



- **Transmittal of Integrated Water Resources Plan Implementation Report 2017**

Summary

This report provides a progress update on resource development goals in the 2015 Integrated Water Resources Plan Update for the Colorado River Aqueduct, the State Water Project, local resources, and conservation. Overall, the region is on course to meet the 2040 IRP targets. Long-term challenges remain, including regulatory and institutional constraints, climate change, growth in population and economy, groundwater overdraft, and infrastructure needs. Metropolitan and other entities will need to continue their efforts to ensure the long-term water reliability envisioned by the IRP.

Attachment

[Integrated Water Resources Plan Implementation Report 2017](#)

Detailed Report

See attachment for the detailed report.

WATER TOMORROW
Integrated Water Resources Plan

Integrated Water Resources Plan
Implementation Report 2017



The Metropolitan Water District of Southern California



This report updates progress on resource development goals in the 2015 Integrated Water Resources Plan Update. The IRP provides targets for water resource development and conservation through 2040. Two years into the 25-year plan, the region is on course to meet the 2040 targets. Long-term challenges remain, including regulatory and institutional constraints, climate change, growth in population and economy, groundwater overdraft, and infrastructure needs. Metropolitan and other entities will continue efforts to ensure the long-term water reliability envisioned by the IRP. In particular, Metropolitan will continue to work closely with statewide interests, other states, and Mexico to stabilize imported supplies. New policy principles adopted in 2017 provide a basis for Metropolitan's enhanced role in further promoting and protecting the local supplies and water-use efficiency that will provide for future growth.

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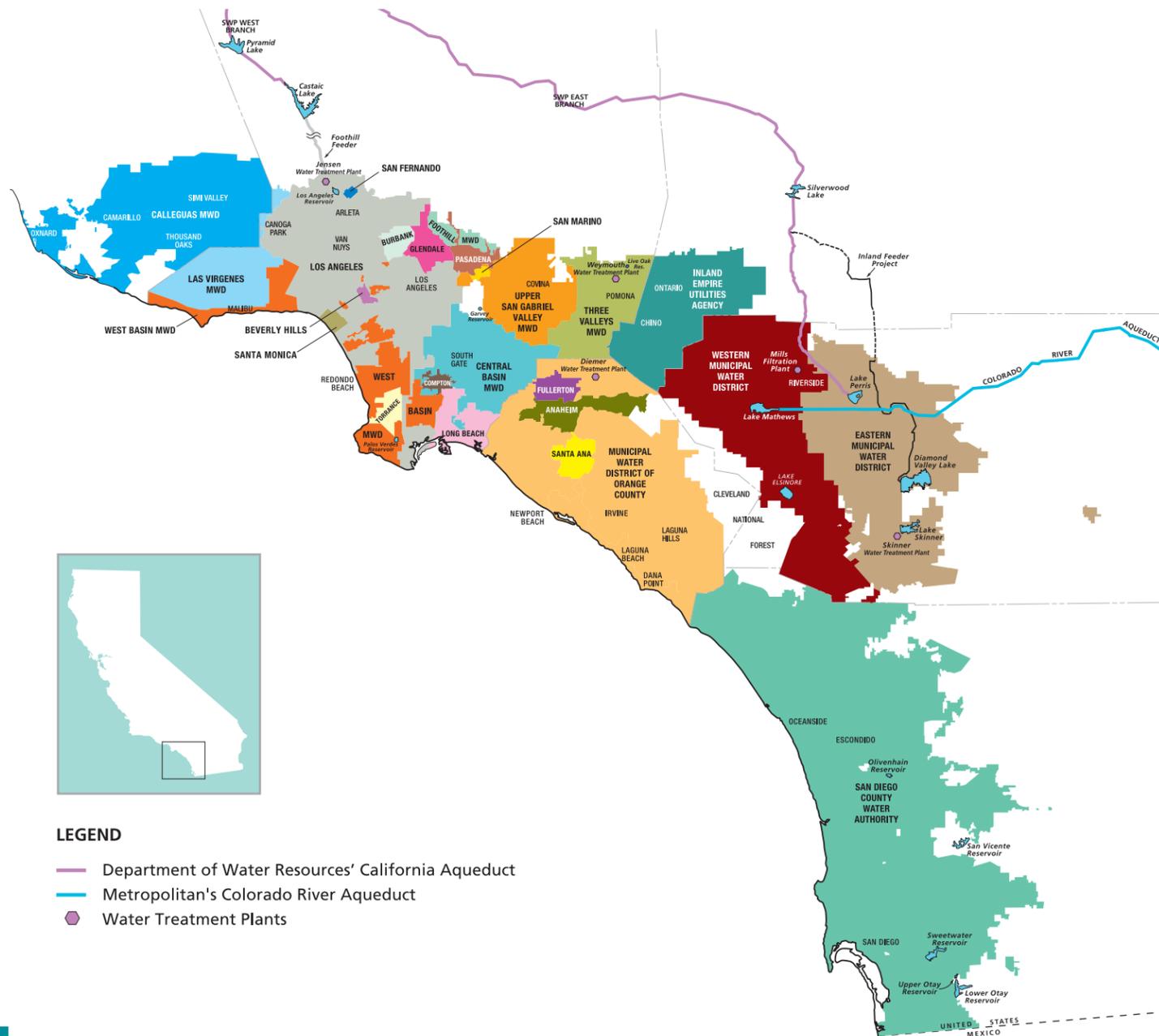
Who is Metropolitan

The Metropolitan Water District of Southern California is the Southland's water provider for a six-county region with a population of nearly 19 million. From the engineered gravity-flow of the Colorado River Aqueduct and Northern California via the State Water Project, to sustainable water recycling and groundwater replenishment, to today's investments in innovation – Metropolitan thinks ahead.

Our Mission

The mission of the Metropolitan Water District of Southern California is to provide its service area with adequate and reliable supplies of high-quality water to meet present and future needs in an environmentally and economically responsible way.

Our Service Area



Overview

BACKGROUND: THE 2015 IRP UPDATE

In January 2016, Metropolitan's board adopted the 2015 Integrated Water Resources Plan Update as the latest in an ongoing series of updates to its long-term adaptive management strategy. The IRP serves as a framework for future activity by Metropolitan and its member agencies. Specifically, the 2015 IRP Update identifies regional targets for water resource development to ensure water supply reliability for its service area through the year 2040. As did the previous reports, the updated IRP continues with the portfolio approach for water management. This approach includes a balanced mix of imported supplies from the Colorado River and the State Water Project as well as maintenance and further development of the region's base of local supplies and conservation. When successfully implemented, the IRP should lead to a future without water shortages or mandatory restrictions under planned conditions.

Significant progress has been made toward meeting the IRP's future targets with both short-term and long-term actions. This report provides an account of activities, opportunities, and challenges, along with the outlook for various components of the IRP strategy.

RECENT PROGRESS TOWARD MEETING THE IRP RELIABILITY TARGETS

During calendar year 2017, greatly improved hydrologic conditions for California and the Colorado River Basin combined with low demands enabled Metropolitan to rebuild regional storage reserves. While 2017 brought short-term relief from the recent drought, Metropolitan continues to implement the long-term targets called for in the IRP.

Imported Supplies

The goal for managing Colorado River Aqueduct (CRA) supplies is to maintain a minimum diversion of 900,000 acre-feet when needed. During dry years, the goal is to be able to deliver 1.2 million acre-feet through development of dry-year programs and storage. Wet conditions in the Colorado River and State Water Project watersheds allowed Metropolitan to keep much of its 2017 Colorado River supplies in Lake Mead.

Record weather conditions in Northern California led to a State Water Project allocation of 85 percent in 2017, the highest since 2011. However, even under these extremely wet hydrological conditions, the 1.749 million acre-feet in SWP deliveries, was less than 2.022 million acre-feet that had been predicted under the 2015 IRP Update model for 2017. With the higher State Water Project allocation, Metropolitan provided over 90 percent of its service area deliveries with such supplies. At the same time, Metropolitan kept the majority of its Colorado River supply in storage. Additionally, some SWP supplies were banked in Metropolitan's storage programs in the Central Valley. Metropolitan increased storage in Diamond Valley Lake to nearly full at 747,000 acre-feet by the end of 2017. Working with member agencies, Metropolitan moved imported water into groundwater through the Conjunctive Use Program and Cyclic Storage Program. Overall, in 2017, Metropolitan put 1.2 million acre-feet into storage, a record amount. Total dry-year storage reserves are now at nearly 2.5 million acre-feet, approaching the 2012 record levels.

Imported Supplies	2017 Actuals		Projections					2040 IRP Target
			2017	2020	2025	2030	2035	
CRA Supplies*	1,038,000	Minimum Diversion	900,000	900,000	900,000	900,000	900,000	900,000
		Dry-Year Diversion	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
SWP Supplies**	1,749,000	Minimum	206,000	229,000	229,000	314,000	314,000	314,000
		Average	1,221,000	984,000	984,000	1,213,000	1,213,000	1,213,000
		Maximum	2,022,000	1,695,000	1,695,000	1,863,000	1,863,000	1,863,000

*Subject to reconciliation

**Includes Table A Allocation and Article 21

Local Supplies & Conservation

The IRP strategy calls for current local supply production to be maintained into the future and for additional local supplies to be developed to meet future demands and protect against potential loss. By 2040, local supplies are expected to provide about 2.43 million acre-feet per year.

Local Supplies	CY2016 Actuals*	Projections					2040 IRP Target
		2016	2020	2025	2030	2035	
Local Supplies	1,846,000	2,199,000	2,307,000	2,356,000	2,386,000	2,408,000	2,426,000

* Based on best available data.

Local water production for calendar year 2016 was relatively low, at 1.846 million acre-feet, influenced by unusually low overall water demand in response to California's drought emergency. Regional potable water use fell to 127 gallons per capita per day, the lowest on record. Under normal conditions, local supplies would be expected to produce about 2.2 million acre-feet in 2017. This includes increased production as new customers begin to take recycled water from existing projects and from new projects coming on-line.

