



**CAMP4W**  
Climate Adaptation  
Master Plan for Water

# Annual Report

A summary of Signposts, Time-Bound Targets,  
and progress to date in the advancement of  
climate adaptation goals.

---

# 2024



The Metropolitan Water District  
of Southern California

# Table of Contents

<b>03</b>	Introduction and Purpose
<b>05</b>	Signposts
<b>11</b>	Time-Bound Targets
<b>14</b>	Implementation Highlights
<b>19</b>	Appendix A

# Acknowledgements

This progress report for the Climate Adaptation Master Plan for Water would not be possible except for the dedication of Task Force Members, Metropolitan's Staff, and consultants.

## Task Force Members

### Directors

Adán Ortega, Jr. (Chair), *City of San Fernando*  
Matt Petersen (Task Force Chair), *City of Los Angeles*  
Karl Seckel (Task Force Vice Chair), *Municipal Water District of Orange County*  
S. Gail Goldberg (Vice Chair of the Board – Finance, Audit and Planning), *San Diego County Water Authority*  
Nancy Sutley (Vice Chair of the Board - Climate Action), *City of Los Angeles*  
Desi Alvarez, *West Basin Municipal Water District*  
Jeff Armstrong, *Eastern Municipal Water District*  
Dennis Erdman, *Municipal Water District of Orange County*  
Stephen J. Faessel, *City of Anaheim*  
Lois Fong-Sakai, *San Diego County Water Authority*  
Mark Gold, *City of Santa Monica*  
Jacque McMillan, *Calleguas Municipal Water District*  
Tracy Quinn, *City of Los Angeles*

### Member Agency Managers

Cesar Barrera, *City of Santa Ana*  
Anselmo Collins, *City of Los Angeles*  
Harvey De La Torre, *Municipal Water District of Orange County*  
Dan Denham, *San Diego County Water Authority*  
Shivaji Deshmukh, *Inland Empire Utilities Agency*  
Anatole Falagan, *City of Long Beach Water Department*  
Nina Jazmadarian, *Foothill Municipal Water District*  
Tom Love, *Upper San Gabriel Valley Municipal Water District*  
Craig Miller, *Western Municipal Water District*  
Kristine McCaffrey, *Calleguas Municipal Water District*  
Joe Mouawad, *Eastern Municipal Water District*  
Chisom Obegolu, *Glendale Water and Power*  
Dave Pedersen, *Las Virgenes Municipal Water District*  
Stacie Takeguchi, *Pasadena Water and Power*

## Metropolitan Staff

Deven Upadhyay (General Manager)  
Elizabeth Crosson (Chief Sustainability, Resilience, and Innovation Officer)  
John Bednarski  
Adam Benson  
Winston Chai  
Brad Coffey  
Steven Dunbar  
Chris Foley  
Brandon Goshi  
Nina Hawk  
Adrian Hightower  
Candice Lin  
Mohsen Mortada  
Keith Nobriga  
Demetri Polyzos  
Jon Rubin  
Carolyn Schaffer  
Martin Schlageter  
John Shamma  
Sam Smalls  
David Sumi  
Liji Thomas  
Arnout Van den Berg

## Project Consultants

Jennifer Coryell, *Hazen and Sawyer*  
Hampik Dekermenjian, *Hazen and Sawyer*  
Sarah Dominick, *Hazen and Sawyer*

# Introduction and Purpose

This annual report is intended to provide decision makers with up-to-date data to assist in the decision making process, summarize advancement of the time-bound targets, and report on progress made toward CAMP4W goals and initiatives.

In February 2023, the Board directed staff to integrate water resources, climate, and financial planning into a Climate Adaptation Master Plan for Water (CAMP4W) and in October 2023, chartered a Joint Task Force of Board Members and Member Agency Managers to facilitate the development of CAMP4W in a timely and transparent process. CAMP4W includes: (1) Climate and Growth Scenarios, (2) Time-Bound Targets, (3) A Framework for Climate Decision-Making and Reporting, (4) Policies, Initiatives, and Partnerships, and (5) Business Models and Funding Strategies. CAMP4W will increase Metropolitan's understanding of the climate risks to water supplies, infrastructure, operations, workforce, and business model. CAMP4W will also provide decision-making tools and long-term planning guidance for adapting to climate change to strengthen Metropolitan's ability to fulfill its mission.

With the significant investments needed to provide Metropolitan with the reliability and resilience needed to deliver on its core mission, it is important that investment decisions are made through an adaptive management process to avoid the risks associated with over or under development. A key aspect of the CAMP4W process involves adhering to an adaptive management process by facilitating incremental investment decisions, maintaining a knowledge base that supports understanding current trends that impact scenario planning projections, and understanding Member Agency needs and adjusting accordingly with a long-term view. Tracking signposts and progress towards time-bound targets is therefore critical, and a key purpose of this annual report.

The CAMP4W process will also include the development of a roadmap to advance the priorities identified by the Task Force. With the completion of the initial CAMP4W implementation strategy being developed in early 2025, future CAMP4W annual reports will summarize progress on each element defined. This annual report summarizes the progress to date that has occurred concurrently during the initial development of the CAMP4W.

## Importance of annual reporting

Annual reporting supports adaptive management by providing decision-makers with key information needed to make incremental investment decisions. It provides a means for informing the Board on progress to date in advancing climate resilience and reliability initiatives.



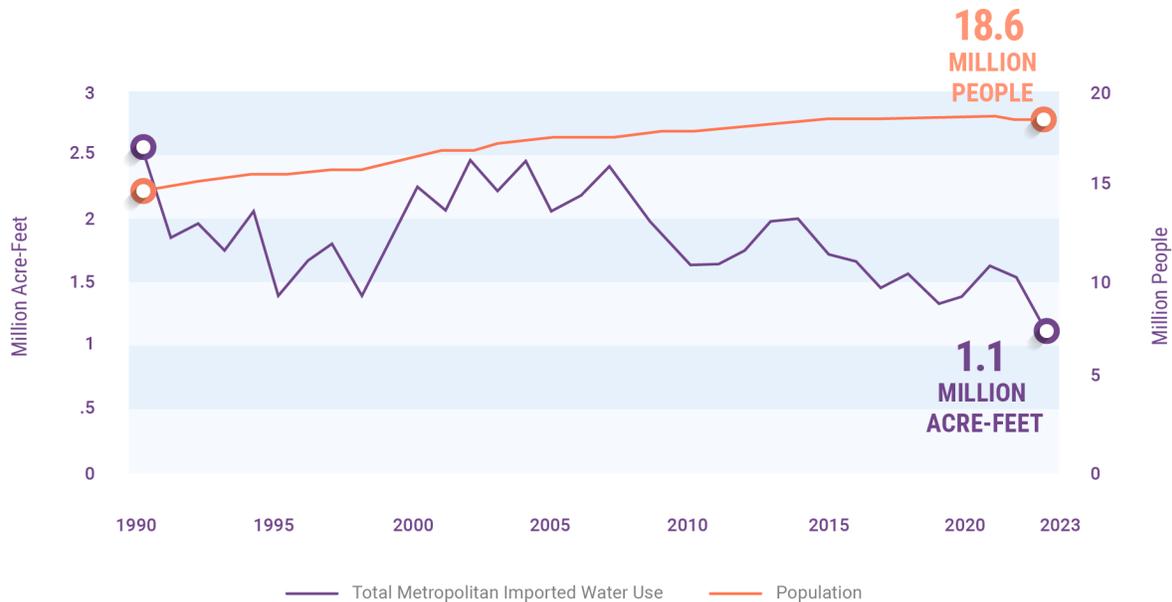
Lake Mathews June 2024

## Example of Using Data Tracked Over Time to Support Scenario Planning Understanding the Linkage Between Population, Demands on Imported Supplies, and Per Capita Water Use

Over the past decades, Metropolitan's service area has reduced its demands on imported water in spite of a steady increase in population, which can be attributed to several factors including a reduction in per capita water use, as presented in the graphs shown below.

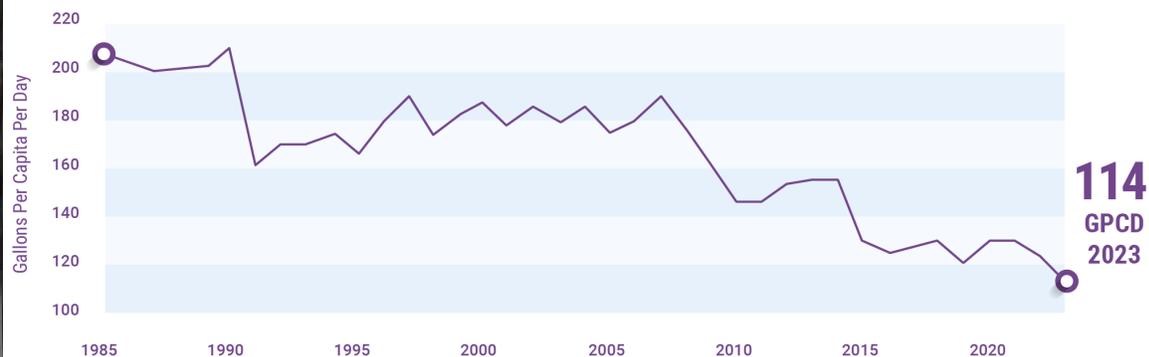
Tracking and understanding these trends and the range of potential future growth and demand scenarios was captured as a key part of the 2020 Integrated Resources Plan (IRP) Needs Assessment. Continued assessment over time will inform when and to what extent scenarios should be updated, as part of the adaptive management process.

**Population Growth vs Imported Water Use**  
Metropolitan's Service Area Calendar Year 1990-2023



1. Calendar year data.
2. Population based on Department of Finance.
3. Total Imported Water Use includes municipal, industrial, and agricultural consumptive uses, as well as groundwater replenishment and seawater barrier uses.

**Population Per Capita Water Use**  
Metropolitan's Service Area Calendar Year



1. Calendar year data.
2. 2023 GPCD based on best available data (as of August 2024) and is subject to reconciliation. Data is received in 2024 for the previous calendar year.

# Signposts

As the scenario planning approach helps account for a range of supply gaps and uncertainties, signposts contribute to an updated understanding of how the drivers of change may be shaping actual conditions relative to potential scenarios. Signposts serve as measurable indicators of the direction and trends of the identified drivers of change over time. Tracking signposts involves collecting data over time and analyzing the data to identify patterns, shifts, or movements that impact water supply and demand conditions, track impacts to infrastructure, and inform our assumptions about possible future conditions. Although signposts do not eliminate uncertainty, they offer a data-driven understanding of patterns, helping to contextualize trends over time and enhance decision-making.

Signposts will facilitate the adaptive management approach developed through the CAMP4W process by providing data to the Board on a regular basis that will inform decisions on project and program investments, strategy development, and initiatives. The following section includes ongoing tracking of signposts for water supply and demand. Future CAMP4W Annual Reports will also include infrastructure and financial signposts, as those are further refined over the coming year. The five categories of supply and demand signposts are demographics, climate change, local agency supply, imported supply, and storage.

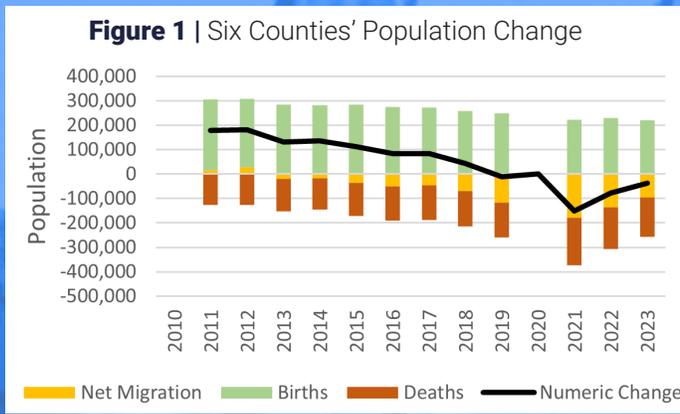
A summary of each signpost category and assessment is provided within this annual report, with further detailed analyses included in the attached Appendix A. Tracking these signposts is essential for identifying trends that may signal a need to modify or update the Integrated Resources Plan (IRP) Regional Needs Assessment assumptions and/or the CAMP4W Time-Bound Targets. This proactive monitoring supports adaptive management, ensuring that Metropolitan responds effectively to evolving conditions and maintains regional reliability and resilience. Data used to evaluate the supply and demand signposts for 2024 vary by subject and reflect readily available information at the time of publication. This report reflects data available as of November 2024.

**General Finding:** The current trends are tracking within the range of the 2020 IRP Regional Needs Assessment scenarios and will continue to be monitored on an annual basis.

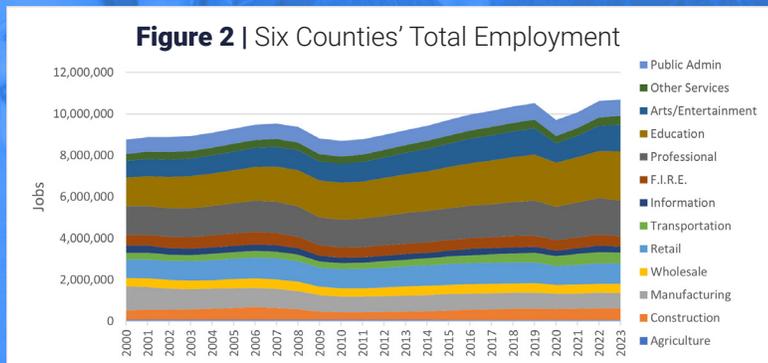
# Demographics

**Description:** Demographic factors (i.e. population, housing, employment) influence water demands. Systemic changes can affect demand/supply gaps (e.g. low birthrate and migration).

