This deceptively beautiful scene shows a leaking slide gate repaired during Metropolitan's 2019/20 shutdown season, which continued even amid the COVID-19 pandemic.

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

ANNUAL REPORT FOR THE FISCAL YEAR

July 1, 2019 to June 30, 2020

LOS ANGELES, CALIFORNIA
2020

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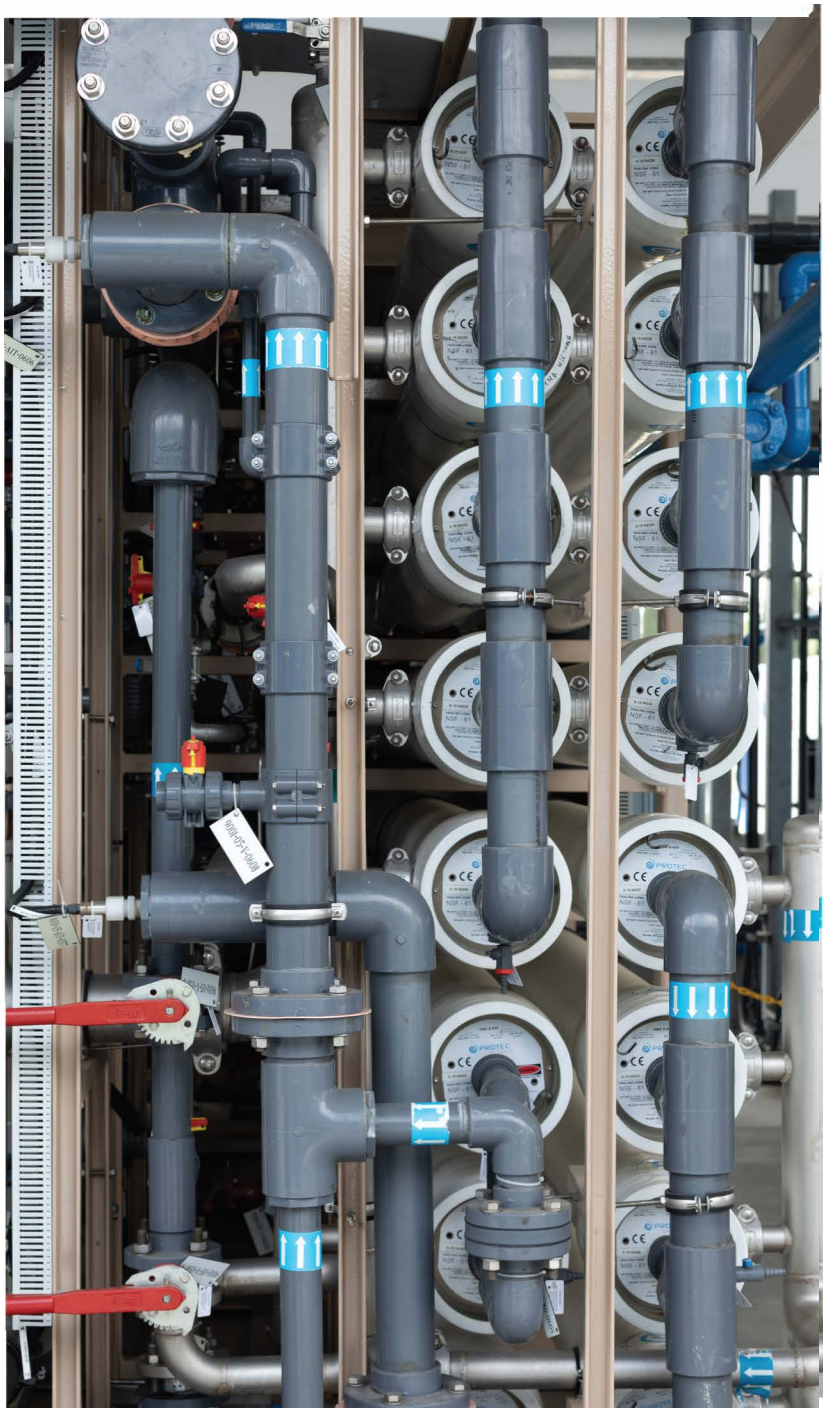
FIGURES

LIST OF ABBREVIATIONS

Abbreviation	Term
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
CAISO	California Independent System Operator
CARB	California Air Resources Board
CDFW	California Department of Fish and Wildlife
CEC	Constituents of emerging concern
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFO	Chief Financial Officer
CIP	Capital Investment Plan
CNPS	California Native Plant Society
CPP	Community Partnering Program
CVP	Central Valley Project
CRA	Colorado River Aqueduct
CVWD	Coachella Valley Water District
CY	Calendar year
DART	Days Away, Restricted, or Transferred
DBP	Disinfection Byproducts
DCA	Delta Conveyance Design and Construction Authority
DDW	Division of Drinking Water
DOE	Department of Energy
DCP	Drought Contingency Plan
DVL	Diamond Valley Lake
DWCV	Desert Water/Coachella Valley
DWR	Department of Water Resources
EIS	Environmental Impact Statement
EOC	Emergency Operations Center
FY	Fiscal year
GIS	Geographic Information System
HAA5	Five haloacetic acids
HEP	Hydroelectric plant
ICS	Intentionally Created Surplus
IID	Imperial Irrigation District

LIST OF ABBREVIATIONS

Abbreviation	Term
IRP	Integrated Water Resources Plan
ITP	Incidental Take Permit
LRP	Local Resources Program
LRAA	Locational Running Annual Average
µg/L	Micrograms per liter
MAF	Million acre-feet
MCL	Maximum Contaminant Level
MGD	Million gallons per day
MIB	Methylisoborneol
MMU	Metropolitan Management University
ND	Not detected
NDMA	N-Nitrosodimethylamine
PCCP	Prestressed Concrete Cylinder Pipe
PCS	Pressure Control Structure
PFAS	Per- and polyfluoroalkyl substances
PFHxA	Perfluorohexanoic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PVID	Palo Verde Irrigation District
RAA	Running Annual Average
SB	Senate Bill
SDCWA	San Diego County Water Authority
SNWA	Southern Nevada Water Authority
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



Gauges at the Regional Recycled Water Advanced Purification Center.

General Manager Jeffrey Kightlinger speaks at the grand opening of the Regional Recycled Water Advanced Purification Center.

About Metropolitan

The Metropolitan Water District of Southern California is a regional wholesaler that delivers water to 26 member public agencies in a service area of 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. The member agencies or their sub-agencies 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.

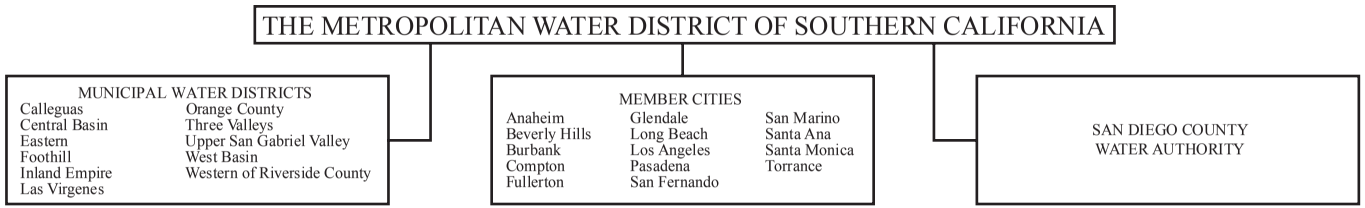
Metropolitan was established in 1928 under an act of the state Legislature to construct and operate the 242-mile Colorado River Aqueduct, which runs from an intake at Lake Havasu on the California-Arizona border, to an endpoint at Metropolitan's Lake Mathews reservoir in Riverside County.

When Metropolitan began delivering water, its service area consisted of about 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, subject to availability, and SWP participation rights.

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 to the 1920s also is 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
West Valley Water District

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, 2020

Chairwoman
Gloria D. Gray
West Basin Municipal Water District

Vice Chair
Jerry Butkiewicz
San Diego County Water Authority

Vice Chair
Cynthia Kurtz
Pasadena

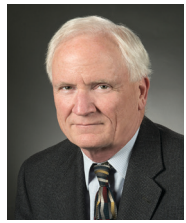
Vice Chair
Heather Repenning
Los Angeles

Secretary
Judy Abdo
Santa Monica

DIRECTORS
JUNE 30, 2020

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

Steve Blois
Calleguas Municipal Water District

Michael Camacho
Inland Empire Utilities Agency

Gloria Cordero
Long Beach

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

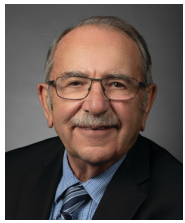
S. Gail Goldberg
San Diego County Water Authority

DIRECTORS
JUNE 30, 2020

Phillip D. Hawkins
Central Basin Municipal Water District

Michael T. Hogan
San Diego County Water Authority

Ardy Kassakhian
Glendale



Russell Lefevre
Torrance

Tana L. McCoy
Compton

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

Tracy Quinn
Los Angeles

DIRECTORS
JUNE 30, 2020

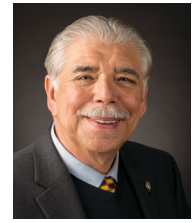
Jesús E. Quiñonez
Los Angeles

Marsha Ramos
Burbank

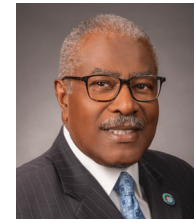
Randy A. Record
Eastern Municipal Water District

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

BOARD OF DIRECTORS
July 1, 2019 to June 30, 2020

OFFICERS OF THE BOARD

Chairwoman ..... Gloria D. Gray
Vice Chair ..... Jerry Butkiewicz
Vice Chair ..... Cynthia Kurtz
Vice Chair ..... Lorraine Paskett
Vice Chair ..... Heather Repenning
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 ..... Robert Apodaca
Central Basin Municipal Water District ..... Frank M. Heldman
Central Basin Municipal Water District ..... Phillip D. Hawkins
Compton ..... Janna Zurita
Compton ..... Tana L. McCoy
Eastern Municipal Water District ..... Randy A. Record
Foothill Municipal Water District ..... Richard W. Atwater
Fullerton ..... Adán Ortega
Glendale ..... Vartan Gharpetian
Glendale ..... Ardy Kassakhian
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
Los Angeles ..... Tracy Quinn
Los Angeles ..... Heather M. Repenning
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..... Jerry Butkiewicz
San Diego County Water Authority..... Tim M. Smith
San Diego County Water Authority..... S. Gail Goldberg
San Fernando ..... Sylvia Ballin
San Marino..... John T. Morris
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, 2020

EXECUTIVE COMMITTEE

Gloria D. Gray, Chair
Jerry Butkiewicz, Vice Chair
Cynthia Kurtz, Vice Chair
Heather M. Repenning, Vice Chair
Judy Abdo, Secretary
Linda Ackerman
Richard W. Atwater
Gloria Cordero
Michael T. Hogan
Larry McKenney
John W. Murray Jr.
Barry D. Pressman
Jesús E. Quiñonez
Marsha Ramos
Randy A. Record
Tim M. Smith
Charles M. Treviño

AUDIT AND ETHICS

Marsha Ramos, Chair
Tana McCoy, Vice Chair
Linda Ackerman
Sylvia Ballin
Steve Blois
Jerry Butkiewicz
Phillip D. Hawkins
Michael T. Hogan
Cynthia Kurtz
Larry McKenney
Jésus E. Quiñonez
Randy A. Record
Tim M. Smith

BAY-DELTA

Linda Ackerman, Chair
Stephen Faessel, Vice Chair
Robert Apodaca
Richard W. Atwater
Steve Blois
Gloria Cordero
Michael T. Hogan
Cynthia Kurtz
Russell Lefevre
Tana McCoy
Larry McKenney
John T. Morris
John W. Murray Jr.
Glen D. Peterson
Barry D. Pressman
Heather M. Repenning

COMMUNICATIONS AND LEGISLATION

Gloria Cordero, Chair
Cynthia Kurtz, Vice Chair
Judy Abdo
Linda Ackerman
Jerry Butkiewicz
Donald Galleano
Larry McKenney
John T. Morris
John W. Murray Jr
Glen D. Peterson
Tracy Quinn
Randy A. Record
Heather M. Repenning
Tim M. Smith
Charles M. Treviño

ENGINEERING AND OPERATIONS

Tim M. Smith, Chair
Charles M. Treviño, Vice Chair
Robert Apodaca
Steve Blois
Michael Camacho
David D. De Jesus
Larry D. Dick
Stephen Faessel
Donald Galleano
Russell Lefevre
John T. Morris
John W. Murray Jr.
Adán Ortega
Glen D. Peterson
Heather M. Repenning
Harold C. Williams

FINANCE AND INSURANCE

Jesús E. Quiñonez, Chair
Randy A. Record, Vice Chair
Steve Blois
Larry D. Dick
Stephen Faessel
S. Gail Goldberg
Phillip D. Hawkins
Adán Ortega
Tracy Quinn
Marsha Ramos
Tim M. Smith

LEGAL AND CLAIMS

Larry McKenney, Chair
Jesús E. Quiñonez, Vice Chair
Richard W. Atwater
Michael Camacho
Larry D. Dick
S. Gail Goldberg
Ardy Kassakhian
John W. Murray Jr.
Randy A. Record
Tim M. Smith

ORGANIZATION, PERSONNEL AND TECHNOLOGY

John W. Murray Jr., Chair
Sylvia Ballin, Vice Chair
Gloria Cordero
Stephen Faessel
Michael T. Hogan
Tana McCoy
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
Michael Camacho
Larry D. Dick
Ardy Kassakhian
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
Glen D. Peterson
Barry D. Pressman
Jesús E. Quiñonez
Randy A. Record

HISTORICAL
ROLL OF DIRECTORS
June 30, 2020

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
October 15, 2019 to
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 October 3, 2019

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 July 16, 2019
TANA L. MCCOY.....August 19, 2019 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 June 7, 2019
Vartan Gharpetian.....October 8, 2019 to March 31, 2020
ARDY KASSAKHIAN.....May 21, 2020 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
January 8, 2020 to
Jasmin A. Hall.....February 11, 2019 to January 8, 2020

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
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
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 November 5, 2019
Lorraine Paskett .....December 7, 2015 to January 16, 2020
Mark Gold.....April 11, 2016 to July 9, 2019
TRACY QUINN .....September 24, 2019 to
HEATHER M. REPENNING.....December 18, 2019 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 May 26, 2020
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
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

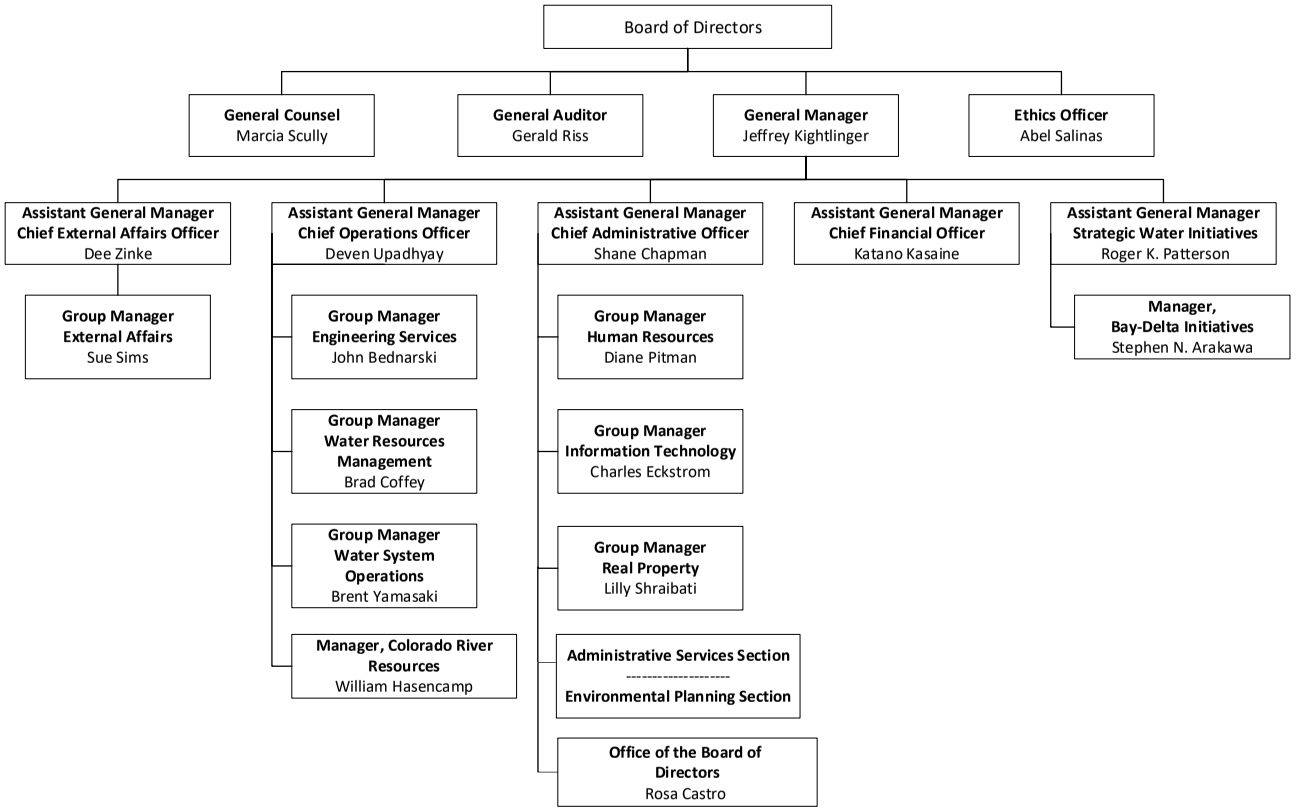
WEST BASIN MUNICIPAL WATER DISTRICT

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.


Board of Directors
General Counsel
Marcia Scully
General Auditor
Gerald Riss
General Manager
Jeffrey Kightlinger
Ethics Officer
Abel Salinas
Assistant General Manager
Chief External Affairs Officer
Dee Zinke
Group Manager
External Affairs
Sue Sims
Assistant General Manager
Chief Operations Officer
Deven Upadhyay
Group Manager
Engineering Services
John Bednarski
Group Manager
Water Resources
Management
Brad Coffey
Group Manager
Water System
Operations
Brent Yamasaki
Manager, Colorado River
Resources
William Hasencamp
Assistant General Manager
Chief Administrative Officer
Shane Chapman
Group Manager
Human Resources
Diane Pitman
Group Manager
Information Technology
Charles Eckstrom
Group Manager
Real Property
Lilly Shraibati
Administrative Services Section

Environmental Planning Section
Office of the Board of
Directors
Rosa Castro
Assistant General Manager
Chief Financial Officer
Katano Kasaine
Assistant General Manager
Strategic Water Initiatives
Roger K. Patterson
Manager,
Bay-Delta Initiatives
Stephen N. Arakawa

June 30, 2020

EXECUTIVE MANAGEMENT
JUNE 30, 2020

Jeffrey Kightlinger
General Manager

Marcia L. Scully
General Counsel

Gerald C. Riss
General Auditor

Abel Salinas
Ethics Officer

Dee Zinke
Assistant General Manager/
Chief External Affairs Officer

Deven Upadhyay
Assistant General Manager/
Chief Operating Officer

Katano Kaisane
Assistant 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, 2020

EXECUTIVE MANAGEMENT

General Manager ..... J. Kightlinger
General Counsel ..... M.L. Scully
General Auditor ..... G.C. Riss
Ethics Officer ..... A. Salinas
Assistant General Manager/Chief Operating Officer ..... D. Upadhyay
Assistant General Manager/Chief Administrative Officer ..... S.O. Chapman
Assistant General Manager/Chief Financial Officer ..... K. Kaisane
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 & Revenue ..... A. Van den Berg
Manager, Treasury and Debt ..... Vacant

CHIEF OPERATING OFFICER

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

ENGINEERING SERVICES

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

ETHICS

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

EXTERNAL AFFAIRS

Group Manager ..... S. Sims
State Legislative Representative ..... K. Viatella
Federal Legislative Representative ..... A.R. Schneider
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
Strategic Communications & Policy Advisor ..... T. Philp
Special Projects Manager ..... M. Westford

STAFF
June 30, 2020

HUMAN RESOURCES

Group Manager ..... D. Pitman
Manager, HR Partners Section ..... S. Lem
Interim Manager, HR Services Section ..... B. Patrick

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 ..... H. Torres Jr.

OFFICE OF THE BOARD OF DIRECTORS

Board Administrator ..... R. Castro

REAL PROPERTY

Group Manager ..... L. Shraibati
Manager, Real Property Section ..... O. Tucker

STRATEGIC WATER INITIATIVES

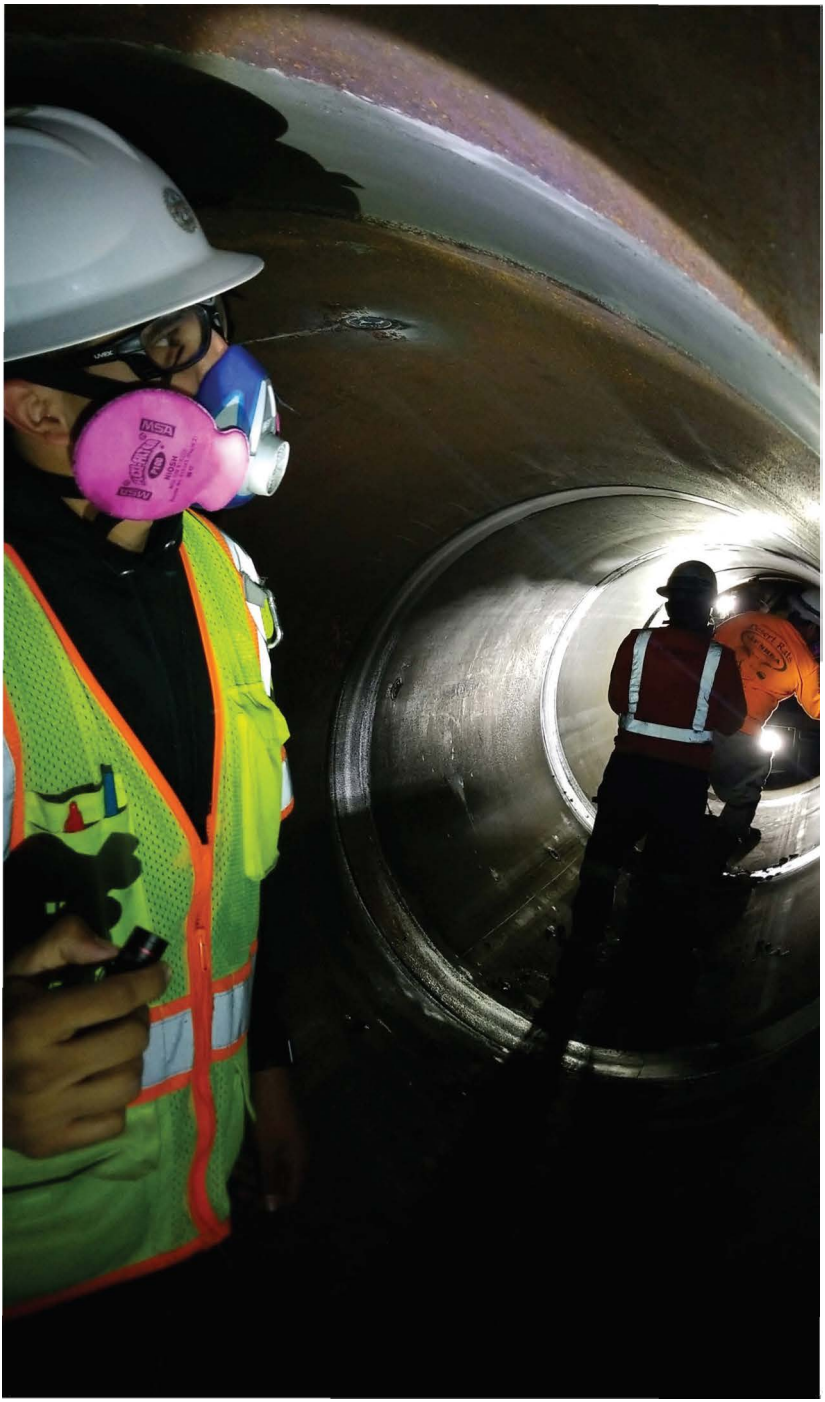
Manager, Bay-Delta Initiatives ..... S.N. Arakawa
Special Projects Manager ..... R.D. Neudeck
Executive Strategist ..... M.J. Wheeler

WATER RESOURCE MANAGEMENT

Group Manager ..... B. Coffey
Manager, Resource Implementation Section ..... K. Donhoff
Manager, Resource Planning & Development Section ..... Vacant

WATER SYSTEM OPERATIONS

Group Manager ..... B. Yamasaki
Assistant Group Manager ..... M. Chaudhuri
Assistant Group Manager ..... J. Jontry
Manager, Conveyance & Distribution Section (East/West) ..... G. Boyd
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



Amid a global pandemic, Metropolitan continued essential work under careful guidelines, including cement mortar lining at Reach 2 of the Second Lower Feeder, April 2020.

Introduction

It was a year without precedent. There had been challenges before—building the Colorado River Aqueduct in the midst of the Great Depression, signing onto the State Water Project, enduring record-breaking drought. But never had they taken place during a once-a-century pandemic and a time of social and cultural upheaval.

COVID-19 pandemic: As the coronavirus pandemic took hold in March, a majority of employees began working from home, supported by a secure information network and increased use of digital technologies. However, many other workers labored in the field to treat and deliver a safe and reliable water supply to Southern California. The use of micro-teams, personal protective equipment and deep cleaning helped keep these essential workers, our field employees, safe.

Whether it was conducting virtual board meetings, maintaining a vast delivery system, or promoting conservation and water education, the district's work continued uninterrupted. Metropolitan relined 11 miles of the Second Lower Feeder, while redesigning and rehabilitating key infrastructure along the Colorado River Aqueduct. With the headquarters building at Union Station largely unoccupied, seismic retrofit work was accelerated.

Regional Recycled Water Program: The grand opening of the award-winning Regional Recycled Water Advanced Purification Center laid the groundwork for a future full-scale water recycling plant that could be among the largest in the nation. This project would allow Southern California to reduce its reliance on imported supplies to replenish the region's groundwater basins and produce clean water for both industrial and eventually direct potable use.

Delta: Metropolitan continued working with state and federal agencies on the Delta Conveyance Project environmental review process and defining the scope of the single tunnel project supported by the governor. The proposed project would develop new facilities to modernize the State Water Project and protect its water supply by guarding against sea level rise, climate change and seismic threats. Metropolitan also played a role in the Delta Conveyance Design and Construction

Authority, and continued working on amendments for long-term State Water Project contracts that focused on cost allocation and the development of equitable water accounting and management processes.

Record storage: Despite enduring a decade with two severe droughts, including a year with the lowest snowpack in over 1,500 years, Metropolitan ended calendar year 2019 with the highest end-of-year storage balance in its history. Record reserves included 979,000 acre-feet of Intentionally Created Surplus storage in Lake Mead.

After Metropolitan reinstated its $2-per-square-foot incentive under its turf replacement program, turf removal in the region skyrocketed by 84 percent from the previous year. Metropolitan also completed a disadvantaged communities regional pilot program that replaced toilets in pre-1995 apartment buildings and began two pilot programs on using stormwater for direct use and groundwater recharge. Reduced regional demands and enhanced conservation allowed Metropolitan to store a record amount of water to safeguard against future droughts.

Racial justice: Metropolitan recommitted to leadership practices and values that promote diversity, equity, inclusion and tolerance in response to a nationwide racial reckoning and calls for change in government, business and society. Metropolitan engaged in discussion forums and efforts to promote a culture assessment, recognize biases and broaden outreach to promote careers in the water sector.

Chairwoman Gloria D. Gray helped champion the work. “Within the Metropolitan community, we are committed to the call for equality and welcome our member agencies and cities to join us,” Gray said. “We must be courageous and honest and boldly forge a path for change that will strengthen our commitment to diversity and inclusion.”

Colorado River: Due to agricultural and urban conservation activities, California diverted the lowest amount of water from the Colorado River in 70 years. Arizona and Nevada also stockpiled significant amounts of water in Lake Mead, raising its elevation by 9 feet during the year despite reduced upstream releases from Lake Powell.

Metropolitan entered into a seven-year seasonal fallowing agreement with Bard Water District expanding Metropolitan’s successful agricultural-urban partnerships. Additionally, Metropolitan signed a letter of intent with Southern Nevada Water Authority to explore a potential partnership in the development of the Regional Recycled Water Program.

Water Quality: National attention focused on PFAS (Per- and polyfluoroalkyl substances), a family of chemicals used in stain-resistant fabrics and non-stick cookware, firefighting foam and other uses. To date, Metropolitan has detected only PFHxA (perfluorohexanoic acid), an unregulated compound that is believed to pose negligible risk to human health, slightly above the minimum reporting level. State officials tightened notification and response levels for the two most common types of PFAS—perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS)—which have been detected in some groundwater wells in the region. Metropolitan is working with its member agencies to build understanding about how PFAS have affected the region's water.

Future visions: At a board retreat held at the same Pasadena hotel that hosted the first meeting of the Metropolitan Board of Directors in 1928, the board examined the importance of interdependence as it prepared for the update of the Integrated Water Resources Plan.

Finances: The board adopted a $2.8 billion budget covering the next two fiscal years. In response to lower water sales and economic impacts of COVID-19, the board limited rate increases to 3 percent effective Jan. 1, 2021, and 4 percent effective Jan. 1, 2022 by cutting expenditures on some programs, while maintaining essential regional investments in water safety and reliability.

Retirement: After 15 years at the helm, General Manager Jeffrey Kightlinger announced his retirement, ending a tenure that was the longest in Metropolitan's history. Initially set for the end of calendar year 2020, the general manager agreed to delay his departure during the board's recruitment of a successor to deal with the ongoing pandemic into 2021.

Confronted with challenges of historic proportions, the Metropolitan Water District of Southern California called upon its tradition of resilience and innovation to confront a worldwide public health crisis, economic challenges and demands for societal changes to keep Metropolitan well-positioned for the future.

Crews working on the Sunset Strip (near Harper Avenue) during shutdown of Santa Monica Feeder.

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 participation rights 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 2019/20, supply conditions varied from above-normal precipitation in 2019 to dry conditions in the SWP watershed at the beginning of 2020. Despite these changing conditions, Metropolitan continued to adapt its operations to ensure continued water supply reliability, even amid the COVID-19 pandemic.

The state Department of Water Resources set the final SWP allocation for calendar year 2019 at 75 percent, or about 1.43 million acre-feet, as Northern California experienced near record high precipitation. By late 2019, precipitation had decreased and the Sierra Nevada watershed experienced a nearly record dry start to the 2020 water year. Conditions remained dry through April, then experienced relatively high precipitation in May, and the final SWP allocation for CY 2020 ended at 20 percent, or about 382,000 AF.

At the beginning of the fiscal year, with a high 2019 final SWP allocation, Metropolitan continued to maximize SWP deliveries. To free up capacity in the service area and fully maximize SWP deliveries, Metropolitan capitalized on storage of Colorado River water upstream of Metropolitan's service area. Nearly half of the Colorado River diversions were delivered to the Desert Water Agency and Coachella Valley Water District (DWCV) Advanced Delivery Account through the groundwater recharge facilities at the Whitewater and Mission Creek connections along the CRA. Desert Water and CVWD are both SWP contractors with no physical connections to SWP supplies. 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. Low diversions and high deliveries to the DWCV Advanced Delivery Account reduced deliveries of Colorado River water into the service area to about 280,000 AF in CY 2019—one of the lowest delivery amounts to the service area since the early 1950s. This also resulted in a record single-year increase of Metropolitan's Lake Mead Intentionally Created Surplus storage of about 360,000 AF (after losses), for an overall record total storage in this account of about 979,000 AF. As conditions shifted to dry in 2020, Metropolitan adapted to minimize deliveries of limited SWP supplies by March and continued this operation through the end of the fiscal year, maintaining the SWP/Colorado River balancing act while operating under COVID-19 restrictions. Typically, minimized SWP deliveries are countered by maximizing Colorado River water imports. However, a capital project to replace aging CRA power cables that began in October 2019 was still underway, so Metropolitan relied on

Lake Mathews storage until a CRA 7-pump flow was restored by the end of May 2020.

Metropolitan's water transactions for FY 2019/20 were about 1.36 MAF, the lowest since 1983, and significantly below the 10-year average of 1.69 MAF. This is attributed to continued conservation and local supply development, along with generally wet and cool local conditions in the fiscal year that significantly decreased water use and increased local supplies. Maximum daily system deliveries to member agencies were about 5,860 AF per day for the fiscal year, compared to 5,690 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 2019/20. 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 2019/20
(Acre-Feet)

Month	Full Service*	Storage Program**	Totals
July	119,510	5,130	124,640
August	130,239	5,450	135,688
September	128,621	5,083	133,704
October	116,572	5,413	121,986
November	102,657	4,336	106,994
December	67,619	88,252	155,871
January	88,598	3,195	91,794
February	82,758	2,105	84,863
March	82,313	2,287	84,600
April	84,980	0	84,980
May	112,978	0	112,978
June	121,526	0	121,526
Totals	**1,238,371**	**121,251**	**1,359,622**

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

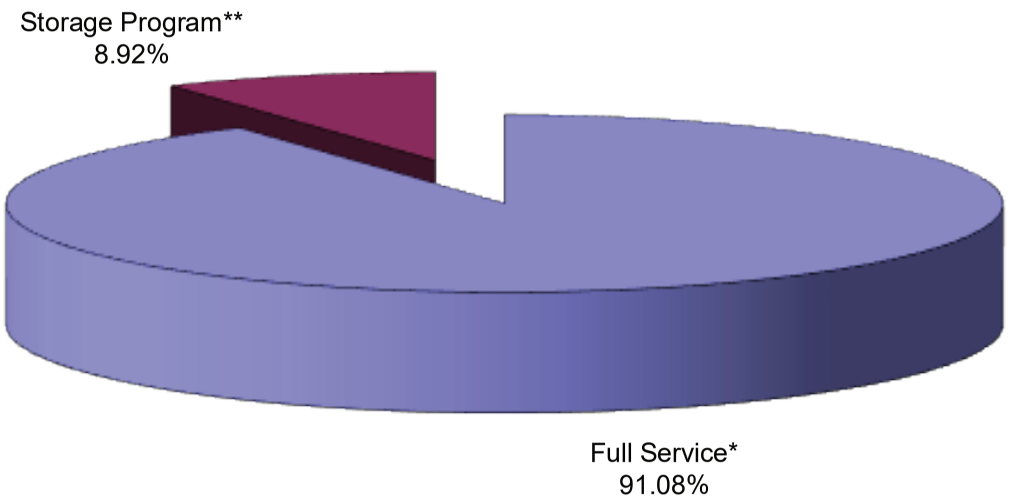
With extraordinary surplus conditions in the first half of FY 2019/20, Metropolitan maximized deliveries into every available storage account and pursued water management actions to increase deliveries to local groundwater basins. Metropolitan worked closely with its member agencies to initiate a new water management tool, the cyclic cost-offset program, a store-now, buy-later program that further helped to capture supplies and replenish in-region storage. Combined, the cyclic cost-offset program, the traditional cyclic program, and the conjunctive use program reached a new single-year record delivery of 189,000 AF, some of which will be sold in future years. Metropolitan's SWP carryover storage also climbed to its highest in history. By the end of 2019, with the combination of high supplies, low demands and strategic operations, Metropolitan increased storage by over 700,000 AF, adding more than 100,000 AF into emergency storage and over 600,000 AF into dry-year storage. This brought Metropolitan's dry-year storage to a new record of more than 3.1 MAF. These conditions created opportunities to reposition storage, such as reducing levels in Diamond Valley Lake from nearly full to slightly over 720,000 AF by the end of the fiscal year, creating some space in the reservoir for additional operational flexibility to capture available supplies, if needed. Metropolitan also took delivery of DWCV carryover supplies stored in San Luis Reservoir early in 2020 to reduce the risk of carryover spill. By the end of CY 2020, storage may increase slightly due to low demands and lower agricultural usage trends in California, resulting in increased Colorado River supplies to Metropolitan, in spite of the relatively low SWP allocation of 20 percent. Those conditions may increase overall supplies to equal or surpass demands, resulting in calendar year 2020 dry-year storage possibly ending at the same or higher level than it began at 3.1 MAF.

Overall, Metropolitan took strategic actions this fiscal year to reposition storage under high supply conditions and manage storage during low supply conditions to best position the region for future challenges.

Major Accomplishments for Fiscal Year 2019/20

System Operations and Planning

- Effectively managed surplus supplies and set record-breaking end-of-year dry-year storage reserves at 3.1 MAF in 2019, including record increases to Lake Mead ICS accounts.
- Quickly adjusted system operations from maximizing delivery and storage of SWP supplies to reduce the risk of spill during surplus conditions, to minimizing delivery of limited SWP supplies when conditions turned dry.
- Coordinated and implemented innovative blending operations utilizing the Lake Perris pump-back, while simultaneously delivering SWP supplies from Devil Canyon to the Mills plant to manage alkalinity and ensure continued delivery of high-quality water.
- Continued critical operations and reliable water deliveries, while maintaining workforce safety amid a global pandemic.
- Successfully managed critical shutdowns for system improvements, maintenance and repairs (major shutdowns and service interruptions are shown in Table 1-5).



