water.

I. Lake Mead Storage Program, Drop 2 Reservoir Funding, and Yuma Desalting Plant Pilot Project

Source of Supply

Water has been and will be stored in Lake Mead as Intentionally Created Surplus (ICS) through extraordinary conservation measures, such as water saved through the Palo Verde Irrigation District Land Management, Crop Rotation, and Water Supply Program.

Water has been and will be stored in Lake Mead as ICS through system efficiency measures, such as Metropolitan's funding contributions toward construction of the Drop 2 Reservoir near the All-American Canal and pilot operation of the Yuma Desalting Plant.

Expected Capability

Metropolitan may create as much as 400 TAF of extraordinary conservation ICS water in a single year less the amount that may be created by IID, which could be as much as 25 TAF.

Upon creation, 5 percent of the extraordinary conservation ICS is deducted resulting in additional system water in storage in Lake Mead leaving 95 percent of the water available for release to Metropolitan. Each year thereafter, the remaining balance at the end of the year is reduced by three percent to account for evaporation losses.

The amount of extraordinary conservation ICS accumulated in Lake Mead for Metropolitan is limited to 1.5 MAF less the amount accumulated by IID which could be as much as 50 TAF.

Metropolitan may take delivery of as much as 400 TAF of extraordinary conservation ICS from Lake Mead in a year less the amount delivered to IID, which could be as much as 50 TAF.

Rather than storing extraordinary conservation ICS water in Lake Mead, IID may, with the written consent of Metropolitan, have up to 25 TAF of this water delivered to Metropolitan for storage in any one calendar year. Upon request by IID, Metropolitan would return 90 percent of the stored water to IID with the remaining 10 percent left for Metropolitan's use. Also, Metropolitan may make temporary use of IID's extraordinary conservation ICS accumulated in Lake Mead.

As of January 1, 2010, Metropolitan has 66 TAF of system efficiency ICS stored in Lake Mead. There are no evaporation losses charged to stored system efficiency ICS. Metropolitan may take delivery of as much as 34 TAF of this system efficiency ICS through 2010, down to 25 TAF annually from 2011 through 2015. The Bureau of Reclamation may reduce this delivery if it determines a reduction is necessary to avoid a shortage. If a shortage is declared in 2011 or 2012, then Metropolitan must payback any system efficiency ICS used from 2008 through 2010 in the shortage year, restoring that water to Metropolitan's system efficiency ICS account.

Pilot operation of the Yuma Desalting Plant is projected to result in the storage of 23.2 TAF of system efficiency ICS for Metropolitan over the course of its 365 days of operation.

Rationale for the Expected Supply

<u>Program Facilities</u>

This program makes use of Lake Mead and the CRA.

<u>Historical Record</u>

Since 2006 Metropolitan has created 100.6 TAF of extraordinary conservation ICS.

In 2008, the USBR assigned to Metropolitan 100 TAF of water stored in Lake Mead as system efficiency ICS.

As of January 1, 2010 Metropolitan's extraordinary conservation and system efficiency ICS volumes in Lake Mead were approximately 79.8 TAF and 66 TAF, respectively.

<u>Written Contracts or Other Proof</u>

- 2007 Lower Colorado River Basin Intentionally Created Surplus Forbearance Agreement among the Arizona Department of Water Resources, PVID, IID, the City of Needles, CVWD, Metropolitan, SNWA, and the Colorado River Commission of Nevada. This agreement sets forth the rules under which ICS water is developed, and stored in and delivered from Lake Mead.
- 2007 California Agreement for the Creation and Delivery of Extraordinary Conservation Intentionally Created Surplus among Metropolitan, PVID, IID, CVWD, and the City of Needles. This agreement determines the conditions under which California contractors receiving Colorado River water may store and deliver water from Lake Mead.
- 2007 Agreement among the United States, the Colorado River Commission of Nevada, and the SNWA for the Funding and Construction of the Lower Colorado River Drop 2 Storage Reservoir Project. This agreement provides for: the United States to design and construct the Drop 2 Storage Reservoir Project, SNWA to fund the capital cost of the Project, the United States to credit SNWA's ICS account with

600 TAF of System Efficiency ICS; and allows Metropolitan to become a party to the agreement requiring that Metropolitan provide funding for a portion of the capital cost.

- 2007 Delivery Agreement between the United States and Metropolitan. This agreement provides the procedures for creating the ICS water and guarantees delivery of the water to Metropolitan.
- 2008 Metropolitan Notice of Election to Participate as a Party to the Drop 2 Funding Agreement. This notice requires Metropolitan to provide funding for a portion of the capital cost of the Drop 2 Storage Reservoir Project, and the United States to credit Metropolitan's ICS account with 100 TAF of System Efficiency ICS, reducing the amount of System Efficiency ICS in SNWA's account by an equal amount.
- 2009 Agreement among the United States, Metropolitan, the Colorado River Commission of Nevada, SNWA, and the Central Arizona Water Conservation District for a Pilot Project for Operation of the Yuma Desalting Plant. This agreement provides for the allocation of the costs for the preparation and pilot operation of the Yuma Desalting Plant.
- 2010 Yuma Desalting Plant Pilot Project Delivery Agreement between the United States and Metropolitan. This agreement secures delivery of the ICS water created and specifies the manner in which this water will be accounted.

J. Programs Under Development as Part of the Five-Year Supply Plan

- *Expansion of the Palo Verde Irrigation District (PVID) Land Management Program:* In March 2009, the Board approved the emergency one year land fallowing expansion of the existing PVID program. An agreement with PVID was signed in April 2009 and farmers began fallowing later that month. The yield of the program is 62 TAF, with 24 TAF saved in 2009 and the balance to be made available in 2010. Additional fallowing agreements may be developed in subsequent years as needed.
- *Arizona Exchange:* An exchange program with Central Arizona Project is still in negotiations. In lieu of Arizona storing Colorado River water in the ground, water would be exchanged with Metropolitan for later return. Arizona does not expect to have water to provide to Metropolitan in 2010, but discussions continue for 2011 and beyond. At this time the potential yield is expected to be up to 150 TAF per year.
- *California Indians:* Discussions continue on developing a fallowing program. There is potential to receive from 10 to 20 TAF beginning in 2011.

A.3.2 California Aqueduct Deliveries

A. State Water Project Deliveries

Source of Supply

The State Water Project (SWP) provides imported water to the Metropolitan service area and has provided from 25 to 50 percent of Metropolitan's supplies through 2001. Since 2002, SWP deliveries accounted for an even greater share—as much as 70 percent. In accordance with its contract with the Department of Water Resources (DWR), Metropolitan has a Table A allocation of 1,911,500 AF per year under contract from the State Water Project. Actual deliveries have never reached this amount because they depend on the availability of supplies as determined by DWR. The availability of SWP supplies for delivery through the California Aqueduct over the next 18 years is estimated according to the historical record of hydrologic conditions, existing system capabilities as may be influenced by environmental permits, requests of the state water contractors and SWP contract provisions for allocating Table A, Article 21 and other SWP deliveries including San Luis carryover to each contractor. As shown in this report, the estimates of SWP deliveries to Metropolitan are based on DWR's most recent SWP reliability estimates contained in its State Water Project Delivery Reliability Report 2007[16] and the December 2009 draft of the biannual update.

As part of its contract with DWR, Metropolitan pays both the fixed costs of financing SWP facilities construction and variable costs of operations, maintenance, power and replacement costs for water delivered each year. SWP water is delivered to Metropolitan through the East Branch at Devil Canyon Power Plant afterbay, along the Santa Ana Valley Pipeline, and at Lake Perris. Metropolitan takes delivery from the West Branch at Castaic Lake.

Expected Supply Capability

The Edmund G. Brown California Aqueduct is capable of transporting Metropolitan's full contract amount of 1,911,500 AF per year. However, the quantity of water available for export through the California Aqueduct can vary significantly year to year. The amount of precipitation and runoff in the Sacramento and San Joaquin watersheds, system reservoir storage, regulatory requirements, and contractor demands for SWP supplies impact the quantity of water available to Metropolitan.

Rationale for Expected Supply

Metropolitan and 28 other public entities have contracts with the State of California for State Water Project water. These contracts require the state, through its DWR, to use reasonable efforts to develop and maintain the SWP supply. The state has made significant investment in infrastructure. It has constructed 28 dams and reservoirs, 26 pumping and generation plants, and about 660 miles of aqueducts. More than 25 million California residents benefit from water from the SWP. DWR estimates that with current facilities and regulatory requirements, the project will deliver approximately 2.3 MAF under average hydrology considering impacts attributable to the combined Delta smelt and salmonid species biological opinions.

On a yearly basis, DWR estimates the amount of supplies that are available for that year. Metropolitan uses a forecasting method for SWP deliveries based on historical patterns of precipitation, runoff, and actual deliveries of water.

Further, under the water supply contract, DWR is required to use reasonable efforts to maintain and increase the reliability of service to Metropolitan. As discussed in a subsequent section, DWR is participating in the Bay-Delta process to achieve these requirements.

<u>Historical Record</u>

The historical record shows significant accomplishments by DWR in providing its contractors with SWP water supplies. Through 2008, the SWP has delivered nearly 80 MAF to its contractors. The maximum annual water supply was delivered in 2005, and totaled 3.75 MAF. In 2006 the project delivered 3.7 MAF. DWR has continued to invest in SWP facilities to deliver water to its contractors.

<u>Written Contracts or Other Proof</u>

- <u>1960 Contract between the State of California and The Metropolitan Water District of Southern California for a Water Supply.</u> This Contract, initially executed in 1960 and amended numerous times since, is the basis for SWP deliveries to Metropolitan. It requires DWR to make reasonable efforts to secure water supplies for Metropolitan and its other contractors. The contract expires in 2035. At that time, Metropolitan has the option to renew the contract under the same basic conditions.

Financing

Metropolitan's payments for its State Water contract obligation are approved each year by its Board of Directors and currently

[16] The State Water Project Delivery Reliability Report 2007 can be accessed at http://baydeltaoffice.water.ca.gov/swpreliability/.

constitute approximately 35 percent of the annual budget (referenced above).

Federal, State and Local Permit/Approvals

- Operation of the SWP. The DWR is responsible for acquiring, maintaining and complying with numerous federal and state permits for operation of the SWP. Metropolitan has been active in monitoring the issues affecting its contract with DWR.
- Environmental Impact Report for the East Branch Enlargement. In April 1984, DWR prepared and finalized an Environmental Impact Report for the Enlargement of the East Branch of the Governor Edmund G. Brown California Aqueduct.
- Environmental Impact Report for the Harvey O. Banks Pumping Plant. In January 1986, DWR prepared and finalized an Environmental Impact Report for the additional pumping units at Harvey O. Banks Delta Pumping Plant.
- Environmental Impact Report for the Mission Hills Extension. In 1990, DWR prepared and finalized an Environmental Impact Report for the State Water Project Coastal Branch, Phase II and Mission Hills Extension.
- East Branch Extension Project Phase 1. In 1998, DWR completed an EIR to extend the East Branch of the California Aqueduct to provide service to San Gorgonio Pass Water Agency. Phase 1 was completed in 2002.
- U.S. Fish and Wildlife Service Biological Opinion. In December 2008, U.S. Fish and Wildlife issued a Biological Opinion for Delta smelt.
- National Marine Fisheries Service Biological Opinion. In June 2009, the National Marine Fisheries Service issued a Biological Opinion for salmon.

B. Desert Water Agency/Coachella Valley Water District/Metropolitan Water Exchange and Advance Delivery Programs

Source of Supply

The Desert Water Agency (DWA) and CVWD, both in Riverside County, have rights to SWP deliveries but do not have any physical connections to the SWP facilities. Both agencies are adjacent to the CRA. For DWA and CVWD to obtain water equal to their SWP allocations, Metropolitan has agreed to exchange an equal quantity of its Colorado River water for DWA and CVWD's SWP water. DWA has a SWP Table A contract right of 55.75 TAF per year and CVWD has a SWP Table A contract right of 138.35 TAF per year, for a total of 194.1 TAF per year.

Expected Supply Capability

Under the existing agreements, Metropolitan provides water from its CRA to DWA and CVWD in exchange for SWP deliveries. Metropolitan can deliver additional water to its DWA/CVWD service connections permitting these agencies to store water. When supplies are needed, Metropolitan can then receive its full Colorado River supply as well as the SWP allocation from the two agencies, while the two agencies can rely on the stored water for meeting their water supply needs. The amount of DWA and CVWD SWP Table A water available to Metropolitan depends on total SWP deliveries and varies from year to year.

In addition to their Table A supplies DWA and CVWD, subject to Metropolitan's written consent, may take delivery of SWP supplies available under Article 21, the Turn-back Pool Program, and non-SWP water supplies they may acquire and convey through the SWP facilities. These non-SWP deliveries are delivered to DWA and CVWD by exchange with Metropolitan in the same manner as Table A deliveries. DWA and CVWD are participants in the Yuba Dry Year Water Purchase Program and DWA participated in the 2009 Drought Water Bank. Metropolitan has also consented to:

- 10 TAF of exchange deliveries to CVWD for non-SWP water acquired from the San Joaquin Valley from 2008 through 2010, and
- 36 TAF of exchange deliveries to DWA for non-SWP water acquired from the San Joaquin Valley from 2008 through 2015.

Rationale for Expected Supply

The DWR estimates the amount of supplies that are available each year. Metropolitan uses a forecasting method for SWP deliveries based on historical patterns of precipitation, runoff and actual deliveries of water.

Historical Record

The DWA and CVWD Exchange Program is currently in operation. The Advance Delivery Agreement has been in place since 1984. Since 1973, Metropolitan has been taking delivery of these agencies' SWP Table A water and has provided equivalent water to those agencies from Metropolitan's CRA supplies. Metropolitan has also been delivering water in advance of the amount needed under the exchange agreements. With water having been delivered in advance, Metropolitan can reduce deliveries to DWA and CVWD as needed. Indeed, from the end of December 2005 through December 2009, Metropolitan drafted approximately 231 TAF leaving 45 TAF in the Advance Delivery account.

Written Contracts or Other Proof

- 1967 and 1983 Water Exchange Contract and Agreements. The DWA and CVWD Program is currently in operation. The DWA and CVWD water exchange contract has been in place since 1967, was amended in 1972 and was modified with execution of additional agreements in 1983.
- 1984 Advance Delivery Agreement. The Advance Delivery Agreement allows Metropolitan to supply DWA and CVWD with Colorado River water in advance of the time these agencies are entitled to receive water under the exchange agreements. In future years, Metropolitan can recover this water by reducing its deliveries under the exchange agreements.
- The 2003 Exchange Agreement. DWA, CVWD and Metropolitan executed The 2003 Exchange Agreement under which Metropolitan transferred 88,100 AF and 11,900 AF of its SWP Table A to DWA and CVWD, respectively, reducing Metropolitan's Table A volume from 2,011,500 AF to 1,911,500 AF. The 2003 Exchange Agreement became operational in calendar year 2005 with the execution of letter agreements among DWA, CVWD, and Metropolitan governing its implementation. The exhibits to the November 9, 2004, and November 19, 2007, letter agreements also modify certain provisions of the Water Exchange Contract and Agreements and the Advance Delivery Agreement.

Financing

The funds for deliveries under this Program are included in Metropolitan's O&M budget and Long-Range Finance Plan (referenced above).

Federal, State, and Local Permits/Approvals

DWR is responsible for acquiring, maintaining and complying with numerous Federal and State permits for operation of the SWP.

- July 26, 1983, CVWD Negative Declaration, Whitewater River Spreading Area expansion Phase 1.
- February 1983, DWA Final EIR for the proposed extension of time for utilizing Colorado River water to recharge the upper Coachella Valley groundwater basins to the year 2035, Volume I and II, April 1983, Volume III
- September 2002, Final Program EIR for Coachella Valley Water Management Plan and State Water Project Entitlement Transfer as certified by CVWD on October 8, 2002

C. Semitropic Water Banking and Exchange Program

Source of Supply

The agreement between Semitropic Water Storage District (Semitropic) and Metropolitan was executed in February 1994. Semitropic obtains water from the SWP through its contracts with the Kern County Water Agency. SWP supplies irrigate an area of 161,200 acres within Semitropic's service area. When this surface water is not available, these growers withdraw water from the underlying aquifer. The agreement between Semitropic and Metropolitan allows Metropolitan to make use of 350 TAF of storage in Semitropic's groundwater basin. In years of plentiful supply, Metropolitan can deliver available SWP supplies to Semitropic through the California Aqueduct. During dry years, Metropolitan can withdraw this stored water. Five other banking partners participate in this Program and use 650 TAF of storage in Semitropic's groundwater basin.

Expected Supply Capability

The Semitropic-Metropolitan Program provides Metropolitan with the capacity to store up to 350 TAF of water under the current agreement. During dry years, Metropolitan can recover its stored water through a combination of direct pumping of the groundwater and delivery of Semitropic's SWP Table A water in the California Aqueduct. Based on the terms and conditions of the program agreements, the return of water to Metropolitan ranges from a minimum of 31.5 TAF per year (assuming the lowest groundwater return capacity available) up to 223 TAF (assuming the maximum capacity from the groundwater return and highest State Water Project Allocation). The average annual supply capability for a single dry year similar to 1977 is 125 TAF or multiple dry years similar to the period 1990-1992 is 107 TAF.

Rationale for Expected Supply

<u>Historical Record</u>

The Semitropic-Metropolitan Water Banking and Exchange Program has been operational since 1994. With existing agreements, it will continue to operate over the term of 41 years (1994-2035). At the end of 2009, Metropolitan had 45 TAF in its storage account. The program expects to have 45 TAF in its storage account by the end of 2010.

<u>Written Contracts or Other Proof</u>

- <u>1992 Turn-in/out Construction, Operation and Maintenance Agreement.</u> This Agreement was executed in 1992 by the Department of Water Resources and Semitropic to allow construction, operation and maintenance of the Semitropic California Aqueduct Turn in/out.
- <u>1993 Temporary Semitropic-Metropolitan Water Banking Agreement.</u> This Agreement was executed in February 1993 by Semitropic and Metropolitan to allow the storage of available Metropolitan supplies in advance of execution of the long-term agreement.
- <u>1994 Semitropic/Metropolitan Water Banking and Exchange Agreement</u>. This Agreement was executed in December 1994 by Semitropic and Metropolitan to implement the program for a 41-year term (1994-2035).
- <u>1995 Point of Delivery Agreement.</u> This agreement, with the Department of Water Resources, Kern County Water Agency and Metropolitan, allows Metropolitan to divert water from the California Aqueduct into Semitropic's service area.
- <u>1995 Introduction of Local Water into the California Aqueduct.</u> This agreement, with the Department of Water Resources, Kern County Water Agency and Semitropic, allows Metropolitan to receive water from the program into the California Aqueduct.

Financing

Metropolitan's O&M budget (referenced above) includes payments for the Semitropic Program.

Federal, State and Local Permits/Approvals

- Final EIR. Semitropic acting as the lead agency under CEQA and Metropolitan acting as a responsible agency jointly completed the Environmental Impact Report for the Program. The EIR was certified by Semitropic in July 1994 and adopted by Metropolitan in August 1994.
- Regulatory Approvals. All regulatory approvals are in place and the program is operational.

D. Arvin-Edison Water Management Program

Source of Supply

The Arvin-Edison Water Storage District (Arvin-Edison) manages the delivery of local groundwater and 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 available and withdrawing that water when the availability of imported supplies is reduced. In 1997, Metropolitan entered into an agreement with the Arvin-Edison Water Storage District. The agreement allows Metropolitan to store available water in Arvin-Edison's groundwater basin, either through direct spreading operations, or through deliveries to growers in Arvin-Edison's service area. Similar to Arvin-Edison's own usage, this previously stored water could be withdrawn when the availability of imported supplies to Metropolitan is reduced.

Expected Supply Capability

The Arvin-Edison/Metropolitan Program provides Metropolitan with the capacity to store up to 350 TAF of water under the current agreement. During dry years, Metropolitan can recover its stored water either through direct pumping of the groundwater or through exchange. Based on the terms and conditions of the program agreement, the return of water to Metropolitan ranges from a minimum of 40 TAF per year (peak 4-month summer period) up to 110 TAF (over a 12-month period). The average annual supply capability for this program is 75 TAF for either a single dry year similar to 1977 or for each year of a multiple dry year period similar to the period 1990-1992.

Rationale for Expected Supply

Historical Record

The Arvin-Edison/Metropolitan Water Management Program has been operational since 1997. With existing agreements, it will continue to operate over the term of 38 years (1997-2035). At the end of 2009, Metropolitan had 95 TAF in its storage account. The program expects to have 95 TAF in its storage account by the end of 2010.

Written Contracts or Other Proof

- 1997 Arvin-Edison/Metropolitan Water Management Agreement. This Agreement was executed in December 1997 by Arvin-Edison and Metropolitan to implement the program for a 30-year term (1997-2027).
- 1998 Turn-in/out Construction and Maintenance Agreement. This Agreement was executed in 1998 by the Department of Water Resources, Kern County Water Agency, Arvin-Edison and Metropolitan to allow construction, operation and maintenance of the Arvin-Edison California Aqueduct Turn in/out.
- 1998-2002 Water Delivery and Return Agreements. These agreements, with the Department of Water Resources, Kern County Water Agency, Arvin-Edison and Metropolitan, allow Metropolitan to divert water from, and introduce water to, the California Aqueduct.

- 2004 Point of Delivery Agreement. This agreement, with the Department of Water Resources, Kern County Water Agency and Metropolitan, allows Metropolitan to divert water from the California Aqueduct into Arvin-Edison's service area.
- 2004 Introduction of Water into the California Aqueduct. This agreement, with the Department of Water Resources, Kern County Water Agency and Arvin-Edison, allows Metropolitan to receive water from the program into the California Aqueduct.
- 2007 First Amended and Restated Agreement Between Arvin-Edison Water Storage District and The Metropolitan Water District of Southern California for a Water Management Program. This amendment increased the maximum storage level to 350 TAF, extended the agreement term to 2035, and provided for the construction of the South Canal Improvement Project. The project increases the reliability of Arvin-Edison returning higher water quality to the California Aqueduct.

Financing

Metropolitan's O&M budget (referenced above) includes payments for the Arvin-Edison Program.

Federal, State and Local Permits/Approvals

- All regulatory approvals are in place.
- Environmental Status: A Negative Declaration was completed in 1996.
- An Addendum to the 1996 Negative Declaration was completed in 2003.
- A Negative Declaration for the Arvin-Edison South Canal Improvement Project was completed in 2007.
- Regulatory Approvals. All regulatory approvals are in place and program is operational.

E. San Bernardino Valley Municipal Water District Program

Source of Supply

The San Bernardino Valley Municipal Water District Program allows Metropolitan to purchase a dependable annual supply, as well as, an additional supply for dry year needs. Under this program, Metropolitan purchases water provided to San Bernardino Valley Municipal Water District (Valley District) from its annual State Water Project (SWP) water allocation. Valley District delivers the purchased supplies to Metropolitan's service area through the coordinated use of facilities and interconnections within the water conveyance system of the two districts.

The purchased SWP supply is provided to Metropolitan as direct deliveries of annual SWP water through the California Aqueduct to Metropolitan's service area, as well as through deliveries of recaptured SWP water previously stored in the San Bernardino groundwater basin to Metropolitan's service area. Under this program, Metropolitan purchases a minimum of 20 TAF per year of SWP allocation every year. In addition, Metropolitan has the option to purchase Valley District's additional SWP allocation, if available, and the first right-of-refusal to purchase additional SWP supplies available beyond the minimum and option amounts. In the event that Metropolitan's operational needs do not require all, or a portion of the minimum purchased water, that unused amount may be carried forward up to a total of 50 TAF for later delivery. Finally, the program establishes a critical dry year supply account for Metropolitan that could provide additional amounts of dry year supplies. During any year designated by DWR as a critically dry year, Valley District could deliver from this account up to 50 TAF of recaptured SWP water previously stored in the San Bernardino groundwater basin.

To facilitate the transfer, the program also provides the coordinated use of existing facilities, including the Valley District's Foothill Pipeline and the Inland Feeder, to improve the conveyance capabilities of the delivery of SWP water to the service areas of both districts. The intertie between the Foothill Pipeline and the Inland Feeder has been constructed and was operational as of December 2002. This intertie allows Metropolitan to move SWP water from the East Branch of the California Aqueduct through the Foothill Pipeline and Inland Feeder, into Diamond Valley Lake and the Colorado River Aqueduct. As a result of this intertie, Metropolitan has an alternative conveyance capacity of 260 cfs into Metropolitan's system should an outage occur on the upper section of the Inland Feeder.

Expected Supply Capability

The average annual supply capability for a single dry year similar to 1977 is 70 TAF. For multiple dry years similar to the period 1990-1992, the expected supply capability is 37 TAF.

Rationale for Expected Supply

Historical Record

The San Bernardino Valley Municipal Water District Program began operations in 2001 and is expected to be renewed continually in the future. Since its inception in 2001, this program has delivered 103 TAF to Metropolitan. There was no water remaining in the carryover account in 2009. Deliveries in 2010 have been suspended by mutual agreement.

Written Contracts or Other Proof

Metropolitan's dependable annual and dry-year supplies from the San Bernardino Valley Municipal Water District Program are based on Metropolitan Board actions and agreements.

- 2000 Board Approval of Coordinated Operating Agreement. In June 2000, Metropolitan's Board authorized entering into a Coordinated Operating Agreement between Metropolitan and Valley District to develop projects that could provide benefits to both districts through the coordinated use of facilities and SWP supplies.
- 2000 Coordinated Operating Agreement. The Coordinated Operating Agreement between Metropolitan and Valley District was executed in July 2000.
- 2001 Board Approval of the Coordinated Use Agreement. In April 2001, Metropolitan's Board authorized entering into the Coordinated Use Agreement for Conveyance Facilities and SWP Water Supplies between Metropolitan and Valley District for the purchase of dependable annual and dry year supplies by Metropolitan.
- 2001 Coordinated Use Agreement. The Coordinated Use Agreement for Conveyance Facilities and SWP Water Supplies between Metropolitan and Valley District for the purchase of dependable annual and dry year supplies by Metropolitan was executed May 2001. The Agreement is effective as of July 1, 2001, for an "evergreen" term (10-years with automatic annual extensions unless otherwise notified).

Financing

Metropolitan's O&M budget (referenced above) includes the funds to purchase Program water.

Federal, State, and Local Permits/Approvals

The Program became effective as of July 1, 2001. An environmental review process and regulatory approval supported implementation.

- Final EIR. Final Regional Water Facilities Master Plan Environmental Impact Report dated February 1, 2001 was certified by Valley District, as lead agency, and by Metropolitan, as responsible agency. Notices of determinations were filed by Valley District and Metropolitan on May 29, 2001, and April 18, 2001, respectively.

- <u>State Water Contractors' Review.</u> In May 2001 the State Water Contractors reviewed and issued a letter supporting the program.
- <u>DWR Review.</u> The California Department of Water Resources agreed to the program in December 2001.

F. Bay-Delta Improvements

Source of Supply

Improving the water supply reliability of the State Water Project (SWP) is a primary focus of Metropolitan's long-term planning efforts. Metropolitan's strategy is to reduce its dependence on SWP supplies during dry years, when risks to the Bay-Delta ecosystem are greatest, and to maximize its deliveries of available SWP water during wetter years to store in surface reservoirs and groundwater basins for later use during droughts and emergencies.

Restoring and stabilizing the environmental health and supply reliability of the Bay-Delta through the implementation of CALFED's Bay-Delta Program and the Sacramento Valley Water Management Agreement are important steps to accomplishing this objective. These improvements are necessary for Metropolitan to attain its goal of 650 TAF of supply yield from the Bay-Delta in dry years by 2020. This yield is 200 TAF to 250 TAF over estimates of existing available dry-year supplies, as described above. This goal means that Metropolitan will rely on only 32.5 percent of its total SWP contract amount of 2.0 MAF per year in dry years. In addition, Metropolitan policy objectives for Bay-Delta improvements include an average of 1.5 MAF of supply yield to Metropolitan over all year types.

The SWP conveys water from the western slope of the Sierra Nevada to water users both north and south of the Bay-Delta. Specifically, SWP is delivered to Metropolitan's service area through a system of reservoirs, the Bay-Delta, pumping plants and the California Aqueduct. 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 SWP average about 2.5 MAF. Municipal uses account for about 60 percent of annual deliveries, with the remaining 40 percent going to agriculture.

In January 2010, DWR released a draft of the biannual update of its Reliability Report. The report shows that future SWP deliveries will be impacted by two significant factors. The first is significant restrictions on SWP and Central Valley Project (CVP) Delta pumping required by the biological opinions issued by the U.S. Fish and Wildlife Service (December 2008) and National Marine Fisheries Service (June 2009). The second is climate change, which is altering the hydrologic conditions in the State. The 2009 draft report shows greater reductions in water deliveries on average when compared to the 2007 report. Over multiple-year dry periods, average annual Table A deliveries vary from 32% to 38% of the maximum Table A amount, while average annual deliveries over multiple-year wet periods range from 72 to 93% of the maximum Table A amount. Under future conditions, annual SWP Article 21 deliveries average 60 TAF, ranging from 1 TAF to 540 TAF over the 82-year simulation period.

The Bay Delta Conservation Plan

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

In order to select the most appropriate elements of the final conservation plan, the

BDCP will consider a range of options for accomplishing these goals using information developed as part of an environmental review process. Potential habitat restoration and water supply conveyance options included in the BDCP will be assessed through an Environmental Impact Report (EIR)/Environmental Impact Statement (EIS). The BDCP planning process and the supporting EIR/EIS process is being funded by state and federal water contractors.

Lead agencies for the EIR/EIS are the California Department of Water Resources, the Bureau of Reclamation, the U.S. Fish and Wildlife Service, and NOAA's National Marine Fisheries Service, in cooperation with the California Department of Fish and Game, the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers. MWD is on the steering committee.

Metropolitan also has been working with Bay-Delta watershed users toward settling the question of how all Bay-Delta water users would bear some of the responsibility of meeting Delta flow requirements. In December 2002, all of the parties signed a settlement agreement known as "The Sacramento Valley Water Management Agreement" or "Phase 8 Settlement Agreement." The agreement resulted from the SWRCB Bay-Delta Water Rights Phase 8 proceedings. It includes work plans to develop and manage water resources to meet Sacramento Valley in-basin needs, environmental needs under the SWRCB's Water Quality Control Plan, and export supply needs for both water demands and water quality. The agreement specifies about 60 water supply and system improvement projects by 16 different entities in the Sacramento Valley. Its various conjunctive use projects will yield approximately 185 TAF per year in the Sacramento Valley, and approximately 55 TAF of this water would come to Metropolitan through its SWP allocation. The Agreement specifies a supply breakdown of 110 TAF (60 percent) to the SWP and 75 TAF (40 percent) to the CVP.

Based on the work plans for CALFED's Bay-Delta Program and the Sacramento Valley Management Agreement, expected dry-year supply capabilities are projected to be 55 TAF for the period 2010 through 2015, and 110 TAF beyond 2015.

Rationale for Expected Supply

Implementation Status

Expected supplies are projected in accordance with the approved implementation plan for CALFED's Bay-Delta Program and with the work plans for the Sacramento Valley Water Management Agreement.

Written Contracts or Other Proof

Metropolitan's projected dependable annual and dry-year supplies from planned Bay-Delta improvements are based on Metropolitan Board actions and agreements.

- CALFED's Bay-Delta Program.
  - Bay-Delta Accord approved in December 1994.[17]
  - Proposition 204 funds approved by voters in November 1996.
  - Metropolitan policy direction regarding CALFED's Bay-Delta Program adopted in July 1999. This policy direction established water supply goals.
  - Proposition 13 funds approved by voters in March 2000.
  - CALFED Framework announced in June 2000[18].
  - Final implementation plans for the first phase of CALFED's Bay-Delta Program approved in August 2000, in conjunction with the approval of the Program and conclusion of the environmental review process.

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[17] A copy of this agreement can be found at http://calwater.ca.gov/Archives/GeneralArchive/SanFranciscoBayDeltaAgreement.shtml.

[18] California's Water Future: A Framework for Action can be found at http://calwater.ca.gov/Archives/GeneralArchive/adobe_pdf/new_final_framework.pdf.

  - Proposition 50 funds approved by voters in November 2002.
  - Annual Federal appropriations.
- Sacramento Valley Water Management Agreement[19]
  - Work plans detailing projects that could provide benefits by the 2002 and 2003 water years were developed in October 2001.
  - Statement of settlement policy principles recommended in December 2001 by negotiators for approval.
  - Statement of settlement policy principles approved by Metropolitan's Board in January 2002.
  - A Sacramento Valley Water Management Agreement was signed and approved by settlement parties in December 2002.

Financing

Funding for BDCP will come from federal, state, and local water supplier sources.

Phase 8 funding is structured as follows. The agreement calls for 185 TAF per year to be produced in below normal, dry and critical years with the ability of Central Valley water agencies to preclude delivery in above-normal years if it impairs their ability to perform in other years. The water is divided equally into two blocks: Block 1 is for local use in the Central Valley and if not needed, it becomes available to exporters (the predominant expectation of all); Block 2 is settlement water, available to meet flow standards/exports, except as noted above. Exporters have to buy an equal amount of Block 1 and Block 2 water if it is made available. Capital expenditures for infrastructure needed to deliver this water are assumed to be financed with public/bond funds. O&M expenses are shared for Block 2 on a 50-50 basis. For Block 1 water the price schedule is fixed at $50/AF in above normal, $75 in below normal, $100 in dry and $125 in critical years. This price schedule is indexed to a cost-of-living index.

Federal, State, and Local Permits/Approvals

- CALFED's Bay-Delta Program.
  - Programmatic Environmental Impact Report/Statement finalized in July 2000.
  - Record of Decision issued in August 2000 for the final Programmatic Environmental Impact Report/Statement regarding the CALFED Bay-Delta Program.
- Sacramento Valley Water Management Agreement.
  - Settlement parties approved Sacramento Valley Management Agreement in December 2002.
  - Environmental review will be conducted by the applicable lead agencies on the various work plan projects to comply with the California Environmental Quality Act, and as appropriate the National Environmental Policy Act.

G. Kern Delta Water Management Program

Source of Supply

In December 1999, Metropolitan advertised a request for proposals for participation in "The California Aqueduct Dry-year Transfer Program." As a result of this request for proposals, four programs, including one from the Kern Delta Water District (Kern Delta), were selected for further consideration. In 2001, Metropolitan entered into Principles of Agreement with Kern Delta for the development of a dry-year supply program. Kern Delta serves 125,000 acres of actively farmed highly productive farmland located in the San Joaquin Valley portion of southern Kern County. Kern Delta has under contract 180 TAF per year of good quality, highly reliable pre-1914 Kern River water and 25.5 TAF per year of SWP Table A contract

[19] A copy of this agreement can be found at http://www.norcalwater.org/pdf/agreementfinal.pdf

right (under contract with Kern County Water Agency).

The dry-year supply program between Kern Delta and Metropolitan involves the storage of water with Kern Delta. In years of plentiful supply the agreement allows Metropolitan to store water in Kern Delta's groundwater basin, either through direct spreading operations or through deliveries to growers in Kern Delta's service area. Metropolitan has the ability to store up to 250 TAF of water. Agreement provisions may allow for storage beyond this amount. When needed, Metropolitan can recover its stored water either through direct pumping of the groundwater or exchange at a rate of 50 TAF per year. The program duration will be from 2002 to 2027 with provisions that allow the water to be withdrawn until 2033.

Expected Supply Capability

The Kern Delta/Metropolitan Program provides Metropolitan with the capacity to store up to 250 TAF of water at any one time. When needed, Metropolitan can recover its stored water either through direct pumping of the groundwater or exchange at a rate of 50 TAF per year.

Rationale for Expected Supply

Implementation Status

Expected supplies are projected in accordance with accepted detailed groundwater modeling that has been accomplished for the program. In addition, the Kern Delta/Metropolitan Water Management Program was operational and accepting water for storage by fall of 2003. Metropolitan had 10 TAF in storage as of the end of 2009 and expects to recover all stored water by the end of 2010.

Written Contracts or Other Proof

- 2001 Kern Delta/Metropolitan Principles of Agreement. Principles of agreement were entered into between Kern Delta and Metropolitan in June 2001, covering program costs, operational aspects and risks/responsibilities.
- 2002 Kern Delta and Metropolitan Boards of Directors Approval. These actions approved execution of the long-term agreement, which delineates program operations, costs, and risks/responsibilities

Financing

Metropolitan's O&M budget (referenced above) includes payments for the Kern Delta/Metropolitan Program.

Federal, State and Local Permits/Approvals

Kern Delta, acting as lead agency under CEQA has prepared a full Environmental Impact Report. As part of this EIR, Kern Delta published a Notice of Preparation, and held meetings with the general public, interested agencies and resource agencies. In November 2002, the Final EIR certified by Kern Delta and adopted by Metropolitan.

H. Central Valley Water Transfers

Source of Supply

Up to 27 MAF of water (80 percent of California's developed water) is delivered for agricultural use every year. Over half of this water is used in the Central Valley; and much of it is delivered by, or adjacent to, SWP and Central Valley Project (CVP) conveyance facilities. This allows for the voluntary transfer of water to many urban areas, including Metropolitan, via the California Aqueduct.

In recent years, a portion of this agricultural water supply has been secured by Metropolitan through mutually beneficial transfer agreements:

- The Governor's Water Bank (Bank) in 1991, 1992, 1994, and 2009 secured 75 to 820 TAF per year of water supply. Further, the DWR's Dry Year Water Purchase Program (Purchase Program) in 2001, 2002 and 2003 secured a total of 162 TAF. The DWR established and administered the Bank and the Purchase Program by facilitating purchasing water from willing sellers and transferring the water to those with critical needs using the State Water Project (SWP) facilities. Sellers, such as farmers and water districts, made water available for the Bank and Purchase Program by fallowing crops, shifting crops, releasing surplus reservoir storage, and by substituting groundwater for surface supplies.