**Assessment:** The region is exhibiting a mixed trend of low growth in terms of population (Figure 1), combined with relatively high growth in terms of employment (Figure 2). Population had fallen every year since 2018 but this trend appears to have abated in 2023. New housing development is increasing steadily. Employment recovered from the COVID-19-induced recession in 2022 and has continued to grow. Metropolitan will continue to track these demographic indicators. Despite short-term disruptions due to the pandemic, long-term prospects for both low- and high-growth futures reflected in the four IRP scenarios remain open.



Source: California Department of Finance (DOF)

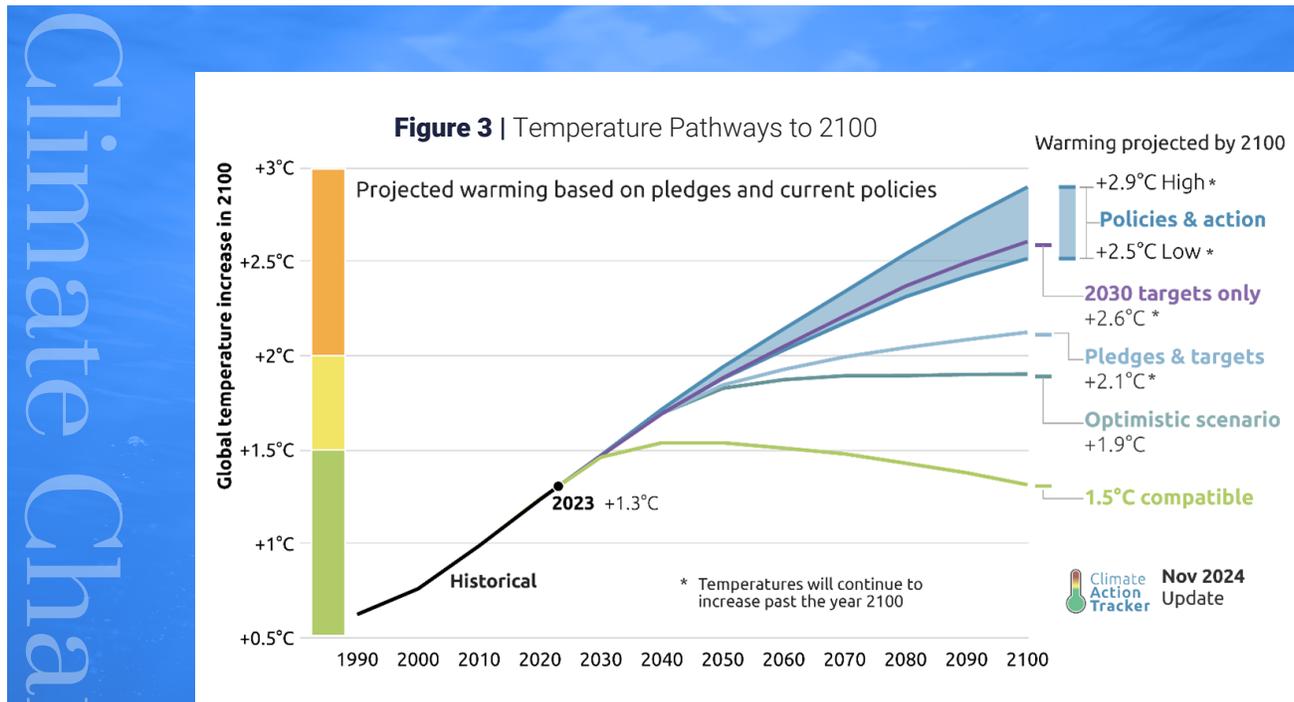


Source: California Department of Finance (DOF)

# Climate Change

**Description:** Emission trends are an indicator of how climate change risk is developing. Evolving science and understanding, and policy and industry changes can also inform the approach to long-term planning for climate change for imported supplies and operations within Metropolitan’s service area.

**Assessment:** The 2020 IRP Needs Assessment incorporated both moderate and severe climate change futures based on Representative Concentration Pathways (RCP) 4.5 and 8.5. RCP 8.5 was approved for use in CAMP4W planning. While current trends suggest that an intermediate climate future consistent with RCP 4.5 is possible, the uncertainty in policy adherence and continuance in achieving emissions targets over the long-term warrants consideration of both moderate and severe climate scenarios at present. Per the Board’s direction, Metropolitan will continue to present resource implications in relation to severe climate scenarios while maintaining our ability to use and consider both RCP 4.5 and 8.5 for its modeling efforts. As new information becomes available and industry understanding of future climate change evolves, Metropolitan will make recommendations on any necessary shift to different RCPs or overall approaches to modeling climate change.



Source: “Warming Projections Global Update” Climate Action Tracker, November 2024

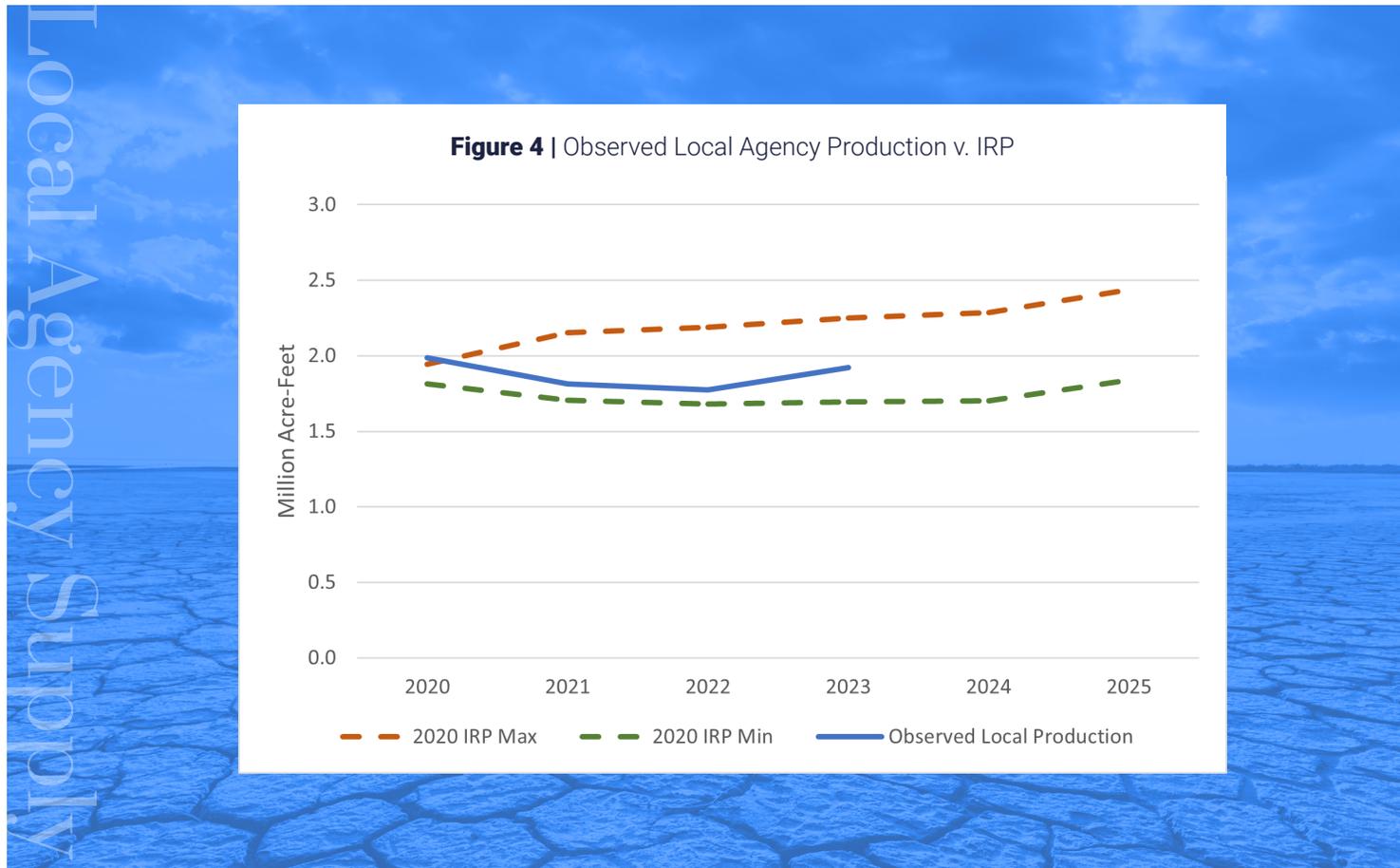
Figure 3 presents the temperature pathways to 2100 presented by Climate Action Tracker as of November 2024. While not directly referencing RCP 4.5 and 8.5, generally the temperature increase of “+2.9°C” depicted in the high end of the “Policies & action” projection aligns with year 2100 temperature assumptions consistent with RCP 4.5. RCP 4.5 results in global temperatures increasing by up to 3 degrees Celsius above preindustrial levels by the end of the century, with emissions peaking around 2040. The more severe RCP 8.5 exceeds warming of 4 degrees with emissions increasing throughout the 21st century.

Climate Change

# Local Agency Supply<sup>1</sup>

**Description:** Local agency supply is a key input in modeling demands on Metropolitan. Systemic changes can affect demand/supply gaps (e.g. impaired groundwater basins).

**Assessment:** Local supply production has remained relatively low in recent years, primarily due to low overall retail demands. Local supply production can also be limited by factors such as hydrological or operational constraints, but these were not significant limiters of local supply production in 2023. Figure 4 shows the observed local agency supply production in 2023 was within the minimum and maximum assumptions across the four scenarios of the 2020 IRP Needs Assessment. More local agency supplies were available in 2023 than were needed to meet retail demand, leading to lower-than-expected local agency production levels. As this low production was demand-induced, it is not considered a loss of local agency supply production. Metropolitan will continue to track production of local agency supplies for significant systemic changes.



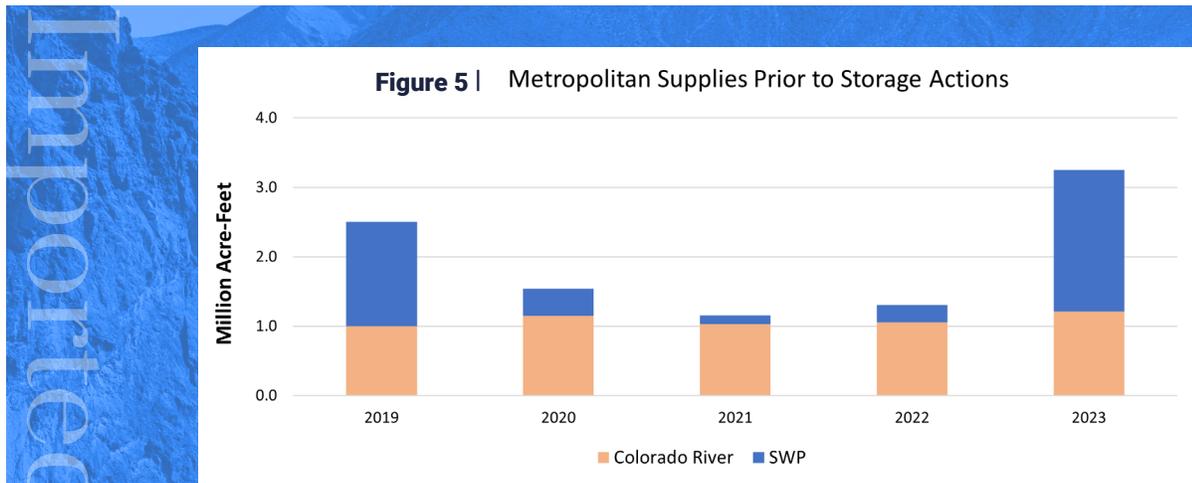
<sup>1</sup> Includes supplies produced and/or managed by local agencies including groundwater replenishment supplies purchased from Metropolitan and commonly referred to as Local Supplies.

# Imported Supply

**Description:** Regulatory and contractual changes may have significant impacts on Metropolitan’s imported supplies and demands and are reflected in Metropolitan’s modeling.

**Assessment:** In recent years, Metropolitan’s State Water Project (SWP) supplies have fluctuated greatly due to the impacts of weather whiplash and regulatory requirements. Recent modeling conducted by the California Department of Water Resources indicates a further decline in the reliability of SWP supplies. Current projections indicate that Metropolitan will not need to make Drought Contingency Plan (DCP) contributions in calendar year 2025 or in calendar year 2026. However, the uncertainty beyond 2026 has increased. While many agreements that govern the management of the Colorado River are scheduled to expire at the end of 2026, efforts to negotiate replacement agreements have not substantially progressed in the past year. This increases the risk of litigation if no agreement is reached. See Appendix A for additional details.

