As Metropolitan played major roles on Colorado River and California water issues and built record water reserves, it increased water conservation rebates and emphasized native plants.

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

ANNUAL REPORT FOR THE FISCAL YEAR

July 1, 2018 to June 30, 2019

LOS ANGELES, CALIFORNIA
2019

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FIGURES

LIST OF ABBREVIATIONS

Abbreviation	Term
AB	Assembly Bill
AEPCO	Arizona Electric Power Cooperative
AF	Acre-feet or acre-foot
AFY	Acre-feet or acre-foot per year
AVEK	Antelope Valley East-Kern Water Agency
AWWA	American Water Works Association
CAISO	California Independent System Operator
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CFO	Chief Financial Officer
CFU	Colony forming units
CIP	Capital Investment Plan
CRA	Colorado River Aqueduct
CY	Calendar year
DART	Days Away, Restricted, or Transferred
DBP	Disinfection Byproducts
DCA	Delta Conveyance Design and Construction Joint Powers Authority
DDW	Division of Drinking Water
DOE	Department of Energy
DCP	Drought Contingency Plan
DVL	Diamond Valley Lake
DWR	Department of Water Resources
EEO	Equal Employment Opportunity
EOC	Emergency Operations Center
FY	Fiscal year
GFOA	Government Finance Officers Association
GHG	Greenhouse gases
HAA5	Five haloacetic acids
ICS	Intentionally Created Surplus
IID	Imperial Irrigation District
IRP	Integrated Water Resources Plan
LRP	Local Resources Program
LRAA	Locational Running Annual Average

LIST OF ABBREVIATIONS

Abbreviation	Term
µg/L	Micrograms per liter
MAF	Million acre-feet
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MGD	Million gallons per day
MIB	Methylisoborneol
MMU	Metropolitan Management University
MOU	Memorandum of Understanding
ND	Not detected
NDMA	N-Nitrosodimethylamine
PCCP	Prestressed Concrete Cylinder Pipe
PCS	Pressure Control Structure
PFAS	Per- and polyfluoroalkyl substances
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PPB	Parts per billion
PVID	Palo Verde Irrigation District
RAA	Running Annual Average
SB	Senate Bill
SDCWA	San Diego County Water Authority
SWC	State Water Contractors
SWP	State Water Project
SWRCB	State Water Resources Control Board
T&O	Taste and odor
TCP	1,2,3-trichloropropane
TDS	Total dissolved solids
TOC	Total organic carbon
TTHM	Total trihalomethane
USEPA	U.S. Environmental Protection Agency
WAPA	Western Area Power Administration
WRM	Water Resource Management
WSO	Water System Operations
WTP	Water Treatment Plant

These straw-shaped membranes remove microorganisms at the Regional Recycled Water Advanced Purification Center, a 500,000-gallon per day demonstration facility in Carson finished in 2019.

Chairwoman Gloria D. Gray made history as Metropolitan's first African-American female board chair in January 2019, succeeding Randy A. Record.

About Metropolitan

The Metropolitan Water District of Southern California is a regional wholesaler that delivers water to 26 member public agencies serving about 19 million people living in Los Angeles, Orange, Riverside, San Bernardino, San Diego and Ventura counties.

Metropolitan is governed by a 38-member board of directors representing the 26 member agencies consisting of 14 cities, 11 municipal water districts and one county water authority, which directly or through their subagencies serve the residents and businesses of more than 300 cities and numerous unincorporated communities.

Metropolitan directors are selected by their respective member agencies and may serve on the board of that particular member agency. It is a diverse group drawn from a variety of sectors, including business, government, engineering, agriculture, non-governmental organizations and the community at large. The board operates under a weighted voting system, with voting share determined by assessed property valuation.

The mission of Metropolitan is to provide its 5,200-square-mile service area with adequate and reliable supplies of high-quality water to meet present and future needs in an environmentally and economically responsible way.

To supply Southern California with reliable and safe water, Metropolitan owns and operates an extensive range of facilities including the Colorado River Aqueduct, 16 hydroelectric plants, nine reservoirs, 830 miles of large-scale pipes, and five water treatment plants. Four of these treatment plants are among the 10 largest plants in the nation. In fact, Metropolitan is the largest distributor of treated drinking water in the United States.

The district imports water from the Colorado River and Northern California to supplement local supplies, and helps its member agencies develop increased water conservation, recycling, storage and other local resource programs.

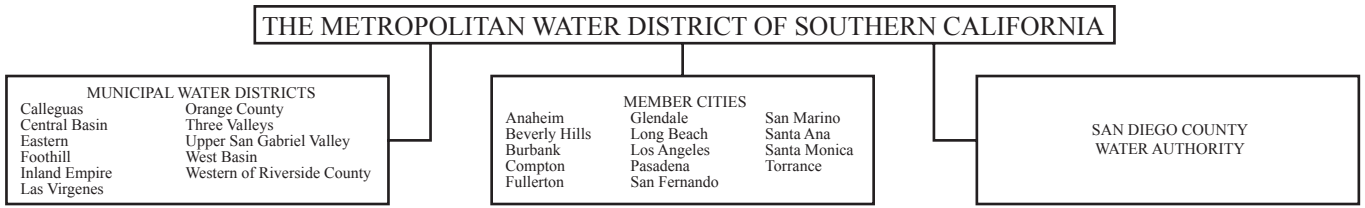
Metropolitan was established in 1928 under an act of the state Legislature to construct and operate the 242-mile Colorado River Aqueduct, which runs from an intake at Lake Havasu on the California-Arizona border, to an endpoint at Metropolitan's Lake Mathews reservoir in Riverside County.

When Metropolitan began delivering water, its service area consisted of approximately 625 square miles. Its service area has increased by 4,575 square miles since that time. The expansion is primarily the result of annexation of the service areas of member agencies.

In 1960, Metropolitan, followed by 30 other public agencies, signed a long-term contract that made possible the construction of the State Water Project's 444-mile California Aqueduct, which currently serves urban and agricultural agencies from the San Francisco Bay Area to Southern California. As the largest of the State Water Contractors, Metropolitan contracts with the state Department of Water Resources, which operates the SWP, for slightly less than half of all SWP allocations.

Water supplies from the SWP travel to Southern California via the California Aqueduct. Metropolitan also has groundwater banking partnerships and water transfer arrangements that secure additional supplies, and provides financial incentives to its member agencies for local investments in water management projects and programs. An increasing percentage of Southern California's water supply comes from these local sources, including conservation, water recycling and recovered groundwater.

Metropolitan's Board of Directors typically meets on the second Tuesday of each month. Board committee meetings usually occur on the Monday preceding the board meeting, and the second and fourth Tuesday of the month. Board and committee meetings are open to the public and are broadcast on the internet through Metropolitan's website, mwdh2o.com. A schedule of board and committee meetings is available on the website. An online archive of board documents dating back to the 1920s is also available.



Calleguas MWD
Berylwood Heights Mutual Water
Brandeis Mutual
Butler Ranch
California American Water Company
California Water Service Company
Camarillo
Camrosa Water District
Crestview Mutual Water Company
Golden State Water Company
Oxnard Pleasant Valley Mutual Water Company
Simi Valley
Solano Verde Mutual Water Company
Thousand Oaks
Triunfo Water and Sanitation District
Ventura Co. Waterworks Dists. (Nos.1, 19 and 38)
Zone Mutual Water Company

Central Basin MWD
Bell Gardens
Bellflower-Somerset Mutual Water Co.
California Water Service Company
Cerritos
Commerce
Downey
Golden State Water Company
Huntington Park
La Habra Heights County Water District
Lakewood
Liberty Utilities
L.A. County Rancho Los Amigos
Lynwood
Maywood Mutual Water Co. Nos. 1, 2 and 3
Montebello
Norwalk
Orchard Dale Water District
Paramount
San Gabriel Valley Water Company
Santa Fe Springs
Signal Hill
South Gate
Suburban Water Systems
Vernon
Walnut Park Mutual Water Company
Water Replenishment District of So. Cal.

Eastern MWD
Hemet
Lake Hemet Municipal Water District
Nuevo Water Company
Perris
Rancho California Water District
San Jacinto

Foothill MWD
Crescenta Valley Water District
La Canada Irrigation District
Las Flores Water Company
Liberty Utilities
Lincoln Avenue Water Company
Rubio Canon Land & Water Assoc.
Valley Water Company

Inland Empire Utilities Agency
Chino
Chino Hills
Cucamonga Valley Water District
Fontana Water Company
Monte Vista Water District
Ontario
San Antonio Water Company
Upland
Water Facilities Authority

MWD of Orange County
Brea
Buena Park
East Orange County Water District
El Toro Water District
Emerald Bay Service District
Fountain Valley
Garden Grove
Golden State Water Company
Huntington Beach
Irvine Ranch Water District
La Habra
La Palma
Laguna Beach County Water Dist.
Mesa Water District
Moulton Niguel Water District
Newport Beach
Orange
Orange County Water District
San Clemente
San Juan Capistrano
Santa Margarita Water District
Seal Beach
Serrano Water District
South Coast Water District
Trabuco Canyon Water District
Tustin
Westminster
Yorba Linda Water District

San Diego County Water Authority
Carlsbad Municipal Water District
Del Mar
Escondido
Fallbrook Public Utility District
Helix Water District
Lakeside Water District
National City
Oceanside
Olivenhain Municipal Water District
Otay Water District
Padre Dam Municipal Water District
Camp Pendleton Marine Corps Base
Poway
Rainbow Municipal Water District
Ramona Municipal Water District
Rincon del Diablo Municipal Water District
San Diego
San Dieguito Water District
Santa Fe Irrigation District
South Bay Irrigation District
Sweetwater Authority
Vallecitos Water District
Valley Center Municipal Water District
Vista Irrigation District
Yuima Municipal Water District

Three Valleys MWD
Boy Scouts of America, Firestone Ranch Reserv.
Cal Poly Pomona
Covina
Covina Irrigating Company
Glendora
Golden State Water Co. (Claremont & San Dimas)
La Verne
Mt. San Antonio College
Pomona
Rowland Water District
Suburban Water Systems
Valencia Heights Water Company
Walnut Valley Water District

Upper San Gabriel Valley MWD
Arcadia
Azusa
Monrovia
Main San Gabriel Basin Watermaster/Alhambra
Golden State Water Company
South Pasadena
Suburban Water Systems
Valley County Water District

West Basin MWD
California American Water (L.A. Division)
California Water Service
Golden State Water Company
El Segundo
Inglewood
Lomita
Los Angeles County Waterworks District 29
Manhattan Beach
Water Replenishment Dist. of So. Cal.

Western MWD of Riverside County
Box Springs Mutual Water Company
Corona
Eagle Valley Mutual Water Company
Elsinore Valley MWD
Norco
Rancho California Water District
Riverside
Temescal Valley Water District

Figure 1. Composition of The Metropolitan Water District of Southern California

DIRECTORS
JUNE 30, 2019

Chairwoman
Gloria D. Gray
West Basin Municipal Water District

Vice Chair
Jerry Butkiewicz
San Diego County Water Authority

Vice Chair
Cynthia Kurtz
Pasadena

Vice Chair
Lorraine A. Paskett
Los Angeles

Secretary
Judy Abdo
Santa Monica

DIRECTORS
JUNE 30, 2019

Linda Ackerman
Municipal Water District of Orange County

Robert Apodaca
Central Basin Municipal Water District

Richard W. Atwater
Foothill Municipal Water District

Sylvia Ballin
San Fernando

Brett R. Barbre
Municipal Water District of Orange County

Steve Blois
Calleguas Municipal Water District

Gloria Cordero
Long Beach

Glen C. Dake
Los Angeles

David D. De Jesus
Three Valleys Municipal Water District

Larry D. Dick
Municipal Water District of Orange County

Stephen J. Faessel
Anaheim

Donald Galleano
Western Municipal Water District of Riverside County

DIRECTORS
JUNE 30, 2019

Mark Gold
Los Angeles

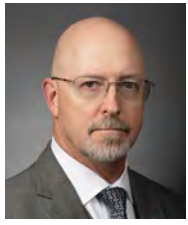
S. Gail Goldberg
San Diego County Water Authority

Jasmin A. Hall
Inland Empire Utilities Agency

Frank Heldman
Central Basin Municipal Water District

Michael T. Hogan
San Diego County Water Authority

Russell Lefevre
Torrance



Larry McKenney
Municipal Water District of Orange County

John T. Morris
San Marino

John W. Murray Jr.
Los Angeles

Adán Ortega
Fullerton

Glen D. Peterson
Las Virgenes Municipal Water District

Barry D. Pressman
Beverly Hills

DIRECTORS
JUNE 30, 2019

Jesús E. Quiñonez
Los Angeles

Marsha Ramos
Burbank

Randy A. Record
Eastern Municipal Water District

Zareh Sinanyan
Glendale

Tim Smith
San Diego County Water Authority

Jose Solorio
Santa Ana

Charles M. Treviño
Upper San Gabriel Valley Municipal Water District

Harold C. Williams
West Basin Municipal Water District

Janna Zurita
Compton

BOARD OF DIRECTORS
July 1, 2018 to June 30, 2019

OFFICERS OF THE BOARD

Chairman.....Randy A. Record
Chairwoman.....Gloria D. Gray
Vice Chair.....Linda Ackerman
Vice Chair.....Gloria D. Gray
Vice Chair.....John W. Murray Jr.
Vice Chair.....David De Jesus
Secretary.....Steve Blois
Vice Chair.....Jerry Butkiewicz
Vice Chair.....Cynthia Kurtz
Vice Chair.....Lorraine Paskett
Secretary.....Judy Abdo

MEMBERS OF THE BOARD

Anaheim.....Stephen J. Faessel
Beverly Hills.....Barry D. Pressman
Burbank.....Marsha Ramos
Calleguas Municipal Water District.....Steve Blois
Central Basin Municipal Water District.....Leticia Vasquez Wilson
Central Basin Municipal Water District.....William C. Gedney
Central Basin Municipal Water District.....Robert Apodaca
Central Basin Municipal Water District.....Frank M. Heldman
Compton.....Janna Zurita
Eastern Municipal Water District.....Randy A. Record
Foothill Municipal Water District.....Richard W. Atwater
Fullerton.....Peter A. Beard
Fullerton.....Adán Ortega
Glendale.....Zareh Sinanyan
Inland Empire Utilities Agency.....Michael Camacho
Inland Empire Utilities Agency.....Jasmin A. Hall
Las Virgenes Municipal Water District.....Glen D. Peterson
Long Beach.....Gloria Cordero
Los Angeles.....Glen C. Dake
Los Angeles.....John W. Murray Jr.
Los Angeles.....Jesús E. Quiñonez

Los Angeles ..... Lorraine Paskett
Los Angeles ..... Mark Gold
Municipal Water District of Orange County ..... Linda Ackerman
Municipal Water District of Orange County ..... Brett R. Barbre
Municipal Water District of Orange County ..... Larry D. Dick
Municipal Water District of Orange County ..... Larry McKenney
Pasadena ..... Cynthia Kurtz
San Diego County Water Authority..... Michael Hogan
San Diego County Water Authority..... Keith Lewinger
San Diego County Water Authority..... Fern Steiner
San Diego County Water Authority..... Elsa Saxod
San Diego County Water Authority..... Jerry Butkiewicz
San Diego County Water Authority..... Tim M. Smith
San Diego County Water Authority..... S. Gail Goldberg
San Fernando ..... Sylvia Ballin
San Fernando ..... Yazdan Emrani
San Marino..... John T. Morris
Santa Ana..... Michele Martinez
Santa Ana..... Jose Solorio
Santa Monica ..... Judy Abdo
Three Valleys Municipal Water District..... David D. De Jesus
Torrance..... Russell Lefevre
Upper San Gabriel Valley
Municipal Water District ..... Charles M. Treviño
West Basin Municipal Water District..... Gloria D. Gray
West Basin Municipal Water District..... Harold C. Williams
Western Municipal Water District
of Riverside County..... Donald Galleano

Note:
This list includes all officers and members who served on the board at any time during the fiscal year.

BOARD OF DIRECTORS
MEMBERS OF STANDING COMMITTEES
June 30, 2019

AUDIT AND ETHICS

Marsha Ramos, Chair
Lorraine Paskett, Vice Chair
Linda Ackerman
Sylvia Ballin
Brett R. Barbre
Jerry Butkiewicz
Michael T. Hogan
Cynthia Kurtz
Larry McKenney
Jésus E. Quiñonez
Tim M. Smith

EXECUTIVE COMMITTEE

Gloria D. Gray, Chair
Jerry Butkiewicz, Vice Chair
Cynthia Kurtz, Vice Chair
Lorraine Paskett, Vice Chair
Judy Abdo, Secretary
Richard W. Atwater
Gloria Cordero
Glen C. Dake
Michael T. Hogan
Larry McKenney
John W. Murray Jr.
Barry D. Pressman
Marsha Ramos
Randy A. Record
Tim M. Smith
Charles M. Treviño

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Cynthia Kurtz, Vice Chair
Judy Abdo
Linda Ackerman
Brett R. Barbre
Jerry Butkiewicz
Donald D. Galleano
Mark Gold
Larry McKenney
John T. Morris
John W. Murray Jr.
Glen D. Peterson
Randy A. Record
Tim M. Smith
Charles M. Treviño

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Steve Blois
Larry D. Dick
Stephen Faessel
Donald D. Galleano
Frank M. Heldman
Russell Lefevre
John T. Morris
John W. Murray Jr.
Adán Ortega
Glen D. Peterson
Charles M. Treviño
Harold C. Williams

FINANCE AND INSURANCE

Glen C. Dake, Chair
Randy A. Record, Vice Chair
Brett R. Barbre
Steve Blois
Larry D. Dick
Stephen Faessel
S. Gail Goldberg
Adán Ortega
Lorraine Paskett
Marsha Ramos
Tim M. Smith

LEGAL AND CLAIMS

Larry McKenney, Chair
Jesús E. Quiñonez, Vice Chair
Richard W. Atwater
Larry D. Dick
S. Gail Goldberg
Jasmin A. Hall
John W. Murray Jr.
Lorraine Paskett
Randy A. Record
Tim M. Smith

ORGANIZATION, PERSONNEL AND TECHNOLOGY

John W. Murray Jr., Chair
Janna Zurita, Vice Chair
Sylvia Ballin
Gloria Cordero
Stephen Faessel
Jasmin A. Hall
Frank M. Heldman
Michael T. Hogan
Larry McKenney
Adán Ortega
Jesús E. Quiñonez
Tim M. Smith
Jose Solorio
Charles M. Treviño
Harold C. Williams

REAL PROPERTY AND ASSET MANAGEMENT

Michael T. Hogan, Chair
Glen D. Peterson, Vice Chair
Glen C. Dake
Larry D. Dick
Frank M. Heldman
Cynthia Kurtz
Randy A. Record
Tim M. Smith

WATER PLANNING AND STEWARDSHIP

Richard W. Atwater, Chair
Cynthia Kurtz, Vice Chair
Judy Abdo
Linda Ackerman
Gloria Cordero
David D. De Jesus
Larry D. Dick
S. Gail Goldberg
Michael T. Hogan
Russell Lefevre
Larry McKenney
John T. Morris
Lorraine Paskett
Glen D. Peterson
Barry D. Pressman
Jesús E. Quiñonez
Randy A. Record

HISTORICAL
ROLL OF DIRECTORS
June 30, 2019

ANAHEIM

A. W. Franzen..... March 1, 1929 to April 11, 1930
O. E. Steward..... April 18, 1930 to April 12, 1935
E. P. Hapgood..... May 3, 1935 to June 14, 1960
Charles A. Pearson..... July 12, 1960 to May 8, 1972
Keith A. Murdoch..... June 13, 1972 to May 29, 1979
Joseph C. Truxaw ..... August 17, 1979 to November 20, 1990
Bob Kazarian ..... November 20, 1990 to July 12, 1994
Edward G. Alario..... November 8, 1994 to April 14, 1998
S. Dale Stanton ..... April 14, 1998 to July 8, 2004
Tom Tait ..... July 8, 2004 to December 13, 2005
Marcie L. Edwards..... December 13, 2005 to August 18, 2009
Kristine L. Murray ..... August 18, 2009 to August 20, 2014
Don Calkins ..... October 3, 2014 to June 8, 2015
STEPHEN J. FAESSEL ..... June 8, 2015 to

BEVERLY HILLS

Paul E. Schwab ..... March 1, 1929 to June 19, 1931
George R. Barker..... June 19, 1931 to August 2, 1935
Arthur Taylor..... August 2, 1935 to August 2, 1951
Floyd E. Fischer..... August 17, 1951 to December 2, 1977
Ellen Stern Harris ..... January 10, 1978 to March 10, 1981
Nicholas H. Cominos..... March 10, 1981 to September 1, 1984
Mel Odom..... January 11, 1983 to February 14, 1984
Ina S. Roth ..... February 14, 1984 to February 11, 1992
Dan Webster ..... March 10, 1992 to September 8, 1999
Betty H. Harris..... September 8, 1999 to June 14, 2007
Robert Wunderlich..... July 6, 2007 to October 10, 2017
BARRY D. PRESSMAN..... October 10, 2017 to

BURBANK

Harvey E. Bruce..... March 1, 1929 to February 11, 1933
James L. Norwood..... March 10, 1933 to April 30, 1943
May 9, 1947 to October 13, 1953
Frank C. Tillson..... May 14, 1943 to May 9, 1947
Walter H. Long ..... October 13, 1953 to June 13, 1961
Earle C. Blais..... June 13, 1961 to June 11, 1985
Michael A. Nolan..... June 11, 1985 to July 9, 1991
Larry L. Stamper..... July 9, 1991 to June 6, 1995
Thomas H. McCauley ..... June 6, 1995 to December 16, 1998

Fred Lantz ..... January 12, 1999 to March 9, 1999
George E. Battey Jr. ..... March 9, 1999 to December 10, 2001
Glenn A. Brown ..... December 10, 2001 to January 13, 2015
MARSHA RAMOS ..... January 13, 2015 to

CALLEGUAS MUNICIPAL WATER DISTRICT

Richard Bard ..... January 10, 1961 to August 22, 1969
Carl E. Ward ..... September 16, 1969 to February 9, 1993
Vincent M. Hardy ..... October 14, 1980 to June 30, 1990
Patrick H. Miller ..... August 21, 1990 to February 1, 1999
Jeffrey A. Borenstein ..... April 7, 1999 to December 31, 2000
Ted Grandsen ..... February 9, 1993 to December 11, 2012
Gail Pringle ..... December 11, 2012 to March 10, 2014
STEVE BLOIS ..... March 10, 2014 to

CENTRAL BASIN MUNICIPAL WATER DISTRICT

Milo Dellmann ..... November 23, 1954 to November 23, 1983
Claire S. Thompson ..... November 23, 1954 to November 30, 1959
Frank H. Wheelock ..... November 23, 1954 to April 10, 1973
Victor H. York ..... November 23, 1954 to November 30, 1963
E. Thornton Ibbetson ..... December 8, 1959 to January 12, 1998
William H. Kent ..... October 10, 1961 to April 7, 1977
Carl Fossette ..... March 13, 1973 to May 30, 1986
Douglas W. Ferguson ..... June 14, 1977 to August 11, 1993
Leonis C. Malburg ..... July 8, 1986 to May 8, 1995
Gary A. Morse ..... August 11, 1993 to February 10, 1997
January 5, 1999 to June 6, 2003
Jorge G. Castro ..... February 10, 1997 to March 9, 1999
Phillip J. Pace ..... May 8, 1995 to January 8, 2008
Richard F. Mayér ..... January 12, 1998 to January 5, 1999
Charles M. Treviño ..... March 9, 1999 to December 31, 2000
ROBERT APODACA ..... June 6, 2003 to August 18, 2009
February 11, 2013 to January 4, 2017
March 11, 2019 to
Phillip D. Hawkins ..... January 8, 2008 to February 11, 2013
July 7, 2014 to February 10, 2015
February 13, 2017 to March 13, 2017
June 25, 2018 to February 25, 2019
Edward C. Vasquez ..... August 18, 2009 to July 13, 2010
Rudy C. Montalvo ..... July 13, 2010 to February 11, 2013

Leticia Vasquez Wilson .....February 11, 2013 to July 7, 2014
February 10, 2015 to January 4, 2017
March 14, 2017 to February 25, 2019
Pedro Aceituno.....February 14, 2017 to March 13, 2017
William C. Gedney.....March 14, 2017 to June 25, 2018
FRANK M. HELDMAN.....March 11, 2019 to

COASTAL MUNICIPAL WATER DISTRICT
(absorbed into MWDOC in 2001)

C. C. Cravath.....August 14, 1942 to January 22, 1957
Lynndon L. Aufdenkamp .....January 22, 1957 to February 12, 1991
James E. O'Connor.....December 7, 1976 to July 1, 1979
John Killefer.....January 12, 1982 to September 9, 1993
Wayne T. McMurray.....February 12, 1991 to December 31, 2000
Donald C. Simpson .....October 7, 1996 to December 9, 1996
Langdon W. Owen .....December 9, 1996 to January 17, 2001

COMPTON

C. A. Dickison.....July 17, 1931 to January 20, 1933
William H. Foster.....January 20, 1933 to June 28, 1935
Warren W. Butler.....June 28, 1935 to January 24, 1980
Regina Murph .....March 11, 1980 to March 25, 2003
Kenneth M. Orduna.....April 8, 2003 to January 14, 2004
Isadore Hall III .....February 9, 2004 to April 13, 2009
Yvonne Arcenaux.....April 13, 2009 to September 14, 2010
March 11, 2014 to November 10, 2015
Diane Sanchez.....September 14, 2010 to March 11, 2014
JANNA ZURITA.....November 10, 2015 to

EASTERN MUNICIPAL WATER DISTRICT

Irwin E. Farrar.....August 31, 1951 to March 1, 1982
Doyle F. Boen .....March 9, 1982 to October 11, 1994
Chester C. Gilbert.....October 11, 1994 to June 1, 1999
Clayton A. Record Jr.....June 1, 1999 to January 9, 2001
Marion V. Ashley.....January 9, 2001 to January 6, 2003
RANDY A. RECORD .....January 14, 2003 to

FOOTHILL MUNICIPAL WATER DISTRICT

Nelson Hayward.....February 8, 1955 to July 4, 1959
Conrad R. Fanton .....November 10, 1959 to November 2, 1964

A. B. Smedley ..... April 13, 1965 to August 1, 1990
Brooks T. Morris ..... September 11, 1990 to November 27, 1991
William T. O'Neil ..... January 14, 1992 to May 10, 1999
James T. Edwards ..... May 10, 1999 to April 1, 2014
RICHARD W. ATWATER ..... April 3, 2014 to

FULLERTON

Walter Humphreys ..... April 10, 1931 to January 19, 1945
H. H. Kohlenberger ..... July 27, 1945 to March 7, 1959
Hubert C. Ferry ..... February 23, 1960 to February 8, 1983
Norman L. De Vilbiss ..... February 8, 1983 to April 12, 1988
James H. Blake ..... August 23, 1988 to August 3, 2012
Thomas Babcock ..... September 6, 2012 to February 11, 2014
Jennifer Fitzgerald ..... February 11, 2014 to July 7, 2014
Peter A. Beard ..... July 7, 2014 to January 15, 2019
ADÁN ORTEGA ..... February 11, 2019 to

GLENDALE

W. Turney Fox ..... March 1, 1929 to November 27, 1931
Samuel G. McClure ..... November 27, 1931 to January 13, 1933
Frank P. Taggart ..... January 13, 1933 to August 31, 1934
Bernard C. Brennan ..... August 31, 1934 to April 23, 1937
Herman Nelson ..... June 4, 1937 to August 27, 1954
Paul L. Burkhard ..... September 28, 1954 to June 10, 1958
Normal C. Hayhurst ..... June 10, 1958 to June 9, 1970
Lauren W. Grayson ..... June 9, 1970 to May 21, 1972
William H. Fell ..... June 13, 1972 to July 13, 1976
C. E. Perkins ..... July 13, 1976 to July 13, 1988
James M. Rez ..... August 23, 1988 to March 9, 2009
Peter Kavounas ..... March 9, 2009 to December 8, 2009
Laura Friedman ..... December 8, 2009 to December 4, 2016
ZAREH SINANYAN ..... February 14, 2017 to

INLAND EMPIRE UTILITIES AGENCY
(formerly Chino Basin MWD)

A. C. Reynolds ..... February 12, 1952 to March 12, 1963
Ray W. Ferguson ..... March 12, 1963 to December 31, 1980
Carl B. Masingale ..... March 10, 1981 to August 9, 1984
John G. Gilday ..... September 11, 1984 to February 15, 1985
Edward A. Girard ..... March 12, 1985 to May 31, 1990

Anne W. Dunihue.....September 20, 1988 to February 11, 1992
Bill M. Hill.....August 21, 1990 to February 9, 1999
Dwight F. French .....February 11, 1992 to August 18, 1994
Wyatt L. Troxel.....August 19, 1994 to November 14, 2003
Gene Koopman.....February 9, 1999 to December 31, 2000
November 14, 2003 to February 10, 2009
Angel Santiago.....February 10, 2009 to February 3, 2011
Michael Camacho.....February 3, 2011 to January 21, 2019
JASMIN A. HALL.....February 11, 2019 to

LAS VIRGENES MUNICIPAL WATER DISTRICT

Earle Brookins.....December 13, 1960 to March 26, 1963
A. Myron McBride.....March 26, 1963 to May 11, 1965
A. Macneil Stelle.....June 8, 1965 to October 23, 1967
March 11, 1975 to February 9, 1993
Whitney P. Reeve.....December 19, 1967 to March 11, 1975
GLEN D. PETERSON.....February 9, 1993 to

LONG BEACH

Nowland M. Reid.....April 10, 1931 to January 27, 1933
W. M. Cook.....January 27, 1933 to April 30, 1943
Gus A. Walker.....April 30, 1943 to December 31, 1976
Lloyd C. Leedom .....May 9, 1947 to June 30, 1979
Samuel C. Rue.....October 9, 1979 to March 12, 1985
Ida Frances Lowry.....March 12, 1985 to February 9, 1993
Henry J. Meyer.....February 9, 1993 to August 19, 1997
Helen Z. Hansen.....August 19, 1997 to May 13, 2008
Suja Lowenthal.....May 13, 2008 to September 13, 2016
GLORIA CORDERO…….September 13, 2016 to

LOS ANGELES

John R. Haynes .....March 1, 1929 to February 4, 1930
John R. Richards .....March 1, 1929 to October 28, 1947
W. P. Whitsett.....March 1, 1929 to January 10, 1947
John G. Bullock.....November 1, 1929 to September 15, 1933
O. T. Johnson Jr. .....November 5, 1929 to August 29, 1930
W. L. Honnold .....February 28, 1930 to July 21, 1933
J. Eisner.....August 29, 1930 to July 2, 1937
Walter A. Ham .....January 20, 1933 to January 4, 1935
D. W. Pontius.....January 20, 1933 to September 3, 1955

Alf W. Brandt.....April 9, 1991 to February 13, 1996
Michael J. Gage.....August 1, 1991 to September 21, 1993
Carolyn L. Green.....August 20, 1992 to December 31, 1995
April 30, 1996 to May 16, 1997
William G. Luddy .....October 13, 1992 to May 10, 2005
George Wein .....October 12, 1992 to August 20, 2002
David Y. Handelman.....November 8, 1993 to November 14, 1995
Kenneth T. Lombard .....November 8, 1993 to April 11, 1995
Katherine W. Moret .....November 8, 1993 to December 31, 2000
Christopher C. Pak .....November 8, 1993 to December 19, 1995
Bonny L. Herman.....April 11, 1995 to April 12, 2004
Larry J. Kosmont.....February 13, 1996 to December 31, 2000
Aaron E. Michaelsen.....February 13, 1996 to January 13, 1997
L. Michael Russell .....June 11, 1996 to January 12, 1998
S. David Freeman.....January 12, 1998 to December 31, 2000
Ronald R. Gastelum .....January 12, 1998 to November 10, 1998
Jorge G. Castro.....June 7, 1999 to October 7, 2003
Deborah Dentler.....August 20, 2002 to January 6, 2006
David Farrar .....October 7, 2003 to January 6, 2006
Robert B. Simonds .....April 12, 2004 to January 6, 2006
Ronald F. Deaton .....May 10, 2005 to January 6, 2006
Aaron A. Grunfeld .....January 6, 2006 to May 12, 2014
JOHN W. MURRAY JR. .....January 6, 2006 to
JESÚS E. QUIÑONEZ .....January 6, 2006 to
Nancy Sutley.....January 6, 2006 to May 12, 2009
David W. Fleming.....May 12, 2009 to January 14, 2014
Paul Koretz.....January 14, 2014 to April 11, 2016
GLEN C. DAKE .....May 12, 2014 to
LORRAINE PASKETT.....December 7, 2015 to
MARK GOLD.....April 11, 2016 to

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

Glenn P. Allen.....December 11, 1951 to December 17, 1986
W. B. Hellis.....August 19, 1955 to February 9, 1975
William J. Teague .....February 11, 1969 to October 10, 1972
Robert R. Dowling .....September 14, 1971 to May 11, 1976
Doyle Miller.....October 10, 1972 to October 31, 1987
Carl J. Kymla .....October 9, 1973 to October 20, 1993
Philip J. Reilly.....December 9, 1975 to December 8, 1978
Gerald E. Price .....May 11, 1976 to December 31, 1988
M. Roy Knauft Jr.....September 13, 1977 to January 12, 1993

Kenneth H. Witt ..... October 13, 1981 to December 31, 2000
William F. Davenport ..... January 13, 1987 to February 14, 1995
John V. Foley ..... August 22, 1989 to March 21, 2014
Wesley M. Bannister ..... January 12, 1993 to October 31, 2006
Jerry A. King ..... January 11, 1994 to July 21, 1999
Robert J. Huntley ..... February 14, 1995 to October 31, 1999
Peer A. Swan ..... August 31, 1999 to June 30, 2002
Ed Royce Sr. ..... February 7, 2000 to December 31, 2000
Langdon W. Owen ..... January 17, 2001 to April 24, 2003
Ergun Bakall ..... July 1, 2002 to December 8, 2009
LARRY D. DICK ..... August 12, 2003 to
Steve Anderson ..... January 30, 2007 to January 16, 2008
LINDA ACKERMAN ..... April 8, 2008 to
BRETT R. BARBRE ..... December 8, 2009 to
LARRY MCKENNEY ..... October 13, 2014 to

PASADENA

Franklin Thomas ..... March 1, 1929 to August 27, 1952
Morris S. Jones ..... September 16, 1952 to October 10, 1961
Robert B. Diemer ..... January 16, 1962 to October 27, 1966
Don C. McMillan ..... January 10, 1967 to October 26, 1975
Karl A. Johnson ..... December 9, 1975 to April 11, 1980
Martin Goldsmith ..... July 8, 1980 to June 11, 1985
Timothy F. Brick ..... June 11, 1985 to December 31, 2012
CYNTHIA KURTZ ..... April 8, 2013 to

SAN DIEGO COUNTY WATER AUTHORITY

Fred A. Heilbron ..... January 10, 1947 to February 14, 1973
J. L. Burkholder ..... January 24, 1947 to April 6, 1953
Richard S. Holmgren ..... August 11, 1953 to February 19, 1963
J. William Fisher ..... April 12, 1955 to October 11, 1955
Hans H. Doe ..... August 20, 1959 to October 20, 1986
Paul Beermann ..... February 19, 1963 to July 9, 1963
Harry Griffen ..... February 19, 1963 to October 13, 1997
George R. Henderson ..... August 13, 1963 to November 29, 1964
Ralph E. Graham ..... September 14, 1971 to January 14, 1975
August 17, 1979 to June 28, 1982
Raymond E. Badger ..... September 18, 1973 to May 14, 1979
Lloyd L. Lee ..... November 20, 1973 to December 31, 1980
John M. Cranston ..... January 14, 1975 to December 31, 1986
John P. Starkey ..... January 13, 1981 to March 12, 1992

Perry H. Greer.....July 21, 1933 to August 14, 1950
V. H. Rossetti.....October 13, 1933 to November 19, 1960
Otto J. Emme .....January 11, 1935 to October 22, 1947
Louis S. Nordlinger.....August 13, 1937 to June 8, 1940
Joseph Jensen.....August 16, 1940 to February 3, 1944
March 8, 1946 to July 8, 1974
Ransom W. Chase.....March 14, 1947 to February 11, 1975
Gordon B. Crary .....March 14, 1947 to November 8, 1959
Howard D. Mills .....March 14, 1947 to March 17, 1965
W. R. Fawcett .....May 13, 1952 to November 27, 1953
Luther C. Anderson.....January 12, 1954 to February 11, 1975
Noah Dietrich.....November 8, 1955 to November 23, 1970
Ferdinand Mendenhall .....July 29, 1958 to October 8, 1974
Ben P. Griffith.....August 9, 1960 to June 7, 1961
Pietro Di Carlo.....February 14, 1961 to November 7, 1967
William S. Peterson .....February 14, 1961 to August 10, 1979
Aubrey E. Austin Jr. .....February 28, 1961 to May 13, 1975
Albert F. Bush.....November 14, 1961 to February 11, 1975
John W. Luhring .....January 16, 1962 to August 8, 1967
Joseph M. Quinn.....May 14, 1968 to September 18, 1973
B. Walter Hicks.....May 8, 1973 to August 20, 1974
Samuel B. Nelson .....September 18, 1973 to October 9, 1984
Katherine B. Dunlap .....August 20, 1974 to September 11, 1984
Jerry Godell.....October 8, 1974 to October 9, 1984
Edward L. Kussman.....October 8, 1974 to November 8, 1993
Herman Leavitt .....February 11, 1975 to August 19, 1975
Yolanda M. Nava.....February 11, 1975 to September 14, 1976
S. Dell Scott.....February 11, 1975 to October 12, 1993
Willie J. Stennis .....May 13, 1975 to December 31, 1978
Mladin Zarubica.....August 19, 1975 to March 16, 1981
Soledad S. Garcia.....September 14, 1976 to September 11, 1984
Mark Lainer .....November 13, 1979 to February 12, 1991
Mark Nathanson.....April 14, 1981 to September 11, 1984
Michael Glazer.....September 11, 1984 to April 9, 1991
Helen Romero Shaw .....September 11, 1984 to November 8, 1993
Marilyn L. Garcia .....October 9, 1984 to February 9, 1993
Rachel Levin.....October 9, 1984 to April 4, 1989
Frank S. Wyle .....October 9, 1984 to August 1, 1991
Robert Abernethy.....April 4, 1989 to October 13, 1992
February 9, 1993 to November 8, 1993
Vernon R. Watkins .....February 12, 1991 to August 20, 1992

Michael D. Madigan.....August 18, 1982 to October 13, 1992
Francesca M. Krauel .....November 8, 1983 to August 20, 2001
John F. Hennigar .....November 18, 1986 to October 31, 1989
Dale Mason .....January 13, 1987 to February 8, 1999
Herbert H. Stickney.....November 14, 1989 to April 13, 1993
Christine M. Frahm .....April 14, 1992 to March 12, 1999
John M. Leach.....October 13, 1992 to October 25, 1993
Joseph Parker .....April 13, 1993 to January 11, 1999
June 7, 1999 to February 10, 2009
Mark W. Watton.....December 13, 1993 to January 12, 1998
February 8, 1999 to May 14, 2001
Gordon W. Tinker .....October 12, 1997 to December 31, 2000
Claude A. "Bud" Lewis.....January 12, 1998 to December 7, 2006
James F. Turner.....January 11, 1999 to December 31, 2000
February 10, 2003 to August 17, 2004
Harold W. Ball .....May 14, 2001 to February 10, 2003
George I. Loveland.....October 15, 2001 to November 1, 2006
W.D. "Bud" Pocklington.....August 17, 2004 to December 14, 2010
James H. "Jim" Bond .....November 1, 2006 to February 10, 2009
James M. Barrett .....December 7, 2006 to July 12, 2010
Keith Lewinger.....February 10, 2009 to July 15, 2018
Fern Steiner.....February 10, 2009 to March 1, 2019
Lynne L. Heidel .....July 12, 2010 to November 5, 2012
James Bowersox.....December 14, 2010 to December 12, 2011
Douglas Wilson.....December 12, 2011 to August 27, 2013
Vincent Mudd .....November 5, 2012 to October 13, 2014
MICHAEL T. HOGAN.....August 27, 2013 to
Yen C. Tu.....October 13, 2014 to July 5, 2016
Elsa Saxod.....October 11, 2016 to July 15, 2018
TIM M. SMITH .....July 24, 2018 to
JERRY BUTKIEWICZ.....July 24, 2018 to
S. GAIL GOLDBERG .....March 11, 2019 to

SAN FERNANDO

Neville R. Lewis.....December 14, 1971 to August 21, 1984
Pat J. Modugno .....August 21, 1984 to August 8, 1986
Doude Wysbeek .....December 9, 1986 to June 10, 1997
Sergio Rascon .....June 10, 1997 to July 7, 2000
Hugo C. Mejia.....July 7, 2000 to November 8, 2004

Steven Veres ..... November 8, 2004 to September 5, 2007
SYLVIA BALLIN ..... September 5, 2007 to November 6, 2018
May 13, 2019 to
Yazdan Emrani ..... November 6, 2018 to April 19, 2019

SAN MARINO

Harry L. Heffner ..... March 1, 1929 to September 29, 1933
John H. Ramboz ..... September 29, 1933 to November 18, 1960
Howard A. Miller ..... January 10, 1961 to April 26, 1975
Preston Hotchkis ..... June 10, 1975 to September 10, 1986
Preston B. Hotchkis ..... March 10, 1987 to March 13, 1990
JOHN T. MORRIS ..... March 13, 1990 to

SANTA ANA

S.H. Finley ..... March 1, 1929 to April 10, 1942
A. H. Allen ..... April 10, 1942 to December 10, 1968
Howard W. Crooke ..... December 10, 1968 to September 1, 1977
John Garthe ..... November 8, 1977 to July 9, 1991
Daniel H. Young ..... July 9, 1991 to December 31, 1993
Lee Harry ..... February 8, 1994 to April 8, 1997
Thom Coughran ..... April 8, 1997 to February 3, 2005
Daniel E. Griset ..... February 3, 2005 to March 10, 2015
Michele Martinez ..... March 10, 2015 to January 21, 2019
JOSE SOLORIO ..... February 12, 2019 to

SANTA MONICA

George H. Hutton ..... March 1, 1929 to January 16, 1931
Arthur A. Weber ..... January 16, 1931 to October 12, 1934
William H. Carter ..... February 15, 1935 to March 13, 1936
Edmond S. Gillette ..... June 12, 1936 to January 8, 1937
Arthur P. Creel ..... January 8, 1937 to March 3, 1941
Samuel G. McClure ..... March 21, 1941 to November 14, 1947
Samuel J. Crawford ..... December 5, 1947 to September 15, 1959
Mark T. Gates ..... January 12, 1960 to July 12, 1972
Francis A. Goplen ..... August 18, 1972 to December 9, 1980
Robert Gottlieb ..... December 9, 1980 to December 8, 1987
Christine E. Reed ..... March 8, 1988 to April 24, 1996
JUDY ABDO ..... June 11, 1996 to

THREE VALLEYS MUNICIPAL WATER DISTRICT

Hugh W. Stiles .....December 8, 1950 to December 31, 1961
Arthur H. Cox .....January 16, 1962 to April 16, 1974
William C. Leech .....April 16, 1974 to February 9, 1982
William H. Koch .....February 9, 1982 to February 12, 1985
Mel Harper .....February 12, 1985 to February 18, 1986
Richard W. Hansen .....June 10, 1986 to August 20, 1991
Bruce R. J. Milne .....August 20, 1991 to February 10, 1997
Henry S. Barbosa .....February 10, 1997 to February 20, 2002
DAVID D. DE JESUS .....March 8, 2002 to

TORRANCE

John Dennis.....March 17, 1931 to April 14, 1933
J. R. Jensen.....April 14, 1933 to December 31, 1933
Charles T. Rippy .....January 19, 1934 to August 8, 1950
George W. Stevens.....September 22, 1950 to June 13, 1961
George A. Bradford.....June 13, 1961 to October 13, 1964
George Vico .....November 17, 1964 to August 13, 1968
Ben Haggott .....August 13, 1968 to November 14, 1982
Marvin Brewer .....March 8, 1983 to November 27, 1993
Bill D. Wright .....March 8, 1994 to July 1, 2013
RUSSELL LEFEVRE.....September 24, 2013 to

UPPER SAN GABRIEL VALLEY MUNICIPAL WATER DISTRICT

J. Ercel Cleminson .....April 9, 1963 to January 30, 1964
Howard H. Hawkins.....April 9, 1963 to December 31, 1989
February 9, 1993 to March 4, 1997
Frank E. Vachon.....March 10, 1964 to March 10, 1970
Robert T. Radford .....March 10, 1970 to December 31, 1970
Travis L. Manning.....January 12, 1971 to December 31, 1978
Burton E. Jones .....January 9, 1979 to February 9, 1993
John E. Maulding .....January 9, 1990 to February 9, 1993
Anthony R. Fellow .....February 9, 1993 to February 10, 2009
February 9, 2010 to July 19, 2011
Edward L. Chavez.....August 30, 2011 to January 9, 2012
Frank F. Forbes .....March 4, 1997 to December 31, 2000
R. William "Bill" Robinson .....February 10, 2009 to February 9, 2010
Stephen Millard.....January 9, 2012 to February 8, 2013
Michael Touhey .....February 8, 2013 to January 3, 2017
CHARLES M. TREVIÑO.....January 10, 2017 to

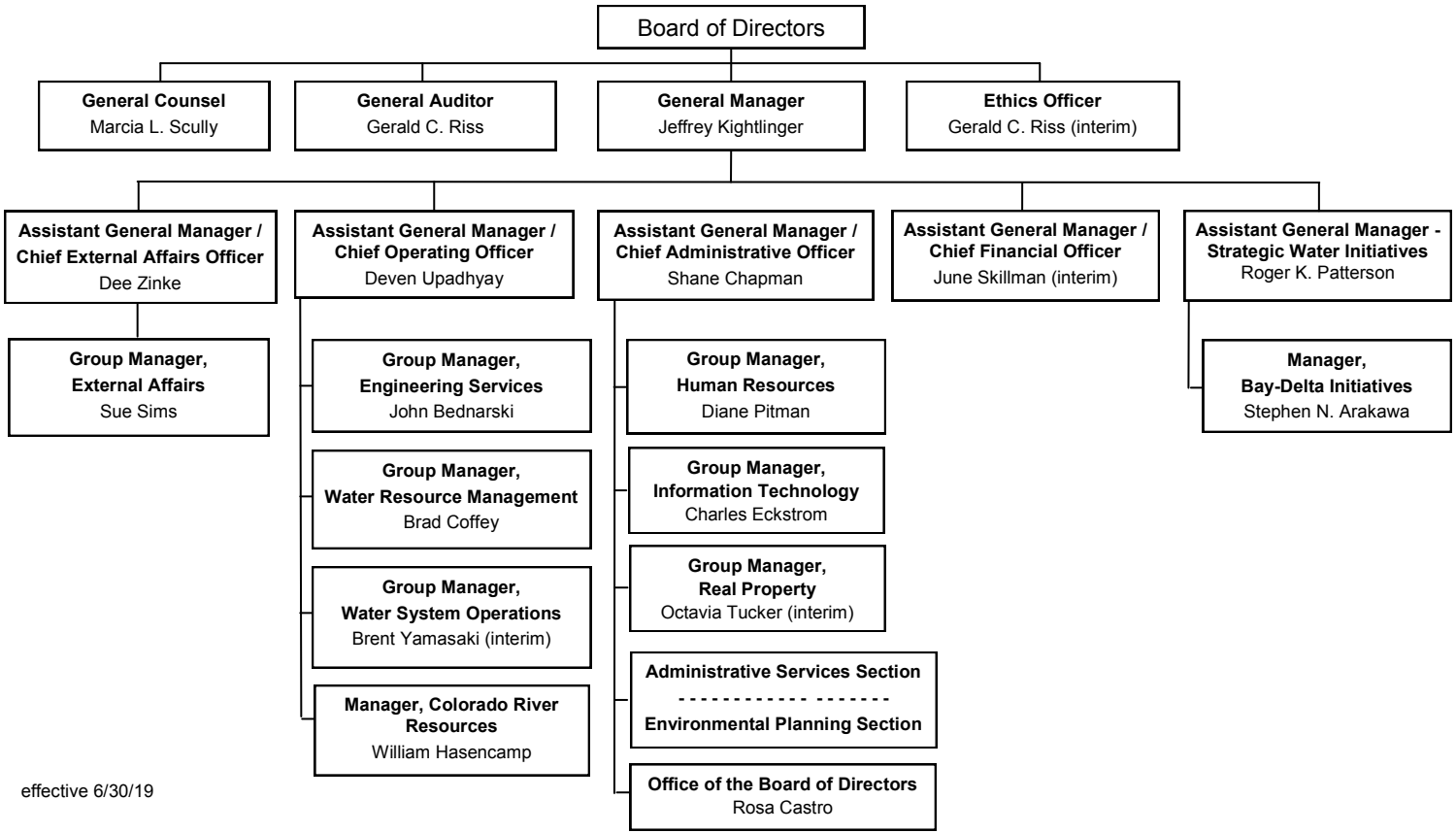
WEST BASIN MUNICIPAL WATER DISTRICT

Robert E. Austin	August 20, 1948 to October 21, 1968
Ben Haggott	March 10, 1953 to October 8, 1956
W. C. Farquhar	August 19, 1955 to July 13, 1976
T. V. Tallon	August 9, 1960 to April 9, 1963
Louis J. Alexander	August 13, 1963 to March 30, 1972
Charles D. Barker	September 10, 1963 to December 31, 2000
Einar C. Matson	November 12, 1968 to February 12, 1984
Lester E. Carlson	October 8, 1974 to September 2, 1988
E. L. Balmer	August 19, 1976 to May 23, 1989
Harold E. Crozier	October 25, 1988 to April 9, 1991
Charles L. Stuart	July 11, 1989 to April 11, 1995
Robert Goldsworthy	April 9, 1991 to March 8, 1994
Edward C. Little	March 8, 1994 to January 12, 1998
	January 5, 1999 to September 5, 2001
	April 9, 2007 to September 24, 2013
Bondie O. Gambrell	April 11, 1995 to February 10, 1997
Mark S. Dymally	February 10, 1997 to January 5, 1999
Carol W. Kwan	January 12, 1998 to January 5, 1999
	September 5, 2001 to April 9, 2007
Willard H. Murray Jr.	January 5, 1999 to April 13, 2009
GLORIA D. GRAY	April 13, 2009 to
Donald L. Dear	September 24, 2013 to March 13, 2018
HAROLD C. WILLIAMS	March 13, 2018 to

WESTERN MUNICIPAL WATER DISTRICT OF RIVERSIDE COUNTY

Howard Boylan	December 14, 1954 to July 13, 1976
Lois B. Krieger	August 19, 1976 to December 31, 2000
John M. Mylne III	October 12, 1993 to January 7, 2008
S.R. “Al” Lopez	January 7, 2008 to July 13, 2009
Thomas P. Evans	July 13, 2009 to May 11, 2015
DONALD GALLEANO	May 11, 2015 to

Notes:
Current Directors’ names are shown in capital letters.
A 2001 reorganization reduced the number of directors on the board from 51 to 37.
In late 2015, a one-seat addition for Los Angeles (based on assessed property valuation) increased the number of directors to 38.



effective 6/30/19

EXECUTIVE MANAGEMENT
JUNE 30, 2018

Jeffrey Kightlinger
General Manager

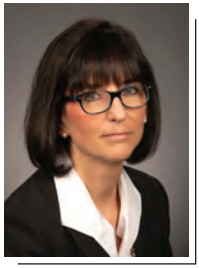
Marcia L. Scully
General Counsel

Gerald C. Riss
General Auditor

Gerald C. Riss
Interim Ethics Officer

Dee Zinke
Assistant General Manager/
Chief External Affairs Officer

Deven Upadhyay
Assistant General Manager/
Chief Operating Officer



June Skillman
Interim Asst. General Manager/
Chief Financial Officer

Shane Chapman
Assistant General Manager/
Chief Administrative Officer

Roger K. Patterson
Assistant General Manager/
Strategic Water Initiatives

STAFF
June 30, 2019

EXECUTIVE MANAGEMENT

General Manager ..... J. Kightlinger
General Counsel ..... M.L. Scully
General Auditor ..... G.C. Riss
Interim Ethics Officer ..... G.C. Riss
Assistant General Manager/Chief Operating Officer ..... D. Upadhyay
Assistant General Manager/Chief Administrative Officer ..... S.O. Chapman
Interim Assistant General Manager/Chief Financial Officer ..... J.M. Skillman
Assistant General Manager/Strategic Water Initiatives ..... R.K. Patterson
Assistant General Manager/Chief External Affairs Officer ..... D. Zinke

ADMINISTRATION

Manager, Administrative Services Section ..... C. Torres
Interim Manager, Environmental Planning Section ..... J. Harriger

CHIEF FINANCIAL OFFICER

Controller ..... B.H. Robertson
Manager, Budget & Treasury ..... J.M. Skillman

CHIEF OPERATING OFFICER

Manager, Colorado River Resources ..... W.J. Hasencamp

ENGINEERING SERVICES

Group Manager/Chief Engineer ..... J. Bednarski
Assistant Group Manager ..... M. Rojas
Manager, Design Section ..... D. Clark
Manager, Engineering Planning Section ..... T. Tellers
Manager, Infrastructure Reliability Section ..... C. Spradling
Interim Manager, Program Management Section ..... F. Becerra

ETHICS

Assistant Ethics Officer ..... P.E. von Haam

EXTERNAL AFFAIRS

Group Manager ..... S. Sims
State Legislative Representative ..... K. Viatella
Federal Legislative Representative ..... B. Hiltscher
Manager, Business Outreach Section ..... J. Arena
Manager, Conservation & Community Services Section ..... Y.L. Martinez
Manager, Legislative Services Section ..... L. Haddad
Manager, Media Services Section ..... B. Muir
Manager, Member Services & Public Outreach Section ..... C. Schaffer
Executive Strategist ..... T. Philp
Special Projects Manager ..... M. Westford

STAFF
June 30, 2019

HUMAN RESOURCES

Group Manager ..... D. Pitman
Manager, Employee Relations, Inclusion & Analytics Section ..... S. Lem
Interim Manager, HR Services Section ..... S. Radhakrishnan

INFORMATION TECHNOLOGY

Group Manager ..... C. Eckstrom
Director, Applications and Infrastructure Section ..... T.D. Miller

INTERNAL AUDIT

Assistant General Auditor ..... J. Tonsick

LEGAL

Assistant General Counsel ..... H.C. Beatty
Assistant General Counsel ..... A. Kear
Assistant General Counsel ..... H. Torres Jr.