Conservation Savings	2016/2017 Actuals*	Projections					2040 IRP Target
		2016/17	2019/20	2024/25	2029/30	2034/35	
Conservation Savings	1,012,000	1,034,000	1,096,000	1,197,000	1,310,000	1,403,000	1,519,000

* Conservation savings actuals and projections are fiscal year (ending on June 30)

Total conservation savings for fiscal year 2016/17 were 1.012 million acre-feet. Active conservation savings from incentive programs accounted for 206,000 acre-feet. The remaining 806,000 acre-feet of savings came from passive conservation achieved through legislation, building and plumbing codes, ordinances, and price-effect. Metropolitan is currently engaged in a deliberative process to discuss ways to refine conservation programs to meet the 2015 IRP Update targets. As part of this process, Metropolitan is considering feedback from the board and member agencies, along with input from a 2016 peer review by the Alliance for Water Efficiency. Looking ahead, conservation will continue to be crucial to meeting the future needs of the region's growing population and economy. New savings from new investments in active conservation will be needed. In addition to its existing Conservation Credits Program, Metropolitan is engaged in a comprehensive research program, partnerships with other entities, and a comprehensive landscape program to pursue further savings in outdoor water-use efficiency.

Metropolitan's Ongoing IRP-Related Initiatives

Even as it managed the considerable challenges and opportunities of a short-term increase in water supplies in 2017, Metropolitan continued with its long-term strategy. Since the 2015 IRP Update, Metropolitan embarked on several IRP-related activities to further the region's resilience to future dry years.

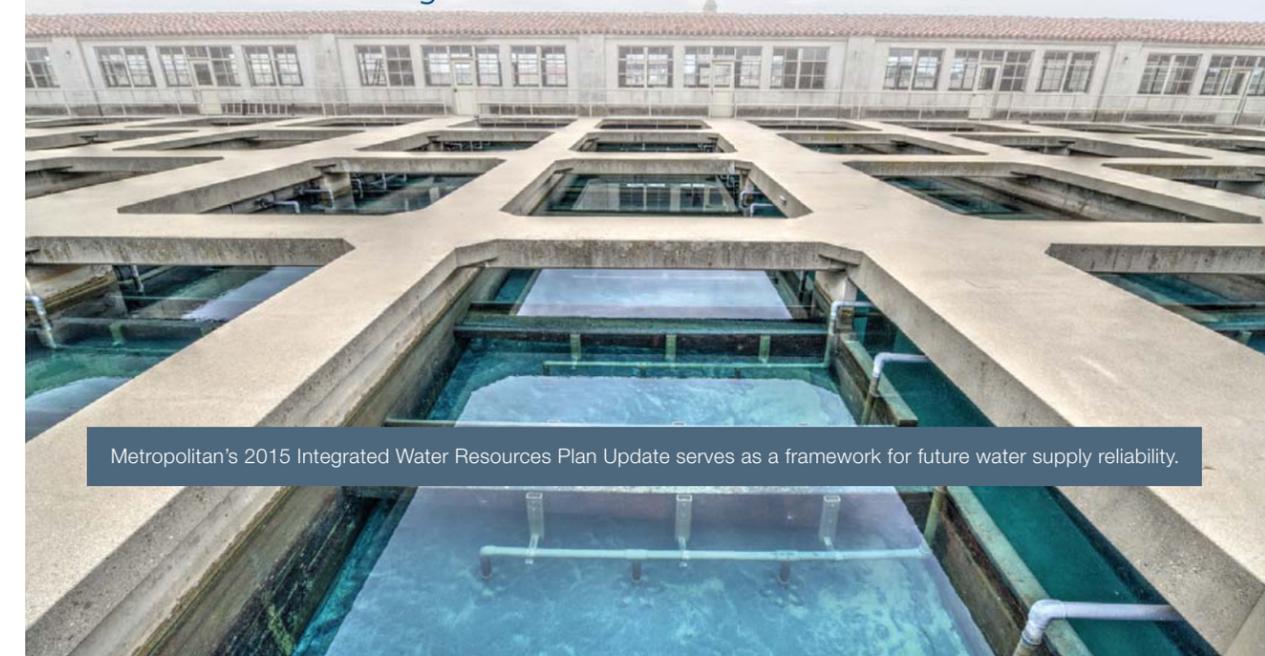
In July 2017, Metropolitan's board adopted policy principles guiding Metropolitan's role in regional implementation of IRP targets for local supplies and conservation. The adopted policy principles direct Metropolitan to take an active role in identifying and evaluating opportunities for local supply and conservation within its service area. As an example of its emerging role in developing supplies in Southern California, Metropolitan is partnering with the Sanitation Districts of Los Angeles County on a joint regional water recycling program that could help refill groundwater basins.

California WaterFix is a crucial part of the overall IRP strategy of stabilizing and safeguarding imported supplies from the State Water Project. On October 10, 2017, Metropolitan's board approved the district's 25.9 percent share of California WaterFix financing, as well as moving forward on a governance structure to build and finance the \$17 billion project.

Metropolitan is also working with water agencies in California, Arizona, and Nevada to develop the Lower Colorado Basin Drought Contingency Plan. The plan would incentivize agencies to store water in Lake Mead, reducing the risk of water curtailments to California that could disrupt deliveries to Metropolitan. It also helps protect Metropolitan's ability to recover stored water to be stored in Lake Mead, even if the lake's elevation were to drop. The plan is expected to be completed in 2018.

After several years of intensive scientific research, results were made available from Metropolitan's pilot Foundational Action Funding Program, which was established in 2013 in support of the IRP adaptive management strategy. Foundational Actions, renamed Future Supply Actions in the 2015 IRP Update, are relatively low-cost, low risk supply development actions designed to better prepare the region for unforeseen water supply challenges. Co-funded by member agencies, the program consisted of technical studies and pilot projects in the areas of groundwater, recycled water, seawater desalination, and stormwater. Metropolitan provided approximately \$3 million of funding for 13 technical studies and pilot projects. In February 2017, Metropolitan hosted a technical conference with more than 300 attendees where each of the participating agencies presented their research findings and took part in panel discussions. 💧

WATER TOMORROW Integrated Water Resources Plan



Metropolitan's 2015 Integrated Water Resources Plan Update serves as a framework for future water supply reliability.

Colorado River Aqueduct

IRP GOAL: MAINTAIN COLORADO RIVER AQUEDUCT SUPPLIES

The goal for managing Colorado River Aqueduct supplies is to protect and maintain base water supplies from existing programs, while also being able to fill the CRA when needed through development of dry-year programs and management of storage. This involves protecting existing supply and storage programs in the face of risks that could impact program yields and the ability to access storage in the future. In order to accomplish this goal, the 2015 IRP Update calls for ensuring that a minimum supply availability of 900,000 acre-feet when needed and to be able to ramp up diversions to 1.2 million acre-feet in dry years.

RECENT CRA SUPPLIES VS. IRP TARGETS

The following table shows CRA estimated supply for calendar year 2017 and the IRP future supply targets.

CRA Programs	2017 Actuals*	Projections					2040 IRP Target
		2017	2020	2025	2030	2035	
Basic Apportionment	550,000	550,000	550,000	550,000	550,000	550,000	550,000
Present Perfected Rights	0	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000
SNWA Return Obligations	0	0	0	0	0	-5,000	-10,000
IID-MWD Conservation Program	105,000	85,000	85,000	85,000	85,000	85,000	85,000
Palo Verde Program Minimum	125,000	30,000	30,000	30,000	30,000	30,000	30,000
IID-SDCWA Transfer and Exchange	100,000	100,000	193,000	200,000	200,000	200,000	200,000
Canal Lining Projects SDCWA	82,000	80,000	80,000	80,000	80,000	80,000	80,000
Canal Lining Projects Lower Colorado Water Supply Project	16,000	16,000	16,000	16,000	16,000	16,000	16,000
IID Exchange	6,000	8,000	8,000	7,000	6,000	5,000	4,000
Bard Program	50,000	-10,000	-20,000	-20,000	-20,000	-20,000	-20,000
	4,000	4,000	5,000	5,000	5,000	5,000	5,000
Total CRA Supplies	1,038,000	861,000	945,000	951,000	950,000	944,000	938,000
Minimum Diversion	900,000	900,000	900,000	900,000	900,000	900,000	900,000
Dry-Year Diversion	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000

*Subject to reconciliation

Overall CRA supplies in calendar year 2017 were relatively high, at 1.038 million acre-feet. Combined with high supplies from the SWP, there was more than enough water to meet relatively low regional demand. This allowed Metropolitan to store an estimated 349,000 acre-feet into Lake Mead Intentionally Created Surplus (ICS), increasing the total storage balance from about 85,000 to 434,000 acre-feet. These actions to rebuild storage will improve future reliability for CRA supply. The numbers shown in the table above are subject to final decree accounting by the U.S. Bureau of Reclamation; any changes would be reflected as an adjustment to the calendar year 2017 ending balance in Metropolitan's ICS account and/or the agricultural use adjustment.

LONG-TERM CHALLENGES

While Metropolitan has been successful in meeting area needs with CRA supplies over the past 15 years, several challenges must be overcome to continue to meet the region's needs. Identified risks to future CRA supplies include increased demands from higher priority Colorado River users and climate change. Climate change can worsen droughts and impact the frequency and depth of shortages on the river.

As Metropolitan holds the lowest priority Colorado River rights in California, increased use by higher priority water users reduces supplies available to Metropolitan. In recent years, water use along the Colorado River has increased, which has negatively impacted the amount of water available to Metropolitan each year. In addition, the Colorado River Basin has experienced a period of prolonged drought and faces long-term challenges as demands on the river exceed available supply. If Lake Mead reaches critically low levels, Metropolitan's basic apportionment of Colorado River water could be cut. Finally, when Lake Mead falls below 1,075 feet elevation (about one-third of capacity), Metropolitan loses its ability to store water in Lake Mead ICS in wet years and to recover those supplies to fill the CRA. As of the end of calendar year 2017, Lake Mead elevation was 1,083.5 feet.

While Metropolitan faced these challenges, it also had an opportunity to address them. In 2015, Metropolitan purchased more than 12,000 acres of land in Palo Verde Valley, bringing Metropolitan's total land ownership to over 20,000 acres. Metropolitan purchased these lands with the intent of providing incentives to its farmer lessees to use water efficient techniques to grow crops. The new leases were approved by Metropolitan's board in late 2016 and executed in 2017, and Metropolitan will be working closely with tenants to monitor water use. This program is designed to protect Metropolitan's basic apportionment, as well as also the agricultural economy.

Metropolitan is also working with water agencies in California, Arizona, and Nevada to develop the Lower Colorado Basin Drought Contingency Plan, which would avoid Lake Mead reaching critically low levels that could disrupt deliveries to Metropolitan. The plan incentivizes water agencies to store water in Lake Mead. The stored water would help keep Lake Mead at higher levels and significantly reduce the risk of any water curtailments to California. Additionally, the plan includes the ability for water agencies to recover stored water below elevation 1,075 feet, which would allow Metropolitan to be able to fill the CRA even if Lake Mead's elevation were to drop.