- Under the Central Valley Improvement Act, passed by Congress in October 1992, water agencies that are not contractors with the Central Valley Project (CVP), such as Metropolitan, may for the first time be able to acquire a portion of the CVP's 7.8 MAF per year of supply.
- In 2003, Metropolitan secured options to purchase approximately 145 TAF of water from willing sellers in the Sacramento Valley during the irrigation season. Using these options, Metropolitan purchased approximately 125 TAF of water for delivery to the California Aqueduct.
- In 2005, Metropolitan, in partnership with three other State Water Contractors, secured options to purchase approximately 130 TAF of water from willing sellers in the Sacramento Valley during the irrigation season, of which Metropolitan's share was 113 TAF. Metropolitan also had the right to assume the other State Water Contractors options if they chose not to exercise their options. Due to improved hydrologic conditions, Metropolitan and the other State Water Contractors did not exercise these options.
- In December 2007, Metropolitan entered into a long-term agreement with DWR providing for Metropolitan's participation in the Yuba Dry Year Water Purchase Program between Yuba County Water Agency and DWR that was approved by the SWRCB as part of the Yuba River Accord. This program provides for transfers of water from the Yuba County Water Agency during dry years through the year 2025 and Metropolitan has purchased 26.4 TAF and 42.9 TAF of Yuba transfer supplies in 2008 and 2009, respectively.
- In 2008, Metropolitan, in partnership with eight other State Water Contractors, purchased approximately 40 TAF of water from willing sellers in the Sacramento Valley during the irrigation season, of which Metropolitan's share was approximately 27 TAF.
- In 2009, Metropolitan participated in the Governor's Water Bank, which purchased approximately 47.5 TAF, of which Metropolitan's share was approximately 36.9 TAF.

Expected Supply Capability

Metropolitan's recent water transfer activities demonstrate Metropolitan's ability to develop and negotiate water transfer agreements working either directly with the agricultural districts that are selling the water or with DWR acting as an intermediary via a Drought Water Bank. As discussed in the State Water Project section of this document, significant restrictions on SWP and Central Valley Project (CVP) Delta pumping required by the biological opinions issued by the U.S. Fish and Wildlife Service (December 2008) and National Marine Fisheries Service (June 2009) will reduce anticipated SWP deliveries and therefore increase Metropolitan's need for Central Valley water transfer supplies. Unfortunately, these biological opinions result in SWP deliveries being shifted to the summer months thereby restricting the ability to pump water transfer supplies through the Delta pumping plants. On average, in dry years when Delta pumping capacity is available, Metropolitan expects to be able to purchase 125 TAF for delivery via the California Aqueduct.

Rationale for Expected Supply

Historical Record

Metropolitan has made rapid progress in developing Central Valley transfer programs. This progress may be attributed to several factors, including Metropolitan dedicating additional staff to identify, develop, and implement Central Valley transfer programs; increased willingness of Central Valley agricultural interests to enter into transfer programs with Metropolitan; and Metropolitan staff's ability to work with California Department of Water Resources and USBR staff to facilitate Central Valley storage and transfer programs. The availability of dry year supplies has been demonstrated in 1991, 1992, 1994, 2001, 2002, 2003, 2005, 2008, and 2009.

The historical record for purchases from the Bank, Purchase Program, and Metropolitan-initiated Central Valley programs, as well as the number of sellers and buyers participating in these Programs, are strong indicators that there are significant amounts of water that can be purchased through spot market water transfers during dry years. This historical record is summarized in Table A.3-1 below.

A portion of these transfers from north of the Delta were lost in its conveyance across the Delta to the Banks Pumping Plant (20 percent) and in its conveyance through the California Aqueduct System to Metropolitan's service area (3 percent).

Written Contracts or Other Proof

- Executive Orders. In response to the extended 1987-92 drought, Governor Wilson issued an executive order establishing a Drought Action Team. This team, made up of state and federal officials, developed an action plan to lessen the impacts of the continuing drought (State 1991). One of the proposed actions was the formation of an emergency water bank managed by DWR. The purpose of the bank would be to help California's urban, agricultural, and environmental interests meet their critical water supply needs. In June 2008, Governor Schwarzenegger issued an executive order establishing a 2009 Drought Water Bank.

Table A.3-1
Historical Record of MWD Central Valley Water Transfers

Program	Purchases (AF per year)		Participants	
	Total	Metropolitan	Seller	Buyers
1991 Governor's Water Bank	820,000	215,000	351	13
1992 Governor's Water Bank	193,246	10,000	18	16
1994 Governor's Water Bank	220,000	100	6	15
2001 Dry-Year Purchase Program	138,806	80,000	9	8
2003 MWD Water Transfer Program	146,230[1]	126,230	11	1
2005 SWC Water Transfer Program	127,275[2]	0	3	4
2008 SWC Water Transfer Program	39,152	26,621	4	8
2009 Governor's Water Bank	47,505	36,900	10	9

[1] Quantities denote options Metropolitan secured, of which 20,000 AF were not exercised due to improved hydrologic conditions.
[2] Quantities denote options Metropolitan secured, but not exercised due to improved hydrologic conditions.

- Agreements Between Sellers and Buyers. Since 1991, Metropolitan has entered into Central Valley water transfer agreements in eight years with sellers, or DWR acting in an intermediary capacity for the Drought Water Banks. The essential terms and conditions for negotiating purchases, including maximum offering price, quantity of water needed, and the timing of delivery, were established in these agreements.
- 1999 Board Directive. Metropolitan's Board has authorized water transfers in accordance with the Water Surplus and Drought Management Plan (WSDM Plan) adopted in April 1999. The WSDM Plan is a comprehensive policy guideline for managing Metropolitan's water supply during periodic surplus and shortage conditions. During shortage conditions, the plan specifies the type, priority and timing of drought actions, including the purchase of transfers on the spot market that could be taken in order to prevent or mitigate negative impacts on retail demands.

Financing

Funds for Central Valley water transfers are included in the O&M budget.

Federal, State, and Local Permits/Approvals

- Environmental documentation for the Drought Water Banks. In November 1993, DWR prepared and finalized a programmatic Environmental Impact Report for the operation of the drought water banks during future drought events. In 2009, an emergency CEQA exemption was issued to support the Drought Water Bank.
- Individual CEQA and NEPA documents for Metropolitan's 2003, 2005, and 2008 Central Valley water transfer programs. Individual sellers prepared CEQA documentation to support their transfers. In addition, the U.S. Bureau of Reclamation prepared NEPA documentation for those transfers requiring federal approval.

I. Yuba Accord Dry Year Purchase Program

Source of Supply

As part of a comprehensive settlement of a State Water Resources Control Board (SWRCB) proceeding in which the Yuba County Water Agency (YCWA) is required to increase Yuba River fishery flows, referred to as the "Yuba River Accord" (Accord), YCWA reached agreement with DWR and the United States Bureau of Reclamation to sell a portion of the water it would be required to release, plus additional water made available by reoperation of YCWA's storage reservoirs and groundwater substitution. DWR entered into a purchase agreement with YCWA under which one-half of the water available for purchase would be available to SWP contractors that elected to participate in the purchase program.

Under this 25-year program Metropolitan is obligated to purchase transfer water when the Table A allocation is 40 percent or less and has the option to purchase transfer water when the Table A allocation is greater than 40 percent but less than or equal to 60 percent. The price for water is set by the agreement between DWR and the Yuba County Water Agency. There are four categories of water the price for which varies depending on hydrology.

Expected Supply Capability

Metropolitan's share of the water made available under the Yuba Accord Dry Year Purchase Program is approximately 25 percent. Should other participating contractors decline to purchase their respective shares, that water is allocated to the remaining interested participating contractors. Metropolitan's likely share of assured YCWA transfer water would be at least 13,750 AF in dry years and up to 35,000 AF or more in other years. These volumes are as provided by YCWA north-of-the-Delta. Conveyance losses through the Delta to the Banks Pumping Plant

(20 percent) and down the California Aqueduct (3 percent) results in net delivery to Metropolitan ranging from approximately 11,000 AF in dry years to 27,000 AF or more in other years.

Rationale for Expected Supply

Historical Record

Actual volumes purchased and net deliveries to Metropolitan during the first two years of this program were as follows:

Year	**Purchased Volume (AF)**	**Net Delivery (AF)**
2008	26,430	20,510
2009	42,915	33,302

Written Contracts or Other Proof

- DWR-YCWA Purchase Agreement. This December 4, 2007, agreement provides the annual determination of the amount of water to be made available by YUBA and purchased by DWR. The agreement also specifies the costs of various categories of water to be made available under a variety of hydrologic conditions.
- DWR-Metropolitan Participation Agreement. This December 21, 2007, agreement provides Metropolitan's election to purchase water made available by YCWA to DWR and the scheduling delivery of the purchased water. The agreement provides for mechanisms for Metropolitan payments to DWR that are due to YCWA under the DWR-YCWA Purchase Agreement.

Financing

Funds for purchases of water from the Yuba Accord Dry Year Purchase Program are included in the O&M budget.

Federal, State, and Local Permits/Approvals

- SWRCB Order WR 2008-0014. Approval of YCWA's petition to modify revised Water Right Decision 1644 related to Water Right Permits 15026, 15027, and 15030 (Applications 5632, 15204, and 15574), and petition for long-term transfer of up to 200,000 AF of water per year from YCWA to the Department of Water Resources and the United States Bureau of Reclamation under Permit 15026 (Application 5632) - Lower Yuba River in Yuba County.

J. *Programs Under Development as Part of the Five Year Supply Plan*

- *Two-Gate System:* This project is in addition to the Bay-Delta improvements described under section F above. The proposed system includes the installation of new temporary gates in central Delta channels that would be operated in real time to reduce fish take, minimize water supply restrictions at the State and Federal export facilities, and improve Delta water quality. A review by the State Water Contractors (SWC) and Central Valley Project contractors suggests that the Two-Gate System can operate within the discretionary provisions of the Biological Opinion (BiOp) to reduce water supply restrictions. This would beneficially affect Delta smelt salvage, help maintain Delta smelt and their preferred habitats further downstream from the export pumps, and provide improved water supply benefits. The installation of the Two-Gate System is estimated to be completed by Fall 2012 and is anticipated to be fully operational in 2013.
- *North of Delta Transfers:* (covered under section H above)
- *In-Delta Transfers*: In January 2009, the Board authorized staff to enter into a water transfer agreement with Delta Wetlands Properties. Metropolitan entered into the water transfer agreement in late January to secure up to 18 TAF of new supply prior to any losses. The program is estimated to provide 8 TAF in 2009, depending on the amount of land fallowed and the conveyance losses. Metropolitan only pays for water that is made available for transfer. For 2010 and beyond, additional transfer agreements

like this one could yield up to 20 TAF per year.

- *North Kern / DWA Exchange*: In this agreement, Desert Water Agency (DWA) will purchase water from North Kern and deliver it to Metropolitan in exchange for Colorado River water delivered to DWA. In 2008, DWA purchased over 8 TAF from North Kern and delivered it to Metropolitan. In future years, DWA will buy additional water for delivery to Metropolitan. Metropolitan is scheduled to return all water received from DWA uniformly over the next 30 years, but may return it sooner if desired.
- *Semitropic Agricultural Water Reuse Demonstration Project*: This project provides a new water supply through the recovery of agricultural water in the San Joaquin Valley with an expected yield of about 11 TAF per year. In November 2009, Metropolitan and Semitropic Water District finalized an agreement to complete environmental review and technical studies for this project. Currently work is underway to complete the characterization of the groundwater, develop documents for environmental permits, and define facility design. Assuming this project moves forward as planned, it could begin operation in late 2011.

A.3.3 In-Basin Storage Deliveries

A. Surface Storage

Source of Supply

Surface storage is a critical element of Southern California's water resources strategy. Because California experiences dramatic swings in weather and hydrology, surface storage is important to regulate those swings and mitigate possible supply shortages. Surface storage provides a means of storing water during normal and wet years for later use during dry years, when imported supplies are limited. Since the early twentieth century, DWR and Metropolitan have constructed surface water reservoirs to meet emergency, drought/seasonal and regulatory water needs for Southern California. These reservoirs include Pyramid Lake, Castaic Lake, Elderberry Forebay, Silverwood Lake, Lake Perris, Lake Skinner, Lake Mathews, Live Oak Reservoir, Garvey Reservoir, Palos Verdes Reservoir, Orange County Reservoir and Metropolitan's Diamond Valley Lake. Some reservoirs such as Live Oak Reservoir, Garvey Reservoir, Palos Verdes Reservoir, and Orange County Reservoir, which have a total combined capacity of about 3,500 AF, are used solely for regulatory purposes. The remaining surface reservoirs are primarily used to meet emergency, drought and seasonal requirements. The total gross storage capacity for these larger remaining reservoirs is 1,768,100 AF. However, not all of the gross storage capacity is available to Metropolitan; dead storage and storage allocated to others reduce the amount of storage that is available to Metropolitan to 1,669,100 AF.

Expected Supply Capability

Surface storage reservoirs are an important tool that allows Metropolitan to meet the water needs of its service area. As discussed in the Final Environmental Impact Report for the Eastside Reservoir (DVL) Project dated October 1991and Metropolitan's IRP, the allocation of available surface storage can be divided into two primary components: emergency and drought/seasonal. As specified by Metropolitan's Board of Directors in the Final EIR for DVL, "Metropolitan shall maintain sufficient water reserves within its service area to supplement local production during an emergency or severe water shortage." With DVL in operation, Metropolitan can now re-operate the surface reservoirs and meet the Board's stated objectives.

<u>Updated Emergency Storage Requirements:</u> Metropolitan's criteria for determining emergency storage requirements, which was approved by Metropolitan's Board, was established in the Final EIR for DVL and further discussed in the IRP. Emergency Storage requirements are based on the potential for a major earthquake to damage the Colorado River Aqueduct, Los Angeles Aqueduct, and both branches of the California Aqueduct that could force the aqueducts out of service for six months. During this period, all interruptible service deliveries would be suspended, a mandatory reduction in water use of 25 percent from normal-year demand levels would be instituted, water stored in surface reservoirs and groundwater basins under Metropolitan's interruptible program would be made available, and full local groundwater production would be sustained.

The storage reserved in system reservoirs for emergency purposes changes over the next 20 years in accordance with the projected demands on Metropolitan as shown in Table A.3-2. The residual storage available to meet other needs, dry-year/seasonal, is also shown and discussed in greater detail in this appendix.

<u>Updated Storage Requirements for Dry-Year Supply and Seasonal Needs:</u> Storage capacity in system reservoirs, including DVL, is also earmarked for dry-year supply and system regulation purposes. Dry-year supply storage within Metropolitan's service area is required to meet the additional water demands that occur during single-year and extended droughts. As specified in the Final EIR for DVL and further discussed in the IRP, this storage requirement is defined as the difference between average-year demand

Table A.3-2
Surface Storage Utilization
(acre-feet per year)

Forecast Year	2015	2020	2025	2030	2035
MWD Dry-Year/Seasonal Surface Storage					
DVL, Mathews, Skinner	794,203	765,773	773,380	756,073	734,180
Flexible Storage in Castaic & Perris	219,000	219,000	219,000	219,000	219,000
Subtotal of Dry-Year/Seasonal Storage	***1,013,203***	***984,773***	***992,380***	***975,073***	***953,180***
MWD Emergency Storage					
DVL, Mathews, Skinner	238,097	266,527	258,920	276,227	298,120
Emergency Storage in DWR Reservoirs	334,000	334,000	334,000	334,000	334,000
Subtotal of Emergency Storage	***572,097***	***600,527***	***592,920***	***610,227***	***632,120***
Total MWD Surface Storage	**1,585,300**	**1,585,300**	**1,585,300**	**1,585,300**	**1,585,300**

and above average demand during dry years. In addition to dry-year storage, seasonal storage is required to meet seasonal peak demands, which are defined as the difference between average winter demands and average summer demands. The dry-year supply and seasonal storage also provides sufficient reserves to permit approximately five percent downtime for rehabilitation, repair, and maintenance of raw water transmission facilities.

Historical Record

Metropolitan has a contract with the Department of Water Resources that allows use of DWR's terminal reservoirs, such as Lake Castaic on the West Branch and Lake Perris on the East Branch of the California Aqueduct (see Section A.3.3.B for a discussion of Metropolitan's contractual rights to storage in these DWR reservoirs). In addition, Metropolitan owns and operates surface reservoirs such as Lake Skinner, Lake Mathews and Diamond Valley Lake to enhance water supply reliability for its Member Agencies.

Written Contracts or Other Proof of Usage

The Surface Reservoirs used by Metropolitan are available either by contract (in the case of the DWR terminal reservoirs) or by construction of its own facilities. The following historical record is provided:

November 1960 Contract between the State of California Department of Water Resources and the Metropolitan Water District of Southern California for a Water Supply. This Contract and its numerous amendments describe Metropolitan's legal access to and obligations for the operation of the State Water Project for the benefit of its Contractors. Metropolitan has an entitlement to 1,911,500 AF of water each year subject to availability. The terms of this Contract describe Metropolitan's rights to and obligations for the terminal surface reservoirs for water supply purposes.

November 1974 Memorandum of Understanding and Agreement on Operation of Lake Skinner. This MOU, signed by Metropolitan and other affected parties, governs Metropolitan's operations of Lake Skinner in Riverside County. The DWR Division of Safety and Dams also reviews monitoring data on the safety of the dam annually.

November 1999 Memorandum of Understanding on Operation of Diamond Valley Lake. This MOU, signed by Metropolitan and other affected parties, governs Metropolitan's operations of Lake Skinner in Riverside County. The DWR

Division of Safety and Dams also reviews monitoring data on the safety of the dam annually.

Elderberry Forebay Contract for Conditions for Use. Conditions for use of storage are described in the Contract between the Department of Water Resources, State of California, and the Department of Water and Power, City of Los Angeles, for Cooperative Development, West Branch, California Aqueduct; Amendment No. 1, July 3, 1969; and Amendment No. 4, June 27, 1985.

June 2002 Division of Safety of Dams Certificate of Approval. The Department of Water Resources, Division of Safety of Dams issued the Certificate of Approval for operation of Diamond Valley Lake in early 2000, with three conditions. These conditions were: (1) Satisfactory operation of the butterfly valves and emergency gate in the inlet/outlet tower, (2) completion of the Tank Saddle Cutoff remediation and (3) completion of the Signal Spillway. Metropolitan completed these conditions in 2001 and the Diamond Valley Lake is currently operational in accordance with the Certificate of Approval.

October 1991 Final Environmental Impact Report for the Eastside Reservoir Project (DVL). The EIR established criteria for integrating the operations of Metropolitan's reservoirs and DWR's southern reservoirs for emergency purposes. These criteria also provided that Metropolitan reservoirs could be expected to withdraw all drought storage water within a two-year period.

B. Flexible Storage Use of Castaic Lake and Lake Perris

Source of Storage

Metropolitan's flexible storage accounts in Castaic Lake and Lake Perris, SWP reservoirs, is 153,940 AF and 65,000 AF, respectively. These accounts provide Metropolitan with dry-year supply that is independent of the Table A allocation. Metropolitan can withdraw water from these reservoirs in addition to their allocated supply in any year on an as-needed basis. Withdrawn water must be replaced from supplies available to Metropolitan within five years of each withdrawal. This "flexible storage" is available in Castaic Lake to Metropolitan, Ventura County Flood Control and Water Conservation District, and to the Castaic Lake Water Agency. It is available in Lake Perris to Metropolitan only.

Expected Supply Capability

The dry year supply available to Metropolitan from the flexible storage use of Castaic Lake and Lake Perris totals 218,940 AF, made up of 153,940 AF in Castaic Lake and 65,000 AF in Lake Perris. Table A.3-3 shows the use of this available supply in accordance with Metropolitan's operating criteria.

In 2005, Seismic concerns arose regarding the Lake Perris Dam. In response, DWR plans to reduce the storage amount at Lake Perris by half until those concerns can be studied and addressed. In the long-term, the reduction in storage may potentially impact the amount of flexible storage available to Metropolitan from Lake Perris, and also impact the total amount of emergency storage available. However, since 2005 Metropolitan has continued to withdraw and replace water from the reservoir, which is operating at a lower level. In January 2010, DWR issued a Draft EIR for the repair of the Dam. Discussions are ongoing regarding the ultimate disposition of the reservoir as it related to costs allocated to the SWP contractors.

Rationale for Expected Supply

Implementation Status
Express provisions related to flexible storage have been incorporated in Metropolitan's SWP contract since 1995. The operating options have been available for use since that time and will continue to be in effect indefinitely as a part of the SWP contracts.

Historical Record
Metropolitan has exercised the flexible storage provision on numerous occasions through and including calendar year 2010. Its use is based on existing contract provisions.

Table A.3-3
Estimated Water Supplies Available for Metropolitan's Use Under the Flexible Storage Use of Castaic Lake and Lake Perris *
(TAF per year)

Year	Multiple Dry-Years (1990-1992)	Single Dry Year (1997)
2015	73	219
2020	73	219
2025	73	219
2030	73	219
2035	73	219

* Source: Metropolitan's operating criteria.

DWR Bulletin 132-94. The use of Castaic Lake and Lake Perris is determined in accordance with the proportionate use factors from Bulletin 132-94, Table B, upon which capital cost repayment obligations are based. Based on its capital repayment obligations, Metropolitan's proportionate use of Castaic Lake is 96.2 percent and of Lake Perris is 100 percent. Per its SWP contract, Metropolitan has express rights to use certain portions of the SWP southern reservoirs independently of DWR to supply water in amounts in addition to approved SWP deliveries.

Metropolitan's SWP Contract. Metropolitan's SWP contract was amended in 1995 to include Article 54, "Usage of Lakes Castaic and Perris." This article provides flexible storage to contractors participating in repayment of the capital costs of Castaic Lake and Lake Perris. Each contractor shall be permitted to withdraw up to a Maximum Allocation from Castaic Lake and Lake Perris. These contractors may withdraw a collective Maximum Allocation up to 160 TAF in Castaic Lake and 65 TAF in Lake Perris, which shall be apportioned among them pursuant to the respective proportionate use factors, as shown in Table A.3-4 below.

Table A.3-4
Flexible Storage Allocations

Participating Contractor	Proportionate Use Factor	Maximum Flexible Storage Allocation (AF)
Castaic Lake		
Metropolitan	.96212388	153,940
Ventura County Flood Control and Water Conservation District	.00860328	1,376
Castaic Lake Water Agency	.02927284	4,684
Total Castaic Lake	1.00000000	160,000
Lake Perris[1]	1.00000000	65,000
Metropolitan		

[1] The 2003 Exchange Agreement among Metropolitan, CVWD, and DWA, among other things, transferred to CVWD and DWA a portion of Metropolitan's capacity in the California Aqueduct and the East Branch including Lake Perris. However, Metropolitan's rights to the full 65,000 AF of Lake Perris flexible storage account was retained by Metropolitan.

Financing

The cost associated with the withdrawal and replacement of water in the flexible storage is included in Metropolitan's annual payments under the State Water Contract.

Federal, State, and Local Permits/Approvals

The flexible storage provision became effective in 1995. DWR has the approval authority to affect changes in the operations and usage of existing SWP facilities, including Castaic Lake and Lake Perris.

C. Metropolitan Surface Reservoirs

Source of Supply

Storage capacity in Metropolitan reservoirs, including Lake Skinner, Lake Mathews, Live Oak Reservoir, Garvey Reservoir, Palos Verdes Reservoir, Orange County Reservoir and Metropolitan's Diamond Valley Lake, is earmarked to meet emergency, dry-year/ seasonal and system regulation needs, as these have been defined above.

Expected Supply Capability

The total available storage capacity for all Metropolitan-controlled surface reservoirs (Metropolitan-owned and DWR terminal reservoirs) is 1,585,300 AF. As discussed earlier, approximately 570 TAF in 2015 rising to 630 TAF in 2035 has been set aside to meet the emergency storage requirements of the service area. After accounting for emergency storage, the surface storage available in Metropolitan-owned reservoirs to meet dry-year/seasonal requirements is presented in Table A.3-5.

Rationale for Expected Supply

Program Facilities

Major facilities for Lake Mathews include an earthen dam to impound water and a recently completed new outlet tower. Major facilities for Lake Skinner include an earthen dam to impound water, an outlet tower, a inlet from the San Diego Canal to deliver water into the reservoir, a water treatment filtration facility, and recreational facilities consisting of a marina, parks, swimming areas, golf course, and hiking trails. Major facilities at Diamond Valley Lake include three earthen dams to impound water, an inlet/outlet tower, a secondary inlet from the Inland Feeder, a large pumping station to deliver water into the reservoir, and power generating facilities. Recreational facilities consisting of a marina, parks, swimming areas, golf course, hiking trails, equestrian trails and lodging are planned.

Historical Record

The Diamond Valley Lake has been operational for 10 years and is currently half full. Lake Mathews and Lake Skinner have been in service for over 30 years and are currently available for full operations.

- November 1974 Memorandum of Understanding and Agreement on Operation of Lake Skinner. This MOU, signed by Metropolitan and other affected parties, governs Metropolitan's operations of Lake Skinner in Riverside County. The DWR Division of Safety and Dams also reviews monitoring data on the safety of the dam annually.
- October 1991 Final Environmental Impact Report for the Eastside Reservoir Project (DVL). The EIR established criteria for integrating the operations of Metropolitan's reservoirs and DWR's southern reservoirs for emergency purposes. These criteria also provided that Metropolitan reservoirs could be expected to withdraw all drought storage water within a two-year period.
- November 1999 Memorandum of Understanding on Operation of Diamond Valley Lake. This MOU, signed by Metropolitan and other affected parties, governs Metropolitan's operations of Lake Skinner in Riverside County. The DWR Division of Safety and Dams also reviews monitoring data on the safety of the dam annually.

Table A.3-5
Estimated Supplies Available from Metropolitan Surface Storage
Program Capabilities
(acre-feet per year)

Forecast Year	Multiple Dry Years (1990-92)	Single Dry Year (1977)
2015	171,000	514,000
2020	239,000	716,000
2025	277,000	832,000
2030	237,000	712,000
2035	192,000	576,000

Source: Metropolitan analysis

- June 2002 Division of Safety of Dams Certificate of Approval. The Department of Water Resources, Division of Safety of Dams issued the Certificate of Approval for operation of Diamond Valley Lake in early 2000, with three conditions. These conditions were: (1) satisfactory operation of the butterfly valves and emergency gate in the inlet/outlet tower, (2) completion of the Tank Saddle Cutoff remediation and (3) completion of the Signal Spillway. Metropolitan completed these conditions in 2001 and the Diamond Valley Lake is currently operational in accordance with the Certificate of Approval.

Financing

The capital cost of Diamond Valley Lake, Lake Mathews and Lake Skinner was financed by a combination of revenue bonds and operating revenues. Annual operating costs, including maintenance and pumping, are included in Metropolitan's annual O&M budget (referenced above).

Federal, State, and Local Permits/Approvals

All necessary permits have been obtained. A permit to generate and sell power has been acquired from the Federal Energy Regulatory Commission. No further regulatory permits are required.

D. Groundwater Conjunctive Use Programs

Source of Supply

Metropolitan's IRP established the strategy to store imported water that is most available during wet years in surface reservoirs or groundwater aquifers for later use during droughts and emergencies. In this way, Metropolitan can reduce its reliance on direct deliveries from the SWP and the Colorado River during dry years when competing demands by other users and risks to the watershed ecosystems are greatest.

Groundwater basins in Metropolitan's service area have potential to store more than 3.0 MAF of additional water supplies. In 2000, the Association of Ground Water Agencies (AGWA) published Groundwater and Surface Water in Southern California: A Guide to Conjunctive Use which estimated a substantial potential for developing dry-year or long term conjunctive use within Metropolitan's service area. In 2007, Metropolitan published the Groundwater Assessment Study which estimated 3.2 MAF of space in groundwater basins available for storage. Based on these studies, Metropolitan continues to pursue a resource objective to develop dry-year supply from in-basin groundwater storage of 300 TAF per year by 2020.

Rationale for Expected Supply

Implementation Status:

The status of implementation for the groundwater conjunctive use programs has been described in the body of this report.

Historical Record

- Long-term Replenishment Program. In years of surplus imported supply, Metropolitan has delivered discounted water for groundwater storage under the Long-Term Replenishment Program in order to maintain groundwater production during the summer season and dry years. In recent years, Metropolitan has sold an average of 200 to 225 TAF per year of water under this program. The Replenishment Program was interrupted in 2007 due to imported water shortages.
- The Main San Gabriel Cyclic Storage Agreement. The Cyclic Storage Agreement with Upper San Gabriel Valley MWD was originally signed in 1975 for a term of five years and has been extended in five year increments. In 2009, the agreement was extended for two years. Currently expires in 2009, but is expected to be renewed repeatedly in future. The Cyclic Storage Agreement with Three Valleys MWD was originally signed in 1991 for a term of five years and has been extended in five year increments. This agreement was also extended for two years in 2009.
- Chino Basin Cyclic Storage Agreement. The Cyclic Storage Agreement with Inland Empire Utilities Agency was first signed in 1979 and extended in five year increments through 2012.
- North Las Posas Groundwater Storage Program. Two phases of the program's ASR wells (18 wells) have been constructed, providing approximately 8 TAF per year of replenishment capacity and 12 TAF per year of withdrawal capacity until fully integrated into Calleguas MWD's distribution system. At such time, the wellfields will be fully operational and able to pump 47 TAF per year of stored water from the basin. This agreement is in place for forty years, through 2035.

As of July 1, 2007, approximately 230 TAF of water had been stored in contractual dry-year storage programs in the North Las Posas, Chino, Orange County, Live Oak, Central, and Raymond groundwater basins. As of January 1, 2010, 117 TAF had been produced to offset imported water shortages leaving a balance of about 113 TAF in these storage accounts.

Written Contracts or Other Proof

Metropolitan's dry-year supply from the ground water conjunctive use programs is based on Metropolitan's Board actions and agreements.

- Approval of Long-term Replenishment Program. Beginning in fiscal year 1989/90, Metropolitan implemented the Long-term Replenishment Program. The continuation of this program was reaffirmed as part of the new rate structure that was approved by Metropolitan's Board in April 2009.
- Agreements for North Las Posas Groundwater Storage Program. An Agreement between Metropolitan and Calleguas Municipal Water District (Calleguas) was executed in June 1995 and amended in May 1998 and in March 2008. The term of the Agreement extends to 2035.
- Proposition 13 Groundwater Conjunctive Use Programs Operational by 2010.
  - Association of Ground Water Agencies (AGWA) published Groundwater and Surface Water in Southern California: A Guide to Conjunctive Use in 2000 identifying the potential storage capacity for groundwater basins.

- Metropolitan Water District published the Groundwater Assessment Study Report in 2007 in collaboration with its member agencies and groundwater basin managers documenting existing use and development of groundwater resources in Metropolitan's service area and estimating additional groundwater basin storage potential.
- Principles for groundwater storage adopted by the Metropolitan Board in January 2000.
- Resolution for Proposition 13 Funds adopted by the Metropolitan Board in October 2000.
- Agreement executed with the California Department of Water Resources for Interim Water Supply Construction Grant Commitment Safe Drinking Water, Clean Water, Watershed Protection and Flood Protection (Proposition 13, Chapter 9, Article 4) providing for Metropolitan to administer $45 million in state Proposition 13 grant funds for groundwater reliability programs; October 2000
- Agreement executed for Long Beach Conjunctive Use Project, July 2002
- Agreement executed for Live Oak Conjunctive Use Project, October 2002
- Agreement executed for Foothill Area Groundwater Storage Project, February 2003
- Agreement executed for Chino Basin Programs, June 2003
- Agreement executed for Orange County Groundwater Storage Program, June 2003
- Agreement executed for Compton Conjunctive Use Program, February 2005
- Agreement executed for Long Beach Conjunctive Use Project — Expansion in Lakewood, July 2005
- Agreement executed for Upper Claremont Basin Groundwater Storage Program, September 2005
- Agreement executed for Elsinore Basin Conjunctive Use Program, May 2008

All of these programs have an initial 25-year term, with provision for renewal or extension after that period.

Financing

Financing has been supplied from multiple sources as discussed below:

- <u>Financing for Long-Term Replenishment Program.</u> No capital or O&M costs are associated with the implementation of the Long-term Replenishment Program. Rather, Metropolitan provides a discounted water rate to encourage member agencies to take delivery of surplus water for storage purposes.
- Financing for North Las Posas Groundwater Storage Program.
  - Metropolitan's Board appropriated $6 million to construct wells and appurtenant facilities in Phase 1 of the program in June 1995.
  - Metropolitan's Board appropriated $25 million to construct wells and appurtenant facilities Phase 2 of the program in January 1998.
  - Metropolitan has reimbursed Calleguas MWD for over $28 million for capital facilities for this program.
- Financing for Proposition 13 and Additional Groundwater Storage Programs.
  - Metropolitan's Board appropriated $210,000 to conduct initial environmental, engineering and planning studies for the Raymond Basin storage program in January 2000. In May 2006, Metropolitan's Board appropriated $480,000 to conduct preliminary engineering and complete CEQA environmental

documentation for the proposed storage program.

– Proposition 13 funds ($45 million) were allocated to Metropolitan by the state in May 2000 for the development of local groundwater storage projects.

– Metropolitan has executed groundwater storage funding agreements for nine storage programs, expended $45 million of the Proposition 13 funds, and appropriated over $35 million of Metropolitan capital funds for the storage programs in the Orange County and Chino groundwater basins. All nine storage programs have completed facilities and are on-line. Metropolitan has called for production of stored water beginning in 2007.

Table A.3-6 provides details of funding for specific groundwater storage programs.

Federal, State, and Local Permits/Approvals

- Final EIR for North Las Posas Groundwater Storage Program. Environmental Impact Report for the North Las Posas Groundwater Storage Program was certified by Calleguas Municipal Water District, lead agency, and by Metropolitan, responsible agency, in April 1995 and June 1995, respectively.
- Long Beach Conjunctive-use Storage Project. Environmental documentation for the Long Beach Conjunctive-use Storage Project was certified by the City of Long Beach in August 2001.
- Live Oak Basin Conjunctive-use Storage Project. Environmental documentation for the Live Oak Basin Conjunctive-use Storage Project was certified by Three Valleys MWD in January 2002.
- Foothill Area Groundwater Storage Project. Environmental documentation for the Foothill Area Groundwater Storage Project was certified by Foothill Municipal Water District in January 2003.
- Chino Basin Programs Groundwater Storage Project. Environmental documentation for the Chino Basin Programs Groundwater Storage Project was certified by Inland Empire Utility Agency in December 2002.
- Long Beach Conjunctive Use Storage Project — Expansion in Lakewood. Environmental documentation for the project was certified by the City of Lakewood in May 2005.
- City of Compton Conjunctive Use Program. Environmental documentation for the project was certified by the City of Compton in December 2004.
- Orange County Groundwater Conjunctive Use Program. Environmental documentation for the project was certified by Orange County Water District in March 1999 and in July 2002.
- Upper Claremont Basin Groundwater Storage Program. Environmental documentation for the project was certified by Three Valleys MWD in July 2005.
- Elsinore Basin Conjunctive Use Program. Environmental documentation for the project was certified by Elsinore Valley MWD in February 2004

E. Programs under Development as Part of the Five Year Supply Plan

LADWP Groundwater Demonstration Project: Treatment facilities were installed at the Tujunga Well Field to produce about 12 TAF per year. In December 2008, Metropolitan entered into an agreement with LADWP and in April 2009, a contract was awarded to Siemens Water Technologies Corporation. The facilities were on line and production began in May 2010. Metropolitan's partnership with LADWP brought the treatment facilities on-line nearly two years ahead of the original schedule.

F. IRP Development Targets

20% x 2020 Regional Consistency: Achieving regional consistency on water use efficiency with the legislative goal of 20 percent reduction for the region as a whole would result in a total reduction of potable demand by 580 TAF by 2020. This estimate for regional compliance requires a 200 TAF of additional savings over the 380 TAF estimated retail level reduction already included in the demand projections for the 2010 RUWMP. The additional 200 TAF savings target by 2020 would be an important part of the region's future supply and is included in the water supply forecast tables as part of IRP Development Targets presented in Appendix A.3-7. Achieving an annual demand reduction of 580 TAF by 2020 will require additional local and regional investments in both conservation and recycled water.

Local Supply Augmentation: Included as part of the IRP Development Target are additional supplies obtained through Local Supply Augmentation. Appendix A.5 presents a list of recycling, groundwater recovery, and seawater desalination projects within Metropolitan's service area that could be developed to achieve this future supply goal. Metropolitan collected information on the ultimate yields of each project and potential project on-line dates through various technical workgroups and collaborative efforts with the member agencies. These local projects are in various stages of development and Metropolitan anticipates continued partnership with its member agencies in augmenting local water supplies.

The following Table A.3-7 shows the detailed water supply forecasts by water source, in five-year increments and for single dry-year, multiple dry years, and average years.

In developing the supply capabilities for the 2010 RUWMP, Metropolitan assumed a simulated median storage level going into each of the five-year increments based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher than the assumption used, and a 50 percent probability that storage levels would be lower than the assumption used. All storage capability figures shown in the 2010 RUWMP reflect actual storage program conveyance constraints. In addition, SWP supplies are estimated using the draft 2009 SWP Delivery Reliability Report distributed by DWR in December 2009. The draft 2009 reliability report presents the current DWR estimate of the amount of water deliveries for current (2009) conditions and conditions 20 years in the future. DWR estimates are based on current facilities and incorporate restrictions on SWP and CVP operations in accordance with the biological opinions of the U.S. Fish and Wildlife Service and National Marine Fishery Service issued on December 15, 2008, and June 4, 2009, respectively.

