The Metropolitan Water District of Southern California

Agenda

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.

OW&S Committee

- T. Quinn, Chair
- S. Faessel, Vice Chair
- L. Ackerman
- D. Alvarez
- J. Armstrong
- G. Cordero
- D. De Jesus
- D. Erdman
- L. Fong-Sakai
- M. Gold
- S. Goldberg
- C. Kurtz
- R. Lefevre
- J. Lewitt
- C. Miller
- B. Pressman
- N. Sutley

One Water and Stewardship Committee

Meeting with Board of Directors *

September 9, 2024

2:15 p.m.

Monday, September 9, 2024 Meeting Schedule
09:00 a.m. EOT
11:15 a.m. Break
11:45 a.m. LEG
01:15 p.m. LEGAL
02:15 p.m. OWS

Agendas, live streaming, meeting schedules, and other board materials are available here: https://mwdh2o.legistar.com/Calendar.aspx. Written public comments received by 5:00 p.m. the business days before the meeting is scheduled will be posted under the Submitted Items and Responses tab available here: https://mwdh2o.legistar.com/Legislation.aspx.

If you have technical difficulties with the live streaming page, a listen-only phone line is available at 1-877-853-5257; enter meeting ID: 873 4767 0235.

Members of the public may present their comments to the Board on matters within their jurisdiction as listed on the agenda via in-person or teleconference. To participate via teleconference 1-833-548-0276 and enter meeting ID: 876 9484 9772 or to join by computer click here.

MWD Headquarters Building • 700 N. Alameda Street • Los Angeles, CA 90012
Teleconference Locations:
525 Via La Selva • Redondo Beach, CA 90277
Alandale Insurance Agency • 337 W. Foothill Blvd. • Glendora, CA 91741
Marriott Desert Springs Villa II • 1091 Pinehurst Lane • Palm Desert, CA 92260
Flat 1 • 16 Clifton Road • London, United Kingdom W91SS
Western Municipal Water District • 14205 Meridian Parkway • Riverside, CA 92518
Cedars Sinai Medical Center • 8700 Beverly Boulevard, Room M 313 • Los Angeles, CA 90048
Conference Room • 1545 Victory Boulevard, 2nd Floor • Glendale, CA 91201
5481 Lago Vista Lane • Frisco, TX 75034

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* The Metropolitan Water District's meeting of this Committee is noticed as a joint committee meeting with the Board of Directors for the purpose of compliance with the Brown Act. Members of the Board who are not assigned to this Committee may participate as members of the Board, whether or not a quorum of the Board is present. In order to preserve the function of the committee as advisory to the Board, members of the Board who are not assigned to this Committee will not vote on matters before this Committee.

US2-145

1. Opportunity for members of the public to address the committee on matters within the committee's jurisdiction (As required by Gov. Code Section 54954.3(a))

**** CONSENT CALENDAR ITEMS -- ACTION ****

2. CONSENT CALENDAR OTHER ITEMS - ACTION

A. Approval of the Minutes of the One Water and Stewardship Committee for August 19, 2024 (Copies have been submitted to each Director, any additions, corrections, or omissions) **21-3736**

Attachments: 09092024 OWS 2A (08192024) Minutes

3. CONSENT CALENDAR ITEMS - ACTION

7-4 Authorize the General Manager to enter into agreements with the Plumas Community Protection I Forest Resilience Bond LLC, North Feather I Forest Resilience Bond LLC, and Upper Butte Creek I Forest Resilience Bond LLC to establish watershed partnerships and forest health pilot investigations in the Northern Sierra Nevada; each agreement is not to exceed $200,000 per year for a maximum of two years; the General Manager has determined that the proposed action is exempt or otherwise not subject to CEQA **21-3732**

Attachments: 09102024 OWS 7-4 B-L
09092024 OWS 7-4 Presentation

**** END OF CONSENT CALENDAR ITEMS ****

4. OTHER BOARD ITEMS - ACTION

NONE

5. BOARD INFORMATION ITEMS

9-2 Proposed Modifications to the Reverse-Cyclic Program **21-3734**

Attachments: 09102024 OWS 9-2 B-L
09092024 OWS 9-2 Presentation

9-3 Update on proposed agreements with Western Canal Water District and Richvale Irrigation District for water transfer options and first rights of refusal during 2025 through 2027 **21-3780**

Attachments: 09102024 OWS 9-3 B-L
09092024 OWS 9-3 Presentation

6. COMMITTEE ITEMS

a. Update on Webb Tract Rice Development and Wetland Restoration Projects **21-3742**

Attachments: 09092024 OWS 6a Presentation

b. Update on Conservation as a California Way of Life **21-3743**

Attachments: 09092024 OWS 6b Presentation

c. Update on Conservation **21-3744**

Attachments: 09092024 OWS 6c Presentation

d. Update On State Water Project Overview **21-3781**

Attachments: 09092024 OWS 6d Report
09092024 OWS 6d Presentation

7. MANAGEMENT ANNOUNCEMENTS AND HIGHLIGHTS

a. Bay-Delta Resources activities **21-3737**
Colorado River Resources activities
Sustainability, Resilience and Innovation activities
Water Resource Management activities

Attachments: 09092024 OWS 7a Bay-Delta Resources Activities
09092024 OWS 7a Colorado River Resources Activities
09102024 OWS 7a Sustainability, Resilience, and Innovation Activities
09092024 OWS 7a Water Resources Management Monthly Activities

8. COMMITTEE REPORTS

a. Report on the Delta Conveyance Design and Construction Authority Meeting **21-3738**

b. Report on Delta Conveyance Finance Authority Meeting **21-3739**

c. Report on the Bay-Delta Ad Hoc Meeting **21-3740**

9. SUBCOMMITTEE REPORTS AND DISCUSSION

a. Discuss and provide direction to Subcommittee on Demand Management and Conservation Programs and Priorities **21-3741**

10. FOLLOW-UP ITEMS

NONE

11. FUTURE AGENDA ITEMS

12. ADJOURNMENT

NOTE: This committee reviews items and makes a recommendation for final action to the full Board of Directors. Final action will be taken by the Board of Directors. Committee agendas may be obtained on Metropolitan's Web site https://mwdh2o.legistar.com/Calendar.aspx. This committee will not take any final action that is binding on the Board, even when a quorum of the Board is present.

Writings relating to open session agenda items distributed to Directors less than 72 hours prior to a regular meeting are available for public inspection at Metropolitan's Headquarters Building and on Metropolitan's Web site https://mwdh2o.legistar.com/Calendar.aspx.

Requests for a disability-related modification or accommodation, including auxiliary aids or services, in order to attend or participate in a meeting should be made to the Board Executive Secretary in advance of the meeting to ensure availability of the requested service or accommodation.

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

MINUTES

ONE WATER AND STEWARDSHIP COMMITTEE

August 19, 2024

Chair Quinn called the meeting to order at 3:00 p.m.

Members present: Directors Ackerman, Alvarez, Armstrong, De Jesus (teleconference posted location), Fong-Sakai, Erdman, Faessel, Goldberg, Kurtz (entered after rollcall), Lefevre (teleconference posted location), Lewitt, Miller, Pressman (teleconference posted location), Quinn, and Sutley.

Members absent: Director Cordero

Other Board Members present: Directors Dennstedt, Gold (teleconference posted location), Luna, McMillan, Morris, Ortega, Seckel, and Smith.

Committee Staff present: Bednarski, Crosson, Goshi, Hasencamp, Hawk, Munguia, Schlotterbeck, Upadhyay, and Wheeler.

1. OPPORTUNITY FOR MEMBERS OF THE PUBLIC TO ADDRESS THE COMMITTEE ON MATTERS WITHIN THE COMMITTEE'S JURISDICTION

1. Karl Rogers, Sierran Supra Community on Environment, spoke on item 9-2.

CONSENT CALENDAR ITEMS -- ACTION

2. CONSENT CALENDAR OTHER ITEMS -- ACTION

A. Approval of the Minutes of the One Water and Stewardship Committee Meeting for July 9, 2024.

3. CONSENT CALENDAR ITEMS – ACTION

None.

Director Kurtz entered the meeting room.

Director Sutley made a motion, seconded by Director Erdman, to approve the consent calendar consisting of item 2A.

Ayes:	Directors Ackerman, Alvarez, Armstrong, De Jesus, Erdman, Faessel, Fong-Sakai, Goldberg, Kurtz, Lefevre, Lewitt, Miller, Pressman, and Sutley
Noes:	None
Abstentions:	Director Quinn.
Absent	Director Cordero.

The motion for item 2A passed by a vote of 14 ayes, 0 noes, 1 abstention, and 1 absent.

END OF CONSENT CALENDAR ITEMS

4. OTHER BOARD ITEMS – ACTION

Director Miller read a disclosure statement regarding item 8-1, stating that he would not vote, including abstaining.

Director Fong-Sakai read a disclosure statement regarding item 8-1, stating that she would not vote, including abstaining.

Director Goldberg read a disclosure statement regarding item 8-1, stating that she may participate in the item.

Director Smith read a disclosure statement regarding item 8-1, stating that he would not vote, including abstaining. Director Smith is not a committee member.

8-1	Subject:	Authorize the General Manger to enter into a: (1) a forbearance agreement with Coachella Valley Water District, Imperial Irrigation District, Palo Verde Irrigation District, and the City of Needles to allow water conserved under the U.S. Burea of Reclamation's conservation program to be added to Lake Mead; and (2) an agreement with Imperial Irrigation District and San Diego County Water Authority under U.S. Bureau of Reclamation's conservation program to add water conserved by Imperial Irrigation District to Lake Mead that would otherwise accrue to San Diego County Water Authority; the General Manager has determined that the proposed actions are exempt or otherwise not subject to CEQA
	Presented by:	Laura Lamdin, Engineer, Water Resource Management

Motion:	Authorize the General Manager to enter into: (1) a forbearance agreement with Coachella Valley Water District, Imperial Irrigation District, Palo Verde Irrigation District, and the City of Needles to allow water conserved under the U.S. Bureau of Reclamation’s conservation program to be added to Lake Mead; and (2) agreements with Imperial Irrigation District and San Diego County Water Authority under Reclamation’s conservation program to add water conserved by Imperial Irrigation District to Lake Mead that would otherwise accrue to San Diego County Water Authority

Mr. Bill Hasencamp, Manager, Colorado River Resources provided background information and introduced this presentation.

Ms. Lamdin gave a presentation on the proposed action to to enter into agreements to allow water to be added to Lake Mead pursuant to funding provided by the U.S. Bureau of Reclamation’s Lower Colorado Conservation Program. These agreements demonstrate how multi-agency partnerships can benefit the Colorado River.

After completion of the presentation, Director Sutley made a motion, seconded by Director Erdman, to approve option 1 of the board letter.

The vote was:

Ayes:	Directors Ackerman, Alvarez, Armstrong, De Jesus, Erdman, Faessel, Goldberg, Kurtz, Lefevre, Lewitt, Pressman, Quinn, and Sutley.
Noes:	None.
Not voting:	Directors Fong-Sakai and Miller.
Absent:	Director Cordero.

The motion for item 8-1 passed by a vote of 13 ayes, 0 noes, 2 not voting, and 1 absent.

5. BOARD INFORMATION ITEMS

9-2 Subject: Update on proposed agreement with the Plumas Community Protection I Forest Resilience Bond LLC, North Feather I Forest Resilience Bond LLC, and Upper Butte Creek I Forest Resilience Bond LLC to establish watershed partnerships and forest health pilot investigations in North Sierra Nevada; each agreement will not exceed $200,000 per year for a maximum of two years.

Presented by: Jennifer Nevills, Manager, Program Manager, Bay-Delta Initiatives

Nina Hawk, Manager, Bay-Delta Initiatives provided background information and introductory comments.

Ms. Nevills gave a presentation on watershed agreements would help Metropolitan assess the potential benefits and value of investments in watershed health through pilot investigations, while advancing the relevant science and building relationships within the watersheds.

The following Directors provided comments or asked questions:

1. Miller
2. Sutley
3. Lefevre
4. Gold
5. Fong-Sakai
6. Erdman
7. Lewitt
8. Kurtz

Staff responded to Directors questions and comments.

6. COMMITTEE ITEMS

a. Subject: Science Update: Salmon Reorienting to Recovery

Presented by: Alison L. Collins, Sr. Resource Specialist, Bay-Delta Initiatives

Ms. Hawk provided background information and introductory comments.

Ms. Collins gave a presentation on Salmon Reorienting to Recovery Project status.

Director Sutley left the meeting at 3:57 p.m.

b. Subject: Approaches for Securing Dry-Year Water Transfers

Presented by: Sarah J. Bartlett, Program Manager, Water Resource Management

Brandon Goshi, Interim Manager, Water Resource Management provided background information and introductory comments.

Ms. Bartlett gave a presentation on past practices and current challenges in securing dry-year water transfers via State Water Project facilities.

c. Subject: Update on Chino Basin Program Development with Metropolitan and Inland Empire Utilities Agency

Presented by: Areeba Syed, Engineer, Water Resource Management

Ms. Syed gave an abbreviated presentation that included a brief program overiew and recent activity.

d. Subject: Update on Conservation

Presented by: Karina Sandique, Associate Resource Specialist, Water Resource Management

Ms. Sandique gave an update on Conservation expenditures and activity.

Chair Quinn requested an update next month on lifetime statistics on device and turf replacements.

e. Subject: CAMP4W Policies, Initiatives, and Partnerships Discussion

Presented by: Liz Crosson, Chief Sustainability, Resiliency, and Innovation Officer

Ms. Crosson provided a presentation on the development of a Climate Adaptation Policy Framework for Board Approval in early 2025.

Chair Quinn requested for this item to return next month to allow more time for Directors to provide feedback.

The following Directors provided comments or asked questions:

1. Ackerman
2. Alvarez
3. Ortega
4. Smith
5. Seckel
6. Fong-Sakai

7. MANAGEMENT ANNOUNCEMENTS AND HIGHLIGHTS

a. Subject: Bay-Delta Resources, Colorado River Resources, Sustainability, Resilience and Innovation, and Water Resource Management activities

Presented by: John Bednarski, Interim Assistant General Manager, Water Resources and Technical Services
Liz Crosson, Chief Sustainability, Resiliency, and Innovation Officer

Mr. Bednarski reported on the timelines for hearings for Sites Reservoir water rights, and Delta Conveyance water rights.

8. COMMITTEE REPORTS

a. Report on the Delta Conveyance Design and Construction Authority Meeting

Director Luna provided a report from the Delta Conveyance Design and Construction Authority Meeting held on August 15, 2024.

b. Report on Delta Conveyance Finance Authority Meeting

There was none.

c. Report on Bay-Delta Ad Hoc Meeting

Director McMillan provided a report on three Bay-Delta Ad Hoc Meetings held on July 1, 2024, July 15, 2024, and August 5, 2024.

9. SUBCOMMITTEE REPORTS AND DISCUSSION

a. Discuss and provide direction to Subcommittee on Demand Management and Conservation Programs and Priorities

Director Armstrong commented on proposed future meetings for that committee. Chair Quinn requested that staff coordinate a meeting with Accelerate Resilience Los Angeles on stacked incentives report.

10. FOLLOW-UP ITEMS

None.

11. FUTURE AGENDA ITEMS

None.

12. ADJOURNMENT

The next meeting will be held on August 19, 2024.

The meeting adjourned at 5:52 p.m.

Tracy Quinn
Chair

- **Board of Directors**
  One Water and Stewardship Committee

9/10/2024 Board Meeting

7-4

Subject

Authorize the General Manager to enter into agreements with the Plumas Community Protection I Forest Resilience Bond LLC, North Feather I Forest Resilience Bond LLC, and Upper Butte Creek I Forest Resilience Bond LLC to establish watershed partnerships and forest health pilot investigations in the Northern Sierra Nevada; each agreement is not to exceed $200,000 per year for a maximum of two years; the General Manager has determined that the proposed action is exempt or otherwise not subject to CEQA

Executive Summary

Staff is seeking authorization to enter into agreements with Upper Butte Creek I Forest Resilience Bond (FRB) LLC, North Feather I FRB LLC and Plumas Community Protection I FRB LLC in amounts not to exceed $200,000 per year each for a maximum of two years. These agreements would be funded from the approved FY 2024/25-FY 2025/26 Bay-Delta Initiatives Grant/Donation budget.

Staff has been exploring upper Bay-Delta watershed partnerships in support of Metropolitan's One Water approach and Bay-Delta Policies to improve water supply resiliency in the face of climate change. Supplies from the Bay-Delta watershed are integral to implementing Metropolitan's water supply portfolio and Metropolitan's One Water approach. Impacts of climate change include changes in hydrology (wetter and drier periods than experienced historically) and wildfire risk threatening water supply reliability and water quality that Metropolitan relies upon. 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, along with other source supplies from the Bay-Delta watershed that Metropolitan relies upon, such as critical dry year supplemental supplies (e.g., Yuba Accord transfer water).

Consistent with the Board's adopted Bay-Delta Policies, staff has advanced efforts to participate in three distinct and complimentary watershed partnerships to assess the potential water supply and water quality benefits of various watershed management techniques (pilot investigations). The proposed partnerships support pilot investigations facilitated by Blue Forest, a 501(c)(3) nonprofit and developer of the FRB conservation finance model. Metropolitan would enter into agreements with LLCs which are subsidiaries of Blue Forest and were developed to finance portions of larger watershed programs and projects being led by the United States Department of Agriculture (USDA) Forest Service. The primary purpose of the proposed programs and projects led by the USDA Forest Service is to reduce the risk of wildfire impacts to communities and critical infrastructure (including State Water Project infrastructure).

Metropolitan staff and Blue Forest have identified a suite of potential water supply and water quality benefits that could accrue once the programs and projects have been implemented. Metropolitan's investment at this time would ensure that the programs and projects, subject to the agreements, would be implemented such that the potential water supply and water quality benefits would be assessed and reported. Evaluating the potential water supply and water quality benefits of watershed health treatments over the next two years would provide valuable information to guide: Metropolitan's future policies, potential and existing investments related to the State Water Project or supplemental water supplies, and future legislative and regulatory development by state and federal administrations and agencies. Other funding partners are specific to each LLC and are listed below. Blue Forest has successfully implemented similar watershed partnerships in the upper Yuba and Mokelumne watersheds in the past.

- Upper Butte Creek I FRB LLC - up to $200,000 per year in FY 2024/25 and FY 2025/26
- North Feather I FRB LLC - up to $200,000 per year in FY 2024/25 and FY 2025/26
- Plumas Community Protection I FRB LLC – up to $200,000 per year in fiscal year (FY) 2024/25 and FY 2025/26

The key deliverable for each agreement will be an Annual Impact Report. These reports will summarize pilot investigation outcomes, including those associated with water supply and other key information. In addition, these pilot investigations will create opportunities for additional science, foster collaborative relationships in the upper watersheds, and establish a methodology for valuing ecosystem services to help inform Metropolitan's potential future participation in upper watershed health initiatives to help inform Metropolitan's future policies, potential and existing investments related to the State Water Project or supplemental water supplies, future legislative and regulatory development by state and federal administrations and agencies.

Proposed Action(s)/Recommendation(s) and Options

Staff Recommendation: Option #1

Option #1

Authorize the General Manager to enter into agreements with the Plumas Community Protection I Forest Resilience Bond LLC, North Feather I Forest Resilience Bond LLC, and Upper Butte Creek I Forest Resilience Bond LLC to establish watershed partnerships and forest health pilot investigations in the Northern Sierra Nevada, each agreement is not to exceed $200,000 per year for a maximum of two years.

Fiscal Impact: The total fiscal impact would be $1.2 million over the term of the biennial budget; $200,000 per year, per agreement, for two years. These funds were included in the approved FY 2024/25-FY 2025/26 Bay-Delta Initiatives Grant/Donation budget and therefore would not require a budget adjustment.
Business Analysis: These agreements would initiate pilot investigations into the potential benefits and value to Metropolitan of investments in Northern Sierra Nevada watershed health projects. In addition, these agreements would help strengthen relationships in the upper watersheds and advance the associated science.

Option #2

Do not authorize the General Manager to enter into agreements with the Plumas Community Protection I Forest Resilience Bond LLC, North Feather I Forest Resilience Bond LLC, and Upper Butte Creek I Forest Resilience Bond LLC at this time.
Fiscal Impact: Not approving these agreements would likely result in unspent funds that were included in the approved FY 2024/25-FY 2025/26 Bay-Delta Initiatives Grant/Donation budget.
Business Analysis: Under this option, Metropolitan would not initiate pilot investigations to evaluate the potential benefits of investments in Northern Sierra Nevada watershed health projects. This option would forego the opportunity to strengthen relationships in the upper watersheds and advance the associated science.

Applicable Policy

Metropolitan Water District Administrative Code Section 8121: General Authority of the General Manager to Enter Contracts

Metropolitan Water District Administrative Code Section 11104: Delegation of Responsibilities

Metropolitan Water District Administrative Code Section 8140: Competitive Procurement

By Minute Item 53012, dated October 11, 2022, the Board adopted the revision and restatement of Bay-Delta Policies.

Related Board Action(s)/Future Action(s)

None

California Environmental Quality Act (CEQA)

CEQA determination for Option #1:

The proposed action to enter into agreements is not defined as a project under CEQA because it involves organizational or administrative activities; government fiscal activities; and/or general policy and procedure making that will not result in direct or indirect physical changes in the environment. (Public Resources Code Section 21065; State CEQA Guidelines Section 15378(b)(2), (4) and (5)).

CEQA determination for Option #2:

None required

Details and Background

Background

Over the past few years, staff has been exploring upper watershed partnerships in support of Metropolitan's One Water approach and Bay-Delta Policies to improve water supply resiliency in the face of climate change. Staff has kept the Board apprised of developments related to watershed health and watershed partnerships. In September and October 2022, these concepts were discussed as part of the Revision and Restatement of Bay-Delta Policies process. In January 2023, Yuba Water Agency General Manager Willie Whittlesey presented on their North Yuba Forest Partnership Resilience Bond investments at One Water and Stewardship Committee (OWS Committee). And in March 2023, staff provided an update to the OWS Committee seeking direction from the Board to pursue pilot investigations in the Northern Sierra Nevada. The three proposed agreements funding pilot investigations, presented as an informational item to the OWS Committee in August 2024, represent a first step towards building better relationships in the upper watersheds, furthering science related to quantifying the benefits of forest management actions and valuing the potential benefits to Metropolitan of investments that promote improved forest health in the upper watersheds of the Bay-Delta.

Overview of Importance/Relevance of Watershed Health

State Water Project supplies and water transfers from the Bay-Delta watershed are integral to implementing Metropolitan's One Water approach. Such supplies are foundational to the One Water approach as they meet demands in Metropolitan's service area, help ensure drought resilience in conjunction with Metropolitan's storage portfolio and provide a high level of water quality that supports salinity management goals and the production of key local supply sources in the region. With much of the state's water supply originating in the mountains, the health and management of the upper watersheds are critically important to California's water quality and water supply.

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. Over the last decade, major catastrophic wildfires including the Camp Fire (2018), North Complex Fire (2020), Dixie Fire (2021) and Beckwourth Complex Fire (2021) have burned more than 1.5 million acres of land in the Feather River Watershed, which is more than 65 percent of the watershed. Investments in watershed health in the Northern Sierra Nevada that reduce the risk of catastrophic wildfire may contribute to improved imported water source resilience for the State Water Project and sources of water transfers. Potential benefits of investments in upper watershed health include:

- <u>Resilience to Climate Variability</u> – Healthy forests are more resilient to climate extremes, such as droughts and heavy rains, ensuring more stable and reliable water supplies.
- <u>Enhanced Water Supply</u> – Forests regulate the flow of water by absorbing rainfall, reducing runoff, and increasing groundwater recharge. This helps maintain water supplies during dry periods.

- Improved Water Quality – Healthy forests filter pollutants, reduce sedimentation, and enhance water quality.
- Biodiversity and Ecosystem Services – Forests support diverse ecosystems that provide essential services, such as cold-water habitats for temperature-sensitive aquatic species.
- Carbon Sequestration – Forests act as carbon sinks, capturing CO2 from the atmosphere and helping to mitigate climate change impacts.
- Fire Risk Reduction - Healthy, well-managed forests are less susceptible to catastrophic wildfires, which can damage watersheds and infrastructure, leading to costly repairs and water contamination.

Metropolitan's Guiding Policies

The proposed watershed partnerships and associated pilot investigations support several elements of Metropolitan's Bay-Delta Policy Objectives and Framework that were adopted by the Board in October 2022, including:

- Promoting a sustainable Bay-Delta within Metropolitan's One Water approach.
- Addressing the risks associated with climate change.
- Protecting and restoring aquatic species and habitats based on best available science.
- Partnering in watershed-wide approaches to develop comprehensive solutions.
- Maintaining and pursuing cost-effective financial investments.
- Fostering broad and inclusive engagement of Delta interests and beneficiaries.
- Promoting innovative and multi-benefit initiatives.

Overview of Funding

Metropolitan has the opportunity to participate in three distinct and complimentary watershed partnerships. Funding would come from Bay-Delta Initiatives' Grant/Donation Expense funds, which were approved under the current biennial budget. This budget category is intended for cost-share contributions through collaborative partnerships with other agencies and academic institutions that pursue studies that are of interest to Metropolitan.

The proposed pilot investigations would be facilitated by Blue Forest, a 501(c)(3) nonprofit and developer of the FRB. The FRB is a conservation finance model specifically designed to add new revenue streams to fund forest restoration and finance project costs. The three partnerships would be contracted through sole-source agreements with three different FRB LLCs. Each is a separate and distinct subsidiary of Blue Forest.

- Upper Butte Creek I Forest Resilience Bond LLC – The pilot Upper Butte Creek I FRB LLC will be launched in early 2025, contingent upon a signed National Environmental Policy Act (NEPA) record of decision for the Upper Butte Creek Forest Health Initiative. Funding would be provided by Metropolitan to the Upper Butte Creek I FRB LLC to support financing of the Upper Butte Creek I FRB. Metropolitan's maximum funding contribution would be $400,000 over FY 2024/25 and FY 2025/26, and the Upper Butte Creek I FRB would finance up to $5 million of initial work on the landscape. Upon success, this initial investment could unlock further opportunities within the Upper Butte Creek Watershed. A scaled FRB could finance up to $40 million to restore and protect 20,000 acres. Other potential FRB financing partners currently include the Wildlife Conservation Board, CalFire, the National Fish and Wildlife Foundation, and the Sierra Nevada Conservancy. As the project is implemented, Metropolitan would work with Blue Forest to assess the potential water flow, water quality, and aquatic ecosystem benefits and economic impacts within the Upper Butte Creek Watershed.

- North Feather I Forest Resilience Bond LLC -– The pilot North Feather I FRB LLC will be launched in late 2024 or early 2025, contingent upon a signed NEPA record of decision for the North Fork Forest Recovery Project. Funding would be provided by Metropolitan to the North Feather I FRB LLC to support financing of the North Feather I FRB. Metropolitan's maximum funding contribution would be

$400,000 over FY 2024/25 and FY 2025/26. While funding commitments are still being finalized, we expect The North Feather I FRB would leverage public and private funds to finance up to $3.5 million of initial work on the landscape. Upon success, this initial investment could unlock further opportunities within the Feather River Watershed. A scaled FRB could finance up to $50 million of restoration activities to restore up to 12,000 priority acres within the 167,000-acre North Fork Forest Recovery Project. Other potential FRB financing partners currently include USDA Forest Service - Plumas National Forest, Cal Fire, Sierra Institute, Pacific Gas & Electric Company (PG&E), and the California Department of Water Resources (DWR). As the project is implemented, Metropolitan would work with Blue Forest to conduct pilot investigations to assess the potential water supply and quality benefits and economic impacts within the Feather River Watershed.

- Plumas Community Protection I Forest Resilience Bond LLC– The pilot Plumas Community Protection I FRB LLC will be launched in late 2024 or early 2025, contingent upon a signed NEPA record of decision. Funding would be provided by Metropolitan to the Plumas Community Protection I FRB LLC to support financing of the Plumas Community Protection I FRB. Metropolitan's maximum funding contribution would be $400,000 over FY 2024/25 and FY 2025/26. Similar to the other two pilot projects, a pilot Plumas Community Protection I FRB would finance critical restoration and protection work on the landscape. While pilot footprint and funding commitments are still being finalized, it is estimated the Plumas Community Protection I FRB could finance the restoration activities to protect 9,000 to 39,000 acres within the 240,000-acre Plumas Community Protection Project. Other potential FRB financing partners currently include the USDA Forest Service Wildlife Crisis Strategy, PG&E, and DWR. As the project is implemented, Metropolitan would work with Blue Forest to conduct pilot investigations to assess the potential water supply and quality benefits and economic impacts within the Feather River Watershed.

Although there was a structured decision-making process used to select these specific partnership opportunities, these contracts would be made through sole-source agreements per Administrative Code Section 8140(1)(d). As described in Section 8140(1)(d), Metropolitan may enter sole-source agreements "[i]f competitive procurement could not produce an advantage, or it is impracticable to obtain what is required subject to the competitive procurement provisions because of the unique, exploratory, or experimental nature of the work." Blue Forest created the FRB financing model and is the only entity currently facilitating this type of investment in the Northern Sierra Mountains.

The Forest Resilience Bond Model

To launch an FRB, Blue Forest partners with communities, land managers, governments, and nonprofits to develop a finance plan and facilitate the development of an implementation team to manage the work on the ground that will ultimately improve forest and watershed health. Blue Forest also works with beneficiaries to evaluate the benefits of a potential project and uses this information to establish an economic, social, and environmental case for funding. The FRB is then brought to private investors, like foundations and institutional asset managers, who provide capital to finance the project work. This means critical financing is available up-front for restoration projects, enabling them to happen at a faster pace and larger scale. The primary goals of the FRB model are to:

- Provide up-front funding needed for project work to enable faster implementation.
- Smooth cash flows to enable consistent and ongoing work.
- Blend public and private funding sources to streamline administration.
- Quantify ecosystem benefits to attract new, flexible funding streams for the implementation of forest and watershed restoration projects.
- Develop long-term contracts that support local restoration economies.
- Leverage federal and state funding sources.

The use of the FRB financing model to implement large-scale forest health initiatives has been increasing, with several projects completed, underway, and under development in California, Oregon, and Washington. For example, the Yuba I and Yuba II FRBs helped catalyze the formation of the North Yuba Forest Partnership, a partnership of nine federal, Tribal, state, local government agencies, and nonprofits focused on forest restoration across 275,000 acres of public and private lands in the North Yuba River Watershed. The Yuba I FRB was launched in 2018, and restoration work was completed in 2023. The Yuba I FRB protected and restored 15,000 acres in the upper headwaters of the North Yuba River Watershed. Building on the success of the Yuba I FRB, the Yuba II FRB was launched in 2021 and finances an additional 28,000 acres of treatment activities such as thinning, prescribed burning, hardwood regeneration, invasive species removal, and other forms of ecological restoration.

Proposed Pilot Investigations

The selection of these watershed partnership opportunities was facilitated through a structured decision-making process (**Attachment 1 and Attachment 2**). Each partnership targets different aspects of potential watershed management activities that could improve water supply resiliency of supplies from the Bay-Delta watershed, including conditions for anadromous fish, water quality, water supply and improved forest health.

Upper Butte Creek I Forest Resilience Bond LLC

Funding would be provided by Metropolitan to the Upper Butte Creek I FRB LLC to support financing of the Upper Butte Creek I FRB. As the project is implemented, Blue Forest would conduct pilot investigations to assess the potential benefits of the project to Metropolitan. Butte Creek supports the largest self-sustaining, naturally spawning, wild population of spring-run Chinook salmon in the Central Valley. This investment would also complement past investments made by Metropolitan and others to improve fish passage on lower Butte Creek.

The Upper Butte Creek Forest Health Initiative will restore and protect 20,000 acres within the Upper Butte Creek Watershed. The Upper Butte Creek Watershed was specifically chosen because this area has high biodiversity values, proximity to communities, committed partnership opportunities, and risk of severe wildfire. Other potential FRB financing partners include the Wildlife Conservation Board, CalFire, the National Fish and Wildlife Foundation, and the Sierra Nevada Conservancy. Potential local partners include the Lassen National Forest, the South Lassen Watershed Group, and the Butte County Resource Conservation District.

Forest health treatments planned through the Upper Butte Creek I FRB include general forest thinning, prescribed fire, meadow and aspen restoration, and trail development. A quarter of the project area will restore and reforest areas burned by the 2021 Dixie Fire. These treatments yield numerous benefits to the Lassen National Forest and nearby communities by restoring overly dense forests to a resilient state, encouraging a more natural fire return interval, protecting water supply, and increasing carbon sequestration.

North Feather I Forest Resilience Bond LLC

Funding would be provided by Metropolitan to the North Feather I FRB LLC to support financing of the North Feather I FRB. As the project is implemented, Metropolitan would work with Blue Forest to conduct pilot investigations to assess the potential benefits of the project to Metropolitan.

The North Fork Recovery Project will restore and protect up to 12,000 acres as part of the 167,000-acre North Fork Forest Recovery Project. This project provides an opportunity to accelerate post-Dixie Fire recovery to build resilience for the landscape and surrounding communities. Other potential FRB financing partners include USDA Forest Service - Plumas National Forest, Cal Fire, Sierra Institute, PG&E and DWR. Potential local partners include the Sierra Institute and the Plumas National Forest.

Forest health treatments planned through the North Feather I FRB include general forest thinning, prescribed fire, fuels reduction, reforestation, invasive species management, stream restoration, and recreation improvements. These treatments yield numerous benefits to the Plumas National Forest and nearby communities by restoring overly dense forests to a resilient state, encouraging a more natural fire return interval, protecting water supply, and increasing carbon sequestration. The post-fire nature of this project makes it vital for activities to happen as quickly as possible, making funding available to speed along implementation even more critical than in some other projects.

Plumas Community Protection I Forest Resilience Bond LLC

Funding would be provided by Metropolitan to the Plumas Community Protection I FRB LLC to support financing of the Plumas Community Protection I FRB. As the project is implemented Metropolitan would work with Blue Forest to conduct pilot investigations to assess the potential benefits of the project to Metropolitan. As the source of much of State Water Project water supplies, the Feather River Watershed is of significant importance to Metropolitan's current and future water supplies.

At its full scale, the FRB would finance the restoration and protection of up to 39,000 acres within the total 240,000-acre Plumas Community Protection Project. In addition to directly supporting long-term reliability of the State Water Project, the Feather River Watershed was specifically chosen as this area has high biodiversity values, proximity to communities, committed partnership opportunities, and risk of severe wildfire. Potential FRB financing partners include PG&E and DWR. In addition, the Plumas National Forest has received Wildfire Crisis Strategy funding for the Plumas Community Protection Project, and there is $278 million in federal funding that requires a 5 percent match to deploy. Potential local partners include the National Forest Foundation, the Feather River Resource Conservation District, the Mule Deer Foundation, and the Plumas National Forest.

Forest health treatments planned through the Plumas Community Protection I FRB include general forest thinning, prescribed fire, meadow and aspen restoration, and trail development. These treatments yield numerous benefits to the Plumas National Forest and nearby communities by restoring overly dense forests to a resilient state, encouraging a more natural fire return interval, protecting water supply, and increasing carbon sequestration.

Benefits to Metropolitan

The deliverables for each cost-share agreement will be an FRB Annual Impact Report developed by Blue Forest. These Reports will summarize pilot investigation outcomes, including those associated with water supply and other key information. For each pilot investigation, Blue Forest will analyze and report in the FRB Annual Impact Report the annual and cumulative quantities of:

- Water supply protected.
- Contributions to local economic growth and job creation.
- Contributions to local community protection.
- Plant and animal species protected.
- Land area of forest, meadow, and invasive plant treatments implemented.
- Terrestrial ecosystems restored and protected.

In addition, these pilot investigations will create opportunities for additional science, foster collaborative relationships in the upper watersheds, and establish a methodology for valuing ecosystem services to help inform Metropolitan's potential future participation in upper watershed health initiatives.

Project Milestones

The FRB Annual Impact Report for each pilot investigation will be provided to Metropolitan annually beginning in 2025.

8/28/2024

Nina E. Hawk *Date*
Chief, Bay-Delta Resources

9/3/2024

Deven Upadhyay *Date*
Interim General Manager

Attachment 1 – Project Decision-Making Memo

Attachment 2 – Benefit Analysis Results

Ref# eo12696876

Memo: Project Decision Making Process Utilized on August 16, 2023

Created by Blue Forest for Metropolitan Water District

Blue Forest developed a decision-making process to help Metropolitan Water District (Met Water) members narrow down the list of potential projects to consider funding through a Forest Resilience Bond (FRB). Seven projects were initially considered based on their proximity to the State Water Project and potential impacts on the Bay Delta. Met Water worked with Blue Forest to prioritize four projects for further consideration and analysis using a number of materials, including a spreadsheet of information about each project as well as maps depicting the wildfire hazard potential and water benefits on each project's landscape.

This memo details this process and the rationale behind the selection of the four projects about which Met Water and Blue Forest will continue discussions.

Step One: Determining Criteria Importance

In the spring of 2023, Met Water and Blue Forest discussed various components of restoration projects that might make a project a funding priority for Met Water. Eight criteria were identified through these discussions: Primary Benefits to Met Water, Collaboration, Terrestrial Species Benefitted, ESA-listed Salmonids, Tributaries, Service Area Connection, Other Project Benefits, and Timeline.

The first step of the decision-making process utilized on August 16 was for Met Water members to consider the relative importance of each of these project criteria, culminating in an assignment of scores ranging from 1-3 for each criterion (with 3 being assigned to the criteria of most importance, and 1 to the criteria of least importance). Met Water staff assigned the following weights to each of the eight criteria: 3 to the Primary Benefits to Met and ESA-listed Salmonids criteria, 2.5 to Collaboration, 2 to Service Area Connection and Other Project Benefits, 1.5 to Timeline, and 1 to Terrestrial Species Benefitted. The Tributaries category was not weighted (and therefore discarded as a criterion), as the information conveyed by this criterion was already captured by the ESA-listed Salmonids criterion.

Step Two: Identifying Projects That Best Meet Criteria

Each Met Water member individually considered the spreadsheet of information and maps of water benefits and wildfire hazard potential provided by Blue Forest for each project area to narrow down the top two projects that they believed best met each criterion.

These decisions were visually depicted through colored-coded sticky notes: each Met Water member received 14 sticky notes, with two of each color according to the seven criterion (again, Tributaries was no longer being used as a criterion). In each color pair, one sticky note had a "1" on it (indicating best), and the other had a "2" on it (indicating second-best). Eight sticky notes, each with a project name on it, had been set up by Blue Forest on a wall of the conference room, and Met Water members put sticky notes under the projects corresponding to what they believed were the best and second-best project for meeting each of the seven criteria. A picture of this process can be seen in *Appendix A: Sticky Note Activity.*

Four projects (West Lassen Headwaters, Upper Butte Creek Forest Health Initiative, West Shore Community Protection Project, and Plumas National Forest Community Protection Project) dominated in terms of the numbers of sticky notes corresponding with them — meaning that these four were the most preferred according to the seven criterion.

Met Water members discussed their choices for each project criterion. Following this discussion, it was unanimously agreed that the three projects that had *not* received the majority of sticky note votes would no longer be considered. The few votes cast for these projects were then reassigned to the top four projects (for example, the “1” that the Texas Vegetation Management/Nyack project received in the “Other Project Benefits” category was reassigned to a different project, in this case the Plumas National Forest Community Protection Project). The completion of this vote reassignment resulted in six votes *per criterion* across the top four projects, with three votes designating projects that best met the criterion, and three votes designating projects that second best met the criterion. This can be seen in *Appendix B: Results of Sticky Note Activity.*

Step Three: Scorecard Ranking Activity

Each of the voting assignments were converted into a score. Votes of 1 (best) were assigned a score of 2, and votes of 2 (second-best) were assigned a score of 1, such that higher scores indicated better-ranked projects. Following this conversion, the scores in each box of the matrix were added up (for example, three sticky notes labeled “1” would translate to a combined score of 6), resulting in a matrix in which each of the four projects was given a score for how well it met each criterion, with higher scores indicating a project that better met a certain criterion.

These scores were then multiplied by the criterion weighting assigned in step 1, and these products were summed, to determine a final score for each of the projects, again with higher scores indicating better projects. As shown in *Appendix C: Final Scores Matrix*, Upper Butte Creek Forest Health Initiative scored the highest, with Plumas National Forest Community Protection Project coming in second, West Lassen Headwaters a close third, and West Shore Community Protection Project coming in a rather distant fourth.

Step Four: Final Scores Discussion

Met Water members agreed with the scores and project rankings given their thinking around how well each project met the different criteria. To get a better sense of how criterion weighting affected these scores, the criterion weights were toggled to perform a sensitivity analysis (for example, Service Area Connection being bumped from a 2 to a 3), and results consistently indicated that the Plumas Community Protection Project, Upper Butte Creek, and West Lassen Headwaters were all the most-preferred, although toggling the scores sometimes switched the order of first, second, and third place ranking among these projects.

The initial intention of the exercise was to determine the top two or three projects for Met Water to consider for contributing funding. However, although the West Shore Community Protection Project was ranked lower than all the others, after some discussion it was decided that this project would continue to be considered as well as the other three. This decision was made for three reasons:

1. The project performed well in meeting some of the most important criteria, as evidenced by the fact that toggling of criteria importance decreased the gap in scores between this project and the other projects.
2. Given the smaller size of the project, Met Water’s potential funding contribution to the project could close a larger portion of the funding gap compared to some of the other larger projects.
3. The project is already in implementation whereas the other three projects won’t begin implementation until late 2024 or early 2025.

The decision-making activities resulted in four projects that Met Water will further consider for potential funding contributions. With this narrowed-down list, Blue Forest will now provide Met Water with more detailed scientific and economic analyses to help determine which one or two of these projects might best meet Met Water’s financial, ecological, and other organization goals.

Appendix

Appendix A: Sticky Note Activity

Appendix B: Results of Sticky Note Activity (Screenshot)

	A	B	C	D	E	F	G	H
1	*Weighting*	2	3	2.5	1	3	2	1.5
2		**Other Project Benefits**	**Primary Benefits to Met**	**Collaboration**	**Species Benefitted**	**ESA-Listed Salmonids**	**Service Area Connection**	**Timeline**
3	**West Lassen Headwaters**	2,2	1,2	2,2	2,2,2	1,2,2	2	
4	**Upper Butte Creek Forest Health Initiative**	2		1,1	1,1,1	1,1,2		1 2,2
5	**West Shore Community Protection Project**		1, 2	2			1,1	1,1
6	**Community Protection Project**	1,1,1	1,2	1			1 2,2	2

Appendix C: Final Scores Matrix (Screenshot)

	A	B	C	D	E	F	G	H	I
1	*Weighting*	2	3	2.5	1	3	2	1.5	
2		**Other Project Benefits**	**Primary Benefits to Met**	**Collaboration**	**Species Benefitted**	**ESA-Listed Salmonids**	**Service Area Connection**	**Timeline**	**Score**
3	**West Lassen Headwaters**	2	3	2	3	4	1		**35**
4	**Upper Butte Creek Forest Health Initiative**	1		4	6	5		4	**39**
5	**West Shore Community Protection Project**		3	1			4	4	**25.5**
6	**Community Protection Project**	6	3	2			4	1	**35.5**

Benefit Analysis Results

Created by Blue Forest for Metropolitan Water District *July 2024*

Overview of Modeling and Analysis

Blue Forest's analysis focused on three benefits associated with the planned activities of each project: water volume (via reduced evapotranspiration), water quality (via reduced sedimentation risk), and decreased risk of high-severity wildfire. Analysis activities were completed using the Natural Climate Solutions (NCS) Toolbox developed by the Center for Ecosystem Climate Solutions (CECS). See Appendix 1 for more information about the NCS Toolbox.

The tables in the following section summarize contextual information about each project and benefit analysis results. Please note that, while the models used are built on sophisticated and rigorous research, the actual benefit values that result from project implementation may vary from the values presented in this document.

Summary of Benefits Analyzed:

- ***Water Volume:*** increased water yield as measured by decreased evapotranspiration.
- ***Water Quality:*** the decrease in sediment deposition in bodies of water, which in turn affects infrastructure that processes and intakes water. The tool has some limitations and these numbers should only be used as a comparative metric between projects. See Appendix 1 for more information.
- ***Flame Length:*** a metric that informs the wildfire hazard potential (WHP) and rate of spread from a potential wildfire. Decreased flame length indicates a lower WHP and rate of spread.

Project Profiles and Analysis Results

<table>
<tr><th colspan="3">Upper Butte Creek Forest Health Initiative (Lassen National Forest)</th></tr>
<tr><td>Basic information</td><td colspan="2">• 20,079 acres in the Lassen NF
• Forest thinning, prescribed fire, meadow/aspen restoration, trail development
• A quarter of the project area will restore and reforest areas burned by the 2021 Dixie Fire
• NEPA decision expected spring 2025, implementation can begin soon thereafter</td></tr>
<tr><td>Notable details</td><td colspan="2">• This project scored the highest during the August 16, 2023 Met prioritization exercise</td></tr>
<tr><td>Funding and collaboration</td><td colspan="2">• Current funder(s): Wildlife Conservation Board Forest Conservation Program, Dept of Conservation Forest Health Watershed Coordinator funding, private foundations, National Fish and Wildlife Foundation CA Forests & Watersheds Program, seeking additional funding from Sierra Nevada Conservancy
• Local partners: South Lassen Watershed Group, Butte County RCD</td></tr>
<tr><td>Salmonids & habitat impact</td><td colspan="2">• Additional water flows and water quality protection for ecological purposes (largest self-sustaining, naturally spawning, wild population of spring-run Chinook salmon in the Central Valley)
• TNC's Salmonscape map shows that the Butte Creek watershed is a high priority for salmonid conservation, particularly the northeastern portion of the watershed (adjacent to the Lower Feather watershed)
• Protected spotted owl and goshawk habitat</td></tr>
<tr><th colspan="3">Estimate of Benefits</th></tr>
<tr><td>Wildfire Benefits</td><td colspan="2">Average Flame Length Reduction (percent): 77%</td></tr>
<tr><td>Water Benefits</td><td>Volume: 2,500 acre feet (AF) of reduced evapotranspiration (0.12 AF/acre)</td><td>Quality: 37% decrease in post-fire sedimentation risk</td></tr>
</table>

North Fork Forest Recovery Project (Plumas National Forest)	
Basic information	• 166,889 acres in the Plumas NF • Post-fire restoration activities: prescribed fire, thinning, hazard tree removal, reforestation, invasive species management, and hydrological improvements • Within the Feather River Watershed • NEPA decision expected in spring 2025, implementation to begin soon thereafter
Notable details	• This project is almost entirely comprised of post-fire restoration activities, following the 2021 Dixie Fire
Funding and collaboration	• Current funders: FS Wildfire Crisis Strategy funding, CALFIRE • Local partners: Sierra Institute • Other potential beneficiaries have expressed interest in this project, including PG&E and CA DWR
Salmonids & habitat impact	• TNC's Salmonscape map shows a portion of the Lower Feather watershed along the Sacramento River as high priority for salmonid conservation
Estimate of Benefits	
Wildfire Benefits	Average Flame Length Reduction: 9.18%
Water Benefits	Volume: 26,317 AF of reduced evapotranspiration (0.16 AF/acre)

<table>
<tr><th colspan="3">Plumas Community Protection Project (Plumas National Forest)</th></tr>
<tr><td>Basic information</td><td colspan="2">• 250,000 acres in the Plumas NF
• Focused on reducing the potential for extreme fire behavior in the wildland urban interface and improving road systems for community egress
• Implementation will begin in 2025</td></tr>
<tr><td>Notable details</td><td colspan="2">• Acreage will be further refined over time, likely larger than 250k when the Forest finalizes planning</td></tr>
<tr><td>Funding and collaboration</td><td colspan="2">• Current Funders: Plumas NF has $278M in federal funds that will require a 5% match to deploy
• PG&E is also considering funding contributions on this landscape
• Adding resources would help leverage an already well-funded project</td></tr>
<tr><td>Salmonids & habitat impact</td><td colspan="2">• TNC's Salmonscape map shows portions of the Lower Feather, Battle, Paynes, Singer, and Big Chico watersheds as high priority for salmonid conservation (steelhead and Chinook salmon)</td></tr>
<tr><th colspan="3">Estimate of Benefits</th></tr>
<tr><td>Wildfire Benefits</td><td colspan="2">Average Flame Length Reduction: 80%</td></tr>
<tr><td>Water Benefits</td><td>Volume: 36,400 AF of reduced evapotranspiration (0.48 AF/acre)</td><td>Quality: 4% decrease in post-fire sedimentation risk</td></tr>
</table>

Appendix 1: Information and Resources about the CECS Tool[1]

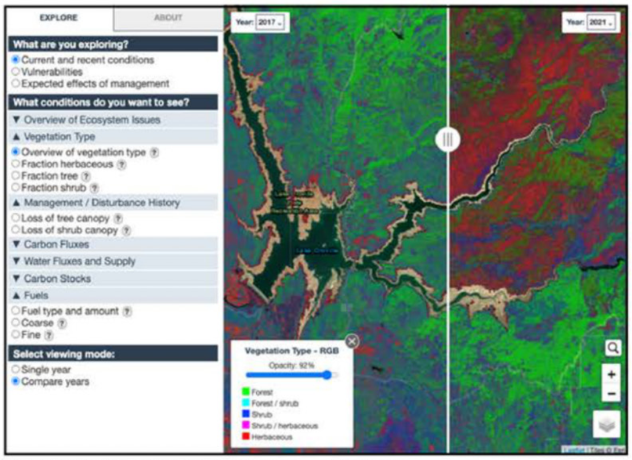


Figure 2: *The DataAtlas tool visualizes CECS-original data.*

The DataAtlas is an online visualization tool that displays select ecosystem data at 30-m resolution statewide. Every data layer within this tool is an original CECS product, and was created using the DataEngine. The DataAtlas allows users to get an overview of ecosystem conditions, compare years, forecast general outcomes of potential management, and identify areas of interest for further analysis using the DataBridge.

View the DataAtlas here: https://cecs.ess.uci.edu/data-atlas/

The DataBridge tools allow a user to select and export ecosystem data from the DataEngine to a user's preferred analysis software. Users select data based on their needs, including for planning, prioritization, or monitoring. Data files can be statewide or for a specific area. The DataBridge creates formatted tables, time series, or shapefiles that can be imported into software such as ArcGIS, QGIS, Excel, R, or ForSys. This tool is best for advanced users with working knowledge of one of these software tools, as well as experience in landscape. Contact CECS for more information.

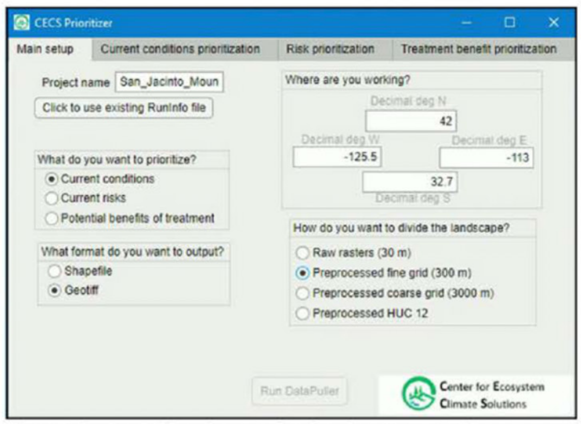
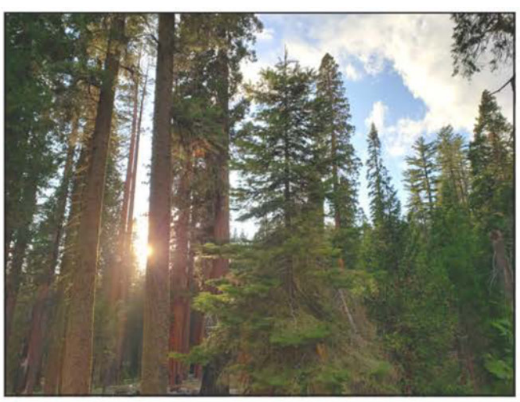


Figure 3: *The DataBridge tool extracts data based on a user's needs.*



We'd like to collaborate!
Please reach out with your input and ideas.

Contact: ecosystemclimate@ess.uci.edu
Director: Michael Goulden, UC Irvine, mgoulden@uci.edu
Co-Director: Roger Bales, UC Merced, rbales@ucmerced.edu

https://california-ecosystem-climate.solutions/
@CA_CECS

Rev. August 2022

Center for Ecosystem Climate Solutions

CECS is supported by the California Strategic Growth Council's Climate Change Research Program with funds from California Climate Investments—Cap-and-Trade Dollars at Work.

California Strategic Growth Council

California Climate Investments — Cap and Trade Dollars at Work

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One Water & Stewardship Committee

Watershed partnerships and forest health pilot investigations in the Northern Sierra Nevada

Item 7-4

September 9, 2024

Item 7-4
Watershed Agreements

Subject

Authorize the General Manager to enter into agreements with the Plumas Community Protection I Forest Resilience Bond LLC, North Feather I Forest Resilience Bond LLC, and Upper Butte Creek I Forest Resilience Bond LLC to establish watershed partnerships and forest health pilot investigations in the Northern Sierra Nevada; each agreement is not to exceed $200,000 per year for a maximum of two years.

Purpose

These agreements would help Metropolitan assess the potential benefits and value of investments in watershed health through pilot investigations, while advancing the relevant science and building relationships within the watersheds.

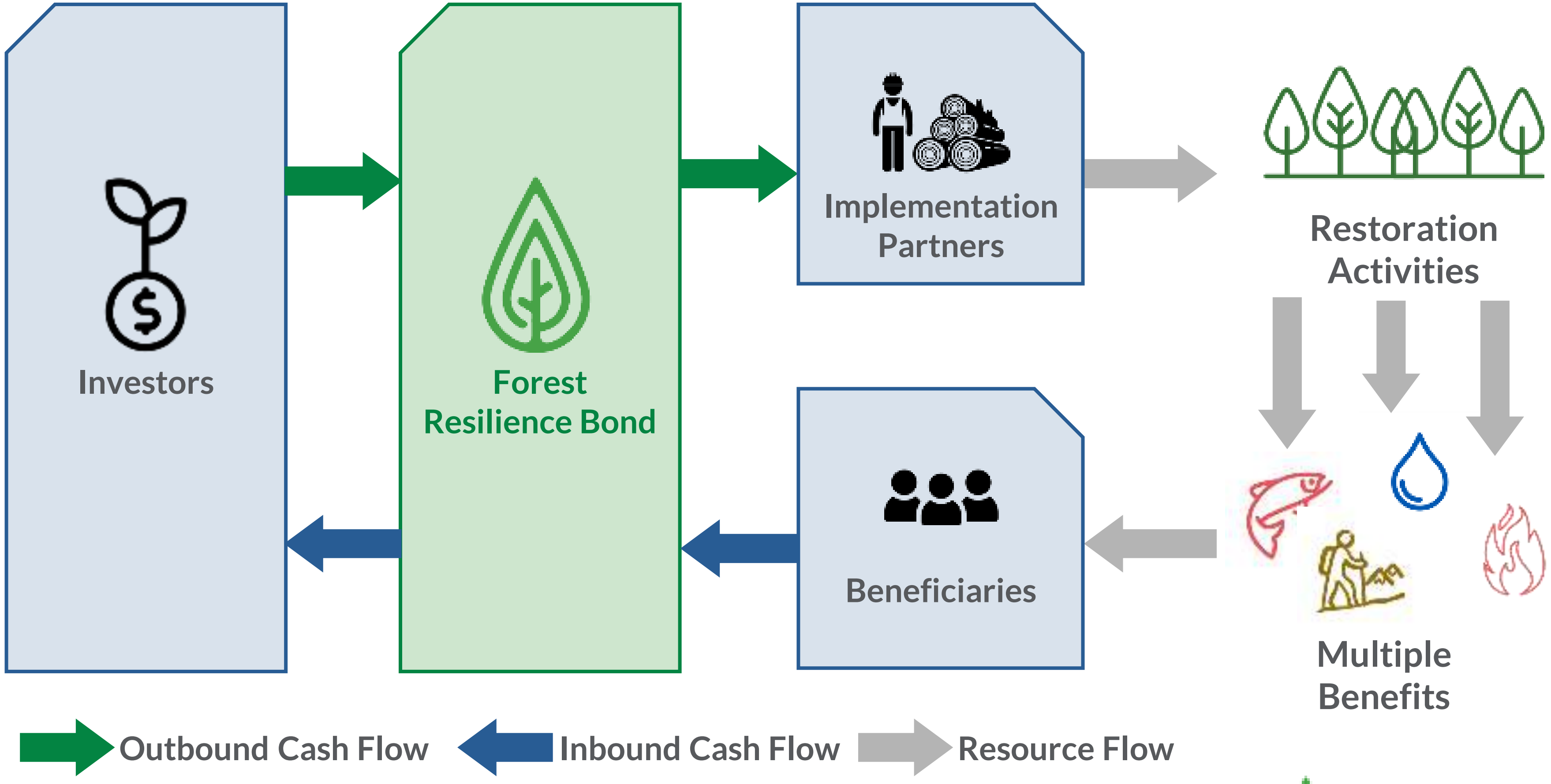
Recommendation and Fiscal Impact

Authorize the General Manager to enter into agreements with the Plumas Community Protection I Forest Resilience Bond LLC, North Feather I Forest Resilience Bond LLC, and Upper Butte Creek I Forest Resilience Bond LLC, each agreement is not to exceed $200,000 per year for a maximum of two years. These funds were included in the approved FY 2024/25-FY 2025/26 Bay Delta Initiatives Grant/Donation budget and therefore would not require a budget adjustment.