Figure 5 presents Metropolitan’s annual Colorado River and SWP supplies prior to storage actions. See Appendix A for additional discussion.



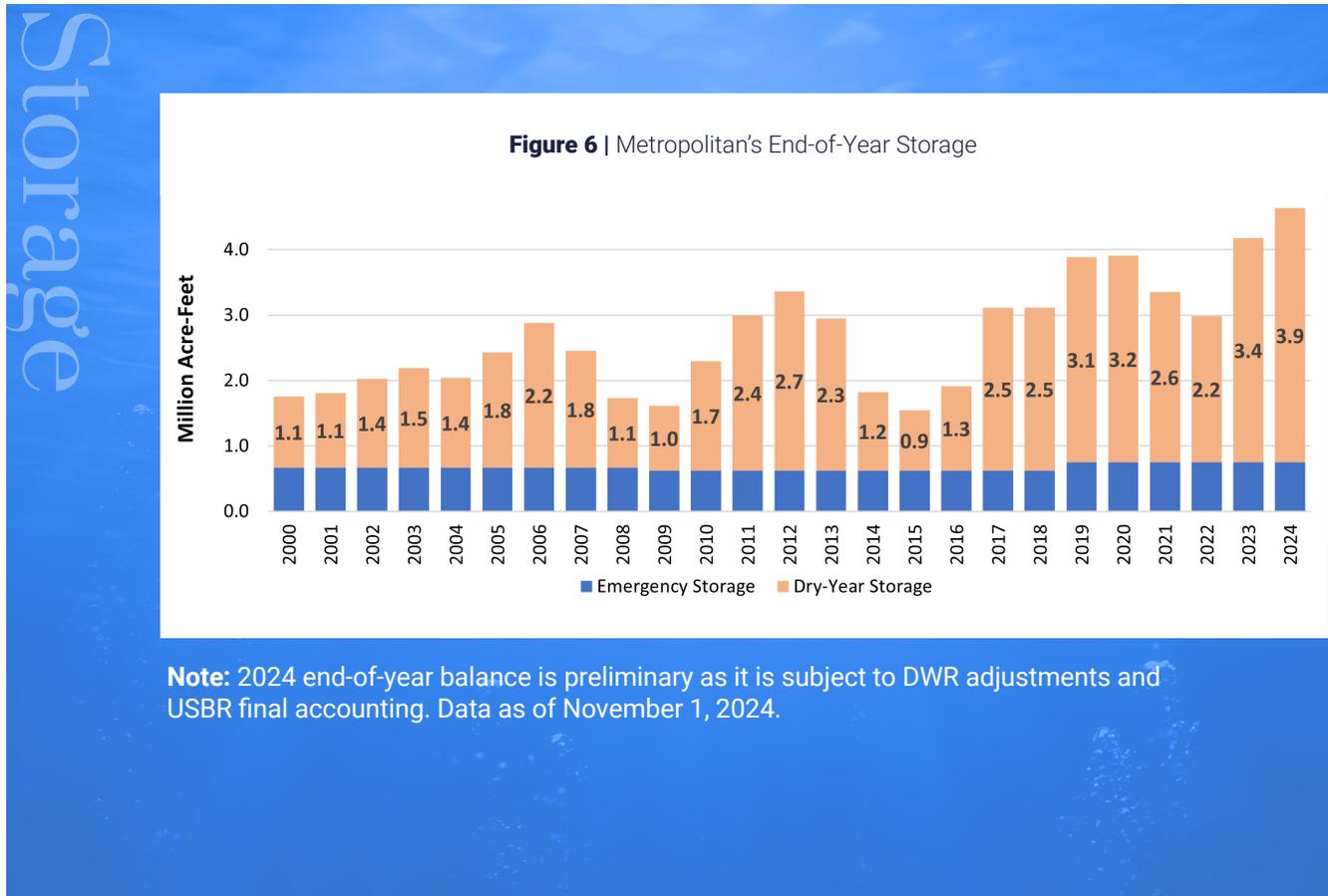
Notes: Graph depicts Metropolitan’s annual Colorado River supplies (includes Metropolitan’s Basic Apportionment, transfers and exchanges, adjustments for higher priority water use, and Indian and Misc. Present Perfected Rights; does not include water stored for Southern Nevada Water Authority or Imperial Irrigation District) and SWP supplies (includes total allocated Table A supplies, deliveries of Article 21 supplies, SWP transfer deliveries, and Human Health & Safety supplies). Graph does not reflect any operational limitations within either system and does not include puts or takes from Metropolitan’s storage accounts.

Imported Supply

# Storage

**Description:** Stored water is a core supply needed to balance demand and supply to ensure dry-year reliability. The development, use, and storage capacity of Metropolitan’s stored supplies are tracked and evaluated.

**Assessment:** Metropolitan’s storage balances both within and outside of the service area have improved since the 2020 IRP Needs Assessment. An indicator of the effectiveness of Metropolitan’s storage portfolio is closely tracking the ability to store water and withdraw it when needed, as well as ensuring the accessibility of these storage programs (particularly for areas dependent on the SWP). Through diverse and expansive storage accounts, Metropolitan is well-positioned for the next potential drought sequence (Figure 6). However, Metropolitan’s storage will fluctuate in the coming years depending on hydrologic conditions and on regulations, including the outcome of the ongoing Colorado River negotiations, and the snapshot of today’s storage levels does not in itself change the long-term concerns identified in the Needs Assessment. While Metropolitan will continue to manage its storage to support near-term supply and operational demands, it will also pursue additional and improved capacity that may affect our resource planning as that capacity comes online.





*Metropolitan and Antelope Valley-East Kern  
(AVEK) Water Agency High Desert Water Bank*

# Time-Bound Targets

Time-Bound Targets are used to guide project and program development and support the evaluation of proposed investments. They establish a timeframe for when projects or programs need to be planned and implemented to provide readiness for future scenario conditions and identify emphases to pursue potential co-benefits along with water supply reliability and system resilience. When considering which projects and programs will be assessed through the CAMP4W decision-making framework, staff consider their relevance toward Time-Bound Targets in addition to other screening parameters.

Time-Bound Targets are divided into resource-based targets that include core supply, storage, and flex supply targets, and policy-based targets. The following provides an update on progress to date under each category.

## Updating Time Bound Targets through the Adaptive Management Process

All Time-Bound Targets remain in draft format and are subject to change prior to the completion of the CAMP4W Implementation Strategy in spring 2025. Following approval of the CAMP4W Implementation Strategy, Metropolitan will be documenting any proposed recommendations to revise the Time-Bound Targets based on the trends identified through Signpost tracking. These recommendations will be detailed in this section of future Annual Reports.

# Resource-Based Time-Bound Targets

Metropolitan took several actions that advance us toward our targets on core supply, storage and flex supply:

-  Accepted up to \$125.4 million in grant funding for Pure Water Southern California
-  Approved investing \$141.6 million for planning and studies related to Delta Conveyance Project
-  Authorized agreements for water transfer options for three years with agencies in the Sacramento Valley
-  Accepted up to \$82 million in federal funding to expand the Antelope Valley-East Kern High Desert Water Bank

Future CAMP4W Annual Reports will include graphical representation of Metropolitan's progress toward the Time-Bound Targets.

---

Future iterations of the Annual Report will also outline challenges Metropolitan has faced in achieving the Time-Bound Targets, how challenges may be resolved, and potential impacts to achieving goals within the defined timeframe.

	CATEGORY	NEAR TERM	MID TERM	LONG TERM
 <p><b>Resource-Based Targets</b> Numbers reflect additional supplies unless indicated otherwise</p>	 Core Supply <sup>1</sup>	N/A	Identify 300 TAF for potential implementation by 2035.  Alternatively, 250 TAF of new storage will reduce core supply need to 200 TAF	Identify 650 TAF for potential implementation by 2045. Alternatively, 250 TAF of new storage will reduce core supply need to 550 TAF or, 500 TAF of new storage will reduce core supply need to 500 TAF
	 Storage	Identify up to 500 TAF for potential implementation by 2035		
	 Flex Supply (Dry Year Equivalent)	Acquire capability for up to 100 TAFY		

**Notes**

<sup>1</sup> Core Supply sub-targets will be considered and may include targets for groundwater remediation and stormwater capture.

To remain adaptive to climate change, the Resource-Based Time-Bound Targets are independent of the selection of a specific future scenario, as no single future scenario can be predicted. By identifying actions needed to close the gap in Scenario D, which aligns with the Board’s directive to plan towards Representative Concentration Pathway (RCP) 8.5, we ensure planning coverage across all scenarios. The intentional use of the term “identify” in the Time-Bound Targets for core supply and storage should be noted. This target specifically addresses the need to identify opportunities, where as implementation of selected options will be done at the discretion of the Board over time, based on IRP updates, Signpost tracking, and other factors such as risk tolerance. This ensures we plan appropriately by identifying opportunities early enough to be well informed prior to any investment decision on implementation, given the long lead-time required for project development. This methodology supports Metropolitan’s core mission and will facilitate the region being adequately prepared and not unprepared for a given future.

# Policy-Based Time-Bound Targets

Metropolitan took several actions and made progress on policy-based targets related to equitable supply reliability, demand management, GHG reduction and others:



Accepted \$5 million in grant funding for Drought Mitigation projects; initiated implementation of Phase 1 projects



Progress on zero emission vehicles purchases and charging infrastructure



Approved investing \$600,000 in Forest Resilience Bond pilot program for forest restoration / watershed resilience



Added four projects to the Project Labor Agreement, expanding workforce development and equity for underserved communities



Accepted up to \$95.8 million in federal funding for replacing non-functional turf at commercial, industrial and institutional facilities



Awarded \$247.8 million in four new Local Resources Program projects



Accepted \$2 million in federal funding for water and energy efficiency improvements and turf removal in underserved communities



## Policy-Based Targets

CATEGORY	NEAR TERM	MID TERM	LONG TERM
Equitable Supply Reliability	Add 160 CFS capacity to the SWPDA by 2027	Implement additional 130 CFS capacity to SWPDA by 2032	Implement capacity, conveyance, supply, and programs for SWPDA by 2045
Local Agency Supply <sup>1</sup>	Maintain 2.09 to 2.32 MAF (under average year conditions)	2.12 to 2.37 MAF (under average year conditions)	2.14 to 2.40 MAF (under average year conditions)
Demand Management <sup>2</sup>	Implement structural conservation programs to achieve 300 TAF by 2045		
Regional Water Use Efficiency	Assist Retail Agencies to achieve, or exceed, compliance with SWRCB Water Use Efficiency Standards <sup>3</sup>		
	GPCD target for 2030 <sup>4</sup>	GPCD target for 2035	GPCD target for 2045
Greenhouse Gas Reduction	N/A	40% below 1990 emission levels by 2030	Carbon Neutral by 2045
Surplus Water Management	Develop capability to manage up to 500 TAFY of additional wet year surplus above Metropolitan's Storage Portfolio and WSDM action		
Community Equity*			
Water Quality*			
Imported Water Source Resilience*			

\*Time-Bound Targets are in development.

### Notes

- 1 This initial target includes existing (and under construction) local agency supplies and can be augmented to include new local agency supply.
- 2 Used to offset the need for additional core supply and using 2024 as a baseline.
- 3 Each retail water supplier will report progress to the State Water Board annually through a Water Use Objective (WUO) equaling the sum of efficiency budgets for a subset of urban water uses: residential indoor water use, residential outdoor water use, real

- 4 Specific GPCD Time-Bound Targets will be identified based on final SWRCB standards. If the Board wishes to set a higher target, it would be designed to track water use efficiency trends by sector over time and will take local conditions, including climate, into consideration.

# Implementation Highlights

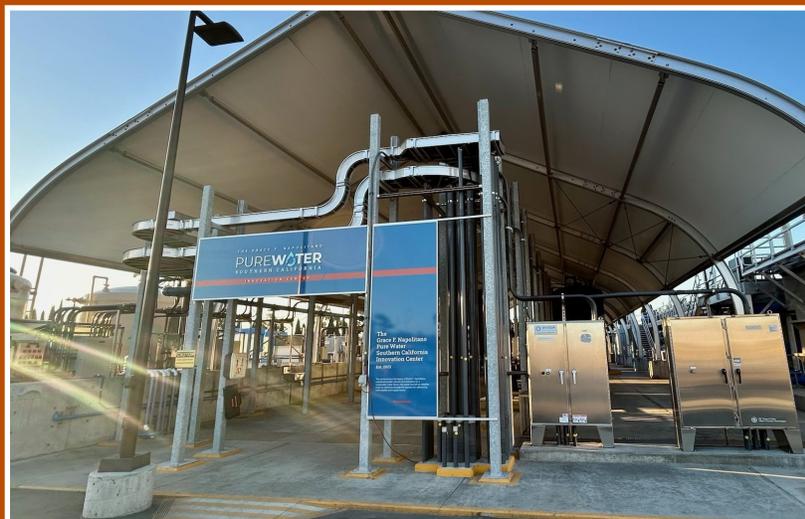


## Pure Water Southern California (Reliability)

Planning for Pure Water Southern California (PWSC), a regional water recycling program being developed in partnership with the Los Angeles County Sanitation Districts, continued its progress this year. If approved by Metropolitan’s Board, PWSC will produce a climate resilient water supply to help meet time-bound targets and address the unpredictability of imported supplies. Early this year Metropolitan participated in a technical workgroup on regional water reuse along with universities, member agencies, and environmental organizations, looking at ways to maximize benefits, reduce impacts, and consider affordability. The summary report was published in June 2024. Metropolitan also investigated program phasing alternatives to reduce initial scope and costs of the first phase and ensure there is large enough capacity to achieve viability. Considering different phasing alternatives underscores the opportunity to adaptively manage and tailor the project to supply needs and financial capacity. With the State Water Board’s adoption of Direct Potable Reuse (DPR) regulations in late 2023, Metropolitan developed a research plan to address both raw water augmentation and treated water augmentation, and prepared a white paper which provides background on DPR and how it could be implemented at Metropolitan. In addition, Metropolitan discussed terms for water delivery with member agencies and met regularly with the Southern Nevada Water Authority and with the Central Arizona Project (CAP) to discuss potential investment in PWSC. The agreement with the Los Angeles County Sanitation Districts was amended and restated to address shared responsibility of implementation for a full-scale Advanced Water Purification Facility (the Sanitation Districts will take responsibility for design and operation of the membrane bioreactor and appurtenances), sharing of grants, and partnering in the demonstration plant testing and operation. To date, PWSC has received over \$210 million in state and federal grant funding to support current and future planning efforts.