CRA ACTIVITIES

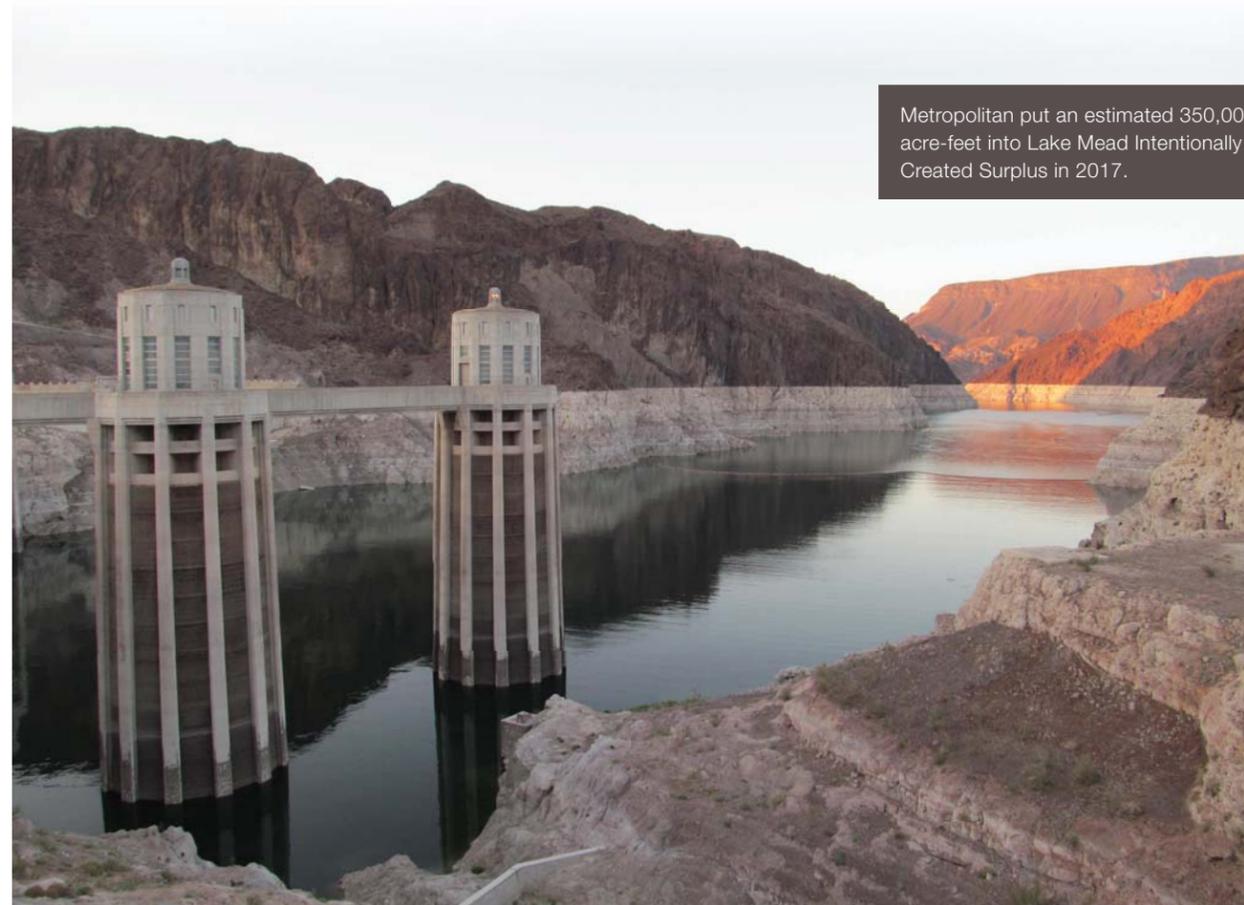
The following section describes recent notable activities by Metropolitan in the Colorado River system to maintain and augment base supplies. Metropolitan's base supplies are comprised of its Basic Colorado River Apportionment of 550,000 acre-feet and the long-term agricultural to urban transfers. Long-term programs include: conserved water transfers from Imperial Irrigation District to Metropolitan and San Diego County Water Authority, lining the All-American and Coachella Canals, and the Palo Verde Irrigation District Crop Rotation and Land Fallowing Program. Over the years, Metropolitan has increased reliable supply for the CRA through programs that it helped fund and implement, including: farm and irrigation district conservation programs, reservoir system operations, land management programs, and water transfers and exchanges through arrangements with agricultural water districts, San Diego County Water Authority, entities in Arizona and Nevada that use Colorado River water, and the U.S. Bureau of Reclamation.



Metropolitan is implementing water measurement technologies, like this real-time sensor installation, in order to better measure the impact of water conservation practices on Metropolitan farmlands in the Palo Verde Valley.

Drought Response Memorandum of Understanding

Metropolitan was a partner in the Lower Colorado River Basin Drought Response Memorandum of Understanding (MOU), which aimed to protect Lake Mead's elevation from dropping to critical levels. The MOU was executed in 2014 and terminated in 2017. It specified protection volume goals for Metropolitan, Southern Nevada Water Authority, Central Arizona Project, and U.S. Bureau of Reclamation. These agencies agreed to make best efforts to add specified amounts of water to Lake Mead. Metropolitan exceeded in meeting its protection volume goal of adding 300,000 acre-feet of conserved water to Lake Mead during the term of the MOU.



Metropolitan put an estimated 350,000 acre-feet into Lake Mead Intentionally Created Surplus in 2017.

Pilot System Conservation Program

Metropolitan, the U.S. Bureau of Reclamation, Central Arizona Project, Denver Water, Southern Nevada Water Authority, and the Upper Colorado River Commission are implementing a Pilot System Conservation Program. The pilot program pays Colorado River water users on a voluntary basis to conserve water that will remain in Lake Mead or Lake Powell for the benefit of the overall system. As of mid-September 2017, there are 53 projects conserving 138,000 acre-feet.

Storage Agreement with Imperial Irrigation District

In 2015, Imperial Irrigation District (IID) expressed interest in expanding its conservation activities for a short period of time, but a place was needed to store the conserved water. Metropolitan partnered with IID to develop a three-year agreement whereby IID can store conserved water with Metropolitan in the near term, with the water returned to IID at a future date. This program helped Metropolitan fill the CRA during 2015, and provided additional supplies in 2016 and 2017. In November 2017, Metropolitan approved IID's request to store up 69,000 acre-feet of conserved water on behalf of IID.

San Diego County Water Authority/Imperial Irrigation District Exchange

In 2017, San Diego County Water Authority (SDCWA) and Metropolitan extended the exchange agreement by 10 years to secure transfer of conserved Colorado River water through 2047. The water transferred by IID is made available by SDCWA to Metropolitan for diversion at Lake Havasu. Metropolitan provides a matching volume to SDCWA by exchange.

Seasonal Land Fallowing Pilot Program with Bard Water District

On the Colorado River, a traditional agricultural-urban fallowing program would require a participating farmer to idle cropland for an extended period of time. In an effort to explore a different approach to land fallowing, Metropolitan funded a two-year seasonal pilot program with Bard Water District in the southeast corner of California. The pilot program tested a new way to maximize the utility of water for farmers and cities alike. Under the pilot program, farmers would forgo planting a water-intensive crop for a portion of the spring and summer, when crop yields are typically low. Participation grew from 509 acres of farmland in 2016 to 1,600 acres in 2017. Because Metropolitan has the lower priority right from the Colorado Water, every acre fallowed allows a net increase in water available to Metropolitan. The pilot program provided an opportunity to investigate the potential for a longer-term water management program with a new, flexible, and affordable water supply. The pilot program was concluded in August 2017. 💧



This picture exemplifies measures taken to ensure that water from the channel did not enter the irrigation canal for land fallowed under the Metropolitan/Bard Seasonal Fallowing Program. The irrigation gates remained locked while the lands participated in the program.

Minute 323

After more than two years of negotiations among federal and state officials from both countries, in September 2017, the United States and Mexico approved Minute 323 to the International Water Treaty with Mexico, which is titled "Extension of Cooperative Measures and Adoption of a Binational Water Scarcity Contingency Plan in the Colorado River Basin." Minute 323 gives Metropolitan and other contractors in the United States the opportunity to fund and share in the benefit of water conserved in Mexico. The conserved water is stored in Lake Mead until it is needed in Metropolitan's service area. This is a successor to Minute 319 which was approved in 2012 and expired on December 31, 2017. Minute 323 builds upon areas of binational cooperation achieved in International Boundary and Water Commission Minute No. 319. Minute 323 will remain in effect through 2026. A minute is an agreement between two governments to implement a treaty.



State Water Project

IRP GOAL: STABILIZE STATE WATER PROJECT SUPPLIES

The 2015 IRP Update calls for managing State Water Project (SWP) supplies in compliance with regulatory restrictions in the near term for an average of 984,000 acre-feet per year. In 2030, the target changes to 1.2 million acre-feet on average when a long-term Delta solution is estimated to be in place. The IRP's framework for a reliable water supply future depends on the continued capability to move water into storage in wet periods and flexibility to manage around fishery needs. Metropolitan is involved in a number of initiatives supporting the state's established coequal goals of providing more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem.

RECENT SWP SUPPLIES VS. IRP TARGETS

SWP supplies in calendar year 2017 were relatively high. The following table shows actual Table A allocation and Article 21 interruptible supply for calendar year 2017 and the IRP future supply targets.

State Water Project	2017 Actuals*	Projections					2040 IRP Target	
		2017	2020	2025	2030	2035		
SWP Supplies	1,749,000	Minimum	206,000	229,000	229,000	314,000	314,000	314,000
		Average	1,221,000	984,000	984,000	1,213,000	1,213,000	1,213,000
		Maximum	2,022,000	1,695,000	1,695,000	1,863,000	1,863,000	1,863,000

* Includes Table A Allocation and Article 21 Interruptible Supplies

Metropolitan's annual SWP supply is significantly affected by weather and hydrologic conditions in the SWP's watersheds and environmental conditions in the Sacramento-San Joaquin Delta. In any given year, variations in temperature, rainfall, and snowpack greatly affect the amount of water runoff available. Factors such as antecedent soil moisture conditions affect how weather-based factors translate into hydrologic factors like runoff and river flow. Over time, changing climate can also alter both weather-based factors and hydrologic conditions. In addition, the long-term trend has been toward increased environmental regulation and reduced supply. The 2015 IRP Update targets anticipate pumping and export restrictions to become more restrictive in 2020, consistent with the scheduled timetable for review of the biological opinions for key fisheries in the Delta.