Budgeted

Blue Forest

Forest Resilience Bond



FOREST RESILIENCE BOND

Upper Butte Creek I Forest Resilience Bond

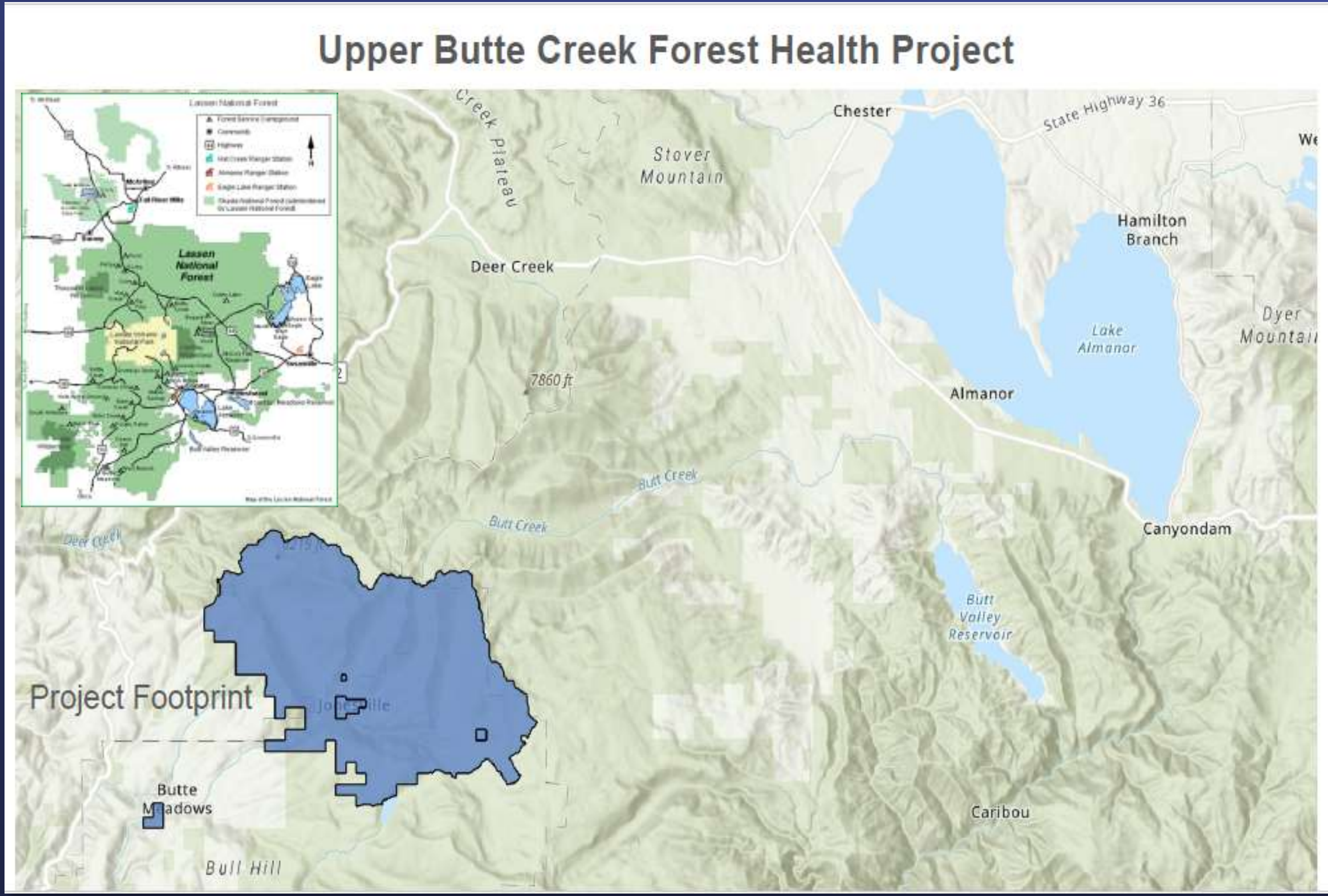
Focus on potential benefits to aquatic species

Full Project
20,000 acres

Initial FRB
~$5 million

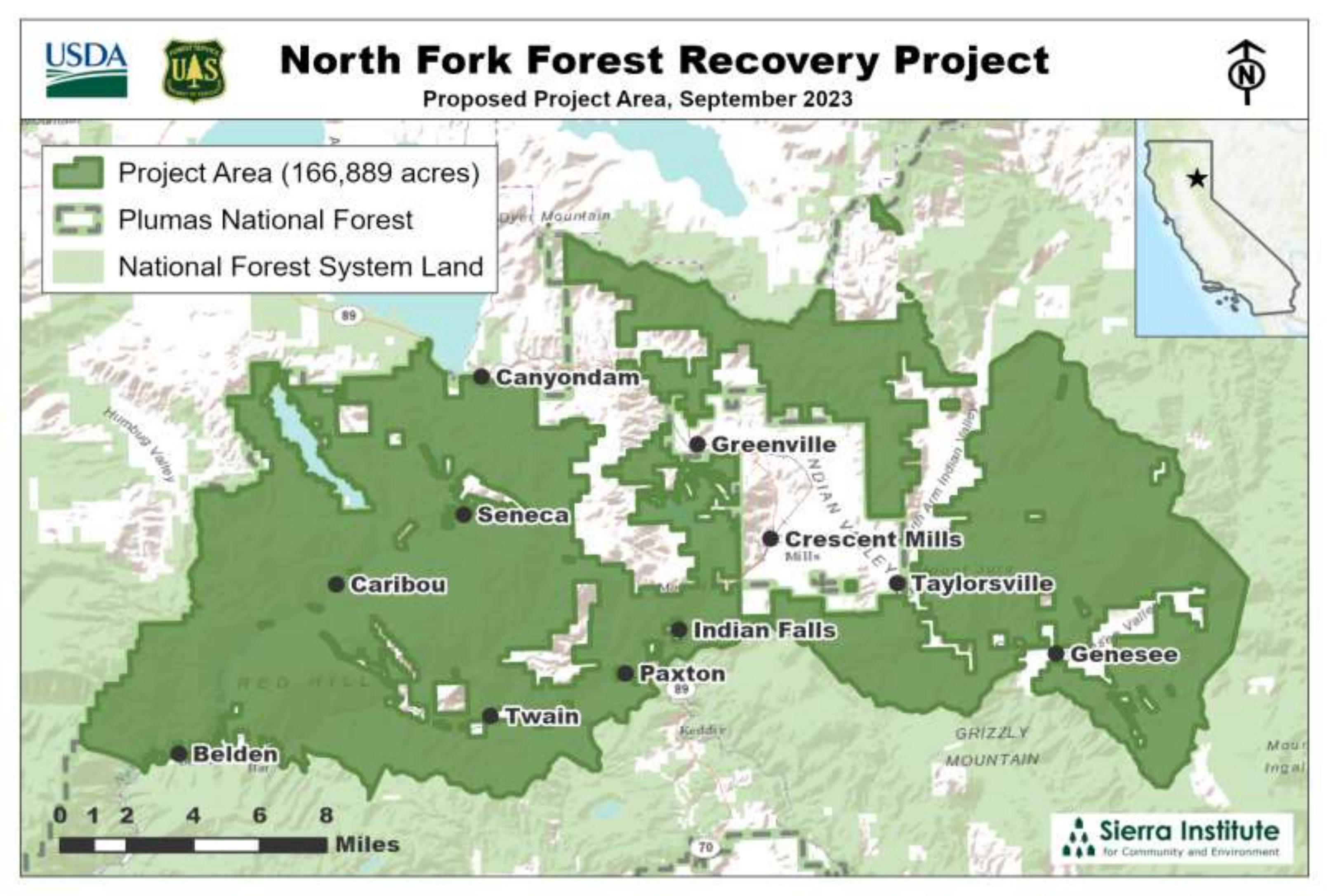
Potential FRB Partners
CalFire, NFWF, Wildlife Conservation Board, Sierra Nevada Conservancy

Local Partners
Lassen NF, South Lassen Watershed Group, Butte County RCD



North Feather I Forest Resilience Bond

Focus on potential benefits of post-fire recovery



Full Project
167,000 acres

Initial FRB
~$3.5 million

Potential FRB Partners
Plumas NF, CalFire, Sierra Institute, PG&E, DWR

Local Partners
Sierra Institute, Plumas NF

Plumas Community Protection I FRB

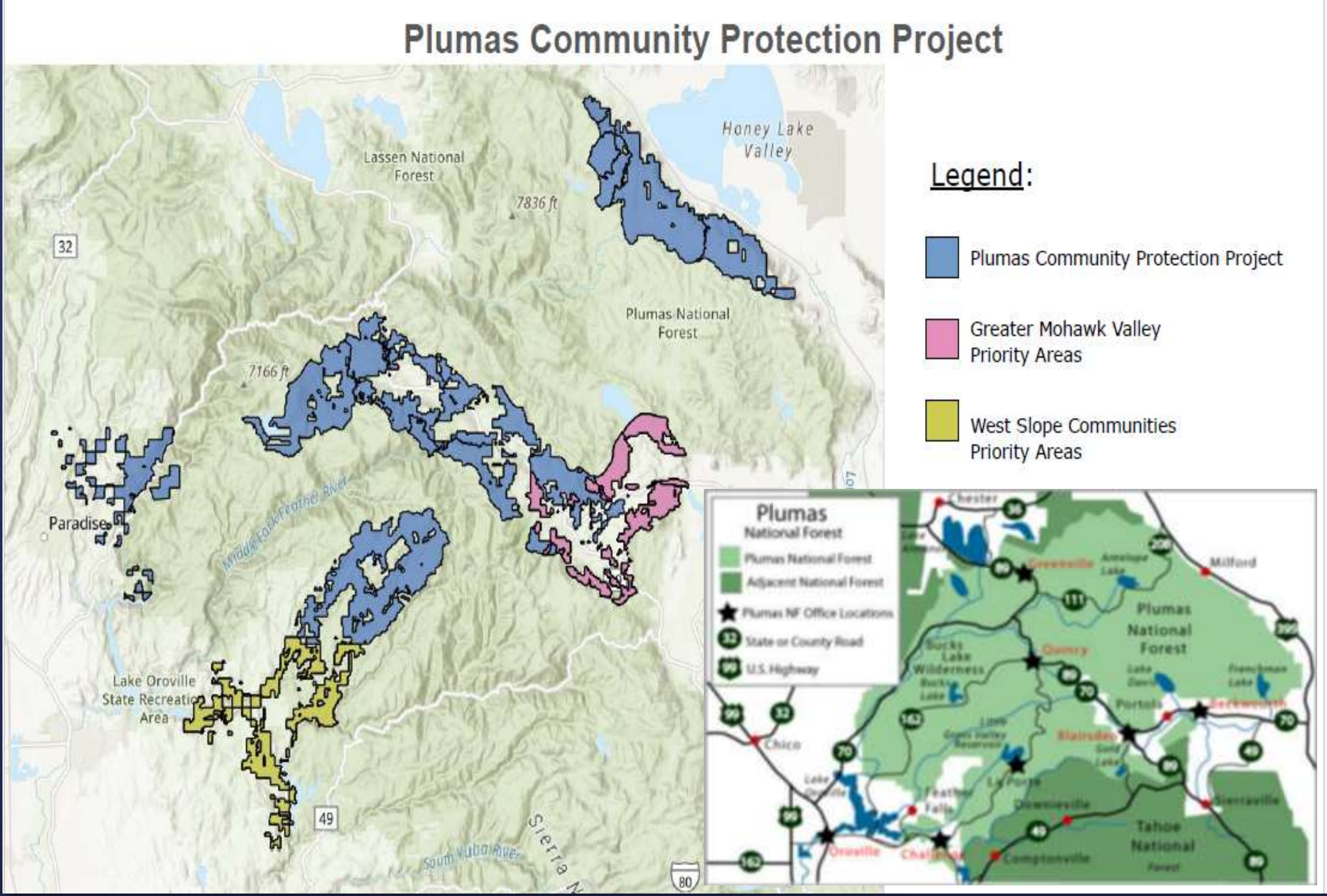
Focus on potential benefits of green forest protection

Full Project
240,000 acres

Initial FRB
Up to 39,000 acres

Potential FRB Partners
PG&E, DWR

Local Partners
National Forest Foundation, Feather River RCD, Mule River RCD, Mule Deer Foundation, Plumas NF



August Committee Input

- Minimize Financial & Implementation Risk
  - Protections will be provided in contract provisions
  - Spending contingent on successful Forest Resilience Bonds
  - Ensure overhead and administrative costs are minimized
- Ensure Project Outcomes
  - Implementation of restoration and management actions
  - Pilot Investigations will help quantify and value potential benefits
- Be Mindful of Budget Concerns
  - Funding in approved Bay-Delta science budget
  - Future investments should include additional partners (e.g. State & Federal contractors, other PWA's, associations)

Item 7-4
Watershed Agreements

Next Steps

- Updates on implementation progress and Pilot Investigation findings at future One Water & Stewardship Committee meetings

Board Options

Option 1

- Authorize the General Manager to enter into agreements with the Plumas Community Protection I Forest Resilience Bond LLC, North Feather I Forest Resilience Bond LLC, and Upper Butte Creek I Forest Resilience Bond LLC, to establish watershed partnerships and forest health pilot investigations in the Northern Sierra Nevada; each agreement is not to exceed $200,000 per year for a maximum of two years

Option 2

- Do not authorize the General Manager to enter into agreements with the Plumas Community Protection I Forest Resilience Bond LLC, North Feather I Forest Resilience Bond LLC, and Upper Butte Creek I Forest Resilience Bond LLC at this time

Item 7-4
Watershed Agreements

Item 7-4
Watershed Agreements

Staff Recommendation

- Option 1

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Board Information

- **Board of Directors**
  One Water and Stewardship Committee

9/10/2024 Board Meeting

9-2

Subject

Proposed Modifications to the Reverse-Cyclic Program

Executive Summary

This report provides information on potential modifications to the Reverse-Cyclic Program ("Program"). The Program allowed member agencies to purchase and pay for water and defer the actual delivery of water to a later year. The Program helped to preserve Metropolitan's limited State Water Project ("SWP") supplies in calendar year ("CY") 2022 while preserving current year revenues. The Program implemented in CY 2022 was designed to manage the particular conditions that year. Because staff recognizes that the Program can be effective in managing both water supply conditions and revenue requirements, staff is proposing a modified Reverse-Cyclic Program to defer deliveries of purchased water under various water supply conditions. Under the modified program, the General Manager would have the authorization and discretion to initiate the program similarly to the Cyclic Program – when supplies are available for this Program – or when Metropolitan must preserve supplies during drought years. In wet years when member agencies are unable to accept Metropolitan deliveries due to capacity limitations or in dry years when Metropolitan must preserve limited available stored supplies, member agencies would be able to purchase water at that year's full-service rate for deferred delivery in a future year.

Fiscal Impact

None expected. The difference in revenues due to increases in the full-service rate between the time of purchase and the time of delivery is anticipated to be offset with savings to Metropolitan that would accrue from having to acquire water during drought years. In wet years, Metropolitan would increase its sales revenue by recording a full-service rate transaction when a delivery cannot take place due to capacity constraints.

Applicable Policy

Metropolitan Water District Administrative Code Section 11104: Delegation of Responsibilities

Metropolitan Water District Administrative Code Section 4209: Contracts

Metropolitan Water District Administrative Code Section 4507: Billing and Payment of Water Deliveries

By Minute Item 43514, dated April 13, 1999, the Board adopted the Water Surplus and Drought Management Plan.

Related Board Action(s)/Future Action(s)

By Minute Item 52707, dated February 8, 2022, the Board authorized the General Manager to enter into reverse-cyclic agreements with participating agencies to preserve the availability of State Water Project supplies to Metropolitan. Staff will bring an action for consideration next month.

Staff plans to bring the proposed modifications to the Reverse Cyclic Program to the Board for approval in October 2024.

Details and Background

Background

Metropolitan is on track to end CY 2024 with record-high dry-year storage levels of 3.7 million acre-feet. This accomplishment follows three unprecedented drought years, nine atmospheric rivers that saturated Metropolitan's service area, a 100 percent SWP allocation, and a 40 percent SWP allocation. As conditions changed from dry to wet, Metropolitan has experienced lower sales and a corresponding decrease in revenue.

During the 2020-2022 drought, Metropolitan's Board of Directors ("Board") took actions to mitigate historically low SWP allocations by authorizing programs to preserve limited SWP stored supplies. In February 2022, the Board approved the Reverse-Cyclic Program to allow member agencies to purchase water in CY 2022 for delivery in a future year. Member agencies paid the full-service rate in effect at the time of purchase, generating revenue that Metropolitan would not have received without the Program. The Reverse-Cyclic Program ended on December 31, 2022.

In the year that followed, Metropolitan began to refill Diamond Valley Lake for the first time in three years and has subsequently been storing water in its various out-of-region banking programs, local storage accounts via the Cyclic Program, and other storage reserves. In CY 2023, demands remained low due to the overall cooler weather and capacity constraints resulting from the atmospheric rivers that refilled member agency reservoirs and replenishment basins. Metropolitan continues to experience low demands as some member agencies continue to be unable to accept planned Metropolitan deliveries due to having to manage their high local supplies. For example, member agencies with high local supplies have been unable to accept planned deliveries this year due to capacity constraints. To mitigate these capacity impacts, staff proposes modifying the Reverse-Cyclic Program to allow member agencies to purchase water for future delivery. Allowing the purchases now generates full-service sales revenue to help increase the decrease in water demands Metropolitan is experiencing this biennium and ensures future movement of water Metropolitan is currently storing.

Proposed Modifications to the Reverse-Cyclic Program

Staff is proposing modifications to the 2022 Reverse-Cyclic Program that would make it a standing program that could be initiated and implemented at the General Manager's discretion with no additional Board authorization required. These proposed modifications would provide staff with additional flexibility to allow the purchase of water and defer deliveries under various water supply conditions and would provide the General Manager with the authority to enter into agreements with the member agencies without requiring Board action for each separate agreement. Staff will evaluate the supply and demand conditions through the Water Surplus and Demand Management (WSDM) process and provide a WSDM recommendation to the General Manager when there is a need to initiate the Program. In the years the General Manager initiates the Program, these agreements will allow member agencies to purchase water for delivery in a future dry or wet year per the terms described in this report.

General Terms

The following conditions would apply each year – wet or dry - the General Manager initiates the Reverse-Cyclic Program:

- The member agency's purchase may not exceed the difference between its highest annual purchase in any of the prior five years and the projected deliveries to the member agency in the year the Program is implemented.
- Metropolitan will bill the member agency at the full-service water rate in effect, plus the treatment charge if applicable, at the time of the purchase.
- Metropolitan will include member agency purchases under the Program as allocated supply under a Metropolitan Water Supply Allocation Plan implementation or any other allocation or shortage program that may be implemented.

- When Metropolitan determines water is available to deliver to participating agencies, Metropolitan would deliver water to reduce the deferment balance incurred under the Program.
    - Metropolitan, at its sole discretion, shall determine when the water may be returned.
    - Deliveries will be negotiated based on the conditions for Metropolitan and the conditions for the member agency but will not exceed five full calendar years from the date of purchase unless the Parties mutually agree to a different delivery schedule.
    - Metropolitan will make best efforts to prioritize deliveries to the member agency if there is a critical need; for example, the groundwater storage basin reaches low levels where wells are not operable, or the basin reaches emergency storage levels.
    - Metropolitan will not apply any losses to the pre-purchased water if the water is delivered within five years or if delivered after five years due to Metropolitan's inability to deliver the water within that time period. If Metropolitan is unable to deliver the pre-purchased water within five years due to the member agency's inability to receive the water, then losses shall be applied to the pre-purchased water at a rate of 20 percent per year.
- Each year the Program is initiated, the GM will determine the supplies available for the Program based on water supply, hydrologic, financial, and operational conditions.

Metropolitan will consider member agency purchases under the Program to be part of the member agency's Revised Base Firm Demand for the year of the purchase. Purchases made under this Program will be included in the determination of the member agency's Readiness-to-Serve Charge at the time of purchase but will not be included in the determinations of the Capacity Charge because the deferred delivery will be completed at Metropolitan's discretion.

Initiating Dry Year Pre-Sales

The Program would be initiated in a dry year when the General Manager determines that the supply conditions warrant deferring the use of limited stored supplies due to the risk of shortage. For example, the Program may be initiated when there is a need to strategically work with the member agencies to reduce deliveries to help preserve limited available supplies and to avoid additional resource and operational costs that would be necessary without demand deferment. Metropolitan proposes offering the Program in dry years under the following conditions:

- The member agency and Metropolitan agree to defer Metropolitan deliveries of water purchased to allow Metropolitan to preserve limited stored supplies.
- When the General Manager initiates the Program to preserve limited stored supplies, Metropolitan would certify that the purchase reduces deliveries.

Initiating Wet Year Pre-Sales

The Program would be initiated when the General Manager deems it necessary to pre-sell water in wet years with SWP allocations of 40 percent or higher. For example, the General Manager may initiate the Program at times when Metropolitan is unable to complete deliveries due to member agency capacity constraints or limitations. Metropolitan proposes offering the Program in wet years under the following conditions:

- The member agency and Metropolitan agree to defer Metropolitan deliveries of water purchased.
- Metropolitan and the member agency agree on a baseline purchase of normal demands for the agency over five years.
- The delivery of pre-sold water to a member agency shall not reduce Metropolitan's full-service water sales in the year the water is delivered. Certification of Reverse-Cyclic deliveries could be limited if the member agency does not achieve projected full-service deliveries as determined by Metropolitan for that year.

Reporting and Billing

Metropolitan regularly reports to the Board on developing supply and demand conditions through WSDM Plan reports. Staff provides these monthly reports through the winter and spring and keeps the Board apprised of developing conditions, including the potential use of storage assets and the likelihood of storing or withdrawing supplies. Implementation of the Program will be incorporated into this regular reporting. Under the Program, Metropolitan will bill the member agency the full-service water rate plus the treatment charge, if applicable, at the time of the purchase. Under the Program, billing will occur before delivery is made, modifying the timing of billing required under Section 4507 of the Metropolitan Administrative Code (normally required at the time of delivery); all other aspects of Section 4507 will continue to apply. Metropolitan will include purchases made under this Program to determine the member agency's Readiness-to-Serve Charge at the time of sale but will not include the purchase or delivery in the determination of the agency's Capacity Charge because the initiation of the Program and the deliveries are at Metropolitan's discretion.

Summary

The proposed Reverse-Cyclic Program would help member agencies purchase planned amounts in times when Metropolitan may be unable to meet a member agency's normal demands due to a need to preserve limited stored supplies or because the member agency is temporarily unable to accept Metropolitan deliveries in a wet year. Metropolitan will bill member agencies the full-service rate and applicable treatment charge in effect at the time of purchase. In doing so, the member agency will avoid paying the projected higher service rate that would be in place when Metropolitan makes the deferred delivery. Additionally, Metropolitan will benefit from a positive financial impact in the year the Program is initiated. With this delegation of authority to the General Manager, Metropolitan will have the additional operational flexibility (1) in dry years to save the limited storage for future drought years and (2) in wet years to assist member agencies with making planned purchases when they do not have the capacity to accept their full normal demands.

Next Steps

Staff will incorporate feedback received from the committee and return to the Board to request approval of the proposed modifications to the Reverse Cyclic Program in October 2024.

9/4/2024

Brandon J. Goshi *Date*
Interim Manager,
Water Resource Management

9/5/2024

Deven N. Upadhyay *Date*
Interim General Manager

Ref# wrm12702252

One Water & Stewardship Committee

Proposed Modifications to the Reverse-Cyclic Program

Item 9-2

September 9, 2024

Item 9-2

Proposed Modifications to the Reverse Cyclic Program

Subject

Information on proposed modifications to the Reverse Cyclic Program

Purpose

To expand the Reverse Cyclic Program to make it available under various conditions

Next Steps

Incorporate committee feedback and bring as action in October 2024

Overview

What is the Reverse Cyclic Program?

- When initiated, allows member agencies to purchase water at the current rate that Metropolitan will deliver in a future year.
- Allowed the General Manager to offer the Program in a dry year (CY 2022) to preserve limited stored supplies.

Proposed modifications to the Reverse Cyclic Program would:

- Authorize and delegate the General Manager to offer the Program in wet years and allow deferral of deliveries member agencies cannot temporarily accept due to capacity limitations or operational constraints.

Outline

- Background on 2022 Reverse Cyclic Program
- Current Need and Proposed Program Modifications
- Next Steps

Background

2022 Reverse Cyclic Program

- Member agencies could purchase supplies for delivery in a future year
- Benefits to Metropolitan
  - Deferred deliveries preserved limited stored supplies for the remainder of the drought
  - Increased revenue
- Benefit to Member Agencies
  - Cost savings when purchasing supplies at the current year full-service rate rather than the potentially higher future full-service rate

Why do we need the modifications today?

Saturated Service Area

- Member agencies have decreased capacity to store additional supplies due to wet year
- Decreased participation in storage programs

Capacity or Operational Constraints

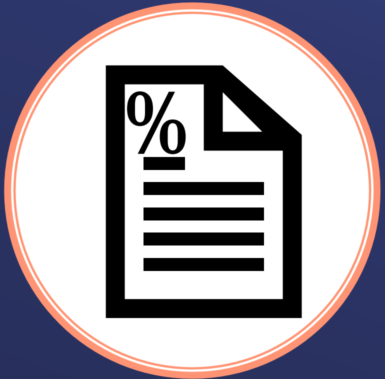
- Member agencies unable to take planned deliveries due to prioritized operations or groundwater recharge basin conditions

Decreased Sales

- Metropolitan is experiencing lower sales than budgeted
- Member agencies have available budget to pre-purchase supplies due to decreased planned purchases
- Additional sales would help maintain Metropolitan's revenue base across the biennium

Proposed Modifications to the Reverse Cyclic Program

Deferral



Low ~~SWP allocation~~
Various water supply conditions

GM determination
(based on WSDM Recommendation)

Pre-purchase and Deferral
with additional parameters

Delivery

~~SWP allocation above 40% or~~
Metropolitan determines it has supplies

Delivery of supplies within five years *

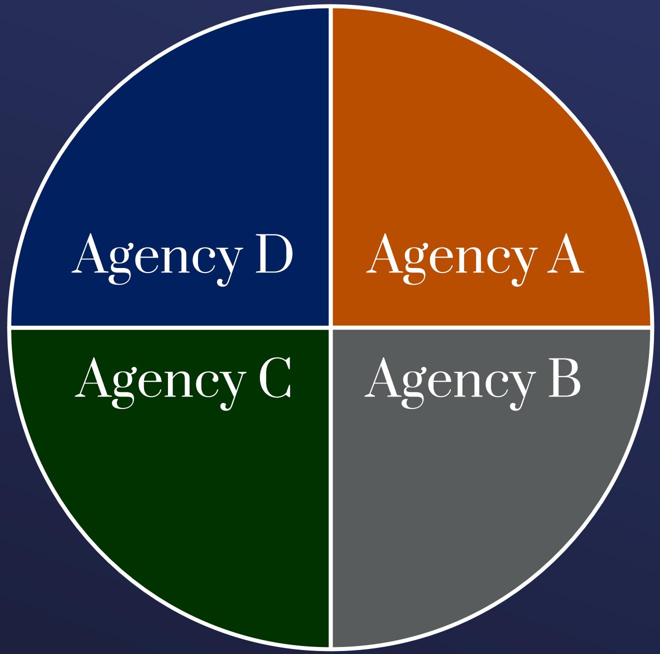
*Metropolitan will apply losses if the member agency is unable to receive the water within 5 years

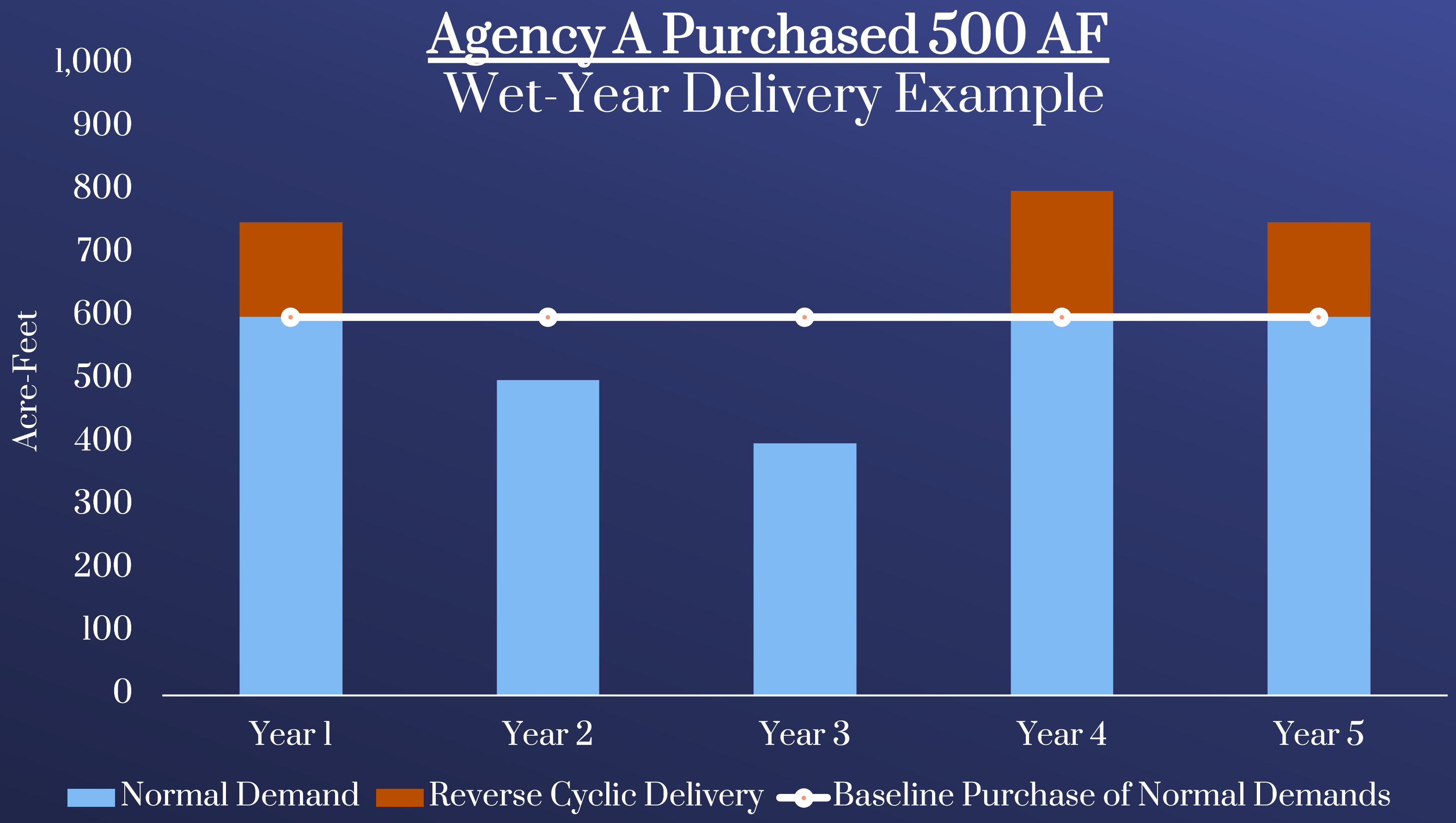
Proposed Modifications to the Reverse Cyclic Program

Deferral	Member agencies purchase supplies for deferred delivery		
Dry Year	Available at GM's discretion Example: to preserve limited stored supplies	Billed at that year's full-service rate. Capacity charge waived.	Limited to a portion of the highest annual purchase in the preceding 5 years.
Wet Year	Available at GM's discretion in wet years with SWP allocations of 40%+ Example: when MAs are unable to accept planned deliveries due to high local storage	Billed at that year's full-service rate. Capacity charge waived.	Limited to a portion of the highest annual purchase in the preceding 5 years. Metropolitan to determine a baseline to ensure deliveries do not reduce future full-service sales.

Example of Wet Year Reverse Cyclic Purchase

The General Manager identifies 2,000 AF for pre-sale in 2024. Four member agencies purchase 500 AF each.





Program Terms

Program Terms

- At time of purchase, purchases would be included in the:
  - Readiness to Serve Charge
  - Revised Base Firm Demand
- Purchases will be included as allocated supply under a Metropolitan allocation or shortage program (if/when implemented)
- Reverse Cyclic water shall be documented and ineligible for other Metropolitan programs
- Metropolitan staff to certify and reconcile deferred deliveries

Proposed Modification

Additional Proposed Modifications: Control Parameters

- General Manager would have authority and delegation to initiate the Program
- General Manager to determine amount of water available for pre-sale at time of initiation
- 10 year agreement term with member agencies
- Deferral not to exceed highest annual purchase in the past 5 years.
- Baseline calculated for deliveries deferred in wet years

Summary

Modifications to the Reverse Cyclic Program would:

- Allow all member agencies to purchase water - at the current rate – that Metropolitan will deliver in a future year.
- Allow deferral of deliveries under various supply conditions, such as when members are not able to accept deliveries due to capacity or operational constraints or limitations.
- Include additional parameters to provide Metropolitan with flexibility on the initiation of deferrals and the delivery of water.

Next Steps

- Incorporate committee feedback
- Action to approve in October 2024

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Board Information

- **Board of Directors**
  One Water and Stewardship Committee

9/10/2024 Board Meeting

9-3

Subject

Update on proposed agreements with Western Canal Water District and Richvale Irrigation District for water transfer options and first rights of refusal during 2025 through 2027

Executive Summary

Staff has been developing water transfer agreements with Western Canal Water District (Western) and Richvale Irrigation District (Richvale) for annual north-of-Delta water transfers during 2025 through 2027. Under the proposed agreements, Metropolitan would pay an option to each agency, located in the Feather River service area, in return for the first right to annually call on each agency's available water transfer supplies during 2025 through 2027. The proposed one-time up-front option payment would secure the first right of refusal for available water transfer supplies from each agency at negotiated prices tied to the final State Water Project (SWP) allocation. The option payment would be $250,000 for each of the two agencies. The price for water made available and called is $965 per acre-foot at SWP allocations of 20 percent or less and $600 per acre-foot at SWP allocations greater than 20 percent. Western and Richvale may annually transfer up to a combined 52,800 acre-feet.

In recent years, Metropolitan has purchased water transfers from sellers north of the Delta via the collective buying groups facilitated by the State Water Contractors (Buyers Group). In the recent drought years of 2021 and 2022, Metropolitan's share of water transfer purchases via the Buyers Group was only 6,000 to 8,000 acre-feet. The purpose of the new agreements is to secure a first right of refusal on available water from two willing sellers in order to maximize the quantity of water that can be secured by Metropolitan. The ultimate goal of the agreements is to improve reliability for Metropolitan's SWP dependent area, consistent with the Board's intent to provide equitable reliability across Metropolitan's service area.

Fiscal Impact

If the Board approves the agreements, the fiscal impact in the current 2024/25 fiscal year would be the one-time option payment of $500,000, and up to $51 million annually for water purchases in the event the maximum amount of water were purchased under a low SWP allocation (20 percent or less). These costs were not included in the biennial budget for Fiscal Years 2024/25 and 2025/26 and would be sourced from budgeted funds from the Water Supply Program and SWP budget. Potential purchases in fiscal years beyond the current biennium would be considered in the requested budget for Water Supply Programs for those future years.

Applicable Policy

Metropolitan Water District Administrative Code Section 4203: Water Transfer Policy

Metropolitan Water District Administrative Code Section 8121: General Authority of the General Manager to Enter Contracts

By Minute Item 52946, dated August 16, 2022, the Board adopted a resolution committing to regional reliability for all member agencies.

Related Board Action(s)/Future Action(s)

Staff plans to bring the proposed agreement terms with Western and Richvale to the Board for approval in October 2024.

Details and Background

Background

Over the past few years, staff has been exploring water transfer partnerships to help improve dry-year reliability for the SWP-dependent area. The Board has supported the pursuit of water transfers with various parties through annual authorizations, and most recently authorized the General Manager to secure up to $100 million of water transfer supplies in 2022 and up to $50 million of water transfer supplies in 2023. Since 2008, Metropolitan has purchased dry-year water transfers from sellers north of the Delta via a Buyers Group facilitated by the State Water Contractors (SWC). During the recent drought years of 2021 and 2022, Metropolitan's share of purchases via the SWC Buyers Group was only 6,000 to 8,000 acre-feet. To maximize the potential water transfers available to Metropolitan, staff proposes entering into option agreements with Western and Richvale for the first right of refusal on their available water transfer supplies from 2025 through 2027.

Sellers

Western and Richvale are agricultural water districts in the Feather River service area in Butte County with pre-1914 surface water rights. The districts have a diversion agreement with the State of California Department of Water Resources (DWR) to receive their water supplies via Thermalito Afterbay, downstream of Oroville Reservoir. Land in these districts is irrigated primarily for rice production. Water is made available for transfer solely by crop idling (fallowing) participating fields during May through December.

Both agencies have historically sold water transfer supplies to SWP contractors, including Metropolitan, via the SWC Buyers Group. In recent years, Western and Richvale sold transfers in 2008 to 2010, 2012, 2014, and 2018, with total combined volumes ranging from approximately 13,000 acre-feet to 56,000 acre-feet. The districts did not sell water in 2015, 2021, or 2022 because DWR curtailed contract deliveries to the districts by 50 percent pursuant to the drought provisions in their diversion agreement.

Environmental Compliance

In 2018, Western and Richvale certified the Final Environmental Impact Report for the Western Canal Water District and Richvale Irrigation District Water Transfers from 2018 to 2022. In 2022, the districts approved an addendum to the Environmental Impact Report (EIR) to extend the covered period for water transfers another five years, from 2023 to 2027. The term lengths of the proposed agreements are coincident with the environmental coverage provided by the addendum. The proposed option payment of $250,000 to each agency ($500,000 total) is sized to help defray costs incurred by Western and Richvale to prepare the EIR and addendum.

Proposed Agreements

Staff is proposing two separate option agreements, one with each agency, that will provide the framework for Metropolitan having the first right to annually call on available transfer supplies from 2025 through 2027. Key provisions proposed include:

- *Option Payment* - Metropolitan will pay Western and Richvale $250,000 each (a total of $500,000) for the exclusive first right to purchase water offered by Western and Richvale from 2025 to 2027.
- *Available Supply*
  - Western may transfer up to 33,600 acre-feet of water via crop idling up to 11,200 acres.
  - Richvale may transfer up to 19,200 acre-feet of water via crop idling up to 6,400 acres.

- *Notification Dates*
    - By February 28 of each year, Metropolitan will notify Western and Richvale of its interest in acquiring transfer supplies for that year, and upon notification, Western and Richvale will solicit landowner interest in participating in a transfer on the terms set forth in the agreement.
    - By March 31 of each year, Western and Richvale will notify Metropolitan of the amount of water, if any, offered during the year.
    - By April 15 of each year, Metropolitan will notify Western and Richvale of the amount of water, if any, it will purchase during the year.
- *Water Purchase Price*
    - Metropolitan will pay Western and Richvale $965 for each acre-foot Western and Richvale deliver to point of delivery (Thermalito Afterbay) when the SWP allocation as of June 30 is less than or equal to 20 percent.
    - Metropolitan will pay Western and Richvale $600 for each acre-foot Western and Richvale deliver to point of delivery (Thermalito Afterbay) when the SWP allocation as of June 30 is greater than 20 percent.
- *Conveyance Risk*
    - Metropolitan will bear the conveyance risk for water purchased by the April 15 call date that the sellers have provided at Thermalito Afterbay. This risk includes the inability of DWR to export transfer supply from the Delta during the "transfer window" or the potential spilling of any backed-up transfer supply temporarily stored in Lake Oroville. Staff will monitor DWR's monthly studies as the SWP supply develops during the water year.
    - Metropolitan will be responsible for any carriage losses that DWR assesses to convey transfer supply from the point of delivery at Thermalito Afterbay through the Delta. This loss is a share of the transfer supply that contributes to Delta water quality and flow objectives and has historically ranged from 20 to 35 percent.
- *Reductions in Available Supply*
    - Western and Richvale will not make water available during a year in which their surface water allocations are reduced, including if reduced pursuant to the shortage provisions in their diversion agreement with the State of California.
    - Western and Richvale are potential participants in the Agreements to Support Healthy Rivers and Landscapes (Voluntary Agreements) under consideration as part of the State Water Resources Control Board's planned update to the Bay-Delta Water Quality Control Plan; if Voluntary Agreements are adopted and implemented during the term of the proposed agreements, Western and Richvale's available transfer supplies will be reduced in Above Normal, Below Normal, and Dry water year types.

If Metropolitan were to call on available supplies in future years, in addition to the proposed agreements with Western and Richvale, Metropolitan would need to enter into annual storage and conveyance agreements with the sellers and DWR.

Metropolitan's decision to purchase transfer supplies, under the proposed agreements, will be consistent with and informed by Metropolitan's Water Surplus and Drought Management plan. As with any decision to purchase annual water transfers via the SWP, Metropolitan will consider the developing hydrologic conditions, the need for and capacity to store the supplemental water supply, and the DWR's ability to convey the transfer supplies through the Delta. Staff will continue to seek annual board authorization for purchasing additional water transfers beyond the scope of the proposed agreements.

Benefits to Metropolitan

The proposed agreements benefit Metropolitan by enhancing dry-year reliability for the SWP-dependent area. They offer exclusive first-right access to purchase water that may be made available by two major sellers in the Feather River service area ensuring a dependable source when water is typically scarce. Additionally, these agreements increase Metropolitan's flexibility in managing water resources, allowing for better planning and response to fluctuating hydrologic conditions. By securing available water supply from trusted sources, Metropolitan can reduce the risk of shortages and maintain consistent service to its customers.

Upcoming Milestones

Staff will obtain board feedback and finalize negotiations with Western Canal Water District and Richvale Irrigation District. Staff anticipates bringing the proposed agreements to the board for approval in October.

9/4/2024

Brandon J. Goshi — *Date*
Interim Manager,
Water Resource Management

9/6/2024

Deven Upadhyay — *Date*
Interim General Manager

Ref# wrm12698514

One Water & Stewardship Committee

Proposed agreements with Western Canal Water District and Richvale Irrigation District for water transfer options and first rights of refusal during 2025 through 2027

Item 9-3

September 9, 2024

Item 9-2
Proposed Water Transfer Agreements

Subject

Proposed agreements with Western Canal Water District and Richvale Irrigation District for water transfer options and first rights of refusal during 2025 through 2027

Purpose

Update the board on proposed water transfer agreements that would improve access to limited north-of-Delta water transfer supplies and increase drought reliability for the SWP dependent area.

Next Steps

Staff will return to the One Water and Stewardship Committee in October with an Action letter and oral report.

Background

Slide 6 Item 6B OW&S Committee
August 19, 2024

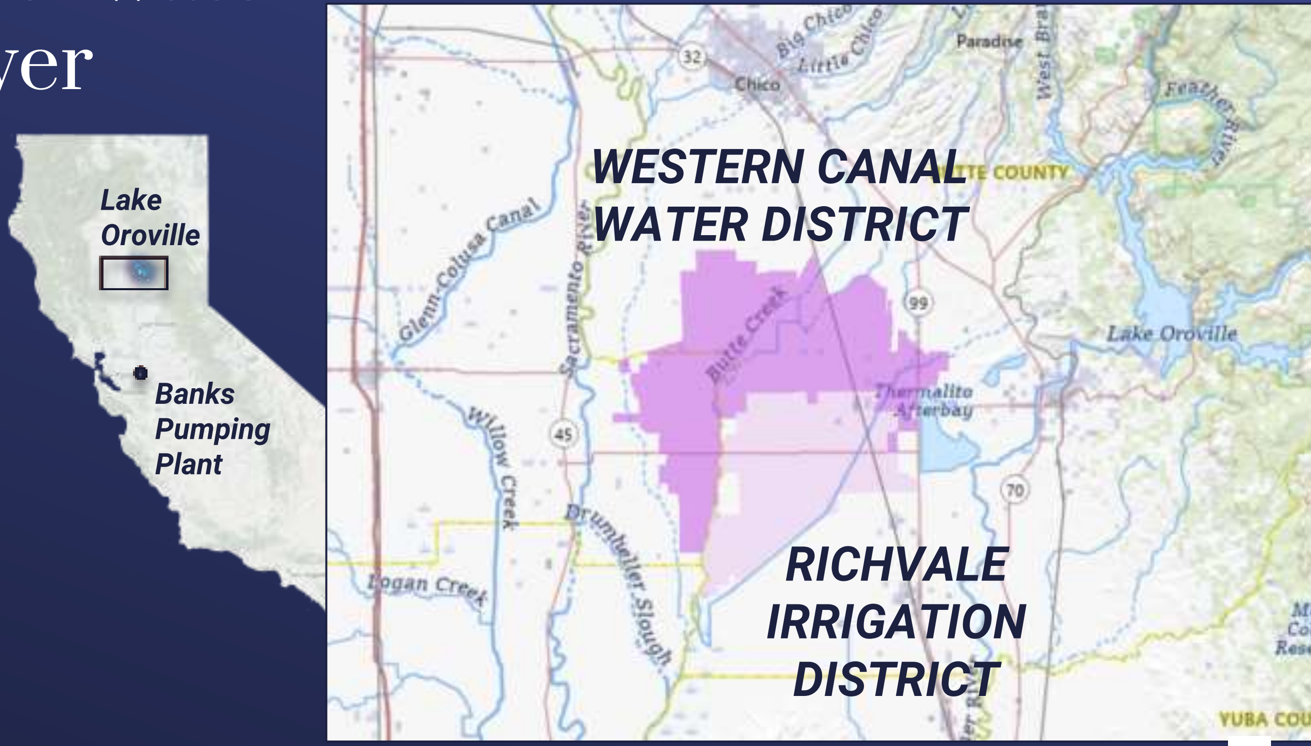
- Water transfers help meet demands
  - Approach for dry and critical years
- Board authorized the General Manager to secure up to $50M of water transfers in 2024
  - Funded by unused Water Supply Program and SWP Budget
- Past participation in the dry-year transfer program with State Water Contractors
  - Limited availability and access
- Exploring new partnerships and approaches to water transfer arrangements
  - Improve access to limited supplies
  - Increase drought reliability for the SWP-dependent area

Proposed Water Transfer Agreements

- Multi-year option with north-of-Delta sellers for single-year transfers
  - Annual decision to purchase water based on WSDM recommendation
- One-time option payment for first right of refusal of available water supplies
- Pre-negotiated price of water based in SWP allocation

Western Canal Water District and Richvale Irrigation District

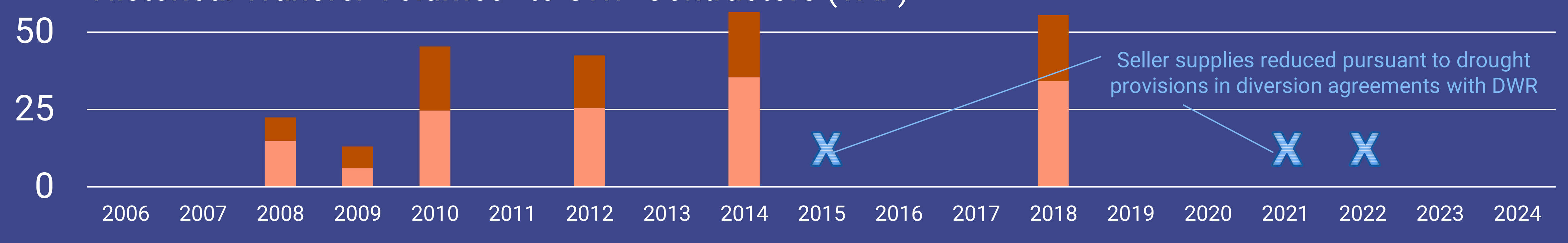
- Located in Glenn and Butte Counties
- Land in these districts is irrigated primarily for rice production
- Combined total of 445 TAF of water supply from the Feather River during irrigation season (Apr-Oct)
  - Pre-1914 surface water rights
  - Diversion agreements with the State of California



Seller Water Transfer Program

Program Description

- Transfer water provided by idling up to 20 percent of rice acreage within the districts
  - Up to 53 TAFY transfer supply combined is available



*Volumes prior to conveyance losses

Seller Water Transfer Program

Program Description (continued)

- Water made available on same pattern as rice irrigation season (May – September)
- Department of Water Resources temporarily stores water in Oroville prior to conveyance to Delta export facilities
  - Separate annual storage and conveyance agreements needed with DWR
  - Delta carriage losses of 20 to 35 percent imposed
    - Help achieve Delta water quality objectives

Multi-Year Option

Rice fields in northern CA, DWR photo

Proposed Agreements

- One agreement for each seller (two total):
  - Western Canal Water District
  - Richvale Irrigation District
- Term: 2025-2027
- One-time option payment to each seller for first right of refusal on crop idling water transfers
- Water purchase price based on final SWP allocation

Multi-Year Option

Proposed Agreements (continued)

- Annual decisions for single-year transfers
  - Sellers decide:
    - To offer water for sale
    - Quantity of water for sale
  - Metropolitan decides:
    - To purchase water
    - Quantity of water to purchase

Rice fields in northern CA, DWR photo

Fiscal Impact

- In February 2024, Board authorized the General Manager to secure up to $50 million of water transfers if needed
  - Funding from unused Water Supply Program and SWP Budget

	FY 24/25	FY 25/26	FY 26/27
Option Payment	$500,000	$0	$0
Water Purchase Payments	Up to $51M	Up to $51M	Up to $51M
Total	Up to $51.5M	Up to $51M	Up to $51M
Source of Funds	Unused Water Supply Program and State Water Project Budget		Budget request for Water Supply Programs

Benefits

- Increase Metropolitan's flexibility in managing water resources
  - Better planning and response to fluctuating hydrologic conditions
- Securing available water supplies from trusted sources reduces the risk of shortages
  - Maintain consistent service to its customers
- Exclusive first-right access to limited north-of-Delta transfer supplies
- Stability in purchase price
- Building partnerships with north of Delta agricultural districts

Next Steps

- Receive committee feedback
- Board action item on proposed new agreements in October
- Continue to identify new structures and partnerships

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

One Water & Stewardship Committee

Update on Rice Development and Wetland Restoration Projects on Webb Tract

Item 6a

September 9, 2024

Item 6a
Webb Tract Projects Update

Subject

Update on Rice Development and Wetland Restoration Projects on Webb Tract

Purpose

Provide update to the Board on current status of the grant-funded, multi-benefits projects on Webb Tract

Next Steps

Return to the Board later this year to approve the Rice Development Project and approve lease agreement

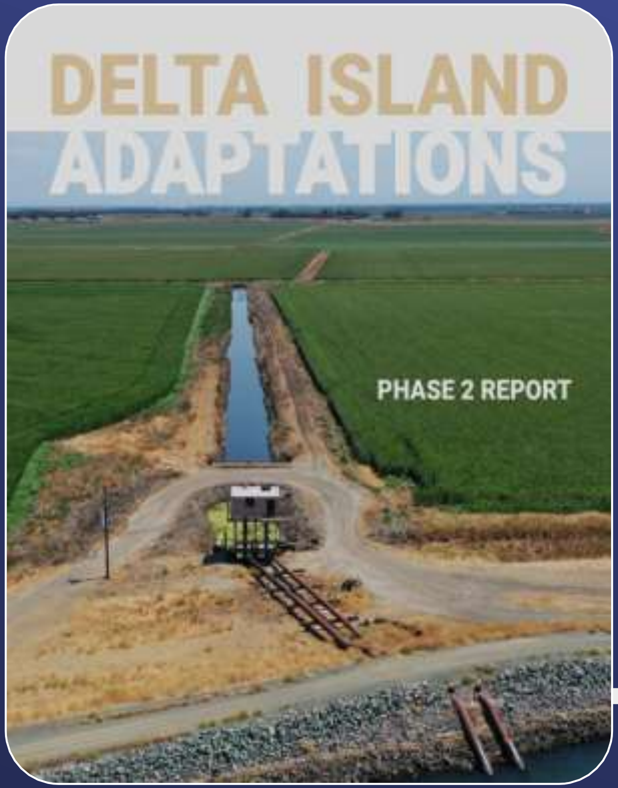
Outline

- Background
- Wetland Restoration Project
- Rice Development Project
- Public Engagement
- Webb Tract Landscape Restoration Video

Overview


Shasta
Reservoir
Oroville
Reservoir
Feather
River
Sacramento
River
Sacramento
Webb Tract
SWP
Pumps
CVP
Pumps
DELTA ISLANDS
STRATEGIC, FISCAL, AND RISK ANALYSIS
February 2024

Evolution of a Concept



Largest grant ever for Delta wetland restoration & agriculture enhancement

Grant Funds Multi-Benefit Projects on Webb Tract

- Awarded $20.9 million grant – May 2023
- Grant agreement signed – March 2024
  - Funds two projects
    - Rice Development
    - Wetland Restoration

Grant Goals Consistent with Board Policy

Wetland

- Reverse subsidence
- Reduce greenhouse gas (GHG) emissions
- Create habitat
- Generate revenue from carbon credits

Rice

- Stop subsidence
- Reduce greenhouse gas (GHG) emissions
- Sustainable agriculture

Wetland Restoration Project

- Completed
  - Biological & hydrological studies
- In progress
  - Preliminary design
  - Cultural resource study
  - Environmental documentation

Streamlining Habitat Restoration

Reducing regulatory barriers

- Statutory Exemption for Restoration Projects (SERP)
- Restoration Management Permit Act (AB 1581)

Webb Tract Rice Project

- Request for Proposal (rice only)
- Proposed lease terms
  - Grant-funded subsidy to encourage rice development
  - Flexible rent structure (crop share) option
  - Ten-year lease agreement with farmer tenant
  - Five-year extension option

Rice Project Schedule

- Farmer negotiations - In progress
- Board action – Anticipated Nov. 2024
  - Approve Rice Development Project
- Delta Conservancy Board action
  - Approve project as responsible agency
  - Release Phase 2 grant funds

Engaging Local Interests

- Local counties
- Farming interests
- Rice cooperatives
- California Department of Fish & Wildlife
- Delta Stewardship Council
- Delta Protection Commission
- Delta Conservancy

Tribal Partnerships

- Eco-cultural working group
- Initiated tribal outreach (AB 52)
- Site visits planned

First Public Outreach Meeting

Public Information

News @ Webb Tract

PUBLIC MEETING VIDEO AVAILABLE

A public meeting held on July 10 introduced local interests and other stakeholders to two multi-benefit projects to improve Webb Tract, one of four islands in the Sacramento-San Joaquin Delta owned by the Metropolitan Water District.

In partnership with the Sacramento-San Joaquin Delta Conservancy, the first hybrid meeting held at Big Break Visitor Center in Oakley focused on the Rice Development and Wetland Restoration Projects planned for Webb Tract. The projects are funded by the Nature-Based Solutions Grant Program administered by the Delta Conservancy. The recorded meeting can be viewed here.

GRANT-FUNDED, MULTI-BENEFIT PROJECTS ON WEBB TRACT

Webb Tract
Outreach
Video

One Water & Stewardship Committee

Update on Conservation as a California Way of Life

Item 6b

September 9, 2024

Item 6b

Update on Conservation as a California Way of Life

Subject

Update on Conservation as a California Way of Life

Purpose

Provide update on final Making Conservation a California Way of Life Regulation

History of the Regulation Rule-making Process

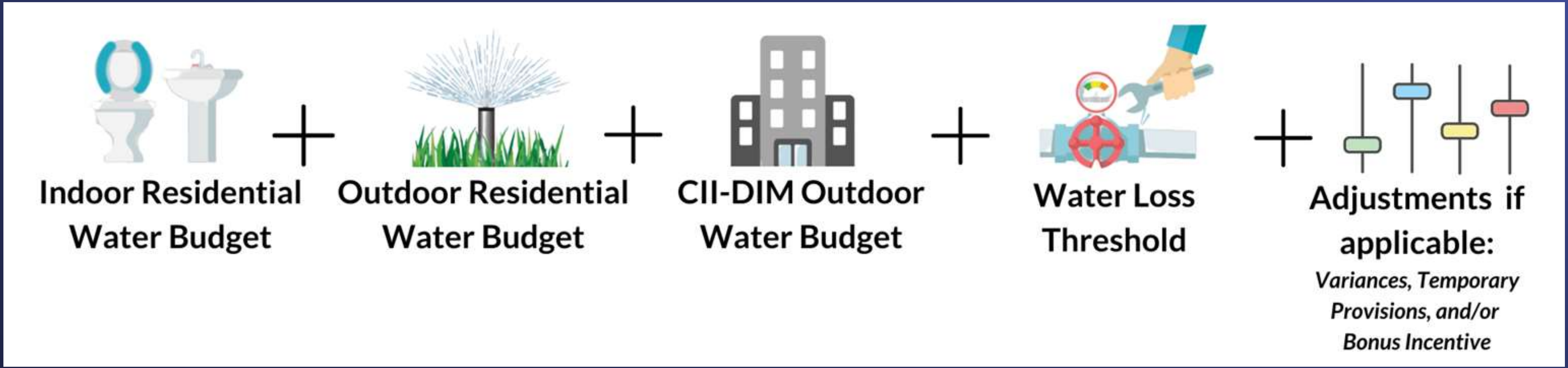
- 2018
  - SB606/AB1668 passed in 2018
- 2018-2022
  - DWR studies and working group meetings held
  - DWR recommendations to SWRCB submitted on September 29, 2022
- 2022-2024
  - SWRCB pre-rulemaking workshops and interested party working groups
  - Final regulation passed on July 3, 2024

Metropolitan Participation in Rulemaking Efforts

- Workgroup representation along with other member agency staff
  - DWR
  - SWRCB pre-rulemaking workshops
  - SWRCB interested parties working groups
- Participation and Collaboration with other industry partners
  - ACWA/CMUA
  - CUWA
  - CalWEP
  - WateReuse
- Submitted six comment letters on proposed regulation

Calculating the Urban Water Use Objective

Providers cannot exceed the SUM of the standards



*Agriculture and indoor CII not part of objective; indoor CII is covered by other BMP requirements.

Final Regulation Key Takeaways

- Outdoor standard adjustment to 0.55 LEF and 0.45 LEF changed from 2035 to 2040
- Inclusion of existing tree variance for RES and CII outdoor standard
- Alternative compliance pathway for DAC retailers facing a 20% or greater reduction in water use
- Inclusion of regional programs as qualifying performance measures and BMPs for CII standard compliance

Metropolitan Support and Next Steps

- Compliance support provided through:
  - Member Agency Administered Program
  - Regional Rebate Program
  - Water Savings Incentive Program
  - Turf Dashboard
- Next Steps
  - Metropolitan staff participation on DWR Indoor Residential End Use Studies Technical Advisory Panel
  - Monitoring of proposed SWRCB UWUO advisory groups
  - Continual review of grant funding opportunities to expand or develop new programs to meet regulation requirements

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

One Water and Stewardship Committee

Update on Conservation

Item 6c

September 9, 2024

Item 6c

Update on Conservation

Subject

Update on Conservation

Monthly update on conservation expenditures and activity from July 1, 2022 – July 30, 2024

Current Program Expenditures & Commitments

Current Conservation Program Expenditures
FYs 2024/25 & 2025/26 [1]

	Paid[2]	Committed[3]
Regional Devices	$0.6 M	$2.1 M
Member Agency Administered	$1.1 M	$4.2 M
Turf Replacement	$2.2 M	$19.6 M
Advertising	$0.0 M	$7.0 M
Other	$0.2 M	$1.2 M
TOTAL	**$4.1 M**	**$34.1 M**

(1) The Conservation Program biennial expenditure authorization is $98.2M.

(2) Paid as of 7/1/2024 - 7/31/2024. Financial reporting on cash basis.

(3) Committed dollars as of August 10, 2024.

Current Conservation Program Activity

FYs 2024/25 & 2025/26

Turf Replacement Rebates:

July: 917,667 ft^2 replaced

FY2024/25-FY2025/26: 917,667 ft^2 replaced

Trees (part of Turf Replacement Program):

July: 291 trees rebated

FY2024/25-FY2025/26: 291 units rebated

Toilets:

July: 2,063 units rebated

FY2024/25-FY2025/26: 2,063 units rebated

Lifetime Water Savings to be achieved by all rebates in July 2024: 5,288 AF

FY2024/25-FY2025/26: 5,288 AF lifetime water savings

Fiscal Years 2022/23 & 2023/24

In Review

Current Conservation Program Expenditures
FYs 2022/23 & 2023/24 (1)

	Paid(2)	Committed(3)
Regional Devices	$15.3 M	$2.3 M
Member Agency Administered	$12.0 M	$1.6 M
Turf Replacement	$47.9 M	$17.0 M
Advertising	$9.6 M	$0.9 M
Other	$4.8 M	$1.6 M
TOTAL	**$89.6 M**	**$23.4 M**

(1) The Conservation Program biennial expenditure authorization is $86M.

(2) Paid as of 7/1/2022 - 6/30/2024. Financial reporting on cash basis.

(3) Committed dollars as of July 10, 2024.

Conservation Program

Overview

Regional Residential Rebates

Regional Commercial, Industrial, and Institutional Rebates

Turf Replacement Program

Member Agency Administered Program

Innovation Conservation Program with SoCalGas

Water Savings Incentive Program

Conservation Grant Funding

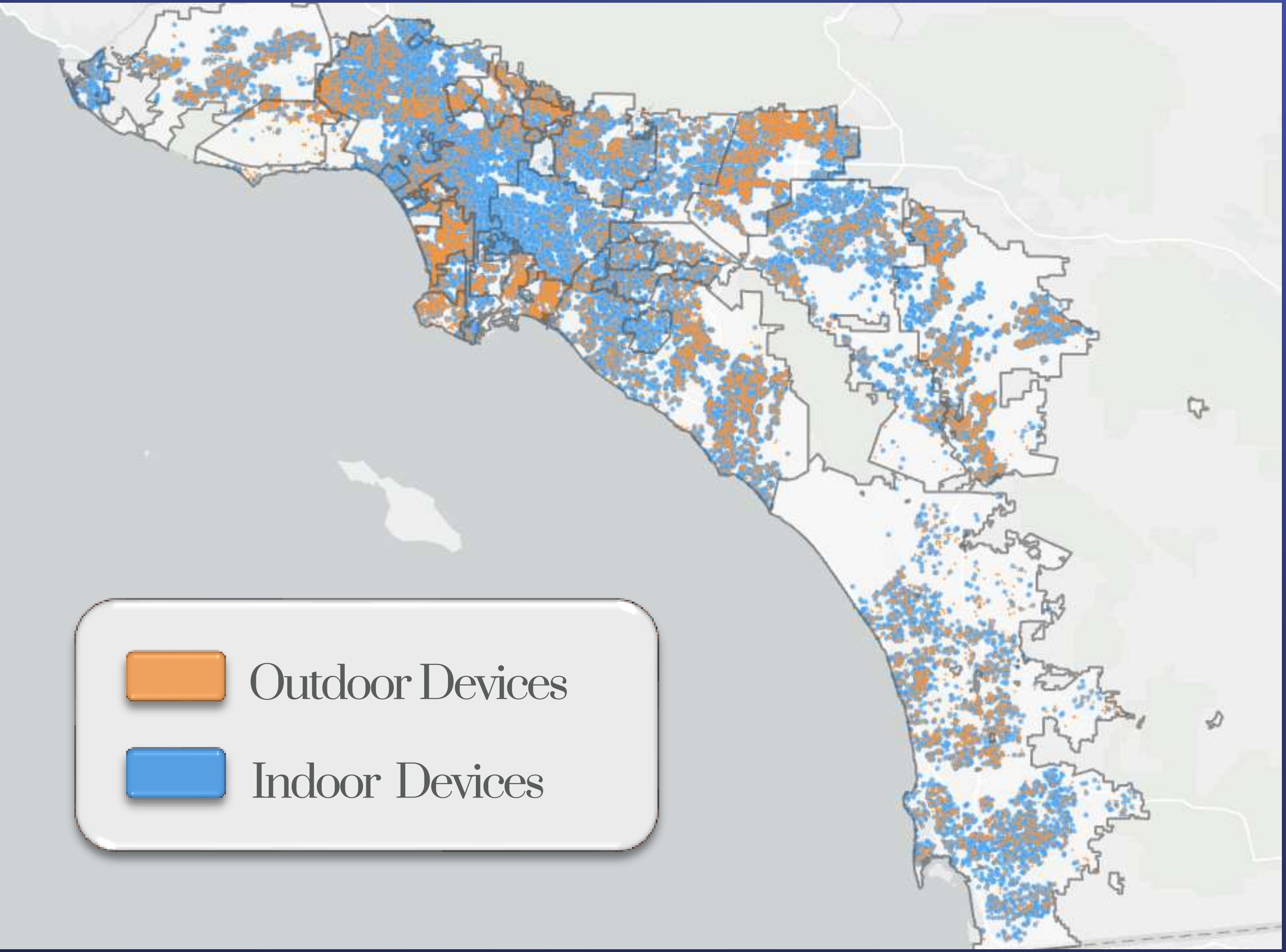
Landscape & Irrigation Classes and Trainings

and much more!