*The Grace P. Napolitano Pure Water Southern California Innovation Center is a partnership between Metropolitan and the Los Angeles County Sanitation Districts providing 500,000 gallons of purified water daily.*

*Treated wastewater from the Sanitation Districts’ A.K. Warren Water Resource Facility passes through the demonstration plant and undergoes a rigorous purification process to ensure it is safe for drinking. The purification process, which combines innovative and proven water treatment technologies, is tested and validated at the demonstration plant. Data collected is used to gain regulatory acceptance of the purification process and provides valuable information for the design needs of a full-scale purification plant.*



## Drought Mitigation Projects (Reliability, Adaptability and Flexibility)

Metropolitan is investing \$205 million to increase flexibility within its distribution system to improve equitable supply reliability and regional drought resilience for areas dependent on State Water Project supplies. On the western side, Metropolitan is designing and will construct the first stage of two new pump stations along its Sepulveda Feeder to allow delivery of up to 22,000 acre-feet of additional water annually from the Diemer and Weymouth Water Treatment Plants during SWP shortages. This project is scheduled to be operational in 2027. A potential second stage is in the planning process and will be evaluated through the CAMP4W process. On the eastern side, a suite of four projects using existing pipelines and pumping facilities will deliver water from Metropolitan's Diamond Valley Lake in the southern portion of Riverside County up to the Rialto Pipeline in San Bernardino County. These projects received grant funding of \$5 million from the U.S. Bureau of Reclamation and \$50 million from the state of California. The projects are anticipated to be fully operational in 2027.





ReDesign LA Tour and Workshop, December, 2024

### Listening Sessions/Forums (Equity)

Connecting with the public is a vital element of climate adaptation, for transparency, knowledge-sharing and strengthening communication channels. Metropolitan held five listening sessions and workshops this year along with hosting tours of the Weymouth Water Treatment Plant, Water Quality Lab and the Grace F. Napolitano Pure Water Southern California Innovation Center. Listening sessions with Metropolitan’s General Manager focused on community equity, time-bound targets, and evaluative criteria for environmental co-benefits. A forum in January introduced CAMP4W to young civic leaders in the region, seeking their ideas on engagement around climate change and adaptation for Southern California. Another forum, hosted by Eastern Municipal Water District, focused on agricultural interests and priorities, and a third brought forward the priorities of environmental and community-based organizations, as well as their ideas on partnerships and collaborations to accomplish the significant work ahead. Input from each engagement is shared with the CAMP4W Planning Team to inform development of the plan.

### Grants (Financial Sustainability and Affordability)

Affordability is a critical focus of Metropolitan with discussions on climate adaptation projects and programs highlighting the importance of this issue. Metropolitan was successful in pursuing grants to further climate adaptation work while easing the future financial impact to water ratepayers across Southern California. Grant awards this year include:

- \$125.4 million from the U.S Bureau of Reclamation for planning and design of Pure Water Southern California, a project that will make Southern California more resilient to climate change by purifying and reusing cleaned wastewater
- Up to \$178 million from the U.S. Bureau of Reclamation for phase two of the Lower Colorado River Basin System Conservation and Efficiency Program. This includes two programs: Antelope Valley-East Kern High Desert Water Bank and the Turf Replacement Program for commercial, industrial, and institutional properties. These programs will conserve up to 265,296 AF of Colorado River water to be stored in Lake Mead.
- \$2 million from the U.S. Bureau of Reclamation to support Metropolitan’s ongoing collaboration with the Southern California Gas Company to provide water and energy efficiency upgrades to single-family residences in disadvantaged communities, and a new, small-scale direct install turf replacement program for single-family residences in disadvantaged communities. These programs will conserve up to 238 AF annually to alleviate current stress on the Lower Colorado River Basin.
- \$20.9 million from the Sacramento-San Joaquin Delta Conservancy to design and construct up to 3,500 acres of managed, flooded wetlands and up to 1,500 acres of rice fields on Webb Tract. The main objectives of the projects are to restore habitat, stop ongoing organic soil subsidence, reduce greenhouse gas emissions, develop sustainable agriculture opportunities, investigate sustainable water management practices, and study how managed wetlands may augment the Delta pelagic food web in line with goals of Metropolitan’s Climate Action Plan and the Delta Plan.





### Future Supply Actions Program (Reliability)

Regional climate adaptation can be advanced through working with member agencies on innovative technologies and approaches. Metropolitan is investing in research through the third round of funding for the Future Supply Actions Program. The Future Supply Actions Program funds technical studies and pilot tests to target barriers to future production of recycled water, stormwater, seawater desalination, and groundwater resources. In 2024 Metropolitan approved \$2.75 million in funding for seven projects that will be led by member agencies:

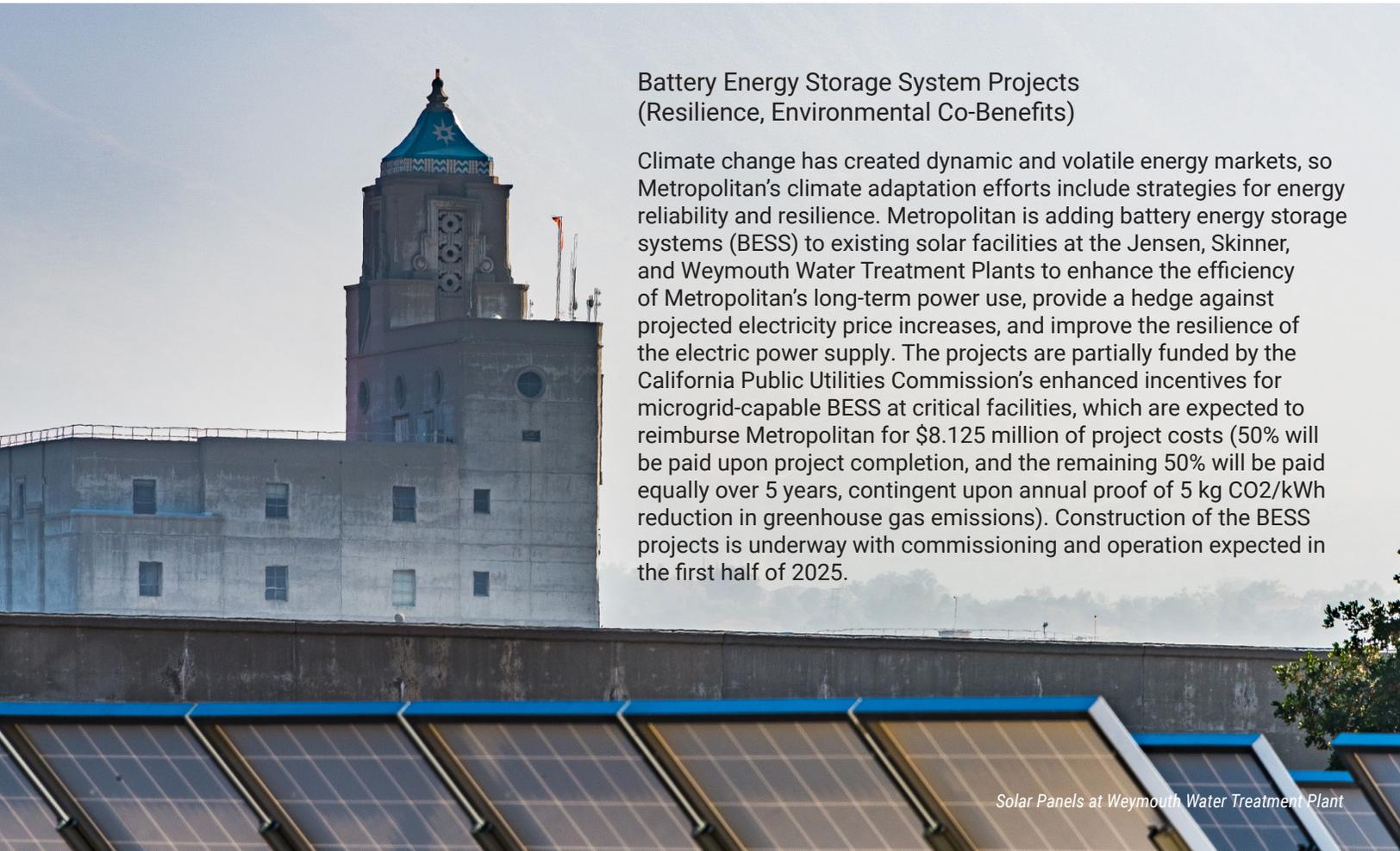
- Lead agency Las Virgenes Municipal Water District with partnering agencies Los Angeles Department of Water and Power, Calleguas Municipal Water District, and Eastern Municipal Water District is conducting the OceanWell: A Climate-Resilient, Eco-Friendly, Submerged Reverse Osmosis System pilot. This pilot will assess the system's performance, effectiveness, and capacity to contribute to the local water supply.
- The Los Angeles Department of Water and Power is leading the Headworks Reservoir Complex Direct Potable Reuse Pilot. Through a series of tests four potential process trains will be evaluated for removal efficiency of pathogens and chemical contaminants in direct potable reuse.
- The City of Long Beach is conducting the Ground Water Augmentation, Groundwater Collection System, and New Wells Site Study. This project will update and calibrate the existing Los Angeles USGS Coastal Plan Groundwater Model to further develop a framework for future groundwater enhancement projects.
- The San Diego County Water Authority is leading the Lake Henshaw Oxygenation Pilot Study. This pilot aims to explore the effectiveness of oxygenation as a method to prevent Harmful Algal Blooms by reducing bioavailable nitrogen and phosphorus.
- Lead agency Inland Empire Utilities Agency, along with Three Valleys Municipal Water District and Western Municipal Water District, will investigate the link between well drilling products and PFAS in the Identifying and Removing PFAS Used in Well Drilling Pilot Study. The study will analyze drilling mud products and water samples for PFAS, and pilot chemical well rehabilitation to assess PFAS reduction effectiveness.
- Inland Empire Utilities Agency will also lead the Chino Basin Advanced Water Purification Demonstration Facility. The Demonstration Facility will conduct tests on microfiltration, high-recovery reverse osmosis, and ultraviolet-advanced oxidation processes.
- Foothill Municipal Water District will use Data-Driven Resource Optimization and Planning System (DROPS) to integrate advanced data analytics and artificial intelligence to enhance stormwater management.



Oroville Spillway Release, March 2024  
(photo courtesy of DWR)

### Forest Resilience Bonds (Reliability, Resilience, Environmental Co-Benefits)

Metropolitan’s water supplies from the Bay-Delta watershed are already facing increasing pressures from the impacts of climate change, including reduced snowpack, increased drought severity and frequency, changing precipitation patterns, degradation of habitat and ecosystems, and sea level rise. In addition, wildfires in the Western United States are becoming more frequent, larger, and more severe due to a combination of climate change and overly dense forest conditions resulting from modern forest management and fire suppression practices. Investments in watershed health in the Bay-Delta watershed could help to protect or enhance, inform, and improve water source resilience for the State Water Project and other supplies from the Bay Delta watershed, such as critical dry year supplemental supplies. In 2024, Metropolitan committed to invest \$200,000 per year for two years in three watershed partnerships using the Forest Resilience Bond conservation model. The bonds finance portions of larger watershed programs and projects being led by the United States Department of Agriculture Forest Service to reduce the risk of wildfire impacts to communities and critical infrastructure (including State Water Project infrastructure). Potential benefits of investments in upper watershed health include resilience to climate variability, enhanced water supply, improved water quality, biodiversity and ecosystem services, carbon sequestration, and fire risk reduction.