OFFICE OF THE BOARD OF DIRECTORS

Board Administrator ..... R. Castro

REAL PROPERTY

Interim Group Manager ..... O. Tucker
Interim Manager, Real Property Section ..... S. Hom

STRATEGIC WATER INITIATIVES

Manager, Bay-Delta Initiatives ..... S.N. Arakawa
Special Projects Manager ..... R.D. Neudeck
Executive Strategist ..... M.J. Wheeler

WATER RESOURCE MANAGEMENT

Group Manager ..... B. Coffey
Manager, Resource Implementation Section ..... K. Donhoff
Manager, Resource Planning & Development Section ..... G.L. Chan

WATER SYSTEM OPERATIONS

Interim Group Manager ..... B. Yamasaki
Assistant Group Manager ..... M. Chaudhuri
Interim Assistant Group Manager ..... L.L. Shraibati
Manager, Conveyance & Distribution Section (East/West) ..... G. Boyd
Interim Manager, Conveyance & Distribution Section (Desert) ..... G. Patricio
Manager, Operational Safety & Regulatory Services Section ..... D. Guillory
Manager, Operations Support Services Section ..... S. Escalante
Manager, Power Operations & Planning Section ..... S. Bailey
Manager, Water Operations & Planning Section ..... K. Nobriga
Manager, Water Quality Section ..... M.H. Stewart
Manager, Water Treatment Section ..... H. Collins

The Colorado River Drought Contingency Plan helped assure continued deliveries from the Upper Colorado River (above) to the Lower Basin States.

Introduction

Almost 90 years ago, Metropolitan board Chairman W.P Whitsett declared to a Southern California gathering that "whatever is done should be done for the benefit of the whole and whatever is done for the benefit of the whole should be shared by all the parts."

A little more than a year prior to that February 1930 speech, plummeting groundwater tables and a rapidly growing population had demanded a coordinated regional response. Cities in Southern California counties saw the benefit of pooling their resources to build the Colorado River Aqueduct, a decision that launched the establishment of the Metropolitan Water District of Southern California.

Since then, Metropolitan's ability to forge a regional consensus on water issues and craft an evolving array of regional benefits has allowed Southern California to play a constructive leadership role in the most pressing water issues of our time. The advantages and power of that approach were on full display this past fiscal year.

Colorado River Drought Contingency Plan: Metropolitan played a pivotal role in the development and adoption of the Colorado River Drought Contingency Plan. This process showcased the cooperation of seven states, two nations and 10 Indian tribes. The DCP helps stave off plummeting storage levels at Lake Mead to avoid reaching critical elevations, while also providing incentives for agencies to store additional water in Lake Mead. When the Imperial Irrigation District elected not to execute the DCP at the end of 2018, Metropolitan stepped up and agreed to cover California's full share of DCP contributions. Absent Metropolitan's leadership and willingness to take on additional risk, the DCP would not have been completed.

With the DCP in place, Metropolitan is looking to have record amounts of storage in Lake Mead by the end of this calendar year—nearly 1 million acre-feet, more than the amount of water stored in

Metropolitan's Diamond Valley Lake. Metropolitan's storage alone accounts for more than 12 feet of Lake Mead's elevation. The DCP will improve the reliability of the Colorado River through 2026. In 2020, work will begin on a long-term agreement to head off increasing risk of shortages beyond 2026.

Delta Conveyance: After Metropolitan's board voted to make a major contribution to the California WaterFix project, Gov. Gavin Newsom in February announced a shift to a single-tunnel Delta conveyance strategy. Metropolitan supports this effort, and the governor's commitment to modernize Delta conveyance.

Metropolitan is also working with a broad alliance of stakeholders to implement voluntary agreements regarding Sacramento and San Joaquin river flows that could protect the environment and avert years of litigation.

Regional Recycled Water Program: Crews were putting the final touches on the Regional Recycled Water Advanced Purification Center, a 500,000-gallon-per-day demonstration facility in Carson that paves the way for one of the largest water recycling plants in the nation. A partnership with the Sanitation Districts of Los Angeles County, this demonstration facility was ready to go on-line operationally in fall 2019 with tours to elected officials and the public interested in learning about using recycled water as a future sustainable water supply.

The demonstration facility will put the treatment process through rigorous testing to ensure it effectively removes impurities and the resulting water meets the highest quality standards. Operation of the facility will inform design of the full-scale plant in order to ensure full optimization of a facility of this scope. A full-scale plant could produce up to 150 million gallons of purified water daily—enough to serve more than 500,000 homes and industrial facilities.

Conservation: Metropolitan revived one of its most popular water-saving rebates as it doubled the incentive for the turf replacement program. Customers can now receive at least $2 per square foot of grass removed from yards, with a new emphasis on native plants and stormwater retention features.

Metropolitan also launched a $3 million regional pilot program to increase water conservation in disadvantaged communities, and provided increased flexibility for its member agencies to serve those communities as well.

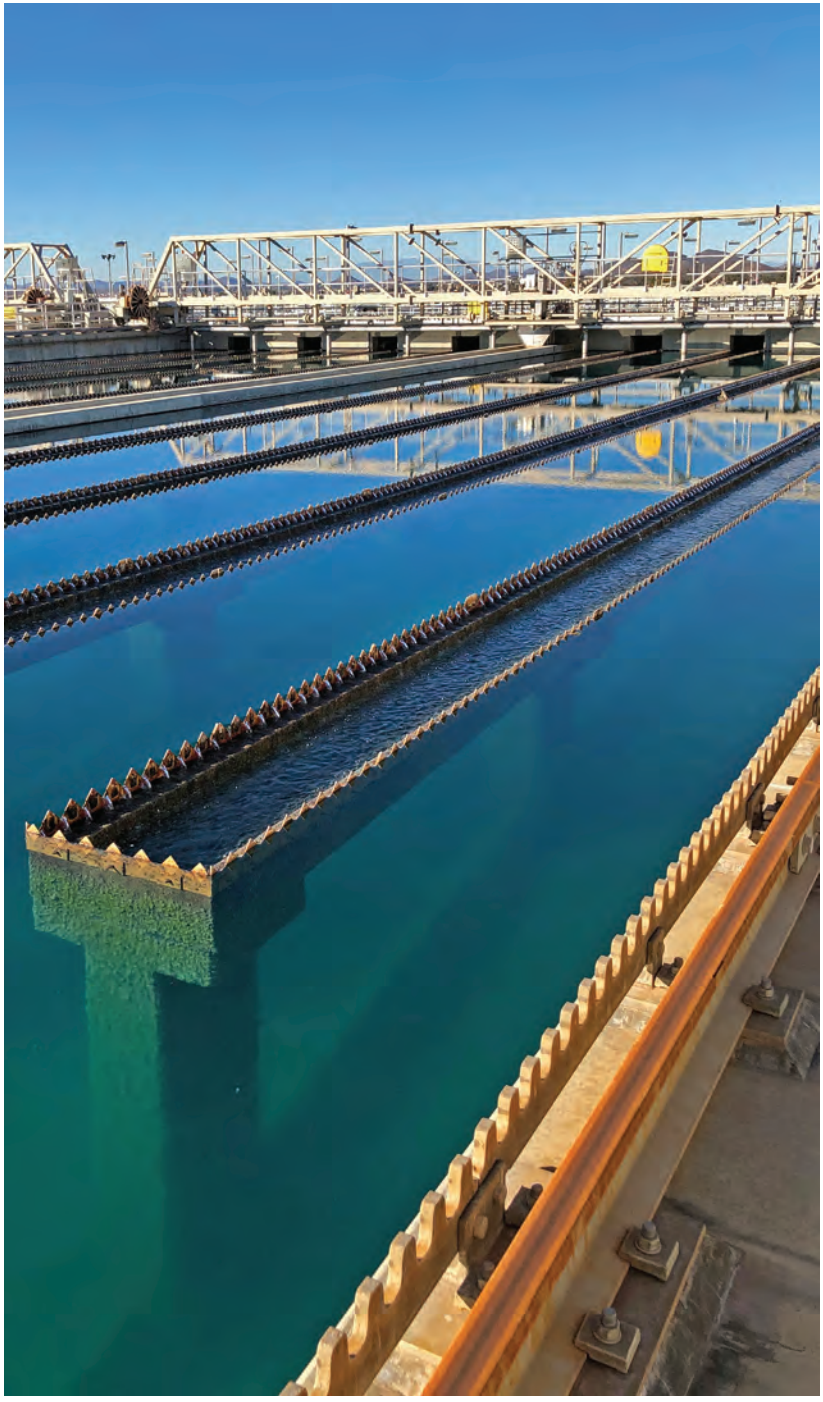
Storage: Just three years after Southern California experienced its worst drought in 1,200 years, Metropolitan maximized its carryover storage in late 2018. Wet conditions and a high snowpack in Northern California led to a 75 percent allocation on the State Water Project. Ample supply coupled with low demand thanks to Metropolitan's conservation programs allowed Metropolitan to put significant deliveries into storage. Metropolitan expects to add a record 800,000 acre-feet into storage for calendar year 2019, and reach nearly 4 million acre-feet of total storage, the highest level of storage in Metropolitan's history. This record amount of storage positions Southern California to withstand a significant multiple-year drought with minimal impacts.

Climate Change: Metropolitan began preparation of a Climate Action Plan, under which it will inventory greenhouse gas emissions. Metropolitan will then estimate future projections to develop an emissions target specific to the agency. Just as it does with its Integrated Water Resources Plan, Metropolitan will track progress to make sure Metropolitan meets targeted goals.

Emerging Contaminants: The state indicated it would lower the notification levels for PFOA (perfluorooctanoic acid) and PFOS (perfluorooctane sulfonate), the two most common and studied compounds in the group of man-made chemicals known as PFAS (per- and polyfluoroalkyl substances). Neither of these chemicals has been detected in Metropolitan's source or treated waters. Metropolitan is working with its member agencies to see whether PFOA and PFOS are present in their local supplies and is prepared to handle any increased demand for imported water to help offset the potential loss of any affected local supplies

Embracing Innovation and Diversity: Metropolitan made history with the election of Chairwoman Gloria D. Gray, the first African-American female to head the board of directors. Metropolitan is evaluating new ways to tap into the region's diverse workforce, a move that is crucial to preparing for the future, creating momentum for innovation, and engineering solutions for tomorrow's challenges.

Whether rebuilding miles of pipelines, or being a constructive partner in pioneering balanced solutions for a new era, or devising inventive innovative ways to confront a future we can only imagine, Metropolitan continues to work to benefit the whole of its Southern California service area, and to provide those benefits to all of its member agencies and the region.



A settling basin at the Robert A. Skinner Water Treatment Plant in Winchester.

CHAPTER 1

Delivering Metropolitan's Water Supplies

Metropolitan supplies water to its 5,200-square-mile service area through a conveyance and distribution system that consists of the 242-mile-long Colorado River Aqueduct, five pumping plants, about 830 miles of pipeline, five water treatment plants and nine reservoirs; and a participation right in the State Water Project. Metropolitan also has 16 hydroelectric power recovery plants throughout its system. See Table 1-1 for the rated capacity of Metropolitan's five treatment plants.

TABLE 1-1
METROPOLITAN'S DISTRIBUTION SYSTEM
WATER TREATMENT PLANTS

Plant (Location)	Process/ Water Type	Rated Capacity (MGD)
Joseph Jensen Water Treatment Plant (Granada Hills)	Conventional treatment with ozone, SPW	750
Robert A. Skinner Water Treatment Plants 1 & 3 (Winchester)*	Conventional treatment with ozone, blend of CRW/SPW	350
F. E. Weymouth Water Treatment Plant (La Verne)	Conventional treatment with ozone, blend of CRW/SPW	520
Robert B. Diemer Water Treatment Plant (Yorba Linda)	Conventional treatment with ozone, blend of CRW/SPW	520
Henry J. Mills Water Treatment Plant (Riverside)	Conventional treatment with ozone, SPW	220

SPW = State Project Water
CRW = Colorado River Water
MGD = Million Gallons per Day
*Following the decommissioning of Skinner Plant 2, the rated Skinner plant capacity was reduced from 630 to 350 MGD.

In fiscal year 2018/19, water conditions varied from below-normal precipitation in the SWP watershed in 2018, to the highest peak snowpack since 2011 by April 2019. Conditions in the Colorado River Basin started out dry, with a relatively high chance of shortage in Lake Mead by 2020. By the end of the fiscal year, conditions were wet with a forecasted increase in Lake Mead of nearly 9 feet by the end of 2019 and no chance of shortage in 2020. Throughout these changing conditions, Metropolitan continued to adapt its operations to ensure continued water supply reliability.

The state Department of Water Resources set the final SWP allocation for calendar year 2018 at 35 percent, or about 669,000 AF, reflecting abnormally dry to extreme drought conditions that returned across the state after extraordinarily wet conditions in 2017. By February 2019, precipitation had increased dramatically, generating high San Joaquin River flows through June. The final SWP allocation for CY 2019 hit 75 percent, or about 1.43 million acre-feet. Also in February 2019, high-volume precipitation quickly filled San Luis Reservoir, so that the SWP quickly reached its share. This triggered the availability of Article 21 water, the amount in excess of regularly allocated SWP supplies. Metropolitan shifted operations and successfully secured about 65,000 AF of this surplus supply.

The fiscal year began with a relatively low 2018 final SWP allocation and the Colorado River Drought Contingency Plan not yet in place. Without the DCP, Metropolitan risked losing access to conserved water stored in Lake Mead, so Metropolitan continued with high CRA pumping of up to 7-pump flow (out of an 8-pump flow capability). By February 2019, with wet conditions and the sudden availability of SWP Article 21 supplies, Metropolitan shifted system operations to maximize the capture of the higher SWP supplies while reducing CRA pumping to a one-pump flow. Through the end of the fiscal year, Metropolitan continued to minimize deliveries of Colorado River water into the service area to free up capacity and take full advantage of the high SWP supplies. The May 2019 signing of the DCP allowed Metropolitan to maximize storage in its Intentionally Created Surplus account in Lake Mead. Metropolitan also began maximizing deliveries of Colorado River water to the groundwater recharge facilities at the Whitewater River and Mission Creek to store in the Advanced Delivery Account with Desert Water Agency and Coachella Valley Water District. Desert Water and Coachella Valley are both SWP contractors with no physical connection

to SWP facilities. Metropolitan has a long-term exchange agreement with the agencies to take delivery of their SWP supplies in exchange for an equal quantity of Colorado River water. Deliveries to this account are on track to be about 250,000 AF by the end of CY 2019.

Metropolitan's water transactions for FY 2018/19 were about 1.37 MAF, the lowest since 1983, and significantly below the 10-year average of 1.77 MAF. Continued conservation, along with wet and cool 2019 conditions, significantly decreased water use and increased local supplies. Maximum daily system deliveries to member agencies were about 5,690 AF per day for the fiscal year, compared to 6,490 AF per day for the previous fiscal year. The maximum daily delivery over the last 10 years was 7,600 AF per day in FY 2013/14. Table 1-2 shows Metropolitan's monthly water transactions for FY 2018/19. Additional figures and tables at the end of this chapter show total fiscal-year water transactions by category, monthly water transactions by category, a comparison of water transactions by category for the past two fiscal years, historical water transactions by calendar and fiscal year, and water use by member agency.

TABLE 1-2
MONTHLY WATER TRANSACTIONS FOR ALL MEMBER AGENCIES
Fiscal Year 2018/19
(Acre-Feet)

Month	Full Service*	Storage Program**	Totals
July	155,905	1,600	157,505
August	162,181	0	162,181
September	148,281	0	148,281
October	152,645	0	152,645
November	139,586	0	139,586
December	102,883	5,719	108,602
January	92,425	0	92,425
February	47,717	0	47,717
March	62,168	18,253	80,421
April	95,634	1,568	97,202
May	85,052	1,849	86,901
June	98,902	1,959	100,861
Totals	**1,343,379**	**30,948**	**1,374,327**

* Water transactions include water sales, wheeling and exchange water transactions.
** Includes water transactions from the Conjunctive Use, Cyclic Storage and Soboba Settlement programs.

Despite the below-average hydrologic conditions in the first half of FY 2018/19, water supplies and demands in 2018 were balanced. Benefiting from increased flexibility in operations, Metropolitan repositioned storage and further optimized water storage reserves, while maintaining high dry-year storage of 2.5 MAF. For example, by the end of CY 2018, Metropolitan shifted water from Diamond Valley Lake to other storage facilities, reducing DVL levels to slightly over 700,000 AF. With additional space in the reservoir, Metropolitan quickly moved SWP carryover supplies from San Luis Reservoir into Diamond Valley Lake in early 2019. This minimized loss of these supplies, and the additional space also allowed Metropolitan to capture Article 21 water. With wet conditions during the second half of the fiscal year, Metropolitan maximized deliveries into every available storage account and pursued water management actions to increase deliveries to local groundwater basins. With high supplies, low demands and strategic operations, Metropolitan is on track to increase storage by about 700,000 AF in CY 2019, or adding over 100,000 AF into emergency storage and about 600,000 AF into dry-year storage. This would bring dry-year storage to a new record of nearly 3.1 MAF.

Overall, Metropolitan took actions this fiscal year to strategically reposition storage in balanced conditions, and maximize storage under high supply conditions to best position the region for future challenges.

Major Accomplishments for Fiscal Year 2018/19

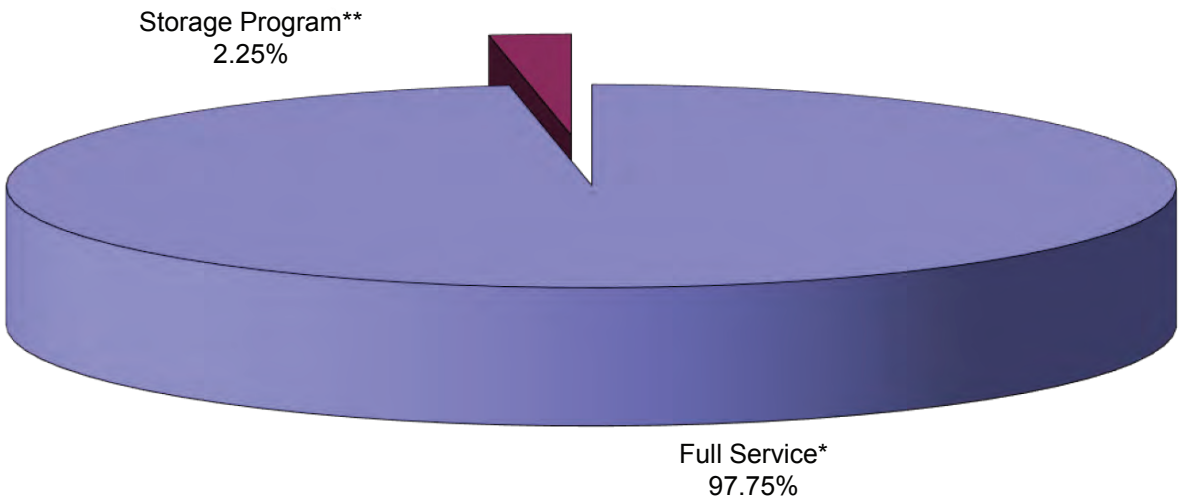
System Operations and Planning

- Effectively managed surplus supplies and increased dry-year storage reserves to potentially record levels, and captured 65,000 AF of Article 21 supplies by dramatically and quickly adjusting system operations.
- Successfully managed critical shutdowns for system improvements, maintenance and repairs (major shutdowns and service interruptions are shown in Table 1-5).

- Implemented changes to the Administrative Code that bolster regional reliability by allowing member agencies to deliver agency water supplies in Metropolitan's system under emergency conditions, as determined by the General Manager.

Colorado River

- Metropolitan adjusted operations, with high CRA pumping in late 2018 and early 2019, to reposition conserved water in Lake Mead to other locations to reduce the risk of losing access to Metropolitan's water prior to the passing of the DCP.
- Maximized storage of Colorado River supplies later in the year, after significant progress was made on the DCP development, positioning Metropolitan to be on track to increase Lake Mead Intentionally Created Surplus to a record of about 1 MAF in CY 2019.



* Water transactions include water sales, wheeling and exchange water transactions.
** Includes water transactions from the Conjunctive Use, Cyclic Storage and Soboba Settlement programs.

Figure 1-1. Total Water Transactions for Fiscal Year 2018/19 - All Member Agencies

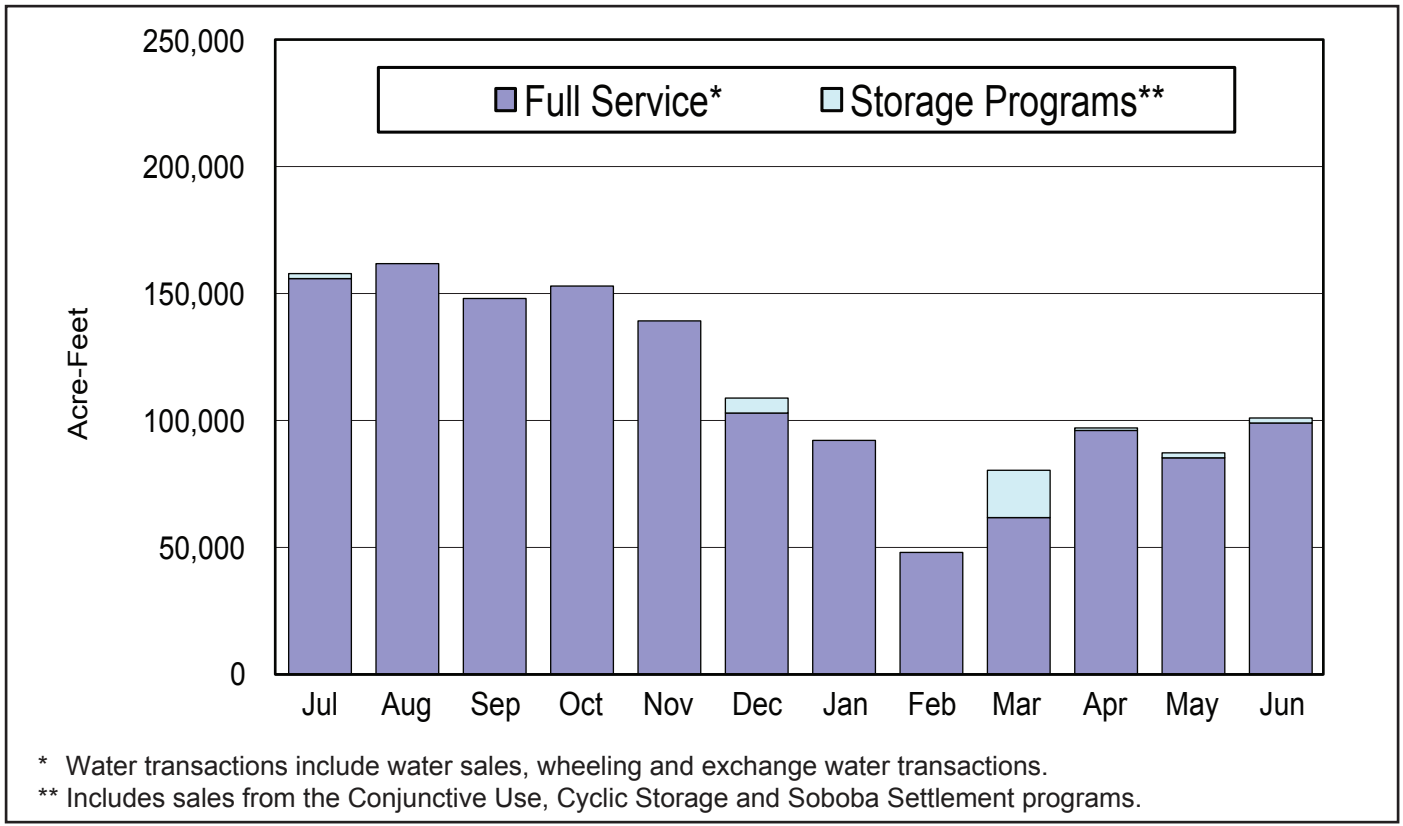
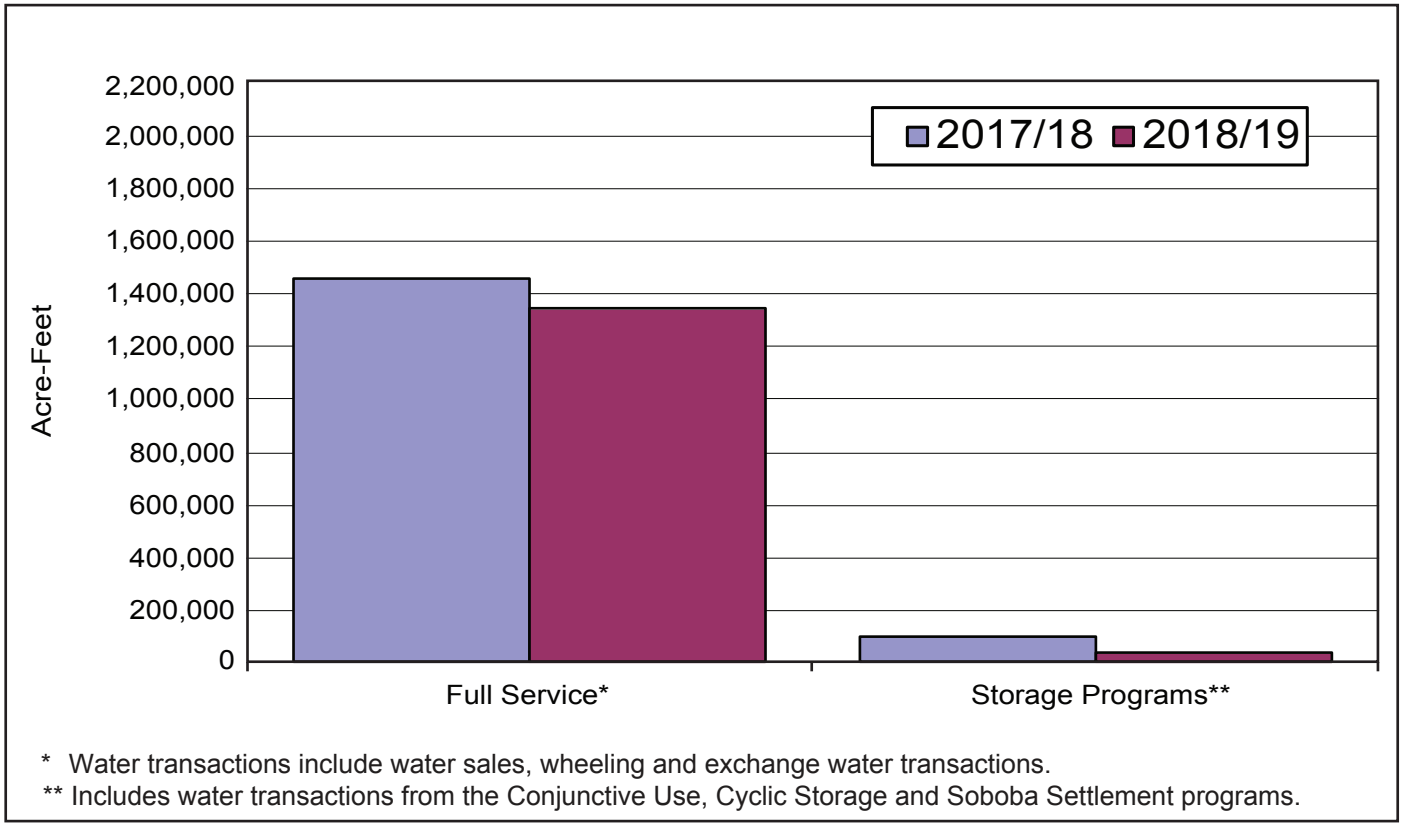


Figure 1-2. Monthly Water Transactions for Fiscal Year 2018/19 - All Member Agencies



* Water transactions include water sales, wheeling and exchange water transactions.
** Includes water transactions from the Conjunctive Use, Cyclic Storage and Soboba Settlement programs.

Figure 1-3. Comparison of Water Transactions with Member Agencies For The Past Two Fiscal Years

TABLE 1-3
HISTORICAL WATER TRANSACTIONS
Calendar Year & Fiscal Year Totals
(Acre-Feet)

	Calendar Year	Fiscal Year		Calendar Year	Fiscal Year
1941	4,444		1981	1,597,315	1,462,825
1942	12,391	9,739	1982	1,366,664	1,502,949
1943	16,355	14,566	1983	1,180,616	1,226,783
1944	24,567	15,875	1984	1,547,078	1,428,253
1945	37,883	30,606	1985	1,653,414	1,574,216
1946	54,134	46,686	1986	1,685,359	1,642,249
1947	73,573	59,721	1987	1,857,591	1,825,657
1948	148,178	113,090	1988	2,017,403	1,923,824
1949*	163,817	145,008	1989	2,371,479	2,095,079
1950*	170,825	165,616	1990	2,626,124	2,511,375
1951*	192,416	165,473	1991	1,809,606	2,264,864
1952	203,068	197,210	1992	1,989,165	1,888,907
1953	221,022	219,397	1993	1,812,644	1,910,644
1954	333,968	245,875	1994	1,955,411	1,930,529
1955	386,341	385,946	1995	1,458,237	1,591,496
1956	482,909	405,962	1996	1,675,254	1,641,670
1957	518,754	543,706	1997	1,838,675	1,787,857
1958	578,384	539,734	1998	1,413,674	1,569,024
1959	660,718	601,099	1999	1,776,306	1,593,687
1960	816,722	734,919	2000	2,325,836	2,075,680
1961	977,795	935,228	2001	2,100,771	2,164,556
1962	1,033,361	931,795	2002	2,438,570	2,326,920
1963	943,745	1,020,822	2003	2,251,051	2,271,628
1964	1,122,880	1,064,381	2004	2,440,724	2,437,678
1965	1,105,809	1,148,847	2005	2,003,041	2,076,100
1966	1,115,040	1,059,631	2006	2,129,518	2,116,039
1967	1,008,946	1,059,354	2007	2,390,535	2,351,927
1968	1,208,064	1,077,178	2008	2,178,630	2,250,184
1969	997,623	1,057,335	2009	1,963,448	2,137,979
1970	1,152,914	1,165,866	2010	1,658,597	1,780,030
1971	1,184,697	1,113,968	2011	1,650,260	1,613,529
1972	1,213,417	1,248,710	2012	1,748,167	1,708,565
1973	1,218,156	1,177,860	2013	1,955,799	1,856,537
1974	1,223,256	1,139,175	2014	2,015,848	2,056,396
1975	1,294,650	1,329,636	2015	1,732,324	1,905,480
1976	1,390,822	1,389,248	2016	1,672,077	1,578,495
1977	1,312,876	1,390,466	2017	1,428,465	1,504,654
1978	1,302,312	1,198,325	2018	1,540,021	1,549,941
1979	1,230,068	1,235,193	2019		1,374,327
1980	1,295,903	1,282,064			

Note:
* Calendar years 1949, 1950, and 1951 are estimated values.
Figures from 1979 to present consist of water transactions which include water sales, exchanges and wheeling transactions to member agencies.

TABLE 1-4
WATER USE BY METROPOLITAN'S MEMBER AGENCIES
Fiscal Year 2018/19[1]
(Acre-Feet)

Member Agency	Total Local Production[2]	Total Local Use[3]	MWD Direct Deliveries[4]	MWD Indirect Deliveries[5]	MWD Total Deliveries	Total Water Use[6]	MWD Direct Deliveries as % of Total Use
Anaheim	44,660	44,660	11,022		11,022	55,681	20%
Beverly Hills	0	0	9,905		9,905	9,905	100%
Burbank	12,451	12,451	5,865	9,417	15,281	18,315	32%
Calleguas	38,149	46,899	85,521	1,220	86,741	132,421	65%
Central Basin	209,850	234,035	14,707	5,340	20,046	248,741	6%
Compton	7,245	7,245	0		0	7,245	0%
Eastern	119,759	119,759	83,964	7,451	91,414	203,723	41%
Foothill	7,811	7,811	7,605		7,605	15,416	49%
Fullerton	18,500	18,500	5,519		5,519	24,019	23%
Glendale	9,415	9,415	14,185		14,185	23,599	60%
Inland Empire	181,098	179,961	63,812	4,862	68,673	243,772	26%
Las Virgenes	4,553	4,662	19,191		19,191	23,853	80%
Long Beach	34,752	34,752	25,512		25,512	60,264	42%
Los Angeles	377,491	378,271	142,647		142,647	520,918	27%
MWDOC	362,733	376,703	125,513	40,345	165,859	502,216	25%
Pasadena	10,822	10,905	17,996		17,996	28,901	62%
San Diego CWA	136,399	136,399	346,378		346,378	482,776	72%
San Fernando	2,819	2,819	0		0	2,819	0%

TABLE 1-4 (Continued)
WATER USE BY METROPOLITAN'S MEMBER AGENCIES
Fiscal Year 2018/19[1]
(Acre-Feet)

Member Agency	Total Local Production[2]	Total Local Use[3]	MWD Direct Deliveries[4]	MWD Indirect Deliveries[5]	MWD Total Deliveries	Total Water Use[6]	MWD Direct Deliveries as % of Total Use
San Marino	3,594	3,594	840		840	4,434	19%
Santa Ana	26,430	26,430	7,743		7,743	34,173	23%
Santa Monica	9,400	9,400	3,157		3,157	12,557	25%
Three Valleys	44,817	45,987	55,261	7,074	62,336	101,248	55%
Torrance	4,481	11,085	14,176		14,176	25,261	56%
Upper San Gabriel	172,457	135,034	5,420	50,776	56,195	140,454	4%
West Basin	59,546	52,163	117,109		117,109	169,272	69%
Western	190,830	190,830	66,142		66,142	256,971	26%
	2,090,060	2,099,767	1,249,188	126,484	1,375,672	3,348,955	37%

Footnotes:

[1] Local supply data includes three year averages for those sources unavailable at time of publication. Totals may not foot due to rounding.

[2] Total Local Production = groundwater, groundwater recovery, surface water, recycled water, seawater desalination, and Los Angeles Aqueduct supplies produced, but not necessarily used, within a member agency boundary, not including water used for environmental purposes.

[3] Total Local Use = Total Local Production adjusted for inter-agency water transfers and locally produced water, not including water used for environmental purposes.

[4] MWD Direct Deliveries includes SDCWA/IID exchange.

[5] MWD Indirect deliveries: Non-consumptive water being delivered to storage for later use.

[6] Total Water Use = Total Local Use + MWD Direct Deliveries.

TABLE 1-5
2018/19 MAJOR SHUTDOWNS & SERVICE INTERRUPTIONS

FACILITY	DATES	NO. OF DAYS	LIMITS OF SHUTDOWN	PURPOSE
WADSWORTH PUMPING/ POWER PLANT	Jul 16-Dec 24, 2018	162	Wadsworth Facility	Perform upgrade to control systems for pumps and generating units.
MIDDLE FEEDER (South)	Jul 18-Jul 22, 2018	5	From Rio Hondo pressure control structure to the Greenleaf Blvd. sectionalizing valve (w. of 710 Fwy.)	Perform repairs and inspection of pipelines inside Rio Hondo pressure control structure.
SEPULVEDA FEEDER	Jul 30-Aug 6, 2018	8	From W. El Segundo Blvd. and Van Ness Ave. sectionalizing valve to Second Lower Feeder	Inspect prestressed concrete cylinder pipe.
SANTA MONICA FEEDER	Aug 19-Aug 22, 2018	4	From Beverly Hills pressure control structure to pipeline terminus	Replace two pipeline flanges for insertion and extraction points for a leak detection device.
ETIWANDA PIPELINE	Sep 9-Sep 23, 2018	15	From Rialto Pipeline to Upper Feeder (Untreated)	Inspect lining and influent meters.
BOX SPRINGS FEEDER -MILLS WATER TREATMENT PLANT -PERRIS VALLEY PIPELINE	Oct 3-Oct 4, 2018	2	From Santa Ana Valley Pipeline to the Mills water treatment plant	Support DWR Santa Ana Valley Pipeline inspection.
MIDDLE FEEDER (South)	Oct 8-Oct 14, 2018	7	From Rio Hondo PCS to the sectionalizing valve on Greenleaf Blvd west of the 710 Fwy.	Perform repairs to pipelines #2 & #6 in the Rio Hondo PCS.
SAN DIEGO PIPELINE 5	Nov 4-Nov 13, 2018	10	From the Skinner water treatment plant to SDCWA jurisdiction line	1. Install bulkheads for a 5-month relining project of SDCWA's portion of Pipeline 5. 2. Perform PCCP inspections.
PALOS VERDES FEEDER	Nov 5-Nov 10, 2018	6	From Appian Way to Palos Verdes Reservoir	Perform installation of new meter and valve.
PALOS VERDES RESERVOIR	Nov 5-Feb 16, 2019	104	Palos Verdes Reservoir	Perform return-to-service work including disinfection and startup procedures.
BOX SPRINGS FEEDER -MILLS WATER TREATMENT PLANT -PERRIS VALLEY PIPELINE	Nov 6-Nov 7, 2018	2	From Santa Ana Valley Pipeline to Mills water treatment plant	Support DWR Santa Ana Valley Pipeline inspection.
DIAMOND VALLEY LAKE FACILITY	Nov 27-Jan 31, 2019	66	DVL pumphouse	Remove existing epoxy lining and apply polyurethane lining to pumphouse conduits, pumphouse manifold and pressure control conduits.
RIALTO PIPELINE -ETIWANDA PIPELINE	Dec 3-Dec 12, 2018	10	From Devil Canyon Facility to Live Oak Reservoir	1. Replace valves, Service Connections CB-12, CB-16. 2. Perform PCCP inspections.

TABLE 1-5 (Continued)
2018/19 MAJOR SHUTDOWNS & SERVICE INTERRUPTIONS

FACILITY	DATES	NO. OF DAYS	LIMITS OF SHUTDOWN	PURPOSE
BOX SPRINGS FEEDER -MILLS WATER TREATMENT PLANT -PERRIS VALLEY PIPELINE	Dec 4-Dec 6, 2018	3	From Santa Ana Valley Pipeline to the Mills WTP	Support DWR Santa Ana Valley Pipeline repair.
SANTA MONICA FEEDER	Dec 16-Dec 22, 2018	7	From Hollywood Tunnel to the Beverly Hills PCS	Perform urgent leak repairs.
SEPULVEDA FEEDER	Jan 3-Jan 26, 2019	24	W. El Segundo Blvd. and Van Ness Ave. sectionalizing valve to Second Lower Feeder	Perform PCCP relining urgent repair.
PALOS VERDES FEEDER	Jan 7-Jan 8, 2019	2	From Appian Way to Palos Verdes Reservoir	Install new 36-inch BFV.
SECOND LOWER FEEDER	Jan 28-Feb 3, 2019	7	From Oak Street PCS to Palos Verdes Reservoir	Remove bulkheads and disinfect piping prior to Palos Verdes Reservoir disinfection.
PERRIS BYPASS PIPELINE	Jan 22-Jan 29, 2019	8	From Santa Ana Valley Pipeline terminus to Perris HEP	Perform PCCP inspection.
BOX SPRINGS FEEDER -MILLS WATER TREATMENT PLANT -PERRIS VALLEY PIPELINE	Jan 23-Jan 28, 2019	6	From Santa Ana Valley Pipeline to Mills WTP	Perform PCCP inspection.
FOOTHILL FEEDER -SAN FERNANDO TUNNEL -JENSEN WATER TREATMENT PLANT -SEPULVEDA FEEDER -EAST VALLEY FEEDER -WEST VALLEY FEEDER 1 -WEST VALLEY FEEDER 2 -CALABASAS FEEDER	Feb 2-Feb 22, 2019	21	From Castaic Lake to Jensen WTP	Perform PCCP inspection and support DWR's valve maintenance at Castaic outlet and bring CLWA-1 online.
ORANGE COUNTY FEEDER	Feb 18-Aug 9, 2019	133	From Willits PCS to Irvine Cross Feeder	Perform lining repairs.
SAN DIEGO PIPELINE 1 (Treated)	Feb 24-Mar 5, 2019	10	From Auld Valley Pipeline to SDCWA jurisdiction line	SDCWA to install bulkheads and perform internal assessment.
SAN DIEGO PIPELINE 2 (Treated)	Feb 24-Mar 5, 2019	10	From Auld Valley Pipeline to SDCWA jurisdication line	SDCWA to install bulkheads and perform internal assessment.

TABLE 1-5 (Continued)
2018/19 MAJOR SHUTDOWNS & SERVICE INTERRUPTIONS

FACILITY	DATES	NO. OF DAYS	LIMITS OF SHUTDOWN	PURPOSE
COLORADO RIVER AQUEDUCT -SAN JACINTO PIPELINE -SAN JACINTO PIPELINE 1 & 2	Mar 5-Mar 30, 2019	26	From Intake pumping plant to Lake Mathews	1. Install surge chamber bypass covers. 2. Replace liner at Iron Mt. Reservoir and canal. 3. Perform tunnel cleaning.
SAN DIEGO CANAL	Mar 8-Mar 15, 2019	8	From Casa Loma Canal to Lake Skinner	Perform cleaning of siphons along the canal.
SECOND LOWER FEEDER	Mar 11-Sep 1, 2019	152	From Ball and Dale sectionalizing valve to Carson and Bataan sectionalizing valve.	Perform PCCP rehab on Reach 4.
BOX SPRINGS FEEDER -MILLS WATER TREATMENT PLANT -PERRIS VALLEY PIPELINE	Mar 25-Mar 28 ,2019	4	Mills WTP	Perform electrical upgrades.
SAN DIEGO PIPELINE 5	Mar 31-Apr 9 ,2019	10	From Skinner WTP to Twin Oaks WTP	Remove bulkheads, reactivate SDCWA Pipeline 5 and bring SDCWA's Crossover Pipeline back to normal operation.
SANTA MONICA FEEDER	Apr 15-Apr 18, 2019	4	From Beverly Hills PCS to pipeline terminus	Install internal bands to repair leaks.
SAN DIEGO PIPELINE 1 (Treated)	Apr 15-May 15, 2019	31	From Auld Valley Pipeline to SDCWA jurisdiction line	1. Perform inspection of Reinforced Concrete and Metallic Pipe. 2. Perform coating repairs to open vent structures.
SAN MARINO LATERAL	Apr 17-Apr 24, 2019	8	From Upper Feeder (Treated) to pipeline terminus	1. Replace plugs on meter components within SMR-01 structure. 2. Relocate sample tap.
SAN DIEGO PIPELINE 2 (Treated)	May 20-Jun 20, 2019	32	From Auld Valley Pipeline to SDCWA jurisdiction line	1. Perform inspection of Reinforced Concrete and Metallic Pipe. 2. Perform coating repairs to open vent structures.
LAKE SKINNER OUTLET TOWER	May 28-Jun 13, 2019	16	From outlet tower to the Lower Outlet Structure's 144-inch butterfly valve	Perform core drilling in preparation for future seismic upgrades.
SANTA MONICA FEEDER	May 29-May 30, 2019	2	From Hollywood Tunnel to Beverly Hills PCS	Perform acoustic leak detection inspection.

In addition to this priority relining project on the Sepulveda Feeder, Metropolitan continued investing in maintenance and protecting its infrastructure, as detailed in Table 1-5.

Signing of the historic Colorado River Drought Contingency Plan, designed to preserve Lake Mead water levels (top); Sutter Bypass floodwaters move north to south (left to right) across the snaking Sacramento River and Fremont Weir to the Yolo Bypass.

CHAPTER 2

Strategic Water Initiatives

Metropolitan provides imported water supplies to its member agencies from two primary sources, the Colorado River and Northern California via the State Water Project. Strategic Water Initiatives staff coordinates resources throughout the organization to manage and protect Metropolitan's interests in the watersheds that support these two key systems.

Bay-Delta Initiatives

Bay-Delta Initiatives has been heavily involved in a variety of key regulatory and planning processes in the Sacramento-San Joaquin Delta; it continues to advance Metropolitan's interests in water supply reliability and ecosystem restoration and provides support to developing the new Delta Conveyance Project. Staff actively participated in collaborative science efforts such as pursuing studies related to a variety of fish species, providing leadership in science workshops and conferences and publishing scientific manuscripts in peer-reviewed publications. Figure 2-1 shows a map of the Delta region.

Long-Term Actions

California WaterFix/Delta Conveyance

The first half of the year saw significant work completed on the state's proposed California WaterFix two-tunnel conveyance project, including coordination with other State Water Project contracting agencies for the State Water Resources Control Board proceedings. However, Gov. Newsom's State of the State address on Feb. 12 signaled a change in the direction of Delta conveyance, as the governor announced movement toward a single-tunnel approach. Metropolitan has been working closely with the Newsom administration and its fellow State Water Contractors to evaluate the ramifications of the shift to an updated Delta Conveyance strategy.