Record hydrologic conditions in Northern California supported an 85 percent SWP allocation in calendar year 2017, the highest since 2006. The Northern Sierra 8-Station Index reached 94.7 inches in April 2017, breaking its previous record set in 1983. Additionally, the Northern California snowpack reached 148 percent of normal on April 1, 2017. The extreme wet conditions tested the resiliency of key SWP facilities and triggered failures at the Oroville main spillway and Clifton Court Forebay structures. Despite these infrastructure issues, water supply reliability was not impacted in calendar 2017. The California Department of Water Resources (DWR) maintained the SWP Table A allocation at 85 percent and offered Article 21 interruptible supplies, for the first time since calendar year 2011. However, even at 1.749 million acre-feet, this amount was less than the 2015 IRP Update's model results of 2.022 million acre-feet for maximum SWP deliveries under extremely wet hydrologic conditions prior to 2020.

LONG-TERM CHALLENGES

The current SWP delivery system is susceptible to earthquakes, floods, subsidence, climate change, rising sea levels, aging facilities, and increasing regulatory constraints on water operations, as well as other risks and uncertainties in the Delta. All of these factors contribute to a decline in water supply.

To protect endangered species in the Delta, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the California Department of Fish and Wildlife have issued biological opinions (BiOps). The BiOps include incidental take permits in an effort to reduce harm to protected fish and their habitat. The SWP and the Central Valley Project (CVP) operated by DWR and the U.S. Bureau of Reclamation, respectively, must often alter their water operations in order to achieve the fishery protection measures prescribed in the BiOps. As a result, water supply reliability for SWP and CVP municipal and agricultural water users south of the Delta has been reduced. The Delta's ecosystem and water supply reliability will continue to decline unless action is taken. In 2017, even with record-breaking precipitation, Metropolitan and other SWP contractors only received 85 percent of their Table A allocations.

SWP ACTIVITIES

The following section describes recent activities by Metropolitan to stabilize SWP supplies in the near and long term.

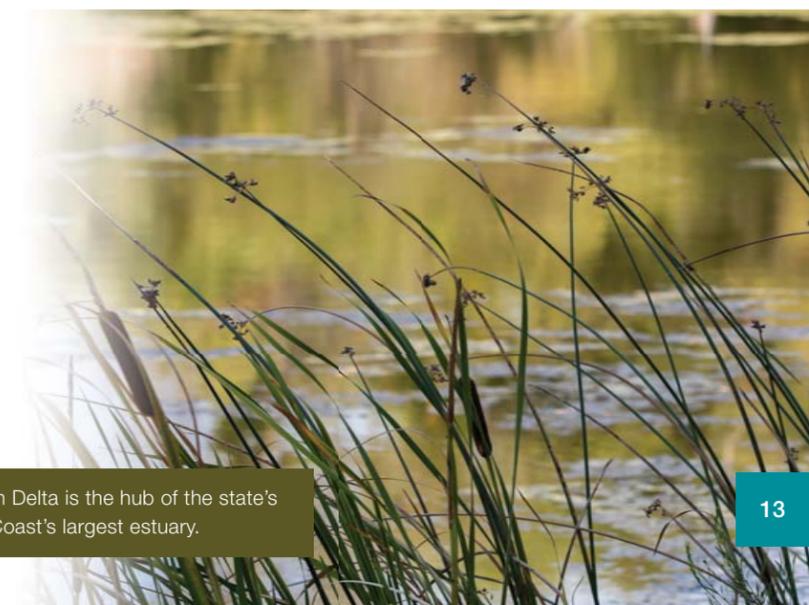
California WaterFix

Significant milestones were reached in 2017 for California WaterFix, the state of California's proposed project to improve system operational capability to support more reliable Delta water exports and provide greater assurances to guard against risks. California WaterFix is critical to the 2015 IRP Update's long-term reliability targets for the SWP. The National Marine Fisheries Service and U.S. Fish and Wildlife Service issued their biological opinions for the proposed California WaterFix which are permits under the federal Endangered Species Act. Both biological opinions found the construction and operation of California WaterFix as proposed would not jeopardize the continued existence of ESA-listed species or destroy or adversely modify critical habitat for those species. The California Department of Fish and Wildlife issued its permit under the state Endangered Species Act. DWR completed its environmental review process by certifying the 2016 Final Environmental Impact Report and the California WaterFix Notice of Determination, which completes DWR's compliance with the California Environmental Quality Act. The California Department of Fish and Wildlife issued an incidental take permit for the construction and operation of California WaterFix in compliance with Section 2081(b) of the California Endangered Species Act. This permit authorizes the incidental take of state-listed species associated with future operation of the SWP with the addition of the California WaterFix. In September and October 2017, Metropolitan's board, in addition to 11 other State Water Contractors, voted to support California WaterFix. Other State Water Contractors in the export area did not take explicit action to their boards but anticipate cost responsibility under their existing SWP contract with the state, along with existing opportunities under the contract to manage their supply and costs through water transfers, banking, and exchanges.

Additional regulatory and permitting actions must be taken before project construction can begin, including a State Water Resources Control Board (SWRCB) water rights action on the proposed diversions. As a member of the State Water Contractors, Metropolitan has been participating in the SWRCB's California WaterFix Petition proceedings. Part 1 of the hearings addressed potential injury to other legal users of water. Part 2 of the hearings, which will address the potential effects of the proposed project on fish and wildlife including consideration of appropriate Delta flow criteria, is anticipated to begin in February 2018.

California EcoRestore

EcoRestore is an initiative to help coordinate and advance at least 30,000 acres of critical habitat restoration in the Delta by 2020. Implemented through multi-agency coordination and management, EcoRestore is focused on habitat restoration actions to support the long-term health of the Delta and its native fish and wildlife species, including aquatic, sub-tidal, tidal, riparian, flood plain; and to support upland ecosystem projects, which are at various stages of planning, permitting and construction. After 2 years in operation, EcoRestore projects have progressed at all stages of implementation, including two projects that began construction in 2016 and four projects that began construction in 2017.



The Sacramento-San Joaquin Delta is the hub of the state's water system and the West Coast's largest estuary.

Delta Plan

Metropolitan provided input on an amendment to the Delta Stewardship Council's Delta Plan that exempts single-year water transfers from regulation under the Delta Plan and simplifies implementation of short-term transfers. This is important to allow flexibility in the system to transfer water on a timetable when it is available. The Delta Plan established new rules and recommendations to further the state's coequal goals for the Delta of improving statewide water supply reliability and protecting and restoring the Delta ecosystem.

Delta Resiliency Plan and Salmon Resiliency Plan

Metropolitan participates in the state's development of the Delta Resiliency Plan and Salmon Resiliency Plan. The Delta Resiliency Plan addresses both immediate and near-term needs of Delta smelt to promote their resiliency to drought conditions as well as future variations in habitat conditions. The Salmon Resiliency Plan addresses specific near- and long-term needs of Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and California Central Valley steelhead. The state plans are science-driven, focused, and designed to provide resource agencies, the public, Congress, and the California State Legislature with information critical to collaborative approaches to species resiliency. In the long term, these efforts will continue to define the actions necessary to implement successful restoration in the Delta system building upon EcoRestore's 5-year focus.

Regulations and Delta Science

Metropolitan continued to collaborate with state and federal agencies and science experts to develop scientific information and assess environmental concerns in the Delta. Metropolitan's efforts have focused on factors that impact Bay-Delta water supply reliability, including evaluation of fishery abundance and distribution dynamics; survey data collection; effect of stressors; impact on the species of water project operations; and physical habitat attributes. Addressing the many stressors in the Delta will continue to inform operational decisions, sometimes by incorporating real-time information.

Metropolitan continued to participate in the Collaborative Science and Adaptive Management Program (CSAMP), which was initiated in 2013 to address science and adaptive management issues related to protection of Delta smelt and salmon in the Delta. In January 2017, CSAMP released the final salmon gap analysis report with key findings and knowledge gaps concerning South Delta salmon survival, areas of technical disagreement, and recommendations for further studies. Metropolitan also continued to participate in CSAMP Delta smelt studies addressing entrainment and effects of fall outflow, and development of monitoring plans to evaluate the potential effects of outflow alterations on Delta smelt habitat, condition, and survival.

Metropolitan contributed to significant progress conducting longfin smelt studies to develop a better understanding of the life cycle and habitat use for longfin smelt. Metropolitan worked with consulting scientists to design and conduct the longfin smelt Vertical Distribution Habitat Study, which included field survey work in late September 2016. In December 2016, the California Department of Fish and Wildlife awarded a Proposition 1 grant to Metropolitan for a study investigating the factors that affect distribution, abundance, and recruitment of longfin smelt in the Upper San Francisco Estuary. The study will fill several key information gaps on the role of habitat and food availability in the early life history of longfin smelt.

Several science projects funded by Metropolitan were published in 2016 and first half of 2017, addressing native Delta fish species, the food web, and historical relationships between Delta outflow and salinity.

- In September 2016, a study addressing the feasibility of implanting PIT tags and acoustic tags into adult Delta Smelt was published in the North American Journal of Fisheries Management. The development of improved tagging and tracking capabilities for Delta smelt will be essential in understanding Delta smelt behavior and habitat.

- In July 2017, another Delta smelt study was published, which focused on developing a better understanding of Delta smelt genetic status, or effective population size. Loss of genetic diversity may increase risk of extinction for a species. The study results indicate that Delta smelt are not declining because of genetic factors, and are not at immediate risk of losing genetic diversity from low effective population size.
- In 2017, a study was published addressing the distribution of larval longfin smelt in the Bay Delta estuary. The study results suggest that longfin smelt spawn primarily in the shallows and wetlands ringing Suisun Bay and San Pablo Bay and that they are much more tolerant of salinity than previously believed. The implication of the study results is that downstream production could be very important in wetter years and that habitat restoration around Suisun Bay and San Pablo Bay could boost longfin spawning habitat.
- In August 2016, a study was published investigating factors controlling phytoplankton blooms in Suisun Bay. The investigators evaluated the relationship between clam grazing and nutrient concentrations in controlling phytoplankton blooms in Suisun Bay and developed a model that incorporates clam abundance and grazing, nutrient concentrations, and flow to predict conditions for phytoplankton blooms.
- In July 2017, a study evaluated factors affecting salinity intrusion into the Delta in both pre-development and contemporary conditions. The study also resulted in a set of calibrated 3-D hydrodynamic models for the pre-development and contemporary Bay-Delta estuary.