### Battery Energy Storage System Projects (Resilience, Environmental Co-Benefits)

Climate change has created dynamic and volatile energy markets, so Metropolitan’s climate adaptation efforts include strategies for energy reliability and resilience. Metropolitan is adding battery energy storage systems (BESS) to existing solar facilities at the Jensen, Skinner, and Weymouth Water Treatment Plants to enhance the efficiency of Metropolitan’s long-term power use, provide a hedge against projected electricity price increases, and improve the resilience of the electric power supply. The projects are partially funded by the California Public Utilities Commission’s enhanced incentives for microgrid-capable BESS at critical facilities, which are expected to reimburse Metropolitan for \$8.125 million of project costs (50% will be paid upon project completion, and the remaining 50% will be paid equally over 5 years, contingent upon annual proof of 5 kg CO<sub>2</sub>/kWh reduction in greenhouse gas emissions). Construction of the BESS projects is underway with commissioning and operation expected in the first half of 2025.

Solar Panels at Weymouth Water Treatment Plant



# Appendix A

This appendix provides a more robust discussion on the water supply reliability signposts to support the Board's adaptive management and decision-making process.

# Appendix A

## Supply and Demand Signposts - Detailed Discussion

### Demographics

---

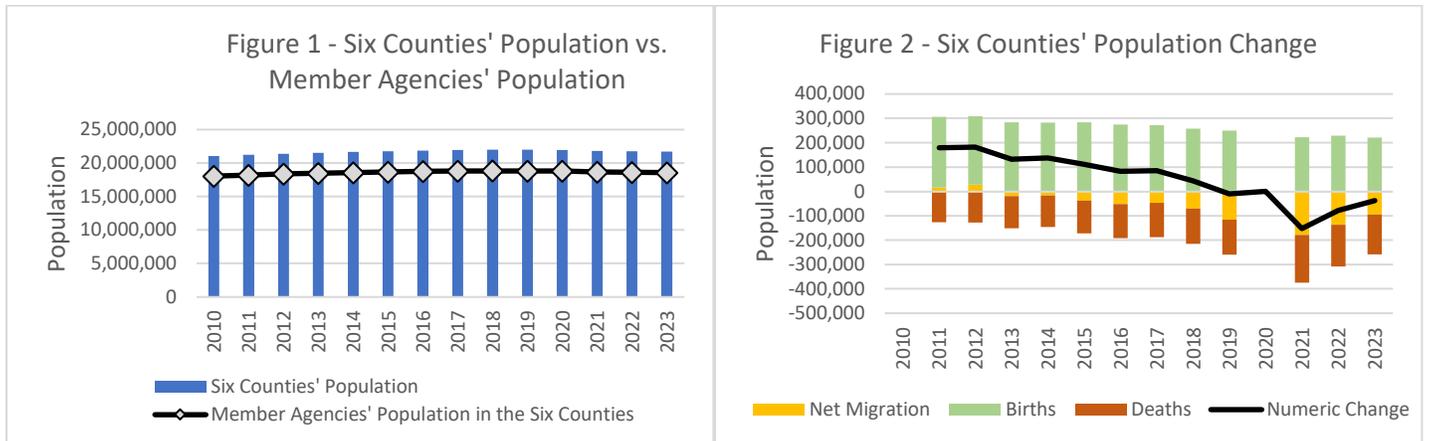
Demographic growth is a key driver of water demand. Population, households, and employment are tracked on an annual basis and are used as inputs for Metropolitan’s retail demand model. Ongoing monitoring and analysis are crucial for anticipating and adapting to changing water needs. This section provides the latest population, households, and employment estimates from the California Department of Finance and the California Employment Development Department and observations on trends.

Although the Great Recession of 2009 and the COVID-19 pandemic in 2020 were highly disruptive to population growth, new housing development, and employment in Southern California in the short term, growth prospects remain open to both high and low growth outcomes over the long term. In terms of trends, the service area’s overall population has experienced low or negative rates of growth in recent years, peaking in 2018 (Figure 1). After falling slightly each year since 2019, in 2023 the overall population began to grow again as net outmigration and accelerated deaths related to the pandemic subsided (Figure 2). The workforce has recovered from the pandemic with the number of people working exceeding pre-pandemic levels and continuing to grow (Figure 3).<sup>1</sup> As shown in Figure 4, more new housing is developed each year.

---

<sup>1</sup> “State’s Population Increases While Housing Grows Per New State Demographic Report”, Department of Finance, April 2024, [https://dof.ca.gov/wp-content/uploads/sites/352/Forecasting/Demographics/Documents/E-1\\_2024\\_Press\\_Release.pdf](https://dof.ca.gov/wp-content/uploads/sites/352/Forecasting/Demographics/Documents/E-1_2024_Press_Release.pdf)

## Population



Source: California Department of Finance (DOF)

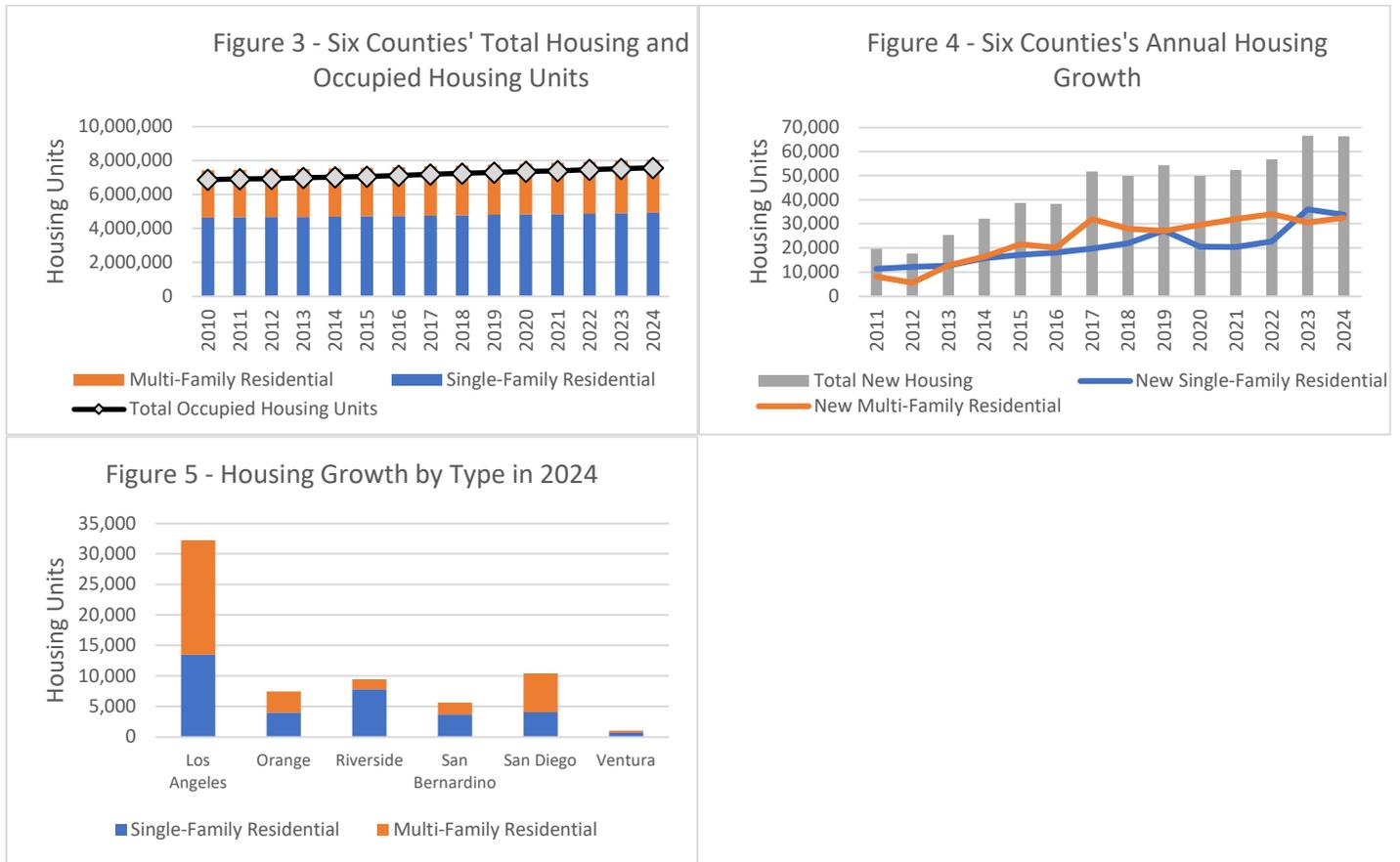
The July 1, 2023 population estimates from the California Department of Finance (DOF) indicate that the six-county region encompassing Metropolitan’s service area had a population of 21.6 million. Of this total, approximately 18.5 million people, or about 86 percent, reside within Metropolitan’s service area (Figure 1). The six counties within the Metropolitan service area are Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura.

Data detailing population changes are readily available from the DOF at the county level and can be used to analyze population trends. As such, the following observations are based on data from the six-county region.

Observations at the six-county region:

- The number of new births continues to decline, consistent with national and global trends (Figure 2).
- The number of deaths peaked in 2021 at 195,000 because of COVID-19 and has declined to 163,000 in 2023 (Figure 2).
- Since 2013, the six-county region has experienced negative net migration, with more people leaving the region than entering. Negative net migration peaked during the COVID-19 pandemic in 2020-21 (-179,000) with remote work and high housing costs being the main drivers. Since 2021, the net migration has slowed down to roughly -96,000 in 2023 (Figure 2).
- Overall, the population loss trend is reversing with a net loss of -37,000 in 2023 vs. -152,000 in 2021.
- In Figure 2, the 2020 data are not available.

## Housing



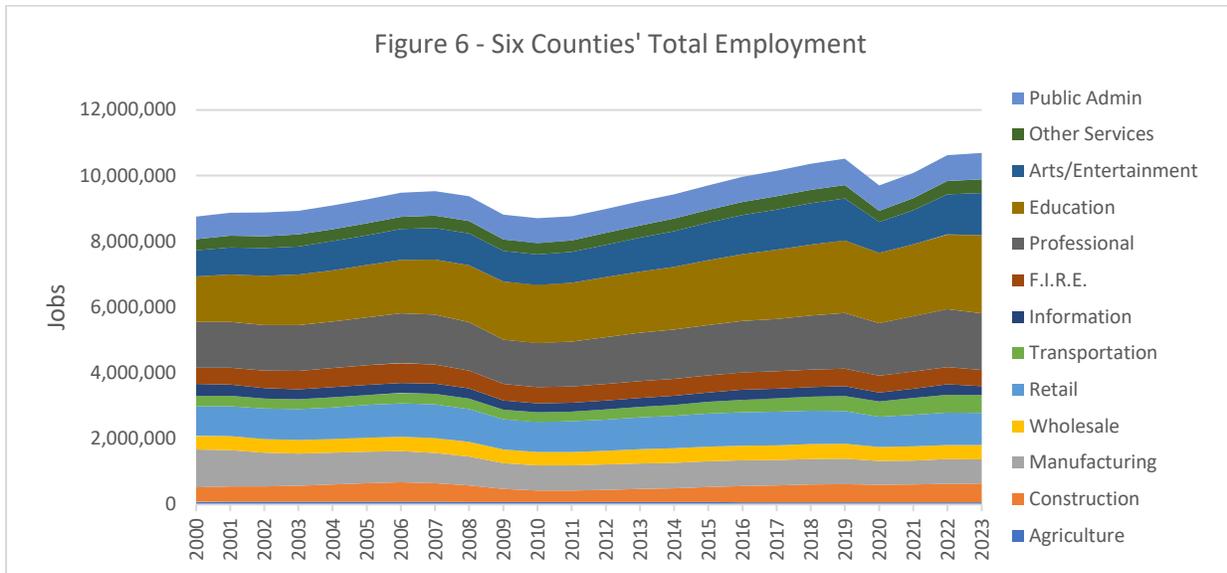
Source: California Department of Finance (DOF)

Housing growth was hampered by the Great Recession of 2009. In 2011 and 2012, new home constructions were less than 20,000 units per year (Figure 4). Since then, new construction has grown steadily, reaching annual growth of more than 66,000 units in 2024. In 2024, there were almost the same number of single-family units built as multi-family units (Figure 4). As SHOWN in Figure 5, there is a diversity in housing types being built across the region. In the Inland Empire, 77 percent of new homes in the last year were single-family units. The rest of the region saw a majority (57 percent) of new housing built as multifamily units. The mix of housing types has implications for growth in outdoor water use, since multifamily units tend to use less water on a per unit basis than single family dwellings. Figure 5 shows that Los Angeles led the region in gaining the most units.

Observations at the six-county level:

- New housing construction reached a new record in 2023 at 66,000 units.
- Housing growth is dependent on many factors, including the state of the economy (interest rates), permits, and affordability. Since 2011, the six-county region has added a total of 620,000 housing units.
- Annual growth has exceeded 300 percent since the Great Recession of 2009, which was caused by sub-prime mortgage lending that led to a slowdown in new home construction.
- Construction of multi-family housing exceeded single-family housing between 2014 and 2022 due to high demand for rental properties as banks tightened their mortgage lending.

## Employment



Source: California Employment Development Department (EDD)

The number of jobs fluctuates with cycles of economic expansion and contraction. Following the Great Recession of 2009, employment plummeted by nearly 1 million jobs. It took eight years to recover to the pre-recession employment peak in 2007. In 2020, the COVID-19 pandemic and lockdowns caused employment to plummet (Figure 6). Southern California's economy quickly regained the lost jobs and was exceeding pre-pandemic employment by 2022. As of the time of this writing, there was no indication of recession in the U.S. or in California.