* 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 2019/20 - All Member Agencies

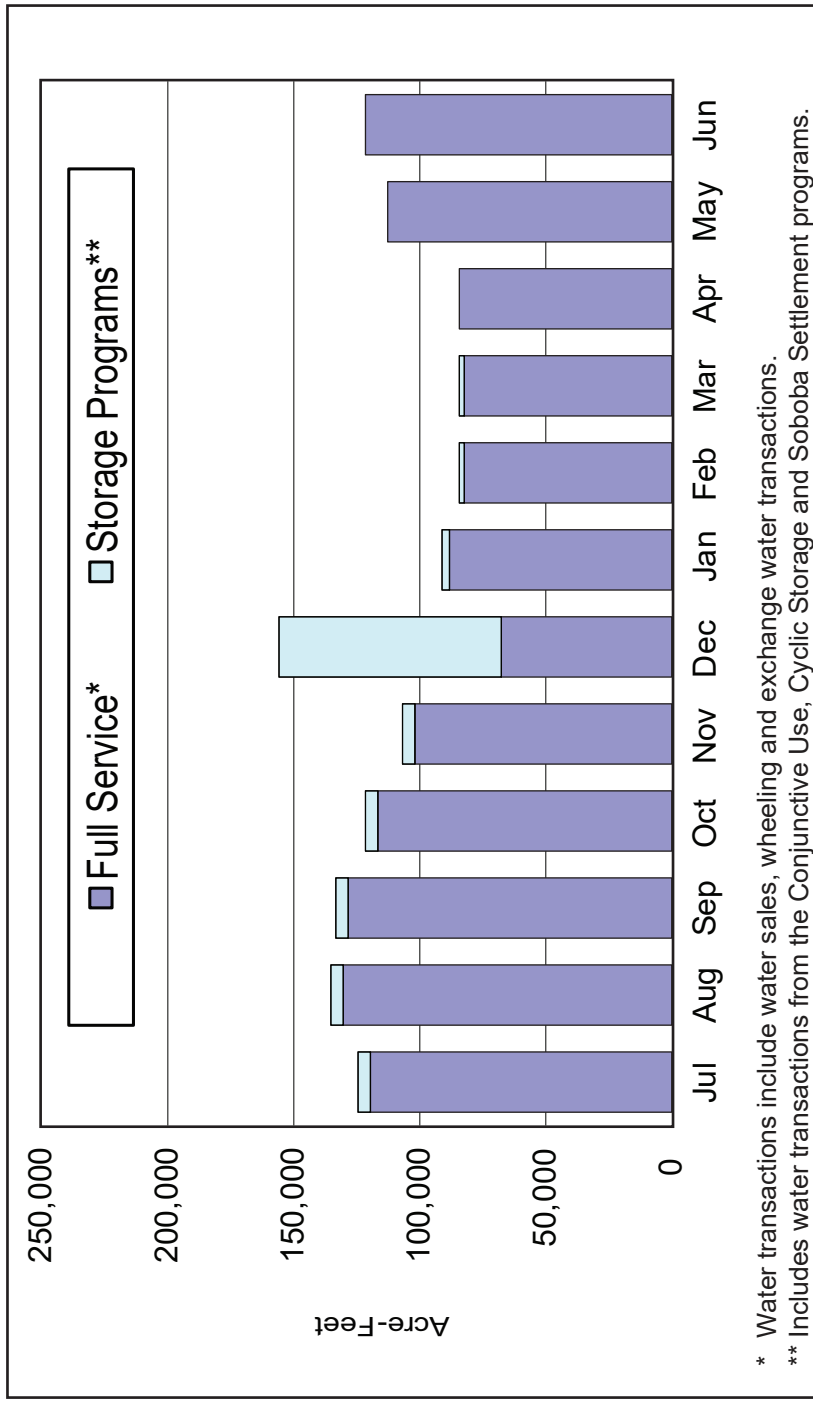


Figure 1-2. Monthly Water Transactions for Fiscal Year 2019/20 - All Member Agencies

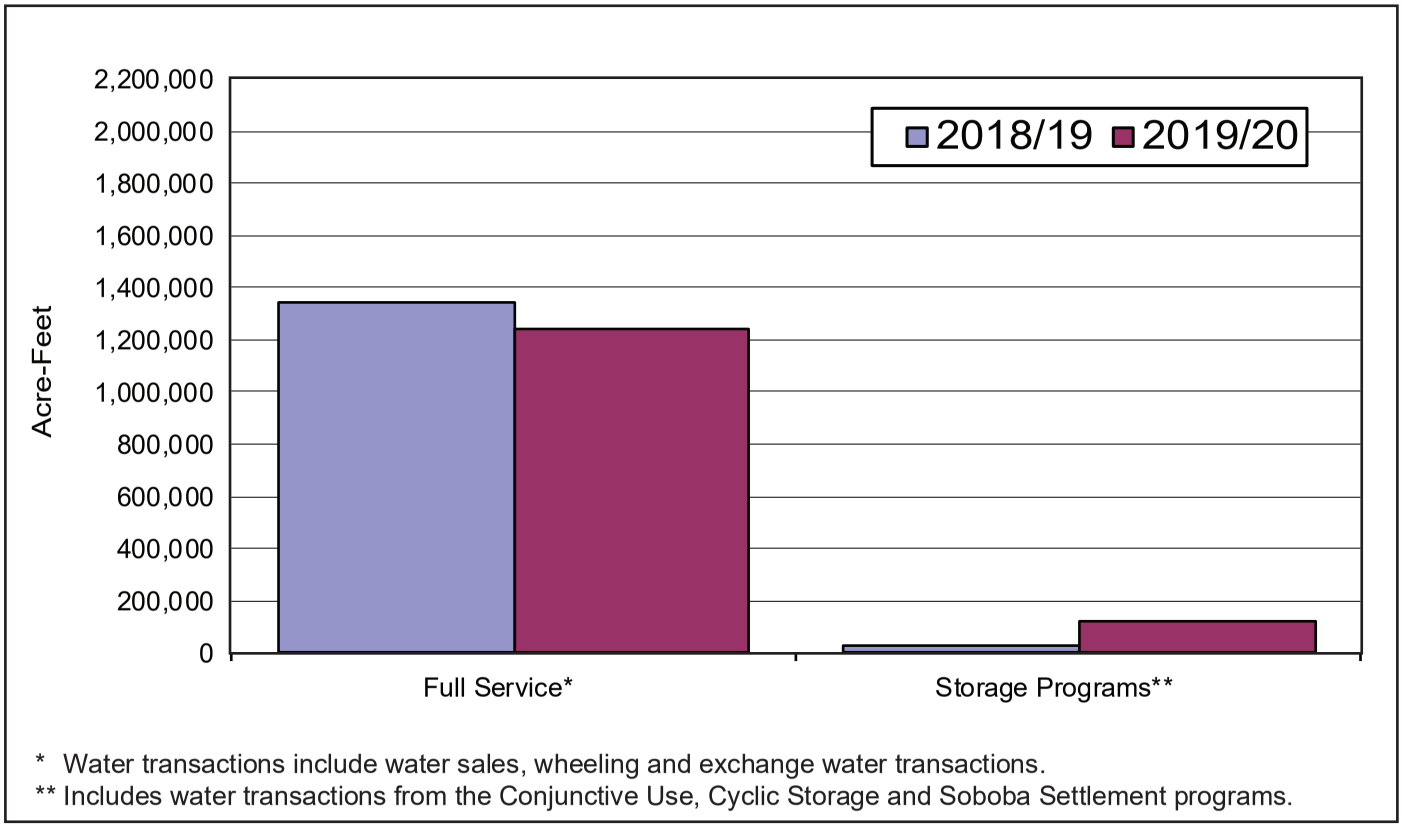


Figure 1-3. Comparison of Water Transactions to Member Agencies For The Past Two Fiscal Years

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	1,284,410	1,374,327
1980	1,295,903	1,282,064	2020		1,359,622

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 2019/20[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	43,767	43,767	24,183		24,183	67,950	36%
Beverly Hills	0	0	9,553		9,553	9,553	100%
Burbank	12,823	12,823	6,781	9,182	15,963	19,604	35%
Calleguas	38,584	48,095	89,031	4,771	93,802	137,126	65%
Central Basin	207,667	231,044	16,429		16,429	247,473	7%
Compton	7,269	7,269	38		38	7,307	1%
Eastern	112,508	112,508	88,524	25,996	114,520	201,032	44%
Foothill	8,013	8,013	7,968		7,968	15,981	50%
Fullerton	18,512	18,512	5,041		5,041	23,553	21%
Glendale	9,816	9,816	14,465		14,465	24,281	60%
Inland Empire	183,132	181,645	47,440	18,122	65,562	229,085	21%
Las Virgenes	3,899	4,026	20,205		20,205	24,231	83%
Long Beach	32,137	32,137	34,622		34,622	66,759	52%
Los Angeles	341,420	342,448	153,784		153,784	496,232	31%
MWDOC	349,620	364,019	139,316	18,030	157,346	503,335	28%
Pasadena	8,070	8,148	18,536		18,536	26,684	69%
San Diego CWA	151,073	151,073	322,627		322,627	473,700	68%
San Fernando	2,772	2,772	0		0	2,772	0%
San Marino	3,423	3,423	1,633		1,633	5,056	32%
Santa Ana	25,299	25,299	7,649		7,649	32,948	23%

TABLE 1-4 (Continued)
WATER USE BY METROPOLITAN'S MEMBER AGENCIES
Fiscal Year 2019/20[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
Santa Monica	10,171	10,171	4,179		4,179	14,350	29%
Three Valleys	45,002	46,372	58,184	13,505	71,689	104,556	56%
Torrance	4,233	9,737	15,096		15,096	24,833	61%
Upper San Gabriel	167,243	130,561	6,021	84,355	90,376	136,582	4%
West Basin	56,267	49,736	112,636		112,636	162,372	69%
Western	168,546	168,546	66,787		66,787	235,333	28%
	2,011,266	2,021,960	1,270,728	173,961	1,444,689	3,292,688	39%

Footnotes:

[1] Local supply data includes three year averages for those sources unavailable at time of publication.

[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
2019/20 MAJOR SHUTDOWNS & SERVICE INTERRUPTIONS

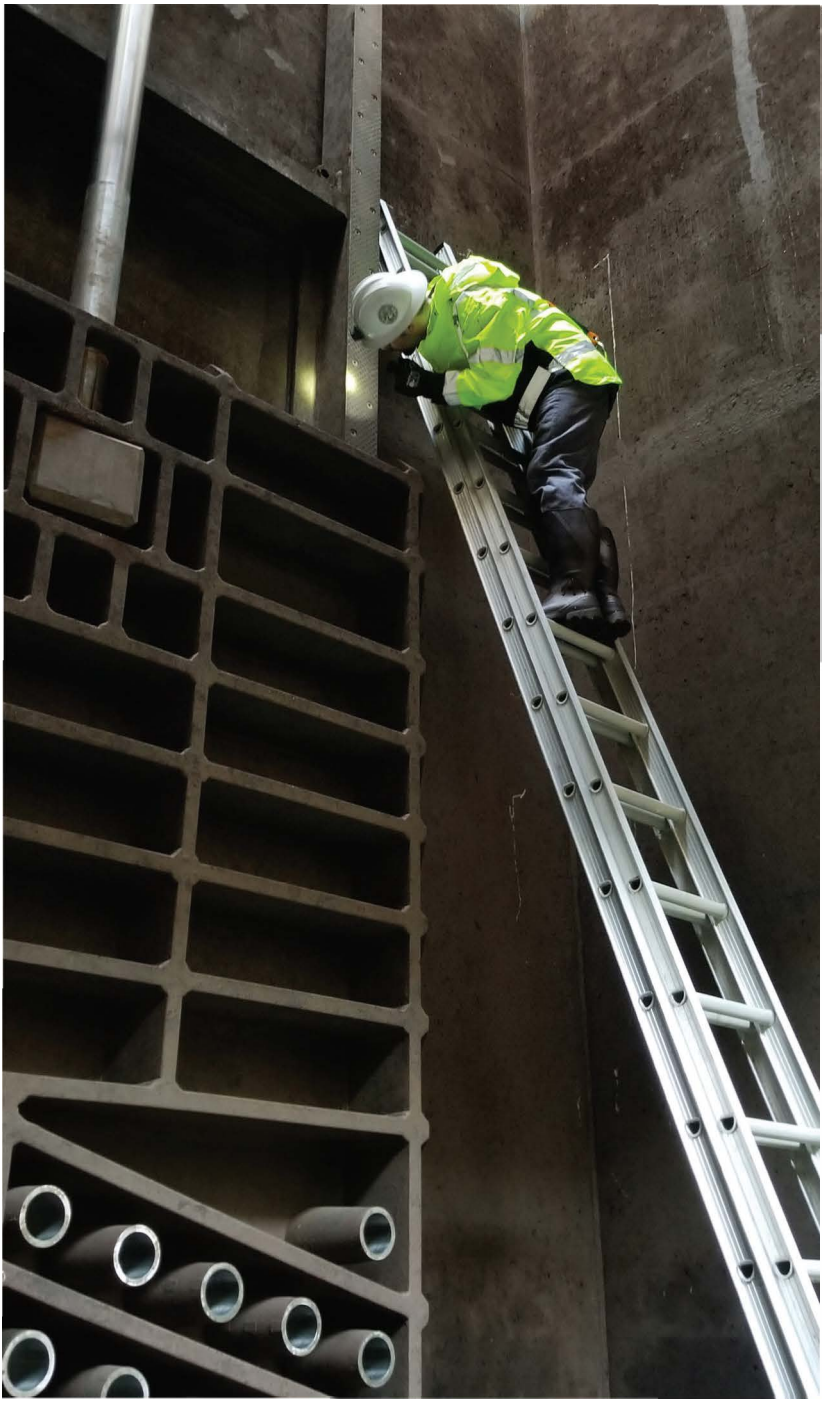
FACILITY	DATES	NO.OF DAYS	LIMITS OF SHUTDOWN	PURPOSE
SECOND LOWER FEEDER	Jul 1-Sep 1, 2019	63	From Ball and Dale sectionalizing valve to Carson and Bataan sectionalizing valve	Perform PCCP rehabilitation on Reach 4.
ORANGE COUNTY FEEDER	Jul 1-Sep 21, 2019	83	From Willits PCS to Irvine Cross Feeder	Perform lining repairs (project began in February 2019).
SAN DIEGO PIPELINE 4	Sep 9-Sep 18, 2019	10	From Skinner WTP to SDCWA jurisdiction line	For SDCWA to perform urgent leak repair.
SECOND LOWER FEEDER	Oct 10-Oct 14, 2019	5	From Diemer WTP to Carbon Creek PCS	Perform PCCP inspection.
LOWER FEEDER (UNTREATED)	Oct 21-Oct 21, 2019	1	From Lake Mathews to Santiago Control Tower	Perform repairs at the Temescal HEP.
SECOND LOWER FEEDER -SEPULVEDA FEEDER	Oct 21-Oct 27, 2019	7	From South Coast Feeder to Palos Verdes Reservoir	Install two bulkheads to prepare for Reach 2 PCCP rehabilitation.
SECOND LOWER FEEDER	Oct 28, 2019-Jun 13, 2020	230	From Victoria to 223rd Street Cross Feeder to Sepulveda Feeder	Perform PCCP rehabilitation on Reach 2.
SAN DIEGO PIPELINE 4	Nov 4-Nov 10, 2019	7	From Skinner WTP to SDCWA jurisdiction line	For SDCWA to remove bulkhead and temporary relief piping.
EAST VALLEY FEEDER	Nov 4, 2019-Feb 16, 2020	105	From Greg Ave Pumping Plant to Santa Monica Feeder	Perform feeder inspection.
GREG AVENUE PUMPING PLANT	Nov 4, 2019-June 30, 2020	240	From Greg Ave PCS and Pumping Plant Facility	Install new pump header and other pump foundation components (estimated completion date November 2020).
ORANGE COUNTY FEEDER	Nov 12-Nov 19, 2019	8	From Willits PCS to Irvine Cross Feeder	Remove bulkhead and return feeder to normal operation.
SKINNER WATER TREATMENT PLANT -AULD VALLEY PIPELINE -SAN DIEGO PIPELINES 1 & 2 -SAN DIEGO PIPELINE 3 -SAN DIEGO PIPELINE 4	Dec 8-Dec 16, 2019	9	Skinner WTP	Install SKPE-1 Bypass Meter and perform PCCP inspections.
SANTA MONICA FEEDER	Jan 6-Jan 14, 2020	9	From South Portal of Hollywood Tunnel to Beverly Hills PCS	Perform PipeDiver inspection and install internal seals at four locations.
INLAND FEEDER	Jan 6-Jan 14, 2020	9	From DWR's Devil Canyon Power Plant to Inland Feeder 132-inch butterfly valve	Perform valve repair and meter inspection.
RIALTO PIPELINE -ETIWANDA PIPELINE	Jan 6-Jan 16, 2020	11	From DWR Devil Canyon Power Plant to Live Oak Reservoir	Support DWR's Devil Canyon Power Plant shutdown.

TABLE 1-5 (Continued)
2019/20 MAJOR SHUTDOWNS & SERVICE INTERRUPTIONS

FACILITY	DATES	NO.OF DAYS	LIMITS OF SHUTDOWN	PURPOSE
BOX SPRINGS FEEDER -MILLS WATER TREATMENT PLANT -PERRIS VALLEY PIPELINE	Jan 13-Jan 18, 2020	6	From DWR's Santa Ana Valley Pipeline to Mills WTP	For DWR to install bulkhead on the Santa Ana Valley Pipeline, upstream of the Box Springs Feeder turnout.
DIEMER WATER TREATMENT PLANT -LOWER FEEDER (TREATED) -SECOND LOWER FEEDER -EAST ORANGE COUNTY FEEDER 2 -ALLEN-MCCOLLOCH PIPELINE	Jan 21-Jan 26, 2020	6	Diemer WTP	Modify ozone generator system; replace and install flowmeter; raise effluent weir elevation; perform PCCP inspection; and replace Service Connection A-06 venturi meter.
LOWER FEEDER (UNTREATED) - EAST ORANGE COUNTY FEEDER 1	Jan 21-Jan 27, 2020	7	From Olinda PCS to Diemer WTP	Support Diemer WTP shutdown.
LAKE SKINNER OUTLET CONDUIT	Jan 27-Feb 1, 2020	6	From Lake Skinner Outlet Tower to Auld Valley Control Structure	Perform PCCP inspection and replace Lake Skinner Outlet Conduit meter.
SAN DIEGO PIPELINE 3 SAN DIEGO PIPELINE 5	Jan 27-Feb 5, 2020	10	From Skinner WTP to SDCWA jurisdiction line	For SDCWA to remove cement mortar lining from its Rejection Tower.
BOX SPRINGS FEEDER -MILLS WATER TREATMENT PLANT -PERRIS VALLEY PIPELINE	Jan 28-Feb 1, 2020	5	From DWR's Santa Ana Valley Pipeline to Mills WTP	For DWR to remove bulkhead on the Santa Ana Valley Pipeline upstream of the Box Springs Feeder turnout.
EAST VALLEY FEEDER	Feb 3-Feb 22, 2020	15	From Sepulveda Feeder/East Valley Interconnection to East Valley to Santa Monica Feeder Interconnection	Perform PCCP inspection and support rehabilitation work at Service Connection B-05.
COLORADO RIVER AQUEDUCT -SAN JACINTO PIPELINE -SAN JACINTO PIPELINE 1 & 2	Feb 4-Feb 28, 2020	25	From Whitsett Intake Pumping Plant to Lake Mathews	Perform repair, cleaning, and maintenance; resume 6.9 kV cables replacement; and perform San Jacinto Tunnel weir measurement.
SAN DIEGO CANAL	Feb 7-Feb 14, 2020	8	From Casa Loma Canal to Lake Skinner	Clean out siphons and sediment.
WEST ORANGE COUNTY FEEDER	Feb 9-Feb 16, 2020	8	From OC Feeder to Lower Feeder (Treated)	Replace 13 valves.
SAN DIEGO PIPELINES 1 & 2	Feb 10-Feb 19, 2020	10	From Skinner WTP to SDCWA jurisdiction line	For SDCWA to repair leak.

TABLE 1-5 (Continued)
2019/20 MAJOR SHUTDOWNS & SERVICE INTERRUPTIONS

FACILITY	DATES	NO.OF DAYS	LIMITS OF SHUTDOWN	PURPOSE
FOOTHILL FEEDER -SAN FERNANDO TUNNEL -JENSEN WATER TREATMENT PLANT -SEPULVEDA FEEDER -WEST VALLEY FEEDER 1 & 2 -CALABASAS FEEDER	Feb 18-Feb 22, 2020	5	From Castaic Lake to Jensen WTP	For DWR to re-install 132-inch isolation valve.
LOWER FEEDER (UNTREATED)	Feb 20-Feb 22, 2020	3	From Lake Mathews to Santiago Control Tower	Perform repairs on the Temescal Throttling Gate.
SAN DIEGO PIPELINE 4	Mar 1-Mar 10, 2020	10	From Skinner WTP to SDCWA jurisdiction line	For SDCWA to perform internal inspection and Metropolitan to perform PCCP inspection.
ETIWANDA PIPELINE	Mar 12-Mar 22, 2020	11	From Rialto Pipeline to Etiwanda Reservoir	Perform inspection to assess mortar and polyurethane lining.
PALOS VERDES RESERVOIR	Mar 16-Mar 20, 2020	5	Palos Verdes Reservoir Second Outlet and Bypass Feeders	Replace valve and flowmeter at Service Connection WB-32.
LAKEVIEW PIPELINE	Mar 30-Apr 3, 2020	5	From PC-1 to Casa Loma Canal	Replace valve at Service Connection EM-14.
SAN DIEGO PIPELINE 5	Mar 30-Apr 5, 2020	7	From Red Mountain Pumping Plant to SDCWA jurisdiction line	For SDCWA to install bulkheads.
BOX SPRINGS FEEDER -MILLS WATER TREATMENT PLANT -PERRIS VALLEY PIPELINE	Apr 30-May 3, 2020	4	From DWR's Santa Ana Valley Pipeline to Mills WTP	For DWR to install bulkhead on the Santa Ana Valley Pipeline, upstream of the Box Springs Feeder turnout.
BOX SPRINGS FEEDER -MILLS WATER TREATMENT PLANT -PERRIS VALLEY PIPELINE	May 12-May 15, 2020	4	From DWR's Santa Ana Valley Pipeline to Mills WTP	For DWR to remove bulkhead on the Santa Ana Valley Pipeline, upstream of the Box Springs Feeder turnout.
SECOND LOWER FEEDER	Jun 22-Jun 30, 2020	9	From Diemer WTP to Carbon Creek PCS	Install bulkhead upstream of Service Connection OC-56 to prepare for Reach 8 PCCP repair.



A worker inspects slide gates at the Henry J. Mills Water Treatment Plant.

The Road Bridge, gateway to Bacon Island (top); a closeup of Tule Red levee during breach ceremony.

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 operates at the forefront of planning activities for proposed Delta programs and projects affecting water supply reliability and sustainability, such as the Delta Conveyance Project and the proposed Sites Reservoir. Staff continued participation in various activities that include collaborative science, the support of efforts that may influence regulatory processes that affect State Water Project supplies, and project planning. Even with restrictions brought about by COVID-19 and the challenges of teleworking, the group has continued protecting Metropolitan's interests, especially in the Delta region (shown in Figure 2-1).

Long-Term Actions

Delta Conveyance

The California Department of Water Resources initiated the California Environmental Quality Act scoping period for the proposed Delta Conveyance Project, with the release of the Notice of Preparation on January 15. DWR conducted statewide public scoping meetings concluding the scoping period on April 17 after an extended 93-day public comment period. Metropolitan submitted comments prior to the original deadline and provided supporting documents

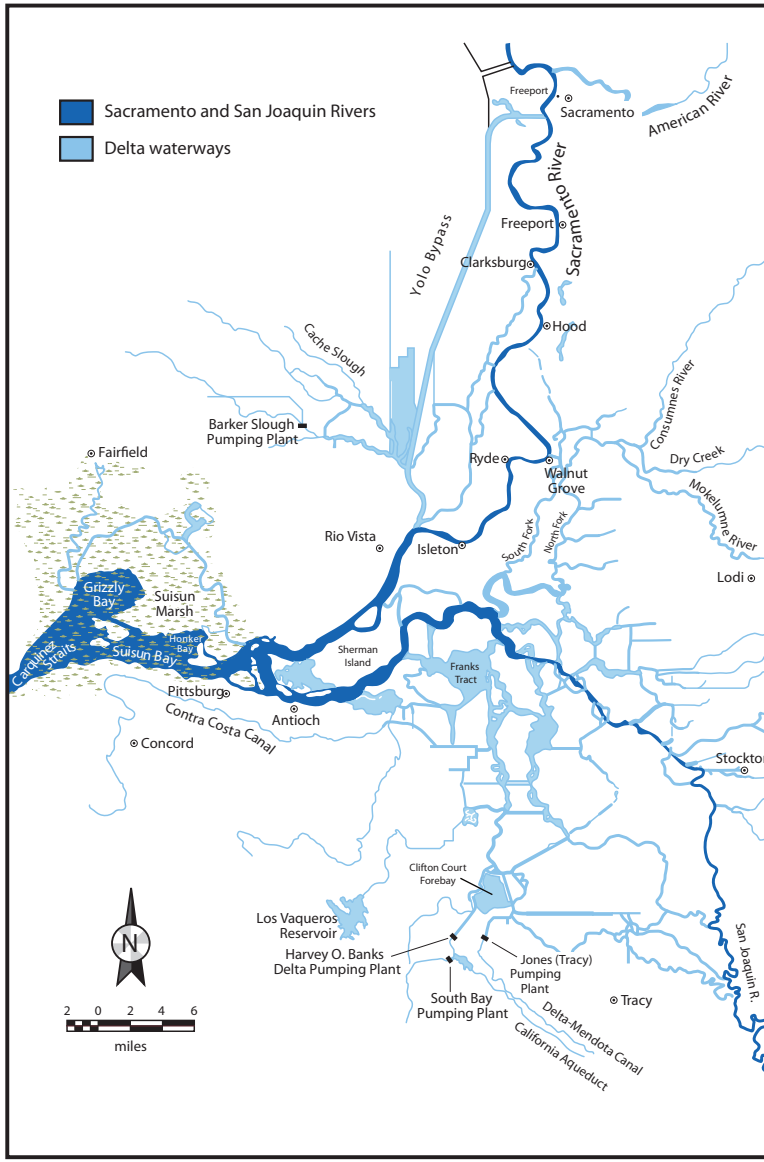


Figure 2-1. Map of the Delta Region

to member agencies and others. DWR is reviewing all submitted comments and will publish a summary in summer 2020. Comments received will be considered in the development of the Draft Environmental Impact Report.

DWR submitted a revised permit application on June 15 to request authorization for the proposed Delta Conveyance Project activities in the waters of the United States. The Section 404 permit application formally engaged the U.S. Army Corps of Engineers in coordinating DWR's CEQA process with the Army Corps' process for compliance with the National Environmental Policy Act, the Clean Water Act, and Rivers and Harbors Act.

Amendments to State Water Project Contracts

SWP Contractors and DWR publicly negotiated for months on amendments to the SWP water supply contracts that focused on cost allocation and the development of equitable water accounting and management processes. An Agreement in Principle finalized in April includes an "Opt-Out" approach for cost allocation for Delta Conveyance. It will be presented later this year to State Water Contractor member water agencies for their consideration.

California EcoRestore

The Tule Red Restoration Project and the levee breach finished construction in October 2019. Metropolitan actively partnered in this joint effort by the State and Federal Contractors Water Agency and DWR. The project opens more than 400 acres of wetlands to daily tides to benefit native fish species and provide much-needed habitat for endangered fish and wildlife species. Tule Red is the fourth EcoRestore project implemented by DWR to count toward the 8,000-acre restoration obligation.

Staff supported various stakeholders on implementing infrastructure improvement for the Yolo Bypass Habitat Drainage Improvement Project. It aims to expand and increase productivity of wetlands, improve land management for agriculture, including migratory waterfowl habitat, and reduce flooding.

Sites Reservoir

Metropolitan is a member of the Sites Reservoir Project Committee, which helps carry out the budget, work plan, development, benefits, and associated operations plan. Under the 2019 planning agreement, Metropolitan reserved a proportionate 50,000 AF of Class 1 water supply yield.

A revised proposal reduces costs by about 40 percent. While the changes will delay the start of construction to at least 2023, the project completion may now be more viable and affordable for its participants.

Near-Term Actions

Regulatory Activities

The October 2019 updated federal biological opinion under the federal Endangered Species Act is expected to advance scientific management of the Delta based on real-time conditions and real-time monitoring of important fish species. In March, the California Department of Fish and Wildlife issued an incidental take permit for long-term SWP operations. The permit covers four species protected under the California Endangered Species Act: Delta smelt, longfin smelt, winter-run Chinook salmon and spring-run Chinook salmon. To protect Metropolitan's interests, the board authorized the filing of a lawsuit against CDFW and DWR challenging the new CESA permit and Final Environmental Impact Report. The lawsuit questions the science used to develop the state permit.

Staff participated in policy- and technical-level discussions to consider an agreement approach with multiple stakeholders to update the State Water Resources Control Board Bay-Delta Water Quality Control Plan. No decision was made to advance the approach as of the end of 2019, but the discussions could be the basis for a comprehensive management approach to the Bay-Delta watershed, with governance, science, funding and adaptive management elements.

Science Activities

Staff continued participating in the Collaborative Science and Adaptive Management Program, including participation on the Collaborative Adaptive Management Team and in various committees and workshops to develop up-to-date science. Staff also worked in

various Delta science forums on work plans and studies, including the Delta Independent Science Board.

Staff co-authored a study to determine the exposure pathway and impacts of microcystis on threadfin shad, a pelagic fish in the Delta, and a white paper for the control of invasive aquatic weeds in the Delta to identify critical needs, including regulatory changes and funding.

Delta Islands Activities

Bacon Island's $14.5 million multi-benefit Levee Improvement Project finished work in December 2019. It will ensure a more stable levee along the western portion of Bacon Island, enhance flood protection, and provide an improved water supply conveyance in the central Delta. This multi-benefit project will assist in securing ecosystem in-Delta enhancements, and reliability for SWP and Central Valley Project supplies.

Staff also worked with reclamation districts in completing a Proposition 218 process that increased property assessments and reduced some of the outstanding capital improvement debts.

CDFW announced the selection of Metropolitan as a grant recipient of up to $1.1 million to analyze opportunities for subsidence reversal, sustainable agricultural practices, carbon sequestration, water quality, and habitat restoration. The grant study aims to conduct science-based planning for alternate land uses on one or more of Metropolitan's Delta properties to increase water supply reliability, agriculture practices sustainability and resilience to climate change.

The last of the four cases challenging Metropolitan's decision to purchase property known as the Delta Islands concluded with Metropolitan prevailing on the merits in the trial court and the court of appeal. This concludes all litigation challenging Metropolitan's purchase of the Delta Islands.

Emergency Preparedness Plan

Staff worked closely with DWR in updating the Delta Emergency Operations Integration Plan, to integrate personnel and resources from DWR and the Army Corps of Engineers during Delta flood-fighting emergencies. The plan reviews operational guidelines and after-action

reports of field exercises to craft a multi-agency response to large-scale emergencies by integrating organizational structures, responsibilities and communications.

A flood emergency exercise addressing flood effects to San Joaquin River levees both within and outside the Delta region was conducted by the Sacramento Joint Flood Operations Center. The exercise included the use of a Flood Emergency Response Information Exchange online data-sharing system developed by DWR to improve flood emergency preparedness, response and recovery through a real-time GIS interface.

The DWR Delta Levees Program approved engineering and design for levee improvements on portions of the Bacon Island east levees that have been identified for improvement as part of the emergency freshwater pathway. These are in addition to other levee improvements at the island, which will better prepare levees and facilitate emergency repairs in the event of a major earthquake.

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 (which includes Bard Water District, Imperial Irrigation District and Coachella Valley Water District, as well as Metropolitan.

Record Low Water Use

During calendar year 2019, water contractors in California collectively used 3.84 million acre-feet of water from the Colorado River, significantly less than the state's basic apportionment of 4.4 MAF and the lowest amount of water diverted from the Colorado River since 1949. Substantial conservation programs implemented in both urban and agricultural areas helped reduce water demands, and the recently approved Colorado River Drought Contingency Plan incentivized storing that conserved water in Lake Mead as

Intentionally Created Surplus. Metropolitan stored 409,000 acre-feet of water in Lake Mead in 2019, the most it has ever stored in one year, bringing its total ICS storage in Lake Mead to 979,000 acre-feet. This large volume of ICS ensures that Metropolitan has sufficient resources to fill its Colorado River Aqueduct for several years in the event dry conditions continue in California.

In addition to California's ICS storage in 2019, Nevada and Arizona stored significant amounts of water in Lake Mead, with the three states storing a total of 625,000 AF of ICS, the maximum amount allowed by the DCP in one year. As a result, the reservoir increased in elevation by 9 feet during 2019 even though releases from Lake Powell into Lake Mead remained steady.

Bard Seasonal Fallowing Program

In early 2020, Metropolitan and Bard Water District entered into a seven-year agreement under which farmers in Bard agree to fallow their land during four high water-use months each spring and summer. Under the agreement terms, Metropolitan makes an annual call to fallow up to 3,000 acres of land each year, and farmers in Bard have the option of accepting the fallowing payment in exchange for agreeing not to irrigate crops on enrolled lands between April 1 and August 1 each year. This program incentivizes farmers to irrigate higher valued, lower water-use crops (such as vegetables) in the fall and winter months and to avoid planting lower valued, higher water use crops (such as hay) in the late spring and summer. Metropolitan estimates the fallowing program saves about 2 acre-feet of water for each participating acre. In 2020, Metropolitan issued a call for the full 3,000 acres to be fallowed during 2020, and farmers in Bard agreed to fallow nearly that entire amount. Metropolitan plans to save the conserved water in Lake Mead for future use.

Metropolitan, Coachella and Desert Exchange Agreements

In late 2019, Metropolitan, Coachella Valley Water District and Desert Water Agency amended their exchange agreements to better serve the needs of each agency. The amendments provided Desert and Coachella increased certainty in developing and securing additional water supplies and provided Metropolitan financial reimbursement for a portion of its water management costs under the program. It is the

latest amendment in the exchange agreements, which date back to the 1960s. At that time, in lieu of building a physical connection the State Water Project, Coachella and Desert entered into an agreement to exchange state project supplies with Colorado River water, as the Colorado River Aqueduct runs adjacent to their service areas. The agreements were expanded during the approval of the 2003 Quantification Settlement Agreement.

Southern Nevada Water Authority Partnership

Metropolitan and Southern Nevada Water Authority have a long-term program of storing Colorado River water for each agencies' mutual benefit. That partnership expanded in 2020, when the agencies signed a letter of intent to explore options for SNWA to work with Metropolitan on funding and developing the Regional Water Recycling Program in Metropolitan's service area, with the new water supplies potentially being shared by both agencies. Any long-term partnership would require a new agreement on the Colorado River to allow the interstate exchange of water produced through conservation or augmentation projects.

Salinity Control Program

The Colorado River Salinity Control Program has effectively reduced the salinity of Metropolitan's Colorado River supplies by about 20 percent since its inception in the 1970s. The program funds several initiatives, including projects that reduce flood irrigation in the Upper Colorado River Basin that contributes to salinity increases. The single largest salinity control project is a well in Paradox Valley, Colorado that captures and injects natural brine shallow groundwater two miles below the ground surface where it cannot interact with the Colorado River. Since being constructed in the 1990s, this project has successfully prevented about 110,000 tons per year of salt from reaching the Dolores River, a Colorado River tributary. Increased seismicity in the area may indicate the well is nearing the end of its useful life. In 2019, the Bureau of Reclamation issued a draft Environmental Impact Statement with options that included constructing a new well, building evaporation ponds, or using a new zero liquid discharge technology to manage the brine. In its comments, Metropolitan joined the Colorado River Basin States in endorsing evaporation ponds. The final EIS is scheduled to be released in late 2020.

Figure 2-2. Map of the Colorado River Basin

Studying the water used by crops in the Palo Verde Valley helps farmers and Metropolitan improve water efficiency.

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.

In calendar year 2019, State Water Project contractors were operating under a 75 percent SWP allocation due to above-average hydrologic conditions. With the high allocation, water supplies exceeded demands in 2019, enabling the district to increase dry-year storage reserves to a record high level of 3.1 million acre-feet. The 2020 water year began with very dry conditions from October through late November 2019, followed by the driest February in the historical record of Northern Sierra precipitation. In response to modest improvements in statewide hydrologic conditions, in May the state Department of Water Resources increased SWP supplies from an initial allocation of 10 percent to a final allocation of 20 percent for CY 2020. Despite the low supply allocation, Metropolitan stood ready to meet demands in 2020 thanks to investments in storage.

Amid the COVID-19 pandemic, Water Resource Management staff began working from home. Staff continued all essential functions such as supporting Water Surplus and Drought Management decisions as the water year developed and continuing progress on the 2020 Integrated Water Resources Plan update. Staff also adapted conservation programs for social-distancing requirements and converted to online training.

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 an amendment to the contract on Dec. 11, 2018 that extended its term to 2085 and made other changes aimed at improving the financial management and integrity of the SWP. This amendment will become effective and be implemented after additional State Water Contractors sign and any legal actions challenging it are resolved.

Dry hydrologic conditions during water year 2019/20 resulted in a 20 percent allocation of SWP contract supplies for CY 2020. Northern Sierra snowpack peaked at 66 percent of average levels for April 1, after which snowpack typically melts. This followed a wet year with a 75 percent allocation in CY 2019. In sum, Metropolitan managed nearly 1.5 million AF through the SWP system (Fig. 3-1), almost 400,000 AF more water than in the previous fiscal year (FY 2019/20 deliveries and storage are subject to final reconciliation). Metropolitan stored or exchanged about 440,000 AF of supplies outside of the service area during the fiscal year. These storage actions and deliveries occurred in the latter half of CY 2019, when Metropolitan maximized carryover storage and continued to store wet-year supplies in San Joaquin Valley groundwater storage programs.

Metropolitan's net SWP payments during FY 2019/20 were $519 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.

Water Storage Programs

Semitropic/Metropolitan Water Banking and Exchange Program

Metropolitan's 1994 groundwater storage agreement with Semitropic Water Storage District in Kern County allows storage of up to 350,000 AF. During FY 2019/20, Metropolitan stored 45,180 AF with Semitropic and retrieved 5,090 AF. The total water in storage on June 30, 2020 was 260,605 AF.

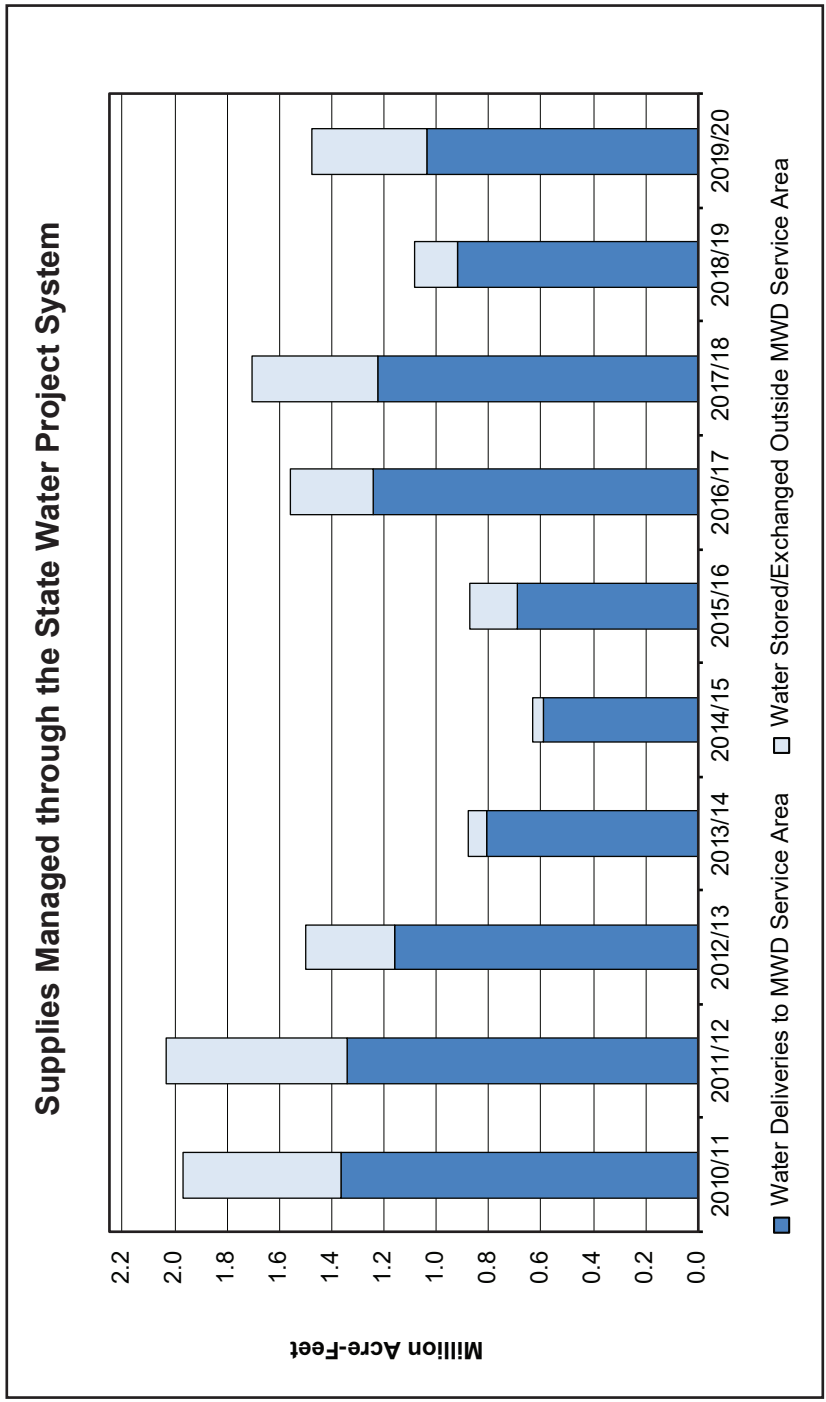


Figure 3-1. Supplies Managed through the State Water Project System

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
2019/20 [5]	48.89	89.93	96.32	125.54	148.08	38.11	19.34	566.21	(47.26)	518.95	13,747.90
TOTALS	952.02	1,316.51	3,760.01	5,861.71	2,359.46	987.28	513.09	15,750.09	(2,002.19)	13,747.90	

* 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.

[5] Does not include the partial refund of prepaid costs for the funding of new facilities planning.

Arvin-Edison/Metropolitan Water Management Program

Under a 1997 agreement with Arvin-Edison Water Storage District, Metropolitan can store up to 350,000 AF. The total water in storage on June 30, 2020, was 142,258 AF. As a result of detecting TCP (1,2,3-trichloropropane) in Arvin-Edison's wells, Metropolitan has temporarily suspended operation of the program until the water quality concerns can be further evaluated and managed.

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, located downstream of the Edmonston Pumping Plant along the East Branch of the California Aqueduct. During FY 2019/20, Metropolitan stored 18,000 AF in the program. The total water in storage on June 30, 2020 was 27,000 AF.

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

In April 2019, Metropolitan entered into an agreement for the 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. AVEK carried out final design activities, including a Metropolitan-involved value engineering process. When 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 2019/20, Metropolitan stored 34,202 AF with Kern Delta and retrieved 7,466 AF. Total water in storage on June 30, 2020, was 181,157 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 did not store or recover water from the Mojave program during FY 2019/20, leaving 18,812 AF in the exchange account as of June 30, 2020.

Water Transfers and Exchanges

San Gabriel Valley Municipal Water District Exchange

A 2013 purchase and exchange agreement with San Gabriel Valley Municipal Water District meant that during FY 2019/20, Metropolitan developed 1,504 AF of additional supply by exchange.