Regional Rebate and Turf Replacement Program

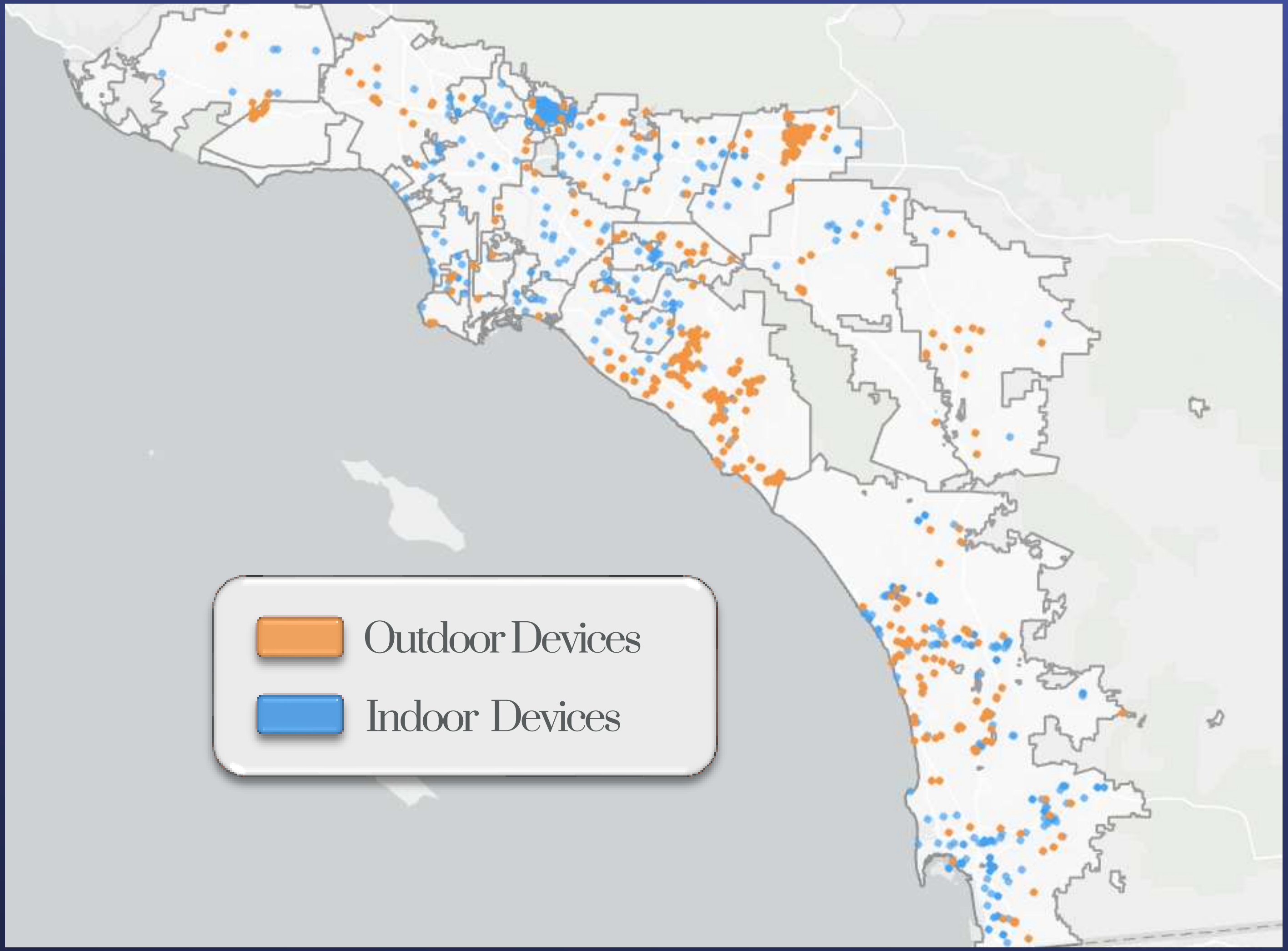
Residential Rebate Program - Devices

Completed Rebates	Total Est. Water Savings
220,883	30,402 AF



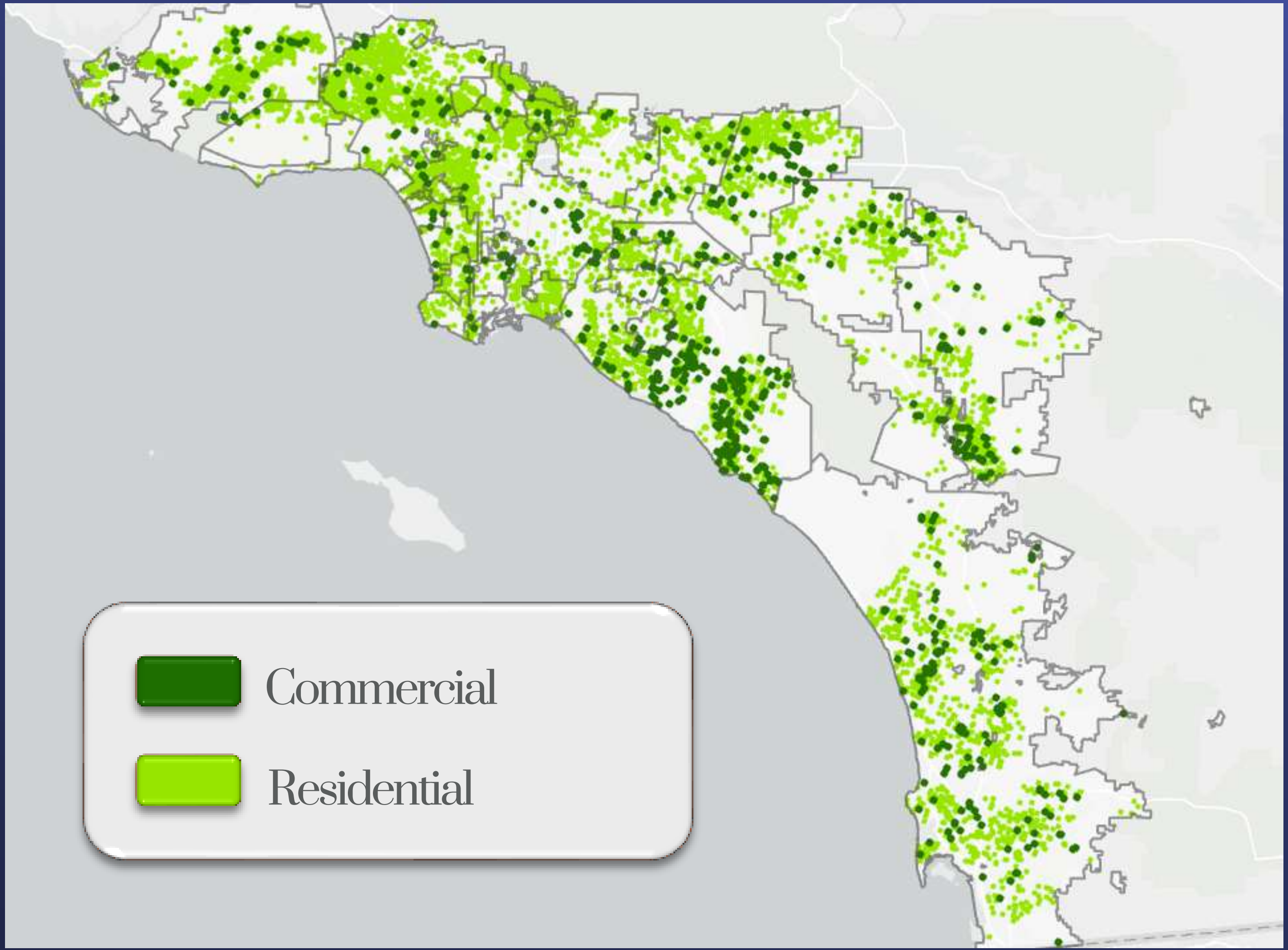
Commercial Rebate Program - Devices

Completed Rebates	Total Est. Water Savings
3,595	14,748 AF

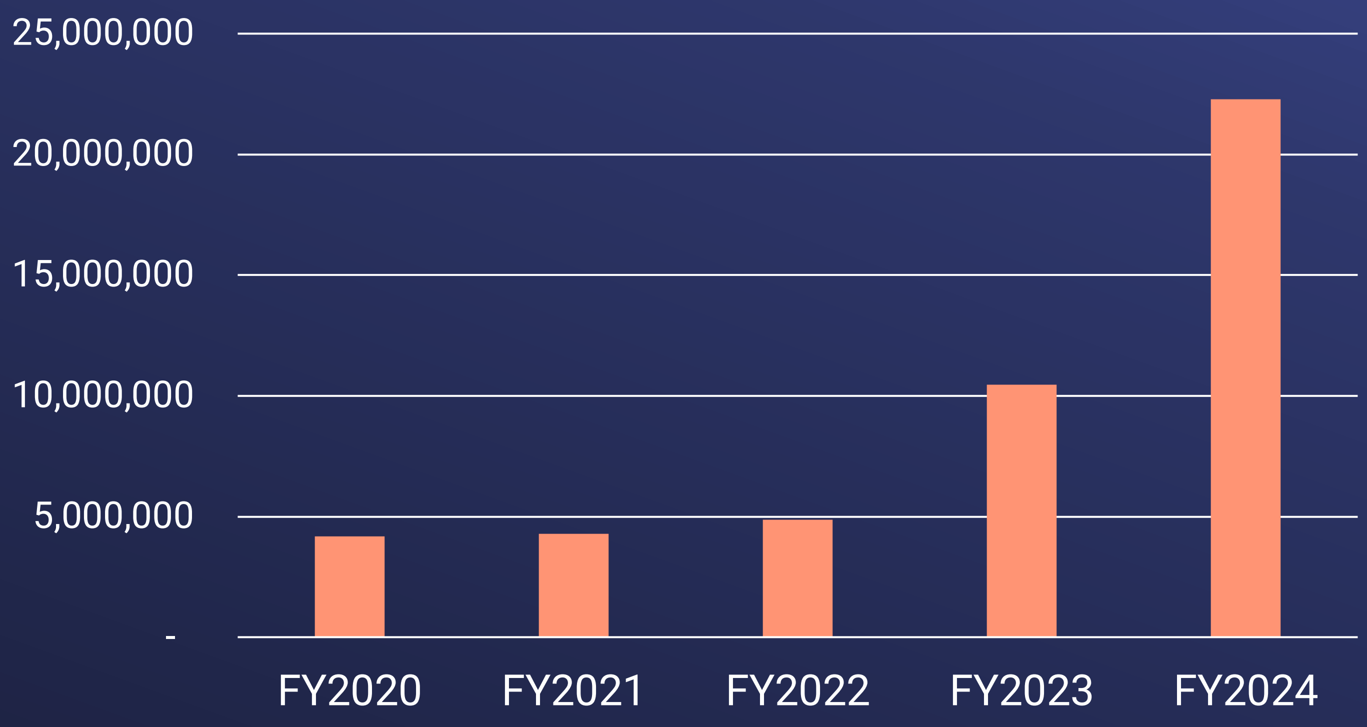


Turf Replacement Program

- Multi-pronged approach to maximize water utilization and conservation
- Incorporates watershed components to retain stormwater
- Incentives available for:
  - Residential
  - Commercial
  - Public Agency



Turf Removal Rebates (square feet)



- 54% RES & 46% CII
- Avg RES project = 1,400 sf
- Avg CII project = 12,000 sf

Annual Avg FY23/24 RES = 5.1M sf
Annual FY23/24 Avg CII = 6.0M sf

Residential and Commercial Turf Replacement Program

Total Reservations	Completed Projects	Total Sq. Ft. Removed	Total Est. Water Savings/Lifetime
12,279	9,142	22.2M	79,803 AF

Total Tree Rebate Reservations	Total Completed Tree Rebates
1,724	132

Conservation Grant Funding

Grant	Projects	Award Amount	Use of funds	Status	Must be spent by
USBR WaterSMART FY22	Public Agency Turf Replacement	$2M	Increase incentive from $3 to $4/sqft	Awarded, Available to applicants starting 11/1/22	6/30/2025
DWR Urban Drought Relief 2021	RES and CII Turf Replacement	$2M	Increase RES/CII incentives from $2 to $3/sqft	Awarded, Available to applicants starting 11/1/22	12/31/2026
	Residential Direct Install Program (SoCalGas)	$2.5M	Expand reach of program, target more units	Awarded, Available to applicants starting 11/1/22	12/31/2026
USBR WaterSMART FY23	RES Turf Replacement	$5M	Increase RES incentives from $2 to $3/sqft	Awarded, Available to applicants starting 3/1/24	12/31/2026

Conservation Grant Funding (cont.)

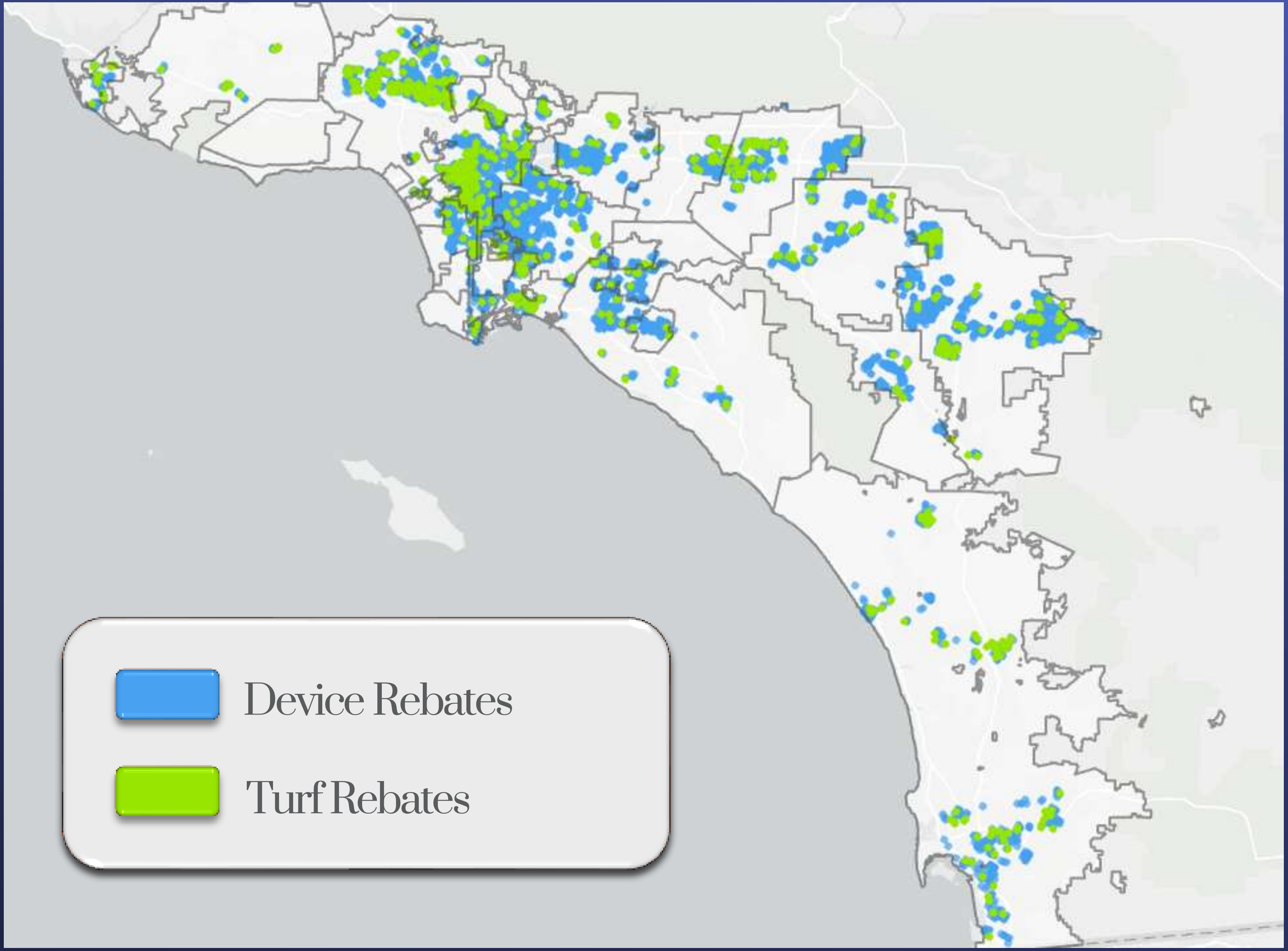
Grant	Projects	Award Amount	Use of funds	Status	Must be spent by
DWR Urban Drought Relief 2022	CII and PA Turf Replacement	$30M	Increase CII from $2 to $3/sqft, Increase PA from $3 to $4,	Awarded, Available to applicants starting 7/1/24	12/31/2026
	Residential Direct Install Program (SoCalGas)	$5M	Expand reach of program, target more units		
	Recirculating Firefighting Training Units (DRAFTS Pump Pods)	$3M	Supplemental incentive for purchase to be administered through WSIP		

Conservation Grant Funding

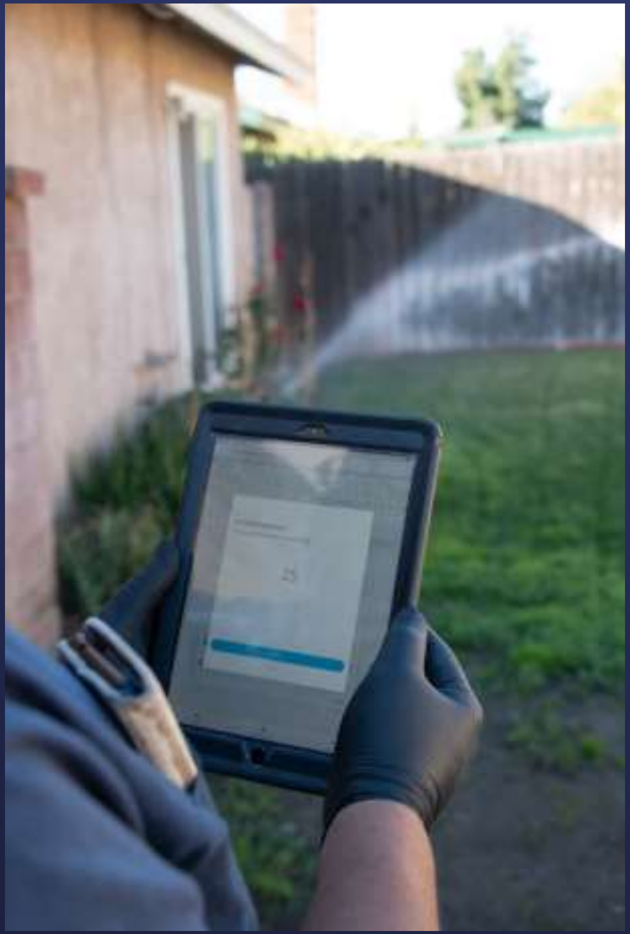
Source	Grant Program	Amount
State	DWR Urban and Multi-benefit Drought Relief FY21	$4.5M
Federal	USBR WaterSmart Water and Energy Efficiency Programs FY22	$2M
State	DWR Urban Community Drought Relief FY22	$38M
Federal	USBR WaterSmart Water and Energy Efficiency Programs FY23	$5M
Federal	USBR WaterSmart Water and Energy Efficiency Programs FY24	$2M
	Total State Funding	**$42.5M**
	Total Federal Funding	**$9M**
	Total Conservation Grant Funding	**$51.5M**

Conservation Efforts in Underserved Communities

Rebates in Underserved Communities



Conservation in Underserved Communities



FY22/23-23/24 **Achievements:**

- Turf Replacement Program – 2.9M sf replaced
- Regional Rebate Program
  - Indoor Devices – 43,710 devices
  - Outdoor Rebates – 1,004 devices
- Member Agency Administered Program – 35 projects
- Direct Install Program in partnership with SoCalGas

Programs and Partnerships

Member Agency Administered Program

Member and retail agencies may implement local water conservation programs within their respective service area and receive Metropolitan incentives

Project Flexibility

- Device-based projects (standard rebate)
- Customized Projects ($195/AF limit)
- Disadvantaged communities Focus (DACs)
- Customized with non-documented water savings

FY22/23-23/24 Achievements:

- Total agency projects: 217
- Total est. water savings/lifetime: 19,404 AF
- Total investment: $12M

Innovative Conservation Program

Six projects were awarded funding, totaling $274,370

- Program in partnership with SoCalGas
- Next round of funding available Spring 2025

Water Savings Incentive Program

The Water Savings Incentive Program provides incentives for non-residential, customized projects that save at least 1 million gallons per year

FY22/23-23/24 Achievements:

- Total awarded funding: $46,500
- 77M gal/saved a year
- 60+ applications submitted
- One Water Awards recognized 10 innovative and successful projects

Landscape & Irrigation Classes and Trainings

Residential Landscape Classes

Free virtual and in-person classes in landscape design and irrigation principles

FY22/23-23/24 Achievements:

- Hosted 258 classes
- Reached 4,587 residents
- New class added on Turf Removal

Landscape & Irrigation Classes and Trainings

WELDCP for Landscape Professionals

- Partnership with California Landscape Contractors Assoc.
- One-of-a-kind certification and education opportunity for landscape professionals in Southern California

MWEL Workshops

- Partnership with California Landscape Contractors Assoc.
- A closer look at the Water Efficient Ordinance compliance and enforcement roles

FY22/23-23/24 Achievements:

  - Hosted 18 WELDCP/MWEL workshops
  - Total Attendees: 570
  - Total WELDCP Certified Professionals: 244

Research & Studies

Highlights

- Turf Dashboard to help identify Non-Functional Turf
- Household Water Use Study with Flume Data Labs
- Municipal Leak Detection and Repair Grant Program

Upcoming…

USBR Water and Energy Efficiency Grant Program (WEEG)

Annual federal grant opportunity that focuses on quantifiable and sustained water savings and prioritizes projects with sustainability benefits, and addresses the impacts of climate change, enhancing drought resiliency, and projects that will complement on-farm irrigation improvements

Metropolitan selected for funding for Metropolitan's Residential Direct Install Program for DAC in Partnership with SoCalGas and Direct Install Turf Replacement Program for DAC

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Board Report

Water Resource Management Group

- **Report On State Water Project Overview**

Summary

This report provides an overview of the State Water Project, with discussion on its significance for the Metropolitan Water District of Southern California in terms of investment, benefits, and ongoing challenges. This report serves as a foundation for upcoming discussions on the Delta Conveyance Project.

Purpose

Informational

Attachments

Attachment 1: The Economy of the State Water Project

Attachment 2: The State Water Project and Benefits to Southern California's Local Water Supplies: A Framework for Thinking about Benefits

Attachment 3: The State Water Project Delivery Capability Report 2023

Detailed Report

Background

The State Water Project provides a critical water supply lifeline to the Southern California region and spans over 705 miles throughout the state, originating from the Northern Sierras. This water system of existing storage and conveyance delivers clean water to approximately 27 million Californians, of which 19 million are within Metropolitan's service area. Given the size and importance of this water system to the state, and Metropolitan's service area, staff is providing monthly updates to the Metropolitan Board starting in September 2024 through December 2024. These updates include:

- September 2024: State Water Project overview
- October 2024: Importance of the Bay-Delta and the addition of a 45-mile conveyance facility (known as the Delta Conveyance Project), to the existing 705 miles of canals and pipelines of the State Water Project
- November 2024: Information Board Letter regarding upcoming Board deliberation on the Delta Conveyance Project summarizing key information and staff oral report
- December 2024: Action Board Letter regarding continued funding for planning efforts related to the Delta Conveyance Project.

Collectively these updates will help facilitate education about the inception and original purpose of the State Water Project, Metropolitan's role and ultimately foster deliberation on the modernization of the State Water Project. A construction investment would not be considered until 2027 at the earliest and therefore only planning investment dollars are contemplated for Board deliberation by end of 2024.

Date of Report: September 9, 2024

Delta Conveyance Project

Since 2019, the California Department of Water Resources (DWR) has led the planning efforts for the Delta Conveyance Project (DCP), a water conveyance improvement of the State Water Project through the Sacramento-San Joaquin Bay-Delta. The project includes construction of two new intakes off the Sacramento River near Hood and an underground single tunnel which is forty-five (45) miles in length and thirty-six (36) feet in diameter. This project modernizes the State Water Project system to allow for dual conveyance through and under the Sacramento-San Joaquin Bay-Delta. DWR is pursuing the DCP to improve the reliability of the State Water Project given historical and future risks.

Metropolitan Board Actions and Information Updates related to Delta Conveyance Project:

In December 2020, the Metropolitan Board of Directors authorized execution of a Funding Agreement with DWR, through which Metropolitan committed to its share of 47.2 percent of DCP planning and pre-construction costs. With funds provided by Metropolitan and other State Water Project (SWP) contractors, DWR has completed significant planning and pre-construction activities. Funds committed in 2020 cover expenditures planned through 2025. However, post 2025, DWR must complete additional planning and pre-construction activities, and are requesting additional funding.

Since the funding action taken in December 2020, Metropolitan's Board has received a total of 17 oral committee updates on Delta Conveyance, with the most recent in June 2024.

Summary of September 2024 State Water Project Overview

The SWP, owned and operated by DWR, is an essential part of Southern California's diversified portfolio strategy to meet current and future demands on Metropolitan. The SWP's large-scale storage and conveyance system provides a unique array of benefits for Metropolitan at relatively low cost compared with alternative supplies. The large volume of high-quality water made available through the SWP system provides Metropolitan's own system with flexibility to manage both drought and surplus conditions. Although California's hydrology and SWP supplies are highly variable from year-to-year, Metropolitan's investments in Central Valley groundwater storage and in-region surface storage, such as Diamond Valley Lake, have leveraged the SWP supply by creating unique opportunities to store water during wet periods for use in dry years. Metropolitan's ability to distribute or store SWP supplies as they materialize enhances the region's reliability, particularly within the portions of Metropolitan's service area that depend upon SWP water for their imported supply needs. In addition, the interconnected nature of Metropolitan's unique system can directly impact storage conditions in the Colorado River basin, especially during high allocation years on the SWP.

However, regulatory conditions and climate change continue to impact the reliability of the SWP. Projections by DWR anticipate a continual decline in SWP supplies over time. Due to climate change, more rainfall, less snowpack, and earlier runoff are expected in the Northern Sierra, reflecting a systemic shift from historical hydrologic patterns. Because the current SWP system was not designed for this shifting hydrologic pattern, continued improvements in storage and conveyance projects within the SWP may be important over time.

For more information, refer to **Attachments 1-3**.

THE ECONOMY OF THE STATE WATER PROJECT

Clean, Reliable, and Affordable Water for California

Prepared by: David Sunding, Ph.D., Oliver Browne, Ph.D., and Zhaolong Jerry Zhu

BRG Berkeley Research Group

DEPARTMENT OF WATER RESOURCES STATE OF CALIFORNIA

December 14, 2023

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Figures

Tables

Executive Summary

The State Water Project (SWP) is among the world's most extensive water conveyance projects, featuring a 705-mile-long network of dams, reservoirs, hydroelectric facilities, pumping plants, and canals. The State Water Project plays a key role in the state's economy. It supplies over 27 million Californians, a majority of the state's population, along with commercial and industrial customers, including in the technology and manufacturing sectors, that account for a majority of the state's economic activity. Project deliveries also supply water to the agricultural sector, supporting the cultivation of fruits, vegetables, and nuts, particularly in the Central Valley, the nation's most productive agricultural region. This reliable water source not only ensures the livelihood of residents, businesses, and farmers but also contributes significantly to the state's economy through technology, manufacturing, and agricultural exports.

This report consolidates publicly available data from the California Department of Water Resources (DWR) and other agencies to provide policymakers with a comprehensive overview of the economy that is supported by the State Water Project. The aim is to present this information in a concise format to facilitate well-informed decision-making regarding the project. The information in this report covers patterns of water use in the State Water Project service area, the size of the urban and agricultural economies served by the State Water Project, the role of the State Water Project in serving underrepresented communities, and how the costs of State Water Project water deliveries compare to the costs of developing alternative water supplies.

Water from the State Water Project is delivered to twenty-nine contractors in six regions of California. These contractors are water agencies of varying sizes that fulfill diverse roles, including direct municipal water supply, wholesaling water to other local utilities and municipalities, and supplying water for irrigation and managing groundwater storage. Of the six regions supplied by the State Water Project, the two largest are Southern California, where 54% of State Water Project deliveries are used primarily in the urban sector, and the San Joaquin Valley, where 38% of State Water Project deliveries are used primarily in the agricultural sector. The remaining 8% of State Water Project deliveries are used in the Feather River Basin, the North and South Bay regions of the San Francisco Bay Area, and on the Central Coast in San Luis Obispo and Santa Barbara counties. Based on data on water use in California, 56.4% of total State Water Project deliveries are used by urban customers and 43.6% are used in agriculture. The State Water Project also delivers water for other beneficial uses, which are beyond the scope of this report.

Most State Water Project water deliveries are governed by contractual terms that set a maximum annual volume for each contractor, often referred to as Table A deliveries. During the year, the Department of Water Resources announces what percentage of contracted Table A volumes contractors can expect to receive. Allocations can shift significantly from one year to the next due to California's highly variable climate and hydrology. Over the past 20 years, contractors have received an average of 63% of their contracted Table A volumes.[1] Besides Table A deliveries, contractors also receive two other types of deliveries; Carryover Water, which lets contractors store unused Table A allocations for later use, and Article 21 Water, which is additional water that is made available to contractors when export capacity exceeds both current demands and regulatory obligations.

The State Water Project service area is the largest economy supported by a major water conveyance system anywhere in the United States, and the second largest anywhere in the world. The service area of the State Water Project is home to over twenty-seven million individuals, over two-thirds of the state's population, and supports an economy with a Gross Domestic Product (GDP) surpassing $2.25 trillion. Based on GDP, the State Water Project service area would rank as the world's eighth-largest economy if it were an independent nation. This economy supports the full-time employment of over 8.7 million individuals with jobs that pay a median income 23% higher than the national average.[2]

The regions served by the State Water Project have experienced significant income and population growth since the project was approved by voters in 1960. Since that time, populations in the six regions served by the State Water Project have at least doubled and in some cases tripled. Today, property in the State Water Project service area is valued at a total of over $4.26 trillion.[3]

In Southern California, the State Water Project constitutes more than 28% of its urban water supply, surpassing the volume of water supplied by the regions other two major urban water conveyance systems: the Colorado Aqueduct at 23% and the Los Angeles Aqueduct at 14%.[4]

In Kern County, the State Water Project provides 24% of all water used in agriculture.[5] State Water Project supplies have been crucial to driving the county's growth in almond and pistachio production, which has led the real value of agricultural production in the county to more than double since the early 2000s to an annual value of $8.2 billion. The State Water Project water will play an increasingly vital role in Kern county's agricultural water supply as the region takes actions to comply with the Sustainable Groundwater Management Act (SGMA).

California Assembly Bill 685 (2012) recognizes the human right to water which guarantees the right to safe, clean, affordable, and accessible water for all Californians. However, many communities still face challenges accessing a safe water supply today due to social, economic, health, and environmental considerations. State Water Project deliveries uphold the right to water for a significant number of underrepresented people and communities. The term disadvantaged community (DAC) has differing definitions in state legislation, often

[1] See Section II.
[2] See Section III.
[3] See Section III.
[4] See Section III. Note that the All-American Canal conveys a larger volume of water to Southern California than the State Water Project, but this primarily serves the agricultural Imperial Valley.
[5] See Section IV.

relating to median household income (MHI) or health and environmental quality measures. Depending on the definition used, 6.6 to 8.2 million individuals reside in disadvantaged communities served by State Water Project water. This is between 65% and 75% of all disadvantaged communities in California and between 17% and 21% of the state's total population. Most of these residents live in Southern California, between 6.1 to 7.1 million, depending on the definition used. Disadvantaged communities served by the State Water Project in Southern California constitute between 56 and 70% of the state's total population of disadvantaged communities.[6] In the San Joaquin Valley, residents of DACs are disproportionately likely to be employed in farm jobs served with water from the State Water Project.

The cost of water deliveries to State Water Project contractors is determined by a water charge that covers capital and operational costs of facilities that collect water north of and within the Delta, as well as the Project's share of costs of the California Aqueduct, and San Luis Reservoir. Contractors also pay a transportation charge that covers the capital and operational costs of facilities that pump and convey water from the delta to the contractors. The capital costs are amortized over varying time periods, with the requirement that the Project's initial facilities be recovered by the end of 2035.

The average cost of delivering State Water Project water ranges between $250 per acre-foot in the San Joaquin Valley, to $600 per acre-foot in Southern California and as high as $1,440 per acre-foot on the Central Coast. However, costs per acre-foot vary significantly from year-to-year depending on whether hydrologic conditions are wet or dry.

The long-term average costs of State Water Project water are competitive when compared to alternatives such as stormwater conservation programs ($600 to $5,000 per acre-foot, with a median of $2,100) and water conservation efforts such as turf (lawn) removal rebate programs ($420 to $1,500 per acre-foot, with a median of $1,100). Other common water conservation programs such as replacing toilets and clothes washers with high efficiency models, installing weather-based controllers and rotating nozzles for irrigation, and rain barrels can have lower costs comparable to State Water Project water deliveries, however these programs are not scalable and could not replace a significant volume of Project water deliveries.

State Water Project water has a notably lower cost than water recycling programs, which can exceed $2,200 per acre-foot, and seawater desalination facilities, which can cost upwards of $2,800 per acre-foot.[7] In addition to cost considerations, permitting and building desalination facilities in Southern California have proven to be challenging. Currently, desalination accounts for less than one percent of Southern California's water supply. Additionally, alternatives like recycling, stormwater management, and conservation programs are often limited in scale, often producing less than 10,000 acre-feet of water per year.

[6] See Section V.
[7] See Section VI.

California's largest desalination plant, located in Carlsbad, has an annual capacity of 56,000 acre-feet. To replace the volume of water currently provided by the State Water Project to Southern California, twenty-five additional desalination plants of the same size as the Carlsbad facility would need to be permitted and constructed. This highlights the significant challenges in ensuring water supply reliability and underscores the crucial role the State Water Project will continue to play in California's future water security.

I. Introduction

Despite the key role the State Water Project plays in California's water supply, there is a lack of recent publications that review the available data on the scope of the economy it serves. This report addresses this gap by summarizing publicly available data on State Water Project water distribution, the scale of the urban and agricultural economies it supports, the extent to which underrepresented populations are served, and the costs associated with developing alternative water supplies. The primary objective of this report is to inform policymakers about the State Water Project's operations and the economy that is served by the State Water Project.

The report is not a comprehensive valuation of the benefits of the State Water Project and does not attempt to document the benefits or costs of the State Water Project's non-water supply related impacts and amenities such as power generation, flood control, or any recreational and environmental values. These other benefits are significant, but beyond the scope of this report.

This report relies on publicly available data from multiple sources. One extensively used source is the Department of Water Resources' Bulletin 132; this publication aggregates data on various aspects of the State Water Project, including water supply planning, construction, finance, management, and operations.[8] Also extensively relied on is Department of Water Resources' Water Balance Dataset, a program that calculates applied, net, and depletion water balances for California.[9] Additional economic and demographic data were sourced from various public outlets such as the California Employment Development Department, the US Census Bureau, and the Bureau of Economic Analysis.[10] Agricultural production figures were taken from annual crop reports produced by county agricultural commissioners.[11] Data on the classification of disadvantaged communities were sourced either from Department of Water Resources data or from the

[8] "Bulletin 132 Management of the California State Water Project," California Department of Water Resources.
Hereinafter referred to as "Bulletin 132."
[9] Water Plan Water Balance Data," California Natural Resources Agency.
Hereinafter referred to as "Water Balance Data."
Water balance data available annually from 2002 to 2019, except 2017. Department of Water Resources did not produce water balance estimates in 2017.
[10] "Employment by Industry Data," Employment Development Department.
"Population and Housing Unit Estimates," U.S. Census Bureau.
"Gross Domestic Product," Bureau of Economic Analysis.
[11] "California Agricultural Production Statistics," California Department of Food and Agriculture.

Office of Environmental Health Hazard Assessment's (OEHHA) CalEnviroScreen tool.[12] Other studies, described in further detail in Section VI, were consulted to assess the costs of alternative water supplies in Southern California.

The Department of Water Resources was created in 1956 with a mandate to create a comprehensive statewide water management system. During this period, the State Water Project was conceived to complement the existing federal Central Valley Project (CVP), which was primarily focused on agriculture in the Central Valley. The State Water Project addresses the geographical mismatch between the supply of water, which is concentrated in the snowpacks of Northern California, and the demand for water, which is concentrated in the cities and urban regions in Central and Southern California. In 1960, voters approved the California Water Resources Development Bond Act, which authorized the financing for the State Water Project's construction and ongoing management. One of the project's primary objectives is to provide a reliable water supply to urban and agricultural customers.

The core of the State Water Project's infrastructure includes thirty dams forming storage reservoirs, 705 miles of aqueducts, and thirty pumping and generating plants. Water is initially collected in Northern California's Feather River Basin. From there, water travels through the Feather and Sacramento rivers into the San Francisco Bay Delta. The San Francisco Bay Delta plays a pivotal role in this conveyance system, serving as a natural hub where water from the north meets the aqueducts leading to the south. At the Clifton Court Forebay water is lifted into the California Aqueduct, a 444-mile-long channel that conveys water to the south end of the San Joaquin Valley. Water is then pumped over the Tehachapi Mountains at the Edmonston Pumping Plant and into Southern California. Here the aqueduct splits into east and west branches, with terminal reservoirs that serve various parts of Southern California. Additional branch aqueducts serve specific communities in the North Bay and South Bay regions of the San Francisco Bay Area and on the Central Coast.

Oroville and the San Luis Reservoir, located near Los Banos, are key storage facilities that enhance the State Water Project's ability to provide reliable water supply. Lake Oroville has a capacity of 3.5 million acre-feet, while the San Luis Reservoir, a joint federal-state facility shared with the Central Valley Project, holds about two million acre-feet, of which the SWP's share is slightly over one million acre-feet.

In the face of climate change, California is expected to experience heightened water supply challenges. With rising temperatures and unpredictable weather patterns, managing the already complex water system will become increasingly demanding. Specifically, the impacts of climate change are anticipated to pose new challenges for the San Francisco Bay Delta, a crucial nexus in California's water supply chain.

[12] "DAC Mapping Tool," Department of Water Resources.
"Cal EnviroScreen 4.0," California Office of Environmental Health Hazard Assessment.

To adapt to these changes, the Department of Water Resources is currently pursuing the proposed Delta Conveyance Project and collaborating with agencies on other water storage projects, among other management plans and future projects. These plans are one part of the state's strategy to manage future water supply reliability.

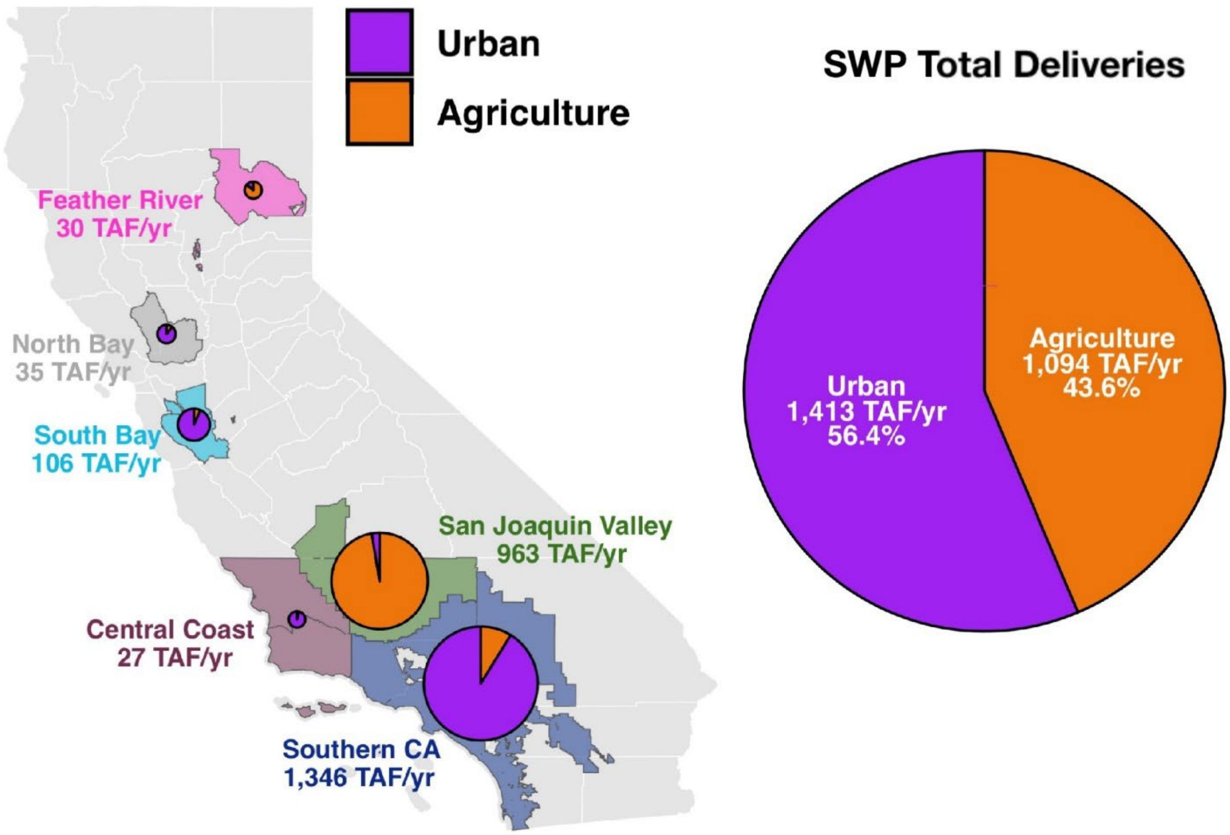
II. Water Use in the State Water Project Service Area

Figure 1 shows the six regions served by the State Water Project and how deliveries are used within the State Water Project service area. The text next to each region shows the average State Water Project deliveries over 18 years. The pie charts in Figure 1 illustrate the annual average breakdown of water use for each region and for the State Water Project service area as a whole. These figures are based on the Department of Water Resources' Water Balance Data. This dataset is based on simplified water budgets that compute applied, net, and depletion water balances for a water year, based on analyses of developed and dedicated water supplies, water uses by sector, water reuses, operational characteristics for an area, and inflows and outflows. These estimates are based on data from 2002 to 2019.[13]

On average, the State Water Project delivers over 2.5 million acre-feet of water annually. Around 1.4 million acre-feet of water, or 56.4% of total State Water Project deliveries, supply urban areas, including residential, commercial, and industrial customers and other urban water uses such as parks, landscaping, and urban fire suppression. Deliveries to the agricultural sector constitute around 1.1 million acre-feet per year, or around 43.6% of total State Water Project deliveries.

[13] Note that these estimates exclude data from 2017. DWR did not produce data for this year.

Figure 1: Water Use in the State Water Project Service Area



Sources: Department of Water Resources, "Water Plan Balance Data."
Note: Units in thousands of acre-feet per year. Water use averaged over 2002-2019 (excluding 2017, for which data was not available).

Southern California receives about 1.35 million acre-feet of State Water Project water per year on average, or around 54% of all water deliveries. Around 90% of all State Water Project water use in Southern California is in the urban sector.[14] Within Southern California, the Metropolitan Water District of Southern California (MWD) is the single largest user of State Water Project water. Currently about 24% of total water needs come from State Water Project deliveries, according to MWD's Integrated Resource Plan.[15] The MWD serves a large area that includes parts of six counties: Los Angeles, Orange, San Diego, Riverside, San Bernardino, and Ventura. The district provides water to twenty-six member agencies, which in turn supply water to a total of approximately nineteen million people.

[14] Department of Water Resources, "Water Balance Data."
[15] "The Integrated Water Resource Plan," The Metropolitan Water District of Southern California.

The State Water Project delivers on average 963 thousand acre-feet per year to the San Joaquin Valley, around 90% of which is delivered to Kern County. Unlike Southern California, State Water Project water is primarily used for agricultural purposes in the San Joaquin Valley.

The South Bay counties of Santa Clara and Alameda receive around 106 thousand acre-feet of State Water Project water per year. Water in the South Bay is predominantly used in the urban sector. The North Bay aqueduct delivers on average thirty-five thousand acre-feet per year, primarily to urban customers in Napa and Solano Counties in the North Bay. The Central Coast aqueduct supplies on average twenty-seven thousand acre-feet per year of water to San Luis Obispo and Santa Barbara counties, again mostly to the urban sector. Finally, in the Feather River Basin, thirty-six thousand acre-feet per year of water is used for both agriculture and urban sectors.

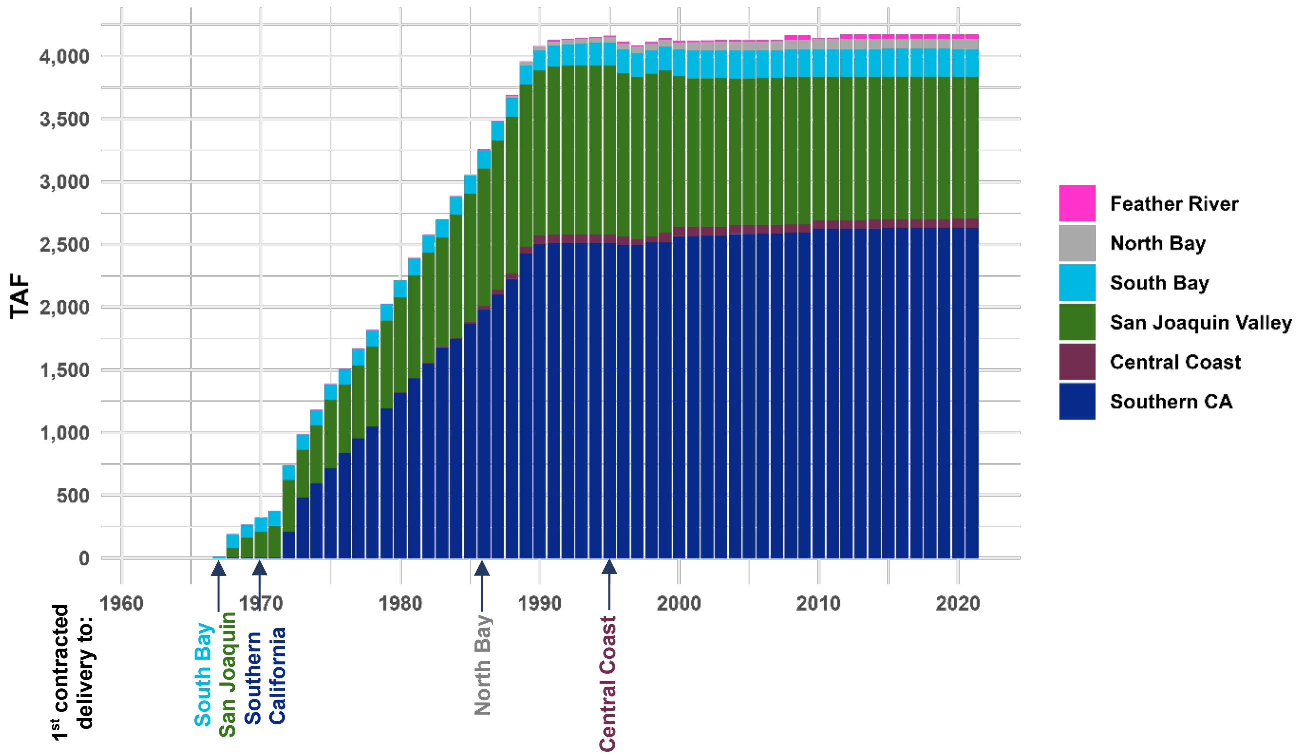
State Water Project deliveries are allocated among contractors in three ways: Table A deliveries, carryover storage, and Article 21 deliveries. Table A water serves as the cornerstone of the State Water Project's allocations, providing long-term stability for both urban and agricultural customers through providing contractors with a share of the available water each year. Carryover storage offers contractors the flexibility to store Table A allocations for future use, as part of a risk mitigation policy to protect against future dry periods. Article 21 water is available occasionally, providing short-term opportunities to access additional supplies when conditions permit.

Figure 2 shows the history of maximum contractual Table A allocations by service area. Currently, almost 4.2 million acre-feet of water is contracted as Table A. Southern California accounts for 63% of the contracted maximum Table A volume, with Metropolitan Water District alone contracting 45%. Contractors in the San Joaquin Valley hold 27% of the maximum Table A volume. Contractors in the South Bay hold 5% of total allocations, whilst contractors in the Feather River Basin, North Bay, and Central Coast each hold 1 to 2%.

Figure 2 shows how the volumes of water contracted under Table A increased over time as new project facilities came online. The first contracted deliveries of project water to the South Bay and San Joaquin Valley began in 1968.[16] In 1971, the Edmonston Pumping Plant began operating, delivering the first water to Southern California. In 1987, the North Bay Aqueduct was completed, allowing the State Water Project to deliver the first contracted water to the North Bay.[17] The first deliveries to the Central Coast began in 1996, with the Central Coast Aqueduct completed and dedicated shortly after in 1997. The East Branch Extension (EBX) of the State Water Project, completed in two phases between 2003 and 2017, supplies project water to eastern San Bernardino County in Southern California[18].

[16] Between 1962-1968, the State Water Project supplied non-project water to contractors in the South Bay, as shown in Figure 3.
[17] Between 1968-1987, the State Water Project supplied non-project water to contractors in Napa Valley through an interim facility.
[18] "Projects and Facilities," San Gorgonio Pass Water Agency.

Figure 2: History of State Water Project Maximum Contractual Table A Allocations by Service Area (1962-2021)

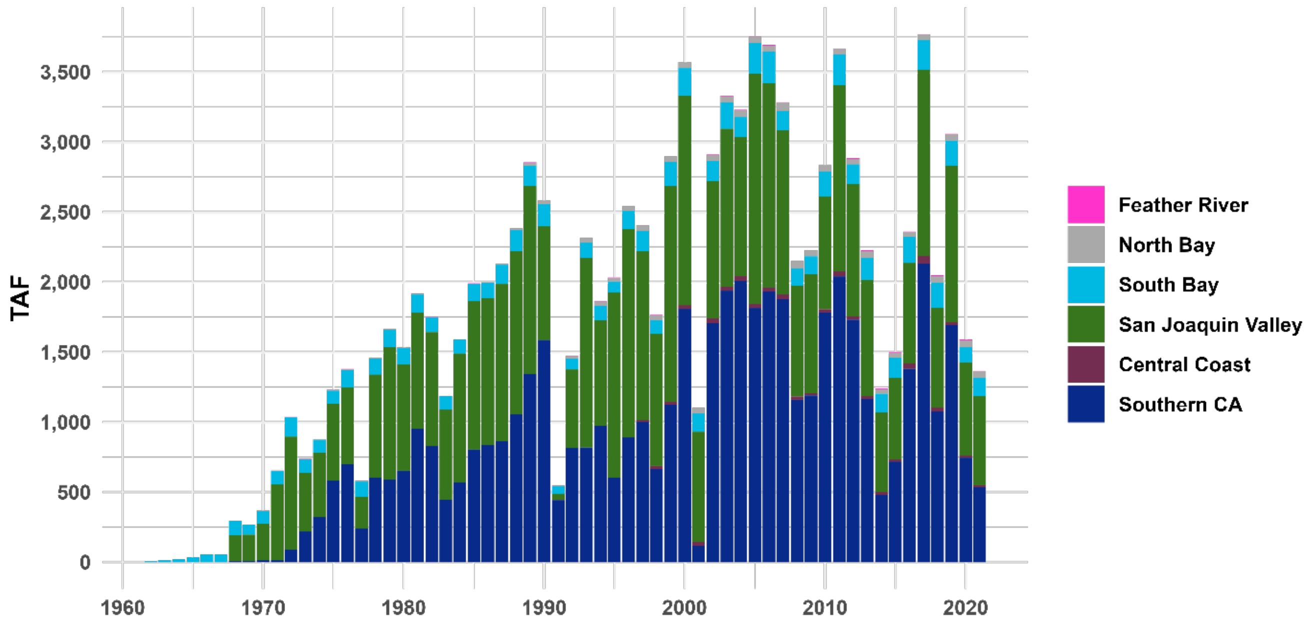


Source: California Department of Water Resources, "Bulletin 132-22, Table B-4."

Table A allocations provide the basis for extended planning, however actual deliveries vary considerably based on year-to-year water availability and operational considerations. Figure 3 shows the full history of actual deliveries to each region in the State Water Project service area. These data include both Table A allocations, as well as carryover water and Article 21 water. Over the past 20 years, State Water Project contractors have received on average 63% of their Table A allocation.[19] Figure 3 highlights the variable nature of water supply; California's climate is characterized by patterns of alternating dry and wet periods, often resulting in challenges for water resource management.

[19] California Department of Water Resources, "Bulletin 132-22, Appendix Tables B-4 and B-5B."

Figure 3: History of State Water Project Deliveries by Service Area (1962-2021)



Source: California Department of Water Resources, "Bulletin 132-22, Table B-5B."

III. The Urban Economy of the State Water Project

The State Water Project contractors supply water to urban customers in all six State Water Project service regions. These regions are home to over two-thirds of California's population, including six of the state's ten largest cities.[20] Urban water customers include residential, commercial, and industrial customers, as well as municipal uses of water such as public parks. A reliable water supply is essential for these customers; it plays a critical role in public health and sanitation, attracting and retaining the residential and business customers that drive economic growth, and contributing to the overall quality of life.

Within this service area, the State Water Project provides 20% of all water for urban consumption, making it a critical part of the area's water supply portfolio. Table 1 below presents summary statistics describing the size of the economy in each of the six service regions. In total, the State Water Project service area contains twenty-seven million residents and serves an area with a GDP of about $2.3 trillion and a median household income of $85,460. This median income is about 23% higher than the average for the United States.[21] The

[20] The six cities supplied by the State Water Project are Los Angeles, San Diego, San Jose, Long Beach, Bakersfield, and Anaheim. Of the remaining four largest cities, three are supplied by other large water conveyance projects: San Francisco is supplied by San Francisco Public Utility Commission's Hetch Hetchy Aqueduct, Fresno by the Central Valley Project's Friant Division, and Oakland by East Bay Municipal Utility District's Mokelumne Aqueduct. Sacramento draws water directly from the Sacramento River.

21 Based on a 2021 American Community Survey estimate of national median household income of $69,717 in 2021 dollars. Gloria Guzman, "Household Income 2021, American Community Survey Briefs," US Census Bureau, October 2022.

State Water Project service area also contains 800,000 businesses that employ more than seven million workers.[22] These urban customers include many underrepresented communities who depend on the State Water Project for a low-cost and reliable water supply. The economic and demographic characteristics of these communities are further discussed in Section V.

Customers in Southern California account for the majority of State Water Project deliveries to urban customers, on average around 1.4 million acre-feet of water per year, or 86% of all urban State Water Project deliveries. Southern California also relies the most heavily on State Water Project water for its urban water supply, with State Water Project deliveries accounting for 28% of its total urban water consumption. Other major sources of urban water supply in Southern California include the Los Angeles Aqueduct, the Colorado Aqueduct, and local surface and groundwater supplies. In terms of salinity, the quality of State Water Project deliveries is significantly better than Colorado Aqueduct deliveries or local groundwater supplies, which in some cases must be treated or blended before use.[23] The State Water Project's Southern California service area has a population of over 22.1 million with a GDP of $1.6 trillion. The Southern California service area includes over 600,000 businesses employing over seven million individuals. The assessed value of property in the State Water Project Service Area is estimated to exceed $3.3 trillion.

The second largest recipient of State Water Project urban water is the South Bay region, including Santa Clara and parts of Alameda County, which receives 7% of total State Water Project urban water deliveries. The State Water Project accounts for 15% of all urban water use in the South Bay. The region's other major water sources include local surface- and groundwater supplies, the Central Valley Project, and the Hetch Hetchy aqueduct. The South Bay service area has a population of over 2.6 million. This region is home to the Silicon Valley tech industry and has a median household income over 50% higher than the State average.

In addition to the urban economies in Southern California and the South Bay, the State Water Project also delivered over eighty-six thousand acre-feet per year to urban customers in the other State Water Project service areas: the Feather River, North Bay, San Joaquin Valley, and Central Coast. These areas have a combined population of over 2.6 million and a combined GDP of over $160 billion.

[22] Note that these estimates include all individuals in the State Water Project service area, not only those who receive residential water from the State Water Project.

[23] The high salinity and contamination in groundwater supplies and Colorado Aqueduct deliveries in Southern California causes hundreds of millions of dollars' worth of damages each year, a disadvantage that is not shared by State Water Project Deliveries. See the results of the Bureau of Reclamation's Salinity Economic Impact Model.

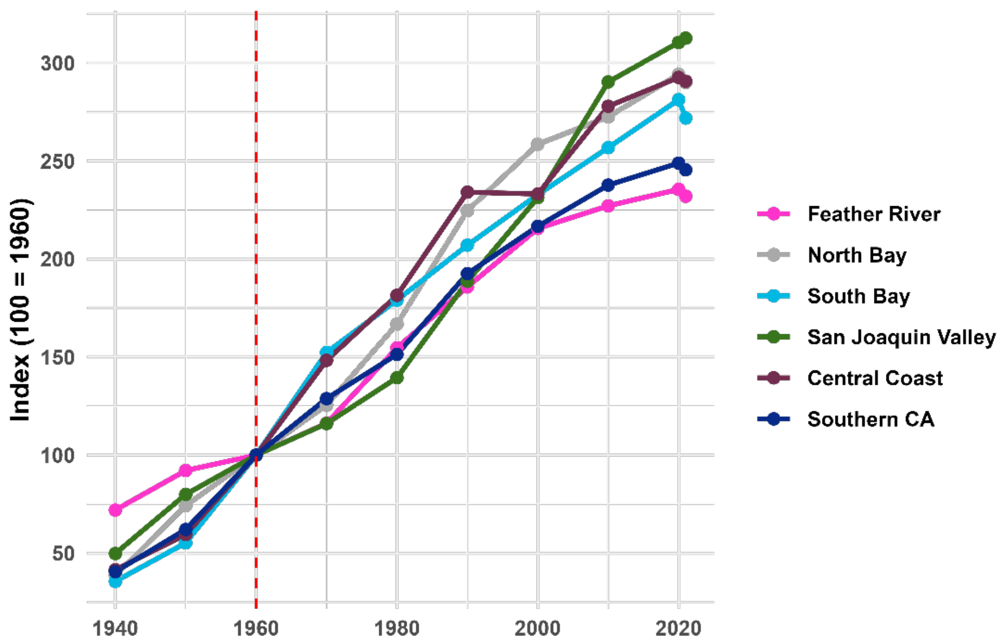
Table 1: Urban Water Use in the State Water Project Service Area

SWP Water Region	SWP Deliveries (TAF / yr)	SWP Deliveries as % of Total Urban Water Supply	Population in SWP Service Area	Median HH Income ($ 2021)	GDP Total ($ Bns 2021)	No. Businesses in SWP Service Area	Employment in SWP Service Area	Assessed Property Value in SWP Service Area ($ Bns 2021)
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Feather River	3.7	3%	318,208	$63,450	$3.4	8,110	18,751	$30.7
North Bay	31.4	7%	584,557	$90,862	$46.3	41,406	192,858	$93.4
South Bay	99.1	15%	2,555,414	$132,548	$460.8	90,219	975,767	$602.7
San Joaquin Valley	24.7	2%	1,043,142	$59,686	$59.5	66,071	259,060	$104.9
Central Coast	26.3	19%	656,421	$84,717	$52.1	20,846	212,092	$84.6
Southern CA	1,222.8	28%	22,051,662	$81,419	$1,630.1	596,652	7,078,430	$3,345.5
Total	**1,408.1**	**20%**	**27,209,404**	**$85,460**	**$2,252.2**	**823,304**	**8,736,958**	**$4,261.7**

Sources and Notes:
[2], [3]: California Department of Water Resources, "Water Balance Data." Annual averages based on data from 2002 to 2019 (missing 2017). Calculated from DAU level data aggregated to the service areas of State Water Project contractors.
[4]: "Bulletin 132-19 Table 1-6 Estimated Population, California Department of Water Resources.
[5]: "2021 American Community Survey 5-year Estimates, Census Tract-level median household income data." US Census Bureau. Weighted average calculated across census tracts by population and State Water Project service area coverage.
[6]: "Regional GDP data (2021)," Bureau of Economic Analysis.
County-level GDP data aggregated to State Water Project service regions based on State Water Project contractor service area coverage.
[7]: "County Business Pattern," US Census Bureau.
County-level data on business establishment aggregated based on State Water Project contractor service area coverage.
[8]: "2021 American Community Survey 5-year Estimates," US Census Bureau.
Census Tract-level data on total employment data aggregated based on the population within the service areas of State Water Project contractors.
[9]: Bulletin 132-19, Table 1-6 Assessed Valuation, measured in 2021 dollars.