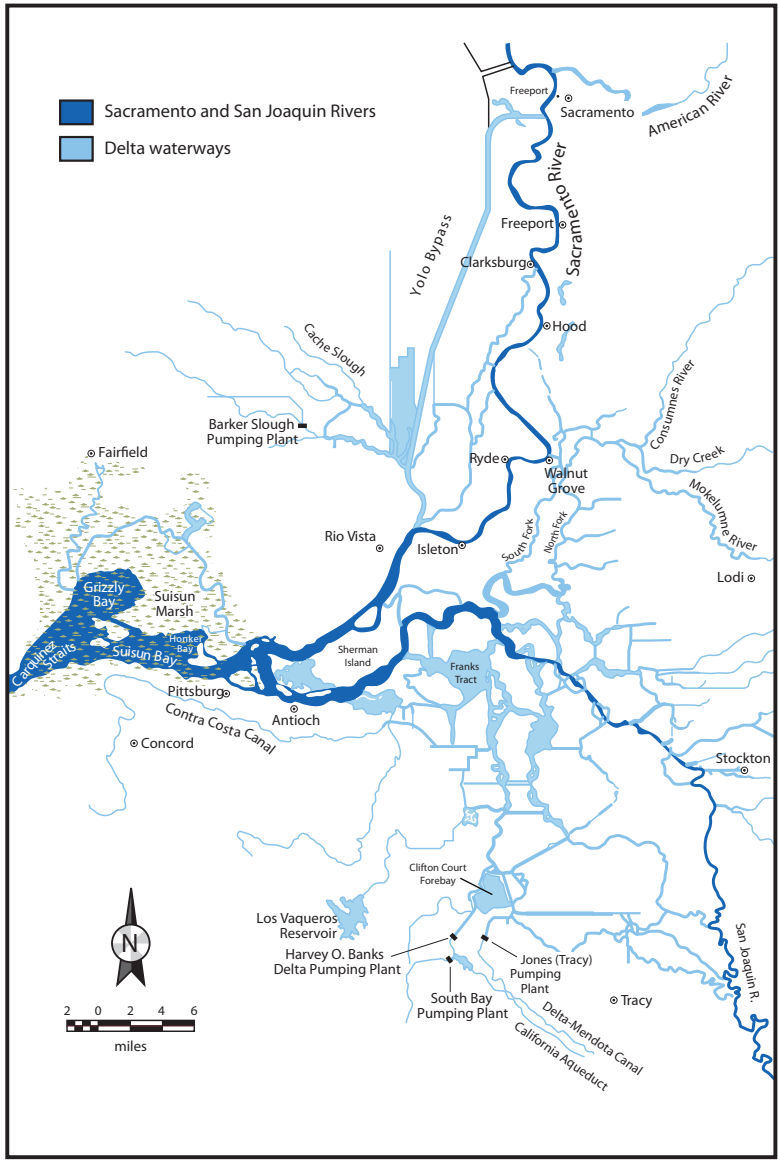


Figure 2-1. Map of the Delta Region

In a May 2 letter, the Department of Water Resources withdrew its previous WaterFix environmental approvals. Metropolitan's board would consider the Newsom administration's Delta Conveyance proposal once it has been further defined by the state and the cost and benefit allocation approach has been agreed upon between DWR and the SWP contractors.

Through its membership on the Design and Construction Authority board, Metropolitan worked on an updated DCA budget and timeline for engineering/planning support. Metropolitan helped develop an "Opt In" approach to the SWP contract amendment on cost allocation, along with participating in a new Delta Conveyance environmental review planning.

Metropolitan also sits on the Delta Conveyance Finance Authority, which took action to approve the fiscal year 2019/20 budget and authorized its executive director to execute an audit services agreement.

California EcoRestore

Work continued to complete the construction of the Tule Red Restoration Project in the Suisun Marsh area of the Bay-Delta estuary. Metropolitan has been involved in developing this tidal restoration through the State and Federal Contractors Water Agency, and completion is expected in 2020.

Staff worked with DWR to produce a short documentary video on the EcoRestore initiative to highlight the value, purpose and benefits of Delta restoration efforts.

Near-Term Actions

Science Activities

Staff participated in various science efforts and collaborated with Bay-Delta science teams to advance the development of scientific understanding in the Delta.

Progress continued on several grant-funded science studies, with completion of a salmon predation study jointly funded by a California Department of Fish and Wildlife grant and funding from Metropolitan. Study findings suggest that for largemouth bass, a commonly occurring predator in the Delta, there were significant increases in

predation of juvenile salmon due to interactions with submerged aquatic vegetation. Study results may inform possible management actions that could benefit Chinook salmon survival. A second predation study, primarily funded by the Central Valley Project Improvement Act with some Metropolitan funding, began in October 2018 to investigate the role of predator contact points on salmon predation in the Delta. In August 2018, a scientific paper in Limnology and Oceanography on how fish populations respond to environmental variables in the Bay-Delta concluded that the amount of variation described by the environmental drivers has declined, suggesting the drivers have less cause and effect relationship with those population trends and thus diminishing their value as policy tools.

Two scientific papers were published in December 2018. A paper in the Journal of Fish and Wildlife Management evaluated rates of fish misidentification and analyzed the rate at which experienced biologists misidentified fish species in a lab setting. A second paper in the San Francisco Estuary & Watershed Science journal, on potential bias in three fish surveys, found that a number of Bay-Delta species including Delta smelt and longfin smelt become more invisible to fishing gear as the water becomes clearer.

In June 2019, a scientific paper in the San Francisco Estuary & Watershed Science journal, evaluated early 20th century outflow and salinity intrusion in the Bay-Delta estuary.

Regulatory Activities

Significant effort and progress was made on the development of a Voluntary Agreement approach to update the SWRCB Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. The Voluntary Agreements are proposed as an alternative to the unimpaired-flow approach recommended by SWRCB staff. The proposed Voluntary Agreements would be a comprehensive set of actions in the Sacramento and San Joaquin rivers, their tributaries, and Delta that would provide flow, habitat, funding, and a robust science program to adaptively manage the assets provided by the Voluntary Agreements. Staff and management collaborated with the state agency leads, and other stakeholders including upstream and export water right holders, and environmental non-governmental organizations. Efforts allowed for key submittals to the SWRCB including a

framework for completion of a Voluntary Agreement alternative that could be analyzed by the SWRCB in its environmental review.

Additionally, staff provided comments on the draft report concerning biological goals developed by the Independent Scientific Advisory Panel that was organized at the request of the SWRCB. The purpose of the report is to provide recommendations that can be used to assess progress toward achieving the proposed Bay-Delta Water Quality Control Plan narrative objectives. The final panel report has been issued and is under staff review.

Delta Islands Activities

The Delta Watermaster within the SWRCB extended the metering experiment on Delta Islands for one year. The experiment's goal is to test different meters and identify which would meet regulatory accuracy compliance as required by Senate Bill 88 to quantify in-Delta agricultural diversions, passed by the Legislature in June 2015. The extension will allow for the completion of the experiment and the development of a plan for full implementation after approval by the Delta Watermaster.

The Bacon Island Levee Rehabilitation Project located at the north end of the island is in its second year of implementation. This project is being done by the local reclamation district and is funded primarily by state bond funds, with additional funding from Metropolitan and urban water agencies in Northern California. The potential risk of flooding to nesting bird habitat delayed the project from November 2018 through March 2019. Earthwork consolidation and creation of land-side habitat has begun, with project completion scheduled for December 2019. The project was identified as a priority levee rehabilitation project on the Old and Middle River freshwater corridor. Because it forms a critical link to the emergency freshwater pathway and water export operations, Bacon Island also served as one of the sites for a full-scale exercise on responding to simulated significant levee erosion and potential levee breach scenarios in the Delta. Metropolitan played a key role in this exercise in coordination with local reclamation districts.

Staff and consultants have started reviewing levee monitoring instruments and testing various surveillance technologies to better

understand how Delta island levees perform, and provide guidelines for systematic levee monitoring to increase levee structure reliability.

Emergency Preparedness Plan

In early 2019, culminating many years of work, DWR approved the Delta Flood Emergency Management Plan for responding to catastrophic events that could significantly impact State Water Project operations in the Delta. Developed in close cooperation with Metropolitan, the plan incorporates reference materials and specific procedures into training programs used effectively in Delta flood emergencies. The plan is part of a broader Delta levee emergency preparedness and response strategy.

Colorado River Resources

Figure 2-2 shows a map of the Colorado River Basin and the states that rely on the Colorado River system for water. The map also shows California's major water agencies with federal water supply contracts. California has a basic apportionment of 4.4 million acre-feet, most of which is used by higher-priority agricultural users (Palo Verde Irrigation District, Yuma Project Reservation Division, Imperial Irrigation District and Coachella Valley Water District), as well as Metropolitan.

Palo Verde Farmland Leases

Metropolitan is the largest landowner in the Palo Verde Valley, owning about 21,000 acres of irrigable farmland, purchased in 2001 and 2015 to support the reliability of Colorado River water supplies. Metropolitan's goals for its land holdings are to maintain agricultural productivity while reducing consumptive water use below historical levels. In calendar year 2018, Metropolitan's four lessees reduced their consumptive water use by nearly a foot per irrigated acre (about 20 percent) below 2016 levels. The lessees received financial incentives provided by farm leases signed with Metropolitan aimed to reduce water use by 25 to 30 percent below the historical level. While the leases were successful, due to uncertainties in the PVID irrigation delivery measurements that affected the lessees' rent payments, the leases were amended in 2019 to instead provide financial incentives for switching from alfalfa to lower water-using crops. Metropolitan

continues to pursue technologies to improve the measurement of water use on its lands and in the future intends to revert back to leases that provide incentives based on actual water use.

Lake Mead Operation & Management Updated Through 2026

After years of negotiations among the Basin States and with possible shortages imminent, the Drought Contingency Plan agreements went into effect on May 20, 2019. The DCP is a set of short-term agreements and voluntary measures designed to reduce to less than 10 percent the risk of Lake Mead and Lake Powell reaching critically low elevations, back to the level it was when federal guidelines were adopted in 2007. Beginning no later than 2020, the Interior Secretary, the Basin States and the Colorado River contractors, including Metropolitan, will begin work on the renegotiation of those guidelines. That process is expected to result in new rules for management and operation of the Colorado River after 2026.

A combination of factors including the effects of climate change, increasing temperatures in the Colorado River Basin, decreased snow accumulation and reduced runoff have all contributed to decreasing inflows into the Colorado River's mainstream reservoirs. This decline in runoff and inflow into the system has been more severe than what was expected during development of the Interim Guidelines for Lower Basin Shortages. The potential for declining elevations at Lake Powell and Lake Mead presented Metropolitan (and all Colorado River water users) with unacceptable risks, particularly to hydropower generation and the ability to continue full water deliveries from Glen Canyon Dam and Hoover Dam. A 2018 Bureau of Reclamation modeling forecast predicted that the first-ever shortage declaration would likely be declared for the calendar year. Above-average snowfall in the Upper Colorado River Basin this winter has pushed that risk off for at least another year. But at the end of 2018, the risk remained for more than 600,000 acre-feet of Intentionally Created Surplus that Metropolitan had stored in Lake Mead. The 2007 guidelines required declaring a shortage in the Lower Basin if Lake Mead declined to an elevation of 1,075 feet or below. Over the past few years, Lake Mead has hovered just above this elevation. Without the Lower Basin DCP, Metropolitan could have lost the ability to access its ICS water in Lake Mead during a declared shortage. Reclamation's forecasts show an increasing risk of shortage through 2026. ICS is a valuable tool for Metropolitan to ensure a full aqueduct and the ability to access ICS

helped to offset the record low State Water Project allocation of 5 percent in 2014.

The key requirement of the Lower Basin DCP is for each of the Lower Division States to make DCP contributions at defined reservoir elevations, in specified volumes. The DCP contribution requirement is intended to significantly reduce the risks of further decline in Lake Mead. The Lower Basin DCP also increases the cumulative ICS available to each Lower Division state by 200,000 acre-feet and enhances flexibility to access ICS. These measures encourage creation and long-term storage of ICS and aim to bolster Lake Mead's elevation.

The Lower Basin DCP builds on the success of the Intentionally Created Surplus Program first authorized in the 2007 guidelines. The ability to create ICS allows Colorado River contract holders to conserve water through a variety of methods and store that conserved water in Lake Mead. In this way, the ICS program encourages both conserving water and adding to storage in Lake Mead. The Lower Division states can use ICS to make DCP contributions. These types of DCP contributions become a new category of ICS–"DCP ICS." Like ICS, DCP ICS will be stored in Lake Mead and the entity that conserved and stored the water can have it delivered at a later date. The Lower Basin DCP established the rules for delivery of DCP ICS for two periods: through 2026 when the 2007 guidelines are set to expire, and from 2027 to 2057. The Lower Basin DCP Agreement also includes accounting, consultation, delivery adjustment, and system assessment provisions.

One final benefit that comes with implementation of the Lower Basin DCP is that it triggers Mexico's Water Scarcity Contingency Plan as laid out in Section IV of Minute 323 to the 1944 U.S.-Mexico Water Treaty. In Minute 323, Mexico committed to share proportionally in making additional contributions to Lake Mead at specified elevations.

Figure 2-2. Map of the Colorado River Basin

Metropolitan's Water Savings Incentive Program has paid for several fire departments (including Glendale Fire, above) to purchase equipment for firefighter training that allows water to be recirculated through pumps and fire hoses.

CHAPTER 3

Water Resource Management

The Water Resource Management Group plans, secures and manages high-quality water resources for Metropolitan's member agencies in a reliable, cost-effective and environmentally responsible manner. Principal responsibilities include managing imported water supplies and quality, advancing water-use efficiency and local resource development, and providing supply and demand forecasts that form the foundation for resource and facility planning. Other responsibilities include developing and implementing timely resource programs and projects, assisting member agencies in optimizing local resources to benefit the entire Metropolitan service area, and ensuring a fair return on Metropolitan's contractual investments in local and imported resources.

As the fiscal year began, State Water Project contractors were operating under a 35 percent SWP allocation for calendar year 2018 due to below-average hydrologic conditions. Despite the low allocation, Metropolitan water supplies and demands remained balanced in 2018, with storage levels remaining steady at 2.4 million acre-feet. Dry conditions persisted through the end of 2018 and into the new year, leading to an initial SWP allocation of 10 percent for 2019. Conditions rapidly improved in February 2019, leading to a full San Luis Reservoir and surplus Article 21 water supplies being made available to Metropolitan.

On June 19, 2019, in response to significantly improved statewide hydrologic conditions, the state Department of Water Resources set the SWP allocation at 75 percent for CY 2019. Metropolitan expects to substantially add to dry-year storage reserves in 2019 and may end the year with record reserves.

State Water Project Resources

Metropolitan holds a State Water Project contract with DWR for an allocation of 1,911,500 AF annually, subject to availability, and SWP participation rights. Metropolitan signed a contract extension amendment on December 11, 2018, to extend its SWP contract 50 years to 2085. The contract extension will become effective and implemented after additional State Water Contractors sign and any contract validation actions are resolved.

Wet hydrologic conditions during water year 2018/19 allowed for a 75 percent allocation of SWP contract supplies for CY 2019. Northern Sierra snowpack peaked at 163 percent of average levels for April 1, after which snowpack typically melts. This followed an average year with a 35 percent allocation in CY 2018. In sum, Metropolitan managed nearly 1.08 million AF through the SWP system (Fig. 3-1), about 625,000 AF less water than in the previous fiscal year. (FY 2018/19 deliveries and storage are subject to final reconciliation.) More than half of the 160,000 AF of supplies stored or exchanged outside of the service area in the fiscal year occurred in the latter half of CY 2018, when Metropolitan maximized carryover storage. The remainder occurred in the first half of 2019 as deliveries to San Joaquin Valley groundwater storage programs.

Metropolitan's net SWP payments during FY 2018/19 were $482 million (Table 3-1) on a modified accrual basis. Metropolitan also administered existing storage programs outside its service area along the SWP system, as described on the following pages.

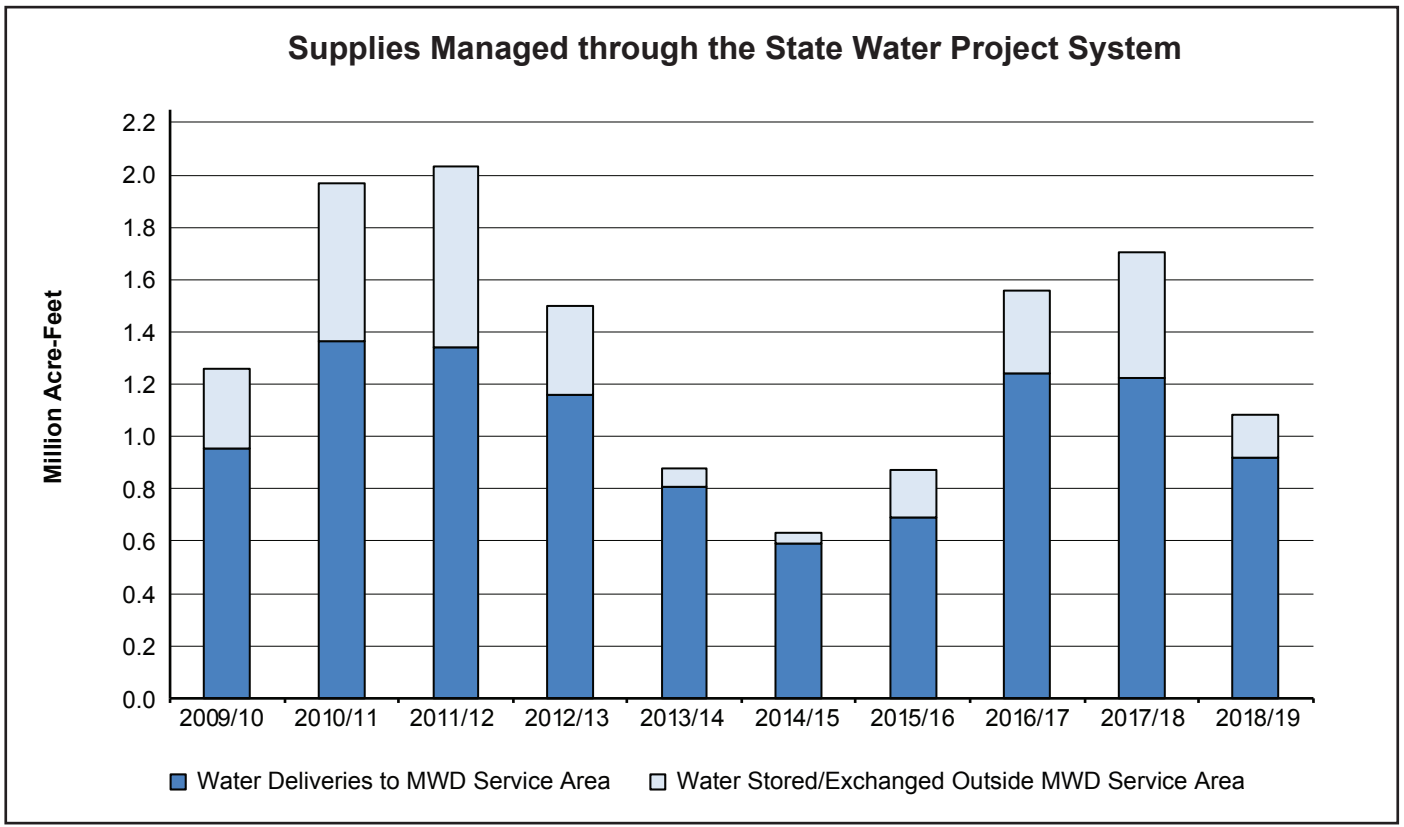


Figure 3-1. Supplies Managed through the State Water Project System

TABLE 3-1
CHARGES, PAYMENTS AND CREDITS UNDER THE STATE WATER AND DEVIL CANYON CASTAIC CONTRACTS
(Millions of Dollars)

	Conservation (Delta)		Transportation								
Fiscal Year	Capital	Minimum OMP&R [1]	Capital	Minimum OMP&R [1]	Variable	Extra * Capacity Costs	Devil Canyon/ Castaic	Subtotals	Credits	Totals	Accumulated Totals
1963-73	2.50	0.66	197.31	19.33	1.02	39.16	3.56	263.54	(15.62)	247.91	247.91
1973-83	80.68	29.43	484.57	181.61	59.06		70.74	906.09	(49.53)	856.56	1,104.47
1983-93	163.85	127.62	662.42	1,391.73	88.29	85.62	88.50	2,608.03	(373.17)	2,234.86	3,339.33
1993/94	23.50	16.92	74.35	147.75	(5.86)	25.24	9.89	291.79	(101.81)	189.98	3,529.31
1994/95	22.58	17.29	77.05	150.63	8.96	24.01	10.24	310.76	(94.13)	216.63	3,745.94
1995/96	21.85	19.68	81.31	111.87	3.11	26.08	10.60	274.49	(65.33)	209.16	3,955.10
1996/97	21.51	21.19	85.23	109.56	10.00	29.18	10.44	287.11	(38.30)	248.81	4,203.91
1997/98	21.79	22.87	90.07	138.35	6.67	27.58	9.56	316.87	(64.74)	252.14	4,456.05
1998/99	20.56	23.07	90.58	139.60	6.50	29.48	9.40	319.19	(74.96)	244.23	4,700.28
1999/00	19.16	24.11	89.26	164.26	12.05	29.99	10.32	349.15	(70.06)	279.09	4,979.37
2000/01	26.91 [2]	24.60	115.99 [2]	156.53	35.73	32.99	10.81	403.57	(27.19)	376.38	5,355.75
2001/02	8.46	25.20	60.24	147.23	111.75	38.99	10.53	402.40	(68.44)	333.97	5,689.72
2002/03	16.32	25.90	88.45	161.36	64.83	32.95	10.26	400.07	(57.10)	342.97	6,032.68
2003/04	18.39	27.86	94.86	169.12	110.22	31.49	10.23	462.18	(69.47)	392.71	6,425.39
2004/05	20.60	29.65	98.51	149.53	102.39	28.28	10.99	439.94	(66.68)	373.26	6,798.65
2005/06	17.36	28.37	88.80	140.92	130.82	23.60	11.10	440.97	(41.33)	399.64	7,198.30
2006/07	21.34	25.40	87.95	172.78	88.82	28.64	11.90	436.83	(74.20)	362.63	7,560.92
2007/08	23.95	15.33	80.98	188.78	165.49	36.24	12.12	522.90	(58.60)	464.30	8,025.22
2008/09	23.18	30.50	73.30	224.90	56.72	31.30	13.40	453.30	(58.59)	394.71	8,419.93
2009/10	34.69	39.06	91.87	205.72	71.27	35.93	13.97	492.49	(54.28)	438.22	8,858.15
2010/11	34.70	49.13	97.02	206.13	100.66	36.22	14.10	537.96	(46.08)	491.88	9,350.03
2011/12	26.52	57.29	94.26	197.73	109.67	38.73	14.68	538.88	(59.04)	479.84	9,829.87
2012/13 [3]	34.62	61.06	72.72	170.08	135.15	35.30	14.35	523.28	(42.33)	480.95	10,310.81
2013/14	27.13	60.51	93.50	163.40	91.77	30.64	14.21	481.17	(49.77)	431.40	10,742.21
2014/15	25.74	68.67	97.40	160.18	97.27	26.84	15.63	491.73	(51.74)	439.99	11,182.20
2015/16	33.95	85.43	97.75	193.95	115.63	31.52	16.95	575.17	(63.72)	511.45	11,693.65
2016/17	36.55	91.18	99.40	131.59	148.57	37.96	17.65	562.90	(37.16)	525.74	12,219.39
2017/18	35.93	90.15	97.96	136.63	150.19	37.95	18.66	567.47	(40.18)	527.29	12,746.68
2018/19[4]	38.79	88.44	100.59	104.94	134.62	37.28	18.98	523.64	(41.37)	482.27	13,228.95
TOTALS	903.13	1,226.59	3,663.70	5,736.18	2,211.37	949.16	493.75	15,183.88	(1,954.92)	13,228.95	

* Includes costs for excess capacity constructed for Metropolitan on the System and East Branch Enlargement

[1] Minimum Operations, Maintenance, Power, and Replacement charge

[2] DWR requested early payment of $36M to manage cash shortages due to 2001 California's energy crisis

[3] Reporting changed from cash to modified accrual basis in FY 2012/13.

[4] Does not include advance payments for new facilities planning

Water Storage Programs

Semitropic/Metropolitan Water Banking and Exchange Program

In 1994, Metropolitan entered into a groundwater storage agreement with Semitropic Water Storage District in Kern County that allows storage of up to 350,000 AF. During FY 2018/19, Metropolitan stored 33,172 AF with Semitropic. The total water in storage on June 30, 2019 was 220,515 AF.

Arvin-Edison/Metropolitan Water Management Program

Under a 1997 agreement with Arvin-Edison Water Storage District, Metropolitan can store up to 350,000 AF. During FY 2018/19, Metropolitan recovered 9,895 AF by surface water exchange from the program to reposition water for future use during a dry year. The total water in storage on June 30, 2019, was 143,338 AF. Some Arvin-Edison groundwater extraction wells exceed the state's five-parts-per-trillion MCL (Maximum Contaminant Level) for TCP (1,2,3-trichloropropane), and this may affect the overall program yield in the future. Staff is evaluating all options available, including exchanges or using only wells with TCP below the MCL.

Antelope Valley East-Kern Water Agency/Metropolitan Water Management Program

A 2016 agreement with the Antelope Valley East-Kern Water Agency allows Metropolitan to store up to 30,000 AF in the AVEK groundwater basin, that is located downstream of the Edmonston Pumping Plant along the East Branch of the California Aqueduct. During FY 2018/19, Metropolitan neither stored nor recovered water from the program. The total water in storage on June 30, 2019, was 9,000 AF.

Antelope Valley East-Kern Water Agency/Metropolitan Water Management High Desert Water Bank Program

In April 2019, the board approved entering into an expanded High Desert Water Bank program with Antelope Valley-East Kern. Under the program, Metropolitan can store up to 280,000 AF in the groundwater basin. When the facilities are completed, Metropolitan

expects to be able to recover or store 70,000 AF per year. Metropolitan would recover the water through direct pumpback to the East Branch, providing additional water supply reliability during emergencies or water supply shortages.

Kern Delta/Metropolitan Water Management Program

A 2003 agreement with the Kern Delta Water District allows Metropolitan to store up to 250,000 AF in the groundwater basin underlying Kern Delta, with a retrieval capacity of 50,000 AF per year. During FY 2018/19, Metropolitan stored 15,999 AF with Kern Delta. Total water in storage on June 30, 2019, was 154,421 AF.

Mojave/Metropolitan Water Storage Program

In 2003, Metropolitan entered into a demonstration agreement with Mojave Water Agency. The agreement allows for the exchange of SWP water on the basis of one acre-foot of return water for each acre-foot of water previously delivered to Mojave. A 2011 amendment extended the agreement to 2035 and reduced program costs. Metropolitan recovered 7,335 AF during FY 2018/19, leaving 18,812 AF in the exchange account as of June 30, 2019.

Water Transfers and Exchanges

Improved hydrologic conditions in the SWP watershed resulted in limited need to purchase water transfer supplies in FY 2018/19.

San Gabriel Valley Municipal Water District Exchange

A 2013 purchase and exchange agreement with San Gabriel Valley Municipal Water District meant that during FY 2018/19, Metropolitan developed 1,296 AF of additional supply by exchange and secured a purchase of 2,409 AF.

Colorado River Resources

Acquisitions and exchanges made possible by the 2003 Quantification Settlement Agreement continued during FY 2018/19. Figure 3-2 illustrates annual water supplies managed through the CRA

since CY 2010. The CY 2018 supplies included more than 750,000 AF of diversions into Metropolitan's service area (the dark blue bar in Figure 3-2), plus more than 130,000 AF of Intentionally Created Surplus left in Lake Mead and more than 130,000 AF water stored or exchanged outside Metropolitan's service area (collectively the bright green bar in Figure 3-2), for a total of more than 1.02 million AF of water supplies managed through the Colorado River system. Metropolitan has storage/exchange programs with Coachella Valley Water District, Desert Water Agency and Imperial Irrigation District, of which the first two are along the CRA. As of January 2019, Metropolitan had 624,682 AF of ICS stored in Lake Mead. The 2019 DCP allowed new conservation methods for creating ICS. These new methods were included in a revised 2019 plan for ICS creation. Under that revised plan, Metropolitan's ICS account is on track to reach a record cumulative high in CY 2019.

Figure 3-3 illustrates the storage levels of lakes Mead and Powell through FY 2018/19. Above-average precipitation in the early part of CY 2019 resulted in a projected unregulated inflow to Lake Powell of about 144 percent of the April-July average, and about 124 percent of the water year average. Lake Powell elevations remained above 3,575 feet, which, when combined with Lake Mead elevations, provided for a 9 MAF release to Lake Mead.

Water Supply Acquisitions and Exchanges

Metropolitan's agricultural conservation program with IID yielded 105,000 AF in CY 2018, with an additional 119,379 AF made available through Metropolitan's land-fallowing agreements with farmers in the Palo Verde Valley. In CY 2018, Metropolitan delivered 207,746 AF to San Diego County Water Authority in exchange for 130,000 AF of conserved IID water, plus 77,746 AF of conserved water from the Coachella Canal and All-American Canal lining projects, which was made available to Metropolitan at Lake Havasu. The lining projects also conserved an additional 16,000 AF that was exchanged via a water rights agreement with a group of entities referred to as the San Luis Rey Settlement Parties.

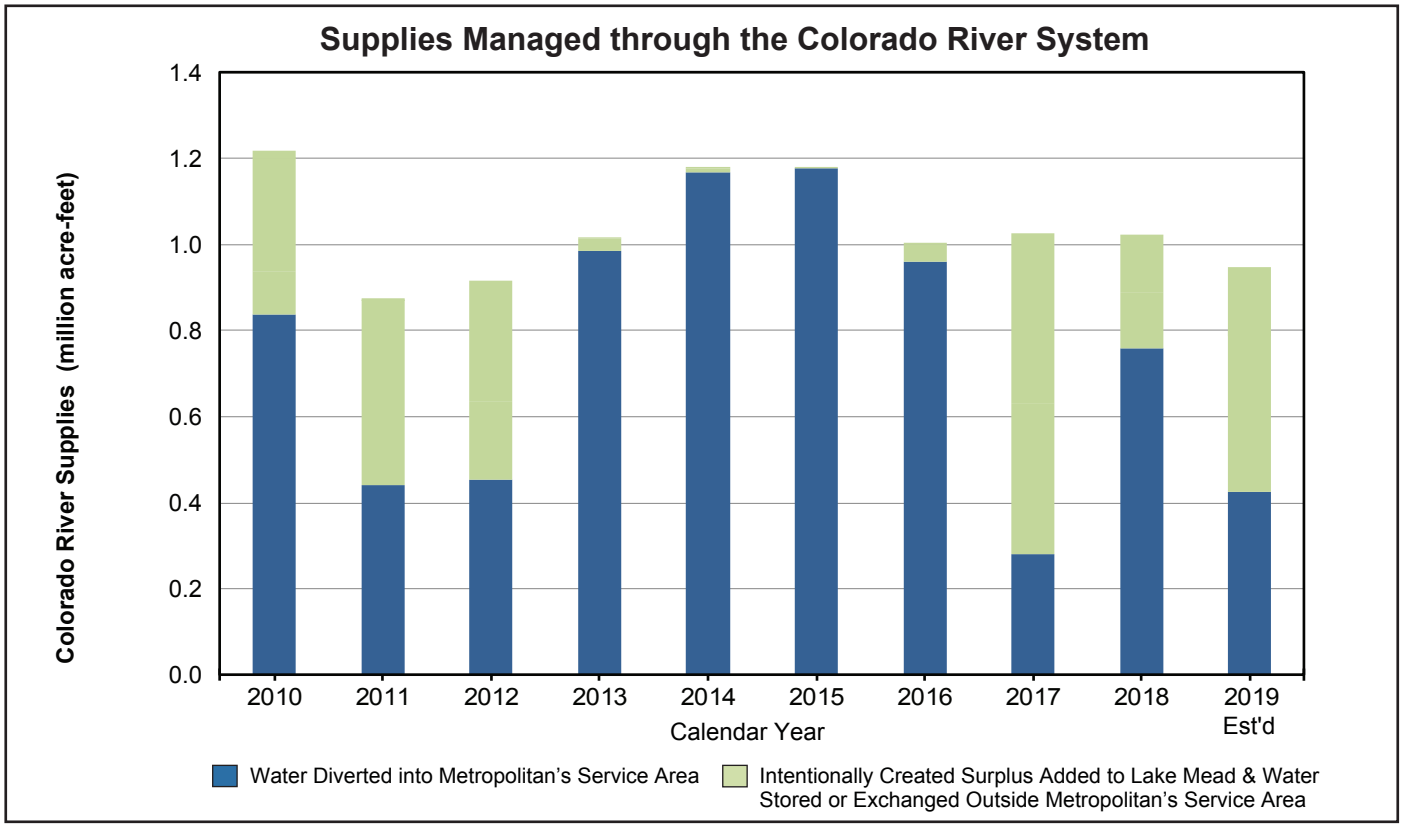


Figure 3-2. Supplies Managed through the Colorado River System

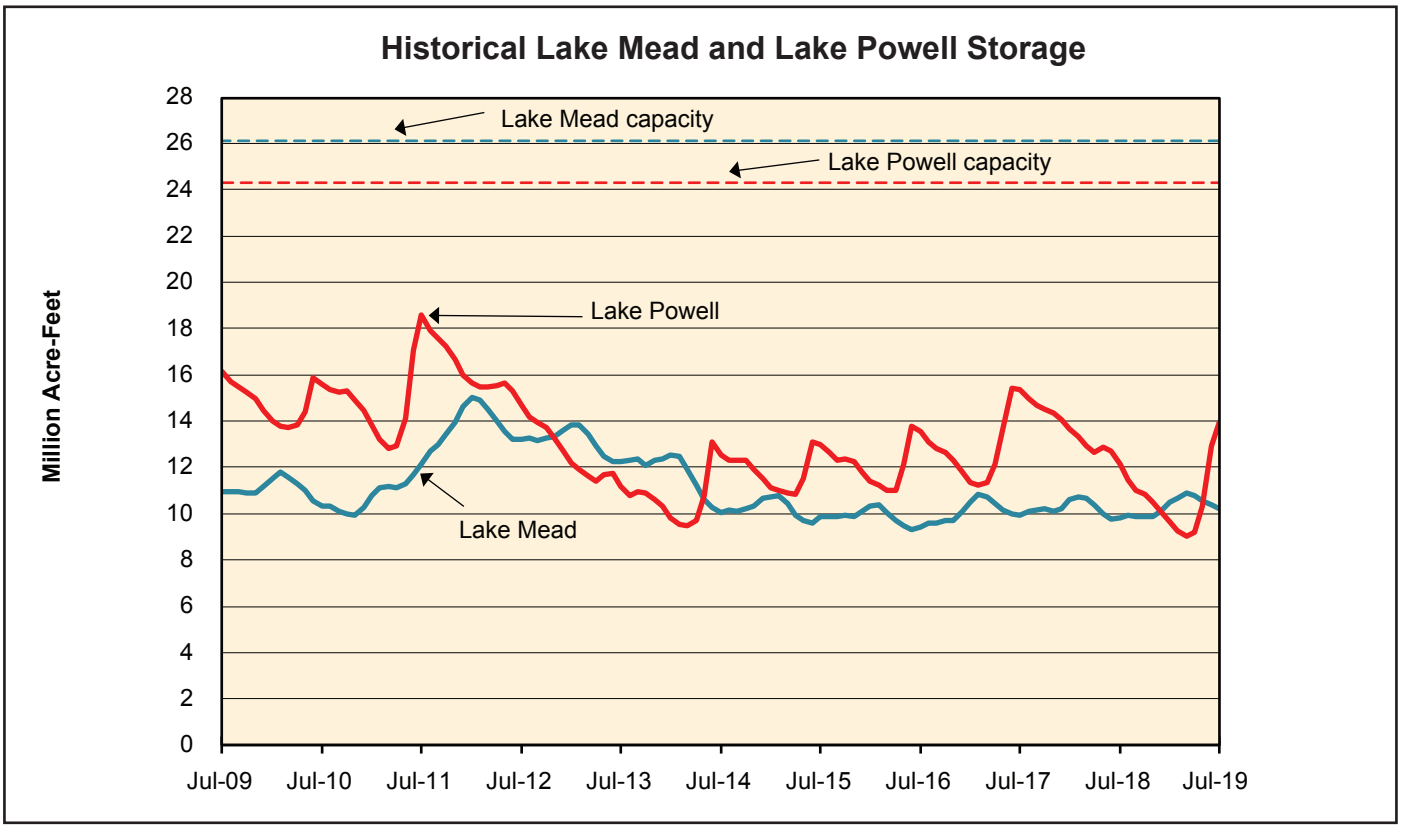


Figure 3-3. Historical Lake Mead and Lake Powell Storage Fiscal Years 2009/10-2018/19

Local Resources

Water Recycling and Groundwater Recovery

Metropolitan's Local Resources Program has provided about $662 million in incentives since 1982. It produced about 3.9 MAF of recycled water and recovered groundwater, through financial incentives of up to $340/AF. During FY 2018/19, Metropolitan provided $29 million for production of 189,000 AF under the LRP. Currently, there are 108 projects under contract expected to produce about 132,000 AF per year once fully implemented. In addition, staff is reviewing new LRP applications for projects submitted by various agencies. Contracts include performance targets that are assessed every year and when targets are not met, reductions to the contract can be made. Including LRP projects, the region used about 453,000 AF of recycled water (Fig. 3-4), and about 112,000 AF of recovered groundwater (Fig. 3-5) in FY 2018/19.

To increase use of recycled water, Metropolitan provides incentives to customers to retrofit and connect irrigation and industrial potable water systems to recycled water. Since 2014, Metropolitan committed $9.9 million for projects replacing 11,000 AFY of historic potable water use at 364 sites.

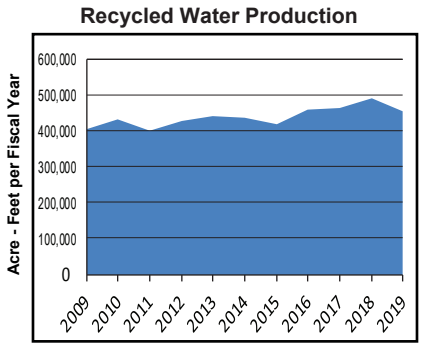


Figure 3-4.

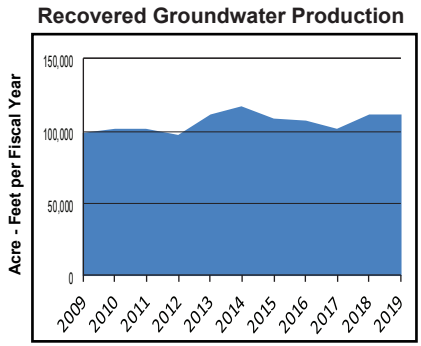


Figure 3-5.

Figures reflect total regional production (including Metropolitan-assisted project production through June 2019), and subject to change due to annual reconciliation and late invoices. Recycled water production includes Santa Ana River base flows below Prado Dam.

Seawater Desalination

During FY 2018/19, Metropolitan supported member agency desalination efforts and continued coordinating regulatory policy for seawater desalination through financial support and participation in CalDesal, a consortium of California water agencies and other stakeholders working to advance seawater and groundwater desalination. Seawater desalination projects have also been eligible for LRP incentives since 2014. Since 2005, Metropolitan has maintained agreements with its member agencies to fund three local seawater desalination projects representing 46,000 AFY of potential future supplies. Two of the three projects are currently in the environmental review and permitting stage while a third is no longer under consideration.

Groundwater Storage

Due to improved hydrologic conditions in FY 2018/19 Metropolitan stored 4,830 AF of imported supplies in local groundwater basins, mostly in the Chino Basin. Metropolitan called upon agencies to store water as part of its conjunctive use program, which is designed to enhance reliability during dry conditions, droughts and emergencies. Table 3-2 shows the balance of stored water in each in-region groundwater conjunctive use program as of June 30, 2019.

Metropolitan develops cyclic agreements with member agencies to pre-deliver full service water for future use upon mutual agreement. The member agency will then pay for the water on an agreed upon schedule for up to five years. The program allows for improved coordination of local resources with regional supplies. Metropolitan maintains cyclic agreements with six member agencies. During FY 2018/19, the cyclic program delivered 16,961 AF of water. Metropolitan's board also approved a cyclic cost-offset program in April 2019. The program allows the General Manager, should conditions warrant, to initiate cyclic deliveries when regional supplies are at risk. Metropolitan is working with member agencies to have agreements in place should the program be needed in the future.

TABLE 3-2
METROPOLITAN'S CONJUNCTIVE USE PROGRAMS

Conjunctive Use Program	Total Storage Capacity (AF)	2018/19 Beginning Balance (AF)	Change in Storage (AF)	2018/19 Ending Balance (AF)
Los Angeles County				
Claremont	3,000	1,050	0	1,050
Compton	2,289	0	0	0
Foothill	9,000	0	0	0
Live Oak	3,000	0	0	0
Long Beach Phase 1	13,000	0	0	0
Long Beach – Lakewood	3,600	0	0	0
Orange County				
Orange County	66,000	315	0	315
San Bernardino County				
Chino Basin	100,000	41,729	4,414	46,143
Riverside County				
Elsinore Basin	12,000	4,370	416	4,786
TOTAL	**211,889**	**47,464**	**4,830**	**52,294**

Some 2018/19 beginning balances differ from 2017/18 ending balances due to data received after publication of the 2018 Annual Report. 2018/19 data presented in this table includes CUP production data that was received by June 30, 2019 and are subject to change.

Conservation and Water-Use Efficiency

By 2040, conservation and water recycling will account for one-third of Southern California's water supply portfolio in Metropolitan's service area. Metropolitan supports financial incentives, education, outreach programs and appliance/plumbing standards at the state, regional and local level. Highlights of FY 2018/19 included the launching of a revised Turf Replacement Program, establishing additional water efficiency incentives with energy utilities, and a new program for increasing conservation in disadvantaged communities.

The disadvantaged community program is comprised of three parts: (1) a regional pilot program; (2) increased flexibility for member agencies to use Metropolitan funds for member agency-administered programs; and, (3) grant funding support. The $3 million regional pilot program provides $250 for installation of premium high-efficiency toilets within multi-family housing constructed prior to 1994. Analyzing program data may better explain how regional approaches could increase conservation within disadvantaged communities. Under the second component, 100 percent of the Metropolitan funds given to member agencies for their locally administered conservation programs could be targeted toward supporting disadvantaged communities or income-qualified consumers. Metropolitan also works with member and local agencies to help identify opportunities and procure grant funding for such conservation programs.

In this past fiscal year, Metropolitan paid a total of $16.4 million in conservation incentives to its consumers. The projected lifetime water savings from these conservation expenditures is approximately 55,300 AF of water.

Water Resource and System Planning

Integrated Water Resources Planning

Metropolitan continued to implement the policy principles relating to the district's role in developing local resources, achieving regional reliability, and increasing outdoor water use efficiency to achieve future conservation. These developments included increasing access to conservation programs to disadvantaged communities, upgrading the

Turf Replacement Program, and developing a possible stormwater pilot program for direct use and for groundwater recharge. These principles were adopted by the board in July 2017 as part of the Integrated Water Resources Plan, which has fostered supply reliability through diversified investments in water conservation, recycling, groundwater treatment, storage and transfers. First adopted by Metropolitan's board in 1996, the IRP was updated in 2004, 2010 and 2015.

Metropolitan continued to engage with the implementation of the "Making Water Conservation a California Way of Life" legislation SB 606 (Hertzberg) and AB 1668 (Friedman), which were signed into law in May 2018. The bills focus on long-term water-use efficiency and drought planning, with new reporting requirements and enforcement actions by state agencies. Significant stakeholder involvement is underway as DWR and the State Water Resources Control Board conduct studies and seek input prior to adopting standards in June 2022 and requiring compliance by November 2023.

Future Supply Actions Program

Established in 2013, Future Supply Actions are low-cost, low-risk supply development efforts designed to better prepare the region for unforeseen water supply challenges. In 2018/19, Metropolitan implemented a request for proposal for new member agency studies. After evaluating the responses, Metropolitan awarded $3.51 million to 11 member agencies for 15 studies. In addition, Metropolitan entered into a funding agreement with Water Research Foundation to fund seven potable and non-potable reuse studies. The studies will help remove barriers to the development of local groundwater, recycling, stormwater and desalination resources.

Water Resource Data

Figure 3-6 displays precipitation for FY 2018/19 compared to average annual precipitation figures for three weather stations within Metropolitan's service area. In contrast with very dry conditions during the previous year, downtown Los Angeles recorded precipitation of 18.8 inches and San Diego recorded precipitation of 12.8 inches, which were both 127 percent of average. Precipitation in Long Beach was 17.6 inches or 147 percent of average.

Figure 3-7 displays population within Metropolitan's service area since 1990, with historical population based on California Department of Finance estimates and projections based on regional transportation planning agencies. Since 1990, the population served has increased from about 15 million to about 19 million, although growth has slowed significantly, from an average of about 180,000 persons per year in the 1990s, to only 100,000 per year since 2015.

Figure 3-8 displays Metropolitan's historical water transactions since FY 1989/90, which ranged between 1.37 and 2.51 MAF (this includes sales, exchanges and wheeling). The decline in transactions since FY 2014/15 reflects reduced consumer demand since the statewide drought emergency was declared in 2014. Demands remained low even after the state ended the drought emergency in 2017. Water transactions fluctuate due to many factors including weather, hydrologic conditions, local supply development, and economic activity. Historically, per capita water use gradually increases in years following severe droughts.

Figure 3-9 displays Metropolitan's calendar year ending storage reserves for the past 11 years. Ongoing conservation efforts and water-use efficiency achievements, allowed Metropolitan to maintain storage levels in CY 2018. At the end of CY 2018, Metropolitan had total storage reserves of 3.1 MAF, consisting of 2.5 MAF of dry-year storage and 630,000 AF of emergency storage. Despite a low SWP allocation and below-average conditions in the Upper Colorado River Basin, Metropolitan's supplies and demands balanced. Given the above-average hydrologic conditions in the winter of 2018/19 and continued low demands, Metropolitan anticipates an increase in storage to record levels in CY 2019. Metropolitan also worked with member agencies to review and update its emergency storage objective. The emergency storage objective will increase from 630,000 AF to 750,000 AF based on an improved understanding of vulnerability and repair durations for the region's imported supply aqueducts.