Colorado River Resources

Acquisitions and exchanges made possible by the 2003 Quantification Settlement Agreement continued during FY 2019/20. Figure 3-2 illustrates annual water supplies managed through the CRA since CY 2011. CY 2019 supplies included more than 290,000 AF of diversions into Metropolitan's service area (the dark blue bar in Figure 3-2), plus more than 409,000 AF of Intentionally Created Surplus left in Lake Mead and more than 240,000 AF water stored or exchanged outside Metropolitan's service area (collectively the bright green bar in Figure 3-2), for a total of about 950,000 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 2020, Metropolitan stored 979,460 AF of ICS in Lake Mead, a record cumulative high. Under current projections for CY 2020 activity, Metropolitan will create additional ICS resulting in a new record with more than 1.0 MAF stored in Lake Mead.

Figure 3-3 illustrates the storage levels of lakes Mead and Powell through FY 2019/20. While peak snowpack conditions were near average, a dry fall and significantly below-average spring precipitation resulted in dry soil conditions. When combined with above-average temperatures, those conditions resulted in a projected unregulated inflow to Lake Powell of about 55 percent of the April-July average, and about 61 percent of the water year average. Lake Powell elevations remained above 3,575 feet, which, when combined with Lake Mead elevations, provided for a 8.23 MAF release to Lake Mead.

Water Supply Acquisitions and Exchanges

Metropolitan's agricultural conservation program with Imperial Irrigation District yielded 105,000 AF in CY 2019, with an additional 44,477 AF made available through Metropolitan's land-fallowing agreements with farmers in the Palo Verde Valley. In CY 2019, Metropolitan delivered 237,711 AF to San Diego County Water Authority in exchange for 160,000 AF of conserved IID water, plus 77,711 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.

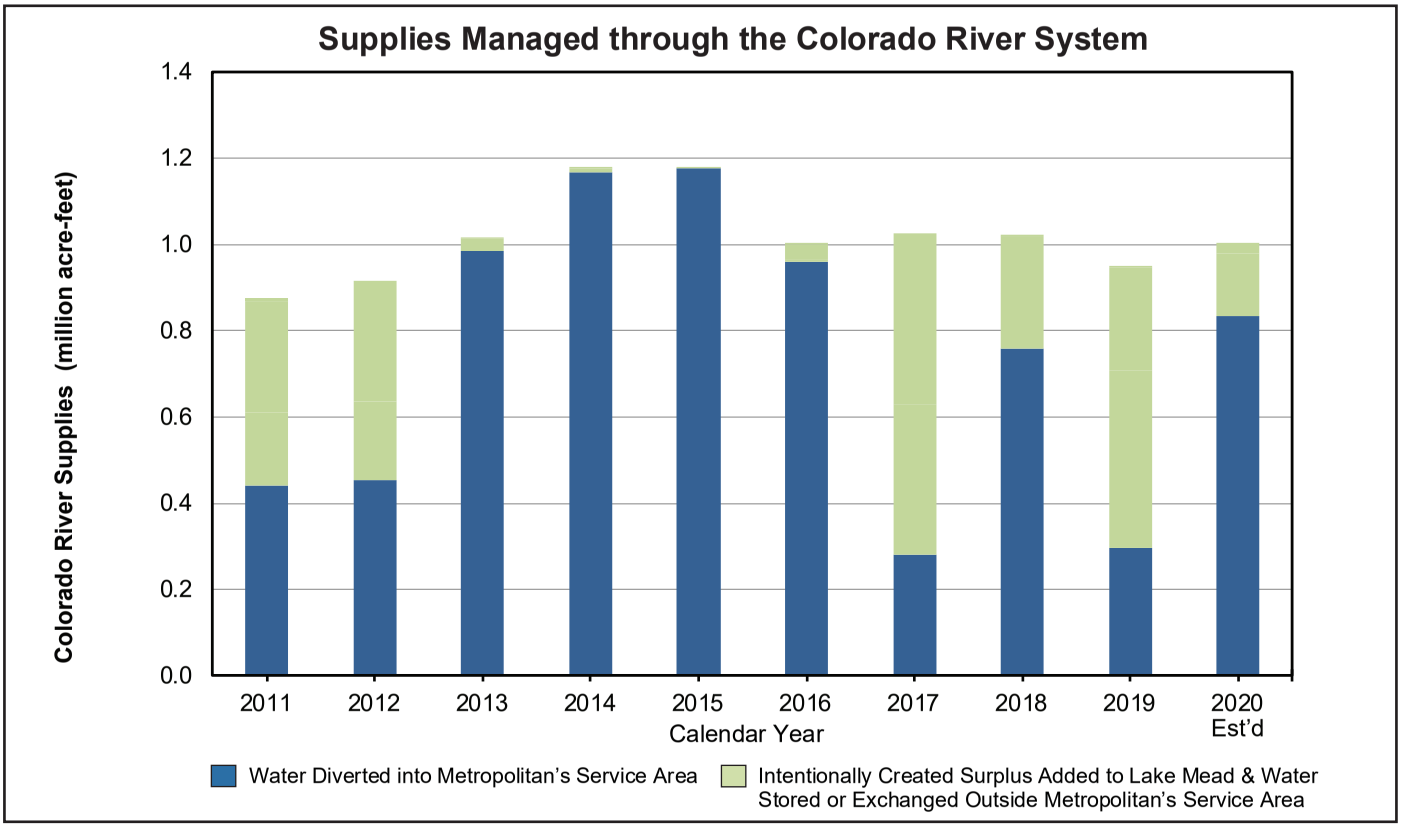


Figure 3-2. Supplies Managed through the Colorado River System

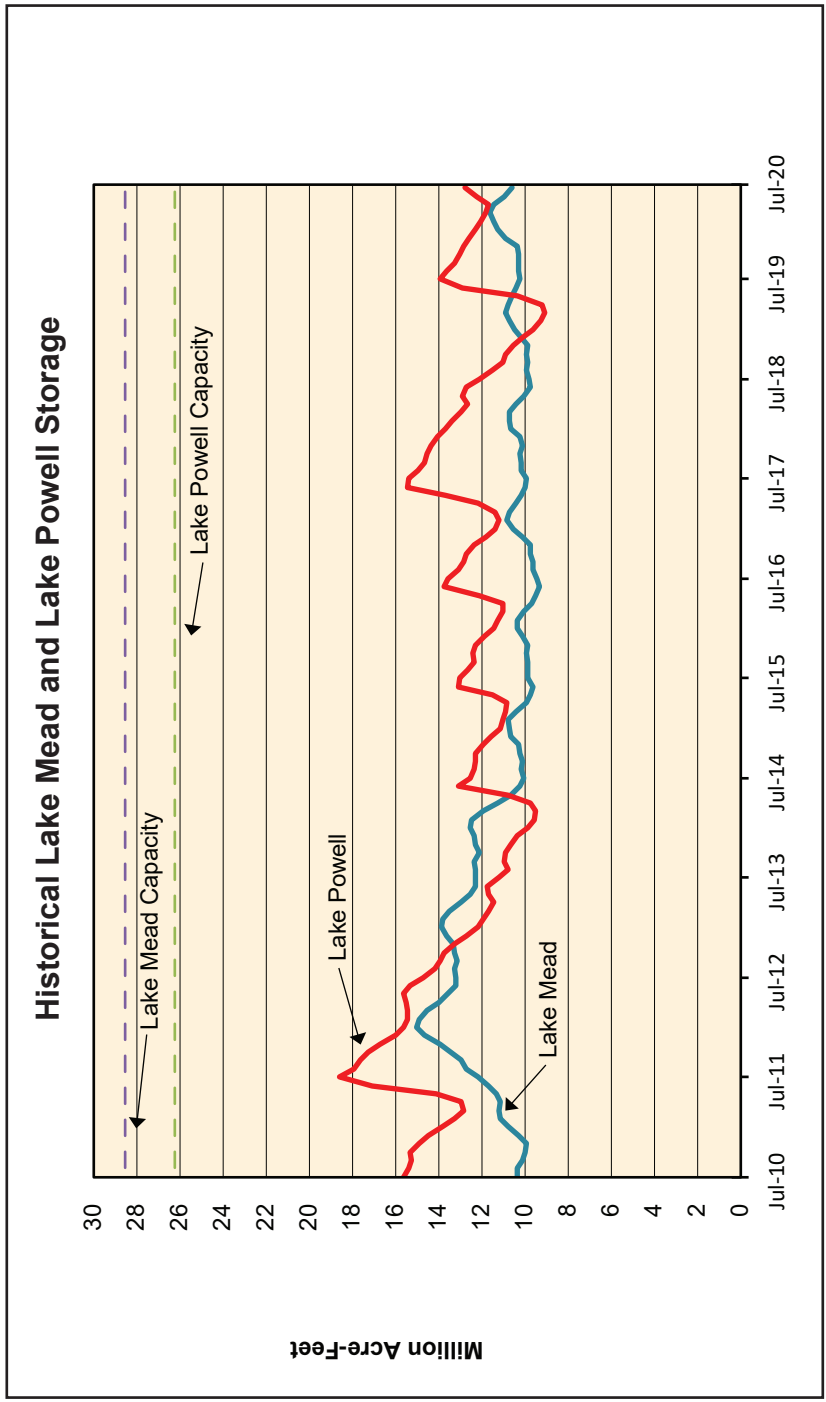


Figure 3-3. Historical Lake Mead and Lake Powell Storage Fiscal Years 2010/11-2019/20

Local Resources

Water Recycling and Groundwater Recovery

Since inception, Metropolitan's Local Resources Program provided about $680 million in incentives to produce a total of about 4 MAF of local recycled water and recovered groundwater production. The LRP provides financial incentives of up to $340/AF for member agencies to develop local supply projects. During FY 2019/20, Metropolitan provided $19 million for production of 115,000 AF under the LRP. Currently, there are 112 projects under contract expected to produce about 238,000 AF per year once fully implemented. In addition, various agencies submit new LRP applications for staff review. Every year, staff assesses performance targets on all contracts and can reduce contract amounts when targets are not met. Including LRP projects, the region used about 454,000 AF of recycled water (Fig. 3-4), and about 111,000 AF of recovered groundwater (Fig. 3-5) in FY 2019/20.

Through the On-site Retrofit Program, Metropolitan provides incentives to customers to retrofit and connect irrigation and industrial potable water systems to recycled water pipelines. Since 2014, Metropolitan has committed $11 million for projects at 410 sites, replacing 12,700 AFY of historic potable water use.

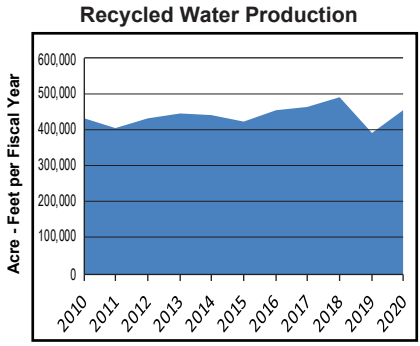


Figure 3-4.

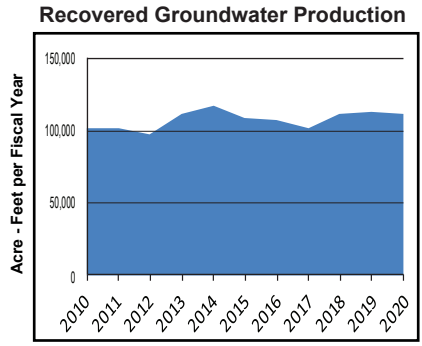


Figure 3-5.

Figures reflect total regional production (including Metropolitan-assisted project production through June 2020), and subject to change due to annual reconciliation and late invoices. Recycled water production includes Santa Ana River base flows below Prado Dam.

Stormwater

To better understand the costs and benefits of stormwater capture, yield, and use, Metropolitan developed two pilot programs using stormwater for direct use and groundwater recharge. Both aim to further evaluate the relationship between stormwater capture and yield. These programs provide funding for new construction and installation of monitoring equipment, and three years of monitoring and reporting. The direct-use pilot launched in January 2020 with a $5 million budget, and the recharge pilot began in March 2020 with a budget of $7.5 million. The data collected from these pilot programs will help evaluate the water-supply benefits of stormwater projects and provide a basis for potential future funding approaches.

Seawater Desalination

During FY 2019/20, Metropolitan supported member agency desalination efforts and continued coordinating regulatory policy for seawater desalination through financial support. Metropolitan also participated in CalDesal, a consortium of California water agencies and other stakeholders working to advance seawater and groundwater desalination. Seawater desalination projects also have been eligible for LRP incentives since 2014. Two local projects are currently in the environmental review and permitting stage while a third is undergoing environmental review. The three projects represent between 81,000 to 131,000 AF of potential new supplies.

Groundwater Storage

Due to improved hydrologic conditions, Metropolitan stored 57,613 AF of imported supplies in local groundwater basins, mostly in the Chino Basin. Metropolitan stored water as part of its conjunctive use program with its member agencies, 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, 2020.

Metropolitan also develops cyclic agreements with member agencies to pre-deliver full service water for future use upon mutual agreement. Participating member agencies 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 seven member agencies. During FY 2019/20, the cyclic program delivered 129,472 AF of water. Metropolitan delivered an additional 19,032 AF of water to member agencies under a 2019 cost-offset program that allows the General Manager to initiate cyclic deliveries when regional imported supplies are at risk.

TABLE 3-2
METROPOLITAN'S CONJUNCTIVE USE PROGRAMS

Conjunctive Use Program	Total Storage Capacity (AF)	2019/20 Beginning Balance (AF)	Change in Storage (AF)	2019/20 Ending Balance (AF)
Los Angeles County				
Claremont	3,000	1,095	0	1,095
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	3,262	3,262
Long Beach – Lakewood	3,600	0	0	0
Orange County				
Orange County	66,000	0	0	0
San Bernardino County				
Chino Basin	100,000	45,969	-8	45,961
Riverside County				
Elsinore Basin	12,000	4,939	2,356	7,295
TOTAL	**211,889**	**52,003**	**5,610**	**57,613**

Some 2019/20 beginning balances differ from 2018/19 ending balances due to data received after publication of the 2019 Annual Report. 2019/20 data presented in this table includes CUP production data that was received by June 30, 2020 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 encourages conservation by providing financial incentives, water conservation education and outreach programs. Water conservation efforts from the state and Metropolitan enabled Southern California to achieve the state's 20x2020 Water Plan goal of 20 percent reduction from 2009 demand levels. More recent efforts put the region on the path to achieving additional efficiency measures outlined in AB 1668 and SB 606. Metropolitan's continued investment in water conservation paved the way for the service area to reduce water demands down to the targeted level and greatly increase future regional reliability.

Metropolitan paid a total of $25.7 million in conservation incentives to water consumers in 2019/20, generating roughly 55,700 AF in projected lifetime water savings. Metropolitan's conservation program doubled the incentive of its turf replacement program to $2 per square foot of grass removed, increasing the area of turf removed by 84 percent from the previous year. FY 2019/20 also saw completion of the regional pilot portion of a disadvantaged communities initiative that provided incentives to retrofit toilets in pre-1994 multi-family residences for replacing of older non-efficient toilets with new premium high efficient models. Nearly 8,000 toilets were replaced through this program. As the COVID-19 pandemic hit Southern California, Metropolitan went online with its in-person water efficient landscape classes. This increased class attendance and allowed the program to continue serving residents during California's emergency "Stay at Home" order.

Water Resource and System Planning

Integrated Water Resources Planning

For nearly 25 years, Metropolitan has based its long-range strategic resource planning on its Integrated Water Resources Plan. First adopted in 1996, the IRP has continually evolved to guide supply and demand actions to ensure regional water reliability over a 25-year timeframe. Last updated in 2015, the plan is revisited about every five years to adapt to changing conditions and emerging challenges.

The district also supports development of water efficient appliance/ plumbing standards and legislation at the state and federal level. In January 2020, Metropolitan formally began work on the 2020 IRP working with a newly-formed board special committee, while holding eight collaborative meetings with member agencies, two stakeholder workshops, and an online survey to solicit input on key uncertainties.

Metropolitan continued to engage with the state's implementation of 2018 California laws that focus on long-term water-use efficiency and drought planning. New reporting requirements affected elements of Metropolitan's forthcoming 2020 Urban Water Management Plan, which formally began development in May 2020 with a coordination kickoff meeting with member agencies. Metropolitan also worked closely with member agencies through the spring to provide input to Gov. Gavin Newsom's Water Resilience Portfolio Initiative which had been announced in April 2019 through Executive Order N-10-19. Metropolitan's IRP is a regional example of the long-term, diversified strategy that the Newsom administration sought statewide through the initiative

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 FY 2019/20, Metropolitan signed 14 new FSA study agreements with nine member agencies representing an investment of $3.15 million in new research. In addition, Metropolitan also managed a $950,000 funding agreement with Water Research Foundation for seven potable and non-potable reuse studies. The FSA 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 2019/20 compared to average annual precipitation figures for three weather stations within Metropolitan's service area. Local rainfall was at or above average for the year. Downtown Los Angeles recorded precipitation of 14.85 inches, which was just over 100 percent of average. San Diego recorded precipitation of 13.71 inches, which was 138 percent of average. Precipitation in Long Beach was 14.22 inches or 124 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 by 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 less than 100,000 per year since 2015.

Figure 3-8 displays Metropolitan's historical water transactions since FY 1989/90, which ranged between 1.36 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 10 years. At the end of CY 2019, Metropolitan accumulated total storage reserves of 3.9 MAF, consisting of 3.1 MAF of dry-year storage and 750,000 AF of emergency storage. Above-average hydrologic conditions in the winter of 2018/19 and continued low demands resulted in an increase in storage to record levels in CY 2019. After an extensive review, Metropolitan increased its emergency storage objective from 630,000 AF to 750,000 AF in 2019, based on an improved understanding of vulnerability and repair durations for the region's imported supply aqueducts.

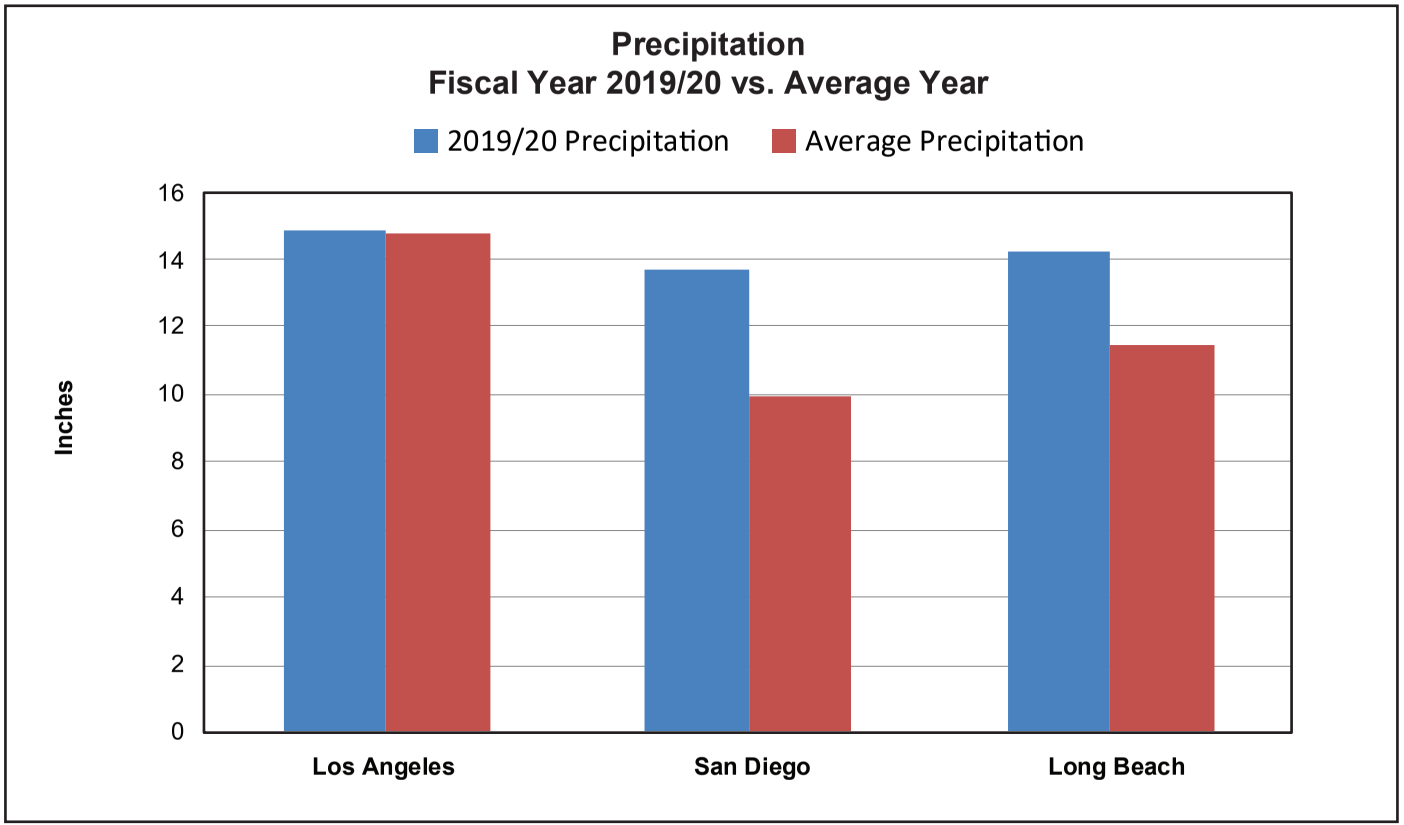


Figure 3-6. Precipitation

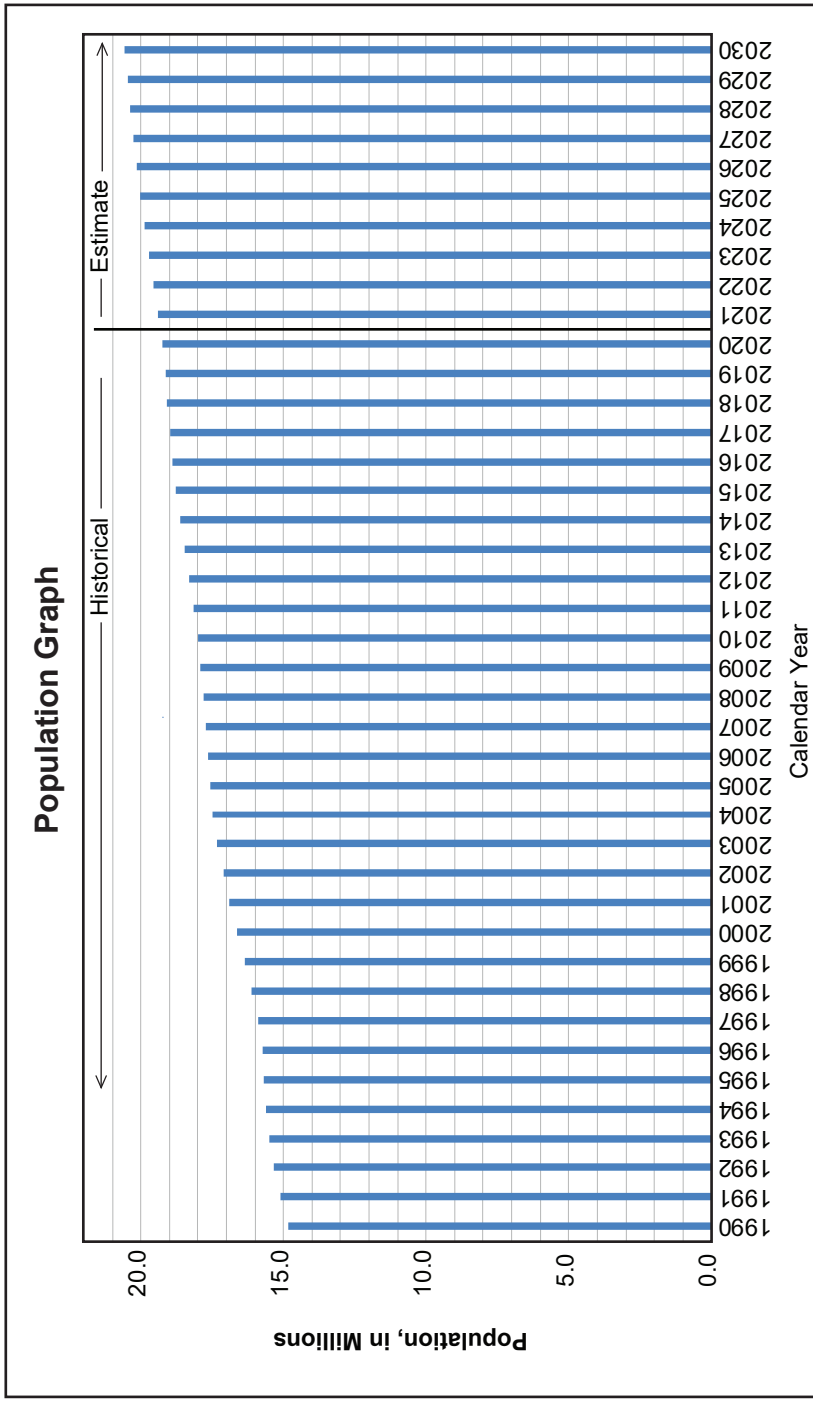


Figure 3-7. Population Growth

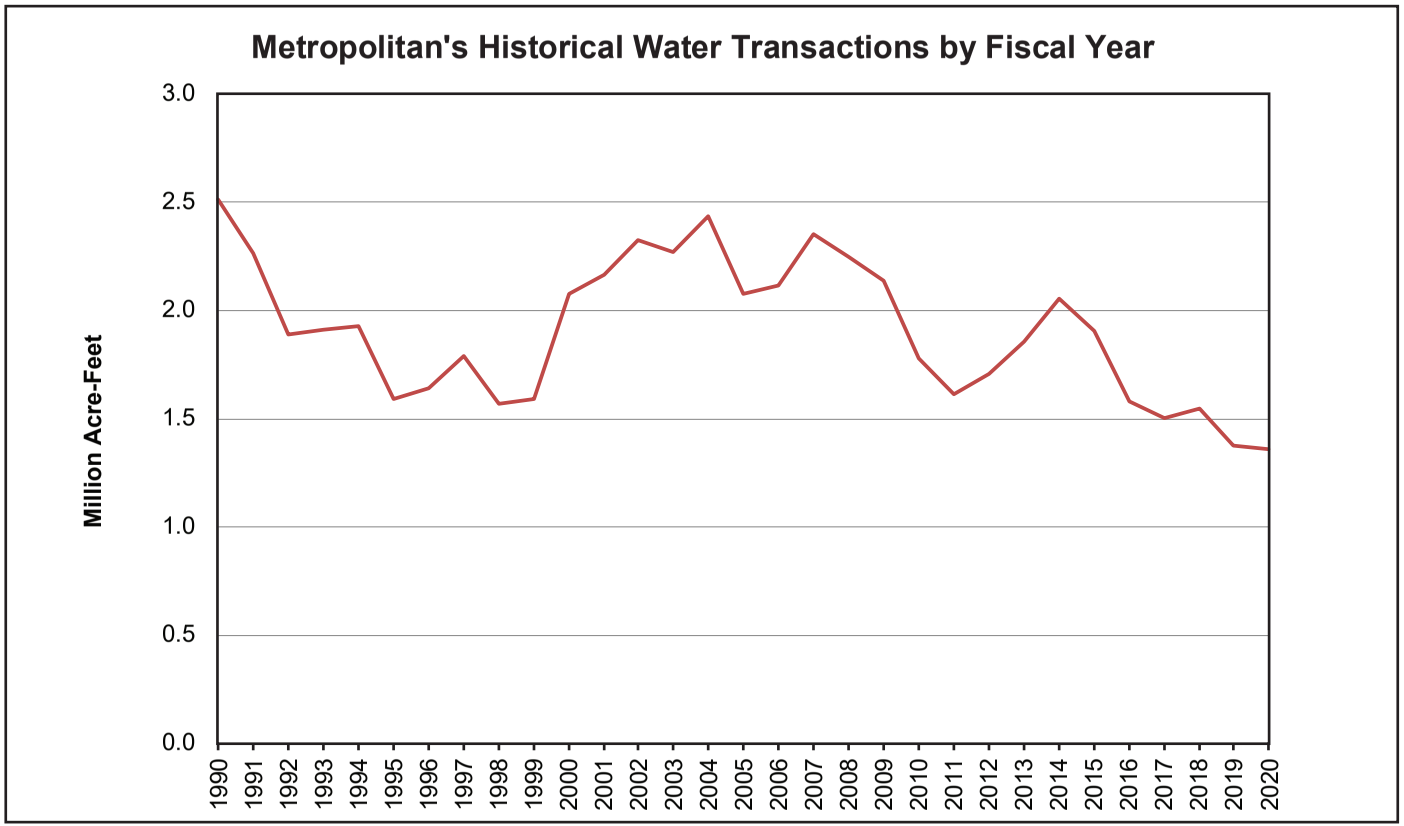


Figure 3-8. Metropolitan's Historical Water Transactions (includes sales, exchanges, and wheeling)

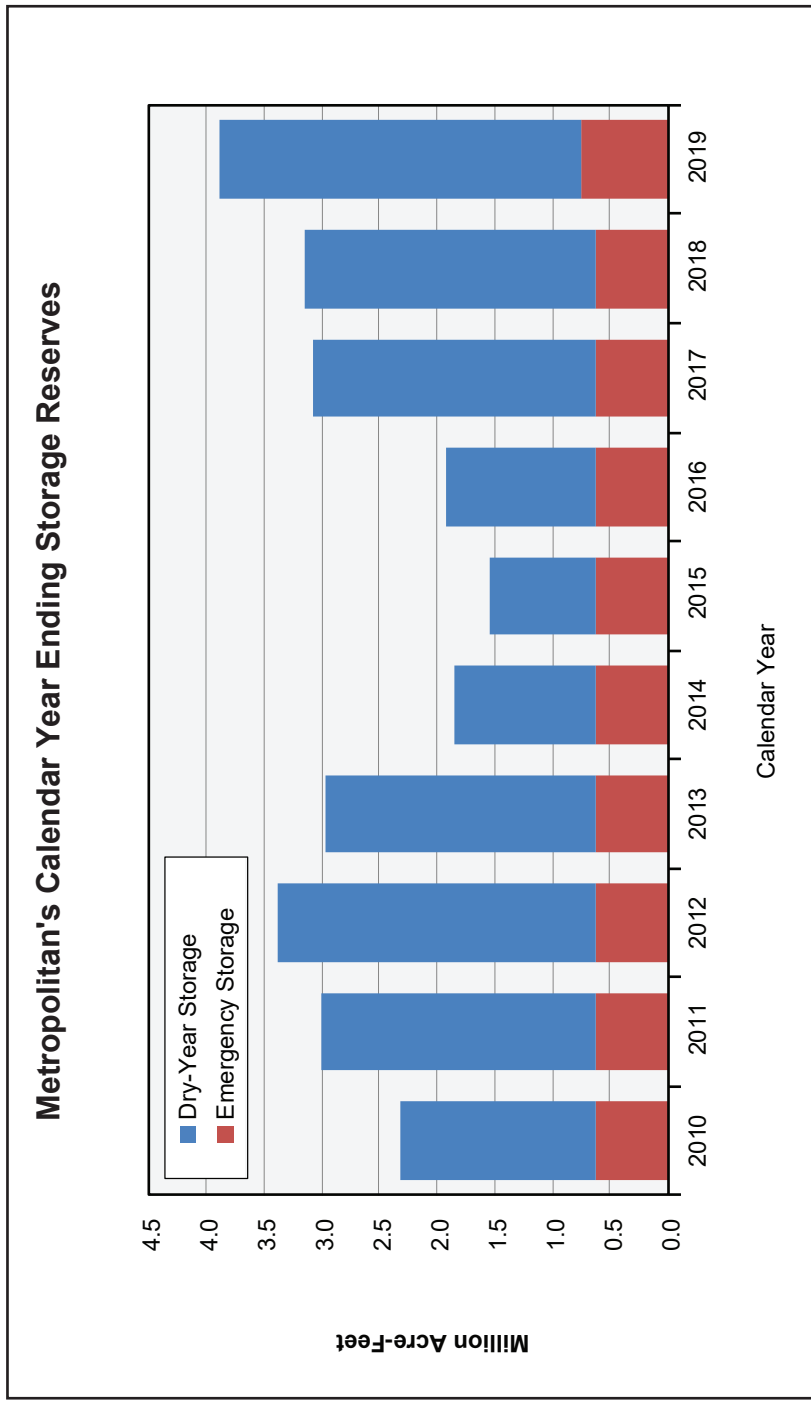


Figure 3-9. Metropolitan's Calendar Year Ending Storage Reserves

Metropolitan staff collects water samples at the Diemer Water Treatment Plant sedimentation basin in the early weeks of the COVID-19 emergency.

CHAPTER 4

Water System Operations

The Water System Operations Group conveys, treats and distributes water to member agencies. The member agencies or their sub-agencies serve about 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

In response to the coronavirus pandemic, Metropolitan's water treatment plants quickly developed and implemented COVID-19 prevention plans. Metropolitan's five 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.

COVID-19 actions included site access restrictions, personal protection guidelines, use of micro-teams, physical distancing modifications, and other policies and procedures to ensure the safety of field staff while maintaining essential treatment operations. Metropolitan also implemented backup control rooms, repurposed work areas, new office and restroom trailers, and other facility modifications.

During fiscal year 2019/20, Metropolitan invested more than $92.2 million to refurbish and upgrade all five plants, ensuring that treated water reliability goals continue to be met.

Refurbishment of the Jensen plant's fluoride system began this fiscal year. Staff replaced one of two fluoride tanks and upgraded piping and instrumentation systems. Replacement of the second tank will be completed in FY 2020/21.

The Skinner plant successfully completed a 10-day full plant shutdown in December 2019, its first full plant shutdown in over 12 years. The driver for the shutdown was a San Diego County Water Authority-requested project to install a new bypass meter at the plant's effluent to measure lower flows. Skinner plant took advantage of the full-plant shutdown to complete 14 additional projects that included replacing the finished water reservoir bypass gate and installing isolation flanges to complete the decommissioning of Skinner plant modules 4, 5, and 6. Decommissioning these modules will reduce ongoing operation and maintenance costs, and defer capital costs associated with lower treated water demands as a result of water conservation and alternate treatment facilities in the region.

The Diemer plant successfully completed a seven-day full plant shutdown in January 2020. The improvements helped to ensure plant reliability and flexibility and included increasing reservoir storage capacity, upgrading metering capabilities, and rehabilitating aging equipment. Consolidating the projects into a single shutdown minimized the impact on member agencies.

In March, the Weymouth plant's ozone system was taken offline for 30 days to upgrade to a more accurate and resilient flow meter. Thirteen newly installed flow meters better stabilized the ozone feed rate, decreasing ozone production and concurrent energy consumption while continuing to meet all water quality regulations.

At the end of April, staff quickly shut down the Mills plant for three days when the state Department of Water Resources discovered a leak on its Santa Ana Valley Pipeline, which supplies water to the Mills plant. During the shutdown, staff arranged to deliver water from Lake Perris north to the Mills plant while DWR made pipeline repairs over a two-week period. Staff effectively coordinated with DWR and the member agencies on several actions to ensure reliable deliveries during this emergency event.

Water Quality

Regulations

Metropolitan's treated supplies met all regulatory requirements and primary drinking water standards during FY 2019/20.

Metropolitan conducted annual monitoring in 2019 for TCP (1,2,3-trichloropropane) and did not detect TCP at any monitoring location. In July 2019, the state Division of Drinking Water approved reducing Metropolitan's monitoring frequency.

The state initiated steps to regulate PFAS (per- and polyfluoroalkyl substances) in drinking water. The two most common and studied types of PFAS are PFOA (perfluorooctanoic acid) and PFOS (perfluorooctane sulfonate). In August 2019, the SWRCB revised notification levels to 6.5 nanograms per liter (ng/L or parts per trillion) for PFOS and 5.1 ng/L for PFOA and advised utilities that they should notify their customers if PFOS or PFOA is detected above these levels in community water supplies. On Feb. 6, 2020, the SWRCB issued updated drinking water response levels of 10 ng/L for PFOA and 40 ng/L for PFOS, based on a running four-quarter average. The response level is the concentration at which water providers are recommended to take mitigating action. State officials also began a phased investigation to evaluate known sources to assess the extent of PFAS contamination in California. In addition, the U.S. Environmental Protection Agency developed an action plan to address national concerns. California and USEPA both announced the intent to regulate PFOA and PFOS. Additional information on PFAS and their impact on regional water supplies can be found in Metropolitan's PFAS fact sheet and FAQs.

California perchlorate regulations are being reviewed for potential revisions to analytical method detection requirements and the maximum contaminant level. Metropolitan provided comments on the federal perchlorate regulatory proposal, but on June 18, 2020, USEPA decided not to regulate perchlorate.

In response to SB 1422, the SWRCB finalized the regulatory definition of microplastics and will require monitoring and reporting of microplastics in drinking water once analytical tools are standardized (likely in 2021). Staff has been learning new analytical detection methods, participating in method training workshops and continuing to track regulatory developments. Metropolitan continues to engage in regulatory and legislative processes associated with water quality constituents of emerging concern. Staff supported efforts to develop Metropolitan-sponsored legislation for a statewide CEC program.

Water Quality Monitoring

Water Quality staff performed over 182,000 analytical tests using more than 150 methods on over 45,000 samples to ensure that Metropolitan's water met regulatory requirements and was safe for public consumption, and continued this work uninterrupted after the COVID-19 emergency began. 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.

Chemical/Physical

Metropolitan finalized its chemical compliance monitoring plan for 2020 through 2028 as required by California drinking water regulations. This updated plan covers organic and inorganic chemicals, radionuclides, general minerals, and general physical parameters. The sampling sites include Metropolitan's source waters, treatment plant influents and treatment plant effluents (entry points to the distribution system). Herbicides, pesticides, and synthetic organic compounds (including 1,2,3-TCP) are on a three-year monitoring cycle. None of these compounds were detected in 2018, and compliance monitoring will be conducted again in the second and fourth quarters of 2021. Tables 4-1, 4-2, and 4-3 show locations and monitoring results for trace metals, radionuclides (most recent triennial monitoring results summary), and general minerals and physical analyses, respectively.