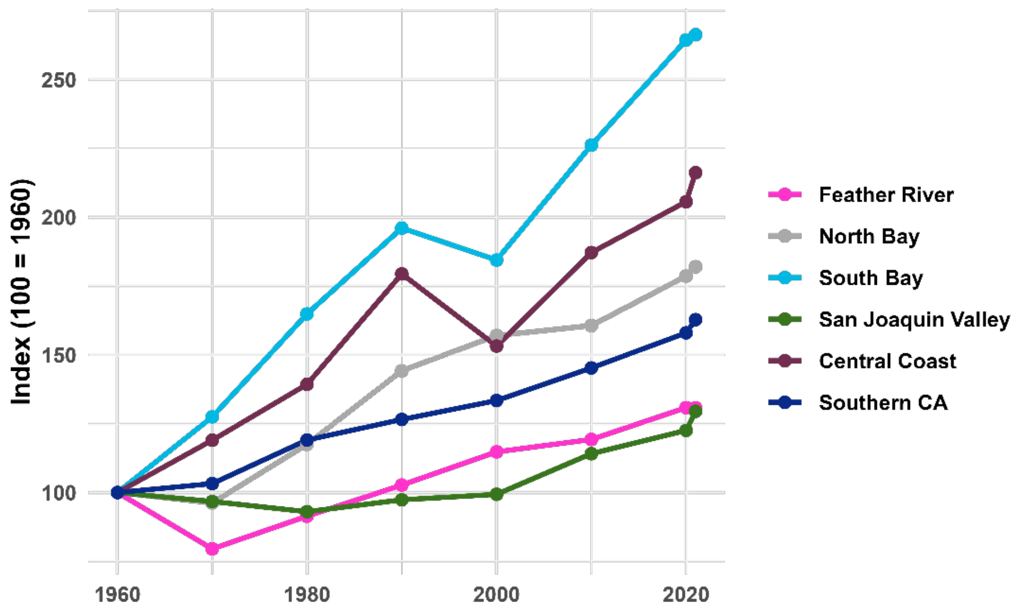
Figure 4 shows the changes in population in each State Water Project service region since 1940, while Figure 5 shows changes in median real household income since 1960. Data for both figures were sourced from the Decennial Census and the American Community Survey. Both population and median household income have grown in all regions over time. Since 1960, the population more than doubled in Southern California, nearly tripled in the Central Coast, South Bay, and North Bay, and more than tripled in the San Joaquin Valley. Household income increased by 25% in rural Feather River and San Joaquin Valley regions. The North Bay and Southern California regions saw increases exceeding 50% and the Central Coast more than doubled its household income. The South Bay saw the largest growth in median household income at over 150%.

Figure 4: Population Growth in the State Water Project Service Area (1940 – 2021)



Sources: Decennial Census (1940 to 2020), US Census Bureau; American Community Survey (2021), US Census Bureau.
Notes: 1960 Population = 100. County-level population data aggregated to State Water Project service regions.

Figure 5: Median Household Income Growth in the State Water Project Service Area (1960 – 2021)



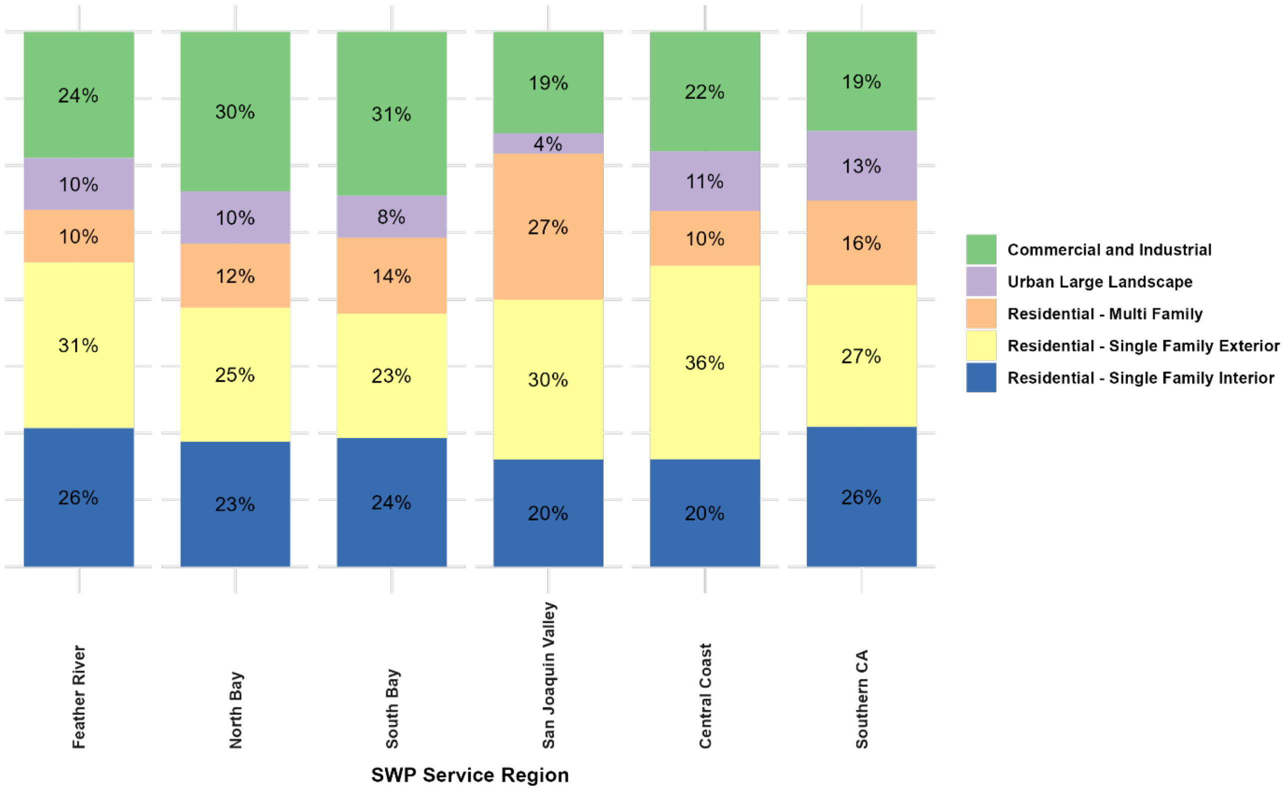
Sources: Decennial Census (1960 to 2020), US Census Bureau; American Community Survey (2021), US Census Bureau.
Notes: 1960 Median Household Income = 100. County level median household income data weighted and aggregated by population served by State Water Project.

Figure 6 shows the percentage breakdown by sector of urban water use within each service area. These sectors include commercial and industrial, urban large landscapes (e.g., parks, golf courses and urban green spaces), multi-family domestic water use, single family exterior (e.g., gardens and yards), and single-family interior.

Most of Southern California's urban water use is in the residential sector, accounting for 69% of the 4.2 million acre-feet used per year. Within the residential sector, 77% of water is consumed by single family units, with a similar split across interior domestic water consumptions and exterior landscape use. Multi-family water consumption only accounts for less than a quarter of all residential water use. Southern California uses the lowest percentage of water in commercial and industrial sectors, but the highest percentage of water in managing large urban landscapes.

Across all service areas, the single-family exterior water use remains the highest at 1.77 million acre-feet per year, 27% of the total urban water consumption. The second highest water use is in the single-family interior sector at 1.6 million acre-feet per year, 25% of the total urban water consumption. Overall, single-family water consumption accounts for more than half of all urban water use across all service areas. Commercial and industrial water use comes third at 1.35 million acre-feet per year, 20% of the total urban water consumption.

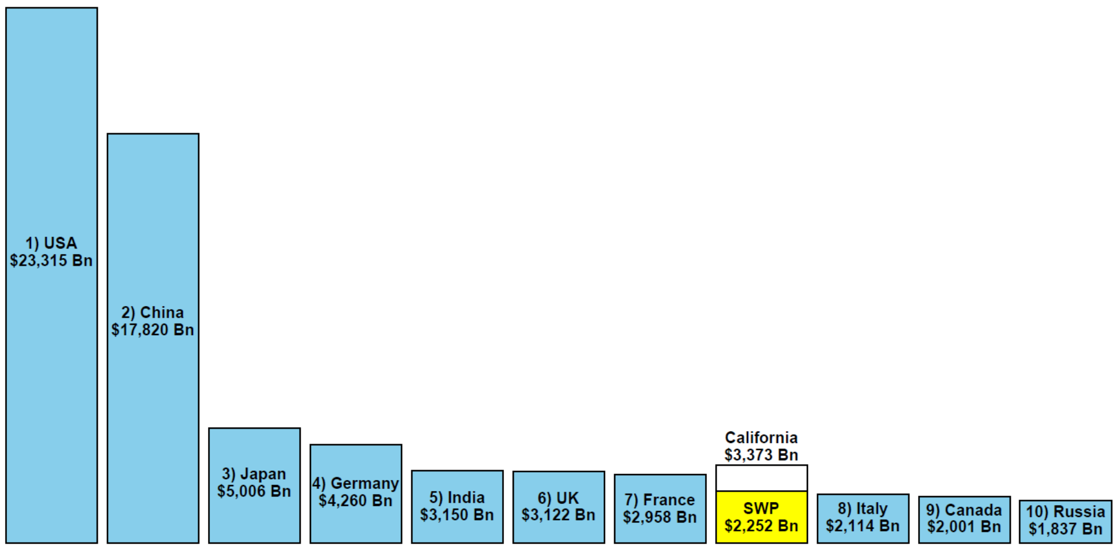
Figure 6: Breakdown of Urban Water Use by Sector



Source: Department of Water Resources, "Water Balance Data."
Note: Water use averaged over 2002 to 2019, except 2017 where data is unavailable.

Figure 7 compares the economy served by the State Water Project with the major world economies, as measured by their GDPs. The State Water Project serves a region equivalent to almost 10% of U.S. GDP and two-thirds of California's GDP, at $2.2 trillion. The State Water Project service area's economy is between the size of those of France and Italy, the 7th and 8th largest economies in the world.

Figure 7: If the State Water Project Service Area Were a Country, it Would Be the World's 8th Largest Economy



Source: "GDPRanking," The World Bank Group.
Notes: GDP measured in billions of 2021 United States Dollars. GDP of economy served by State Water Project calculated by aggregating GDP of counties served by State Water Project, weighted by the proportion of population served by State Water Project.

Table 2 compares the State Water Project with other major domestic water conveyance projects in the USA, as well as the economies they serve. The State Water Project is the largest domestic water transfer infrastructure in the country, in considering distance of water transferred, size of economy served, population served, and size of associated water infrastructures. Although the Central Valley Project and the All-American Canal both convey larger volumes of water than the State Water Project, these projects primarily supply the agricultural sector, and thus support a much smaller economy.

Other projects serve areas that overlap with the State Water Project. The Colorado River Aqueduct, which diverts water from the Colorado River to Coastal Southern California, delivers 1.2 million acre-feet annually to Los Angeles, San Bernadino, Orange, and San Diego Counties. The Los Angeles Aqueducts, serving the City of Los Angeles, transfers around 425 thousand acre-feet of water per year from the Owens River to San Fernando and Los Angeles. The Central Valley Project serves the San Joaquin Valley.

Table 2: Comparison of the State Water Project to Other Water Conveyance Projects in the USA

	Project Name	Economy Served (Billions of 2021 US$)	Water Source(s)	Destination(s)	Purposes of Water Transfer	First Operations	Total Water Transfer Distance (Miles)	Total Water Transfer Volume (TAF/Year)
[1]	California State Water Project	$2,252	Lake Oroville	Southern California, SF Bay Area, San Joaquin Valley	Domestic Supply; Irrigation	1962	701	2,700
[2]	Colorado River Aqueduct	$1,501	Colorado River	Southern California	Domestic Supply	1939	242	1,216
[3]	New York City Water Supply System	$1,068	Catskill / Delaware Watersheds	New York City	Domestic Supply	1842 (Expanded in 1890, 1916, and 1953)	251	2,240
[4]	Los Angeles Aqueducts	$836	Owens River	Los Angeles	Domestic Supply	1913 (Second Aqueduct 1970)	370	425
[5]	Central Valley Project	$663	Trinity, San Joaquin, Sacramento River Basins	San Joaquin Valley and SF Bay Area	Domestic Supply; Irrigation	1933	373	7,003
[6]	Central Arizona Project	$366	Colorado River	Central and Southern Arizona	Domestic Supply; Irrigation	1992	336	1,500
[7]	All-American Canal	$10	Colorado River	Imperial Valley	Domestic Supply; Irrigation	1942	81	18,934

Notes: Estimates of the size of the economy served by each project are calculated based on the service area of each project using BEA county-level GDP data. All other information was referenced from the sources below.

Sources: Shumilova, Oleksandra, et al., "Global Water Transfer Megaprojects: A Potential Solution for the Water-Food-Energy Nexus?," *Frontiers in Environmental Science*, Vol. 6 (2018), https://doi.org/10.3389/fenvs.2018.00150; "Regional GDP data (2021),"Bureau of Economic Analysis; Rennenkampf, Lenore, "National Register of Historic Places nomination, Old Croton Aqueduct," *U.S. National Archives*; "A History of the NYC Water Supply System," Duke Geological Laboratory; "Out of the Archives: 75 Years of Delaware System Water," NYC Water.

Table 3 below compares the State Water Project with other major domestic water conveyance projects in the world. Many countries have adopted similar large-scale water transfer projects to mediate the imbalance of water distributions.[24] Like the State Water Project, most of these projects serve multiple purposes, including energy generation, agricultural, residential, and commercial water supply. Of all the projects, the State Water Project serves the second largest economy, and is among the top three projects in terms of distance water is conveyed. The largest projects in this table from China, Israel and Mexico are briefly described below:

China operates the highest volume and longest water conveyance system in the world.[25] China's water shortage problem is prominently a water distribution problem, exacerbated by a large population. To address these issues, the South-to-North Water Diversion Project was approved, and construction commenced in the

[24] Rodell, M. et al, "Emerging trends in global freshwater availability," *Nature* 557, doi: 10.1038/s41586-018-0123-1.
[25] "South-to-North Water Diversion Project," Water Technology.

early 2000s.[26] The eastern route serves three provinces, benefiting more than 83 million residents with an annual delivery of more than 7 million acre-feet of water.[27] The central route delivers nearly 12 million acre-feet of water to Beijing, Tianjin, Hebei, and Henan. The current two operating routes now transfer almost 20 million acre-feet of water over 1,600 miles, supporting a residential, industrial, and agricultural economy of nearly five trillion dollars, and a population of over one billion. Upon completion, all three routes are estimated to deliver a total of 35 million acre-feet.

Israel's National Water Carrier transports desalinated sea water from the north, which makes up about half of the country's freshwater supply, to replenish Lake Kinneret and service domestic water supply across the country.[28] Managed by the state-owned national water company Mekorot, the project delivers more than 500 thousand acre-feet of residential, commercial, and agricultural water across the country, as well as Jordan, the Palestinian Authority and Gaza Strip.[29] Israel now has a 20% water surplus, and exports some excess water to neighbors like Jordan, even during the drought years.

The Cutzamala System in Mexico was constructed to divert water from the Cutzamala and Lerma-Balsas River systems to the north of Mexico City and the State of Mexico. The water traverses nearly 150 miles and is pumped to a height of more than 1,300 meters using 102 pumping stations.[30] Despite the high energy cost of operation, the system delivers 388 thousand acre-feet of water for urban, industrial, and agricultural uses that support an economy of $338 billion. Despite this conveyance system, Mexico City still struggles with water supply reliability; many neighborhoods receive have intermitted water supplies.

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[26] "South-to-North Water Diversion Project, China," University of Chicago.
[27] "南水北调东线工程通水十年：直接受益人口超 8300 万 综合成效显著," Tibet.cn.
[28] "Reverse water carrier launched to refill Kinneret," Globes.
[29] "Israel Has Become a Water Powerhouse," The Jerusalem Post.
[30] "Summary: Cutzamala System," Auburn Sciences and Mathematics.
"The Cutzamala System," Water for Urban Areas, Foods and Nutrition Library.

Table 3: Comparison of State Water Project to Other International Water Conveyance Projects

	Project Name	Country	Economy Served (Billions of 2021 US$)	Water Source(s)	Destination(s)	Purposes of Water Transfer	First Operations	Total Water Transfer Distance (Miles)	Total Water Transfer Volume (TAF/Year)
[1]	California State Water Project	USA	$2,252	Lake Oroville	Southern California, SF Bay Area, San Joaquin Valley	Domestic Supply; Irrigation	1962	701	2,700
[2]	South-to-North Water Diversion Project (Eastern)	China	$3,953	Yangtze River	Shandong, Anhui, Jiangsu Province	Domestic Supply; Irrigation	2013	718	11,999
[3]	South-to-North Water Diversion Project (Central)	China	$1,063	Yangtze River	Henan, Hebei, Beijing Province	Domestic Supply; Irrigation	2014	890	7,296
[4]	Jiang Shui Bei Diao Project	China	$440	Yangtze River	Northern Jiangsu Province	Domestic Supply	1980	249	2,675
[5]	National Water Carrier of Israel	Israel	$391	Galilee Sea	Most of Israel	Domestic Supply; Irrigation	1964	81	503
[6]	Cutzamala System	Mexico	$338	Cutzamala River	Greater Mexico City	Domestic Supply	1993	138	388
[7]	Tagus-Segura Transfer	Spain	$59	Upper Tagus River	Murcia Region	Domestic Supply; Irrigation	1978	178	247
[8]	Indira Gandhi Canal	India	$48	Harike Wetland	Northwest Rajasthan	Domestic Supply; Irrigation	1983	244	8,600
[9]	Goldfields Water Supply Scheme	Australia	$5	Helena River	Coolgardie and Kalgoorlie	Domestic Supply; Irrigation; Mining	1903	329	26,632
[10]	Yin Da Ru Qin Project	China	$5	Datong River	Lanzhou New District	Domestic Supply	1995	549	3,591

Sources: Shumilova, Oleksandra, et al., "Global Water Transfer Megaprojects: A Potential Solution for the Water-Food-Energy Nexus?," *Frontiers in Environmental Science*, Vol. 6 (2018), https://doi.org/10.3389/fenvs.2018.00150;
[2]: Yang, Zitong, et al., "Benefit Evaluation of East Route Project of South to North Water Transfer Based on Trapezoid Cloud Model," *Agricultural Water Management*(2021).
[3]: 人民网, 央广网, 网易新闻, China Briefing.
[4]: Jiangsu Province Water Board, Frontiers in Environmental Science, Baijiahao.
[5]: The Jerusalem Post, The World Bank.
[6]: Frontiers in Environmental Science, Statista.
[7]: El Regadío, One World - Nations Online, City Population, Expansíon.
[8]: PRS Legislative Research.
[9]: Remplan, Water Technology.
[10]: 甘肃经济信息网, 搜狐新闻, 安徽农业科学.

IV. The Agricultural Economy of the State Water Project

The State Water Project water is used in the agricultural sector primarily in the southern San Joaquin Valley, but State Water Project water is also used in agriculture in most other regions supplied by the project. Kern, Kings, San Diego, and Ventura receive the vast majority of all agricultural State Water Project deliveries, at over 93%, based on Department of Water Resources Water Balance Data. Table 4 below provides an overview of agricultural water use in the four top State Water Project delivery counties. Kern is by far the largest recipient of agricultural water deliveries, receiving 75% of all deliveries. These State Water Project agricultural deliveries are a component of all agricultural water use in these four counties, as they make up between 6 and 29% of total agricultural water use per county. State Water Project agricultural deliveries comprise nearly one quarter of all agricultural water used in Kern County.

In total, the State Water Project service area employs around 160,000 farm workers, according to 2021 data from the Employment Development Department (EDD) Current Employment Statistics (CES) dataset.[31] Farm employment in the top four counties totals over 113,000. Kern County alone makes up about 43% of total farm employment within the State Water Project Service Area.

The total value of agricultural production in regions served by the State Water Project exceeds $19 billion, with over $8 billion worth of production in Kern County alone. Table 4 below also lists the top value agricultural products in each of the four counties and for the entire State Water Project service area. The largest crops in Kern County include table grapes, oranges, tangerines/tangelos, pistachios, and almonds. In Kings County there is significant dairy and cattle production, and cotton is grown in the Tulare Lakebed. In coastal areas such as San Diego and Ventura Counties, nursery crops, raspberries and avocados predominate.

Table 4: Agricultural Water Use in the State Water Project Service Area

County	Average SWP Agricultural Deliveries (TAF / yr)	% of Total SWP Agricultural Deliveries	% of SWP Water Use in Agriculture	Farm Employment	Value of Agricultural Production ($ Bns 2021)	5 Highest Value Agricultural Products
[1]	[2]	[3]	[4]	[5]	[6]	[7]
Kern County, CA	803	74.9%	23.9%	69,000	$8.22	Grapes, Citrus, Pistachios, Almonds, Milk
Kings County, CA	99	9.2%	6.4%	8,095	$2.32	Milk, Pistachios, Almonds, Cotton, Cattle
San Diego County, CA	64	6.0%	29.2%	8,945	$1.67	Nursery, Flowers, Avocados, Vegetables, Citrus
Ventura County, CA	38	3.6%	11.6%	26,677	$2.04	Berries, Citrus, Nursery, Avocados, Vegetables
Other	68	6.3%	0.5%	47,261	$4.80	Grapes, Berries, Nursery, Milk, Lettuce
Full SWP Service Area	**1,072**	**100%**	**5.24%**	**159,978**	**$19.06**	**Grapes, Nursery, Berries, Milk, Almonds**

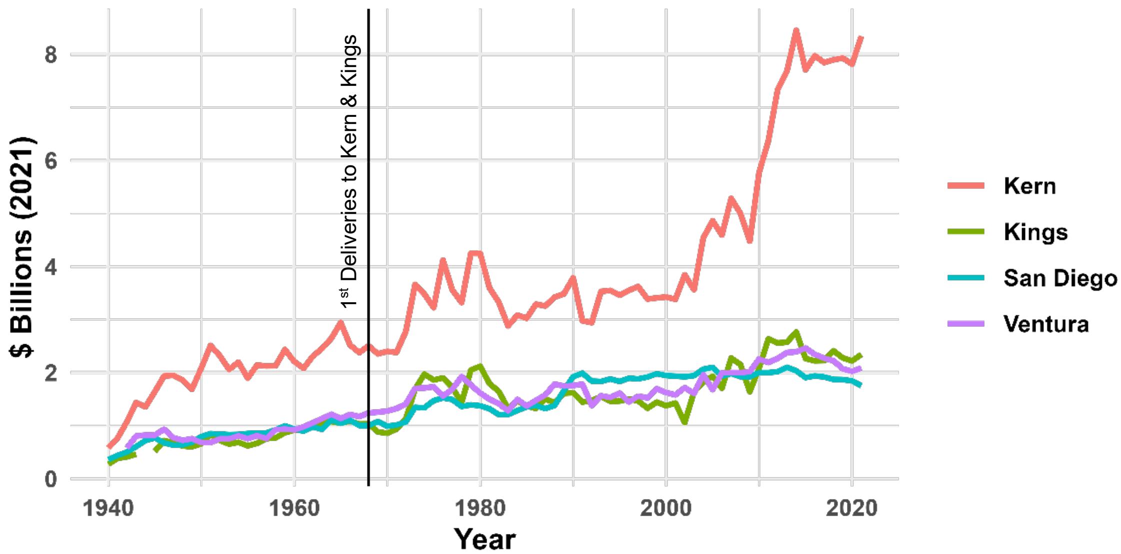
Notes:
[1]: 4 counties with largest average volume of agricultural water deliveries from the State Water Project.
[2]: Department of Water Resources, "Water Balance Data." Annual averages based on data from 2002 to 2019 (missing 2017). Calculated from DAU level data aggregated to the service areas of State Water Project contractors.
[3]: State Water Project agricultural water deliveries in county as a share of total State Water Project agricultural water deliveries. Calculated based on [2]
[4]: State Water Project agricultural deliveries in county calculated as a share of total agricultural water use in the county. Calculated based on Department of Water Resources Water Balance Data.
[5]: 2021 Employment Estimates by Sector, Employment Development Department, aggregated monthly data (maximum)

[31] Note the CES data may undercount farm labor because the data does not include the self-employed, unpaid family workers, and private household employees. The data may also undercount farm contract laborers.
"Current Employment Statistics (CES)," State of California Employment Development Department.

[6], [7]: 2021 County Agricultural Commissioners' Annual Crop Reports, measured in Billions of 2021 USD.

Figure 8 captures the growth in agricultural production value over time for Kern, Kings, San Diego, and Ventura counties. All four counties have steadily grown in agricultural value since the first State Water Project deliveries in 1968. The value of agricultural production has about doubled since then, in the case of Kings, San Diego, and Ventura counties, and has more than tripled in Kern County. Kern County experienced a significant uptick in production value over the past couple of decades, due in large part to almonds and pistachios.

Figure 8: Agricultural Production in Counties with Significant State Water Project Water Use in Agriculture



Source: County Agricultural Commissioners' Annual Crop Reports.
Notes: Top 4 Counties based on volumes of State Water Project Agricultural Delivery based on Department of Water Resources Water Balance Data. Total value of agricultural production measured in billions of 2021 USD. The first deliveries to Kern & Kings counties began in 1968. First deliveries to San Diego via Metropolitan Water District began in 1971. Some communities in Ventura began receiving State Water Project water from Metropolitan in 1971, however Ventura County itself did not become a State Water Project contractor until 1990.

In Kern and Kings counties in particular, agriculture plays a dominant role in the local economy and labor market. Farm employment makes up almost 20% of all employment in these counties, and many other jobs are in adjacent sectors supporting the agricultural economy.

V. Underrepresented Communities Served by the State Water Project

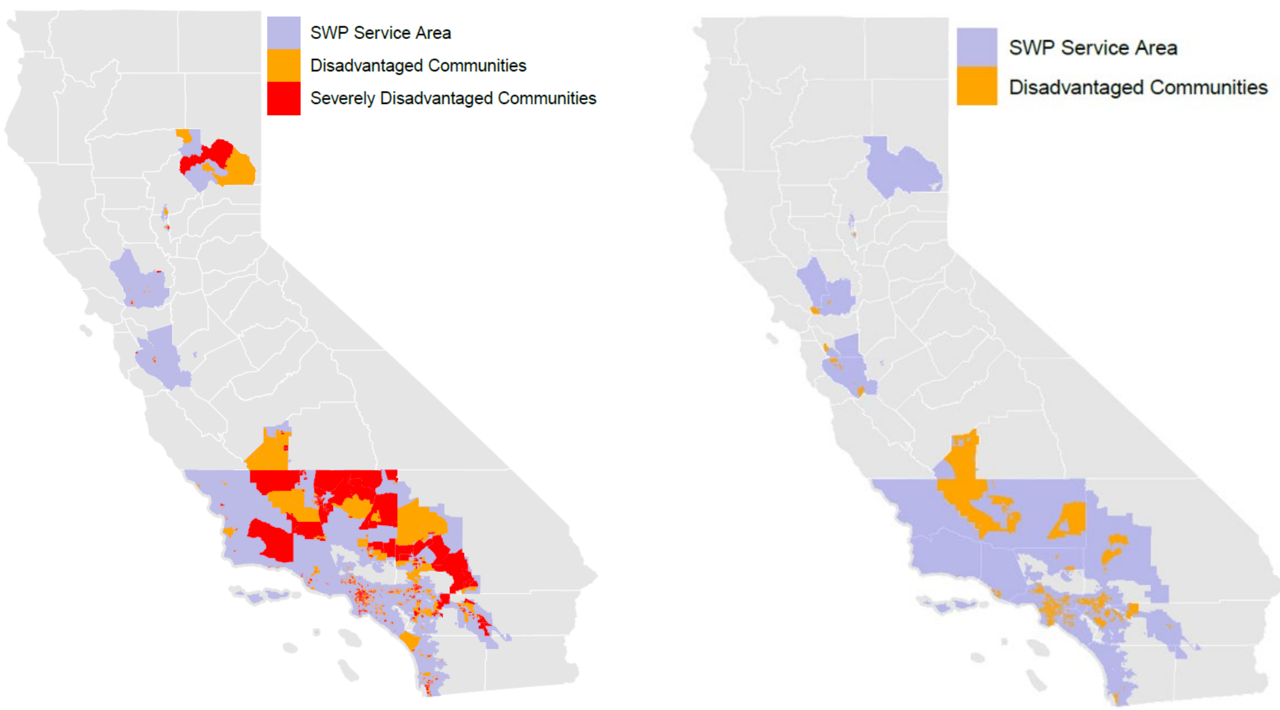
Low-income and environmentally impacted communities make up a sizable number of the residents in the State Water Project service area. California's Human Right to Water Law (Assembly Bill 685) requires that every resident have access to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes. Furthermore, many state-run bonds and grants have requirements that target funds at projects that benefit communities that are identified as “disadvantaged.”

Defining "disadvantaged communities" (DACs) in state programs began in the early 2000s, when the term was used to allocate drinking water bonds to communities with a median household income (MHI) below 80% of the state average. However, DAC definitions that focus only on income are not able to capture other comprehensive social, environmental, and climate-related impacts that led to disparities in quality-of-life outcomes. Different state programs have adopted differing definitions of DAC over time to include some of these additional vulnerabilities. Most notably, the California Environmental Protection Agency (CalEPA) was assigned the responsibility of defining DACs for the purposes of grant programs they manage related to California’s cap and trade program, and they developed a metric called CalEnviroScreen. CalEnviroScreen uses environmental, health, and socioeconomic information to produce scores for every census tract in the state. Census tracts within the bottom 25% of scores using CalEnviroScreen are considered disadvantaged communities. A recent report sponsored by the Department of Water Resources recommended retiring the MHI definition of DAC from future legislation. The report also discusses how the use of the term “disadvantaged community” has been identified as stigmatizing during community outreach processes and encouraged the use of more inclusive terms such as “underrepresented community.”[32]

[32] Haalan, O., & Ortiz, P., “Disadvantaged communities nomenclature within the State of California: Findings and conclusions — A recommendation document,” *California Department of Water Resources*, 2022.

Figure 9: DAC Communities in the State Water Project Service Area

MHI Definition **CalEnviroScreen Definition**



Sources: Disadvantaged Communities Categorization, Department of Water Resources; Disadvantaged Communities Nomenclature Within the State of California: Findings and Conclusions, Department of Water Resources; CalEnviroScreen 4.0, OEHHA.
Notes: Based on Department of Water Resources' income-based disadvantaged communities definition (Left) and OEHHA's CalEnviroScreen score (right).
Disadvantaged communities have a median household income at or below 80 percent of the statewide MHI. Severely disadvantaged communities have a median household income at or below 60 percent of the statewide MHI. Calculated based on Census tract-level median income data from 2021 American Community Survey 5-year Estimates. Aggregated based on the service regions of Department of Water Resources contractors. Note that these service areas might not reflect recipients of municipal water supplies from the State Water Project. CalEnviroScreen identifies California communities most affected by pollution and where residents are more vulnerable due to socioeconomic factors. Disadvantaged communities are defined as the top 25% highest scoring census tracts based on a combined measure of environmental, health, and socioeconomic burdens. This map displays disadvantaged communities in census tracts that have more than half of their population served by the State Water Project.

Figure 9 maps census tracts that meet different definitions of 'disadvantaged community'. The map on the left panel shows census tracts within the State Water Project service area that are defined as disadvantaged or severely disadvantaged according to Department of Water Resources' definition based on median household income. Under this definition, DACs have a MHI at or below 80 percent of the statewide median household income. Severely disadvantaged communities have a MHI at or below 60% of the statewide median household income. Currently, these definitions correspond to a MHI between $47,000 and $63,000 for DACs and below $47,000 for SDACs, respectively. The map on the right panel shows the communities that are defined as DACs according to the CalEnviroScreen definition.

Comparing the distribution of DACs between the two definitions, the MHI definition classifies significantly more census tracts in the San Joaquin Valley as DACs, as average household incomes in this region are significantly lower than the state average. It also classifies significantly fewer households in the South Bay as DACs compared to the CalEnviroScreen definition, which highlights that although average household incomes are significantly higher in the South Bay, there are still many communities that face adverse health and environmental conditions.

Table 5 presents statistics for population and employment in DACs within the State Water Project service area under each definition of DAC. Under the MHI definition of DAC, there are almost 8.2 million individuals living in DAC communities in the State Water Project service area. Most of these individuals (87% or 7.1 million) live in the Southern California service area. Based on the MHI definition, 32% of individuals in the State Water Project service are considered part of DACs. In the rural San Joaquin and Feather River areas, 67% individuals are within the DACs. Overall, the CalEnviroScreen definition of DAC is less stringent than the Department of Water Resources definition. By construction, the CalEnviroScreen definition contains 25% of California's population. The measure also contains 25% of the population of the State Water Project service area, or around 6.5 million individuals, making the State Water Project service area representative of the entire state in terms of DAC populations.

Table 5: DAC Populations in the State Water Project Service Area

SWP Service Area	Disadvantaged and Severely Disadvantaged Communities (Median Household Income Definition)				Disadvantaged Communities under SB535 EnviroScreen			
	Population in DACs	% of Total Population in DACs	Full-Time Employment within DACs	Full-Time Agricultural Employment within DACs	Population in DACs	% of Total Population in DACs	Full-Time Employment within DACs	Full-Time Agricultural Employment within DACs
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Feather River	53,351	75%	19,550	2,087	23,497	33%	8,610	919
North Bay	83,473	14%	31,560	1,273	48,547	8%	18,355	741
South Bay	104,264	4%	60,303	157	109,292	4%	63,211	165
San Joaquin Valley	640,503	60%	241,204	46,192	230,075	22%	86,643	16,593
Central Coast	171,383	24%	83,419	9,143	6,243	1%	3,039	333
Southern CA	7,116,232	34%	3,192,844	19,107	6,119,975	29%	2,745,853	16,432
Full SWP Service Are	**8,169,205**	**31%**	**3,628,881**	**77,958**	**6,537,628**	**25%**	**2,925,711**	**35,182**

Sources and Notes:
[2]: Based on the Department of Water Resources' income-based disadvantaged communities definition.
Disadvantaged communities have a median household income at or below 80 percent of the statewide median household income (MHI).
Severely disadvantaged communities have a median household income at or below 60 percent of the statewide MHI.
Calculated based on Census tract-level median income data from 2021 American Community Survey 5-year Estimates. Aggregated based on the service regions of Department of Water Resources contractors. Note that these service areas might not reflect recipients of municipal water supplies from the State Water Project.
[3]: [2] / Total Population in service areas of State Water Project contractors.
[4], [5]: "2021 Current Employment Statistics (CES)," State of California Employment Development Department.

[6]: Based on CalEnviroScreen disadvantaged communities definition. CalEnviroScreen identifies California communities most affected by pollution and where residents are more vulnerable due to socioeconomic factors. Disadvantaged communities are defined as the top 25% highest scoring census tracts based on a combined measure of environmental, health, and socioeconomic burdens.
[7]: [6] / Total Population in service areas of State Water Project contractors.
[8], [9]: "2021 Current Employment Statistics (CES)," State of California Employment Development Department.

VI. The Costs of State Water Project Deliveries and Alternative Supplies

Between 2012 and 2021, the growth in retail water rates paid by households in the United States increased by 43%, surpassing growth in household income.[33] Rate increases present economic challenges particularly for low-income and underrepresented households. Although it is only one of multiple factors that have driven price increases over the past decade, the costs of water supplies, and particularly of developing new supplies, have directly influenced changes in retail rates. This section analyzes the costs paid by contractors for State Water Project deliveries in the context of the costs of developing alternative water supplies.

Under the original water supply contracts, the costs that State Water Project contractors pay for water have two main components: a Conservation Charge, and a Transportation Charge. The Conservation Charge recovers both capital costs and operation, maintenance, power, and replacement (OMP&R) costs for facilities that store and convey water, including the Oroville Dam complex, Delta facilities, and the San Luis Reservoir. This is a fixed charge based on each contractor's Table A allocation, rather than the volumes of water delivered.[34]

The Transportation Charge covers the capital and OMP&R costs of the facilities that pump and convey water from the Delta to each individual contractor. Transportation costs have a fixed component that covers the costs of conveyance facilities, as well as a variable component that covers the power-related costs needed to convey water to each contractor. The fixed component of this charge varies depending on the cost of specific segments of aqueduct the contractor uses, and the variable component depends on the cost energy used to convey water conveyed in a particular year. Contractors also pay financing costs that fully repay the revenue bonds that finance the State Water Project. These bonds account for 82% of State Water Project financing and are fully repaid by State Water Project contractors through their rate payers instead of the general taxpayers. The objective of these charges is to fully recover the costs of the original facilities by 2035.

Please note that on January 1, 2024, the Department of Water Resources is implementing the State Water Project contract extension amendment. This amendment extends the water supply contracts to 2085 and

[33] "Up 43% over Last Decade, Water Rates Rising Faster than Other Household Utility Bills," Bloomfield Research, August 23, 2021.
[34] Note that the impact of new payment terms starting in 2024 under the recent Contract Extension Amendment has not been considered in this report.

institutes a new cost recovery methodology. This report focuses on the legacy cost recovery methodology used from inception of the State Water Project.

The per acre-foot cost of water delivered by the State Water Project varies significantly from year to year because deliveries are highly variable whilst the costs are mostly fixed. However long-term average costs for project water can be estimated on an acre-foot basis by comparing the long-term averages of costs and deliveries. The approximate cost of delivering State Water Project water ranges between $250 per acre-foot in the San Joaquin Valley, to $600 per acre-foot in Southern California, and as high as $1,440 per acre-foot on the Central Coast.[35] These estimates can then be used to compare the costs of project water to the costs of developing alternative water supplies.

The costs of alternative water supplies are estimated based on various independently conducted studies from research institutes with expertise on California water issues, including the Public Policy Institute of California, California Public Utilities Commission, and the Pacific Institute. Each of them reviewed recently completed alternative water supply projects to analyze yields and cost.

These reports consider the costs of developing four alternative water supplies: desalination projects that produce potable water from seawater using reverse osmosis, recycling projects that reclaim and treat wastewater for reuse, stormwater capture projects that harvest rainwater for storage and local irrigation, and water conservation programs that include use of water-efficient appliances and toilets, as well as landscape rebates for households to replace grassy areas with drought-tolerant plants or artificial turf to reduce water consumption. From the projects reviewed by these studies, we produced cost estimates at the 25th percentile, median, and 75th percentile for each type of project.

These cost estimates should be interpreted cautiously since they describe projects that vary substantially in context and scope. Some alternative water supplies, such as recycling, and stormwater capture have significant scale economies: only large projects achieve costs at the low end of the ranges reported below, whilst small projects have significantly higher costs. Furthermore, there are geographic constraints on the locations of alternative water projects: recycled water projects are most viable when located near both water sources and potential customers; the cost of stormwater capture varies based on urban hydrology, and desalination projects need to be located near the ocean or other saline water source. The reported cost estimates only apply specifically to Southern California and projects requiring additional conveyance will be more costly. Finally, these estimates do not account for additional treatment and compliance costs associated with newer and upcoming water quality regulations; these regulations challenges for stormwater capture and recycled water projects that risk exposure to emerging contaminants.

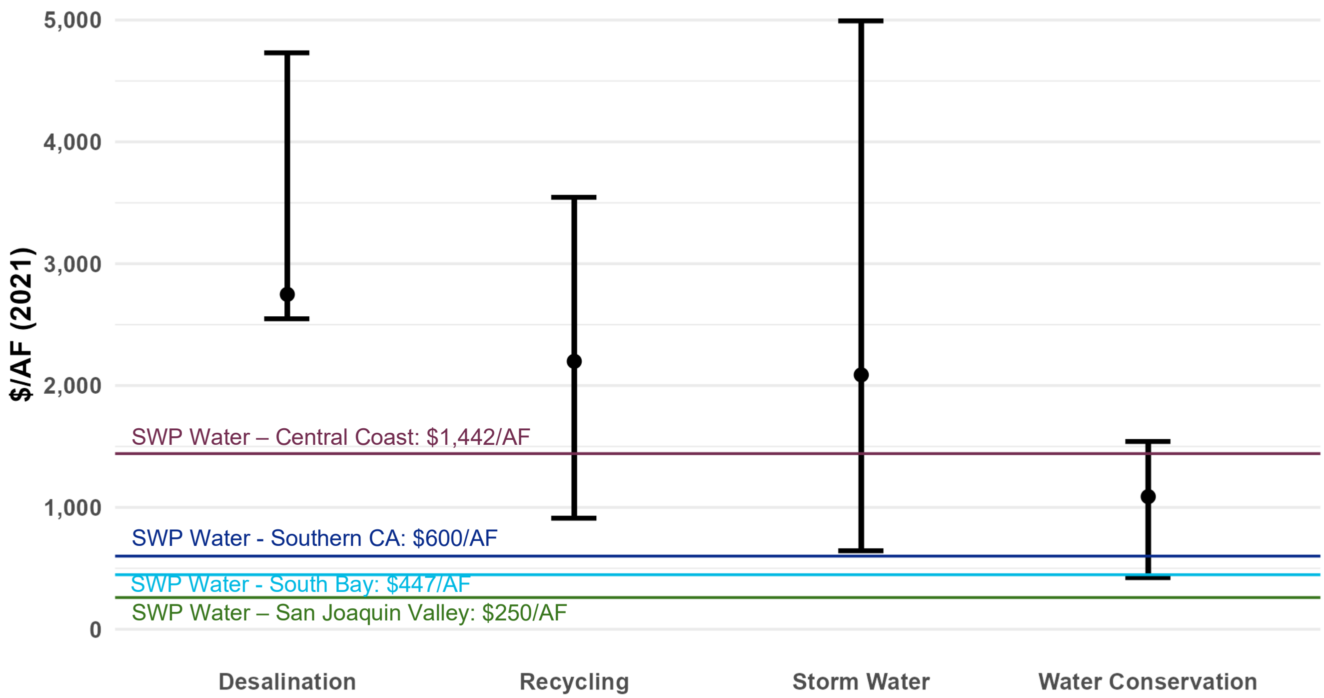
[35] California Department of Water Resources, "Bulletin 132-19, Table 13-12."

Figure 10 below compares the costs of State Water Project deliveries to the costs of alternative water supplies. State Water Project water is more cost-effective than most water recycling programs, which have a median cost of $2,200 per acre-foot, with a range of $1,000 to $3,500, and seawater desalination facilities, which have a median cost of $2,800 per acre-foot, with a range of $2,500 to $4,700. The costs of State Water Project water are competitive when compared to alternatives like stormwater conservation programs ($600 to $5,000 per acre-foot, with a median of $2,100) and water conservation ($420 to $1,500 per acre-foot, with a median of $1,100). The water conservation efforts we consider include replacing toilets and clothes washers with high efficiency models, installing weather-based controllers and rotating nozzles for irrigation, and water capture using rain barrels. Although some water conservation programs have the lowest unit cost of water among the alternatives we consider, they are small in nature and difficult to scale. It would be difficult for these programs to replace a significant volume of State Water Project deliveries.

In addition to cost considerations, permitting and building desalination facilities in Southern California has proven to be challenging, often due to environmental considerations. Currently, desalination accounts for less than one percent of Southern California's water supply. Additionally, alternatives like recycling, stormwater management, and conservation programs are often limited in scale, often less than 10,000 acre-feet of water per year.

California's largest desalination plant in Carlsbad has an annual capacity of 56,000 acre-feet. To replace the volume of water currently provided by the State Water Project to Southern California, twenty-five additional desalination plants of the same size as the Carlsbad facility would need to be permitted and constructed. This highlights the significant challenges in ensuring water supply reliability and underscores the crucial role the State Water Project will continue to play in California's future water security.

Figure 10: The Cost of Developing Alternative Water Supplies to the State Water Project



Sources: Cooley, H., and Phurisamban, R., "The Cost of Alternative Water Supply and Efficiency Options in California," *Pacific Institute*; Sencan, G. and Escriva-Bou, A., "Water Partnerships between Cities and Farms in Southern California and the San Joaquin Valley," *Public Policy Institute of California*; Marie, S., "What Will Be the Cost of Future Sources of Water for California?," *California Public Utilities Commission*; Bulletin 132-2019.

Notes: State Water Project Water Costs for Central Coast, Southern CA and South Bay denoted with solid horizontal lines. State Water Project Water Costs based on Bulletin 132-2019 Table 13-2. Based on Capital, OM&R and Power Charges. Costs adjusted for inflation to 2021 dollars.

Costs of Developing alternative water supplies based on 25th percentile, median and 75th percentile cost estimates included in PPIC, CPUC and Pacific Institute report. The medians of low, median and high estimates are calculated across the three reports. Cost estimates include both large and small water supply projects (> 10,000 & < 10,000 AFY). Desalination cost estimate includes costs for saltwater desalination, but not brackish water. Recycling costs are for indirect potable reuse recycling projects. Water Conservation estimates cover a range of different conservation programs including efficient appliance replacements for toilets and clothes, installing weather-based controllers and rotating nozzles for irrigation, and water capture using rain barrels. Stormwater capture costs are based on the quantiles of proposed projects included in various state databases; See Cooley et. al (2019) for further details.

Costs adjusted for inflation to 2021 dollars.

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Submitted to the Metropolitan Water District of Southern California

June 2024

The State Water Project and Benefits to Southern California's Local Water Supplies: A Framework for Thinking about Benefits

Final Draft White Paper
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Executive Summary

The purpose of this white paper is to explain how the State Water Project benefits Southern California's local water supplies.

Some Southern California communities depend entirely on local and SWP water; some on local and CRA water; and some on local and both CRA and SWP water. No areas rely solely on local supply.

Imported supply, especially from the SWP, is a key part of the supply mix and provides multiple benefits due to its:

1. Relatively low cost (compared to other supply alternatives)
2. High quality (allowing for blending with lower quality water supplies)
3. Interconnections with other parts of the state, which facilitates more efficient allocation of water resources through trades and exchanges, particularly in dry years and water-short circumstances.

The SWP water forms an integral part of Southern California's water supplies, helping to deliver the benefits of reliable potable water services to more than 22.1 million people, with a GDP of $1.6 trillion.

What would happen if the SWP infrastructure were to disappear tomorrow? Besides catastrophic disruption to the intricate Southern California economy[1], Jensen and Mills treatment plants would not have any water to treat if the SWP infrastructure went away.[2] Member agencies that rely on imported water for their replenishment needs would have to purchase more expensive treated water to recharge because Colorado River water is too salty to use directly.[3] None of the groundwater banking programs would work without the SWP's California Aqueduct to move the water during wet years into storage and into Southern

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[1] A complete collapse of the Southern California economic would not be certain because the Southern California water system is a complex adaptive system. The human coupling to the water network makes for the adaptive component. Southern California communities have displayed surprising resilience to fires, floods, earthquakes, multi-year drought emergencies, and other emergencies. The probability of economic collapse would remain nonzero.
[2] The benefits of this world-class treated water could not be delivered to reliant communities of end users throughout Southern California.
[3] Water affordability has been a policy issue growing in magnitude across California and the nation.

California during droughts.[4] The SWP is much more than just an annual water allocation and comprises all the infrastructure built in the past 50 years.

In the pursuit of tomorrow's solutions, it is essential for Southern California's water institutions to forge new connections and collaborate with various other establishments. The American Water Works Association's Water 2050 Initiative[5] underscores this new focus for water institutions, which includes:

- Cultivating public trust in the entities responsible for water services, with the aim of positioning them as cornerstone institutions within every community.
- Fostering a culture that encourages every individual to establish a personal bond with water and embrace a shared responsibility for its preservation.

We believe that the SWP will play a critical role in the collaboration of water-related institutions (the so called "One Water" institutions include water, wastewater, recycled water, and stormwater) to bring about new sustainable water partnerships and solutions.

[4] This would be sad news for water managers striving to build mulit-year drought resilience and climate adaptation.
[5] See David LaFrance (2024) "At it Again", Journal AWWA, April 2024, p.114, https://doi.org/10.1002/awwa.2256

Table of Contents

1. Introduction

1.1 Purpose of White Paper

The purpose of this white paper is to present exactly how the State Water Project benefits Southern California's local water supplies.

Decision-makers in a retail water agency have historically thought of their local water supplies as a cheaper and locally controlled *alternative* to imported water. Such a binary view, however, often overlooks the interconnected dependencies of water supplies across various locations and over time. This document aims to clarify the SWP's contributions to Southern California's local water supplies by examining the entire water system that ensures the delivery of water service benefits to end-users. It is these consumers who ultimately experience the direct benefits of water service, and any deficiencies in this service can significantly undermine or nullify the advantages of a secure water supply.

This white paper begins with a quick overview of the SWP, water supply capabilities of institutions in Southern California, and how water agencies plan for an integrated water system.

In Section 2, we present a framework for understanding how the benefits of local water supplies reach consumers. This analysis highlights the functional interconnections between the SWP and local water supplies within the region to reveal specific vulnerabilities in the supply chain that could impact the ability of retail water agencies to provide clean, potable water to their communities.

A detailed understanding of these functional benefits is essential for making informed decisions about future investments in Climate Adaptation, System Storage, and Delivery Resilience. Such investments must meet three criteria: technical feasibility, economic advantage (where benefits outweigh costs), and practicability within the existing institutional framework. An enhanced understanding of the benefits and costs associated with networked water systems will foster better-informed collective decision-making, crucial for achieving sustainable water management in a changing climate.

1.2 State Water Project (SWP) Overview

The State Water Project (SWP) delivers water from reservoirs in Northern California to the Bay Area, to agricultural industry in Central California, and to the population centers in Southern California. Construction of the State Water Project started in 1961, and the first deliveries to the Bay Area were in 1962 and to the San Joaquin Valley in 1968. But it was 1972 when water was first delivered to Southern California after pumps were constructed to move water over the

Tehachapi Mountains to the East and West branches of the California Aqueduct.[6] The Project spans 700 miles and can deliver water to 27 million people and three quarters of a million acres of farmland.[7]

The SWP is owned by the state of California and operated by the California Department of Water Resources (DWR). Metropolitan has participation rights in the SWP, "because Metropolitan does not import water from the Feather river and others but rather takes delivery of water moved by DWR."[8] In Southern California, Metropolitan takes delivery of SWP water out of Castaic Lake, Lake Perris, and from Silverwood Lake via Devil Canyon powerplant into Metropolitan's Rialto pipeline and Inland feeder. Metropolitan is the largest of 29 agencies that have long-term contracts with DWR (State Water Contractors), and the largest among 13 State Water Contractors in Southern California.[9]

Water Supply Reliability

The SWP enhances water supply reliability by several means. First, it contributes significantly to the region's water supply, having provided 30% of Southern California's water from 2001 to 2020.[10]

Second, the SWP provides not only the volume of water supply implied by Metropolitan's annual allocation but also provides the infrastructure to move water previously stored in groundwater banking or San Luis reservoir into Metropolitan's service area. The use of SWP infrastructure for this purpose, increasing the utilization of out-of-region storage, constitutes an increase in water system flexibility that produces the benefit of water supply resilience.[11] More on this later.

Third, the SWP water provides indispensable supply for Southern California groundwater replenishment and several Metropolitan's agencies depend on the SWP to maintain in compliance with groundwater basin adjudications.

Fourth, the SWP improves flexibility in using Colorado River water due to its lower total dissolved solids (TDS). For water quality, not only Colorado river water is high in salinity but also it also carries quagga mussels, and thus without treatment cannot be released in the local rivers and spreading basins, meaning that either raw SWP or treated CR water is required. Blending SWP water with CRA water allows maximum flexibility in utilizing the full volume of CRA water because blended water reduces the cost of water treatment, which enables local water supplies

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[6] https://water.ca.gov/programs/state-water-project
[7] https://www.mwdh2o.com/state-water-project-map
[8] https://www.mwdh2o.com/media/xgfhsx5n/final_2024_district-at-glance.pdf
[9] MWDSC Special Committee on Bay-Delta Item 3a, September 24, 2019, and 2020 UWMP p. 1–22.
[10] Calculations based on data from 2020 UWMP Table A.2-1.
[11] The SWP contributes toward 5 of the 8 countermeasures identified by Huang, et al., "Building resilience for an uncertain drinking water future," *AWWA Water Science*, 2023. https://doi.org/10.1002/aws2.1362.

and storage. Blended and treated CRA water can be utilized in groundwater recharge and storage.

Fifth, the SWP supplies provide a large source of supply to ground and surface storage facilities in wet years, reducing the need for CRA water, which is drawn on more in dry years. Since the various major supply sources—including SWP—each have their own supply variation, as a collective portfolio they reduce risk of shortage. (Figure 1, below. Source is 2020 UWMP p. A.2-4).

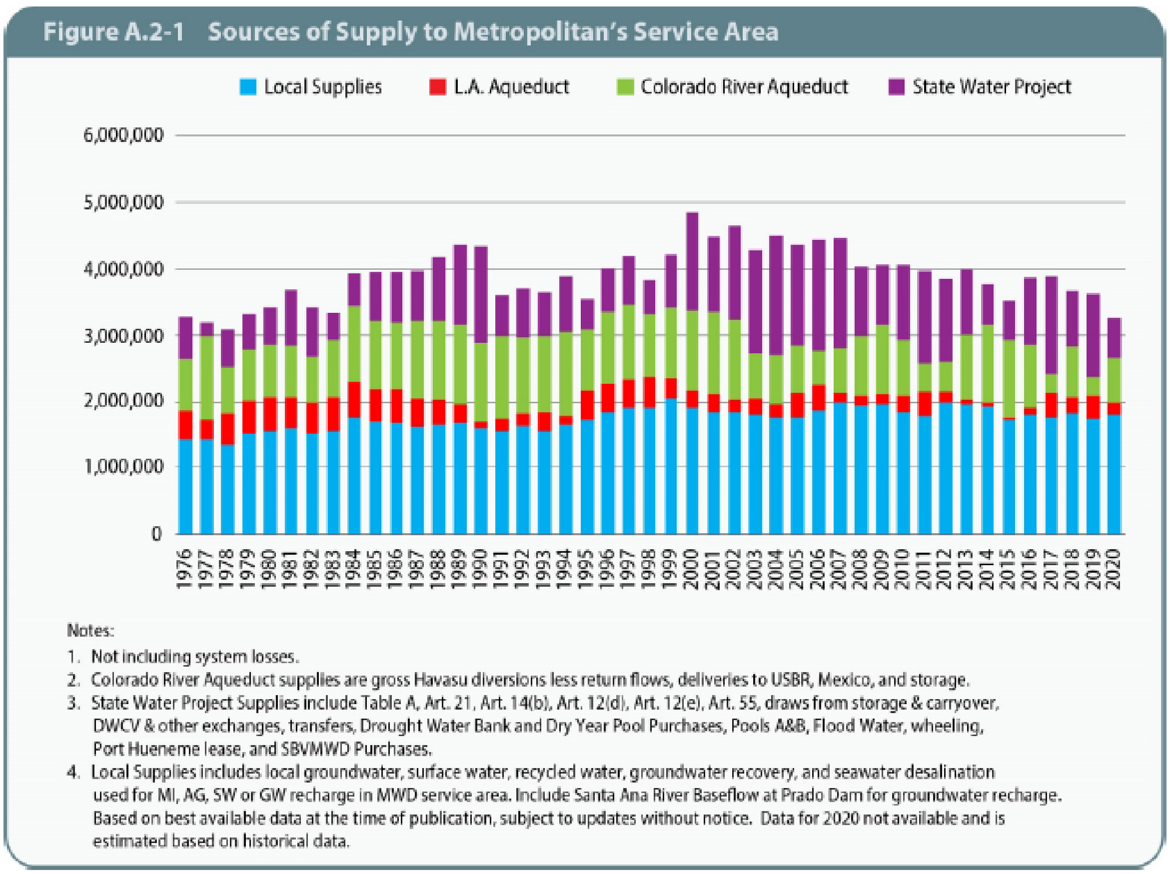

Figure 1 - Sources of Supply to Metropolitan's Service Area (Source 2020 UWMP)

Storage and Transfers

Over the past 40 years, Metropolitan has engaged with transfers/exchanges and storage facilities along the SWP, enhancing reliability by providing additional supply volume during dry years.

Increasing water supplies through water transfers and exchanges has long been integral to Metropolitan's efforts to mitigate water shortages during dry periods. Examples include an exchange of up to 50 TAF with Westside Mutual Water Company and Kern County Water Agency, authorized in January 2015 by Metropolitan's Board. [12] This one-for-one exchange provides water at a time in the year when SWP supplies are expected to be low and provides flexibility on timing of returning water.

As for enhanced storage, Metropolitan has a number of storage programs with water agencies along the California Aqueduct that would allow it to store SWP supplies during surplus conditions and to have stored water returned when needed. One such project was authorized by the Board in September 2014 to providing capital funds to Semitropic Water Storage District to enhance the pump back capacity of the Semitropic Groundwater Storage Program by 13,200 AFY. [13] Another example is the group of agreements approved by the Board in November 2015 with Antelope Valley-East Kern Water Agency (AVEK) to develop exchange and storage programs for SWP supplies.[14] Though the AVEK program will expire soon, the Board authorized agreement with AVEK for the newly developed High Desert Water Bank. Under the Water Bank, Metropolitan could store up to 280,000 acre feet (AF) of its State Water Project (SWP) Table A or other supplies in the Antelope Valley groundwater basin. [15]

Economic Growth

The SWP has enabled and continues to enable large economic growth in Southern California. The Cities of Los Angeles and San Diego—the two largest cities in the state—have "historically obtained up to 85 percent of their water from imported sources."[16]

The SWP is the largest imported supply to Southern California while being economically affordable relative to supply alternatives. "The average cost of delivering State Water Project water ranges between $250 per acre-foot in the San Joaquin Valley, to $600 per acre-foot in Southern California and as high as $1,440 per acre-foot on the Central Coast."[17]

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[12] 2020 UWMP, p. 1-27. This exchange was never exercised.
[13] 2020 UWMP, p. 1-28
[14] 2020 UWMP, p. 1-28
[15] 2020 UWMP, p. 1-28
[16] 2020 UWMP, p. A.209. Imported water includes the CRA and LAA in addition to the SWP. The SWP provided 30% of Southern California's water supply from 2001-2020 (data from 2020 UWMP Table A.2-1).
[17] DWR, The Economy of the State Water Project: Clean, Reliable, and Affordable Water for California, Brochure, 2023, p. 5.

Figure 2 below shows that SWP water in Southern California is significantly lower cost than desalination, recycling, or stormwater, and at large scale.[18] SWP accounts for 30% of Southern California's urban water supply and "Southern California service area has a population of over 22.1 million with a GDP of $1.6 trillion.[19] The Southern California service area includes over 600,000 businesses employing over seven million individuals. The assessed value of property in the Southern California SWP service area is estimated to exceed $3.3 trillion."[20] Since SWP water has less salinity and contamination than the CRA and groundwater supplies, SWP blending both reduces the cost of treatment *and* results as avoiding "hundreds of millions of dollars' worth of damages each year."[21]

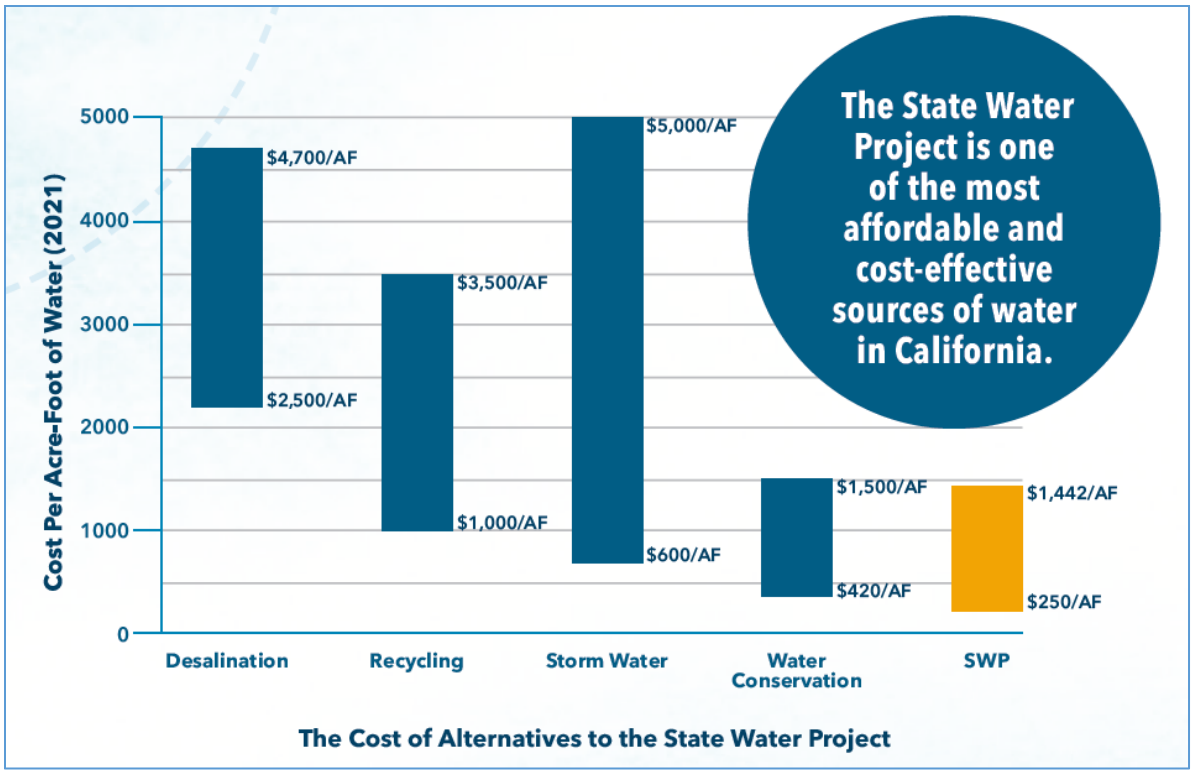

Figure 2 - Costs of Water Supplies (Source: DWR 2023)

[18] Reproduced from DWR, The Economy of the State Water Project: Clean, Reliable, and Affordable Water for California, Brochure, 2023, p. 5.
[19] DWR, The Economy of the State Water Project: Clean, Reliable, and Affordable Water for California, Final Report, 2023, p. 12.
[20] Ibid., Table 1, p. 13.
[21] DWR, The Economy of the State Water Project: Clean, Reliable, and Affordable Water for California, Final Report, 2023, p. 12, including Footnote 23 referring to Bureau of Reclamation's Salinity Economic Impact Model.