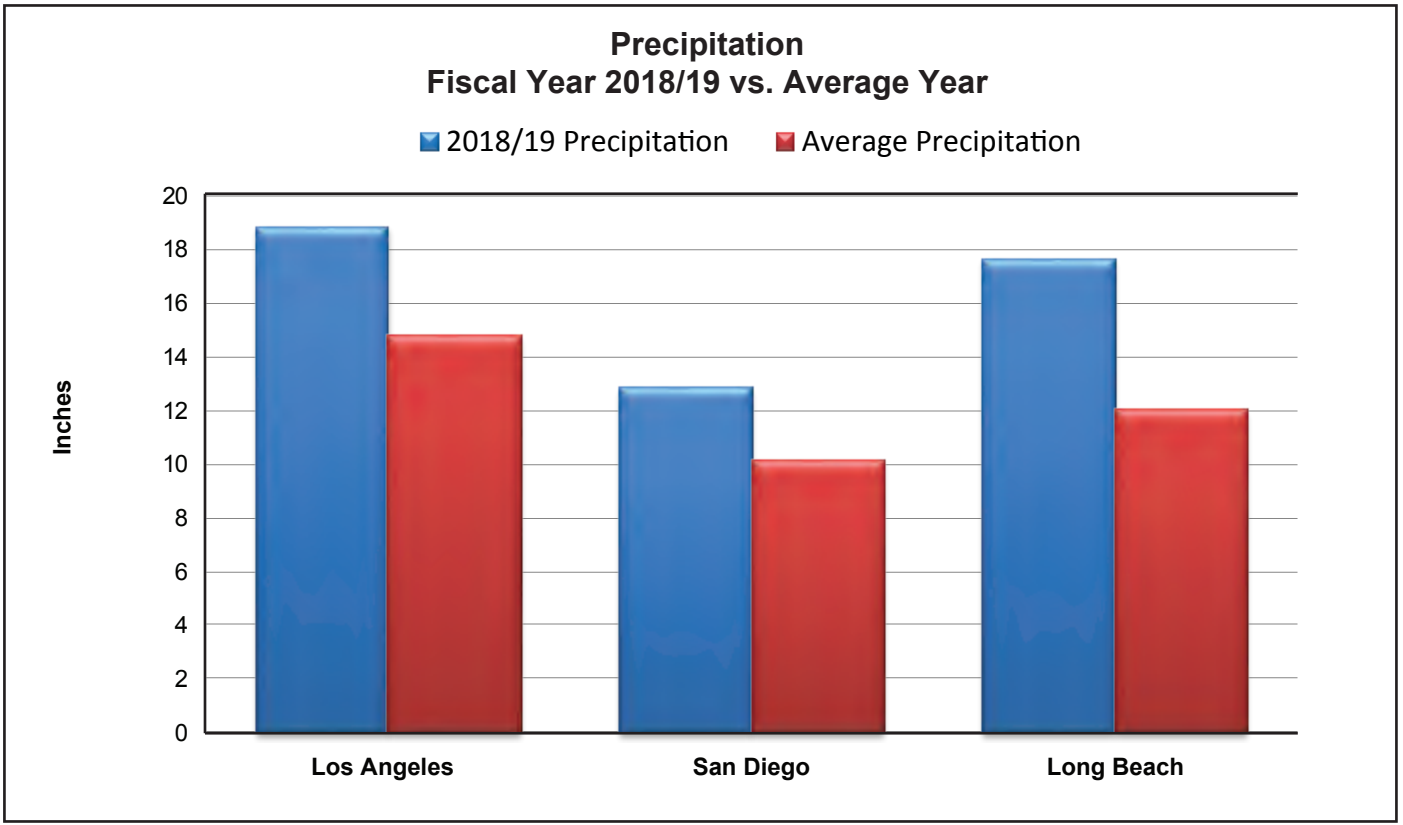


Figure 3-6. Precipitation

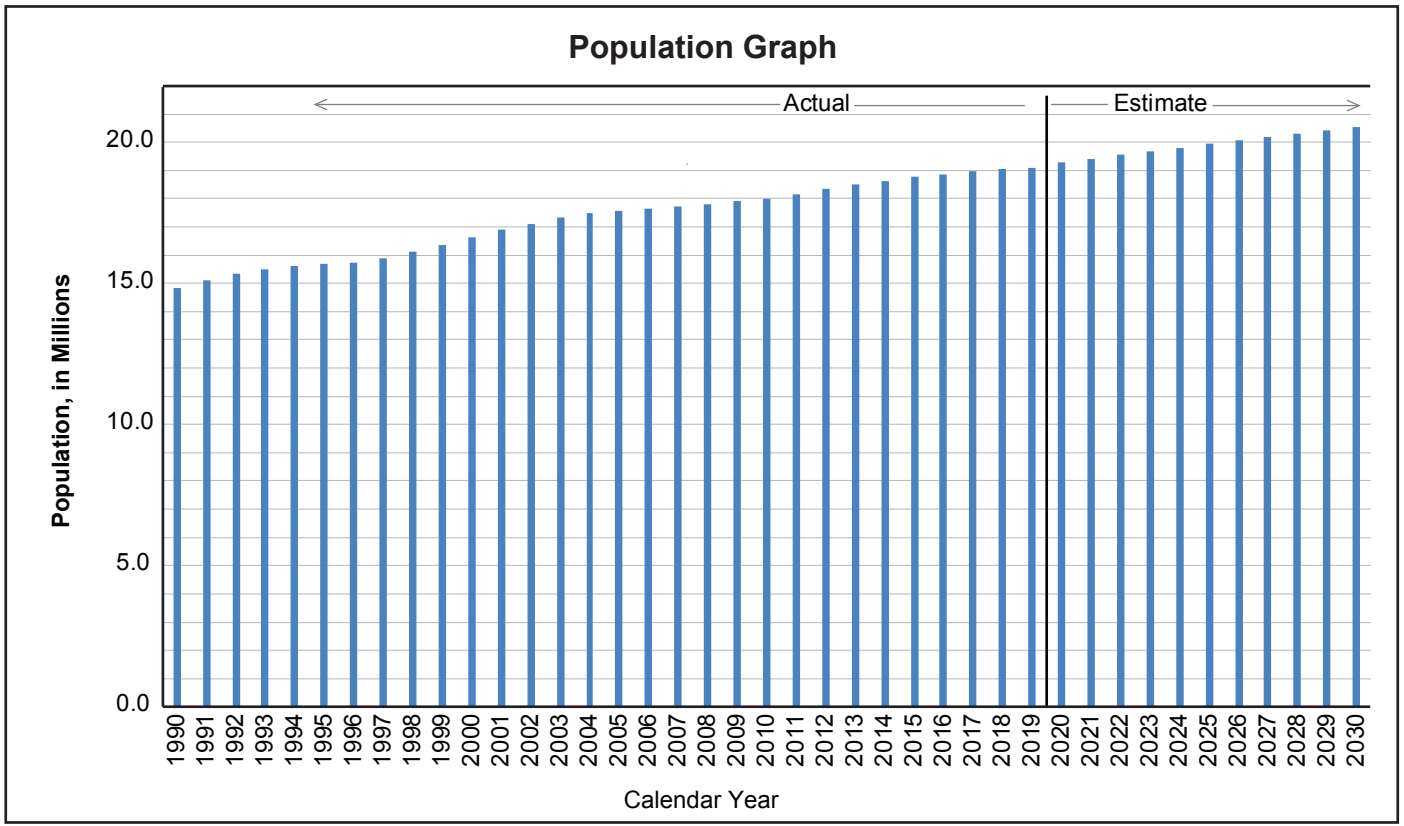


Figure 3-7. Population Growth

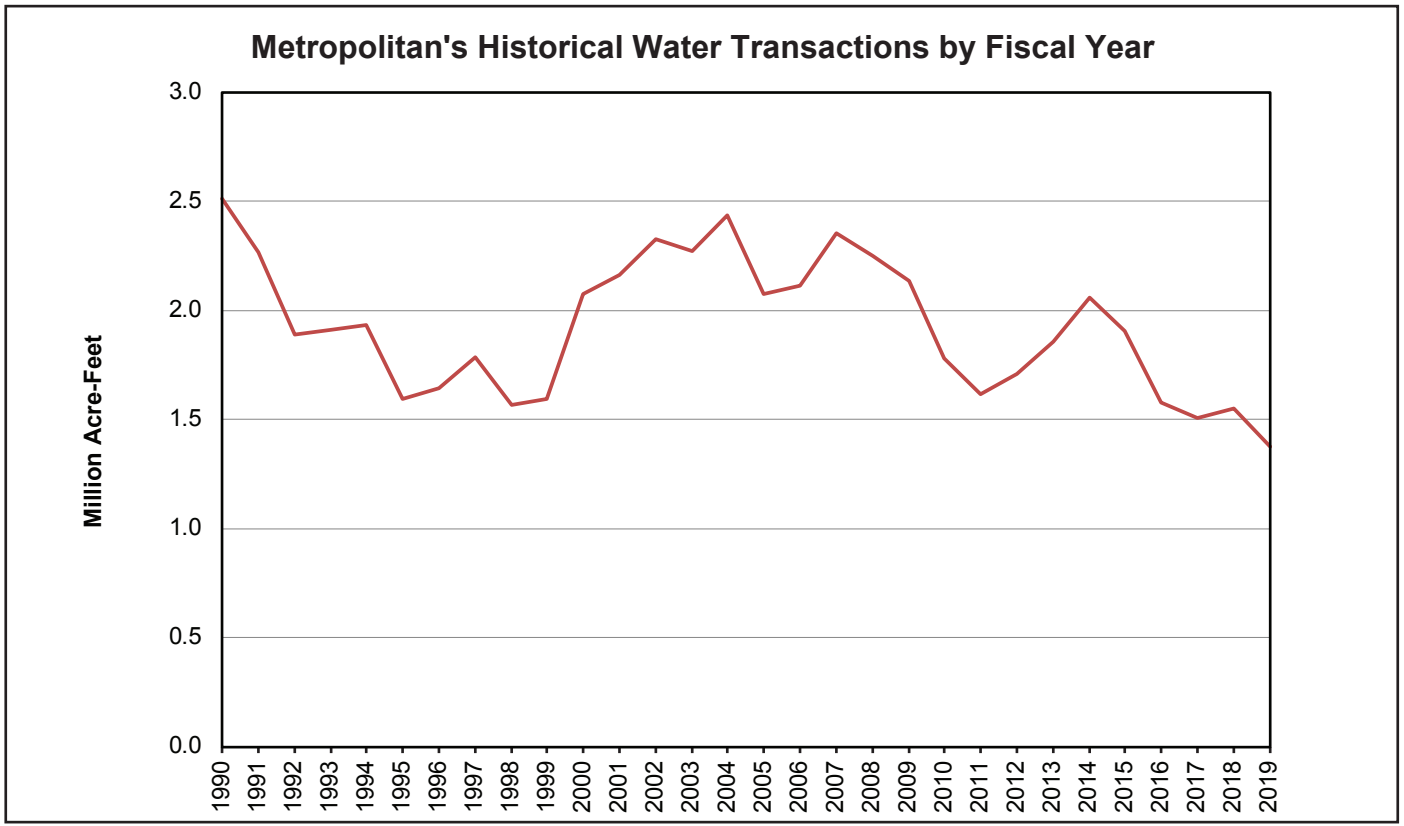


Figure 3-8. Metropolitan's Historical Water Transactions (includes sales, exchanges and wheeling)

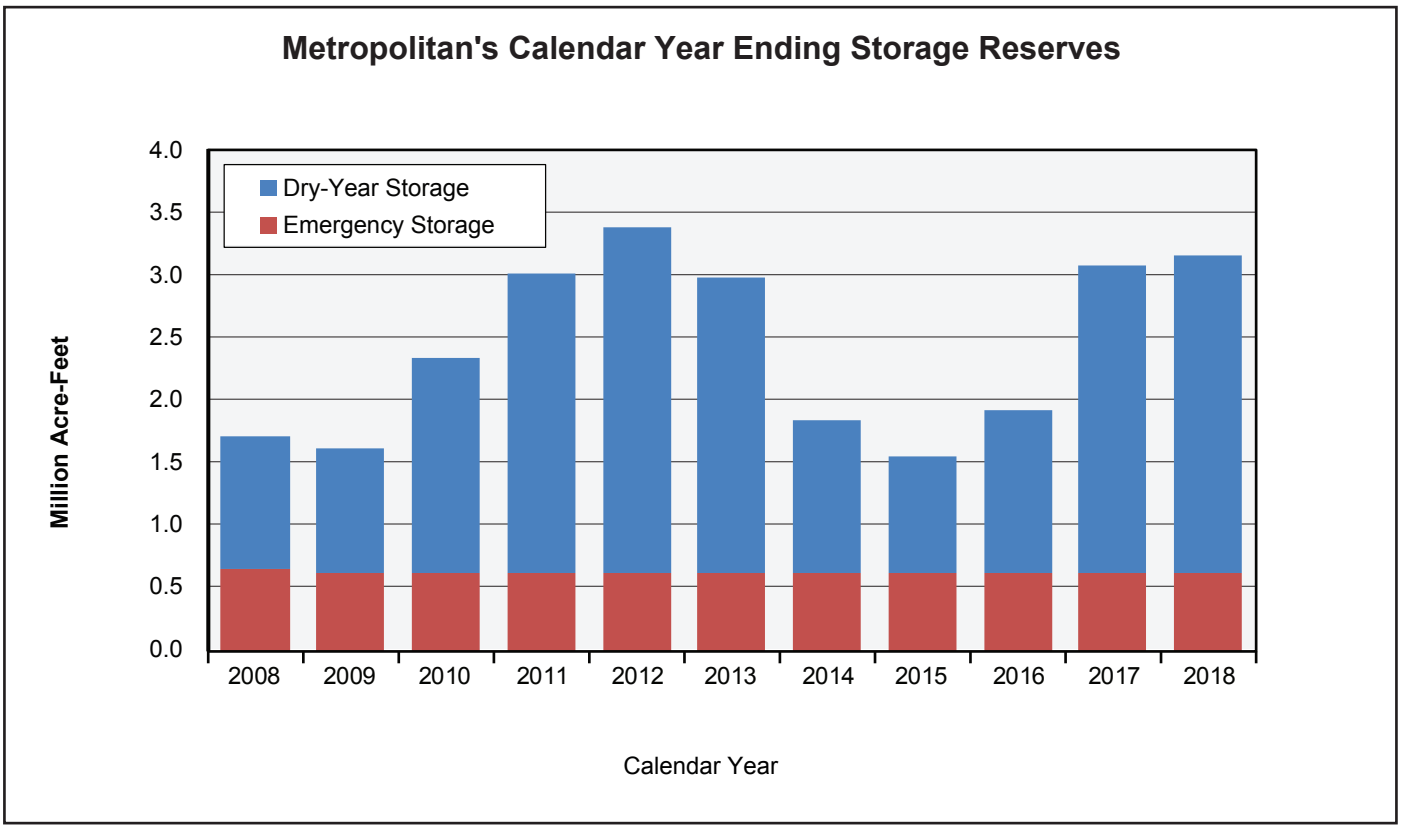


Figure 3-9. Metropolitan's Calendar Year Ending Storage Reserves

Removing deteriorated ladder rungs during a San Diego Pipeline shutdown.

CHAPTER 4

Water System Operations

The Water System Operations Group conveys, treats and distributes water to member agencies that, directly or through their sub-agencies, serve 19 million Southern Californians. WSO protects and ensures water quality for Metropolitan's six-county service area, meeting all primary drinking water standards, while operating and maintaining Metropolitan's five treatment plants with a combined capacity of more than 2.3 billion gallons of water per day. WSO balances demand and supply as it operates, manages and maintains Metropolitan's water and power systems. It also provides manufacturing and fabrication services to support Metropolitan infrastructure; offers technical advice and support to member agencies, customers and other entities; provides technical training to ensure an effective, efficient and safe work environment; runs Metropolitan's Apprenticeship Program; assists in planning, design and construction of new facilities; and responds to emergencies to restore service in the shortest time possible.

Water Treatment

Metropolitan's five water treatment plants treat water from the Colorado River and Northern California. The Robert B. Diemer Water Treatment Plant provides treated water to areas of Orange County and coastal Los Angeles County. The Joseph Jensen Water Treatment Plant supplements local water supplies in the San Fernando Valley, Ventura County and central Los Angeles, while the F.E. Weymouth Water Treatment Plant generally serves eastern Los Angeles County, the San Gabriel Valley and parts of Orange County. The Henry J. Mills Water Treatment Plant serves western Riverside County and Moreno Valley. The Robert A. Skinner Water Treatment Plant serves parts of Riverside County and meets the supplemental treated water needs of San Diego County. The Jensen and Mills plants only treat

State Water Project supplies, while the other three plants treat a blend of supplies from the SWP and Colorado River.

During fiscal year 2018/19, Metropolitan invested more than $42.4 million to refurbish and upgrade all five plants, ensuring that treated water reliability goals continue to be met.

The Mills and Jensen plants completed another stage of electrical upgrades to enhance plant reliability and reduce the risk of unplanned outages. The upgrades replaced aging equipment, provided needed redundancy for critical components of the plant's electrical system, and are consistent with upgrades at the other treatment plants. The upgrades allow electrical maintenance without shutting down the treatment process.

Staff completed modifications to chemical feed systems at the Weymouth plant to allow the use of chloramines for controlling bromate formation, a byproduct of ozonation. These improvements will result in lower bromate levels and operating costs.

Seismic upgrades of the Diemer administration building helped maintain reliable operation and meet current design practices and building codes. The project improves the capability of the building to withstand a major seismic event and included numerous additional safety improvements.

Staff continued efforts for decommissioning Skinner plant modules 4, 5 and 6 to reduce plant capacity from 630 million gallons per day to 350 MGD. Mechanical, electrical and control system equipment was isolated from the remaining plant, taking into consideration water quality, hydraulics and safety. The downsized capacity will meet expected demands at the Skinner plant for over two decades. This action will reduce ongoing operation and maintenance, and defer capital costs associated with lower treated water demands as a result of water conservation and alternate treatment facilities in the region.

Water Quality

Regulations

Metropolitan's treated supplies met all regulatory requirements and primary drinking water standards during FY 2018/19.

In September 2018, Metropolitan finished monitoring for *Escherichia coli* at the influents to the five desert pumping plant domestic water systems, as required by the Long Term 2 Enhanced Surface Water Treatment Rule. Concentrations did not exceed the 10 colony forming units/100 mL trigger level, so no additional monitoring is required under the regulation.

Metropolitan continued quarterly sampling for TCP (1,2,3-trichloropropane), which was not detected at any of Metropolitan's monitoring locations during FY 2018/19. California finalized a drinking water Maximum Contaminant Level of 0.005 µg/L (micrograms per liter), or 5 parts per trillion, for TCP in December 2017 and required quarterly sampling in public water systems starting January 2018. Metropolitan is required to monitor and report TCP in source and treatment plant effluent waters.

The state initiated steps to regulate per- and polyfluoroalkyl substances or PFAS in drinking water. Of all PFAS, the two most common and studied are PFOA (perfluorooctanoic acid) and PFOS (perfluorooctane sulfonate). State officials are conducting a phased investigation into contaminated sites to assess the extent of contamination. The State Water Resources Control Board is expected to reduce the public notification levels for PFOA and PFOS in late summer 2019, and in early 2020 is expected to lower the response level at which water providers are recommended to take action. In addition, USEPA has developed an action plan to address national concerns.

California perchlorate regulations also are being reviewed for potential revisions to analytical methods and the maximum contaminant level. Metropolitan will provide comments on the federal perchlorate regulatory proposal.

Water Quality Monitoring

Water Quality Laboratory staff performed over 184,000 analytical tests using more than 160 methods on nearly 50,000 samples. When all treatment process monitoring measurements of turbidity, pH and chlorine are included, each water treatment plant laboratory contributed an additional 150,000 test results. The number of samples and analyses for Metropolitan's source waters, treatment plants and distribution system may change each year depending on regulations, monitoring plans, operations and water quality studies.

Chemical/Physical

Staff analyzed Metropolitan's source and treated waters for inorganic and organic compounds, physical properties and other constituents. Table 4-1 lists the locations sampled for organic chemicals. Herbicides, pesticides and synthetic organic compounds are on a three-year monitoring cycle. None of these compounds was detected in 2018, and compliance monitoring will be conducted again in the second half of 2021. Tables 4-2, 4-3 and 4-4 show locations and results for trace metals, radiologicals (most recent triennial monitoring results summary), and general minerals and physical analyses, respectively.

TABLE 4-1
SAMPLE LOCATIONS FOR ORGANIC COMPOUNDS
Fiscal Year 2018/19

Source Water	Treated Water
Devil Canyon Afterbay	Diemer Plant Effluent
Diamond Valley Lake	Jensen Plant Effluent
Jensen Plant Influent	Mills Plant Effluent
Lake Havasu Intake	Skinner Reservoir Effluent[1]
Lake Mathews Headworks	Weymouth Plant Effluent
Lake Perris	
Lake Skinner Outlet Conduit	
San Jacinto Tunnel	

[1]Skinner Reservoir Effluent is a combined effluent from Skinner Plants 1 and 3.

Total Dissolved Solids

Salinity of supplies delivered through the Colorado River Aqueduct is typically higher than the State Water Project, largely due to natural mineral salt deposits within the Colorado River watershed (Figure 4-1). Changes in salinity tend to occur more rapidly in SWP supplies as opposed to the CRA due to the hydrodynamic fluctuations of the SWP system. Figure 4-2 presents salinity as flow-weighted averages of the total dissolved solids levels in the effluents from all five treatment plants. Salinity levels at all the plants were generally higher than the previous year, but flow-weighted TDS averages met Metropolitan's water quality goal of below 500 milligrams per liter.

Collecting a treated water sample from Metropolitan's distribution system.

TABLE 4-2
TRACE METALS IN METROPOLITAN'S WATER SUPPLIES
Fiscal Year 2018/19 (in micrograms per liter [µg/L])

Metal	Maximum Contaminant Level (MCL)	Minimum Reporting Level	SOURCE WATERS											TREATMENT PLANT EFFLUENTS				
			Lake Havasu	San Jacinto Tunnel	Lake Mathews	Castaic Lake	Silverwood Lake	Mills Influent	Lake Perris	Weymouth Influent	Diemer Influent	Diamond Valley Lake	Lake Skinner	Weymouth	Diemer	Jensen	Skinner	Mills
Aluminum[1]	1000 (200)	10	27	ND	29	46	47	52	22	34	83	ND	34	100	120	53	65	56
Antimony	6	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	10	0.5	2.4	2.4	2.3	2	1.9	1.9	1.7	2.2	2.2	2.2	2.2	0.9	1	1.3	1	ND
Barium	1000	5	120	120	120	27	26	26	47	72	71	31	77	70	70	27	76	25
Beryllium	4	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boron[2]	1000	20	120	120	120	150	110	110	170	120	120	150	130	120	120	150	120	110
Cadmium	5	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium, Total	50	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium 6[3]	10	0.03	0.03	ND	ND	0.05	0.06	0.06	ND	ND	ND	ND	ND	0.03	0.04	0.05	0.06	0.09
Copper[4(1)]	1300 (1000)	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron[1]	300	10	ND	ND	51	74	128	115	ND	81	92	ND	65	122	ND	ND	ND	ND
Lead[4]	15	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lithium	--	10	40	42	42	ND	ND	ND	ND	23	23	ND	24	24	23	ND	23	ND
Manganese[1]	50	5	ND	ND	5	ND	18	10	ND	7	9	ND	10	ND	ND	ND	7	ND
Mercury	2	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Molybdenum	--	2	4	5	5	ND	ND	ND	3	2	3	2	4	3	3	ND	4	ND
Nickel	100	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver[1]	100	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Strontium	--	20	1000	1040	1040	230	160	160	250	620	610	250	630	600	620	230	670	160
Thallium	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium[2]	50	1	2.3	2.3	2.9	2.5	3.2	3.2	2.5	2.9	3	2	2.8	2.3	2.5	2.3	1.9	2.7
Zinc[1]	5000	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = Not Detected

-- = no MCL

[1] Secondary standard based on consumer acceptance rather than health considerations.

[2] California notification level: a health-based advisory level.

[3] California MCL invalidated by Sacramento County Superior Court on May 31, 2017.

[4] Action level. The MCL for lead has been replaced with a treatment technique requiring agencies to optimize corrosion control treatment when the action level is exceeded in more than 10 percent of samples collected at the consumers' tap. Copper has a similar treatment technique requirement in addition to the secondary MCL. (Per EPA's Lead and Copper Rule.)

TABLE 4-3
RADIOLOGICAL COMPLIANCE MONITORING[1]
2017 Four Quarter Ranges (in pCi/L)

LOCATION	GROSS ALPHA	GROSS BETA	COMBINED RADIUM 226 & 228	STRONTIUM 90	TRITIUM	URANIUM
MCL	**15**	**50[3]**	**5**	**8**	**20,000**	**20**
DLR	**3**	**4**	**1**	**2**	**1,000**	**1**
Lake Havasu Intake	3–6	5	ND	ND	ND	2–3
San Jacinto Tunnel West Portal	ND–7	5–14	ND	ND	ND	3–6
Lake Mathews	ND–3	ND-12	ND	ND	ND	3
Silverwood Lake	ND	ND-5	ND	ND	ND	ND
Lake Perris	ND	ND–5	ND	ND	ND	1–2
Diamond Valley Lake	ND-6	ND-5	ND	ND	ND	ND
Lake Skinner	ND–4	ND	ND	ND	ND	ND–1
Jensen Plant Influent	ND	ND	ND	ND	ND	ND–1
Diemer Plant Effluent	ND	ND	ND	ND	ND	ND
Jensen Plant Effluent	ND–3	ND	ND	ND	ND	ND–1
Mills Plant Effluent	ND	ND	ND	ND	ND	ND
Skinner Reservoir Effluent[2]	ND–4	ND–5	ND	ND	ND	ND–3
Weymouth Plant Effluent	ND	ND	ND	ND	ND	ND

[1] Results obtained during Calendar Year 2017 triennial monitoring. Data are reported for three years until the next scheduled monitoring.

[2] This is a combined effluent from Skinner Plants 1, 2, and 3.

[3] The gross beta particle activity MCL is 4 millirem/year annual dose equivalent to the total body or any internal organ. The screening level is 50 pCi/L (picoCuries/liter).

DLR = Detection Limits for Purposes of Reporting

MCL = Maximum Contaminant Level

ND = Not Detected. All results less than DLR were reported as ND.

TABLE 4-4
GENERAL MINERAL AND PHYSICAL ANALYSIS OF METROPOLITAN'S WATER SUPPLIES
Fiscal Year 2018/19 Averages

CONSTITUENTS	UNITS	SOURCE WATERS								TREATMENT PLANT EFFLUENTS				
		LAKE HAVASU	SAN JACINTO TUNNEL	LAKE MATHEWS	CASTAIC LAKE	SILVER-WOOD LAKE	LAKE PERRIS	DIAMOND VALLEY LAKE	LAKE SKINNER	WEYMOUTH	DIEMER	JENSEN	SKINNER	MILLS
SILICA	mg/L	7.9	7.9	8.1	11.7	9.4	6.1	8.7	6.9	8.3	8.6	11.7	7.6	9.4
CALCIUM	mg/L	71	71	69	23	17	24	24	50	49	49	23	53	17
MAGNESIUM	mg/L	25	25	26	11	11	13	12	20	20	20	11	21	11
SODIUM	mg/L	90	90	93	44	51	61	53	75	82	82	50	84	58
POTASSIUM	mg/L	4.5	4.6	4.7	2.6	2.8	3.5	3.4	3.9	3.9	3.9	2.6	4.0	2.9
CARBONATE	mg/L	0	0	0	0	0	0	1	0	0	**0**	1		
BICARBONATE	mg/L	161	159	151	88	82	105	96	134	118	114	92	123	77
SULFATE	mg/L	218	218	225	44	29	44	51	146	162	161	48	162	40
CHLORIDE	mg/L	85	87	91	57	73	84	69	81	86	85	60	88	78
NITRATE	mg/L	1.2	1.1	0.7	2.1	1.1	0.3	0.5	0.5	1.0	1.1	2.2	0.8	1.8
FLUORIDE	mg/L	0.3	0.3	0.3	0.1	< 0.1	0.1	0.1	0.2	0.8	0.7	0.7	0.7	0.7
TOTAL DISSOLVED SOLIDS (TDS)	mg/L	583	585	592	239	236	288	271	451	472	469	255	483	258
TOTAL HARDNESS AS $CaCO_3$	mg/L	282	278	277	103	89	112	111	209	207	205	102	216	90
TOTAL ALKALINITY AS $CaCO_3$	mg/L	132	131	124	72	68	86	81	111	97	94	77	101	64
FREE CARBON DIOXIDE	mg/L	2.4	1.4	2.2	3.6	1.4	2.4	1.9	1.3	1.4	1.3	0.7	1.5	0.4
pH	pH	8.06	8.27	8.09	7.64	8.05	7.90	8.10	8.26	8.20	8.20	8.39	8.14	8.51
SPECIFIC CONDUCTANCE	µS/cm	946	951	961	430	443	535	493	761	791	788	459	807	479
COLOR	CU	4	2	3	8	10	6	4	6	1	ND	**1**	2	
TURBIDITY	NTU	0.75	0.33	1.0	1.5	1.3	0.95	0.48	0.87	0.05	0.04	0.04	0.06	0.05
TEMPERATURE	°C	19	21	20	15	17	18	16	20	19	22	18	21	20
BROMIDE	mg/L	0.08	0.06	0.07	0.17	0.23	0.27	0.21	0.12	--	--	--	--	--
TOTAL ORGANIC CARBON	mg/L	3.08	3.10	2.97	2.92	3.49	3.89	3.14	3.39	--	--	--	--	--
CYANIDE	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FOAMING AGENTS (MBAS)	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
THRESHOLD ODOR NUMBER (TON)	--	10	6	6	2	7	8	4	7	1	1	1	1	ND
SATURATION INDEX	--	--	--	--	--	--	--	--	--	0.41	0.42	0.28	0.49	0.23
AGGRESSIVENESS INDEX	--	12	13	12	11	12	12	12	12	12	12	12	12	12
STATE PROJECT WATER	%	0	0	0	100	100	100	100	35	40	41	100	36	100

ND = Not Detected
-- = Not Reported

mg/L - milligrams per liter
µS/cm - microSiemens per centimeter
NTU - Nephelometric Turbidity Unit
CU - Color Units

Disinfection Byproducts

Metropolitan has monitored for disinfection byproducts in treatment plant effluents since 1979. Table 4-5 summarizes FY 2018/19 plant effluent levels for the following disinfection byproducts: total trihalomethanes, haloacetic acids and bromate. Compliance under the Stage 2 Disinfectants and Disinfection Byproducts Rule began in 2013, requiring drinking water systems to monitor distribution system locations with the highest TTHMs and HAAs and report results as locational running annual averages. The highest locational running annual averages were below the MCLs of 80 µg/L for TTHMs and 60 µg/L for HAA5. Bromate was below 10 µg/L. Figures 4-3 and 4-4 summarize the long-term trends for TTHMs and HAA5, respectively. Locational running annual averages for both TTHMs and HAA5 are higher in the distribution system than running annual averages at treatment plant effluents because the required disinfectant residual in the distribution system can increase DBPs. Overall, DBP trends have declined since Metropolitan began using ozone. Changing source water conditions and operational changes can cause locational averages to periodically increase.

Figure 4-5 exhibits the plant influent levels of bromide and total organic carbon, which are DBP precursors. The gap in bromide data for the Skinner plant is due to influent chlorination to control quagga mussels during fiscal years 2008/09 and 2009/10. Bromide levels naturally fluctuate every spring and summer because of mountain snowmelt in the Sierra Nevada and increased outflow from the Sacramento-San Joaquin Delta. Bromate, a byproduct of ozone treatment, was monitored after ozone came online at Mills in 2003, Jensen in 2005, Skinner in 2010, Diemer in 2015, and Weymouth in 2017. Figure 4-6 shows trends in bromate levels. Application of an ammonia-chlorine bromate control strategy began in October 2010 at the Mills plant. The implementation of this strategy consistently results in lower bromate levels and operating costs.

Microbiological

Metropolitan complied with state and federal drinking water regulations by monitoring treatment plant influents for total coliforms and *Escherichia coli* (Table 4-6). Coliforms and *E.coli,* a specific type of coliform*,* are bacteria that are used to assess the quality of plant influent water. The natural variability of raw water coliforms, storm

events, changes in source water, and other factors can influence the different ranges observed at the plants—from below 10 to almost 17,000 CFU/mL.

Metropolitan also analyzed nearly 8,500 coliform compliance samples in the distribution system to monitor the microbial quality downstream of the water treatment plants. The monthly average of 0.04 percent total coliform-positive samples was well below the regulatory standard of 5 percent.

Portable instruments, such as this colorimeter, are used for testing water quality in the field.

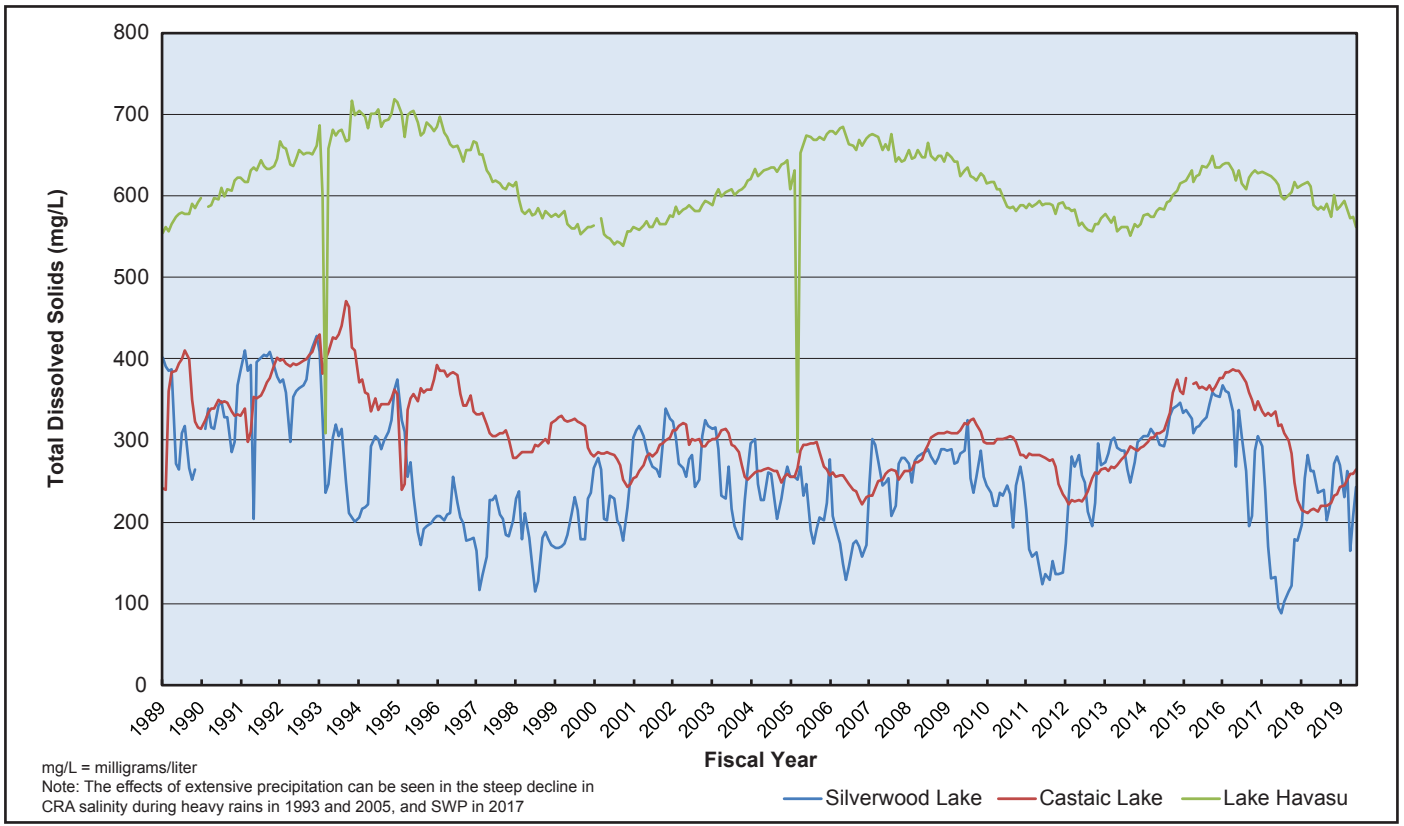


Figure 4-1. Total Dissolved Solids in East Branch State Water Project (Silverwood Lake), West Branch State Water Project (Castaic Lake), and Colorado River Aqueduct (Lake Havasu), 1989 to 2019

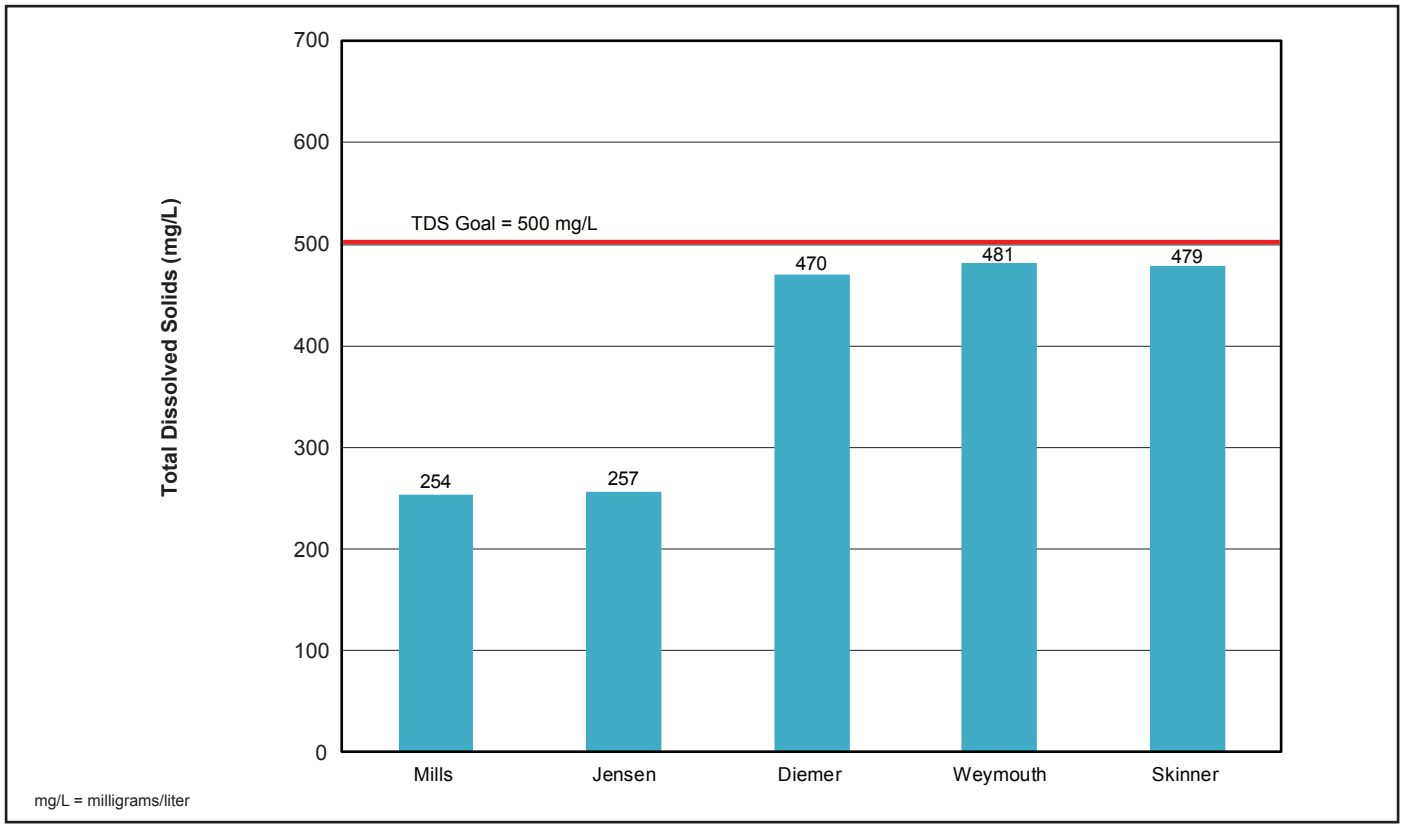


Figure 4-2. TDS (Total Dissolved Solids) in Plant Effluent, Annual Flow-Weighted Averages, FY 2018/19

TABLE 4-5
DISINFECTION BYPRODUCT CONCENTRATIONS
IN PLANT EFFLUENT
Fiscal Year 2018/19 (in µg/L)

	TTHMs MCL = 80		HAA5 MCL = 60		Bromate MCL = 10	
Plant Effluent	**Range**	**Annual Average**	**Range**	**Annual Average**	**Range**	**Annual Average**
Diemer	15–21	18	1–2.8	1.9	ND–5.9	1.3
Jensen	9–12	11	1.5–3.1	2.2	2.4–8.4	4.1
Mills	17–33	25	2.4–5.9	4.0	ND–10	3.4
Skinner	13–25	19	2.2–8.9	5.3	ND–10	1.9
Weymouth	18–23	20	1.3–2.4	1.9	ND–5.0	2.5
Distribution System	**Range**	**LRAA**	**Range**	**LRAA**	**Range**	**LRAA**
	11–39	14–28	ND–9.1	2.3–8.6	NA	NA

µg/L - micrograms per liter
TTHMs = total trihalomethanes
HAA5 = five regulated haloacetic acids
MCL - Maximum Contaminant Level
NA - Not analyzed
ND - Not detected
LRAA - Locational Running Annual Average

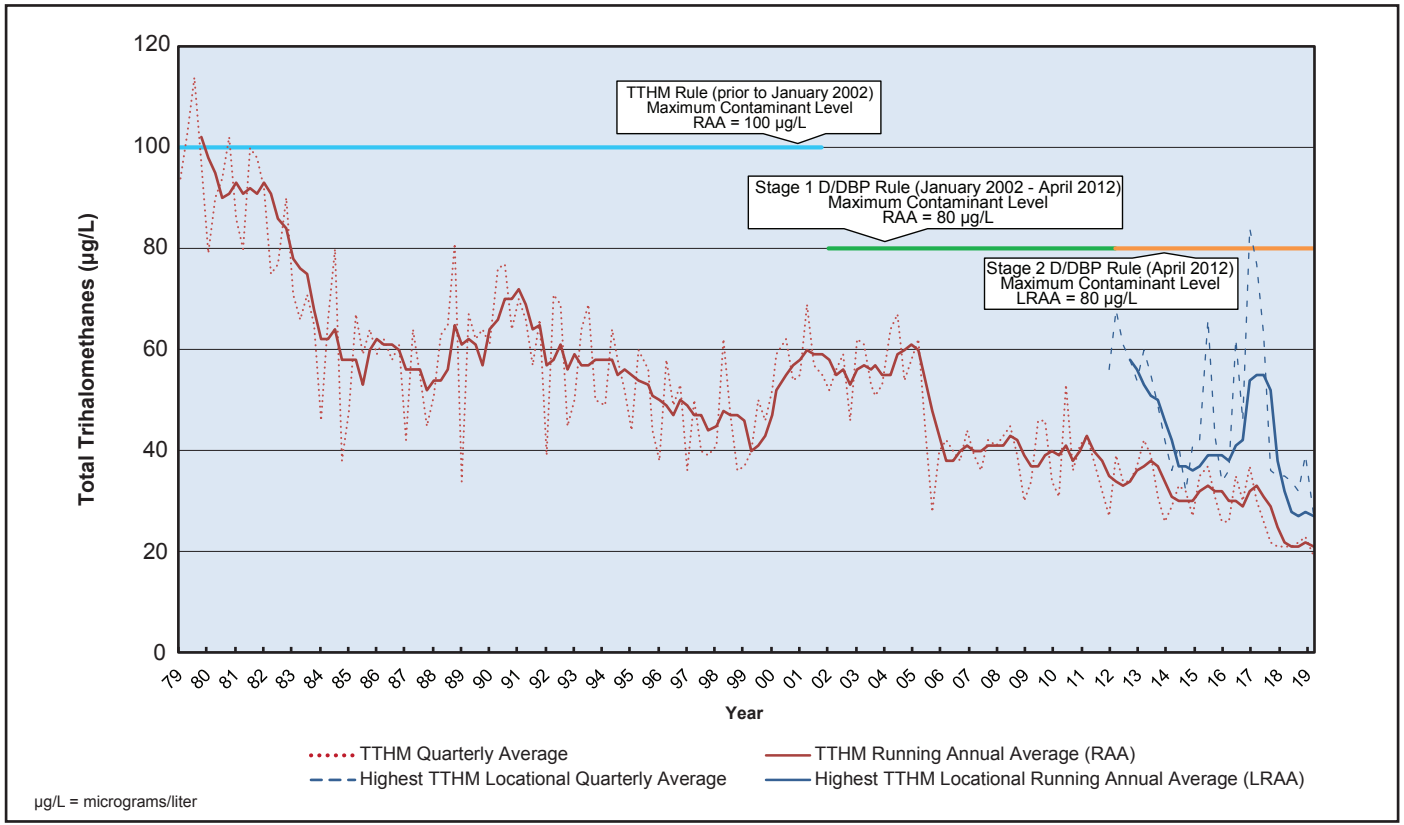


Figure 4-3. Total Trihalomethane (TTHM) Levels Throughout the Distribution System, Quarterly and Running Annual Averages 1979 to 2019

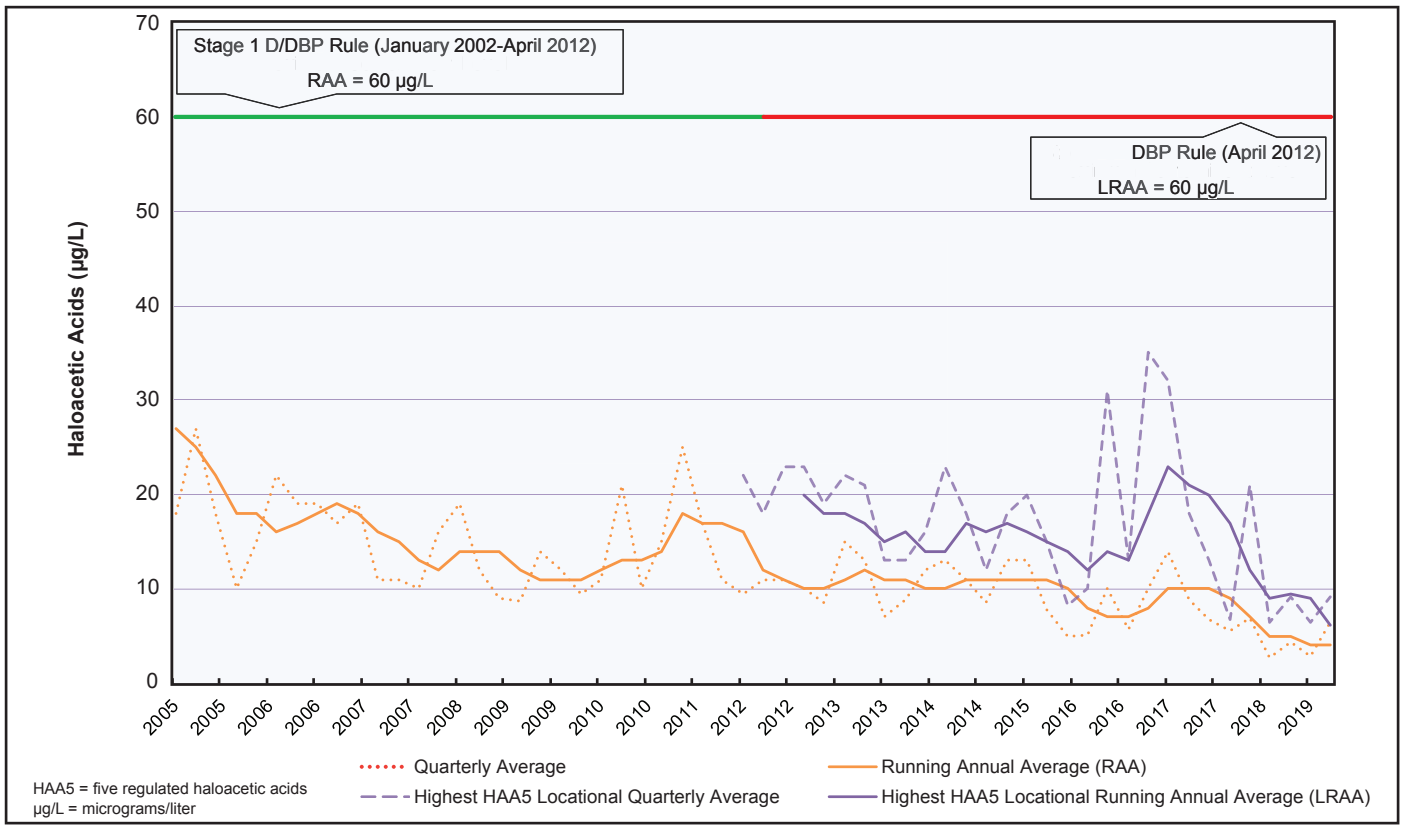


Figure 4-4. Haloacetic Acids Throughout the Distribution System, Quarterly and Running Annual Averages, 2005 to 2019

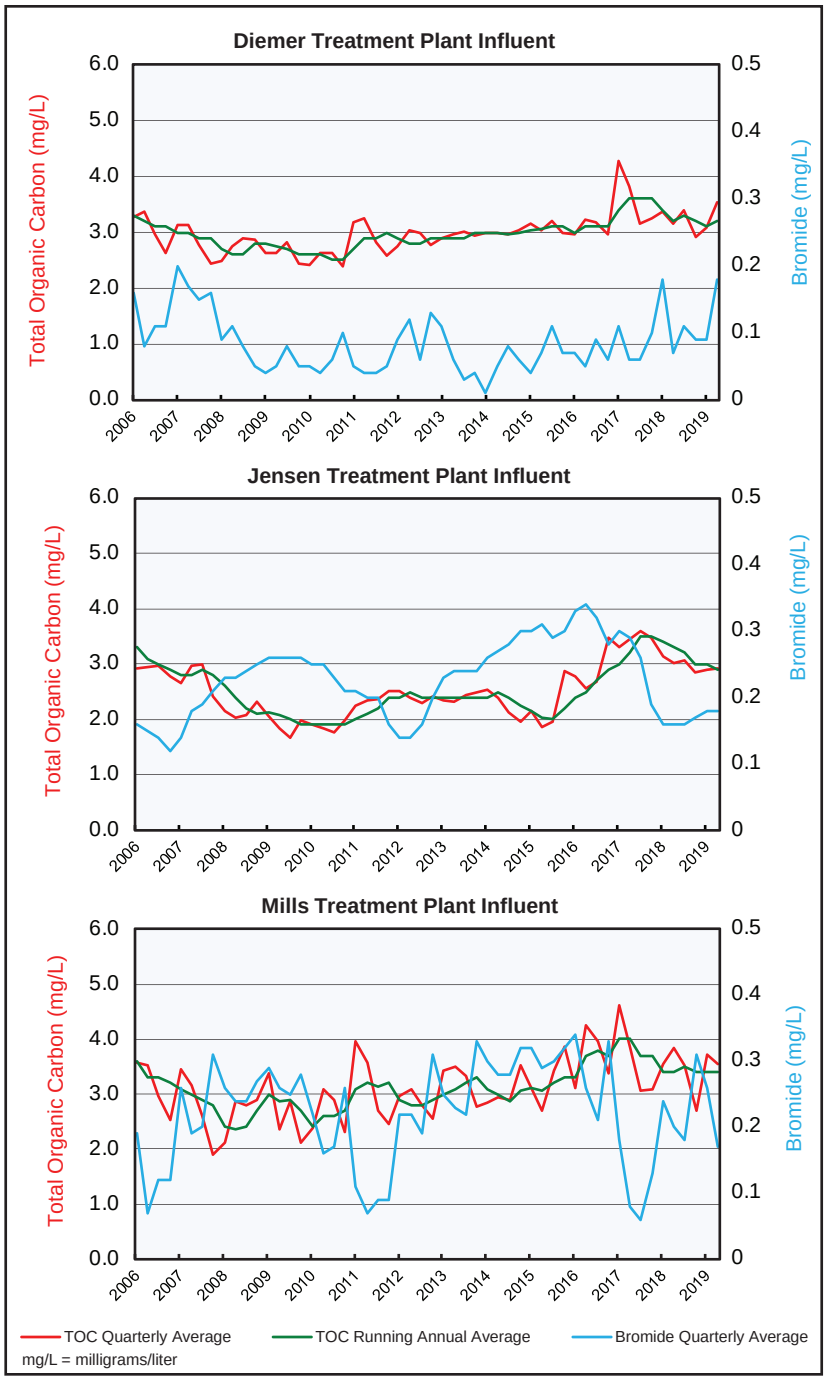


Figure 4-5. Total Organic Carbon (TOC) and Bromide Levels in Treatment Plant Influent, 2006 to 2019