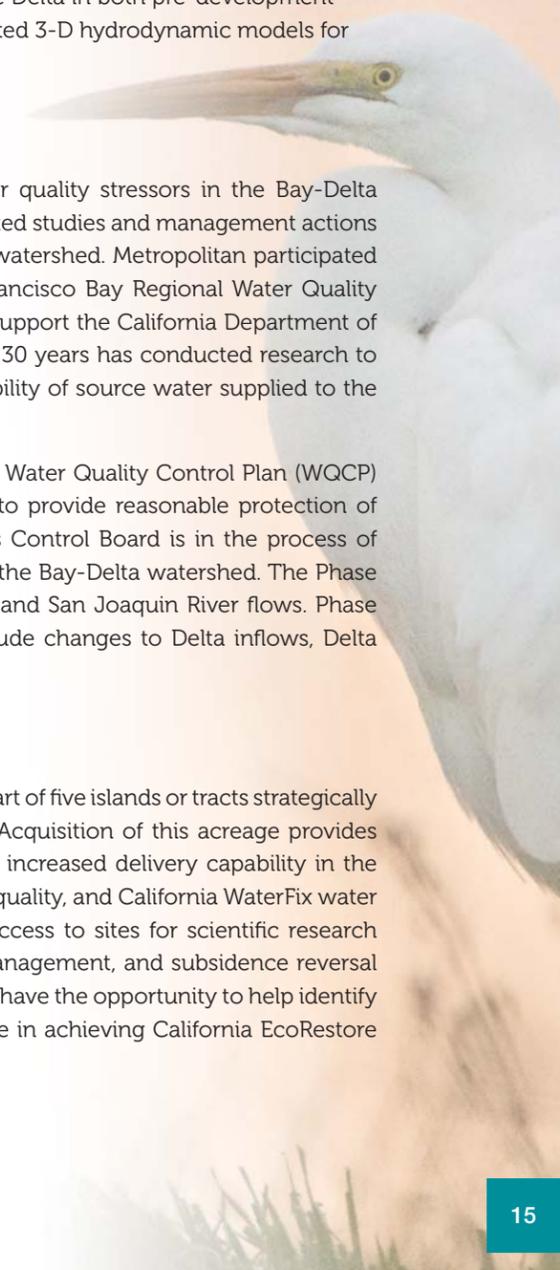
Water Quality Protection

Metropolitan advocates for water quality controls and policies to address water quality stressors in the Bay-Delta ecosystem. Metropolitan, working with state and federal water contractors, supported studies and management actions addressing the impact of nutrients and other water quality stressors in the Delta watershed. Metropolitan participated in the Delta Regional Monitoring Program, and in the Central Valley and San Francisco Bay Regional Water Quality Control Board's nutrient management programs. Metropolitan also continued to support the California Department of Water Resources' Municipal Water Quality Investigations Program, which for over 30 years has conducted research to help understand the effect that the Delta has on the quality, treatability, and reliability of source water supplied to the contractors via the SWP.

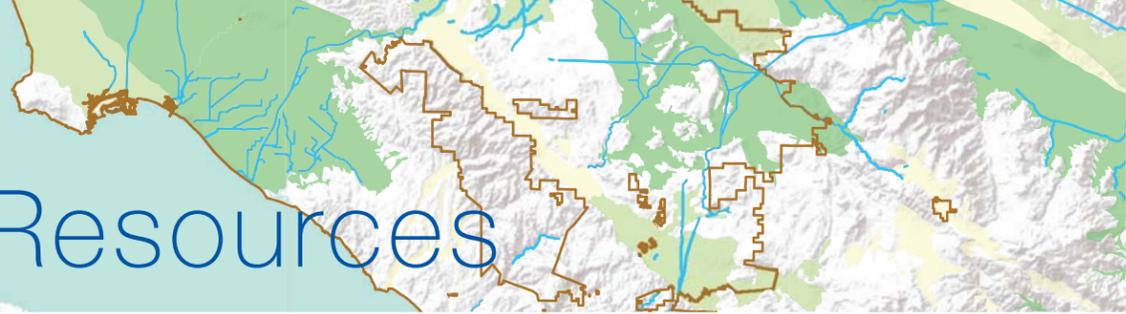
Metropolitan worked with experts to develop science in support of the Bay-Delta Water Quality Control Plan (WQCP) update process. The WQCP establishes water quality control measures needed to provide reasonable protection of beneficial uses of water in the Bay-Delta Watershed. The State Water Resources Control Board is in the process of developing and implementing updates to the WQCP to protect beneficial uses in the Bay-Delta watershed. The Phase 1 update of the WQCP addresses requirements for salinity in the southern Delta and San Joaquin River flows. Phase 2 addresses the Delta and upstream on the Sacramento River, which could include changes to Delta inflows, Delta outflows, and interior Delta flows.

Delta Islands

In March 2016, the Metropolitan Board of Directors approved the purchase of all or part of five islands or tracts strategically located in the Sacramento-San Joaquin Delta, totaling more than 20,000 acres. Acquisition of this acreage provides opportunities to improve SWP reliability in the areas of regulatory requirements, increased delivery capability in the event of an earthquake, improved access for emergency actions, enhanced water quality, and California WaterFix water conveyance alignment and staging. In addition, ownership gives Metropolitan access to sites for scientific research into aquatic/fish food enhancements, levee vulnerability, turbidity and salinity management, and subsidence reversal techniques, among other benefits. As for long-term sustainability, Metropolitan will have the opportunity to help identify and demonstrate actions that create a more sustainable Delta, and assist the state in achieving California EcoRestore goals and meeting California WaterFix habitat mitigation requirements. 💧



Local Resources



IRP GOAL: DEVELOP AND PROTECT LOCAL WATER SUPPLIES

About half of the region's water comes from locally developed sources. The IRP strategy calls for current local supply production to be maintained into the future and for additional local supplies to be developed to meet future demands and protect against losses. Local supplies have suffered from reduced yields from environmental issues, regulatory issues, and from the recent drought. Mitigation against any yield reduction is a primary area of concern for the IRP. By 2040, the IRP calls for a total local supply target of 2.43 million acre-feet per year that will come from a combination of existing and new local supplies.

Local supplies come from groundwater, recycled water, seawater desalination, the Los Angeles Aqueduct, local surface water, and other identified resources. Local water agencies within the Metropolitan service area usually develop and manage these supplies. Although Metropolitan does not currently own or operate any local supplies, it plays an important role providing imported water for recharging local groundwater basins and financial incentives for the production of recycled water and the treatment of degraded groundwater. Similar to water conservation, local supplies serve the important function of reducing demands for imported water, thereby enhancing the utility of Metropolitan's regional water system capacity and storage resources to meet the remaining needs of Southern California.

RECENT PRODUCTION VS. IRP TARGETS

The following table shows 2016 actual production and the IRP targets. Local supply production in calendar year 2016 was relatively low compared to the projection.

Local Production	2016 Actuals*	Projections					2040 IRP Target
		2016	2020	2025	2030	2035	
Existing and Under Construction							
Groundwater Production	1,172,000	1,277,000	1,290,000	1,288,000	1,288,000	1,288,000	1,289,000
Surface Production	37,000	105,000	110,000	110,000	110,000	110,000	110,000
Los Angeles Aqueduct	88,000	243,000	261,000	264,000	264,000	266,000	268,000
Seawater Desalination	45,000	51,000	51,000	51,000	51,000	51,000	51,000
Groundwater Recovery	97,000	125,000	143,000	157,000	163,000	165,000	167,000
Recycling	397,000	386,000	410,000	460,000	484,000	499,000	509,000
Recycling - M&I	203,000	219,000	243,000	267,000	285,000	298,000	308,000
Recycling - Replenishment	143,000	111,000	111,000	126,000	129,000	131,000	131,000
Recycling - Seawater Barrier	52,000	56,000	56,000	67,000	70,000	70,000	70,000
Other Non-Metropolitan Import	10,000	13,000	13,000	13,000	13,000	13,000	13,000
New Local Supply	0	0	3,000	8,000	12,000	16,000	20,000
Total Local Supplies	1,846,000	2,200,000	2,281,000	2,351,000	2,385,000	2,408,000	2,427,000

* Based on best available data

Actual production may not match planning projections for different reasons. Production in any given year may be influenced in the short term by variability in such things as annual weather or emergency regulations. However, there are things that could point to longer term systemic issues, such as climate change. For groundwater recovery and water recycling, IRP targets assume growth in production over time from a fixed baseline of existing and under construction projects. Therefore, production in later years is expected to be higher than in earlier years of the IRP.

Water-use efficiency in recent years contributed to low demand levels that have not been observed since the mid-1980s. Potable per capita water use fell significantly during calendar years 2015 and 2016, as the region responded to the governor's Executive Order B-29-15 that mandated a 25 percent emergency reduction in urban water use. As California's drought emergency remained in effect throughout 2016, regional potable use fell to 127 gallons per capita per day (GPCD), which was below the 2020 target of 145 GPCD under the Water Conservation Act of 2009 (SBX7-7).

The lower local supply production in calendar year 2016 reflects the lowered per capita use. This can be seen in groundwater production, where 2016 production was 1.172 million acre-feet, about 10 percent less than the long-term average of nearly 1.3 million acre-feet (2005-2014). However, the reduced need for groundwater was a welcome reprieve to many groundwater basins as the recent drought periods have not provided sufficient natural recharge. Surface water production and Los Angeles Aqueduct (LAA) deliveries are highly correlated with precipitation. In 2016, local precipitation was below average for five consecutive years (about 12 inches versus an average of 15 inches at the Los Angeles Civic Center weather station). Precipitation in 2016 for the 5-Station index in Southern Sierra, the origin of the LAA water, was 42 inches, which was slightly above the long-term average. However, three consecutive dry years prior to 2016 contributed to lower LAA delivery. Recycled water projects are expected to increase in production over time as new customers begin taking recycled water from existing projects, and as under construction projects start coming on-line.