1.3 Southern California Water Sources —Member Agencies and MWD

Southern California has a range of water sources: Colorado River Supplies, the State Water Project Supplies, and Local Supplies.

Colorado River Supplies

The Colorado River is a crucial water source for the Metropolitan area, supplied through the Colorado River Aqueduct (CRA) since Metropolitan's establishment in 1928. The CRA was the largest public works project during the Great Depression, employing 30,000 people over an eight-year period and as many as 10,000 at one time.[22] Water first began flowing in the aqueduct in 1939. The CRA includes a 242-mile water conveyance system that provides water to 19 million Californians in Southern California.[23] The aqueduct is composed of two reservoirs, five pumping stations, 62 miles of canals, 92 miles of tunnels, and 84 miles of buried conduit and siphons, with an average annual throughput of 1.2 MAF. The CRA is one of the primary sources of drinking water for Southern California.[24]

Metropolitan holds legal rights to receive water from the Colorado River under a permanent service contract with the Secretary of the Interior. The CRA, with a capacity of 1.25 million acre-feet (MAF) per year[25], is owned and operated by Metropolitan, transporting water from Lake Havasu at the California-Arizona border approximately 242 miles to Lake Mathews in Riverside County. The CRA infrastructure is used for exchange agreements for supplemental supplies.

As indicated in Figure 3 below, there are portions of Southern California that are highly dependent upon CRA supplies or blended CRA/SWP supplies. Figure 3 shows the IRP estimate of geographic areas that are dependent on the SWP (blue), the smaller area that is dependent on the Colorado River supplies (brown), and larger "Blended Area" (green) that can be served by both SWP and Colorado River supplies.

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[22] *Zetland, David (August 5, 2009). "Colorado River Aqueduct" (PDF). kysq.org.*

[23] The CRA began delivering water in 1941 and was the largest public works project in southern California during the Great Depression, employing 30,000 workers over an eight-year period.

[24] https://www.mwdh2o.com/media/ja5k5pcu/cra_fact-sheet-2021.pdf

[25] Readers should note that Metropolitan does not have a contract for this volume of water.

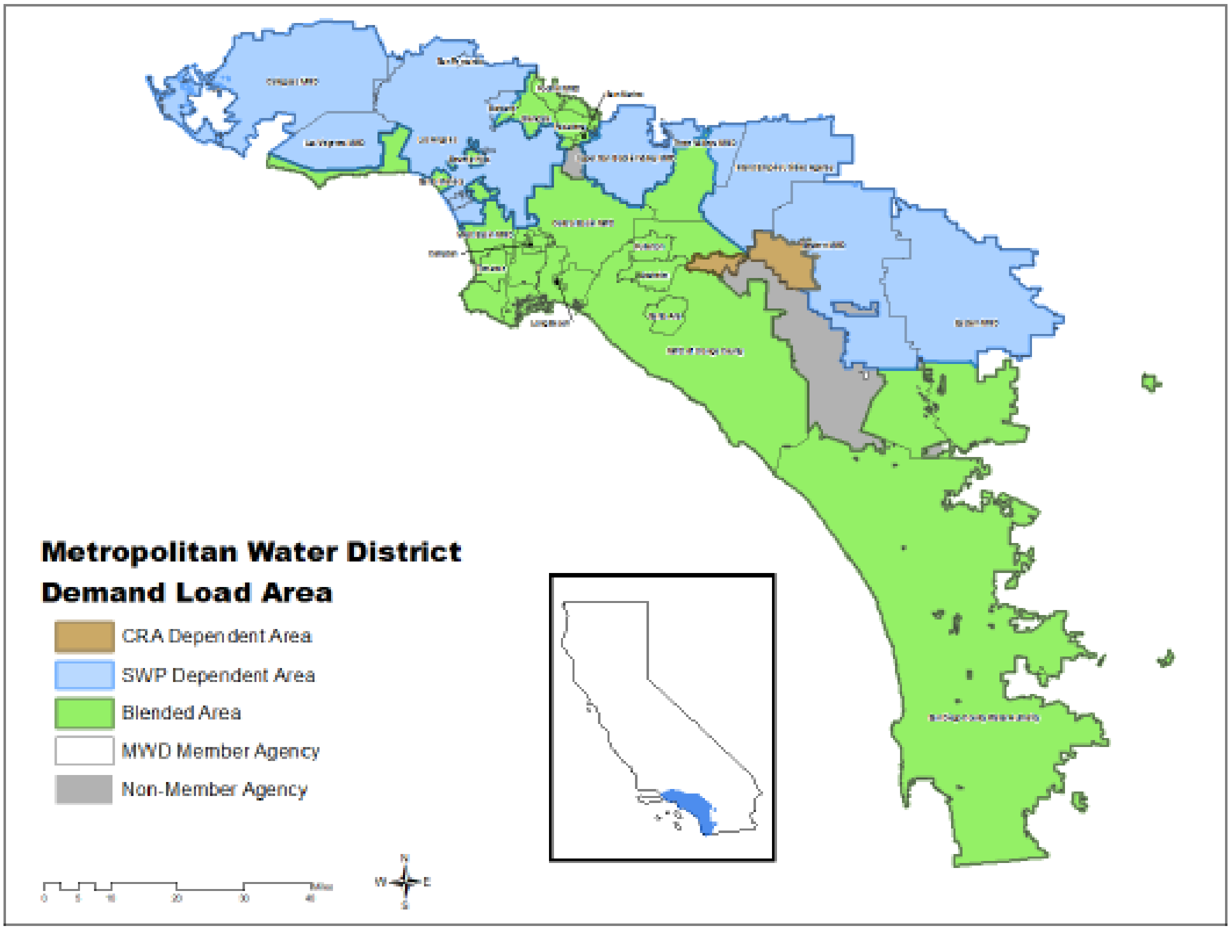

Figure 3 - Demand Load Area Map (Source: 2020 Integrated Water Resources Plan Regional Needs Assessment, Adopted April 12, 2022, p. 27.)

State Water Project Supplies

Metropolitan also obtains water from the State Water Project (SWP) through the California Aqueduct. The SWP, owned by the state of California and operated by DWR transports Feather River water stored and released from Oroville Dam via the Bay-Delta, as well as unregulated flows diverted directly from the Bay-Delta south through the California Aqueduct. Metropolitan imports water from the SWP to four delivery points in its service area.

SWP Focus—Foundational Supply and Storage

Parts of the Metropolitan service area are termed "SWP Dependent Areas" where "demands can only be satisfied with SWP supplies and associated storage programs."[26] Figure 4 shows the

[26] 2020 Integrated Water Resources Plan Regional Needs Assessment, Adopted April 12, 2022, p. 26.

geographic areas containing communities that depend on the SWP (red) and the geographic areas containing communities that rely on other supplies (local, CRA, and blended CRA/SWP; in orange).[27] SWP supplies have considerable variability due to system capacity and hydrologic variability. When "SWP supply exceeds the SWP Dependent area demand, water can be stored directly into SWP storage facilities and/or used in the blended areas, enabling Metropolitan to store imported supply within Colorado River storage facilities."[28] However, when SWP supply is low, water from the Colorado River cannot be moved to the SWP Dependent areas, impairing reliability in some scenarios.[29]

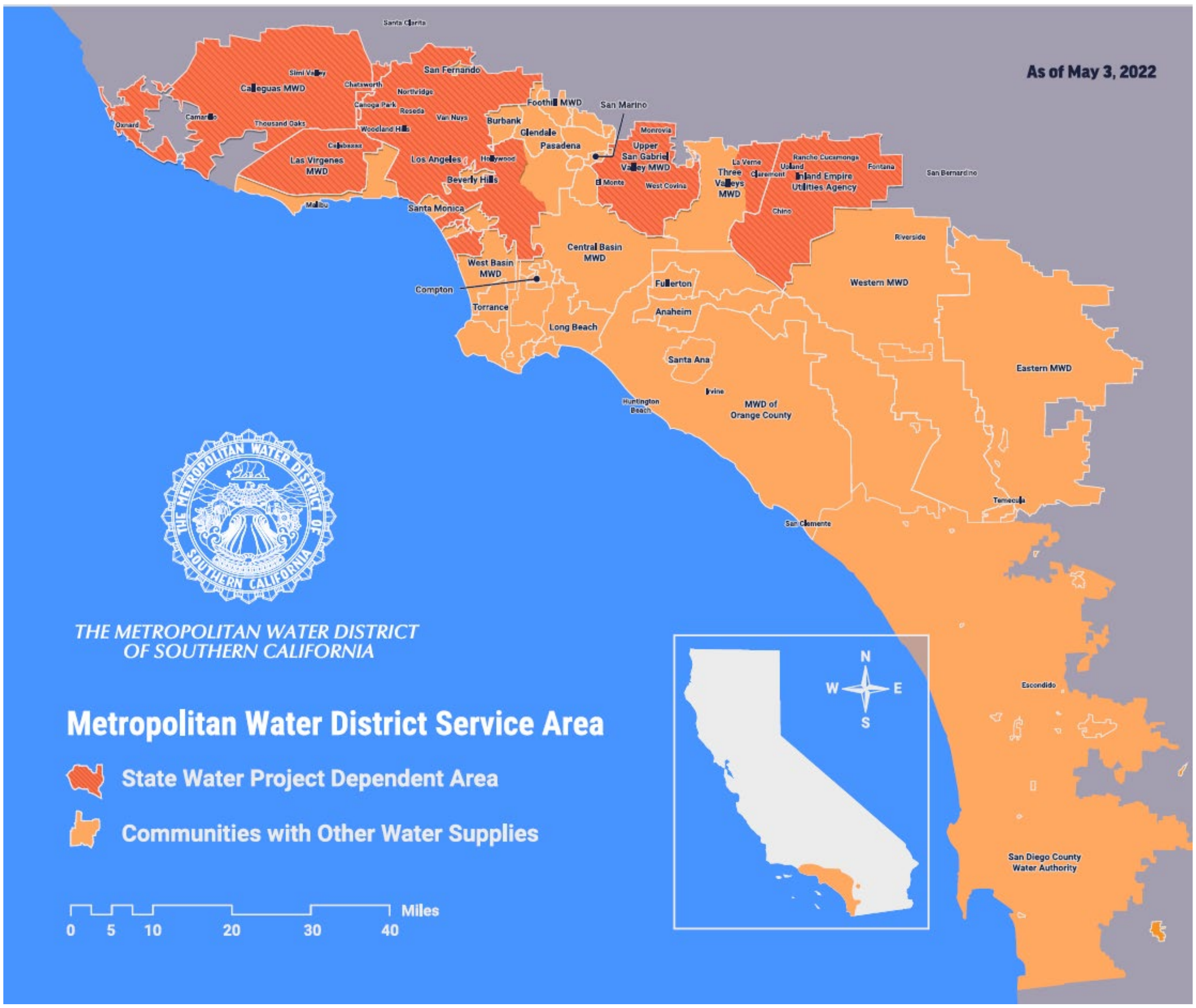

Figure 4 - SWP Dependent Communities

[27] as https://www.mwdh2o.com/media/12542/emergency-conservation-swamp-web.pdf
[28] 2020 Integrated Water Resources Plan Regional Needs Assessment, Adopted April 12, 2022, p. 28.
[29] 2020 Integrated Water Resources Plan Regional Needs Assessment, Adopted April 12, 2022, p. 32.

CRA Storage and Transfers

Metropolitan has enhanced reliable supply through the CRA by supporting and implementing programs such as farm and irrigation district conservation, improved reservoir operations, land management, and water transfers and exchanges. These arrangements involve agricultural water districts in Southern California, entities in Arizona and Nevada using Colorado River water, and the U.S. Department of the Interior's Bureau of Reclamation (USBR).

Local Supplies

Approximately 50% of the region's water supplies originate from local resources managed by individual water agencies. These resources include groundwater extraction, local surface water catchment, and non-Metropolitan imported water supplied through the Los Angeles Aqueduct. Groundwater basins underpinning the region provide an annual average supply of approximately 1.2 MAF, supplemented by active recharge using captured stormwater, recycled water, and imported water.

Recycling and groundwater recovery contribute to the balance of Southern California's diverse water portfolio. In addition to groundwater basin replenishment, water recycling provides treated wastewater for various municipal and industrial uses. Groundwater recovery employs additional treatment techniques to utilize previously non-viable degraded groundwater supplies due to high salinity or other contamination.

Seawater desalination presents an opportunity to diversify the region's water resource mix with a new, locally controlled, reliable potable supply. Metropolitan supports seawater desalination for its member agencies by offering technical assistance, regional facilitation of research and information exchanges, and financial incentives through the Local Resources Program (LRP).

Local agencies maintain surface reservoir capacity to capture local runoff, with an average yield of approximately 90 thousand acre-feet (TAF) per year. The Los Angeles Aqueduct (LAA), although importing water from outside the region, is classified as a local resource because it is developed and imported by a local agency, providing approximately 200 TAF per year on average over the last ten years.

Salinity—Salinity Management Study Findings

Sources of salinity in Southern California’s water supply comes from both imported water and local sources. According to Metropolitan’s 1999 Salinity Management Study,[30] about half of the region’s salt is contributed by imported water and the other half from local sources. Among the

[30] Salinity Management Study Final Report, Metropolitan Water District of Southern California and United States Department of the Interior Bureau of Reclamation, June 1999, p. ES-1.

sources of imported water, the Colorado River Aqueduct contains an average of 700 mg/L, compared to the SWP which averages 250 mg/L on its East Branch and 325 mg/L on its West Branch. In urban use settings, "salt contributions to wastewater range from 250 to 400 mg/L or more in some locations."[31] Metropolitan also offers financial incentives to its member agencies to desalinate brackish groundwater, which improves local salinity management.

Since the SWP salinity levels are lower, albeit variable, Metropolitan has developed the infrastructure to blend SWP water with CRA water to keep concentrations below the goal of 500 mg/L in delivered water. Figure 4 below shows trends in total dissolved solids (TDS) levels at Metropolitan's blending plants.[32] The shaded bar chart in the background, read from the right-hand vertical axis, shows the annual SWP final allocation at the end of each water year. Lower allocations occur in dryer years. The TDS trends at all three plants indicate that in dry

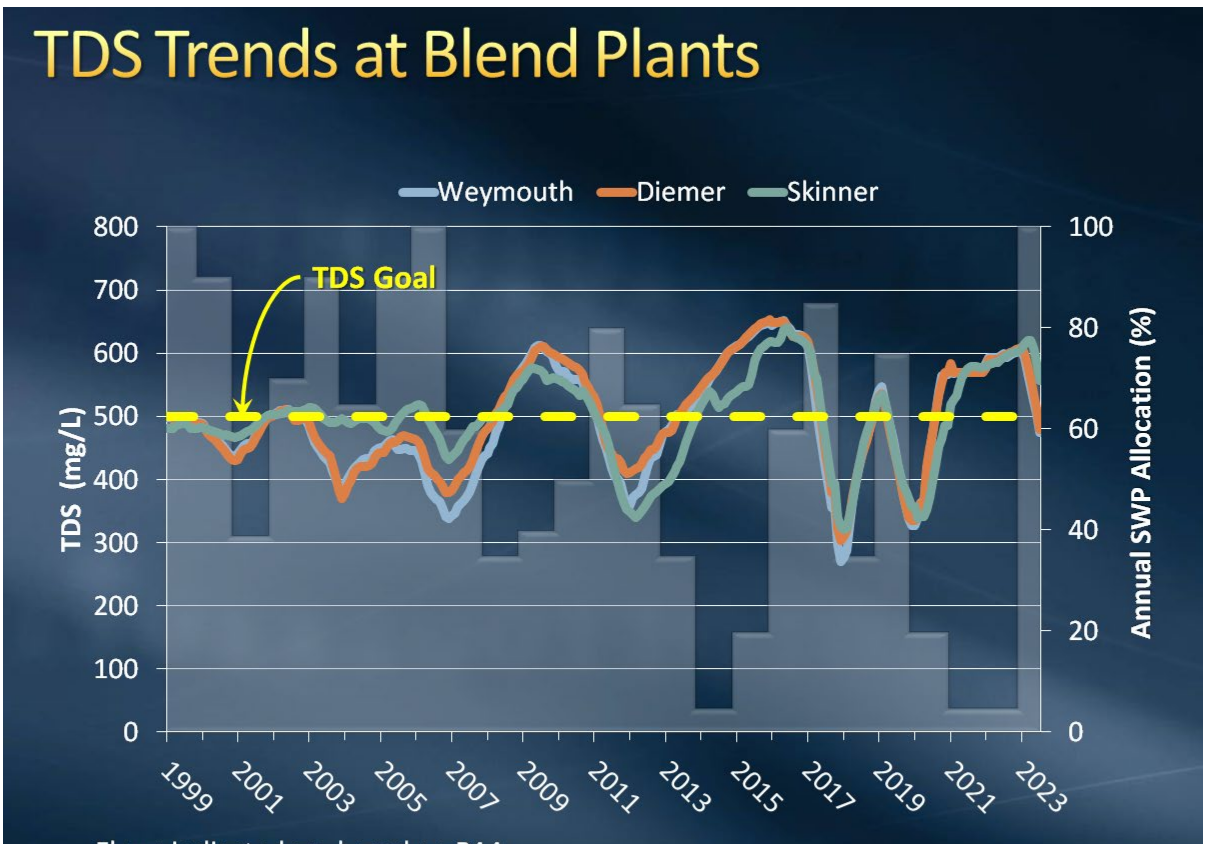

Figure 5: Total Dissolved Solids Trends at Blend Plants

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[31] Salinity Management Study Final Report, Metropolitan Water District of Southern California and United States Department of the Interior Bureau of Reclamation, June 1999, p. ES-2.
[32] Metropolitan source: "TDS Trends at Blend Plants_rev 2023 11 26.pptx"

years, with less SWP water available for blending, TDS increases above the stated goal of 500 mg/L (read from the left-hand vertical axis).[33] TDS declines rapidly in wet years.

How MWD Plans for an Integrated So. Cal. Water System

Metropolitan has a long history of integrating planning with its member agencies that goes back to its origin.[34] Metropolitan initiated a participatory Integrated Water Resources Planning (IRP) process in the mid-1990s and has since refined the IRP several times.[35]

One Water: The Water Research Foundation (WRF) defines One Water as an integrated planning and implementation approach to managing finite water resources for long-term resilience and reliability, meeting both community and ecosystem needs.[36] It is easy to imagine that such multiple objectives would require water institutions to cooperate and collaborate in new and interesting ways. Multiple objectives, multiple institutions, and multiple interconnections[37] combine to increase the challenge.

Figure 6 below displays some of these interconnections throughout an urban watershed. Readers should also note the critical importance of water treatment in obtaining water quality that is fit for purpose.

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[33] Note that the TDS trend lines are 12 month moving averages of monthly TDS readings, labeled "RAA" in the graph for rolling annual average.

[34] https://www.mwdh2o.com/how-we-plan/

[35] Integrated Resource Planning has an interesting history as a planning concept responding to PURPA and energy utility planning challenges in the 1970's. IRP combines supply planning with a least cost planning, equal treatment of demand-side resources with supply side resources, explicit consideration of uncertainty, acknowledges a broader concept of cost (triple bottom line, TBL), involves all institutions with a stake, and emphasizes an ongoing, open, and participatory decision-making process. See "*Putting the Pieces Together: Decision Support for Integrated Resources Planning Using IRPSIM", 1994.*

[36] See https://www.waterrf.org/research/projects/blueprint-one-water. One Water LA adapts the WRF definition as follows: "One Water LA is a collaborative approach to develop an integrated framework for managing the City's watersheds, water resources, and water facilities in an environmentally, economically, and socially beneficial manner." The Water Research Foundation has an ongoing series of projects further developing the planning concept of One Water: WRF 4969 *One Water Cities*, the just completed WRF 5175 *Navigating One Water Planning through Municipal Water Programs*, and the forthcoming WRF 5196 *One Water Program Management.*

[37] https://www.waterrf.org/research/projects/case-studies-water-sector-interdependencies

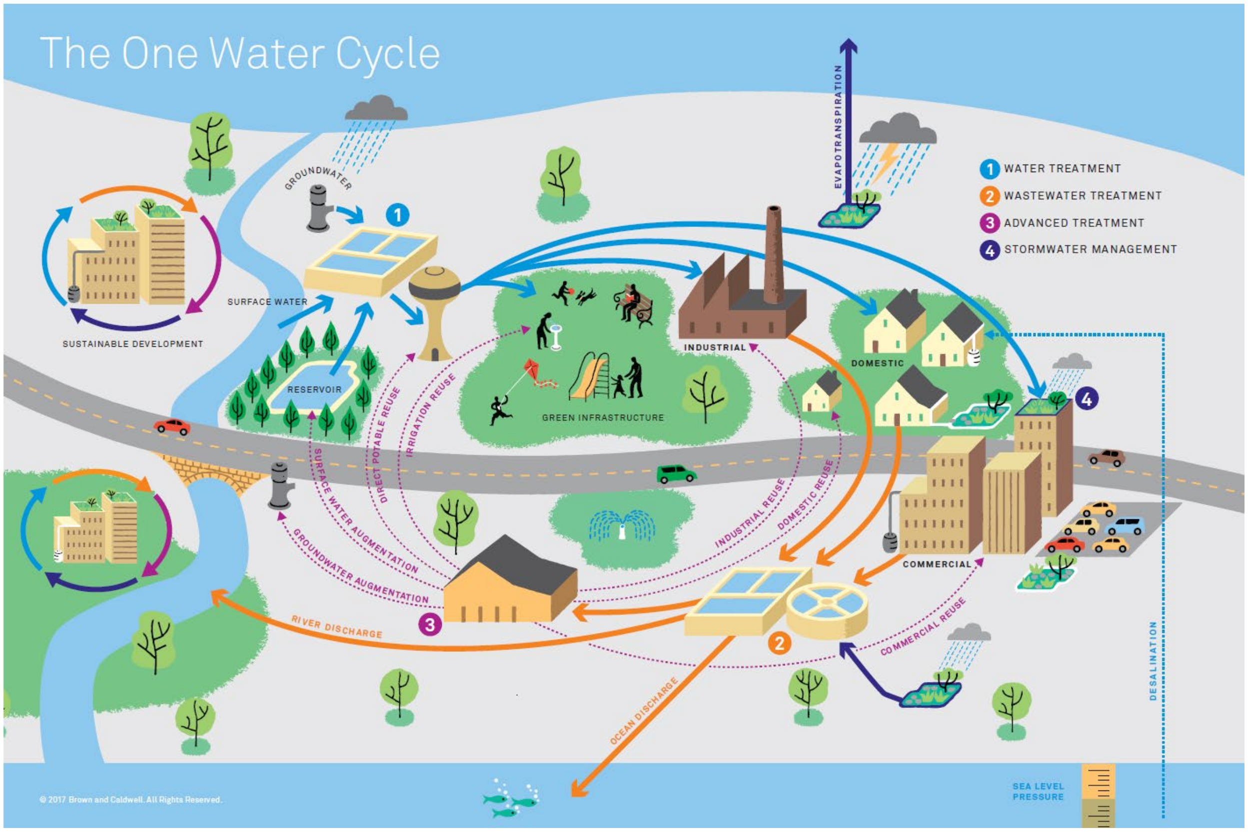

Figure 6 — The One Water Cycle, an infographic from WRF#4660. [Note: we need permission from Brown and Caldwell, I bet the builders of Pure Water So Cal could use the advertising.]

2. A Framework for Benefits

Given that the One Water planning includes the interconnection and integration of water services, wastewater services, stormwater management services, how can one think about the benefits produced by these services?

Metropolitan's mission statement includes mention of adequate, reliable, and high-quality water supply but also points to current and future customer needs while balancing environmental and economic responsibility.

2.1 Benefits and Institutions

Potable water service delivers benefits to residential customers and nonresidential customers throughout Southern California.[38] Not all delivered potable water is consumed on site and wastewater services are needed to safely dispose of water not consumed on site. Some of this wastewater flow can be treated and reused as recycled water. Stormwater management may also be required to handle natural precipitation and human-generated runoff from outdoor irrigation.

This section provides one Framework to classify the benefits of SWP to Southern California's local water supplies. To reveal the interconnections, the Framework will need to classify both types of benefits and which water-related institutions have a purview over that benefit. A water supplier's perspective, for example, is very concerned with delivering water supply for the benefit of their customers. A wastewater utilities' perspective is focused on safely handling and disposing of wastewater. Stormwater management involves multiple perspectives: municipalities and land use agencies with broader authority, wastewater utilities, and sometimes water agencies.

> **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.

The Framework will need to define a typology of potential benefits and compare that to the institutional perspectives. We start by defining categories of potential benefits.

[38] Raw water service is also provided by Metropolitan, which is either directly treated by member agencies, used for groundwater recharge and then treated prior to use, or is directed toward a relatively small and declining agricultural raw water end uses.

2.2 Types of Potential Benefits

Local water supplies deliver different types of benefits to customers. For the purposes of this white paper, these benefits are divided into different parts of the water use cycle—water supply, wastewater, stormwater. The types of benefits can be further divided into direct benefits and indirect benefits.[39]

Our categorization begins with the water supply perspective and becomes more inclusive of other perspectives as the list progresses. A short list of benefits would include:

- Supply Quantity
- Supply Quality
- Reliability
- System Resilience
- Sustainability
- Economic Efficiency
- Social Goals – Affordability
- Environmental Goals (Ecosystem Services)

Water Supply Quantity

One way to divide water supply benefits is to look at those summarized by the average water quantity (more water supply is good) and those benefits that extend beyond the average or expected yield. Understanding additional benefits beyond straightforward metrics (expected yield) requires consideration of how water supplies add to, or subtract from, the portfolio of other water resource alternatives.

Water Supply Quality

Water quality refers to a measure of the suitability of water for a particular use based on selected physical, chemical, and biological characteristics. It is most frequently used by reference to a set of standards against which compliance, generally achieved through treatment of the water, can be assessed.[40] Given the importance of treatment in developing interconnected One Water solutions, water quality will be increasing an important water service benefit.

Reliability

Reliability refers to variability in supply quantity or quality.

[39] The dividing line between "direct" and "indirect" is not hard and fixed. Direct benefits can be thought of as more obvious and indirect benefits are less obvious.

[40] https://www.usgs.gov/special-topics/water-science-school/science/water-quality-information-topic

System Resilience

The US EPA has defined water system resilience as "the ability of the human organizations that manage water to design, maintain, and operate water infrastructure (e.g. water sources, treatment plants, storage tanks, and distribution systems) in such a way that limits the effects of disasters on the water infrastructure and the community it serves and enables rapid return to normal delivery of safe water to customers" (US EPA, 2015).[41]

Sustainability

Sustainability refers to the ability to maintain or support a process over time without depleting natural or physical resources. Sustainability is often broken into three pillars: economic, environmental, and social (also known as Triple Bottom Line or TBL).

Economic Efficiency

Economic efficiency refers to the balance of costs and benefits. To illustrate with a water supply perspective, a water system tries to minimize direct financial cost of providing a fixed level of water service.

Social Goals — Affordability

Water institutions are called on to address additional social goals. Given the fact that water and wastewater costs over the last two decades have risen at more than twice the rate of general inflation, the affordability of water service has become a social goal of increasing import.

Environmental Goals (Ecosystem Services)

Water institutions are also called on to be responsible environmental stewards. This entails minimizing environmental costs and/or maximizing environmental benefits and includes effects on contributing watersheds, receiving bodies of water, and any broader environment effects.

2.3 Framework of Identified Benefits, Descriptions, Metrics, and Examples

Table 1 presents the Framework of Identified Benefits. It contains the benefit description, how the benefit is measured, and examples. The table also compares the relevant institutional perspective, sub-perspective, and stage of the water cycle. This Framework for thinking about One Water solutions will be used to analyze how the SWP benefits Southern California Local Supplies.

[41] USEPA, 2015, *Systems measures of water distribution system resilience. USEPA/NHSRE (Ng 16)*

Table 1 Framework of Identified Benefits, Descriptions, Metrics, and Examples

Table of Identified Benefit Categories, Descriptions, Metrics, and Examples

Perspective Sub-Category	Water Cycle	Benefit Category	Benefit Description	Metrics	Example	Notes
Supply	Source	**Supply_Quantity**	The expected yield of a water supply.	Projectable Volume (Acre feet per year, million gallons per day), Streamflow (cfs), Reliable Yield (AFY)	Example 1: At 100% Table A Allocation Met would expect 1,911,500 AFY[1]. Example 2: Metropolitan can deliver up to CRA capacity of 1.25 MAF.[5]	Water quantity and water quality are related, but multidimensional
Supply	Source, Treatment	**Supply_Quality**	Water quality refers to the chemical, physical, and biological characteristics of water based on the standards of its usage. It is most frequently used by reference to a set of standards against which compliance, generally achieved through treatment of the water, can be assessed. (Wikipedia) [1]	Total Dissolved Solids (TDS, e.g. 500 mg/L), Pollution Index of Groundwater (PIGs), Salt Load	CRA water has averaged greater than 500 mg/L TDS, SWP is less. SWP critically addresses Salinity Management in GW basins throughout So. California.	Water quality measures may occur on a continuous scale, but are converted to a discrete metric of meeting or not meeting a standard.
Supply, Delivery	Water system (storage, treatment, storage, delivery)	**Reliability**	Reliability refers to variability in supply quantity or quality.	Frequency, Duration, and Magnitude	Risk reduction effect of having diversified portfolio of supply sources and distribution.	
System, Storage	Water system (storage, treatment, storage, delivery)	**System Resilience**	An occurrence of rebounding or springing back. (AHD) [2] Ability of networked water system to respond to disruption, foreseen or unforeseen.	Frequency, Duration, and Magnitude	SWP allows Colorado River flexibility (e.g., Intentionally Created Surplus)	
System, End Use, Ecosystem	One Water (PW, WW, RW, GW, SW)	**Sustainability**	Sustainability refers to the ability to maintain or support a process over time without depleting natural or physical resources. It is often broken into three pillars: economic, environmental, and social. [3]	A Viable Process over the Long Term	SWP serves as a vital backstop to threatened GW Basins. SWP ensures influent for RW treatment Plants.	
System	One Water	**Economic Efficiency**	Minimizes financial cost. Minimizes a subset of social cost.	Least Cost Path	SWP costs less than advanced tertiary treatment (ATT) but more than GW pumping (when sustainability is ignored.) SWP blending avoids treatment costs. Ex. 3: Customer Shortage Costs add to Social Costs.	
End Use	One Water	**Social Goals - Affordability**	Minimizes cost required to meet customer demands	Retail bill for x percentile of median household income	Cost-effective water use efficiency (WUE) reduces customer bills.	
Natural Ecosystem	One Water	**Environmental Goals (Ecosystem Services)**	Minimizes environmental costs/maximizes environmental benefits. Includes effects on contributing watersheds, receiving bodies of water, and the lived environment.	Context specific. Ecosystem health metrics have been advancing rapidly.	Example 1 (Negative Externality): Dewatering a watershed. Example 2 (Positive Env. Externality): Shade, birds, and bees from rebated tree canopy.	
		Sources	[1] https://en.wikipedia.org/wiki/Water_quality		Denotation--Contained in Description	
			[2] The American Heritage® Dictionary of the English Language, 5th Ed.		Connotations--Will need to be contained in narrative	
			[3] https://www.investopedia.com/terms/s/sustainability.asp			
			[4] California DWR, NOTICE TO STATE WATER PROJECT CONTRACTORS, Date: 1/9/2023, Number: 23-01			
			[5] MWDSC, 2020 UWMP, p. ES-5			

Note that "Perspective" proceeds Benefits valuation. What customers view as a cost is viewed as a revenue by utilities.
The position within the One Water Cycle connects benefits to a functional water reality. Benefits valuation depends on reality.

3. Southern California Water Supply Capabilities

Given that benefits can be categorized along the water life cycle and the benefits valuation can depend on institutional perspective, exactly what are Southern California's water supply capabilities with the potential to generate benefits? This section reviews the capabilities of Southern California's water supply system by water source, beginning with groundwater supply sources.

3.1 Ground Water Supply—A Pivotal Role

Groundwater plays a pivotal role in the water supply system of Southern California. It has contributed to more than 40% of the total water demand in Southern California, thereby significantly reducing the pressure on imported water treatment and distribution systems during peak usage periods. Additionally, surplus water available in wet years can be stored in groundwater basins, which serves as a crucial reserve during dry spells, droughts, or emergencies.[42]

GW Basin Management, Basin Plans, and Sustainability

More than 90 percent of the groundwater resources in Southern California are adjudicated or formally managed pursuant to statute or adopted groundwater management plans.[43] Most groundwater basins use a formal groundwater basin management plan to manage their basin. Basin plans often use the metric of a "safe yield" as a target for collective pumpers. The definition of "safe yield" can vary by groundwater basin but pumping more than the safe yield, over the long term, results in an unsustainable "overdraft." A basin is in overdraft if the amount of water pumped from the basin exceeds the safe yield of the basin over a period. Pumping in individual years may vary above or below the long-term yield of the basin during drought or wet years, or as dictated by basin management strategies. This said, virtually every basin plan embeds the concept of sustainability in their strategies.

What are the types of water infrastructure needed to accomplish groundwater management strategies? A short list might include:

- Key wells—identified in the basin plan and used to measure and monitor water level in the basin as a key metric for managing safe yield and to prevent basin overdraft.
- Spreading basins—also known as recharge basins. A surface facility (often a large pond) that is used to increase the infiltration of surface water into a groundwater basin.
- AR and ASR wells—"Aquifer recharge (AR) and aquifer storage and recovery (ASR) are manmade processes or natural processes enhanced by humans that convey water underground. The processes replenish ground water stored in aquifers for beneficial purposes. Although AR and

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[42] Metropolitan Water District of So. Calif., (2007), Groundwater Assessment Study: A Status Report on the Use of Groundwater in the Service Area of the Metropolitan Water District of Southern California, Report Number 1308 September 2007.
[43] Source: 2007 Groundwater Assessment Study

ASR are often used interchangeably, they are separate processes with distinct objectives. AR is used solely to replenish water in aquifers. ASR is used to store water, which is later recovered for use."[44]

- Groundwater well pumps—to pump the water stored in a groundwater basin out into a water system.
- Desalters—a treatment process technology to remove salts from a process flow. In the case of water, desalters can be a pre-treatment prior to entry into another treatment process chain.
- Seawater intrusion barriers—A physical facility or method of operation designed to prevent the intrusion of salt water into a body of freshwater, such as the Talbert Barrier in Orange County Basin or the Alamitos Barrier in Central basin.
- Other regionally significant facilities—interties, interconnections, water quality testing laboratories, etc.

How does the water in a groundwater basin reach customers to deliver benefits? To better understand the vulnerabilities in this water supply chain, a better question might include all the ways that delivery might not occur. What are the threats to delivering groundwater to customers in the short term and long term?

Short-Term Threats to delivering Groundwater to Customers

Figure 7 displays four broad functions required to deliver the benefits of local groundwater supplies to customers: source, treatment, distribution, and storage. One can think of different ways that each of these functions might be impaired that would constrain delivery of groundwater and its benefits to customers. A subset of threats to local groundwater are listed: contamination of the basin water source, insufficient treatment process, delivery system leakage or failure, and insufficient operational storage.

[44] USEPA https://www.epa.gov/uic/aquifer-recharge-and-aquifer-storage-and-recovery

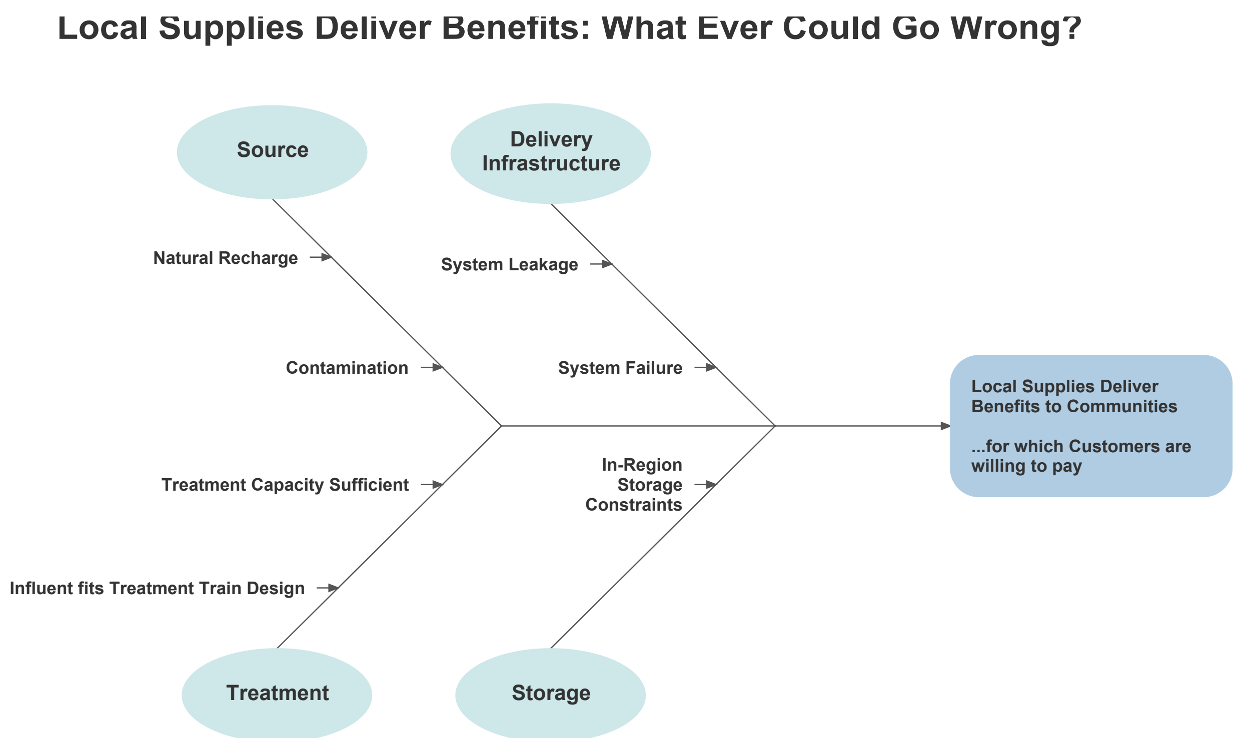

Figure 7 - Local Supplies Deliver Benefits: What Ever Could go Wrong?

While local water agencies must address all these short-term threats to deliver groundwater to customers, there is an additional caveat: Customers must be willing to pay for the costs of the water system that addresses these threats. Customers must determine that the costs of delivered water are worth the benefits derived. This economic constraint from customers is well-known to local retail water agencies. If delivered water costs more than it needs to be, customers will choose to stay within their household budget and consume less. This creates undelivered customer benefits, a cause of grief for most water managers. So, the challenge to integrated water networks in responding to current and future threats is balancing the technical solutions with their economic costs. Only in this way can the benefits of public water be delivered.

Take any, or all, of these short-term threats to local groundwater and allow the clock to tick. What results from this recipe is a collection of long-term threats. These are considered next.

Long-Term Sustainability Problems—GW Basin Management has become more difficult

Questions about the sufficiency of natural recharge in groundwater basins is the long-term challenge confronting groundwater basin management. This challenge to groundwater basins in California brought about the Sustainable Groundwater Management Act in 2014.[45]

Salinity Impacts

Delving into one threat, the level of dissolved salts (minerals) in groundwater can be a limiting factor on delivering groundwater for beneficial use.[46] Salt minerals in water can originate within a groundwater basin or because of basin recharge. Salts can accumulate in groundwater basins and impact uses.

- Scaling of household appliances and plumbing fixtures
- Impacts industrial processes
- Impacts landscapes, gardens, and crops
- Lowers usefulness and increases cost of recycled water
- Limits use of groundwater basins for storage
- Imparts unpleasant taste in drinking water

How the SWP helps Local Groundwater

The SWP is the preferred source for recharging water in groundwater basins due to its favorable water quality profile. Remember, salinity can accumulate in groundwater basins. The SWP water also affects the cost and availability of recycled water used to recharge groundwater basins. Were the SWP water to go missing tomorrow, Groundwater basin Water Masters across Southern California would quickly enter a panicked search for alternatives.

So, the local groundwater supply situation and the SWP's support is straightforward:

1. Local groundwater is a baseload supply to the region, accounting for 40% of total water use.
2. However, nearly all groundwater basins in the region have been adjudicated or are actively managed. Supply is constrained.
3. Additionally, local groundwater is often high in TDS and suffers from other water quality concerns.

The SWP helps alleviate these challenges in four keyways:

1. The SWP is an important source of recharge which allows for more utilization of local groundwater than would otherwise be the case.
2. The SWP can be blended with other high TDS water, thereby improving regional water quality.

[45] https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management

[46] The referent unit of measure is Total Dissolved Solids (TDS), typically measured in parts of solid per million parts of water.

3. Local groundwater basins can be used conjunctively with SWP supplies to store surplus water in wet years so that more water is available in dry years when it is needed most.
4. Importantly the availability of SWP allows and enables successful development and implementation of supply programs such as CUP, cyclic, potential local supply exchanges that augment groundwater basin sustainability and yield.

Specific examples can be cited to illustrate how imported SWP supplies benefit local supplies:

- Groundwater recharge of SWP supplies supports continued production of groundwater supplies (SWP supplies are preferred based on salinity). Member Agencies that take SWP supplies for GW replenishment include USGV, IEUA, MWDOC, Eastern, Three Valleys, Western, Burbank, Calleguas, and Las Virgenes
- SWP supplies supplement local supplies when local supplies are not available either during droughts or emergencies.
  - Example 1: When LADWP's LA Aqueduct supply (local supply) is low, LADWP relies heavily on SWP supplies from MWD.
  - Example 2: During drought and low groundwater supplies, USGV, Burbank and IEUA, among others, rely on SWP supplies from MWD
- SWP supplies can be blended with local supplies to help manage water quality, such as nitrates.
- For completeness, return flow not recycled or recharged could have water quality metrics improved (depending on baseline assumptions). This widens the lens of benefits to include environmental effects on receiving bodies of water.

Local Supplies, Local Problems—your mileage may vary

Every local groundwater basin is unique, confronting a mix of short- and long-term threats. That said, water imported through the SWP will serve a critical role in ensuring sufficiency and reliability of recharge, improving recharge water quality (direct or through recycled water recharge), complementing in-region storage, and lowering the cost of delivered groundwater by avoiding other higher cost alternatives.

3.2 Recycled Water—How the SWP ensures influent quantity and quality for RW

Recycled Water (RW) has diversified local water supplies and improved Southern California's long-term water resilience. Recycled water is recovered from wastewater through a treatment process. The State Water Resources Control Board regulates and sets standards for recycled water quality to ensure that recycled water is fit-for-purpose.[47]

[47] https://www.waterboards.ca.gov/water_issues/programs/recycled_water/

What are the reality constraints to expanding recycled water as a local water supply?

1. Sufficiency of influent into wastewater treatment plants
2. Water quality of influent into wastewater treatment plants
3. Cost of recycled water treatment
4. Cost of recycled water distribution
5. Regulatory constraints

The SWP water contributes to addressing the first three of these reality constraints. The feasibility and cost of recycled water production depends in large part on the quality of the wastewater influent generally and its TDS level especially. Water imported into the region by the SWP increases the feasibility and cost-effectiveness of regional recycling by lowering influent TDS levels.

3.3 Stormwater Management—an emerging water source

Stormwater management has been an infrastructure challenge in the US for many years, with social shifts to urban communities exacerbating the problem. The Environmental Protection Agency (EPA) was tasked with establishing measures to control stormwater runoff under amendments to the Clean Water Act, resulting in two sets of regulations in 1990 and 1999. These regulations established requirements for municipal separate storm sewer systems and industrial activities. However, stormwater management remains a significant challenge for many cities, with treatment of stormwater-related pollutants often required to minimize the impact of contaminants on the watershed. In some cases, treatment is not possible when surges in stormwater overwhelm systems that convey combined sewage and stormwater. The EPA processes permits from three sources: municipal separate storm sewer systems, industrial activities, and construction activities, and is also still the permitting authority in certain states and municipalities. The agency has also established the Urban Waters Federal Partnership to reconnect urban communities with their waterways and better impact their water systems. However, the management and regulation of stormwater in the US still faces many challenges, including insufficient funding, lack of integration between agencies, difficulty in implementation of regulations, ineffective regulations, and limitations in localized monitoring.[48]

Stormwater harvesting and reuse is an emerging field of sustainable water management in urban areas. It involves the collection and storage of stormwater runoff for later use, which can benefit water quality, promote aquifer recharge, and provide an alternative water supply for non-drinking purposes.

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[48] https://www.epa.gov/emergency-response-research/stormwater-management
https://www.wwdmag.com/collection-systems/article/10917809/the-challenges-of-stormwater-management
https://smartgrowthamerica.org/stormwater-management-green-infrastructure-and-the-challenges-of-redevelopment/

Stormwater harvesting can also complement other approaches to sustainable urban water management, such as rainwater tanks, greywater systems, effluent reuse, and demand management.[49]

The challenges and concerns related to stormwater harvesting and reuse include the need for appropriate treatment to ensure water quality and public health, as well as the need for careful design and implementation to minimize negative impacts on the environment. In addition, the controlled flows and discharges into receiving water bodies must be managed to ensure minimal impacts.[50]

Stormwater management addresses critical nodes in the water networks within Southern California and has been described here for completeness. To illustrate, NPDES permit constraints for outflows into receiving water bodies are starting to be translated upstream into strictures for retail HOA, commercial, and industrial customers. Stormwater agencies are leveraging private property incentive programs to achieve water quality benefits faster and more cost-effectively than traditional methods. WUE programs have been designed and implemented, some using state funding, explicitly to address urban runoff that transports contaminants into stormwater drainage systems. Regional Water Quality Boards have collaborated with stormwater agencies to apply co-funding and scale WUE programs to better target water use efficiency outreach where pollutant challenges are highest. Water agencies have existing relationships with retail customers, experience with ongoing WUE programs, and staff willing to adapt programs for multiple benefits. Pilot “stacked incentive” programs have been met with encouragement from regulators, indicating that more collaborations of this type can be expected in the future. [51]

3.4 Colorado River Aqueduct (CRA)—How the SWP complements

The CRA is a water supply and storage system whose value is increased through its integration with the SWP. The section describes how the SWP complements the CRA in Southern California’s integrated water system.

Blending

SWP water is used to blend with CRA water before it undergoes further treatment and is distributed to customers in Southern California. This blending process is crucial to ensure the water meets the required quality standards for drinking. Without blending SWP with CRA water, the region would suffer

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[49] https://www.epa.gov/waterreuse/capturing-stormwater-source-water-reuse-resources
https://watereuse.org/educate/types-of-reuse/stormwater-reuse/

[50] https://www.wwdmag.com/collection-systems/article/10917809/the-challenges-of-stormwater-management

[51] See, for example, https://enviroincentives.com/projects/southern-california-landscape-optimization-service/

water quality degradation which would impact both local groundwater and recycled water operations and costs.[52]

Quagga

Quagga mussels, an invasive species, can attach themselves to various surfaces, including pipes and other water infrastructure, causing blockages and damage. They can also disrupt the water flow and quality, leading to increased maintenance costs and potential water shortages.[53] The Metropolitan Water District of Southern California has implemented various measures to control the spread of Quagga mussels, but their presence continues to challenge the operation and maintenance of the Colorado River aqueduct. The presence of SWP water in the portfolio of water resources gives more flexibility for managing these challenges.

Lake Mead ICS

The Intentionally Created Surplus (ICS) stored in Lake Mead plays a crucial role in managing networked water resources across the region. This conserved water, contributed by Lower Basin states such as California, serves as a vital buffer against drought and low-water conditions by providing a reserve for future use. However, the ICS volume in Lake Mead also impacts the operations of the Colorado River Aqueduct. As of 2020, approximately one-third of the water stored in Lake Mead was comprised of previously conserved ICS. This means that a significant portion of the lake's water is not immediately available for use, limiting the amount that can be drawn and transported through the aqueduct. The State Water Project (SWP) helps mitigate this by meeting Southern California's water demands during wet years, allowing Metropolitan to maximize ICS storage in Lake Mead and enhance multi-year drought resilience."[54]

3.5 Storage—How the SWP contributes to In-Region and Out-of-Region Storage Capabilities

Storage of water serves a critical functional role in ensuring the reliability of water services in Southern California. Functionally, storage serves as a buffer against all kinds of uncertainty, known and unknown. Storage is a very handy function to have around when facing a world full of uncertainty.

Since the SWP includes large storage facilities, it is valid to conclude that the SWP is more than “just another water supply.” The SWP storage facilities include Lake Oroville, San Luis Reservoir, and the terminal reservoirs connected to the regional distribution system. The SWP also connects Southern California to non-SWP storage and banking facilities in the Central Valley. The SWP storage and connected storage systems benefit reliability of supply to SWP contractors, including those in Southern

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[52] https://www.mwdh2o.com/media/j01mnnjw/amendment-to-white-paper-on-planning-financial-considerations-and-agreements-september-2023.pdf
[53] https://www.watereducation.org/aquapedia-background/quagga-mussel
[54] https://sgp.fas.org/crs/misc/R45546.pdf

California, across multiple dry year scenarios. As part of Metropolitan's ongoing planning, the sufficiency of regional storage is being assessed.

In-Region Storage

Within the Southern California region, in-region storage function depends on the SWP in more than one way. SWP water is preferred for groundwater basin recharge due to its favorable water quality profile.

- In-region storage benefits from SWP water being used to blend down salinity flowing into groundwater basins and water treatment plants.
- The in-region Diamond Valley Lake relies exclusively on SWP water to avoid quagga infestation.
- In-region storage benefits from SWP water being used as a feedwater to blend down contaminants, known or emerging.
- In-region storage benefits from SWP water during dry years and multi-dry years to create additional options for supply management.
- In-region surface storage of SWP water is especially beneficial during emergency and catastrophic events when aqueducts are severed, and the region is isolated from its imported water sources.

Out-of-Region Storage

Out-of-Region storage provides reliability benefits via SWP serving as a buffer in dry year, multi-dry year or earthquake scenarios that threaten the CRA.

4. Economic Impacts of SWP supply to Southern California

Exactly how big are the economic stakes attached to water delivery supported by the SWP According to the 2023 study[55] commissioned by the California DWR, the short answer is that the stakes are quite large. The State Water Project serves a Southern California area has a population of over 22.1 million with a GDP of $1.6 trillion. The Southern California area includes over 600,000 businesses employing over seven million individuals. The assessed value of property in the State Water Project Service Area is estimated to exceed $3.3 trillion. What would be the effect of an absence of SWP supply[56] to the health of the Southern California economy?

The economic impact of reduced SWP supply depends directly on the nature of the reduction. The SWP supply into Southern California, per the 2020 UWMP, has declined about 1 percent per year from 2000 to 2019. It is not hard to imagine that a 30% reduction in SWP supply occurring over 30 years would have a different impact on the Southern California economy than if the 30% reduction were to occur within 30 days. Over time Southern California water agencies could develop alternative supplies, albeit at higher cost, to avoid any resultant water shortages to customers. Were the 30 percent reduction to occur within one month, direct economic damages to customers would result.

Economists have measured the economic impact of water shortages. Toward the tail end of the statewide 1987–1992 drought, CUWA commissioned an economic study[57] that examined a 30% SWP shortage scenario that included interviewing 640 industrial plant managers and decision makers. Industrial plant managers were asked about alternative water supplies, technology to reduce water use, expected decrease in output and employment, and impacts on cash flow, expansion plans, and relocation decisions. Findings included

- Plant managers reported that output would be reduced in the presence of water shortages.
- Elasticity of substitution, calculated from survey responses, shows that industries vary in their sensitivity of production output to water supply shortages.
- Production and employment would decline due to the water shortage.

[55] Berkeley Research Group, (2023) *The Economy Of The State Water Project Clean, Reliable, and Affordable Water for California,* A Report for the California Department of Water Resources. https://water.ca.gov/-/media/DWR-Website/Web-Pages/News/Files/FINAL-12-14-2023---The-Economy-of-the-State-Water-Project.pdf

[56] "When the well is dry, we know the worth of water," attributed to Benjamin Franklin.

[57] Spectrum Economics, (1991) *Cost of Industrial Water Shortages,* A Report for California Urban Water Agencies. https://www.cuwa.org/publications-archive/y26y8s6yrny7ect4eebf5m3p5zalyl

The 1991 study concluded that direct production losses due to this 30% hypothetical water shortage in Southern California would be $7.44 billion (p. 7-14, Table 7-5), with employment losses of 25,980 jobs (p. 7–22, Table 7–11).[58]

The economic damages from water shortages are not limited to industrial and commercial customers. Residential customers bear a direct economic cost of water shortages. The water shortage cost has also been studied by economists who have found it to be highly nonlinear: The economic cost of the first gallon reduced is much less than the economic cost of the last gallon reduced.[59] Another study commissioned by CUWA following the 1987–1992 drought[60] found residential customers expressed a willingness-to-pay to avoid water shortages ($11.63 to avoid a yearlong 10% reduction service with an expected frequency of one in ten years), that exceeded the then cost of alternative water supplies.

Though many of these quantitative economic studies are overdue for an update, one can safely infer that a complete cessation of SWP supply would be very disruptive to the health of the Southern California economy, the jobs provided by that economy, the income to residential customers from that economy, and the ability of California to attract companies to build and grow in California. As a recent report by the Public Policy Institute of California (PPIC) on Water and the California Economy summarized:

> California's economy has been evolving in ways that have increased the economic productivity of water use, whether it is measured by jobs, or the value added per unit of water used. This evolution has enabled the state's economy to grow even though water is a scarce resource that must meet numerous competing demands, including increasing demands for environmental water. If we manage it well, the water sector can continue to support a healthy economy.[61]

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[58] Note that the study reported results in 1990 dollars. Note that 25,908 job reduction is 4.4% job reduction of respondent jobs in surveyed industries (Table 7–11).
[59] The value of a gallon of water to customers lost in the desert, which is their willingness to pay, would be constrained only by how much money was in their wallet. In an economic study of the value of water to San Francisco area, Brozović, Sunding, and Zilberman (2007) bounded this theoretically limitless willingness-to-pay by the cost of bottled water, a natural competitor to networked water service. Water Resources Research, Vol. 43, W08423, doi:10.1029/2005WR004782 .
[60] Barakat and Chamberlin, Inc. (1994), The Value Of Water Supply Reliability: Results Of A Contingent Valuation Survey Of Residential Customers, A Report for Calif. Urban Water Agencies, Sacramento, Calif.
[61] Water and the California Economy, PPIC https://www.ppic.org/wp-content/uploads/rs_archive/pubs/report/R_512EHR.pdf

5. Summary

This section summarizes the direct benefits brought by the SWP according to the One Water institutions involved: Water Supply, Wastewater, and Stormwater. Next the indirect benefits—that is less obvious benefits that may not fall directly under the purview of a single type of One Water institution—are briefly summarized. Last, some caveats are provided about the inferences derivable from this white paper need to clarify the path forward.

Water Supply Benefits

SWP water can have lower direct costs than other water resource alternatives such as advanced treatment technologies or ocean desalination. How does a portfolio with SWP hedge against different types of supply disruptions, the hydrologic variability across types of imported water, and water quality regulatory risks? Are there synergistic effects between SWP and storage assets in the water resource portfolio?

The benefits of water supply are divided into parts:

- Water Supply Cost Effectiveness— An increased supply at a lower incremental cost is a benefit.
    - SWP water can have lower direct costs than other water resource alternatives such as ocean desalination.
- Water Quality Benefits
    - Infiltrated SWP water can improve groundwater quality (TDS) and give a means of control over addressing long term groundwater basin management objectives.
    - Avoids any potential imported water contaminants.
    - Drinking Water Protection—directly contributes to technical control over drinking water protection. Future threats to drinking water quality are not known with certainty.
- Water Reliability Benefits—SWP supplies include the effects of diversifying the portfolio of water resource alternatives in Southern California:
    - Direct diversification of the portfolio of water resource alternatives by retaining the largest source of imported water, albeit with variable supply attributes.
    - Can help maximize regional benefits from better utilization of existing groundwater basins. The SWP can improve buffering from existing groundwater storage assets. Lack of a highly reliable infiltration supply has been a limiting constraint on buffering use of GW basins.
    - Drought Benefit—Reduction in frequency of “Drought Allocation” years and the magnitude of shortage during allocation years

- Emergency Benefit—Planned buffering leaves more water banked in groundwater basins for natural or man-make emergency disruptions.
- Distribution Reliability—Adding delivery nodes can improve distribution reliability and diversify local water supply options for member agencies.

- Environmental Benefits
  - The SWP has documented disbenefits north of Metropolitan's service area and the nature, magnitude, and best remediation or remedy has been the subject of contention.
  - The SWP can sustain alternative water supplies that have lower greenhouse gas emissions. The energy embedded in regional recycled water can be less than other alternatives (desalinated water) for example.
  - Increased local environmental benefits are possible from water supply augmentation (such as bird-friendly backyards and ocean-friendly gardens).
- Regulatory Compliance
  - SWP water can be used to compliance targets for emerging water quality threats.

Wastewater Benefits

Potential wastewater benefits include the direct benefit of reduced outflow and additional institutional benefits of participating in regional water solutions.

- Wastewater Benefits
  - Reduced outflow—treatment and outfall constraints drives some forward-looking wastewater system costs.
  - Participation in creating sustainable regional water solutions is high on the list of many wastewater institutions.

Stormwater Benefits

Potential stormwater benefits can also exist.

- Stormwater Benefits
  - SWP water supports regional recycled water that create synergies that reduce costs of complying with Stormwater Regulations.
  - Flood Reduction—by reducing the baseline influent, a small amount of increased flood reduction can result
  - Improved Ocean/stream water quality. Averted effluent leaves more capacity for treating wet or dry weather flow. By reducing the cost of treating above regulatory levels, RRW synergies can create the potential for valuable improvements to receiving waters.

Indirect Benefits

Economic Benefits	
Regional Economic Impact	Increased employment and economic activity. This includes the initial project build as well as ongoing O&M and preservation of Green Industry employment.
Scale Economies	Ability to take advantage of economies of scale when pooling together the size of production facilities.
System Efficiencies	Ability to search for system efficiencies over multiple service areas. (e.g., utilizing more fully capacity for transportation, treatment, or storage).
Financing Efficiency	Potential for lower financing rates due to large size or better credit rating.
Shared Risks	Spread out risk due to economic and financial forces.
Institutional Benefits	
Specialization	Take advantage of expertise and resources of multiple agencies at retail, intermediate level wholesale, and MWDSC wholesale. Regional solutions require regional expertise while simulations tailoring solutions to local retail service areas.
Better Integration of Short and Long Term	Fold regional recycled water into both short-term implementation plans and long-term strategic planning.
Extending Local Control yields Regional Benefits	Recycled water is locally owned and not subject to the same controversial water battles that affect supplies imported from far away. Southern California water agencies are under increasing scrutiny regarding water use. Environmental activists and other motivated citizens have become increasingly involved with water issues and focus more attention on the water use efficiency of California water agencies. Water recycling represents a major component of recognized water use efficiency. Southern California wastewater agencies are under increasing regularity pressures to limit or eliminate treated effluent discharge to bays, estuaries, and river ecosystems. Public sentiment concerning ocean disposal has also become increasingly negative. Southern California's bays and beaches are recognized assets. Water recycling

converts a potentially expensive or controversial discharge to a beneficial, revenue producing resource.

Political Effects

Local water projects are popular and have local political effects in the communities in which they serve.

Equity, Environmental Justice—Underserved areas can be served by RRW. Lower income communities can appreciate the benefits of improved regional water reliability.

Trust—Water organizations are considered “anchor” institutions of the public trust. Given deteriorating public trust in many institutions, positive political effects result from water institutions being effective stewards of water quality and the economic provision of water services.

Ecological Effects

Identification of indirect benefits can include difficult-to-quantify ecological effects. Ecosystems form a vital part of the water infrastructure and provide services of value to human society. Many low-income residents rely on ecological services for a part of their livelihood. When the value of ecological services to disadvantaged or underserved regions has been identified, income distribution objectives can be given meaning. A good benefits analysis can also give articulation to option values (the value of creating or preserving options to deal with unknown outcomes) or existence values (intrinsic values such as cultural, aesthetic, bequest.)

Other Indirect Benefits and Policy Issues

Additional indirect benefits cut across economic, organizational, political, and ecological classifications associated with RRW and potentially may include:

- Value of solution that fits the problem
- Potential for synergism with other water infrastructure
- Water with a high-unit cost can be justified by benefits
- Affordability – value of potable water in underserved area
- Smaller environmental footprints
- The value of local control

- The value of supply reliability vs. cost (a measurement of risk)
- The effectiveness of a diverse portfolio of water resources
- The value of regional cooperation or cost of its absence
- The value of solving regulatory problems by turning them into beneficial water supply opportunities
- The value of community-based decision making
- The effectiveness of alternative implementation strategies

To state that the SWP benefits local water supplies in identifiable ways does not state how large these benefits are in comparison to costs or who receives the benefits and who is responsible for the costs. These questions remain as the next steps in Southern California's ongoing water planning.

In the pursuit of tomorrow's solutions, it is essential for water institutions to forge new connections and collaborate with various other establishments. The American Water Works Association's Water 2050 Initiative[62] underscores this new focus for water institutions, which includes:

- Cultivating public trust[63] in the entities responsible for water services, with the aim of positioning them as cornerstone institutions within every community.
- Fostering a culture that encourages every individual to establish a personal bond with water and embrace a shared responsibility for its preservation.