Table A.3-6
Metropolitan's In-Region Groundwater Storage Programs

Program	Metropolitan Agreement Partners	Agreement Execution Date	Max Storage AF	Dry-Year Yield AF/Yr	Capital Funding
Long Beach Conjunctive Use Storage Project (Central Basin)	Long Beach	June 2002	13,000	4,300	$4.5 million – Prop. 13 funds
Foothill Area Groundwater Storage Program (Monkhill/ Raymond Basin)	Foothill MWD	February 2003	9,000	3,000	$1.7 million – Prop. 13 funds
Orange County Groundwater Conjunctive Use Program	MWDOC OCWD	June 2003	66,000+	22,000	$31.7million: $15.0 million – Prop 13 $16.7million – Met CIP*
Chino Basin Programs	IEUA TVMWD Watermaster	June 2003	100,000	33,000	$27.5 million: $9.0 million – Prop 13 $18.5 million – Met CIP*
Live Oak Basin Conjunctive Use Project (Six Basins)	TVMWD City of La Verne	October 2002	3,000	1,000	$3.3 million – Prop 13
City of Compton Conjunctive Use Project (Central Basin)	Compton	February 2005	2,289	763	$2.43 million – Prop 13
Metropolitan – Calleguas MWD Groundwater Storage Project (North Las Posas Basin)	Calleguas MWD	1995, amended 1999	210,000	47,000	$31 million – Met CIP* $28.2 million expended.
Long Beach Conjunctive Use Program Expansion in Lakewood (Central Basin)	Long Beach	July 2005	3,600	1,200	$3.1 million – Prop 13

Table A.3-6 (Contd)
Metropolitan's In-Region Groundwater Storage Programs

Program	Metropolitan Agreement Partners	Agreement Execution Date	Max Storage AF	Dry-Year Yield AF/Yr	Capital Funding
Upper Claremont Basin Groundwater Storage Program (Six Basins)	TVMWD	Sept. 2005	3,000	1,000	$1.23 million – Prop 13
Elsinore Basin Conjunctive Use Storage Program (Elsinore Basin)	Western MWD Elsinore Valley MWD	May 2008	12,000	4,000	$4.74 million - Prop 13
Total			**421,889**	**117,263**	**$45 million – Prop 13** **$63.4 million – Met CIP***

* Metropolitan's Capital Investment Plan

Table A.3-7
Colorado River Aqueduct
Program Capabilities
Year 2015
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Basic Apportionment – Priority 4	550,000	550,000	550,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	0	0	91,000
PVID Land Management, Crop Rotation, and Water Supply Program	133,000	133,000	133,000
Lower Colorado Water Supply Project	6,000	6,000	6,000
Lake Mead Storage Program	341,000	400,000	400,000
Quechan Settlement Agreement Supply	7,000	7,000	7,000
Forbearance for Present Perfected Rights	(42,000)	(47,000)	(47,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(60,000)	(54,000)	(127,000)
DWCV SWP Table A Transfer Callback	32,000	29,000	67,000
DWCV Advance Delivery Account	28,000	25,000	60,000
Drop 2 Reservoir Funding	22,000	66,000	66,000
SNWA Agreement	40,000	40,000	40,000
Expand SNWA Agreement	15,000	15,000	15,000
Subtotal of Current Programs	***1,122,000***	***1,220,000***	***1,311,000***
Programs Under Development			
Additional PVID Transfers (Crop Stressing/Fallowing)	62,000	62,000	62,000
Arizona Programs - CAP	50,000	50,000	50,000
California Indians / Other Ag	10,000	10,000	10,000
ICS Exchange	25,000	25,000	25,000
Agreements with CVWD	35,000	35,000	35,000
Hayfield Groundwater Extraction Project	5,000	5,000	5,000
Subtotal of Proposed Programs	***187,000***	***187,000***	***187,000***
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	100,000	100,000	100,000
Coachella & All-American Canal Lining			
To SDCWA	80,000	80,000	80,000
To San Luis Rey Settlement Parties1	16,000	16,000	16,000
Subtotal of Non-Metropolitan Supplies	***196,000***	***196,000***	***196,000***
Maximum CRA Supply Capability[2]	**1,505,000**	**1,603,000**	**1,694,000**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(255,000)*	*(353,000)*	*(444,000)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**
Less Non-Metropolitan Supplies[4]	*(196,000)*	*(196,000)*	*(196,000)*
Maximum Metropolitan Supply Capability[5]	**1,054,000**	**1,054,000**	**1,054,000**

[1] Subject to satisfaction of conditions specified in agreement among Metropolitan, the United States, and the San Luis Rey Settlement Parties
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The Colorado River Aqueduct delivery capacity is 1.250 MAF annually.
[4] Exchange obligation for the SDCWA-IID transfer and the Coachella and All American Canal Lining projects.
[5] The amount of CRA water available to Metropolitan after meeting its exchange obligations.

Table A.3-7
Colorado River Aqueduct
Program Capabilities
Year 2020
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Basic Apportionment – Priority 4	550,000	550,000	550,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	167,000	356,000	61,000
PVID Land Management, Crop Rotation, and Water Supply Program	133,000	133,000	133,000
Lower Colorado Water Supply Project	6,000	6,000	6,000
Lake Mead Storage Program	400,000	400,000	400,000
Quechan Settlement Agreement Supply	7,000	7,000	7,000
Forbearance for Present Perfected Rights	(47,000)	(47,000)	(47,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(60,000)	(54,000)	(127,000)
DWCV SWP Table A Transfer Callback	32,000	29,000	67,000
DWCV Advance Delivery Account	28,000	25,000	60,000
Drop 2 Reservoir Funding	22,000	25,000	25,000
SNWA Agreement	40,000	40,000	40,000
Expand SNWA Agreement	15,000	15,000	15,000
Subtotal of Current Programs	***1,343,000***	***1,535,000***	***1,240,000***
Programs Under Development			
Additional PVID Transfers (Crop Stressing/Fallowing)	62,000	62,000	62,000
Arizona Programs - CAP	50,000	50,000	50,000
California Indians / Other Ag	10,000	10,000	10,000
ICS Exchange	25,000	25,000	25,000
Agreements with CVWD	35,000	35,000	35,000
Hayfield Groundwater Extraction Project	5,000	5,000	5,000
Subtotal of Proposed Programs	***187,000***	***187,000***	***187,000***
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	161,000	193,000	193,000
Coachella & All-American Canal Lining			
To SDCWA	80,000	80,000	80,000
To San Luis Rey Settlement Parties1	16,000	16,000	16,000
Subtotal of Non-Metropolitan Supplies	***257,000***	***289,000***	***289,000***
Maximum CRA Supply Capability[2]	**1,787,000**	**2,011,000**	**1,716,000**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(537,000)*	*(761,000)*	*(466,000)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**
Less Non-Metropolitan Supplies[4]	*(257,000)*	*(289,000)*	*(289,000)*
Maximum Metropolitan Supply Capability[5]	**993,000**	**961,000**	**961,000**

[1] Subject to satisfaction of conditions specified in agreement among Metropolitan, the United States, and the San Luis Rey Settlement Parties
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The Colorado River Aqueduct delivery capacity is 1.250 MAF annually.
[4] Exchange obligation for the SDCWA-IID transfer and the Coachella and All American Canal Lining projects.
[5] The amount of CRA water available to Metropolitan after meeting its exchange obligations.

Table A.3-7
Colorado River Aqueduct
Program Capabilities
Year 2025
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Basic Apportionment – Priority 4	550,000	550,000	550,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	0	250,000	53,000
PVID Land Management, Crop Rotation, and Water Supply Program	133,000	133,000	133,000
Lower Colorado Water Supply Project	6,000	5,000	5,000
Lake Mead Storage Program	400,000	400,000	400,000
Quechan Settlement Agreement Supply	7,000	7,000	7,000
Forbearance for Present Perfected Rights	(47,000)	(47,000)	(47,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(77,000)	(60,000)	(155,000)
DWCV SWP Table A Transfer Callback	41,000	32,000	82,000
DWCV Advance Delivery Account	36,000	28,000	73,000
Drop 2 Reservoir Funding	22,000	25,000	25,000
SNWA Agreement	0	0	0
Expand SNWA Agreement	0	0	0
Subtotal of Current Programs	***1,121,000***	***1,373,000***	***1,176,000***
Programs Under Development			
Additional PVID Transfers (Crop Stressing/Fallowing)	62,000	62,000	62,000
Arizona Programs - CAP	50,000	50,000	50,000
California Indians / Other Ag	10,000	10,000	10,000
ICS Exchange	25,000	25,000	25,000
Agreements with CVWD	35,000	35,000	35,000
Hayfield Groundwater Extraction Project	5,000	5,000	5,000
Subtotal of Proposed Programs	***187,000***	***187,000***	***187,000***
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	200,000	200,000	200,000
Coachella & All-American Canal Lining			
To SDCWA	80,000	80,000	80,000
To San Luis Rey Settlement Parties1	16,000	16,000	16,000
Subtotal of Non-Metropolitan Supplies	***296,000***	***296,000***	***296,000***
Maximum CRA Supply Capability[2]	**1,604,000**	**1,856,000**	**1,659,000**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(354,000)*	*(606,000)*	*(409,000)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**
Less Non-Metropolitan Supplies[4]	*(296,000)*	*(296,000)*	*(296,000)*
Maximum Metropolitan Supply Capability[5]	**954,000**	**954,000**	**954,000**

[1] Subject to satisfaction of conditions specified in agreement among Metropolitan, the United States, and the San Luis Rey Settlement Parties
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The Colorado River Aqueduct delivery capacity is 1.250 MAF annually.
[4] Exchange obligation for the SDCWA-IID transfer and the Coachella and All American Canal Lining projects.
[5] The amount of CRA water available to Metropolitan after meeting its exchange obligations.

Table A.3-7
Colorado River Aqueduct
Program Capabilities
Year 2030
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Basic Apportionment – Priority 4	550,000	550,000	550,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	0	0	13,000
PVID Land Management, Crop Rotation, and Water Supply Program	133,000	133,000	133,000
Lower Colorado Water Supply Project	5,000	5,000	5,000
Lake Mead Storage Program	400,000	400,000	400,000
Quechan Settlement Agreement Supply	7,000	7,000	7,000
Forbearance for Present Perfected Rights	(47,000)	(47,000)	(47,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(77,000)	(60,000)	(155,000)
DWCV SWP Table A Transfer Callback	41,000	32,000	82,000
DWCV Advance Delivery Account	36,000	28,000	73,000
Drop 2 Reservoir Funding	22,000	25,000	25,000
SNWA Agreement	0	0	0
Expand SNWA Agreement	0	0	0
Subtotal of Current Programs	***1,120,000***	***1,123,000***	***1,136,000***
Programs Under Development			
Additional PVID Transfers (Crop Stressing/Fallowing)	62,000	62,000	62,000
Arizona Programs - CAP	50,000	50,000	50,000
California Indians / Other Ag	10,000	10,000	10,000
ICS Exchange	25,000	25,000	25,000
Agreements with CVWD	35,000	35,000	35,000
Hayfield Groundwater Extraction Project	0	0	0
Subtotal of Proposed Programs	***182,000***	***182,000***	***182,000***
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	200,000	200,000	200,000
Coachella & All-American Canal Lining			
To SDCWA	80,000	80,000	80,000
To San Luis Rey Settlement Parties1	16,000	16,000	16,000
Subtotal of Non-Metropolitan Supplies	***296,000***	***296,000***	***296,000***
Maximum CRA Supply Capability[2]	**1,598,000**	**1,601,000**	**1,614,000**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(348,000)*	*(351,000)*	*(364,000)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**
Less Non-Metropolitan Supplies[4]	*(296,000)*	*(296,000)*	*(296,000)*
Maximum Metropolitan Supply Capability[5]	**954,000**	**954,000**	**954,000**

[1] Subject to satisfaction of conditions specified in agreement among Metropolitan, the United States, and the San Luis Rey Settlement Parties
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The Colorado River Aqueduct delivery capacity is 1.250 MAF annually.
[4] Exchange obligation for the SDCWA-IID transfer and the Coachella and All American Canal Lining projects.
[5] The amount of CRA water available to Metropolitan after meeting its exchange obligations.

Table A.3-7
Colorado River Aqueduct
Program Capabilities
Year 2035
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Basic Apportionment – Priority 4	550,000	550,000	550,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	0	0	10,000
PVID Land Management, Crop Rotation, and Water Supply Program	133,000	133,000	133,000
Lower Colorado Water Supply Project	5,000	5,000	5,000
Lake Mead Storage Program	400,000	400,000	400,000
Quechan Settlement Agreement Supply	7,000	7,000	7,000
Forbearance for Present Perfected Rights	(47,000)	(47,000)	(47,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(77,000)	(60,000)	(155,000)
DWCV SWP Table A Transfer Callback	41,000	32,000	82,000
DWCV Advance Delivery Account	36,000	28,000	73,000
Drop 2 Reservoir Funding	22,000	25,000	25,000
SNWA Agreement	0	0	0
Expand SNWA Agreement	0	0	0
Subtotal of Current Programs	***1,120,000***	***1,123,000***	***1,133,000***
Programs Under Development			
Additional PVID Transfers (Crop Stressing/Fallowing)	62,000	62,000	62,000
Arizona Programs - CAP	50,000	50,000	50,000
California Indians / Other Ag	10,000	10,000	10,000
ICS Exchange	25,000	25,000	25,000
Agreements with CVWD	35,000	35,000	35,000
Hayfield Groundwater Extraction Project	0	0	0
Subtotal of Proposed Programs	***182,000***	***182,000***	***182,000***
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	200,000	200,000	200,000
Coachella & All-American Canal Lining			
To SDCWA	80,000	80,000	80,000
To San Luis Rey Settlement Parties1	16,000	16,000	16,000
Subtotal of Non-Metropolitan Supplies	***296,000***	***296,000***	***296,000***
Maximum CRA Supply Capability[2]	**1,598,000**	**1,601,000**	**1,611,000**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(348,000)*	*(351,000)*	*(361,000)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**
Less Non-Metropolitan Supplies[4]	*(296,000)*	*(296,000)*	*(296,000)*
Maximum Metropolitan Supply Capability[5]	**954,000**	**954,000**	**954,000**

[1] Subject to satisfaction of conditions specified in agreement among Metropolitan, the United States, and the San Luis Rey Settlement Parties
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The Colorado River Aqueduct delivery capacity is 1.250 MAF annually.
[4] Exchange obligation for the SDCWA-IID transfer and the Coachella and All American Canal Lining projects.
[5] The amount of CRA water available to Metropolitan after meeting its exchange obligations.

Table A.3-7
California Aqueduct
Program Capabilities
Year 2015
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
MWD Table A	469,000	107,000	1,026,000
DWCV Table A	60,000	54,000	127,000
San Luis Carryover [1]	48,000	145,000	145,000
Article 21 Supplies	0	0	3,000
San Bernardino Valley MWD Minimum Purchase	8,000	5,000	20,000
San Bernardino Valley MWD Option Purchase	11,000	13,000	20,000
Yuba River Accord Purchase	14,000	14,000	4,000
Central Valley Storage and Transfers			
Semitropic Program	41,000	39,000	60,000
Arvin Edison Program	47,000	75,000	75,000
San Bernardino Valley MWD Program	7,000	20,000	20,000
Kern Delta Program	47,000	50,000	50,000
Subtotal of Current Programs	***752,000***	***522,000***	***1,550,000***
Programs Under Development			
Delta Improvements	154,000	487,000	285,000
Mojave Groundwater Storage Program	5,000	2,000	30,000
North of Delta/In-Delta Transfers	33,000	33,000	33,000
SBVMWD Central Feeder	5,000	5,000	5,000
Shasta Return	18,000	18,000	18,000
Semitropic Agricultural Water Reuse	11,000	11,000	11,000
IRP SWP Target [2]	16,000	0	0
Subtotal of Proposed Programs	***242,000***	***556,000***	***382,000***
Maximum Supply Capability	**994,000**	**1,078,000**	**1,932,000**

[1] Includes DWCV carryover.

[2] Remaining supply needed to meet IRP target.

Table A.3-7
California Aqueduct
Program Capabilities
Year 2020
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
MWD Table A	469,000	107,000	1,026,000
DWCV Table A	60,000	54,000	127,000
San Luis Carryover [1]	69,000	208,000	208,000
Article 21 Supplies	0	0	3,000
San Bernardino Valley MWD Minimum Purchase	8,000	5,000	20,000
San Bernardino Valley MWD Option Purchase	11,000	13,000	20,000
Yuba River Accord Purchase	14,000	14,000	4,000
Central Valley Storage and Transfers			
Semitropic Program	41,000	39,000	60,000
Arvin Edison Program	63,000	75,000	75,000
San Bernardino Valley MWD Program	12,000	36,000	36,000
Kern Delta Program	47,000	50,000	50,000
Subtotal of Current Programs	***794,000***	***601,000***	***1,629,000***
Programs Under Development			
Delta Improvements	154,000	487,000	285,000
Mojave Groundwater Storage Program	5,000	2,000	31,000
North of Delta/In-Delta Transfers	33,000	33,000	33,000
SBVMWD Central Feeder	5,000	5,000	5,000
Shasta Return	18,000	18,000	18,000
Semitropic Agricultural Water Reuse	11,000	11,000	11,000
IRP SWP Target [2]	47,000	0	0
Subtotal of Proposed Programs	***273,000***	***556,000***	***383,000***
Maximum Supply Capability	**1,067,000**	**1,157,000**	**2,012,000**

[1] Includes DWCV carryover.

[2] Remaining supply needed to meet IRP target.

Table A.3-7
California Aqueduct
Program Capabilities
Year 2025
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
MWD Table A	469,000	107,000	1,026,000
DWCV Table A	77,000	60,000	155,000
San Luis Carryover [1]	80,000	239,000	239,000
Article 21 Supplies	0	0	52,000
San Bernardino Valley MWD Minimum Purchase	12,000	8,000	20,000
San Bernardino Valley MWD Option Purchase	12,000	11,000	29,000
Yuba River Accord Purchase	14,000	14,000	2,000
Central Valley Storage and Transfers			
Semitropic Program	46,000	41,000	69,000
Arvin Edison Program	63,000	75,000	75,000
San Bernardino Valley MWD Program	15,000	46,000	46,000
Kern Delta Program	47,000	50,000	50,000
Subtotal of Current Programs	***835,000***	***651,000***	***1,763,000***
Programs Under Development			
Delta Improvements	341,000	628,000	605,000
Mojave Groundwater Storage Program	11,000	5,000	43,000
North of Delta/In-Delta Transfers	33,000	33,000	33,000
SBVMWD Central Feeder	5,000	5,000	5,000
Shasta Return	18,000	18,000	18,000
Semitropic Agricultural Water Reuse	11,000	11,000	11,000
IRP SWP Target [2]	0	0	0
Subtotal of Proposed Programs	***419,000***	***700,000***	***715,000***
Maximum Supply Capability	**1,254,000**	**1,351,000**	**2,478,000**

[1] Includes DWCV carryover.

[2] Remaining supply needed to meet IRP target.

Table A.3-7
California Aqueduct
Program Capabilities
Year 2030
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
MWD Table A	469,000	107,000	1,026,000
DWCV Table A	77,000	60,000	155,000
San Luis Carryover [1]	69,000	208,000	208,000
Article 21 Supplies	0	0	52,000
San Bernardino Valley MWD Minimum Purchase	12,000	8,000	20,000
San Bernardino Valley MWD Option Purchase	12,000	11,000	29,000
Yuba River Accord Purchase	0	0	0
Central Valley Storage and Transfers			
Semitropic Program	46,000	41,000	69,000
Arvin Edison Program	63,000	75,000	75,000
San Bernardino Valley MWD Program	16,000	49,000	49,000
Kern Delta Program	47,000	50,000	50,000
Subtotal of Current Programs	***811,000***	***609,000***	***1,733,000***
Programs Under Development			
Delta Improvements	341,000	628,000	605,000
Mojave Groundwater Storage Program	11,000	5,000	43,000
North of Delta/In-Delta Transfers	33,000	33,000	33,000
SBVMWD Central Feeder	5,000	5,000	5,000
Shasta Return	18,000	18,000	18,000
Semitropic Agricultural Water Reuse	11,000	11,000	11,000
IRP SWP Target [2]	0	0	0
Subtotal of Proposed Programs	***419,000***	***700,000***	***715,000***
Maximum Supply Capability	**1,230,000**	**1,309,000**	**2,448,000**

[1] Includes DWCV carryover.

[2] Remaining supply needed to meet IRP target.

Table A.3-7
California Aqueduct
Program Capabilities
Year 2035
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
MWD Table A	469,000	107,000	1,026,000
DWCV Table A	77,000	60,000	155,000
San Luis Carryover [1]	69,000	208,000	208,000
Article 21 Supplies	0	0	52,000
San Bernardino Valley MWD Minimum Purchase	12,000	8,000	20,000
San Bernardino Valley MWD Option Purchase	12,000	11,000	29,000
Yuba River Accord Purchase	0	0	0
Central Valley Storage and Transfers			
Semitropic Program	46,000	41,000	69,000
Arvin Edison Program	63,000	75,000	75,000
San Bernardino Valley MWD Program	17,000	50,000	50,000
Kern Delta Program	47,000	50,000	50,000
Subtotal of Current Programs	***812,000***	***610,000***	***1,734,000***
Programs Under Development			
Delta Improvements	341,000	628,000	605,000
Mojave Groundwater Storage Program	11,000	5,000	43,000
North of Delta/In-Delta Transfers	33,000	33,000	33,000
SBVMWD Central Feeder	5,000	5,000	5,000
Shasta Return	18,000	18,000	18,000
Semitropic Agricultural Water Reuse	11,000	11,000	11,000
IRP SWP Target [2]	0	0	0
Subtotal of Proposed Programs	***419,000***	***700,000***	***715,000***
Maximum Supply Capability	**1,231,000**	**1,310,000**	**2,449,000**

[1] Includes DWCV carryover.

[2] Remaining supply needed to meet IRP target.

Table A.3-7
In-Region Storage and Programs
Program Capabilities
Year 2015
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Metropolitan Surface Storage			
(DVL, Mathews, Skinner)	134,000	403,000	403,000
Flexible Storage in Castaic & Perris	37,000	111,000	111,000
Groundwater Storage			
Conjunctive Use	56,000	115,000	115,000
Cyclic Storage	19,000	56,000	56,000
Subtotal of Current Programs	***246,000***	***685,000***	***685,000***
Programs Under Development			
Raymond Basin Groundwater Conjunctive Use	9,000	22,000	22,000
LADWP Groundwater Recovery Project	12,000	12,000	12,000
IRP Development Targets			
20% by 2020 Regional Consistency	80,000	100,000	100,000
Local Supply Augmentation	61,000	72,000	72,000
Subtotal of Proposed Programs	***162,000***	***206,000***	***206,000***
Maximum Supply Capability	**408,000**	**891,000**	**891,000**

Table A.3-7
In-Region Storage and Programs
Program Capabilities
Year 2020
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Metropolitan Surface Storage			
(DVL, Mathews, Skinner)	186,000	557,000	557,000
Flexible Storage in Castaic & Perris	53,000	159,000	159,000
Groundwater Storage			
Conjunctive Use	101,000	115,000	115,000
Cyclic Storage	33,000	100,000	100,000
Subtotal of Current Programs	***373,000***	***931,000***	***931,000***
Programs Under Development			
Raymond Basin Groundwater Conjunctive Use	16,000	22,000	22,000
LADWP Groundwater Recovery Project	12,000	12,000	12,000
IRP Development Targets			
20% by 2020 Regional Consistency	180,000	200,000	200,000
Local Supply Augmentation	72,000	72,000	72,000
Subtotal of Proposed Programs	***280,000***	***306,000***	***306,000***
Maximum Supply Capability	**653,000**	**1,237,000**	**1,237,000**

Table A.3-7
In-Region Storage and Programs
Program Capabilities
Year 2025
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Metropolitan Surface Storage (DVL, Mathews, Skinner)	216,000	648,000	648,000
Flexible Storage in Castaic & Perris	61,000	184,000	184,000
Groundwater Storage			
Conjunctive Use	115,000	115,000	115,000
Cyclic Storage	43,000	129,000	129,000
Subtotal of Current Programs	***435,000***	***1,076,000***	***1,076,000***
Programs Under Development			
Raymond Basin Groundwater Conjunctive Use	20,000	22,000	22,000
LADWP Groundwater Recovery Project	12,000	12,000	12,000
IRP Development Targets			
20% by 2020 Regional Consistency	200,000	200,000	200,000
Local Supply Augmentation	82,000	102,000	102,000
Subtotal of Proposed Programs	***314,000***	***336,000***	***336,000***
Maximum Supply Capability	**749,000**	**1,412,000**	**1,412,000**

Table A.3-7
In-Region Storage and Programs
Program Capabilities
Year 2030
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Metropolitan Surface Storage (DVL, Mathews, Skinner)	184,000	552,000	552,000
Flexible Storage in Castaic & Perris	53,000	160,000	160,000
Groundwater Storage			
Conjunctive Use	115,000	115,000	115,000
Cyclic Storage	46,000	137,000	137,000
Subtotal of Current Programs	***398,000***	***964,000***	***964,000***
Programs Under Development			
Raymond Basin Groundwater Conjunctive Use	22,000	22,000	22,000
LADWP Groundwater Recovery Project	12,000	12,000	12,000
IRP Development Targets			
20% by 2020 Regional Consistency	200,000	200,000	200,000
Local Supply Augmentation	102,000	102,000	102,000
Subtotal of Proposed Programs	***336,000***	***336,000***	***336,000***
Maximum Supply Capability	**734,000**	**1,300,000**	**1,300,000**

Table A.3-7
In-Region Storage and Programs
Program Capabilities
Year 2035
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Metropolitan Surface Storage			
(DVL, Mathews, Skinner)	148,000	444,000	444,000
Flexible Storage in Castaic & Perris	44,000	132,000	132,000
Groundwater Storage			
Conjunctive Use	115,000	115,000	115,000
Cyclic Storage	46,000	139,000	139,000
Subtotal of Current Programs	***353,000***	***830,000***	***830,000***
Programs Under Development			
Raymond Basin Groundwater Conjunctive Use	22,000	22,000	22,000
LADWP Groundwater Recovery Project	12,000	12,000	12,000
IRP Development Targets			
20% by 2020 Regional Consistency	200,000	200,000	200,000
Local Supply Augmentation	102,000	102,000	102,000
Subtotal of Proposed Programs	***336,000***	***336,000***	***336,000***
Maximum Supply Capability	**689,000**	**1,166,000**	**1,166,000**

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APPENDIX A.4

WATER SUPPLY ALLOCATION PLAN

AND

WATER SURPLUS AND DROUGHT MANAGEMENT PLAN

Water Supply Allocation Plan

Revised June 2009

Southern California

Inside cover: Photo courtesy of Cora Edmonds/ArtXchange for the Healing Planet

Water Supply Allocation Plan

Table of Contents

List of Tables and Figures:

List of Acronyms:

AF- Acre-feet
CWD- County Water District
DWP- Drought Management Plan
IAWP-Interim Agricultural Water Program Reductions and Rates
IICP- Incremental Interruption and Conservation Plan
IRP- Integrated Resources Plan
M&I- Municipal and Industrial
MWD- Municipal Water District
RUWMP- Regional Urban Water Management Plan
SWP - State Water Project
WSDM- Water Surplus and Drought Management

Definitions:

Extraordinary Increases in Production- Local water production efforts that increase local supplies, including purchasing water transfers or overproducing groundwater yield.

Groundwater Recovery- The extraction and treatment of groundwater making it usable for a variety of applications by removing high levels of chemicals and/or salts.

In-lieu deliveries- Metropolitan-supplied water bought to replace water that would otherwise be pumped from the groundwater basins.

Overproducing groundwater yield- Withdrawal (removal) of groundwater over a period of time that exceeds the recharge rate of the supply aquifer. Also referred to as overdraft or mining the aquifer.

Seasonal Shift- Water requested in a period of low demand for use in high demand periods. This water will not be available beyond 2009.

Seawater Barrier- The injection of fresh water into wells along the coast to protect coastal groundwater basins from seawater intrusion. The injected fresh water acts like a wall, blocking seawater that would otherwise seep into groundwater basins as a result of pumping.

Surface Storage Operating Agreement Demand- Deliveries made to the San Diego County Water Authority under the Surface Storage Operating Agreement. Water delivered under this program is used by San Diego County Water Authority to offset peak period delivery requirements.

Section 1: Introduction

Calendar Year 2007 introduced a number of water supply challenges for The Metropolitan Water District of Southern California (Metropolitan) and its service area. Critically dry conditions affected all of Metropolitan's main supply sources. In addition, a ruling in the Federal Courts in August 2007 provided protective measures for the Delta smelt in the Sacramento-San Joaquin River Delta which brought uncertainty about future pumping operations from the State Water Project. This uncertainty, along with the impacts of dry conditions, raised the possibility that Metropolitan would not have access to the supplies necessary to meet total firm demands[1] and would have to allocate shortages in supplies to the member agencies[2].

In preparing for this possibility, Metropolitan staff worked jointly with the member agency managers and staff to develop a Water Supply Allocation Plan (Plan). This Plan includes the specific formulas for calculating member agency supply allocations and the key implementation elements needed for administering an allocation should a shortage be declared. Ultimately, the Plan will be the foundation for the urban water shortage contingency analysis required under Water Code Section 10632 and will be incorporated into Metropolitan's Regional Urban Water Management Plan (RUWMP).

Section 2: Development Process

Member Agency Input

Between July 2007 and February 2008, Metropolitan staff worked cooperatively with the member agencies through a series of member agency manager meetings and workgroups to develop a formula and implementation plan to allocate supplies in case of shortage. These workgroups provided an arena for in-depth discussion of the objectives, mechanics, and policy aspects of the different parts of the Plan. Metropolitan staff also met individually with 15 member agencies for detailed discussions of the elements of the recommended proposal. Metropolitan introduced the elements of the proposal to many nonmember retail agencies in its service area by providing presentations and feedback to a number of member agency caucuses, working groups, and governing boards. The discussions, suggestions, and comments expressed by the member agencies during this process contributed significantly to the development of this Plan.

Board of Directors Input

Throughout the development process Metropolitan's Board of Directors was provided with regular progress reports on the status of this Plan, with oral reports in September, October, and December 2007, an Information Board of Directors Letter with a draft of the Plan in November 2007, and a Board of Directors Report with staff recommendations in January 2008. Based on Water Planning and Stewardship Committee discussion of the staff recommendations and further review of the report by

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[1] Firm demands are also referred to as uninterruptable demands; likewise non-firm demands are also called interruptible demands.
[2] See Appendix A for list of member agencies.

the member agencies, refinements were incorporated into the Plan for final consideration and action in February 2008. The Plan was adopted at the February 12, 2008 Board of Directors meeting[3].

Section 3: Review of Historical Shortage Plans[4]

The Plan incorporates key features and principles from the following historical shortage allocation plans but will supersede them as the primary and overarching decision tool for water shortage allocation.

Interruptible Water Service Program

As part of the new rate structure implemented in 1981, Metropolitan's Board of Directors adopted the Interruptible Water Service Program (Interruptible Program) which was designed to address short-term shortages of imported supplies. Under the Interruptible Program, Metropolitan delivered water for particular types of use to its member agencies at a discounted rate. In return for this discounted rate, Metropolitan reserved the right to interrupt delivery of this Interruptible Program water so that available supplies could be used to meet municipal and industrial demands.

Incremental Interruption and Conservation Plan

The ability to interrupt specific deliveries was an important element of Metropolitan's strategy for addressing shortage conditions when it adopted the Incremental Interruption and Conservation Plan (IICP) in December 1990. Reductions in IICP deliveries were used in concert with specific objectives for conservation savings to meet needs during shortages. The IICP reduced Interruptible Service deliveries in stages and provided a pricing incentive program to insure that reasonable conservation measures were implemented.

1995 Drought Management Plan

The 1995 Drought Management Plan (DMP) was a water management and allocation strategy designed to match supply and demand in the event that available imported water supplies were less than projected demands. Adopted by the Metropolitan Board of Directors in November 1994, the 1995 DMP was a short-term plan designed to provide for the 1995 calendar year only. The primary objective of the 1995 DMP was to identify methods to avoid implementation of mandatory reductions. The 1995 DMP included various phases and a step-by-step strategy for evaluating supply and demand conditions and utilizing Metropolitan's available options, with the final phase being implementation of the revised IICP.

1999 Water Surplus and Drought Management Plan

Metropolitan staff began work on the Water Surplus and Drought Management (WSDM) Plan in March 1997 as part of the Integrated Water Resources Plan (IRP), which was adopted by Metropolitan's Board of Directors in January 1996. The IRP established regional water resource targets, identifying the need for developing resource management policy to guide annual operations. The WSDM Plan defined Metropolitan's resource management policy by establishing priorities for the use of regional resources

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3 A complete listing of member agency meetings and Board of Directors reporting activities is contained in Appendix B of this report.

4 A summary of the key elements in the following allocation plans is found in Appendix C.

to achieve the region's reliability goal identified in the IRP. In April 1999, Metropolitan's Board of Directors adopted the WSDM Plan.

The WSDM Plan also included a set of principles and considerations for staff to address when developing specific allocation methods. The WSDM Plan stated the following guiding principle to be followed in developing any future allocation scheme:

> *"Metropolitan will encourage storage of water during periods of surplus and work jointly with its member agencies to minimize the impacts of water shortages on the region's retail consumers and economy during periods of shortage."*[5]

This principle reflects a central desire for allocation methods that are both equitable and minimize regional hardship to retail water consumers. The specific considerations postulated by the WSDM Plan to accomplish this principle include the following:[6]

- The impact on retail customers and the economy
- Allowance for population and growth
- Change and/or loss of local supply
- Reclamation/Recycling
- Conservation
- Investment in local resources
- Participation in Metropolitan's interruptible programs
- Investment in Metropolitan's facilities.

Section 4: Water Supply Allocation Formula

Based on the guiding principle and considerations described in the WSDM Plan, Metropolitan staff and the member agencies developed a specific formula for allocating water supplies in times of shortage. The formula seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level, and takes into account growth, local investments, changes in supply conditions and the demand hardening[7] aspects of non-potable recycled water use and the implementation of conservation savings programs. The formula, described below[8], is calculated in three steps: base period calculations, allocation year calculations, and supply allocation calculations. The first two steps involve standard computations, while the third section contains specific methodology developed for this Plan.

Step 1: Base Period Calculations

The first step in calculating a water supply allocation is to estimate water supply and demand using a historical base period with established water supply and delivery data. The base period for each of the different categories of demand and supply is calculated using data from the three most recent non-shortage years, 2004-2006.[9]

[5] WSDM Plan, p. 1. Emphasis added.
[6] WSDM Plan, p. 2.
[7] Demand hardening is the effect that occurs when all low-cost methods of decreasing overall water demand have been applied (e.g., low-flow toilets, water recycling) and the remaining options to further decrease demand become increasingly expensive and difficult to implement.
[8] Detailed operational elements of these objectives and a numerical example are discussed in Appendix D of this report.
[9] Exceptions to this methodology are noted in the descriptions of base period calculations.

(a) Base Period Local Supplies: Local supplies for the base period are calculated using a three-year average of groundwater production, groundwater recovery, Los Angeles Aqueduct supply, surface water production, and other imported supplies. Non-potable recycling production is not included in this calculation due to its demand hardening effect.

(b) Base Period Wholesale Demands: Firm demands on Metropolitan for the base period are calculated using a three-year average of full-service, seawater barrier, seasonal shift, and surface storage operating agreement demand.

(c) Base Period Retail Demands: Total retail-level municipal and industrial (M&I) demands for the base period are calculated by adding the Base Period Wholesale Demands and the Base Period Local Supplies. This estimates an average total demand for water from each agency.

(d) Base Period In-lieu Deliveries: Base period in-lieu deliveries to member agency storage are calculated using a three-year average of in-lieu deliveries to long-term groundwater replenishment, conjunctive use, cyclic, and supplemental storage programs.

(e) Base Period Interim Agricultural Water Program Deliveries: Through discussions with the member agencies, fiscal year 2003/04 was established as the base period for Interim Agricultural Water Program (IAWP) deliveries. This baseline will remain in place for the period in which the IAWP Reduction is in effect and for droughts continuing into successive years.

(f) Base Period Conservation: Conservation savings for the base period are calculated using modeled estimates of the most recent year's savings from active programs, code-based savings, and system losses. This is different than other base period calculations because, for demand hardening purposes, it is preferable to use the most recent estimate of installed water savings as opposed to a three-year average. Modeled estimates are generated using device-based savings and decay rates provided by California Urban Water Conservation Council and other recognized sources. These estimates currently include savings accumulated from Metropolitan funded programs. Agencies with verified conservation device installations from conservation efforts funded without Metropolitan assistance can be added through an appeals process.

(g) Qualifying Conservation Rate Structure: An additional consideration will be given to agencies whose retail-level water use is subject to a qualifying water rate structure. A qualifying rate structure is defined as one with at least two tiers of volumetric rates, with a price differential between the bottom and top tiers of at least 10 percent. Agencies with a qualifying rate structure will be given a credit of .five percent of the qualified Base Period Retail Demand to be added to the Base Period Conservation estimate listed above.

Step 2: Allocation Year Calculations

The next step in calculating the water supply allocation is estimating water needs in the allocation year. This is done by adjusting the base period estimates of retail demand for population or economic growth and changes in local supplies.

(a) **Allocation Year Retail Demands:** Total retail M&I demands for the allocation year are calculated by adjusting the Base Period Retail Demands for growth. The growth adjustment is calculated using the estimated actual annual rate of population growth at the county level, as generated by the California Department of Finance, whenever possible. For years without complete data, the growth rate is calculated using an average of the three most recent years available. On an appeals basis, member agencies may request that their adjustment be calculated using member agency level population growth. A weighted combination of actual population and actual employment growth rates may also be requested.