LONG-TERM CHALLENGES

Groundwater basin yields are dependent upon local rainfall, replenishment with imported supplies, and locally recycled water. Four years of drought leading up to 2016 placed significant stress on local groundwater basins. Some of these local groundwater basins are overdrafted. Rainfall and replenishment deliveries in the basins have not been sufficient to maintain groundwater basin levels. Several issues have affected replenishment, including water quality, the capacity of spreading basins, and maximum storage limits in basin conjunctive use and cyclic storage agreements. In the long term, climate change may affect the availability of imported replenishment deliveries and the natural recharge of groundwater and surface water supplies.

Another local supply challenge is ramping up and maintaining production of recycling projects at planned capacity levels. Some recycling projects are built in phases and may be slow to convert new customers to take recycled water. Among the reasons for this are: extending the delivery pipeline to a new customer may be cost-prohibitive, funding may be exhausted, and in some cases, water conservation lowers recycling production by reducing both the wastewater effluent and consumer demands.



Non-potable recycled water is distributed separately from drinking water through purple color pipes commonly seen in parks."

NEW PROJECTS

Since the adoption of the 2015 IRP Update in January 2016, Metropolitan's board has approved funding under the Local Resources Program (LRP) for eight new local projects with a combined yield of 25,000 acre-feet. These projects will contribute to the 2.43 million acre-feet of total local supply identified in the 2040 IRP Target. As mentioned above, typically projects do not produce at their stated yields for various reasons. Current and future new projects are needed to protect against risk.

Metropolitan's board approved LRP funding for the following eight projects:

Agency	Project	Yield (Acre-feet)	Online
LADWP	North Hollywood Water Recycling Project	300	2018
LADWP	Sepulveda Basin Sports Complex Water Recycling Project	350	2018
LADWP	Terminal Island Recycled Water Expansion Project	8,000	2018
LADWP	Westside Area Water Recycling Project	150	2018
Torrance	Water Replenishment District's GRIP Water Recycling Project	10,000	2018
MWDOC	Santa Margarita Water District's Lake Mission Viejo Advanced Purification Water Treatment Facility	300	2018
MWDOC	El Toro Water District's El Toro Phase II Recycled Water Distribution System Expansion Project	300	2018
EMWD	Perris II Brackish Groundwater Desalter	5,500	2018
Total Yield		24,900	

NEW PROJECTS WITHOUT METROPOLITAN FUNDING

There were no new local resources projects that came on-line without Metropolitan funding since the 2015 IRP Update.

LOCAL RESOURCES ACTIVITIES

The following section describes activities by Metropolitan and local water agencies to maintain and improve local supply production.

Metropolitan's Policy Principles for Role in Local Supplies and Conservation

In July 2017, Metropolitan's board adopted policy principles guiding Metropolitan's role in regional implementation of IRP targets for local resources and conservation. Among other things, the principles called for Metropolitan to take an active role in identifying and evaluating local resource and conservation opportunities within the service area, and to evaluate the feasibility and effectiveness of direct investment and development of regionally beneficial local resources and conservation where appropriate. These policy principles provide flexibility and opportunities for future programs, which may include eligibility of stormwater capture projects, different incentive methods, or even joint or sole development of local projects.

Groundwater Recharge

In calendar year 2016, the region's groundwater basins recharged 420,000 acre-feet of recycled and imported water in addition to natural storm infiltration. In 2017, despite ample supplies from the SWP, several issues affected groundwater recharge including: detections of invasive mussels in the pipelines that deliver SWP water; the capacity of spreading basins; and maximum storage limits on conjunctive use and cyclic storage agreements. In calendar year 2017, approximately 89,000 acre-feet of imported water and 263,000 acre-feet of recycled water were recharged in local groundwater basins.

Groundwater Management Actions

Since the 2015 IRP Update, many agencies reviewed options for increasing groundwater recharge in their areas, including:

- In 2015, the Los Angeles Department of Water and Power (LADWP) completed its Stormwater Capture Master Plan to capture more stormwater within the city of Los Angeles.
- In 2016, the Water Replenishment District (WRD) finalized its Groundwater Basins Master Plan to further develop supplemental replenishment water supplies in the West Coast and Central groundwater basins.
- WRD also began construction of the Groundwater Reliability Improvement Project to increase recycled water recharge in the Central Groundwater Basin.
- Raymond Basin, Elsinore Basin, and others have voluntarily reduced groundwater production to maintain sustainable levels. The Chino Basin Watermaster also has been reevaluating its basin's safe yield.

Metropolitan's Conjunctive Use Program

Metropolitan's water management strategy includes conjunctive use of local groundwater resources. Conjunctive use refers to the practice of storing imported surface water in groundwater basins during years when there is a surplus of supply for use in times of drought or other supply interruptions. Metropolitan has nine storage projects with nearly 212,000 acre feet of storage capacity and can store up to 53,000 acre-feet per year and withdraw up to 71,000 acre-feet annually during shortage years. In fiscal year 2016/17, Metropolitan stored about 7,900 acre-feet in these projects.

Metropolitan's Cyclic Storage Program

The Cyclic Storage Program allows Metropolitan to pre-deliver water to either member agency surface water reservoirs or groundwater storage that will be paid at the full service rate in the future on a fixed schedule. Prior to 2017, Metropolitan had cyclic storage agreements with Upper San Gabriel Valley Municipal Water District and Three Valleys Municipal Water District. On April 2017, Metropolitan's board authorized the General Manager to enter into more cyclic storage agreements, and in calendar year 2017, Metropolitan entered into four such agreements with city of Burbank, Calleguas Municipal Water District, Eastern Municipal Water District, and the Municipal Water District of Orange County.

Sustainable Groundwater Management Act

In September of 2014, Governor Edmund G. Brown, Jr. signed a three-bill package known as the Sustainable Groundwater Management Act. SGMA requires groundwater-dependent regions to halt overdraft and bring basins into balanced levels of pumping and recharge. Most of the groundwater basins in the Metropolitan service area are adjudicated and are, therefore, exempt from SGMA. However, they do need to comply with the reporting requirements. Most of the adjudicated basins submitted their SGMA-required reports in fiscal year 2016/17. The non-adjudicated basins were required to report extractions beginning on July 1, 2017.

Metropolitan's Local Resources Program

Metropolitan provides financial incentives to member and retail agencies through its Local Resources Program (LRP) for the development and use of recycled water, recovered groundwater, and seawater desalination. While some member and local water agencies continue to pursue local projects independently of Metropolitan, most agencies seek financial assistance for new projects from Metropolitan's LRP. As of fiscal year 2016/17, Metropolitan has provided \$448 million to produce about 2.6 million acre-feet of recycled water since the program inception in 1982. Metropolitan also provided approximately \$151 million to produce 893,000 acre-feet of recovered degraded groundwater for municipal use. Currently, 107 projects receive LRP funding, 82 of which are recycling projects and 25 are groundwater recovery projects.

Metropolitan is reviewing six new applications for recycled water and seawater desalination that would have a combined yield of 160,000 acre-feet per year. Member agencies indicated that they are in the process of preparing 12 more applications for funding consideration. These applications comprise 30,000 acre-feet of yield from recycled water, groundwater recovery, and seawater desalination. In addition, member agencies have identified at least 43 new projects that may apply for LRP funding in the near future.



Conservation

Metropolitan's On-Site Retrofit Pilot Program

The On-site Retrofit Pilot Program was established in July 2014 to provide rebates to public and private entities toward the cost of converting existing irrigation and industrial systems to use recycled water instead of potable water. To date, Metropolitan has provided rebates of about \$8 million for converting 291 sites to use about 2,200 acre-feet per year. Sites converted to recycled water use include parks, schools, golf courses, cemeteries, housing developments, and industrial facilities.

Regional Recycled Water Program

Metropolitan and the Sanitation Districts of Los Angeles County inaugurated a regional water recycling program. Under this potential new program, Metropolitan would purify treated wastewater through multiple advanced processes to help replenish groundwater basins in Los Angeles and Orange counties. Fiscal year 2016/17 saw the completion of a comprehensive feasibility study to evaluate groundwater basin conditions, treatment requirements, conveyance facilities, and cost of a full-scale project. The agencies broke ground September 2017 for construction of a demonstration advanced purification facility that will generate information needed for the potential future construction of a full-scale advanced water treatment plant that would produce up to 150 million gallons daily. The demonstration plant is expected to be operational in early 2019, with testing completed by the end of 2019.

Legislative/Regulatory Advancement

Metropolitan has been a leader and strong advocate for the safe expansion of recycled water as part of a diverse water supply portfolio. Metropolitan continues to work with its member agencies and organizations such as WateReuse, California Urban Water Agencies, and the Association of California Water Agencies to streamline implementation of recycled water projects. The June 2014 adoption of regulations for groundwater replenishment using recycled water facilitated the planned use of municipal wastewater as a source of groundwater supply. In June 2016, the State Water Resources Control Board adopted a revised statewide general order for non-potable recycled water use. The purpose of the general order is to help streamline issuance of new non-potable recycled water permits and maintain statewide consistency.

Metropolitan provided comments on the SWRCB's Draft Surface Water Augmentation Regulations proposed for indirect potable reuse, which involves putting recycled water into a surface water reservoir used for domestic drinking water supply. In addition, Metropolitan coordinated comments with its member agencies on the SWRCB's Feasibility of Developing Uniform Water Recycling Criteria for Direct Potable Reuse report, which was released in December 2016. Metropolitan also worked with the California Building Standards Commission on requirements for new developments to use recycled water.

GIS Coordination

In 2016, Metropolitan and its member agencies initiated an effort to develop a comprehensive Geographic Information System map to capture information on wastewater treatment plants and existing recycled water distribution systems. The GIS map will identify existing recycled water infrastructure such as plants, facilities, pipelines, connections, service points, and storage. It can be used to analyze areas using recycled water and to identify potential recycled water customers in order to manage source water supply and end-use demands.

Research and Development

Metropolitan conducts joint studies with member agencies and other entities to advance development of local resources. For several years, Metropolitan has participated, supported, and funded research by the research affiliates of the Water Environment Federation and Water ReUse, which merged in 2016 to form the Water Environment and Reuse Foundation to advance recycled water use and to address regulatory requirements, as well as the public's perceptions and concerns. Moving forward, Metropolitan intends to expand its partnerships with other agencies and trade organizations. 