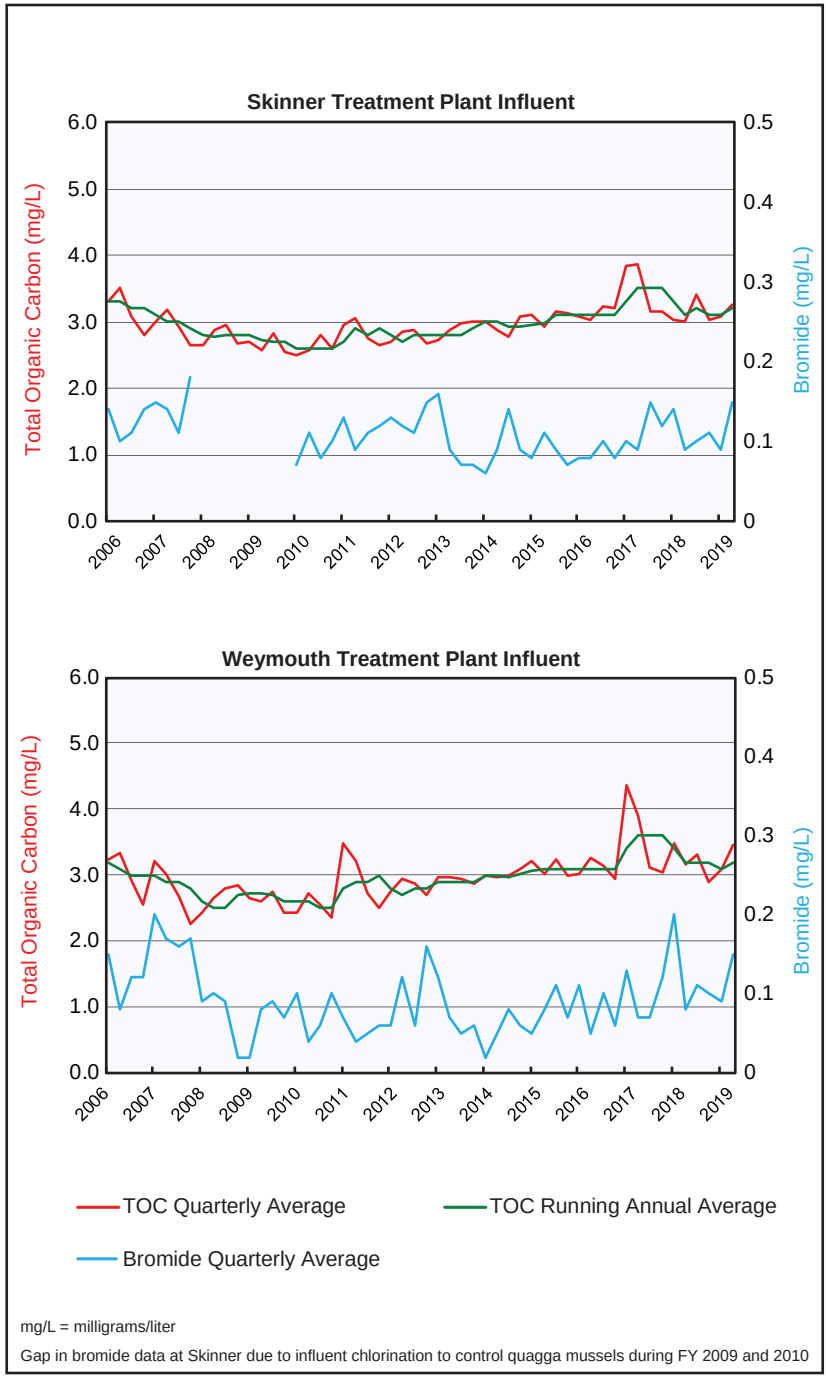


Figure 4-5 (continued). Total Organic Carbon (TOC) and Bromide Levels in Treatment Plant Influent, 2006 to 2019

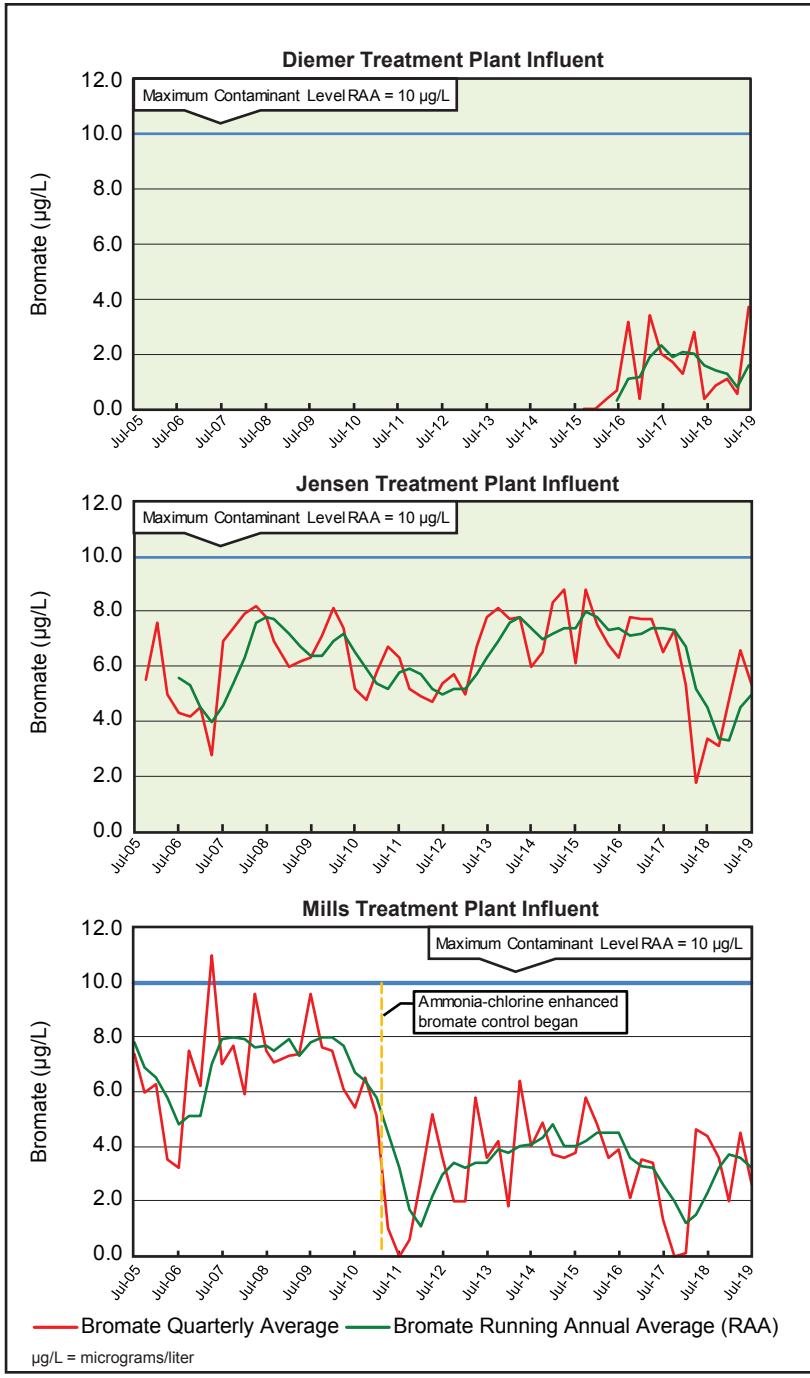


Figure 4-6. Bromate Levels in Treatment Plant Effluent, 2005 to 2019 (Ozone came online at Mills, Jensen, Skinner, Diemer and Weymouth in 2003, 2005, 2010, 2015 and 2017, respectively)

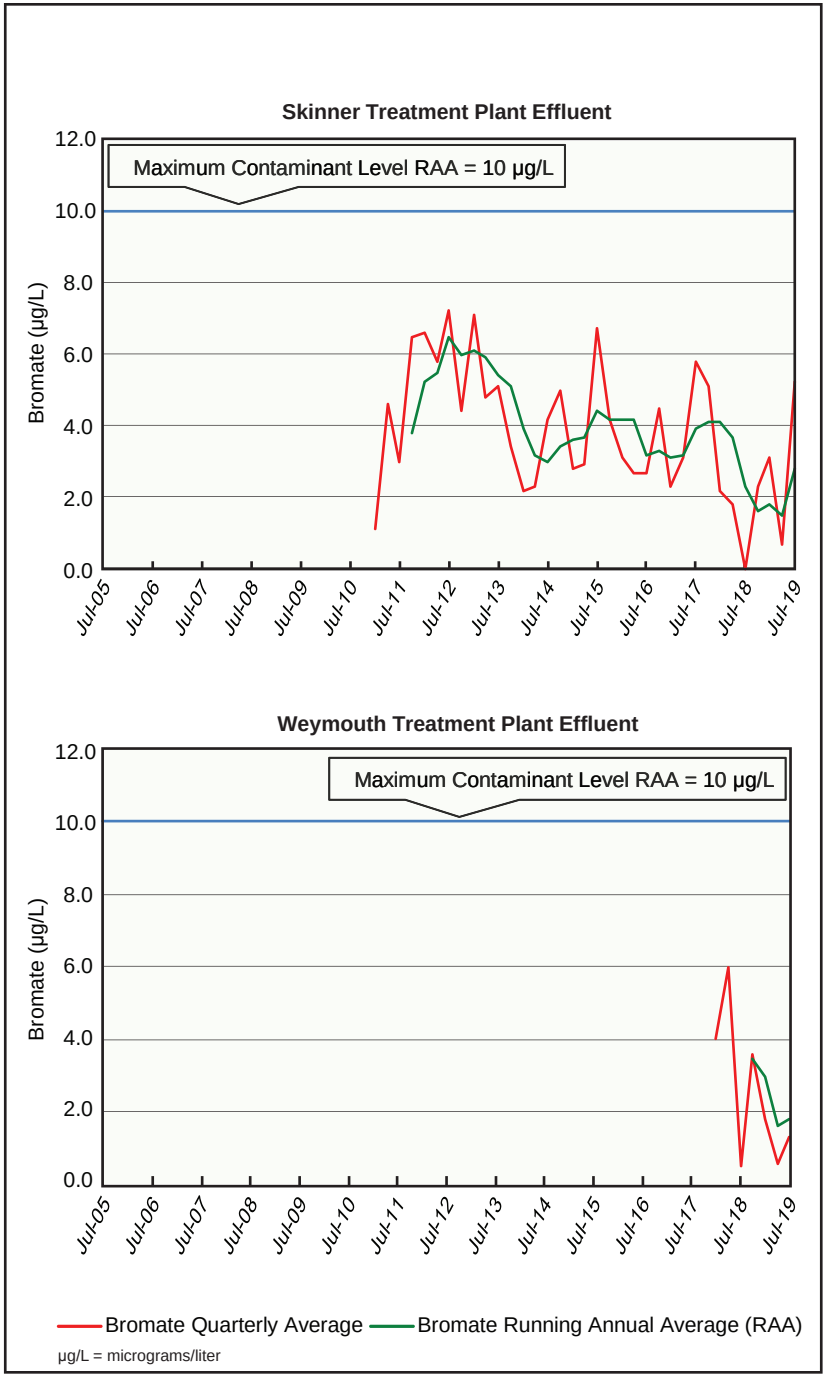


Figure 4-6 (continued). Bromate Levels in Treatment Plant Effluent, 2005 to 2019 (Ozone came online at Mills, Jensen, Skinner, Diemer and Weymouth in 2003, 2005, 2010, 2015 and 2017, respectively)

TABLE 4-6
RAW WATER COLIFORM RESULTS
Fiscal Year 2018/19

	Treatment Plant Influent[1]				
	Diemer	**Jensen**	**Mills**	**Skinner**	**Weymouth**
	(CFU/100 mL)[2]				
Total Coliforms					
Range	8-16,000	140-6,300	65-1,300	15-17,000	11-14,000
Average[3]	4,600	1,900	570	2,800	1,800
E. coli					
Range	ND-3	ND-2	ND-4	ND-24	ND-5
Average[3]	1	1	2	4	1

Notes:
[1] Samples were collected weekly and analyzed by membrane filtration or Quanti-Tray.
[2] Coliform concentration either colony forming units per 100 mL OR Most Probable Number per 100 mL
[3] Annual average of monthly averages.
ND = Not Detected; method detection limit is 1 coliform per 100 mL.

Metropolitan tests influents and effluents at all five treatment plants monthly for the protozoan parasites *Cryptosporidium* and *Giardia*. During FY 2018/19, neither parasite was detected in treatment plant influent or effluent samples. In the last 19 years of monitoring, less than 1 percent of monthly plant influent samples tested positive for *Cryptosporidium* or *Giardia*.

System Management Monitoring

Cyanobacteria and Algae Control Program

Staff analyzed nearly 2,600 samples for the earthy/musty T&O (taste-and-odor) compounds MIB (2-methylisoborneol) and geosmin to monitor and manage T&O events in Metropolitan's source water in FY 2018/19 (Figure 4-7). About half of the samples were used to evaluate T&O problems caused by cyanobacteria in the SWP, reflecting the high cyanobacterial production potential of SWP supplies. The state Department of Water Resources treated its lakes several times during the year to control T&O-producing cyanobacteria. Metropolitan treated Lake Skinner twice during the year with a total of 14 tons of copper sulfate to control problematic cyanobacteria; Lake Mathews and Diamond Valley Lake were not treated during this reporting period (Figure 4-8).

Metropolitan received one consumer complaint associated with water received from the Skinner plant due to a cyanobacterial bloom-producing T&O compound MIB in Lake Skinner. Metropolitan temporarily bypassed the lake and treated it with copper sulfate to control the bloom.

Metropolitan analyzed almost 350 samples for cyanotoxins during the past fiscal year. The frequency of cyanobacterial blooms that produce these naturally occurring cyanotoxins appears to be increasing both nationally and within Metropolitan's region, possibly due to climatic changes and increased nutrient runoff into source waters. The U.S. Environmental Protection Agency published non-enforceable drinking water health advisories for cyanotoxins in 2015, and many states, including California, have developed voluntary guidelines for recreational water. In 2019, the USEPA also published water quality guidelines and recommendations for managing cyanotoxins in recreational waters. In June 2019, a recreational warning was posted for approximately two weeks at Lake Skinner due to elevated cyanotoxin concentrations, based on the state's voluntary guidelines for managing cyanotoxins in recreational water. This cyanotoxin event in Lake Skinner did not affect the quality of Metropolitan's treated water because water was being withdrawn from deep in the lake and was not impacted by the cyanobacterial bloom at the surface. Metropolitan has an active monitoring program for cyanotoxins and continues to research and optimize control methods to ensure the safety of its treated water. Metropolitan also continued work on a grant-funded project from the Water Research Foundation to improve and standardize cyanotoxin detection methods.

Ozone, which is Metropolitan's primary disinfectant, is particularly effective at removing cyanotoxins in drinking water supplies.

Quagga Mussel Control Program

Chlorination of the CRA system for quagga mussel control continued to be effective, as demonstrated by the continued operation of the CRA with no reports of damaged infrastructure or out-of-service equipment. As part of support work for shutdowns, raw water discharges, and system maintenance, Metropolitan analyzed over 70 samples for veligers (microscopic mussel larvae), and an additional 100 were analyzed using molecular methods developed at the Water

Quality Laboratory. No adult mussel or veligers were detected in SWP supplies during FY 2018/19 and there are currently no restrictions on Metropolitan's use of water from either the west or east branches of the SWP.

N-Nitrosodimethylamine

Since 1999, Metropolitan has monitored its distribution system for NDMA (N-nitrosodimethylamine), a byproduct of the chloramine disinfection process. Table 4-7 shows NDMA levels in the distribution system for FY 2018/19. Concentrations were all below the notification level of 10 nanograms per liter (ng/L) established in 2002. Seven other nitrosamines were analyzed but not detected at any of the monitoring locations.

TABLE 4-7
N-NITROSODIMETHYLAMINE LEVELS
IN THE DISTRIBUTION SYSTEM
Fiscal Year 2018/19 [in nanograms per liter (ng/L)]

Sample Location[1]	NDMA Result[2]
Diemer Plant	2.2
Jensen Plant	2.7
Mills Plant	4.0
Skinner Plant	3.7
Weymouth Plant	ND
Central Pool Sites[3]	ND-3.4

ND - Not Detected; NDMA reporting level is 2 ng/L.

[1] Sample locations are distribution system sites associated with each treatment plant.
[2] SWRCB-DDW notification level is 10 ng/L.
[3] Sample locations in the distribution system that can receive water from multiple plants.

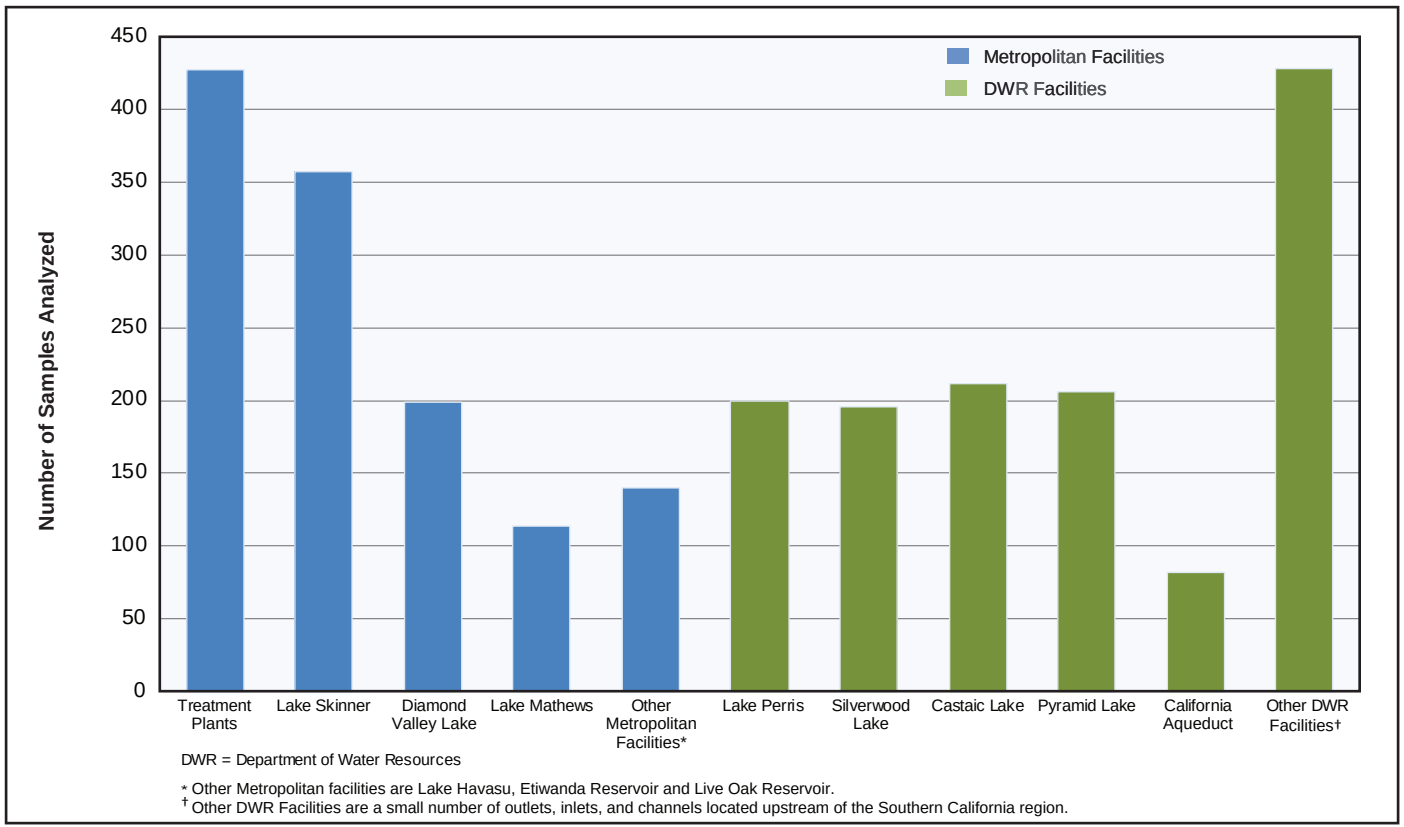


Figure 4-7. Number of Samples Analyzed for the Taste-and-Odor Compounds 2-Methylisoborneol (MIB) and Geosmin in Source and Treated Water, FY 2018/19

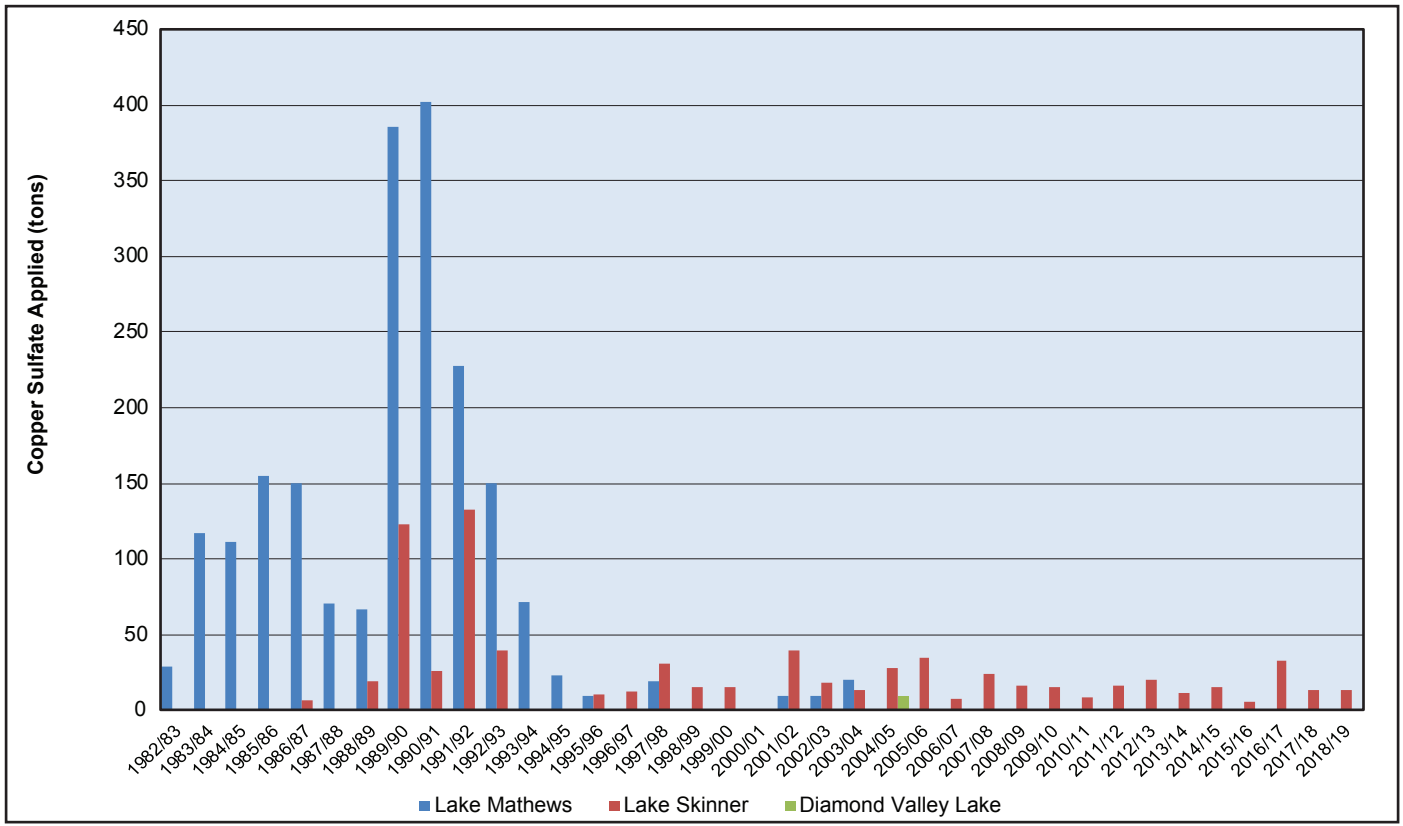


Figure 4-8. Copper Sulfate Usage in Metropolitan's Reservoirs, FY 1982/83 to 2018/19

Source Water Protection

Watershed Management and Protection

Metropolitan continued its oversight and coordination on water quality issues with key Colorado River stakeholders through active participation in the Lower Colorado River Water Quality Partnership and Clean Colorado River Sustainability Coalition. Staff also collaborated with DWR and the State Water Contractors on Delta and SWP water quality monitoring and forecasting programs.

Salinity Control

In FY 2018/19, Metropolitan continued to engage in salinity control efforts through the Colorado River Basin Salinity Control Forum to mitigate salt loading into the Colorado River, focusing on efforts to replace the Paradox Valley Unit project in Colorado, which currently reduces 10 percent of the salt load into the Colorado River. Metropolitan took over the chair's post at the forum in June 2019.

Uranium Mill Tailings Cleanup

Metropolitan continued to monitor the removal of the uranium mill tailings pile along the banks of the Colorado River near Moab, Utah. Since 2009, the U.S. Department of Energy has shipped 10 million tons of mill tailings via rail to an engineered disposal site about 30 miles northwest of Moab. Metropolitan and other stakeholders successfully advocated for increased federal funding for FY 2019, which has allowed DOE to double the mill tailings removal rate since February 2019. Maintaining the increased funding level will help meet DOE's targeted completion in the 2030s.

Chromium 6 Remediation

Construction began in October 2018 on Pacific Gas & Electric's chromium 6 groundwater remediation efforts along the Colorado River near Topock, Ariz. Completion is expected in 2025, followed by operation of the treatment system for an estimated 30 years.

Interim measures, consisting of groundwater extraction and treatment, have been in place since 2004 to prevent chromium 6 migration to the Colorado River. Concentrations of chromium 6 in the

river are typically below detection level (less than three parts per billion).

Perchlorate Remediation

Perchlorate loading into Las Vegas Wash has decreased more than 90 percent since 1998 as a result of remediation at the former Tronox, Inc. site, now owned by the Nevada Environmental Response Trust (Figure 4-9). Levels have consistently remained below 2 ppb at Metropolitan's Lake Havasu intake (Figure 4-10).

Metropolitan also monitored the disbursement of funds from a $1.1 billion settlement between Tronox and its predecessors for site cleanup. Staff participated in site visits and reviewed interim results for inclusion in the feasibility studies scheduled for completion in 2023, followed by design of a long-term remediation strategy. The current target cleanup goal for perchlorate loading into Las Vegas Wash is based on the interim federal drinking water health advisory level of 15 ppb. This goal would help ensure compliance with any potential reduction in California's perchlorate MCL of 6 ppb, in light of a 1 ppb public health goal adopted in February 2016. A proposed federal regulation for perchlorate issued in June 2019 considers options for an MCLG/MCL of 90 ppb, 56 ppb, 18 ppb, or withdrawing the 2011 determination to regulate perchlorate.

Technology Assessment

Treatment Process Optimization and Development

Staff continued to study various source water challenges, including the potential impacts of cyanobacterial blooms. Staff presented the results of a bench-scale study on the reduction of cyanotoxins by ozone processes at the American Water Works Association annual conference in June 2019. In response to the new drinking water standard for TCP finalized in December 2017, staff continued examining the efficacy of ozone in removing TCP. Staff updated the operations, maintenance and monitoring plan for the Skinner plant, and submitted the plan to the state Division of Drinking Water in February 2019 to request a permit amendment reflecting the removal of direct filtration Plant 2 from service.

Potable Reuse

Metropolitan, in partnership with the Sanitation Districts of Los Angeles County, helped complete conceptual studies and prepared for demonstration facility startup at the Regional Recycled Water Advanced Purification Center in Carson. Construction of the facility is scheduled to be completed in summer 2019, with testing and commissioning to begin in fall 2019. Data collected at the demonstration facility will be used to facilitate regulatory acceptance of the proposed treatment process. Staff also held a workshop with an independent scientific advisory panel to provide objective review of the scientific, technical and regulatory issues associated with the project. Finally, staff continued its engagement with DDW and the Regional Water Quality Control Boards on program development, including receiving regulatory approval for the testing and monitoring plan.

Funded Projects

Metropolitan managed two externally funded grants for water quality projects in FY 2018/19. A National Science Foundation-funded project evaluates disinfection byproduct levels, identifies which DBPs are the key drivers of toxicity, and supports long-term engineering solutions to enhance drinking water safety and sustainability. A Water Research Foundation-funded project refines, standardizes, and streamlines analytical procedures for cyanotoxin monitoring, providing water utilities with practical analytical guidelines to improve the precision, accuracy and overall data quality (Table 4-8).

Service to Member Agencies and Drinking Water Industry

Staff conducted a member agency Water Quality Managers meeting, with presenters providing information on economic feasibility considerations in developing regulatory MCLs, regional fluoridation levels, the history of implementing ozone at Metropolitan, and an update on the Regional Recycled Water Program.

Metropolitan continued its involvement with the water industry's principal advocates, most notably the Association of California Water Agencies, American Water Works Association, Association of Metropolitan Water Agencies, and the California Municipal Utilities Association. These organizations provided regulatory and legislative

input on behalf of Metropolitan and other member agencies on federal, state and local drinking water issues.

TABLE 4-8
ACTIVE WATER QUALITY GRANTS[1]
Fiscal Year 2018/19

Prime Funding Agency	Title of Grant Project	Total Project Budget[2]	Amount of Award to MWD[3]
National Science Foundation	Drinking Water Safety and Sustainability: Identifying Key Chemical Drivers of Toxicity for Long-Term Solutions in the United States	$ 330,000	$ 50,000
Water Research Foundation	Refinement and Standardization of Cyanotoxin Analytical Techniques for Drinking Water	670,753	416,000
	TOTALS	**$1,000,753**	**$466,000**

Notes:
[1] Externally-funded grant projects managed by Water Quality's principal investigators during the fiscal year.
[2] Reimbursable dollars plus total cost-share and in-kind commitments from all participating agencies; includes payments to sub-awardees and/or subcontractors as applicable.
[3] Amount managed by Metropolitan; award amounts may occasionally change from prior years due to realigned budgets.

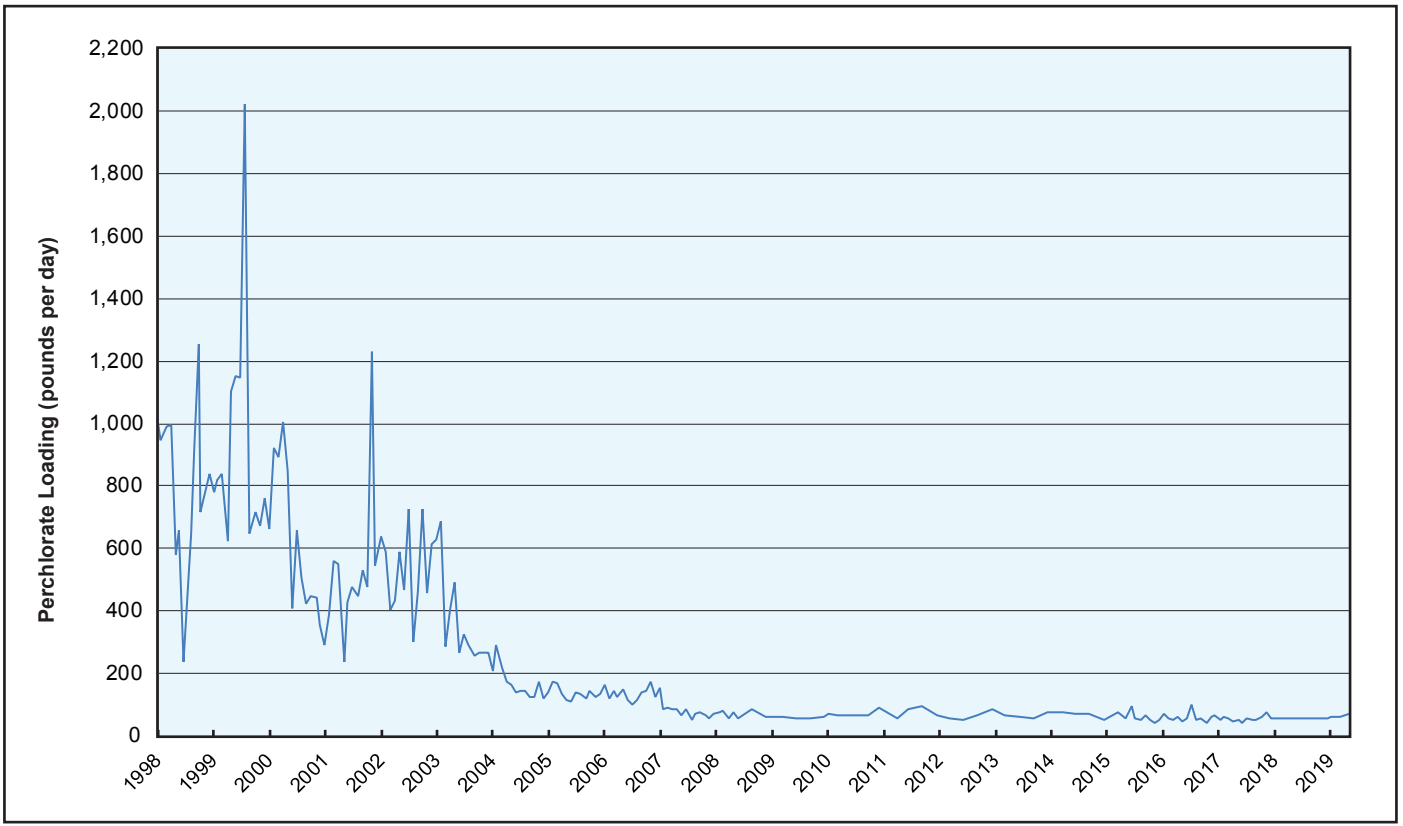


Figure 4-9. Perchlorate Loading in Las Vegas Wash, half a mile upstream of Lake Mead, 1998 to 2019

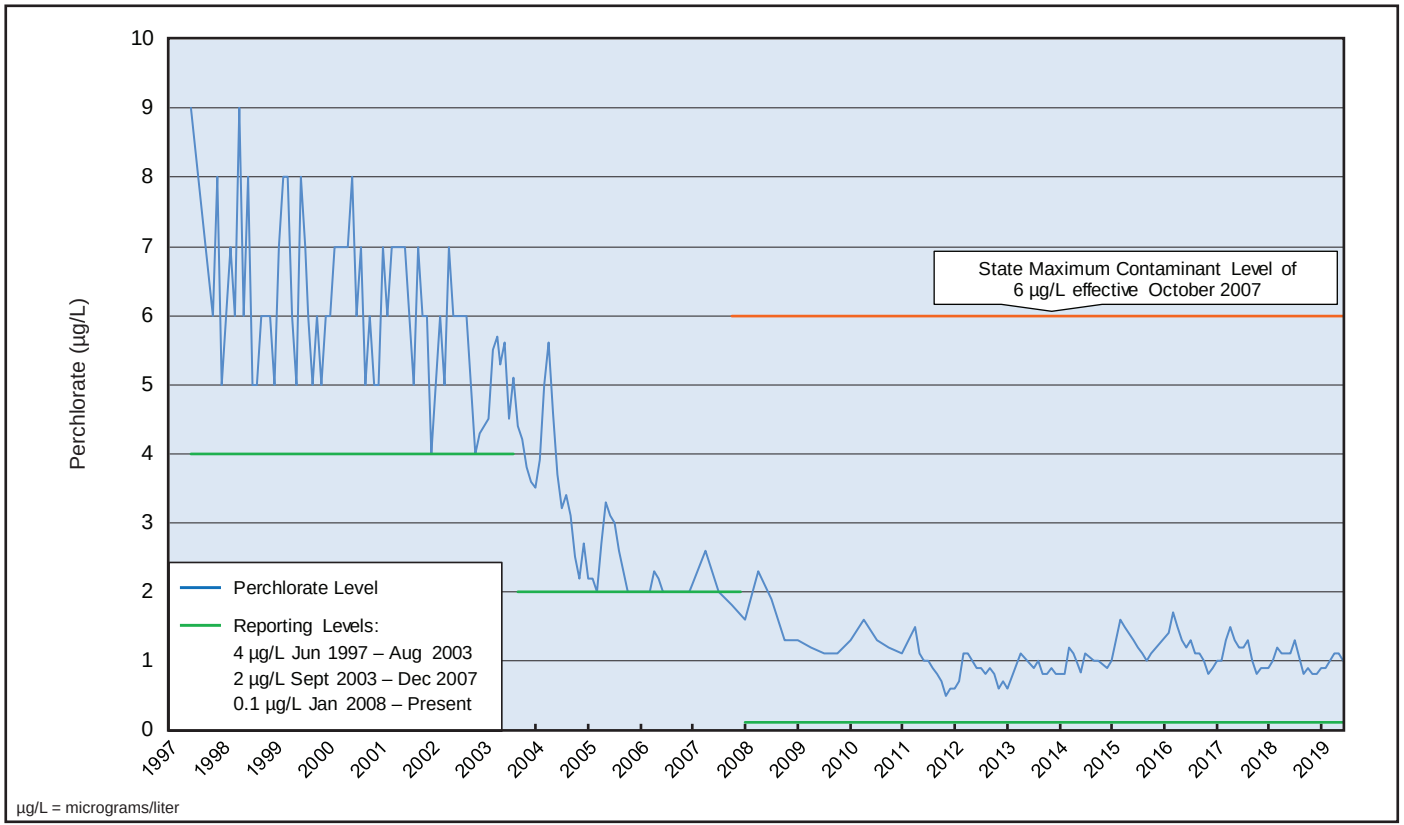


Figure 4-10. Perchlorate Levels at Lake Havasu, 1997 to 2019

Conveyance, Distribution and Support

Conveyance and Distribution

Staff performs preventive and corrective maintenance activities throughout the year with the objective of ensuring reliable deliveries to member agencies. In addition, staff plan and perform shutdowns to complete pipeline and facility inspections, perform repairs on pipelines or equipment, and support Capital Investment Plan projects.

In FY 2018/19, Metropolitan pumped nearly 798,000 AF through the CRA and successfully completed planned shutdowns on the CRA and pipelines throughout its service area.

Using visual inspections and eddy-current inspection technology, staff inspected about 70 miles of pipeline to assess the condition of steel mortar-lined and prestressed concrete cylinder pipe. Metropolitan completed the second major construction contract of its PCCP rehabilitation program, this one for lining about 10,000 feet of PCCP within the western portion of the Second Lower Feeder. Completed over a six-month period, the repairs involved the insertion of steel reinforcement sleeves. Relining also took place along another 400-foot section of the Sepulveda Feeder in the city of Torrance. Other projects saw about 21,000 feet of the Orange County Feeder relined with mortar to replace the previous coal tar epoxy, and 2,200 feet of polyurethane lining replacing epoxy coating at the Wadsworth pumping plant. Member agency deliveries remained unaffected during these projects, thanks to the distribution system's operational flexibility.

Throughout FY 2018/19, WSO maintained the system to ensure an eight-pump flow capability on the CRA. To ensure consistent operation and reliability, CRA refurbishment work took place during a 24-day shutdown in March 2019. Work performed included 22,000 square feet of concrete panel repairs in several locations along the canal and Iron Mountain reservoir, installation of internal bands to seal minor cracking in the CRA conduit, replacement of valves and metering equipment, inspection and testing of high-voltage equipment, and rehabilitation work on surge chambers and head gates at the pumping plants. Tunnel cleaning, canal scraping and debris removal were also performed to maintain the hydraulic capacity of the CRA.

Higher than normal precipitation and two major storms in October 2018 and February 2019 caused substantial erosion along the CRA. Although the aqueduct did not sustain any system damage, there were about 80 sites along the CRA and in-basin distribution system that required major site restoration and drainage improvements.

The Coatings Program protects Metropolitan's physical assets from corrosion and harsh environments to maximize the useful life of pumps, valves, meters, pipes, buildings and delivery lines. When not focusing on shutdown activities, staff coated equipment and structures at pumping plants, treatment plants and pressure control structures, including over 260 valves. In order to prevent water intrusion that could accelerate corrosion, staff sealed structures that are particularly vulnerable to water damage, such as vaults located below road grade.

During FY 2018/19, crews performed nearly 260,000 hours of maintenance on conveyance and distribution infrastructure, including shutdowns. See Table 1-5 for a full list of shutdowns that occurred during the year.

Operations Support Services

Staff provides a wide range of support services to Metropolitan's core operational functions and, on a reimbursable contract basis, to DWR, member agencies and other public entities. Services include maintenance engineering, manufacturing, rehabilitation, new construction and emergency response.

Manufacturing Services

Manufacturing services provided by the La Verne shops include fabrication, machining and coating services, valve and pump testing and repairs, equipment refurbishment, diving inspections, floating reservoir cover maintenance, as well as crane maintenance and annual certification.

The La Verne shops refurbished a wide variety of critical equipment for Metropolitan's conveyance and distribution system, including the hydroelectric plants. Major refurbishment included a 42-inch conical plug valve for the Second Lower Feeder as part of the PCCP Rehabilitation Program and manufacturing a 7-foot, 10-inch by 26-foot, 8-inch drop gate on the Casa Loma Canal. The shops also

fabricated and coated various pipes, fittings, and valves for Palos Verdes Reservoir.

Using a reimbursable agreement, the La Verne shops provided support for DWR's SWP facilities. The shops manufactured a 132-inch diameter flanged pipe section for DWR to be installed at the Castaic Outlet Valve Structure. The shops also manufactured two four-ton gates for the John E. Skinner Delta Fish Protective Facility located two miles upstream of Banks Pumping Plant, which helps divert fish away from the pumps that lift water into the California Aqueduct. The shops also refurbished 10 stems and couplings for DWR's San Luis Dam head gate. Staff performed a 3-D scan of the various equipment components and used this data to create shop drawings for future use.

Construction Services

Staff completed the installation of electrical duct banks and switchgear at Greg Avenue pump station. This installation will allow for the relocation of overhead electrical lines as part of the Greg Avenue pump upgrade project. The project will replace the existing aging pumps, control building, and seismically deficient tanks, and upgrade key electrical, mechanical, and control equipment at the facility. Staff also performed maintenance and repairs along the CRA, some reimbursable by the Federal Emergency Management Agency. Other projects included: road maintenance on the Foothill Feeder to support 2019 shutdowns, air release valve repairs at service connection CENB-21, and routine cleaning of siphons along the Casa Loma and San Diego canals.

Staff also constructed an energy dissipater structure, and installed a new control valve and several hundred feet of high-density polyethylene pipe at Palos Verdes Reservoir. At the Perris pressure control structure, staff installed new fiber optic cables to ensure reliable communication to and from the facility.

Power Equipment and Reliability

This unit evaluates maintenance, equipment reliability engineering issues, and performs technical investigations related to water billing meters; and maintains hydroelectric power plants, high voltage systems, and HVAC (heating, ventilation, and air conditioning) systems throughout Metropolitan's facilities.

Metropolitan certified its compliance for calendar year 2018 with all national electric reliability standards for the CRA 230 kilovolt (kV) transmission system, as well as with the delegated requirements from AEPCO (Arizona Electric Power Cooperative), which is registered as Metropolitan's transmission system operator. Metropolitan must comply with applicable reliability standards due to its ownership of the CRA transmission system. In September 2018, Metropolitan's board appropriated $4.66 million and authorized staff to rehabilitate the 5.9 MW turbine-generator at Red Mountain hydroelectric plant. The plant had been in continuous service since commissioning in 1986 and identified for refurbishment due to wear on several of the components. Refurbishment should be complete by the end of CY 2019. This year, staff refurbished the Valley View hydroelectric turbine generator and installed a new voltage regulator for Etiwanda HEP, in addition to performing electrical and mechanical testing at several hydroelectric plants.

Staff used condition-based monitoring to increase reliability of emergency generators as part of a multi-year effort that will include electrical motors and mechanical gearboxes.

Staff conducted a pump efficiency test and procured vibration monitoring equipment to assess conditions of one pump unit at the Gene pumping plant as a pilot for the upcoming CRA main pump reliability program. This multi-year effort will be repeated for all five desert pumping plants.

Staff provided member agency technical support on several service connections.

Fleet Services

In FY 2018/19, staff completed more than 6,040 preventive maintenance work orders and nearly 2,400 corrective work orders on 1,430 fleet assets and about 600 facility assets; and replaced aging vehicles and equipment while meeting all applicable air quality regulations.

The California Air Resources Board updated its registration program for portable equipment. Staff is working to meet these new requirements, which includes labeling and reporting each piece of portable equipment to certify compliance with the new standards

annually. Metropolitan met all of the required timelines and requirements for this new process for 2019.

Emergency Management

Metropolitan performed over 50 emergency exercises in FY 2018/19, including a full-scale exercise in November 2018 in which over 50 staff members practiced physically shifting multiple critical functions from the Eagle Rock facility to alternate sites due to a simulated wildfire. The Metropolitan Operations Control Center, Emergency Operations Center and Security Watch Center all successfully evacuated the Eagle Rock site and re-established operations at alternate locations. Four member agencies participated: Eastern and Western municipal water districts, Inland Empire Utilities Agency, and San Diego County Water Authority.

Many high-level officials attended a successful multi-agency tabletop exercise held at the Mills plant in April 2019. Designed to test mutual-aid security support following a catastrophic earthquake, the exercise included the California Office of Emergency Services, National Guard, counties of Riverside and San Bernardino, and other first responders. Relationships developed in this exercise would soon yield real-world benefits.

Emergency repair operations on the Santa Monica Feeder briefly activated the EOC, which coordinated directly with Water System Operations management and the city of Beverly Hills.

Energy Management

Hydroelectric Power Recovery Plant Operations

Metropolitan has 16 small-conduit hydroelectric power recovery plants that generated a total of 211 million kilowatt-hours (kWh) for FY 2018/19 (Table 4-9), earning revenues of $11.8 million. This was about 111 million kWh less generation and $4.5 million less revenue compared to FY 2017/18. Generation from all 16 power plants is governed under contractual agreements with Pacific Gas & Electric, Southern California Public Power Authority, Los Angeles Department of Water and Power, and two separate DWR agreements. The average

revenue for the energy generated from Metropolitan's hydroelectric plants was about $56/megawatt-hour.

Solar Power Energy Production

Metropolitan has four solar photovoltaic energy facilities. The facility at the Skinner plant is rated at 1 megawatt, the Diamond Valley Lake Visitor Center facility is rated at 0.52 MW, the Weymouth plant facility is rated 3 MW, and the newest facility, which came online in January 2018 at the Jensen plant, has a rating of 1 MW. During FY 2018/19, facilities at the Skinner plant produced 2,078 MWh of energy, the DVL Visitor Center produced 584 MWh, the Weymouth plant produced 5,218 MWh, and the Jensen plant produced 2,745 MWh, all of which offsets retail energy purchases at the four locations from the local energy utility company.

Greenhouse Gases

Power utilities that emit greenhouse gases from power plants or import energy into California from facilities that emitted greenhouse gases when the energy was produced, are obligated to surrender allowances to the California Air Resources Board to cover the amount of gas emitted. In November 2018, Metropolitan submitted allowances to cover its obligation for energy imported into California to serve the CRA pumping load in CY 2017. This was the fourth year Metropolitan made such a submittal.

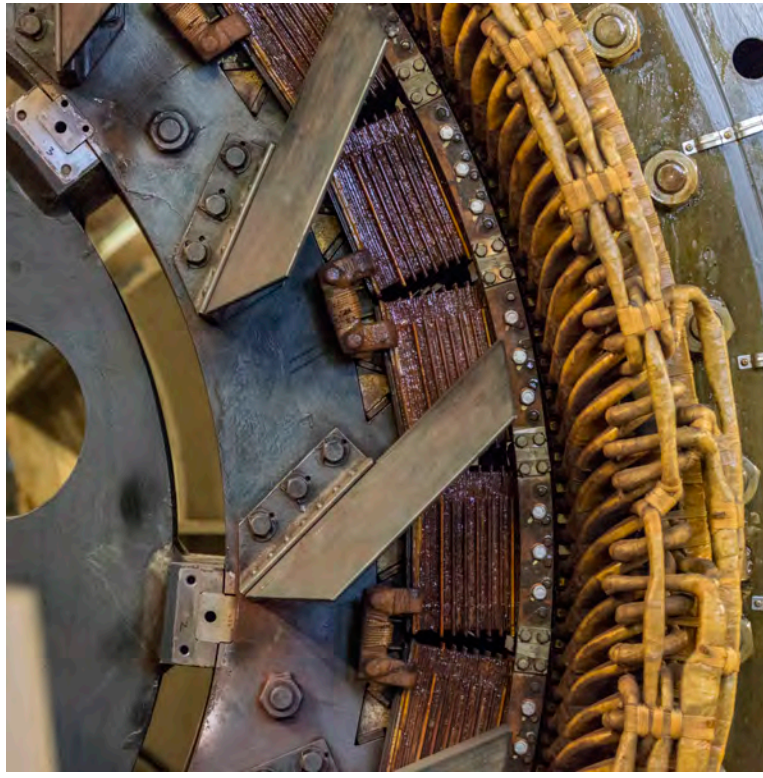
Colorado River Aqueduct Power

In FY 2018/19, Metropolitan pumped nearly 798,000 AF through the CRA, requiring about 1.5 billion kWh of electricity. Energy costs for pumping Colorado River water are shown in Table 4-10. The current and historical energy resources used to meet CRA water delivery energy requirements are shown in Table 4-11 and Figures 4-11 and 4-12.

During FY 2018/19, SWP deliveries were similar to FY 2017/18 with relatively low CRA pumping demand. CRA energy usage remained consistent, at about 1.5 billion kWh from year to year.

In FY 2018/19, Metropolitan relied entirely on AEPCO to be its purchasing agent for additional supplemental power to balance its CRA load and resources. Supplemental energy purchases increased from 94 million KWh in FY 2017/18 to 395 million KWh in FY 2018/19. Energy costs rose from about $3 million in FY 2017/18 to $14 million in FY 2018/19.