(b) **Allocation Year Local Supplies:** Allocation year local supplies are estimated using the Base Period Local Supplies plus Base Period In-Lieu Deliveries and adjusting for any local gain or loss in supply, including extraordinary increases in production. In-lieu deliveries are added to reflect the corresponding reduction in base year local production that was required to certify in-lieu deliveries to storage. Planned or scheduled increases in supply, which are not due to extraordinary increases in production over the base year, are added to the Base Period Local Supplies. Losses of local supply due to such things as hydrology or water quality are subtracted from the Base Period Local Supplies[10]. These adjustments are made to give a more accurate estimate of actual supplies in the allocation year and more accurately reflect an agency's demand for Metropolitan supplies.

(c) **Allocation Year Wholesale Demands:** Demands on Metropolitan for the allocation year are calculated by subtracting the Allocation Year Local Supplies from the Allocation Year Retail Demands.

Step 3: Supply Allocation Calculations

The final step is calculating the water supply allocation for each member agency based on the allocation year water needs identified in Step 2. The following table displays the elements that form the basis for calculating the supply allocation. Each element and its application in the allocation formula is discussed below.

[10] Losses of local supply that are not covered by this adjustment include groundwater losses that are less than or equal to base period replenishment deliveries (for a two year period following interruptions of replenishment deliveries) and supplies that were used to cover IAWP shortages and are no longer available to meet firm demands.

Table 1: Shortage Allocation Index					
(a) Regional Shortage Level	(b) Regional Shortage Percentage	(c) Extraordinary Increased Production Percentage	(d) Wholesale Minimum Percentage	(e) Maximum Retail Impact Percentage	(f) IAWP Reduction
1	5%	0%	92.5%	0.0%	30%
2	10%	0%	85.0%	0.0%	30%
3	15%	15%	77.5%	7.5%	40%
4	20%	20%	70.0%	10.0%	50%
5	25%	25%	62.5%	12.5%	75%
6	30%	30%	55.0%	15.0%	90%
7	35%	35%	47.5%	17.5%	100%
8	40%	40%	40.0%	20.0%	100%
9	45%	45%	32.5%	22.5%	100%
10	50%	50%	25.0%	25.0%	100%

(a) Regional Shortage Levels: The formula allocates shortages of Metropolitan supplies over ten levels.

(b) Regional Shortage Percentage: The total regional shortage is determined by dividing Metropolitan's available supplies by the sum of the Allocation Year Wholesale Demands and subtracting this amount from 1, presented as a percentage in five percent increments from five to 50.

(c) Extraordinary Increased Production Adjustment: This adjustment accounts for extraordinary increases in local supplies in times of shortage above the base period, including such efforts as purchasing water transfers or overproducing groundwater yield. In order not to discourage these efforts, only a percentage of the yield from these supplies is added back to Allocation Year Local Supplies, as seen in Table 1. This has the effect of "setting aside" the majority of the yield for the agency who procured the supply.

(d) Wholesale Minimum Allocation: The Wholesale Minimum Allocation ensures a minimum level of Metropolitan supplied wholesale water service to the member agencies equal to 100 percent of Allocation Year Wholesale Demand minus one-and-a-half times the Shortage Percent. The Wholesale Minimum Allocation ensures that member agencies will not experience shortages on the wholesale level that are greater than one-and-a-half times the Regional Shortage Percentage.

(e) Maximum Retail Impact Adjustment: The purpose of this adjustment is to ensure that agencies with a high level of dependence on Metropolitan do not experience disparate shortages at the retail level compared to other agencies when faced with a reduction in wholesale water supplies. The Maximum Retail Impact Percentage is calculated as the difference between the Regional Shortage Percentage and the Wholesale Minimum Percentage then prorated on a linear scale[11] based on each member agency's dependence on Metropolitan at the retail level. This percentage is then multiplied by the agency's Allocation Year Wholesale Demand to determine an additional allocation. For agencies that are 100 percent dependent on Metropolitan, this will result in a shortage equal to the Regional Shortage Percentage.

(f) **Interim Agricultural Water Program Reductions:** Certified Interim Agricultural Water Program (IAWP) allocation is calculated by decreasing the base year IAWP deliveries by the IAWP Reduction Percentage as seen in Table 1. Penalty rates for noncompliance with this reduction schedule shall be consistent with the rates described in Administrative Code Section 4907.

(g) **Conservation Demand Hardening Credit:** The Conservation Demand Hardening Credit addresses the increased difficulty in achieving additional water savings at the retail level that comes as a result of successful implementation of water conserving devices and conservation savings programs. This supply credit is calculated in two steps. First, an estimated retail shortage percentage is calculated by adding Wholesale Minimum Percentage, Retail Impact Allocation, and Allocation Year Local Supplies and dividing by Allocation Year Retail Demands and then subtracting this from 1. Finally, this retail shortage percentage is multiplied by the agency's quantified conservation savings to find the Conservation Demand Hardening Credit. This indicates the fraction of an agency's conservation savings that will be credited back to the agency as additional allocation.

(h) **Municipal & Industrial Allocation:** The allocation to an agency for its M&I retail demand is the sum of the Wholesale Minimum Allocation, the Retail Impact Adjustment, and the Conservation Demand Hardening Credit.

(i) **Total Allocation:** The total allocation of Metropolitan supplies to an agency is calculated by adding together the Municipal & Industrial Allocation and the Interim Agricultural Water Program Reductions. This is the total amount of water the agency will receive from Metropolitan at any given Regional Shortage Level, factoring in local production, wholesale allocation, retail allocation, IAWP allocation, and conservation[12].

Section 5: Plan Implementation

The Plan will take effect if a regional shortage is declared by the Board of Directors. The following implementation elements are necessary for administering the Plan during a time of shortage. These

[11] This pro-rated adjustment is only applied when Metropolitan Shortage Level is three or greater.
[12] See Appendix D for specific allocation formulae.

elements cover the processes needed to declare a regional shortage level as well as provide a penalty rate structure for enforcing each agency's allocation.

Allocation Period

The allocation period covers twelve consecutive months, from July of a given year through the following June. This period was selected to minimize the impacts of varying State Water Project (SWP) allocations and to provide member agencies with sufficient time to implement their outreach strategies and rate modifications.

Setting the Regional Shortage Level

Metropolitan staff is responsible for recommending a Regional Shortage Level for the Board of Directors' consideration. The recommendation shall be based on water supply availability, and the implementation of Metropolitan's water management actions as outlined in the WSDM Plan. Metropolitan staff will keep the Board of Directors apprised to the status of water supply conditions and management actions through monthly reports to the Water Planning and Stewardship Committee. To further facilitate staff in the development of a recommended regional shortage level, member agency requests for local supply adjustments shall be submitted by April 1st.

Metropolitan's Board of Directors, through the Water Planning and Stewardship Committee, is responsible for approving the final Regional Shortage Level at its April meeting. By the April meeting, the majority of the winter snowfall accumulation period will have passed and will allow staff to make an allocation based on more stable water supply estimates. Barring unforeseen large-scale circumstances, the Regional Shortage Level will be set for the entire allocation period, which will provide the member agencies an established water supply level for their planning.

Allocation Appeals Process

An appeals process is necessary for the administration of any changes or corrections to an agency's allocation. Metropolitan's General Manager will designate, subsequent to a declaration of an allocation by the Board of Directors, an Appeals Liaison as the official point of contact for all information and inquiries regarding appeals. All member agency General Managers will be notified in writing of the name and contact information of the Appeals Liaison. Only appeals that are made through the Appeals Liaison and in accordance with the provisions outlined in Appendix G will be evaluated. Basis for appeals claims can include but are not limited to:

- Adjusting erroneous historical data used in base period calculations
- Adjusting for unforeseen loss or gain in local supply
- Adjusting for extraordinary increases in local supply
- Adjusting for population growth rates
- Reviewing calculation of base period, allocation year and supply allocation figures for consistency with the standards outlined in the Plan

Additional details and a checklist for the appeals process are available in Appendix G and H.

Allocation Penalty Rates

Member agency allocations are enforced through a penalty rate structure. The applicable rates are based on Metropolitan's established tiered pricing structure[13]. Penalty rates and charges will only be assessed to the extent that an agency's total annual usage exceeds its total annual allocation. Any funds collected will be applied towards investments in conservation and local resources development within the service area of the member agency by which the penalties are incurred. No billing or assessment of penalty rates will take place until the end of the twelve-month allocation period.

(1) **Standard Penalty Rates:** The recommended penalty rate structure is an ascending block structure that provides a lower penalty for minor overuse of allocations and a higher penalty for major overuse of allocations. The structure and applicable rates are listed in Table 2. The penalty rates shall be based on the official Metropolitan water rates in effect the last day in June of the 12-month allocation period.

Table 2: Standard Penalty Rates

Water Use	Base Water Rate[14]	Penalty Rate[15]	Total Rate
100% of Allocation	Tier 1	0	Tier 1
Between 100% and 115%	Tier 1	2 x Tier 2	Tier 1 + (2 x Tier 2)
Greater than 115%	Tier 1	4 x Tier 2	Tier 1 + (4 x Tier 2)

(2) **Penalty Rates in Recognition of Section 135 of the MWD Act[16]:** Section 135 of the Metropolitan Water District Act declares that a member agency has the right to invoke its preferential right to water. Each year, Metropolitan calculates each agency's percentage of preferential rights based on a formula of collected cumulative revenues. Table 3 shows the preferential rights percentages as of July 2007.

[13] See Appendix E for tiered pricing rates as of January 10, 2008.

[14] The base water rate shall be the applicable water rate for the water being purchased. In most cases, it will be the Tier 1 rate (plus Treatment Surcharge for treated water deliveries). However, it is possible that the water being purchased would be in the amount that would put an agency beyond its Tier 1 limit. In that case, the base water rate will be the Tier 2 rate (plus Treatment Surcharge for treated water deliveries).

[15] Penalty rate is the fully loaded untreated Tier 2 rate.

[16] For further definition of Preferential Rights, see Appendix F.

Table 3: Preferential Water Rights by Member Agency[17]	
Member Agency	Preferential Right as Percent of Total
City of Anaheim	0.97%
City of Beverly Hills	1.01%
City of Burbank	0.94%
Calleguas MWD	3.85%
Central Basin MWD	7.48%
City of Compton	0.26%
Eastern MWD	3.11%
Foothill MWD	0.68%
City of Fullerton	0.59%
City of Glendale	1.29%
Inland Empire Utilities Agency	2.47%
Las Virgenes MWD	0.80%
City of Long Beach	2.54%
City of Los Angeles	20.97%
MWD of Orange County	13.99%
City of Pasadena	1.08%
San Diego CWA	16.73%
City of San Fernando	0.10%
City of San Marino	0.20%
City of Santa Ana	0.77%
City of Santa Monica	0.88%
Three Valleys MWD	2.62%
City of Torrance	1.17%
Upper San Gabriel MWD	3.74%
West Basin MWD	8.16%
Western MWD	3.60%

There is a discounted penalty rate schedule in recognition of these preferential rights. Using the regional supply amount used in the determination of a Regional Shortage Level, Metropolitan staff will also calculate an allocation to each member agency based on its most recent preferential right percentage. Member agencies that exceed allocations under the Plan formula but do not exceed an equivalent calculation using preferential rights will be subject to the penalty rate schedule described in Table 4.

[17] Calculated by Metropolitan staff and audited June 30 of each year.

Table 4: Preferential Right Penalty Rate[18]			
Water Use	Base Water Rate	Penalty Rate[19]	Total Rate
100% of Allocation	Tier 1	0	Tier 1
Between 100% and 115%	Tier 1	1 x Tier 2	Tier 1 + (1 x Tier 2)
Greater than 115%	Tier 1	3 x Tier 2	Tier 1 + (3 x Tier 2)

As previously stated, the penalty rates shall be based on the official Metropolitan water rates in effect the last day in June of the 12-month allocation period. Metropolitan staff will include equivalent preferential rights calculations in monthly reports of each member agency's water use compared to allocations.

(3) Qualifying Income-Based Rate Penalty Adjustment[20]: Any penalties incurred by a member agency under the Plan will be adjusted to reflect the extent to which retail customers within a member agency's service area are served under a "lifeline" or similar qualified discounted rate program based on income or ability to pay ("Income-Based Rate").

Any member agency who is assessed penalties under the Plan may submit an acre-foot equivalent of water used by retail customers served under a qualifying Income-Based Rate[21]. This amount of water use would be multiplied by the percentage of retail-level reduction in allocation year demand necessary for that member agency to avoid exceeding its allocation. The monetary penalties resulting from these acre feet are subtracted from the total monetary penalties incurred by an agency for exceeding its allocation. In the case that the monetary penalties associated with the Income-Based Rate are greater than the total penalties an agency incurs, no penalty will be incurred. The end result of this adjustment is that the member agency will not be subject to penalties for the use of water by their retail customers served under a qualifying Income-Based Rate.

Tracking and Reporting

Subsequent to a declared regional shortage by the Board of Directors, Metropolitan staff will produce monthly reports of each member agency's water use compared to its allocations based on monthly delivery patterns to be submitted by the member agency. In order to produce these reports, member agencies are requested to submit their local supply use on a monthly basis and certify end of allocation

[18] The base water rate shall be the applicable water rate for the water being purchased. In most cases, it will be the Tier 1 rate (plus Treatment Surcharge for treated water deliveries). However, it is possible that the water being purchased would be in the amount that would put an agency beyond its Tier 1 limit. In that case, the base water rate will be the Tier 2 rate (plus Treatment Surcharge for treated water deliveries).

[19] Penalty rate is the fully loaded untreated Tier 2 Rate.

[20] See Appendix E for specific penalty adjustment formulae and example.

[21] Appropriate documentation and certification will be required.

year local supply use. These reports and comparisons are to be used for the purposes of tracking and communicating potential underage/overage of an agency's annual allocations.

Key Dates for Water Supply Allocation Implementation

The timeline for implementation of an allocation is shown in Table 5. A brief description of this timeline follows:

January to March: Water Surplus and Drought Management reporting occurs at Metropolitan's Water Planning and Stewardship Committee meetings. These reports will provide updated information on storage reserve levels and projected supply and demand conditions.

April: Member agencies report their projected local supplies for the coming allocation year. This information is incorporated in staff analysis of storage reserves and projected supply and demand conditions in order to provide an allocation recommendation to the Board. Metropolitan's Board will consider whether an allocation is needed. A declaration of an allocation will include the level of allocation to be in effect for the allocation year.

June 30: The allocation year is complete.

July 1st: If the Board declared an allocation in April, then it will be effective starting July. The allocation level will be held through June 30, barring unforeseen circumstances. Member agencies will now be requested to submit their local supply use on a monthly basis and certify end of allocation year local supply use. Local production data must be reported to Metropolitan by the end of the month following the month of use (use in July must be reported by the end of August). This information will be combined with Metropolitan sales information in order to track retail water use throughout Metropolitan's service area. Each month Metropolitan will report on member agency water sales compared to their allocation amounts.

June 30: The allocation year is complete.

July: Member agency local supplies must be certified for the month of June, the last month of the previous allocation year.

August: Metropolitan will calculate each member agency's total potable water use based on local supply certifications and actual sales data for the allocation year of July through June. Penalties will be assessed for usage above a given member agency's final adjusted allocation (reflecting the actual local supply and imported water use that occurred in the allocation year).

Table 5: Board Adopted Allocation Timeline					
Year	Month	Year 1 Board Allocation Decision	Year 1 Allocation Year	Year 2 Board Allocation Decision	Year 2 Allocation Year
Year 1	January				
	February				
	March				
	April	Declaration *			
	May				
	June				
	July		**Effective Period** Continuous Tracking of Member Agency Local Supply and Imported Water Use		
	August				
	September				
	October				
	November				
	December				
Year 2	January				
	February				
	March				
	April			Declaration *	
	May				
	June				
	July				**Effective Period** Continuous Tracking of Member Agency Local Supply and Imported Water Use
	August		Assess Penalties		
	September				
	October				
	November				
	December				
Year 3	January				
	February				
	March				
	April				
	May				
	June				

* Member agency projections of local supplies are due on April 1st to assist Metropolitan staff in determining the need for an allocation in the coming allocation year.

Revisiting the Plan

There will be a formal revisit of the Plan commencing in February 2010. The scheduled revisit ensures the opportunity for Metropolitan staff and the member agencies to re-evaluate the plan and recommend appropriate changes to the Board of Directors. The Plan will also be reviewed twelve months following a Board of Directors implementation of the Plan to consider any immediate refinements that are necessary based on lessons learned.

Appendix A: Member Agency List as of November 2007

Table 6: Member Agencies		
City of Anaheim	City of Glendale	City of San Marino
City of Beverly Hills	Inland Empire Utilities Agency	City of Santa Ana
City of Burbank	Las Virgenes MWD	City of Santa Monica
Calleguas MWD	City of Long Beach	Three Valleys MWD
Central Basin MWD	City of Los Angeles	City of Torrance
City of Compton	MWD of Orange County	Upper San Gabriel MWD
Eastern MWD	City of Pasadena	West Basin MWD
Foothill MWD	San Diego CWA	Western MWD
City of Fullerton	City of San Fernando	

Source: http://mwdh2o.com/mwdh2o/pages/memberag/member04.html

Appendix B: Water Supply Allocation Plan Process Timeline

July 2007

- City of Long Beach Water Department staff briefing
- Member Agency Managers/Member Agency Workgroup meeting
- Northern Managers Group meeting
    - Foothill MWD, City of Pasadena, City of Long Beach, Calleguas MWD, City of Los Angeles, West Basin MWD, City of Burbank, Three Valleys MWD, City of Glendale, Upper San Gabriel MWD

August 2007

- Central Basin MWD staff briefing
- Eastern MWD staff briefing
- San Diego CWA staff briefing
- Member Agency Managers/Member Agency Workgroup meeting
- Western MWD staff briefing
- City of Beverly Hills staff briefing

September 2007

- Member Agency Subgroup meetings
    - MWD of Orange County, San Diego CWA, West Basin MWD, Central Basin MWD
- MWD of Orange County staff briefing
- Member Agency Workgroup meeting

- Member Agency Workgroup meeting
- MWD Board of Directors Oral Report

October 2007

- Inland Empire Utilities Agency staff briefing
- Central Basin MWD Caucus Meeting (included sub-agencies)
- Three Valleys MWD staff briefing
- MWD of Orange County staff briefing
- West Basin MWD staff briefing
- MWD Board of Directors Oral Report

November 2007

- West Basin MWD Caucus Meeting (included sub-agencies)
- West Basin Water Users Association presentation
- Walnut Valley MWD staff briefing (sub-agency of Three Valleys MWD)
- Foothill MWD Managers Meeting (included sub-agencies)
- Central Basin MWD staff briefing
- City of Claremont City Council (sub-agency of Three Valleys MWD)
- MWD Board of Directors Information Letter with Draft Proposal

December 2007

- Northern Managers Group Meeting
- California Department of Public Health staff briefing
- City of Long Beach Water Department staff briefing
- Santa Ana River Watershed Project Authority presentation
- Foothill MWD Managers Meeting (included sub-agencies)
- MWD Board of Directors Oral Report

January 2008

- Northern Managers Group Meeting
- Water Replenishment District Board of Directors presentation
- Three Valleys MWD staff briefing
- Member Agency Conservation Coordinator's Group presentation
- Member Agency Managers/Member Agency Workgroup meeting
- City of Chino Hills presentation (sub-agency of IEUA)
- Member Agency Workgroup meeting
- Hemet/San Jacinto Exchange Club presentation
- MWD Board of Directors Report with Staff Recommended Water Supply Allocation Plan

February 2008

- MWD of Orange County and Irvine Ranch WD staff briefing
- MWD Board of Directors Action Item
- San Gabriel Valley Water Association Meeting
- Orange County Water Policy Meeting
- SCAG Water Policy Task Force Meeting

Appendix C: Summary of Historical Shortage Plans

These five elements incorporated into the Plan have, in four out of five instances, been used in previous shortage plans. Both the IICP and the 1995 DMP used a historical base period calculation, adjusted for growth, made local supply adjustments, and used conservation hardening credits in their formulations. The retail impact adjustment is the only feature of the Plan that has not been used historically.

Table 7: Historical Shortage Plan Overview

Plan Element	1991 IICP	1995 DMP	Water Supply Allocation Plan
Historical Base Period	√	√	√
Growth Adjustment	√	√	√
Local Supply Adjustment	√	√	√
Conservation Hardening Credit	√	√	√
Retail Impact Adjustment			√

Appendix D: Water Supply Allocation Formula Example

The following example gives a step-by-step description of how the formula would be used to calculate an allocation of Metropolitan supplies for a hypothetical member agency. All numbers are hypothetical for the purpose of the example and do not reflect any specific member agency.

Step 1: Base Period Calculations

(a) Base Period Local Supplies: Calculated using a three-year average of groundwater (gw), groundwater recovery (gwr), Los Angeles Aqueduct supply (laa), surface water(sw), and other non-Metropolitan imported supplies(os).

$$[(gw^1+gwr^1+laa^1+sw^1+os^1)+(gw^2+gwr^2+laa^2+sw^2+os^2)+(gw^3+gwr^3+laa^3+sw^3+os^3)] \div 3=59{,}000 \text{ AF}$$

(For the purpose of this example, assume that the three year average is 59,000 AF.)

(b) Base Period Wholesale Demands: Calculated using the same three-year time period as the Base Period Local Supplies. The Base Period Wholesale Demands include full-service (fs), seawater barrier (sb), seasonal shift (ss), and surface storage operating agreement (ssoa).

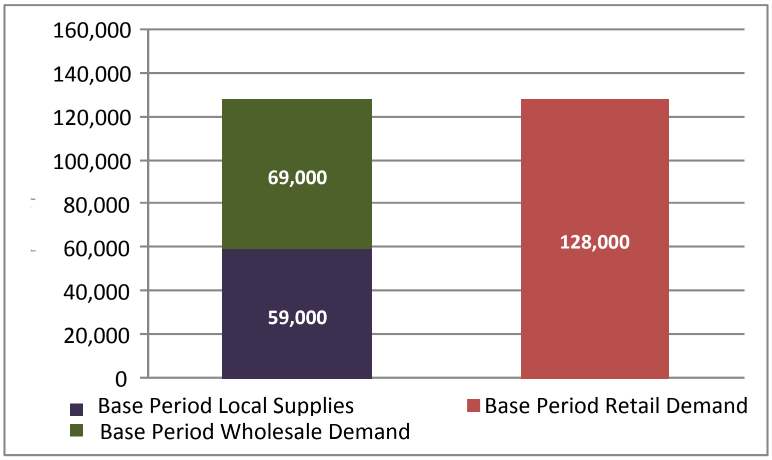
$$[(fs^1+sb^1+ss^1+ssoa^1)+(fs^2+sb^2+ss^2+ssoa^2)+(fs^3+sb^3+ss^3+ssoa^3)] \div 3=69{,}000 \text{ AF}$$

(For the purpose of this example, assume that the three year average is 69,000 AF.)

(c) Base Period Retail Demands: Calculated as the sum of the Base Period Local Supplies and Base Period Wholesale Demand.

59,000 + 69,000 = 128,000 AF

Figure 1: Base Period Calculations



(d) Base Period In-lieu Deliveries: Calculated by averaging in-lieu deliveries from the same three-year period that was used to calculate the Base Period Local Supplies and Demands.

(4,000 AF +5,000 AF +4,500 AF)÷3=4,500 AF

(e) Base Period Interim Agricultural Water Program Deliveries: Fiscal year 2003/04 was established as the base period for Interim Agricultural Water Program (IAWP) deliveries

Base Period IAWP Deliveries = 6,000 AF

(f) Base Period Conservation: Calculated using a tool developed by Metropolitan staff that inputs the total amount of conservation savings devices and programs installed by each member agency and standardized water savings factors provided by the CUWCC and other recognized bodies.

Base Period Conservation=14,500 AF

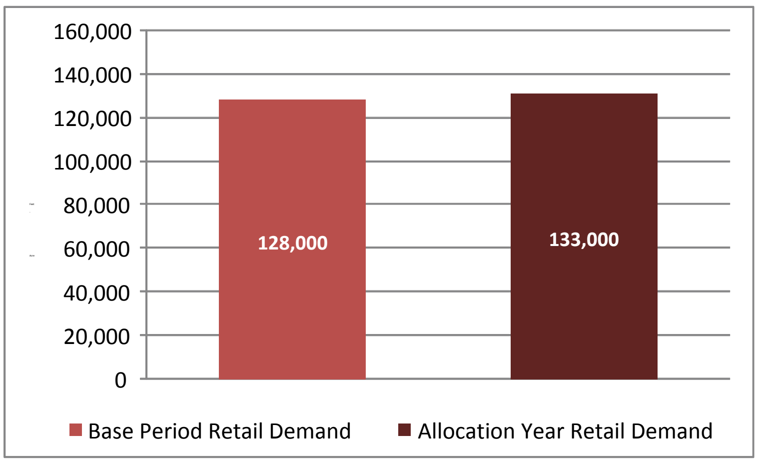
(g) Qualifying Conservation Rate Structure: Agencies that have retail use that is covered by a qualifying conserving water rates structure would be able to add .five percent of their covered Base Period Retail Demand to the Base Period Conservation.

Step 2: Allocation Year Calculations

(a) Allocation Year Retail Demand: Calculated by adjusting the Base Period Retail Demand for growth that occurred since the Base Period. Growth is estimated using the actual annual rate of county-level population growth whenever possible, or an average of the three most recent years if complete data in not available. Member agency level population or a weighted combination of population and employment growth rates may be used if an agency so requests through the appeals process.

128,000 AF + 5,000 AF (based on average annual growth rates)= 133,000 AF

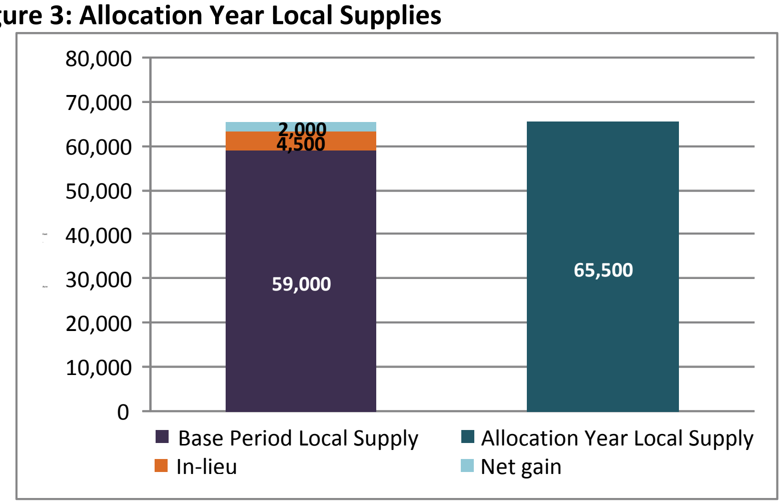
Figure 2: Allocation Year Retail Demand



(b) Allocation Year Local Supplies: Calculated by adding the Base Period Local Supplies (59,000 AF), Base Year In-Lieu Deliveries (4,500 AF), and adjustments for gains or losses of local supply. For the purposes of this example a net gain in local supply of 2,000 AF is assumed.

59,000 AF + 4,500 AF + 2,000 AF =65,500 AF

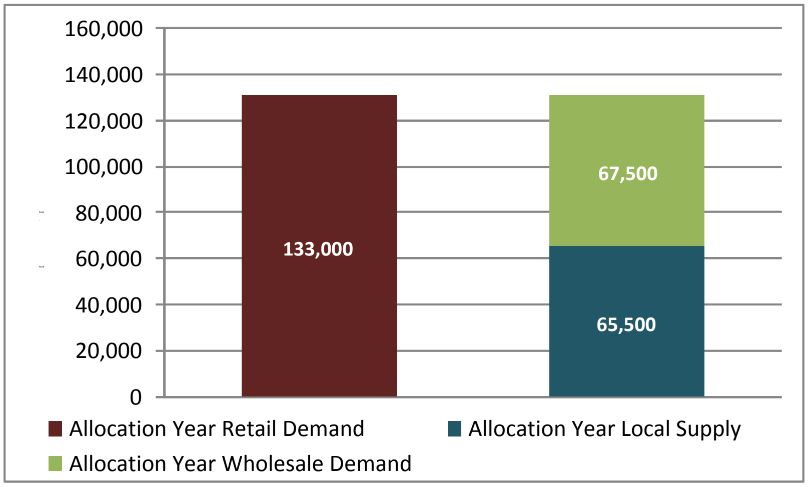
Figure 3: Allocation Year Local Supplies



(c) Allocation Year Wholesale Demands: Calculated by subtracting the Allocation Year Local Supplies (65,500 AF) from the Allocation Year Retail Demands (133,000 AF).

133,000 AF - 65,500 AF= 67,500 AF

Figure 4: Allocation Year Wholesale Demand



Step 3: Supply Allocation Calculations

Regional Shortage Levels 1 &2: For regional shortages of 10 percent or less, the allocation is an across-the-board reduction in wholesale supplies to all agencies with adjustments for conservation demand hardening. There is no adjustment to address disparate retail level shortages in Regional Shortage Levels 1 & 2.

(a) Regional Shortage Levels: For the example, we will use calculations from Table 1 for Regional Shortage Level 2.

Table 1: Shortage Allocation Index

(a) Regional Shortage Level	(b) Regional Shortage Percentage	(c) Extraordinary Increased Production Percentage	(d) Wholesale Minimum Percentage	(e) Maximum Retail Impact Percentage	(f) IAWP Reduction
2	10%	0%	85.0%	0.0%	30%

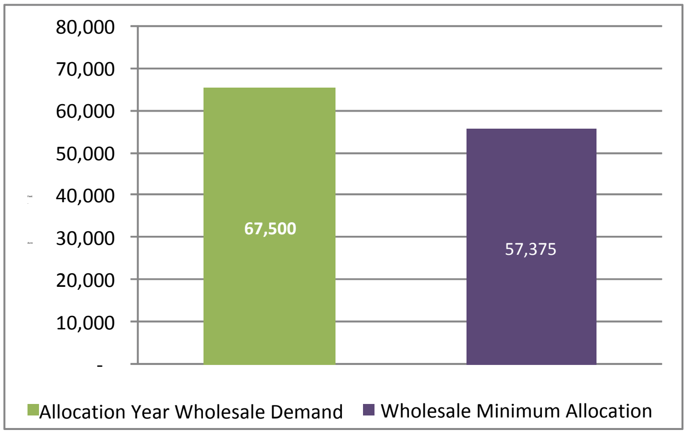
(b) Regional Shortage Percentage: The Regional Shortage Percentage at Regional Shortage Level 2 = 10%

(c) Extraordinary Increased Production Adjustment: There is no increase in Allocation Year Local Supplies for Extraordinary Increased Production in Regional Shortage Levels 1 and 2.

(d) Wholesale Minimum Allocation: Calculated by multiplying the agency's Allocation Year Wholesale Demand (67,500 AF) by the Wholesale Minimum Percentage (85%) from the Table 1 for Regional Shortage Level 2.

67,500 AF*.85 = 57,375 AF

Figure 5: Wholesale Minimum Allocation Shortage Level 2



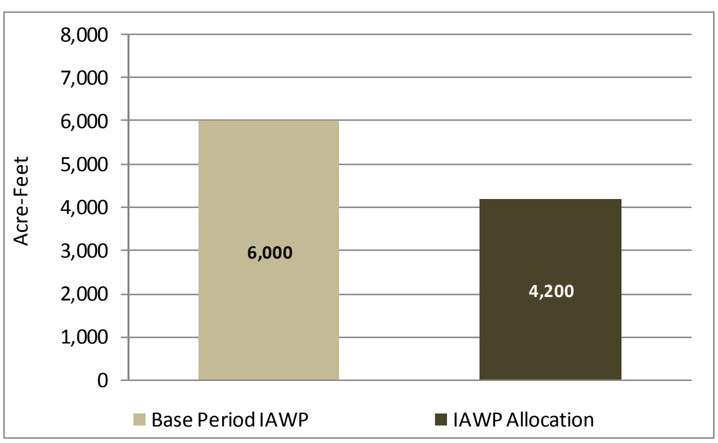
(e) Maximum Retail Impact Adjustment: There is no adjustment for Maximum Retail Impact Adjustment for Regional Shortage Levels 1 and 2.

(f) Interim Agricultural Water Program Reductions: Calculated by reducing the Base Year IAWP deliveries (6,000 AF) by the IAWP Reduction Percentage (30%). At Regional Shortage Level 2 this agency would see a 30 percent reduction in IAWP deliveries in the allocation year.

6,000 AF x .30 = 1,800 AF reduction

6,000 AF- 1,800 AF= 4,200 AF IAWP Allocation

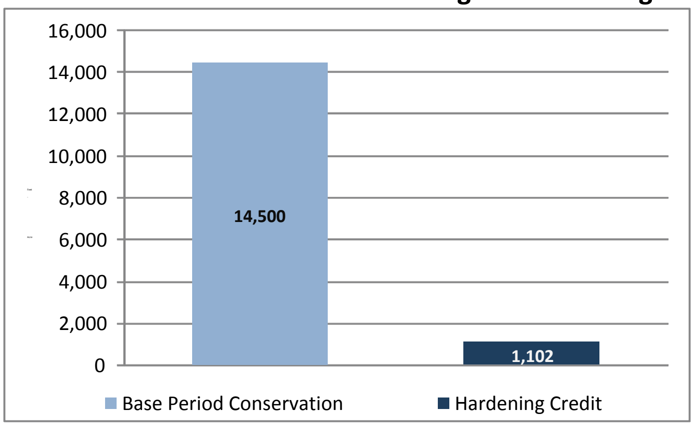
Figure 6: Interim Agricultural Water Program Reductions Shortage Level 2



(g) Conservation Demand Hardening Credit: Calculated by multiplying the agency's quantified conservation savings in acre-feet (14,500 AF) by its estimated retail shortage percentage. The retail shortage percentage is calculated by adding Wholesale Minimum Allocation (57,375 AF) and Allocation Year Local Supplies (65,500 AF), dividing by Allocation Year Retail Demands (133,000 AF) and then subtracting this from 1. .

1- ((57,375 + 65,500) ÷ 133,000) = .076 = 7.6%.
14,500 AF*.076= 1,102 AF

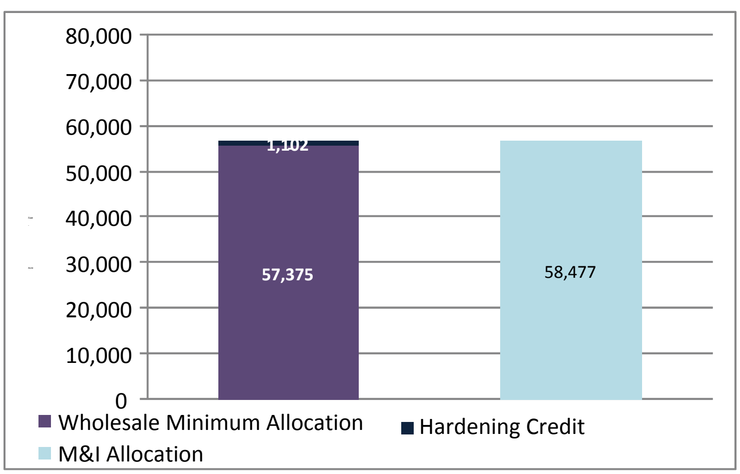
Figure 7: Conservation Demand Hardening Credit Shortage Level 2



(h) Municipal & Industrial Allocation: Calculated by adding the Wholesale Minimum Allocation (57,375 AF) and the Conservation Hardening Credit (1,102 AF).

57,375 AF + AF+1,102 AF= 58,477 acre-feet.

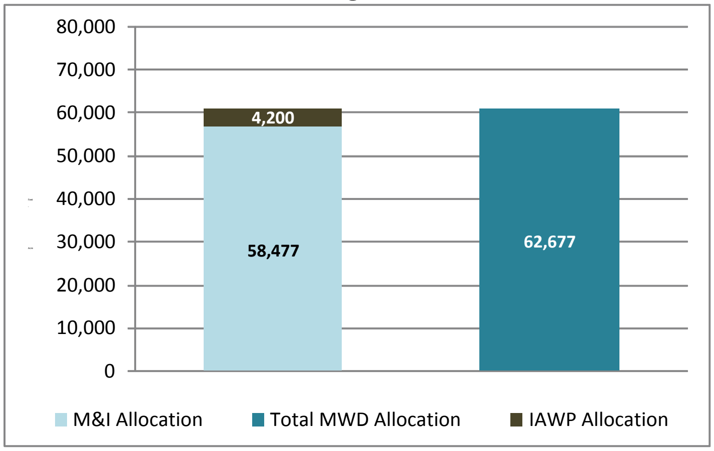
Figure 8: Municipal and Industrial Allocation Shortage Level 2



(i) Total Allocation: Add Municipal & Industrial Allocation (58,477 AF) and Interim Agricultural Water Program (4,200 AF) totals.

58,477 AF + 4,200 AF = 62,677 AF

Figure 9: Total Allocation Shortage Level 2



Regional Shortage Levels 3-10: For deeper regional shortages greater than 10 percent, the Allocation Plan formula includes a Retail Impact Adjustment Allocation to address disparate retail level shortages. This example will follow the allocation formula through a Regional Shortage Level 4.

(a) Regional Shortage Levels: Calculate from Table 1 for Regional Shortage Level 4.

Table 1: Shortage Allocation Index

(a) Regional Shortage Level	(b) Regional Shortage Percentage	(c) Extraordinary Increased Production Percentage	(d) Wholesale Minimum Percentage	(e) Maximum Retail Impact Percentage	(f) IAWP Reduction
4	20%	20%	70.0%	10.0%	50%

(b) Regional Shortage Percentage: The Regional Shortage Percentage at Regional Shortage Level 4 is 20%

(c) Extraordinary Increased Production Adjustment: Let us assume that the agency has produced 3,700 AF of extraordinary production of local supplies in a shortage year. This is calculated by multiplying the extraordinary production (3,700 AF) and the Extraordinary Increase Percentage (20%).

3,700 AF*.20=740 AF

This is then added to the Allocation Year Local Supply (65,500 AF).