IRP GOAL: ACHIEVE ADDITIONAL CONSERVATION SAVINGS WITH INCREASED OUTDOOR EMPHASIS

Conservation is essential to meeting water needs of a growing Southern California. The IRP aims to provide reliable water supplies to meet future water-efficient demands. The IRP target for conservation is to achieve 1,519 million acre-feet per year by 2040 through an emphasis on outdoor water-use efficiency. In order to achieve this target, Metropolitan and its member agencies will need to continue to effectively implement indoor and outdoor water efficiency devices and programs and to develop new outdoor efficiency programs to produce at least 180,000 acre-feet of additional savings per year.

RECENT SAVINGS VS. IRP TARGETS

The following table shows conservation savings for fiscal year 2016/17 and the IRP target. Fiscal year 2016/17 conservation savings were estimated at 1,012 million acre-feet. Conservation savings estimated in IRP reporting is based on water-efficient devices under normal usage and consumer behavior. Extraordinary water use reduction for changed consumer behavior during the 2015 and 2016 drought emergency mandate is not quantified as conservation savings and is not shown in the table below. However, the effects of behavioral changes in water use are clearly evident in observed reductions in the region's water demand and per capita water use. Potable per capita water use fell nearly 20 percent, from 157 gallons per capita per day in 2014 to 127 GPCD in 2016. At the writing of this report, data was not available to calculate the per capita use for 2017.

Conservation Savings	2017	Projections					2040 IRP Target
	Actuals*	2017	2020	2025	2030	2035	
Existing Conservation							
Active	198,000	225,000	210,000	196,000	184,000	166,000	159,000
Code-Based & Price Effect	806,000	808,000	846,000	931,000	1,016,000	1,097,000	1,180,000
New Savings							
Total Conservation Savings	1,012,000	1,050,000	1,096,000	1,197,000	1,310,000	1,403,000	1,519,000

Active conservation is water saved directly as a result of conservation programs by Metropolitan and its member agencies. Total active conservation savings in fiscal year 2016/17 were estimated at 206,000 acre-feet (active and new savings combined). These savings include water efficient devices installed under the Metropolitan's Conservation Credits Program and member agency administered programs. Active conservation also accounts for savings from previously installed devices that continued to save water into 2017. In fiscal year 2016/17, Metropolitan and its member agencies invested \$45 million in conservation, generating more than 8,000 acre-feet of new savings. To maintain a certain level of active conservation savings, the region would need to continue to provide financial incentives for water efficient devices and programs. The 2017 savings will diminish over time if devices are not replaced after their useful lifespan. The IRP targets for existing active conservation for 2020 and beyond only include active devices installed as of the time of the 2015 IRP Update; existing conservation is shown to decline over time as these devices end their life spans. Therefore, new savings from new investments are needed to meet the 2040 IRP target.

Most of the conservation savings come from code-based and price-effect conservation, commonly known as passive conservation. Passive conservation is achieved through legislation, building and plumbing codes, ordinances that require water-efficient devices, and through water saved by retail customers responding to the effects of changes in the price of water. In fiscal year 2016/17, passive conservation was 806,000 acre-feet. Passive conservation is calculated using demographic data. Over time, passive conservation is expected to increase from year to year as existing households and businesses continue to replace their water fixtures with more efficient ones and as new households and businesses form with efficient fixtures in place.

LONG-TERM CHALLENGES

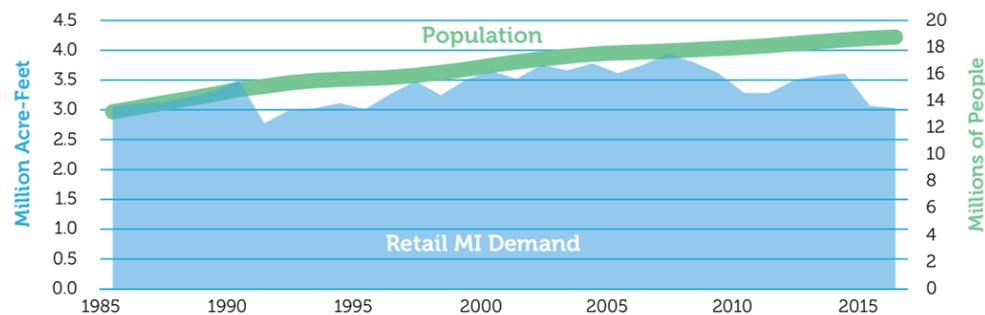
The goal for conservation is to achieve additional savings through an emphasis on outdoor water-use efficiency. Existing households and businesses make up the majority of total landscape water use in the region. The majority of potential savings from efficient landscape water use lies in these existing households and businesses. The current state Model Water Efficiency Landscape Ordinance is essentially a new standard for outdoor landscape water use. However, there is uncertainty regarding effective compliance due to limited enforcement mechanisms within the model ordinance. The 2015 IRP Update targets the estimated additional savings of 180,000 acre-feet associated with the equivalent of a replacement and retrofit rate of 1 percent of the existing stock of homes and businesses per year.

Other factors that may impact conservation savings are changes to demographics. Historical demographic data used for calculating passive savings are subject to revision by the California Department of Finance. The DOF provides official demographic estimates for use by many local and state government agencies. In addition, calculation of future savings depends on demographic growth forecasts from regional planning agencies which are updated to reflect demographic and economic trends every four years. Upward or downward revision to demographic estimates or forecasts will impact the amount of savings accordingly.

Measuring the implementation and effectiveness of conservation programs is also a challenge when estimating whether overall IRP conservation goals and targets are being met. Estimating active conservation savings is relatively straightforward by using verified device installations along with estimates of the device usage profile, useful life, and the characteristics of the device being replaced. Passive conservation savings through code-based implementation of conservation devices are calculated similarly but are also driven by estimates of demographics. Passive conservation savings through price effects have similar issues as they rely on estimates of both the consumer response to price and the estimated price levels in the future.

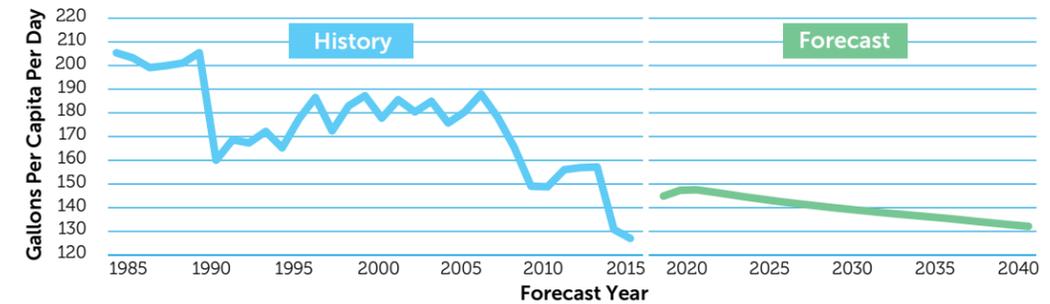
Conservation savings in the IRP are the expected outcomes when devices perform and consumers behave as expected under normal conditions. However, to the extent that actual device usage departs from normal assumptions, these savings estimates may not match the actual conservation that occurs in a given timeframe. There are many reasons why consumers might behave differently from normal. On the retail level, these changes in behavior can be driven by a number of different factors that occur in real-time including drought awareness, precipitation conditions, abrupt or implied price changes, and advertising/media outreach campaigns and education.

As an alternative way to measure the effectiveness of conservation savings programs and devices, tracking and analyzing water demand can be instructive but also requires caution when interpreting demand changes due to conservation programs. As mentioned above, water use can be significantly impacted, both short and long term, by changes in retail consumer behavior. The following chart shows total urban water usage in Metropolitan's service area since 1985. Water use has remained remarkably stable over last 30 years, despite growth in the region's population from about 13 million in 1985 to nearly 19 million in 2016. Conservation activity began in earnest in the early 1990s. This history suggests that, over the long term, much of the suppressed growth in demand can be attributed to efficiency gains from active and passive conservation.



Water use can also be examined on a per capita basis as an indicator of water use efficiency. The chart below illustrates the impact of conservation savings and recycled water on the potable use within Metropolitan's service area. The blue line shows the historic potable water use in gallons per capita per day (GPCD). This history highlights the significant decreases in potable water use since the 1990s. Although factors such as weather and economic conditions affect per capita water use from year to year, the trend shows continued lower per capita water use over time. Between 2014 and 2016, potable water use per person fell from 157 GPCD to 127 GPCD as the region responded to a 25 percent mandatory emergency reduction in urban water use. The dramatic decline reflects temporary drought measures rather than long-term structural changes

to water-use efficiency. The forecast years that follow in the orange line assume per capita use rebound to under normal conditions. Based on the 2015 IRP Update's forecasts of demands, conservation, and recycled water development, potable per capita water use in the year 2040 is expected to be 132 GPCD under normal conditions, notwithstanding changes to consumer behavior as previously discussed.



CONSERVATION ACTIVITIES

Water conservation in Southern California is achieved through collaborative efforts among Metropolitan, member agencies, and retail agencies. Since 1990, Metropolitan and its 26 member agencies have developed and refined conservation programs to maximize water savings for indoors and outdoors. To benefit from economies of scale, most of the region's conservation activities are coordinated and implemented with resources from Metropolitan. Currently, conservation efforts consolidated under Metropolitan consist of four major components: 1) incentive-based conservation for indoor and outdoor water fixtures; 2) landscape programs to address outdoor conservation; 3) a research program to refine water savings values and identify innovative ways to save water; and 4) public outreach to continue engaging the public in water conservation.

Incentive-Based Programs

Conservation Credits Program

The Conservation Credits Program (CCP) is the foundation of Metropolitan's conservation efforts. It funds indoor and outdoor device rebates, customized incentive programs, and partnerships that are key to engaging the region in water conservation. Under the CCP, Metropolitan's most popular conservation program is SoCal WaterSmart, a regional incentive program for residential and commercial customers. Launched in 2008, the SoCal WaterSmart residential conservation program provides rebates to customers to reduce the cost of water-efficient products. Water-use efficient products under the program include high-efficiency clothes washers, premium high-efficiency toilets, multi-stream rotary sprinkler nozzles and smart irrigation controllers. Member agencies have the ability to add more money to any of the rebates to increase conservation activity in their service area through this program. Separately, Metropolitan's member agencies and other retail water agencies can also implement custom residential water conservation programs using Metropolitan incentives as part of the member agency administered conservation program. For commercial, industrial, and institutional customers, SoCal WaterSmart also provides rebates for premium high efficiency toilets, cooling tower conductivity controllers, urinals, dry vacuum pumps, irrigation controllers and high efficiency sprinkler nozzles. During fiscal year 2016/17, savings from devices installed through the SoCal WaterSmart reduced demands by 8,400 acre-feet. Metropolitan has invested approximately \$772 million in water conservation incentives since 1990, saving 2.6 million acre-feet.