The lower cost in FY 2017/18 was attributed to the use of remaining banked energy under the Southern California Edison Service and Interchange Agreement, which was in effect for three months in FY 2017/18. Supplemental power purchases for FY 2018/19 replaced the SCE Exchange and Benefit Energy that had been provided at no cost under the SCE agreement. Further, generation from Hoover and Parker dams decreased from the previous fiscal year. Finally, there was an increase in CRA pumping load in FY 2018/19.



Valley View hydroelectric plant generator, rotor and windings during plant refurbishment.

TABLE 4-9
HYDROELECTRIC POWER RECOVERY PLANTS[1]
PRODUCTION FOR THE PAST TWO FISCAL YEARS

Power Plant[2]	Nameplate Capacity (Megawatts)	2018/19 Production (kWh)	2017/18 Production (kWh)
Greg Ave.	1	0	192,000
Lake Mathews	5	18,026,618	9,633,343
Foothill Feeder	9	41,404,003	56,499,724
San Dimas	10	40,906,179	27,627,925
Yorba Linda	5	18,718,188	19,222,295
Sepulveda Canyon	9	14,181,272	14,883,448
Venice	10	0	2,224,520
Temescal	3	6,689,019	0
Corona	3	7,027,483	386
Perris	8	15,237,862	20,182,693
Rio Hondo	2	1,972,007	1,092,315
Coyote Creek	3	0	0
Red Mountain	6	5,267,241	32,486,571
Valley View	4	0	0
Etiwanda	24	36,660,084	117,080,868
Wadsworth (DVL)	30	4,888,102	20,500,660
TOTAL	**131**	**210,978,058**	**321,626,748**

[1] Annual Power generation varies significantly, depending on member agency demands, mix of water sources (Colorado River Aqueduct vs. State Water Project), what shutdowns/outages are taking place, and each generator's operational constraints.

[2] Power Plants are listed in the order they became operational. Greg Avenue was first and Wadsworth last.

TABLE 4-10
ENERGY COST FOR PUMPING
COLORADO RIVER WATER
Fiscal Year 2018/19

Energy Source	Cost ($)
Hoover Power Plant	16,972,363
Parker Power Plant	3,733,751
Energy Purchases/Sales [1]	14,011,554
Exchange (Edison & DWR) [2]	0
Colorado River Water Pumping Revenue [3]	(1,468,552)
Benefit Energy and Exchange Surcharge [4]	0
Reduction in Energy Surcharge [5]	33,992
TOTAL	**33,215,124**

Notes:
[1] Energy Purchases/Sales. A negative number indicates net revenue to Metropolitan.
[2] Cost of exchanging energy with another utility.
[3] Payments received for energy costs associated with moving non-Metropolitan water on the CRA.
[4] Tax paid to state of California for SCE Benefit and Exchange energy.
[5] Reduction in tax due to transmission losses and small hydro generation.

TABLE 4-11
METROPOLITAN'S HISTORICAL CRA ELECTRIC ENERGY USE
Kilowatt Hours

	Hoover	Parker	Edison Benefit [1]	Edison Exchange [2]	DWR Exchange [2]	Edison & DWR Exchange & Edison Benefit	Energy Purchases/Sales [3]	Total
1987/88*	1,432,001,000	290,400,000	216,981,190	1,764,000	0	218,745,190	832,498,639	2,773,644,829
1988/89	1,231,206,000	237,142,000	215,485,363	(27,764,000)	0	187,721,363	735,276,330	2,391,345,693
1989/90	1,205,476,000	230,545,000	219,139,828	24,777,000	0	243,916,828	754,629,485	2,434,567,313
1990/91	1,130,155,000	223,831,000	221,837,010	13,298,000	0	235,135,010	871,799,953	2,460,920,963
1991/92	1,086,888,000	206,513,000	210,490,214	16,145,000	0	226,635,214	891,296,400	2,411,332,614
1992/93	966,614,000	182,606,000	208,800,738	(28,220,000)	0	180,580,738	1,035,586,974	2,365,387,712
1993/94	1,256,009,000	214,961,000	199,304,945	(16,175,000)	0	183,129,945	914,591,730	2,568,691,675
1994/95	1,166,517,000	217,365,000	186,648,325	(88,977,000)	0	97,671,325	680,010,352	2,161,563,677
1995/96	1,357,937,000	237,627,000	286,971,075	(32,150,000)	0	254,821,075	401,318,041	2,251,703,116
1996/97	1,292,375,000	243,993,000	253,134,785	47,302,000	0	300,436,785	595,050,513	2,431,855,298
1997/98	1,370,317,000	302,069,000	200,076,045	90,000,000	(123,316,955)	166,759,090	327,992,313	2,167,137,403
1998/99	1,411,403,000	297,219,000	212,312,000	13,490,000	108,417,736	334,219,736	329,691,494	2,372,533,230
1999/00	1,392,515,000	262,383,000	263,326,907	(26,405,000)	3,967,942	240,889,849	646,961,000	2,542,748,849
2000/01	1,311,068,000	243,647,000	173,785,599	21,586,000	0	195,371,599	788,937,000	2,539,023,599
2001/02	1,322,037,000	241,048,000	199,205,189	(54,931,000)	0	144,274,189	804,044,166	2,511,403,355
2002/03	1,193,682,000	230,871,000	284,085,067	50,371,800	(162,807,504)	171,649,363	232,051,017	1,828,253,380
2003/04	1,179,118,000	229,886,000	164,721,756	(61,823,800)	105,280,095	208,178,051	(141,923,768)	1,475,258,283
2004/05	931,893,000	198,606,000	381,481,989	18,022,000	5,059,196	404,563,185	(39,632,380)	1,495,429,805
2005/06	1,158,901,000	212,687,000	405,612,265	(116,265,000)	37,054,891	326,402,156	74,465,049	1,772,455,205
2006/07	1,143,870,000	229,881,000	387,630,441	(38,400,000)	68,876	349,299,317	(421,365,512)	1,301,684,805
2007/08	1,117,068,000	217,106,000	431,283,980	70,272,000	0	501,555,980	(250,140,000)	1,585,589,980
2008/09	1,075,217,000	223,056,000	260,209,614	90,363,000	0	350,572,614	371,765,025	2,020,610,639
2009/10	994,222,000	195,063,000	233,871,837	21,870,000	0	255,741,837	595,894,000	2,040,920,837
2010/11	1,094,130,000	225,236,000	227,018,084	(160,574,000)	0	66,444,084	583,958,000	1,969,768,084
2011/12	1,165,206,000	214,680,000	35,860,567	(33,725,000)	0	2,135,567	33,603,000	1,415,624,567
2012/13	1,075,958,000	236,045,000	234,852,498	53,437,000	0	288,289,498	(100,968,000)	1,499,324,498
2013/14	1,099,377,000	224,957,000	574,836,315	90,393,000	0	665,229,315	203,715,000	2,193,278,315
2014/15	1,023,690,000	214,130,000	401,355,532	44,943,000	0	446,298,532	709,652,000	2,393,770,532
2015/16	1,023,789,000	214,109,000	289,902,322	(41,954,000)	0	247,948,322	689,547,000	2,175,393,322
2016/17	939,410,000	211,118,000	340,445,225	(15,061,000)	0	325,384,225	32,092,255	1,508,004,480
2017/18	967,444,000	220,368,000	142,816,615	74,391,000	0	217,207,615	93,741,708	1,498,761,323
2018/19	925,705,000	211,291,000	0	0	0	0	395,306,715	1,532,302,715

* Includes June 1987 data

[1] Energy provided by Southern California Edison (Edison) at no cost pursuant to 1987 Service and Interchange Agreement.

[2] Energy exchanged with Edison. Negative number indicates net energy banked with Edison.

[3] Energy Purchases/Sales. A negative number indicates net energy sold to others.

[4] The contract with Edison terminated on 9.30.2017. Effective 10.1.2017, MWD purchased Supplemental energy from the Southwest spot market and the California Independent System Operator to meet its incremental energy needs.

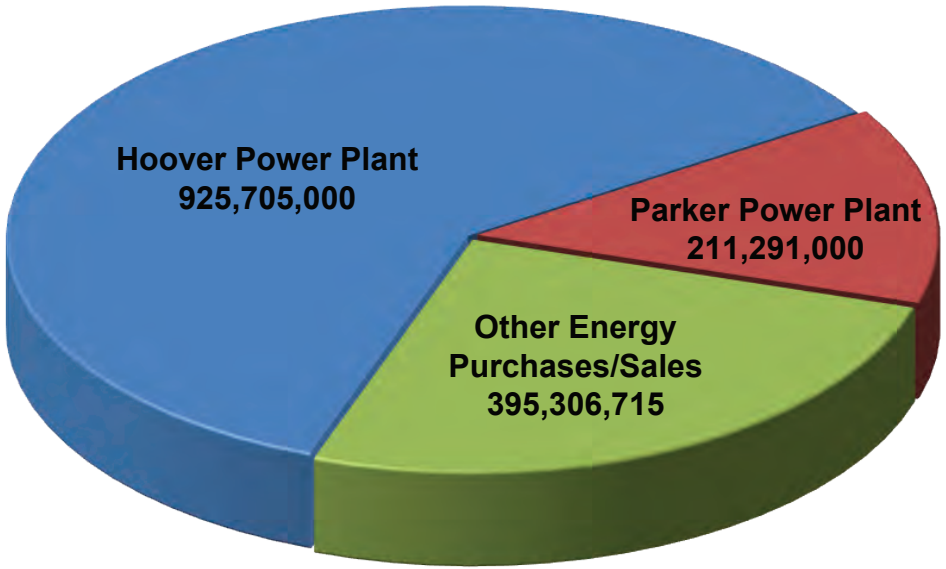


Figure 4-11. Metropolitan's CRA Electric Energy Use (kWh) Fiscal Year 2018/19

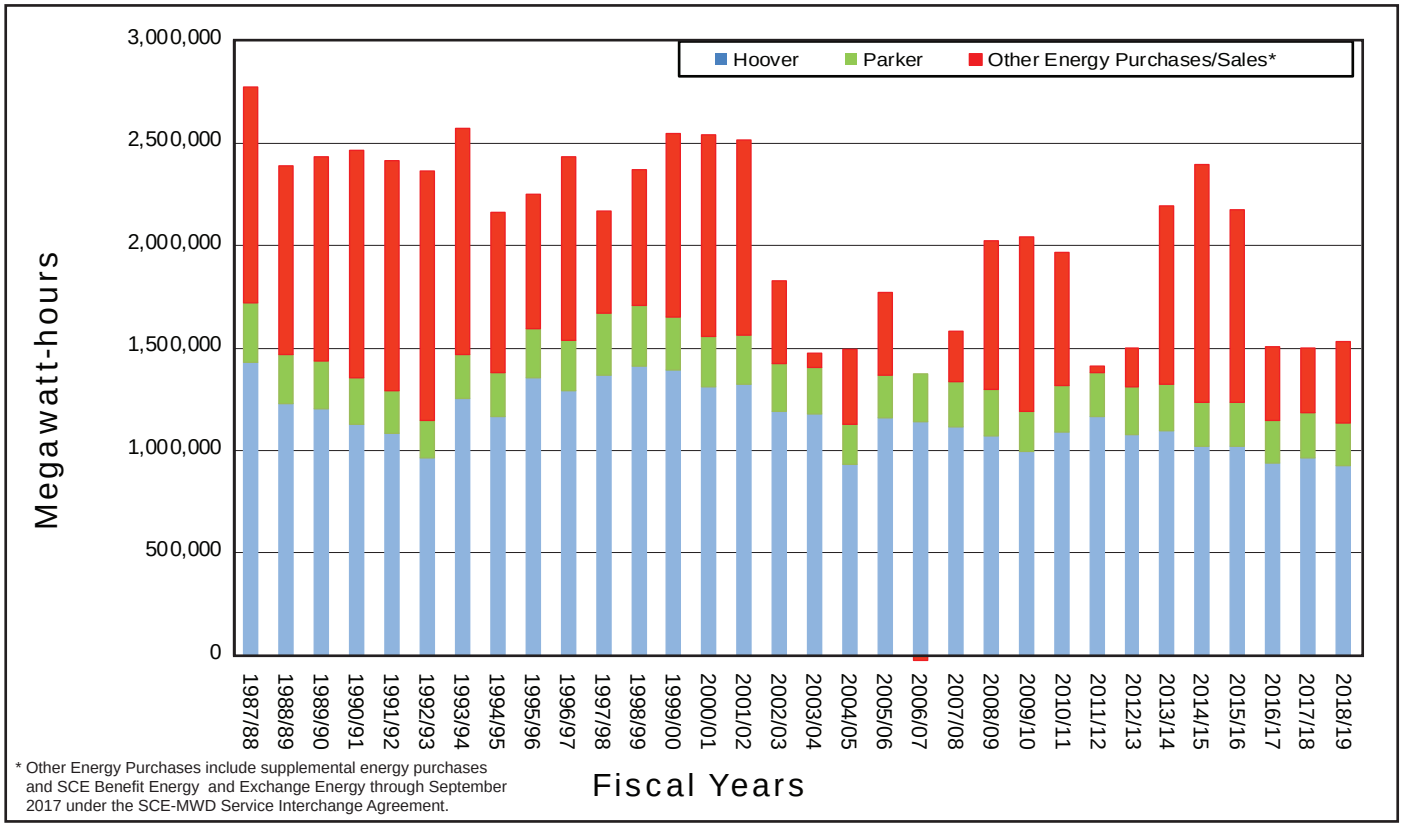


Figure 4-12. CRA Energy Mix, Fiscal Years 1987/88 to 2018/19

Agreements for CRA Operations

Metropolitan has service and interconnection agreements with CAISO (California Independent System Operator), and WAPA (Western Area Power Administration). These provide balancing services for Metropolitan's pump loads and ensure transmission for energy deliveries from Hoover and Parker dams. Long-term agreements with CAISO and AEPCO were executed for CRA power deliveries that began on October 1, 2017. The CAISO agreement establishes the operational relationship between CAISO and Metropolitan. The agreements with AEPCO provide for energy scheduling, trading, and power system operations services. The operation services agreement establishes AEPCO as the transmission operator for the CRA and identifies tasks to be delegated to Metropolitan to comply with the national electricity reliability standards.

Safety and Regulatory Services

Staff ensures that Metropolitan complies with environmental and safety regulations and procedures through regular site inspections that proactively address environmental and safety issues. There were 79 routine regulatory inspections in the areas of air quality, wastewater, hazardous materials, hazardous waste, stormwater, underground and aboveground petroleum storage tanks, and safety. Staff coordinates and tracks all identified corrective actions to ensure an appropriate response to the corresponding agency.

Regulatory

Metropolitan completed over 280 compliance reports required for air quality, wastewater, stormwater, underground storage tanks, and hazardous materials/hazardous waste. Staff successfully negotiated and acquired dewatering permits from regulatory agencies in support of Metropolitan's shutdown projects, and managed over 310 air quality permits for portable and stationary equipment.

Compliance with regulations for aboveground fuel tanks continued as staff updated and implemented 20 plans for oil spill prevention control and countermeasures. Metropolitan submitted annual disclosures and updates to local health and fire departments for

business plans dealing with hazardous materials for 38 Metropolitan facilities.

Metropolitan coordinated a full-scale multi-agency Hazardous Materials/Chemical Response Exercise with Riverside County's HazMat Operations Group. Over 40 Metropolitan staff participated in hosting 70 agency attendees for the one-day event at the Mills plant. Staff will continue to conduct outreach to local agencies responsible for emergency response at Metropolitan facilities.

Metropolitan and its member agencies coordinated on providing written comments to California-Nevada AWWA on a manual addressing best management practices for drinking water discharges. Additionally, staff submitted comments on the State Water Resources Control Board's proposed amendments to the underground storage tank regulations. Staff then initiated a capital project to upgrade five underground tanks to comply with the SWRCB's amended regulations and implemented new storage-tank training requirements to ensure compliance.

Staff worked with the Joint Utilities Group and California Municipal Utilities Association to provide comments on CARB's draft regulations for reducing and phasing out sulfur hexafluoride emissions from gas insulated electrical switchgear. Formal rulemaking is expected to begin in fall 2020 with final rule adoption in mid to late 2020.

Staff across multiple groups within Metropolitan are working to respond to USEPA's new requirements for Vulnerability Assessments, now referred to as Risk and Resilience Assessments and the accompanying Emergency Response Plans. The new federal law expands the scope of existing threat assessments to include malevolent acts, natural hazards, and cybersecurity. Metropolitan will need to certify by 2020 that it meets the updated requirements.

Metropolitan provided input to the South Coast Air Quality Management District on coating regulations. Staff also worked with the Mojave Desert Air Quality Management District to install community air monitoring sensors at the Gene and Iron Mountain pumping plants that provide real-time monitoring information on general air quality throughout the local region.

Health & Safety

Staff provided safety coverage during the FY 2018/19 shutdown season to successfully minimize accidents and injuries. This included safe work practices, toolbox training, and ventilation monitoring for all underground operations.

Site inspections identify safety performance issues, which are addressed through safety training and toolbox talks, safety committee communications, and revisions of safety procedures, if needed. Staff also prepared a book of safety talks for managers to use when conducting weekly safety toolbox meetings. Table 4-12 shows the injuries, illnesses and incidents that required time off from work during FY 2018/19 for each Metropolitan facility. The Occupational Safety and Health Administration defines Total Incident Rate (also known as injury/illness rate) as the number of recordable incidents in a year per 100 employees. Overall, Metropolitan's Total and DART (Days Away, Restricted, or Transferred) Incident Rates are below the average federal and state rate for water utilities. A recordable incident is generally defined as a new work-related injury or illness that results in death, lost time from work, work restriction, or medical treatment beyond first aid.

Metropolitan offered over 800 classes covering nearly 100 individual safety and regulatory compliance topics. Online courses continued to provide flexibility for diverse work schedules and accounted for nearly 40 percent of training provided. If an incident occurs, staff investigates each incident and works with managers to implement proactive measures to protect employees.

Staff worked with the Phylmar Regulatory Roundtable to help craft the language for CalOSHA's draft proposal to protect workers from exposure to smoke in the event of wildfire. The draft regulation lowers the Air Quality Index for particulate matter below 2.5 microns that triggers action on the part of the employers including notification, additional monitoring, and/or use of respirators depending on the trigger level. The emergency regulation will go into effect July 26, 2019, and will be effective for one year, followed by the drafting of permanent regulations. Staff is currently revising Metropolitan's Health, Safety and Environmental Manual to include wildfire smoke training material and protocols.

Apprenticeship Program Training

The Apprenticeship Program trains prospective industrial mechanics and electricians to ensure skilled trade persons are available to repair and maintain Metropolitan's water treatment and conveyance and distribution system. The state Department of Apprenticeship Standards continues to recognize Metropolitan's curriculum as meeting the breadth and level commensurate with journey-level mechanical and electrical trades. A new class of 16 apprentices began work in FY 2018/19.

Metropolitan's Apprenticeship Program has several classes in progress to train electricians and mechanics to the journey level. During a four-year period, apprentices attend over 700 hours of classroom instruction, must pass more than 90 tests, and complete over 7,200 hours of on-the-job training. Since its inception in 2003, the Apprenticeship Program has graduated 128 journey-level mechanical and electrical craft persons which comprises over 40 percent of Metropolitan's current apprenticeable trades workforce.

Completion certificates prepared for graduates of Metropolitan's Apprenticeship Program.

TABLE 4-12
ACCIDENT INCIDENTS
Fiscal Year 2018/19

Location	Total* Incident Rate	DART** Incident Rate
Diamond Valley Lake	0	0
Diemer	4.2	4.2
Eagle Mountain	8.6	8.6
Eagle Rock	0	0
Gene Camp	0.9	0
Hinds	10	10
Iron Mountain	8.9	8.9
Jensen	6.0	3.0
Lake Mathews	13.4	10.4
Mills	13.7	11.9
Sacramento	0	0
San Diego	0	0
Skinner	7.8	4.7
Soto Street	16.0	12.8
Sunset	0	0
Union Station	0.8	0.4
Washington, D.C.	0	0
Weymouth	2.0	1.2
AVERAGE RATE	**2.8**	1.8
Federal Utility Average	**5.4**	3.0
State Utility Average	**5.1**	3.2

*Total Incident Rate – Number of recordable incidents in a year per 100 employees. Total Incident Rate is calculated by multiplying the number of recordable incidents by 200,000 and then dividing that number by the number of total labor hours at the facility.

**DART Incident Rate – Number of incidents with days away, restriction, and/or transfer in a year per 100 employees.

Aeration basin equipment undergoes testing at the Regional Recycled Water Advanced Purification Center in Carson.

CHAPTER 5

Engineering Services

The Engineering Services Group is a full-service engineering organization that is responsible for delivering a variety of projects so that Metropolitan can treat and distribute water reliably to its member agencies. Engineering Services provides a wide range of technical services with a focus on providing innovative and cost effective solutions to its project partners and stakeholders. Key functions within the group include program management, engineering design, construction management, facility planning, geodetics and field survey, dam surveillance, and corrosion engineering. A significant activity for Engineering Services is oversight of Metropolitan's Capital Investment Plan, which represents the district's commitment to constructing and rehabilitating facilities that enable long-term, reliable water deliveries. Additionally, Engineering Services provides a core suite of operation and maintenance activities to support numerous ongoing initiatives. Highlights of the year included overseeing the completion of the Regional Recycled Water Advanced Purification Center in Carson, commencing seismic improvements at the downtown Los Angeles headquarters building, continuing relining work of the Second Lower Feeder, responding to unscheduled Santa Monica Feeder repairs, and addressing the need for urgent erosion repairs on the Colorado River Aqueduct.

Capital Investment Plan

Metropolitan's CIP is comprised of 12 major capital programs based on project type, business driver and location. Projects within Metropolitan's CIP are prioritized and scheduled to reflect the strategic goals of providing a reliable supply of high-quality water at the lowest cost possible. During the fiscal year, Engineering Services managed and executed projects and programs with a total CIP budget in excess of $250 million.

During fiscal year 2018/19, CIP expenditures totaled about $213 million for all capital programs as depicted in Figure 5-1, while Figure 5-2 shows long-term expenditures for each capital program. Both charts cover a range of activities for each program, including feasibility planning, from design and construction, and project closeout. The fiscal year saw completion of 23 construction contracts with a total constructed value of $100 million (Table 5-1), while 23 construction contracts remained underway with a total value of $313 million (Table 5-2). Metropolitan also had 129 major capital projects in various stages of design (Table 5-3). Additionally the group managed 10 ongoing procurement contracts with a total value of $52 million.

Below are highlights of Engineering Services' major activities for each capital program during FY 2018/19:

Regional Recycled Water Program

This program involves the design and construction of the Regional Recycled Water Advanced Purification Center, which represents the initial step to develop a potential full-scale regional recycled water program. The program would purify wastewater for replenishment of groundwater basins throughout Southern California. This work is being undertaken in collaboration with the Sanitation Districts of Los Angeles County. During FY 2018/19, the group oversaw the completion of construction of the 500,000 gallon-per-day demonstration plant and led the development of the conceptual planning studies report for the program. Staff continued to develop planning documents with other Metropolitan staff to support upcoming board deliberations on the program.

Water Quality/Oxidation Retrofit Program

The 27-year program to reduce disinfection byproducts and improve water quality by retrofitting Metroplitan's five water treatment with ozone is now winding down, following completion of new facilities at the Weymouth plant in 2017. During FY 2018/19, staff completed chemical system upgrades related to the program at the Weymouth plant, including construction of a new hypochlorite and ammonia storage/feed system, which are needed for full integration of the ozone system into the plant's treatment process.

Treatment Plant Reliability Program

Projects under this program maintain reliability and improve the operating efficiency of Metropolitan's water treatment plants. Projects completed during the fiscal year included: seismic and fire system upgrades for the Diemer plant administration building, seismic upgrades of the filter outlet conduit at the plant, and Stage 1 upgrades to the Jensen electrical systems. During the fiscal year, work continued on electrical upgrades at the Mills plant, as well as seismic upgrades of the west washwater tank at the Weymouth plant.

Distribution System Reliability Program

Projects within this program maintain delivery reliability to Metropolitan's member agencies. Projects completed during the fiscal year included: rehabilitation of Lake Mathews headworks forebay liner and outlet tower; procurement and installation of isolation valves for service connections Central Basin-12 and CB-16 on the Rialto Pipeline; replacement of the internal lining within the yard piping at Wadsworth pumping plant; installation of an internal seal within San Diego Pipeline No. 1; and substantial completion of the Palos Verdes Reservoir rehabilitation. During the fiscal year, Metropolitan awarded contracts to reline a portion of the Orange County Feeder, upgrade the electrical systems at 15 underground structures in the Orange County region, and construct erosion control improvements at Garvey Reservoir.

Colorado River Aqueduct Reliability Program

Projects within this program maintain the reliability of the Colorado River Aqueduct and its pumping plants. Projects completed during the fiscal year included: structural upgrades to the 6.9 kV switch houses at each of the CRA pumping plants; surge chamber bypass covers at each pumping plant; concrete lining replacement along the aqueduct and at Iron Mountain Reservoir; repair of existing erosion control facilities along a nine-mile portion of the CRA, and renovation of six houses at the CRA pumping plants. Metropolitan also awarded contracts to rehabilitate the circulating water and sump discharge systems, and replace the 6.9 kV power cables at all five pumping plants.

PCCP Reliability Program

This long-term, comprehensive program will rehabilitate 100 miles of Metropolitan's 163 miles of prestressed concrete cylinder pipe. Through FY 2018/19, 10 miles of PCCP have been rehabilitated, leaving 90 miles that remain to be lined or replaced. During the fiscal year, specific accomplishments included: completion of a contract to line 4.4 miles of existing Second Lower Feeder PCCP; awarding of contracts to rehabilitate Second Lower Feeder reaches 2 and 4; completion of urgent relining of approximately 400 feet on the Sepulveda Feeder at Del Amo Boulevard; inspection of 40 miles of PCCP lines, and awarding a procurement contract for 13 large diameter conical plug valves for the Second Lower Feeder. Preliminary design to rehabilitate the Allen-McColloch and Rialto pipelines, and Calabasas and Sepulveda feeders continued during the fiscal year.

Right of Way and Infrastructure Protection Program

This comprehensive program protects access rights, minimizes erosion and secures programmatic environmental permits along all of Metropolitan's pipelines throughout the distribution system. This enables long-term rehabilitation work and operational activities to proceed with minimal delays, and will provide relief from escalating permitting costs. During the year, staff continued to execute various phases of the program, including design, preparation of programmatic environmental documentation, acquisition of necessary permits, and identification and resolution of right-of-way issues.

System Flexibility/Supply Reliability Program

In response to the recent drought and the reduced availability of State Water Project supplies, staff continues executing projects that expand the reach of CRA water throughout Metropolitan's distribution system. During the fiscal year, Metropolitan awarded a construction contract to rehabilitate the Greg Avenue Pump Station, and completed preliminary design for the Lake Perris seepage water conveyance pipeline.

System Reliability Program

This program will improve or modify facilities located throughout Metropolitan's service in order to utilize new processes and/or technologies, and to improve facility safety and overall reliability. Specific accomplishments included commencing construction of building improvement of the headquarters building; and continuation of upgrades to the control and protection systems for nine pump/turbine units at the Hiram W. Wadsworth Pumping Plant at Diamond Valley Lake.

Regulatory Compliance Program

This program provides for prudent use and management of Metropolitan's assets in compliance with regulations and codes other than water quality. During the fiscal year, staff continued the design activities related to the replacement of the original sewer systems at the Iron Mountain, Gene and Intake pumping plants.

Minor Capital Projects Program

Minor capital projects involve refurbishments, replacements, or upgrades at Metropolitan facilities that cost less than $400,000. During FY 2018/19, Metropolitan authorized 24 projects and completed 15 minor capital projects.

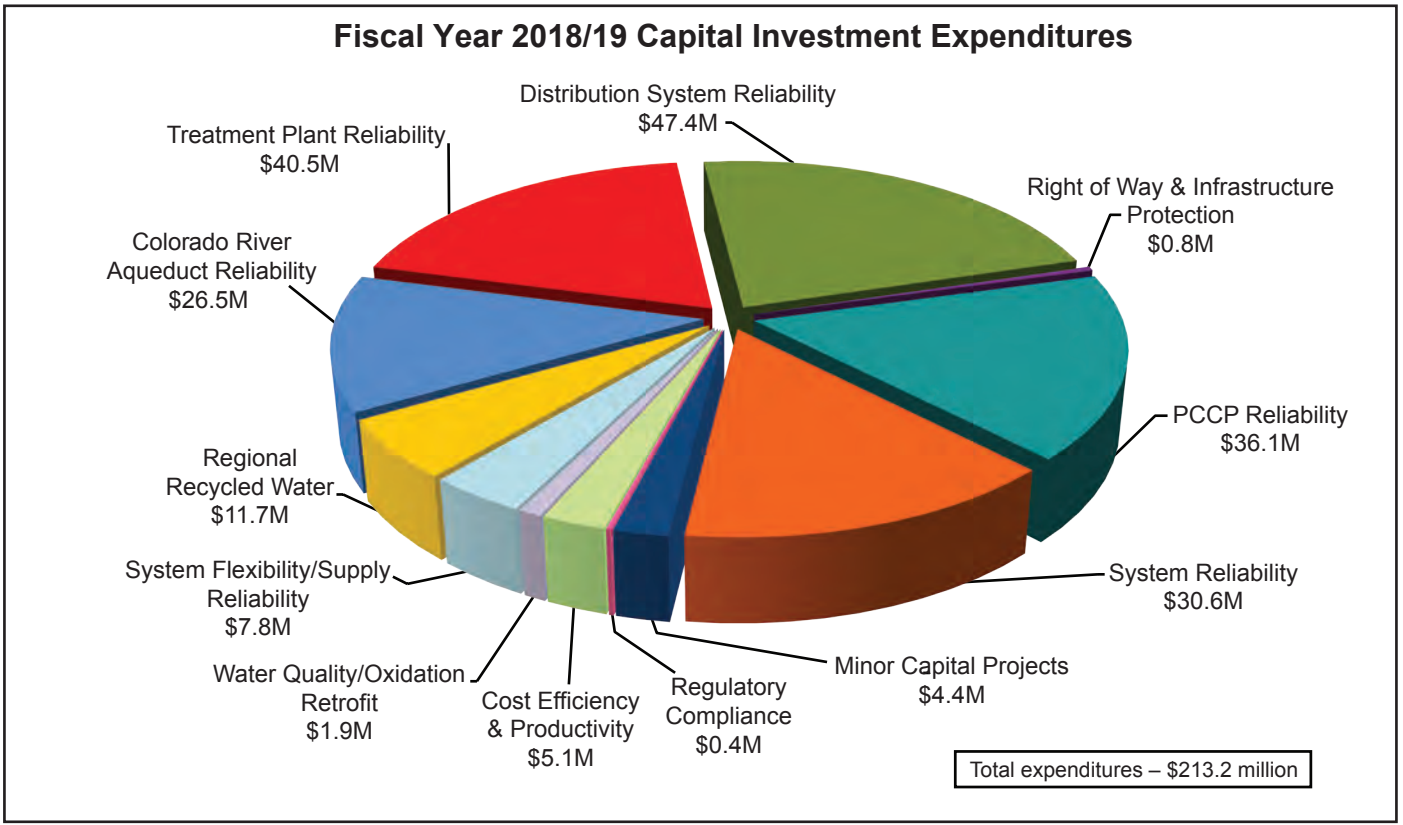


Figure 5-1. Fiscal Year 2018/19 Capital Investment Expenditures

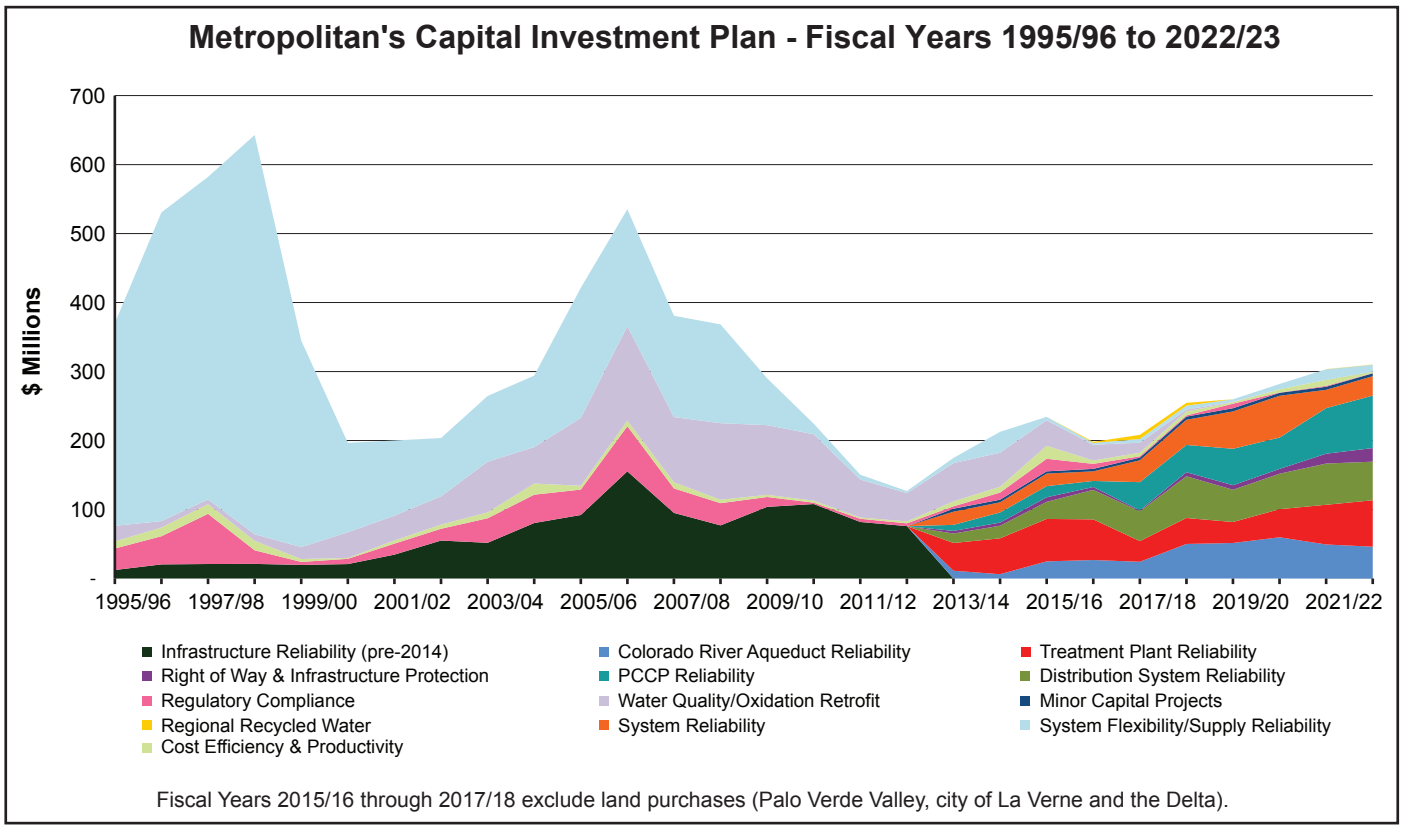


Figure 5-2. Metropolitan's Capital Investment Plan - Fiscal Years 1995/96 to 2022/23

TABLE 5-1
CONSTRUCTION CONTRACTS COMPLETED AS OF JUNE 30, 2019 (Unaudited)

Completion Date	Contract / Spec. No.	Project	Base Bid Amount ($)	Final Amount ($)
7/19/18	1827/1778	Jensen Electrical Upgrades - Stage A1	15,800,000	16,255,668
7/25/18	1844/1853	Colorado River Aqueduct Pumping Plants Seismic Retrofit of 6.9kV Switch Houses	9,595,000	9,298,114
8/3/18	1876/1898A	Eagle Rock Operation Control Center Building Roof Replacement	194,517	210,187
8/22/18	1859/1894	Garvey Reservoir Drainage and Erosion Improvements - Areas 1 and 5	280,238	348,438
8/28/18	1841/1826	Joseph Jensen Water Treatment Plant Solar Power Facility	4,503,635	4,293,766
8/31/18	1818/1750	F. E. Weymouth Water Treatment Plant Chemical Upgrades	10,267,000	10,692,931
9/24/18	1862/1901	Second Lower Feeder PCCP Rehabilitation - Contract 1	19,362,000	20,122,822
10/2/18	1860/1866	Inland Feeder and Lakeview Pipeline Intertie Valve Installation	767,201	752,201
11/16/18	1918/1918	Eagle Mountain Pumping Plant - Renovations of Houses 41 and 146	378,985	454,960
11/19/18	1850/1792	Colorado River Aqueduct Whitewater Siphons Erosion Protection	5,285,000	5,278,044
11/26/18	1843/1748	Robert B. Diemer Treatment Plant Administration Building Seismic Upgrades	4,426,000	4,613,015
12/14/18	1872/1915	Gene Pumping Plant Renovation of Houses 12 and 47	339,500	580,730
12/20/18	1881/1931	Julian Hinds Pumping Plant Renovation of Houses 42 and 149	349,000	452,555
2/5/19	1869/1881	Robert B. Diemer Water Treatment Plant Filter Outlet Conduit Seismic Upgrade - Northeast Slope	4,394,400	4,352,070
2/8/19	1950/1950	Sepulveda Feeder PCCP Del Amo Boulevard Urgent Relining	1,200,000	1,200,000
3/15/19	1866/1910	Lake Mathews Headworks Forebay Liner and Outlet Tower Repair	3,248,000	3,264,355
3/20/19	1906/1906	Wadsworth Pumping Plant Yard Piping Lining Repairs	5,416,000	5,390,918
3/27/19	1901/M-3006	Wadsworth Pumping Plant Control and Electrical Protection Upgrade	420,000	420,000
4/8/19	1892/1892	Rialto Pipeline CB-12 and CB-16 Valve Installation	866,600	866,600
4/23/19	1871/1797	Eagle Mountain Pumping Plant Reservoir Spillway Radial Gate Replacement	1,433,000	1,104,703
4/24/19	1888/1888	Colorado River Aqueduct Iron Mountain Reservoir and Canal Liner Repair	4,674,444	4,623,869
5/28/19	1870/1622	Colorado River Aqueduct Surge Chamber Discharge Line Bypass Covers	2,560,232	2,468,232
6/25/19	1956/1956	Colorado River Aqueduct Urgent Erosion Repair Mile Marker 131.5 to 140.2	3,200,100	2,886,957

TABLE 5-2
MAJOR CONSTRUCTION CONTRACTS IN PROGRESS
AS OF JUNE 30, 2019 (UNAUDITED)
Accrual Basis

Contract No.	Project	Percent Contract Complete through 6/30/2019	Estimated Contract Completion Date	Contract Earnings ($) through 6/30/2019 [1]	Base Bid Amount ($)
1825	Palos Verdes Reservoir Cover and Liner Replacement	99%	Jul. 2019	31,678,434	29,560,000
1856	Advanced Water Treatment Demonstration Facility	99%	Sep. 2019	13,964,100	13,856,000
1857	Mills Electrical Upgrades – Stage1A	75%	Aug. 2019	2,315,973	3,097,927
1877	F. E. Weymouth Water Treatment Plant - West Washwater Tank Seismic Upgrades	78%	Jul. 2019	2,026,675	2,591,576
1879	Joseph Jensen Water Treatment Plant Inlet Water Quality Instrumentation Enclosure	56%	Nov. 2019	551,925	985,000
1880	Orange County Region Service Center	48%	Nov. 2019	4,408,078	9,257,483
1882	Weymouth Plant Domestic Water Systems Improvement	29%	Feb. 2020	1,074,383	3,740,000
1883	F. E. Weymouth Water Treatment Plant Chlorination Systems Upgrades	10%	Jan. 2021	873,648	8,487,170
1889	Colorado River Aqueduct Pumping Plants Uninterruptible Power Supply Replacement	25%	Oct. 2019	230,999	939,000
1890	Intake Pumping Plant 2.4kV Power Line Relocation	72%	Aug. 2019	3,979,755	5,553,669
1893	Electrical Upgrades at 15 Structures in the Orange County Region	6%	Jan. 2020	150,300	2,606,700
1899	Orange County Feeder Cathodic Protection	29%	Jan. 2020	163,000	556,000
1900	Diemer Water Treatment Plant West Basin and Filter Building Rehabilitation	28%	Nov. 2020	10,931,781	38,539,196

TABLE 5-2 (Continued)
MAJOR CONSTRUCTION CONTRACTS IN PROGRESS
AS OF JUNE 30, 2019 (UNAUDITED)
Accrual Basis

Contract No.	Project	Percent Contract Complete through 6/30/2019	Estimated Contract Completion Date	Contract Earnings ($) through 6/30/2019 [1]	Base Bid Amount ($)
1902	Second Lower Feeder PCCP Rehabilitation - Reach 2	2%	Dec. 2020	1,000,000	53,273,196
1904	Orange County Feeder and Extension Relining - Reach 2	50%	Sep. 2019	3,455,740	6,967,500
1905	Metropolitan Headquarters Building Improvements	17%	Jun. 2022	7,527,738	43,998,000
1908	CRA Pumping Plants - Sump Rehabilitation	2%	Mar. 2022	403,500	26,900,000
1911	Greg Avenue Pressure Control Structure - Pump Modification and New Control Building	12%	Dec. 2020	2,614,779	20,975,000
1915	Colorado River Aqueduct Pumping Plants 6.9 kV Power Cable Replacement	1%	Jun. 2020	163,444	16,452,832
1930	Garvey Reservoir Drainage and Erosion Improvements - Areas 2, 3, and 4	0%	Oct. 2019	0	648,745
1931	Joseph Jensen Water Treatment Plant Modules 2 and 3 Flocculator Rehabilitation	0%	Feb. 2021	0	8,888,000
1932	Iron Mountain Pumping Plant Renovation of Houses 74, 125, and 126	98%	Jul. 2019	607,142	619,000
1940	Second Lower Feeder PCCP Rehabilitation - Reach 4	82%	Oct. 2019	11,921,602	14,536,130

[1] Earnings reflected represent the value of work performed by the contractor as of the date indicated and include contract retention and other similar deductions from amounts earned by the contractor but otherwise required to be withheld by Metropolitan by law or contract.

TABLE 5-3
MAJOR PROJECTS UNDER DESIGN DURING FISCAL YEAR 2018/19

Appropriation Number	Appropriation Title	Appropriation Estimate	Project Description	Estimated or Actual Completion Date for Final Design
Colorado River Aqueduct Reliability Program				
15320	Cabazon Radial Gate Facility Improvements	$5,000,000	Cabazon Radial Gate Facility Improvements	September 2020
15373	CRA Conveyance Reliability	$186,000,000	Copper Basin & Gene Wash Dam Discharge Valve Replacement	June 2020
			Iron Mountain Tunnel Rehabilitation	September 2020
15384	CRA Electrical/Power Systems Reliability	$48,600,000	CRA Auxiliary Power Systems	May 2024
			CRA Main Transformer Replacement/Rehabilitation	October 2021
			CRA Power Cable Replacement	November 2018
			Iron Mountain Auxiliary Power System Rehabilitation	December 2020
15438	CRA Reliability - FY2006/07 Through FY2011/12	$110,200,000	CRA Pumping Plant Sump System Rehabilitation	November 2018
			CRA Radial Gates and Slide Gate Rehabilitation	August 2019
			Iron Mountain Pumping Plant Generator Replacement	December 2020
			Seismic Evaluation of CRA Structures	July 2021
15481	CRA Main Pump Reliability	$177,200,000	CRA Discharge Line Isolation Couplings	August 2019
			CRA Overhead Crane Replacement	March 2020
15483	CRA Reliability - FY2012/13 Through FY2017/18	$67,600,000	CRA Conduit Erosion Control Improvements	June 2021
			CRA Conduit Structural Protection	June 2020
			CRA Domestic Water Treatment System Replacement	September 2020
			CRA Pumping Plant Drainage Improvements	November 2021
			CRA Pumping Plant Storage Buildings at Hinds, Eagle Mountain and Iron Mountain	September 2020
			CRA Water Distribution System Replacement - Intake	February 2021
			CRA Water Distribution System Replacement - Hinds and Eagle Mountain	December 2019
			CRA Water Distribution System Replacement - Iron Mountain and Gene	June 2020
			Whitewater Tunnel No. 2 Seismic Upgrades	June 2019
Distribution System Reliability Program				
15377	Conveyance and Distribution System Rehabilitation	$119,500,000	Coyote Creek Hydroelectric Plant Rehabilitation	July 2020
			Orange County Feeder Relining	June 2019
			Orange County Feeder Station 1920+78 Blow-Off	October 2018
			West Valley Feeder No. 1 Access Roads & Structures Improvements - Stage 3	December 2020
15425	Perris Valley Pipeline	$151,000,000	Perris Valley Pipeline - Tunnels	October 2018

TABLE 5-3 (Continued)
MAJOR PROJECTS UNDER DESIGN DURING FISCAL YEAR 2018/19

Appropriation Number	Appropriation Title	Appropriation Estimate	Project Description	Estimated or Actual Completion Date for Final Design
15417	Reservoir Cover and Replacement	$41,500,000	Jensen Finished Water Reservoir No. 1 Cover Rehabilitation	December 2018
			Jensen Finished Water Reservoir No. 2 Floating Cover Rehabilitation	March 2019
			Mills Finished Water Reservoirs Rehabilitation	December 2020
15419	Dam Rehabilitation & Safety Improvements	$8,900,000	Dam Monitoring Upgrades Lake Mathews	December 2019
			Dam Monitoring Upgrades Lake Skinner	December 2019
			DVL Dam Monitoring System Upgrade	December 2020
15441	Conveyance and Distribution System Rehabilitation - FY2006/07 Through FY2011/12	$182,700,000	Etiwanda Pipeline Mortar Lining Repair	March 2019
			Lake Mathews Forebay Repairs	December 2020
			OC-88 Pump Plant Surge Tank Upgrade	June 2019
			San Gabriel Tower Seismic Upgrade	June 2021
			Santiago Lateral Sectionalizing Valve Replacement	December 2019
			Sepulveda Canyon Control Facility Water Storage Tanks Seismic Upgrade	July 2022
15458	Hydroelectric Power Plant Improvements	$39,300,000	Foothill Hydroelectric Plant Rehabilitation	December 2020
			Foothill Hydroelectric Plant Seismic Upgrades	December 2020
			Red Mountain Hydroelectric Plant Rehabilitation	December 2018
			San Dimas Hydroelectric Plant Rehabilitation	March 2020
			Sepulveda Canyon Hydroelectric Plant Rehabilitation	March 2019
			Valley View Hydroelectric Plant Rehabilitation	October 2019
15480	Conveyance and Distribution System Rehabilitation - FY2012/13 Through FY2017/18	$332,500,000	C & D System Electrical Structures Rehabilitation	September 2023
			Casa Loma Siphon Barrel No. 1 Project No. 2 - Permanent Repairs	February 2020
			Corona Hydroelectric Plant Seepage Remediation	March 2021
			East Lake Skinner Bypass #2 Screening Structure Upgrade	December 2021
			East Orange County Feeder No. 2 Service Connection A-6 Rehabilitation	July 2020
			Electrical Upgrades at 15 Structures in the Orange County Region	August 2018
			Garvey Reservoir Drainage and Erosion Improvements	June 2019
			Lake Mathews Electrical Upgrades	December 2020
			Lake Skinner Pipelines Cathodic Protection	June 2019
			Lakeview Pipeline Repair	January 2020
			Live Oak Pipelines Cathodic Protection	June 2019
			North Portal of the Hollywood Tunnel Equipment Replacement	November 2019

TABLE 5-3 (Continued)
MAJOR PROJECTS UNDER DESIGN DURING FISCAL YEAR 2018/19

Appropriation Number	Appropriation Title	Appropriation Estimate	Project Description	Estimated or Actual Completion Date for Final Design
			Olinda Pressure Control & Santiago Tower Emerg. Gens	October 2019
			Orange County and Riverside/San Diego County Operating Regions Valve Replacement	December 2018
			Rialto Pipeline Service Connections CB-12 and CB-16 Valve Replacement & Electrical Improvements	April 2019
			San Diego Canal Radial Gate VO-8 Rehabilitation	June 2020
			San Dimas and Red Mountain Power Plants Standby Diesel Engine Generator Replacement	April 2020
			Santa Monica Feeder Cathodic Protection	June 2019
			Sepulveda Canyon Control Facility Reliability Improvements	May 2024
			Wadsworth Pumping Plant Yard Piping Lining Repairs	March 2019
			West Orange County Feeder Valve Replacement	October 2020
			West Orange County Feeder Cathodic Protection	June 2019
			West Orange County Feeder OC-09 Rehabilitation	December 2020
Minor Capital Projects Program				
15476	Capital Program for Projects Costing Less Than $250,000 for FY2012/13 Through FY2013/14	$10,000,000	Various	N/A
15489	Capital Program for Projects Costing Less Than $250,000 for FY2014/15 Through FY2015/16	$8,000,000	Various	N/A
16810	Capital Program for Projects Costing Less Than $250,000 for FY2016/17 Through FY2017/18	$10,000,000	Various	N/A
System Reliability Program				
15395	La Verne Shop Facilities Upgrades		La Verne Shops - Stage 4 Building Completion & Equipment Installation	September 2019
15473	Headquarters Building Improvements	$42,200,000	Headquarters Building Improvements	November 2018

TABLE 5-3 (Continued)
MAJOR PROJECTS UNDER DESIGN DURING FISCAL YEAR 2018/19

Appropriation Number	Appropriation Title	Appropriation Estimate	Project Description	Estimated or Actual Completion Date for Final Design
PCCP Reliability Program				
15497	Second Lower Feeder PCCP Rehabilitation	$606,400,000	Second Lower Feeder PCCP Rehabilitation - Preliminary Design	December 2018
			Second Lower Feeder PCCP Rehabilitation - Package 2	October 2018
			Second Lower Feeder PCCP Rehabilitation - Package 3	October 2019
			Second Lower Feeder Pipe Procurement - Package 4	July 2018
			Second Lower Feeder PCCP Rehabilitation Right of Way Acquisition	December 2030
			Second Lower Feeder PCCP Rehabilitation Valve Procurement	December 2018
15502	Allen McColloch Pipeline, Calabasas Feeder, and Rialto Pipeline PCCP Rehabilitation	$986,976,000	Allen McColloch Pipeline PCCP Rehabilitation	March 2020
			Calabasas Feeder PCCP Rehabilitation	December 2022
			Rialto Feeder PCCP Rehabilitation	June 2028
15496	Sepulveda Feeder PCCP Rehabilitation	$754,200,000	Sepulveda Feeder PCCP Rehabilitation	August 2027
Regulatory Compliance Program				
15385	CRA Discharge Containment	$19,800,000	CRA Pumping Plant Wastewater System Replacement - Gene & Iron Mountain	June 2020
Right of Way & Infrastructure Protection Program				
15474	Right of Way and Infrastructure Protection	$71,200,000	Infrastructure Improvements for L.A. County Region	June 2023
			Infrastructure Improvements for Orange County Region	June 2020
			Infrastructure Improvements for Riverside / San Diego County Region	December 2022
			Infrastructure Improvements for Western San Bernardino County Region	September 2020
System Flexibility/Supply Reliability Program				
15402	Hayfield Groundwater Storage	$32,310,000	Lake Perris Seepage Water Conveyance Pipeline	January 2021
			CRA Housing Improvements Renovation	December 2020
15495	Operation Support Facilities Improvement	$35,100,000	La Verne Seismic Upgrades Building 40 and 50	October 2019
			Lake Mathews Wastewater System Replacement	December 2018
15499	Metropolitan Security System Enhancements	$9,731,000	Headquarters Building Physical Security Improvements	June 2019
15488	Water Delivery System Improvements	$40,500,000	Greg Avenue Pump Station Rehabilitation	September 2018

TABLE 5-3 (Continued)
MAJOR PROJECTS UNDER DESIGN DURING FISCAL YEAR 2018/19

Appropriation Number	Appropriation Title	Appropriation Estimate	Project Description	Estimated or Actual Completion Date for Final Design
Treatment Plant Reliability Program				
15369	Weymouth Improvements - FY2000/01 Through FY2005/06	$240,700,000	Weymouth Administration Building Seismic Upgrades	April 2022
			Weymouth Filter Valve Replacement - Two Phases	March 2021
15371	Jensen Improvements - FY2000/01 Through FY2005/06	$75,100,000	Jensen Bulk Chemical Tank Farm Facility Upgrades	December 2021
			Jensen Modules Nos. 2 & 3 Travelling Bridge Repairs	August 2021
			Washwater Return Pump Modifications - Phase 2	October 2018
15380	Diemer Improvements	$238,000,000	Diemer Main Washwater Reclamation Plant	July 2021
			Diemer West Basin Rehabilitation	July 2018
15381	Mills Improvements	$8,200,000	Mills Solid Removal Automation	December 2021
15436	Diemer Improvements - FY2006/07 Through FY2011/12	$79,500,000	Diemer Chemical Feed System Improvements	May 2021
			Diemer Filter Building Seismic Upgrades	July 2018
			Diemer Filter Valve Replacement	July 2018
			Diemer Water Sampling System Improvements	July 2018
15440	Weymouth Improvements - FY2006/07 Through FY2011/12	$57,000,000	Weymouth Treatment Basins Nos. 5-8 Refurbishment	March 2021
			Weymouth Dry Polymer System	November 2022
15442	Jensen Improvements - FY2006/07 Through FY2011/12	$146,000,000	Jensen Electrical Systems Reliability - Three Stages	July 2024
			Jensen Modules 2 & 3 Flocculator Refurbishment	April 2019
15452	Mills Improvements - FY2006/07 Through FY2011/12	$27,500,000	Mills Electrical Improvements - Three Stages	August 2021
			Mills Module Influent Flash Mix Chemical Containment	July 2019
15477	Weymouth Improvements - FY2012/13 Through FY2017/18	$81,000,000	Water Quality Instrumentation Improvements	May 2019
			Weymouth Basin Inlet Channel Seismic Upgrades	March 2021
			Weymouth Chlorine System Upgrade	August 2018
			Weymouth Filter Building Sump Sparger Rehabilitation	March 2021
			Weymouth ODP (Oxidation Demonstration Plant) Rehab.	June 2022
			Weymouth Storm Water Management Improvements	November 2020
			Weymouth Washwater Pump Station Improvements	March 2021

TABLE 5-3 (Continued)
MAJOR PROJECTS UNDER DESIGN DURING FISCAL YEAR 2018/19

Appropriation Number	Appropriation Title	Appropriation Estimate	Project Description	Estimated or Actual Completion Date for Final Design
15478	Diemer Improvements - FY2012/13 Through FY2017/18	$10,400,000	Diemer Chemical Tank Farm Improvements	May 2021
15479	Mills Improvements - FY2012/13 Through FY2017/18	$36,500,000	Mills Fluoride Tank Replacement	June 2020
			Mills Plant Perimeter Security and Environmental Improvements	March 2020
15486	Jensen Improvements - FY2012/13 Through FY2017/18	$16,300,000	Jensen Chemical Containment Upgrades	December 2021
			Jensen Fluoride Tank Replacement	August 2018
			Jensen Tank Farm Caustic Metering and Control Facilities	December 2021
15508	Jensen Improvement - FY2018/19 Through FY2023/24	$19,701,000	Jensen Plant Site Security Upgrades	September 2020
			Jensen Ozone PSU (Power Supply Unit) & Critical Components Upgrade	October 2020
15510	Diemer Improvements - FY2018/19 Through FY2023/24	$4,876,000	Diemer Ozone Generator Open-Loop Cooling Water System Improvements	July 2019
Water Quality/Oxidation Retrofit Program				
15472	Enhanced Bromate Control	$13,300,000	Mills Bromate Control Facilities	July 2020

The following sections present highlights of Engineering Services' operation and maintenance activities during FY 2018/19:

Delta Conveyance

Engineering Services provided direct support for the Delta Conveyance project in collaboration with Metropolitan's Bay-Delta Initiatives office. Key activities during the fiscal year included: providing updates to the State Water Contractors and participating in meetings with program stakeholders; helping in the start-up of the Design and Construction Authority Joint Powers Authority by providing project management and technical support for the initial work activities; and providing engineering and technical resources for work related to other Delta-related activities such as EcoRestore.