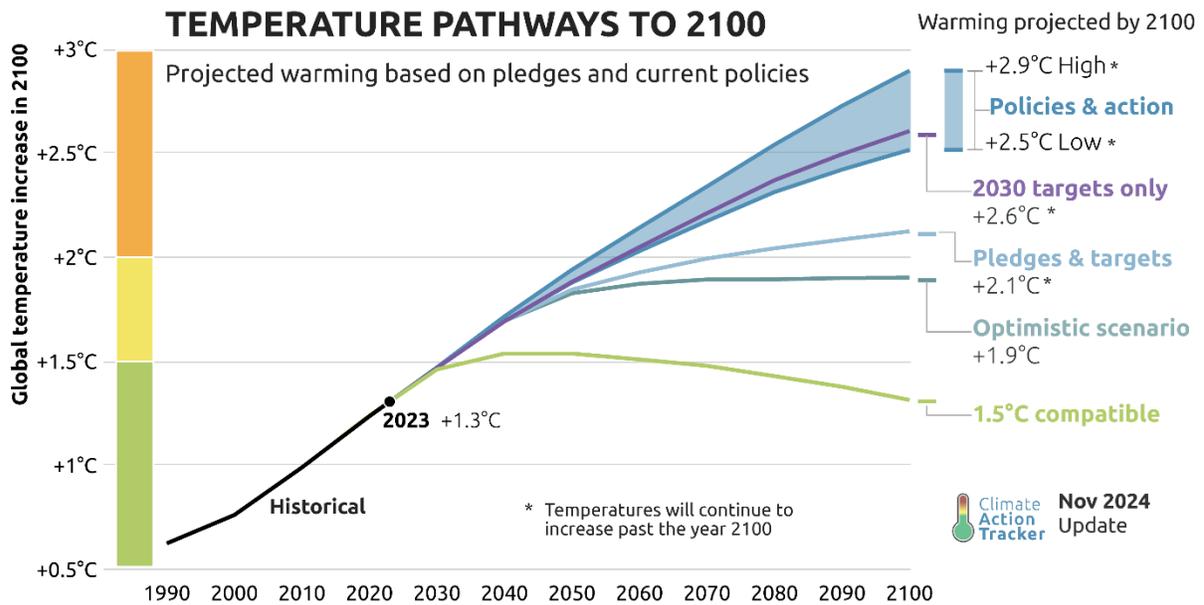
Observations at the six-county level:

- Southern California's employment fell in 2020 during the COVID-19 pandemic but recovered to pre-pandemic levels by 2022.
- Employment growth has continued on an upward trend with no sign of economic recession since 2020.

## Climate Change

Climate change is a major source of long-term uncertainty with implications for both water supply and demand. Hotter and drier temperatures reduce available supply while increasing local demands and changes to precipitation and weather patterns are stressing our natural and built systems resulting in unpredictability and water management challenges. Global greenhouse gas emissions and concentrations are widely used to track and assess climate change risk and conditions. To reflect a range of plausible climate change outcomes, the 2020 IRP Needs Assessment scenarios incorporated moderate and severe climate change futures based on Representative Concentration Pathways (RCP) 4.5 and 8.5. RCPs are climate change scenarios adopted by the Intergovernmental Panel on Climate Change that were developed to project future greenhouse gas and aerosol concentrations. The concentrations of greenhouse gases and aerosols are recognized as key drivers of climate change. These pathways, or trajectories, describe how greenhouse gas concentrations and radiative forcing might change in the future due to human activities. RCP scenarios are not intended to reflect specific policies or economic futures and are instead defined by total "solar radiative forcing" by 2100. RCP 4.5 is considered to be a moderate emissions reduction policy-based pathway and can only be achieved by deliberate actions to reduce global emissions. RCP 8.5 is considered a high emissions pathway consistent with continued dependence on fossil fuels. The more moderate RCP 4.5 shows global temperatures increasing by up to 3 degrees Celsius above preindustrial levels by the end of the century, with emissions peaking around 2040. The more severe RCP 8.5 exceeds warming of 4 degrees with emissions increasing throughout the 21<sup>st</sup> century.

Figure 7 – Temperature Pathways to 2100



Source: “Warming Projections Global Update” Climate Action Tracker, November 2024

In September 2023, the Metropolitan Board approved use of RCP 8.5 for planning purposes in the CAMP4W process. As shown in Figure 7, while international climate change mitigation pledges and actions made so far may make an intermediate warming outcome consistent with RCP 4.5 possible, uncertainty exists as to the extent that emission targets and climate policies will be achieved.<sup>2</sup> The Governor’s Office of Planning and Research recommended that agencies use RCP 8.5 for analyses considering the impacts through 2050 because of existing gaps between the pledged greenhouse gas emissions reductions and the reductions required to align with the long-term temperature goals.

In terms of global climate change mitigation efforts, there have been mixed signals from global governments and actions. According to a November 2024 report issued by Climate Action Tracker, on the positive side, renewable energy and electric vehicle deployment report record-breaking progress, with energy investments in clean energy now double those for fossil fuels. On the negative side, fossil fuel subsidies remain at an all-time high and funding for fossil fuel prolong projects quadrupled between 2021 and 2022. On the positive side, the current rapid growth of renewable energy now indicates a faster decline after 2030 even with the increase in emissions in recent years. In terms of climate change policy, it remains highly uncertain how governments define their long-term net zero targets and how they may implement them.<sup>2</sup>

2023 was the hottest year on record with a global average temperature 1.18 degrees Celsius above the 20th century average, with 2024 on track for another record high.<sup>3</sup> Additionally, a NOAA Research report indicated that the levels of three of the most important human-caused greenhouse gas emissions (carbon dioxide, methane, and nitrous-oxide) did not show signs of slowing down in 2023.<sup>4</sup> For the purpose of long-term planning, it is important to keep in mind that recent observations and policies do not necessarily indicate what conditions will be 100, 50, or even 20 years later. Modeling of varying future emissions scenarios remains appropriate for Metropolitan’s scenario planning for water reliability. Metropolitan will continue to monitor climate change developments.

<sup>2</sup> “Warming Projections Global Update,” Climate Action Tracker, November 2024, [https://climateactiontracker.org/documents/1277/CAT\\_2024-11-14\\_GlobalUpdate\\_COP29.pdf](https://climateactiontracker.org/documents/1277/CAT_2024-11-14_GlobalUpdate_COP29.pdf)

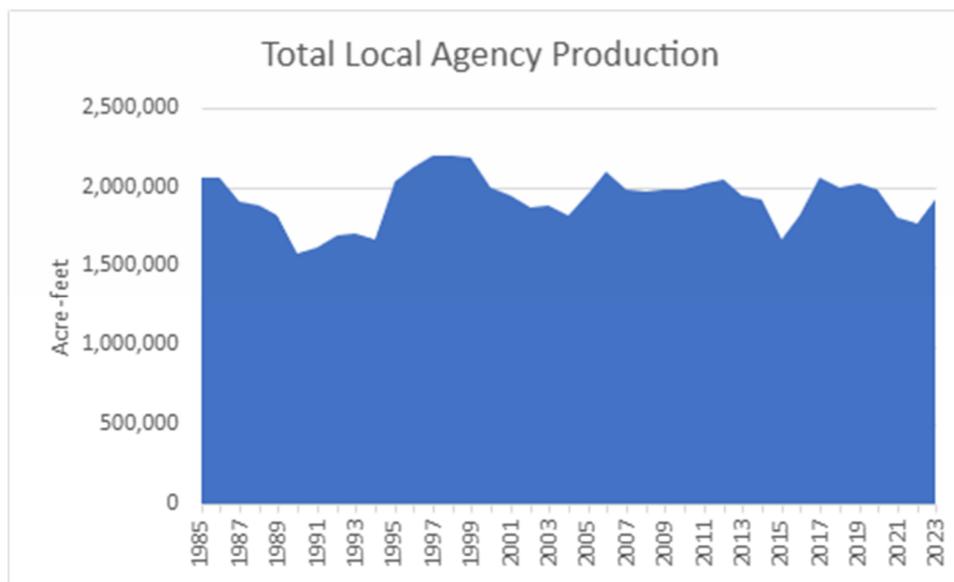
<sup>3</sup> “Monthly Global Climate Report for Annual 2023”, NOAA National Centers for Environmental Information, January 2024, <https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/202313>

<sup>4</sup> “No sign of greenhouse gases increases slowing in 2023,” NOAA Research, April 2024, <https://research.noaa.gov/2024/04/05/no-sign-of-greenhouse-gases-increases-slowing-in-2023/>

## Local Supply<sup>5</sup>

Local supplies are produced to meet individual agency demands and their production and use play a key role in determining the level of Metropolitan’s supply required. Maintaining available local supply production levels and development of new local supplies are critical in helping manage demands on Metropolitan. It should be noted that fluctuations in local supply production on a year-to-year basis, can be attributed not only to changes in local supply availability, but also to changes in retail water demand. Decreased local production as a result of low retail demand in a single year is not in itself a notable signpost. However, it is important to observe trends over the longer term. A sustained decline in local production, in the presence of high retail demands, may indicate a higher dependency on Metropolitan supplies. As such, impacts to reliability can also occur if local supply assumptions are not achieved. Therefore, it is important to track the progress of local supply production as a signpost.

Since 1985, local supply production has averaged about 1.93 MAF (Figure 8) and supply availability has typically been the dominant driver of local production. Long-term trends such as the reduction of allowed pumping rights from managed groundwater basins, water quality regulatory restrictions, and environmental regulatory restrictions have affected production from local groundwater basins, surface reservoirs, and the Los Angeles Aqueduct. Development of new supplies through local recycled water, groundwater recovery, and seawater desalination projects have helped maintain overall local production levels despite long-term impacts to groundwater production.



More recently in 2023, extraordinarily low retail water demands have resulted in lower than expected local production. Despite increased local supply availability from an exceptionally wet year in 2023, local supply production only increased by approximately 150,000 acre-feet compared to 2022. Production of hydrologically driven local supplies like the Los Angeles Aqueduct and Local Surface Water increased by nearly 300,000 acre-feet combined, as expected with more supply available for use in wet years. However, groundwater production declined by approximately 125,000 acre-feet. Member agencies indicated that this decline in groundwater production was due to demand-side rather than supply-side causes. Groundwater production was not primarily affected by a loss of supply, such as PFAS contamination. Rather, the low overall retail demands and the above average rainfall allowed agencies to meet their demands with more economical surface water supply in lieu of groundwater pumping. Additionally, non-potable recycled water use declined by approximately 25,000 acre-feet, signaling low water demand for landscape irrigation in 2023. For these reasons, we conclude that in 2023, the availability of local supplies exceeded the demand, resulting in lower-than-anticipated levels of local production.

<sup>5</sup> Includes supplies produced and/or managed by local agencies including groundwater replenishment supplies purchased from Metropolitan.

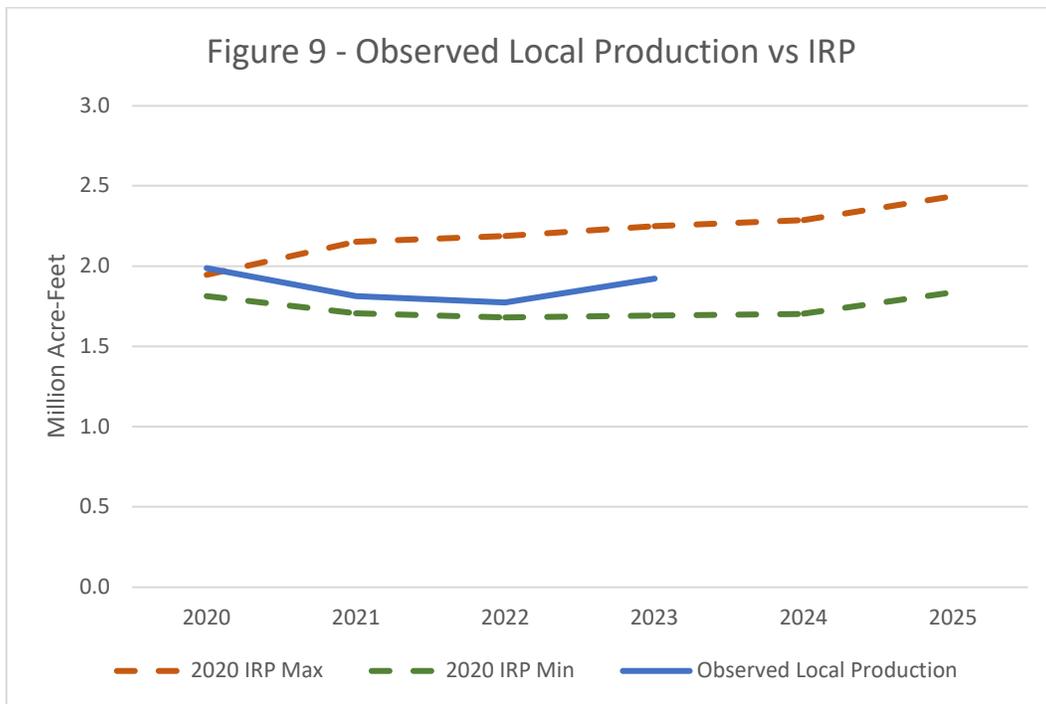


Figure 9 shows the observed local supply production in 2023 was within the minimum and maximum assumptions across the four scenarios of the 2020 IRP Needs Assessment. Metropolitan will continue to monitor local supply production for any significant changes.