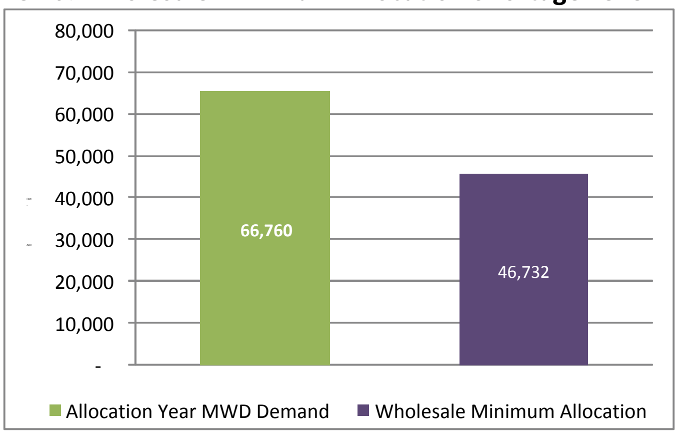
65,500 AF + 740 AF = 66,240 AF

The **Allocation Year Wholesale Demand** (67,500 AF) is then decreased by the extraordinary local supply production (740 AF) because Allocation Year Retail Demands (133,000 AF) remain unchanged.

133,000 AF- 66,240 AF = 66,760 AF or
67,500 AF-740 AF=66,760 AF

(d) Wholesale Minimum Allocation: Calculated by multiplying the agency's Allocation Year Wholesale Demand (66,760 AF) by the Wholesale Minimum Percentage (70%) from the Table 1 for Regional Shortage Level 4.
66,760 AF*.70 = 46,732 AF

Figure 10: Wholesale Minimum Allocation Shortage Level 4



(e) Maximum Retail Impact Adjustment: Calculated first by determining the agency's dependence on Metropolitan by dividing the Allocation Year Wholesale Demand (66,760 AF) by the Allocation Year Retail Demand (133,000 AF) and multiplying by 100.

(66,760 AF/ 133,000 AF)*100=50.2%

Next, this percentage dependence on Metropolitan (50.2%) is multiplied by the Maximum Retail Impact Percentage for Shortage Level 4 (10%).

.502 * .10 =.050=5%

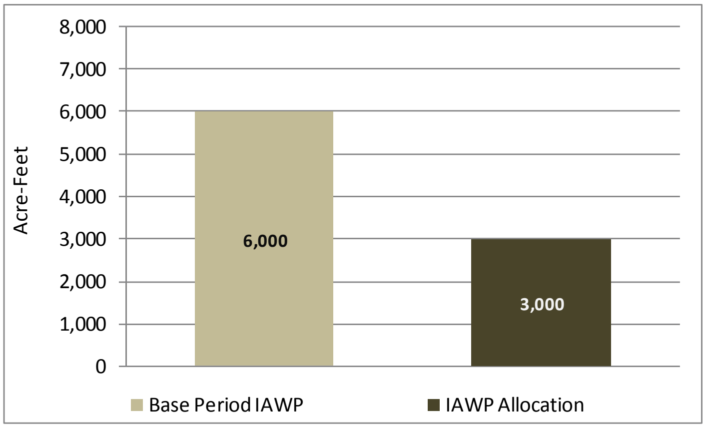
This percentage is now multiplied by the Allocation Year Wholesale Demand (66,760 AF) for the Maximum Retail Impact Adjustment.

66,760 AF*.050=3,351 AF

(f) Interim Agricultural Water Program Reductions: Calculated by reducing the Base Year IAWP deliveries by the IAWP Reduction Percentage. Under a Regional Shortage Level 4 the agency would see 50% reduction in IAWP deliveries in the allocation year. We will assume the agency has 6,000 AF IAWP water.

6,000 AF * .50 = 3,000 AF

Figure 11: Interim Agricultural Water Program Reductions Shortage Level 4



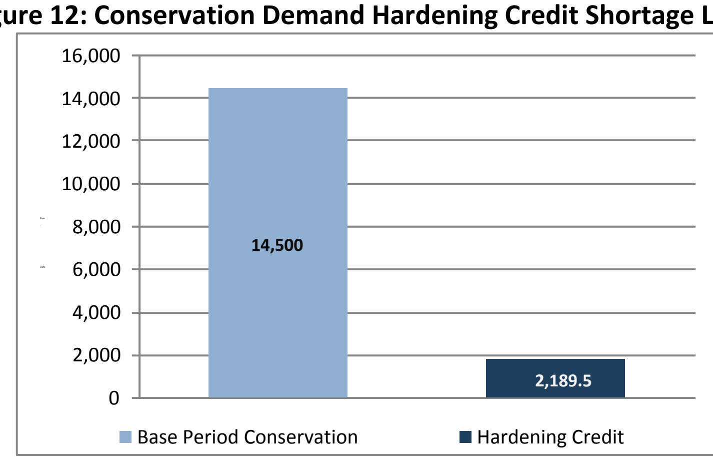
(g) Conservation Demand Hardening Credit: Calculated by adding Wholesale Minimum Allocation (46,732 AF) and Allocation Year Local Supplies (66,240 AF), dividing by Allocation Year Retail Demands (133,000 AF) and then subtracting this from 1.

1- ((46,732 + 66,240) ÷ 133,000) = .151 = 15.1%.

Next, multiply the agency's quantified conservation savings in acre-feet (14,500 AF) by its estimated retail shortage percentage calculated in the step above.

14,500 AF*.151= 2,189.5 AF

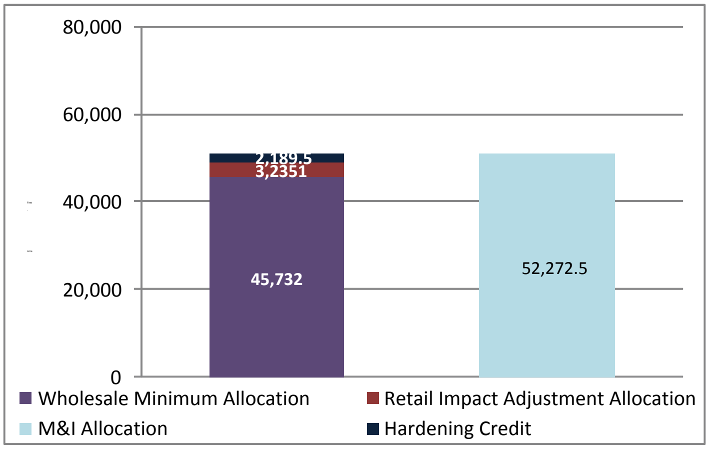
Figure 12: Conservation Demand Hardening Credit Shortage Level 4



(h) Municipal & Industrial Allocation: Calculated by adding the Wholesale Minimum Allocation (46,732 AF), the Maximum Retail Impact Adjustment (3,351 AF), and the Conservation Hardening Credit (2,189.5 AF).

46,732 AF + 3,351 AF+ 2,189.5 AF= 52,272.5 AF

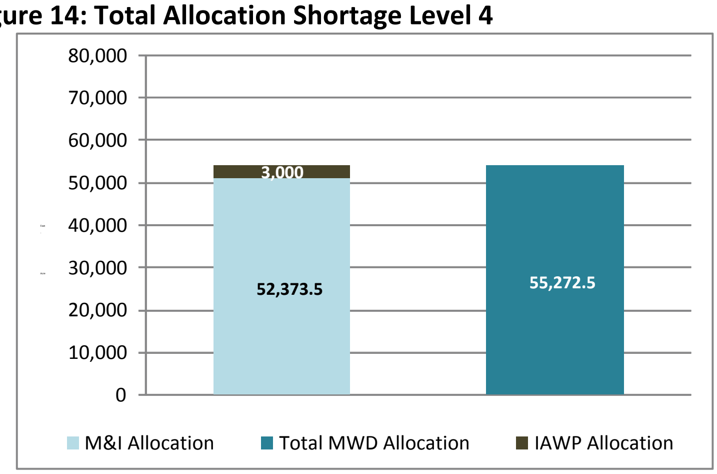
Figure 13: Municipal and Industrial Allocation Shortage Level 4



(i) Total Allocation: Calculated by adding the Municipal and Industrial Allocation (52,272.5 AF) and the Interim Agricultural Water Program Allocation (3,000 AF).

52,272.5 AF + 3,000 AF= 55,272.5 AF

Figure 14: Total Allocation Shortage Level 4



Appendix E: Qualifying Income-Based Rate Penalty Adjustment Example

The following example provides a step by step description of how the qualifying income-based rate penalty adjustment is calculated.

The following table summarizes the allocation year demands, local supplies and allocation as calculated in Appendix D for a hypothetical agency under a Level 1 or 2 Regional Shortage Level. For detailed instructions on how to calculate these figures, reference Appendix D of the Plan.

Allocation Year Retail Demand	133,000 AF
Allocation Year Local Supplies	65,500 AF
Wholesale Municipal & Industrial Allocation	58,477 AF

Step 1: Penalty Calculation

(a) Water Use above Allocation: The first step in calculating the income-based rate penalty adjustment is to calculate the agency's total penalty under the Plan. If the agency did not incur any penalties from the allocation year, the income-based rate penalty adjustment would not apply. For the purpose of this example, the agency used 67,600 acre-feet of MWD supplies in the allocation year. This represents 9,123 acre-feet of use above the water supply allocation.

Total MWD Water Supply Allocation	58,477 AF
Actual MWD Water Use	67,600 AF
Use Above Water Supply Allocation	**9,123 AF**

(b) Total Penalty: In this example the agency used 115.6% of its water supply allocation. Assuming that the preferential right penalty rate does not apply to this agency, 8,772 of the 9,123 acre-feet of use above the allocation would be penalized at a rate of two times the untreated Tier 2 rate and 351 of the 9,123 acre-feet of use above the allocation would be penalized at a rate of four times the untreated Tier 2 rate. Note that this calculation is based on the 2008 rates found in Appendix F; the actual rate will be based on the rate in effect at the end of the allocation year.

Between 100% and 115% of Allocation	8,772 AF	2 x Tier 2 = $898/AF	$7,877,256
Greater than 115% of Allocation	351 AF	4 x Tier 2 = $1796/AF	$630,396
Total	**9,123 AF**		**$8,507,652**

Step 2: Effective Income-Based Rate Cutback

(a) Calculate Retail Cutback: The second step in calculating the income-based rate penalty adjustment is to calculate the amount of supply cutback that would have been expected from qualifying income-based rate customers under the WSAP. Using the water supply allocation that was calculated above, the total retail level impact on the agency can be determined. In this example the agency receives a retail level cutback of 9,023 acre-feet, or 6.8% of their retail level demand.

Wholesale Municipal & Industrial Allocation + Allocation Year Local Supplies	123,977 AF
Allocation Year Retail Demand	133,000 AF
Effective Cutback	**9,023 AF (6.8%)**

(b) Income-based Rate Customer Retail Cutback: To calculate the effective income-based rate cutback, the amount of demand covered by a qualifying income-based rate is multiplied by the effective retail level cutback.

Qualifying Income-Based Rate Demand	7,690 AF
Effective Cutback Percentage	6.8%
Effective Income-Based Rate Cutback	**523 AF**

(c) Income-based Rate Cutback Penalty: Once the effective cutback has been calculated, the amount of penalty that is associated with qualifying income-based rate customers can be determined.

Between 100% and 115% of Allocation	172 AF	2 x Tier 2 = $898/AF	$154,456
Greater than 115% of Allocation	351 AF	4 x Tier 2 = $1796/AF	$630,396
Total	**523 AF**		**$784,852**

(d) Adjusted Penalty Calculation: Finally, the penalty attributable to qualifying income-based rate customers is subtracted from the total penalty that was calculated above to determine the qualifying income-based rate adjusted penalty. In the case that the monetary penalties associated with the Income-Based Rate are greater than the total penalties an agency incurs, no penalty will be incurred.

Total Penalty	$8,507,652
Qualifying Income-Based Rate Penalty	$784,852
Qualifying Income-Based Rate Adjusted Penalty	**$7,722,800**

Appendix F: Water Rates, Charges, and Definitions

Table 8: Tiered Water Pricing Rates and Charges		
Rate	**2007**	**2008**
Tier 1 Supply Rate (dollars per acre-foot)	$73	$73
Tier 2 Supply Rate (dollars per acre-foot)	$169	$171
System Access Rate (dollars per acre-foot)	$143	$143
Water Stewardship Rate (dollars per acre-foot)	$25	$25
System Power Rate (dollars per acre-foot)	$90	$110
Full Service Untreated Volumetric Cost ($/AF)		
Tier 1	$331	$351
Tier 2	$427	$449
Replenishment Water Rate: untreated (dollars per acre-foot)	$238	$258
Interim Agricultural Water Program: untreated (dollars per acre-foot)	$241	$261
Treatment Surcharge (dollars per acre-foot)	$147	$157
Full Service Treated Volumetric Cost ($/AF)		
Tier 1	$478	$508
Tier 2	$574	$606
Treated Replenishment Water Rate (treated dollars per acre-foot)	$360	$390
Treated Interim Agricultural Water Program (dollars per acre-foot)	$364	$394
Readiness-to-Serve Charge (millions of dollars)	$80	$82
Capacity Charge (dollars per cubic foot second)	$6,800	$6,800

Definitions:

(1) **Tier 1 Supply Rate -** recovers the cost of maintaining a reliable amount of supply.

(2) **Tier 2 Supply Rate** - set at Metropolitan's cost of developing additional supply to encourage efficient use of local resources.

(3) **System Access Rate** – recovers a portion of the costs associated with the delivery of supplies.

(4) **System Power Rate** – recovers Metropolitan's power costs for pumping supplies to Southern California.

(5) **Water Stewardship Rate** – recovers the cost of Metropolitan's financial commitment to conservation, water recycling, groundwater clean-up and other local resource management programs.

(6) **Replenishment Water Rate** – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

(7) **Treated Replenishment Water Rate** – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

(8) **Interim Agricultural Water Rate** – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

(9) **Treated Interim Agricultural Water Program Rate** – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

(10) **Treatment Surcharge** – recovers the costs of treating imported water.

(11) **Readiness-to-Serve Charge -** a fixed charge that recovers the cost of the portion of system capacity that is on standby to provide emergency service and operational flexibility.

(12) **Capacity Charge** – the capacity charge recovers the cost of providing peak capacity within the distribution system.

http://www.mwdh2o.com/mwdh2o/pages/finance/finance_03.html

Appendix G: Preferential Rights

Any review of Metropolitan's methods for allocating supplies during shortages must recognize Section 135 of the 1927 Metropolitan Water District Act (Act). Under Section 135, each member agency has a preferential right to a percentage of Metropolitan's available water supplies based on a legislatively established formula. That percentage is equal to the ratio of each member agency's total accumulated payments to Metropolitan's capital costs and operating expenses compared to the total of all member agencies' payments toward those costs, exempting payments for water purchases. As a result, a member agency's preferential right roughly equals it's pro rata share of all tax assessments and other payments.

In the event of a water supply shortage or drought, any Metropolitan member agency can request that its preferential right be invoked; however, Metropolitan's Board of Directors has never exercised this provision of the Act, even in response to the two statewide droughts in 1976-77 and 1987-92.

Appendix H: Allocation Appeals Process

Step 1: Appeals Submittal:

All appeals shall be submitted to the Appeals Liaison in the form of a written letter signed by the member agency General Manager. Each appeal must be submitted as a separate request, submittals with more than one appeal will not be considered. The appeal request is to include:

- A designated member agency staff person to serve as point of contact.
- The type of appeal (erroneous baseline data, loss of local supply, etc.).
- The quantity (in acre-feet) of the appeal.
- A justification for the appeal which includes supporting documentation.

A minimum of 60 days are required to coordinate the appeals process with Metropolitan's Board process.

Step 2: Notification of Response and Start of Appeals Process

The Appeals Liaison will phone the designated member agency staff contact within three business days of receiving the appeal to provide an initial receipt notification, and schedule an appeals conference. Subsequent to the phone call, the Liaison will send an e-mail to the Agency General Manager and designated staff contact documenting the conversation. An official notification letter confirming both receipt of the appeal submittal, and the date of the appeals conference, will be mailed within two business days following the phone contact

Step 3: Appeals Conference

All practical efforts will be made to hold an appeals conference between Metropolitan staff and member agency staff at Metropolitan's Union Station Headquarters within 15 business days of receiving the appeal submittal. The appeals conference will serve as a forum to review the submittal materials, and ensure that there is consensus understanding as to the spirit of the appeal. Metropolitan staff will provide an initial determination of the size of the appeal (small or large), and review the corresponding steps and timeline for completing the appeals process.

Steps 4-7 of the appeals process differ depending upon the size of the appeal

Small Appeals

Small appeals are defined as those that would change an agency's allocation by less than 10 percent, or are less than 5,000 acre-feet in quantity. Small appeals are evaluated and approved or denied by Metropolitan staff.

Step 4: Preliminary Decision

Metropolitan staff will provide a preliminary notice of decision to the member agency within ten business days of the appeals conference. The Appeals Liaison will mail a written letter to the member agency staff contact and General Manager, stating the preliminary decision and the rationale for approving or denying the appeal.

Step 5: Clarification Conference

Following the preliminary decision the Appeals Liaison will schedule a clarification conference. The member agency may choose to decline the clarification conference if they are satisfied with the preliminary decision. Declining the clarification conference serves as acceptance of the preliminary decision, and the decision becomes final.

Step 6: Final Decision

Metropolitan staff will provide a final notice of decision to the member agency within ten business days of the clarification conference. The Appeals Liaison will mail a written letter to the member agency staff contact and General Manager, stating the final decision and the rationale for the decision. A copy of the letter will also be provided to Metropolitan executive staff.

Step 6a: Board Resolution of Small Appeal Claims

Member agencies may request to forward appeals that are denied by Metropolitan staff to the Board of Directors through the Water Planning and Stewardship Committee for final resolution. The request for Board resolution shall be submitted to the Appeals Liaison in the form of a written letter signed by the member agency General Manager, this request will be administered according to Steps 6 and 7 of the large appeals process.

Step 7: Board Notification

Metropolitan staff will provide a report to the Board of Directors, through the Water Planning and Stewardship Committee, on all submitted appeals including the basis for determination of the outcome of the appeal.

Large Appeals

Large appeals are defined as those that would change an agency's allocation by more than 10 percent, and are larger than 5,000 acre-feet. Large appeals are evaluated and approved or denied by the Board of Directors.

Step 4: Preliminary Recommendation

Metropolitan staff will provide a preliminary notice of recommendation to the member agency within 10 business days of the appeals conference. The Appeals Liaison will mail a written letter to the member agency staff contact and General Manager, stating the preliminary recommendation and the rationale for the recommendation. A copy of the draft recommendation will also be provided to Metropolitan executive staff.

Step 5: Clarification Conference

Following the preliminary recommendation the Appeals Liaison will schedule a clarification conference. The member agency may choose to decline the clarification conference if the satisfied with preliminary recommendation. Declining the clarification conference signifies acceptance of the preliminary recommendation, and the recommendation becomes final.

Step 6: Final recommendation

Metropolitan staff will provide a final notice of recommendation to the member agency within 10 business days of the clarification conference. The Appeals Liaison will mail a written letter to the member agency staff contact and General Manager, stating the final recommendation and the rationale for the recommendation. A copy of the final recommendation will also be provided for Metropolitan executive review.

Step 7: Board Action

Metropolitan staff shall refer the appeal to the Board of Directors through the Water Planning and Stewardship Committee for approval.

Appendix I: Appeals Submittal Checklist

Appeal Submittal

- ☐ Written letter (E-mail or other electronic formats will not be accepted)
- ☐ Signed by the Agency General Manager
- ☐ Mailed to the appointed Metropolitan Appeals Liaison

Contact Information

- ☐ Designated staff contact
  - Name
  - Address
  - Phone Number
  - E-mail Address
- ☐ General Manager
  - Name
  - Address
  - Phone Number
  - E-mail Address

Type of Appeal

- ☐ State the type of appeal
  - Erroneous historical data used in base period calculations
    - Metropolitan Deliveries
    - Local Production
    - Growth adjustment
    - Conservation savings
  - Unforeseen loss or gain in local supply
  - Extraordinary increases in local supply

Quantity of Appeal

- ☐ State the quantity in acre-feet of the appeal

Justification and Supporting Documentation

- ☐ State the rationale for the appeal
- ☐ Provide verifiable documentation to support the stated rationale
  - Examples of verifiable documentation Include, but are not limited to:
    - Billing Statements
    - Invoices for conservation device installations
    - Basin Groundwater/Watermaster Reports
    - CA Department of Finance economic or population data
    - Department of Public Health reports

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

WATER SURPLUS AND DROUGHT MANAGEMENT PLAN

REPORT NO. 1150

AUGUST 1999

ACKNOWLEDGMENTS

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WATER SURPLUS AND DROUGHT MANAGEMENT PLAN

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

TABLE OF CONTENTS

EXECUTIVE SUMMARY

INTRODUCTION

The Water Surplus and Drought Management (WSDM) Plan for the Metropolitan Water District of Southern California (Metropolitan) is a ten-year plan that will be used to direct Metropolitan's resource operations to help attain the region's 100% reliability goal. The WSDM Plan recognizes the interdependence of surplus and shortage actions and is a coordinated plan that utilizes all available resources to maximize supply reliability. The overall objective of the WSDM Plan is to ensure that shortage allocation of Metropolitan's imported water supplies is not required.

The central effort in developing the WSDM Plan was a participatory process involving Metropolitan and its member agencies. Metropolitan staff and member agency representatives coordinated the Plan's development during a series of meetings of the Rate Refinement Team.

To lay a foundation for the WSDM Plan, participants in the Rate Refinement Process developed a set of proposed WSDM Principles and Implementation Goals which were subsequently adopted by the Metropolitan Board of Directors in September 1998. These Principles and Implementation Goals outline fundamental policies for guiding surplus and shortage management and establish a basis for dealing with shortages in an equitable and efficient manner.

WSDM PRINCIPLES AND IMPLEMENTATION GOALS

Guiding Principle

- Metropolitan will encourage storage of water during periods of surplus and work jointly with its Member Agencies to minimize the impacts of water shortages on the region's retail consumers and economy during periods of shortage.

Supporting Principles

- Maintain an ongoing coordinated effort among Metropolitan and its Member Agencies to encourage efficient water use, develop cost-effective local resource programs, and inform the public on water supply and reliability issues

- Encourage local and regional storage during periods of surplus and use of storage during periods of shortage

- Manage and operate Metropolitan's regional storage and delivery system in coordination with local facilities to capture and store surplus water in local groundwater and surface reservoirs

- Arrange for secure sources of additional water from outside the region for use during periods of shortage

- Call upon sources of additional water from outside the region and water stored locally to meet the needs of consumers and protect the economy during periods of shortage

WSDM Plan Implementation Goals

- Avoid mandatory import water allocations to the extent practicable

- Equitably allocate imported water on the basis of agencies' needs

  Considerations to create an equitable allocation of imported water may include:

  - Impact on retail consumers and economy
  - Reclamation/Recycling
  - Conservation
  - Population and economic growth
  - Investment in local resources
  - Change and/or loss of local supply
  - Participation in Metropolitan's Non-firm (interruptible) programs
  - Investment in Metropolitan's facilities

- Encourage storage of surplus supplies to mitigate shortages and improve water quality

SURPLUS AND SHORTAGE ACTIONS

The region's ability to implement a long-term WSDM Plan results from the significant investments Metropolitan and its member agencies have made in a variety of resources since 1991. These additional resources include increased local conservation and water recycling, improvements in the reliability of imported supplies, increased regional storage, and increased conjunctive use groundwater programs. Together these improvements allow a comprehensive approach to water management.

The growing variety of resources available to the region is transforming Metropolitan from an agency with relatively modest storage capacity to one that will have storage sufficient to manage many shortages without impacts to its member agencies or retail customers. To attain this level of reliability, all storage programs and facilities, along with conservation, recycling, and other programs, must be managed as an integrated set of regional resources. To accomplish this, the WSDM Plan establishes the linkage between surplus and shortage resource management actions.

When imported supplies exceed projected demands for imported water within Metropolitan's service area, Metropolitan can operate available storage facilities to maximize the benefits of stored water to its member agencies. A number of factors affect Metropolitan's ability to divert surplus water into storage. Some of these factors include facility outages, system capacity, water quality (including requirements for managing total dissolved solids), and varying supply and demand patterns. The WSDM Plan provides a description of storage options available to Metropolitan and a framework for storing water in these programs and facilities when surplus supplies are available.

Except in severe or extreme shortages (defined in the Introduction) or emergencies, Metropolitan's resource management will allow shortages to be mitigated without impacting retail Municipal and Industrial (M&I) customers. A list of resource management actions and their descriptions are provided below. This list emphasizes critical storage programs and facilities, and conservation programs that make up part of Metropolitan's response to shortages. The order in which these actions are presented does not imply the exact operational management of resources that would occur during a shortage, rather it represents a general framework and guide. In fact, several actions are likely to be taken concurrently. Many factors will dictate the exact order in which these actions will be taken during shortages. One action, however, will have an assigned prioritization: the curtailment of Full Service (firm) deliveries will be last. The following summarizes the drought actions:

- Draw on storage in the Eastside Reservoir Project
- Draw on out-of-region storage in Semitropic and Arvin-Edison
- Reduce/suspend long-term seasonal and groundwater replenishment deliveries
- Draw on contractual groundwater storage programs in the region
- Draw on State Water Project (SWP) terminal reservoir storage (per Monterey Agreement)
- Call for extraordinary drought conservation and public education
- Reduce Interim Agricultural Water Program (IAWP) deliveries
- Call on water transfer options contracts
- Purchase transfers on the spot market
- Implement the allocation of Metropolitan's imported supplies to its member agencies

For the ten-year period addressed by the WSDM Plan, 1999-2008, the majority of shortage contingencies will be managed by withdrawals from storage, groundwater management and options transfers. Shortages managed using these actions would not impact the quantity of water delivered to member agencies for consumptive uses. In fact, when coupled with other drought actions such as extraordinary conservation and reduction of agricultural deliveries, it is fully expected that an allocation of firm imported water supplies will not be necessary during the next ten years. Under this worse-case scenario, an approach to allocate Metropolitan's firm imported water supplies in a fair and equitable manner will be developed.

The overall policy objective of the allocation method will be to minimize the impacts to any one agency and the region as a whole. To meet that objective, the method of allocating firm imported supply will account for:

- Each agency's demands on Metropolitan,
- Each agency's local resources
- Each agency's total retail demands.

The WSDM Plan allocation method would address each of these supply and demand components and account for each agency's conservation and recycled water programs. A pricing structure will be coupled with the WSDM allocation method to accomplish two goals:

- Encourage conservation and water recycling
- Ensure that the regional impact of the shortage is as small as possible

To provide as much water as possible without changing wholesale prices, the allocation of all available supplies will be made at the prevailing rates for firm deliveries. In order to encourage conservation to the level of allocation, the rate for agency usage from 100-102% of its allocation will be the Full Service rate plus $175. Usage above 102% of allocated supply will be charged at three times the Full Service rate. Any substantial change in Metropolitan's water rate structure may require these rates to be revised.

During severe or extreme shortage conditions, public outreach will play a critical role in shaping consumer response. Public information campaigns will send clear signals if extraordinary drought conservation is required. An effective public information campaign requires a joint effort among Metropolitan and its member agencies. Under this Plan, the administration of the Public Information and Government Affairs program will be the responsibility of a Drought Program Officer (DPO). The DPO will be responsible for integrating the various activities in these areas, coordinating efforts with Metropolitan's Board of Directors and member agencies, and designing the region-wide messages for the general public and various target audiences. Important constituencies are residential users, industrial and institutional users, business interests, agricultural users, elected officials, officials of various agencies such as the Department of Water Resources, and the media.

INTEGRATED RESOURCES MANAGEMENT

Throughout the Integrated Resources Planning process and the development of the WSDM Plan, extensive analysis of resource management strategies focused on maximizing supply reliability while minimizing overall resource costs. Various management strategies were analyzed trader shortage scenarios based on historical hydrologic data. The WSDM Plan presents a resource management framework to guide Metropolitan's integrated approach to supply management.

The resource management framework does not dictate a scripted response to shortage or surplus. The framework recognizes the complexity and variety of conditions that require action. Supporting this framework are general rules that describe the actions to be taken in each stage of surplus or shortage. These rules depend on shortage stage, account for monthly delivery requirements, and depend on when various supplies would be available.

One of the fundamental trade-offs in dealing with supply shortages is the need to maintain flexibility while providing supply certainty to member agencies and consumers. A central focus of the WSDM Plan is the analysis of information about supplies and demands. When do various pieces of information about the supply/demand balance become more certain? When should this information impact policy-making and trigger various resource actions? The WSDM Plan addresses these questions and the actual implementation of the Plan during a shortage.

Appendix A of this report provides a ten-year simulation of projected demands and supplies showing an example of how the region can maintain 100% reliability.

INTRODUCTION

The Metropolitan Water District of Southern California (Metropolitan) provides water to a service area covering approximately 5,200 square miles. Over 16.5 million people live within the service area, which supports a $500 billion economy. Metropolitan provides supplemental supplies to twenty-seven member agencies, both retail and wholesale agencies, who in turn provide water to over three hundred cities and local agencies providing supplies at the retail level. In recent years Metropolitan supplemental deliveries have accounted for about one-half to two-thirds of the region's total water demands. With supplies from its Colorado River Aqueduct (CRA) and the State Water Project (SWP), Metropolitan delivers water for municipal and industrial (M&I) uses, agricultural uses, and augmentation of local storage.

As part of the implementation of the regional Integrated Resources Plan (IRP), Metropolitan and its member agencies have developed the Water Surplus and Drought Management (WSDM) Plan for Southern California. This ten-year plan will direct Metropolitan's resource operations to help attain the region's 100% reliability goal. Over this ten-year period, the WSDM Plan will be updated to account for changes impacting supplies from the Colorado River and California's Bay-Delta. In the past, Metropolitan has developed drought management plans that simply addressed shortage actions and primarily focused on issues of short-term conservation and allocation of imported water. The WSDM Plan recognizes the interdependence of surplus and shortage actions and is a coordinated plan that utilizes all available resources to maximize supply reliability. The overall goal of the WSDM Plan is to ensure that shortage allocation of Metropolitan's imported water supplies is no---At required.

Because it addresses both surplus and shortage contingencies, the WSDM Plans draws clear distinctions among the terms *surplus, shortage, severe shortage,* and *extreme shortage.*

Surplus*: Supplies are sufficient to allow Metropolitan to meet Full Service demands, make deliveries to all interruptible programs (replenishment, long-term seasonal storage, and agricultural deliveries), and deliver water to regional and local facilities for storage.*

Shortage*: Supplies are sufficient to allow Metropolitan to meet Full Service demands and make partial or full deliveries to interruptible programs, sometimes using stored water and voluntary water transfers.*

Severe Shortage*: Supplies are insufficient and Metropolitan is required to make withdrawals from storage, call on its water transfers, and possibly call for extraordinary drought conservation and reduce deliveries under the IAWP.*

Extreme Shortage*: Supplies are insufficient and Metropolitan is required to allocate available imported supplies.*

WSDM PRINCIPLES AND IMPLEMENTATION GOALS

The central effort in developing the WSDM Plan was a participatory process involving Metropolitan and its member agencies. Metropolitan staff and member agency representatives coordinated the Plan's development during a series of meetings of the Rate Refinement Team and the Integrated Resources Planning Workgroup. To lay a foundation for the WSDM Plan, participants in the Rate Refinement Process developed a set of "WSDM Principles and Implementation Goals."

Guiding Principle

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- Manage and operate Metropolitan's regional storage and delivery system in coordination with local facilities to capture and store surplus water in local groundwater and surface reservoirs
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  Considerations to create an equitable allocation of imported water may include:
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  - Reclamation/Recycling
  - Conservation
  - Population and economic growth
  - Investment in local resources
  - Change and/or loss of local supply
  - Participation in Metropolitan's Non-firm (interruptible) programs
  - Investment in Metropolitan's facilities.

- Encourage storage of surplus supplies to mitigate shortages and improve water quality

REGIONAL RESOURCES AND DEMANDS

Southern California receives its water supplies from a variety of different sources, both local to the region and imported from outside the region. These sources are summarized below.

Local Supplies

Local supplies include groundwater pumping of local aquifers, surface reservoir production, recycled water, and supplies imported through wheeling arrangements or through the Los Angeles Aqueduct, which is owned and operated by the City of Los Angeles. Local supplies have, in the past, provided as much as 2.1 million acre-feet (maf) of water to meet the region's water demands. By far the largest component of local supplies is groundwater pumping, providing over 75% of historical local supplies.

Colorado River Supplies

The distribution and management of Colorado River water is governed by a complex body of laws, court decrees, compacts, agreements, regulations, and an international treaty collectively known as the "Law of the River." Metropolitan's entitlement is established by the fourth and fifth priorities of California's Seven Party Agreement, included in Metropolitan's 1931 and 1946 contracts with the Secretary of the Interior. These priorities provide 550,000 acre-feet (af) per year and 662,000 af per year, respectively. In addition, Metropolitan holds a surplus water contract for delivery of 180,000 af. The physical capacity of the CRA is slightly in excess of 1.3 maf per year, based on a pumping capacity of 1,800 cubic feet per second (cfs). Metropolitan's long-held objective is to maximize the availability of Colorado River water, up to the maximum capacity of the CRA, subject to environmental, contractual, legal, political, financial, and institutional constraints. A California 4.4 Plan is being developed among California parties that will help ensure that full CRA deliveries are maintained, while addressing the concerns of the other Colorado River basin states that rely on the river. The California 4.4 Plan includes core transfers (such as the IID/MWD conservation agreement and the proposed IID/SDCWA transfer), system conservation (such as the lining of the All American Canal), offstream storage (such as the Arizona groundwater storage program), dry year option transfers (such as PVID land fallowing), and river re-operations.

State Water Project

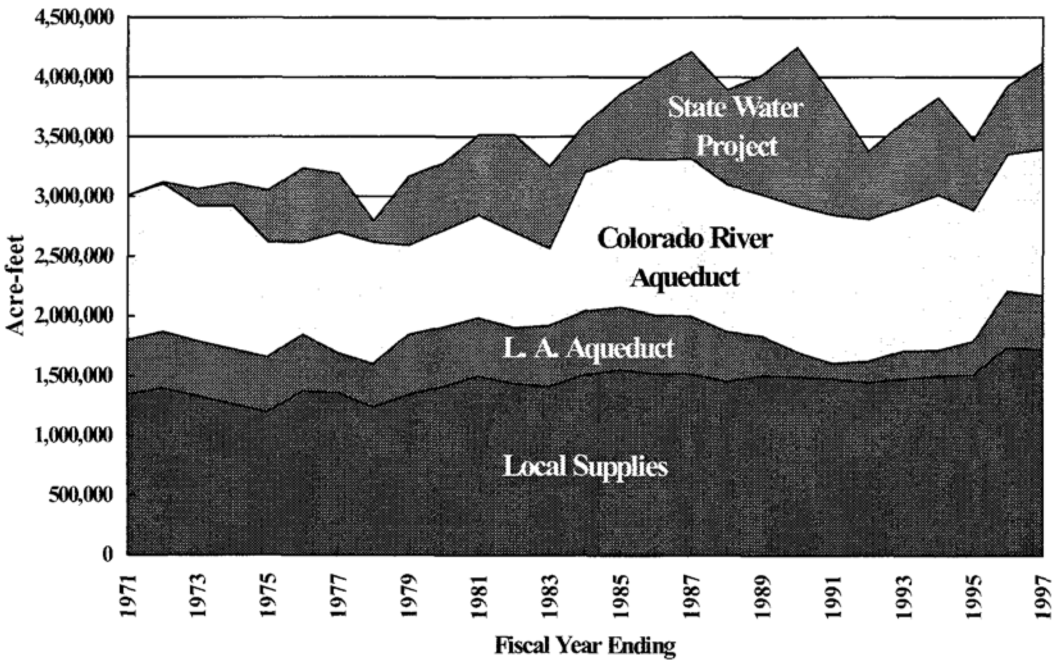
Metropolitan is one of 29 water agencies that have contracted with the State of California, through the Department of Water Resources (DWR), for water deliveries from the SWP system. Metropolitan's contracted entitlement is for 2.01 maf per year, or about 48 percent of the total contracted entitlement of 4.2 maf per year. SWP deliveries to Metropolitan are made via the SWP's California Aqueduct.

Initial SWP facilities, completed in the early 1970's, have produced average supply yields adequate to meet just over half of the total contracted entitlement. While it was intended that additional SWP facilities would be constructed as SWP contractor demands increased up to their contracted entitlements, few facilities have been constructed since that time.

The SWP obtains its supplies primarily from the Sacramento River Basin. About half of the total supply diverted from the Delta for the SWP is regulated flow from the Feather River (a tributary to the Sacramento River), while the other half is unregulated flow from runoff downstream of Sacramento River reservoirs and from other rivers that flow into the Delta. The Sacramento River watershed is subject to wide annual variations in total runoff. The Sacramento River Index (SRI), which measures runoff in the watershed, has averaged about 18 maf per year over the last 90 years. However, runoff varies widely from year to year. For example, the SRI measured 7.8 mafin 1994 and 32.5 mafin 1995.

Figure 1 shows the historical total regional supply production by type. As shown in Figure 1, water supplies were as high as 4.25 mafin 1990 and within two years dropped to 3.4 mar, a 20% decrease.