We believe that the SWP will play a critical role in the collaboration of water-related institutions (the so called "One Water" institutions include water, wastewater, recycled water, and stormwater) to bring about new sustainable water partnerships and solutions.[64]

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[62] See David LaFrance (2024) "At it Again", Journal AWWA, April 2024, p.114, https://doi.org/10.1002/awwa.2256

[63] According to Gallup polling, the average faith in American institutions is roughly half of what it was in 1979: https://news.gallup.com/poll/508169/historically-low-faith-institutions-continues.aspx. Water institutions providing water service have been facing more specific challenges of earning public trust: Dr. Teodoro's recent scholarly book examines this issue in depth. See Teodoro, Zuhlke, and Switzer, *The Profits of Distrust Citizen-Consumers, Drinking Water, and the Crisis of Confidence in American Government,* Cambridge Univ. Press, 2022. https://doi.org/10.1017/9781009244893

[64] Further reading on reconfiguring water governance should include the very thoughtful USEPA/WateReuse commissioned report from Rosenblum et al. March 2022, *Multi-agency Water Reuse Programs Lessons for Successful Collaboration*, https://www.epa.gov/system/files/documents/2022-03/multi-agency_water_reuse_programs-one_pager_march_2022.pdf and Barton H. Thompson, Jr.'s book on how the public and private sectors can work together on water solutions *Liquid Assest: How Business and Government Can Partner to Solve the Freshwater Crisis,* Stanford Univ. Press, ISBN: 9781503632417, 2023. https://www-sup.stanford.edu/books/title/?id=35076

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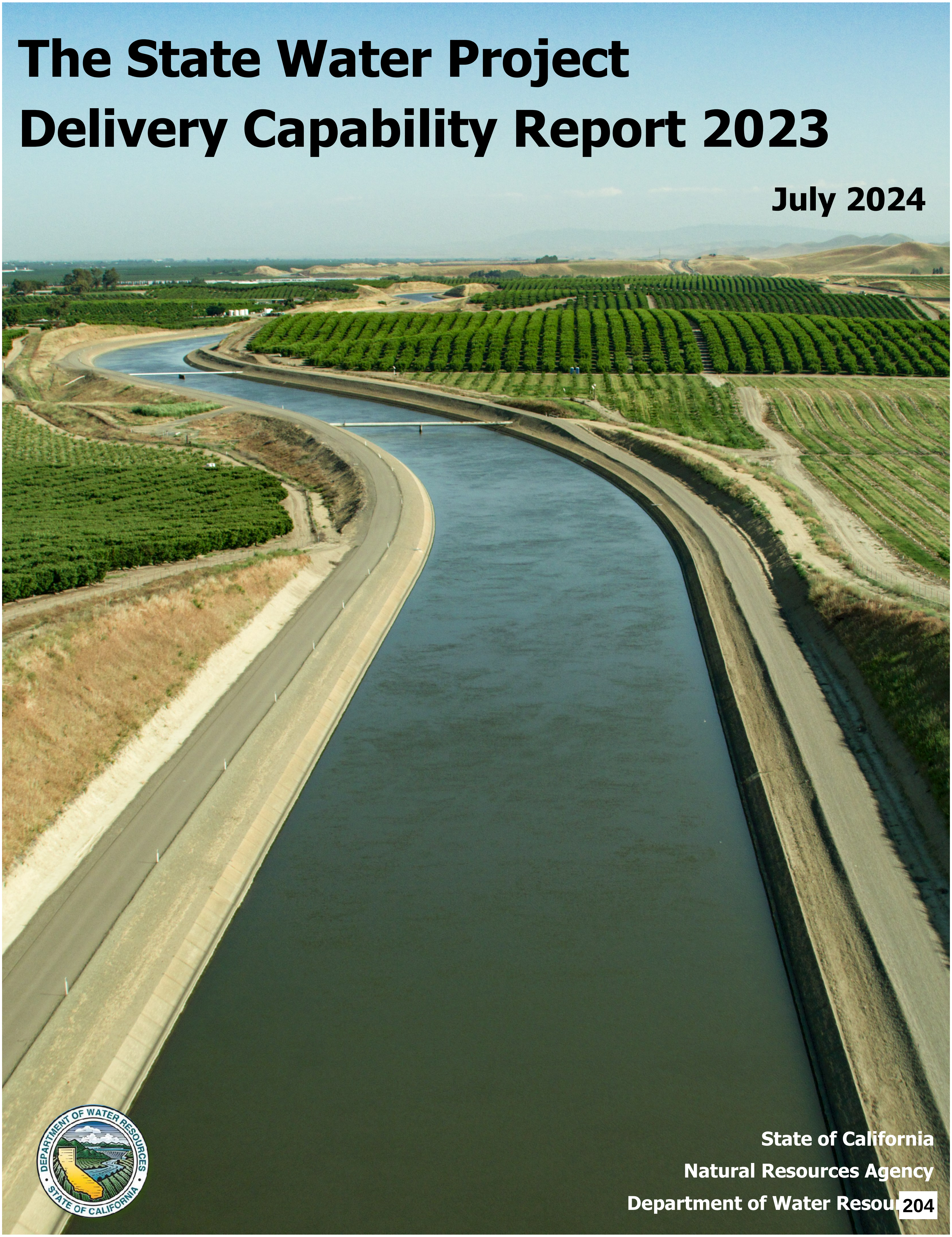

State of California

Natural Resources Agency

Department of Water Resou

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Gavin Newsom, Governor

Natural Resources Agency
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Director’s Foreword

I am pleased to share with you the latest edition of the bi-annual report, the 2023 State Water Project Delivery Capability Report (2023 DCR), which provides a comprehensive analysis of the current and future conditions for the State Water Project (SWP) water supply.

If actions are not taken to address the water delivery challenges faced by the SWP, the 2023 DCR forecasts substantial reductions in SWP delivery capability and reliability. These reductions are driven by the impacts of climate change and constraints within the federal and State permits needed to protect critical species. And these reductions underscore the need for investments in the SWP in order to maintain its historical delivery capability and reliability.

The Delivery Capability Report is used widely both within and outside the State Water Project for water supply planning. The provision of the information in these reports is a key component of the drought planning done by the SWP and is fundamental to the drought planning done by the Public Water Agencies that receive SWP and Central Valley Project (CVP) Water. These reports provide the information needed by these Agencies to develop and manage their own water supply portfolios and are important inputs for Sustainable Groundwater Management Plans, Urban Water Management Plans, Agricultural Water Management Plans, and Integrated Regional Water Management Plans.

Importantly, decreases in the availability of surface water deliveries can lead to supply shortages, an increase in groundwater demand, and reductions in available supplies to support groundwater replenishment. DWR’s Sustainable Groundwater Management Office will use the information in the 2023 DCR to update its existing climate change data and guidance that many Groundwater Sustainability Agencies used for their initial Plans. Similarly, DWR’s Office of Water Use Efficiency will be advising urban and agricultural water agencies to update their water budget assumptions based on these new assessments.

The 2023 DCR introduces two innovative approaches to characterize current climate change conditions and emphasize the uncertainty in future climate change projections, both of which have undergone independent peer review and are considered significant improvements over previous methodologies.

While the report focuses on current regulations and operations, collaborative efforts between the Department of Water Resources (DWR), the U.S. Bureau of Reclamation (USBR), the Water Board, and resource agencies are ongoing to develop new operating permits for the SWP and Central Valley Project (CVP). These permit conditions, once finalized, will be integrated into the 2025 Delivery Capability Reports.

Simultaneously, the Water Board is developing a new Sacramento-San Joaquin Delta Water Quality Control Plan Update. Board staff has proposed a draft Plan that would meet objectives solely through flow requirements - which would have a substantial impact on the future yield of the State Water Project. In parallel, water users in the Delta Watershed are exploring alternative approaches, such as the Healthy Rivers and Landscapes initiative, that would rely on a combination of water use reductions and habitat improvements. The outcomes of these negotiations and the eventual Plan adopted by the SWRCB will significantly influence the future operations of the SWP.

Despite uncertainties in future regulations and climate conditions, the 2023 DCR unmistakably demonstrates substantial reductions in SWP delivery capability and reliability if no or insufficient action is taken. Immediate action is imperative to address the impact of a warming climate, with the report indicating that these effects are already in motion.

Looking ahead, the SWP is proactively evaluating and developing key adaptation strategies, including Delta Conveyance, Forecast Informed Reservoir Operations, and opportunities for new and expanded storage both above and below ground. A forthcoming SWP Climate Adaptation Analysis in 2024 will provide an evaluation of the expected effectiveness of these strategies.

I encourage all SWP water users to leverage the insights from this report for their own planning and adaptation investigations. Ensuring the water needs of the people of the State are met in the face of a changing climate requires a collaborative and proactive approach.

Karla A Nemeth

Karla Nemeth
Director
California Department of Water Resources
May 2024

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List of Acronyms

ANN	Artificial Neural Network
BiOps	Biological Opinions
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CDEC	California Data Exchange Center
CCWD	Contra Costa Water District
CDFW	California Department of Fish and Wildlife
CII	Commercial, Industrial, Institutional
COA	Coordinated Operation Agreement
CVP	Central Valley Project
CY	Calendar/Contract Year
D-1641	State Water Board's Water Right Decision 1641 (D-1641), issued in December 1999 and updated in March 2000
DCD	Delta Channel Depletion
DCP	Delta Conveyance Project
DCR	Delivery Capability Report
DSC	Delta Stewardship Council
DLL	Dynamic Link Library
DO	Dissolved Oxygen
DSM2	Delta Simulation Model 2
E/I	Delta Exports to Inflow ratio
EcoRestore	Governor Brown's Delta habitat restoration plan
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FCWCD	Flood Control and Water Conservation District
ID	Irrigation District

ITP	Incidental Take Permit for Long-Term Operation of the State Water Project
KCWA	Kern County Water Agency
MAF	Million Acre-Feet
M&I	Municipal and Industrial
MWDSC	Metropolitan Water District of Southern California
NDOI	Net Delta Outflow Index
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOD	Notice of Determination
NOP	Notice of Preparation
OAL	The State Office of Administrative Law
ROC on LTO	Re-initiation of Consultation on the Long-Term Operations of the Central Valley Project and State Water Project
ROD	Record of Decision
RPA	Reasonable and Prudent Alternative
SED	Substitute Environmental Document
SJRRP	San Joaquin River Restoration Program
SMSCG	Suisun Marsh Salinity Control Gate
SVI	Sacramento Valley Index
SWP	State Water Project
SWPAO	State Water Project Analysis Office
SWRCB	State Water Resources Control Board
TAF	Thousand Acre-Feet
USBR	United States Bureau of Reclamation
USFWS	United States Fish and Wildlife Service
UWMP	Urban Water Management Plan
VA	Voluntary Agreements
VIC	Variable Infiltration Capacity Model

WaterFix	Water transfer component of the Bay Delta Conservation Plan
WD	Water District
WGEN	Weather-regime-based Stochastic Weather Generator
WSD	Water Storage District
WSI-DI	Water Supply Index vs. Demand Index Relationship
WQCP	Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta
WY	Water Year
WYT	Water Year Type
X2	Distance in kilometers from Golden Gate, where salinity concentration in the Delta is 2 parts per thousand

Summary

This Delivery Capability Report presents California Department of Water Resources (DWR) analysis of the State Water Project (SWP) system and provides important planning information for users of SWP water. The analysis provides information about how changing climate, regulatory, and operational considerations impact SWP delivery capability.

DWR has authority under state law to construct, operate, and maintain the SWP to manage, store and deliver water for the benefit of the State. This report is intended to provide information about the key factors affecting the operation of the SWP in California, its long-term capability as a source of water for beneficial use, and an estimate of its current delivery capability. This report meets the requirements of Attachment B to the Monterey Plus Settlement Agreement of May 2003.

Water provided by the SWP is a major source of water supplies available to many SWP contractors. SWP contractors consist of 29 public entities that include cities, counties, urban water agencies, and agricultural irrigation districts. SWP contractors' local/regional water users have long-term contracts with the DWR for all, or a portion of their water supply needs. Thus, the delivery capability of water from the SWP system is an important component in the water supply planning of its recipients, and ultimately affects the amount of water available for beneficial use in California.

The availability of these water supplies may be highly variable. A sequence of relatively wet water years[1] may be followed by a varying sequence of dry or critically dry years. Having good and reliable estimates on how much water each contractor will receive each year—whether it be a wet water year, a critical year, or somewhere in between—gives contractors a better sense of the degree to which they may need to implement increased conservation measures, or plan for new facilities or back up sources of water to meet their needs. This is increasingly important given the anticipated effects of climate change on the sources of these water supplies.

The geography of California and the infrastructure of water conveyance from the source areas, located in the Sierra Mountain Range, to areas of demand

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[1] Water years start on October 1 and end on September 30 of the next calendar year.

for water, makes the Sacramento-San Joaquin Delta a key feature of the SWP's ability to deliver water to its agricultural and urban contractors in the North Bay, the South Bay, California Central Valley, Central Coast, and Southern California. All but three of the 29 SWP contractors receive water deliveries by diversions from the Delta. These water diversions are pumped by either the Harvey O. Banks or Barker Slough pumping plants.

DWR and the United States Bureau of Reclamation (USBR), the managing entities of the two statewide systems of water conveyance in California, face numerous challenges in the operation of their diversion facilities in the Delta, and are regulated by several state and federal agencies to maintain, and enhance the Delta's long-term sustainability.

Maintaining suitable quality of water flowing in the channels of the Delta for the numerous in-basin beneficial uses, and the protection of endangered and threatened fish species are important factors of concern for the operators of the Delta export diversion facilities. Ongoing regulatory requirements, such as those aimed at protecting the estuary's resident and migratory fish species, are major challenges to a reliable and sustainable water delivery capability of both SWP, and the Central Valley Project (CVP) systems.

Climate change is also increasing the variability, frequency, and magnitude of floods and droughts. The projected sea level rise caused by the increase in average temperature complicates efforts to manage salinity levels in the channels affected by tides. Additionally, higher ocean levels could result in more frequent water quality degradation in the Delta channels requiring additional Delta outflow to maintain water quality objectives. This report provides estimates of both current and future delivery capability to help inform water users and guide their climate change adaptation efforts.

Operationalizing climate change adaptation requires that we continuously evaluate conditions and respond to new trends. However, this DCR does not include any adaptations in the climate change scenarios. This DCR update includes substantially expanded climate change analysis and planning information to evaluate the effect of climate change on delivery capability. This improved planning information includes multiple scenarios of future climate conditions to help examine the resiliency of SWP water supply to changes in climate. This report presents an acknowledgement of climate uncertainties and the need to manage risks to water supply reliability—and a greater understanding that important climate changes have already occurred and are affecting water supply reliability today. While this DCR evaluates future climate conditions, it does not model future adaptation strategies that DWR is pursuing and plans to have in place by mid-century, analysis of key adaptation strategies with the DCR climate scenarios will be published in mid-2024. The inclusion of this improved planning information is discussed at length in Section 3 and Section 7 of this report.

The analyses in this report factor in all the current regulations governing SWP and CVP operations in the Delta (i.e., D-1641, 2019 BiOps and ITP), existing infrastructure[2] and assumptions about water uses upstream in the Sacramento River and San Joaquin River watersheds. Analyses were conducted that determined the amounts of water that SWP contractors receive and the amounts of water they choose to hold for use in a subsequent year.

SWP Delta exports have decreased since 2005, although the bulk of the change occurred between 2005 and 2009 and in 2019. The former reduction is due to the Delta regulations which constrained exports that culminated in the federal Biological Opinions (BiOps) which went into effect in 2008-2009. These BiOps modified operations of the CVP and SWP diversion pumps. The later reduction is due to two main factors: first, the amended Coordinated Operation Agreement (COA) with accompanying project operation changes which reduced SWP exports and increased CVP exports, and second, a more conservative operation of Lake Oroville by the SWP.

Many of the same assumptions of SWP operations described in the 2021 Report remain the same in this 2023 update, however, there are some

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[2] The studies in this report do not consider the diminished capacities of the California Aqueduct due to subsidence. See Section 4, California Aqueduct Subsidence Program for a discussion on the topic.

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notable changes to the inputs to the simulation. The most notable changes include:

- The extension of the modeling period for an additional six years. The model now simulates a 100-year period from October 1921 to September 2021.
- The baseline projected hydrology incorporates the changes in climate that have already occurred.[3]
- The delivery capability with expected climate change 20 years into the future (2043) was evaluated for three levels of risk to the SWP as compared to only one scenario in prior reports.[4]

As a result of the above improvements and refinements, the differences between the 2021 and 2023 Reports can be attributed to differences in hydrology, temporal expansion, and operational refinements.

The most salient findings in this report are:

- Under existing conditions, the estimated average annual delivery of Tabler A water for this report is 2,202 thousand acre-feet (TAF)/year, 119 less than the 2,321 TAF/year estimated for the 2021 Report (Table 6-2).
- The likelihood of existing condition SWP Article 21 deliveries (supplemental deliveries to Table A water) being greater than 20 TAF/year has increased by 4 percent relative to the likelihood presented in the 2021 Report (Figure 6-6).
- Under the climate change scenarios, which project conditions 20 years into the future under median to extreme hot-dry conditions with no adaptation, the estimated average annual delivery of Table A water shown in the three scenarios is 13 percent to 22 percent lower than under existing conditions. Section 7 highlights the scenario selection

[3] Refer to https://data.cnra.ca.gov/dataset/state-water-project-delivery-capability-report-dcr-2023/resource/ad861b0b-c0aa-4578-8af0-54485e751ca8 for more information.

[4] Refer to https://data.cnra.ca.gov/dataset/state-water-project-delivery-capability-report-dcr-2023/resource/dffe00a6-017c-4765-affe-36b045c24969 for more information

method and the impact of all three scenarios on the delivery capability of the SWP.

- Under future climate conditions, California's hydrology is likely to become more extreme with periods of high flows that current infrastructure and operations are unable to capture and longer more severe dry periods that challenge operations.
- While the 50% level of concern scenario is considered the median of the expected SWP delivery capability 20-years into the future, SWP water users are encouraged to carefully consider the information from all three 2043 potential future climate scenarios and evaluate their vulnerability to a range of climatic changes based on their respective risk tolerance.

Section 1. Reasons to Assess SWP Water Delivery Capability

Three major factors underscore the importance of regularly assessing the SWP's water delivery capability: the effects of population growth on California's balance of water supply and demand, State legislation intended to help maintain a reliable water supply, and impact of potential climate change-driven shifts in hydrologic conditions.

Population Growth, Land Use, and Water Supply

California's population has grown rapidly in recent years, with resulting changes in land use. This growth is expected to continue. From 1990 to 2005, California's population increased from about 30 million to about 36 million. Based on this trend, California's population has been projected to be more than 43 million by 2030. The California Water Plan (CWP) indicates that for year 2060 conditions, based on the California Department of Finance's projections of 2010 U.S. Census data, the population is projected to be nearly 51 million — a 70 percent increase compared with the 1990 population.

The amount of water available in California can vary greatly from year to year. Some areas may receive 2 inches of rain a year, while others are deluged with 100 inches or more. As land uses have changed, population centers have emerged in many locations without enough local water supply. Thus, Californians have always been faced with the problem of how best to conserve, control, and move water from areas of abundant water to areas of water need.

The final California Water Plan Update 2023 sets forth objectives, recommendations, and actions for promoting climate change adaptation, supporting California's regions, and strengthening water equity. Action 2.4.1 of the CWP, *Improve SWP Delivery Capability Report*, recommends DWR provide assurance that SWP water users and the public have transparent, risk-informed information about SWP capabilities by making key improvements to the SWP Delivery Capability Report. In support of this action, the 2023 DCR includes use of climate-adjusted hydrology, evaluation of system risk-informed future scenarios, and model updates for recent operational, regulatory, and physical conditions.

For more information on the CWP Update 2023, visit: https://water.ca.gov/Programs/California-Water-Plan/Update-2023.

Legislation on Ensuring a Reliable Water Supply

The laws described below impose specific requirements on both urban and agricultural water suppliers. These laws increase the importance of SWP water delivery capability estimates to local and regional water purveyors.

Urban Water Management Planning Act

The Urban Water Management Planning Act was enacted in 1983 (California Water Code, Sections 10610–10656). As amended, this law requires all public urban water purveyors to adopt Urban Water Management Plans (UWMPs) every five years and submit those plans to DWR. DWR reviews the submitted plans to report to the legislature on the status of these plans and for the purposes of grant eligibility requirements.

UWMPs must include an estimate of water supply and demand for a 20-year planning horizon and three water-year types, normal, single dry year, and a drought lasting five consecutive years. SWP contractors use SWP delivery capability to estimate their long-term water supply needs from other sources available to them. DWR publishes a guidebook to assist water suppliers with preparing their urban water management plans.

Further information is available at: [https://water.ca.gov/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/Urban-Water-Management-Plans.](https://water.ca.gov/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/Urban-Water-Management-Plans)

Water Conservation Act of 2009: SB X7-7

California became the first state to adopt urban water use efficiency targets with the enactment of the Water Conservation Act of 2009 (SB X7-7, Steinberg 2009). This act mandated the State achieve a 20 percent reduction in urban per capita water use by 2020. It directed urban water suppliers to develop individual targets based on a historical per capita baseline and report interim progress in their 2015 UWMPs and full compliance of their 2020 plans.

In addition, the act requires agricultural water suppliers serving more than 25,000 irrigated acres (excluding recycled water deliveries) to adopt and submit to DWR an Agricultural Water Management Plan (AWMP). These plans must include reports on the implementation status of specific Efficient Water Management Practices (EWMPs), including the measurement and volumetric pricing of water deliveries. Agricultural water suppliers can submit individual plans or collaborate and submit regional plans if the plans meet the requirements of SB X7-7. Agricultural water suppliers that provide water to between 10,000 and up to 25,000 irrigated acres (excluding recycled water) are not required to prepare or submit AWMPs under SB X7-7 unless State funds are made available to support this.

Water Conservation Legislation of 2018 (AB 1668 and SB 606)

In 2018, new landmark water conservation legislation was signed into law. Together, AB 1668 (Friedman 2018) and SB 606 (Hertzberg 2018), lay out a new long-term water conservation framework for California. This new framework is far-reaching for both the urban and agricultural sectors of California and represents a major shift in focus. Programs and initiatives are organized around four primary goals: (1) use water more wisely, (2) eliminate water waste, (3) strengthen local drought resilience, and (4) improve agricultural water use efficiency and drought planning.

The 2018 legislation defined a process to establish new, standards-based, urban water use objectives (targets) that go beyond the 2020 targets set in the Water Conservation Act of 2009. It also calls for the establishment of performance measures for Commercial, Industrial, Institutional (CII) water use, methods to strengthen local drought resilience including more robust water shortage contingency plans, a new five-year Drought Risk Assessment, and an annual water supply and demand assessment by urban water suppliers. DWR is required to prepare and submit an annual report to the Water Board summarizing the annual assessment results, water shortage conditions, and a regional and statewide analysis of water supply conditions. To improve countywide drought planning, the legislative code requires DWR to conduct a water shortage vulnerability study of rural and small communities and report back to the legislature with recommendations on implementation of drought contingency plans for rural small water systems.

Measures to improve agricultural water use efficiency include strengthened or new agricultural water management planning requirements that include annual water budgets, water management objectives, the quantification of agricultural water use efficiency within an agricultural water supplier’s service area, and new drought planning for periods of limited supply.

To fully plan, develop, and implement the new framework, DWR is responsible for numerous studies and investigations over the next three years which include the development of the following:

- Standards.
- Guidelines and methodologies.
- Performance measures.
- Web-based tools and calculators.
- Data and data platforms.
- Reports.
- Recommendations to the State Water Resources Control Board (Water Board) for adoption of new regulations.

A detailed outline of the key authorities, requirements, timeline, roles, and responsibilities of State agencies, water suppliers, and other entities during implementation of actions described in the 2018 water conservation legislation can be found in the summary report "Making Water Conservation a California Way of Life — Primer of 2018 Legislation on Water Conservation and Drought Planning, Senate Bill 606 (Hertzberg), and Assembly Bill 1668 (Friedman)" prepared by DWR and the Water Board.

Additional information on agricultural water use efficiency, water management plans, and supplier compliance can be found in the Agricultural Water Use Efficiency webpage maintained by DWR's Water Use and Efficiency Branch.

Potential Climate Change Driven Shifts in Hydrologic Conditions

DWR continuously reviews and analyzes hydrologic conditions in California and has been monitoring potential shifts in hydrology. The recent hydrologic conditions have been notable for warmer average temperatures, more extreme precipitation (larger storms and drier periods), a change in the form of precipitation to more rain and less snow, and a decreasing Sierra Nevada snowpack which impacts the timing and magnitude of snowmelt runoff volumes. DWR has multiple efforts underway to compare and evaluate recent and long-term hydrologic characteristics. These studies have identified several trends in hydrologic conditions that have shifted the distributions of these conditions outside of the long-term historical distribution.

DWR recognizes the risk posed by climate change to both current and future hydrologic and water supply conditions. The 2023 DCR incorporates analysis of the potential impact of climate change on delivery capability in a more comprehensive manner than previous DCRs. The Hydrologic Conditions Assessment section of this report has a summary of the methods used to conduct this analysis. This report includes substantial peer reviewed enhancements to the methods and information provided in previous reports. DWR will continue to work with state water contractors and the scientific community to further improve and expand the information in future DCRs to provide contractors with decision relevant information for their climate change adaptation planning needs.

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Section 2. Regulatory Restrictions on SWP Delta Exports

Multiple objectives converge in the Sacramento-San Joaquin Delta (Delta): to protect a fragile ecosystem, to support Delta recreation and farming, and to provide water for agricultural and urban needs throughout most of California. Various regulatory requirements are placed on the SWP's Delta operations to protect special-status species such as Delta smelt and spring- and winter-run Chinook salmon. As a result, restrictions on SWP operations imposed by State and federal fish and wildlife agencies contribute substantially to the challenge of accurately determining the SWP's water delivery capability in any given year.

Key policies pertaining to Delta operations are undergoing discussions as of the publication of this report. Namely, updates to the Water Quality Control Plan, Agreements to Support Healthy Rivers and Landscapes (sometimes referred to as Voluntary Agreements), and the re-initiation of Consultation for Long-Term Operations. Since none have been finalized, the modeling analysis in this report assumes the same regulatory environment as the 2021 DCR: SWRCB D-1641, 2019 BiOps and its associated ITP (2020). The remainder of this section describes the context and qualitative implications of these regulations on project operations.

Regulations Related to Endangered Species

Biological Opinions on Effects of Coordinated SWP and CVP Operations

Several fish species listed under the federal Endangered Species Act (ESA) as threatened or endangered are found in the Delta. The health and the viability of their populations are impacted by various factors, including SWP and CVP operations, nonnative species, predation, Delta salinity, water quality and contaminants, sediment supply, physical alterations to the Delta, land subsidence, pelagic organism decline, methylmercury and selenium, invasive aquatic vegetation, low dissolved oxygen (DO) levels, and illegal harvest.

Because of the decline of these species, the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) have issued several Biological Opinions (BiOps) since the 1990s on the effects of coordinated SWP/CVP operations on several listed species. Examples are the USFWS BiOp for Delta smelt protection and NMFS BiOp for salmonids, green sturgeon, and Southern Resident killer whales.

These BiOps affect the SWP's water delivery capability in two ways. Most notably, they include terms that restrict SWP exports in the Delta to specific amounts at certain times under certain conditions. The BiOps also include Delta outflow requirements during certain times of the year, consequently reducing the available supply for export or storage.

The first BiOp on the effects of SWP (and CVP) operations was issued in February 1993 (NMFS BiOp) on the effects of project operations on winter-run Chinook salmon, and in March 1995 (USFWS BiOp) on project effects on Delta smelt and splittail. Among other requirements, the BiOps contained requirements for Delta inflow, Delta outflow, and export pumping restrictions to protect listed species. These requirements imposed substantial constraints on Delta water supply operations. Many were incorporated into the 1995 Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta (1995 WQCP), as described in the Water Quality Objectives section, below.

The terms of the USFWS and NMFS BiOps have become increasingly restrictive over the years. In 2004, the USBR sought a new BiOp from USFWS regarding the operation of the CVP and the SWP (referred to collectively as Projects). USFWS issued the opinion in 2005, finding that the proposed coordinated operations of the Projects were not likely to jeopardize the continued existence of the Delta smelt or result in the destruction or adverse modification of its critical habitat. After judicial review, the 2005 BiOp was vacated and USFWS was ordered to prepare a new one. USFWS found that the proposed operations of the Project would result in jeopardy to the Delta smelt and in December 2008 issued a Jeopardy BiOp which included a Reasonable and Prudent Alternative (RPA) with more protective export restrictions and other actions intended to protect the Delta smelt.

Similarly, in 2004 NMFS issued a BiOp on the effects of the coordinated operation of the Projects on salmonids, green sturgeon, and Southern Resident killer whales and found that the proposed operations of the Projects were not likely to jeopardize the continued existence of the listed species or result in the destruction or adverse modification of their critical habitat. After judicial review, the 2004 BiOp was rescinded, and NMFS was ordered to prepare a new one. In June 2009, NMFS issued a Jeopardy BiOp covering effects on winter-run and spring-run Chinook salmon, steelhead, green sturgeon, and killer whales. Like the 2008 smelt BiOp, the salmon BiOp included an RPA with more protective export restrictions and other actions intended to protect listed species.

The 2008 USFWS BiOp included requirements on operations in all but two months of the year. The BiOp called for "adaptively managed" (adjusted as necessary based on the results of monitoring) flow restrictions in the Delta intended to protect Delta smelt at various life stages. One such requirement is Fall X2, a component to improve fall habitat for Delta smelt through increasing Delta outflow. In September, October and November in wet and above-normal water years, additional outflow—achieved through export reductions and reservoir releases—is required to meet salinity targets. In the event there is an increase in storage during any November this action applies, the increase in reservoir storage is released in December to augment the December outflow requirements in SWRCB D-1641. Because this flow restriction was determined based on fish location and decisions by USFWS staff, predicting the flow restriction and corresponding effects on export pumping with any great certainty posed a challenge.

Among the provisions included in the 2009 NMFS BiOp were reducing exports to limit negative flows on OMR between January and June, as well as restricting total Delta exports in the months of April and May, based on SJR flows for all but extremely wet years.

The 2008 and 2009 BiOps were respectively issued shortly before and after Governor Arnold Schwarzenegger proclaimed a statewide water shortage state of emergency in February 2009, amid the threat of a third consecutive dry year. NMFS calculated that implementing its BiOp would reduce SWP and CVP Delta exports by a combined 5 to 7 percent, but DWR's initial estimates showed an impact on exports closer to 10 percent in average years, combined with the effects of pumping restrictions imposed by the BiOps to protect Delta smelt and other species. The California Department of Fish and Wildlife (CDFW) issued consistency determinations under Section 2080.1 of the California Fish and Game Code for these BiOps. The consistency determinations stated that the USFWS and the NMFS BiOps would be consistent with the California Endangered Species Act (CESA). Thus, CDFW allowed incidental take of species listed under both the federal ESA and CESA to occur during SWP and CVP operations without requiring DWR or the USBR to obtain a separate State-issued permit. In addition to the consistency determination, CDFW issued a separate ITP for the incidental take of Longfin Smelt, which is not a listed species under ESA.

In August 2016, the USBR and DWR requested a Reinitiation of Consultation for Long-term Operations (RoC on LTO) of the CVP and SWP with NMFS and USFWS because of new information and science on declining listed fish species populations. On October 21, 2019, the USFWS and NMFS released their new BiOps. USBR released a final EIS on the RoC on LTO on December 19, 2019, and approved a Record of Decision that finalized environmental review on February 18, 2020. The USBR began to operate according to the new operations plan in early 2020.

Incidental Take Permit

The 2008 USFWS and 2009 NMFS BiOps were consistent with CESA requirements. As such, further authorizations with respect to species listed under both ESA and CESA were not required. Under section 2081 of the California Fish and Wildlife Code, DWR held an Incidental Take Permit (ITP) from the CDFW related to Longfin Smelt.

With the expiration of the ITP at the end of December 2019 and the decision to pursue a separate State permit to ensure the SWP's compliance with CESA rather than relying on a consistency determination with federal permits, DWR pursued a new ITP.

The ITP covers species listed under CESA subject to incidental take through long-term operation of the SWP, including Delta smelt, Longfin Smelt, winter-run Chinook salmon, and spring-run Chinook salmon. An EIR on the new ITP was issued in November 2019, an ITP application was submitted to CDFW in December 2019, and the new ITP was issued on March 31, 2020. DWR began to operate according to the ITP in April 2020.

The key elements of DWR’s long-term operations of the SWP through the ITP include:

- Stronger species protections.
- Water dedicated for Delta outflow.
- Innovative use of facilities for fish management.
- Decision-making authority for CDFW.
- New protections for migrating salmon.
- Operational clarity and flexibility.
- Real-time operations.
- Adaptive management plan.
- Enhanced studies, monitoring, and financial commitments.
- SWP exports similar to existing conditions.

For more information, see the Final EIR for the SWP Long-Term Operations: https://water.ca.gov/News/Public-Notices/2020/March-2020/Final-EIR-for-SWP-Operations.

Re-initiation of Consultation for Long-Term Operations

On September 30, 2021, the USBR again requested RoC on LTO. The reinitiation was requested because of anticipated modifications to the Proposed Action that may cause effects to ESA-listed species or designated critical habitats not analyzed in the 2019 USFWS and NMFS BiOps. Under this 2021 RoC on LTO, which is still in progress, the USBR and DWR anticipate that new BiOps will be developed for the CVP and SWP. DWR will also be an applicant in the consultation, and CDFW will facilitate the process of DWR updating their Incidental Take Permit for SWP operations. On November 1, 2023, DWR submitted a new incidental take permit application. Because the application is still under review, the modeling analysis in this report assumes the 2019 BiOps and 2020 ITP.

For more information on the RoC on LTO, visit: https://www.usbr.gov/mp/bdo/lto/

Water Quality Objectives

1995 Bay-Delta Water Quality Control Plan (D-1641)

Because the Delta is an estuary, salinity is a concern. In the 1995 Bay-Delta Water Quality Control Plan (WQCP), the State Water Board set water quality objectives to protect beneficial uses of water in the Delta and Suisun Bay. The objectives must be met by the SWP and federal CVP as specified in the water right permits issued to DWR and the USBR. These objectives — minimum Delta outflows, limits on SWP and CVP Delta exports, and maximum allowable salinity levels — are enforced through the provisions of the State Water Board's Water Right D-1641, issued in December 1999 and updated in March 2000, which officially instated the 1995 WQCP.

Both DWR and the USBR must monitor the effects of their respective diversions and project operations to ensure compliance with existing water quality objectives.

Among the objectives established in the 1995 WQCP and D-1641 are the "X2" objectives. X2 is defined as the distance in kilometers from the Golden Gate, where salinity concentration in the Delta is 2 parts per thousand. The location of X2 is used as a surrogate measure of Delta ecosystem health.

For the X2 objective to be achieved, the X2 position must remain downstream of Collinsville in the Delta, February through June, and downstream of other specific locations in the Delta on a certain number of days each month from February through June. This means that Delta outflow, which among other factors controls the location of X2, must be at certain specified levels at certain times. This can limit the amount of water the SWP may pump at those times at its Harvey O. Banks Pumping Plant in the Delta.

Because of the relationship between seawater intrusion and interior Delta water quality, meeting the X2 objective can also improve water quality at Delta drinking water intakes; however, meeting the X2 objectives can require a relatively large volume of water for outflow during dry months that follow months with large storms.

The 1995 WQCP and D-1641 also established an export/inflow (E/I) ratio. The E/I ratio is designed to provide protection for the fish and wildlife beneficial uses in the Bay Delta estuary. The E/I ratio limits the fraction of

Delta inflows that are exported. When other restrictions are not controlling, Delta exports are limited to 35 percent of total Delta inflow from March through June and 65 percent of inflow from July through January. The February E/I ratio can vary from 35 percent to 45 percent depending on the January Eight River Index (8RI). The 8RI is the sum of the Sacramento River and San Joaquin River runoff. This index is used from December through May to set flow objectives as implemented in SWRCB D-1641.

In December 2018, the State Water Board updated the WQCP for the San Joaquin River flows and southern Delta salinity. The State Water Board is in the process of updating the WQCP for Sacramento/Delta flows and cold water, Delta outflows, and interior Delta flows. A primary focus of the WQCP update is on additional flows for the beneficial use of fish and wildlife. Based on the environmental documentation that has been produced up to this date by the State Water Board, it is likely that the implementation of these flow requirements will affect SWP contractor deliveries.

The San Joaquin River (SJR) portion of the WQCP update was approved in December 2018 but not implemented. For implementation, there would need to be a Decision (like Decision-1641) that amends the water rights license and permits for the SWP and CVP (the Projects collectively) to require the Projects and others to meet the Bay-Delta Plan before the SWP operates to the approved SJR portion of the update. As a result, this Report assumes the existing Decision-1641 in its modeling.

D-1641 Water Year Types

Delta inflows vary considerably from season to season, and from year to year. For example, in an above-normal year, nearly 85 percent of the total Delta inflow comes from the Sacramento River, more than 10 percent comes from the San Joaquin River, and the rest comes from the three eastside streams (the Mokelumne, Cosumnes, and Calaveras rivers).

All other factors (such as upstream level of development) being equal, much less water will flow into the Delta during a dry or critical water year (that is, during a drought) than during a wet or above-normal water year. Fluctuations in inflows are a substantial overall concern for the Delta, and a specific concern for the SWP; such fluctuations affect Delta water quality and fish habitat, which in turn trigger regulatory requirements that constrain SWP Delta exports.

Delta inflows will also vary by time of year as the amount of precipitation varies by season. About 80 percent of annual precipitation occurs between November and March, and very little rain typically falls from June through September. Upstream reservoirs regulate this variability by reducing flood flows during the rainy season and storing water to be released later in the year to meet regulatory requirements and water demands.

To characterize these varying hydrology conditions, State Water Resources Control Board Decision 1641 defined the Sacramento 40-30-30 Water Year type (Water Rights Programs - Decision 1641) This water year type is discussed here because it is used extensively in defining regulations both in D-1641 and in Biological Opinions. These water year types are defined based on the Sacramento Valley Water Year Index (Index), which is calculated using the sum of unimpaired flow in million acre-feet (MAF) at the following locations:

- Sacramento River Above Bend Bridge.
- Feather River at Oroville (inflow to Lake Oroville).
- Yuba River near Smartville.
- American River below Folsom Lake.

The exact calculation of the Index is 0.4 * Current Apr-Jul Runoff Forecast (in MAF) + 0.3 * Current Oct-Mar Runoff in (MAF) + 0.3 * Previous Water Year's Index (if the Previous Water Year's Index exceeds 10.0, then 10.0 is used). The Index is converted into one of five Water Year types using the thresholds shown in

Table 2-1. The final determination of the Index and Water Year Type is based on 50 percent exceedance forecast of flows as of May 1.

Table 2-1. Sacramento Valley Index Year Type Classification Thresholds in MAF

Year type classification	Threshold criteria (MAF)
Wet	Equal to or greater than 9.2
Above Normal	Greater than 7.8, and less than 9.2
Below Normal	Greater than 6.5, and equal to or less than 7.8
Dry	Greater than 5.4, and equal to or less than 6.5
Critical	Equal to or less than 5.4

2.28

Agreements to Support Healthy Rivers and Landscapes

DWR and CDFW are working to establish the Agreements to Support Healthy Rivers and Landscapes with participating water users following adoption by SWRCB of the San Joaquin River/southern Delta salinity WQCP update. The approach is sometimes referred to as the "Voluntary Agreements" (VAs) because state, federal, and local agencies came together to propose it. As stated above under the Water Quality Objectives section, the San Joaquin River/southern Delta salinity portion of the WQCP update was approved in December 2018 but not implemented.

The VAs involve the development of projects that provide flow augmentation, modified storage releases, and non-flow actions such as floodplain inundation to enhance Delta conditions. Both departments are continuing the effort to develop and evaluate proposed agreements. On March 1, 2019, DWR and DFW submitted documents to the State Water Resources Control Board that reflect progress on the previously submitted framework. The objectives are to improve conditions for fish through targeted river flows and a suite of habitat-enhancing projects including floodplain inundation and physical improvement of spawning and rearing areas.

On March 29, 2022, a "Memorandum of Understanding" (MOU) was released that outlined the terms of an eight-year program for the VAs. The program would provide new flows for the environment above existing regulatory requirements, create new and restored habitat for fish and wildlife, provide funding for environmental improvements and water purchases, and start a collaborative science program for monitoring and adaptive management. However, the VAs have not been officially finalized. Therefore, the modeling analysis in this report assumes the existing Decision-1641.

SWP-CVP Coordinated Operation Agreement

Originally negotiated and signed in 1986, the Coordinated Operation Agreement (COA) establishes the shared responsibility for the SWP and CVP each to meet water quality and regulatory standards. Between 1986 and 2018, the State Water Resources Control Board imposed additional restrictions, including new Delta outflow requirements, which further restricted Delta exports and affect CVP and SWP operations. In response to these changes, a joint review of the 1986 agreement was conducted by both projects. At the conclusion of this review in December 2018, DWR and the

USBR agreed to a COA addendum to reflect the current regulatory environment and operations of the projects. The 2018 agreement addendum is included in the modeling analysis in this report.

Section 3. Hydrologic Conditions Assessment

Historical Hydrologic Conditions

Similar to previous Delivery Capability Reports, the DCR 2023 includes an analysis using historical hydrologic conditions as inputs to the CalSim 3 model. However, the DCR 2023 does not use the historical hydrologic conditions data in its evaluation of existing Project delivery capability, and instead uses the adjusted hydrologic conditions discussed below. The historical hydrologic conditions input data represents a period of record of water years 1922 through 2021 (October 1, 1921, through September 30, 2021). The historical hydrologic conditions data set was developed using historical data (streamflow, land use, and meteorological data) when available, and extrapolation from historical data when the full period of historical data was not available.

Adjusted Historical Hydrologic Conditions (Baseline Conditions)

A shortcoming of using the historical hydrologic conditions data set to assess existing Project delivery capability is that the effect of climate change is not consistent throughout the modeled period. Statistical characteristics of historical rim inflow in California’s Central Valley show noticeable and statistically significant changes in the past 100 years. Standard deviations of precipitation and rim inflow from most of the rim watersheds in the early periods of the past 100 years are significantly different from the recent 30 years. These differences indicate that the non-stationary historical meteorological and hydrological data may not be completely representative of recent and current conditions. To develop a hydrologic data set for the entire modeled period that represents current hydrology, an adjusted historical hydrologic conditions data set was developed. The intent of the adjusted historical hydrologic conditions data set is to provide a reasonable representation of recent climatic conditions and serve as a basis for creating future climate change scenarios.

The historical hydrologic conditions data set was used as a basis for the adjusted historical hydrologic conditions data set. Precipitation and rim inflows for the last 30 years of the period of record (water years 1992 through 2021) were used as a basis for modification of the first 70 years of the period of record (water years 1922 through 1991). The standard deviation and monthly distribution of historical streamflow for the first 70 years of the period of record were adjusted to match the last 30 years via a combination of statistical scaling methods. The resulting data set is identical to the historical hydrologic conditions for water years 1992 through 2021, with adjustments to water years 1922 through 1991. The Evaluation and Adjustment of Historical Hydroclimate Data (California Department of Water Resources, 2023) report will include a detailed description of the processes used to develop the adjusted hydrologic conditions data set.

This report will use adjusted historical hydrologic conditions as its baseline, as it is more representative of current conditions. As with previous releases of the DWR, contextual information about the evolution of SWP water delivery capability will be informed by a comparative analysis between the current baseline and the previous baseline. The last baseline for the 2021 DCR used historical hydrology, so the Existing SWP Water Delivery Capability section of this report will compare the results from an *adjusted* hydrology to a historical hydrology. In previous DCR's comparative analyses (historical vs. historical), the outcomes of the comparison reveal the effects primarily from operational and regulatory changes. In this comparison (*adjusted* historical compared with historical) the outcomes reveal the impact of both (1) adopting the adjusted hydrology and (2) operational updates.

Although the Historical Hydrology CalSim 3 model will not be the DCR baseline, it was still developed as part of the overall modeling process. The results of the 2023 Historical Hydrology CalSim 3 study will be presented briefly in this document and in more detail in the Technical Addendum.

Climate Change Scenarios Hydrologic Conditions

The single SWP future conditions scenario provided in past DCRs was developed to represent a median or central tendency of impacts in the SWP watershed area across the ensemble of global climate models. This approach provided a useful starting point for thinking about and planning for future risks. Considering multiple future scenarios allows for more robust planning. Further, applications of the DCR future scenarios may have different risk tolerances or risk aversions depending on the user and purpose. Providing a tractable range of SWP future climate scenarios provides users with additional climate risk information that is more transparent about uncertainty associated with future climate change, allows users to make their own decisions about risk tolerance, and ultimately will lead to better and more informed planning and operational decision-making. The development of those scenarios is described in the Risk-Informed Future Climate Scenario Development for SWP DCR (California Department of Water Resources, 2023).

The 2023 DCR analyzes Project delivery capability under multiple risk-informed climate scenarios (50 percent, 75 percent, and 95 percent level-of-concern). In developing these scenarios, three key objectives were sought: (1) explicit representation of climate change uncertainties, (2) improved transparency and information for local planners, and (3) maintaining the utility of the DCR and the information it provides. The methods used to develop hydrologic data sets under climate changed conditions are built on the work conducted for previous DCRs and other climate change analyses conducted by DWR and others. The hydrologic data sets for the climate changed conditions were selected to represent specific levels of change to unimpaired flow that stress SWP and CVP operations. This differs from previous approaches that used the ensemble average or central tendency of projected climate conditions. In this new approach, DWR applies a bottom-up stress test and uses a climate-model-informed probability density function to develop "level-of-concern" scenarios at specified climate-informed system performance levels (e.g., a 95 percent level-of-concern scenario depicts a future condition in which 95 percent of model-informed climate outcomes result in better SWP system reliability). The Technical Addendum includes a detailed description of the methods used to develop the climate change conditions hydrologic data sets.

3.33

Section 4. Ongoing Environmental, Infrastructure, and Policy Planning Efforts and Projects

The Delta's importance to California's economy and natural heritage cannot be overstated. The Delta supplies a large share of the water used in the state. California would not be the same without that water — hundreds of billions of dollars of economic activity depend upon it. Southern California, with half of the state's population, gets approximately 30 percent of its average water supply from the Delta; Kern County, which produces about $7 billion annually in grapes, almonds, pistachios, milk, citrus, and other agricultural products, depends on the Delta for about a fifth of its irrigation supply. The west side of the San Joaquin Valley also produces billions of dollars worth of food and depends on the Delta for about three-quarters of its irrigation supply; the San Francisco Bay Area, including the innovation hub of Silicon Valley, takes about half of its water supply from the Delta and its tributaries.

At the same time, the hundreds of miles of river channels that crisscross the Delta's farmed islands provide a migratory pathway for Chinook salmon, which support an important West Coast fishing industry. Other native fish species depend upon the complex mix of fresh and saltwater in the Delta estuary. Multiple stressors have impaired the ecological functions of the Delta, and concerns have been growing over the ability to balance the many needs of both people and the ecosystem.

To respond to these concerns, considerable effort by government agencies and the California water community has been spent during the past several decades to study ways that the problems in the Delta can be addressed, and the more recent attention to the effects of climate change has helped the water community to realize the urgency of addressing these problems. The essential part of all these efforts has been to find a comprehensive solution that brings various, sometimes competing, interests together in a coordinated and concerted set of actions. The Delta Plan, Delta Conveyance Project (DCP), and California EcoRestore are three large-scale statewide efforts. Since 2010, the Delta Stewardship Council (DSC) has developed, amended, and begun implementing the Delta Plan. The DCP, on the other hand, is currently under development. Lastly, California EcoRestore celebrated its first five years in 2020 and was on track to exceed initial targets.

4.35

Delta Plan

After years of concern about the Delta amid rising water demand and habitat degradation, the DSC was created in legislation to achieve State-mandated coequal goals for the Delta. As specified in Section 85054 of the California Water Code:

"Coequal goals" means the two goals of providing more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. These goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.

The DSC is required to review the Delta Plan at least every five years. The first Delta Plan was adopted by the DSC on May 16, 2013. The State Office of Administrative Law (OAL) approved the 14 regulations to implement the Delta Plan, which became effective, with legally enforceable regulations, on September 1, 2013.

To be responsive to changing circumstances and in accordance with commitments made in the 2013 Plan, the DSC amended the Delta Plan twice in 2016. The latest Delta Plan was released April 2018 and amended July 2019. The Delta Plan contains a set of 14 regulatory policies as well as 95 recommendations, which are non-regulatory but identify actions essential to achieving the coequal goals. The next five-year review of the Delta Plan is slated for 2023.

Delta Conveyance Project

Delta conveyance refers to SWP infrastructure in the vast network of waterways comprising the Sacramento-San Joaquin Delta. Modernization of this infrastructure through construction of intakes in the northern Delta and a north-to-south water conveyance tunnel has been planned under previous projects (Bay-Delta Conveyance Plan and California WaterFix). On May 2, 2019, Governor Gavin Newsom officially ended California WaterFix and announced a new approach to modernize Delta Conveyance through a single tunnel alternative. Governor Newsom also released Executive Order N-10-19, which directed State agencies to inventory and assess the new planning for the single tunnel project.

DWR approved the Delta Conveyance Project, a modernization of the infrastructure system that delivers water to millions of Californians. DWR has certified the Environmental Impact Report (EIR) and completed an extensive environmental review of the Delta Conveyance Project on December 21, 2023. DWR selected the "Bethany Reservoir Alignment" for further engineering, design and permitting.

The environmental review included a 142-day public comment period in which DWR received more than 700 letters and 7,000 individual comments. Outreach began in 2020 and has included a multitude of webinars, workshops, briefings, multi-language informational materials, email updates, videos, animations, tabling at local events, and a comprehensive Delta survey. The Final EIR responds to all substantive comments.

For more information about the project, visit water.ca.gov/deltaconveyance. For more information about permitting and to view the final EIR, visit deltaconveyanceproject.com

EcoRestore

Governor Brown announced the creation of the California EcoRestore program in April 2015, committing to restore more than 30,000 acres of Delta habitat by 2020. This comprehensive suite of habitat restoration actions under the California EcoRestore program includes specific targets for floodplain, tidal and sub-tidal, managed wetlands, and fish passage improvements to benefit native fish species and a commitment to adaptive management. As of January 2021, more than 38,000 acres are projected to be restored under the EcoRestore program, with over 6,500 acres already restored.

For more information, visit https://water.ca.gov/Programs/All-Programs/EcoRestore.

California Aqueduct Subsidence Program

Subsidence, or the sinking of land, has been documented throughout California for almost a century, with the primary cause being deep groundwater pumping. The land underlying the California Aqueduct has sustained an alarming and unprecedented increase in subsidence rates in recent years, affecting conveyance capacity of the Aqueduct. For example, in the three years of the drought from 2013 through 2016, areas of the aqueduct sunk nearly three feet. In addition to reducing flow capacity of the system, subsidence also leads to operational difficulties. The goal of the California Aqueduct Subsidence Program (CASP) is to address ongoing subsidence while developing solutions and funding sources to preserve the Aqueduct's ability to deliver water. The studies in this report do not consider the diminished capacity of the California Aqueduct due to subsidence. The future rates of subsidence are dependent on future groundwater pumping, and consequently the future actions taken by local Groundwater Sustainability Agencies (GSAs). This report does not make assumptions regarding the timing, location, or nature of those future actions. CASP includes a rigorous methodology for evaluating many potential futures that account for the uncertainty in these variables. Work is ongoing to incorporate the Risk Informed Methodology into the methods used by the CASP project.

For more information, visit: https://water.ca.gov/Programs/Engineering-And-Construction/Subsidence.

Section 5. State Water Project Historical Deliveries

Sections 5 and 8 present the actual SWP Historical Deliveries from calendar years 2013-2022. Section 5 focuses on the annual minimum, maximum, and average total recorded contractor combined deliveries during this 10-year period. Section 8 includes tables of annual recorded historical deliveries by various water classifications for each SWP Contractor for 2013–2022. Contractor deliveries are presented as four different delivery types: Table A delivery, Article 21 delivery, carryover delivery, or turnback delivery. These delivery types are briefly described below.

Table A Water is an exhibit to the SWP's water supply contracts. The maximum Table A amount is the basis for apportioning water supply and costs to the SWP contractors. Once the total amount of water to be delivered is determined for the year, all available water is allocated in proportion to each contractor's annual maximum SWP Table A amount. Table A water is given priority for delivery over other types of SWP water. Contractors have several options for what to do with the water that is allocated to them: use it, store it for later use, or transfer it to another contractor.

Article 21 Water (so named because it is described in Article 21 of the water contracts) is water that SWP contractors may receive on intermittent, interruptible basis in addition to their Table A water, if they request it. Article 21 water is used by many SWP contractors to help meet demands when allocations are less than 100 percent. The availability and delivery of Article 21 water cannot impact the Table A allocation of the any contractor's water, nor can it negatively impact normal SWP operations.

Carryover Water, also known as Article 56 water, is SWP water that is allocated to an SWP contractor and approved for delivery to that contractor each year, but not used by the end of the year. This water is exported from the Delta by the Banks Pumping Plant, but instead of being delivered to the contractor, it is stored in the SWP's share of San Luis Reservoir, when space is available, for the contractor to use in the following year[5].

[5] In real-time operations, Article 56 water can be carried over for several years if conditions permit. But the modeling assumes single year carryover.

Turnback Pool Water SWP contractors may offer a portion of their Table A water that has been allocated in the current year and exceeds their needs to a "turnback pool," where another contractor may purchase it. Contractors that sell their extra Table A water in a turnback pool receive payments from contractors that buy this water.

Table 5-1 lists the 2023 maximum annual SWP Table A water contract amounts for SWP contractors. Figure 5-1 shows that the historical deliveries from 2013–2022 of SWP Table A water, including the carryover water deliveries, range from a minimum of 278 TAF (2022) to a maximum of 3,094 TAF (2017), with an average 1,416 TAF/year. Total historical SWP deliveries, including Table A, Article 21, turnback pool, and carryover water, range from 279 to 3,404 TAF/year, with an average of 1,484 TAF/year in the same 2013–2022 period (Figure 5-2).

Table 5-1. 2023 Maximum Annual SWP Table A Water Contract Amounts for SWP Contractors

Contractor	Maximum Table A Delivery Amounts (acre-feet)
Feather River Area Contractors	—
Butte County	27,500
Plumas County Flood Control and Water Conservation District	2,700
Yuba City	9,600
Feather River Area Contractors Total	39,800
North Bay Area Contractors	—
Napa County Flood Control and Water Conservation District	29,025
Solano County Water Agency	47,756
North Bay Area Contractors Total	76,781
South Bay Area Contractors	—
Alameda County Flood Control and Water Conservation District, Zone 7	80,619
Alameda County Water District	42,000
Valley Water (also known as Santa Clara Valley Water District)	100,000
South Bay Area Contractors Total	222,619
San Joaquin Valley Area Contractors	—

Contractor	Maximum Table A Delivery Amounts (acre-feet)
Dudley Ridge Water District	41,350
Empire West Side Irrigation District	3,000
Kern County Water Agency	982,730
Kings County	9,305
Oak Flat Water District	5,700
Tulare Lake Basin Water Storage District	87,471
San Joaquin Valley Area Contractors Total	1,129,556
Central Coastal Area Contractors Area Contractors	—
San Luis Obispo County Flood Control and Water Conservation District	25,000
Santa Barbara County Flood Control and Water Conservation District	45,486
Central Coastal Area Contractors Area Contractors Total	70,486
Southern California Area Contractors	—
Antelope Valley-East Kern Water Agency	144,844
Coachella Valley Water District	138,350
Crestline-Lake Arrowhead Water Agency	5,800
Desert Water Agency	55,750
Littlerock Creek Irrigation District	2,300
Metropolitan Water District of Southern California	1,911,500
Mojave Water Agency	89,800
Palmdale Water District	21,300
San Bernardino Valley Municipal Water District	102,600
San Gabriel Valley Municipal Water District	28,800
San Gorgonio Pass Water Agency	17,300
Santa Clarita Valley Water Agency	95,200
Ventura County Watershed Protection District	20,000
Southern California Area Contractors Total	2,633,544
Grand Total	4,172,786

5.41

Figure 5-1. **Historical Deliveries of SWP Table A and Carryover Water, 2013–2022**

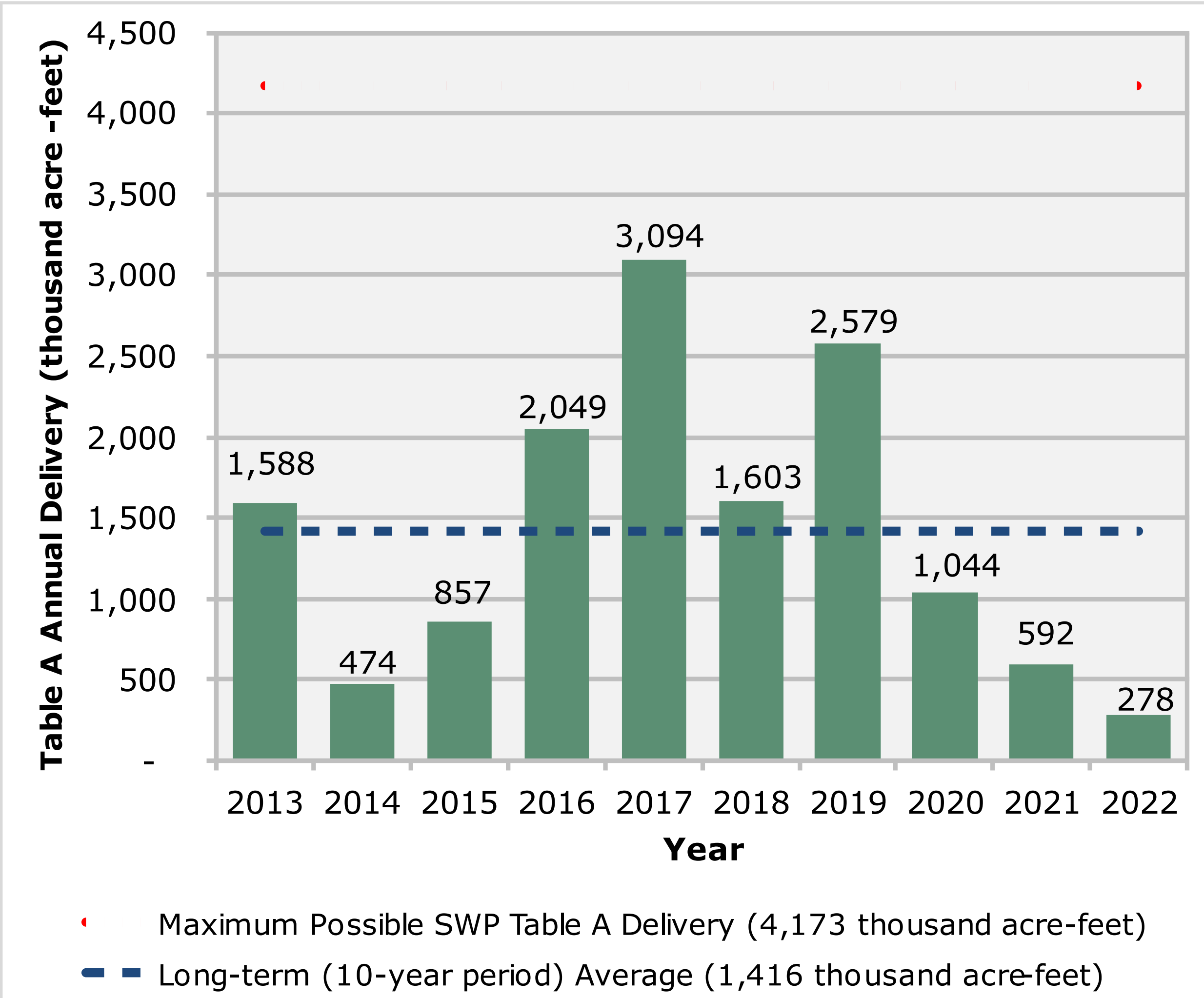
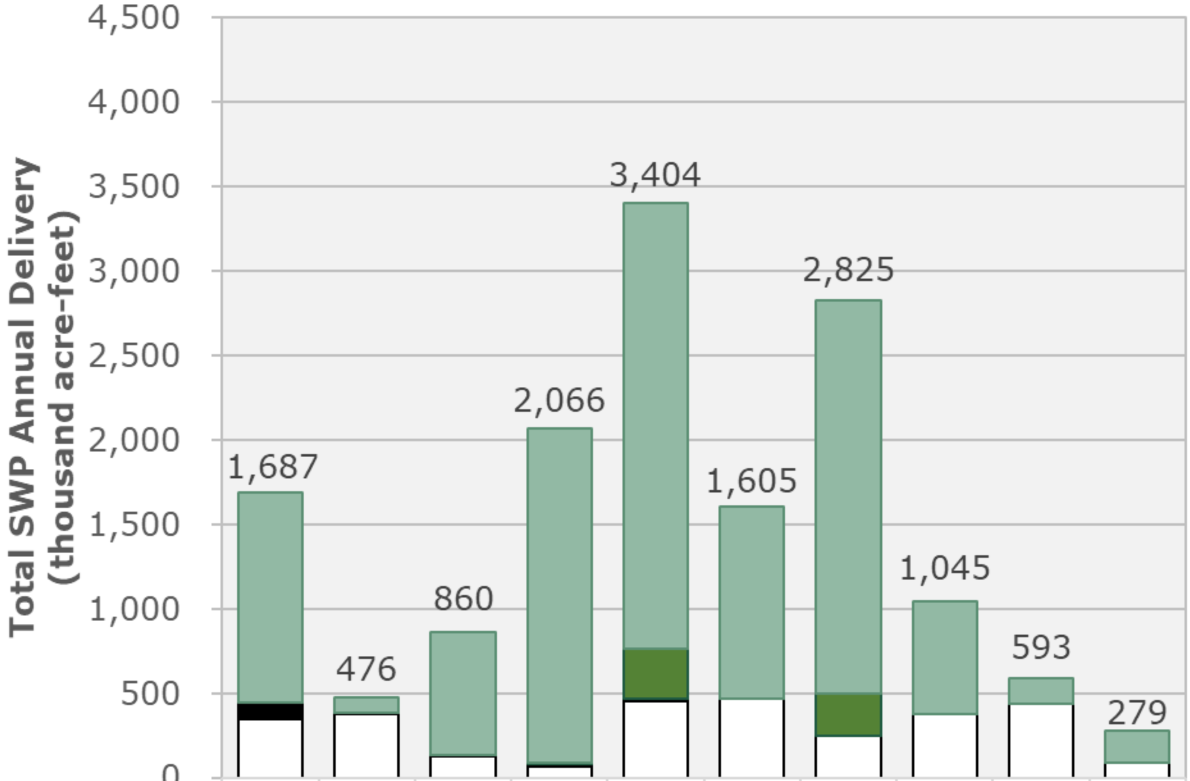


Figure 5-2. **Total Historical SWP Deliveries, 2013-2022 (by Delivery Type)**



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Table A	1,237	92	724	1,977	2,639	1,135	2,327	668	152	190
Article 21	0	1	1	3	297	2	246	1	1	1
Turnback	99	1	3	14	13	0	0	0	0	0
Carryover	351	382	132	72	455	468	253	377	439	87
Total	1,687	476	860	2,066	3,404	1,605	2,825	1,045	593	279

Section 6. Existing SWP Water Delivery Capability

Modeling Approach

To model existing (Baseline) SWP water delivery capability, CalSim 3 was configured to simulate existing regulations (SWRCB D-1641, 2019 BiOps and its associated ITP (2020)), infrastructure and demands using Adjusted Historical Hydrology.