### Imported Supply (Risks & Regulations)

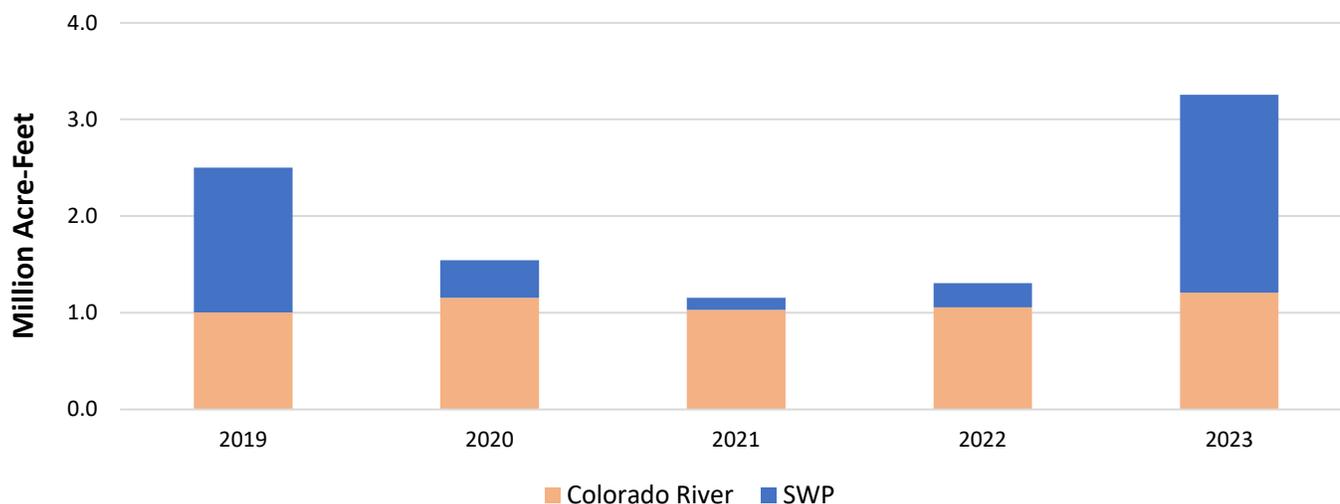
During the past several years, there has been significant fluctuation in the availability of total imported supplies. Although these fluctuations have so far been primarily caused by volatility in the State Water Project (SWP), the outlook for Metropolitan’s Colorado River Aqueduct supplies also face uncertainty into the future. Figure 10 below reflects the amount of imported supply made available each year from calendar years 2019-2023, prior to any storage actions.

Beginning in the fall of 2019, the SWP watersheds received very low precipitation and runoff. SWP Table A allocations for 2020, 2021, 2022 were only 20, 5, and 5 percent, respectively. Despite substantial precipitation in October and December 2021, precipitation in Northern California from January through March 2022 fell to the driest levels on record. In 2022, for the first time in history, the California Department of Water Resources (DWR) used a provision of the SWP Contract to allocate water on a basis other than Table A to meet minimum demands of contractors for human health and safety needs. Despite extraordinary efforts by Metropolitan to maximize available resources through operational drought actions, Metropolitan did not have a sufficient amount of SWP supplies available to meet normal demands in the SWP Dependent Area for the remainder of 2022. Metropolitan thus implemented the Emergency Water Conservation Program from June 2022 to March 2023 to conserve limited SWP supplies. Despite a low initial allocation for 2023, the extraordinary wet conditions at the end of 2022 into the beginning of 2023 resulted in the 2023 SWP Table A allocation rising to 100 percent. In calendar year 2024, the SWP watersheds received above average snowpack and near-normal precipitation and runoff. However, the presence of threatened and endangered fish species near SWP pumping facilities affected the ability to move water from the Delta and resulted in a final SWP Table A allocation of 40 percent. The shift from extreme dry conditions to extreme wet conditions in a short time period, along with the impact of various regulations over these past few years has shown the ongoing challenges faced by Metropolitan’s SWP supplies.

During water years 2020, 2021, and 2022, the Colorado River Basin experienced three of the lowest consecutive years of inflow on record. During this time, the combined storage of Lake Powell and Lake Mead declined from about 50 percent to 25 percent of total live capacity. The Lower Basin experienced its first ever shortage conditions, which impacted both Arizona and Nevada, but not California, per stipulations set forth in the 2007 Interim Guidelines. To address concerns over low reservoir levels and hydrologic conditions, the U.S. Bureau of Reclamation developed and adopted the 2024 Supplement to the 2007 Colorado River Guidelines for Lower Basin Operations and the Coordination Operations for Lake Powell and Lake Mead Record of Decision (2024 ROD). Similar to conditions in California, water year 2023 was also extraordinarily wet in the Colorado River Basin. Between the favorable hydrologic conditions and the system conservation efforts implemented to achieve the conservation goals

set in the 2024 ROD, the combined storage of Lake Powell and Lake Mead increased to 35 percent of total live capacity by the end of calendar year 2023. Due to this increase in storage, Lower Basin shortage levels decreased from a Level 2 Shortage in 2023 to a Level 1 Shortage in 2024. In 2024, the Colorado River Basin received an above average snowpack and near-average precipitation, with runoff at 82 percent of normal. System conservation efforts have continued, and the Lower Basin is expected to conserve approximately 2 MAF of its 3 MAF goal by the end of 2024, which includes water from Metropolitan programs that were turned over for system water creation through 2026. However, several important water management decisions that govern the operation of Colorado River facilities and management of Colorado River water are scheduled to expire at the end of 2026. Negotiations on these water management agreements are underway. Due to long-term drought conditions on the Colorado River, it is possible that California and/or Metropolitan may face future supply reductions. There is no consensus alternative at this time.

Figure 10 - Metropolitan Supplies Prior to Storage Actions



Notes: Graph depicts Metropolitan’s annual Colorado River supplies (includes Metropolitan’s Basic Apportionment, transfers and exchanges, adjustments for higher priority water use, and Indian and Misc. Present Perfected Rights; does not include water stored for SNWA or IID) and SWP supplies (includes total allocated Table A supplies, deliveries of Article 21 supplies, SWP transfer deliveries, and Human Health & Safety supplies). Graph does not reflect any operational limitations within either system and does not include puts or takes from Metropolitan’s storage accounts.

**SWP Outlook**

Forecasts of SWP supplies for the 2020 IRP Needs Assessment were based on modeling studies produced by DWRs’ CALSIM-II model. CALSIM-II simulates SWP and Central Valley Project operations under a range of historical hydrologic conditions. DWR publishes updated CALSIM forecasts of SWP deliveries in its biennial SWP Delivery Capability Report (DCR). The 2019 DCR was used in the 2020 IRP Needs Assessment and provided estimates of the existing (2019) and future (2040) SWP delivery capability for Metropolitan. These estimates incorporated regulatory requirements in accordance with U.S. Fish and Wildlife Service and National Marine Fisheries Service biological opinions. In addition, the estimates of future capability also reflected potential impacts of climate change and sea level rise.

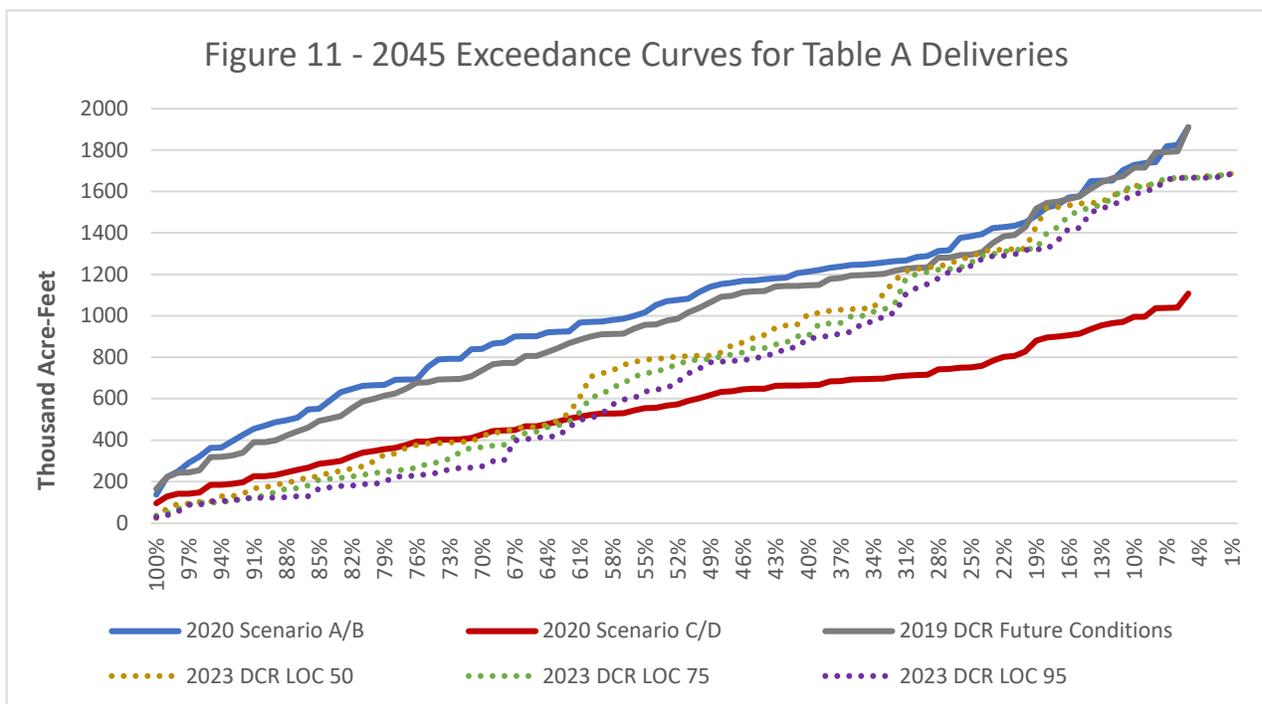
The impacts of climate change were incorporated into the modeled SWP deliveries for all four 2020 IRP Needs Assessment scenarios. The 2019 DCR future condition included SWP deliveries with climate change impacts associated with RCP 8.5 and 1.5 feet of sea level rise. This more severe climate future was incorporated into scenarios C and D. In addition, it was determined that further degradation of SWP deliveries should be included in Scenarios C and D to account for future regulatory uncertainty, which was not included in the 2019 DCR, and unaccounted for climate impacts. A moderate level of climate change (RCP 4.5) was incorporated into scenarios A and B by interpolating between the existing and future (RCP 8.5) modeling studies in the 2019 DCR without an additional degradation of SWP deliveries.

Since first published in the early 2000s, the DCR has shown a long-term trend of steadily declining water supply reliability. Since 2005, average modeled SWP deliveries have decreased by over 600,000 acre-feet, equivalent to about a 15% SWP allocation<sup>6</sup>. These reductions are largely due to new regulatory requirements such as the 2008/2009 Federal Biological Opinions and increased regulatory responsibilities stemming from changes to the 2018 Coordinated Operations Agreement. The most recent declines shown in the 2023 DCR are due to the use of an adjusted historical hydrology with extended dry periods and more precipitation falling earlier in the year as rain instead of snow.

The 2023 DCR utilizes CALSIM 3 instead of CALSIM-II. There are several differences between the models, perhaps most importantly the inclusion of enhanced physical modeling, particularly the implementation of stream-groundwater interaction. In addition to the change in models, the 2023 DCR also uses an extended hydrology in its studies, 1922-2021 compared to 2019 DCR’s 1922-2015.

The biggest difference between the 2023 DCR and the 2019 DCR is the approach to modeling climate change. The 2019 DCR included the existing condition study and only one future condition (RCP 8.5). The 2023 DCR includes the existing condition, the existing condition adjusted for climate change, and three climate “futures” identified as levels of concern (LOC50, LOC75, LOC90)<sup>7</sup>. While these LOCs do not represent specific RCPs, they are compatible with the 2020 IRP Needs Assessment methodology in terms of modeling climate-impacted SWP deliveries, as both methodologies associate SWP deliveries with specific future temperature increases.

Like the 2019 DCR, the 2023 DCR does not include any future regulatory uncertainty or further restrictions. Figure 11 compares the 2045 exceedance curves of modeled SWP deliveries for the 2020 IRP scenarios and those in the 2023 DCR. This figure shows that the 2020 IRP Scenarios C and D have lower deliveries in wetter years than those found in the 2023 DCR LOCs. This is mainly due to the inclusion of the additional SWP delivery degradation associated with regulatory uncertainty and unknown climate impacts. The new modeling studies will be incorporated into the next IRP update.