TABLE 4-1
TRACE METALS IN METROPOLITAN'S WATER SUPPLIES
Fiscal Year 2019/20 (in micrograms per liter [µg/L])

	Maximum Contamminant 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]	1,000 (200)	10	18	19	26	60	42	26	19	80	32	ND	22	88	88	94	69	58
Antimony	6	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	10	0.5	2.3	2.3	2.2	1.7	1.8	1.7	1.5	2.1	2.1	2.2	2.1	0.9	1.0	1.2	0.7	ND
Barium	1,000	5	110	110	110	26	25	24	44	71	78	30	65	70	77	25	63	23
Beryllium	4	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boron[2]	1000	20	130	130	130	180	110	110	160	100	110	150	130	110	110	170	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]	--	0.03	ND	ND	ND	0.05	0.07	0.06	ND	ND	ND	ND	ND	0.03	0.04	0.06	0.06	0.10
Copper[1,4]	1,300 (1,000)	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron[1]	300	10	26	29	69	36	51	32	44	57	51	ND	40	ND	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	42	42	39	ND	ND	ND	ND	20	27	ND	20	20	27	ND	20	ND
Manganese[1]	50	5	ND	ND	ND	ND	23	11	9	8	9	9	5	ND	ND	ND	ND	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	2	3	4	ND	3	3	4	ND	3	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	990	950	240	180	170	220	620	680	220	530	640	670	240	550	170
Thallium	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium[2]	50	1	2.4	2.4	2.9	2.1	2.9	2.7	2.3	2.9	3.0	1.7	2.7	2.6	2.7	2.0	2.3	2.5
Zinc[1]	5,000	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 remanded 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 4-2
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 4-3
GENERAL MINERAL AND PHYSICAL ANALYSIS OF METROPOLITAN'S WATER SUPPLIES
Fiscal Year 2019/20 Averages

		SOURCE WATERS								TREATMENT PLANT EFFLUENTS				
CONSTITUENTS	UNITS	LAKE HAVASU	SAN JACINTO TUNNEL	LAKE MATHEWS	CASTAIC	SILVER-WOOD LAKE	LAKE PERRIS	DIAMOND VALLEY LAKE	LAKE SKINNER	WEYMOUTH	DIEMER	JENSEN	SKINNER	MILLS
SILICA	mg/L	7.4	7.7	7.8	11.1	9.1	4.2	7.4	7.1	8.3	8.3	11.0	7.4	8.8
CALCIUM	mg/L	71	70	66	26	18	23	24	35	44	44	26	37	19
MAGNESIUM	mg/L	25	25	26	12	9	12	12	15	18	19	12	15	10
SODIUM	mg/L	88	88	92	44	37	57	50	57	72	74	50	66	48
POTASSIUM	mg/L	4.4	4.6	4.6	2.7	2.3	3.3	3.3	3.3	3.5	3.6	2.7	3.5	2.5
CARBONATE	mg/L	0	0	0	0	0	0	0	0	0	0	0		
BICARBONATE	mg/L	160	156	145	93	82	101	95	111	113	112	97	107	81
SULFATE	mg/L	214	212	218	53	28	40	46	86	140	140	57	103	38
CHLORIDE	mg/L	86	86	91	55	49	79	67	67	74	75	59	74	59
NITRATE	mg/L	1.2	1.0	0.5	1.7	1.5	0.4	1.0	0.6	0.9	0.9	1.8	0.8	1.9
FLUORIDE	mg/L	0.3	0.3	0.3	0.1	<0.1	<0.1	0.1	0.2	0.7	0.8	0.7	0.7	0.8
TOTAL DISSOLVED SOLIDS (TDS)	mg/L	578	574	579	252	196	269	258	326	417	421	269	360	230
TOTAL HARDNESS AS $CaCO_3$	mg/L	276	272	265	112	80	106	105	144	183	183	114	152	85
TOTAL ALKALINITY AS $CaCO_3$	mg/L	131	129	119	76	68	83	78	91	93	92	81	88	69
FREE CARBON DIOXIDE	mg/L	2.1	1.5	2.4	3.3	1.3	2.5	3.6	1.7	1.2	1.2	0.7	1.2	0.4
pH	pH	8.12	8.26	8.06	7.71	8.07	7.93	7.72	8.06	8.25	8.26	8.39	8.18	8.56
SPECIFIC CONDUCTANCE	µS/cm	928	930	946	445	355	507	471	574	706	710	475	630	415
COLOR	CU	5	3	3	8	10	6	5	6	ND	ND	1	1	ND
TURBIDITY	NTU	0.83	0.65	1.0	0.86	1.2	0.91	0.40	0.82	0.04	0.04	0.04	0.06	0.05
TEMPERATURE	°C	19	20	18	14	17	18	15	19	19	22	18	22	20
BROMIDE	mg/L	0.08	0.06	0.08	0.17	0.15	0.25	0.21	0.15	--	--	--	--	--
TOTAL ORGANIC CARBON	mg/L	3.03	3.09	3.04	2.81	3.29	3.69	2.70	3.11	--	--	--	--	--
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
SATURATION INDEX	--	--	--	--	--	--	--	--	--	0.37	0.43	0.33	0.32	0.31
CALCIUM CARBONATE PRECIPITATION POTENTIAL	mg/L	--	--	--	--	--	--	--	--	4.02	4.53	2.08	2.57	1.75
AGGRESSIVENESS INDEX	--	12	13	12	11	12	12	11	12	12	12	12	12	12
STATE PROJECT WATER	%	0	0	0	100	100	100	100	64	43	46	100	62	100

ND - Not Detected
"--" - Not Reported
mg/L - milligrams per liter
µS/cm - microSiemen per centimeter
NTU - Nephelometric Turbidity Unit
CU - Color Units

Total Dissolved Solids

The salinity of supplies delivered through the Colorado River Aqueduct is typically higher than the State Water Project (Figure 4-1), primarily due to natural mineral salt deposits within the Colorado River watershed. 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 lower than the previous year due to high blends of SWP water in 2019 with above-normal precipitation, and flow-weighted TDS averages met Metropolitan's water quality goal of below 500 milligrams per liter.

Disinfection Byproducts

Metropolitan has been monitoring for disinfection byproducts in treatment plant effluents since 1979. Table 4-4 summarizes FY 2019/20 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 2012. This rule requires drinking water systems to monitor distribution system locations with the highest levels of TTHM and HAA5 and report results as locational running annual averages. The highest locational running annual averages were below the MCLs of 80 µg/L for TTHM and 60 µg/L for HAA5. Bromate was below 10 µg/L. Figures 4-3 and 4-4 summarize TTHM and HAA5 trends since 2000. More detailed historical records of DBP trends prior to 2000 are found in Metropolitan's earlier annual reports. Locational running annual averages for both TTHM and HAA5 tend to be higher in the distribution system than running annual averages at treatment plant effluents because the required disinfectant residual in the distribution system can increase DBP concentrations. Changing source water conditions and operational changes can cause locational averages to periodically fluctuate.

Figure 4-5 exhibits plant influent levels of bromide and total organic carbon, which are DBP precursors. 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.

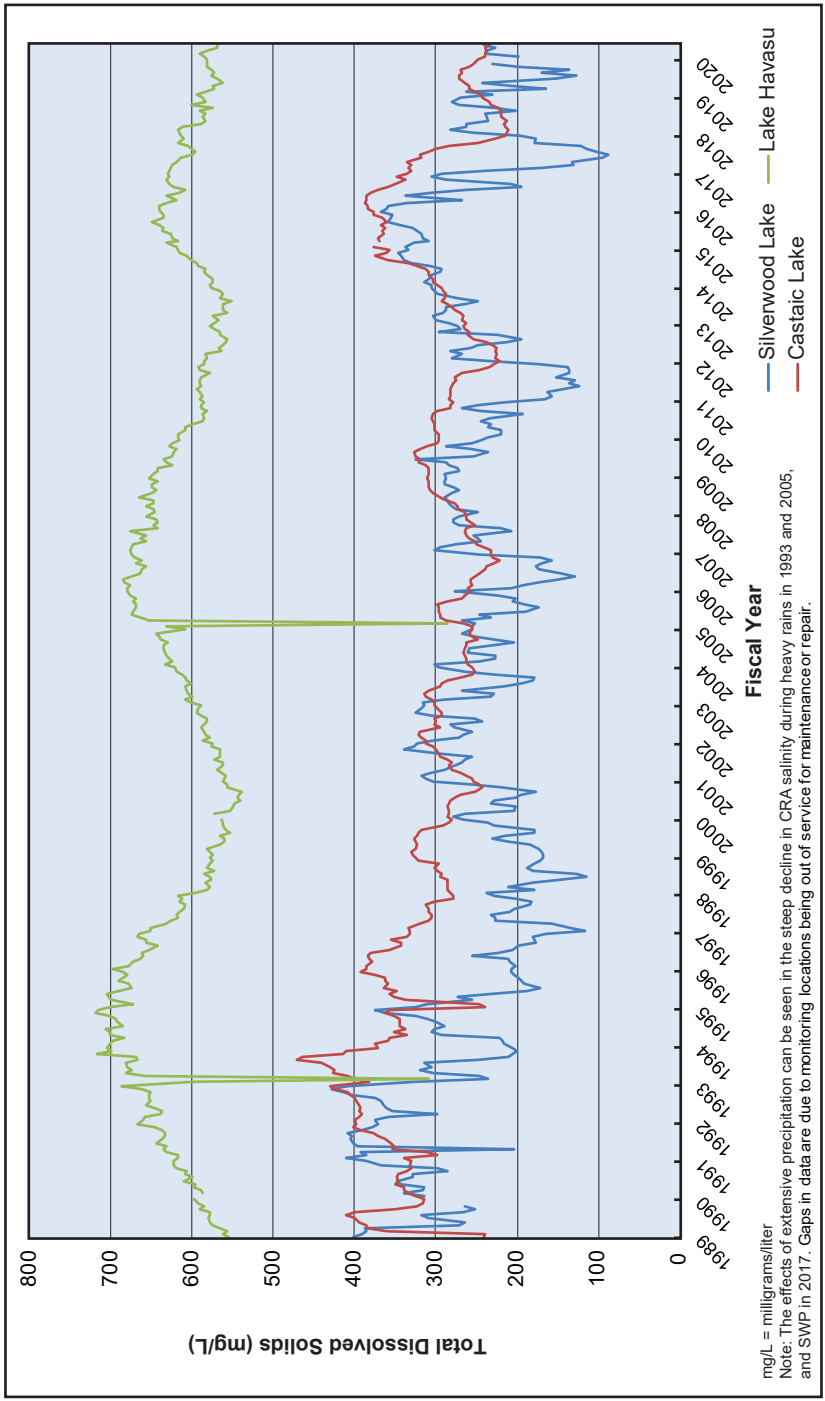


Figure 4-1. Total Dissolved Solids in East Branch State Water Project (Silverwood Lake), West Branch State Water Project (Castaic Lake), and Colorado River Aqueduct (Lake Havasu), 1989 to 2020

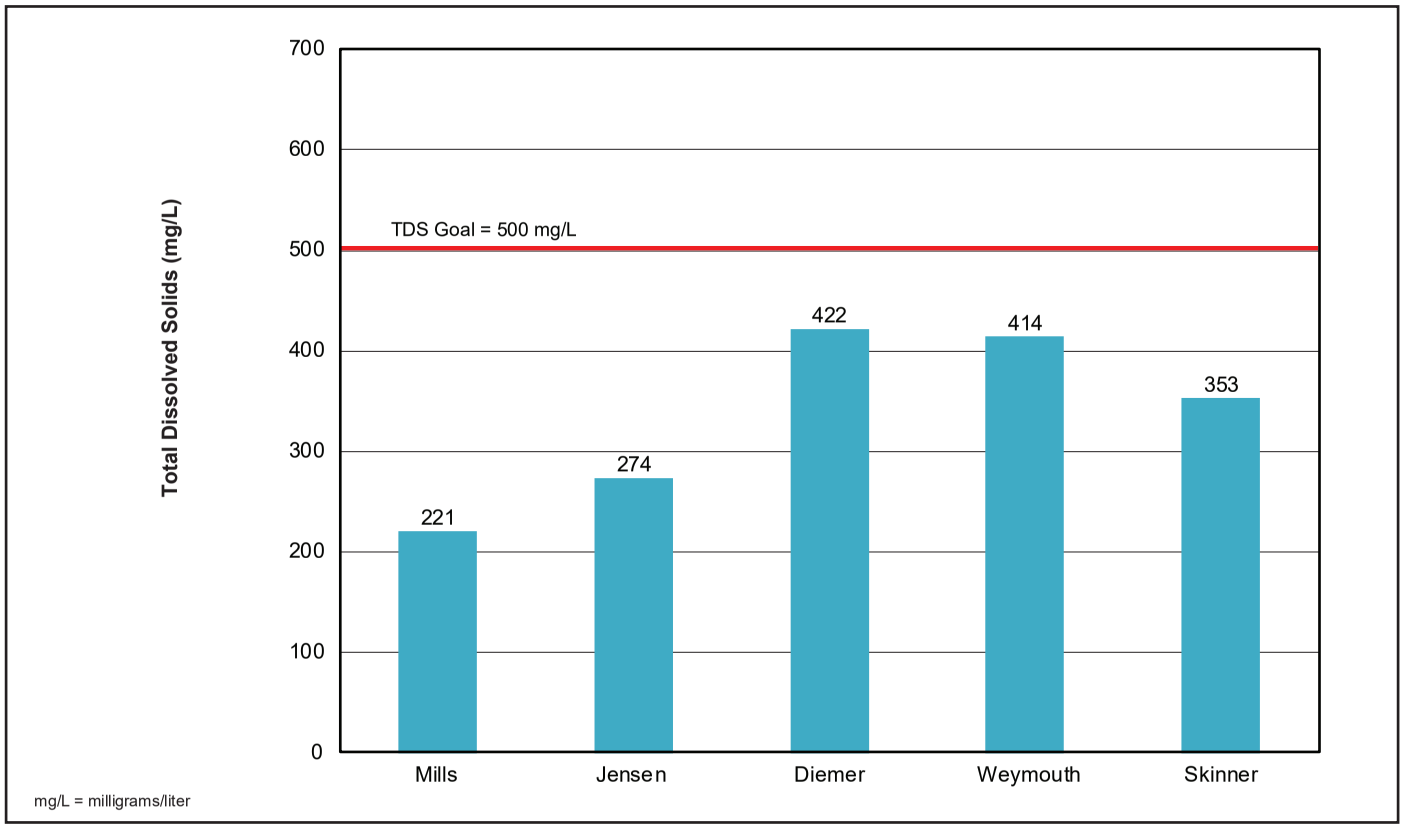


Figure 4-2. Total Dissolved Solids (TDS) in Plant Effluent, Annual Flow-Weighted Averages, FY 2019/20

TABLE 4-4
DISINFECTION BYPRODUCT CONCENTRATIONS
IN PLANT EFFLUENT

Fiscal Year 2019/20 (in µg/L)

	TTHMs MCL = 80		HAA5 MCL = 60		Bromate MCL = 10	
Plant Effluent	**Range**	**Annual Average**	**Range**	**Annual Average**	**Range**	**Annual Average**
Diemer	13-19	16	2.4-3	2.7	0.9-2.0	1.6
Jensen	8.4-13	11	2.7-4.9	3.5	3.8-5.6	4.8
Mills	10-29	20	4.5-7.6	6.4	2.2-2.4	2.4
Skinner	14-23	18	5.9-7.4	6.9	1.6-2.5	2.3
Weymouth	13-20	17	3.2-6.7	4.7	1.1-2.0	1.7
Distribution System	**Range**	**LRAA**	**Range**	**LRAA**	**Range**	**LRAA**
	12-30	13–26	2.3-14	3.0–9.1	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

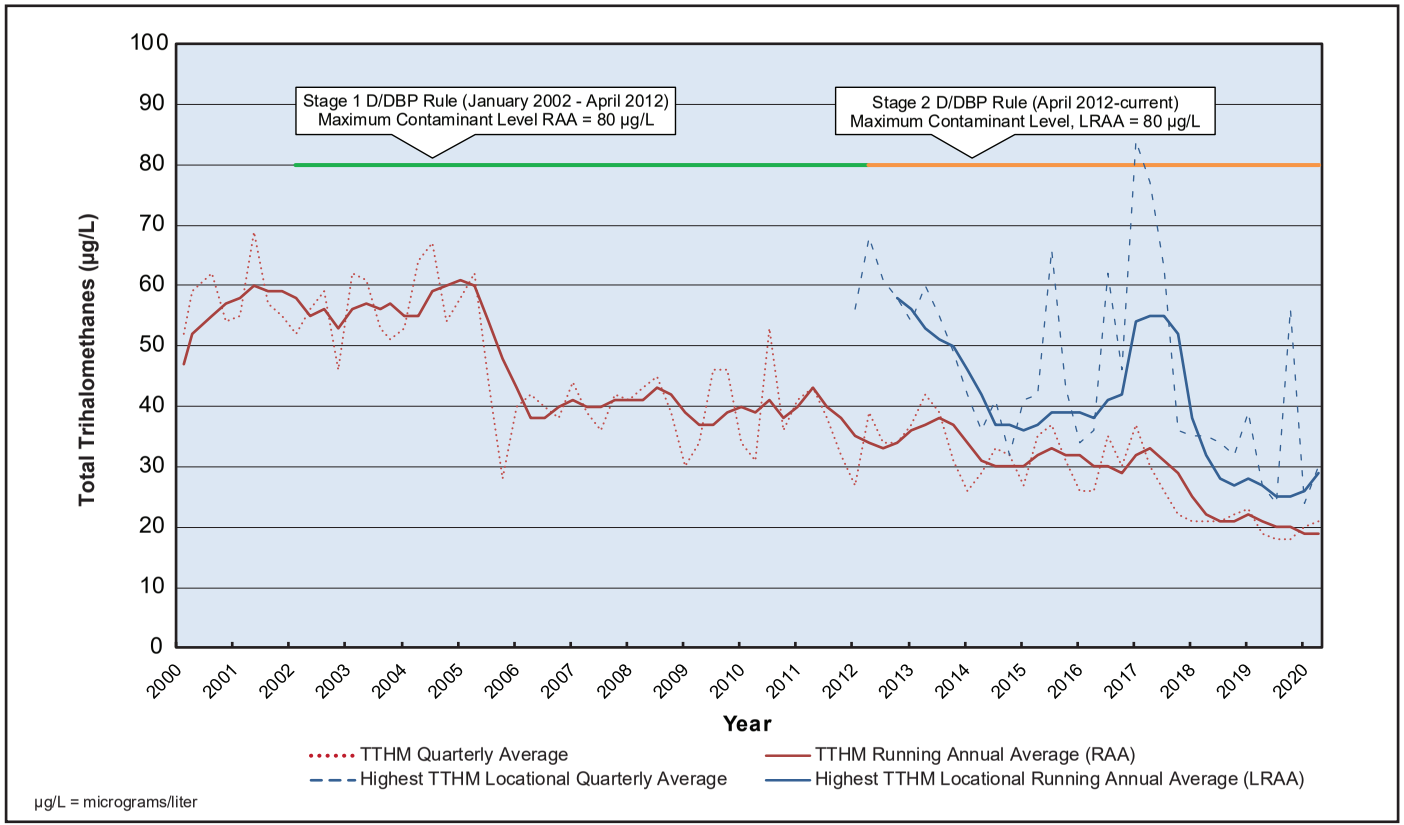


Figure 4-3. Total Trihalomethane (TTHM) Levels in Metropolitan's Distribution System, Quarterly and Running Annual Averages 2000 to 2020

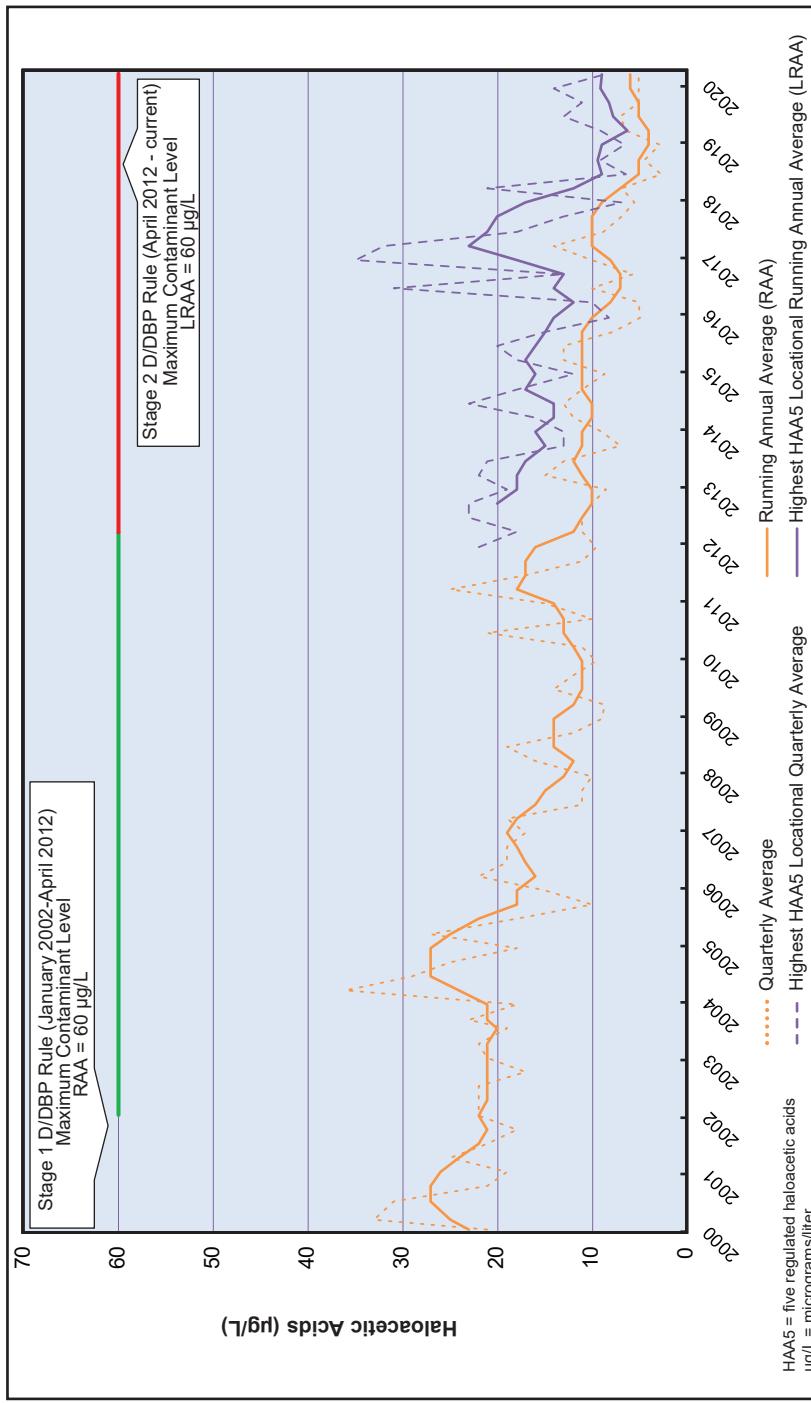


Figure 4-4. Haloacetic Acids in Metropolitan's Distribution System, Quarterly and Running Annual Averages, 2000 to 2020

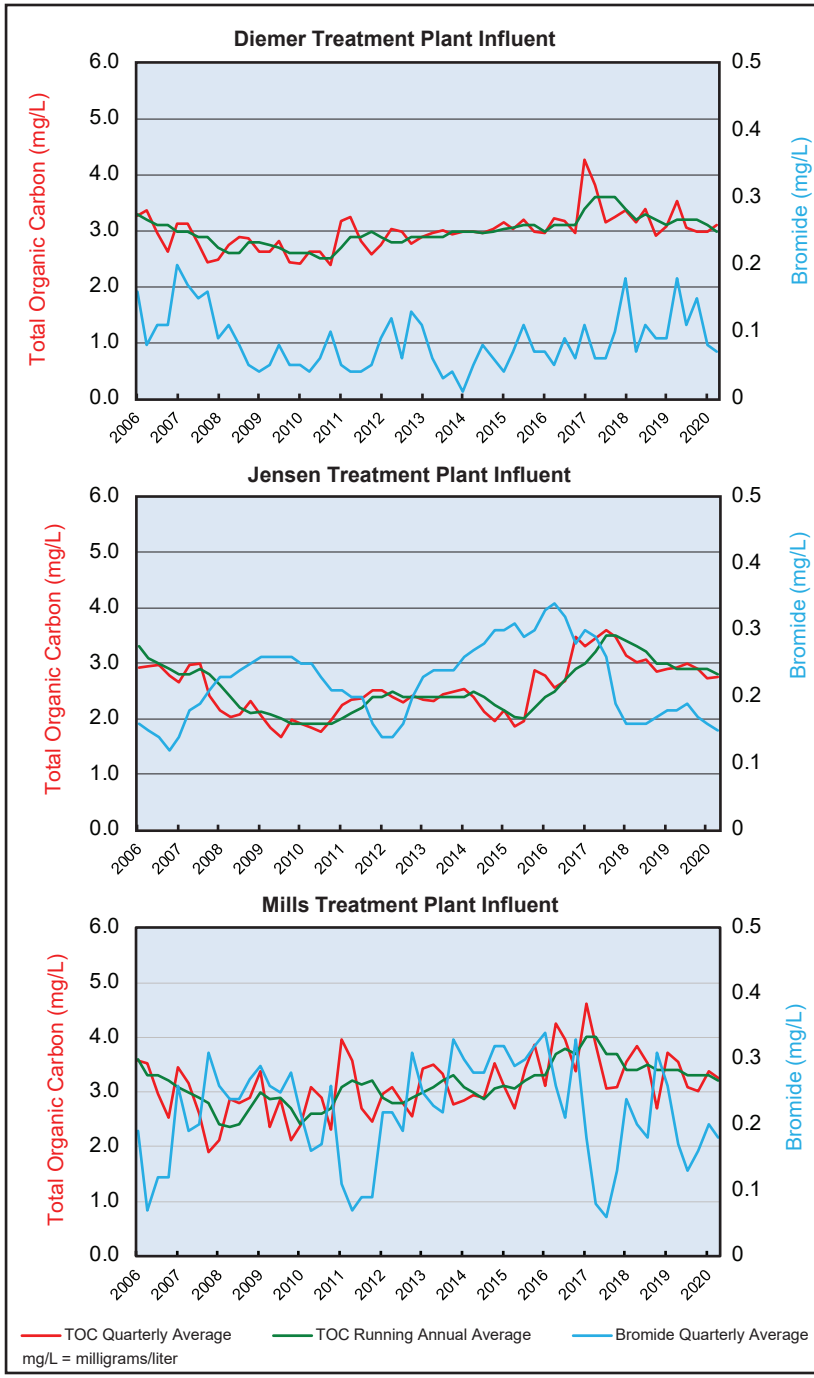


Figure 4-5. Total Organic Carbon (TOC) and Bromide Levels in Treatment Plant Influent, 2006 to 2020

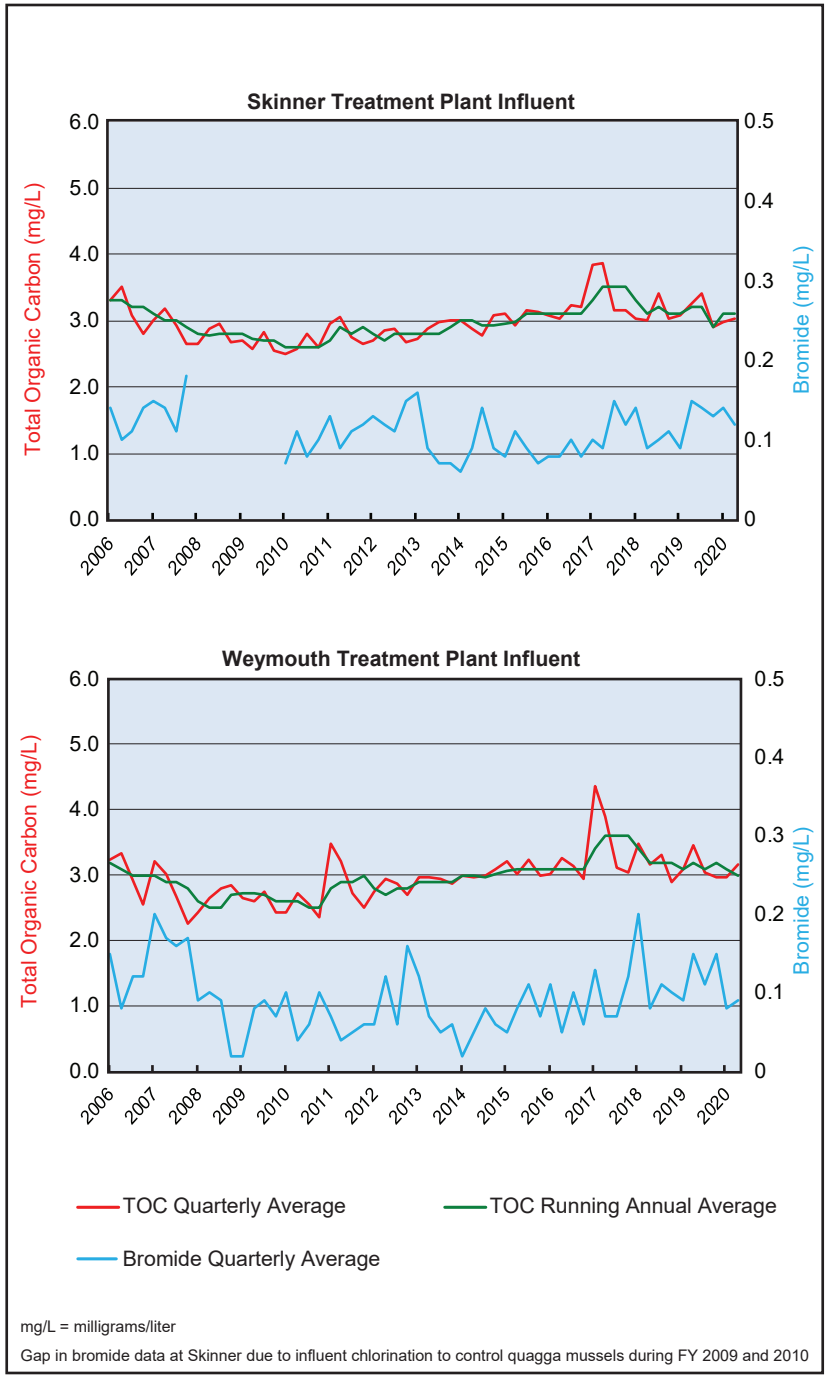


Figure 4-5 (continued). Total Organic Carbon (TOC) and Bromide Levels in Treatment Plant Influent, 2006 to 2020

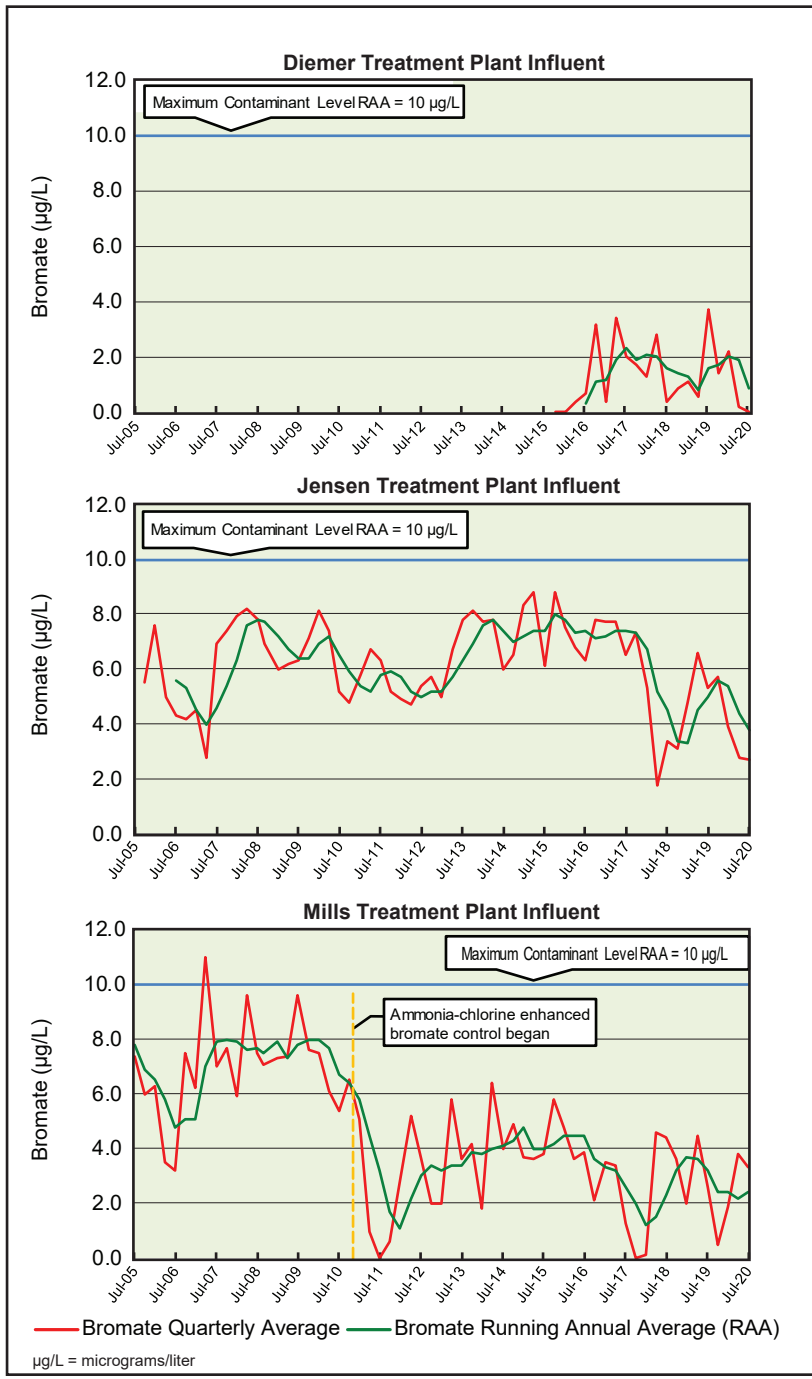


Figure 4-6. Bromate Levels in Treatment Plant Effluent, 2005 to 2020 (Ozone came online at Mills, Jensen, Skinner, Diemer and Weymouth in 2003, 2005, 2010, 2015 and 2017, respectively)

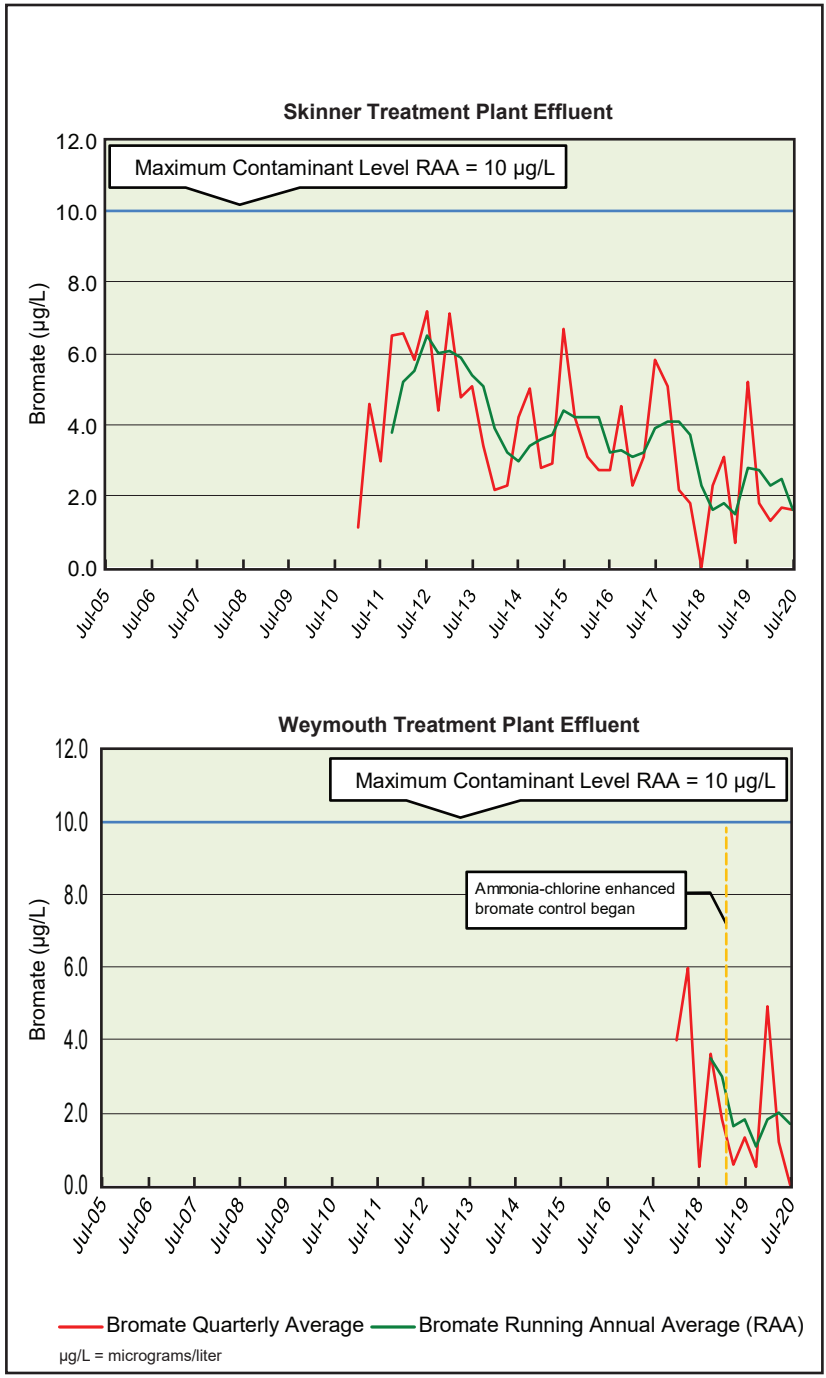


Figure 4-6 (continued). Bromate Levels in Treatment Plant Effluent, 2005 to 2019 (Ozone came online at Mills, Jensen, Skinner, Diemer and Weymouth in 2003, 2005, 2010, 2015 and 2017, respectively)

Microbiological

To comply with state and federal coliform monitoring regulations, Metropolitan tested for coliforms in nearly 8,800 treated drinking water samples in the distribution system downstream of the water treatment plants. The monthly average of 0.03 percent total coliform-positive samples was well below the regulatory standard of 5 percent. *Escherichia coli,* a specific type of coliform, was not detected in any treated water samples. Coliforms and *E. coli* are bacteria that are used to assess the quality of untreated and treated drinking water.

Metropolitan also complied with state and federal drinking water regulations by monitoring treatment plant influents for total coliforms and *E. coli* (Table 4-5). The natural variability of raw water coliforms, storm events, changes in source water, and other factors can influence the coliform concentration observed at the plants—with the most probable number ranging from below 10 to 11,000 /100 mL in FY 2019/20.

TABLE 4-5
RAW WATER COLIFORM RESULTS
Fiscal Year 2019/20

	Treatment Plant Influent[1]				
	Diemer	**Jensen**	**Mills**	**Skinner**	**Weymouth**
	(MPN/100 mL)[2]				
Total Coliforms					
Range	7-1,800	10-2,100	11-2,500	52-11,000	1-3,100
Average[3]	440	420	690	3,100	490
E. coli					
Range	ND-14	ND-2	ND-35	ND-6	ND-49
Average[3]	2	1	4	3	5

Notes:
[1] Samples were collected weekly and analyzed by Quanti-Tray.
[2] Most Probable Number per 100 mL is a measure of coliform concentration.
[3] Annual average of monthly averages.
ND = Not Detected; method detection limit is 1 coliform per 100 mL.

Metropolitan tests plant influents and effluents monthly for the protozoan parasites *Cryptosporidium* and *Giardia*. During FY 2019/20, neither parasite was detected in treatment plant influent or effluent samples. In the last 20 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 2,700 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 waters in FY 2019/20 (Figure 4-7). About half the samples were used to evaluate T&O problems caused by cyanobacteria in the SWP, reflecting the high cyanobacterial production potential of SWP supplies. DWR treated its lakes several times during the year to control T&O-producing cyanobacteria. Metropolitan treated Lake Skinner once during the year with a total of seven tons of copper sulfate to control cyanobacteria; Lake Mathews and Diamond Valley Lake were not treated (Figure 4-8).

Metropolitan received two consumer T&O complaints related to delivered raw water from Silverwood Lake, but there were no consumer complaints about treated water from Metropolitan's five treatment plants.

Metropolitan analyzed 140 samples for cyanotoxins during the fiscal year. The frequency of cyanobacterial blooms that produce these naturally occurring cyanotoxins appears to be increasing both nationally and within Metropolitan's region. USEPA 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, USEPA also published water quality guidelines and recommendations for managing cyanotoxins in recreational waters. 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 at the treatment plants, is effective at removing cyanotoxins in drinking water supplies.

Quagga Mussel Control Program

Chlorinating 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. Metropolitan analyzed over 130 samples for veligers (microscopic mussel larvae) for routine monitoring and system maintenance. Staff analyzed an

additional 60 samples using molecular methods developed at the Water Quality Laboratory. No adult mussels or veligers were detected in SWP supplies during FY 2019/20 and there are currently no restrictions on Metropolitan's use of water from either the west or east branches of the SWP.

PFAS (Per- and Polyfluoroalkyl Substances)

In FY 2019/20, staff analyzed six source water and five treatment plant effluent samples for PFAS using a standard method and a research method, in parallel. Monitoring was conducted in September 2019 and Lake Mathews was monitored again in spring 2020. EPA Method 537.1 and research method L402 analyzed for 18 and 45 different types of PFAS, respectively.

PFOA and PFOS were not detected in any samples in FY 2019/20 by either method. PFHxA (perfluorohexanoic acid) was the only PFAS detected in Metropolitan's source and treated water samples, slightly above the 2.0 ng/L minimum reporting level. PFHxA is a common PFAS that is thought to be an impurity that is inadvertently produced during the manufacture of other PFAS. It is also a breakdown product from lubricants, coatings on food packaging, and household products. PFHxA is not currently regulated in California and is believed to present negligible human health risk in drinking water.

Nitrosamines

NDMA (N-nitrosodimethylamine), a chloramine disinfection byproduct, and other nitrosamines are unregulated contaminants sometimes found in treated drinking water. Metropolitan has monitored and tracked nitrosamines at treatment plant effluents and in the distribution system since 1999. Currently, there are three nitrosamines with established notification levels of 10 ng/L (parts per trillion) in California. In FY 2019/20, NDMA concentrations ranged from not detected to 5.2 ng/L in treatment plant effluents and central pool locations. Since all NDMA monitoring results are below the notification level and many are non-detect, they will no longer be presented in a table. Please see prior annual reports for FY 2006/07 through 2018/19 for specific NDMA levels. Seven other nitrosamines were analyzed but not detected at any location.