Infrastructure Protection

Engineering Services regularly monitors critical facilities, including dams, reservoirs, pipelines and chemical storage tanks to assess their condition and identify needed repairs to maintain reliable operation. Staff also reviews third-party requests for crossings or use of Metropolitan's right of way. Projects and activities completed during the fiscal year included: condition assessments of 63 miles of PCCP pipelines, including internal electromagnetic and visual inspections of eight pipelines (which resulted in the urgent relining of 400 feet of pipeline); start-up and testing of a new cathodic protection system on 11 miles of the Allen-McColloch Pipeline; installation of an innovative cathodic protection system on the Lake Mathews forebay outlet tower; and in-line leak detection on 10 miles of cast-iron pipe on the Santa Monica Feeder (which resulted in the repair of one leak and allowed staff to verify the effectiveness of previous repairs).

Dam Safety

Engineering Services regularly performs inspection of Metropolitan's 24 dams and conducts deformation monitoring to ensure public safety, reliability and avoidance of unplanned outages. Key activities during the fiscal year included: development of initiatives that respond to newly adopted state regulations;

performance of regular inspections and deformation monitoring of all dams; preparation of Emergency Action Plans; continuation of regular updates to inundation maps, and performance of comprehensive evaluations of dam structures as required by the California Division of Safety of Dams.

Seismic Resilience

Engineering Services has developed a proactive seismic resilience strategy with the goal of minimizing interruptions of water deliveries after a major seismic event. This approach involves regularly assessing the seismic resilience of specific facilities and performing upgrades as needed; evaluating the seismic vulnerability of the system as a whole and increasing operational flexibility when needed; and improving the seismic resilience of the distribution system over time by incorporating new, seismic-resilient components, such as flexible pipe joints, where effective and economical. Key activities during the fiscal year included: planned and participated in a workshop with DWR and Los Angeles Department of Water and Power to improve the overall seismic resilience of imported water to Southern California; conducted system vulnerability assessments, and addressed near-term and long-term goals outlined in the biennial report on seismic resilience.

Cooperative Education Program

Engineering Services continued to offer summer and year-round student intern positions for the 17th consecutive year. This program provides engineering students with an opportunity to augment their studies with practical work experience in the water industry. Fourteen students participated in the program during FY 2018/19. About 230 students have participated in the program since its 2002 inception.

Technical Leadership

Engineering Services' staff continued participation in technical and professional organizations, including publication of technical papers and presentations with a highlight on seismic resilience and tunneling. Staff continued active participation on committees of professional organizations, including the American Water Works

Association, American Society of Mechanical Engineers, American Concrete Institute, California Land Surveyor's Association, Chlorine Institute, Greenbook Committee of Public Works Standards, Inc., National Association of Corrosion Engineers, Water Research Foundation, Steel Structures Painting Council and Society of American Value Engineers. Staff published a number of technical papers and gave presentations with a highlight on seismic resilience, tunneling, and water reuse. Staff also took a leadership role in organizing and maintaining the activities of the CLEAN-17 work group, which is comprised of engineering managers from 19 large western water agencies that provide peer-to-peer collaboration on project issues and new industry developments. Staff also organized and conducted the annual member agency engineering managers workshop, which was attended by representatives from 17 member agencies.

The Legal Department helped establish the Dennis Underwood Conservation Area to provide habitat for this yellow-billed cuckoo and other threatened and endangered species.

CHAPTER 6

Legal

The Legal Department represents Metropolitan, its directors, officers and, on occasion, employees in litigation and administrative proceedings; renders legal advice; prepares or reviews contracts; and monitors litigation, administrative proceedings, and state and federal legislative and regulatory proposals that could affect Metropolitan.

Major Events

Delta Conveyance

During the first part of the fiscal year, a significant focus for the Legal Department was supporting implementation of the approved California WaterFix, including assistance in permitting and approval proceedings, supporting the start-up of implementing joint powers agencies, assisting with cost allocation and financing, and defending against dozens of lawsuits challenging the project. In February, Gov. Newsom signaled a new direction for a delta conveyance facility, and in May, the state withdrew its approval for the two-tunnel California WaterFix and announced it would begin planning and environmental review for a new Delta Conveyance project.

Planning, Permitting, and Environmental Review

Staff provided legal advice to the General Manager and Delta policy team on a variety of topics involving California WaterFix and its successor, a potential single-tunnel Delta Conveyance project. For California WaterFix, staff provided assistance on topics involving financing, cost allocation, joint powers agencies, implementation agreements, California water rights, and various permitting proceedings. Legal staff continued to support the Department of Water Resources' efforts in proceedings before the State Water Resources Control Board. Along with the State Water Contractors, Metropolitan participated in Part 2 of the petition proceedings, covering potential injury to fish and wildlife and the public interest, which was

completed in fall 2018. Staff also supported DWR in hearings before the Delta Stewardship Council concerning appeals of DWR's determination of consistency with the Delta Plan.

Staff reviewed and prepared a variety of legal memoranda and agreements and represented Metropolitan in meetings regarding the Newsom administration's shift to a potential Delta Conveyance project on topics involving environmental review and permitting, staffing and organization, funding, and refocusing efforts of the Delta Conveyance Joint Powers Authority.

Litigation

Legal staff represented Metropolitan in multiple state and federal lawsuits regarding California WaterFix, including a complaint filed by DWR seeking validation of its authority to issue revenue bonds to finance design and construction. Seventeen state court cases challenged the final Environmental Impact Report and two cases challenged the incidental take permit issued by the state Department of Fish and Wildlife, while two federal district court cases challenged the biological opinions issued by the federal fishery agencies. With DWR's rescission of the project approval and withdrawal of permit applications, these cases have either been completely dismissed or reduced to issues of attorney fees and costs.

Another case challenged the Metropolitan board's July 10, 2018 approval of additional participation in California WaterFix as illegal taxation and a violation of the existing State Water Contract, while a case filed by San Diego County Water Authority challenged Metropolitan's rates and charges as illegal due to Metropolitan's direct participation in the project. Prior to the change in direction on a Delta conveyance project, Legal staff was successful in achieving a trial court dismissal of the case challenging Metropolitan's board action.

State Water Project

SWP Contract Amendments

Staff attorneys provided legal advice and support in connection with three different sets of proposed amendments to Metropolitan's long-term SWP contract with DWR. The first set of amendments, referred to as the Contract Extension, will extend the contract term through 2085 and improve the project's overall financial integrity and management. Contract Extension amendments were completed and Metropolitan

executed the amendments in December. However, litigation challenging DWR's authority and approval has been filed, and Legal Department staff has been participating in defending against these challenges. The second set, consisting of water management amendments, would provide greater flexibility with respect to water storage, transfers and exchanges. The third set would implement a Delta conveyance facility. Legal participated in the SWC attorney group working with DWR legal counsel to finalize contract amendment language for the water management amendments.

Bay-Delta Water Quality Control Plan Voluntary Agreements

Legal staff assisted management in analyzing, negotiating and drafting voluntary agreements regarding flow requirements in lieu of the State Water Resources Control Board's proposal to adopt a percent of unimpaired flow approach to Sacramento River and Delta flows.

Endangered Species Act Compliance

Working with the State Water Contractors, Legal staff assisted in reviewing and commenting on draft biological opinions under the federal Endangered Species Act for long-term operations of the Central Valley Project and SWP.

Legal staff also supported DWR's environmental review of and application for a new incidental take permit under the California Endangered Species Act for ongoing operations of the SWP.

Colorado River

Drought Contingency Planning

Metropolitan attorneys provided legal counseling and advice in support of negotiations with the other Colorado River water users and the seven Colorado River Basin States regarding development of drought contingency plans. Staff attorneys negotiated and drafted multiple agreements for the creation of Colorado River system water to maintain water levels in Lake Mead and prevent shortage through voluntary water conservation. Staff also assisted with environmental review of the Lower Basin Drought Contingency Plan under the California Environmental Quality Act and defended against a lawsuit challenging Metropolitan's compliance under CEQA.

Lower Colorado River Multi-Species Conservation Plan

Legal staff provided ongoing support on issues, including financial contributions, acquisition of habitat lands to satisfy conditions of the permits, and changes to the plan to add the Northern Mexican garter snake, a newly discovered species. Staff also drafted legal documents for Metropolitan's conveyance of a 635-acre easement to the Bureau of Reclamation for creation of the Dennis Underwood Conservation Area.

Legislation

Legal staff analyzed and prepared reviews of numerous proposed federal and state bills that may affect Metropolitan's water supplies or its ability to provide reliable and safe supplies in an environmentally responsible manner. Staff participated in drafting proposed legislation sponsored or supported by Metropolitan and its water industry group partners, including legislation on CEQA, recycled water, groundwater, and Delta matters.

Water Quality

Legal staff monitored activities of Regional Water Quality Control Boards, which are considering adoption of municipal stormwater discharge permits having the potential to impact Metropolitan's operations. Legal assisted water quality staff regarding the proposed remediation plan for chromium 6 groundwater contamination adjacent to Colorado River at Pacific Gas & Electric's Topock compressor station site.

Legal staff provided legal assistance regarding detections of quagga mussels in Colorado River and SWP supplies. Activities included the development of quagga mussel control plans and other operational measures to address potential water supply impacts from invasive species, particularly potential impacts to groundwater recharge or replenishment.

Finance

Metropolitan attorneys, with bond and disclosure counsel, completed several financial transactions totaling over $660 million. Transactions included the issuance of four series of bonds, refunding of all or a portion of 13 series of bonds resulting in significant savings in debt service, and the sale of six subseries of short-term revenue certificates. Legal staff also worked with bond counsel to replace and amend various agreements

associated with Metropolitan's outstanding variable-rate bonds and other forms of indebtedness.

San Diego County Water Authority v. Metropolitan et al.

Legal staff continued to represent Metropolitan in conjunction with outside counsel in San Diego County Water Authority litigation challenging the validity of Metropolitan's rates adopted in 2010, 2012, 2014, 2016 and 2018, as well as charges adopted in 2016, 2017 and 2018, and other finance-related matters. The parties are currently engaged in settlement discussions and the remand is on-hold while settlement discussions continue.

Proceedings continued for the 2010 and 2012 cases, which were remanded in 2017 by the California Court of Appeal to the San Francisco Superior Court, which had issued a 2015 judgment with certain rulings in SDCWA's favor and other rulings in Metropolitan's favor. The 2014, 2016, 2017 and 2018 cases are stayed pending final resolution of the 2010 and 2012 cases. The 2016-2018 cases raise new finance-related challenges that have not yet been litigated.

Other Litigation

Copper Pitting Cases

Staff attorneys successfully defended Metropolitan in multiple lawsuits alleging Metropolitan and other defendant water agencies were liable for delivering "aggressive and/or corrosive" water to consumers that resulted in pinhole leaks in residential copper plumbing. On July 11, 2018, the California Supreme Court denied plaintiffs' petition for review, concluding this matter.

Real Estate Matters

Delta Wetlands and Litigation

An appeal is pending in the Court of Appeal for the Third Appellate District in Sacramento in *County of San Joaquin, et al. v. Metropolitan Water District of Southern California, et al*. case in which Metropolitan prevailed at the trial court level. This CEQA case and an intentional interference with contract case concerning Metropolitan's purchase of 20,000 acres of land in the Sacramento-San Joaquin Delta from Delta Wetlands Properties were brought in 2016 shortly after the board authorized the purchase. In the interference with contract case, *Central Delta Water Agency, et al. v. Delta Wetlands Properties, et al.*,

Metropolitan successfully moved to dismiss all causes of action alleged against it and won a post-judgment motion to recover over $393,000 in attorneys' fees and other costs. After plaintiffs appealed, Metropolitan settled the case and any potential non-CEQA claims in exchange for accepting a 30-percent reduction in its fee award.

Managing Energy Costs

Metropolitan attorneys assisted in the implementation of three new agreements related to the operation of the CRA transmission system: These include an interconnection agreement and six facilities agreements with SCE; an operating agreement with the California Independent System Operator; and, a scheduling and trading and a power system operations agreement with the Arizona Electric Power Cooperative. These long-term agreements will govern the operation of Metropolitan's Colorado River Aqueduct power system, and the procurement and delivery of energy necessary to operate Metropolitan's pumping plants.

Workforce Matters

Legal staff defended Metropolitan with outside counsel in various employment lawsuits:

May v. Metropolitan Water District

A lawsuit brought by an employee alleged disability discrimination, retaliation, failure to prevent unlawful discrimination, failure to accommodate disability, and failure to engage in the interactive process. The lawsuit settled. The settlement included a dismissal, termination of employment, no admission of wrongdoing, and a general release.

Padres v. Metropolitan Water District

A lawsuit brought by an employee released during probation alleged gender discrimination and retaliation/wrongful termination in violation of public policy. The lawsuit settled at mediation. The settlement included a dismissal, no future employment at Metropolitan, no admission of wrongdoing, and a general release.

Pettit v. Metropolitan Water District

A deceased employee's son brought this lawsuit, alleging disability discrimination, failure to accommodate disability, and failure to engage in the interactive process. On March 27, 2019 the court dismissed the case.

Bargaining Unit Grievances and Appeals

Metropolitan participated in three hearing officer appeals:

In one decision, the hearing officer upheld the basis for the discipline of an employee disciplined for fighting, but reduced the discipline from a discharge to a three-week suspension. Metropolitan appealed the reduction to superior court, and a hearing is set for December 16, 2019. In the second decision, the hearing officer determined Metropolitan did not violate the AFSCME Local 1902 MOU by limiting triple overtime compensation to only those employees who actually worked on holidays as operators, responders, and plant laboratory staff. In the third matter, the California Supreme Court denied an appeal by AFSCME Local 1902 of an appellate decision in which Metropolitan prevailed. The September 18, 2018 action by the high court let stand a published decision that can be cited as precedent and will be highly advantageous in future grievance issues. The California Court of Appeal for the Second District affirmed the trial court decision, which had reversed an adverse hearing officer ruling, and determined that a hearing officer's interpretation of a MOU is subject to independent review by the courts; that the hearing officer's authority is limited to the scope of the issue; and that the hearing officer exceeded his authority by modifying the terms and conditions of the MOU. (*Metropolitan Water District of Southern California v. Winograd* (2018) 24 Cal.App.5th 881.)

Public Records Act Requests

Legal staff coordinated Metropolitan's responses to 160 requests under the Public Records Act, including review of all documents for responsiveness and privilege. Requests related to all areas of Metropolitan's business including: GIS data and maps of Metropolitan' service area boundaries and facilities; data and reports on conservation rebate programs; water supply and deliveries, including operations data; employee salaries and job descriptions; bids, proposals, contracts and agreements; purchase order data; water quality and blend data; water usage; investment portfolio and capitalization; contract- and environmental-related documents for construction projects; construction and land purchase documents on Palo Verde Valley and Delta Islands; PVID fallowing program; data on uncashed checks; water rates and charges; and California WaterFix.

In January 2019, Metropolitan's board approved renaming Diamond Valley Lake's East Dam in honor of former General Manager Carl Boronkay, with a plaque later unveiled by his son, Risk Manager Drew Boronkay and Chairwoman Gloria D. Gray.

CHAPTER 7

Finance

The Office of the Chief Financial Officer is responsible for providing innovative, proactive and strategic financial direction in support of the mission of Metropolitan, the Board of Directors, management and employees. The Office of the CFO maintains Metropolitan's strong financial position and high credit ratings; helps achieve equitable water rates and charges that generate sufficient revenues; assists in the efficient management of Metropolitan's financial resources; and ensures adequate financial controls are in place to accurately record financial transactions, communicate financial results and protect Metropolitan assets.

Finance Overview

The roles and responsibilities of the Office of the CFO include:

- Developing a biennial budget that supports Metropolitan's mission and business planning and performance measurement programs.
- Providing comprehensive financial analyses and development of the biennial revenue requirement, supporting cost-of-service studies, the recommended water rates and charges, and long-range financial forecasts.
- Maintaining Metropolitan's official accounting records, cash control and accounting services related to vendor, payroll and other payments.
- Collecting, investing, safekeeping and disbursing Metropolitan's funds.
- Maintaining effective financial controls to safeguard assets.

- Administering the debt portfolio, including issuing debt to efficiently fund Metropolitan's capital expenditures at the lowest possible cost.
- Continuing and improving relations with Metropolitan's bond investors, including investors supporting Metropolitan's diversified variable rate bond portfolio.
- Developing and maintaining accounting guidelines and policies for accurate and timely financial reporting and control.
- Accounting for all assets, liabilities, revenues and expenditures, and determining the availability of funds for investment.
- Providing timely financial reporting, preparing the annual tax levy and annexation fee calculations, and administering rates and charges.
- Managing Metropolitan's Business Continuity Program to ensure critical business processes can continue in the event of a disaster.
- Providing risk management to prevent, control, transfer and minimize exposure to liability risk to protect Metropolitan's assets.

Details on the biennial budget, rates and charges, financial statements, financial policies and financing documents can be found at the financial information webpage.

FY 2018/19 Major Financial Activities and Accomplishments

Security Sales/Debt Administration

Metropolitan maintained S&P Global Ratings' highest long-term water revenue bond rating of AAA, and the second highest credit rating for Moody's and Fitch Ratings of Aa1 and AA+ on its senior lien debt. Metropolitan's long-term subordinate lien debt is rated AA+ by S&P Global Ratings and AA+ by Fitch Ratings. Metropolitan's variable rate debt is rated in the highest short-term rating category from each rating agency. Senior-lien variable rate debt is rated MIG 1, A-1+, and F1+, from Moody's, S&P Global Ratings, and Fitch Ratings, respectively. Subordinate variable rate debt is rated A-1+ by S&P Global Ratings and F1+ by Fitch Ratings.

In August 2018, Metropolitan entered into a Note Purchase and Continuing Covenant Agreement with Bank of America, N.A., to provide advance funding for costs related to the California WaterFix. As of June 2019, Metropolitan had drawn $46.8 million under this agreement.

In December 2018, Metropolitan issued $137.5 million Water Revenue Refunding Bonds, 2018 Series B. The refunding provides total debt service savings of $44.0 million over the next 20 years.

In June 2019, Metropolitan issued two bond refundings – $218.1 million Water Revenue Refunding Bonds, 2019 Series A, and $241.5 million Subordinate Water Revenue Refunding Bonds, 2019 Series A. The refundings provide $135.5 million of debt service savings over the next 20 years.

Treasury Operations

- Successfully managed short-term and bond reserve/trust portfolios averaging $633.1 million during the five months ending November 30, 2018, complying with the state Government Code and Metropolitan's Statement of Investment Policy.
- Earned total returns of 2.53 and 5.07 percent respectively for the short-term and long-term portfolios.

- Monitored performance by the external managers of the short-term and bond reserve/trust portfolios averaging $810.7 million during the seven months ending June 30, 2019, as well as the long-term portfolio averaging $338.1 million during the fiscal year, to ensure compliance with Metropolitan's Statement of Investment Policy.
- Provided the necessary liquidity to fund approximately $1.6 billion in expenditures during the fiscal year.
- Managed, calculated and coordinated approximately $337.7 million in debt service, swap payments and debt administration expenses.
- Managed net interest exposure within board-approved parameters.

Accounting Operations

- Provided accurate, timely and transparent financial reports to the board and member agencies.
- Recorded and reported Metropolitan's financial activities in a timely manner, ensuring sufficient financial controls to protect Metropolitan's assets.
- Completed the FY 2017/18 external audit with an unmodified (i.e. "clean") opinion.
- Achieved internal financial audit reviews with ratings of generally satisfactory or higher and no major findings.
- Updated the documentation of internal controls over financial reporting, with no material issues brought to management's attention as a result of internal and external audits for FY 2018/19.
- Received the Award of Excellence for financial reporting from the Government Finance Officers Association for FY 2017/18.

Budget and Financial Planning

- Implemented Metropolitan's biennial budget and water rates and charges for FY 2018/19.

- Prepared financial analyses to evaluate the financial impacts of the Regional Recycled Water Program.
- Worked with the Legal Department to maintain Metropolitan's ad valorem property tax assessment at the FY 2017/18 rate to offset a portion of State Water Contract costs; prepared the analysis to support the updated annexation fee.
- Received the GFOA Distinguished Budget Presentation Award for the FY 2018/19 and 2019/20 biennial budget.

Business Continuity

- Conducted testing of backup critical information technology applications at the Lake Mathews disaster recovery facility to validate their functionality if production systems were temporarily unavailable.
- Completed updates for business continuity plans; implemented and conducted tabletop exercises.
- Conducted regular testing of the MetAlert Emergency Notification System with employees and the board; trained key personnel.

Risk Management

- Completed incident reports involving Metropolitan property damage, liability issues, workplace injuries, regulatory visits, criminal activity and spills; and managed Metropolitan's self-insured liability and property claims program.
- Completed risk assessments of professional service agreements, purchase orders, construction contracts, entry permits, easements, special events and film permits within required timeframes.
- Collaborated with the Legal Department on accurately managing liability reserves and provided feedback into the claims settlement and litigation process; renewed excess and specialty insurance coverages below anticipated premium costs and within budget.

Financial Information

Metropolitan operates as a utility enterprise and maintains its accounting records in accordance with generally accepted accounting principles for proprietary funds as prescribed by the Governmental Accounting Standards Board. Metropolitan's financial reports can be found at the financial information webpage.

Revenues

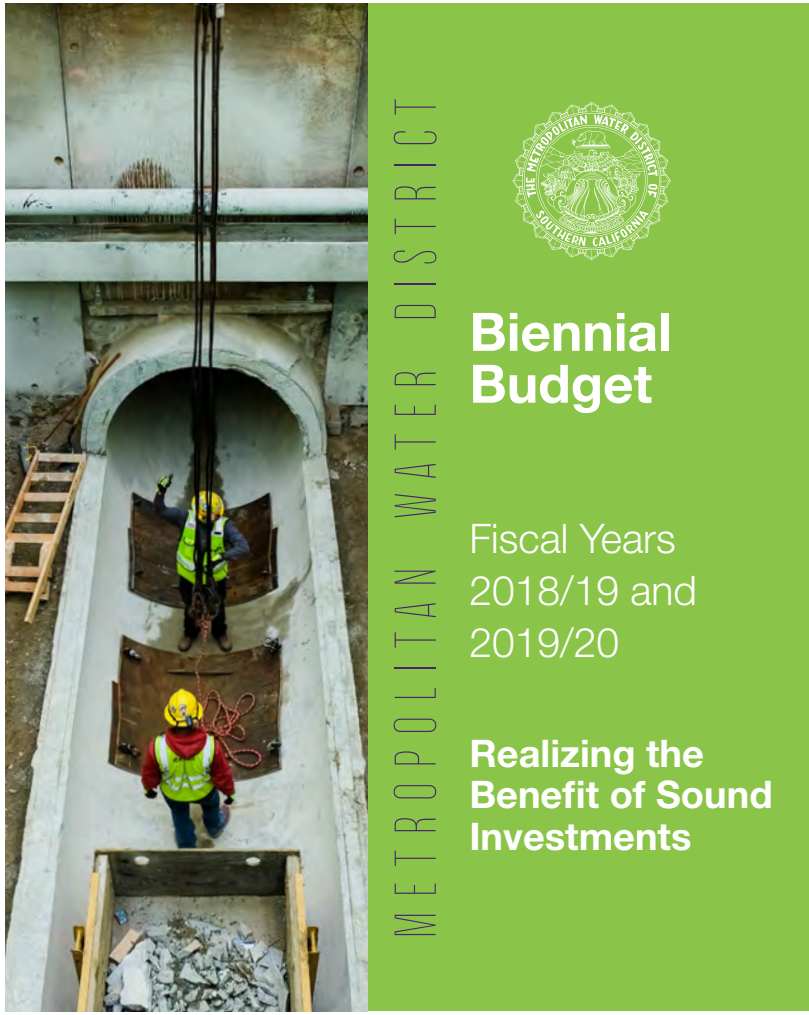
Metropolitan's principal revenue source consists of revenues received by Metropolitan from charges for water transactions and availability of water, including Metropolitan's water rates, readiness-to-serve charge and capacity charge (revenues from water transactions include sales, exchanges and wheeling). Other sources of revenue include property taxes, investment income and power sales. Every two years, the board establishes water rates and charges, which are not subject to regulation by the California Public Utilities Commission or any other governing body.

The rate structure implemented on January 1, 2003 unbundled Metropolitan's previous water rate into separate rates and charges (a power rate, a treatment surcharge, a system access rate, a water stewardship rate and a capacity charge) to provide transparency regarding the cost of specific functions to member agencies. This rate structure also includes a two-tiered block pricing structure for water supply. Effective January 1, 2019, the full service Tier 1 rate (including all rate elements), which is based on recovering the cost of maintaining a reliable amount of supply, was $731 per acre-foot for untreated water. Likewise, the full service Tier 2 rate of $817 per acre-foot is set at Metropolitan's cost of purchasing water transfers north of the Delta and encourages member agencies to maintain existing local supplies and develop cost-effective local supply resources and conservation. A complete list of current water rates and charges is available in Table 7-1. Overall, Metropolitan increased rates and charges 4 percent effective January 1, 2019.

Metropolitan is empowered under the Metropolitan Water District Act to levy and collect taxes on all taxable property within its boundaries for the purpose of carrying on its operations and paying

obligations. The board levies property taxes annually to pay Metropolitan's general obligation bond debt service and part of its State Water Contract costs.

Metropolitan's revenues in fiscal year 2018/19 totaled $1.526 billion. Sources of revenues include water transactions, readiness-to-serve charges, capacity charges, power sales, property taxes, investment income and other income, such as rents. Total revenues were $106 million lower than the prior fiscal year, primarily due to a lower level of water transactions.



The process for putting together Metropolitan's biennial budget is described later in this chapter.

TABLE 7-1
WATER RATE TABLE
(Dollars per acre-foot-unless otherwise specified)

	Calendar Year[1]										
	2019	**2018**	**2017**	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	**2010**	**2009**
Tier 1 Supply Rate	$ 209	$ 209	$ 201	$ 156	$ 158	$ 148	$ 140	$ 106	$ 104	$ 101	$ 109
Delta Supply Surcharge[2]	--	--	--	--	--	--	--	58	51	69	--
Tier 2 Supply Rate	295	295	295	290	290	290	290	290	280	280	250
Water Supply Surcharge	--	--	--	--	--	--	--	--	--	--	25
System Access Rate	326	299	289	259	257	243	223	217	204	154	143
Water Stewardship Rate	69	55	52	41	41	41	41	43	41	41	25
System Power Rate	127	132	124	138	126	161	189	136	127	119	110
Full Service Untreated:											
Tier 1	731	695	666	594	582	593	593	560	527	484	412
Tier 2	817	781	760	728	714	735	743	686	652	594	528
Replenishment Water Rate[3]											
Untreated	--	--	--	--	--	--	--	422	409	366	294
Treated	--	--	--	--	--	--	--	651	601	558	436
Interim Agricultural Water Program[4]											
Untreated	--	--	--	--	--	--	--	537	482	416	322
Treated	--	--	--	--	--	--	--	765	687	615	465
Treatment Surcharge	319	320	313	348	341	297	254	234	217	217	167
Full Service Treated:											
Tier 1	1,050	1,015	979	942	923	890	847	794	744	701	579
Tier 2	1,136	1,101	1,073	1,076	1,055	1,032	997	920	869	811	695
Capacity Charge ($ per cubic foot second)	8,600	8,700	8,000	10,900	11,100	8,600	6,400	7,400	7,200	7,200	6,800
Readiness-to-Serve Charge ($Millions)	133	140	135	153	158	166	142	146	125	114	92

[1] Rates are set on a calendar year basis.

[2] The Delta Supply Surcharge was suspended after 2012.

[3] The Replenishment Program was discontinued after 2012.

[4] The Interim Agricultural Water Program was discontinued after 2012.

Table 7-2 lists revenues by source and the change in revenues from the prior year.

TABLE 7-2
REVENUES
(Dollars in Millions)

	Year Ended June 30,		
	2019	**2018**	**Change**
Water Revenues [1]	$ 1,149	$ 1,285	$ (136)
Capacity Charge [2]	33	35	(2)
Readiness-To-Serve Charges	137	137	-
Power Sales [3]	18	24	(6)
Taxes (Net)	143	127	16
Investment Income (loss)	36	11	25
Other	10	13	(3)
Total	**$ 1,526**	**$ 1,632**	**$ (106)**

[1] Water Revenues includes revenues from water sales, exchanges and wheeling.

[2] Previously reported as part of water revenues.

[3] Previously referred to as power recoveries or hydroelectric power sales.

Expenses

Metropolitan continued its efforts to manage finances, control costs, enhance productivity, support conservation and local resource programs, and procure additional supplies during the fiscal year. Major components of Metropolitan operations and maintenance costs include labor, chemicals, utilities, outside services, materials and operating equipment. Table 7-3 lists expenses by function and the changes from the prior year, while Table 7-4 summarizes changes in net position (revenues and expenses).

Metropolitan is one of 29 contractors to the State Water Project. Under the contract, Metropolitan is obligated to pay the state Department of Water Resources its portion of the costs for construction of the system as well as the minimum operations, maintenance, power and replacement costs of the project regardless of the amount of water actually delivered. Variable power charges are based on actual deliveries of SWP supplies.

In addition, Metropolitan has an obligation to pay its share of the ongoing capital and remediation costs of certain off-aqueduct power facilities regardless of the amount of water delivered.

Metropolitan also buys power to pump Colorado River water into its service area. Metropolitan secures this power under federal energy contracts and from purchases of supplemental energy from a variety of sources as available. In addition, Metropolitan has entered into, and is negotiating, a number of agreements with entities along the Colorado River that have higher priority rights to water on the Colorado River. These agreements give Metropolitan firm rights to water that it otherwise would not have.

A combination of long-term debt and operating revenues fund the construction required to rehabilitate and repair facilities, and provide enhanced water treatment capability. General obligation bond debt service is funded from ad valorem property taxes. Tables 7-5 and 7-6 show assessed valuations and property tax rates for FY 2018/19 and the preceding nine years, while Table 7-7 shows property tax levies and collections. Revenue bond debt service is funded from water revenues. Table 7-8 is a 10-year summary of net operating income and revenue bond service coverage, while Table 7-9 is a listing of Metropolitan's 10 largest water customers.

TABLE 7-3
EXPENSES
(Dollars in Millions)

	Year Ended June 30,		
	2019	**2018**	**Change**
Power and Water Costs	$ 376	$ 447	$ (71)
Operations and Maintenance	494	507	(13)
Depreciation and Amortization	361	330	31
Bond Interest	127	125	2
Loss on Disposal of Plant Assets	14	89	(75)
Other	5	68	(63)
Total	**$ 1,377**	**$ 1,566**	**$ (189)**

Fiscal year 2018/19 expenses totaled $1.377 billion. Expenses include power and water costs, operations and maintenance costs, depreciation and amortization, interest on debt obligations, loss on disposal of plant assets and other miscellaneous expenses. Total expenses were $189 million lower than the previous year. One reason was because the $75 million loss on disposal of plant assets during the

decommissioning of treatment facilities in FY 2017/18 did not occur in FY 2018/19. In addition, power and water costs decreased $71 million because of a decline in water transactions, and also because of a credit received from the Department of Water Resources for the overcollection of prior-year charges. Other expenses decreased $63 million as the adjustments related to interest on construction and construction-in-progress programs in FY 2017/18. These decreases were partially offset by $31 million of higher depreciation and amortization costs due to a net increase in depreciable capital assets of $321 million.

Budget Process

Metropolitan combines elements of program budgeting and performance reporting in its budget system. These elements provide for funding, analysis, review and control. During FY 2018/19, Metropolitan was in the first year of a biennial budget for FY 2018/19 and 2019/20 that the board approved in April 2018.

The biennial budget process begins in July of odd-numbered years (e.g., July 2017 for the FY 2018/19 and FY 2019/20 biennial budget). Each group identifies major maintenance and capital projects, then submits project requests to Engineering Services beginning in July. This gives staff adequate time to plan project design and construction schedules, and to allow Water System Operations to plan for system shutdowns. Each department and group prepares operating budgets from August to November. Programs get analyzed and reviewed as to resources required and the extent to which each program is consistent with the priorities and strategies of the General Manager's Business Plan. All recommended programs are then incorporated into the overall budget. The proposed biennial budget includes a 10-year forecast of revenues, expenditures, unrestricted reserve balances and projected rates and charges. These forecasts incorporate projected costs associated with the repair and replacement of existing infrastructure, and also the projected costs of the Delta conveyance project, to help member agencies and the general public understand long-term cost trends and potential future water rate impacts.

Monthly variance reports allow board and management to compare budget estimates with actual revenues and take corrective action. All major expense categories are controlled via the board-approved biennial budget and authorized appropriations. A mid-cycle update is provided to the Metropolitan board at the midpoint of the two-year period.

Treasury Operations and Cash Management

Annually, Metropolitan's board approves the Statement of Investment Policy and delegates to the Treasurer the authority to invest Metropolitan funds.

Investments by the Treasurer are limited to those instruments specified in the board-approved Statement of Investment Policy, which sets out, in order of priority, three fundamental criteria: safety, liquidity and return.

State law and board policy allow Metropolitan to invest in a variety of instruments, including U.S. Treasury securities; federal agencies; repurchase agreements; negotiable certificates of deposit; bankers' acceptances; prime commercial paper; asset and mortgage-backed securities; supranationals; and California local agency securities, including Metropolitan-issued securities. Metropolitan can also invest in corporate notes, time deposits, investment contracts, shares of beneficial interest, money market funds, the Local Agency Investment Fund and the California Asset Management Program.

Treasury activities during the year included the management of the short-term and bond reserve portfolios and oversight of the firms managing the long-term investment portfolios. Metropolitan's total portfolio averaged about $1.075 billion during fiscal year 2018/19, with cash basis investment earnings of approximately $31.4 million. As of June 30, 2018, the market value of Metropolitan's investment portfolio was approximately $1 billion.

TABLE 7-4

TEN-YEAR SUMMARY OF CHANGES IN NET POSITION (UNAUDITED) - ACCRUAL BASIS[1]

(Dollars in Millions)

	Fiscal Year Ended June 30,									
	2019	2018[2] As Adjusted	2017	2016	2015[3]	2014 As Adjusted	2013	2012[4] As Adjusted	2011[4] As Adjusted	2010
Water Revenues[5]	$ 1,148.7	$ 1,285.2	$ 1,150.5	$ 1,166.0	$ 1,382.9	$ 1,484.6	$ 1,282.5	$ 1,123.3	$ 1,001.0	$ 1,010.9
Readiness-to-serve charges	136.5	137.5	144.0	155.5	162.0	154.0	144.0	135.5	119.5	103.0
Capacity charge	33.0	34.6	39.7	44.7	37.5	28.5	28.7	33.0	34.4	33.4
Power recoveries	18.3	23.7	20.9	7.5	8.4	14.6	24.5	31.5	22.9	18.3
Operating revenues	1,336.5	1,481.0	1,355.1	1,373.7	1,590.8	1,681.7	1,479.7	1,323.3	1,177.8	1,165.6
Taxes, net	142.7	127.3	115.4	107.9	102.3	94.5	94.8	79.2	79.3	98.1
Investment income	36.0	10.6	6.2	19.4	(3.6)	5.7	(0.4)	4.1	2.0	40.6
Other, net	10.4	12.9	7.3	10.2	5.4	—	6.1	0.6	22.0	6.4
Nonoperating revenues	189.1	150.8	128.9	137.5	104.1	100.2	100.5	83.9	103.3	145.1
Total revenues	1,525.6	1,631.8	1,484.0	1,511.2	1,694.9	1,781.9	1,580.2	1,407.2	1,281.1	1,310.7
Power and water costs	(375.8)	(446.5)	(455.4)	(552.3)	(473.6)	(510.1)	(371.3)	(384.0)	(364.8)	(433.7)
Operations and maintenance	(493.9)	(507.4)	(487.5)	(650.1)	(543.4)	(439.7)	(419.8)	(433.5)	(394.9)	(395.6)
Depreciation and amortization	(361.1)	(330.3)	(301.7)	(376.5)	(374.8)	(261.5)	(265.4)	(290.1)	(286.4)	(246.4)
Operating expenses	(1,230.8)	(1,284.2)	(1,244.6)	(1,578.9)	(1,391.8)	(1,211.3)	(1,056.5)	(1,107.6)	(1,046.1)	(1,075.7)
Bond interest	(126.9)	(124.5)	(134.6)	(126.9)	(132.5)	(146.7)	(150.2)	(135.8)	(135.7)	(133.3)
Interest and adjustments on OAPF[6]	—	—	(0.6)	(0.8)	(1.2)	(1.6)	(2.1)	(2.6)	(3.0)	(3.4)
Loss on disposal of plant assets	(13.7)	(88.7)	(20.9)	—	—	—	—	—	—	—
Other, net	(5.3)	(68.2)	(9.4)	(4.6)	—	(23.7)	—	—	—	—
Nonoperating expenses	(145.9)	(281.4)	(165.5)	(132.3)	(133.7)	(172.0)	(152.3)	(138.4)	(138.7)	(136.7)
Total expenses	(1,376.7)	(1,565.6)	(1,410.1)	(1,711.2)	(1,525.5)	(1,383.3)	(1,208.8)	(1,246.0)	(1,184.8)	(1,212.4)
Contributed capital	0.8	1.5	—	2.1	2.3	2.2	1.7	13.6	17.7	4.6
Cumulative effect of change in accounting principle	—	(138.9)	—	—	(491.0)	—	—	—	(8.2)	—
Change in net position	$ 149.7	$ (71.2)	$ 73.9	$ (197.9)	$ (319.3)	$ 400.8	$ 373.1	$ 174.8	$ 105.8	$ 102.9

[1] Metropolitan implemented Governmental Accounting Standards Board (GASB) Statement No. 63, *Financial Reporting of Deferred Outflows of Resources, Deferred Inflows of Resources and Net Position*, in fiscal 2012. This pronouncement requires that the difference between assets and liabilities be reported as net position, therefore, net assets are now referred to as net position.

[2] Adjustment relates to Metropolitan's implementation of GASB Statement No. 75 (GASB 75), *Accounting and Financial Reporting for Postemployment Benefits Other Than Pension.* GASB 75 requires the reporting of a net Other Postemployment Benefit (OPEB) liability in the basic financial statements when an organization's OPEB liability exceeds the net position available for paying benefits.

[3] Adjustment relates to Metropolitan's implementation of GASB Statement No. 68 (GASB 68), *Accounting and Financial Reporting for Pensions - an amendment of GASB Statement No. 27,* and GASB Statement No. 71. (GASB 71), *Pension Transition for Contributions Made Subsequent to the Measurement Date - an amendment of GASB Statement No. 68.* GASB 68 requires the reporting of net pension liability in the basic financial statements when an organization's pension liability exceeds the net position available for paying benefits while GASB 71 requires the recognition of beginning deferred outflow of resources for pension contributions made after the measurement date. Fiscal years 2010 through 2014 have not been adjusted.

[4] Adjustment relates to the adoption of GASB No. 65, *Items Previously Reported as Assets and Liabilities*. This pronouncement requires debt issuance costs (except prepaid insurance costs) to be recognized as expense in the period incurred. Fiscal year 2010 has not been adjusted.

[5] Water Revenues includes revenues from water sales, exchanges, and wheeling.

[6] Off-Aqueduct Power Facilities. The State relieved Metropolitan of its obligation during the year ended June 30, 2018.

TABLE 7-5
TEN MEMBER AGENCIES WITH LARGEST ASSESSED VALUATIONS
YEAR ENDED JUNE 30, 2019
(Dollars in Billions)

Member Agency	Assessed Valuation	*Percent of Total
Los Angeles	$599.7	20.56
San Diego County Water Authority	508.6	17.44
MWD of Orange County	499.3	17.12
West Basin MWD	199.7	6.85
Central Basin MWD	147.2	5.05
Inland Empire Utilities Agency	112.9	3.87
Western MWD	105.6	3.62
Upper San Gabriel Valley MWD	105.0	3.60
Calleguas MWD	103.7	3.55
Eastern MWD	79.0	2.71
	$2,460.7	**84.37**
Total Gross Assessed Valuation (All 26 Member Agencies)	**$2,916.6**	

*Total may not foot due to rounding.

TABLE 7-6
TEN-YEAR SUMMARY OF ASSESSED VALUATIONS AND PROPERTY TAX RATES
(Dollars in Billions)

Fiscal Year Ended June 30,	Gross Assessed Valuation [1]	Homeowner's Exemption	Net Assessed Valuation [2]	Secured Property Percentage Tax Rate
2019	$ 2,916.6	$ 15.4	$ 2,901.2	0.0035
2018	2,740.6	15.6	2,725.0	0.0035
2017	2,583.4	15.8	2,567.6	0.0035
2016	2,451.0	15.9	2,435.1	0.0035
2015	2,314.9	16.2	2,298.8	0.0035
2014	2,183.4	16.3	2,167.0	0.0035
2013	2,097.4	16.7	2,080.7	0.0035
2012	2,067.5	16.9	2,050.5	0.0037
2011	2,049.1	17.1	2,031.9	0.0037
2010	2,081.9	17.2	2,064.7	0.0043

[1] Gross assessed valuations (before deduction of Homeowner's and Business Inventory Exemptions), as of August each year, of all secured and unsecured property within Metropolitan's service area, as certified by the County Auditor-Controllers for the respective counties.

[2] May not foot due to rounding.

TABLE 7-7
TEN-YEAR SUMMARY OF PROPERTY TAX LEVIES AND COLLECTIONS (UNAUDITED)
CASH BASIS

(Dollars in Thousands)

Fiscal Year Ended June 30,	Total Tax Levy	Tax Collections			Outstanding Delinquent Taxes [2]	Percent of Current Taxes Collected to Total Tax Levy	Percent of Total Tax Collections to Total Tax Levy	Percent of Delinquent Taxes to Total Tax Levy
		Current	Delinquent	Total [1]				
2019	$ 130,566	$ 138,427	$ 6,727	$ 145,154	$ —	106.0 %	111.2 %	0.0 %
2018	121,647	124,628 [3]	5,038 [3]	129,666	—	102.5 [3]	106.6	0.0
2017	112,727	112,886 [3]	2,251 [3]	115,137 [3]	—	100.1 [3]	102.1 [3]	0.0
2016	104,829	104,829	5,825	110,654	—	100.0	105.6	0.0
2015	100,066	97,687	5,320	103,007	2,379	97.6	102.9	2.4
2014	94,963	94,963	3,744	98,707	—	100.0	103.9	0.0
2013	92,247	89,576	7,078	96,654	2,671	97.1	104.8	2.9
2012	94,810	80,775	9,478	90,253	4,076	85.2	95.2	4.3
2011	95,385	71,069	16,987	88,056	9,478	74.5	92.3	9.9
2010	107,867	82,164	15,083	97,247	16,987	76.2	90.2	15.7
2009	109,755	91,632	12,951	104,583	15,083	83.5	95.3	13.7

[1] Total tax collections exclude cash payments on new annexations.

[2] Delinquent taxes shown are net of the "Allowance for Uncollectibles" - determined by historical trends of collections and payments.

[3] Amounts were updated subsequent to the Annual Report submission deadline.