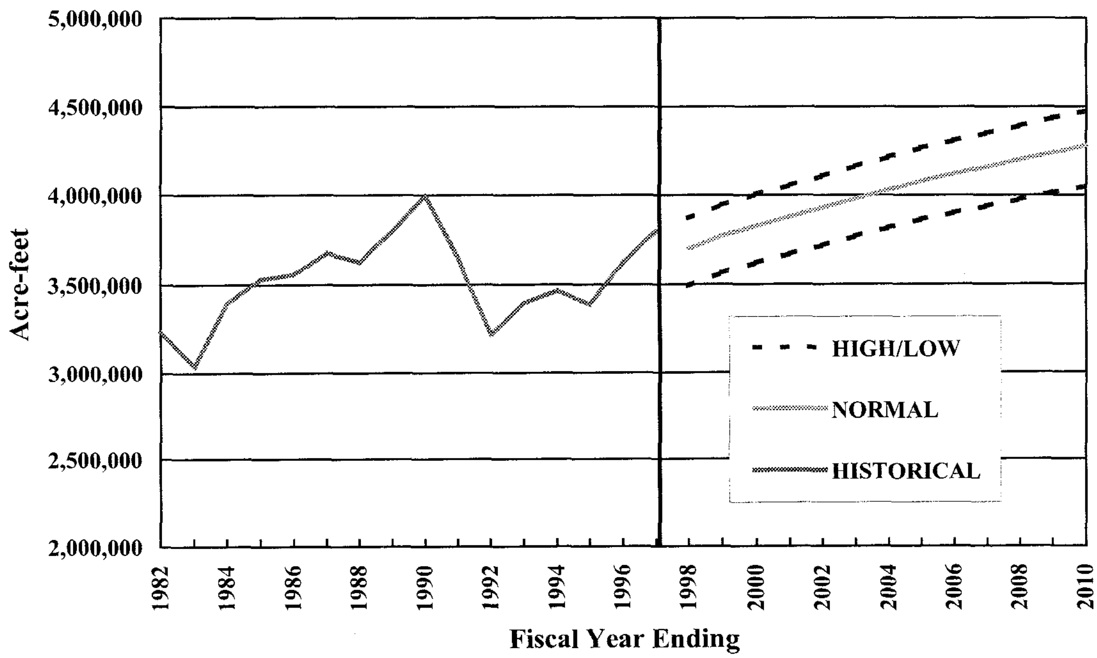
Figure 1. Historical Supply Production by Type of Supply



RETAIL DEMANDS

From 1982 through 1995, the region experienced retail water demands averaging 3.5 mar. In dry years retail demands are approximately 5 to 7% greater than normal years, while demands in wet years are about 6 to 8% below normal demands. Under normal weather conditions, assuming full implementation of conservation best management practices, total regional retail demands are projected to increase from about 3.7 mar in 1997 to almost 4.3 mar in 2010. Without conservation, demands in 2010 would be about 10 to 12% greater than projected. Increases in retail demand are driven by demographics and economics, including changes in population, housing, employment, and income. Figure 2 shows the historical and projected retail demands in Metropolitan's service area.

Figure 2. Regional Retail Water Demands



The historical variability in demands from 1982 to 1997 is mainly due to weather and the economy. In 1983, extreme wet weather caused a significant drop in retail demands. During the period from 1985 to 1990, hot and dry weather coupled with a strong economy resulted in increased demand from 3.5 maf to 4.0 maf, a 14% increase. In 1991, the 5th year of a prolonged drought, conditions forced many communities to implement mandatory supply reductions. These mandatory reductions coupled with extraordinary drought conservation caused a 10 to 15% decrease in retail demands for the region. In addition, the period between 1992 and 1995 was very wet (with the exception of 1994, which was dry), and was a period of severe economic recession. Southern California alone lost some 700,000 jobs from 1990 through 1995. The combination of wet weather, economic recession, and conservation resulted in demands decreasing by over 17%.

DEMANDS ON METROPOLITAN

For many member agencies, Metropolitan's water deliveries represent a supplemental supply. Most member agencies have local water supplies, but agencies differ in how much their supplies alone can meet their respective retail demands. Local supplies are often base-loaded (maximized subject to various constraints) and purchases from Metropolitan are used to meet remaining demands. In addition, to meeting consumptive demands, Metropolitan's deliveries are used to replenish local groundwater and surface reservoirs. To project demands on Metropolitan, projections of member agency's retail water demands and local water supplies are made. Local supplies are then subtracted from retail demands to get consumptive demands on Metropolitan. A projection of Metropolitan's long-term seasonal and replenishment deliveries are made based on safe groundwater yield and weather/hydrology.

Metropolitan forecasts its demands for three different broad categories: Full Service, Seasonal (reservoir storage and groundwater replenishment delivered for shift or long-term storage purposes and sold at a discount), and Agricultural (deliveries of water sold at a discount for agricultural use). Overall, demands on Metropolitan can vary -+ 11 to 18% from normal conditions due to weather and hydrology.

The following four figures show historical and projected demands on Metropolitan by category. Figure 3 shows Basic Water Deliveries, Figure 4 shows Seasonal Water Deliveries, Figure 5 shows Interim Agricultural Water Program (IAWP) Deliveries, and Figure 6 shows Total Water Deliveries for Metropolitan.

Figure 3. MWD Basic Water Deliveries

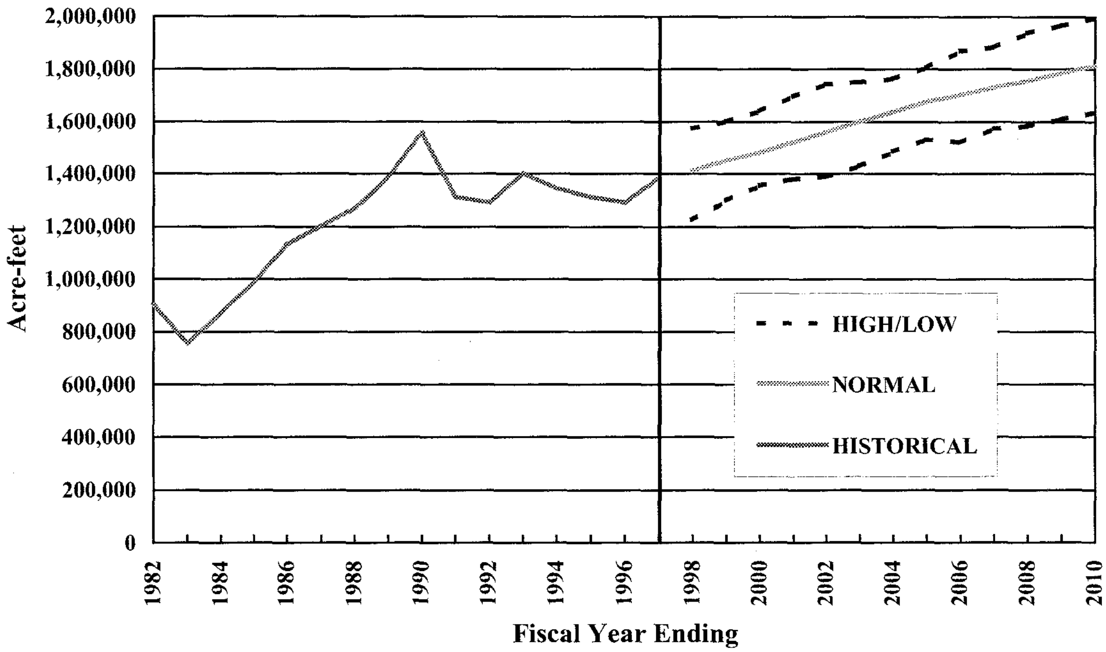


Figure 4. MWD Seasonal Water Deliveries

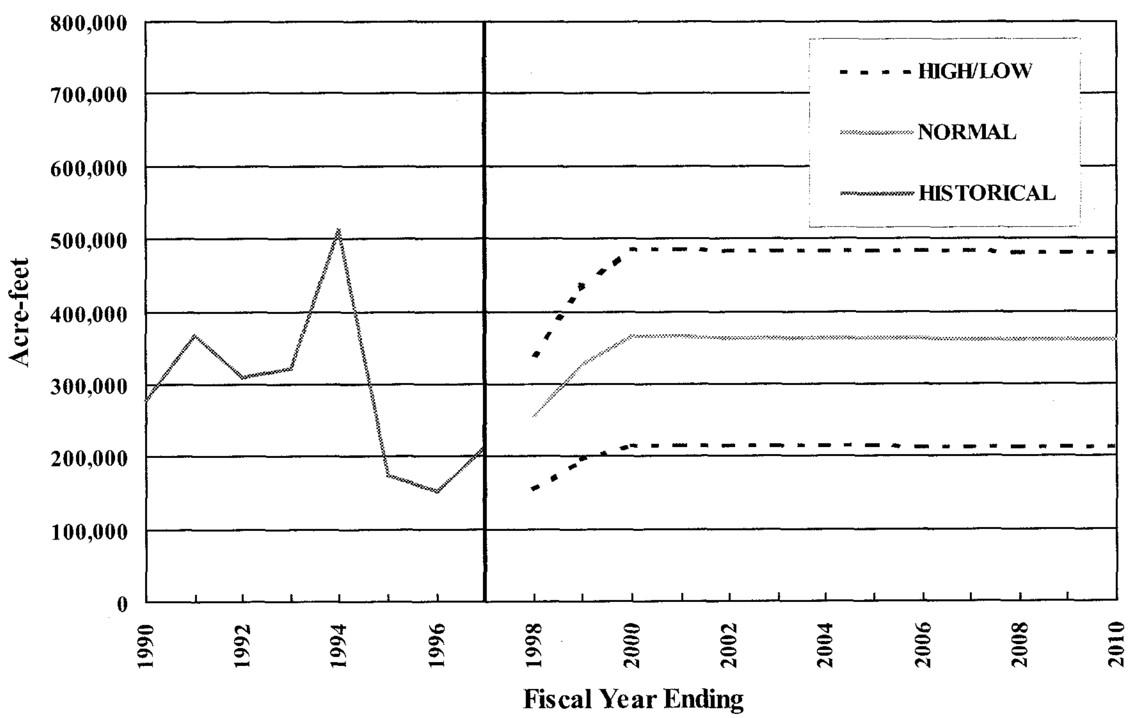


Figure 5. MWD Interim Agricultural Water Program (IAWP) Deliveries

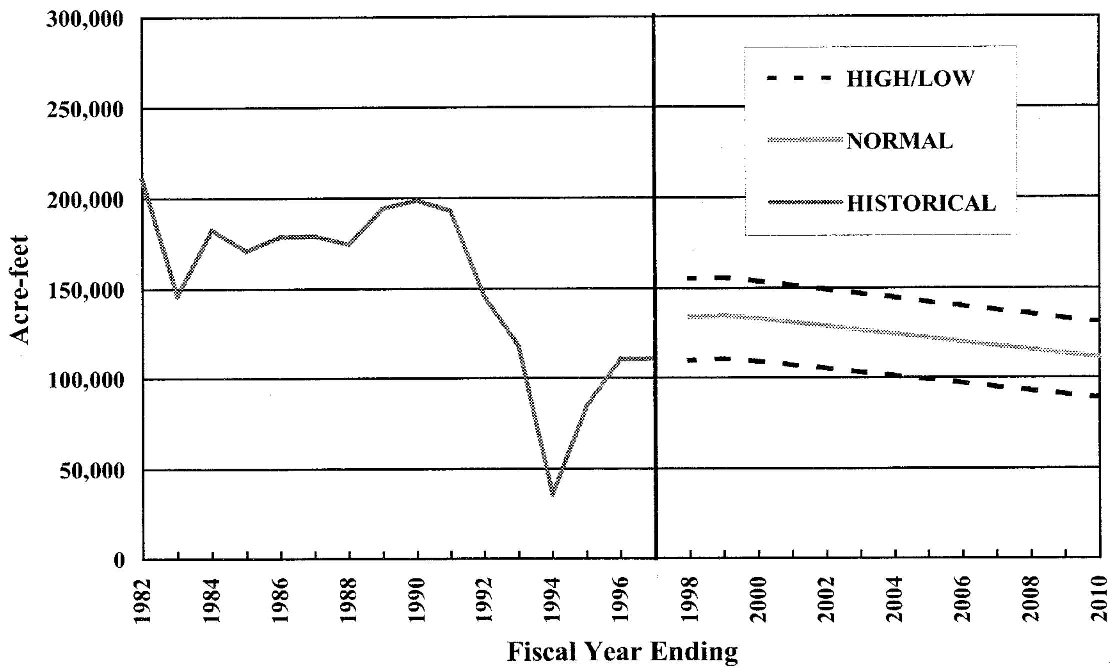
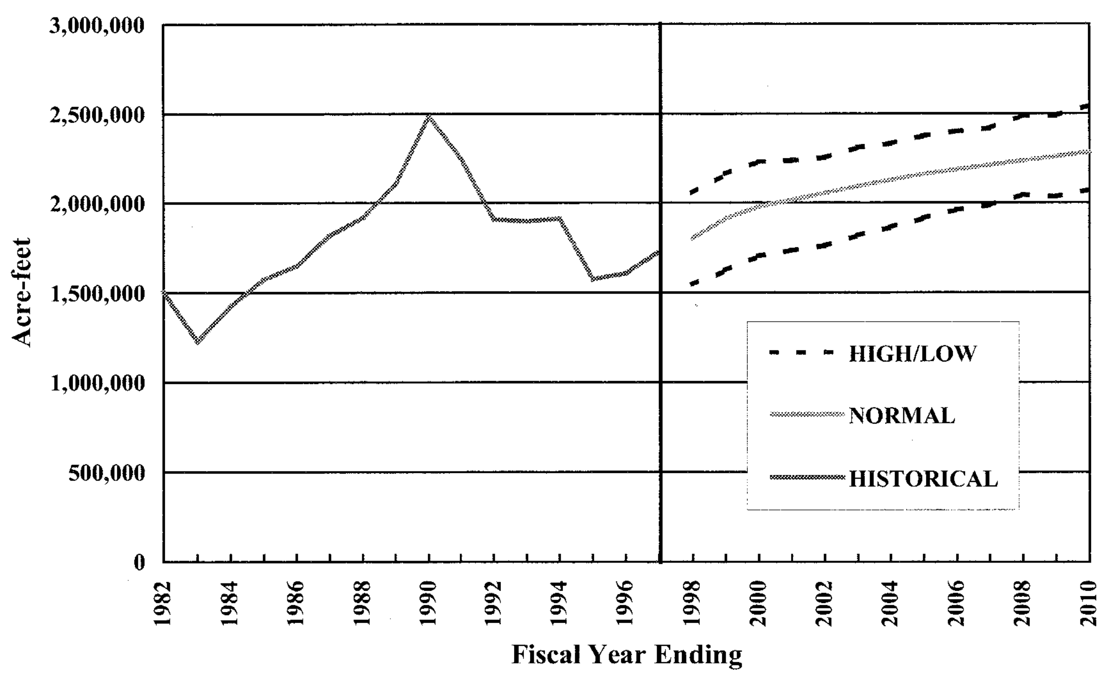


Figure 6. MWD Total Water Deliveries



INTEGRATED RESOURCES PLANNING

To ensure supply reliability under various drought conditions, Metropolitan and its member agencies developed an Integrated Resources Plan (IRP). The IRP, adopted by Metropolitan's Board of Directors in January 1996 and periodically updated, guides Metropolitan's resource and capital improvements investments. The region's ability to develop a long-term WSDM Plan results from the significant investments Metropolitan and its member agencies have made in resources since 1991. To date, these investments include:

- Local supplies: Metropolitan co-funded over 23 local projects and 200 conservation programs that will yield a total of 160,000 af per year.

- **Colorado River Aqueduct:** Metropolitan developed transfers and storage programs to help ensure a full aqueduct. The landmark Metropolitan/Imperial Irrigation District Conservation Program (IID), will result in a savings of 107,000 af per year. Storage programs in Arizona and California, combined with the IID savings, yield a total of 280,000 af of annual core, dry year options, and storage supply.

- **State Water Project:** Metropolitan and other parties negotiated the Bay-Delta Accord and the Monterey Amendment. The Bay-Delta Accord and subsequent efforts will increase the reliability of Metropolitan's entitlement deliveries. The Monterey Amendment provides access to 220,000 af of SWP storage.

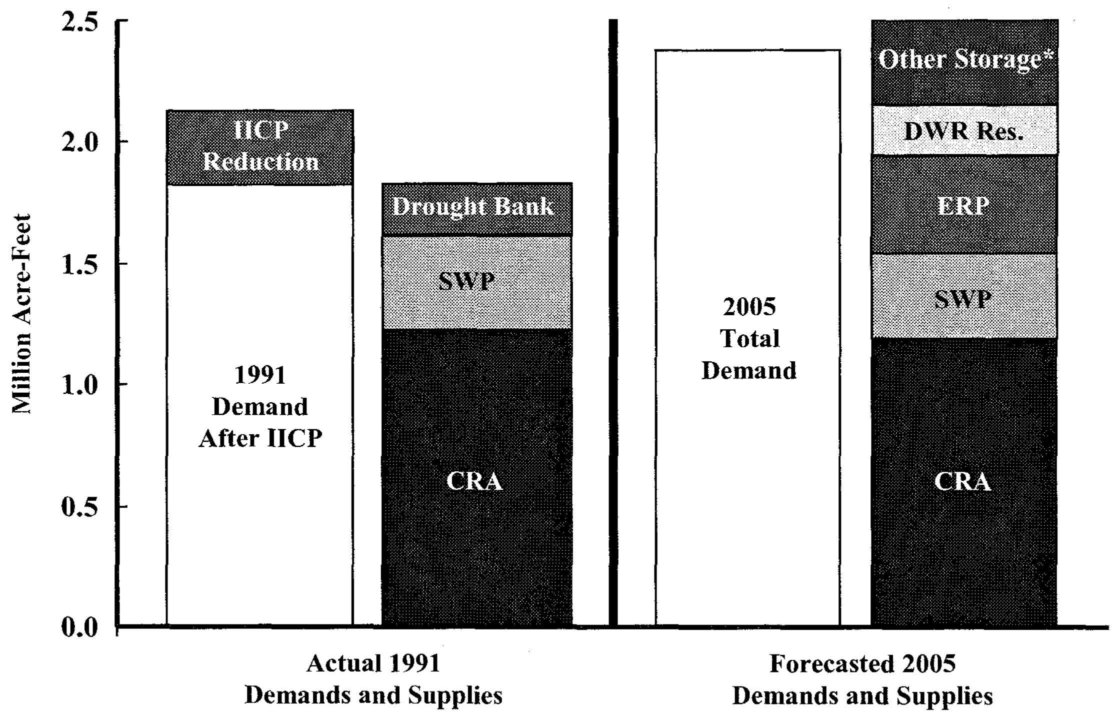
- **In-Basin Storage:** Metropolitan is constructing the Eastside Reservoir Project, with 800,000 af of storage (400,000 af of which is emergency storage for use in case of facility failure as a result of earthquake or other event).

- **Groundwater Conjunctive Use Storage:** Metropolitan developed a conjunctive use storage program in the North Las Posas Basin in Ventura County with an anticipated capacity of 210,000 af and a dry-year withdrawal rate of up to 70,000 af.

- **Transfers and Storage:** Metropolitan developed the Semitropic Storage Program, with 350,000 af of storage and dry-year withdrawals averaging about 60,000 af. Metropolitan also approved the Arvin-Edison Storage and Transfer Program, with 250,000 af of storage and dry-year withdrawals averaging about 70,000 af. Metropolitan is also exploring storage and transfer programs with the Coachella Valley Water District and the Cadiz Land Company.

As a result of these investments, it is anticipated that Metropolitan and its member agencies will be 100% reliable over the next 10 years even under a repeat of the 1991 drought condition. Figure 7 compares actual Metropolitan demands and supplies during 1991 (the last year in a multiyear severe drought) and projected demands and supplies in year 2005 (assuming a repeat of 1991 conditions). In 1991, the region faced shortages that required Metropolitan to allocate water under the Incremental Interruption and Conservation Plan (IICP). The reduction in deliveries came after demands had already been reduced as a result of local conservation. In addition, water had to be purchased from the Governor's drought emergency water bank. By the year 2005 with the investments made to date, Metropolitan's additional water supplies will be more than adequate to meet demands under a repeat of the 1991 drought event--even with increased demands due to growth.

Figure 7. Historical and Projected Metropolitan Supplies and Demands Under Drought Conditions



* Groundwater management, Semitropic Storage Program, and Arvin-Edison Storage Program

SURPLUS AND SHORTAGE RESOURCE ACTIONS

Metropolitan's investments in water resources, facilities, and programs has transformed it from an agency with relatively modest storage capacity to one that will have storage sufficient to manage many shortages without negative impacts to its member agencies or retail customers. To attain this level of reliability, storage programs and facilities, along with conservation, recycling, and other programs, must be managed as an integrated set of regional resources. To accomplish this, the WSDM Plan recognizes the linkage between surplus and shortage resource management actions.

SURPLUS ACTIONS

The combination of Metropolitan's regional storage facilities, such as Lake Mathews, Lake Skinner, the future Eastside Reservoir Project, and the storage capacity available to Metropolitan in Castaic Lake and Lake Perris as a result of the Monterey Amendment, allows Metropolitan great flexibility in managing its water resources. The development of storage programs both outside and within the service area provides even greater flexibility in storing surplus water. Each of the storage facilities and programs plays an important role in achieving Metropolitan's reliability goal.

When imported supplies exceed projected demands for imported water within Metropolitan's service area, Metropolitan can operate storage facilities to maximize stored water to benefit its member agencies. A number of factors affect Metropolitan's ability to divert surplus water into storage. Some of these factors include facility outages, system capacity, water quality (including requirements for managing total dissolved solids), and varying supply and demand patterns. This section provides a description of storage options available to Metropolitan and a framework for storing water in these programs and facilities when surplus supplies are available.

Storage of Colorado River Supplies

Metropolitan has participated in a number of programs to maximize the reliability of supplies from the Colorado River. The landmark Metropolitan/Imperial Irrigation District Conservation Program will result in a savings of 107,000 af per year. These supplies will increase the reliability of Metropolitan's entitlement of Colorado River water. Other programs yield shortage benefits by increasing amounts of water stored for use during shortages. Between August 1992 and July 1994, Metropolitan and the Palo Verde Irrigation District conducted a Test Land Fallowing Program. Approximately 20,000 acres of farmland in the Palo Verde Valley were not irrigated, saving 186,000 af of water which was stored in Lake Mead for later use by Metropolitan. With Arizona and Nevada water agencies, Metropolitan is participating in a Central Arizona Groundwater Storage Demonstration Program that has encouraged the storage of water. To date, 139,000 af of supplies have been stored in groundwater basins in Central Arizona. The Desert Coachella program is an exchange and storage program with agencies situated along the Colorado River Aqueduct. Metropolitan releases Colorado River water for storage in the Coachella Groundwater Basin. Metropolitan then exchanges these supplies for the participating agencies' SWP supplies. These programs serve as models for future programs that could increase the reliability of Colorado River supplies. Metropolitan continues to explore other possible options that would increase the reliability of supplies. The California 4.4 Plan is being developed among California parties to increase storage programs for Colorado River supplies. In addition to core transfers and conservation programs, the California 4.4 Plan includes offstream storage (such as the Arizona groundwater storage program), dry year option transfers (such as PVID land fallowing), and river re-operations. These programs, in conjunction with favorable supply determinations by the Secretary of Interior, will ensure the highest possible reliability of Colorado River supplies.

In addition to the programs mentioned above, the Colorado River system itself contributes to the high reliability of Metropolitan's Colorado River supplies. Currently, the average Colorado River runoff exceeds basin-wide demands by over 1.0 maf per year. The Colorado River system also contains a great deal of reservoir storage capacity. The total storage capacity in the Colorado River Basin is approximately 60 maf, almost four times the Colorado River's average annual flow. For much of 1997, system storage levels were at 80% or more of total capacity. These factors allow the Bureau of Reclamation, operators of the Colorado River system, to store significant supplies for use during shortages.

Storage of State Water Project Supplies

Total storage capacity is a critical factor in comparing the operations of the Colorado River system with the SWP. On average, both systems have similar amounts of water available on an annual basis. The SWP's watersheds in the Sacramento River Basin have produced about 18 maf per year over the long term, as represented by the Sacramento River Index (SRI.) Long-term runoff on the Colorado River has averaged more than 16 maf annually since 1906. However, the ability to carry over unused water from a wet year for use in a dry year differs substantially between the two systems. State Water Project storage facilities have storage capacity of about 4.5 maf, while system storage in the Colorado River Basin totals nearly 60 maf. This gives the operators of the Colorado River reservoirs much more flexibility in storing unused water from a wet year for use in a subsequent dry year.

When water from the SWP cannot be put to immediate use in Metropolitan's service area, the water may be stored for future use. Provided storage capacity is available, the water may remain in either Oroville Reservoir (as SWP storage for delivery to all contractors the following year) or San Luis Reservoir (as carryover storage assigned to Metropolitan). Through the carryover storage program, as amended by the Monterey Amendment, Metropolitan can place a maximum of 200,000 af per year of allocated supplies in SWP surface reservoirs. The program also allows for carryover storage in non-project facilities, including surface reservoirs and groundwater basins. In the case of carryover storage in San Luis Reservoir, SWP supplies allocated to but unused by a contractor may, under certain conditions, be assigned as carryover if storage capacity is available at the end of the calendar year. However, carryover water stored for a contractor has lower priority than storage of SWP water and consequently "spills" first as San Luis Reservoir fills.

Also, in a wet year such as 1995, low demands may allow DWR to operate San Luis Reservoir nearly full, eliminating any possibility of contractor carryover storage into the following year. As a result, carryover storage on the SWP may not be possible, and even when possible, is subject to spilling.

Due to these carryover storage limitations, Metropolitan has invested a great deal to expand its ability to store surplus SWP supplies. Metropolitan has entered into a number of water transfer and storage agreements. The Semitropic Water Banking and Exchange program allows Metropolitan to store up to 350,000 afin the groundwater basin underlying the Semitropic Water Storage District. The storage and withdrawal capacities of the program are shared with other participants in the storage program, with Metropolitan's share equaling 35%. Dry-year withdrawals will average about 60,000 af.

Metropolitan and the Arvin-Edison Water Storage District have developed a program that allows Metropolitan to store water in the groundwater basin in the Arvin-Edison service area. The program would allow the storage and withdrawal of 250,000 af of supplies over the next 25430 years. Dry-year withdrawals will average about 70,000 af.

Storage in Regional Facilities

In addition to the storage of Colorado River and SWP supplies outside the region, Metropolitan has established a number of programs for storing supplies within the region. Metropolitan owns and operates two main surface reservoirs, Lake Mathews and Lake Skinner, which have a combined storage of about 226,000 af. Only a small portion of this capacity is available for shortages, with the balance being used to regulate flows in Metr0Politan's delivery system. The Eastside Reservoir Project, currently under construction, will have a total capacity of 800,000 af, with approximately 400,000 af of operational drought and seasonal storage and 400,000 af of emergency storage. Through the Monterey Amendment, Metropolitan obtained the fight to use up to 220,000 af of water stored in the SWP terminal reservoirs. However, withdrawals from these terminal reservoirs must be replaced within five years.

Metropolitan and its member agencies have established the cyclic storage program to increase storage in groundwater basins within the service area. Regional groundwater basins offer an economical way for Metropolitan to improve supply reliability by storing water within the service area. This makes water readily accessible in times of need, either in emergency situations or during shortages. Some limitations are imposed by the fact that such water can generally only be used through pumping from the groundwater basin by an overlying member agency or local agency. Storage in groundwater basins takes place either by direct replenishment (spreading or injection), or through in-lieu means. Spreading (or injection) is desirable because direct measurement of the amount of stored water is a relatively simple, verifiable transaction. The main disadvantage to direct spreading is that spreading can occur only under certain conditions. For example, spreading cannot occur when spreading facilities are being used to capture local storm runoff for flood control purposes, or when the amount of local runoff precludes the need for imported water to replenish the basins. Also, spreading basins require frequent maintenance to assure maximum efficiency. These and other conditions can limit the ability to deliver water for spreading at a time when surplus supplies are available.

In-lieu replenishment allows most member agencies to participate in groundwater replenishment without needing direct access to replenishment facilities. Their wells, in effect, become their replenishment facilities. Both direct and in-lieu replenishment from 1986 through 1990 served the region well during the critical drought years from 1991 through 1993.

The overall objective of the various storage programs is to maximize the availability of imported water during times of need by storing surplus water in a strategic manner and utilizing the storage available within the region. Many factors affect the availability of storage capacity and Metropolitan's ability to move water to and from various facilities. After reviewing the full range of shortage actions available to Metropolitan, a framework for prioritizing the full range of surplus and shortage actions will be presented.

In addition to pricing incentives used to encourage local agencies to store water in groundwater basins, Metropolitan has developed a conjunctive use contractual storage program with the Calleguas MWD in the North Las Posas Basin. Metropolitan will fund the construction of wells which will be called upon to meet demands during dry years. This program will yield a dry year supply of about 70,000 af.

SHORTAGE ACTIONS

Except in severe or extreme shortages or emergencies, Metropolitan's management of available resources will allow shortages to be mitigated without negatively impacting retail M&I demands. Below is a list of drought actions that will be taken during periods of shortage. The goal of these actions is to avoid, to the extent practicable, the allocation of Metropolitan's firm supplies. The order in which these actions are presented does not imply the exact operational management of resources that would occur. In fact, several actions are likely to be taken concurrently. Many factors dictate the particular order in which actions will be taken during an actual shortage, although it is clear that the last action will be the curtailment of firm deliveries to the member agencies.

- Draw on storage in the Eastside Reservoir Project
- Draw on out-of-region storage in Semitropic and Arvin-Edison
- Reduce/suspend long-term seasonal and groundwater replenishment deliveries
- Draw on contractual groundwater storage programs in the region
- Draw on SWP terminal reservoir storage (per Monterey Agreement)
- Call for extraordinary drought conservation and public education
- Reduce IAWP deliveries
- Call on water transfer options contracts
- Purchase transfers on the spot market
- Implement an allocation of Metropolitan's imported supplies to its member agencies

Even with dedicated programs to meet the reliability goal for the region, proper management and operations of these resources is critical to ensure reliability. The prioritization of both surplus and shortage actions need to account for several important criteria. It is also important to recognize that these criteria will need to be balanced. The criteria include:

Location: Out-of-region storage is more vulnerable than in-basin-storage due to the risks of seismic events. To only maximize out-of-region storage will put reliability at risk.

Take capacity: Surface reservoirs generally have the ability to be filled and drawn down very quickly. Certain groundwater storage programs have limited take capacities--requiring several years at full take capacity to withdraw **all** available storage. Stored water will be balanced so that dry year supplies are maximized.

Cost: Programs vary with respect to their marginal operating costs. Program actions will be taken to maximize supply reliability while minimizing cost.

Flexibility: Not all storage programs and transfers offer the same flexibility to Metropolitan. Some programs can only meet specific overlying demands, while others can meet demands anywhere in the system.

DESCRIPTIONS OF RESOURCE ACTIONS

Draw on storage in the Eastside Reservoir Project: Withdrawals from the Eastside Reservoir Project would provide a flexible supply for meeting a shortage. Eastside Reservoir Project supplies can be drawn upon quickly. The amount of water drawn from the Eastside Reservoir Project before exercising other shortage actions will depend on the severity of the shortage and the overall condition of other resources available to Metropolitan.

Draw on out-of-region storage in Semitropic and Arvin-Edison programs: Out-of-region programs such as Semitropic and Arvin-Edison provide cost-effective shortage supplies. These supplies also provide flexibility, as they can be distributed as effectively as any SWP supplies coming into Metropolitan's service area. Exercising these programs relatively early in the order of actions reduces the risk of leaving supplies out-of-region. Based upon the ratio of storage capacity to take capacity, these programs will generally provide supplies over several years. This provides the rationale for calling on these programs relatively early in a shortage.

Reduce Long-Term Seasonal and Replenishment Deliveries, and call on cyclic storage accounts: Certain interruptible supply programs provide benefits during shortage. Reducing deliveries to interruptible programs established for storage purposes, while continuing expected levels of groundwater production, allows limited supplies to go toward meeting direct consumptive uses. In addition, calling on cyclic storage accounts can extend the replenishment needs for several years. Most replenishment supplies would be expected to be interruptible for a minimum of two years before agencies would be allowed to claim a local supply adjustment on such supplies. Some programs have longer interruption requirements. For example, most Groundwater Recovery Programs are governed by contracts that require supply production through a three-year interruption in service.

Draw on contractual groundwater storage programs: In-region contractual groundwater programs provide cost-effective supplies that would be drawn upon during shortages. These programs are also limited by their take capacities and generally have several years of withdrawals in storage. For this reason, these programs might be called upon before withdrawing heavily from surface reservoir storage.

Draw on SWP terminal reservoir storage: The storage available in the SWP terminal reservoirs provides a flexible and cost-effective shortage supply. Supplies withdrawn from this program must be replaced within five years of withdrawal. For this reason, the storage in these reservoirs would be reserved for more serious shortage conditions and would be utilized after the programs and facilities listed above were used to meet the shortage.

Call for extraordinary drought conservation: Voluntary conservation programs have historically been effective in reducing water demand during drought. However, voluntary conservation programs are not without impact to the retail customer and can be perceived as a failure of water agencies to properly plan for shortages. Therefore, the call for extraordinary drought conservation will only be taken with the consent of Metropolitan's Board of Directors.

Reduce agricultural deliveries: The Interim Agricultural Water Program (IAWP) offers interruptible water to southern California's agricultural industry at discounted rates. These supplies will be interrupted as part of Metropolitan's shortage actions. Metropolitan will work with IAWP participants to provide as much advance warning of interruption as possible. The IAWP reflects current policies toward agricultural water users. The policies underlying this program are due to be reviewed during the ten-year period of the WSDM Plan. The WSDM Plan will be changed accordingly.

Call on water transfer option contracts: Transfer options programs provide cost-effective supplies when the region is faced with reducing deliveries to meet consumptive demands. These programs might also be used to increase storage levels in Metropolitan storage facilities. Replenishment of these facilities reduces the risk of leaving available supplies outside the region and helps to protect the region during extended shortages.

Purchase transfers on the spot market: During the 1987-92 drought, the Drought Water Bank proved to be one mechanism for California to reduce the overall impacts of the shortage. However, the cost of spot market supplies may cause Metropolitan to use them as a last increment of supply before the region implements reductions in M&I deliveries. It is likewise possible that availability and cost will make spot market options more favorable under certain conditions. If this occurs then spot market supplies will be sought prior to calls on option transfers. However, participation in the spot market may be restricted to those agencies that have already taken significant actions in response to the shortage.

Implement allocation plan: As the final stage in responding to shortages, Metropolitan will implement an allocation plan to deliver reduced supplies to its member agencies. The issues of allocation and the methods of allocation are outlined in the following section.

ALLOCATION OF SUPPLY FOR M&I DEMANDS

The equitable allocation of supplies is addressed by the Implementation Goals established for the WSDM Plan, with the first goal being to "avoid mandatory import water allocations to the extent practicable." The second fundamental goal is to "equitably allocate imported water on the basis of agencies' needs." Factors for consideration in establishing the equitable allocation include retail and economic impacts, recycled water production, conservation levels, growth, local supply production, and participation and investment in Metropolitan's system and programs. In the event of an extreme shortage an allocation plan will be adopted in accordance with the principles of the WSDM Plan.

INTEGRATED RESOURCE MANAGEMENT STRATEGY

Throughout the Integrated Resources Planning process and the development of the WSDM Plan, extensive analysis of resource management strategies focused on maximizing supply reliability while minimizing overall resource costs. Various management strategies were analyzed under shortage scenarios based on historical hydrologic data. Certain strategies yield high reliability but incur very high costs. This is the case for strategies that utilize relatively costly transfer programs early in a shortage while maintaining high storage levels. If a shortage is short, this results in high transfer costs and shortage storage programs that are not fully utilized. Other strategies draw more heavily on storage early in a shortage and do not use options transfer programs. Later in a shortage, the yields from these transfer programs, combined with low yields from depleted storage facilities, might not make up for continuing or deepening shortages. Overall, such approaches may be inexpensive to pursue at the wholesale level but have high costs associated with retail level impacts. The resource management framework presented results from extensive analysis of various strategies for managing available resources under a variety of surplus and shortage conditions. Although the extent to which various actions are exercised may still vary depending on specific shortage conditions, the ordering presented does reflect Metropolitan's anticipated order of actions during shortages.

RESOURCE MANAGEMENT FRAMEWORK

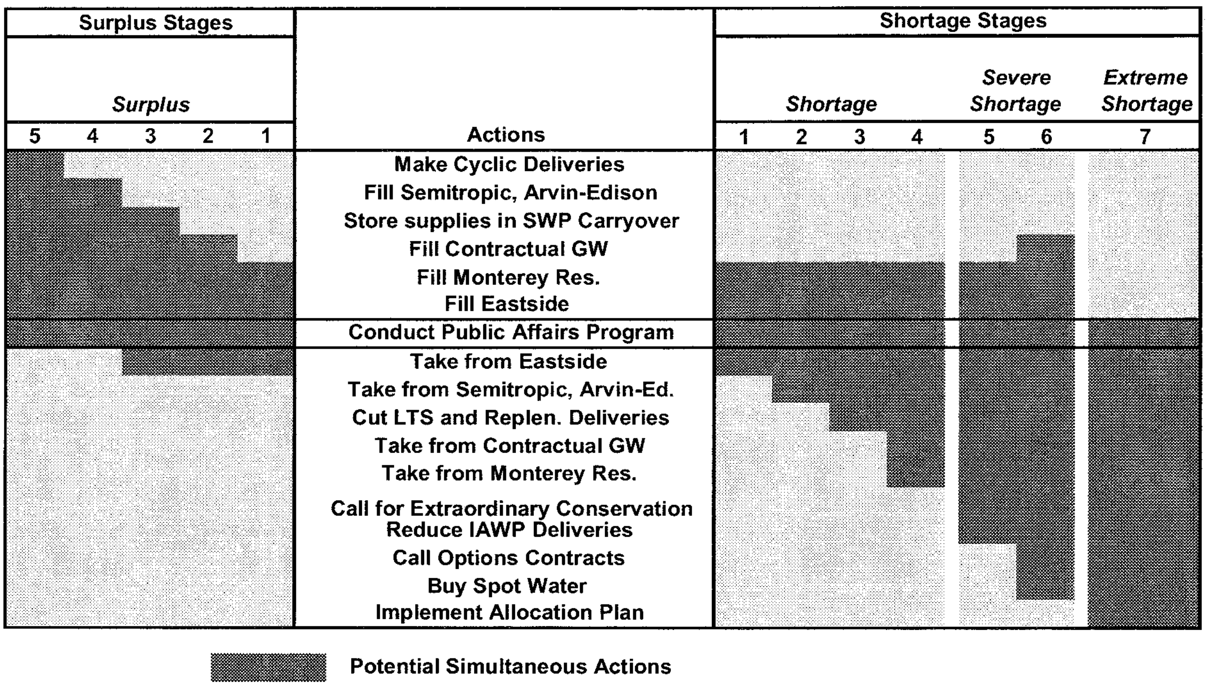
The analysis of surplus and shortage actions yields a water management framework that accounts for the degree or "stage" of surplus and shortage. These stages are defined by parameters such as storage levels and expected SWP supplies. Each stage has associated actions that could be taken as part of the response to prevailing shortage conditions. For example, Surplus Stage 1 might have as associated actions to place water in the highest-priority storage resources. Figure 8 shows the mapping between actions and stages. The darkly shaded diagonal area identifies actions that can be undertaken concurrently, while the lightly shaded areas show actions that will not be taken. For example, Metropolitan will not withdraw water from most storage resources during a surplus.