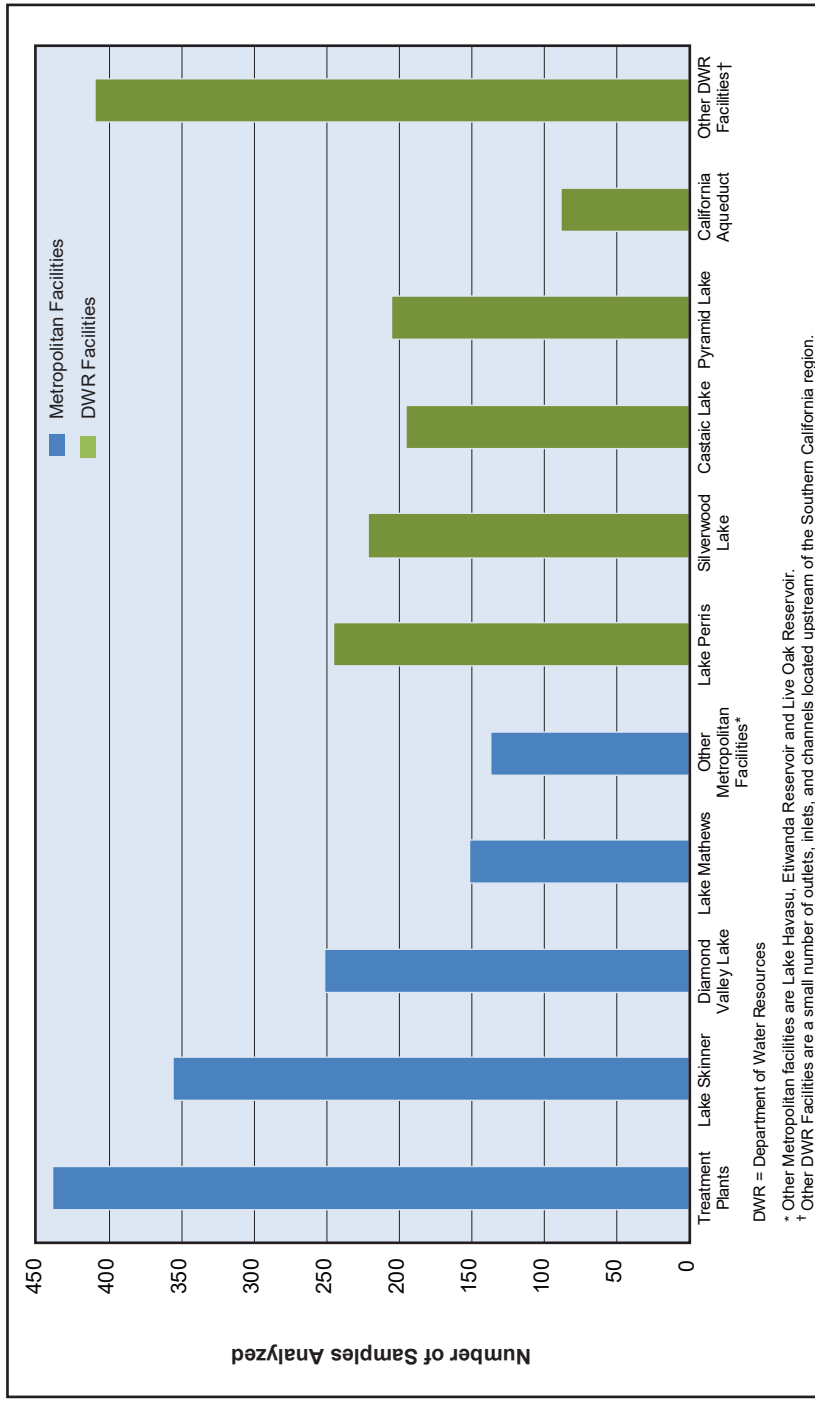


Figure 4-7. Number of Samples Metropolitan Analyzed for Taste-and-Odor Compounds 2-Methylisoborneol (MIB) and Geosmin in Source and Treated Water, FY 2019/20

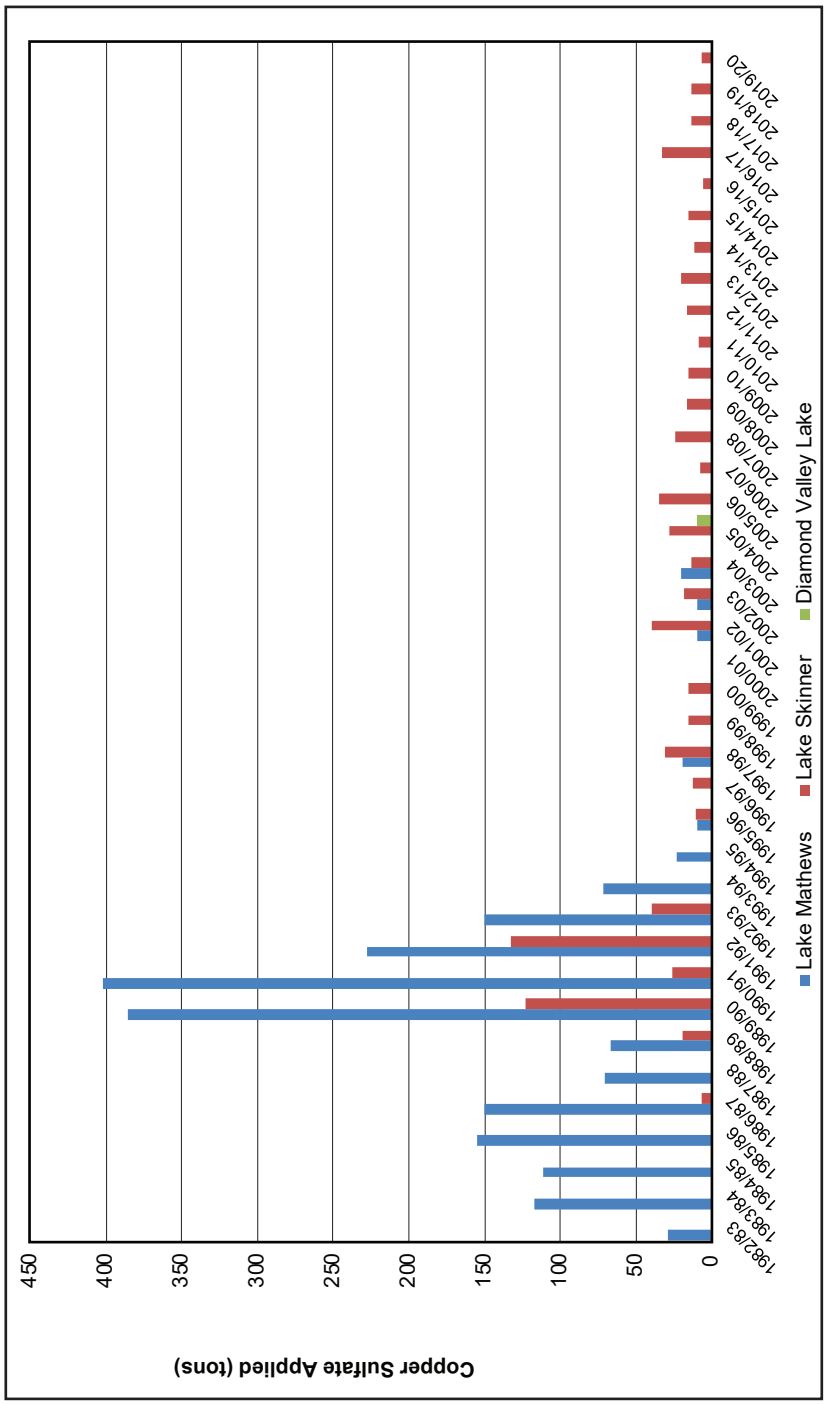


Figure 4-8. Copper Sulfate Usage in Metropolitan's Reservoirs, FY 1982/83 to 2019/20

Source Water Protection

Watershed Management and Protection

Metropolitan continued its oversight and coordination on water quality issues with key Colorado River stakeholders by actively participating 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 2019/20, Metropolitan continued to engage in salinity control efforts through the Colorado River Basin Salinity Control Forum to address salt loading into the Colorado River. Metropolitan supported fixes for the Paradox Valley Unit project in Colorado, which currently reduces 10 percent of the salt load into the Colorado River. Metropolitan will continue to track federal Bureau of Reclamation's operation of that unit. Through the forum, Metropolitan also worked with Reclamation to update the salinity economic impact model, which is used to evaluate economic effects in the Colorado River basin from high salinity Colorado River water.

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 via rail close to 11 of 16 million tons of mill tailings to an engineered disposal site about 30 miles northwest of Moab. Metropolitan and other stakeholders successfully advocated to maintain increased levels of funding for FY 2020 to help meet DOE's targeted completion in the 2030s.

Chromium 6 Remediation

Metropolitan continues to be active in workgroups to ensure effectiveness of chromium 6 groundwater remediation and long-term protection of the Colorado River near Topock, Ariz. Pacific Gas & Electric began construction in October 2018 on a treatment system and expects completion by 2025, followed by operation for an estimated 30 years.

Concurrently, PG&E is conducting a soil remedial investigation and proposes to develop a long-term soil remedy plan by 2023.

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

On June 18, 2020, USEPA issued a final action to withdraw its 2011 determination to regulate perchlorate and declined to issue a national regulation. But regional efforts continued. 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 µg/L (parts per billion) at Metropolitan's Lake Havasu intake (Figure 4-10).

Metropolitan 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 2024, followed by design of a long-term remediation strategy. The current target cleanup goal for perchlorate loading into Las Vegas Wash is based on Nevada's provisional action level of 18 µg/L. This goal will help ensure compliance with any potential reduction in California's perchlorate MCL of 6 µg/L, considering a 1 µg/L public health goal adopted in February 2016.

Technology Assessment

Treatment Process Optimization and Development

Staff continued to study various source water challenges, including the potential impacts of cyanobacterial blooms. Staff presented study results on factors affecting removal of cyanotoxins by ozone at the 2019 Water Quality Technology Conference and continued examining the efficacy of ozone in removing TCP. Staff also conducted a bench-scale study to develop mitigation strategies for low alkalinity water at the Mills plant, finding the addition of carbon dioxide followed by pH adjustment would aid in providing the necessary corrosion control for treated water.

Potable Reuse

In October, Metropolitan, in partnership with the Sanitation Districts of Los Angeles County, completed construction and commissioning at the Regional Recycled Water Advanced Purification Center in Carson. A pretesting phase and demonstration testing followed, during which staff optimized biological treatment and ensured that all advanced water treatment unit processes could operate reliably during the approved testing and monitoring period. The COVID-19 pandemic impacted the sample collection and testing schedule. Staff developed novel inactivation methods for SARS-CoV-2 to ensure safe handling and analysis of microbiological wastewater samples, an integral part of achieving the overall demonstration testing objectives. The demonstration facility remained operational throughout the pretesting phase. Baseline testing begins in July 2020.

The Independent Science Advisory Panel continued to objectively review the scientific, technical and regulatory issues associated with the project. An in-person two-day workshop in December 2019 and a virtual workshop in April 2020 provided opportunities to review and discuss all aspects of the project. Staff continued to engage with the DDW and the Regional Water Quality Control Boards on program development, testing progress, and plans for testing future treatment processes. Data collected at the demonstration facility will be used to facilitate regulatory acceptance of the proposed treatment process.

Applied Research

Metropolitan conducts applied research to optimize water treatment; improve contaminant detection and identification methods; evaluate alternative sources of water such as potable reuse; and to ensure readiness to address emerging and future water quality challenges. For example, Metropolitan currently participates in a study to evaluate analytical methods for microplastics in water so that staff and member agencies have access to the latest technologies and most up-to-date information on this emerging constituent of concern.

Water Quality Grants

Metropolitan applied for a $750,000 grant from Reclamation to support testing at the water recycling demonstration facility. This funding will help support collection of pathogen removal data and other performance testing measures necessary for validating and permitting treatment processes for full-scale design. The funding agreement was expected to be finalized in September 2020.

Metropolitan continued managing two externally funded grants for water quality projects in FY 2019/20 (Table 4-6). A National Science Foundation-funded project is evaluating DBP concentrations and identifying the relative risks of various DBPs to support possible regulatory changes and long-term engineering solutions to enhance drinking water safety and sustainability. A Water Research Foundation-funded project aims to improve and streamline analytical procedures for monitoring cyanotoxins in water, providing water utilities with practical analytical guidelines to improve the precision, accuracy, and overall data quality of the detection methods.

Service to Member Agencies and Drinking Water Industry

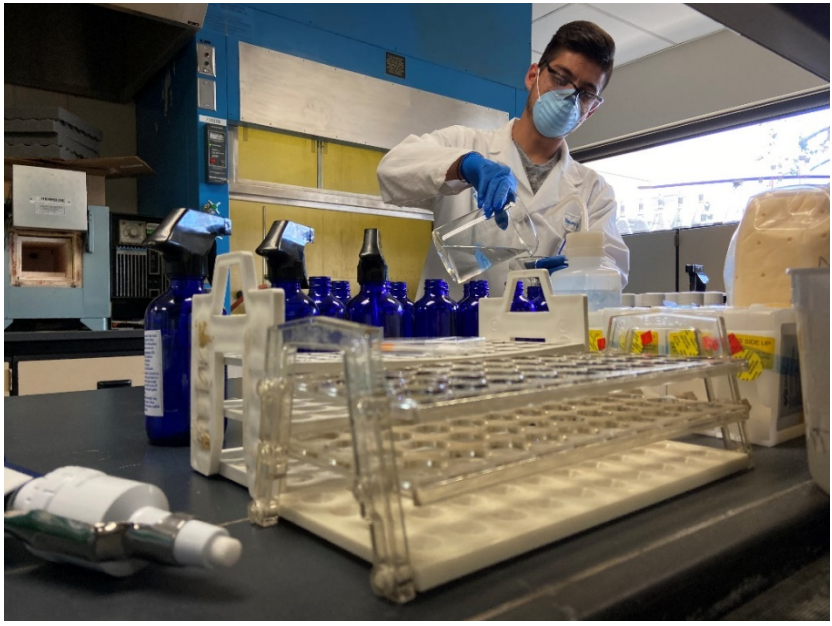
Staff conducted two chloramine chemistry and nitrification workshops for member agencies, with presenters providing information on fundamentals of chloramine chemistry, biology of nitrification, and prevention of nitrification in distribution systems. Staff also conducted a member agency workshop on PFAS, providing information on sources of contamination, monitoring methods, occurrence in water supplies, and regulatory developments.

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 4-6
ACTIVE WATER QUALITY GRANTS[1]
Fiscal Year 2019/20

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.



Preparing hand-sanitizer spray bottles for Water Quality staff to help prevent potential spread of COVID-19.

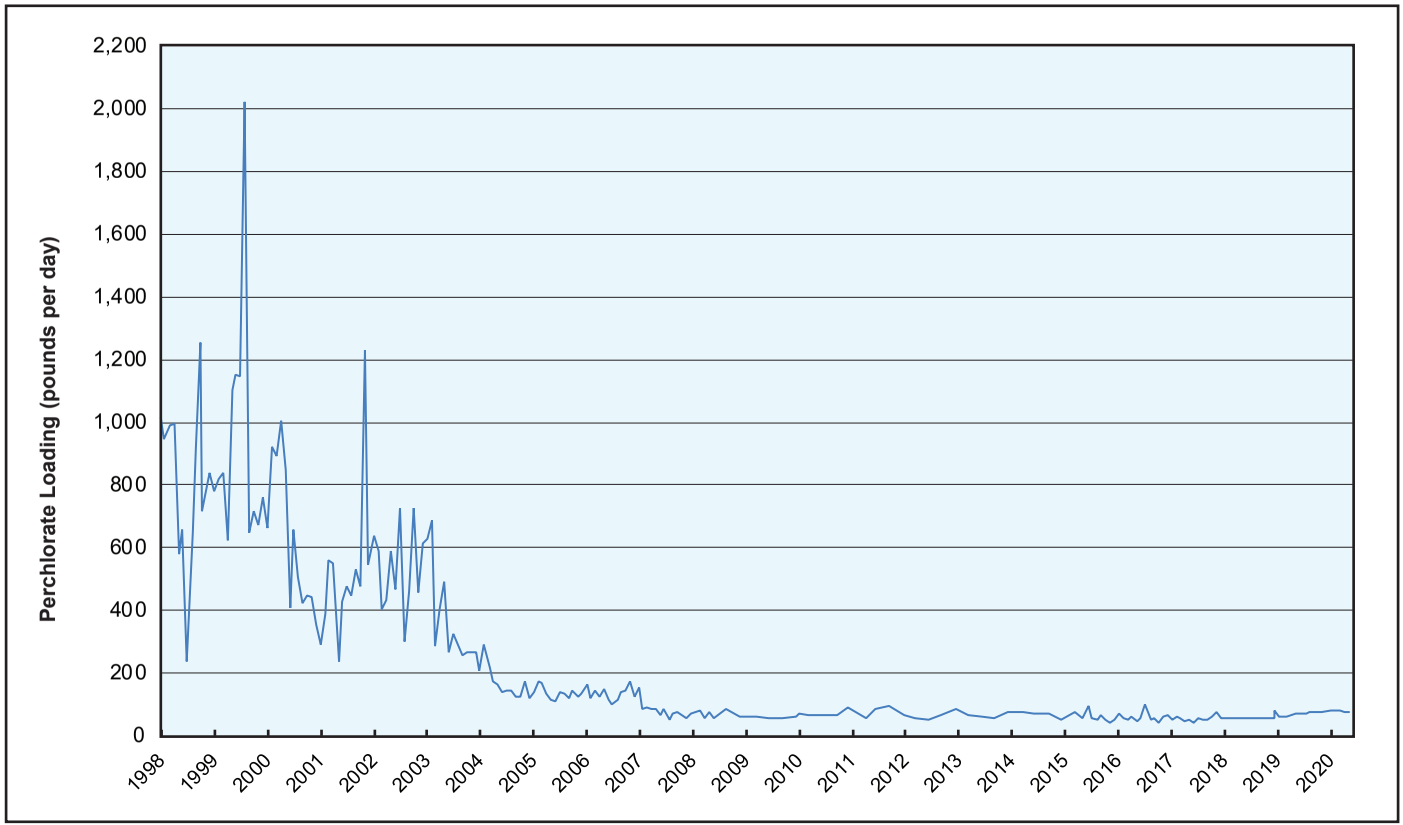


Figure 4-9. Perchlorate Loading in Las Vegas Wash, half a mile upstream of Lake Mead, 1998 to 2020

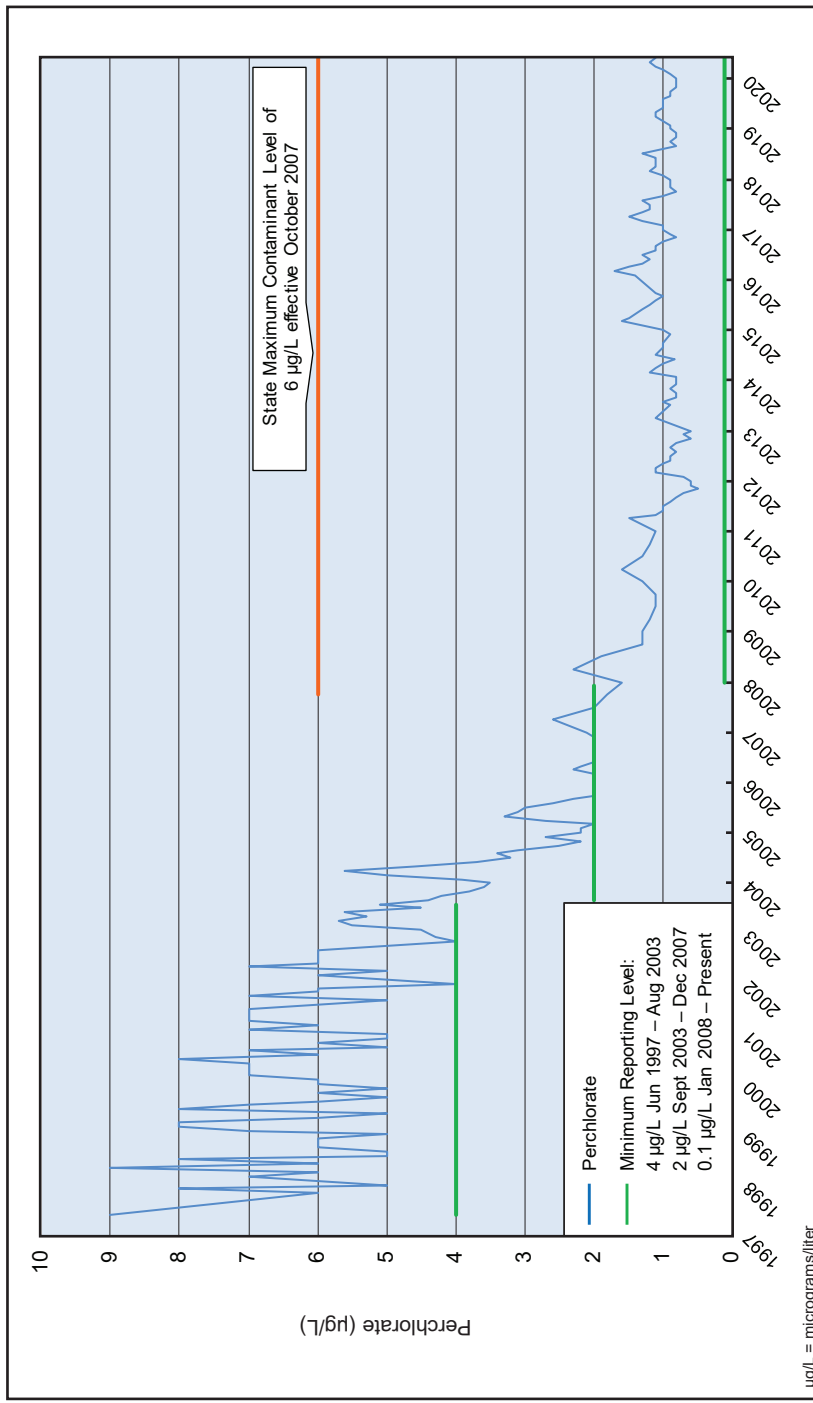


Figure 4-10. Perchlorate Levels at Lake Havasu, 1997 to 2020

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, repair pipelines or equipment, and support capital projects. During the last quarter of this fiscal year, Metropolitan established a micro-team structure for field staff in response to the COVID-19 pandemic. This consisted of dividing larger teams into smaller work groups and strategically deploying them to temporary reporting locations across Metropolitan's service area. Use of micro-teams allowed critical operational and maintenance practices to continue while helping to ensure the health and safety of the workforce.

In FY 2019/20, Metropolitan pumped nearly 550,000 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 47 miles of pipeline to assess the condition of steel mortar-lined and prestressed concrete cylinder pipe. Metropolitan completed the third major construction contract of its PCCP rehabilitation program, for lining about 24,000 feet of PCCP within the western portion of the Second Lower Feeder. Completed over an 11-month period, the repairs involved the insertion of steel reinforcement sleeves. Relining also began along another 2,900-foot section in the city of Placentia. Other projects relined with mortar about 19,000 feet of the Orange County Feeder to replace the previous coal tar epoxy. Member agency deliveries remained unaffected during these projects, due to the distribution system's operational flexibility.

Throughout FY 2019/20, WSO maintained the system to ensure an eight-pump flow capability on the CRA. To safeguard consistent operation and reliability, CRA refurbishment work took place during a 25-day shutdown in February 2020. Work included coating inspections and installation of pump discharge line isolation couplings, replacement of seven large radial gates, inspection and testing of high-voltage equipment, and rehabilitation work on head gates at the pumping plants. Crews performed tunnel and sand trap cleaning, canal scraping and debris

removal to maintain the CRA's hydraulic capacity. Workers also conducted critical maintenance on the 230kV transmission system.

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 other structures, and delivery lines. Staff coated equipment and structures at pumping plants, treatment plants and pressure control structures, including over 430 valves. Additionally, as part of the Red Mountain hydroelectric plant rehabilitation, staff inspected, repaired and recoated critical structural and turbine components. To prevent water intrusion that could accelerate corrosion, staff sealed structures that are particularly vulnerable to water damage, such as vaults located below grade.

During FY 2019/20, crews performed over 240,000 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 and reliability 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, and 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. While San Diego County Water Authority repaired a leak on its portion of Pipeline No. 4, staff installed a temporary relief pipe to prevent over-pressurization of the pipeline. The shops manufactured and coated two pipe spools, a blind flange and a butterfly valve for this project. The shops made pipes and fittings of various lengths for a new service

connection at the Skinner plant effluent. The shops also refurbished two valves for the Venice Pressure Control Structure, machined new turbine hardware for the Red Mountain hydroelectric plant, and repaired a damaged actuator stem shaft at the Sepulveda PCS. The shops manufactured and coated a new 13-square-foot bypass gate assembly for the Skinner finished water reservoir to replace a deteriorating gate originally installed in 1991. The shops also fabricated two 42-inch stainless steel thimbles for West Valley Feeder No. 1.

Using a reimbursable agreement, the La Verne shops provided support for DWR's SWP facilities. The shops refurbished equipment for the Gianelli and Dos Amigos pumping plants. The shops also manufactured two 19-foot by 8-foot stop log gates for the Alamo power plant.

Construction Services

This unit provides a range of support services, including heavy equipment operation; construction of new facilities; welding, fabrication, and electrical support; access road maintenance; and emergency services such as pipeline and erosion repair.

Staff constructed a new service connection at the Skinner plant effluent that allows lower flows to be delivered to the member agency. Staff installed a new metered potable water line at Metropolitan's Chlorine Unloading Facility in Riverside; and installed about 2,500 feet of underground water quality sample lines, along with associated instrumentation appurtenances, at the Diemer plant.

Staff relocated standby generators at three of Metropolitan's five wide area network sites for consistency with current fire codes and to enhance safety. Staff also repositioned the automatic meter reading cabinet, electrical service pedestal, vent stack, and below-ground piping for service connection WB-13 (West Basin) to allow street construction in the city of Redondo Beach.

Power Equipment and Reliability

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

This year, staff recommissioned a 4.3-MW turbine generator at the Valley View hydroelectric plant after its refurbishment, began refurbishing the 5.9-MW turbine generator for Red Mountain HEP, and performed electrical and mechanical testing at several hydroelectric plants. Metropolitan certified its compliance for calendar year 2019 with all applicable NERC (North American Electric Reliability Corporation) 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.

Staff applied condition-based monitoring to increase the reliability of chemical storage tanks, as part of a multi-year effort that will include electrical motors and mechanical gearboxes. Staff also provided member agency technical support for several service connections.

Fleet Services

In FY 2019/20, staff completed nearly 6,870 preventive maintenance work orders and 2,960 corrective work orders on about 1,430 fleet assets and 600 facility assets; and replaced aging vehicles and equipment while meeting all applicable air quality regulations.

Metropolitan is ready to apply the changes as the California Air Resources Board develops a final rule for its New Portable Equipment Registration Program. With CARB also revamping its Heavy-Duty Vehicle Inspection Program, fleet staff have been working to meet these new regulatory requirements, which will include staff certification for new testing and reporting methods. Metropolitan continued to meet all timelines and conditions necessary for these new processes during FY 2019/20.

Asset Management

Metropolitan has several programs that have established the organization as a high-performing utility with a reliable and flexible system. These programs have allowed Metropolitan to consistently meet member agency service demands by maximizing the service life of critical infrastructure and keeping asset downtime to a minimum.

In FY 2019/20, Metropolitan launched several efforts to evaluate current asset management practices and identify areas of improvement to achieve best-in-class status. Staff conducted several workshops with industry experts that led to the development of a strategic asset management plan. Nearly complete, the plan establishes an asset management framework with a focus on improving processes, maximizing the value of all Metropolitan assets and fostering a strong internal asset management culture. A new organizational unit assists cross-functional teams in developing foundational elements of an asset management program, including risk and data management, and tactical asset management plans for pipelines and billing meters.

Emergency Management

The year 2020 will be remembered for the COVID-19 pandemic and its regional, statewide and global impacts. Metropolitan responded quickly to the pandemic by reviewing its Pandemic Action Plan, proclaiming a state of emergency, and virtually activating the Emergency Operations Center in early March 2020 for over three months. The EOC coordinated daily with local and state public health and emergency management officials. Staff also worked across several units within Metropolitan to ensure safety, operations, supplies and procurement, personnel, finance, public outreach and other critical elements were planned for and well-coordinated. The pandemic response tested nearly all aspects of Metropolitan's Emergency Response Plan, along with the creativity and resolve of staff across the organization. These efforts allowed Metropolitan to continue meeting its mission of safe and reliable deliveries of drinking water to the region during this emergency event.

One key example involved the leak discovered on DWR's Santa Ana Valley Pipeline on April 30. As the pipeline supplies SWP water to the Mills plant, Metropolitan immediately shut down the plant for three days to allow DWR to install a temporary bulkhead that allowed Metropolitan to deliver water from Lake Perris to the Mills plant during the repairs. Staff coordinated closely with the member agencies during this unexpected outage amid the pandemic, including joint conservation messaging and operational changes, with the agencies taking several actions to ensure sufficient supplies for their customers.

Prior to the pandemic period, Metropolitan performed over 70 emergency exercises in FY 2019/20, including a full-scale exercise in

October 2019 as part of the Great California ShakeOut. In this "live start" exercise, staff responded in real time to the EOC in response to a simulated earthquake. Other exercises that focused on dam safety and plane crash scenarios were held with Orange County member agencies at the Diemer plant.

Energy Management

Hydroelectric Power Recovery Plant Operations

Metropolitan has 16 small-conduit hydroelectric power recovery plants that generated a total of 204 million kilowatt-hours (kWh) for FY 2019/20 (Table 4-7), earning revenues of $10.4 million. This was about 6 million kWh less generation and $1.4 million less revenue compared to FY 2018/19. The sale of 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 $52/megawatt-hour.

Solar Power Energy Production

Metropolitan has four solar photovoltaic energy facilities. The Skinner plant facility 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 2019/20, facilities at the Skinner plant produced 2,052 MWh of energy, the DVL Visitor Center produced 488 MWh, the Weymouth plant produced 5,149 MWh, and the Jensen plant produced 2,052 MWh, all of which offsets retail energy costs at the four locations from the local energy utility company.

Greenhouse Gases

Power utilities that release 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 2019, Metropolitan submitted allowances to cover its obligation

for energy imported into California to serve the CRA pumping load in CY 2018. This was the fifth year Metropolitan made such a submittal.

Colorado River Aqueduct Power

In FY 2019/20, Metropolitan pumped nearly 550,000 AF through the CRA compared to 795,000 AF the previous year, requiring about 1.1 billion kWh of electricity compared to about 1.5 billion kWh in the previous year. This represented the lowest pumping demand since the mid-1950s.

Energy costs for pumping Colorado River water are shown in Table 4-8. The current and historical energy resources used to meet CRA water delivery energy requirements are shown in Table 4-9 and Figures 4-11 and 4-12.

In FY 2019/20, Metropolitan relied entirely on AEPCO to be the purchasing agent for supplemental power to balance CRA load and resources. During the period, Metropolitan was a net seller of energy into CAISO (California Independent System Operator).

Net supplemental energy purchases decreased from 395 million kWh in FY 2018/19 to net sales of about 54 million kWh in FY 2019/20 into the CAISO energy market. CRA energy costs decreased from about $14 million in FY 2018/19 to $9.7 million in FY 2019/20. The lower cost in FY 2019/20 was again attributed to reduced CRA pumping demand. Further, generation from Hoover and Parker dams decreased by about 14 million kWh from the previous fiscal year.

TABLE 4-7
HYDROELECTRIC POWER RECOVERY PLANTS[1]
PRODUCTION FOR THE PAST TWO FISCAL YEARS

Power Plant[2]	Nameplate Capacity (Megawatts)	2019/20 Production (kWh)	2018/19 Production (kWh)
Greg Ave.[3]	1	0	0
Lake Mathews	5	5,745,509	18,026,618
Foothill Feeder	9	46,631,021	41,404,003
San Dimas	10	21,957,942	40,906,179
Yorba Linda	5	21,035,708	18,718,188
Sepulveda Canyon	9	6,261,940	14,181,272
Venice	10	0	0
Temescal	3	0	6,689,019
Corona	3	6,162,579	7,027,483
Perris	8	6,566,324	15,237,862
Rio Hondo	2	0	1,972,007
Coyote Creek	3	0	0
Red Mountain	6	0	5,267,241
Valley View	4	3,319,588	0
Etiwanda	24	54,560,718	36,660,084
Wadsworth (DVL)	30	31,470,043	4,888,102
TOTAL	**131**	**203,711,372**	**210,978,058**

[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.

[3] Greg Ave. Power Plant is out of service and may be considered for permanent retirement in the future

TABLE 4-8
ENERGY COST FOR PUMPING
COLORADO RIVER WATER
Fiscal Year 2019/20

Energy Source	Cost ($)
Hoover Power Plant	16,175,469
Parker Power Plant	3,769,646
Energy Purchases/Sales [1]	9,721,865
Colorado River Water Pumping Revenue[2]	(1,460,701)
Reduction in Energy Surcharge [3]	20,549
TOTAL	**28,226,828**

Notes:

[1] Energy Purchases/Sales. A negative number indicates net revenue to Metropolitan.
[2] Payments received for energy costs associated with moving non-Metropolitan water on the CRA.
[3] Reduction in tax due to transmission losses and small hydro generation.

Staff removing an isolation gate at Wadsworth Pumping Plant while adhering to COVID-19 response protocols.

TABLE 4-9
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	Other Energy Purchases/Sales *
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	1,051,244
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	922,998
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	998,546
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	1,106,935
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	1,117,932
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	1,216,168
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	1,097,722
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	777,682
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	656,139
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	895,487
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	494,751
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	663,911
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	887,851
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	984,309
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	948,318
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	403,700
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	66,254
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	364,931
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	400,867
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	(72,066)
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	251,416
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	722,338
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	851,636
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	650,402
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	35,739
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	187,321
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	868,944
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	1,155,951
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	937,495
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	357,476
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	310,949
2018/19	925,705,000	211,291,000	0	0	0	0	395,306,715	1,532,302,715	395,307
2019/20	916,824,000	205,557,000	0	0	0	0	(53,861,886)	1,068,519,114	(53,862)

* Includes June 1987 data

[1] Energy provided by Southern California Edison (SCE) at no cost pursuant to 1987 Service and Interchange Agreement. [2] Energy exchange with SCE. Negative number indicates net energy banked with SCE.

[3] Energy purchases and sales. A negative number indicates net energy sold to other parties.

[4] The operating agreement with SCE terminated on September 30, 2017. Effective October 1, 2017, MWD purchased Supplemental energy from the Southwest spot market and the California Independent System Operator to meet its incremental energy needs. .

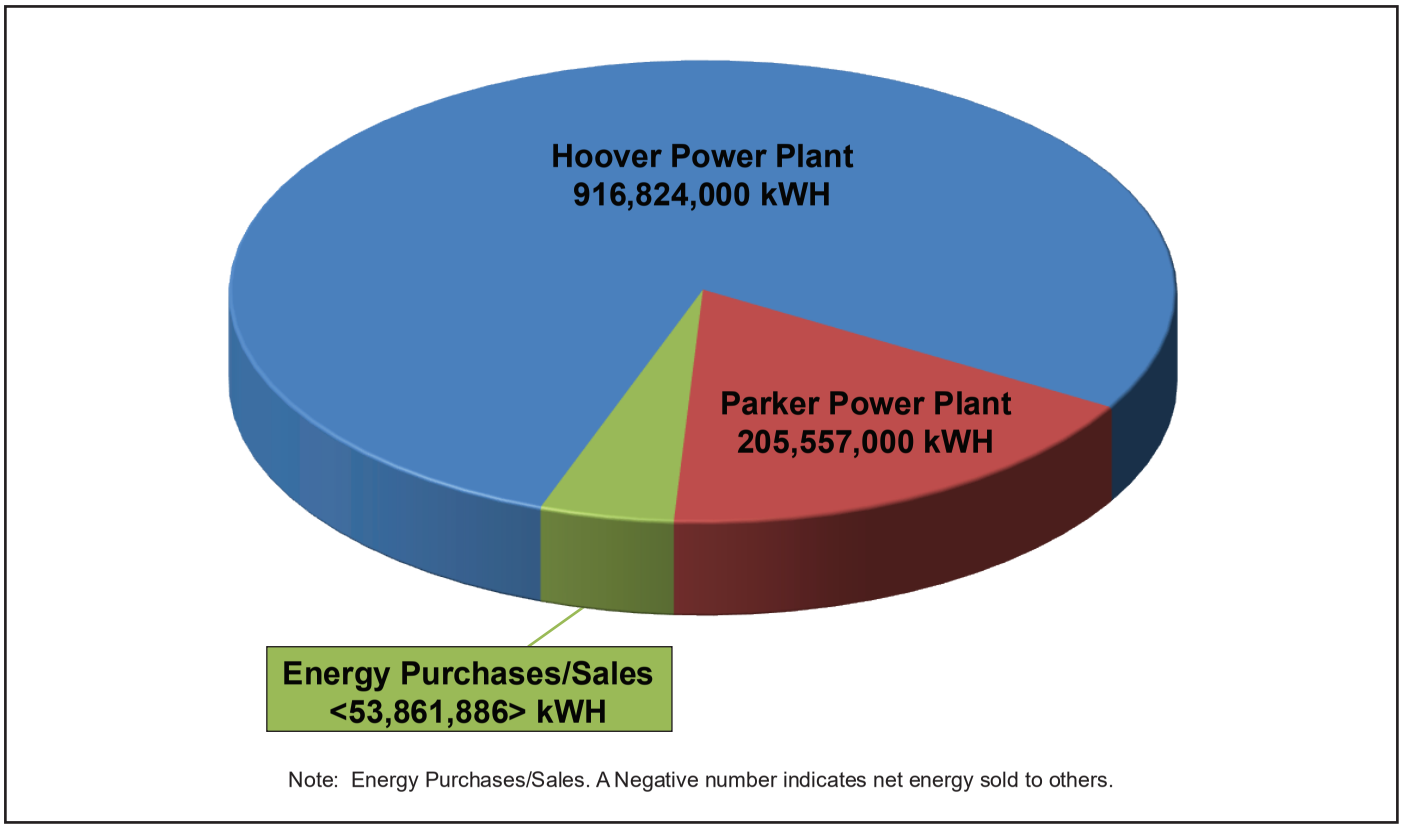


Figure 4-11. Metropolitan's CRA Electric Energy Use (kWh) Fiscal Year 2019/2020

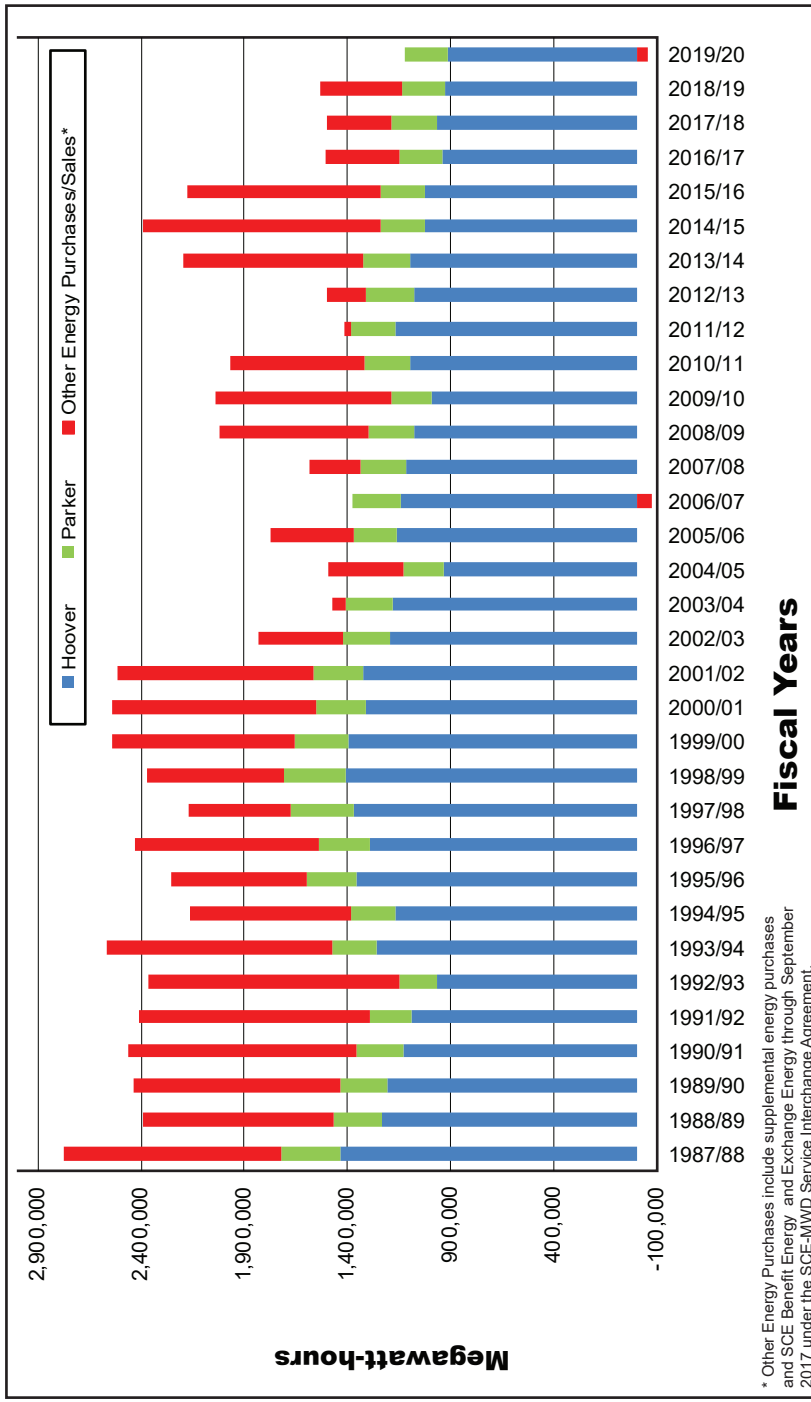


Figure 4-12. CRA Energy Mix Fiscal Years 1987/88 to 2019/20

Agreements for CRA Operations

Metropolitan maintains agreements with CAISO and WAPA (Western Area Power Administration) to 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 on Oct. 1, 2017. The CAISO agreement establishes the operational relationship between CAISO and Metropolitan. One agreement with AEPCO provides for the scheduling and trading of energy resources needed to operate the CRA. A second 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.