<sup>6</sup> Figure 6-1, “Risk-Informed Future Climate Scenario Development for the State Water Project Delivery Capability Report”, Department of Water Resources, December 2023

<sup>7</sup> “Risk-Informed Future Climate Scenario Development for the State Water Project Delivery Capability Report”, Department of Water Resources, December 2023, <https://data.cnra.ca.gov/dataset/finaldcr2023/resource/e41f531d-dace-4d37-b52e-35a6ddd2224e>

## BiOps/ITP

Updates to State and Federal permits for the Long-Term Operations of the Central Valley and State Water Projects have been underway for the last four years. An updated State Incidental Take Permit and Federal Biological Opinion were released in November and December of 2024, respectively. The most significant changes are adjustments to the Spring outflow requirement and new flow-based offramps to early water year Old and Middle River (OMR) actions such as the turbidity bridge. Modeling in the draft permits showed minor increases to State Water Project deliveries.

## Water Quality Control Plan

The State of California is currently in the process of updating its Bay-Delta Water Quality Control Plan, which identifies, balances, and protects beneficial uses of water – including municipal, agricultural, and environmental uses. The plan does this by adopting numerical and narrative water quality objectives to reasonably protect those uses. On October 25, 2024, the State Water Board (Water Board) released draft updates to the Bay-Delta Plan and a proposed program of implementation, based on staff alternatives described in the Water Board’s September 2023 draft Staff Report that are centered around unimpaired flow. This newly released document also includes proposed updates based on the Agreements to Support Healthy Rivers and Landscapes (HRL), also known as voluntary agreements, which would provide additional flows as well as habitat restoration. As reported in the 2023 draft Staff Report, the Water Board staff’s preferred alternative of 55% unimpaired flow would on average, result in estimated annual reductions to Southern California’s water supply of about 450 TAF. Five public workshops led by State Water Board staff are planned through early next year and the Water Board is expected to make a final decision on the Bay-Delta Plan update by the end of Q2 2025.

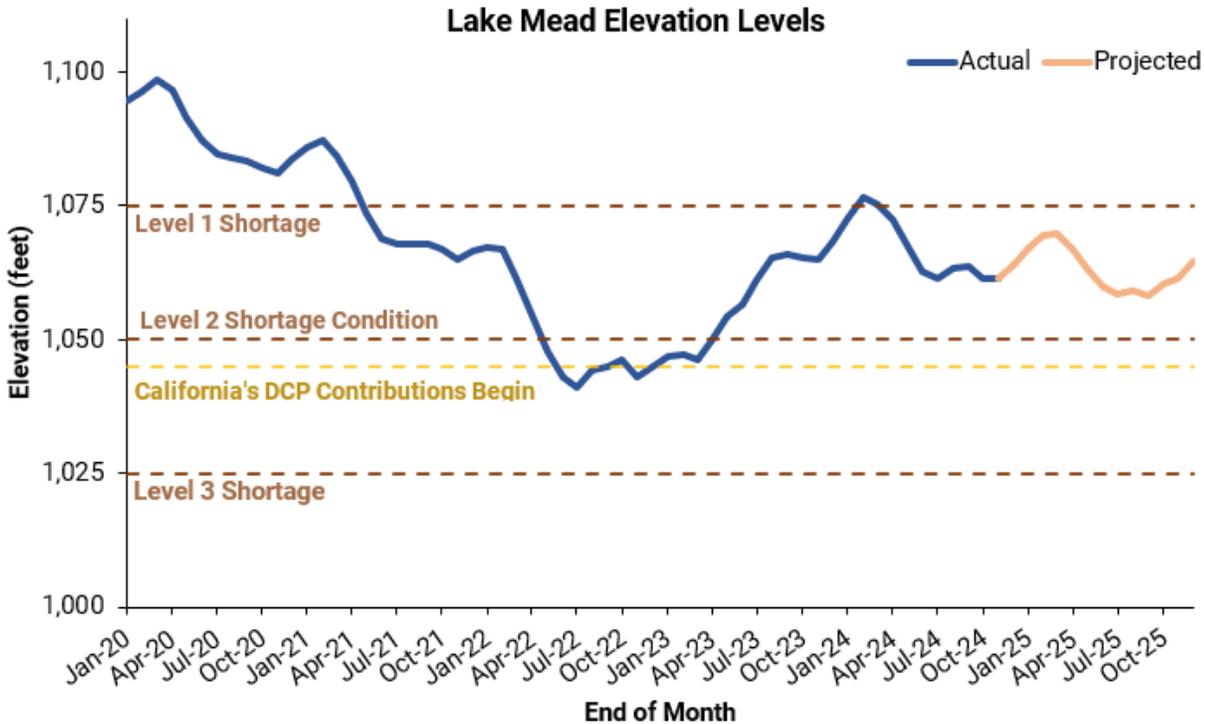
## ***CRA Outlook***

While the Colorado River remains in a decades-long drought, Lake Mead’s elevation levels have shown signs of improvement since reaching a historic low in 2022, as shown in Figure 12. Continuing from calendar year 2024, Lake Mead will operate in a Tier 1 Shortage Condition during calendar year 2025. Metropolitan’s water supplies are not impacted during a Tier 1 shortage. Thus, in the short term, there are no anticipated impacts to Metropolitan’s Colorado River supplies; current projections indicate that no DCP contributions are expected to be required in calendar year 2026.

However, the long-term outlook still contains a significant degree of uncertainty. Several reservoir and water management decisional documents and agreements that govern the operation of Colorado River facilities and management of the Colorado River are scheduled to expire at the end of 2026. These include the 2007 Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead (2007 Interim Guidelines), the 2019 Drought Contingency Plans, as well as international agreements between the United States and Mexico pursuant to the United States-Mexico Treaty on Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande (1944 Water Treaty).

The United States Bureau of Reclamation is undertaking a multi-year NEPA process that will identify a range of alternatives and determine operations for Lake Powell and Lake Mead and other water management actions post-2026 that could last for potentially decades into the future. To address unknown future conditions in the face of climate change, this process will consider a wide range of potential hydrologic conditions informed by historical conditions, paleontological records, climate-model based ensembles, and climate science. Reclamation has stated that they plan to release the set of alternatives that will be evaluated in the Draft EIS for post-2026 Colorado River operations by the end of calendar year 2024 and would undertake the analysis and development of the Draft EIS in the first half of 2025. The outcome of that process is uncertain, however all alternative proposals submitted by basin stakeholders have included reductions in the Lower Basin that have the potential to impact Metropolitan’s supplies. While no consensus alternative has been developed to date, the seven Colorado River Basin States and others will continue to work towards the development of a consensus alternative that can be evaluated in the Final EIS. When a consensus alternative has been determined, it will be incorporated into IRPSIM modeling.

Figure 12 – Lake Mead Elevation Levels



Notes: Metropolitan is required to make Drought Contingency Plan (DCP) contributions in the following year if the August 24-month Study projects Lake Mead’s elevation to be at or below 1,045 feet on January 1. Since the August 2024 24-month Study projected Lake Mead’s elevation to be above 1,045 feet on January 1, 2025, Metropolitan is not required to make DCP contributions in 2025. This figure reflects the latest 24-month study (November 2024) available at the time of this report.

## Storage

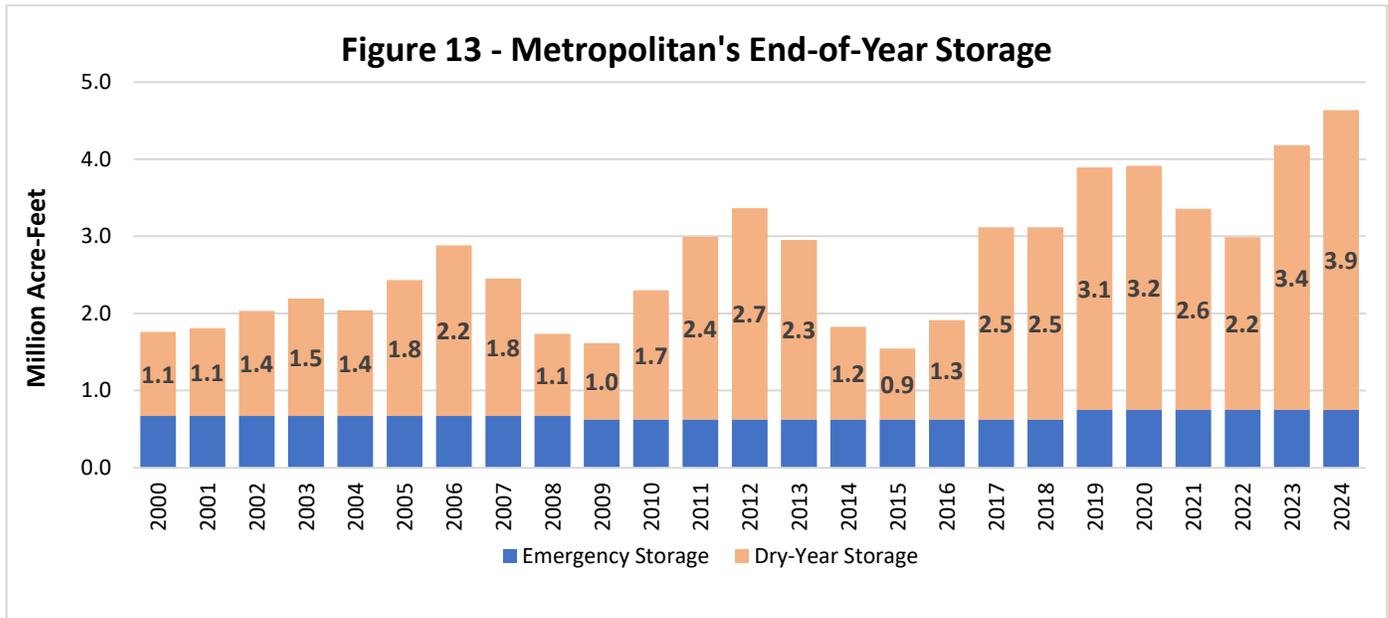
While Metropolitan’s storage is cyclical, the state of storage balances has significant implications for water reliability in both the near term and long term. Stored water is essential in helping Metropolitan balance demand and supply in a given year or within a drought sequence. Since the 2020 IRP, Metropolitan has made great strides with its storage efforts. In particular, Metropolitan has worked to develop operational flexibility and additional SWP storage programs to help further ensure SWP reliability, most notably with the start of operations with the Antelope Valley – East Kern Water Agency (AVEK) High-Desert Water groundwater banking program. Metropolitan continues to explore storage opportunities both within and outside of Metropolitan’s service area.

As detailed in Figure 13 below, Metropolitan’s dry-year storage levels have experienced significant fluctuations over the past five years, driven by varying hydrologic conditions and the corresponding withdrawals and puts into storage. During the previous drought sequence, Metropolitan withdrew roughly a million acre-feet from its dry-year storage accounts and faced emergency drought restrictions within the SWP Dependent Area. The restrictions within the SWP Dependent Area were a result of historic dry conditions within California, as well as limited access to stored supplies for the SWP Dependent Area. Infrastructure constraints had prevented these agencies from accessing sufficient supply from the Colorado River Aqueduct, or from previously stored water in Diamond Valley Lake or Lake Mead.

Metropolitan’s storage balance is on track to begin 2025 with higher starting storage balances than had been assumed in the 2020 Needs Assessment. Wet and above normal water years in water years 2022/2023 and 2023/2024, respectively, enabled significant puts into Metropolitan’s storage accounts, in particular within the SWP Dependent Area. As a result, Metropolitan ended calendar year 2023 with a record high amount of storage and is projected to end calendar year 2024 with another record high, with around 3.9 MAF of dry-year storage. Metropolitan’s storage actions in calendar year 2024 include putting water into Diamond Valley Lake, Metropolitan’s Intentionally Created Surplus account in Lake Mead, and San Luis Reservoir carryover supplies. Additionally, Metropolitan’s groundwater banking programs are expected to have four years of dry-year storage by the end of 2024, with the exception of the AVEK High-Desert Water Bank program, as it remains a relatively new program. More information on the current estimates of Metropolitan’s storage accounts and the maximum put and take capacities for these

storage accounts can be found in the Water Surplus and Drought Management Update report, Attachment 1, dated December 10, 2024.

Through Metropolitan’s diverse and expansive storage accounts, Metropolitan is well positioned for the next drought sequence that may arise. More specifically, Metropolitan’s storage at the end of calendar year 2025 will allow Metropolitan to sustain a repeat of the recent drought sequence, if such a period were to occur. Metropolitan is committed to regional reliability through a balanced portfolio and SWP transfer supplies and new storage opportunities will continue to be pursued by Metropolitan to help ensure a reliable water supply for the SWP Dependent Area in the coming years. Storage of Metropolitan’s Colorado River supplies will continue to be monitored and evaluated in light of the current post-2026 negotiations, which may impact Metropolitan’s Lake Mead ICS stored supplies.



Note:  
2024 end-of-year balance is preliminary as it is subject to DWR adjustments and USBR final accounting. Data as of November 1, 2024.



**THE METROPOLITAN WATER DISTRICT OF  
SOUTHERN CALIFORNIA**

700 North Alameda Street  
Los Angeles, California 90012  
(213) 217-6000

*[mwdh2o.com](http://mwdh2o.com)*

**Hazen**