Figure 8 highlights several aspects of the WSDM Plan's approach to supply management. First and most importantly, it does not dictate a response to shortage or surplus. The framework recognizes the complexity and variety of conditions that could require various responses. Supporting this framework are general "rule curves" that dictate the extent to which particular actions are taken in various stages of surplus or shortage. For example, the rule curves indicate approximately how much water should be taken from the Eastside Reservoir Project before calling on supplies from the Semitropic or Arvin-Edison storage programs. If a shortage were greater than the desired initial withdrawal from the Eastside Reservoir Project, then Stage 2 actions would be taken. The rule curves for a particular resource would take into account shortage stage, monthly delivery requirements, and when various supplies are available.

Surplus and Shortage Stages are determined by the total amount of water that would be stored or produced by exercising the actions in that Stage. Overall storage levels in each stage are determined by the extent to which storage is increased or reduced by earlier actions. Therefore, each Stage is defined by supplies (stored or produced) and an approximate overall level of storage remaining in all resources. Up through Shortage Stage 4, the actions taken will not result in negative impacts to any consumptive uses. Shortage Stages 1 through 4 constitute shortage management without retail level impacts. The conservation efforts and reductions in IAWP deliveries in Shortage Stage 5 will result in retail impacts.

Action by the Metropolitan Board of Directors would be required before actions corresponding to Stages 5, 6, and 7.

Figure 8. Resource Stages and Actions Matrix



The Stages and Actions Matrix (Figure 8) is read from the center moving outward. Moving from the center to the left, are actions that Metropolitan will take during surplus conditions. For instance, in a Stage 3 Surplus, Metropolitan will be adding water to the Eastside Reservoir Project, the Monterey Reservoirs (if any water is due for repayment), Contractual Groundwater Programs, and carryover storage on the State Water Project. Moving from the center to the right are actions that Metropolitan will take during periods of shortage. For instance, in a Stage 3 Shortage, Metropolitan will be pulling water from the Eastside Reservoir Project, the Semitropic and Arvin Edison programs, and interrupting deliveries of Long-Term Seasonal and Replenishment program water. In addition, the Stages and Actions Matrix allows for surplus actions to be taken during shortages and vice versa, but these actions are strictly a result of prudent water management. For example, in a Stage 6 Shortage, Figure 8 shows Metropolitan potentially filling the Eastside Reservoir Project, the Monterey Reservoirs, and contractual groundwater programs while calling on spot transfers and buying spot water. Through these actions Metropolitan will be ensuring that water supply opportunities during a drought are realized--ultimately adding to the drought reserves of southern California.

Figure 8 also highlights the on-going efforts by Metropolitan and its member agencies in the conduct of public outreach and active conservation programs. Through all conditions, effective pubilc outreach and conservation programs are an integral part of Metropolitan's management of resources. In addition to ongoing conservation and water efficiency programs, Stage 5 of the Stages and Actions Matrix calls for participation of the citizens of southern California to take extraordinary conservation measures to cut water demand during droughts.

As with the listing of shortage actions earlier in the report, the Stages/Actions matrix in Figure 8 only highlights certain programs and response actions. However, unlike the discussion of actions earlier, Figure 8 is intended to convey Metropolitan's currently anticipated ordering for those actions listed. As the supply and demand outlooks, programs, and other factors continue to change, the analysis of the ordering of actions will continue during the ten-year period of the WSDM Plan.

SUPPLY CERTAINTY AND THE TIMING OF RESOURCE ACTIONS

One of the fundamental trade-offs in dealing with supply shortages is the need to maintain flexibility while providing supply certainty to member agencies and consumers. A central focus of the WSDM Plan is the analysis of information about supplies and demands. When do various pieces of information about the supply/demand balance become more certain? When should this information impact policy-making and trigger various resource actions? The WSDM Plan addresses these questions and the actual implementation of the Plan during a shortage.

Figure 9 shows a hypothetical shortage year. With respect to the supply and demand outlook, a typical shortage year will have periods of certainty and stability, and other periods of relative uncertainty and transition. Important supply components--such as the SWP, CRA, Los Angeles Aqueduct (LAA), and local supplies--are closely monitored through the early part of the year. These supplies and demands are fairly well-known through the April-September period. Storage is assessed in the post-summer period and decisions about certain programs, such as long-term (LT) seasonal deliveries could be made at this time.

Figure 9. Water Supply Outlook Throughout the Year

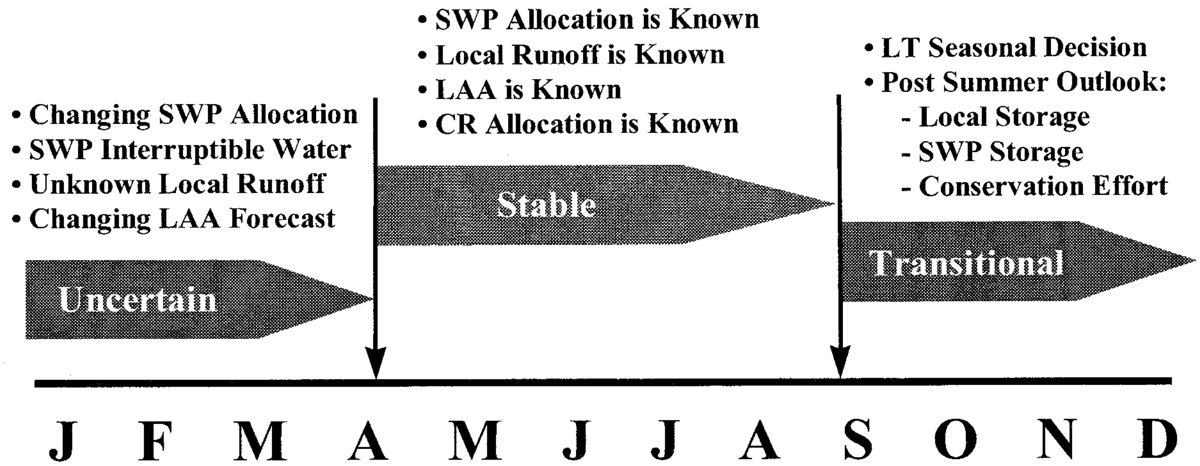
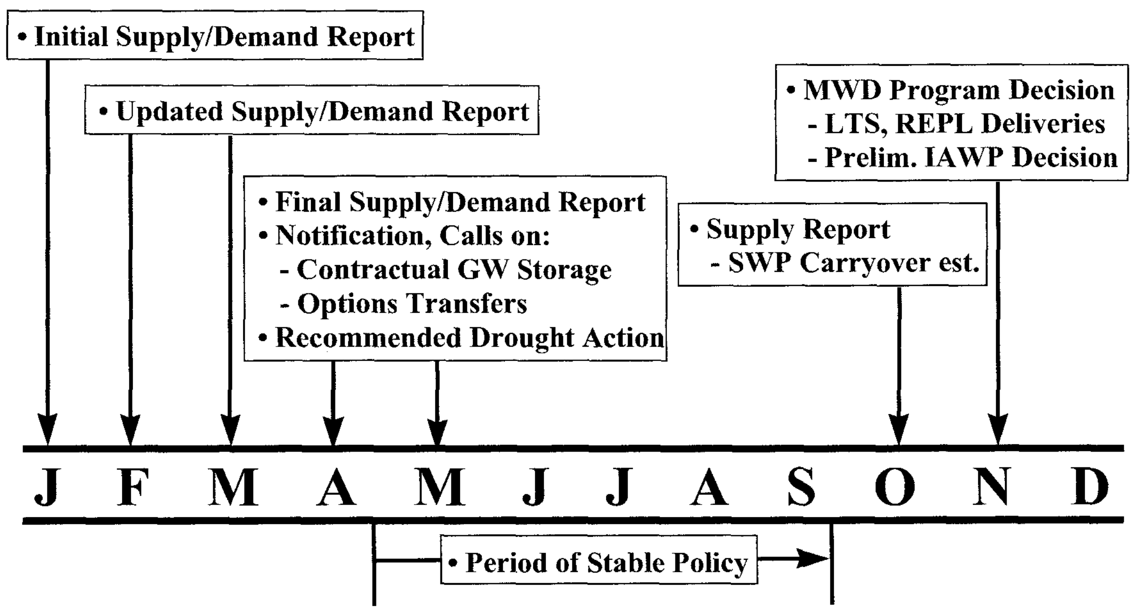


Figure 10 presents the annual schedule for actions taken in response to shortage conditions. Starting in January, an initial supply/demand report will be presented to the Metropolitan Board of Directors. SWP allocations are still only estimates in January and become more certain towards April and May. Demands for Metropolitan deliveries depend in part on how the winter hydrology develops and the condition of local supplies. These factors start to become known during the February-March period and will be reported to the Board in the Supply Report Update. By April-May, the outlook for imported supplies is known to a fairly high degree of certainty and a Final Supply Report will be produced. The May-September period will be one in which the import supply situation does not change drastically and drought policies can be implemented. Demands can be more or less than anticipated as a result of unusually hot or cool weather. At the end of summer, carryover SWP storage will be determined. October through December is a transitional period during which early assessments of available supplies for the following year will be made. During this period, Board actions would determine the management of various Metropolitan programs such as long-term seasonal (LTS) and IAWP deliveries. The following list presents major information and decision points during the year.

Month	Information/Action
January	Initial Supply/Demand Reports
February, March	Updated Supply/Demand Reports
April, May	Final Supply/Demand Report
	Notification on Contractual GW and Options Transfer Programs
	Recommended Drought Actions
May-September	Stable Policy Period
October	Supply and Carryover Storage Report
November	MWD Program Decisions - LT Seasonal, Replenishment, IAWP

Figure 10. One Year of a Hypothetical Shortage - Supply and Demand Reports and Response Actions



PUBLIC OUTREACH AND CONSERVATION

Mechanisms are already in place to implement most of the water management actions and programs that are addressed in the WSDM Plan. Under the majority of supply and demand conditions, the actions of Metropolitan's Board of Directors, the General Manager, the operational activities of Metropolitan, and its member agencies would constitute all actions necessary to mitigate the shortage. Several aspects of the WSDM Plan, however, require additional attention to the administration of programs and actions. In particular, a shortage contingency requires special programs in the areas of public and governmental affairs and conservation. Metropolitan maintains an on-going public information program to encourage efficient water use. Public outreach programs are conducted at all times under both surplus and shortage conditions (see Figure 8). The actions discussed in this section constitute special actions in times of shortage.

During shortage conditions, public outreach will play a critical role in shaping consumer response. Public information campaigns need to send clear signals if extraordinary drought conservation is to achieve needed reductions in demands. Given Metropolitan's diverse set of customers and the varying impacts that shortages can have on different consumer groups, an effective public information campaign will require a joint effort among Metropolitan and its member agencies. Under this Plan, the administration of the Public Information and Government Affairs programs will be the responsibility of a Drought Program Officer (DPO). The DPO will be responsible for integrating the various activities in these areas, coordinating efforts with Metropolitan's Board of Directors and member agencies, and designing the region-wide messages for the general public and various target audiences. Important constituencies that have been identified in the process are residential users, business interests, agricultural users, elected officials, officials of various agencies (such as the Department of Water Resources), and the media.

Many conservation programs, such as Metropolitan's ultra-low flush toilet rebate program, are driven by member agency requests. Based on history, Metropolitan expects member agency requests to increase during droughts. Metropolitan is committed to increasing overall conservation program funding to meet member agency requests during droughts and attain higher levels of savings. These programs will be implemented by Metropolitan and member and local agency conservation staff. As many of the short-term conservation objectives during a shortage would be dependent upon an effective public information program, the Drought Program Officer will also be responsible for monitoring the effectiveness of the augmented conservation programs. A monthly conservation reporting process will be implemented. Quarterly estimates of regional conservation will be developed to track the progress of various actions in mitigating the shortage.

APPENDIX A: RESOURCE AND STORAGE SIMULATION

The Water Surplus and Drought Management Plan (WSDM Plan) uses the Stages and Actions Matrix (Figure 8) as a guide for the operation of storage and transfers for the next ten years, 1999-2008. Metropolitan asserts that the investments that Metropolitan and its member agencies have made in water supply and storage, managed in a coordinated manner as presented in the WSDM Plan, will be sufficient to assure that retail firm water demands will be met 100% of the time through the year 2008. Metropolitan performed an extensive analysis of projected water demands, current and expected water supplies, along with hydrologic variations to support this assertion. Appendix A presents a summary of this analysis which includes statistical probabilities of actions under the WSDM Plan and two illustrative examples of how supply resources may be used in the future under worst-case drought events. Although the WSDM Plan is intended to be in effect through 2008, for the purposes of analysis the planning horizon was extended through 2010.

The WSDM Plan seeks to define the operational envelope for the Metropolitan system into the near future. Although the WSDM Plan only looks out ten years, it nonetheless involves the operation of some storage and water transfer projects that have not yet become fully operational. This makes the estimation of storage and transfers operations difficult. Compounding this problem is the lack of certainty around future demands, economic conditions, or even the weather over the next ten years. To manage these uncertainties, Metropolitan has developed a computer based simulation model called the Integrated Resources Planning Simulation Model or IRPSIM.

IRPSIM uses a modeling method known as sequentially indexed monte-carlo simulation. Simply put, the model looks at projected regional retail demand and supplies of water over the next twelve years and adjusts each, up or down, based on an assumed pattern of future weather. For instance, if Metropolitan expected the weather over the next twelve years (1999-2010) to be the same as the last twelve years (1987-1998), then IRPSIM would adjust the projected 1999 demands and supplies based on the historical 1987 hydrology, and adjust the projected 2000 demands and supplies using the historical 1988 hydrology, and so on. One obvious drawback to this approach is that Metropolitan does not know what future weather will be. Therefore, Metropolitan runs the models over and over again until all recorded hydrologies, 70 in all, have been tried. In this way, Metropolitan can look at probabilistic results of being in shortage year by year through 2010.

Although the projections of water supplies used in this analysis required certain assumptions to be made, they were based on most likely or probable outcomes. In most cases, projected water supplies represented projects that are currently operational, under construction, or in the final stages of negotiations. The following represents a summary of these assumptions:

- Local recycling and groundwater recovery: assumes currently operational projects with expected increases in supply yield as demand increases

- Conjunctive use groundwater storage: assumes Las Posas (under final stages of construction) and implementation of similar programs which are under negotiation (such as Raymond, Orange, and Chino Basins)

- Semitropic and Arvin-Edison storage: assumes use of both programs which are operational with water already stored

- Eastside Reservoir Project: assumes use of non-emergency storage from the reservoir currently under construction and an initial fill projected to start in approximately one year

- The Monterey Reservoirs: assumes use of State Water Project terminal reservoir supplies, Castaic and Perris Reservoirs, per the Monterey Amendment

- Colorado River Aqueduct: assumes a full aqueduct through the implementation of the California Plan (including lining of All American and Coachella canals, SD/IID water transfer/exchange, conjunctive use off-aqueduct storage, and river re-operations)

- State Water Project: assumes continuance of Bay-Delta Accord (with only current facilities)

One way of viewing the result of Metropolitan's WSDM Plan analyses is by summary statistics. Table A- 1 gives the probabilities of shortage actions over the next twelve years.

Table A-1. Probability of Shortage Stage[1] by Forecast Year

1999	13%	13%	11%	7%	3%	0%	O%
2000	13%	13%	11%	9%	3%	O%	0%
2001	19%	17%	13%	10%	6%	O%	0%
2002	19%	17%	13%	10%	4%	1%	0%
2003	19%	19%	14%	11%	4%	0%	0%
2004	20%	19%	16%	13%	4%	0%	0%
2005	21%	19%	17%	13%	6%	O%	O%
2006	21%	19%	19%	13%	6%	0%	0%
2007	23%	20%	19%	13%	4%	0%	0%
2008	26%	21%	19%	16%	6%	1%	0%
2009	26%	24%	19%	17%	6%	1%	0%
2010	26%	26%	19%	19%	6%	1%	O%

Table A-1 can be read in one of two ways, by column or row. The Stage 7 column indicates that there are no historical weather conditions that require allocation over the next twelve years. This is the single most important conclusion of the WSDM Plan analysis. The Stage 6 column indicates that only in a few years--2002, and 2008 through 2010--would Metropolitan need have a need for option or spot transfer water. Read by row, Table A-1 indicates that in the year 2008 there is a 21% likelihood of taking some water from the Eastside Reservoir Project, a 19% likelihood of taking water from Semitropic or Arvin-Edison storage programs, a 17% likelihood of interrupting long-term seasonal and replenishment deliveries for two years, and so on. It should be noted that these probabilities represent the best current estimates by Metropolitan, but are based entirely on historical weather conditions. Conditions that fall outside of historical ranges, either in duration or severity, are not represented by this data.

Another way to view the WSDM Plan analysis is by observing the operation of a single hydrology. Table A-2 provides an example of resource operations for the period 1999 through 2010 assuming a repeat of the 1923 through 1934 hydrology. The table provides descriptions of hydrologic conditions to aid in understanding the example.

[1] Stage 1 consists of withdrawal from the Eastside Reservoir Project. Stage 2 consists of the above plus withdrawals from the Semitropic and Arvin-Edison water storage and transfer projects. Stage 3 consists of the above plus an interruption of Long-Term Seasonal and Replenishment discount water. Stage 4 consists of the above plus withdrawal from contractual groundwater programs and the Monterey Reservoirs. Stage 5 consists of the above plus a call for extraordinary drought conservation and interruption in agricultural discount water. Stage 6 consists of the above plus calls on option contract water and purchases of water on the open market. Stage 7 consists of the above plus allocation of remaining shortages. For a full description of stages and action, see Surplus and Shortage Resource Actions section and Figure 8 above.

For instance, 1923 was considered to be a dry year in southern California (defined as less than 9 inches of rain at the Los Angeles Civic Center) and is categorized by the California Department of Water Resources (DWR) as a below normal year for State Water Project deliveries. In this example, 1923 weather increases southern California's demand for water and decreases imported State Water Project supplies. The Colorado River Aqueduct supplies are influenced by yet another hydrologic indicator, but for the next ten year Metropolitan expects the Aqueduct to be full.

Table A-2 indicates that retail water demands in 1999, assuming a 1923 hydrology, will be 3.979 million acre-feet (maf). Adding expected long-term seasonal and replenishment demands of 0.165 maf gives a regional total water demand of 4.144 maf. After subtracting local supplies of 2.192 maf, which are also adjusted for 1923 weather, Metropolitan expects to see a demand of 1.952 maf. In 1999, under a 1923 hydrology, Metropolitan expects to see 2.954 maf of supply. This is enough to meet all expected demands and put over 1.0 maf into storage.

The 1923 through 1934 hydrology is significant because it starts and ends dry with little recovery in the middle. However, even in these most adverse conditions the actions proposed by the WSDM Plan provides the region with enough water to avoid shortage allocation. Again the most important result of this example is read from the last line, which indicates that there are no remaining shortages through 2008

Table A-3 provides a second example of using the 1980 through 1991 hydrology. This hydrology contains the most significant drought in recent record, ending with a critically dry year on the State Water Project that is expected to yield a mere 0.389 maf. However, even under these conditions the WSDM Plan provides a method to avoid firm water allocation.

The analyses performed using the prioritized action of the Stages and Actions Matrix support Metropolitan's assertion that water supply reliability can be attained through the use of regional storage, interruption of discounted water supplies, and transfers. And, through the implementation of the WSDM Plan, Metropolitan does not expect to allocate firm water deliveries for at least the next ten years.

Table A-2. A Simulation of Water Supplies and Demands 1923-1934 Hydrology

Forecast Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Hydrology Year	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934
Hydrologic Conditions												
Southern California Year Type	Dry	Dry	Dry	Wet	Wet	Dry	Dry	Normal	Wet	Normal	Wet	Normal
Sacramento River Index D1630 Year Type	Below Normal	Critically Dry	Dry	Dry	Wet	Above Normal	Critically Dry	Dry	Critically Dry	Dry	Critically Dry	Critically Dry
Demands												
Retail Demand	3.979	4.152	4.149	4,018	4.005	**4.249**	4.237	4.223	4.280	4.280	4.407	4.500
Long-term/Replenishment Demand	0.165	0.182	0.226	0.188	0.149	0.176	0,213	0.203	0.164	0.175	0.141	0.163
Total Demand	4.144	4.334	4.375	4.205	4.154	4.425	4.450	4.426	4,443	4.455	4.548	4,663
Local Supplies												
Groundwater Production	1.529	1.545	1.537	1.288	1.299	1.575	**1.568**	1.434	1.307	1.439	1.318	1.454
L. A. Aqueduct Production	0.383	0,287	0.304	0.316	0.392	0.302	0,245	0.235	0.174	0,324	0.251	0.220
Recycling Production	0.152	0.162	0.174	0.186	0,197	0.207	0.217	0.230	0,242	0.254	0.266	0.277
Surface Production	0,128	0,089	0,076	0.116	0.154	0.147	0.108	0.094	0,133	0,136	0.151	0.145
Total Local Supply	2,192	2.084	2.091	1.905	2,043	2.231	2,139	1.993	1.856	2.153	1.986	2,097
Total MWD Demand	1.952	2.250	2,284	2,300	2.112	2.194	2.311	2.433	2.587	2.302	2.562	2.566
MWD Supply Sources												
Colorado River Aqueduct Supply	1.200	1.200	1.200	1.200	1.200	**1.200**	1.200	1.200	1.200	1.200	1.200	1.200
State Water Project Supply	1.754	0.812	0.783	1.280	1.678	1.438	0,764	1.163	0,589	0.843	0.559	0.620
MWD Cyclic Groundwater Deliveries	0.000	0.060	0.060	0.000	0.000	0,000	0.060	0,060	0.060	0.059	0.000	0.000
Eastside Reservoir	0.000	0.066	0.058	0.000	0.000	0.000	0,060	0.010	0.425	0.023	0.219	0.041
Arvin/Semitropic Groundwater Storage	0.000	0.111	0.115	0,000	0.000	0,000	0,119	0,000	0.115	0.117	0.059	0.041
Longterm Seasonal Demand Cuts	0.000	0,000	0,166	0.000	0.000	0.000	0.153	0.000	0.104	0,116	0.000	0.000
Cyclic Benefits	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0,000	0,000	0.060	0.060
Contractual Groundwater Storage	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0,000	0.095	0.000	0.095	0.084
DWR Reservoirs (Monterey Agreement)	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0.131	0.088
Voluntary Conservation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.206	0.210
MWD Ag Cuts	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.033	0.031
Central Valley Transfers	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.193
Storage Puts	1.003	0.000	0.097	0.180	0.549	0.438	0.045	0.000	0,000	0.056	0.000	0.000
Remaining Shortage	0,000	0,000	0.000	0,000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000

Table A-3. A Simulation of Water Supplies and Demands 1980-1991 Hydrology

Forecast Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Hydrology Year	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934
Hydrologic Conditions												
Southern California Year Type	Wet	Normal	Normal	Wet	Dry	Dry	Wet	Normal	Normal	Dry	Dry	Normal
Sacramento River Index D1630 Year Type	Above Normal	Dry	Wet	Wet	Wet	Dry	Wet	Dry	Critically Dry	Dry	Critically Dry	Critically Dry
Demands												
Retail Demand	3.781	4.170	3.930	3.647	4.308	4.250	4.151	4.281	4.380	4.550	4.663	4.497
Lon£1-term/Replenishment Demand	0.105	0.141	0.171	0.101	0.136	0.187	0.183	0.201	0.191	0.219	0.224	0.214
Total Demand	3.886	4.311	4.101	3.748	4.444	4.437	4.334	4.483	4.572	4.769	4.887	4.712
Local Supplies												
Groundwater Production	1.292	**1.440**	**1.381**	1.248	1.546	1.565	1.275	1.413	1.438	1.588	1.600	1.446
L. A. Aqueduct Production	0.462	0.372	0.499	0.529	0.516	O.367	0.472	0.400	0.326	0.278	0.213	0.223
Recycling Production	0.152	0.162	0.174	0.186	0.197	0.207	0.217	0.230	0.242	0.254	0.266	0.277
Surface Production	0.225	0.175	0.154	0.194	0.195	0.151	0.115	0.116	0.115	0.081	0.068	0.081
Total Local Supply	2.131	2.149	2.208	2.156	2.455	2.290	2.081	2.159	2.122	2.200	2,146	2.027
Total MWD Demand	1.755	2.162	1.894	1.591	1.989	2.147	2.253	2.324	2.450	2.569	2.741	2.684
MWD Supply Sources												
Colorado River Aqueduct Supply	1.200	1.200	1.200	1,200	1.200	1.200	1.200	1.200	**1.200**	1.200	1.200	1.200
State Water Project Supply	1.561	1.441	1.725	1.886	1.643	1.590	1.441	1.292	0.611	1.285	0.877	0.389
MWD Cyclic Groundwater Deliveries	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.060	0.060	0.060	0.060
Eastside Reservoir	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.199	0.024	0.222	0.209
Arvin/Semitropic Groundwater Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.115	0.000	0.122	0.104
Long-term Seasonal Demand Cuts	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.131	0.000	0.164	0.154
Cyclic Benefits	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Contractual Groundwater Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.133	0.000	0.095	0.085
DWR Reservoirs (Monterey Agreement)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.216
Voluntary Conservation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.235
MWD Ag Cuts	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032
Central Valley Transfers	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Storage Puts	1.006	0.260	0.344	0.240	0.200	0.200	0.388	0.168	0.000	0.000	0.000	0.000
Remaining Shortage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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APPENDIX A.5
Local Projects

Table A.5-1

Groundwater Recovery Projects

Existing	Ultimate Yield/Capacity Acre-Feet	Online Date
City of Beverly Hills		
Beverly Hills Desalter Project	2,600	
City of Burbank		
Burbank Lake Street GAC Plant	2,744	
Burbank Operable Unit/Lockheed Valley Plant	14,517	
Central Basin Municipal Water District		
Water Quality Protection Project	5,807	
Eastern Municipal Water District		
Menifee Basin Desalter	3,360	
Perris Desalter	4,500	
Foothill Municipal Water District		
Glenwood Nitrate	1,600	
City of Glendale		
San Fernando Basin - Glendale Operable Units	7,300	
Verdugo Basin - Verdugo Wells A & B	2,750	
Inland Empire Utilities Agency		
Chino Basin Desalter 1	6,000	
Chino Basin Desalter 2	8,000	
Municipal Water District of Orange County		
Arlington Basin Groundwater Desalter Project	2,000	
IRWD DATS Potable (Exempt)	8,000	
IRWD Irvine Desalter Project	11,200	
Mesa Colored Water Treatment Facility	11,300	
SJC San Juan Desalter GRP Project	4,800	
So Coast WD Capistrano Beach Desalter	1,300	
Tustin Desalter 17th St.	3,200	
Tustin Main Street Nitrate	2,000	
Well 28	4,300	
San Diego County Water Authority		
Lower Sweetwater Desalter	3,600	
Oceanside Mission Basin Desalter	6,500	
Three Valleys Municipal Water District		
City of Pomona VOC Plant	4,678	
Pomona Well #37	1,100	
City of Torrance		
Madrona Desalter (Goldsworthy)	2,400	
West Basin Municipal Water District		
West Basin Brewer Desalter No. 1	1,524	
Western Municipal Water District of Riverside County		
Arlington Basin Groundwater Desalter Project	4,100	
Chino Basin Desalter 1	2,000	
Chino Basin Desalter 2	8,000	
Temescal Basin Desalting Facility Project	10,000	

Table A.5-1

Groundwater Recovery Projects

Full Design & Appropriated Funds	Ultimate Yield/Capacity Acre-Feet	Online Date
Inland Empire Utilities Agency		
Chino Basin Desalter 2	11,760	2016
San Diego County Water Authority		
Lower Sweetwater Desalter	5,200	2020

Advanced Planning (EIR/EIS Certified)	Ultimate Yield/Capacity Acre-Feet	Online Date
Calleguas Municipal Water District		
Oxnard GREAT Program	15,500	2016
City of Los Angeles		
Tujunga Well Treatment	24,000	2014
Municipal Water District of Orange County		
SJC San Juan Desalter GRP Project	3,363	2014
Tustin Legacy Well # 1	2,200	2014
Wells 21 & 22	7,900	2014
San Diego County Water Authority		
Middle Sweetwater River Basin Groundwater Well System (Capacity)	1,000	2018
Rancho del Rey Well Desalination	500	2016

Feasibility	Ultimate Yield/Capacity Acre-Feet	Online Date
Municipal Water District of Orange County		
IRWD Wells 51,52,53, 21& 22 Potable (Non-exempt)	12,700	2018
Mesa Colored Water Treatment Facility	5,650	2018
San Diego County Water Authority		
Mission Valley Brackish Groundwater Recovery Project	1,760	2016
Oceanside Mission Basin Desalter	5,600	2016
Otay Mesa Lot 7 Well Desalination	400	2016
San Diego Formation / Balboa Park Pilot Production Well	1,300	2018
San Diego Formation / Diamond BID Pilot Production Well	1,600	2015
San Dieguito Reservoir Seepage Recovery Feasibility Study	150	2015
San Paqual Brackish Groundwater Recovery Project	3,360	2016
San Vicente & El Capitan Seepage Recovery	1,400	2015
Sweetwater Authority/Otay WD San Diego Formation Recovery	3,900	2020
City of San Marino		
San Marino GWR Project	2,500	2018
West Basin Municipal Water District		
West Basin Brewer Desalter No. 1	156	2018
Western Municipal Water District of Riverside County		
Chino Basin Desalter 3	10,000	2018

Table A.5-1

Groundwater Recovery Projects

Conceptual	Ultimate Yield/Capacity Acre-Feet	Online Date
City of Beverly Hills		
Shallow Groundwater Development	500	2020
Calleguas Municipal Water District		
Camarillo (City of) Groundwater Treatment Facility	4,000	2020
Camrosa Brackish Water Reclamation Project (CSUCI)	1,050	2020
Camrosa Santa Rosa Basin Desalter	5,040	2020
Golden State Desalter	1,668	2020
Somis Desalter (District 19)	2,800	2020
South Las Posas Desalter	5,000	2020
West Simi Desalter (District 8)	2,800	2020
Eastern Municipal Water District		
Perris Desalter	5,585	2020
Municipal Water District of Orange County		
So Coast WD Capistrano Beach Desalter	700	2020
City of Pasadena		
Sunset Reservoir Well Treatment,IX	1,500	2020
San Diego County Water Authority		
San Dieguito River Basin Brackish GW Recovery and Treatment	500	2015
City of Torrance		
Madrona Desalter (Goldsworthy)	2,600	2020
Western Municipal Water District of Riverside County		
Arlington Basin Groundwater Desalter Project	8,000	2020

Table A.5-2

Recycled Water Projects

Existing	Ultimate Yield/Capacity Acre-Feet	Online Date
City of Burbank		
Burbank Reclaimed Water System Project	850	
Caltrans and BWP Power Plant	1,520	
Calleguas Municipal Water District		
Camrosa Water District Recycling System	1,680	
City of Simi Vally/VCWWD No. 8 Reclaimed Water Distribution System	1,100	
Conejo Creek Diversion Project	14,000	
Lake Sherwood Reclaimed Water System	250	
Oak Park/North Ranch Water Reclamation Project	1,300	
VCWWD No. 1/Moorpark WWTP Reclaimed Water Distribution System	5,040	
Central Basin Municipal Water District		
Century/Rio Hondo Reclamation Program	10,500	
Cerritos Reclaimed Water Project	4,000	
Lakewood Water Reclamation Project	440	
Montebello Forebay	50,000	
Eastern Municipal Water District		
Eastern Regional Reclaimed Water System	56,000	
EMWD Recycled Water Pipeline Reach 1 Phase II	1,700	
EMWD Recycled Water Pipeline Reach 16	820	
Rancho California Reclamation	6,450	
Foothill Municipal Water District		
La Canada-Flintridge Country Club	224	
City of Glendale		
Glendale Forest Lawn Water Reclamation Expansion Project	500	
Glendale Grayson Power Plant Project	600	
Glendale Verdugo-Scholl Brand Park Reclaimed Water Project	2,225	
Inland Empire Utilities Agency		
Carbon Canyon/IEUA Regional Recycled Water Distribution System	38,500	
Las Virgenes Municipal Water District		
Calabasas System	4,700	
Decker Canyon Recycled Water Line Extension Project	300	
Las Virgenes Reclamation Project	2,700	
Las Virgenes Valley Reclaimed Water System	500	
City of Long Beach		
Alamitos Barrier Reclaimed Water Project	3,025	
Long Beach Reclamation Project	6,550	
THUMS	1,429	
City of Los Angeles		
Environmental Use	28,500	
Griffith Park and MCA/Universal	2,920	
Hansen Area Water Recycling Project Phase 1	2,500	
Harbor Water Recycling Project	3,600	
Los Angeles Greenbelt Project	900	
Sepulveda Basin Water Reclamation Project	1,500	
West Basin Water Reclamation Program	1,000	

Table A.5-2

Recycled Water Projects

Existing	Ultimate Yield/Capacity Acre-Feet	Online Date
Municipal Water District of Orange County		
El Toro WD Recycling	375	
Green Acres Reclamation Project	6,200	
Irvine Ranch Reclamation Project	10,000	
IRWD Los Alisos Water Reclamation Plant	1,500	
IRWD Michelson & LAWRP Reclamation Upgrades	8,500	
IRWD Michelson Reclamation Project	8,200	
MNWD Moulton Niguel Water Reclamation Project	9,746	
OCWD Groundwater Replenishment System	72,000	
San Clemente Water Reclamation Project	1,610	
SJC Capistrano Valley Non-Domestic Water System Expansion	3,460	
SMWD Chiquita Reclamation Project	2,772	
SMWD Oso Reclamation Expansion Project	3,600	
SMWD purchase from IRWD	321	
South Coast WD South Laguna Reclamation Project	1,450	
Trabuco Canyon Reclamation Expansion Project	1,330	
San Diego County Water Authority		
Camp Pendleton	1,700	
Carlsbad MWD Encina Basin Water Reclamation Program - Phases I and II	5,000	
Escondido Regional Reclaimed Water Project	2,800	
Fairbanks Ranch	308	
Fallbrook Reclamation Project	1,200	
North City Water Reclamation Project	17,500	
Oceanside Water Reclamation Project	200	
Olivenhain Recycled Project - SE Quadrant	1,888	
Otay Recycled Water System	7,500	
Padre Dam Reclaimed Water System	850	
Ramona MWD - San Vicente Water Pollution Control Facility	585	
Ramona MWD - Santa Maria Water Reclamation Project	400	
Rancho Santa Fe Water Pollution Control Facility	500	
RDDMWD Recycled Water Program	4,074	
San Diego Wild Animal Park	168	
San Elijo Water Reclamation System	1,600	
Skyline Ranch	28	
South Bay Water Reclamation Project	1,670	
Valley Center MWD - Lower Moosa Canyon	476	
Valley Center MWD - Woods Valley Ranch	300	
Whispering Palms	448	
City of Santa Ana		
Green Acres Reclamation Project	800	
City of Santa Monica		
Santa Monica Urban Runoff Recycling Facility (SMURRF)	280	
Three Valleys Municipal Water District		
City of Industry Regional Water System	2,584	
Pomona Reclamation Project	9,320	

Table A.5-2
Recycled Water Projects

Existing	Ultimate Yield/Capacity Acre-Feet	Online Date
Three Valleys Municipal Water District (contd)		
Rowland Reclamation Project	2,000	
Walnut Valley Reclamation Project	4,234	
City of Torrance		
West Basin Water Reclamation Program	7,800	
Upper San Gabriel Valley Municipal Water District		
Direct Reuse	3,258	
Los Angeles County Sanitation District Projects	4,375	
Norman's Nursery	100	
West Basin Municipal Water District		
West Basin Water Reclamation Program	46,700	
Western Municipal Water District of Riverside County		
Elsinore Valley/Horse Thief Reclamation	560	
Elsinore Valley/Railroad Canyon Reclamation	730	
March Air Force Base Reclamation Project	896	
Rancho California Reclamation	4,950	
Western Riverside County Regional Water Authority	8,950	

Under Construction	Ultimate Yield/Capacity Acre-Feet	Online Date
Inland Empire Utilities Agency		
Carbon Canyon/IEUA Regional Recycled Water Distribution System	25,000	2015
Three Valleys Municipal Water District		
City of Industry Regional Water System	2,164	2011
Upper San Gabriel Valley Municipal Water District		
City of Industry Regional Water System	3,720	2013
Western Municipal Water District of Riverside County		
March Air Force Base Reclamation Project	448	2012