Energy Sustainability Plan

Staff continued development of a comprehensive Energy Sustainability Plan to manage future energy use and move Metropolitan toward energy independence and sustainability. The ESP examines changing energy markets, evaluates Metropolitan's energy use and exposure to price volatility, and identifies potential projects and initiatives to contain energy costs and increase operational flexibility. Potential energy management projects include Yorba Linda HEP modifications; retail battery storage systems at Weymouth, Skinner, Jensen and the OC-88 (Orange County) pump station; and evaluation of variable-speed pump drives at Intake and Gene pumping plants. The ESP is the result of an 18-month effort by multiple groups within Metropolitan and will be completed in fall 2020.

Safety and Regulatory Services

Metropolitan complies with environmental and safety regulations and procedures through regular site inspections that proactively address environmental and safety issues. There were 65 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 and responds appropriately to the corresponding agency.

Regulatory

Metropolitan completed over 250 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 about 450 environmental permits for portable and stationary equipment, and hazardous materials.

Staff assisted in returning Palos Verdes Reservoir to service. Specifically, staff obtained a dewatering permit from the Los Angeles County Department of Public Works, allowing the reservoir to be filled, disinfected and dechlorinated, and then dewatered to the storm drain. Staff also obtained a new permit from the Los Angeles County Sanitation Districts to discharge groundwater and reservoir seepage water.

Staff submitted quagga mussel control plans to the California Department of Fish and Wildlife and obtained approval to dewater facilities at the Skinner plant and several pipelines within the Skinner area.

To comply with new underground storage tank regulations, operations and engineering staff worked together to successfully complete a capital project to enhance leak detection at five underground storage tanks. Compliance with regulations for above-ground fuel tanks continued as staff updated and executed 20 plans for oil spill prevention control and countermeasures. Metropolitan submitted annual disclosures and updates to local health and fire departments for business plans addressing hazardous materials for 38 Metropolitan facilities.

Staff coordinated one five-year resubmittal and six triennial internal audits of all six of Metropolitan's California Accidental Release Prevention/Risk Management Plan and Process Safety Management Program facilities. Support was provided to ensure compliance with applicable chlorine and aqueous ammonia regulations and industry standards, aimed at preventing releases, employee injuries and environmental impacts.

Staff supported PCB (polychlorinated biphenyl) remediation and abatement projects at Carbon Creek PCS, the Second Lower Feeder and the Diemer plant. Staff also supported Real Property by coordinating Phase I Environmental Site Assessments for Palo Verde Irrigation District

for land acquisitions. Staff supported 18 asbestos, lead, and mold abatements for various Metropolitan facilities.

Staff completed a total of 58 regulatory submittals to the Department of Toxic Substances Control and California Department of Taxes and Fees Administration. These included an application for a permanent state identification number for the Regional Recycled Water Advanced Purification Center in Carson.

Metropolitan 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 late 2020. Staff also continued to provide input to the South Coast and Mojave Desert air quality management districts to increase operational flexibility and ensure compliance for paint coating application equipment. The Mojave Desert Air Quality Management District recognized Metropolitan's 2019 environmental compliance, stewardship, and sustainability accomplishments by nominating Metropolitan for its prestigious Exemplar Award. The final recipient will be announced by the end of 2020.

Health & Safety

Health and Safety Program staff played a key role in responding to the COVID-19 pandemic by quickly developing guidance to protect Metropolitan employees, contractors and vendors. This included (1) facility-specific COVID-19 prevention plans; (2) banners, signs and stickers displaying safety information; (3) safety talks on control measures for essential workers, personal protective equipment and telework best practices; and (4) employee training on COVID-19 response procedures and guidelines. Staff assessed employee work duties to ensure all COVID-19 related prevention and control measures met guidelines established by the local, state and federal authorities.

All Metropolitan facilities are routinely cleaned, and this was further enhanced as a response to the COVID-19 pandemic. A deep cleaning pilot was conducted with a vendor to demonstrate a high level of sanitization that would be utilized, when needed, in the event of a potential COVID-19 exposure at a Metropolitan facility. The vendor thoroughly cleaned and disinfected two field facilities, including utilizing fog spray equipment

containing an EPA-approved disinfectant recommended for the pandemic response. This pilot program increased Metropolitan's preparedness to respond to a potential COVID-19 exposure and ensure a safe work environment for continuing operations.

In response to the pandemic, online safety and technical training was quickly expanded from about 40 percent of training offered to over 90 percent of training delivered. Metropolitan offered more than 660 classes covering nearly 100 individual safety and regulatory compliance topics. Online courses continued to provide flexibility for diverse work schedules and proved especially beneficial for maintaining training completion during the pandemic period. Courses that require practical demonstrations were conducted using physical distancing guidelines.

Staff provided safety coverage during the FY 2019/20 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 4-10 shows the injuries, illnesses and incidents that required time off from work during FY 2019/20 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 federal and state rates 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.

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 Division of Apprenticeship Standards continues to recognize Metropolitan's curriculum as meeting the breadth and level commensurate with journey-level mechanical and electrical trades.

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 more than 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, comprising over 45 percent of Metropolitan's current apprentice-specific trades workforce.

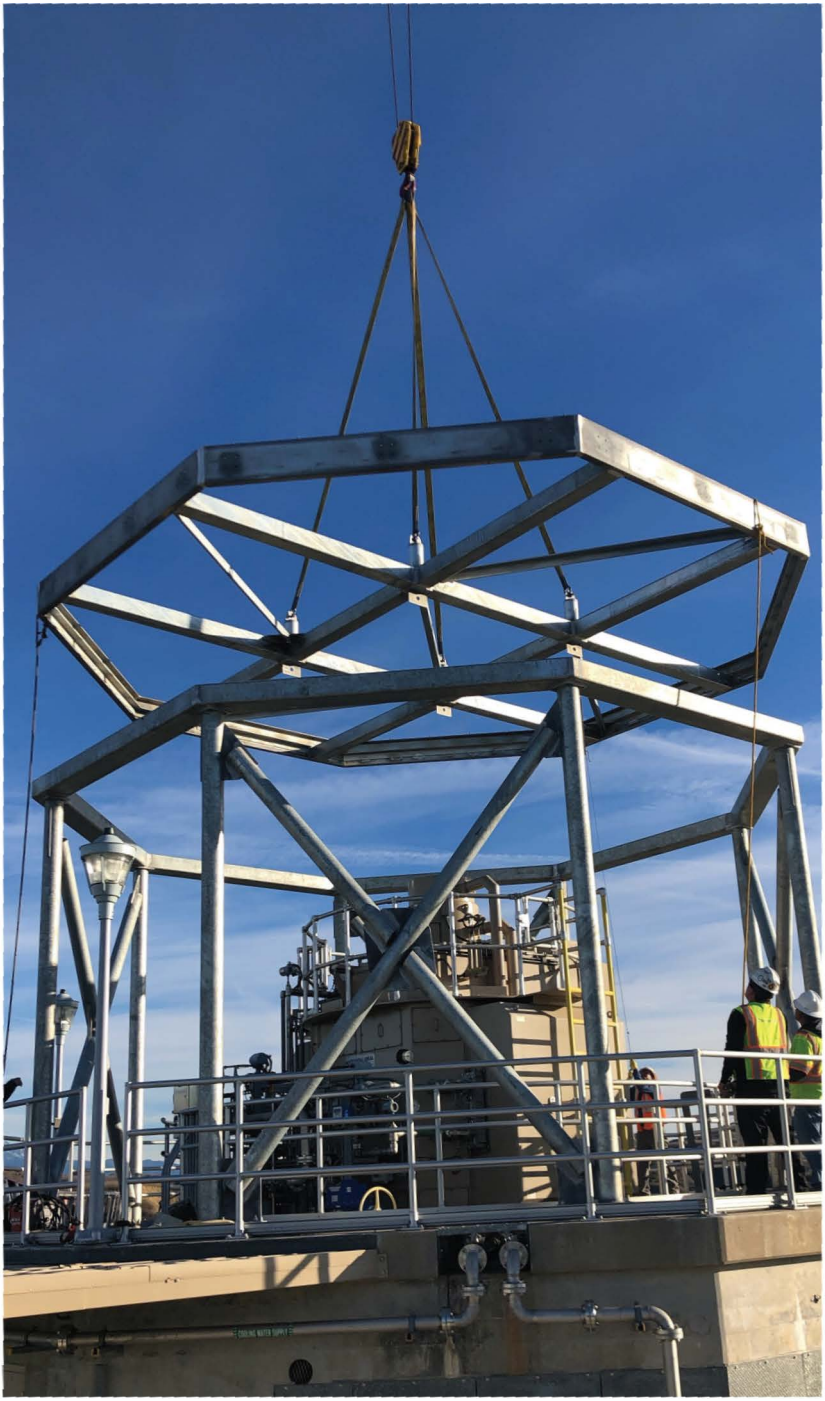
Staff coating a bypass slide gate and frame for the Skinner Water Treatment Plant.

TABLE 4-10
ACCIDENT INCIDENTS
Fiscal Year 2019/20

Location	Total* Incident Rate	DART** Incident Rate
Diamond Valley Lake	2.9	0
Diemer	1.5	1.5
Eagle Mountain	7.6	7.6
Eagle Rock	0	0
Gene	5.3	2.1
Hinds	0	0
Iron Mountain	10.0	10.0
Jensen	1.5	1.5
Lake Mathews	10.4	6.0
Mills	2.0	2.0
Sacramento	0	0
San Diego	0	0
Skinner	6.6	5.0
Soto Street	13.5	10.1
Sunset	0	0
Union Station	0.3	0.1
Washington, D.C.	0	0
Weymouth	1.5	1.5
AVERAGE RATE	**2.1**	1.5
Federal Utility Average	**5.8**	3.5
State Utility Average	**4.0**	2.1

*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.



Crews install structural steel for weather enclosure at Yorba Linda hydroelectric plant.

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 responsibility 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.

In response to the General Manager's COVID-19 emergency declaration, Metropolitan temporarily suspended all construction contracts in mid-March 2020 to assess the viability of moving ahead with construction work in light of the pandemic. Work on procurement contracts and off-site fabrication was not impacted by this action. Eventually, Metropolitan restarted all but one construction contract after applying COVID-19 mitigation practices. Working remotely, engineering staff continued the planning, design and bid advertisement of capital and O&M work. In spite of the pandemic, engineering staff continued all of its regulatory required inspections of dams and other critical infrastructure. Staff also continued ongoing relining work on the Second Lower Feeder and seismic upgrades and other needed improvements at the downtown Los Angeles headquarters building, advancing additional portions of the work ahead of original schedule.

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 $260 million.

During fiscal year 2019/20, CIP expenditures totaled about $307 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 14 construction contracts with a total constructed value of $87 million (Table 5-1), while 19 construction contracts remained underway with a total value of $301 million (Table 5-2). Metropolitan also had 108 major capital projects in various stages of design (Table 5-3). Additionally, the group managed 15 ongoing procurement contracts with a total value of $60 million.

Below are highlights of Engineering Services' major activities for each capital program during FY 2019/20:

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 2019/20, staff oversaw the completion of startup and commissioning of the advanced water treatment demonstration plant and held the grand opening event for the plant. Additionally, Metropolitan received the Engineering News-Record Owner of the Year award for the facility.

Several potential project participants have signed letters of intent. Staff also conducted presentations at major conferences on innovative design concepts, planning and nitrogen management strategies for the large-scale program.

Water Quality/Oxidation Retrofit Program

This program adds or upgrades facilities to ensure compliance with water quality regulations at Metropolitan's treatment plants and throughout the distribution system. During FY 2019/20, staff completed ozone gas flow meters at the Weymouth plant, and continued preparation of record drawings for the plant's enhanced bromate control facilities and oxidation retrofit program switchgear.

Treatment Plant Reliability Program

Projects under this program maintain reliability and improve the operating efficiency of Metropolitan's water treatment plants. During the year, staff completed seismic upgrades to the west washwater tank at the Weymouth plant, and substantially completed upgrades to the plant's domestic water system while continuing upgrades to Weymouth's chlorination system. Staff also continued rehabilitation of Jensen plant flocculators, and the Diemer plant's west basin and filter building.

Distribution System Reliability Program

This program maintains delivery reliability to Metropolitan's member agencies. Projects completed during the fiscal year included installation of a drainage system and erosion control features at Garvey Reservoir and first-phase construction of a Palos Verdes Reservoir sewer line connector. Metropolitan also repaired storm damage to the Whitewater erosion protection structure; substantially completed electrical upgrades at 15 structures in the Orange County operating region, rehabilitated a service connection on the east Orange County Feeder No. 2, and installed a cathodic protection system on the Orange County Feeder.

Colorado River Aqueduct Reliability Program

Projects within this program maintain the reliability of the Colorado River Aqueduct and its pumping plants. During the fiscal year, staff upgraded the uninterruptible power supply systems at each CRA pumping plant, replaced the 2.4 kV power line at Intake Pumping Plant and completed final design for replacement of the CRA overhead cranes. Rehabilitation work continued for the Gene Wash Water Reservoir discharge valves, the discharge isolation couplings at five CRA plants, and radial gates along the CRA.

PCCP Reliability Program

This long-term, comprehensive program will rehabilitate 100 miles of Metropolitan's 163 miles of prestressed concrete cylinder pipe. Through FY 2019/20, 15 miles of PCCP have been rehabilitated, leaving 85 miles that remain to be lined or replaced. During the fiscal year, Metropolitan installed 2 miles of steel liner for Reach 4 on the Second Lower Feeder, and substantially completed 4.5 miles for Reach 2 and final design for the urgent relining of a 2,900-linear-foot portion for Reach 8. Additionally, staff inspected 17 miles of PCCP lines and continued preliminary design to rehabilitate the Allen-McColloch Pipeline, Calabasas Feeder, Rialto Pipeline and Sepulveda Feeder.

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, successfully negotiating the right-of-way for five project sites in the Orange County area and awarding construction contracts for six project sites in the region.

System Flexibility/Supply Reliability Program

In response to the recent drought and the reduced availability of State Water Project supplies, staff continued executing projects that expand the reach of CRA water throughout Metropolitan's distribution

system. During the fiscal year, construction work continued on the rehabilitation of the Greg Avenue Pump Station, and final design commenced on the Lake Perris seepage water conveyance pipeline.

System Reliability Program

This program will improve or modify facilities located throughout Metropolitan's service to utilize new processes and/or technologies, and to improve facility safety and overall reliability. During the fiscal year, staff continued construction of building seismic improvements at the Los Angeles headquarters building, and substantially completed 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 final design of utility improvements and roadway asphalt replacement for the Eagle Mountain, Iron Mountain and Gene pumping plants, and preliminary design of Intake Pumping Plant improvements.

Minor Capital Projects Program

Minor capital projects involve refurbishments, replacements, or upgrades at Metropolitan facilities that cost less than $400,000. During FY 2019/20, Metropolitan authorized 24 projects and completed 17 minor capital projects.

District Housing & Property Improvements Program

This new program will refurbish or upgrade workforce housing at Metropolitan to provide enhanced living conditions that attract and retain skilled employees. During the year, staff completed the desert housing conceptual design report, provided an updated plan for design and construction, and substantially completed the employee village enhancement master planning document.

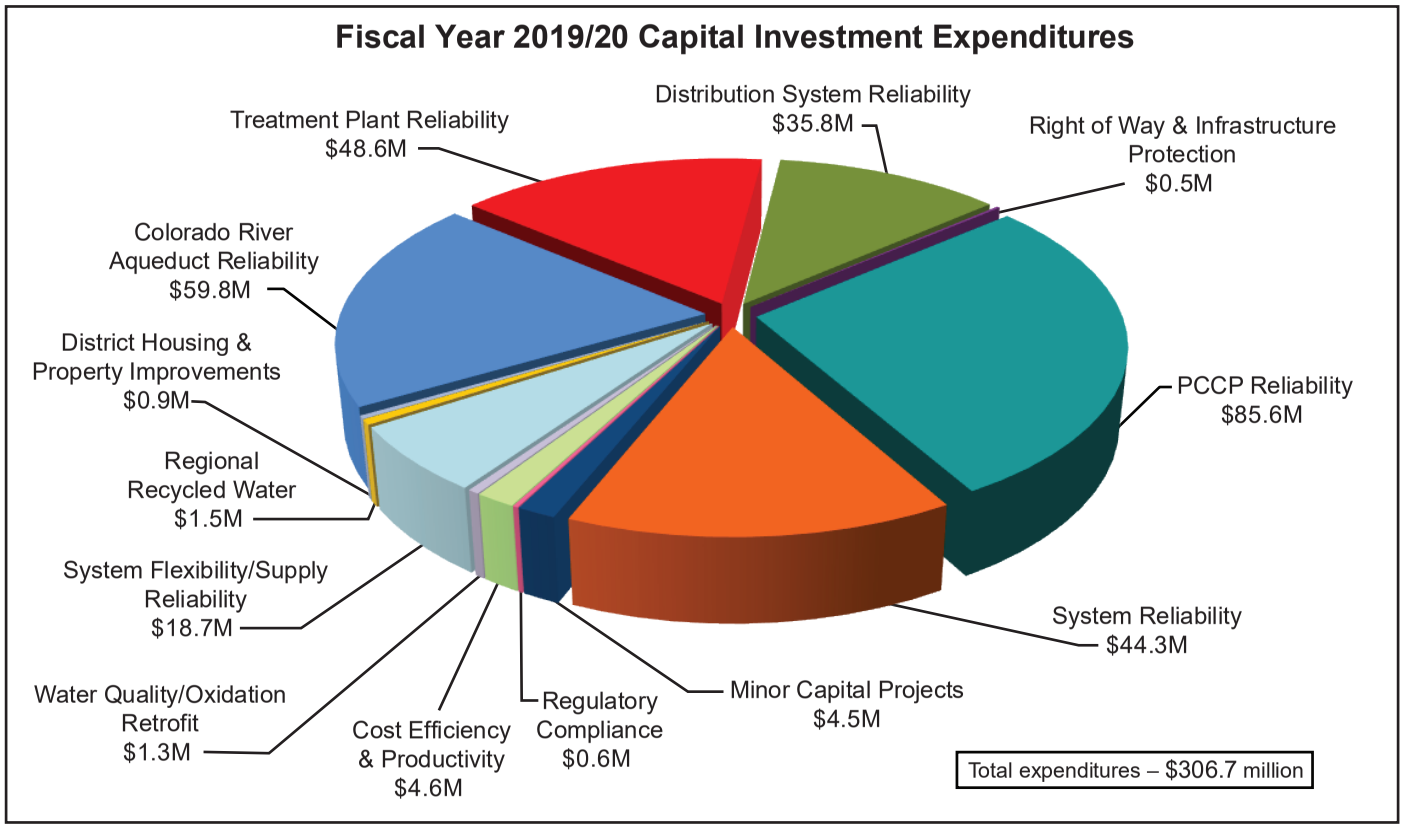


Figure 5-1. Fiscal Year 2019/20 Capital Investment Expenditures

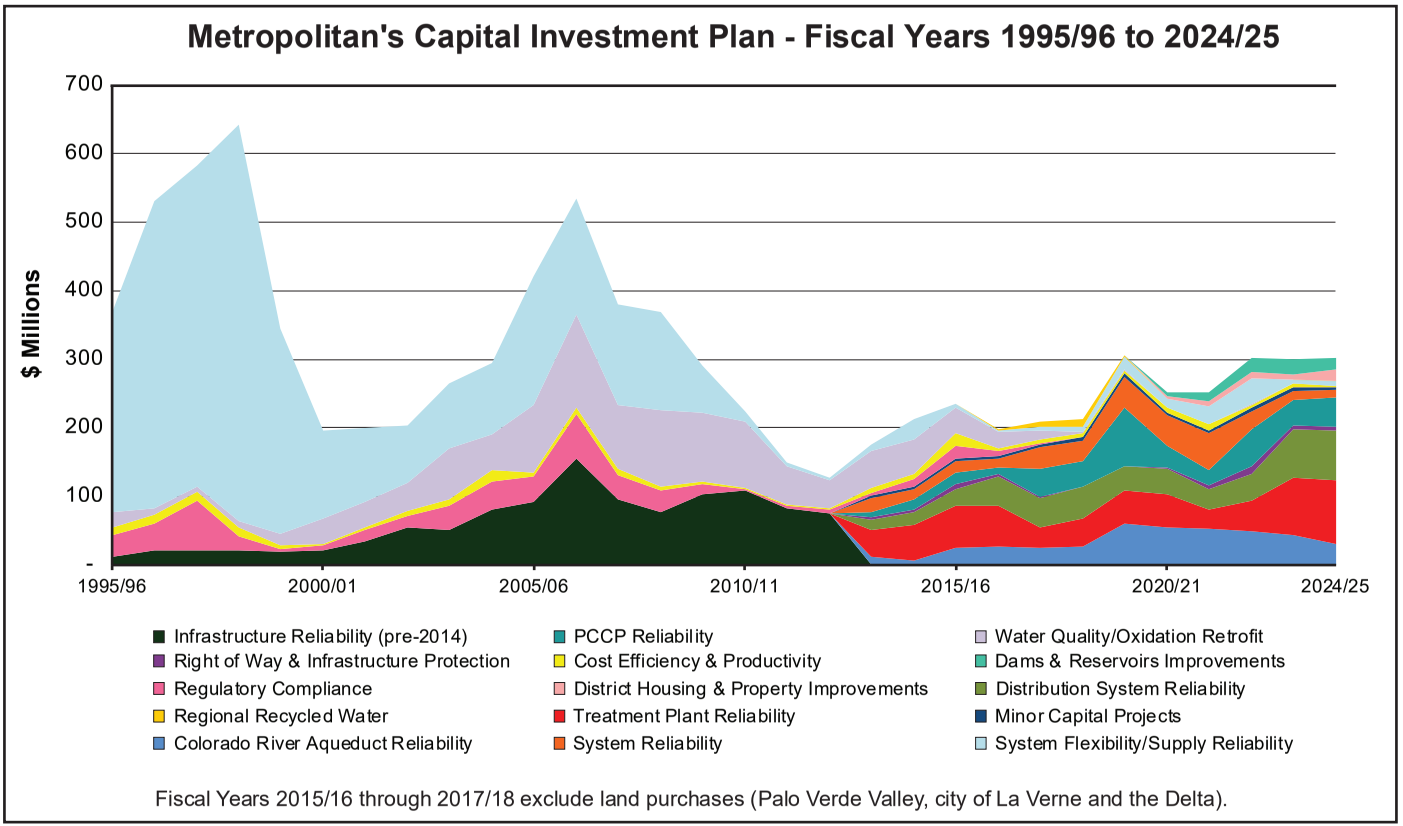


Figure 5-2. Metropolitan's Capital Investment Plan - Fiscal Years 1995/96 to 2024/25

TABLE 5-1
CONSTRUCTION CONTRACTS COMPLETED AS OF JUNE 30, 2020 (Unaudited)

Completion Date	Contract / Spec. No.	Project	Base Bid Amount ($)	Final Amount ($)
6/8/20	1899/1899	Orange County Feeder Cathodic Protection	556,000	604,272
5/26/20	1953/1953	Installation of Yorba Linda Generator Enclosure	475,000	475,000
5/4/20	1959/1959	Whitewater Erosion Protection Structure Rehabilitation	3,634,250	3,602,025
4/15/20	1879/1852	Joseph Jensen Water Treatment Plant Inlet Water Quality Instrumentation Enclosure	985,000	970,640
3/16/20	1889/1810	Colorado River Aqueduct Pumping Plants Uninterruptible Power Supply Replacement	939,000	925,727
2/24/20	1857/1793	Mills Electrical Upgrades – Stage 1A	3,097,927	3,087,430
1/15/20	1877/1788	F. E. Weymouth Water Treatment Plant – West Washwater Tank Seismic Upgrades	2,591,576	2,591,576
1/9/20	1904/1843	Orange County Feeder Extension Relining – Reach 2	6,957,500	7,243,539
10/31/19	1890/1798A	Intake Pumping Plant 2.4 kV Power Line Relocation	5,555,669	5,589,075
10/25/19	1940/1940	Second Lower Feeder PCCP Rehabilitation – Reach 4	14,536,130	14,011,881
10/21/19	1930/1930	Garvey Reservoir Drainage and Erosion Improvements – Areas 2, 3, and 4	648,745	869,767
10/3/19	1856/1879	Advanced Water Treatment Demonstration Facility	13,856,000	14,364,721
7/11/19	1932/1932	Iron Mountain Pumping Plant Renovation of Houses 74, 125, and 126	619,000	665,038
7/9/19	1825/1771	Palos Verdes Reservoir Cover and Liner Replacement (Litigation)	29,560,000	31,775,846

TABLE 5-2
MAJOR CONSTRUCTION CONTRACTS IN PROGRESS
AS OF JUNE 30, 2020 (UNAUDITED)

Accrual Basis

Contract No.	Project	Percent Contract Complete through 6/30/2020	Estimated Contract Completion Date	Contract Earnings ($) through 6/30/2020 [1]	Contract Amount ($) 6/30/2020 [2]	Base Bid Amount ($)
1878	Gene Wash Reservoir Discharge Valve Replacement	4%	Jun. 2021	$222,504	$5,316,900	$5,316,900
1880	Orange County Region Service Center	97%	Jul. 2020	$9,204,348	$9,474,274	$9,257,483
1882	Weymouth Plant Domestic Water Systems Improvement	92%	Jul. 2020	$3,633,979	$3,945,000	$3,740,000
1883	F. E. Weymouth Water Treatment Plant Chlorination Systems Upgrades	76%	Jan. 2021	$6,484,940	$8,487,170	$8,487,170
1893	Electrical Upgrades at 15 Structures in the Orange County Region	99%	Aug. 2020	$2,597,129	$2,606,700	$2,606,700
1900	Diemer Water Treatment Plant West Basin and Filter Building Rehabilitation	73%	Jan. 2021	$28,245,641	$38,539,196	$38,539,196
1902	Second Lower Feeder PCCP Rehabilitation – Reaches 2 and 8	87%	Dec. 2020	$50,674,065	$58,087,826	$53,273,196
1905	Metropolitan Headquarters Building Improvements	64%	Jun. 2022	$28,168,145	$43,725,269	$43,998,000
1908	CRA Pumping Plants – Sump Rehabilitation	4%	Mar. 2022	$1,134,254	$26,900,000	$26,900,000
1911	Greg Avenue Pressure Control Structure – Pump Modification and New Control Building	65%	Dec. 2020	$13,921,848	$21,560,700	$20,975,000
1914	Joseph Jensen Water Treatment Plant Electrical Upgrade – Stage 2	16%	Apr. 2022	$2,317,190	$14,784,000	$14,784,000
1915	Colorado River Aqueduct Pumping Plants 6.9 kV Power Cable Replacement	67%	Sep. 2020	$11,015,509	$16,452,832	$16,452,832

TABLE 5-2 (Continued)
MAJOR CONSTRUCTION CONTRACTS IN PROGRESS
AS OF JUNE 30, 2020 (UNAUDITED)

Accrual Basis

Contract No.	Project	Percent Contract Complete through 6/30/2020	Estimated Contract Completion Date	Contract Earnings ($) through 6/30/2020 [1]	Contract Amount ($) 6/30/2020 [2]	Base Bid Amount ($)
1920	Colorado River Aqueduct – Installation of Radial Gates at Seven Facilities	46%	Jun. 2021	$4,791,931	$10,439,354	$10,439,354
1921	F. E. Weymouth Water Treatment Plant Water Quality Instrumentation Improvements	37%	Feb. 2021	$1,098,863	$2,944,000	$2,944,000
1923	Colorado River Aqueduct – Discharge Line Isolation Couplings and Bulkheads Installation	55%	Jun. 2021	$18,249,209	$32,946,000	$32,946,000
1924	Orange County Region Erosion Control Improvements – Stage 1	0%	Jun. 2021	$0	$429,295	$429,295
1931	Joseph Jensen Water Treatment Plant Modules 2 and 3 Flocculator Rehabilitation	37%	Feb. 2021	$3,305,407	$8,888,000	$8,888,000
1943	East Orange County Feeder No. 2 Service Connection A-06 Rehabilitation	66%	Sep. 2020	$391,107	$594,480	$594,480
1957	West Valley Feeder No. 1 De Soto Avenue Valve Structure Upgrades	3%	May. 2021	$20,000	$594,800	$594,800

[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.

[2] The Contract Amount may differ from the bid amount due to periodic change orders approved by the General Manager or, if required, by the Board

TABLE 5-3
MAJOR PROJECTS UNDER DESIGN DURING FISCAL YEAR 2019/20

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 2022
15373	CRA Conveyance Reliability	$186,000,000	Copper Basin & Gene Wash Dam Discharge Valve Replacement	October 2019
15384	CRA Electrical/Power Systems Reliability	$48,600,000	CRA Auxiliary Power Systems	May 2024
			CRA Main Transformer Replacement/Rehabilitation	June 2022
			Iron Mountain Auxiliary Power System Rehabilitation	December 2022
15438	CRA Reliability - FY2006/07 Through FY2011/12	$110,200,000	CRA Pumping Plant Sump System Rehabilitation	November 2021
			Iron Mountain Pumping Plant Generator Replacement	December 2022
			Seismic Evaluation of CRA Structures	July 2022
15481	CRA Main Pump Reliability	$177,200,000	CRA Main Pump Rehabilitation	November 2023
			CRA Overhead Crane Replacement	March 2020
15483	CRA Reliability - FY2012/13 Through FY2017/18	$67,600,000	CRA Conduit Erosion Control Improvements	June 2023
			CRA Conduit Structural Protection	June 2021
			CRA Domestic Water Treatment System Replacement	September 2022
			CRA Pumping Plant Drainage Improvements	November 2022
			CRA Pumping Plant Storage Buildings at Hinds, Eagle Mountain and Iron Mountain	September 2021
			CRA Water Distribution System Replacement - Intake	February 2022
			CRA Water Distribution System Replacement – Iron Mountain and Gene	June 2021
			Whitewater Tunnel No. 2 Seismic Upgrades	June 2022
Distribution System Reliability Program				
15377	Conveyance and Distribution System Rehabilitation	$119,500,000	Orange County Feeder Relining	September 2020
			Orange County Feeder Station 1920+78 Blow-Off	April 2019
			West Valley Feeder No. 1 Access Roads & Structures Improvements - Stage 3	December 2021
15425	Perris Valley Pipeline	$151,000,000	Perris Valley Pipeline - Tunnels	October 2021
15417	Reservoir Cover and Replacement	$41,500,000	Jensen Finished Water Reservoir No. 1 Cover Rehabilitation	November 2021
			Jensen Finished Water Reservoir No. 2 Floating Cover Rehabilitation	November 2021
			Mills Finished Water Reservoirs Rehabilitation	September 2022
15419	Dam Rehabilitation & Safety Improvements	$8,900,000	Dam Monitoring Upgrades Lake Mathews	December 2021
			Dam Monitoring Upgrades Lake Skinner	December 2021
			DVL Dam Monitoring System Upgrade	December 2021

TABLE 5-3 (Continued)
MAJOR PROJECTS UNDER DESIGN DURING FISCAL YEAR 2019/20

Appropriation Number	Appropriation Title	Appropriation Estimate	Project Description	Estimated or Actual Completion Date for Final Design
15441	Conveyance and Distribution System Rehabilitation - FY2006/07 Through FY2011/12	$182,700,000	Etiwanda Pipeline Mortar Lining Repair	March 2022
			OC-88 Pump Plant Surge Tank Upgrade	June 2022
			San Gabriel Tower Seismic Upgrade	June 2023
			Santiago Lateral Sectionalizing Valve Replacement	December 2021
			Sepulveda Canyon Control Facility Water Storage Tanks Seismic Upgrade	July 2022
			Foothill Hydroelectric Plant Rehabilitation	December 2021
15458	Hydroelectric Power Plant Improvements	$39,300,000	Foothill Hydroelectric Plant Seismic Upgrades	June 2021
			Red Mountain Hydroelectric Plant Rehabilitation	December 2020
			San Dimas Hydroelectric Plant Rehabilitation	August 2023
			Valley View Hydroelectric Plant Rehabilitation	November 2020
			C & D System Electrical Structures Rehabilitation	September 2023
15480	Conveyance and Distribution System Rehabilitation - FY2012/13 Through FY2017/18	$332,500,000	Casa Loma Siphon Barrel #1 Proj. #2 Permanent Repairs	February 2021
			East Lake Skinner Bypass #2 Screening Structure Upgrade	December 2022
			Garvey Reservoir Drainage and Erosion Improvements	July 2020
			Lake Mathews Electrical Upgrades	December 2021
			Lake Skinner Pipelines Cathodic Protection	October 2020
			Lakeview Pipeline Repair	January 2024
			Live Oak Pipelines Cathodic Protection	December 2020
			North Portal Hollywood Tunnel -- Replace Equipment	November 2021
			Orange County and Riverside/San Diego County Operating Regions Valve	December 2022
			San Diego Canal Radial Gate VO-8 Rehabilitation	June 2022
			San Dimas and Red Mountain Power Plants Standby Diesel Engine Generator	October 2020
			Santa Monica Feeder Cathodic Protection	March 2021
			Sepulveda Canyon Control Facility Reliability Improvements	May 2024
			West Orange County Feeder Valve Replacement	October 2020
			West Orange County Feeder Cathodic Protection	March 2021
			West Orange County Feeder OC-09 Rehabilitation	December 2021
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

TABLE 5-3 (Continued)
MAJOR PROJECTS UNDER DESIGN DURING FISCAL YEAR 2019/20

Appropriation Number	Appropriation Title	Appropriation Estimate	Project Description	Estimated or Actual Completion Date for Final Design
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 2020
15473	Headquarters Building Improvements	$42,200,000	Headquarters Building Improvements	November 2018
PCCP Reliability Program				
15497	Second Lower Feeder PCCP Rehabilitation	$606,400,000	Second Lower Feeder PCCP Rehabilitation - Package 3	March 2021
15502	Allen McColloch Pipeline, Calabasas Feeder, and Rialto Pipeline PCCP Rehabilitation	$986,976,000	Allen McColloch Pipeline PCCP Rehabilitation	March 2023
			Calabasas Feeder PCCP Rehabilitation	December 2024
			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 2021
Right of Way & Infrastructure Protection Program				
15474	Right of Way and Infrastructure Protection	$71,200,000	Infrastructure Improvements for L.A. County Region	June 2024
			Infrastructure Improvements for Orange County Region	June 2022
			Infrastructure Improvements for Riverside / San Diego County Region	December 2023
			Infrastructure Improvements for Western San Bernardino County Region	September 2021
System Flexibility/Supply Reliability Program				
15402	Hayfield Groundwater Storage	$32,310,000	Lake Perris Seepage Water Conveyance Pipeline	January 2021
15495	Operation Support Facilities Improvement	$35,100,000	La Verne Seismic Upgrades Building 40 and 50	October 2019
			Lake Mathews Wastewater System Replacement	September 2020
15499	Metropolitan Security System Enhancements	$9,731,000	Headquarters Building Physical Security Improvements	June 2019
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	November 2021
15371	Jensen Improvements - FY2000/01 Through FY2005/06	$75,100,000	Jensen Bulk Chemical Tank Farm Facility Upgrades	June 2023
			Jensen Modules Nos. 2 & 3 Travelling Bridge Repairs	December 2022
			Washwater Return Pump Modifications - Phase 2	June 2019
15380	Diemer Improvements	$238,000,000	Diemer Main Washwater Reclamation Plant	June 2024
			Diemer West Basin Rehabilitation	July 2018

TABLE 5-3 (Continued)
MAJOR PROJECTS UNDER DESIGN DURING FISCAL YEAR 2019/20

Appropriation Number	Appropriation Title	Appropriation Estimate	Project Description	Estimated or Actual Completion Date for Final Design
15381	Mills Improvements	$8,200,000	Mills Solid Removal Automation	March 2023
15436	Diemer Improvements - FY2006/07 Through FY2011/12	$79,500,000	Diemer Chemical Feed System Improvements	December 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	November 2021
			Weymouth Dry Polymer System	December 2024
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	June 2019
15452	Mills Improvements - FY2006/07 Through FY2011/12	$27,500,000	Mills Electrical Improvements - Three Stages	April 2021
			Mills Module Influent Flash Mix Chemical Containment	October 2019
15477	Weymouth Improvements - FY2012/13 Through FY2017/18	$81,000,000	Water Quality Instrumentation Improvements	June 2019
			Weymouth Basin Inlet Channel Seismic Upgrades	November 2021
			Weymouth Chlorine System Upgrade	August 2018
			Weymouth Filter Building Sump Sparger Rehabilitation	September 2020
			Weymouth ODP (Oxidation Demonstration Plant) Rehab.	June 2023
			Weymouth Storm Water Management Improvements	November 2022
			Weymouth Washwater Pump Station Improvements	March 2024
15478	Diemer Improvements - FY2012/13 Through FY2017/18	$10,400,000	Diemer Chemical Tank Farm Improvements	December 2021
15479	Mills Improvements - FY2012/13 Through FY2017/18	$36,500,000	Mills Fluoride Tank Replacement	July 2021
			Mills Plant Perimeter Security and Environmental Improvements	September 2021
15486	Jensen Improvements - FY2012/13 Through FY2017/18	$16,300,000	Jensen Chemical Containment Upgrades	November 2019
			Jensen Fluoride Tank Replacement	July 2019
			Jensen Tank Farm Caustic Metering and Control Facilities	June 2023
15508	Jensen Improvement - FY2018/19 Through FY2023/24	$19,701,000	Jensen Plant Site Security Upgrades	August 2021
			Jensen Ozone PSU (Power Supply Unit) and Critical Components Upgrade	June 2021
15510	Diemer Improvements - FY2018/19 Through FY2023/24	$4,876,000	Diemer Ozone Generator Open-Loop Cooling Water System Improvements	September 2019
15516	AC Paving and Roofing Rehab	$2,500,000	Lake Skinner AC Paving and Roofing Rehab	February 2021
Water Quality/Oxidation Retrofit Program				
15472	Enhanced Bromate Control	$13,300,000	Mills Bromate Control Facilities	July 2022

The following sections present highlights of Engineering Services' operation and maintenance activities during FY 2019/20:

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. Staff also reviewed and commented on design work prepared by the Design and Construction Authority joint powers authority, including providing comments on the project alternative analysis. Engineering staff also reviewed and provided comments on the technical reports prepared by the Department of Water Resources in support of the notice of preparation for the project.

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. Engineering conducted condition assessments of 32 miles of PCCP pipelines, including internal electromagnetic and visual inspections of seven pipelines, which resulted in the relining of 1,000 feet of pipeline on the Sepulveda Feeder. Staff also rehabilitated three cathodic protection systems on the Orange County Feeder; and conducted an ultrasonic thickness inspection of 4.6 miles of cast iron pipe on the Santa Monica Feeder using a technology that allows testing to occur while the pipeline remains in service.

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. During the fiscal year, staff continued to develop initiatives that responded to newly adopted state regulations; performed regular inspections and

deformation monitoring of all dams; prepared Emergency Action Plans; provided regular updates to inundation maps; and performed comprehensive evaluations of dam structures as required by the California Division of Safety of Dams.

Seismic Resilience

Engineering Services has developed a proactive 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: completion of the 2020 seismic resilience report and vulnerability studies that focus on the liquefaction susceptibility and the potential of seismically induced damages to the conveyance and distribution system; and addressing near-term and long-term goals outlined in the biennial report on seismic resilience.