Water Savings Incentive Program

Under the Water Savings Incentive Program (WSIP), Metropolitan provides performance-based financial incentives for customized commercial, industrial, institutional, and agricultural projects for unique savings opportunities that are not covered by the rebate programs. Qualifying projects receive funding for permanent water efficiency changes that result in reduced potable demand. This past year Metropolitan incorporated the WSIP into the commercial SoCal WaterSmart website, with an online streamlined application process to increase participation and remove some administrative burdens. During fiscal year 2016/17, 20 new projects were executed through the WSIP with a total projected lifetime water savings value of 17,000 acre-feet.

Partnerships with Other Utilities

In addition to regional and local incentive programs, Metropolitan also seeks partnerships with independently-owned utilities and energy utilities to collaborate on projects that save both energy and water. Metropolitan currently has a Memorandum of Understanding with the Southern California Gas Company that provides a framework to develop joint programs. The first program implemented under the framework is a SoCal Gas high efficiency clothes washer (HECW) direct-install program for economically disadvantaged customers. For clothes washers that SoCal Gas installs free of charge, Metropolitan provides HECW rebates to SoCal Gas through the SoCal WaterSmart Rebate Program. This allows SoCal Gas to install more clothes washers within Metropolitan's service area, producing more water savings.

Landscape Programs

Although the CCP supports outdoor water efficiency by offering incentives for efficient outdoor devices and customized landscape improvement projects, Metropolitan also has dedicated landscape efficiency programs. These programs not only provide training in the logistics of sustainable landscaping but also encourage residents to rethink the value of water. Landscape education is an integral part of the non-incentive based conservation strategies and sets the groundwork for future, more integrated landscape offerings. Metropolitan plans to pursue other landscape programs, including supporting enhanced regional compliance with the state model landscaping ordinance.

Landscape Training

Landscape education for residents is fundamental to achieving a regional conservation ethic. Metropolitan currently offers two types of classes: California Friendly™ Landscape Training and Turf Removal. Since 2013, the California Friendly Landscape classes teach residents the benefits of sustainable landscaping along with considerations for creating their own sustainable landscape. Topics covered include site selection and design, rainwater capture, and irrigation management. The turf removal classes, launched in early 2017, teach residents how to perform do-it-yourself projects, while addressing methods for removing existing grass, soil preparation, plant selection, and garden maintenance. Metropolitan has also partnered with the Los Angeles Department of Water and Power and SoCal Gas to create the California-friendly yard maintenance guide, a reference booklet currently distributed in all Metropolitan-sponsored classes. In fiscal year 2016/17, there were 89 California Friendly™ Landscape classes offered and more than 2,200 participants throughout Metropolitan's service area.

The Public Agency Landscape Program

This program was created to assist Southern California public agencies in improving their outdoor irrigation efficiencies with upfront enhanced financial incentives for outdoor water efficient products. Popularity of this program continues to increase, as public agencies take advantage of the increased incentives to perform large scale irrigation improvement programs. The program currently offers rebates for irrigation control systems and high efficiency nozzles.

Landscape Surveys

Metropolitan continues to provide irrigation surveys for large landscape customers. These surveys are performed by a certified Landscape Irrigation Auditor and provide the customer with specific recommendations on how to improve irrigation efficiency at the site. The survey report generated by the auditor also provides information on incentives to help the customer fund the needed improvements. A total of 36 surveys covering 1,000 acres were conducted last year.

Research Program

Metropolitan has been investing in conservation research almost as long as it has been managing water-use efficiency programs. Metropolitan continues to seek ways to expand the conservation research efforts to improve the efficacy of current and future programs. A two-fold approach studies the performance of currently rebated items and identifies new areas for water savings potential and program development. This approach enables Metropolitan to determine the best use of resources to maximize program participation, cost-effectiveness, and water savings.

Research helps Metropolitan adapt and manage programs with information about new innovative programs, water savings, the expected lifetime of a program, using internal staff research, contracted research programs, and partnering with other agencies. The outcome of a research project can have different implications for Metropolitan's conservation programs. If the findings differ from the current baseline, Metropolitan may revise program incentives or criteria to correlate with the recent study results.

Innovative Conservation Program

Metropolitan's Innovative Conservation Program is a competitive grant program that evaluates water savings and reliability of innovative water saving devices, technologies and strategies. Approximately \$560,000 was provided for research for the program by the following entities: the Bureau of Reclamation, the Environmental Protection Agency, the Southern Nevada Water Authority, the Central Arizona Project, the SoCal Gas Company, Western Resource Advocates and Metropolitan. A selection committee evaluated 98 project proposals from diverse groups such as universities, entrepreneurs, commercial labs, non-profit organizations, and individuals. Ten projects were selected for up to \$100,000 funding each. The focus for this round of proposals is the water/energy nexus

Research Partnerships

Partnerships with the Alliance for Water Efficiency and the California Data Collaborative allow Metropolitan to participate in cutting-edge research in water-use efficiency in a cost-effective way. In addition, Metropolitan sponsors pilot projects conducted by its member agencies such as pressure regulation in residential properties. Some recent study topics include drought tolerant turf grass, lessons learned from the extreme drought in Australia, development of nozzle performance criteria, and a GIS mapping tool for conservation and recycled water planning activities.

Current research includes:

- Conducting a comprehensive study on Metropolitan's turf removal program;
- Partnering with the Alliance for Water Efficiency for water conservation research on the rationale for landscape choices;
- Creating a pilot program with Inland Empire Utilities Agency on pressure regulation;
- Analyzing rain barrel rebates for potential correlation to other consumer water-saving measures or behaviors;
- Evaluating commercial cooling towers' potential for water savings; and
- Studying market saturation of residential indoor water fixtures in Southern California.

Public Outreach

Public outreach and education encourage a conservation ethic and awareness of the value of water. Metropolitan conducts annual advertising, education and community outreach campaigns to urge residents and business owners to make permanent changes in their everyday uses of water. In addition, Metropolitan continues to maintain a strong presence in community water resource education and conservation activities. Much more information is available on Metropolitan's online water conservation portal at bewaterwise.com and on Metropolitan's website at mwdh2o.com.



Metropolitan's H2Love water conservation campaign features a timeless message to keep on saving and loving water.

In 2017, Metropolitan launched a new water conservation campaign, H2Love, which features a bright blue, water-inspired retro design with a timeless message to keep on saving and loving water. Taglines include "Loving water means saving water," "Saving water matters here," and "Love water. Save water. Always." With appearances across billboards, transit shelters, buses, and trains, the message of water conservation is literally traveling across the region. The campaign directs people to bewaterwise.com for conservation tips and information on the current rebate programs and classes. It is also shared through social media accounts with the hashtag #H2Love, where people can post photos of their water conservation efforts. 💧

Conclusion

The IRP is an adaptive strategy that is meant to meet the region's present and future water needs. Metropolitan's water sources in any given year are affected by highly variable hydrology across vast watersheds in California and the Colorado River basin. Such highly variable hydrology affects the sustainable yields and operating integrity of storage supplies. At the time when the 2015 IRP Update was developed and published, Southern California had been enduring a historic multi-year drought that had resulted in statewide emergency declarations, mandatory conservation measures, and depletion of groundwater and other storage reserves. The recent experience of rapid transition from unprecedented extreme drought to record runoff emphasizes the need for foresight and resolve to deal with the continuous fluctuation of supply and demand.

Metropolitan recognizes many challenges facing the region's supplies – from institutional and climate-based limitations on SWP and CRA deliveries to persistent overdraft of local groundwater basins. Metropolitan also recognizes that there may be other threats and opportunities that are yet not apparent today. For such risks, both known and unknown, the IRP continues to provide Metropolitan with the framework for addressing them over the long term.

Ultimately, the IRP is more than just about Metropolitan. The IRP is for the region. Southern California's water management needs are large and complex. The success of the comprehensive water management strategy will require significant cooperation and collaboration among decision-makers at all levels – from large government agencies down to the individual consumer. Metropolitan will remain focused on working closely with statewide interests, other states, and Mexico to stabilize imported supplies. Additionally, based on 2017 adopted policy principles, Metropolitan will continue in an enhanced role of pursuing and protecting local supplies and promoting water-use efficiency. In the long term, these efforts by Metropolitan will provide a reliable water supply meeting the future growth in the region's communities – communities that have built the \$1 trillion economy of Southern California. 💧

Metropolitan Member Agencies



www.anaheim.net/utilities



www.beverlyhills.gov



www.burbankca.gov



www.calleguas.com



www.centralbasin.org



www.comptoncity.org



www.emwd.org



www.fmwd.com



www.ci.fullerton.ca.us



www.ci.glendale.ca.us



www.ieua.org



www.lvmwd.com



www.lbwater.org



www.ladwp.com



www.mwdoc.com



www.ci.pasadena.ca.us



San Diego County
Water Authority

www.sdcwa.org



www.ci.san-fernando.ca.us



City of San Marino

www.ci.san-marino.ca.us



www.ci.santa-ana.ca.us



City of
Santa Monica

www.smgov.net



www.threevalleys.com



www.torranceca.gov



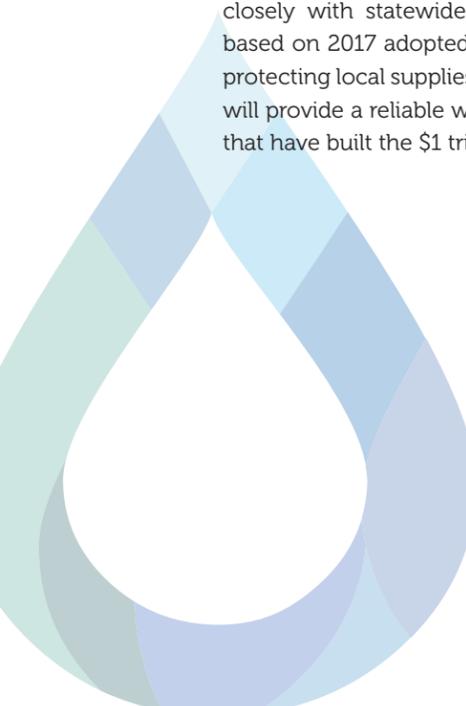
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