As described in Section 3, this report uses the Adjusted Historical Hydrology in its Baseline because it is more representative of current conditions. The last baseline for the 2021 report used Historical Hydrology, therefore this report will compare the results from an Adjusted Historical Hydrology to a Historical Hydrology. In previous reports' comparative analysis (Historical vs. Historical), the outcomes of the comparison reveal the impacts mainly due to updated hydrology, and CalSim code refinements. In this report's comparative analysis (Adjusted Historical vs. Historical), the outcomes will reveal the impacts of adjusted hydrology and operational updates. For comparative purposes, the Historical Hydrologic Condition results are presented in Table 6-3 through Table 6-9. For more information on the development process for the Adjusted Historical Hydrology, please refer to the report Evaluation and Adjustment of Historical Hydroclimate Data (California Department of Water Resources, 2023).

Model Period Extension

The simulation period for CalSim 3 for this report is from WY 1922-2021, adding six more years to the period of record used in the 2021 Report.

Hydrologic Sequence

SWP delivery amounts are estimated in this report for existing conditions using computer modeling that incorporates the adjusted historic range of hydrologic conditions (i.e., precipitation and runoff) that occurred from WY 1922 through 2021. This is the period of record used in the CalSim 3 model. As noted in Section 3, the adjusted historic hydrologic conditions were developed by adjusting the standard deviation and monthly distribution of historical streamflow for the first 70 years of the period of record to match the statistics of the last 30 years using a combination of statistical scaling methods. By using this adjusted 100-year historical flow record, the delivery estimates modeled for existing conditions reflect a reasonable range of potential hydrologic conditions from wet years to critically dry years.

Existing Demand for Delta Water

Demand levels for the SWP water users in this report are derived from historical data and information from the SWP contractors themselves. The amount of water that the SWP contractors request each year is related to:

- The magnitude (maximum contracted amount)
- The extent of water conservation measures in place
- Local weather patterns
- Water costs

The existing level of development (i.e., the level of water use in the source areas from which the water supply originates) is based on recent land uses and is assumed to be representative of existing conditions for the purposes of this report.

SWP Table A and Article 56 Water Demands

The current combined maximum Table A amount is 4,173 TAF/year. See Table 5-1 in Section 5, State Water Project Historical Deliveries. Of the combined maximum Table A amount, 4,133 TAF/year is the SWP's maximum Table A water available for delivery from the Delta. The estimated demands by SWP contractors for deliveries of Table A water from the Delta under existing conditions are assumed to be the maximum SWP Table A delivery amount for this report (Table 6-1), which is the same as in the 2021 Report.

Table 6-1. Comparison of Estimated Average, Maximum, and Minimum Demands for SWP Table A Water, Excluding Butte County, Yuba City, and Plumas County FCWCD (Existing Conditions, in TAF/year)

Statistic	2021 Report	2023 Report
Average	4,133	4,133
Maximum	4,133	4,133
Minimum	4,133	4,133

SWP Article 21 Water Demands

Under Article 21 of the SWP's long-term water supply contracts, contractors may receive additional water deliveries only under the following specific conditions:

- Such deliveries do not interfere with SWP Table A allocations and SWP operations.
- Excess water is available in the Delta.
- Capacity is not being used for SWP purposes or scheduled SWP deliveries.
- Contractors can use the SWP Article 21 water directly or can store it in their own system (i.e., the water cannot be stored in the SWP system).

Contractor demand for water is assumed to vary depending on the current month as well as current year hydrologic conditions. Additionally, the capacity to deliver Article 21 water is dependent on available pumping and conveyance capacity within the SWP (e.g. Banks pumping plant, California Aqueduct).

In CalSim3, contractor demands for Article 21 are characterized by an annual total demand specified for each contractor. These annual demands are based on historical data and contractor input. Water is delivered in CalSim3 depending on the availability of water, the capacity to deliver that water, and whether or not a contractors total annual demand has been met or not.

Updates to Article 21 Demand Assumptions

The various assumptions regarding the contractor demands for Article 21 have changed since the 2021 Report. In the 2021 Report, a distinction was made between demands in "Kern wet" and "Kern non-wet" years. This distinction has been removed in this Report.

Previously, Article 21 demands in "Kern wet years" for Kern region contractors (Empire, Tulare, Dudley Ridge, Kern County – Ag, and Santa

Clarita) were assumed to be zero. This assumption was removed for the following reasons:

- Zero Article 21 demand during "Kern wet years" resulted in lower-than-expected Article 21 deliveries. "Kern wet years" coincide with the wettest years in the simulation period.
- Recent historical data shows that Kern region contractors take non-zero deliveries of Article 21 water in "Kern wet years".
- More consultation with Kern region contractors is needed to understand their demands and operations during "Kern wet years".

Estimates of SWP Table A Water Deliveries

Table 6-2 presents the annual average, maximum, and minimum estimates of SWP Table A deliveries from the Delta for existing conditions for the 2021 and 2023 Reports within a SWP contract year (January – December). In this report, SWP Table A deliveries also include Article 56 (carryover) water from last year. Article 56 water delivered in the SWP contract year is some portion of Table A from the previous contract year that the contractors requested to defer for the following year[6]. The estimated average annual delivery of Tabler A water for this report is 2,202 TAF.

Average long-term Table A deliveries decreased in this report compared to the 2021 Report by 119 TAF. Note that the simulation periods in both studies are different. This report's simulation period spans WY 1922-2021 while that of the 2021 Report only spans WY 1922-2015.

The average annual SWP Table A delivery in this report during the shorter WY 1922-2015 simulation period is 2,190 TAF/year. When comparing the WY 1922-2015 period between the 2021 and 2023 Reports, the average Table A deliveries decreased by 131 TAF (in contrast to 119 TAF as indicated earlier).

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[6] In real-time operations, Article 56 water can be carried over for several years if conditions permit. But the modeling assumes single year carryover.

From this point forward (unless otherwise mentioned), the long-term period of record for the 2021 Report spans from WY 1922-2015, and from WY 1922-2021 for this report.

Table 6-2. Estimated Long-Term Annual Average, Maximum, and Minimum Deliveries of SWP Table A Water, Excluding Butte County, Yuba City, and Plumas County FCWCD (Existing Conditions, in TAF/year)

Statistic	2021 Report (1922-2015)	2023 Report (1922-2021)*
Average	2,321	2,202
Maximum**	4,004	3,904
Minimum***	230	184

* The 2023 Report uses adjusted historical hydrologic conditions as its baseline. See Section 3 for further discussion.

** 2021 Report maximum occurred in 2006. 2023 Report maximum occurred in 1998.

*** 2021 Report minimum occurred in 2014. 2023 Report minimum occurred in 1977.

Figure 6-1 shows the average annual SWP exports and Table A deliveries from the 2005 through 2023 Delivery Capability Reports. Exports and deliveries decreased from 2005 to 2009 due to Delta regulations which constrained exports, culminating in the 2008-2009 BiOps. Average annual exports and deliveries were then relatively stable through 2017, before decreasing again in 2019 and 2021 due to changes described in the respective reports. In this report, annual exports and deliveries decreased due to several factors. These include changes in the hydrology used as the Baseline as discussed in Section 3, and the collective improvements made to the CalSim3 model.

6.49

Figure 6-1. Estimated Average Annual Delta Exports and SWP Table A Water Deliveries (Excluding Butte County, Yuba City, and Plumas County FCWCD), for 2005 through 2023 Reports

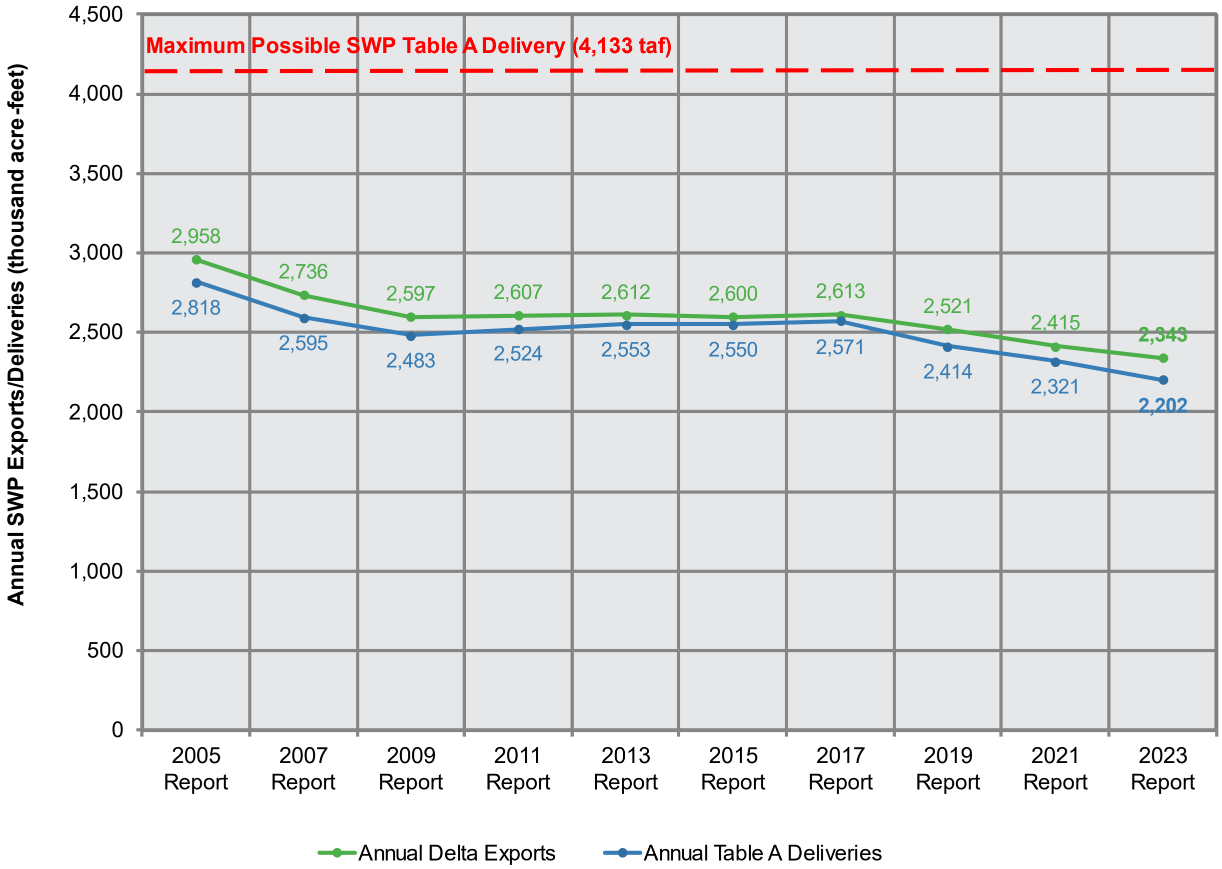
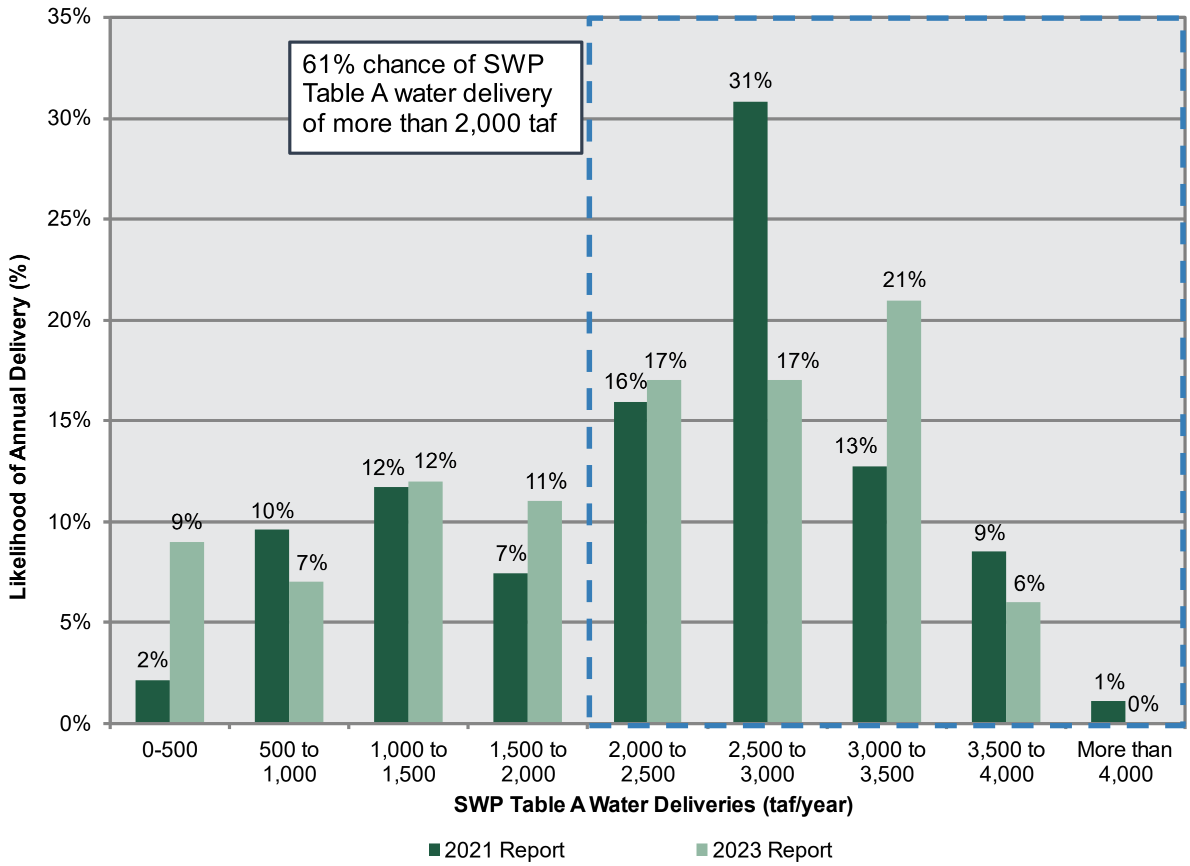


Figure 6-2 presents the estimated likelihood of delivery of a given amount of SWP Table A water under the Baseline scenario, as estimated for both the 2021 and 2023 Reports. This figure shows a 61 percent likelihood (compared to 70 percent in the 2021 Report) that more than 2,000 TAF/year of Table A water will be delivered under the current estimates.

Figure 6-2. **Estimated Likelihood of SWP Table A Water Deliveries, by Increments of 500 TAF (Excluding Butte County, Yuba City, and Plumas County FCWCD)**



Wet-Year Deliveries of SWP Table A Water

Table 6-3 and Figure 6-3 present estimates of SWP Table A water deliveries under existing conditions during possible wet conditions and compare them with corresponding delivery estimates calculated for the 2021 Report. Wet periods for this report are determined using adjusted historical precipitation and runoff patterns from the 1922-2021 period of record, and existing 2023 conditions are also accounted for in the modeling. For reference, the wettest single year according to the historical Sacramento Valley Index (SVI) during the period of record was 1983. This year had the highest historical index at 15.29 million acre-feet (MAF). Refer to D-1641 Water Year Types section for background on WYTs and SVI.

The results of modeling existing conditions over historical wet years indicate that SWP Table A water deliveries during wet periods can be estimated to range between yearly averages of 2,849 to 3,904 TAF. Table 6-3 and Figure 6-3 show that the 2023 deliveries of SWP Table A water decreased in most wet periods in comparison to the 2021 Report, except in 1998. Note that in wet years Table A deliveries may not be 100 percent despite having 100 percent allocation due to Article 56 carryover deliveries.

Table 6-3. Estimated Average and Wet-Period Deliveries of SWP Table A Water (Existing Conditions, in TAF/year) and Percent of Maximum SWP Table A Amount, 4,133 TAF/year.

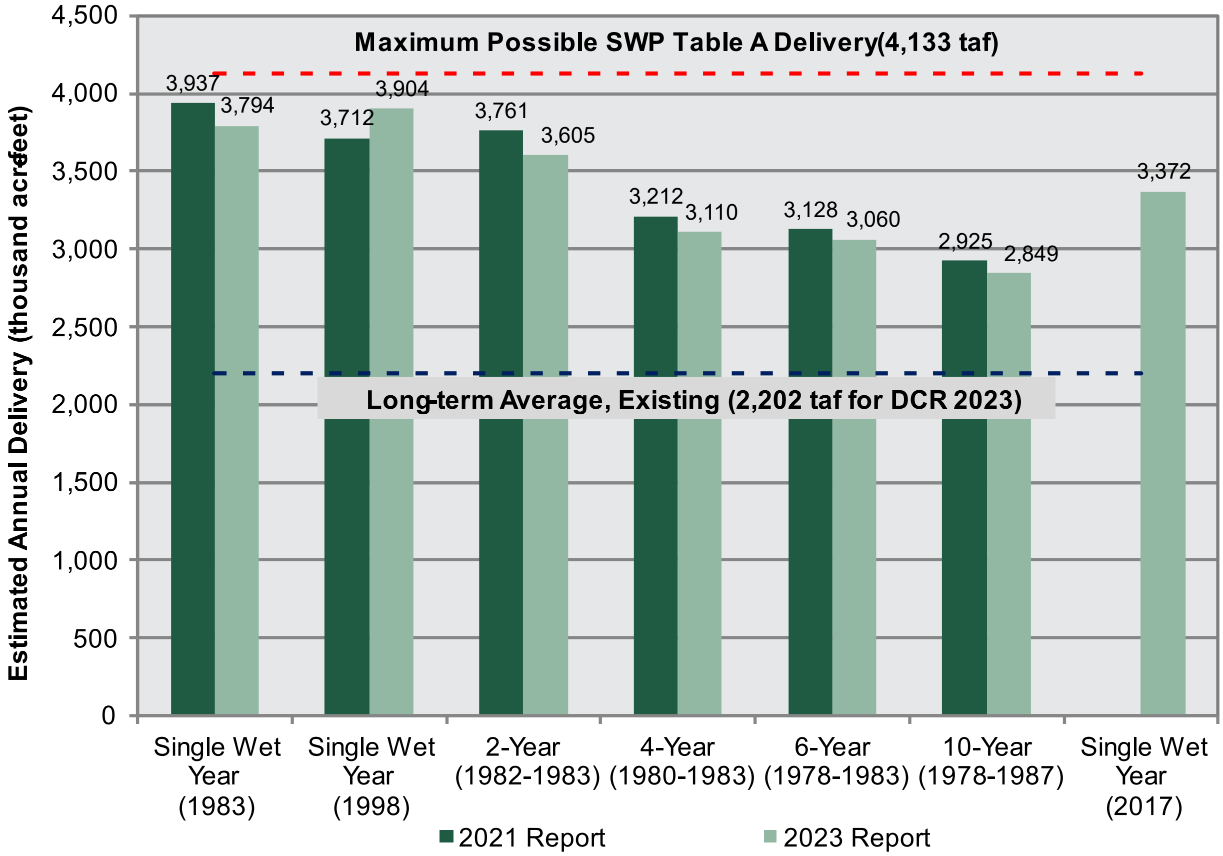
Period*	Historical		Adjusted
	DCR 2021 (1922 – 2015)	DCR 2023** (1922 – 2021)	DCR 2023 (1922 – 2021)
Long Term Average	2,321 (56%)	2,261 (55%)	2,202 (53%)
Single Year (1983)	3,937 (95%)	3,792 (92%)	3,794 (92%)
Single Year (1998)	3,712 (90%)	3,909 (95%)	3,904 (94%)
2 Year (1982-1983)	3,761 (91%)	3,613 (87%)	3,605 (87%)
4 Year (1980-1983)	3,212 (78%)	3,145 (76%)	3,110 (75%)
6 Year (1978-1983)	3,128 (76%)	3,035 (73%)	3,060 (74%)
10 Year (1978-1987)	2,925 (71%)	2,871 (69%)	2,849 (69%)
Single Year (2017)	-***	3,371 (82%)	3,372 (82%)

* Periods were manually selected to include the wettest, most notable, and most recent years from the simulation.

** Historical Hydrological results are included for comparative purposes.

*** The simulation period for the 2021 report did not include 2017.

Figure 6-3. Estimated Wet-Period SWP Table A Water Deliveries (Excluding Butte County, Yuba City, and Plumas County FCWCD)



Dry-Year Deliveries of SWP Table A Water

Table 6-4 and Figure 6-4 present estimates of SWP Table A water deliveries under existing conditions during possible drought conditions and compare them with corresponding delivery estimates calculated for the 2021 Report. Droughts are analyzed using the adjusted historical drought-period precipitation and runoff patterns from 1922 through 2021, and existing 2023 conditions are also accounted for in the modeling. For reference, the worst multiyear drought on the 1922-2021 record was the 1929-1934 drought, although the brief drought of 1976-1977 was more intensely dry. The driest single year in terms of the historical SVI was 1977, which had the lowest index at 3.11.

The results of modeling existing conditions under historical drought scenarios indicate that SWP Table A water deliveries during dry years can be estimated to range between 184 and 922 TAF. Table 6-4 and Figure 6-4 show that the deliveries of SWP Table A water decreased in most dry periods in comparison to the 2021 Report.

The changes compared to the 2021 Report can be attributed to the cumulative effects of implementing adjusted historical hydrology, extending the simulation period to 2021, and code updates. The code updates are documented in the Technical Addendum to this report. However, the use of Adjusted Historical hydrology as the baseline is the most impactful change between the 2021 Report and 2023 Report. Spring and summer Oroville reservoir inflow decreases by approximately 100 TAF in Dry and Critical years under Adjusted Historical Hydrology, reducing dry year water supply. Furthermore, in wetter years the peak runoff under Adjusted Hydrology is higher by approximately 200 TAF and occurs one month earlier than under Historical Hydrology. The peak runoff occurs when there is less storage available for conservation. As a result, the excess water cannot be captured, leading to increased Delta outflow.

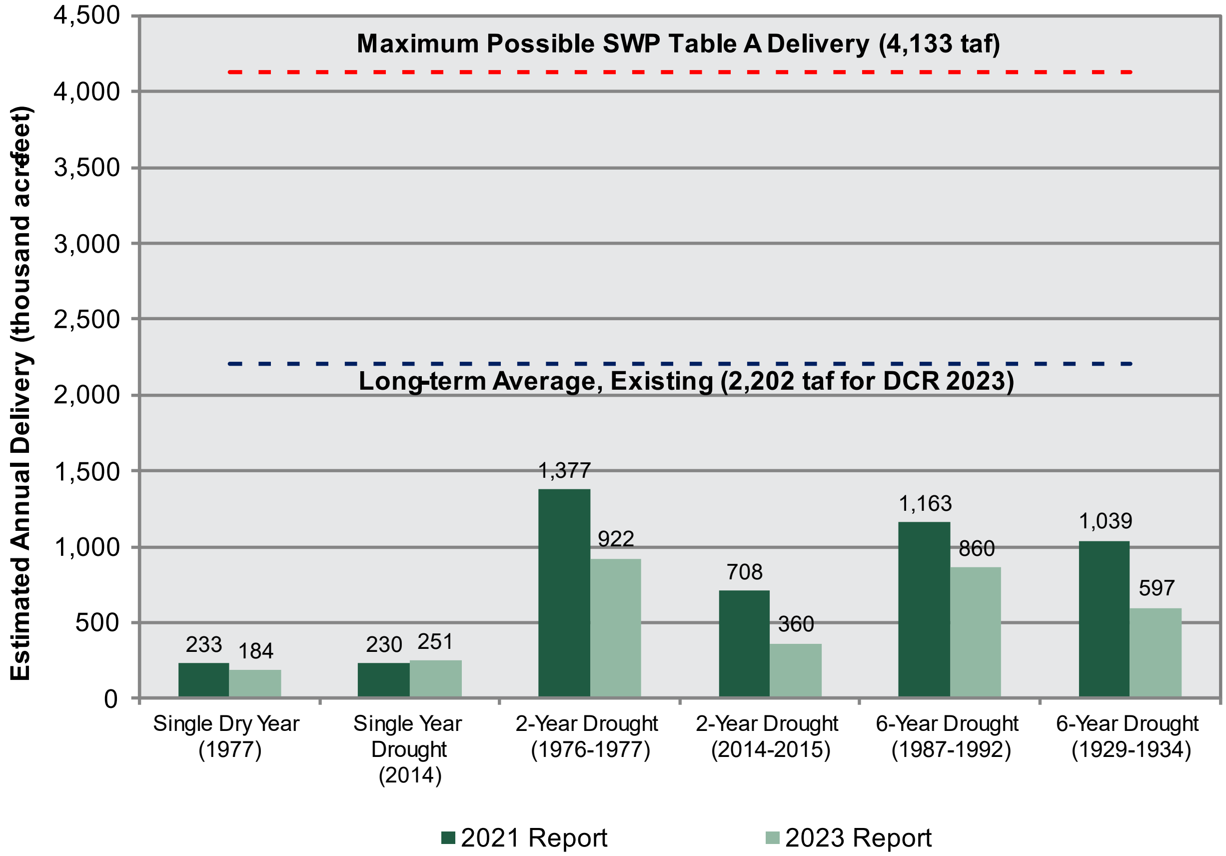
Table 6-4. Estimated Average and Dry-Period Deliveries of SWP Table A Water, Excluding Butte County, Yuba City, and Plumas County FCWCD (Existing Conditions, in TAF/year) and Percent of Maximum SWP Table A Amount, 4,133 TAF/year.

Period*	Historical DCR 2021 (1922 – 2015)	Historical DCR 2023** (1922 – 2021)	Adjusted DCR 2023 (1922 – 2021)
Long Term Average	2,321 (56%)	2,261 (55%)	2,202 (53%)
Single Year (1977)	233 (6%)	161 (4%)	184 (4%)
Single Year (2014)	230 (6%)	253 (6%)	251 (6%)
2 Year (1976-1977)	1,377 (33%)	1,093 (26%)	922 (22%)
2 Year (2014-2015)	708 (17%)	363 (9%)	360 (9%)
6 Year (1987-1992)	1,163 (28%)	934 (23%)	860 (21%)
6 Year (1929-1934)	1,039 (25%)	859 (21%)	597 (14%)

* Periods were manually selected to include the driest, most notable, and most recent years from the simulation.

** Historical Hydrological results are included for comparative purposes.

Figure 6-4. **Estimated Dry-Period SWP Table A Water Deliveries (Excluding Butte County, Yuba City, and Plumas County FCWCD)**

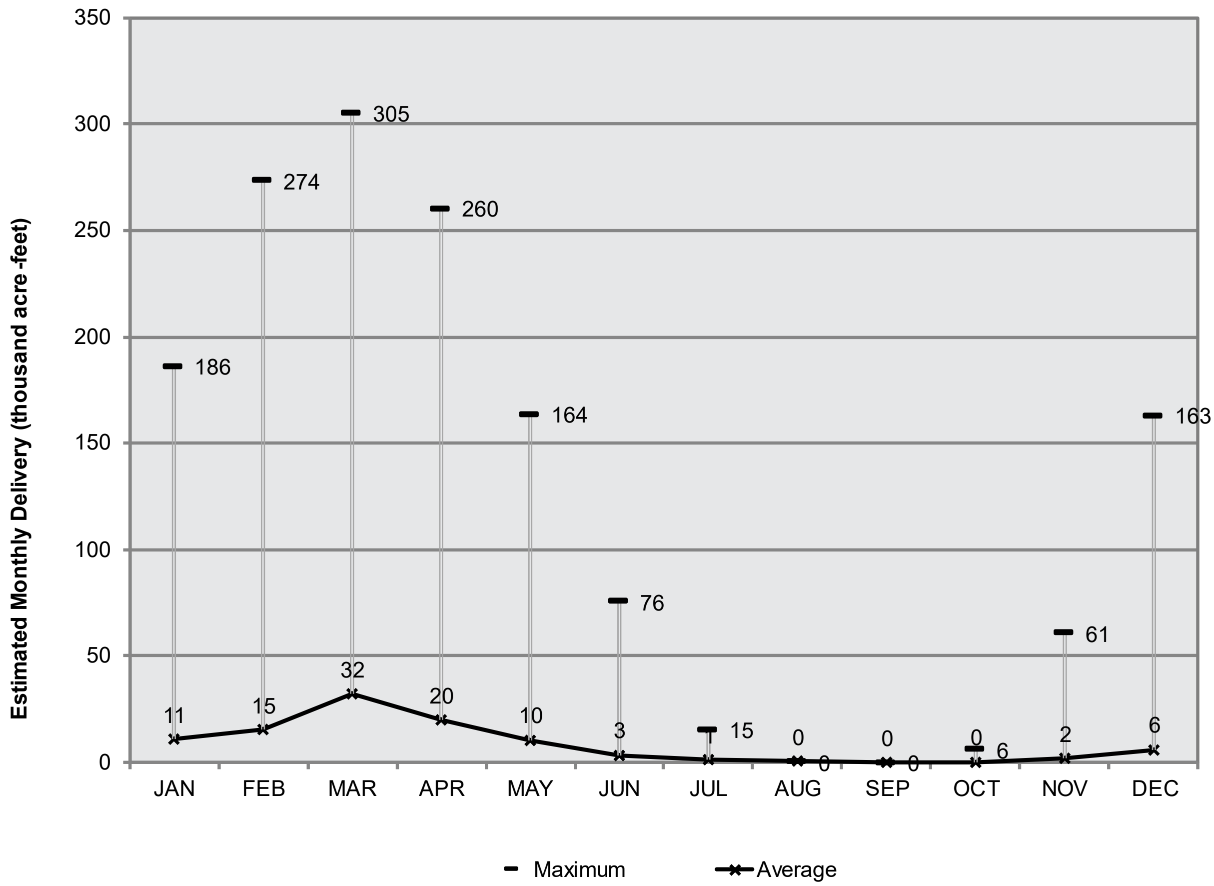


Estimates of SWP Article 21 Water Deliveries

SWP Article 21 water is the third type of SWP delivery considered in the model along with Table A and Article 56. Some SWP contractors store Article 21 water locally when extra water and capacity are available beyond that needed by normal SWP operations. Deliveries of SWP Article 21 water vary not only by year, but also by month. The estimated range of monthly deliveries of SWP Article 21 water is displayed in Figure 6-5 (only the maximum and averages have data labels shown as the minimums are zero). From June through November, essentially no Article 21 water is estimated to be delivered on average. In the winter and spring (November through May), maximum monthly deliveries range from 163 to 305 TAF/month.

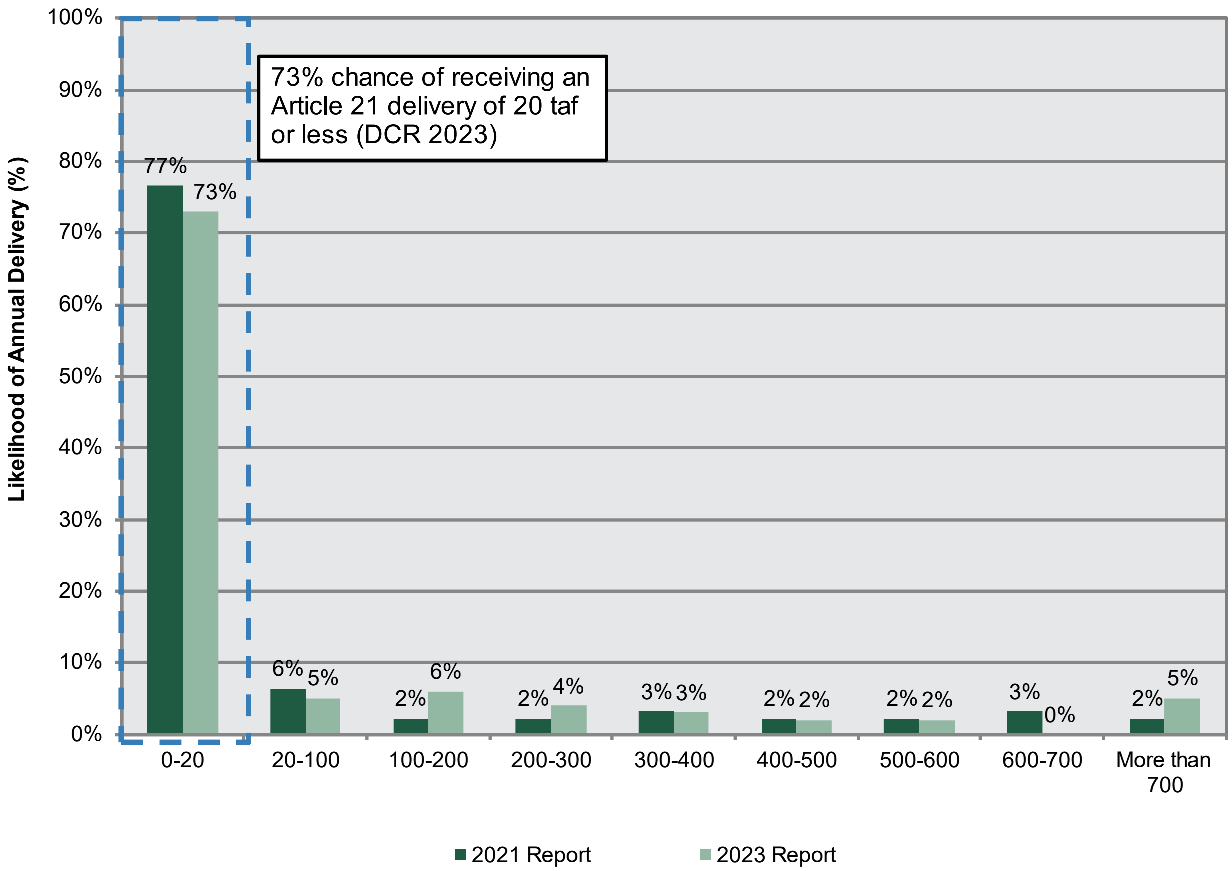
6.55

Figure 6-5. Estimated Range of Monthly Deliveries of SWP Article 21 Water (Existing Conditions)



The estimated likelihood that a given amount of SWP Article 21 water will be delivered is presented in Figure 6-6. The 73 percent chance of delivering 20 TAF or less is lower than the 77 percent chance in the 2021 Report. The likelihood of receiving greater than 20 TAF/year Article 21 deliveries is 4 percentage points higher (23 percent to 27 percent). This increased frequency of higher Article 21 deliveries is due to the increased availability of water during “wet” years in the DCR 2023 Baseline compared to the DCR 2021 Baseline. The DCR 2023 Baseline estimations of wet years predict higher flows than in the DCR 2021 Baseline. These higher flows allow for Article 21 water to be delivered more often than previously estimated.

Figure 6-6. Estimated Likelihood of Annual Deliveries of SWP Article 21 Water (Existing Conditions)



Wet-Year Deliveries of SWP Article 21 Water

Table 6-5 shows the estimates of deliveries of SWP Article 21 water during wet periods under existing conditions. Estimated deliveries of SWP Article 21 water in wet periods range between 269 and 1,025 TAF. Wet-period Article 21 deliveries in this report are higher than in the 2021 Report for all periods shown, except for the year 1998.

6.57

Table 6-5. Estimated Average and Wet-Period Deliveries of SWP Article 21 Water (Existing Conditions, in TAF/year)

Period*	Historical DCR 2021 (1922 – 2015)	Historical DCR 2023** (1922 – 2021)	Adjusted DCR 2023 (1922 – 2021)
Long Term Average	89	95	101
Single Year (1983)	593	1,025	1,025
Single Year (1998)	380	275	271
2 Year (1982-1983)	416	648	878
4 Year (1980-1983)	274	453	564
6 Year (1978-1983)	186	305	385
10 Year (1978-1987)	165	222	269
Single Year (2017)	-***	344	353

* Periods were manually selected to include the wettest, most notable, and most recent years from the simulation.
** Historical Hydrological results are included for comparative purposes.
*** The simulation period for the 2021 report did not include 2017.

Dry-Year Deliveries of SWP Article 21 Water

Table 6-6 shows the estimates of deliveries of SWP Article 21 water during dry periods under existing conditions. Estimated deliveries of SWP Article 21 water in dry periods range between 3 and 7 TAF. Although deliveries of SWP Article 21 water are lower during dry years than during wet ones, it’s possible to deliver SWP Article 21 water during multiyear drought periods. Compared to the 2021 Report, dry period Article 21 deliveries are larger.

Table 6-6. Estimated Average and Dry-Period Deliveries of SWP Article 21 Water (Existing Conditions, in TAF/year)

Period*	Historical DCR 2021 (1922 – 2015)	Historical DCR 2023** (1922 – 2021)	Adjusted DCR 2023 (1922 – 2021)
Long Term Average	89	95	101
Single Year (1977)	3	5	4
Single Year (2014)	5	7	7
2 Year (1976-1977)	3	5	3
2 Year (2014-2015)	4	5	5
6 Year (1987-1992)	5	13	5
6 Year (1929-1934)	6	9	7

* Periods were manually selected to include the driest, most notable, and most recent years from the simulation.
** Historical Hydrological results are included for comparative purposes.

Wet-Year SWP South of Delta Allocation

Table 6-7 shows the estimates of SWP allocations south of the Delta during wet periods under existing conditions. Estimated SWP allocations south of the Delta in wet periods range between 73 and 100 percent. Compared to the 2021 Report, SWP allocations south of the Delta in all wet periods are either the same or within 1 percent of each other.

Table 6-7. Estimated Average Wet-Period SWP South of Delta Allocation (Existing Conditions)

Period*	Historical		Adjusted
	DCR 2021 (1922 – 2015)	DCR 2023** (1922 – 2021)	DCR 2023 (1922 – 2021)
Long Term Average	57%	56%	55%
Single Year (1983)	100%	100%	100%
Single Year (1998)	100%	100%	100%
2 Year (1982-1983)	100%	100%	100%
4 Year (1980-1983)	82%	83%	81%
6 Year (1978-1983)	79%	80%	80%
10 Year (1978-1987)	72%	73%	73%
Single Year (2017)	-***	100%	100%

* Periods were manually selected to include the wettest, most notable, and most recent years from the simulation.
** Historical Hydrological results are included for comparative purposes.
*** The simulation period for the 2021 report did not include 2017.

Table A deliveries in 1983 (single wet year) are 92% of the Maximum Table A allotment in the 2023 Report and 95% in the 2021 Report, although the final raw allocation is 100% in both reports. A common inquiry is why Table A deliveries are not 100% in 1983 despite the 100% allocation.

The estimated Table A final allocation in contract year 1983 was 100% (Table 6-7). As such, CalSim predicts the SOD Table A Contractors (including Napa County and Solano County) can theoretically receive the full 4,133 TAF allotment. The 2021 DCR estimated that 3,469 TAF was delivered in contract year 1983 while 664 TAF was held for delivery as Article 56 in the following contract year (1984). Table A allocation in contract year 1982 was estimated to also be 100%. As such, CalSim predicted that 664 TAF of Article 56 was requested to be delivered in 1983.

6.59

However, in the 2021 Report, it was estimated that 196 TAF of the carryover request from 1982 spilled in contract year 1983 in February and March because San Luis reservoir filled up in those months. Therefore, the total estimated contract delivery in 1983 was 3,469 TAF of Table A and 468 TAF of Article 56 for a total of 3,937 TAF. This is 95% of the maximum Table A amount of 4,133 TAF.

Similar behavior can be observed in the 2023 Report. Instead, 314 TAF of the carryover request from 1982 spilled. This amount is 118 TAF more than the carryover spilled in the 2021 Report. Due to this higher carryover spill in the 2023 Report, only 92% of the 4,133 TAF contract supply was delivered despite the 100% final SWP allocation. See Table 6-8 for a comparison of 2021 and 2023 Report 1983 SWP allocation, Table A and Article 56 requests and deliveries, and carryover spills.

Table 6-8. Comparison of 2021 and 2023 Report 1983 SWP Allocation, Table A and Article 56 Requests and Deliveries, and Carryover Spills

Calculation Step	Report	2021 DCR	2023 DCR
1	SWP Allocation	100%	100%
2	Delivery without Article 56 Carryover (TAF)	3,469	3,372
3	Article 56 Carryover Requested from Previous CY (TAF)	468	421
4	Spill of Carryover Request from Previous CY (TAF)	196	314
5	Total Article 56 Request from previous CY $(3 + 4)$	664	735
6	Total Table A Delivery (TAF) $(2 + 3)$	3,937	3,794
7	Percent of Maximum Table A $(6 \div 4{,}133)$	95%	92%

Dry-Year SWP South of Delta Allocation

Table 6-9 shows the estimates of the percentage of SWP allocations south of the Delta during dry periods under existing conditions. Estimated SWP allocations south of the Delta in dry periods range between 3 and 22 percent. Compared to the 2021 Report, SWP allocations south of the Delta in all dry periods are lower, except in the year 2014.

Table 6-9. Estimated Average Dry-Period SWP South of Delta Allocation (Existing Conditions)

Period*	Historical		Adjusted
	DCR 2021 (1922 – 2015)	DCR 2023** (1922 – 2021)	DCR 2023 (1922 – 2021)
Long Term Average	57%	56%	55%
Single Year (1977)	3%	4%	3%
Single Year (2014)	5%	6%	6%
2 Year (1976-1977)	30%	20%	14%
2 Year (2014-2015)	18%	9%	9%
6 Year (1987-1992)	26%	6%	6%
6 Year (1929-1934)	24%	23%	22%

* Periods were manually selected to include the driest, most notable, and most recent years from the simulation.

** Historical Hydrological results are included for comparative purposes.

6.61

Section 7. SWP Water Delivery Capability Under Future Climate Change Conditions

Interpretation of Delivery Capability Estimates Under Future Climate Change Conditions

Recent Delivery Capability Reports considered a single future climate scenario twenty years into the future. The selected scenario was generally a central tendency or average across several downscaled global model projections. The inclusion of multiple future climate scenarios showing a range of impacts to system performance present an explicit acknowledgement of the uncertainty in estimating potential future delivery capability. While the 50^{th} percentile level of concern scenario described below is generally comparable to central tendency scenarios provided in previous DCRs, the twenty-year forward window continues to proceed. Further, the 75^{th} and 95^{th} percentile level of concern scenarios explore future plausible climate conditions that would result in worse system performance. SWP water users are encouraged to carefully consider the information from all three 2043 potential future climate scenarios and evaluate their vulnerability to a range of climatic changes.

The three-risk informed future climate scenarios provided in the DCR are described in plain language below. These descriptions are intended to further describe the climate and delivery capability conditions that each scenario simulates. For information on the methods used to develop the future climate conditions from these parameters, refer to the Risk-Informed Future Climate Scenario Development for SWP DCR (California Department of Water Resources, 2023). Table 7-1 presents the values for each parameter under each future climate scenario.

7.63

Table 7-1. Hydrologic Parameter Changes for each 2043 Climate Change Scenario by Level of Concern

Future System Performance Level of Concern (%)	Change in Temperature (°C)	Change in Average Precipitation (%)	Change in Precipitation Intensification (%)	Sea Level Rise* (cm)
50%	1.5	+1.5%	+11%	15
75%	1.7	+0.1%	+12%	30
95%	1.8	-1.8%	+13%	30

* The sea level rise projections align with updated 2024 Ocean Protection Council guidance, which indicates that by the year 2040, sea levels are most likely to rise 0.6 ft (18 cm) to 0.8 ft (24 cm) for the intermediate and high scenarios, respectively.

Plain Language Description of 50th Percentile Level-of-Concern Scenario

The 50th percentile level-of-concern scenario represents a 2043 middle-of-the-road or central tendency future for the SWP. It includes:

- A temperature increase over current average temperatures of 1.5 degrees Celsius (2.7 degrees Fahrenheit [°F]).
- 1.5 percent wetter average precipitation than current conditions.
- 10.5-percent increase in the 99th percentile daily precipitation event.
- 15 cm of SLR at the Golden Gate Bridge.

Land use is representative of existing levels of development, and regulations are represented by current regulations, including the 2019 U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) biological opinions, its associated incidental take permit, and the 2018 addendum to the Coordinated Operations Agreement between the SWP and CVP. Ongoing processes, such as the Agreements to Support Healthy Rivers and Landscapes and the 2021 Reinitiation of Consultation for Long-Term Operations of the CVP and SWP, are not included in the modeling.

Users of this scenario should assume that current climate model simulations indicate that actual 2043 climate conditions would have an approximate equal chance of either being worse than conditions represented in this scenario or as being better than the conditions represented in this scenario — better or worse generally meaning higher or lower SWP water supply deliveries. Put another way, there is an approximate 50-percent chance that planning *only* this scenario would leave an agency under-planned and potentially under prepared for the actual climate conditions to which they would need to operate. Nonetheless, this scenario could also be considered the statistically expected future level of performance of the SWP system. This scenario may be appropriate for use in certain types of planning documents, such as California Environmental Quality Act environmental impact reports which require agencies to consider “reasonably foreseeable indirect physical change in the environment.” (Public Resources Code section 21065).

Plain Language Description of 75th Percentile Level-of-Concern Scenario

The 75th percentile level-of-concern scenario represents a 2043 worse than average future for the SWP. It includes:

- A temperature increase above current average temperatures of 1.7 °C (3 °F).
- Average precipitation amount that is very similar to current conditions.
- 12-percent increase in the 99th percentile daily precipitation event.
- 30 cm of SLR at the Golden Gate Bridge.

Land use is representative of existing levels of development and regulations are represented by current regulations, including the 2019 USFWS and NMFS biological opinions, its associated incidental take permit and the 2018 addendum to the Coordinated Operations Agreement between the SWP and CVP. Ongoing processes, such as the Agreements to Support Healthy Rivers and Landscapes and the 2021 Reinitiation of Consultation for Long-Term Operations of the CVP and SWP, are not included in the modeling.

Users of this scenario should assume that current climate model simulations indicate that actual 2043 climate conditions would have about a 25-percent chance of being worse than the conditions represented in this scenario. Put another way, there is an approximate 25-percent chance that planning to *only* this scenario would leave an agency under-planned and potentially under prepared for the actual climate conditions to which they need to operate. This scenario may be considered a moderate risk aversion scenario, as it provides significantly more challenging future conditions than the 50th percentile level of concern but does not provide the most extreme planning conditions.

Plain Language Description of 95th Percentile Level-of-Concern Scenario

The 95th percentile level-of-concern scenario represents a 2043 much worse than average future for the SWP. It includes:

- A temperature increase over current average temperatures of 1.8 °C (3.2 °F).
- Average precipitation amount that is 1.8 percent drier than current conditions.
- 12.6-percent increase in the 99th percentile daily precipitation event.
- 30 cm of SLR at the Golden Gate Bridge.

Land use is representative of existing levels of development and regulations are represented by current regulations, including the 2019 USFWS and NMFS biological opinions, its associated incidental take permit and the 2018 addendum to the Coordinated Operations Agreement between the SWP and CVP. Ongoing processes, such as the Agreements to Support Healthy Rivers and Landscapes and the 2021 Reinitiation of Consultation for Long-Term Operations of the CVP and SWP, are not included in the modeling.

Users of this scenario should understand that current climate model simulations indicate that actual 2043 climate conditions would have an approximate 5-percent chance of being worse than the conditions represented in this scenario. Put another way, there is only an approximate 5-percent chance that planning for *only* this scenario would leave an agency under-planned and potentially under-prepared for the actual climate conditions to which they need to operate. This scenario may be considered a high-risk aversion scenario, as it provides significantly more challenging future conditions than the 50th and 75th percentile levels-of-concern. This scenario provides the most extreme planning conditions for DCR users provided in this report.

Modeling Approach

As discussed in Section 3, the future climate scenarios analyzed in this DCR report were developed using a risk-informed methodology. "Risk-informed" in this context means future climate scenarios were selected from a large ensemble of potential future conditions, with estimates of the future delivery capability of the SWP for each potential future in the ensemble. Documentation for the methodology used to select and develop future climate scenarios can be found in the Risk-Informed Future Climate Scenario

Development for SWP DCR (California Department of Water Resources, 2023).

Overall Effects of Climate Change

The cumulative effects of climate change on the hydrologic conditions relevant to the Delivery Capability of the SWP can be categorized into three parts:

- Changes to monthly patterns of flows.
- More extreme events.
- Lower reservoir storage levels.

Each of these changes impacts the delivery capability of the SWP in overlapping and related ways, but categorizing the effects can help to understand the complex influences of climate change.

Climate change predicts more precipitation to fall as rain instead of snow. The monthly patterns of flows into reservoirs and into the Delta are expected to be higher in winter months, and lower flows the rest of the year. Increased flows during the winter months are not stored as effectively in reservoirs as inflows that occur later in the water year. This is because storage during the winter months is subject to stricter flood control levels. These levels are set to mediate the risk of reaching critical operational thresholds in each reservoir. Due to these limits, even when there are higher flows in winter months in the future climate scenarios, much of the additional flow cannot be stored.

The ability to export these additional flows is constrained by infrastructure limitations, permitted capacity, and regulatory constraints on existing State Water Project facilities in the Delta. Climate change will lead to increased events in which more water supply through Delta flows is available during times when capturing additional water is already limited, impacting operational flexibility.

In addition to the discussions above regarding changes in the timing and magnitude of reservoir and Delta inflows, rising sea levels influence operations in the Delta. Rising mean sea levels tend to push saltier water into the Delta, which increases the required Delta outflow volumes to meet salinity and X2 requirements. These Delta outflows are supported by reservoir releases. This increased reliance on reservoir releases, and the limitations on storing increased winter reservoir inflow both tend to cause lower average annual reservoir storage levels.

Recommendations on the Use of the Future Climate Change Scenarios

The choice of which scenario or scenarios to use for planning should be made by the users after careful consideration of several factors. DWR recommends that users of these DCR scenarios evaluate at least two of the scenarios to gauge the sensitivity of their analysis to the choice of scenario. Guidance and other considerations regarding the use of these scenarios is given in Chapter 7 of the "Risk-Informed Future Climate Scenario Development for the State Water Project Delivery Capability Report", (California Department of Water Resources, 2023).

Users should understand that the three potential future climate change scenarios in this report only consider existing regulations, existing infrastructure, and current project operations. Put another way, no adaptation actions, nor future degradation of infrastructure are included. The purpose of these studies is to evaluate the baseline risks and impacts of climate change on the Delivery Capability of the SWP. Additional studies are being conducted to evaluate the impact of different adaptation strategies on SWP delivery capability and will be published in 2024. Climate change adaptation strategies being evaluated in other efforts by DWR and its partners include, but are not limited to:

- Climate Change Adaptation Studies
- Advancement of Forecast-Informed Reservoir Operations (FIRO)
- California Aqueduct subsidence and remediation
- Delta Conveyance Project
- Ground and surface water storage enhancement
- Enhanced SWP asset management

For more information about how DWR is addressing climate change through programs, projects, and activities, view the Climate Action Plan here: https://water.ca.gov/Programs/All-Programs/Climate-Change-Program/Climate-Action-Plan.

Estimates of SWP Table A Water Deliveries Under Climate Change

The three climate change scenarios present an estimate of Table A water deliveries under three various levels of risk. In this report, SWP Table A deliveries also include Article 56 (carryover) water in the year it is delivered. Article 56 water delivered in the SWP contract year is some portion of Table A from the previous contract year that the contractors requested to defer for the following year[7]. From this point forward (unless otherwise mentioned), the long-term period of record for this report is from WY 1922-2021.

The average, minimum, and maximum estimated annual deliveries under each level of risk is presented in Table 7-2. The DCR 2023 baseline scenario is included for reference.

Table 7-2. Estimated Long-Term Annual Average, Maximum, and Minimum Deliveries of SWP Table A Water, Excluding Butte County, Yuba City, and Plumas County FCWCD (2043 Climate Change Conditions with no Adaptation, in TAF/year)

Statistic	DCR 2023 Baseline	2043 50% LOC	2043 75% LOC	2043 95% LOC
Average	2,202	1,921	1,812	1,706
Maximum*	3,904	3,848	3,834	3,791
Minimum**	184	75	97	80

* The maximum for the 2043 95% LOC occurred in 1983. All other scenario maximums occurred in 1998.

** All minimums occurred in 1977.

With respect to Table A water deliveries, the three climate change scenarios are typically more similar to each other than they are to the baseline condition. This similarity, even across the various levels of concern, signals that the SWP will lose delivery capability over the next 20 years if no adaptation measures are made.

Wet-Year Deliveries of SWP Table A Water

The results of modeling future climate conditions over wet years indicate that SWP Table A water during wet periods can be estimated to range between yearly averages of 2,292 to 3,848 TAF under potential future

[7] In real-time operations, Article 56 water can be carried over for several years if conditions permit. But the modeling assumes single year carryover.

climate conditions. Table 7-3 and Figure 7-1 present estimates of SWP Table A water deliveries under baseline, and climate change conditions during possible wet conditions. The same wet periods are used as in the existing conditions analysis for comparative purposes.

Table 7-3. Estimated Average and Wet-Period Deliveries of SWP Table A Water (2043 Climate Change Conditions without Adaptation, in TAF/year) and Percent of Maximum SWP Table A Amount, 4,133 TAF/year.

Period*	Baseline**		2043 Future Climate Change Scenarios		
	DCR 2021 (1922 – 2015)	DCR 2023 (1922 – 2021)	50% LOC (1922 – 2021)	75% LOC (1922 – 2021)	95% LOC (1922 – 2021)
Long Term Average	2,321 (56%)	2,202 (53%)	1,921 (46%)	1,812 (44%)	1,706 (41%)
Single Year (1983)	3,937 (95%)	3,794 (92%)	3,790 (92%)	3,790 (92%)	3,791 (92%)
Single Year (1998)	3,712 (90%)	3,904 (94%)	3,848 (93%)	3,834 (93%)	3,784 (92%)
2 Year (1982-1983)	3,761 (91%)	3,605 (87%)	3,595 (87%)	3,592 (87%)	3,592 (87%)
4 Year (1980-1983)	3,212 (78%)	3,110 (75%)	2,849 (69%)	2,722 (66%)	2,746 (66%)
6 Year (1978-1983)	3,128 (76%)	3,060 (74%)	2,773 (67%)	2,669 (65%)	2,588 (63%)
10 Year (1978-1987)	2,925 (71%)	2,849 (69%)	2,459 (59%)	2,422 (59%)	2,292 (55%)
Single Year (2017)	-***	3,372 (82%)	3,505 (85%)	3,357 (81%)	3,423 (83%)

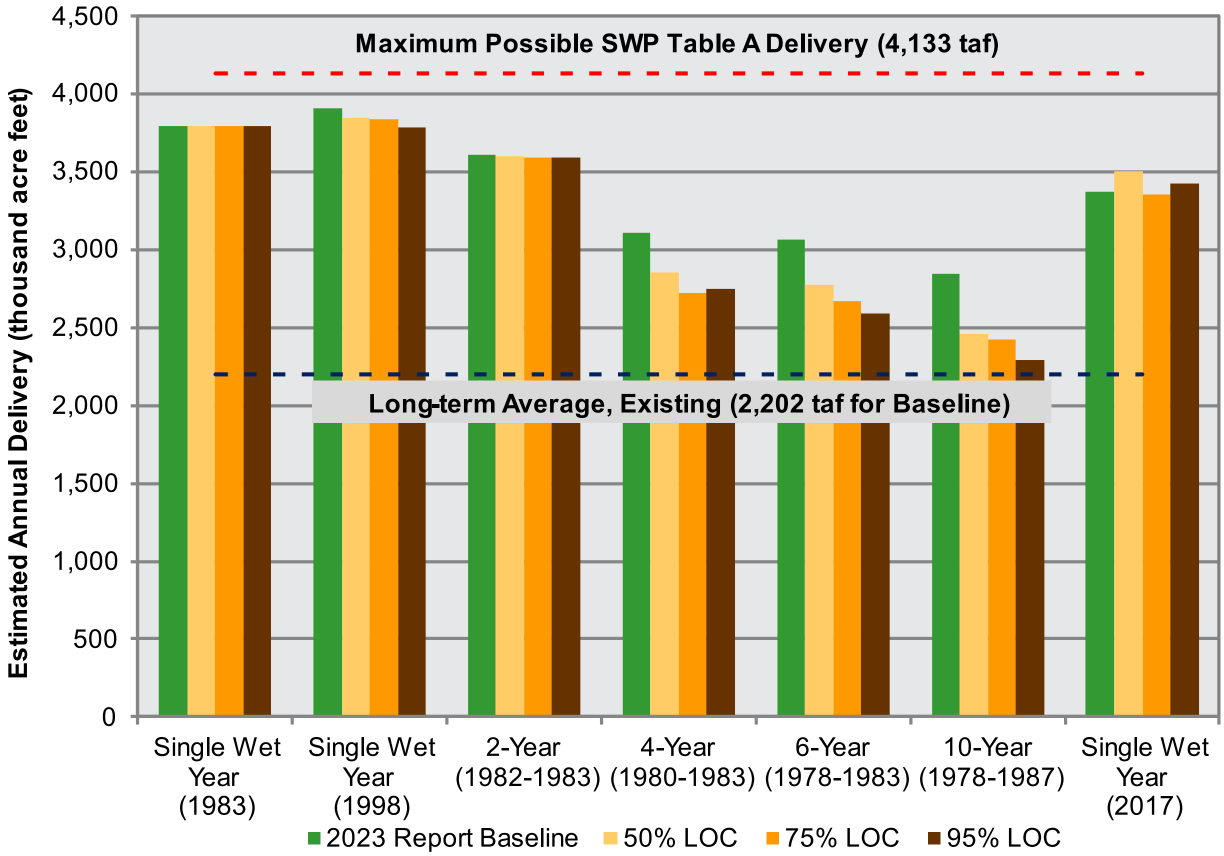
* Periods were manually selected to include the wettest, most notable, and most recent years from the simulation.

** The 2023 Report uses adjusted historical hydrologic conditions as its baseline. See Section 3 for further discussion.

*** The simulation period for the 2021 report did not include 2017.

7.70

Figure 7-1. Estimated Wet Period Deliveries of SWP Table A Water (2043 Climate Change Conditions without Adaptation, in TAF/year)



Dry-Year Deliveries of SWP Table A Water

The results of modeling future climate conditions over dry years indicate that SWP Table A water delivers during dry periods can be estimated to range between yearly averages of 75 to 625 TAF under potential future climate conditions.

Table 7-4 and Figure 7-2 present estimates of SWP Table A water deliveries under baseline, and climate change conditions during possible dry conditions. The same dry periods are used as in the existing conditions analysis for comparative purposes.