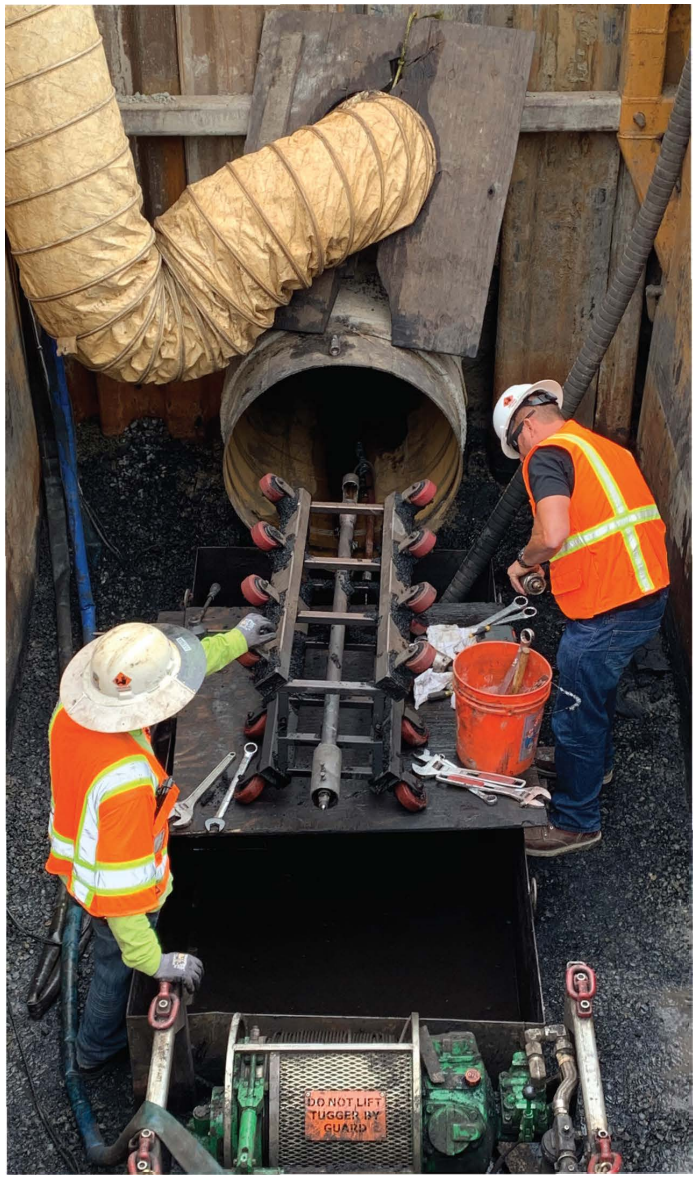
Cooperative Education Program

Engineering Services continued to offer summer and year-round student intern positions for the 18th consecutive year. This program provides engineering students with an opportunity to augment their studies with practical work experience in the water industry. A total of 15 students participated in the program during the fiscal year. About 245 students have participated in the program since its 2002 inception.

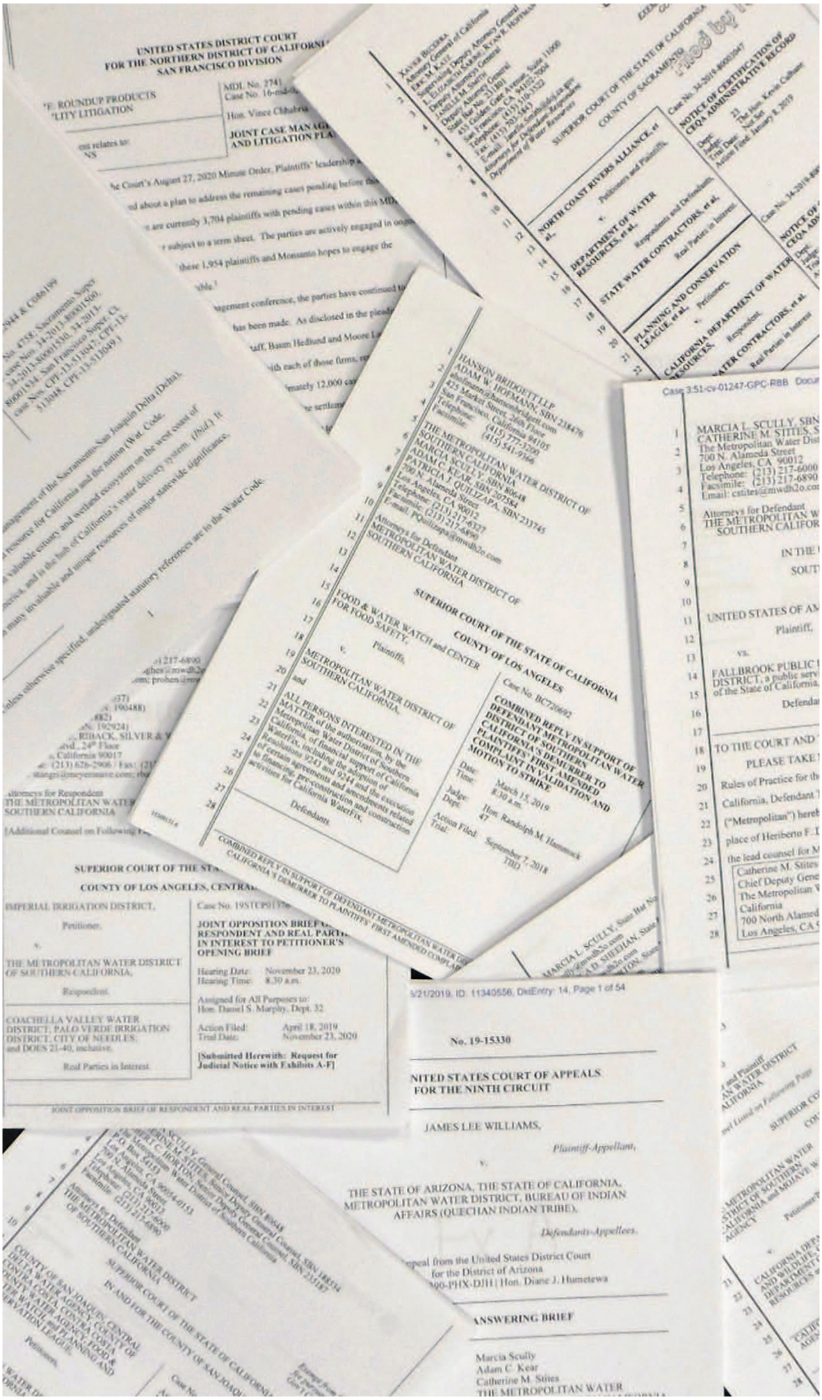
Technical Leadership

Engineering Services staff continued active participation on committees of professional organizations, including the American Water Works Association, WaterReuse Annual Conference & WaterReuse Annual Symposium, Water Systems Seismic Conference, and Southern California Cathodic Protection Committee. Staff published a number of technical papers and gave presentations 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.



Repair crews extract machine used for removing coal tar lining from the interior of Orange County Feeder, July 2019.


UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION
SUPERIOR COURT OF THE STATE OF CALIFORNIA
COUNTY OF LOS ANGELES
COMBINED REPLY IN SUPPORT OF DEFENDANT METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA'S DEMURRER TO PLAINTIFFS' FIRST AMENDED COMPLAINT IN VALIDATION AND MOTION TO STRIKE
FOOD & WATER WATCH and CENTER FOR FOOD SAFETY,
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA,
IMPERIAL IRRIGATION DISTRICT,
THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA,
COACHELLA VALLEY WATER DISTRICT; PALO VERDE IRRIGATION DISTRICT; CITY OF NEEDLES;
No. 19-15330
UNITED STATES COURT OF APPEALS FOR THE NINTH CIRCUIT
JAMES LEE WILLIAMS,
THE STATE OF ARIZONA, THE STATE OF CALIFORNIA, METROPOLITAN WATER DISTRICT, BUREAU OF INDIAN AFFAIRS (QUECHAN INDIAN TRIBE),
ANSWERING BRIEF
UNITED STATES OF AMERICA
FALLBROOK PUBLIC UTILITY DISTRICT
NORTH COAST RIVERS ALLIANCE, et al.,
DEPARTMENT OF WATER RESOURCES, et al.,
STATE WATER CONTRACTORS, et al.,

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

COVID-19 Pandemic

The Legal Department provided advice and assistance to management in response to the COVID-19 pandemic in a variety of areas, including legal compliance with the requirements of the governor's executive orders, multiple county directives, city emergency orders, labor and employment guidance, the federal Families First Coronavirus Response Act, and the federal CARES (Coronavirus Aid, Relief, and Economic Security) Act. Internal to Metropolitan, the Legal Department assisted with the declaration of a state of emergency by the General Manager, the legal requirements for remote board and committee meetings, the rapid transition of much of the Metropolitan staff to teleworking involving the use of new technology, and the pandemic's ongoing impact on Metropolitan's operations and capital programs. The Legal Department continued to represent Metropolitan's interest in litigation, taking into account the COVID-19 emergency rules established by the Judicial Council and local courts, which both delayed matters and required some judicial proceedings to be conducted remotely.

Delta Conveyance

The Legal Department supported the California Department of Water Resources' transition from the previously proposed California WaterFix to a new proposal for a single-tunnel Delta Conveyance Project, including participation in final resolution of 22 lawsuits challenging California WaterFix.

Planning, Permitting, and Environmental Review

Staff provided legal advice to the General Manager and Bay-Delta Initiatives Team on a variety of conveyance matters and associated environmental documentation.

Legal staff worked with technical staff to assist DWR in early consultation with Delta Stewardship Council staff regarding Delta Conveyance Project certification of consistency with the Delta Plan.

The Legal Department provided assistance on Delta Conveyance Project issues involving the state and federal endangered species acts, National Environmental Policy Act, the California Environmental Quality Act, California water rights and various permitting proceedings.

Litigation

Legal staff successfully represented Metropolitan at the trial court level in litigation challenging the Metropolitan board's July 10, 2018 authorization of additional participation in California WaterFix as an illegal tax and a violation of the existing State Water Contract. The matter is pending before the California Court of Appeal.

Metropolitan participated in the termination of WaterFix litigation at the trial court level involving motions by multiple petitioners for $13 million in fees and costs, which are now on appeal.

Construction Entity

Staff provided legal support for the Delta Conveyance Design & Construction Authority, which is currently tasked with design and engineering of the single-tunnel Delta Conveyance Project. Staff provided legal support and drafted documents for amendments to the DCA Joint Exercise of Powers Agreement with DWR.

Cost Allocation and Financing

Staff provided legal advice and support in negotiations among Metropolitan, other State Water Contractors and DWR regarding the allocation of Delta Conveyance Project costs and benefits resulting in a draft Agreement in Principle and an associated white paper describing the cost accounting and administration. The AIP will be converted into contract language and, once environmental review is complete, will be subject to approval by Metropolitan and DWR.

State Water Project

Endangered Species Act Compliance and Related Litigation

Working with technical staff and State Water Contractors, Legal staff assisted in reviewing and commenting on the Bureau of Reclamation's biological assessment and federal fish agencies' respective 2019 biological opinions in the ESA reinitiation of consultation for long-term operations of the Central Valley Project and State Water Project. Legal staff has worked with technical staff and State Water Contractors legal counsel to support State Water Contractors' intervention in two lawsuits filed in federal district court that challenge the 2019 biological opinions under the ESA and National Environmental Policy Act.

In April 2020, Metropolitan and the Mojave Water Agency filed litigation against the California Department of Natural Resources, DWR and the California Department of Fish and Wildlife. The litigation alleged that DWR and CDFW failed to comply with CEQA and violated the California Endangered Species Act in their preparation of CEQA documents and approval of the incidental take permit for operation of the State Water Project. The parties also asserted that DWR violated its duty to the State Water Contractors to perfect and protect the water rights necessary to satisfy their water supply commitments under each member's State Water Contract. The alleged violations included agreeing to excess mitigation, requiring mitigation for the actions of third parties, and for accepting an ITP for the operation of the State Water Project that violated or was inconsistent with legal requirements.

Metropolitan and other State Water Contractors also provided notice to DWR of a potential breach of the respective long-term SWP contracts by DWR's inclusion of unauthorized charges on DWR invoices.

State Water Project Contract Amendments

Staff provided legal advice and support in connection with proposed amendments to Metropolitan's long-term State Water Contract with DWR. The first set of amendments would extend the contracts to 2085 and aim to improve the project's overall financial integrity and management and is currently subject to validation and CEQA actions. The second set would provide greater flexibility with respect to water transfers and exchanges. The third set of amendments would allocate Delta Conveyance Project costs and benefits among the public water agencies that contract with DWR for the State Water Project.

Bay-Delta Water Quality Control Plan Voluntary Agreements

Staff assisted 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.

Colorado River

Drought Contingency Planning

Metropolitan attorneys provided legal counseling and advice regarding implementation of the Drought Contingency Plan approved by the seven Colorado River Basin States and Reclamation in May 2019 to increase Lake Mead and Lake Powell reservoir levels to avoid shortage. Legal staff, with assistance from outside counsel, are also defending Metropolitan in a lawsuit filed by the Imperial Irrigation District asserting Metropolitan's board failed to comply with CEQA in December 2018 and March 2019 when it approved the DCP and authorized Metropolitan's potential DCP obligations.

Lower Colorado River Multi-Species Conservation Plan

Staff provided ongoing support on issues concerning the Lower Colorado River Multi-Species Conservation Plan, including financial contributions, changes to the plan and acquisition of habitat lands to satisfy conditions of the permits. Staff provided legal assistance on the creation of the Dennis Underwood Conservation Area that involved conveying 635 acres of Metropolitan-owned land to Reclamation and development of an easement for conservation purposes, with certain rights retained by CDFW.

Legislation

Staff analyzed and prepared reviews of numerous proposed federal and state bills regarding potential effects on Metropolitan's water supplies and its ability to provide reliable and safe supplies in an environmentally responsible manner. Staff helped draft proposed legislation sponsored or supported by Metropolitan and its water industry group partners, including legislation on constituents of emerging concern such as perchlorate and PFAS and PFOA. Other measures dealt with CEQA, the Surface Mining and Reclamation Act, migratory birds, recycled water, groundwater, CESA 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 the Colorado River at Pacific Gas & Electric's Topock compressor station site and filed claims in PG&E's bankruptcy to ensure PG&E's cleanup obligations would not be discharged in bankruptcy.

Finance

Financial Transactions

Metropolitan attorneys, with bond and disclosure counsel, completed several financial transactions totaling over $1.25 billion. 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 one subseries of short-term revenue certificates. Legal staff also worked with disclosure counsel to update disclosure documents for the remarketing and issuance of Metropolitan's bonds.

San Diego County Water Authority v. Metropolitan, et al.

In conjunction with outside counsel, Legal staff continued to represent Metropolitan in defending against San Diego County Water Authority's 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 cases were stayed for several months during the parties' settlement negotiations. In August 2019, at SDCWA's request, the trial court resumed remand proceedings in the 2010 and 2012 cases, including pre-trial matters on SDCWA's claim for restitution on its Rate Structure Integrity clause claim. In November 2019, Metropolitan made a public, statutory offer to compromise that would have settled all of the litigation. SDCWA did not accept and the offer expired by its own terms in December 2019. Also, in December 2019, SDCWA made a public, non-statutory settlement offer, which Metropolitan did not accept. In February 2020, the SDCWA Board of Directors authorized the dismissal without prejudice of certain claims in the cases. SDCWA notified the court in February 2020 that it would not pursue RSI restitution and the court canceled the June 2020 trial. Due to the impact of COVID-19 on the courts, further substantive proceedings were delayed until July 2020.

Real Estate Matters

Delta Wetlands Litigation

Legal staff argued the appeal of the CEQA lawsuit brought by the county of San Joaquin challenging Metropolitan's 2016 purchase of land from Delta Wetlands Properties. The appellate court ruled in Metropolitan's favor, concluding the matter.

Delta Islands Land Management

Advised staff in negotiating and improving agricultural leases and other issues related to management of the lands held by Metropolitan in the Sacramento-San Joaquin Delta.

Palo Verde Irrigation District Land Holdings

Assisted staff in negotiating, drafting, managing and refining agricultural leases and advancing innovative agricultural practices and reduced water usage in the Palo Verde Valley in Riverside County.

Managing Energy Costs

Staff assisted with transactions, activities, and disputes related to Metropolitan's operating agreement with the California Independent System Operator, the Hoover Electric Service Agreement, and the scheduling and trading agreement with the Arizona Electric Power Cooperative.

Legal counseled staff during the negotiation of agreements with Southern California Edison for a pilot relaying project and the purchase of SCE circuit breakers; contractual matters related to the procurement of energy needed to operate Metropolitan's pumping plants; and CAISO tariff provisions.

Staff provided advice and support in connection with the Federal Energy Regulatory Commission relicensing of the Oroville power facilities and in related federal and state administrative, regulatory and legal proceedings. Legal also defended Metropolitan's interests in litigation filed by Butte and Plumas counties challenging adequacy of the environmental review conducted by DWR pursuant to CEQA in support of the relicensing.

Workforce Matters

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

Fuentes v. Metropolitan

The parties reached a mutually agreeable settlement after the filing of an employee lawsuit alleging discrimination and retaliation.

Staar v. Metropolitan

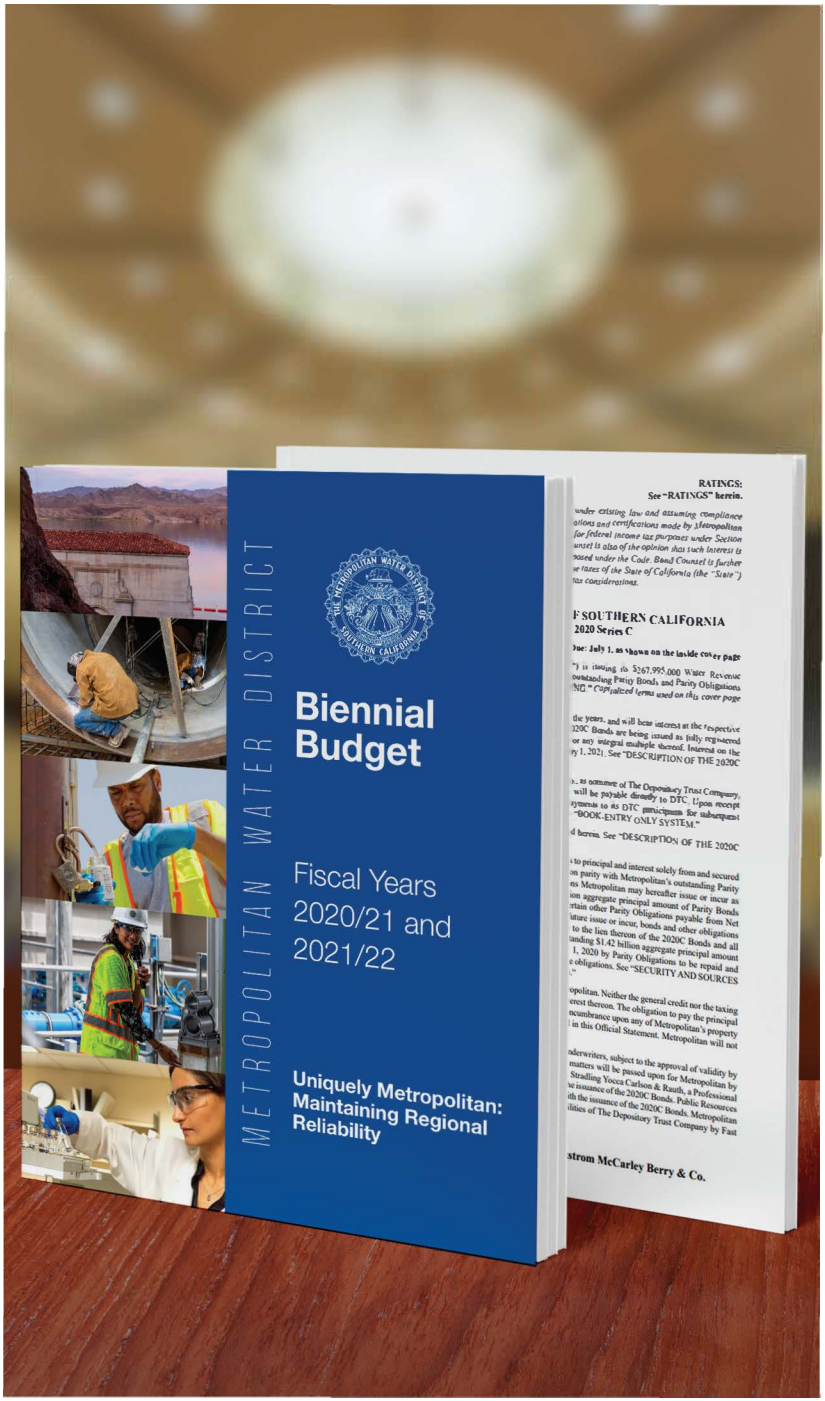
In a lawsuit brought by a former employee alleging whistleblower retaliation, Metropolitan answered the lawsuit and is currently conducting discovery.

Bargaining Unit Grievances and Appeals

Metropolitan participated in several matters related to grievances filed or threatened by AFSCME Local 1902. In one grievance, AFSCME Local 1902 challenged Metropolitan's parental leave policies. Metropolitan disputed this claim, but the parties reached an amicable settlement. In another grievance, AFSCME Local 1902 asserted that a small number of their members were working out of classification. Metropolitan disputed this claim, but the parties reached an amicable settlement. In another grievance, MAPA contended that Metropolitan did not fairly administer a recruitment impacting one of its members. Metropolitan disputed this claim, but the parties reached an amicable settlement.

Public Records Act Requests

Legal staff coordinated Metropolitan's responses to over 145 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 the district's service area boundaries and facilities; data and reports on conservation rebate programs; water supply and deliveries data and operations; employee salaries, benefits and job descriptions; bids and proposals; contracts and agreements; purchase order data; water quality and blend data; water deliveries; contract and environmental related documents for construction projects; inspection reports; documents on water transfers; PVID fallowing program; Metropolitan's farm/agricultural leases; information regarding Metropolitan's history, including information from its annual reports and board records; information on the Lower Basin Drought Contingency Plan; data on uncashed checks; joint powers agreements; and amendments to the SWP-CVP Coordinated Operations Agreement.


METROPOLITAN WATER DISTRICT
Biennial Budget
Fiscal Years 2020/21 and 2021/22
Uniquely Metropolitan: Maintaining Regional Reliability
RATINGS:
See "RATINGS" herein.
F SOUTHERN CALIFORNIA
2020 Series C
Strom McCarley Berry & Co.

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 to support Metropolitan's mission, business planning and performance measurement programs.
- Managing Metropolitan's Business Continuity Program to ensure critical business processes can continue in the event of a disaster, or an emergency such as the COVID-19 pandemic.
- 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, 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.
- Providing risk management to prevent, control, transfer and minimize exposure to liability risk to protect MWD'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 2019/20 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+ respectively on its senior lien debt. Metropolitan's long-term subordinate lien debt is rated AA+ by both S&P Global Ratings and 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, Metropolitan issued $46.8 million of Short-Term Revenue Refunding Certificates, Series 2019A under an agreement with Bank of America, N.A. to refund outstanding certificates.

Also in August, both parties entered into an agreement that allows for the future issuance of up to $39.2 million of additional Short-Term Revenue Certificates, Series 2019.

In October, Metropolitan drew $100 million on its RBC (Royal Bank of Canada) Credit Facility to fund a portion of the FY 2019/20 Capital Investment Plan, or CIP.

In February, Metropolitan issued $207.4 million Water Revenue Bonds, 2020 Series A to fund $170 million of the FY 2019/20 CIP and prepay the $100 million RBC draw.

In March, Metropolitan replaced standby bond purchase agreements relating to the $88 million Water Revenue Bonds, 2000 Authorization, Series B-3 and $80 million Water Revenue Bonds, 2017 Authorization, Series A.

In April, Metropolitan issued $152.5 million of Subordinate Water Revenue Refunding Bonds, 2020 Series A, which refunded $193.5 million of outstanding variable rate debt. The refunding resulted in projected present value debt service savings of $8.6 million. Also in April, Metropolitan issued $271.82 million, Special Variable Rate Water Revenue Refunding Bonds, 2020 Series B. The proceeds were used to refund a like amount of Metropolitan's outstanding variable rate debt. The 2020 Series B bonds have a fixed rate of 1.04 percent and are due on April 2, 2021.

In May, Metropolitan remarketed $80.0 million Subordinate Water Revenue Bonds, 2017 Series C, $95.6 million 2017 Series D, and $95.6 million, 2017 Series E. The bonds have a scheduled mandatory redemption date of June 21, 2021.

In June, Metropolitan drew $35.65 million from its RBC Credit facility, to refund outstanding subordinate water revenue bonds, as part of a larger refunding transaction that closed within a month, prepaying the $35.65 million RBC draw.

Treasury Operations

- Monitored performance of managed short-term portfolio averaging $843 million.
- Monitored performance of managed long-term portfolio averaging $189.8 million.
- Successfully managed bond reserve portfolio averaging $1.8 million.
- Earned total returns of 2.24 and 5.32 percent, respectively, for the short-term and long-term portfolios.
- Provided the necessary liquidity to fund approximately $1.7 billion in expenditures during the fiscal year.
- Managed, calculated and coordinated approximately $287.2 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 2018/19 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 2018/19.

Budget and Financial Planning

- Adopted biennial budget for fiscal years 2020/21 and 2021/22, including the Capital Investment Plan, revenue requirements and the 10-year forecast.
- Adopted resolutions fixing and adopting the water rates and charges for calendar years 2021 and 2022.
- Adopted resolution establishing the tax rate for fiscal year 2020/21.

Business Continuity

- Monitored and reported on COVID-19 business plan impacts; participated in Emergency Operations Center briefings; and distributed MetAlert updates.
- Partnered with Human Resources on gauging workforce strength by monitoring the number of employees unable to work due to pandemic.
- Conducted testing of backup critical information technology applications at the Lake Mathews disaster recovery facility.

Risk Management

- Completed incident reports involving Metropolitan property damage, liability issues, workplace injuries, regulatory visits, criminal activity and spills; 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 claim's 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 the district from charges for water transactions and availability of water, including MWD'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 Jan. 1, 2003 unbundled Metropolitan's previous water rate into separate components for rates and charges (a supply rate, a power rate, a treatment surcharge, a system access rate, a water stewardship rate, a readiness-to-serve charge and a capacity charge) to provide transparency regarding the cost of specific functions to member agencies. This rate structure includes a two tiered- block pricing structure for water service. Effective Jan. 1, 2020, the full-service Tier 1 rate (including all rate elements), which is based on recovering the cost of maintaining a reliable amount of service, was $755 per acre-foot for untreated water. Likewise, the full-service Tier 2 rate of $842 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 3 percent effective Jan. 1, 2020.

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 2019/20 totaled $1.57 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 $43 million higher than the prior fiscal year, primarily due to higher water revenues resulting from higher water rates.

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

	Calendar Year[1]										
	2020	**2019**	**2018**	**2017**	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	**2010**
Tier 1 Supply Rate	$ 208	$ 209	$ 209	$ 201	$ 156	$ 158	$ 148	$ 140	$ 106	$ 104	$ 101
Delta Supply Surcharge[2]	--	--	--	--	--	--	--	--	58	51	69
Tier 2 Supply Rate	295	295	295	295	290	290	290	290	290	280	280
Water Supply Surcharge	--	--	--	--	--	--	--	--	--	--	--
System Access Rate	346	326	299	289	259	257	243	223	217	204	154
Water Stewardship Rate*	65	69	55	52	41	41	41	41	43	41	41
System Power Rate	136	127	132	124	138	126	161	189	136	127	119
Full Service Untreated:											
Tier 1	755	731	695	666	594	582	593	593	560	527	484
Tier 2	842	817	781	760	728	714	735	743	686	652	594
Replenishment Water Rate[3]											
Untreated	--	--	--	--	--	--	--	--	422	409	366
Treated	--	--	--	--	--	--	--	--	651	601	558
Interim Agricultural Water Program[4]											
Untreated	--	--	--	--	--	--	--	--	537	482	416
Treated	--	--	--	--	--	--	--	--	765	687	615
Treatment Surcharge	323	319	320	313	348	341	297	254	234	217	217
Full Service Treated:											
Tier 1	1,078	1,050	1,015	979	942	923	890	847	794	744	701
Tier 2	1,165	1,136	1,101	1,073	1,076	1,055	1,032	997	920	869	811
Capacity Charge ($ per cubic foot second)	8,800	8,600	8,700	8,000	10,900	11,100	8,600	6,400	7,400	7,200	7,200
Readiness-to-Serve Charge ($Millions)	136	133	140	135	153	158	166	142	146	125	114

* The Water Stewardship Rate has been suspended and will not be collected on water transactions after Dec. 31, 2020.

[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,		
	2020	**2019**	**Change**
Water Revenues [1]	$ 1,188	$ 1,149	$ 39
Readiness-To-Serve Charges	134	137	(3)
Capacity Charge [2]	31	33	(2)
Power Sales [3]	16	18	(2)
Taxes (Net)	147	143	4
Investment Income	29	36	(7)
Other	24	10	14
Total	**$ 1,569**	**$ 1,526**	**$ 43**

[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 2019/20 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,		
	2020	**2019**	**Change**
Power and Water Costs	$ 439	$ 376	$ 63
Operations and Maintenance	557	494	63
Depreciation and Amortization	353	361	(8)
Bond Interest, Net of Amount Capitalized	101	127	(26)
Loss on Disposal of Plant Assets	10	14	(4)
Other	6	5	1
Total	**$ 1,466**	**$ 1,377**	**$ 89**

Fiscal year 2019/20 expenses totaled $1.47 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 $89 million higher than the previous year. The variance included $63 million each of higher power and water costs and

operations and maintenance costs due to an increase in the unit cost of water and higher labor and benefits costs resulting from negotiations with bargaining units. These increases were partially offset by $26 million lower bond interest expense due to savings from bond refunding transactions and $8 million lower depreciation and amortization due to the recalculation of depreciation expense related to capitalized interest.

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 2019/20, Metropolitan was in the second year of a biennial budget for FY 2018/19 and 2019/20 that the board approved in April 2018.

The biennial budget process takes place in odd-numbered years, and began in July 2019 for the FY 2020/21 and FY 2021/22 biennial budget. Each group submitted requests for major maintenance and capital projects to Engineering Services. This gave staff adequate time to plan project design and construction schedules and allowed Water System Operations to plan for system shutdowns. Each department and group prepared operating budgets from August to November. Programs got analyzed and reviewed as to resources required and the extent to which each program was consistent with the priorities and strategies of the General Manager's Business Plan. All recommended programs were then incorporated into the overall budget. The proposed biennial budget always 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 prioritizes 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; supranational instruments; 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 $1.03 billion during fiscal year 2019/20, with cash-basis investment earnings of about $18.1 million. As of June 30, 2020, the market value of Metropolitan's investment portfolio was approximately $1.25 billion.

TABLE 7-4

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

(Dollars in millions)

	Fiscal Year Ended June 30,									
	2020	2019	2018[2]	2017	2016	2015[3]	2014	2013	2012[4] As Adjusted	2011[4] As Adjusted
Water Revenues[5]	$ 1,188.0	$ 1,148.7	$ 1,285.2	$ 1,150.5	$ 1,166.0	$ 1,382.9	$ 1,484.7	$ 1,282.5	$ 1,123.3	$ 1,001.0
Readiness-to-serve charges	134.5	136.5	137.5	144.0	155.5	162.0	154.0	144.0	135.5	119.5
Capacity charge	30.5	33.0	34.6	39.7	44.7	37.5	28.4	28.7	33.0	34.4
Power sales	15.9	18.3	23.7	20.9	7.5	8.4	14.6	24.5	31.5	22.9
Operating revenues	1,368.9	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
Taxes, net	146.9	142.7	127.3	115.4	107.9	102.3	94.5	94.8	79.2	79.3
Investment income	28.9	36.0	10.6	6.2	19.4	(3.6)	5.7	(0.4)	4.1	2.0
Other	24.5	10.4	12.9	7.3	10.2	5.4	—	6.1	0.6	22.0
Nonoperating revenues	200.3	189.1	150.8	128.9	137.5	104.1	100.2	100.5	83.9	103.3
Total revenues	1,569.2	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
Power and water costs	(438.7)	(375.8)	(446.5)	(455.4)	(552.3)	(473.6)	(510.1)	(371.3)	(384.0)	(364.8)
Operations and maintenance	(557.4)	(493.9)	(507.4)	(487.5)	(650.1)	(543.4)	(439.7)	(419.8)	(433.5)	(394.9)
Depreciation and amortization	(353.0)	(361.1)	(330.3)	(301.7)	(376.5)	(374.8)	(261.5)	(265.4)	(290.1)	(286.4)
Operating expenses	(1,349.1)	(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)
Bond interest, net of amount capitalized	(100.7)	(126.9)	(124.5)	(134.6)	(126.9)	(132.5)	(146.7)	(150.2)	(135.8)	(135.7)
Interest and adjustments on OAPF[6]	—	—	—	(0.6)	(0.8)	(1.2)	(1.6)	(2.1)	(2.6)	(3.0)
Loss on disposal of plant assets	(10.2)	(13.7)	(88.7)	(20.9)	—	—	—	—	—	—
Other	(5.9)	(5.3)	(68.2)	(9.4)	(4.6)	—	(23.7)	—	—	—
Nonoperating expenses	(116.8)	(145.9)	(281.4)	(165.5)	(132.3)	(133.7)	(172.0)	(152.3)	(138.4)	(138.7)
Total expenses	(1,465.9)	(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)
Contributed capital	—	0.8	1.5	—	2.1	2.3	2.2	1.7	13.6	17.7
Cumulative effect of change in accounting principle	—	—	(138.9)	—	—	(491.0)	—	—	—	(8.2)
Change in net position	$ 103.3	$ 149.7	$ (71.2)	$ 73.9	$ (197.9)	$ (319.3)	$ 400.8	$ 373.1	$ 174.8	$ 105.8

[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 2011 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.

[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, 2020
(Dollars in Billions)

Member Agency	Assessed Valuation	*Percent of Total
Los Angeles	$640.2	20.70
San Diego County Water Authority	537.7	17.39
MWD of Orange County	527.5	17.06
West Basin MWD	214.0	6.92
Central Basin MWD	156.6	5.06
Inland Empire Utilities Agency	120.1	3.89
Western MWD	111.8	3.62
Upper San Gabriel Valley MWD	110.9	3.59
Calleguas MWD	108.2	3.50
Eastern MWD	84.3	2.73
	$2.611.5	**84.45**
Total Gross Assessed Valuation (All 26 Member Agencies)	**$3,092.4**	

*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
2020	$ 3,092.4	$ 15.3	$ 3,077.1	0.0035
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

[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]				
2020	$ 143,646	$ 143,646	$ 3,456	$ 147,102	$ —	100.0 %	102.4 %	0.0 %
2019	130,566	130,566[3]	14,588[3]	145,154	—	100.0[3]	111.2	0.0
2018	121,647	121,647[3]	8,019[3]	129,666	—	100.0[3]	106.6	0.0
2017	112,727	112,727[3]	2,410[3]	115,137[3]	—	100.0[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

[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,									
	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011 As Adjusted
Water Revenues [2]	$ 1,188	$ 1,149	$ 1,285	$ 1,151	$ 1,166	$ 1,383	$ 1,485	$ 1,283	$ 1,062	$ 996
Additional Revenues [2]	165	170	172	184	200	199	182	173	168	153
Total Revenues	1,353	1,319	1,457	1,335	1,366	1,582	1,667	1,456	1,230	1,149
Operating Expenses	(1,026)	(916)	(963)	(927)	(1,201)	(1,005)	(854)	(793)	(792)	(853)
Net Operating Revenues	327	403	494	408	165	577	813	663	438	296
Power Sales and Other	30	40	51	39	30	29	34	48	87	96
Transfer from Reserve Funds	—	-	1	33	222	142	—	—	—	—
Investment Income, net[3]	20	34	8	4	18	13	19	(2)	11	17
Adjusted Net Operating Revenues	377	477	554	484	435	761	866	709	536	409
Senior and Subordinate Bonds Debt Service [4]	(272)	(333)	(340)	(306)	(309)	(280)	(343)	(298)	(297)	(277)
Subordinate Revenue Obligations	—	—	—	(2)	(1)	(1)	(1)	(1)	(1)	(1)
Funds Available from Operations	$ 105	$ 144	$ 214	$ 176	$ 125	$ 480	$ 522	$ 410	$ 238	$ 131
Ratios										
Debt Service Coverage on all Senior and Subordinate Bonds [5]	1.39	1.43	1.63	1.57	1.41	2.72	2.52	2.38	1.81	1.48
Bonds and Additional Bonds Debt Service Coverage [6]	—	—	—	1.58	1.41	2.71	2.51	2.37	1.80	1.47

[1] Prepared on a modified accrual basis for fiscal years 2013-2020 and on a cash basis for fiscal years 2011-2012.

[2] Water Revenues include revenues from water sales, exchanges, and wheeling. Fiscal years 2011-2012 restated to include exchange sales in Water Revenues. They were previously reported under Additional Revenues.

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

[4] Previously reported as Bonds and Additional Bonds Debt Service for fiscal years 2011-2017.

[5] Previously reported as Bonds and Additional Bonds Debt Service Coverage for fiscal years 2011-2017.

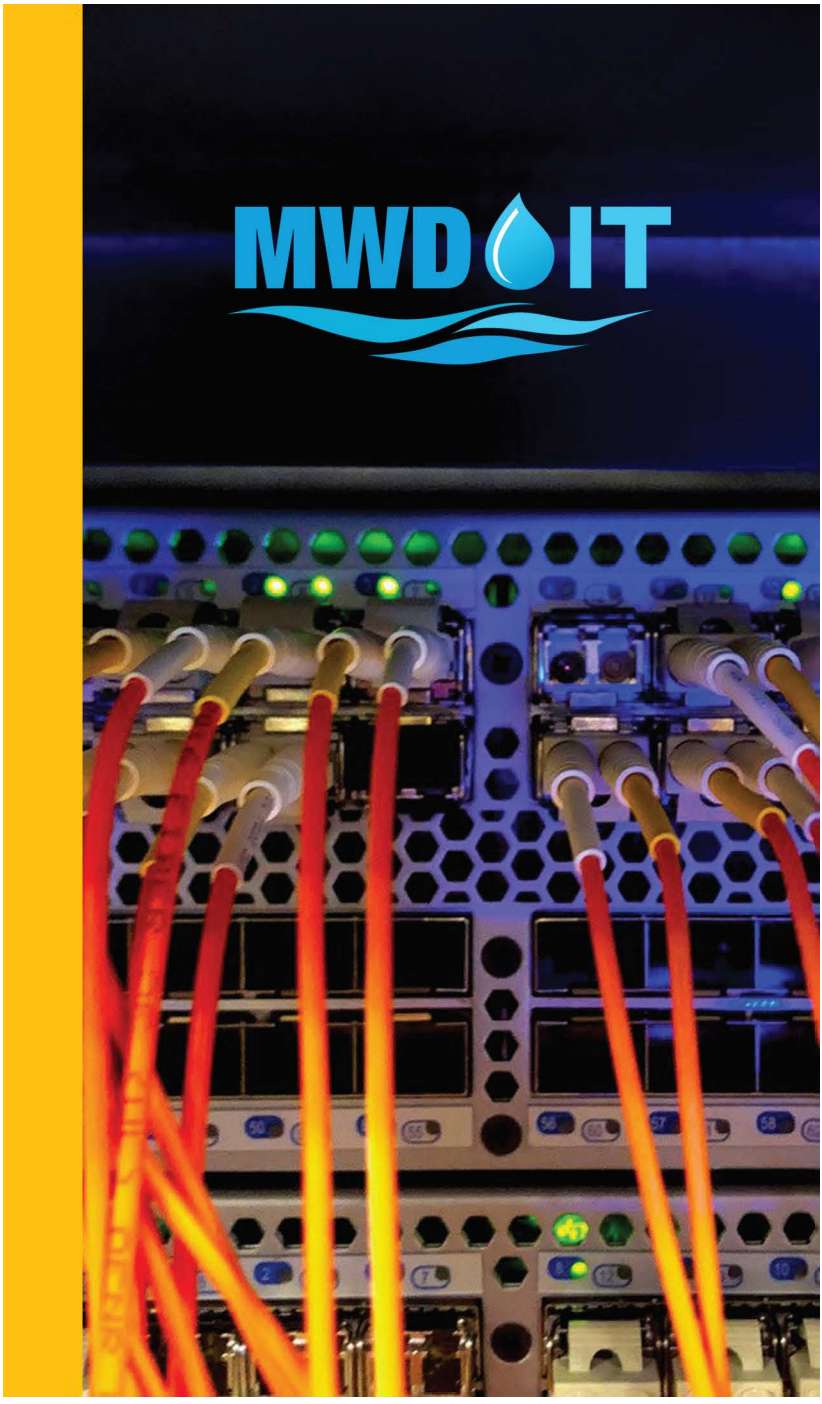
[6] Previously reported as Debt Service Coverage on all Obligations for fiscal years 2011-2017. The State Revolving Fund Loan was paid off at the end of fiscal year 2017, therefore the ratio is the same.