Full Design & Appropriated Funds	Ultimate Yield/Capacity Acre-Feet	Online Date
Las Virgenes Municipal Water District		
Thousand Oaks Boulevard Extension	176	2010
City of Los Angeles		
Hansen Dam Golf Course Water Recycling Project	500	2011
Municipal Water District of Orange County		
SMWD Canada Gobernadora	725	2013
West Basin Municipal Water District		
West Basin Water Reclamation Program	1,710	2011

Table A.5-2
Recycled Water Projects

Advanced Planning (EIR/EIS Certified)	Ultimate Yield/Capacity Acre-Feet	Online Date
City of Burbank		
Burbank Reclaimed Water System Project	974	2013
Calleguas Municipal Water District		
VCWWD No. 1/Moorpark WWTP Reclaimed Water Distribution System	1,179	2014
Eastern Municipal Water District		
Eastern Regional Reclaimed Water System	12,900	2015
Inland Empire Utilities Agency		
Carbon Canyon/IEUA Regional Recycled Water Distribution System	50,000	2020
City of Long Beach		
Long Beach Reclamation Project	450	2014
City of Los Angeles		
LA-Glendale Storage & Distribution System Water Recycling Project	2,600	2014
Municipal Water District of Orange County		
IRWD Michelson Reclamation Project	11,200	2011
OCWD Groundwater Replenishment System	20,000	2013
San Clemente Water Reclamation Project	1,400	2012
SMWD Arroyo Trabuco Sump	270	2013
SMWD Chiquita Reclamation Project	3,360	2014
San Diego County Water Authority		
Padre Dam Reclaimed Water System	3,304	2015
Upper San Gabriel Valley Municipal Water District		
Direct Reuse	620	2020
Western Municipal Water District of Riverside County		
Elsinore Valley/Summerly	1,380	2011
Elsinore Valley/Wildomar (Phase 1)	300	2011
Elsinore Valley/Tuscany (Phase 1A)	1,225	2013

Feasibility	Ultimate Yield/Capacity Acre-Feet	Online Date
Calleguas Municipal Water District		
City of Simi Vally/VCWWD No. 8 Reclaimed Water Distribution System	50	2018
Eastern Municipal Water District		
EMWD Indirect Potable Reuse	15,000	2018
City of Long Beach		
Alamitos Barrier Reclaimed Water Project	5,000	2018
City of Los Angeles		
Elysian Park Tank & Pumping Station Water Recycling Project	500	2014
Harbor Water Recycling Project	15,500	2015
LA Zoo Water Recycling Project	500	2014
LAX Cooling Towers	240	2018
Terminal Island AWTF and Distriubtion System Expansion Water Recyclng Project	10,000	2019
Tillman Groundwater Replenishment System	15,000	2019

Table A.5-2

Recycled Water Projects

Feasibility	Ultimate Yield/Capacity Acre-Feet	Online Date
Municipal Water District of Orange County		
El Toro AWT Joint project (MNWD, ETWD & IRWD)	400	2018
IRWD Michelson Reclamation Project	5,600	2014
LBCWD Laguna Canyon Blended Recycled Water	100	2014
MNWD Moulton Niguel Water Reclamation Project	600	2014
OCWD Groundwater Replenishment System	30,000	2018
SMWD Chiquita Reclamation Project	5,600	2012
SOCWA J.B. Latham AWT Joint project	7,841	2012
San Diego County Water Authority		
Carlsbad MWD - Mahr Reservoir	151	2015
Olivenhain Northwest Quadrant Recycled Water Project	1,000	2015
Otay Recycled Water System	1,200	2015
Otay WD - North District Recycled Water System	1,100	2020
Ramona MWD - Santa Maria Water Reclamation Project	430	2020
Shadowridge Reclaimed Water System	1,100	2020
Valley Center - Welk WRF	140	2020
Valley Center MWD - Lilac Ranch WRF	60	2020
Upper San Gabriel Valley Municipal Water District		
Direct Reuse	7,000	2018
West Basin Municipal Water District		
Joint Water Pollution Control Plant (JWPCP)	17,500	2012
West Basin Water Reclamation Program	25,540	2012
Western Municipal Water District of Riverside County		
Rancho California Reclamation	13,800	2018

Conceptual	Ultimate Yield/Capacity Acre-Feet	Online Date
City of Anaheim		
Anaheim Water Recycling Demonstration Project	110	2020
Calleguas Municipal Water District		
Thousand Oaks-Camrosa Interconnect	314	2020
Central Basin Municipal Water District		
Joint Water Pollution Control Plant (JWPCP)	45,000	2020
Eastern Municipal Water District		
Hemet Citrus In Lieu Project	5,000	2020
Foothill Municipal Water District		
Arroyo Seco - Flint Wash Project	240	2020
Eaton Canyon Project	500	2025
Verdugo Basin Project	400	2020
Las Virgenes Municipal Water District		
Hidden Hills Outdoor Residential Pilot Project	273	2020
Thousand Oaks Boulevard Extension	250	2020

Table A.5-2

Recycled Water Projects

Conceptual	Ultimate Yield/Capacity Acre-Feet	Online Date
Las Virgenes Municipal Water District (contd)		
Woodland Hills Golf Course Extension	316	2020
City of Los Angeles		
San Fernando Valley/Central City Water Recycling and Reliability Project	1,500	2019
Satellite Plant & Distribution System	4,500	2019
Westside Tier 2A Expansion Water Recycling Project	5,000	2019
Municipal Water District of Orange County		
MWDOC West OC Recycling	6,000	2020
City of Pasadena		
Joint Water Pollution Control Plant (JWPCP)	15,000	2020
San Diego County Water Authority		
Carlsbad MWD Encina Basin Water Reclamation Program - Phases I and II	3,658	2020
Escondido Regional Reclaimed Water Project	1,200	2020
Oceanside Water Reclamation Project	1,300	2020
Olivenhain Joint RW Transmission Project with SFID and OMWD	500	2020
Olivenhain Northwest Quadrant Recycled Water Project	300	2020
Olivenhain Wanket Reservoir RW Conversion	300	2020
Santa Fe ID Evaluating Multiple Options	500	2015
Valley Center MWD - Lower Moosa Canyon	672	2016
Valley Center MWD - North Village WRF	150	2015
Three Valleys Municipal Water District		
Thompson Creek	3,000	2020
City of Torrance		
Joint Water Pollution Control Plant (JWPCP)	5,000	2020
Upper San Gabriel Valley Municipal Water District		
Direct Reuse	4,900	2020
Groundwater Reliability Improvement Project	25,000	2020
Joint Water Pollution Control Plant (JWPCP)	35,000	2020
West Basin Municipal Water District		
Joint Water Pollution Control Plant (JWPCP)	5,000	2020
West Basin Water Reclamation Program	1,008	2015
Western Municipal Water District of Riverside County		
City of Riverside Recycled Water Program	41,400	2015

Table A.5-3

Seawater Desalination Projects

Advanced Planning (EIR/EIS Certified)	Ultimate Yield/Capacity Acre-Feet	Online Date
Municipal Water District of Orange County		
Huntington Beach Seawater Desalination Project	56,000	2012
San Diego County Water Authority		
Carlsbad Seawater Desalination Project	56,000	2012

Feasibility	Ultimate Yield/Capacity Acre-Feet	Online Date
San Diego County Water Authority		
Camp Pendleton Seawater Desalination Project	56,000	2019
Rosarito Beach Seawater Desalination Feasibility Study	28,000	2020
West Basin Municipal Water District		
West Basin Seawater Desalination Project	20,000	2025

Conceptual	Ultimate Yield/Capacity Acre-Feet	Online Date
City of Long Beach		
Long Beach Seawater Desalination Project	10,000	2025
Municipal Water District of Orange County		
South Orange Coastal Ocean Desalination Project	16,000	2015

APPENDIX A.6
RECENT CUWCC FILINGS

Water Supply & Reuse

Reporting Unit:	Year:
Metropolitan Water District of SC	**2005**

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type
CRA	611128	Imported
SWP	1575911	Imported

Total AF: 2187039

Purchaser Information

Name of Agency	Quantity (AF) Supplied	Retailer or Wholesaler
Anaheim	28073.9	retail
Beverly Hills	11917.8	retail
Burbank	13764.8	retail
Calleguas MWD	113539.8	wholesale
Central Basin MWD	88790.2	wholesale
Compton	2978.8	retail
Eastern MWD	6221.2	wholesale
Eastern MWD	97465.9	retail
Foothill	11651.4	wholesale
Fullerton	17486.5	retail
Glendale	22678.2	retail
Inland Empire UA	97157.2	wholesale
Las Virgenes MWD	21734	retail
Long Beach	47565.2	retail
Los Angeles	250666.6	retail
MWD of Orange County	266938.6	wholesale
Pasadena	21982	retail
San Diego CWA	531535.7	wholesale
San Fernando	500	retail
San Marino	1422.3	retail
Santa Ana	19177.8	retail
Santa Monica	13195.8	retail
Three Valleys	76610.5	wholesale
Torrance	29045.5	retail
Upper San Gabriel Valley MWD	51951.8	wholesale
West Basin MWD	140841.8	wholesale
Western MWD	112991.9	wholesale

Total AF: 2097885.2

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit: **Metropolitan Water District of SC**		Form Status: **CUWCC Reviewed**	Year: **2005**
A. Implementation			
	1. Does your agency own or operate a water distribution system?		yes
	2. Has your agency completed a pre-screening system audit for this reporting year?		yes
	3. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:		
	a. Determine metered sales (AF)		2060111.1
	b. Determine other system verifiable uses (AF)		0
	c. Determine total supply into the system (AF)		2109000.9
	d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.		0.98
	4. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?		yes
	5. Did your agency complete a full-scale audit during this report year?		yes
	6. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?		yes
	7. Does your agency operate a system leak detection program?		yes
	a. If yes, describe the leak detection program: Metropolitan's system is monitored by 10+ patrols who also collect WQ samples, pilots flying the CRA and pipeline staff in the normal course of their duties. If evidence of leaking water is detected near any of our facilities, we analyze a water sample to determine if it's our water leaking. Normally it is not. If it is, we may hire a leak detection firm to locate the leak.		
B. Survey Data			
	1. Total number of miles of distribution system line.		1017
	2. Number of miles of distribution system line surveyed.		1017
C. "At Least As Effective As"			
	1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?		No
	a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."		
D. Comments			

BMP 07: Public Information Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2005**

A. Implementation

1. How is your public information program implemented?
   Wholesaler implements program (none or minimal retailer participation)

2. Describe the program and how it's organized:
   Major advertising and public relations campaign promoting outdoor water use efficiency and California Friendly landscaping. Educational brochures and campaign artwork including bill-stuffers available for retailer and sub-agency use.

3. Indicate which and how many of the following activities are included in your public information program:

Region-Wide Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	3205
b. Public Service Announcement	yes	48
c. Bill Inserts / Newsletters / Brochures	yes	15
d. Bill showing water usage in comparison to previous year's usage	no	
e. Demonstration Gardens	yes	31
f. Special Events, Media Events	yes	8
g. Speaker's Bureau	yes	0
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

1. Annual Expenditures (Excluding Staffing)	2000000

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."
NA

D. Comments

NA

BMP 08: School Education Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2005**

A. Implementation

1. How is your public information program implemented?
   Wholesaler and retailer both participate in program

2. Please provide information on your region-wide school programs (by grade level):

Grade	Are grade- appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	7	25010	337
Grades 4th-6th	yes	21	33346	450
Grades 7th-8th	yes	12	12104	165
High School	yes	12	12909	171

4. Did your Agency's materials meet state education framework requirements?	yes
5. When did your Agency begin implementing this program?	11/1/1983

B. School Education Program Expenditures

1. Annual Expenditures (Excluding Staffing)	605050

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2005**

A. Implementation

1. Financial Support by BMP

BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded	BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded
1	yes	70000	61298	**8**	No		0
2	yes	350000	373532	**9**	yes	2000000	1901119
3	No		0	**10**	No		0
4	No		0	**11**	No		0
5	yes	60000	57438	**12**	No		0
6	yes	275000	2664241	**13**	No		0
7	No		0	**14**	yes	5500000	5548600

2. Technical Support

a. Has your agency conducted or funded workshops addressing CUWCC procedures for calculating program savings, costs and cost-effectiveness?	No
b. Has your agency conducted or funded workshops addressing retail agencies' BMP implementation reporting requirements?	No
c. Has your agency conducted or funded workshops addressing:	
1) ULFT replacement	No
2) Residential retrofits	No
3) Commercial, industrial, and institutional surveys	yes
4) Residential and large turf irrigation	yes
5) Conservation-related rates and pricing	No

3. Staff Resources by BMP

BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP	BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP
1	yes	.45	**8**	No	
2	yes	.45	**9**	yes	2
3	No		**10**	yes	2.2
4	No		**11**	No	
5	yes	2.7	**12**	No	
6	yes	1.4	**13**	No	
7	No		**14**	yes	1.2

4. Regional Programs by BMP

BMP	Implementation/ Management Program?	BMP	Implementation/ Management Program?
1	No	**8**	yes
2	No	**9**	yes

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2005**

3	No	**10**	No
4	No	**11**	No
5	yes	**12**	No
6	yes	**13**	No
7	yes	**14**	No

B. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

C. Comments

BMP 11: Conservation Pricing

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2005**

A. Implementation

	Water Service Rate Structure Data by Customer Class		
	Number of schedules:	**Use of classification:**	**Rate structure:**
	For the following accounts, how many rate schedules does agency offer/use?	This agency:	Click link for each rate schedule:
	1. Single-family residential: 0	Does not offer	
	2. Multi-family residential: 0	Does not offer	
	3. Commercial: 0	Does not offer	
	4. Industrial: 0	Does not offer	
	5. Institutional/ government: 0	Does not offer	
	6. Dedicated irrigation (potable water): 0	Does not serve	
	7. Other: 0	Does not offer	
	8. Recycled-reclaimed water: 0	Does not offer	
	9. Raw water (urban use): 0	Uses class	
	10. Wholesale (urban use): 1	Uses class	RATES ENTERED
	Sewer Service		
	11. Does your agency provide sewer service to your water customers?		no
	12. Does all sewer service use conservation rate structures?		no
	13. Has your agency made the required efforts (as prescribed in BMP 11) to have sewer services billed on conservation rates?		no
	14. What water agency activities have been undertaken during the reporting period to achieve waste water agency volumetric billing in your water agency service area?		None

B. "At Least As Effective As"

	1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No
	a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	

C. Comments

BMP 12: Conservation Coordinator

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2005**

A. Implementation

	1. Does your Agency have a conservation coordinator?	yes
	2. Is a coordinator position supplied by another agency with which you cooperate in a regional conservation program ?	no
	a. Partner agency's name:	
	3. If your agency supplies the conservation coordinator:	
	a. What percent is this conservation coordinator's position?	80%
	b. Coordinator's Name	Andy Hui
	c. Coordinator's Title	Unit Manager V
	d. Coordinator's Experience and Number of Years	3 years managing unit
	e. Date Coordinator's position was created (mm/dd/yyyy)	8/8/1988
	4. Number of conservation staff (FTEs), including Conservation Coordinator.	10

B. Conservation Program Expenditures

	1. Staffing Expenditures (In-house Only)	1811000
	2. BMP Program Implementation Expenditures (Total of all BMPs)	10606226

C. "At Least As Effective As"

	1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	no
	a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	

D. Comments

	RSU Labor (including travel, training, materials, etc)(minus 45400-45550)+ $500,000 (to cover AH and TB whose salary expenses are under AS's budget) x 0.65 = BMP staff expenses

Water Supply & Reuse

Reporting Unit:	Year:
Metropolitan Water District of SC	**2006**

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type
CRA	611972	Imported
SWP	1625990	Imported

Total AF: 2237962

Purchaser Information

Name of Agency	Quantity (AF) Supplied	Retailer or Wholesaler
Anaheim	31271.4	retail
Beverly Hills	12045.7	retail
Burbank	13031.7	retail
Calleguas MWD	112681.6	wholesale
Central Basin MWD	87261.8	wholesale
Compton	2808.1	retail
Eastern MWD	11850.5	wholesale
Eastern MWD	104225.1	retail
Foothill	10518.3	wholesale
Fullerton	17794.7	retail
Glendale	22317.3	retail
Inland Empire UA	86428.2	wholesale
Las Virgenes MWD	22689.4	retail
Long Beach	44252.7	retail
Los Angeles	208864.1	retail
MWD of Orange County	284399.1	wholesale
Pasadena	21593.5	retail
San Diego CWA	572771.4	wholesale
San Fernado	801.9	retail
San Marino	1208.6	retail
Santa Ana	22007.3	retail
Santa Monica	12885.4	retail
Three Valleys MWD	63447.7	wholesale
Torrance	21337.8	retail
Upper San Gabriel Valley MWD	75565.5	wholesale
West Basin MWD	143485.1	wholesale
Western MWD	89024	wholesale

Total AF: 2096567.9

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2006**

A. Implementation		
	1. Does your agency own or operate a water distribution system?	yes
	2. Has your agency completed a pre-screening system audit for this reporting year?	yes
	3. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
	a. Determine metered sales (AF)	2039602.2
	b. Determine other system verifiable uses (AF)	0
	c. Determine total supply into the system (AF)	2357014.2
	d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.87
	4. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
	5. Did your agency complete a full-scale audit during this report year?	yes
	6. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	yes
	7. Does your agency operate a system leak detection program?	yes
	a. If yes, describe the leak detection program: Metropolitan's system is monitored by 10+ patrols who also collect WQ samples, pilots flying the CRA and pipeline staff in the normal course of their duties. If evidence of leaking water is detected near any of our facilities, we analyze a water sample to determine if it's our water leaking. Normally it is not. If it is, we may hire a leak detection firm to locate the leak.	
B. Survey Data		
	1. Total number of miles of distribution system line.	1017
	2. Number of miles of distribution system line surveyed.	1017
C. "At Least As Effective As"		
	1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No
	a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	
D. Comments		

BMP 07: Public Information Programs

Reporting Unit:	Form Status:	Year:
Metropolitan Water District of SC	**CUWCC Reviewed**	**2006**

A. Implementation

1. How is your public information program implemented?
   Wholesaler implements program (none or minimal retailer participation)

2. Describe the program and how it's organized:
   Major advertising and public relations campaign promoting outdoor water use efficiency and California Friendly landscaping. Educational brochures and campaign artworkincluding bill-stuffers available for retailer and sub-agency use.

3. Indicate which and how many of the following activities are included in your public information program:

Region-Wide Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	6308
b. Public Service Announcement	yes	0
c. Bill Inserts / Newsletters / Brochures	yes	12
d. Bill showing water usage in comparison to previous year's usage	no	
e. Demonstration Gardens	yes	30
f. Special Events, Media Events	yes	10
g. Speaker's Bureau	yes	0
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

1. Annual Expenditures (Excluding Staffing)	3800000

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."
NA

D. Comments

NA

BMP 08: School Education Programs

Reporting Unit:	Form Status:	Year:
Metropolitan Water District of SC	**CUWCC Reviewed**	**2006**

A. Implementation

1. How is your public information program implemented?
   Wholesaler and retailer both participate in program

2. Please provide information on your region-wide school programs (by grade level):

Grade	Are grade- appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	11	28917	378
Grades 4th-6th	yes	22	38556	503
Grades 7th-8th	yes	13	13494	186
High School	yes	14	15	192

4. Did your Agency's materials meet state education framework requirements?	yes
5. When did your Agency begin implementing this program?	11/1/1983

B. School Education Program Expenditures

1. Annual Expenditures (Excluding Staffing)	509450

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2006**

A. Implementation

1. Financial Support by BMP

BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded	BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded
1	yes	70000	31780	**8**	No	0	0
2	yes	350000	225460	**9**	yes	25000000	2679214
3	No	0	0	**10**	No	0	0
4	No	0	0	**11**	No	0	0
5	yes	250000	195213	**12**	No	0	0
6	yes	3000000	3047545	**13**	No	0	0
7	No	0	0	**14**	yes	4500000	4159840

2. Technical Support

a. Has your agency conducted or funded workshops addressing CUWCC procedures for calculating program savings, costs and cost-effectiveness?	No
b. Has your agency conducted or funded workshops addressing retail agencies' BMP implementation reporting requirements?	No
c. Has your agency conducted or funded workshops addressing:	
1) ULFT replacement	No
2) Residential retrofits	No
3) Commercial, industrial, and institutional surveys	yes
4) Residential and large turf irrigation	yes
5) Conservation-related rates and pricing	No

3. Staff Resources by BMP

BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP	BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP
1	yes	.45	**8**	No	
2	yes	.45	**9**	yes	2
3	No		**10**	yes	2.2
4	No		**11**	No	
5	yes	2.7	**12**	No	
6	yes	1.4	**13**	No	
7	No		**14**	yes	1.2

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2006**

4. Regional Programs by BMP

BMP	Implementation/ Management Program?	BMP	Implementation/ Management Program?
1	No	**8**	yes
2	No	**9**	yes
3	No	**10**	No
4	No	**11**	No
5	yes	**12**	No
6	yes	**13**	No
7	yes	**14**	No

B. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

C. Comments

BMP 11: Conservation Pricing

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2006**

A. Implementation

Water Service Rate Structure Data by Customer Class

Number of schedules:	**Use of classification:**	**Rate structure:**
For the following accounts, how many rate schedules does agency offer/use?	This agency:	Click link for each rate schedule:
1. Single-family residential: 0	Does not offer	
2. Multi-family residential: 0	Does not offer	
3. Commercial: 0	Does not offer	
4. Industrial: 0	Does not offer	
5. Institutional/ government: 0	Does not offer	
6. Dedicated irrigation (potable water): 0	Does not offer	
7. Other: 0	Does not offer	
8. Recycled-reclaimed water: 0	Does not offer	
9. Raw water (urban use): 0	Does not offer	
10. Wholesale (urban use): 2	Uses class	RATES ENTERED

Sewer Service

11. Does your agency provide sewer service to your water customers?	no
12. Does all sewer service use conservation rate structures?	no
13. Has your agency made the required efforts (as prescribed in BMP 11) to have sewer services billed on conservation rates?	no
14. What water agency activities have been undertaken during the reporting period to achieve waste water agency volumetric billing in your water agency service area?	None

B. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

C. Comments

BMP 12: Conservation Coordinator

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2006**

A. Implementation

	1. Does your Agency have a conservation coordinator?	yes
	2. Is a coordinator position supplied by another agency with which you cooperate in a regional conservation program ?	no
	a. Partner agency's name:	
	3. If your agency supplies the conservation coordinator:	
	a. What percent is this conservation coordinator's position?	80%
	b. Coordinator's Name	Andy Hui
	c. Coordinator's Title	Unit Manager V
	d. Coordinator's Experience and Number of Years	4 years managing unit
	e. Date Coordinator's position was created (mm/dd/yyyy)	8/8/1988
	4. Number of conservation staff (FTEs), including Conservation Coordinator.	10

B. Conservation Program Expenditures

	1. Staffing Expenditures (In-house Only)	1811000
	2. BMP Program Implementation Expenditures (Total of all BMPs)	10891889

C. "At Least As Effective As"

	1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	no
	a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	

D. Comments

	RSU Labor (including travel, training, materials, etc)(minus 45400-45550)+ $500,000 (to cover AH and TB whose salary expenses are under AS's budget) x 0.65 = BMP staff expenses

Water Supply & Reuse

Reporting Unit:	Year:
Metropolitan Water District of SC	**2007**

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type
CRA	662539	Imported
SWP	1788579	Imported

Total AF: 2451118

Purchaser Information

Name of Agency	Quantity (AF) Supplied	Retailer or Wholesaler
Anaheim	23741.1	retail
Beverly Hills	12775.5	retail
Burbank	13401.4	retail
Calleguas MWD	130688.5	wholesale
Central Basin MWD	119236.9	wholesale
Compton	3694.7	retail
Foothill	12520.8	wholesale
Glendale	23828.8	retail
Inland Empire UA	77717.9	wholesale
Las Virgenes	25372.6	retail
Long Beach	43644.9	retail
Los Angeles	291375	retail
MWD of Orange County	322021.4	wholesale
Pasadena	25309.2	retail
San Diego CWA	609396.6	wholesale
San Fernando	902	retail
San Marino	1572.9	retail
Santa Ana	18427.4	retail
Santa Monica	13472.5	retail
Three Valleys MWD	68454	wholesale
Torrance	21100.3	retail
Upper San Gabriel MWD	15271.7	wholesale
West Basin MWD	149226.4	wholesale
Western MWD	117924.8	wholesale
Eastern MWD	125051.7	retail
Eastern MWD	5210.5	wholesale
Fullerton	16276.6	retail

Total AF: 2287616.1

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2007**

A. Implementation

	1. Does your agency own or operate a water distribution system?	yes
	2. Has your agency completed a pre-screening system audit for this reporting year?	yes
	3. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
	a. Determine metered sales (AF)	2287617.1
	b. Determine other system verifiable uses (AF)	0
	c. Determine total supply into the system (AF)	2357014.2
	d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.97
	4. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
	5. Did your agency complete a full-scale audit during this report year?	yes
	6. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	yes
	7. Does your agency operate a system leak detection program?	yes
	a. If yes, describe the leak detection program: Metropolitan's system is monitored by 10+ patrols who also collect WQ samples, pilots flying the CRA and pipeline staff in the normal course of their duties. If evidence of leaking water is detected near any of our facilities, we analyze a water sample to determine if it's our water leaking. Normally it is not. If it is, we may hire a leak detection firm to locate the leak.	

B. Survey Data

	1. Total number of miles of distribution system line.	1017
	2. Number of miles of distribution system line surveyed.	1017

C. "At Least As Effective As"

	1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No
	a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	

D. Comments

BMP 07: Public Information Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2007**

A. Implementation

	1. How is your public information program implemented? Wholesaler implements program (none or minimal retailer participation)		
	2. Describe the program and how it's organized: Major advertising and public relations campaign promoting outdoor water use efficiency and California Friendly landscaping. Educational brochures and campaign artworkincluding bill-stuffers available for retailer and sub-agency use.		
	3. Indicate which and how many of the following activities are included in your public information program:		
	Region-Wide Public Information Program Activity	**Yes/No**	**Number of Events**
	a. Paid Advertising	yes	5769
	b. Public Service Announcement	yes	300
	c. Bill Inserts / Newsletters / Brochures	yes	25
	d. Bill showing water usage in comparison to previous year's usage	no	
	e. Demonstration Gardens	yes	22
	f. Special Events, Media Events	yes	13
	g. Speaker's Bureau	yes	14
	h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	1. Annual Expenditures (Excluding Staffing)	1522124

C. "At Least As Effective As"

	1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No
	a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	

D. Comments

BMP 08: School Education Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2007**

A. Implementation

1. How is your public information program implemented?
   Wholesaler implements program (none or minimal retailer participation)

2. Please provide information on your region-wide school programs (by grade level):

Grade	Are grade- appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	14	8991	86
Grades 4th-6th	yes	25	42958	418
Grades 7th-8th	yes	19	25975	253
High School	yes	16	21978	214

4. Did your Agency's materials meet state education framework requirements?	yes
5. When did your Agency begin implementing this program?	11/1/1983

B. School Education Program Expenditures

1. Annual Expenditures (Excluding Staffing)	488000

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2007**

A. Implementation

1. Financial Support by BMP

BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded	BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded
1	yes	50000	49288	**8**	No		
2	yes	30000	29040	**9**	yes	6000000	5265935
3	No			**10**	No		
4	No			**11**	No		
5	yes	2000000	1318574	**12**	No		
6	yes	3000000	2262078	**13**	No		
7	No			**14**	yes	7000000	6485726

2. Technical Support

a. Has your agency conducted or funded workshops addressing CUWCC procedures for calculating program savings, costs and cost-effectiveness?	No
b. Has your agency conducted or funded workshops addressing retail agencies' BMP implementation reporting requirements?	No
c. Has your agency conducted or funded workshops addressing:	
1) ULFT replacement	No
2) Residential retrofits	No
3) Commercial, industrial, and institutional surveys	yes
4) Residential and large turf irrigation	yes
5) Conservation-related rates and pricing	No

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2007**

3. Staff Resources by BMP

BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP	BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP
1	yes	.5	**8**	No	
2	yes	.5	**9**	yes	2
3	No		**10**	yes	2.5
4	No		**11**	No	
5	yes	2.5	**12**	No	
6	yes	1.5	**13**	No	
7	No		**14**	yes	1.25

4. Regional Programs by BMP

BMP	Implementation/ Management Program?	BMP	Implementation/ Management Program?
1	No	**8**	yes
2	No	**9**	yes
3	No	**10**	No
4	No	**11**	No
5	yes	**12**	No
6	yes	**13**	No
7	yes	**14**	No

B. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

C. Comments

BMP 12: Conservation Coordinator

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2007**

A. Implementation		
	1. Does your Agency have a conservation coordinator?	yes
	2. Is a coordinator position supplied by another agency with which you cooperate in a regional conservation program ?	no
	a. Partner agency's name:	
	3. If your agency supplies the conservation coordinator:	
	a. What percent is this conservation coordinator's position?	80%
	b. Coordinator's Name	Andy Hui
	c. Coordinator's Title	Unit Manager V
	d. Coordinator's Experience and Number of Years	5 years managing unit
	e. Date Coordinator's position was created (mm/dd/yyyy)	8/8/1988
	4. Number of conservation staff (FTEs), including Conservation Coordinator.	14
B. Conservation Program Expenditures		
	1. Staffing Expenditures (In-house Only)	2605400
	2. BMP Program Implementation Expenditures (Total of all BMPs)	17581628
C. "At Least As Effective As"		
	1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	no
	a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	
D. Comments		
	RSU Labor (including travel, training, materials, etc)(minus 45400-45550)+ $500,000 (to cover AH and TB whose salary expenses are under AS's budget) x 0.65 = BMP staff expenses	

Water Supply & Reuse

Reporting Unit: **Metropolitan Water District of SC**	Year: **2008**

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type
SWP	1312397	Imported
CRA	801018	Imported

Total AF: 2113415

Purchaser Information

Name of Agency	Quantity (AF) Supplied	Retailer or Wholesaler
Anaheim	15271.9	retail
Beverly Hills	12179.3	retail
Burbank	14596.6	retail
Callegua MWD	131364.2	wholesale
Central Basin MWD	59053.6	wholesale
Compton	2237.3	retail
Eastern MWD	104691.5	retail
Eastern MWD	4362.2	wholesale
Foothill	12305.5	wholesale
Fullerton	9224.8	retail
Glendale	21880.6	retail
Inland Empire UA	69040.8	wholesale
Las Virgenes MWD	27064.5	wholesale
Long Beach	35330.1	retail
Los Angeles	422313.8	retail
MWD of Orange County	229682.4	wholesale
Pasadena	25517	retail
San Fernando	.2	retail
San Diego CWA	562208.1	wholesale
San Marino	895.1	retail
Santa Ana	8520.8	retail
Santa Monica	12563.6	retail
Three Valleys MWD	72828.6	wholesale
Torrance	19306.2	retail
Upper San Gabriel MWD	70998.4	wholesale
West Basin MWD	135546.9	wholesale
Western MWD	105945	wholesale

Total AF: 2184929

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2008**
A. Implementation		
	1. Does your agency own or operate a water distribution system?	yes
	2. Has your agency completed a pre-screening system audit for this reporting year?	yes
	3. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
	a. Determine metered sales (AF)	2184929
	b. Determine other system verifiable uses (AF)	0
	c. Determine total supply into the system (AF)	2206548
	d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.99
	4. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
	5. Did your agency complete a full-scale audit during this report year?	yes
	6. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	yes
	7. Does your agency operate a system leak detection program?	yes
	a. If yes, describe the leak detection program: Metropolitan's system is monitored by 10+ patrols who also collect WQ samples, pilots flying the CRA and pipeline staff in the normal course of their duties. If evidence of leaking water is detected near any of our facilities, we analyze a water sample to determine if it's our water leaking. Normally it is not. If it is, we may hire a leak detection firm to locate the leak.	
B. Survey Data		
	1. Total number of miles of distribution system line.	1017
	2. Number of miles of distribution system line surveyed.	1017
C. "At Least As Effective As"		
	1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No
	a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	
D. Comments		
Voluntary Questions (Not used to calculate compliance)		

E. Volumes

		Estimated	Verified
	1. Volume of raw water supplied to the system		
	2. Volume treated water supplied into the system		
	3. Volume of water exported from the system		
	4. Volume of billed authorized metered consumption		
	5. Volume of billed authorized un-metered consumption		

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**			Year: **2008**
	6. Volume of unbilled authorized metered consumption			
	7. Volume of unbilled authorized unmetered consumption			
F. Infrastructure and Hydraulics				
	1. Are system input (source or master meter) volumes metered at the entry to the:			
	2. How frequently are system input volumes tested and calibrated:		# months	
	3. Length of mains			
	4. What % distribution of mains are rigid pipes (metal, ac, concrete)			
	5. Number of service connections			
	6. What % of service connections are rigid pipes (metal)			
	7. Are residential properties fully metered?			
	8. Are non-residential properties fully metered?			
	9. Provide an estimate of customer meter under-registration:			
	10. Average length of customer service line from the main to the point of the meter:			
	11. Average system pressure:			
	12. Range of system pressures:			
	13. What percentage of the system is fed from gravity feed:			
	14. What percentage of the system is fed by pumping and re-pumping:			
G. Maintenance Questions				
	1. Who is responsible for providing, testing, repairing and replacing customer meters?			
	2. Does your agency test, repair and replace your meters on a regular timed schedule?			
	a. If yes, does your agency test by meter size or customer category?			
	b. If yes to meter size, please provide the frequency of testing by meter size:			
	• Less than or equal to 1"			# years
	• 1.5" to 2"		# years	
	• 3" and Larger		# months	
	c. If yes to customer category, provide the frequency of testing by customer category:			
	• SF residential		# years	
	• MF residential		# years	

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**		Year: **2008**
	• Commercial	# months	
	• Industrial & Institutional	# months	
	3. Who is responsible for repairs to the customer lateral or customer service line?:		
	4. Who is responsible for service line repairs downstream of the customer meter?:		
	5. Does your agency proactively search for leaks using leak survey techniques or does your utility reactively repair leaks which are called in, or both?		
	6. What is the utility budget breakdown for:		
	• Leak Detection	$	
	• Leak Repair	$	
	• Auditing and Water Loss Evaluation		$
	• Meter Testing		$

BMP 07: Public Information Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2008**

A. Implementation

1. How is your public information program implemented?
   Wholesaler implements program (none or minimal retailer participation)

2. Describe the program and how it's organized:
   Major advertising and public relations campaign promoting outdoor water use efficiency and California Friendly landscaping. Educational brochures and campaign artwork including bill-stuffers available for retailer and sub-agency use.

3. Indicate which and how many of the following activities are included in your public information program:

Region-Wide Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	27329
b. Public Service Announcement	yes	531
c. Bill Inserts / Newsletters / Brochures	yes	26
d. Bill showing water usage in comparison to previous year's usage	no	
e. Demonstration Gardens	yes	8
f. Special Events, Media Events	yes	17
g. Speaker's Bureau	yes	37
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

1. Annual Expenditures (Excluding Staffing)	5958089

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

BMP 08: School Education Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2008**

A. Implementation

1. How is your public information program implemented?
   Wholesaler implements program (none or minimal retailer participation)

2. Please provide information on your region-wide school programs (by grade level):

Grade	Are grade- appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	12	7594	69
Grades 4th-6th	yes	23	36281	326
Grades 7th-8th	yes	16	21937	198
High School	yes	11	18562	160

4. Did your Agency's materials meet state education framework requirements?	yes
5. When did your Agency begin implementing this program?	11/1/1983

B. School Education Program Expenditures

1. Annual Expenditures (Excluding Staffing)	495000

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2008**

A. Implementation

1. Financial Support by BMP

BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded	BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded
1	yes	10000	7363	**8**	No		
2	yes	10000	12543	**9**	yes	6000000	6381198
3	No			**10**	No		
4	No			**11**	No		
5	yes	2000000	3602141	**12**	No		
6	yes	3000000	3456924	**13**	No		
7	No			**14**	yes	6000000	4639325

2. Technical Support

a. Has your agency conducted or funded workshops addressing CUWCC procedures for calculating program savings, costs and cost-effectiveness?	No
b. Has your agency conducted or funded workshops addressing retail agencies' BMP implementation reporting requirements?	No
c. Has your agency conducted or funded workshops addressing:	
1) ULFT replacement	No
2) Residential retrofits	No
3) Commercial, industrial, and institutional surveys	yes
4) Residential and large turf irrigation	yes
5) Conservation-related rates and pricing	No

3. Staff Resources by BMP

BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP	BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP
1	yes	.5	**8**	No	
2	yes	.5	**9**	yes	2
3	No		**10**	yes	2.5
4	No		**11**	No	
5	yes	2.5	**12**	No	
6	yes	1.5	**13**	No	
7	No		**14**	yes	1.25

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2008**

4. Regional Programs by BMP

BMP	Implementation/ Management Program?	BMP	Implementation/ Management Program?
1	No	**8**	yes
2	No	**9**	yes
3	No	**10**	No
4	No	**11**	No
5	yes	**12**	No
6	yes	**13**	No
7	yes	**14**	No

B. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

C. Comments

BMP 12: Conservation Coordinator

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2008**

A. Implementation		
	1. Does your Agency have a conservation coordinator?	yes
	2. Is a coordinator position supplied by another agency with which you cooperate in a regional conservation program?	no
	a. Partner agency's name:	
	3. If your agency supplies the conservation coordinator:	
	a. What percent is this conservation coordinator's position?	80%
	b. Coordinator's Name	Andy Hui
	c. Coordinator's Title	Unit Manager V
	d. Coordinator's Experience and Number of Years	6 years managing unit
	e. Date Coordinator's position was created (mm/dd/yyyy)	8/8/1988
	4. Number of conservation staff (FTEs), including Conservation Coordinator.	17
B. Conservation Program Expenditures		
	1. Staffing Expenditures (In-house Only)	2521325
	2. BMP Program Implementation Expenditures (Total of all BMPs)	13554507
C. "At Least As Effective As"		
	1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	no
	a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	
D. Comments		