TABLE 7-8
TEN-YEAR SUMMARY OF NET OPERATING INCOME AND REVENUE BOND DEBT SERVICE COVERAGE[1] (UNAUDITED)

(Dollars in Millions)

	Fiscal Year Ended June 30,									
	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Water Revenues [2]	$ 1,149	$ 1,285	$ 1,151	$ 1,166	$ 1,383	$ 1,485	$ 1,283	$ 1,062	$ 996	$ 1,011
Additional Revenues [2]	170	172	184	200	199	182	173	168	153	135
Total Revenues	1,319	1,457	1,335	1,366	1,582	1,667	1,456	1,230	1,149	1,146
Operating Expenses	(916)	(963)	(927)	(1,201)	(1,005)	(854)	(793)	(792)	(853)	(825)
Net Operating Revenues	403	494	408	165	577	813	663	438	296	321
Hydroelectric Power Revenue & Other	40	51	39	30	29	34	48	87	96	52
Transfer from Reserve Funds	—	1	33	222	142	—	—	—	—	—
Interest on Investments [3]	34	8	4	18	13	19	(2)	11	17	19
Adjusted Net Operating Revenues	477	554	484	435	761	866	709	536	409	392
Senior and Subordinate Bonds Debt Service [4]	(333)	(340)	(306)	(309)	(280)	(343)	(298)	(297)	(277)	(244)
Subordinate Revenue Obligations	—	—	(2)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Funds Available from Operations	$ 144	$ 214	$ 176	$ 125	$ 480	$ 522	$ 410	$ 238	$ 131	$ 147
Ratios										
Debt Service Coverage on all Senior and Subordinate Bonds	1.43	1.63	1.57	1.41	2.71	2.51	2.37	1.80	1.47	1.60
Bonds and Additional Bonds Debt Service Coverage [5, 6]	—	—	1.58	1.41	2.72	2.52	2.38	1.81	1.48	1.61

[1] Prepared on a modified accrual basis for fiscal years 2013-2019 and on a cash basis for fiscal years 2010-2012.

[2] Water Revenues include revenues from water sales, exchanges, and wheeling. Fiscal years 2009-2011 restated to include exchange sales in Water Revenues. They were previously reported under Additional Revenue.

[3] Excludes interest applicable to Bond Construction accounts, Excess Earning account(s), Other Trust accounts, and the Deferred Compensation Trust account.

[4] Previously reported as Bonds and Additional Bonds Debt Service for fiscal years 2010-2017.

[5] Previously reported as Bonds and Additional Bonds Debt Service Coverage for fiscal years 2010-2017.

[6] Previously reported as Debt Service Coverage on all Obligations for fiscal years 2010-2017. The State Revolving Fund Loan was paid off at the end of fiscal year 2016/17, therefore the ratio is the same as Debt Service Coverage on all Senior and Subordinate Bonds and is not presented beginning with FY 2017/18.

TABLE 7-9
TEN LARGEST WATER CUSTOMERS
Year Ended June 30, 2019
Accrual Basis (Dollars In Millions)

Agency		Water Revenues [1]	* Percent of Total	Water Sales and Exchanges in Acre-Feet	* Percent of Total
San Diego CWA	$	206.7	18.0%	346,400	24.4%
MWD of Orange County		159.0	13.8%	183,264	12.9%
City of Los Angeles		122.2	10.6%	141,866	10.0%
West Basin MWD		120.7	10.5%	117,039	8.2%
Calleguas MWD		89.3	7.8%	86,741	6.1%
Eastern MWD		77.1	6.7%	86,636	6.1%
Western MWD of Riverside		59.9	5.2%	66,134	4.7%
Three Valleys MWD		53.6	4.7%	64,349	4.5%
Chino Basin MWD		45.6	4.0%	60,693	4.3%
Upper San Gabriel Valley MWD		34.1	3.0%	46,195	3.3%
Total	**$**	**968.2**	**84.3%**	**1,199,317**	**84.5%**
Total Revenue	**$**	**1,148.7**	**Total Acre-Feet**	**1,418,324**	

* Total may not foot due to rounding.

[1] Water Revenues includes revenues from water sales, exchanges, and wheeling.

Servers located inside the data center at Metropolitan's headquarters building.

CHAPTER 8

Information Technology

The Information Technology Group provides innovation and value to its customers for a wide range of technical services and enterprise business solutions. The group collaboratively works with customers to deliver information technology options, services and solutions in the areas of enterprise and business applications, Engineering Services and Water System Operations applications, data analytics, mobile/wireless computing, telecommunications, network services, cybersecurity, project management and personal computing.

IT Infrastructure

The Infrastructure Unit manages Metropolitan's enterprise-wide infrastructure services related to telecommunications, networks, servers, data center operations and related client services.

Highlights for Fiscal Year 2018/19

- Began final design of a microwave upgrade to replace end-of-life communication equipment (microwave tower sites) located throughout Metropolitan's desert region.
- Launched strategy to relocate Metropolitan's data centers and colocation to enhance resiliency and operational reliability.
- Continued technical implementation of the IT Disaster Recovery project as part of upgrades to Metropolitan's disaster recovery data center.
- Tested feasibility of Wi-Fi enhancements in support of developing a more robust (cloud-based) wireless infrastructure.
- Initiated the PC Replacement Project to upgrade desktop/laptop computers for Metropolitan employees.

Enterprise Business Systems

The Enterprise Business Systems Unit develops and supports enterprise and business software applications and ancillary systems.

Highlights for Fiscal Year 2018/19

- Enhanced Metropolitan's enterprise data warehouse and analytics platform to support operational and strategic decision-making.
- Continued Metropolitan's Enterprise Content Management program by working collaboratively with business stakeholders to clean up file-share data; designed taxonomy, record retention schedule and thesaurus.
- Continued replacement of PeopleSoft Enterprise Learning Management System (MyLearning) with a new cloud-based application as part of Metropolitan's Human Resource Management System.
- Updated and upgraded key enterprise applications to ensure operability, add new functions, maintain vendor support, and enhance security.

Enterprise Water Systems

The Enterprise Water Systems Unit provides services, solutions and systems that support business functions in Engineering and Water Systems Operations.

Highlights for Fiscal Year 2018/19

- Completed field deployment of Remote Terminal Unit computers to improve system reliability and enhance security for Metropolitan's control system.
- Initiated the major installation phase of replacing the control and electrical protection system at Wadsworth Pumping Plant.
- Continued upgrading the Maximo software used for Metropolitan's Maintenance Management System.

- Began upgrades to Metropolitan's Enterprise GIS Infrastructure to accommodate increasing demand for big data services and enhanced system performance.

Cybersecurity Services

The Cybersecurity Unit focuses on security standards and policies to enhance Metropolitan's cybersecurity posture and protect against evolving and increasing cyber threats.

Highlights for Fiscal Year 2018/19

- Began rollout of mobile device management system to centrally manage Metropolitan-owned mobile devices securely, as well as employee access to district data and applications on their personal mobile devices.
- Launched Cybersecurity Operations Center initiative to mitigate risks while deploying new and emerging technologies that protect against evolving cyber threats.
- Performed ongoing cybersecurity enhancements; researched innovative cybersecurity tools and tested their feasibility, performance and effectiveness within Metropolitan's computing environment.

Project Management Office

The Project Management Office is responsible for the overall governance and project management of the IT program and project portfolio.

Highlights for Fiscal Year 2018/19

- Continued to execute IT projects that provide innovative information technology options, services, and business solutions.
- Collaborated with key stakeholders on IT capital investments and aligning business priorities with IT strategies.

Dewatering the Foothill Feeder Pipeline into Placerita Creek during the January 2019 shutdown.

CHAPTER 9

Administration

The administrative and environmental planning sections report directly to the Chief Administrative Officer.

Administrative Services

The Administrative Services Section focuses on business process sustainability and achieving cost reduction and efficiencies. These include contracting; warehousing; procurement of goods and nonprofessional services; inventory; records and E-Forms management; Enterprise Content Management; reprographics; technical writing; Rideshare Program and Spring Green Expo.

Highlights for Fiscal Year 2018/19

- Installed electric vehicle charging stations at Weymouth Water Treatment Plant.
- Provided critical procurement support for Delta Conveyance Design & Construction Authority.
- Launched large-scale scanning phase of project to digitize Metropolitan's paper documents.
- Created a business support team to centralize administrative functions and provide greater support to staff in the Sacramento office.
- Conducted open-house forums to familiarize Metropolitan staff with warehouse services and products.
- Received the "Achievement of Excellence in Procurement" award from the National Procurement Institute for administering a best-in-class procurement program.

- Conducted several outreach efforts to educate Metropolitan staff on the services provided by the Records Management and Technical Writing teams.
- Launched an automated operating policy review process to more efficiently create, approve and track operating policies.

Environmental Planning

The Environmental Planning Section ensures Metropolitan activities comply with CEQA (California Environmental Quality Act) and other applicable environmental laws and regulations. It also obtains permits or approvals from federal and state environmental regulatory agencies for Metropolitan's activities; conducts studies, monitoring and training; reviews legislation and federal rulemaking; and participates in management of Metropolitan and non-Metropolitan reserve planning efforts. Environmental Planning also provides environmental planning support to customers, member agencies and outside agencies.

Highlights for Fiscal Year 2018/19

Environmental Planning participated in outreach activities to promote environmental stewardship and support Metropolitan's tradition of supplying high-quality water in an environmentally responsible way. Activities included:

- Participated in and hosted environmental conferences.
- Served on the board for the Natural Communities Coalition and on panels managing the Lake Mathews Multiple Species Reserve, the Southwestern Riverside County Multi-Species Reserve, and the Santa Rosa Plateau Ecological Reserve.

Reserve management activities included controlled burns at multi-species reserves at Lake Mathews in southwestern Riverside County, and the use of endowment funds to remove invasive tamarisk and stinknet vegetation from both reserves. Staff planted prickly pear cacti at the Lake Mathews reserve to aid in cactus wren habitat restoration, and created a restoration site for the federally endangered Munz's onion at the southwestern Riverside County reserve. More than

25,000 people visited the Wildflower Trail during the 2019 spring superbloom.

Environmental Planning led the development efforts for a new multi-use trail network in the southwestern Riverside County reserve, DVL and Lake Skinner areas. Once in place, the network will include a hiking and biking trail to connect the DVL North Hills Trail with the Lake Skinner Recreation Area.

Working collaboratively with groups throughout Metropolitan, Environmental Planning led the development of a Climate Action Plan to offset greenhouse gas emissions from future capital projects and operations. Staff completed a GHG emissions inventory for Metropolitan's operations and a comprehensive forecast of future emissions.

Environmental Planning provided support to critical projects, including the Foothill Feeder shutdown and urgent repairs performed along the Colorado River Aqueduct. For the shutdown, staff obtained a streambed alteration agreement, completed complex negotiations with the California Department of Fish and Wildlife, and obtained state and federal incidental take permits for the unarmored threespine stickleback, a fish on the federal endangered and state fully protected species lists. For the CRA repairs, staff obtained emergency permits and provided environmental monitoring for the state and federally threatened desert tortoise.

Environmental Planning worked with Legal staff and outside professional associations to respond to federal executive orders and federal and state rulemaking proposing regulatory changes to environmental laws, including the Clean Water Act, Endangered Species Act and the Migratory Bird Treaty Act.

Staff provided CEQA language for 144 board letters; procured permits for capital and operations and maintenance projects; provided 92 Water System Operations projects environmental clearances; responded to 35 Engineering Services project requests; conducted 20 bill reviews; and responded to 68 Real Property actions. Staff also reviewed 169 external projects for potential Metropolitan impacts.

Metropolitan won four national awards for its communications to retirement plan participants about the transition to Empower Retirement.

CHAPTER 10

Human Resources

The Human Resources Group is a customer-service-driven organization, responsible for fairly and consistently applying HR policies and procedures throughout Metropolitan. It serves a variety of roles for its customers that include staffing open or newly created positions; educating and integrating new employees into the workplace; ensuring compliance with laws and regulations; managing employee and retiree benefits; providing excellent HR services; and maintaining an engaged and motivated workforce. It seeks to accomplish all of these goals in the most cost-efficient, fiscally responsible manner as possible.

Major Activities and Accomplishments

To meet the challenges of changing workforce demographics, HR collaborated with other Metropolitan groups to develop a succession plan focused on three elements: (1) "tapping the best," with an emphasis on hiring the top talent possible; (2) developing leaders who are ready for the future; and (3) preparing tomorrow's talent today. Each of these elements emphasizes the importance of effective leadership, expanded employee development, and adaptation to a changing workplace, while also complying with laws and regulations.

In addition to the succession plan, HR continued to focus on providing excellent customer service, as well as people management.

Succession Planning

Metropolitan works to attract the best employees by creating an environment that provides opportunity, empowerment, trust and purpose. Metropolitan employees expect to play a significant role in planning and deciding how they accomplish their unique work requirements. Hiring decisions must consider not only a candidate's ability to perform initial job requirements, but also the potential to meet future Metropolitan challenges.

Tapping the Best

HR continued its emphasis on finding the best talent and using internal talent to fill open positions, whenever possible. There were more than 118 retirements and separations, and Recruitment successfully filled 322 positions during fiscal year—a 12 percent increase over the 288 positions filled in the previous year, with 125 external hires. Metropolitan filled most of management and senior-level staff positions with internal candidates, while filling entry and intermediate level positions primarily with external candidates.

HR staff also began validating entry exams used for a select number of its job classifications. Test validity can be an important defense for Metropolitan against claims that its competitive examinations are biased, discriminatory, or not job related.

Achieving a long-sought goal, Metropolitan implemented a new MyJobs recruitment tracking process. The system is designed to accelerate and improve the recruitment process, so that Metropolitan can fill job vacancies more efficiently. HR also partnered with External Affairs on expanded social media outreach, while adding videos into the job website conveying to potential applicants the advantages of working at Metropolitan.

Minority representation in the workforce grew to 54 percent during the year. The Equal Employment Opportunity Office visited various regional job groups and provided outreach to associations of veterans, women and minorities. EEO also visited the annual conference of the National Society of Black Engineers in Detroit, in conjunction with the Black Employees Association. A partnership with Women in Non-Traditional Employment Roles continued, providing opportunities for women in the skilled trades. The EEO Program Office also supported student intern recruiting efforts for many groups, and HR also began administering internships offered through the Cal Poly Pomona Co-Op Program for Engineering Services. For the sixth year, Metropolitan participated in the Hire LA Youth Summer Program employing high school seniors and college students.

HR staff also provided the board and management with workforce analytics to help expand diversity outreach efforts and plan for pending workforce retirements. Staff participated in regional workforce development committees, informing them of potential job opportunities at Metropolitan, and met with universities and colleges to help align their educational curriculums with Metropolitan business needs.

Additional outreach and inclusion efforts involved Metropolitan's employee resource groups. The partnership with Women in Non-Traditional Employment Roles continued to highlight opportunities for women in the skilled trades to work at Metropolitan.

Leaders Ready for the Future

New projects, new technologies and a changing workforce require leaders who understand effective people management, innovation and creativity, collaboration, and sound financial decision-making.

Metropolitan's multi-tiered approach to leadership development and effective people management includes Management Academies for aspiring managers; a six-day Metropolitan Management University development program for new and existing team managers; and an MMU-Graduate program for unit managers. Staff, in-house experts and expert consultants addressed how to lead, engage, motivate and recognize employees in all these programs. Seventy-seven percent of team managers have completed MMU, and 49 percent of unit managers have completed the MMU-Graduate program. To date, 25 percent of WSO Management Academy graduates and 7 percent of graduates of the MWD Management Academy have successfully bid on management positions.

For executive level managers, Metropolitan rotates select staff through special assignments in order to broaden experience. This past year, a second senior manager completed the Executive Development rotation.

Sixty managers learned state-of-the-art management techniques from leading management experts through in-depth workshops delivered through the Institute of Management Studies. Eighty-eight percent of managers completed mandatory reasonable-suspicion training.

Ten external coaches along with internal staff provided coaching support to 25 managers on issues ranging from transition management to personal development and succession planning.

Preparing Tomorrow's Talent Today

All groups are addressing the loss of employees—primarily due to retirements. Metropolitan has developed a robust and comprehensive learning and development program to retain talent and build on existing foundations of knowledge and experience to develop the skills and capabilities they will need tomorrow.

HR staff continued efforts with management to ensure that talent is available to fill critical positions. HR worked with local management to identify and assess skill gaps and expanded training opportunities. HR also facilitated various leadership and management development workshops to support succession planning efforts among groups.

Orientation for new hires and employees who passed probation focused on speeding employee integration into Metropolitan. Career Launch efforts continued to introduce new employees to group practices and operations, and to meet their colleagues early in their careers.

Training curriculum focused on topics such as: improved teamwork and collaboration; communication and business writing; effective performance conversations; conflict resolution; project management; problem-solving; and basic and advanced Microsoft Office skills. Comprehensive online and mobile learning offerings provided all employees and managers with 24/7 access to videos, readings and courses on topics relevant to their work or career needs. A total of 2,153 seats were filled by employees attending multiple sessions of 90 different in-class and online training offerings.

This year, 136 employees participated in Metropolitan's tuition reimbursement program—a 4 percent increase over the prior year. Staff established partnering agreements with eight local universities to provide tuition discounts, grants and other additional educational benefits for employees. Ninety-one employees attended employee tours of the Regional Recycled Water Advanced Purification Center.

HR also completed preparations for the August 2019 launch of the new user-friendly MyLearning management system. The system will provide expanded 24/7 improved access to classroom and online training, simplified course enrollment and scheduling and tools for meeting compliance requirements.

Ninety-one percent of Metropolitan's non-management employees completed drug and alcohol awareness training, and 66 percent of employees completed personal security awareness training to combat workplace violence.

HR Services and People Management

HR facilitated the annual Department Head Performance Evaluations of executive staff who report directly to the board. In October 2018, 89 percent of the board participated by providing direct feedback about strategic and operational leadership, board relationships and business results during the previous fiscal year.

Several events recognized employees for their contributions and commitment to Metropolitan. The General Manager's locally organized and designed Employee Appreciation Day events took place throughout Metropolitan with HR's support. Service Awards luncheons recognized 101 employees for their Metropolitan service ranging from 20 to 40 years.

Metropolitan benefits communications were recognized with four industry awards: The 2018 Platinum and Gold MarCom Award for its strategic communications and print creativity involving the deferred benefits provider transition; and rewards for two other communications campaigns regarding its deferred compensation plans.

In November, HR Benefits launched My Benefits, My Retirement, its first retiree-only workshop, with 61 participants. This was in addition to its educational flagship Stepping Into Retirement workshop, and Mid-Career and Retire Now or Retire Later workshops. Throughout the fiscal year, Metropolitan provided additional financial education workshops and webinars on investment basics, advanced investments, tax planning, and budgeting basics. This ensured Metropolitan met its fiduciary responsibilities, and provided employees with the knowledge and opportunity to be retirement ready when the time comes.

Benefits continued to work with the technology staff on revising the benefits section of the IntraMet to enable user-friendly, on-demand access to benefits information. An updated MyHR system provided enhanced self-service functionality; and HR researched opportunities to go environmentally green, wherever possible.

Metropolitan's MetFit employee wellness program provided workshops, seminars, and periodic email briefings to all employees.

Metropolitan concluded negotiations on subsequent Memoranda of Understanding with its four bargaining units in 2018. Staff continue to engage with bargaining unit representatives on a variety of issues, including Desert Remote Location Incentive Pay, Desert housing, telecommuting, and other matters. Employee Relations staff worked in collaboration with Classification and Compensation staff in developing new job descriptions for several supervisorial classifications. Once new job descriptions have been drafted, they will be provided to the Supervisors Association for review, and the parties will meet and confer over any economic impacts. Completing updated supervisorial job descriptions will bring all of Metropolitan's job descriptions up-to-date for the first time in many years.

The Labor 411 organization recognized Metropolitan as an Ethical Partner for Public Good recipient. This organization recognizes employers that have ethical programs and treatment of employees. Chairwoman Gray accepted the award on behalf of Metropolitan.

Metropolitan rolled out new mandatory Unlawful Workplace and Sexual Harassment Prevention online training courses for employees. This manager version of the course complies with California's legal requirement of two hours of harassment prevention training for supervisors.

Staff presented semi-annual reports on Equal Employment Opportunity and Affirmative Action to the Organization, Personnel and Technology Committee. The reports included an assessment of workforce diversity, outreach efforts, updates on Metropolitan's Affirmative Action Plan for Protected Veterans and Individuals with Disabilities, as well as the nondiscrimination program for women and minorities.

Workers' Compensation and Medical staff continued assessing the workers' compensation process to ensure best practices, and initiated a more streamlined process in the second half of fiscal year 2018/19. It encompassed two key factors: strict adherence to Metropolitan's medical provider list and quicker access to Metropolitan's third-party administrator for medical care and assistance. This two-pronged approach allows injured workers to receive the necessary care in a timely manner and accelerated their return into the workplace.

The Medical Screening Unit enabled Metropolitan field employees to comply with federal and state mandated programs such as: The Department of Transportation, California Division of Occupational Safety and Health, and the Department of Motor Vehicles. Staff arranged medical evaluations of appropriate personnel at their respective home facility, to ensure that Metropolitan employees maintain the requisite certifications and licenses.

Diamond Valley Lake wildflower trail – March 2019.

CHAPTER 11

Real Property

The Real Property Group applies strategic approaches to the acquisition, management and protection of Metropolitan's real property assets, and seeks to effectively optimize revenues and control land management expenses. Real Property reports to the Office of the Chief Administrative Officer.

In addition to planning and acquiring real estate, Real Property manages Metropolitan's real property assets, along with Metropolitan's Headquarters facility, employee housing and the Diamond Valley Lake Visitor Center.

Annexations

Staff completed and recorded four annexations from Metropolitan's member public agencies, totaling approximately 91.5 acres, with minimal potential use of new water demands annually. In Riverside County, these included Eastern Municipal Water District's 108th fringe area and Western Municipal Water District's 51st fringe area, both in Riverside County, with Calleguas Municipal Water District's Nos. 101 and 102 annexed to Metropolitan in Ventura County.

Metropolitan's current service area increased less than 0.15 of a square mile and now totals 5,181 square miles. Newly annexed areas must pay past fees and charges and comply with current water-use efficiency requirements, and Metropolitan's Administrative Code.

Planning and Acquisition

The Planning and Acquisition Unit acquires and disposes of Metropolitan real property in support of strategic water resources management and environmental mitigation requirements, as well as

conveyance and distribution system construction and rehabilitation projects based on near- and long-term operational needs. Staff ensures that Metropolitan realizes all rights, interests and benefits inherent in the ownership of real estate. Staff performs planning and research, including cost and feasibility studies, conducts highest and best use appraisals, identifies right of way needs, and engages in complex and detailed property negotiations.

Accomplishments for Fiscal Year 2018/19

- Closed escrow on 10 manufactured homes in support of the district housing management and employee village enhancement projects; executed fallowing easements in support of the Palo Verde Irrigation District forbearance and fallowing program, and disposed of two surplus properties.
- Hosted the second annual student outreach event focused on introducing college students to the right-of-way industry and providing them with an opportunity to learn more about the practices of public agencies in an open forum panel discussion.
- Executed 22 permanent and temporary easements, entry permits, construction permits, licenses, and leases in support of enhancing infrastructure safety, security and resiliency, including various pipeline repair and rehabilitation projects.
- Prepared 63 cost studies and appraisals related to real property acquisition, management and disposition.

Land Management

The Land Management Unit protects Metropolitan's real property assets and rights, working with internal stakeholders and external law enforcement as required. In addition, the unit identifies surplus properties that generate rental and lease revenue in such market segments as agriculture, telecommunications, energy development, film production, sustainable technology and research. During fiscal year 2018/19, the Land Management Unit generated over $16.9 million in revenue.

Land Management Accomplishments

- Executed 38 transactions, including secondary-use requests, access permits, license agreements, lease agreements, telecommunication uses, filming permits, infrastructure permits, and easements.
- Granted an easement to the U.S. Bureau of Reclamation for nearly 630 acres of restored cottonwood-willow and honey mesquite native habitat for the Lower Colorado River Multi-Species Program, in the Palo Verde Irrigation District of Imperial County; Metropolitan received $9.7 million for the easement.
- Executed four new agricultural leases totaling 3,842 acres in the Palo Verde Valley, with annual gross revenues from farmed acres projected at $1.27 million, and rents designed to incentivize the planting of water-saving crops on Metropolitan owned properties.
- Amended five existing agricultural leases in the Palo Verde Valley.

Facility Asset Management

The Facility Asset Management Unit maintains and operates Metropolitan's Headquarters building, the Diamond Valley Lake Visitor Center, employee housing and leased office spaces in an energy efficient and sustainable manner.

Fiscal Year 2018/19 Highlights

- Assumed the lead role on the district housing management and employee village enhancement projects; formed a new team dedicated to district housing; prepared a housing management plan; executed multiple professional and non-professional contracts, and built partnerships with Water System Operations and Engineering Services groups.
- Received overall rating of 92 out of 100 possible points in the annual Energy Star Audit at Metropolitan's Headquarters.

- Coordinated an arc flash study of the Headquarters building to determine hazards and risks of electrical explosions, resulting in arc flash equipment labeling, and recommended improvements and requirements for proper personal protective equipment.

Diamond Valley Lake Recreation Area

The Diamond Valley Lake Recreation Area contains public recreation and education facilities, including the Diamond Valley Marina; the Lakeview and North Hills trails, the Western Science Center; Valley-Wide Recreation and Park District's DVL Community Park and DVL Aquatic Center, and a multi-species reserve.

This year's wildflower super bloom attracted a record 31,000 visitors to Diamond Valley Lake. The trail signage installed in 2017/18 provided clear directions to guide members of the public in enjoying the wildflowers. Additional marina staff and security helped with the crowds and kept visitors on the trails. The super bloom lasted nearly two months and was a highly successful local attraction that brought visitors to the DVL area.

Approximately 818,000 people have visited the DVL marina facilities since it opened in 2003, with over 246,000 boats launched. Urban Park Concessionaires hosted a number of nighttime fishing tournaments over the past year. The National Bass West tournament had 39 teams and the biggest fish caught weighed in at 9.57 pounds.

The Western Science Center at DVL named the first new mastodon species from North America in over 50 years—the Pacific mastodon or "*Mammut pacificus."* The announcement arrives almost a quarter of a century after the initial discovery of "Max" the mastodon during the DVL excavation project.

Max the mastodon on display at the Western Science Center at Diamond Valley Lake.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CHAPTER 12

External Affairs

The External Affairs Group is responsible for Metropolitan's communication, outreach, education, legislative, business outreach and innovation activities. With a focus on engaging the general public, news media, legislators, regulators, educators, community groups, labor, business, Metropolitan member agencies and other stakeholders on water management and sustainability initiatives, External Affairs communicated the district's interests and its board-adopted policies, using an evolving set of tools to reach a diverse audience.

Major Activities and Accomplishments

Advertising and Outreach Campaign

The award-winning 365 Save Water Every Day water conservation advertising and outreach campaign reinforced the public's awareness of water issues, promoted conservation with a creative approach and continued to position Metropolitan as a leader in sustainability. Radio, digital advertising and nearly 1,500 billboards generated a record 1 billion impressions on social media. The campaign included a strong focus to reach multicultural markets with community newspapers, in-language television segments and a partnership that integrated water-themed questions in a popular Chinese-language game show. Metropolitan also tapped into the marketing power and popular appeal of the Los Angeles Dodgers by sponsoring a bewaterwise game and community outreach events. In spring 2019, External Affairs and Water Resource Management staff collaboratively launched the Turf Replacement Program with targeted marketing to homeowners, displays in hundreds of hardware and big box stores, and digital billboards in malls, grocery stores and movie theaters, which encouraged residents to ditch their grass and claim their rebate.

Media Activities

The Press Office issued 40 press releases, including statements from the general manager and board chair, and responded to more than 100 media requests for information and interviews on wide-ranging policy issues. Topics included California WaterFix/ Delta conveyance, the Colorado River Drought Contingency Plan, Gov. Newsom's vision of a single-tunnel project, Chairwoman Gray's election, conservation campaigns and rebates, tribal water issues, the World Water Forum, recycled water, algae blooms, facility shutdowns, and the appointment of new Metropolitan directors. External Affairs regularly prepared informational materials, talking points and other tools to communicate Metropolitan's operations, policies, news and programs. The Press Office also assisted with the general manager's blog and media inspection trips of the Sacramento-San Joaquin Delta and the Colorado River Aqueduct.

Web and Social Media Activities

Metropolitan's redesigned online water-saving portal, bewaterwise.com, showcased Metropolitan's advertising and outreach conservation campaigns. A new turf replacement program page included creative videos on how to identify and remove specific lawn types. Also added was one of the region's most comprehensive native plant guides with detailed information on plant species, anatomy and nursery availability.

An enhanced Delta Conveyance Project website provided updated information, fact sheets and other resources to support Gov. Newsom's one-tunnel approach. Staff also updated content on key initiatives and created microsites, including a Climate Action Plan site that provides information on Metropolitan's environmental stewardship and goals to reduce greenhouse gas emissions.

Metropolitan continued to engage with audiences on several social media platforms on topics including the inauguration of Chairwoman Gray, the Regional Recycled Water Advanced Purification Center construction and water conservation. Beginning in January 2019, Metropolitan emphasized water saving rebates on Facebook, garnering more than 11 million impressions and 79,000 rebate page views. Metropolitan introduced several podcasts to SoundCloud and iTunes.

Legislative and Policy Activities

In Sacramento, Metropolitan pledged to work with the Newsom Administration on a single-tunnel Delta conveyance project to increase the state's water supply resiliency in the face of climate change and earthquake risks. Metropolitan also actively engaged on a landmark safe drinking water package that avoids a water tax, creates a dedicated fund and continuously appropriates $130 million yearly from a greenhouse gas reduction fund to provide disadvantaged communities access to safe, clean drinking water.

In Washington DC, Metropolitan worked closely with congressional offices to successfully advocate for implementing legislation for the Colorado River Drought Contingency Plan. Efforts continue to support the creation of innovative financing tools and funding for local resource development, water infrastructure, water quality, climate adaptation and environmental planning, and to ensure environmentally protective, science-based flexibility for water delivery operations.

Water Stewardship Education

Education staff worked with member agencies on 200 events and engaged nearly 200,000 students, teachers, parents and participants through activities, social media and curriculum materials. Metropolitan continued to develop multilingual K-12 water education curriculum aligned to the latest educational standards. Working with the Department of Water Resources, Metropolitan created a virtual reality tour of the State Water Project that encourages critical thinking about regional water issues. More than 12,000 public visitors and students toured the Diamond Valley Lake Visitor Center, learning about Metropolitan's water systems and programs.

For the first time, the World Water College Grant Program solicited proposals for $20,000 grants to research water quality, watersheds and water-use efficiency technologies. Solar Cup, the nation's largest high school solar boat race, engaged 40 teams and more than 750 high school students. Metropolitan's "Water is Life" Student Art Exhibit and Calendar compiled 12,000 pieces of art generated by K-12 students throughout Metropolitan's service area.

Inspection trips of State Water Project facilities, the Sacramento-San Joaquin Delta, Metropolitan's Colorado River Aqueduct, Diamond Valley Lake and other district facilities helped inform and engage elected officials, community leaders and the public about Southern California's water resources. This year, more than 1,900 individuals participated on 64 inspection trips.

Publications, Newsletters, Videos

Dozens of new publications were designed, written, distributed and posted by External Affairs, ranging from Delta conveyance and the regional water recycling demonstration project to Colorado River partnerships, to brochures on California Friendly/native landscapes and water quality. Thousands of stakeholders received the monthly "Water Tomorrow" newsletter, while Metropolitan Today and Tomorrow updated 1,400 federal, state and local officials on current activities. External Affairs continued issuing the WaterTalk employee e-newsletter, and disseminated California WaterFix Update, Business Outreach, and Conservation Update e-newsletters to wide-ranging audiences.

Staff produced the 2018 Annual Report, the annual Water Quality Report, and the Regional Progress Report to the state legislature on conservation, recycling and reuse, as well as promotional materials for events.

Metropolitan produced informational videos on California WaterFix, the Regional Recycled Water facility, conservation rebates and events, board ceremonies, and solar technology.

Community Partnerships

The Community Partnering Program provided opportunities for 70 district-sponsored projects and programs such as water conferences, Earth Day events, community gardens and educational publications that promote core conservation and water-use efficiency issues.

Working with Water Resource Management and member agencies, staff created customized marketing materials and partnered on projects to more effectively inform community organizations, disadvantaged communities and commercial and industrial facilities about available rebates, conservation and other programs.

Outreach for Infrastructure Projects

External Affairs provided community outreach for major capital construction projects and system maintenance activities. In addition to distributing thousands of informational notices, community meetings and briefings were convened for city officials. New online and text-based communication tools were successfully used to keep communities informed about project impacts.

Business Outreach, Innovation

Metropolitan co-hosted the Annual California Construction Expo, which attracted more than 1,200 attendees and represented over $150 billion in construction projects. To better leverage technologies used by the agriculture and urban water sectors, Metropolitan co-hosted the first California Agriculture Innovation Summit in partnership with the University of Riverside, Western Growers and the L.A. Regional Technology Association. Attendees included growers, member agencies, small businesses, investors, innovators and academics.

Each quarter, 40-50 utility leaders from throughout the western United States attended the Technology Approval Group forums which featured presentations from global emerging water technology firms. A newly formed Member Agency Innovation Council promoted water-sector collaboration among Metropolitan's 26 public member agencies.

Audit staff inspects a decarbonator at Irvine Desalter Project during an audit of groundwater recovery projects funded through Metropolitan's Local Resources Program.

CHAPTER 13

Internal Audit

Internal Audit provides independent, objective assurance and consulting services designed to add value and improve operations. Internal Audit responsibilities are carried out by a team of audit professionals, who evaluate the extent to which internal controls mitigate risks. Internal Audit also determines whether activities are consistent with policies, procedures, regulatory requirements and contracts, focusing on risk management, controls and governance processes. In this way, the audit staff assists management and the Board of Directors in assessing and understanding risks that could impact the achievement of their objectives.

Audits are performed in accordance with The Institute of Internal Auditors' International Standards for the Professional Practice of Internal Auditing. These standards help define Internal Audit's responsibilities and establish expectations for auditor professionalism and independence. This independence is assured through the Internal Audit Department Charter, which establishes the General Auditor's reporting line to the Board of Directors and the Audit and Ethics Committee.

The Audit and Ethics Committee directs the focus of Internal Audit resources by review and approval of the General Auditor's Annual Audit Plan. The fiscal year 2018/19 Audit Plan resulted from an internal assessment of risks and input from key stakeholders including board members, management and staff.

Major Activities and Accomplishments

During FY 2018/19, Internal Audit contributed to governance activities through the following major actions, which took place while the General Auditor continued with the additional role of Interim Ethics Officer:

- Realigned and filled two open positions, strengthening the Internal Audit organization's expertise and enhancing succession planning.

- Successfully carried out the FY 2018/19 Audit Plan, including significant audits of Desert Housing and Water Information Systems (WINS).
- Completed and issued 20 audits and six special projects, which are reported monthly to the board and can be viewed via the Audit Reports tab at the General Auditor webpage (mwd2o.com).

	Number of Reports
Audits:	**20**
Bay-Delta Initiatives Consulting Agreements	
Consulting Agreements – IBI Group, Vali Cooper & Assocs., Atkins	
CRA Pumping plants Delivery Pipe Expansion Joint Repairs – Phase 2	
Desert Housing Renovation	
Diamond Valley Lake Inlet/Outlet Tower Fish Screen Replacement	
Diemer Administration Building Seismic Upgrades	
Director and Employee Expense Reports	
Internal Controls Over Financial Reporting	
Jensen Electrical Upgrade – Stage 1	
Jensen Solar Power Facility	
Mills Electrical Upgrades – Stage 1	
Payroll	
Privileged Account Management	
Recycled Water Onsite Retrofit Program	
Rehabilitation Second Lower Feeder PCCP Reach 1	
Risk Management Self-Insurance Fund	
Water Information System (WINS)	
Water Supply Programs – Semitropic, Arvin-Edison and Kern Delta	
Weymouth Oxidation Retrofit	
Whitewater Siphons Erosion Protection	
Monitoring:	**5**
Colorado River Water Users Association	
Quarterly Board Reports	
Quarterly Consulting Contract Reporting (3)	
Management Requests:	**1**
Property Leases – Riverside County Regional Park and Western Center Community Foundation	

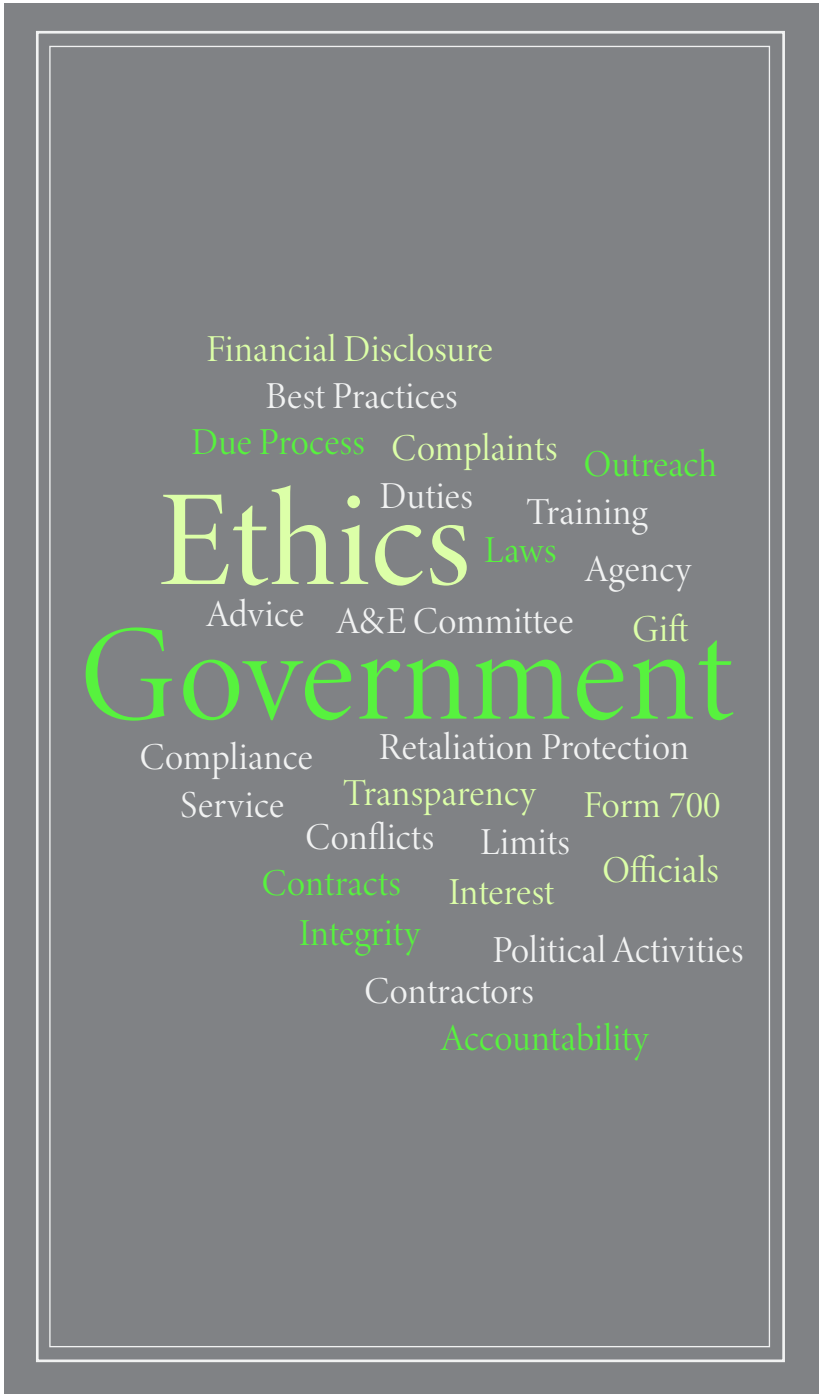
- Reassessed the Audit Plan quarterly to evaluate whether it met the needs and requests of the Board of Directors and management; focused on highest risks and areas of greatest concern, and ascertained whether sufficient progress was being achieved.

- Evaluated management's response to all significant control issues noted in audit reports; tracked and reviewed management responses on 28 recommendations included in audit reports and ensured timely responses to all reports.
- Assisted the external auditors KPMG with the performance of the June 30, 2018, Annual Financial Audit.
- Assisted KPMG with preparation for their June 30, 2019, Annual Financial Audit.

Quality Assurance Activities

Professional auditing standards require internal audit organizations to maintain a quality enhancement and continuous improvement program. In this regard, Internal Audit conducts a comprehensive Quality Assurance and Improvement Program annually that includes auditor training and ongoing, periodic internal quality reviews. Internal Audit also undergoes an external independent quality assessment every five years. FY 2018/19 activities included the following:

- Completed an internal quality self-assessment that evaluated conformance with auditing standards; assessed governance practices; evaluated audit work papers with regards to planning, fieldwork and reporting practices; appraised staff development and resource management activities; and surveyed Audit Department staff for feedback.
- Conducted anonymous surveys of clients on their perceptions of the audit process, including strengths and opportunities for improvement.
- Worked to implement recommended enhancements to compliance efforts.
- Identified training opportunities for Internal Audit staff, who earned nearly 200 continuing education hours in courses including fraud assessment, critical thinking, accounting standard updates, and government auditing.


Financial Disclosure
Best Practices
Due Process
Complaints
Outreach
Duties
Training
Ethics
Laws
Agency
Advice
A&E Committee
Gift
Government
Compliance
Retaliation Protection
Service
Transparency
Form 700
Conflicts
Limits
Officials
Contracts
Interest
Integrity
Political Activities
Contractors
Accountability

Ethics

Created by state legislation in 1999, the Ethics Office promotes a principled culture by administering Metropolitan's governmental ethics policies. The office is committed to furthering the inclusion of these policies in Metropolitan's strategic plan and safeguarding a valuable district asset—its integrity.

Preventing ethical missteps is the cornerstone of Metropolitan's ethics program. The office advances this objective by developing clear and tailored policies; providing training; and advising officials on how to comply with both Metropolitan rules and state ethics laws given their individual situation. To promote employee accountability and institutional growth, potential violations of the district's ethics policies are addressed through a fair and objective investigation process.

Advice and Education

To foster a solid foundation of ethics-centered practices at Metropolitan, the Ethics Office advises directors and employees on how to comply with ethics policies and provides wide-ranging training programs.

For instance, staff routinely engages with directors and employees to assess whether their intended course of action conforms to ethics rules and, if not, advises on how they can adhere to those standards given their situation. This year, staff provided advice to over 150 officials on specific ethics questions involving their Metropolitan work. As an example, some officials were advised to recuse themselves from participating in particular Metropolitan matters to avoid a prohibited conflict of interest.

Moreover, staff provides directors with a monthly bulletin to help them determine whether they have a conflict of interest in a matter appearing before them at their next regularly scheduled board meeting.

Educational programs reinforce awareness and understanding of ethics policies and principles. Ongoing programs include training through Metropolitan's Management University; online and in-person training sessions for officials who report personal financial interests pursuant to state law; and an ethics primer for new employees at orientation.

This fiscal year, staff delivered additional large-scale ethics training programs to board members and other Metropolitan officials. Provided in coordination with the General Counsel, training courses centered on open-meeting requirements under the Ralph M. Brown Act and state governmental ethics laws.

Staff also developed customized live training on due process rights in public employee investigations, in coordination with an outside law firm. Participating in this interactive session were staff from the General Counsel's office and Human Resources Department, as well as the chair and vice chair of the Audit and Ethics Committee.

Policies and Procedures

The Ethics Office regularly evaluates its policies and procedures to ensure that they meet the highest standards for effectively implementing Metropolitan's governmental ethics program. This year, the office finalized with consultants a comprehensive overhaul of Metropolitan's ethics policies and procedures to strengthen and improve upon the ethics program. The board is expected to vote on the proposal by 2020.

Compliance

Among the Ethics Office's core functions is to ensure that Metropolitan consistently adheres to state ethics requirements. To further this objective, the office began a state-mandated biennial review of Metropolitan's conflict of interest code, under which it administers state financial disclosure filings for about 700 district officials. The review entailed evaluating Metropolitan job descriptions, identifying which positions must disclose personal financial interests, and determining the appropriate level of disclosure for each position.

The office also fulfilled its duties as Metropolitan's filing officer by helping officials submit timely and accurate financial disclosure forms to the state. During fiscal year 2018/19, the office administered over 800 disclosure forms.

Investigations

An essential role of the Ethics Office is to independently and objectively investigate alleged violations of Metropolitan's ethics rules and disclose the results of those investigations. Investigations promote individual accountability for Metropolitan officials, identify opportunities for staff to enhance ethics training, and lead to new or improved ethics rules.

This year, the Ethics Office undertook investigations concerning alleged violations of rules involving conflicts of interest, misuse of authority, retaliation, outside employment, and nepotism. Other complaints included allegations of improper disclosure of confidential information and failure to report financial interests.

The investigative matters reviewed by the office prompted broader policy development, including proposing changes to existing ethics rules, adopting new rules, and enhancing training on lesser known rules. For instance, as a result of information obtained during an investigation, the office began holding supplemental, personalized ethics training sessions for officials when they accept positions requiring disclosure of personal financial interests. This holistic approach to investigations supports the office's mission to help Metropolitan officials prevent ethics missteps before they occur.

Staffing and Professional Resources

This year, Metropolitan's General Auditor continued in the role of Interim Ethics Officer. The continuation was marked by a greater emphasis on policymaking, shepherding new office procedures, and increased collaboration with senior management. The board is expected to hire a permanent Ethics Officer in July 2019.

In support of the office's ongoing effort to operate in accordance with best practices in the industry, staff members attended the Council on Governmental Ethics Laws conference.

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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
- Colorado River Aqueduct
- Department of Water Resources' California Aqueduct
- MWD projects under construction
- Outside MWD Service Area
- ▲ Power Plants
- ● Pumping Plants
- ⬢ Water Treatment Plants

VENTURA
LOS ANGELES
SAN BERNARDINO
RIVERSIDE
ORANGE
SAN DIEGO
IMPERIAL
ARIZONA
CALIFORNIA
UNITED STATES
MEXICO

CALLEGUAS MWD
LAS VIRGENES MWD
WEST BASIN MWD
SANTA MONICA
BEVERLY HILLS
LOS ANGELES
GLENDALE
PASADENA
FOOTHILL MWD
SAN FERNANDO
CENTRAL BASIN MWD
WEST BASIN MWD
TORRANCE
COMPTON
LONG BEACH
MWD Palos Verdes Reservoir
THREE VALLEYS MWD
UPPER SAN GABRIEL VALLEY MWD
INLAND EMPIRE UTILITIES AGENCY
WESTERN MWD
EASTERN MWD
MWD OF ORANGE COUNTY
ANAHEIM
FULLERTON
SANTA ANA
RIVERSIDE COUNTY
SAN DIEGO COUNTY WATER AUTHORITY
SAN BERNARDINO VALLEY MWD
SAN GORGONIO PASS WATER AGENCY
MOJAVE WATER AGENCY
CRESTLINE LAKE ARROWHEAD WATER AGENCY
PALMDALE WATER DISTRICT
LITTLEROCK CREEK IRRIGATION DISTRICT
P.I.D. & L.C.I.D.
CASTAIC LAKE WATER AGENCY
DESERT WATER AGENCY
COACHELLA VALLEY WATER DISTRICT
IMPERIAL IRRIGATION DISTRICT

California Aqueduct West Branch
Castaic Power Plant (DWP)
Castaic Lake
2nd Barrel Los Angeles Aqueduct
Bouquet Reservoir
Foothill Feeder Power Plant
Dry Canyon Reservoir
Lake Piru
Santa Clara River
Jensen Water Treatment Plant
Chatsworth Reservoir
Lake Bard
Los Angeles Reservoir
Hansen Reservoir
Greg Ave. Power Plant
Encino Reservoir
Westlake Reservoir
Sepulveda Power Plant
Venice Power Plant
Garvey Res.
Rio Hondo Power Plant
Coyote Creek Power Plant
Orange County Reservoir
Yorba Linda Power Plant
Diemer Water Treatment Plant
Prado Res.
Corona Power Plant
Lake Mathews Power Plant
Lake Mathews
Mills Water Treatment Plant
Perris Power Plant
Lake Perris
Temescal Power Plant
Valley View Power Plant
Santiago Res.
San Joaquin Res.
Railroad Canyon Reservoir
Lake Elsinore
Diamond Valley Lake
Hemet Res.
Lake Skinner
Skinner Water Treatment Plant
Vail Lake
Red Mountain Power Plant
Lake Henshaw
Sutherland Res.
Lake Hodges
San Dieguito Res.
San Vicente Res.
El Capitan Res.
Murray Res.
Sweetwater Res.
Upper Otay Res.
Lower Otay Res.
Judson Res.
Barrett Lake
Morris Reservoir
Cogswell Reservoir
San Gabriel Reservoir
Weymouth Water Treatment Plant
San Dimas Power Plant
Live Oak Reservoir
Puddingstone Reservoir
Santa Fe Reservoir
Whittier Narrows Reservoir
Etiwanda Power Plant
Devil Canyon Power Plant
Silverwood Lake
Lake Arrowhead
Pearblossom Pumping Plant
Little Rock Reservoir
Palmdale Reservoir
Julian Hinds Pumping Plant
Eagle Mountain Pumping Plant
Iron Mountain Pumping Plant
Whitsett Intake Pumping Plant
Gene Pumping Plant
Colorado River Aqueduct
California Aqueduct
East Branch Mojave Power Plant
MWD Inland Feeder
Foothill Feeder
Pure Water
Rio Hondo
San Gabriel River
Santa Ana River
San Jacinto River
Temescal Wash
Lytle Creek
Cajon Canyon
Tujunga Canyon
Big Santa Clara River
Sespe Creek
Santa Margarita River
San Luis Rey River
San Dieguito River
San Diego River
Sweetwater River
Ysabel Creek
San Juan Creek
Coachella Canal
All American Canal
City Aqueduct
MATCH LINE SEE INSERT
MATCH LINE
SCALE IN MILES
0 5 10 15 20
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