TABLE 7-9
TEN LARGEST WATER CUSTOMERS
Year Ended June 30, 2020
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	$	187.3	15.8%	324,660	22.9%
MWD of Orange County		152.6	12.8%	157,346	11.1%
City of Los Angeles		129.0	10.9%	148,022	10.4%
West Basin MWD		119.7	10.1%	112,636	7.9%
Calleguas MWD		99.6	8.4%	93,802	6.6%
Eastern MWD		93.9	7.9%	105,215	7.4%
Three Valleys MWD		65.4	5.5%	73,239	5.2%
Western MWD of Riverside County		59.8	5.0%	64,811	4.6%
Inland Empire Utilities Agency		47.0	4.0%	64,538	4.5%
City of Long Beach		30.2	2.5%	28,332	2.0%
Total	**$**	**984.5**	**82.9%**	**1,172,602**	**82.6%**
Total Revenue	**$**	**1,188.0**	**Total Acre-Feet**	**1,419,156**	

* Total may not foot due to rounding.

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



Responding to COVID-19, Information Technology rapidly provided laptops and secure remote access to teleworkers and supported virtual board and General Manager meetings.

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 collaborates 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.

Cybersecurity Services

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

Highlights for Fiscal Year 2019/20

- Enhanced Metropolitan's cybersecurity and firewall security capabilities to support remote access due to the General Manager's COVID-19 emergency work-from-home order.
- Mobilized IT cybersecurity to provide secure and stable operations within Metropolitan computing environment during the COVID-19 response period.
- Conducted upgrades and software patching to protect Metropolitan's critical infrastructure, assets and data.
- Continued Cybersecurity Operations Center initiative to enhance Metropolitan's security posture, mitigate enterprise risks, deploy new and emerging technologies and protect against evolving cyber threats.

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 2019/20

- Mobilized infrastructure staff to ensure stable operations of Metropolitan's telecommunication networks and systems, while complying with COVID-19 safety protocols.
- Rapidly deployed laptops to allow Metropolitan staff to telework in response to COVID-19.
- Implemented new audio/visual capabilities, supported board and General Manager meetings during COVID-19.
- Completed colocation of the Wide Area Network data center to improve network reliability, resiliency, and capacity to support Metropolitan's migration to cloud processing.
- Completed implementation of the IT Disaster Recovery project, including significant upgrades to Metropolitan's disaster recovery data center.
- Deployed a robust, cloud-based, Wi-Fi system in the Headquarters building low-rise section.

Enterprise Business Systems

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

Highlights for Fiscal Year 2019/20

- Replaced the PeopleSoft Enterprise Learning Management System (MyLearning) with a new cloud-based application as part of Metropolitan's Human Resource Management System.
- Initiated migration of servers and successfully implemented PeopleSoft system within the Oracle cloud.
- Deployed new dashboard reporting, enhancing Metropolitan's enterprise data warehouse and analytics platform.

Enterprise Water Systems

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

Highlights for Fiscal Year 2019/20

- Completed Wadsworth Pumping Plant upgrades involving the control and electrical protection system.
- Upgraded Metropolitan's Enterprise GIS Infrastructure to accommodate growing demand for big data.
- Implemented terminal server services for LIMS to provide WSO staff remote access to support Water Quality compliance reporting while working from home during COVID-19.

Project Management Office

The Project Management Office oversees overall governance and project management of the IT program and project portfolio.

Highlights for Fiscal Year 2019/20

- Participated in CIP evaluations to align IT Strategic Roadmap capital investments with Metropolitan's business priorities.
- Created a performance-tracking framework to provide reliable reporting of operations data.
- Completed final design for the Board/Committee Audio Visual Upgrade and collaborated with Engineering on construction planning.
- Began final site selection and detailed planning for relocating the primary and disaster recovery data center to enhance resiliency and improve operational reliability.

During the COVID-19 pandemic, CalFire crews protected habitat with a prescribed burn at the Lake Mathews Multiple Species Reserve, while the warehouse "pony run" team delivered protective gear to Metropolitan's essential workers.

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 reductions and efficiencies. Activities include contracting, warehousing, procurement of goods and services, inventory, records, E-Forms and RideShare Program management, Enterprise Content Management, reprographics, and technical writing.

Due to the COVID-19 pandemic, Contracting Services experienced a rapid surge of orders for health- and safety-related supplies and equipment. Both procurement and warehouse staff sourced and acquired critical items to help ensure the safety of Metropolitan personnel. When regular antibacterial wipes and dispensers were unavailable, staff created their own. Staff, operating both remotely and on-site, successfully obtained personal protective equipment amid unprecedented market conditions of scarcity, price-gouging, extended delivery times, and backorders, to meet Metropolitan's business objectives and inventory requirements.

Highlights for Fiscal Year 2019/20

- Managed the logistics/procurement function of the Emergency Operations Center to successfully obtain critical safety supplies and operational materials amid major disruptions to markets and supply chains due to COVID-19 impacts.
- Procured and selected new software platform for developing more cyber-secure, functionally robust, and mobile-ready e-forms with significant reporting capability.

- Converted millions of paper documents, photographs and the video media library to electronic format, including the engineering library; personnel, benefits and deferred compensation files; deeds, engineering substructures and environmental planning documents.
- Enhanced warehouse operations by replacing handheld bar code readers with high-performance tablets, facilitating faster and more reliable connectivity and higher productivity.
- Developed a New Employee Orientation hire video to promote and brand the Rideshare Program and a dashboard to monitor vital program statistics; revamped Rideshare IntraMet page.
- Provided critical procurement support for the Delta Conveyance Design and Construction Authority.
- 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.
- Upgraded mailroom equipment to a web-based platform

Environmental Planning

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

Highlights for Fiscal Year 2019/20

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.

Staff served on the Natural Communities Coalition board and on reserve management committees for 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 and removal of invasive vegetation from the Lake Mathews and Southwestern Riverside County Multi-Species reserves. Staff seeded burn areas with coastal sage scrub species and restored a portion of Tucalota Creek with native vegetation.

Environmental Planning staff led an internal interdisciplinary Climate Action Plan Working Group to develop, recommend and garner board support for a greenhouse gas reduction target that demonstrates Metropolitan's leadership in climate action planning and environmental sustainability. Staff identified opportunities to lower Metropolitan's emissions to meet the established target. Staff began preparation of the Climate Action Plan and associated CEQA document, including release of the Notice of Preparation for the draft Program Environmental Impact Report.

Environmental Planning supported critical Water System Operations projects. Staff continued with compliance activities required by long-term state and federal incidental take permits for Foothill Feeder dewatering, including an Unarmored Threespine Stickleback Plan, Upper Santa Clara River Watershed Management Plan and other management plans. Efforts also included ongoing coordination with California Department of Fish and Wildlife for management activities on mitigation lands. Staff also supported desert activities, providing monitoring for the state and federally threatened desert tortoise for the 2020 CRA shutdown and urgent repair projects.

Staff supported the Delta Conveyance Project, serving as the designated coordinator representing public water agencies to assist the Department of Water Resources with regulatory permitting. Tasks included agency coordination meetings, delineation of jurisdictional streams and wetlands and submittal of a Clean Water Act application to the U.S. Army Corps of Engineers.

Staff continued to foster positive working relationships and expedite permitting authorizations through dedicated staff agreements with the U.S. Army Corps of Engineers and California Department of

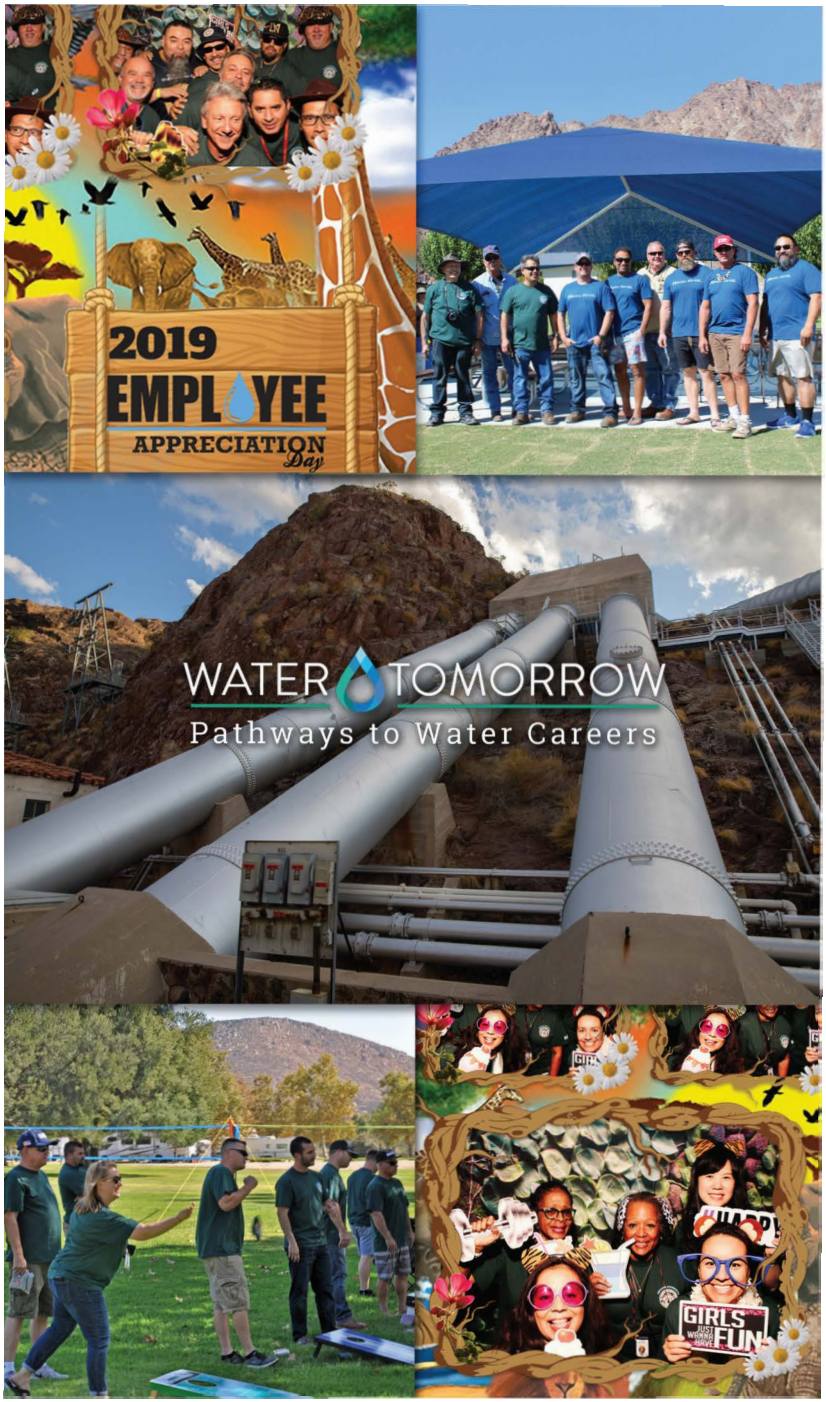
Fish and Wildlife. Environmental Planning staff also represented Metropolitan on the Natural Resources Task Force for the California Council for Environmental and Economic Balance to develop legislative and administrative strategies to address regulatory issues.

To further improve customer service and streamline environmental approvals, staff developed standard operating procedures for environmental processes and prepared standardized templates for documents.

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. With county offices closed due to COVID-19, staff coordinated with External Affairs to post all CEQA documents on Metropolitan's website.

Staff provided CEQA language for 128 board letters; procured regulatory permits for 10 capital and operations and maintenance projects; provided environmental clearance for 122 Water System Operations projects; responded to 31 Engineering Services project requests; conducted 38 bill reviews; and responded to 41 Real Property actions. Staff also reviewed 95 external projects for potential Metropolitan impacts.

A greater roadrunner photographed at the Allen-McColloch Pipeline near Peters Canyon (top); a desert horned lizard suns himself near the Colorado River Aqueduct (middle); and bighorn sheep graze near residences at the Hinds Pumping Plant.



Metropolitan launched the Pathways to Water Careers website and celebrated Employee Appreciation Day throughout the district, including the Hinds and Skinner facilities (upper right and lower left), and at Union Station Headquarters.

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 that is prepared to meet future challenges. It seeks to accomplish these goals in the most cost-efficient, fiscally responsible manner as possible.

Major Activities and Accomplishments

Beginning in March, the COVID-19 pandemic challenged Metropolitan to ensure that the organization remained effective, resilient and safe as up to 80 percent of the workforce shifted to working from home. Core HR strategies, technology and organizational improvements became critical to supporting the workforce during the pandemic. HR also was involved in overseeing a variety of extended administrative leave programs to assist a limited number of employees potentially exposed to COVID-19. Policies were also implemented allowing employees to juggle work and care for school-aged children at home. HR regularly met with group managers to provide the latest COVID updates and communicated weekly with bargaining units to deal with worker safety, teleworking, protective equipment and other operational issues.

To meet the challenges of changing workforce demographics, HR collaborated with other Metropolitan groups to develop group succession plans 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, as well as complying with laws and regulations.

HR also continued its focus on providing excellent customer service, implementing technologies that provide greater flexibility and support for customer self-service. Newly created HR Strategic Partners served as single points of contact for managers on all matters pertaining to human resources. They heard employee concerns, resolved employee issues and supported managers on workforce planning, succession planning and staff development.

Succession Planning

Metropolitan's approach to succession planning enabled groups to tailor their succession initiatives to the needs of their organization.

Tapping the Best

Metropolitan continued its efforts to attract the best employees by creating an environment that provides opportunity, empowerment, trust and purpose. HR maintained its focus on finding the best talent and seeking internal talent to fill open positions, whenever possible. By April, as the workforce had shifted to working from home, recruitment applied effective remote interviewing solutions using Zoom and other online methods to continue filling vacant positions. The MyJobs recruitment tracking system simplified ongoing communications and scheduling potential applicants for remote interviews and assessments.

There were more than 105 retirements and separations, and recruitment successfully filled 233 positions during the fiscal year with 125 of these being external hires. Interviews for vacant positions continued shortly after the stay at home order and staff was able to fill 50 positions during the pandemic. Metropolitan continued to fill most of management and senior-level staff positions with internal candidates, while filling entry and intermediate level positions primarily with external candidates.

The Human Resources group manager began working directly with the Organization, Personnel and Technology Committee and board on the general manager recruitment process.

In addition to the videos and expanded social media outreach to highlight Metropolitan's job opportunities website, HR also partnered with External Affairs to launch the Pathways to Water Careers website, with a goal of encouraging interest in water careers and providing a "one-stop shop" to all water job opportunities and educational programs.

Minority representation in the workforce continued at 54 percent for the year. HR staff also provided the board and management with workforce analytics on diversity outreach efforts, emphasizing the workforce demographics efforts made to increase representation of females and minorities in certain jobs.

HR conducted outreach events for student internships and apprentice program opportunities at community colleges and career expos in Huntington Park, Blythe, and Parker, Ariz. The Equal Employment Opportunity Office continued supporting student intern recruiting efforts for many groups, while HR also administered internships offered through the Cal Poly Pomona Co-Op Program for Engineering Services. For the eighth year, Metropolitan participated in the Hire LA Youth Summer Program employing high school seniors and college students.

Additional outreach and inclusion efforts involved Metropolitan's employee resource groups. The Women at Metropolitan group, in collaboration with HR staff, completed its year-long pilot group mentoring program. Under the program, 12 management mentors coached 31 female employees from throughout the organization. The partnership with Women in Non-Traditional Employment Roles highlighted opportunities for women in the skilled trades at Metropolitan.

Leaders Ready for the Future

Due to the large numbers of staff working from home due to the pandemic, staff and vendors began transitioning Metropolitan's normal classroom curriculum to virtual. Many employees took advantage of conditions to complete mandatory training courses while working from home.

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, which completed its ninth graduating class; and a 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. Fifty-one percent of team managers have completed MMU.

Managers participated in 50 sessions on state-of-the-art management techniques from leading experts through in-depth workshops delivered at the Institute of Management Studies. Eighty-six percent of managers completed mandatory reasonable-suspicion training.

Ten external coaches, along with internal experts, provided additional coaching support to 35 managers on a range of issues such as transition management, team building, personal development, conflict resolution, and leading remote staff. HR staff assisted 30 mentor/mentee pairs participating in the eighth cohort in Engineering Services Mentoring Program and worked with the Ethics Office to prepare the 2019 Ethics Survey of employees.

Preparing Tomorrow's Talent Today

In response to organization-wide separations 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.

This year, HR unveiled a new MyLearning system to streamline course enrollment, approval and scheduling processes and to provide employees and managers with user-friendly tools for managing learning plans and simplified access from work and remotely to training content.

HR staff continued efforts with management to ensure that talent is available to fill critical positions by assessing skill gaps and with expanded training opportunities.

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

To improve remote working, 176 Metropolitan employees completed online training on effective teleworking. Topics covered included creating a home-office environment, setting realistic work schedules, and conducting virtual meetings. Other training curriculum focused on topics such as: improved teamwork and collaboration; leading technical teams; communication and business writing; effective performance conversations; conflict resolution; project management; problem-solving; and basic and advanced Microsoft Office skills. A total of 3,846 training seats—79 percent more than the previous year, were filled by employees attending various sessions of 93 different in-class and online training offerings. Thirty-six employees went on the 2-day Colorado River Aqueduct Inspection Trip. Eighty-six percent of Metropolitan's non-management employees completed drug and alcohol awareness training.

With the pandemic, training added online curriculum to facilitate skills for leading remote teams and for working remotely. The launch of the MyLearning system and LinkedIn Learning (the latter in June) expanded education opportunities to all employees and managers. LinkedIn Learning offers more than 10,000 topics that support job, career and personal development; it can be accessed 24/7 from work, home or mobile devices.

This year, 133 employees participated in Metropolitan's tuition reimbursement program. Partnering agreements with nine local universities provided tuition discounts, grants and other educational benefits for employees. Fifty employees attended an Education Fair at Headquarters to discuss degree options with representatives from eleven universities.

HR Services and People Management

A variety of COVID-related regulatory and legal changes required additional HR research and planning activities. These included the Families First Coronavirus Response Act, with its provisions for emergency paid sick leave and expanded emergency family and medical leave. Other changes involved the SECURE Act and the CARES (Coronavirus Aid, Relief, and Economic Security) Act, which provided access to tax-advantaged accounts and added flexibilities for preventing older Americans from outliving their retirement assets. New California laws on domestic partnerships and lactation programs also took effect.

HR established a Business Transition Team of managers from each of the departments and groups to examine a wide range of legal, safety, health and logistical issues associated with resuming normal business activities during different phases of the COVID-19 pandemic.

To reduce the paper burden and provide added flexibilities during a temporary move during the Headquarters building seismic upgrade, 90 percent of HR's paper records were converted to secure digital records.

HR facilitated the annual Department Head Performance Evaluations of executive staff who report directly to the board. In August 2019, 91 percent of the board participated by providing direct feedback about strategic and operational leadership, board relationships and business results during the previous fiscal year.

Changes to state and federal policy required adjustments to various HR policies, systems and communications with the workforce. These changes require extensive research, coordination, policy adjustments and implementation planning with other affected parties, such as legal, payroll, Information Technology, External Affairs and third-party administrators. Internal Revenue Service maximum contributions for 401(k) and 457(b) plans were increased to $19,500 per plan and $26,000 for employees age 50 and older.

The 2019 Benefits Guide was distributed to all employees and retirees, and total compensation statements also were disseminated to convey the value of the benefits Metropolitan provide to employees. Throughout the fiscal year, Metropolitan provided benefits and financial education programs such as Stepping into Retirement, a Financial Finesse webinar on money management during COVID-19 and market volatility. This

ensured Metropolitan met its fiduciary responsibilities and provided employees with the knowledge and opportunity to be retirement ready when the time comes. Metropolitan benefits communications were recognized with five additional industry awards for its innovative strategic communications.

Several events recognized employees for their contributions and commitment to Metropolitan. The General Manager's Fall 2019 Employee Appreciation Day, with locally organized and designed events, took place throughout Metropolitan with HR's support. The Fall Service Awards luncheons recognized 45 employees for their Metropolitan service ranging from 20 to 50 years.

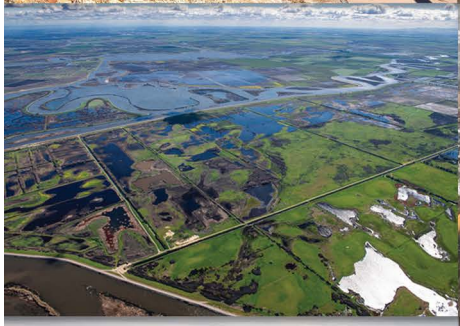
Metropolitan rolled out new mandatory Preventing Workplace Harassment online training courses for employees. This version of the course complies with California's legal requirement of two hours of harassment prevention training for supervisors.

Staff provided semi-annual reports on Equal Employment Opportunity and Affirmative Action to the Organization, Personnel and Technology Committee. Also presented to the committee: an assessment of workforce diversity and 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. This allowed injured workers to receive the necessary care in a timely manner and accelerated their return into the workplace. Staff also arranged medical evaluations of appropriate personnel at their respective home facility, to ensure that Metropolitan employees maintain the requisite certifications and licenses. In addition to processing claims related to the pandemic, Workers' Compensation prepared to address the governor's orders for self-insured healthcare employers, such as Metropolitan, that requires new levels of financial reporting and reduced claims response timeframes.

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


VALLEY OF THE MASTODONS
DIAMOND VALLEY LAKE
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
WESTERN SCIENCE CENTER
VALLEY-WIDE RECREATION
DIAMOND VALLEY LAKE MARINA and TRAILS are
TEMPORARILY CLOSED




12/06/2018

CHAPTER 11

Real Property

The Real Property Group applies strategic approaches to the planning, acquisition and disposition of land, protects Metropolitan's property rights and uses, seeks to effectively optimize revenues through secondary uses while controlling land ownership expenses, and manages and maintains real property assets.

Planning and Acquisition

The Planning and Acquisition Unit acquires and disposes of Metropolitan real property in support of strategic water resource 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.

This past year, Real Property implemented an innovative approach to more effectively market surplus properties, including parcels declared surplus by Metropolitan's board in March 2020. One example is an aerial drone video offered a virtual tour of approximately 223 acres of land northwest of Diamond Valley Lake, highlighting the terrain, topography and the surrounding community. When needed, Metropolitan plans to continue to market properties using aerial drone footage, which has become an industry standard.

Accomplishments for Fiscal Year 2019/20

- Executed and recorded a fallowing easement exchange in support of the Palo Verde Irrigation District forbearance and fallowing program.

- Acquired one residential property as a result of a settlement.
- Executed 32 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 75 cost studies and appraisals related to real property acquisition, management and disposition.

Land Management

The Land Management Unit protects Metropolitan's real property rights, land holdings and permanent easements. The unit works with Metropolitan stakeholders through the district's Property Review Council, and external law enforcement as required. The unit conveys easements to third parties and manages secondary uses on its fee-owned properties, to generate revenue, control maintenance costs, and to maintain a positive presence and neighborly relations with adjacent owners and local communities. Staff also process annexation requests, resulting in expansion of Metropolitan service area boundaries or to close gaps in existing service areas.

During fiscal year 2019/20 the unit managed over 250 active agreements and generated over $6.1 million in revenue. In addition to reviewing secondary land use requests, the review council conducts annual reviews to determine if any property can be considered surplus to Metropolitan's needs. If there is a surplus recommendation, the unit requests that the board declare the land surplus; and requests disposition authorization.

Staff also pursues development and improvement of the Diamond Valley Lake area to support recreation, develop additional leasing and revenue opportunities for Metropolitan; and ultimately to maintain a positive presence that benefits the surrounding community.

Among the highlights was the execution of three new agriculture lease agreements and one amendment in the Bay Delta Islands. The agreements include a one-year lease for 2,728 acres of land on Bouldin Island East; a one-year lease for 5,603 acres of land on Bacon Island; a three-year lease for 3,103 acres on Bouldin Island West and an

amendment of the existing lease on Webb and Holland Tracts for one year.

Other Accomplishments for Fiscal Year 2019/20

- Processed 45 secondary use transactions involving access permits, licenses, leases, filming permits, and easements with various property uses ranging from road crossings, power line crossings, road improvements, flood/erosion/runoff control, telecommunication sites, staging areas, agriculture, geotechnical assessment or monitoring wells.
- Executed leasing of office space in Sacramento, Washington DC and San Diego; and equipment space on various telecommunication towers in California with a total cost of approximately $1 million and 20 corresponding agreements.
- Granted a 30-year lease to Riverside County Regional Park and Open Space District to continue operating and managing Lake Skinner recreational amenities; eliminated an annual $100,000 financial outlay by Metropolitan for the provision of potable water; enhanced the county's ability to obtain grant funds for proposed on-site capital improvements.

Annexations

Staff completed processing four annexations from Metropolitan's member public agencies, totaling approximately 20.28 acres, with minimal potential use of new water demands annually. In Riverside and Ventura counties, these included Eastern Municipal Water District's 109th and 110th fringe areas and Western Municipal Water District's 52nd fringe area, in Riverside County, with Calleguas Municipal Water District's No. 103 annexed to Metropolitan in Ventura County.

Metropolitan's current service area increased less than 0.04 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.

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.

2019/20 DVL Highlights

- Closed Diamond Valley Lake Marina and trails in response to the COVID-19 pandemic, reopening in May with sanitizing measures and signage directing visitors to wear face masks and practice social distancing in alignment with local ordinances.
- Stocked Diamond Valley Lake with over 3,500 pounds of rainbow and lightning trout.

The angler in the picture above won the prize for largest bass after the striper he caught weighed in at 17.6 pounds.

- Worked with the Western Science Center and Valley-Wide Recreation to complete the construction of an illuminated monument sign on the corner of Domenigoni and Searl Parkway that displays messages about special events, recreational opportunities, water conservation and information of interest to the local community.

Facility Asset Management

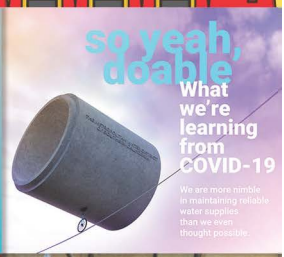
The Facility Asset Management Unit maintains and operates Metropolitan's Headquarters building, the Diamond Valley Lake Visitor Center, employee housing and leased office spaces in an energy efficient and sustainable manner.

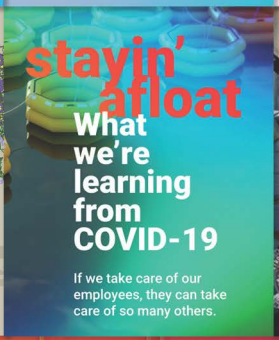
Fiscal Year 2019/20 Highlights

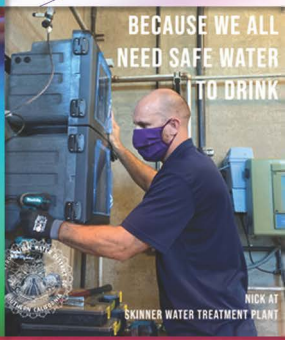
- Retrofitted Headquarters building with touchless auto-flush valves, updated cleaning procedures, increased hand sanitizers throughout the building in response to COVID-19 concerns.
- Hired architectural consultants and conducted resident surveys and town hall meetings to design high-quality cost-effective housing and employee communities.
- Performed maintenance and repairs to district houses, and prepared 28 houses to a "move-in-ready" condition for incoming employee residents.
- Received overall rating of 89 out of 100 possible points in the annual Energy Star Audit at Metropolitan's Headquarters.
- Partnered with Engineering Services Group in support of the Headquarters Building Improvement Project, staff scheduled and executed employee moves, prepared temporary food service, dining room area, conference rooms and storage space.

We're taking care of your water supply and quality.

You take care of each other.







THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

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

Digital Marketing and Social Media Outreach Campaign

Metropolitan promoted a far-reaching conservation message with a new round of creative works. These included an award-winning series of PatchMatch social media posts featuring a dating app format that matched consumers with the perfect California Friendly® plants. A three-part digital commercial series produced entirely in-house drew on horror films, Shakespeare and appalling standup comedy to illustrate how scary, tragic and offensive wasting water really is. Total production costs: less than $50,000, compared to typical ad agency rates of $900,000 to $1.5 million. A gardening and wellness-themed campaign bridged water-efficient California Friendly plants with wellbeing in the COVID-19 pandemic and touched upon holidays like Mother's Day, Father's Day and the first day of summer, resulting in a combined 1.3 million impressions on social media platforms. Metropolitan collaborated with the California Native Plant Society and Municipal Water District of Orange County on a pilot program to increase the plants' availability in retail nurseries, with CNPS-curated

selections for each of Metropolitan's six counties. A targeted, hyper-focused multilingual digital campaign and search advertising promoted the district's turf replacement program, generating 151 million impressions and thousands of turf rebate applications

Media Activities

The Press Office issued 26 press releases, including statements from the general manager and board chair, and responded to more than 70 media requests for information and interviews on wide-ranging policy issues. Topics included pandemic response, Delta conveyance, Colorado River conditions, San Diego issues/settlements, the Regional Recycled Water Advanced Purification Center, voluntary agreements, conservation campaigns and rebates, stormwater capture, biological opinions, agricultural partnerships, the biennial budget, the Integrated Water Resources Plan, facility shutdowns, the appointment of new Metropolitan directors and the naming of a new Ethics Officer. External Affairs regularly prepared informational materials, talking points and other tools to communicate Metropolitan's operations, policies, news, projects and programs.

Web and Social Media Activities

Metropolitan's COVID-19 webpage centralized water safety information and explained impacts on plans and projects, and measures taken to protect staff, while also providing multilingual FAQs, news coverage links, and a "METitations" video series offering reassuring messages. Metropolitan's internal employee website provided COVID-19 information and return-to-work guidance and safety protocols.

An updated Education webpage highlighted virtual learning opportunities, including field trips and online presentations at a time when many parents were suddenly faced with at-home learning. A new Pathways to Water Careers microsite supported and prepared Southern California's young people for career and college pathways into the water industry. Metropolitan's online water-saving portal, bewaterwise.com, showcased a first-of-its-kind native plant guide for customers looking to convert their lawns to California Friendly and native landscapes.

Metropolitan engaged with audiences on several social media platforms on topics including the Regional Recycled Water project, COVID-19 and celebrating diversity. Metropolitan emphasized the effects of wasting water and gardening wellness on Facebook, reaching more than 8 million Facebook users with nearly 15 million impressions.

Legislative and Policy Activities

While the pandemic radically altered "business as usual" in the legislative arena, Metropolitan continued its essential work. Attention focused on public health, water quality and a family of chemicals called per- and polyfluoroalkyl substances (PFAS).

In Washington, DC, Metropolitan, in collaboration with trade associations, worked to ensure that any potential new PFAS water quality standards both protect public health and maintain a scientific approach. Metropolitan also worked to secure federal funding for regional water supply reliability, environmental mitigation, local supply development and COVID-19 relief.

In Sacramento, Metropolitan introduced two legislative proposals. Assembly Bill 2246 (Mayes) would grant Metropolitan special status under the Surface Mining and Reclamation Act for routine maintenance and emergency repairs of water infrastructure. Senate Bill 996 (Portantino), co-sponsored with the California Municipal Utilities Association, would address public concerns about possible health risks of contaminants of emerging concern by creating and funding a statewide CEC program and a science advisory panel. While both measures were held due to the pandemic, Metropolitan plans to reintroduce the bills in the new state legislative session.

Water Stewardship Education

Education staff worked with member agencies to hold more than 100 events and engaged nearly 78,000 students, teachers, parents and participants. Education staff worked with the state Department of Water Resources to promote a virtual reality tour of the State Water Project which captured first place in K-12 Educational Programs from the National Association of Government Communicators. Metropolitan's "Water is Life" Exhibit and Calendar annually

compiles over 5,000 pieces of art generated by K-12 students throughout Metropolitan's service area.

Metropolitan proactively engaged its education partners in the wake of widespread school closures due to COVID-19. Staff offered Zoom classes and online webinars to teachers and students, and held biweekly meetings with their member agency counterparts (as opposed to quarterly). Metropolitan shifted its high school Solar Cup engineering program to an online format.

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. Over 1,000 individuals participated on 39 inspection trips. The trips were halted in mid-March due to COVID-19.

Publications, Newsletters, Videos

External Affairs designed, wrote, distributed and posted dozens of new publications. Topics included COVID-19, PFAS, Delta conveyance, Colorado River and habitat protection. External Affairs continued issuing the WaterTalk employee e-newsletter, and disseminated Business Outreach, Water Tomorrow and Conservation Update e-newsletters to thousands of stakeholders.

Staff produced the 2019 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 the reliability of drinking water supplies during the pandemic, Metropolitan history, marketing of surplus properties, the Regional Recycled Water facility and business outreach.

Community Partnerships

The Community Partnering Program provided more than 50 sponsorships for environmental fairs, native plant gardens and outdoor classrooms, educational curriculum and publications, as well as water resources conferences that support regional water conservation goals. CPP responded to the current health crisis by working with recipient groups to support virtual community events on a variety of communication platforms.

Outreach for Infrastructure Projects

External Affairs provided community outreach for major capital construction projects and system maintenance activities. City officials were briefed and communities were informed through distribution of project notices along with in-person and online meetings.

Business Outreach, Innovation

Metropolitan launched the Regional Agency Innovation Council to share best practices, interact with member agency managers and officials.

Metropolitan successfully completed a company-wide innovation study and in-depth review of our innovation program, which included employee surveys, focus groups, and interviews. According to this review, 88 percent of employees believe innovation is critical to the future of Metropolitan, supporting the district's ongoing work to provide greater investment in innovation while empowering new and long-time staff to generate and execute new ideas.

Metropolitan co-hosted the 4th annual Water Solutions and California Data Collaborative conference with UC Irvine.

Business Outreach also participated in numerous outreach meetings and events with small business groups, ethnic and veteran organizations to promote business opportunities with the district including hosting its signature Connect 2 MET small business workshop in partnership with the city of Compton.


Mom

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. These tasks took on additional urgency amid the coronavirus pandemic.

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 2019/20 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 2019/20, Internal Audit contributed to governance activities through the following significant actions:

- Transitioned to remote execution of all audit activity in response to the onset of the coronavirus pandemic and the shift to teleworking.

- Completed a comprehensive study of the statutory requirements, Administrative Code, policies, procedures, and internal controls governing the Construction-in-Progress process.
- Successfully carried out the FY 2019/20 Audit Plan, including significant audits of Fleet Management and Maintenance and Procurement Card (P-Card) and Travel Card programs.
- Completed and issued 15 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:	**15**
Audit Quality Assurance–Self Assessment	
Bard Water District Land Management and Seasonal Fallowing Pilot	
Consulting Agreements-Power-Tech Engineers, Inc. and GGS CA Inc.	
Diemer East Filter Building Upgrade	
Emergency Response Planning and Exercises	
External Affairs-Quigley-Simpson	
Fleet Management and Maintenance	
Information Technology Network Reliability Upgrades	
Lake Mathews Headworks Forebay Liner & Outlet Tower Repair	
Local Resources Program-Groundwater Recovery Projects	
MWD Leased Lands-Palo Verde Irrigation District-Forbearance and Fallowing Program	
Procurement Card (P-Card) and Travel Card Programs	
Real Property-Lease Management	
Santa Ana River Bridge Seismic Retrofit	
Water Quality Compliance Reporting Systems	
Monitoring:	**6**
Colorado River Water Users Association	
Quarterly Board Reports	
Quarterly Consulting Contract Reporting (4)	

- Collaborated with management in understanding new and evolving risks posed by the coronavirus pandemic; assisted in identifying mitigating strategies.
- 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.
- Implemented additional technology tools and augmented the audit processes to enhance audit execution.
- Assisted the external auditors, KPMG, with the performance of the June 30, 2019 Annual Financial Audit, and with the preparation of their June 30, 2020 Annual Financial Audit, which is being conducted remotely by KMPG due to the coronavirus pandemic.

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 2019/20 activities included the following:

- Commenced the annual internal quality self-assessment that evaluates conformance with auditing standards; assesses governance practices; evaluates audit work papers with regards to planning, fieldwork, and reporting practices; appraises staff development and resource management activities, and surveys Audit Department staff for feedback.
- Worked to implement recommended enhancements to compliance efforts.
- Identified training opportunities for Internal Audit staff, who earned over 500 continuing education hours in courses including fraud assessment, ethics, accounting standard updates, and government auditing.

2019 ETHICS SURVEY

COMPLETE BY NOVEMBER 22

CHAPTER 14

Ethics

Created by state legislation in 1999, the Ethics Office is responsible for promoting a robust and enduring ethical culture at Metropolitan. The office ensures that Metropolitan is transparent, operates with integrity and upholds high ethical standards. To advance its mission, the office develops policies and monitors compliance in individual decision-making and institutional processes.

Preventing violations remains the cornerstone of Metropolitan's ethics program. To further this effort, the office develops sensible and tailored policies, provides training, and advises officials on how to comply with ethics policies and related state ethics laws. A fair and objective investigation process addresses potential violations of the district's ethics policies to strengthen accountability and safeguard public trust.

Staffing

The board hired a new Ethics Officer who emphasized increased outreach to employees, culminating in a district-wide employee survey on ethics. The survey results identified key areas of focus that helped shape Ethics Office objectives.

The Ethics Officer had been at the helm less than a year when the COVID-19 pandemic took hold. Having already tested a telework pilot program back in fall 2019, the office was able to successfully transition to full-time telework without operational interruption or delay in services to Metropolitan.

Advice and Education

Two core functions of the office, advice and education, are central to helping officials avoid ethics missteps and to ensuring integrity within district processes.

This year, staff advised Metropolitan officials on over 180 specific ethics issues related to their work. Requests for advice covered topics including financial conflicts of interest, gifts from contractors, outside employment, political activities, and disclosure of personal finances. For example, the Ethics Office advised some officials that their planned course of action would create a conflict of interest requiring their recusal.

The office's training programs reinforce awareness and understanding of Metropolitan's ethics policies and related state ethics laws. Ongoing programs include training through Metropolitan's Management University; sessions for officials who report personal financial interests pursuant to state law; and an ethics primer for new employees at orientation.

This fiscal year, the office provided its standard in-person trainings through March, then shifted to online and telephonic sessions in the wake of COVID-19. In response to the employee survey, the office also launched a three-part webinar series titled "Meet Your Ethics Office" to address employee requests to learn more about the services the office provides.

Policies and Procedures

The office regularly evaluates Metropolitan's ethics policies and procedures to ensure that they meet Metropolitan's ethics standards and support institutional growth. This year, the Audit and Ethics Committee voted to approve a proposed overhaul of Metropolitan's ethics policies and procedures to strengthen the ethics program and clarify the office's authority. The full board is expected to vote on the proposal by the end of the 2020/21 fiscal year.

Compliance

Among the Ethics Office's core functions is ensuring compliance with state ethics requirements that apply to government agencies and their officials. To that end, the office continued its state-mandated review of Metropolitan's conflict of interest code. The code identifies Metropolitan positions that require disclosure of personal financial interests and assigns an appropriate level of disclosure for each position. The review identified additional positions required to report personal financial interests. The proposed amendments are expected to go before the board during FY 2020/21. 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 2019/20, the office administered over 750 disclosure forms.

Investigations

As one of its essential mandates, the Ethics Office independently and objectively investigates alleged violations of Metropolitan's ethics rules and publicly discloses the investigative findings. Investigations promote individual accountability by Metropolitan officials, identify opportunities for expanded ethics training, and lead to new or improved ethics rules.

In addition to evaluating 29 complaints this year, the Ethics Office undertook seven ethics investigations concerning alleged violations of misuse of authority, retaliation, and conflict of interest rules.

Office and Professional Development

In support of ongoing efforts to monitor best practices in the field of governmental ethics, 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

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

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
Sespe Creek
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
MWD Inland Feeder
Julian Hinds Pumping Plant
Eagle Mountain Pumping Plant
MATCH LINE SEE INSERT
Aqueduct
River
Creek
Canal

CALIFORNIA
ARIZONA
Whitsett Intake Pumping Plant
Gene Pumping Plant
Iron Mountain Pumping Plant
Eagle Mountain Pumping Plant
Colorado River Aqueduct
Colorado River
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