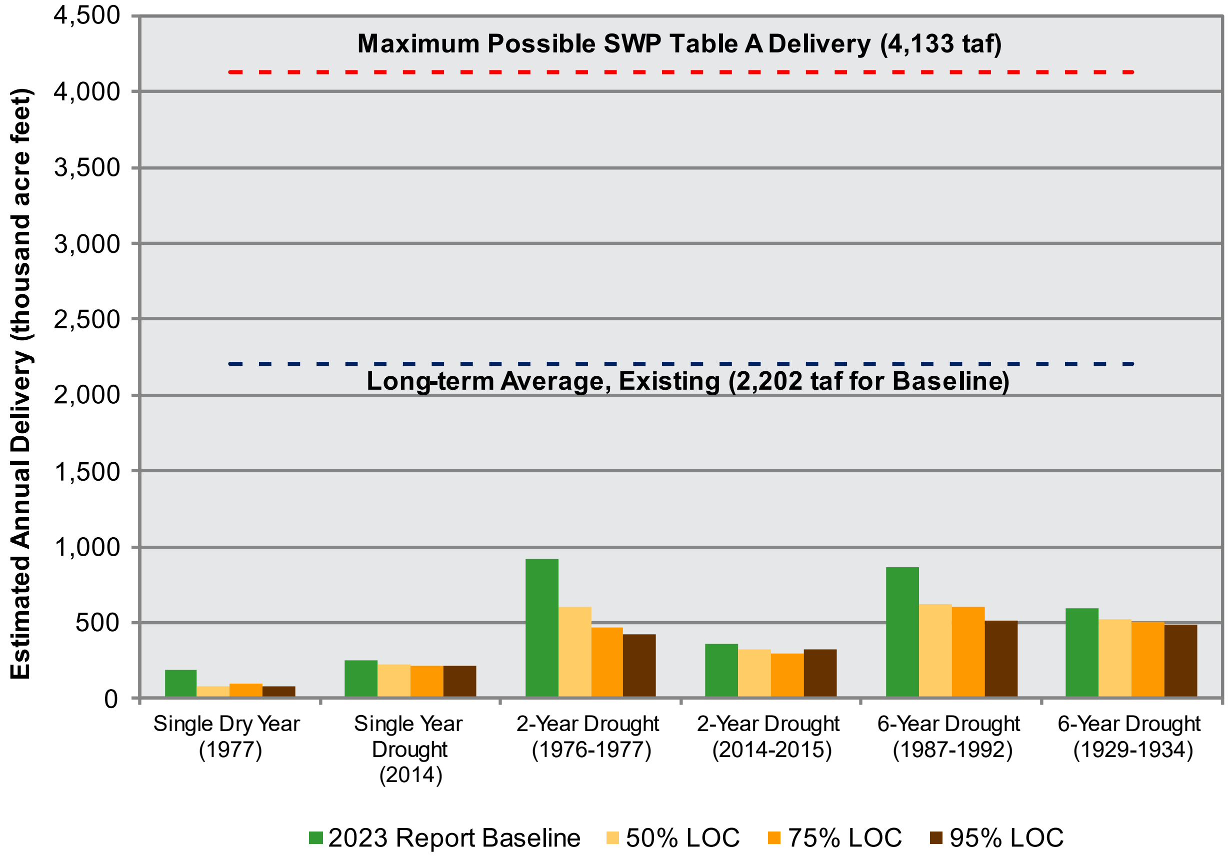
Table 7-4. Estimated Average and Dry-Period Deliveries of SWP Table A Water (2043 Climate Change Conditions without Adaptation, in TAF/year) and Percent of Maximum SWP Table A Amount, 4,133 TAF/year.

Period*	Baseline**		2043 Future Climate Change Scenarios		
	DCR 2021 (1922 – 2015)	DCR 2023 (1922 – 2021)	50% LOC (1922 – 2021)	75% LOC (1922 – 2021)	95% LOC (1922 – 2021)
Long Term Average	2,321 (56%)	2,202 (53%)	1,921 (46%)	1,812 (44%)	1,706 (41%)
Single Year (1977)	233 (6%)	184 (4%)	75 (2%)	97 (2%)	80 (2%)
Single Year (2014)	230 (6%)	251 (6%)	221 (5%)	213 (5%)	211 (5%)
2 Year (1976-1977)	1,377 (33%)	922 (22%)	604 (15%)	464 (11%)	425 (10%)
2 Year (2014-2015)	708 (17%)	360 (9%)	321 (8%)	297 (7%)	319 (8%)
6 Year (1987-1992)	1,163 (28%)	860 (21%)	625 (15%)	602 (15%)	514 (12%)
6 Year (1929-1934)	1,039 (25%)	597 (14%)	520 (13%)	504 (12%)	488 (12%)

* Periods were manually selected to include the driest, most notable, and most recent years from the simulation.

** The 2023 Report uses adjusted historical hydrologic conditions as its baseline. See Section 3 for further discussion.

Figure 7-2. **Estimated Dry Period Deliveries of SWP Table A Water (2043 Climate Change Conditions without Adaptation, in TAF/year)**



Estimates of SWP Article 21 Water Deliveries Under Climate Change

The availability of Article 21 water deliveries is dependent on the availability of excess water during wet events. As such, the shift in monthly inflow patterns and an increase in the likelihood of large rainfall events increase the availability of Article 21 water in wet periods in future climate change scenarios compared to the baseline. Conversely, there is not a large difference between scenarios in dry years when Article 21 water is not available in either the baseline or the future climate scenarios.

Wet-Year Deliveries of SWP Article 21 Water

In wet periods, the Article 21 deliveries in the climate change scenarios tend to be similar to, or slightly lower than the Baseline conditions deliveries. However, in some years the differences between climate change scenarios and the Baseline can be significant. For example, in 1998 and 2017 the differences are large. In 1998 the climate change scenarios predict lower

7.73

Article 21 deliveries, while in 2017 the climate change scenarios predict higher Article 21 deliveries.

Table 7-5. Estimated Average and Wet-Period Deliveries of SWP Article 21 Water (2043 Climate Change Conditions without Adaptation, in TAF/year).

Period*	Baseline**		2043 Future Climate Change Scenarios		
	DCR 2021 (1922 – 2015)	DCR 2023 (1922 – 2021)	50% LOC (1922 – 2021)	75% LOC (1922 – 2021)	95% LOC (1922 – 2021)
Long Term Average	89	101	97	87	81
Single Year (1983)	593	1,025	1,026	1,011	1,008
Single Year (1998)	520	271	208	100	9
2 Year (1982-1983)	416	878	881	840	821
4 Year (1980-1983)	274	564	546	424	427
6 Year (1978-1983)	186	385	436	304	292
10 Year (1978-1987)	165	269	314	264	219
Single Year (2017)	-***	353	458	434	662

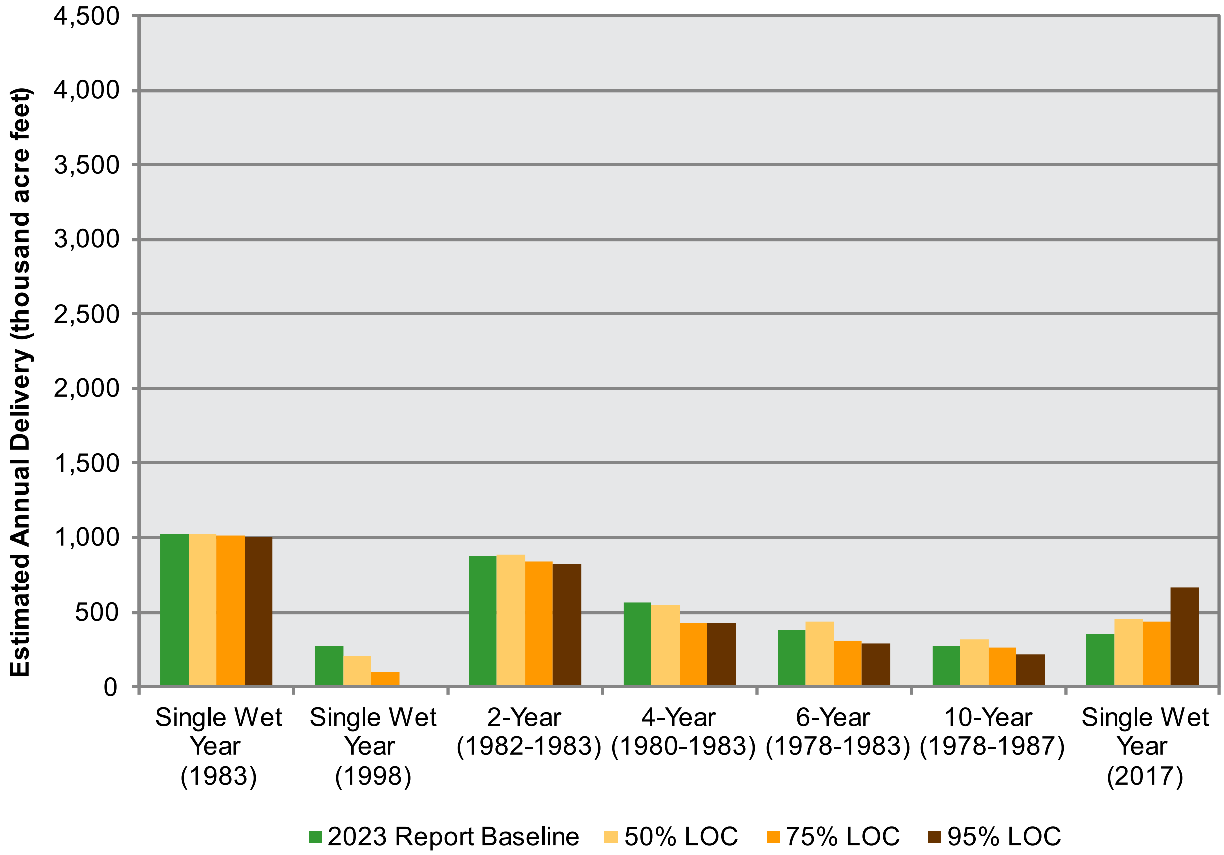
* Periods were manually selected to include the wettest, most notable, and most recent years from the simulation.

** The 2023 Report uses adjusted historical hydrologic conditions as its baseline. See Section 3 for further discussion.

*** The simulation period for the 2021 report did not include 2017.

7.74

Figure 7-3. Estimated Wet Period Deliveries of SWP Article 21 Water (2043 Climate Change Conditions without Adaptation, in TAF/year).



Dry-Year Deliveries of SWP Article 21 Water

In dry periods, the Article 21 deliveries in the climate change scenarios tend to be similar to the baseline scenario. Since Article 21 water tends to not be available during these periods, and demand is the same across all studies, deliveries of Article 21 water do not tend to differ.

7.75

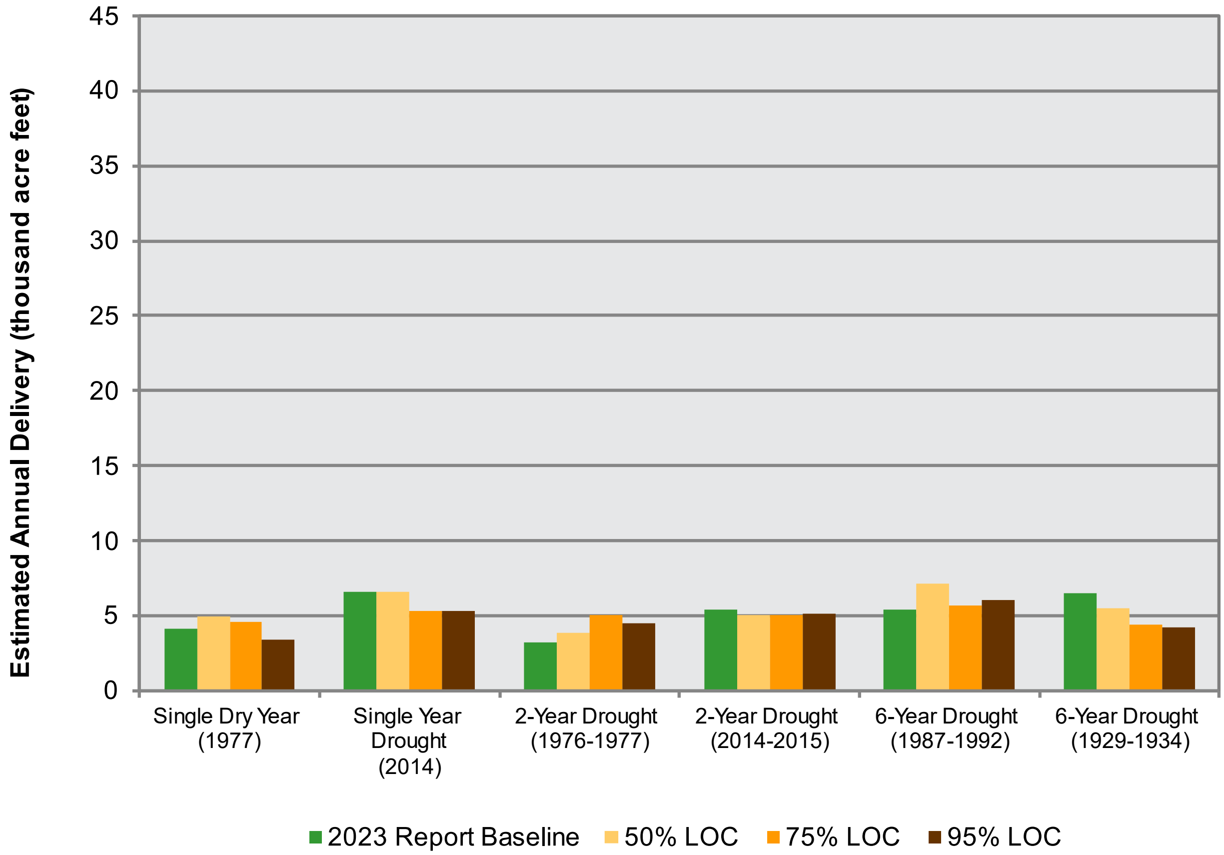
Table 7-6. Estimated Average and Dry-Period Deliveries of SWP Article 21 Water (2043 Climate Change Conditions without Adaptation, in TAF/year).

Period*	Baseline**		2043 Future Climate Change Scenarios		
	DCR 2021 (1922 – 2015)	DCR 2023 (1922 – 2021)	50% LOC (1922 – 2021)	75% LOC (1922 – 2021)	95% LOC (1922 – 2021)
Long Term Average	89	101	97	87	81
Single Year (1977)	3	4	5	5	3
Single Year (2014)	5	7	7	5	5
2 Year (1976-1977)	3	3	4	5	5
2 Year (2014-2015)	4	5	5	5	5
6 Year (1987-1992)	5	5	7	6	6
6 Year (1929-1934)	6	7	5	4	4

* Periods were manually selected to include the driest, most notable, and most recent years from the simulation.

** The 2023 Report uses adjusted historical hydrologic conditions as its baseline. See Section 3 for further discussion.

Figure 7-4. **Estimated Dry Period Deliveries of SWP Article 21 Water (2043 Climate Change Conditions without Adaptation, in TAF/year).**



* Note that the maximum value of the y-axis on this figure differs from Figure 7-2, and Figure 7-3, and Figure 7-3 by a factor of 100.

7.77

Section 8. Response to Public Comments on the Draft DCR 2023 Report

This section presents the comments received on the Draft DCR 2023. It also includes responses from staff, and the actions taken. Actions and their impacts are all included in the Final Report, even if the actions are not discussed there. The comments are presented as they were received and are not edited in any way.

Comment 1

Future sea level rise assumed as 15 cm for 50% LOC and 30 cm for 75% and 95% LOC. Is there a reason that a much lower SLR is being used compared to the 2021 DCR? (55 cm) More explanation of this would be appreciated in the document.

DWR Response

The 2021 DCR Future Conditions scenario used the same climate change hydrology inputs and sea level rise (SLR) as the DCP Draft EIR climate change studies. The DCP climate change scenario was developed centered around 2040 (2026-2055).

In the 2021 DCR, the 55 cm or 1.8 ft SLR future conditions assumption was chosen because this was also the SLR assumed in the DCP future condition modeling. The 1.8 ft SLR projection in 2040 was taken from the 2018 Ocean Protection Council guidance and was characterized by the guidance as an "H++ scenario" or extreme risk aversion. This scenario was not associated with a likelihood of occurrence in the guidance

The extreme sea level rise scenario (i.e. H++) from the 2018 California SLR Guidance of 55 cm used in the 2021 DCR and DCP Draft EIR is higher than the levels the best available science now supports. Due to the rapid near-term increase in sea level rise that is required, the Extreme Risk Aversion scenario, based on H++, is no longer considered physically realistic. The SLR projection used for the 2023 DCR projections align with updated 2024 Ocean Protection Council guidance, which indicates that by the year 2040, sea levels are most likely to rise 0.6 ft (18 cm) to 0.8 ft (24 cm) for the intermediate and high scenarios, respectively.

Action

Added a table note to Table 7-1 to indicate that our SLR selections are consistent with 2024 OPC guidance.

Comment 2

6.51 (p. 64) - 2023 is used for existing conditions but in section 5, 2020 is used - assuming this is a typo?

DWR Response

We are now consistently using 2023, and not 2020, to nominally represent "existing conditions".

Action

Removed instances where "2020" was nominally used to represent existing conditions. In some contexts, the term 'existing conditions' is used instead of a year to avoid unintentionally ascribing precision.

8.78

Comment 3

We noticed there were some significant differences in the tables comparing information from the 2021 and 2023 DCR data. We recommend that DWR include more information about what impacts/changes caused these extreme differences in some cases. There doesn't seem any explanation why the discrepancies between reports are so large and what the reasoning for them is.

DWR Response

The differences between the 2023 DCR and 2021 DCR are attributed to the cumulative effects of implementing adjusted historical hydrology, extending the simulation period from 2015 to 2021, and code updates. The code updates are documented in the Technical Addendum which will be released with the Final DCR.

The use of adjusted historical hydrology as the baseline is the most impactful change between the 2021 and 2023 DCR. The isolated impacts of Adjusted Historical Hydrology indicate that:

- The median State Water Project allocations decreased by 3%.
- In the drier years (Dry and Critical SVI), spring and summer Oroville reservoir inflow decreased, as shown in Figure 8-1.
- In wetter years (Wet and Above Normal SVI), more runoff occurs when it cannot be stored. The peak runoff under Adjusted Historical Hydrology is higher by approximately 200 TAF and occurs one month earlier than under Historical Hydrology. The peak runoff occurs when there is less storage available for conservation, as shown in Figure 8-2. As a result, the excess water cannot be captured, leading to increased reservoir outflow. This outflow occurs when exports from the delta are unable to export this additional water due to a variety of factors. As a result, these shifted flows are no longer stored for later in the year, nor are they exported from the delta.

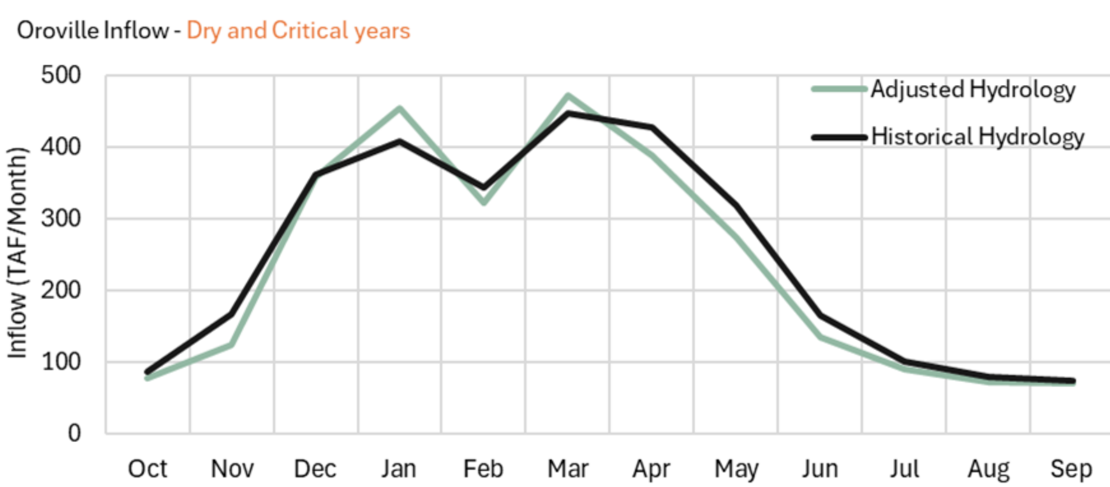


Figure 8-1. Monthly average Oroville Reservoir Inflow in TAF/month for dry and critically dry years.

8.79

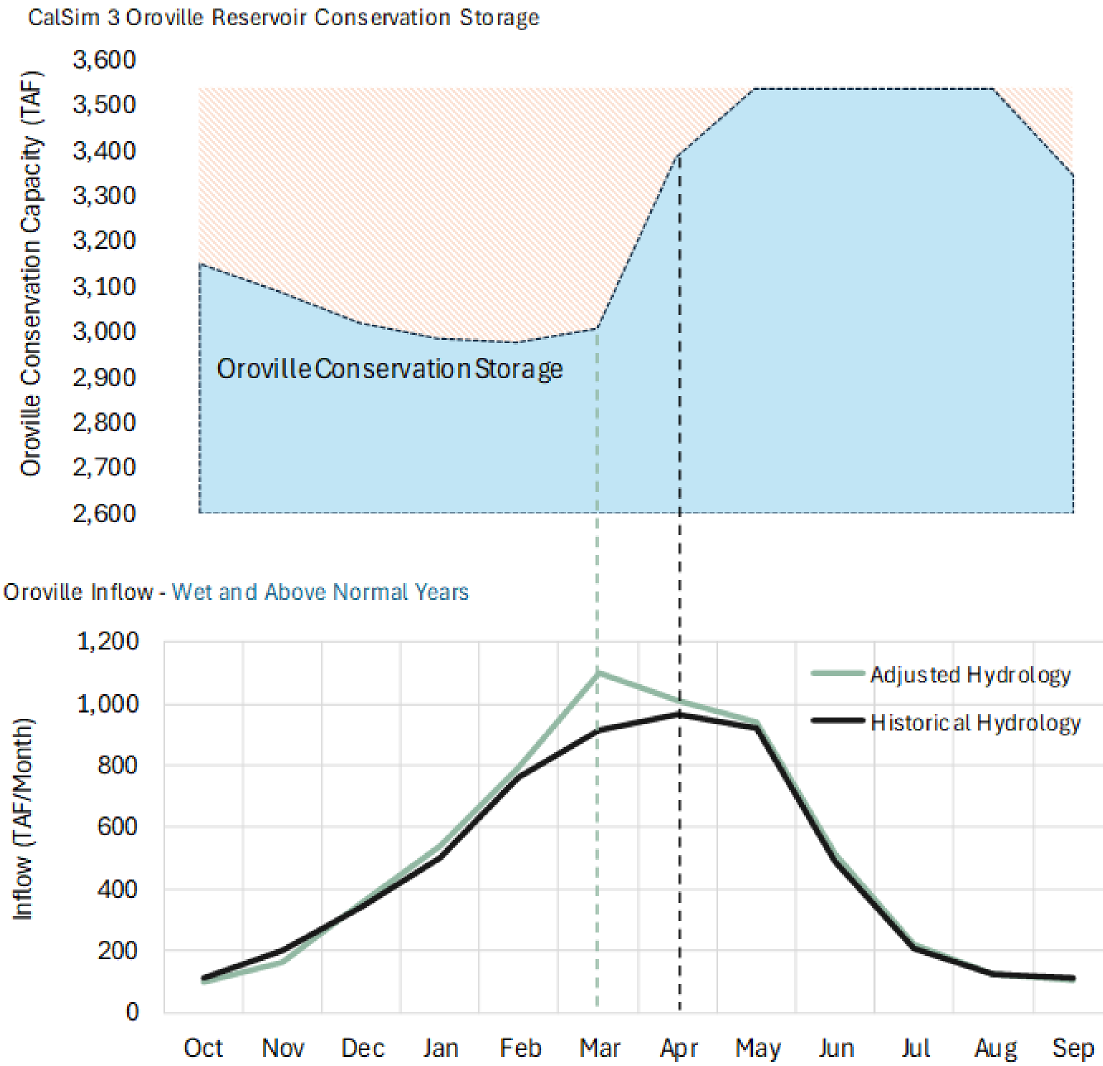


Figure 8-2. Oroville reservoir conservation storage rule curve, as modeled in CalSim 3 compared with wet and above normal year inflows for Adjusted and Historical hydrology.

Action

Added clarifying language to Section 6, explaining that the differences are due to a host of factors, including the use of Adjusted Historical Hydrology.

Comment 4

The draft report says that the final 2023 DCR will include assumptions on subsidence impacts. What assumptions will be included? Will this assume current delivery impacts, a time series of repairs to improve subsidence, future impacts of continued subsidence? More detail on the assumptions that will be included would be appreciated.

8.80

DWR Response

An evaluation of the impacts of potential future subsidence were originally intended to be included in the DCR 2023. Following a review of the methods used to estimate potential future subsidence, it was determined that future subsidence will be dependent on the actions taken by local Groundwater Sustainability Agencies (GSAs). Future subsidence across the San Joaquin Valley will be dependent on the ability of each local agency to meet their own sustainability targets. While "significant and unreasonable land subsidence" is one of the sustainability indicators that each GSA must address in the Groundwater Sustainability Plans (GSPs), the potential impacts to the California Aqueduct (CAA) are not documented uniformly in the different GSPs written for the basins along the aqueduct. As such, any future estimate of subsidence along the CAA alignment must make assumptions regarding the implementation of the Sustainable Groundwater Management Act (SGMA), and the spatial patterns of subsidence within each basin.

The California Aqueduct Subsidence Program (CASP) used a rigorous methodology for estimating future subsidence that accounts for both climate uncertainty, and the uncertainty among experts regarding SGMA implementation across the different basins. Currently available CASP studies were developed using a previous version of the CalSim model. An update of those models to be consistent with the DCR 2023 is ongoing and additional information regarding subsidence will be available later this year. As such, the impacts of subsidence are not included in the DCR 2023.

Action

The discussion of the California Aqueduct Subsidence Program in the Report was updated to be consistent with the information above.

Comment 5

There should be more thought surrounding how carryover is handled in future reports. We understand how it is being represented currently, but feel that in future reports this could be an area that could use some more refinement.

DWR Response

In real-time operations, Article 56 water can be carried over for several years if conditions permit, but the current modeling assumes single year carryover. There are plans to review CalSim 3 carryover logic in future initiatives.

Action

No revisions made to the Report.

Comment 6

With regards to the adjusted hydrology, is DWR planning to have Agencies utilize this information for 2025 UWMP planning?

DWR Response

The methods used for developing the Adjusted Historical Hydrology in the DCR 2023 were independently peer reviewed and provide the best, most updated information available about current SWP delivery reliability and DWR recommends that agencies use the Adjusted Historical Hydrology scenario to represent current conditions. . The ultimate decision of what information an agency uses for their 2025 UWMP resides with the agency itself.

Action

No revisions made to the Report.

Comment 7

P. 1.15 last bullet: Having one future scenario for climate assists with planning uniformity. If multiple scenarios are being used across the State, then even regional planning could become difficult as agencies in the same vicinity could be using different future planning numbers. DWR should clearly recommend the main scenario for using in the regional planning efforts, especially when it comes to CEQA.

DWR Response

There is irreducible uncertainty in potential future conditions as discussed in Chapter 7 of the DCR and throughout the supporting documentation. The 2023 DCR provides 3 future scenarios that explore this uncertainty to assist PWAs with their understanding and planning. Further, each scenario has been assigned a percent level of concern (50, 75 or 95) to explain the relative level of severity or likelihood that actual future conditions would be better than those modeled in each scenario (explained in detail in the supporting documentation). The provision of multiple scenarios is an important step in providing transparency about unknown future conditions and requires users of SWP water to consider their own conditions and risks.

Chapter 7 of the DCR includes plain text summary descriptions of each of the scenarios and some recommendations for their use. As stated in Chapter 7, the 50% level of concern scenario "could also be considered the statistically expected future level of performance of the SWP system. This scenario may be appropriate for use in certain types of planning documents, such as California Environmental Quality Act environmental impact reports which require agencies to consider 'reasonably foreseeable indirect physical change in the environment'." (Public Resources Code section 21065).

DWR does not prescribe how local agencies should conduct their planning or what risk tolerance they should accept. DWR agrees that coordination and consistency between agencies within a region is important and supports the commentors desire for aligned regional planning.

We reiterate the information provided in Chapter 7 of the DCR: "the 50th percentile level of concern scenario described below is generally comparable to central tendency scenarios provided in previous DCRs... Further, the 75th and 95th percentile level of concern scenarios explore future plausible climate conditions that would result in worse system performance. SWP water users are encouraged to carefully consider the information from all three 2043 potential future climate scenarios and evaluate their vulnerability to a range of climatic changes."

Action

Some additional text has been added to the report to increase clarity and specificity.

8.82

Comment 8

P. 2.29: Can we call Voluntary Agreements as The Agreements to Support Healthy River and Landscapes?

DWR Response

Yes.

Action

Language in the report was updated to be consistent with other DWR publications regarding the Agreements to Support Healthy Rivers and Landscapes. The abbreviation “VA” is still used where appropriate for the context and is introduced on page 2.29.

Comment 9

P. 3.32 “Considering multiple future scenarios allows for more robust planning.”:

This may be true for evaluating necessary adaptions for the SWP, but really isn't useful for individual State Water Contractors. This just increases ambiguity in local planning processes and could lead to substantial disagreements over published numbers. It may also make getting apple to apple comparisons difficult between regions.

DWR Response

This ambiguity is unfortunately a function of climatic uncertainty and local risk tolerance or aversion, DWR cannot tell PWAs what the future will be or how to plan for it. DWR has provided the future scenarios and the associated levels of concern for each scenario to assist local agencies in making this determination and explaining their decision to their stakeholders. See the response to comment 7.

Action

No revisions made to the Report.

Comment 10

P. 3.33 “The 2023 DCR analyzes Project delivery capability under multiple risk-informed climate scenarios (50 percent, 75 percent, and 95 percent level-of concern).”:

Ideally only one target is utilized. If more than one are to be used, then perhaps the 25% and 5% should be included as well.

DWR Response

DWR considered the inclusion of more optimistic scenarios such as a 25% or 5% and discussed and evaluated this possibility with contractors at multiple workshops. The decision was made collaboratively that these would not be useful. Planning to such an optimistic future might not be protective of water users because more optimistic scenarios would likely show higher SWP deliveries, if an agency planned to those deliveries and a more severe climate outcome materialized, the agency could be unprepared for the lower level of water deliveries.. Regardless of whether a 25% or 5% scenario are provided, the 50% level of concern scenario is the "middle of the road" or statistical median scenario of future SWP delivery capability at 2043.

Action

No revisions made to the Report.

Comment 11

P. 6.49 Table 6-2:

Even though it's in the table notes, but it needs to be more clear in this table that the "2023 Report" is using the adjusted conditions. Perhaps another row in the table could be added to describe that.

DWR Response

The use of the Adjusted Historical Hydrology as the Baseline condition for the DCR 2023 is discussed in Section 3 "Adjusted Historical Hydrologic Conditions", and in Section 6 "Modeling Approach". Similar table footnotes are given in tables 7-3, 7-4, 7-5, and 7-6 (table numbers correspond to the Draft DCR table numbers and may change in the Final DCR). Table 6-2 is presented in past DCR Reports in the same format to compare estimated Table A deliveries under baseline conditions. The included discussion in other sections presents the full context required to understand the selection of the Adjusted Historical Hydrology for use as the baseline in DCR 2023. Attempting to communicate that selection without the appropriate context can be misleading to the reader, as such the footnote suggests seeing Section 3 for more information.

Action

The subsection "Adjusted Historical Hydrologic Conditions" in Section 3 was changed to "Adjusted Historical Hydrologic Conditions (Baseline Conditions)". Discussions regarding the selection of the Adjusted Hydrology as the baseline condition were highlighted using bold fonts.

Comment 12

P. 6.50 Figure 6-1:

It's difficult to easily discern which report is which on the figure. Perhaps more colors than green could be used in the figure.

DWR Response

The intent of the figure is to communicate the refinement in the estimates of Annual Table A Deliveries and Annual Delta Exports between the previous releases of the DCR Report. This can be achieved with a different plot format that maintains color-blind readability.

Action

The format of the plot was updated to maintain its purpose and readability.

Comment 13

P. 6.59 Table 6-7: Long-term average is stated as 54% in other tables.

DWR Response

The long-term average in *P. 6.59 Table 6-7* is for the SWP final May South-of-Delta (SOD) allocation. These averages will not always match the long-term SWP SOD Table A deliveries percent of maximum Table A amount. This is because some portion of Table A request as Article 56 at San Luis can be spilled. When a portion of Article 56 Carryover request is spilled, however, it can be made available as Article 21 water.

In the contract year 1982 and 1983, the Table A final allocation was 100%. As such, in the contract year 1983, SOD Table A contractors can theoretically receive the full 4,133 TAF allotment with 3,469 TAF in Table A and 664 TAF in carryover.

However, approximately 243 TAF of carryover request spilled in the contract year 1983 in February and March because San Luis reservoir was full. Therefore, the total contract delivery in 1983 was approximately 3,469 TAF of Table A and 421 TAF of Article 56 for a total of 3,890 TAF, 94% of the maximum Table A allotment of 4,133 TAF. The contract year 1983 had 1,114 TAF delivery of SWP Article 21 water, more than offsetting the 243 TAF of Carryover request spilled.

Action

A more detailed discussion on the differences between the allocations and deliveries was added to the "Wet-Year SWP South of Delta Allocation" section, using the contract year 1983 as a case study.

Comment 14

P. 6.60 Table 6-8: Long-term average is stated as 54% in other tables.

DWR Response

See response to comment 13.

Action

See response to comment 13.

Comment 15

P. 7.61 "While the 50th percentile level of concern scenario described below is generally comparable to central tendency scenarios provided in previous DCRs, the twenty-year forward window continues to proceed. Further, the 75th and 95th percentile level of concern":

To round out the possibilities, perhaps the 5% and 25% level of concern should be included as well. Alternatively, just the median number could be included here.

DWR Response

See response to Comment 10

Action

No revisions made to the Report.

Comment 16

P. 7.61 "SWP water users are encouraged to carefully consider the information from all three 2043 potential future climate scenarios and evaluate their vulnerability to a range of climatic changes.":

Things tend to run more efficiently/smoothly when everyone is rowing in the same direction. This could lead to various planning numbers being used for different purposes by different agencies who have different opinions on their own climatic vulnerabilities for the same project and this could lead to conflict where none should exist.

DWR Response

See response to Comment 7.

Action

No revisions made to the Report.

Comment 17

P. 7.62 "Nonetheless, this scenario could also be considered the statistically expected future level of performance of the SWP system. This scenario may be appropriate for use in certain types of planning documents, such as California Environmental Quality Act environmental impact reports which require agencies to consider "reasonably foreseeable indirect physical change in the environment.":

Too many "coulds" and "mays" are being used here. Firmer language as to what benchmark should be used here needs to be included. Perhaps more "shalls" and "shoulds" would be used here.

DWR Response

DWR does not prescribe the information local agencies use for CEQA. We've attempted to provide as much guidance and direction as possible. See also response to comment 7.

Action

No revisions made to the Report.

Comment 18

In the 2021 DCR, there was a technical addendum which tabulated the results by contractor. We have found that section very helpful. Is DWR planning to include that with the final version?

DWR Response

DWR will include individual contractor delivery tables in the Technical Addendum which will be released in the Final 2023 DCR.

Action

No changes were made to the report.

Comment 19

DWR should provide SWC members an opportunity to review the final version of the 2023 DCR.

DWR Response

DWR will arrange for SWC members to review the Final 2023 DCR before public release.

Action

No changes were made to the report.

Comment 20

We noticed that the CVP M&I allocations bottom out at 50% even though other newer models have updated allocations curves from Reclamation. Was this an oversight or was the cut off for the DCR development before the other models?

DWR Response

In the CS3 model, CVP M&I allocations can get cut to 25% (below 50%) when Temporary Urgency Change Petitions (TUCPs) and Shasta Proposed Action (PA) are triggered. As these actions are not represented/triggered in the DCR, CVP M&I allocations are constrained between 50 – 100%.

Action

No changes were made to the report.

Comment 21

We noticed that SWP's share of San Luis fills in 10-15% more months in the historical run compared to the previous generation of CalSim historical runs (DCR 2021, DCP DEIR 2020). What is the explanation for this?

DWR Response

DWR is not able to reproduce the 10-15% increase in months of SWP San Luis filling when comparing the historical DCR 2021 and DCR 2023. Figure 8-3 shows that SWP's share of San Luis fills up 5.7% of the time in DCR 2021 compared to 6.7% of the time with the DCR 2023, approximately a 1% difference. This is comparing consistent simulation periods of water year 1922-2015.

There is a myriad of factors that could have led to slightly fuller SWP San Luis months in the DCR 2023 historical draft study (80 vs. 64). It is difficult to pinpoint specific code changes that resulted in about 1% more months of San Luis filling up relative to DCR 2021.

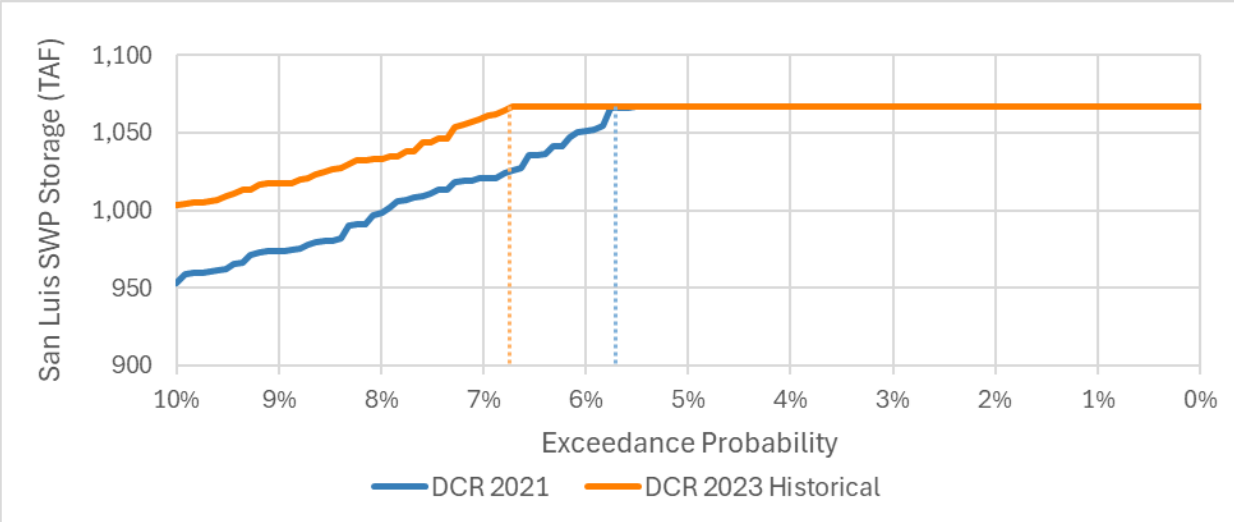


Figure 8-3. Exceedance Probability for Monthly SWP San Luis Storage for DCR 2021 and DCR 2023 (draft) historical, focusing on the likelihood of SWP San Luis being filled to capacity in any given month.

Action

No changes were made to the report.

Comment 22

There should be an explanation provided for why we are seeing the changes in the magnitude and frequency of the Article 21 deliveries.

DWR Response

There are two major factors which are resulting in the changes in magnitude and frequency of Article 21 deliveries. First, the DCR 2023 uses a refined assumption concerning Kern wet year Article 21 demands. This new assumption is discussed in Section 6, subsection "Updates to Article 21 Demand Assumption". Second, wetter wet years in the Adjusted Historical Hydrology in the 2023 DCR (as compared to the Historical Hydrology in the 2021 DCR) increase the availability of water for Article 21 deliveries. This effect was not specifically described in the Report previously. Additionally, a similar discussion regarding Table A deliveries is discussed in the response to Comment 3 above.

Action

Language was added to Section 6, Subsection "Estimates of SWP Article 21 Water Deliveries" to better describe the impact of the increased availability of water in wet years when compared to the DCR 2021 estimates.

8.88

One Water and Stewardship Committee

Update on State Water Project Overview

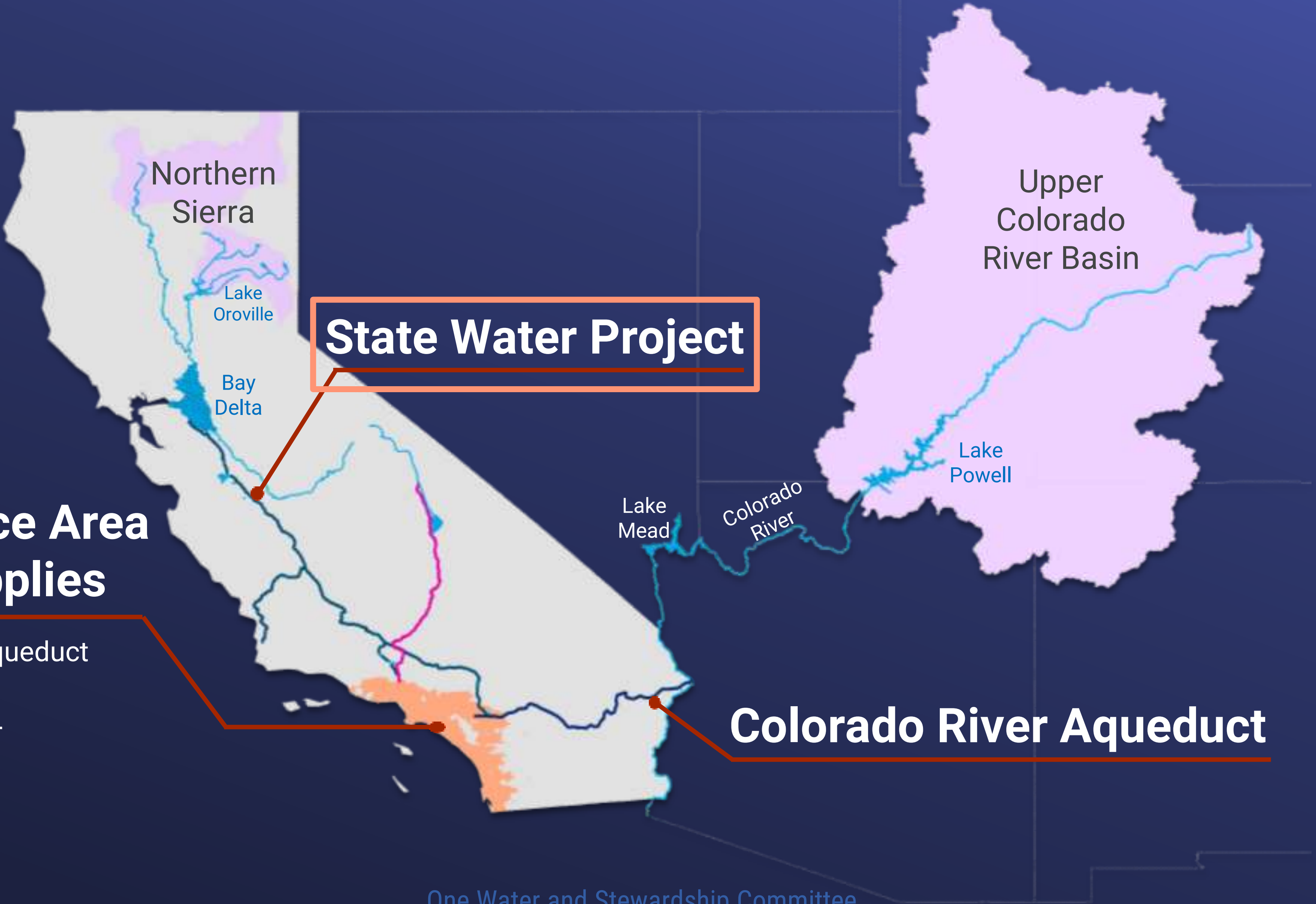
Item 6d
September 9, 2024

Item 6d
Update on State Water Project Overview

Subject
State Water Project Overview

Purpose
Provide a history of and challenges to the State Water Project and the benefits and costs of the State Water Project to Metropolitan

Metropolitan Water District's Sources of Supplies



MWD Service Area Local Supplies

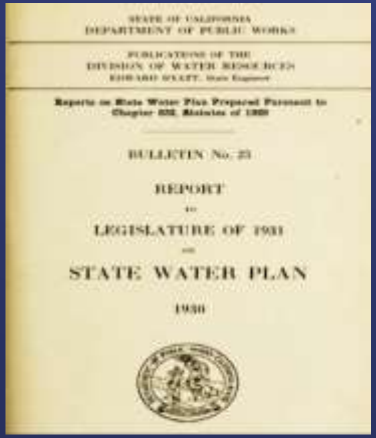
- Los Angeles Aqueduct
- Groundwater
- Recycled Water
- Desalination
- Conservation

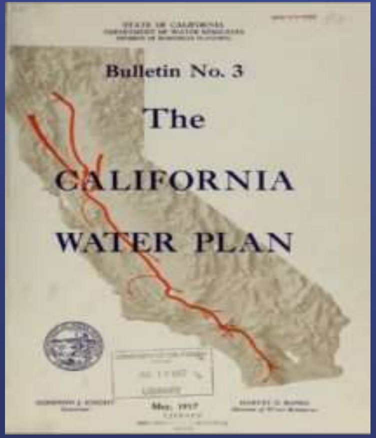
Lake Oroville (March 17, 1970)

Credit: DWR

Background on the State Water Project

History of Metropolitan & the State Water Project





1928

1931

1941

1957

1960

1972

Formation of Metropolitan

Development of first "State Water Plan"

First delivery of Colorado River Water to Southern California

Division of Water Resources issues first modern, "California Water Plan"

California ratifies Burns-Porter Act; Metropolitan signs contract with State

First delivery of State Water Project supplies to Southern California

State Water Contractors

Note: Map not drawn to scale.

	Region	Contractors
M&I	Feather River	County of Butte Plumas County FC&WCD City of Yuba City
M&I	North Bay	Napa County FC&WCD Solano County WA
M&I	South Bay	Alameda County FC&WCD, Zone 7 Alameda County WD Santa Clara Valley WD
Ag	San Joaquin Valley	Oak Flat WD County of Kings Dudley Ridge WD Empire West Side ID Kern County WA Tulare Lake Basin WSD
M&I	Central Coastal	San Luis Obispo County FC&WCD Santa Barbara County FC&WCD
M&I	Southern California	Antelope Valley-East Kern WA Santa Clarita Valley WA Coachella Valley WD Crestline-Lake Arrowhead WA Desert Water Agency Littlerock Creek ID **Metropolitan Water District** Mojave Water Agency Palmdale Water District San Bernardino Valley MWD San Gabriel Valley MWD San Gorgonio Pass WA Ventura County WPD

SWP Contract Extension & Subsequent Amendments

- In 2018, Metropolitan's SWP contract extended to 2085
  - Stability for participation in State Water Project
  - Improved the project's overall financial integrity and management
- In 2021, water management amendment approved for SWP contract
  - Additional flexibility to manage its SWP supplies
    - Provides additional tools to manage SWP water more efficiently
    - Creates new opportunities for creative partnerships with other agencies
    - New provisions provide fair compensation for transfers and exchanges

Overview of SWP Facilities

20 Pumping plants

5 Hydroelectric power plants

4 Pumping generating plants

>700 Miles of canals, tunnels, and pipelines

34 Storage facilities

Note: Map not drawn to scale.

Overview of SWP Facilities

Note: Map not drawn to scale.

Overview of SWP Facilities

Note: Map not drawn to scale.

Overview of SWP Facilities

Note: Map not drawn to scale.

Overview of SWP Facilities

Note: Map not drawn to scale.

Overview of SWP Facilities

Note: Map not drawn to scale.

Hydropower Generation

SWP is a major producer & consumer of power

- The SWP self-generates the majority of its own power demands
  - Fourth largest generator of hydropower in California
    - SWP provides ~14% of state's hydroelectricity
  - Produces power sold to grid during peak demand hours
    - Displaces fossil fuel generation
    - Lowers GHG emissions
    - Generates revenue → lowers water delivery costs

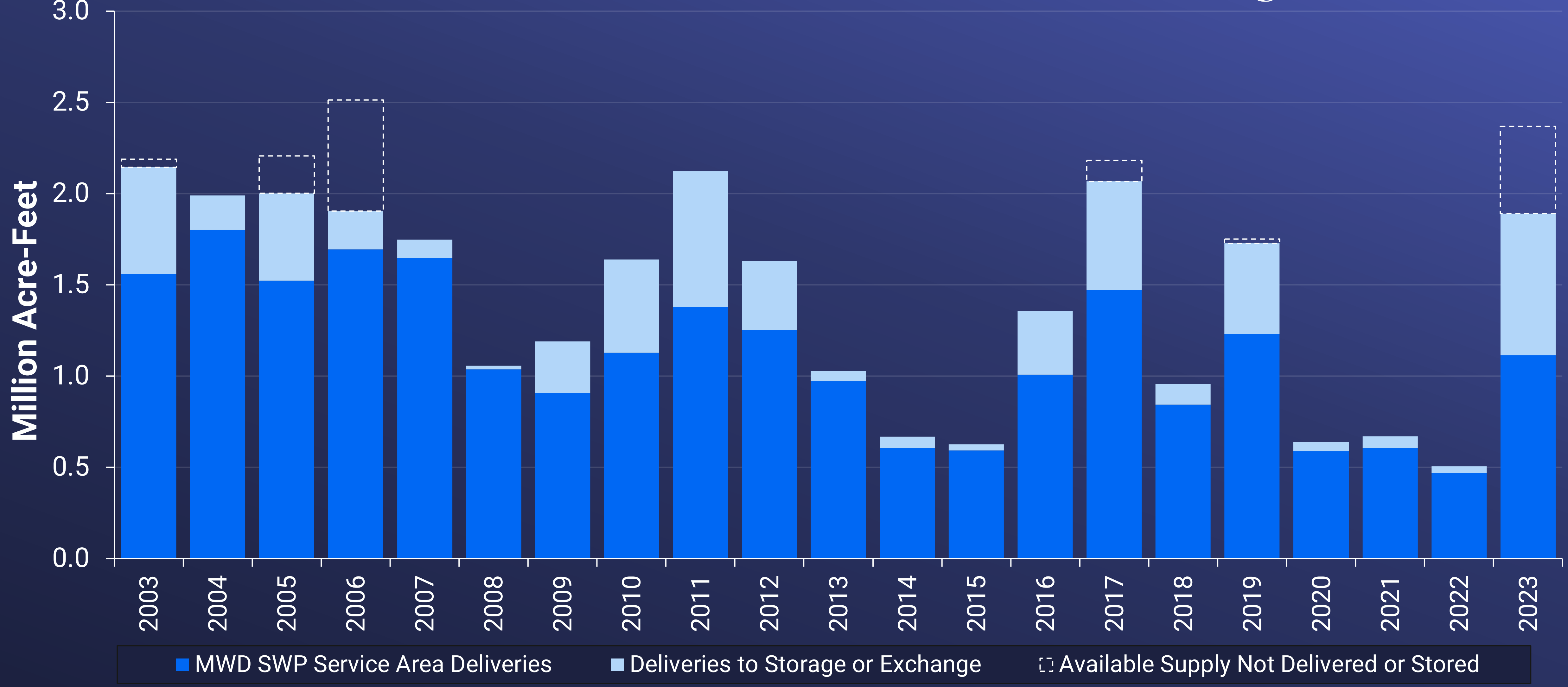
Hyatt Power Plant (May 2022) *Credit: DWR*

Sources: California Department of Water Resources and State Water Contractors.


Benefits from the State Water Project

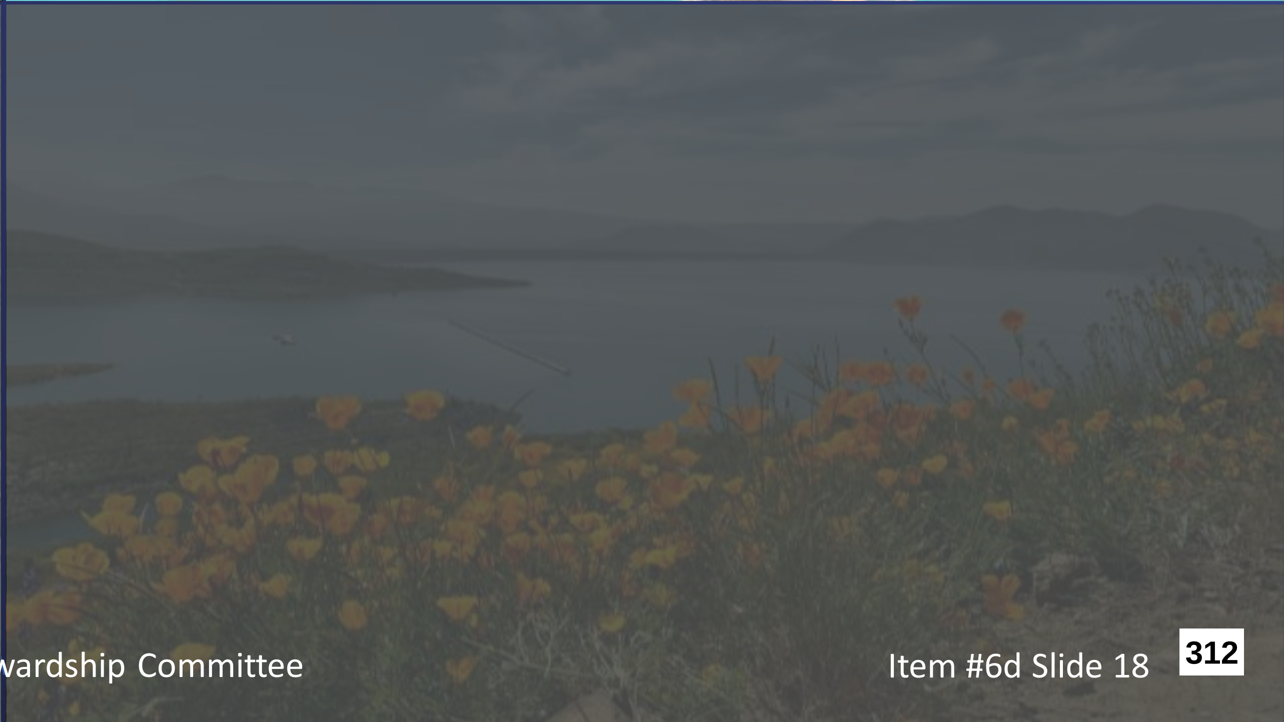

Water Supply

SWP Deliveries to Service Area & Storage



Note: Service area deliveries include Table A Supplies, Art. 21, Art. 14(b), Art. 12(d), Art. 12(e), Art. 55, draws from storage & carryover, DWCV & other exchanges, transfers, Drought Water Bank and Dry Year Pool Purchases, Pools A&B, Flood Water, wheeling, Port Hueneme lease, and SBVMWD Purchases. Deliveries to storage or exchange includes deliveries to groundwater storage, carryover, flexible storage, HH&S repayment, and returns to exchange programs.

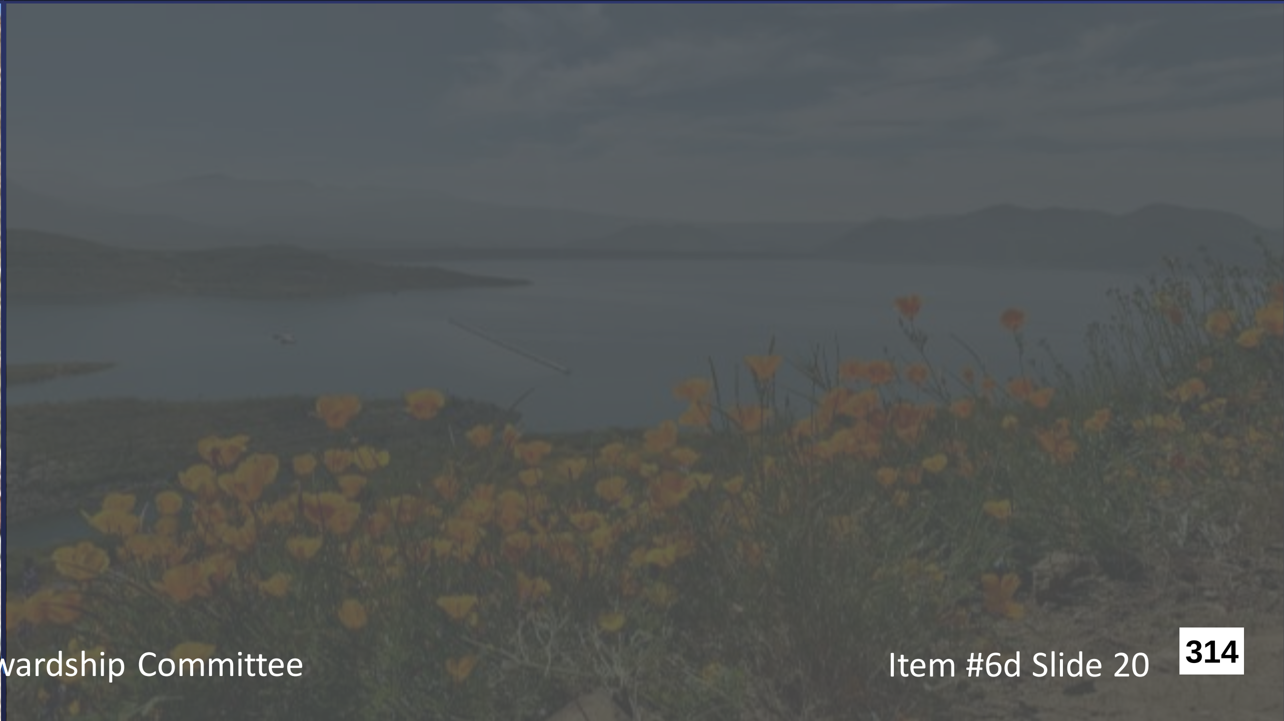
Water Quality



Water Quality

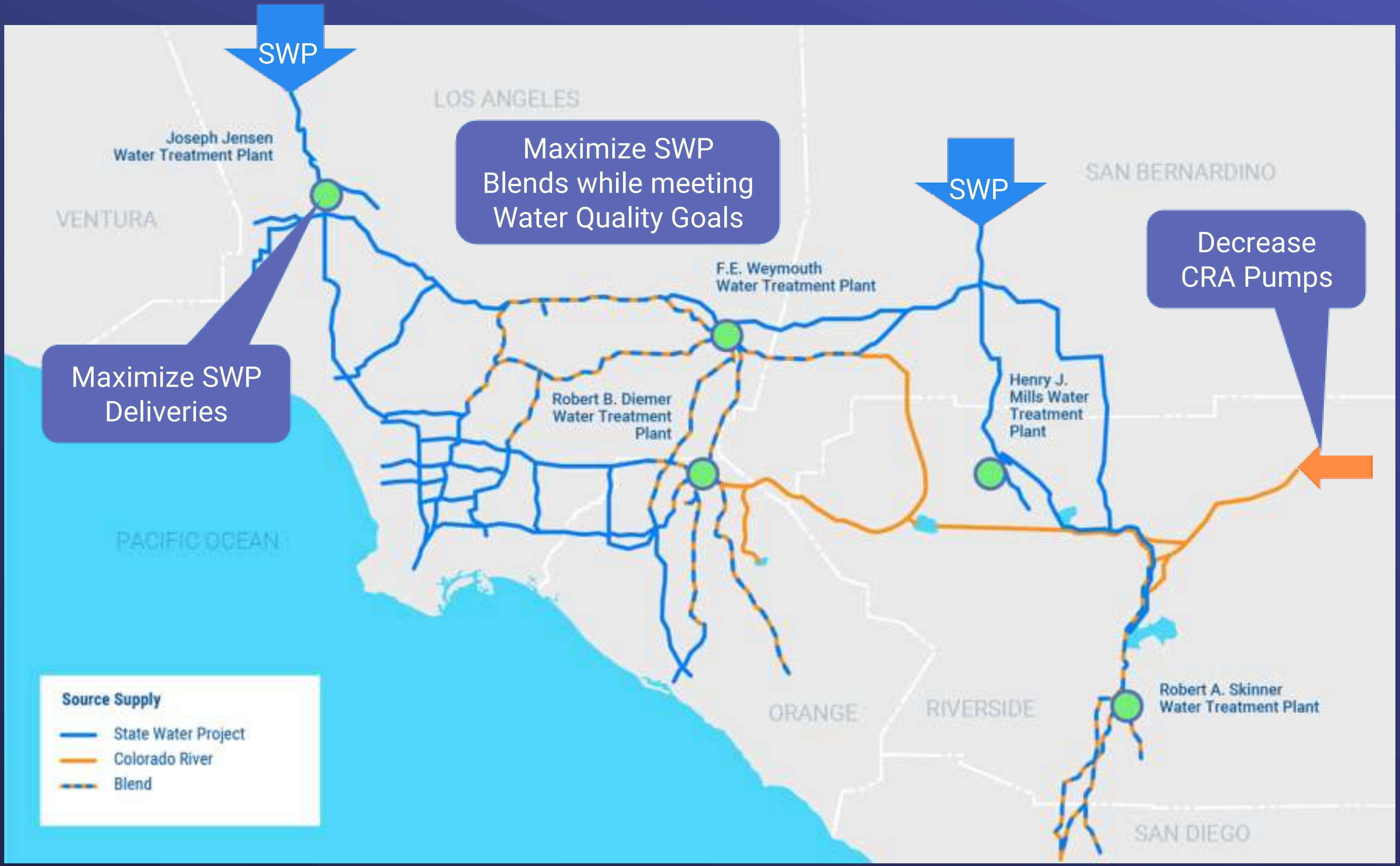
- Southern California's consumers and local supplies depend on SWP's high-quality water
- SWP supplies help Metropolitan meet salinity goals of 500 mg/L at treatment plants
  - SWP supplies typically contain lower total dissolved solids (TDS) compared to CRA supplies
    - Average TDS: 250-325 mg/L (SWP) vs. 625 mg/L (CRA)
  - SWP supplies preferred for blending purposes
- SWP's water quality and salinity management desirable for groundwater basins and recycled water

Deliveries to USG-03 (June 2024)



System Flexibility

Metropolitan's Flexible System



Surplus Year Operations
(Higher SWP Allocations)

- Maximizing West Branch & East Branch
- Maximizing SWP Blends
- Minimizing CRA Diversions
- Maximizing Groundwater Deliveries
- Replenishing Storage Accounts




Storage Portfolio

SWP Essential to Metropolitan's Storage & Reliability

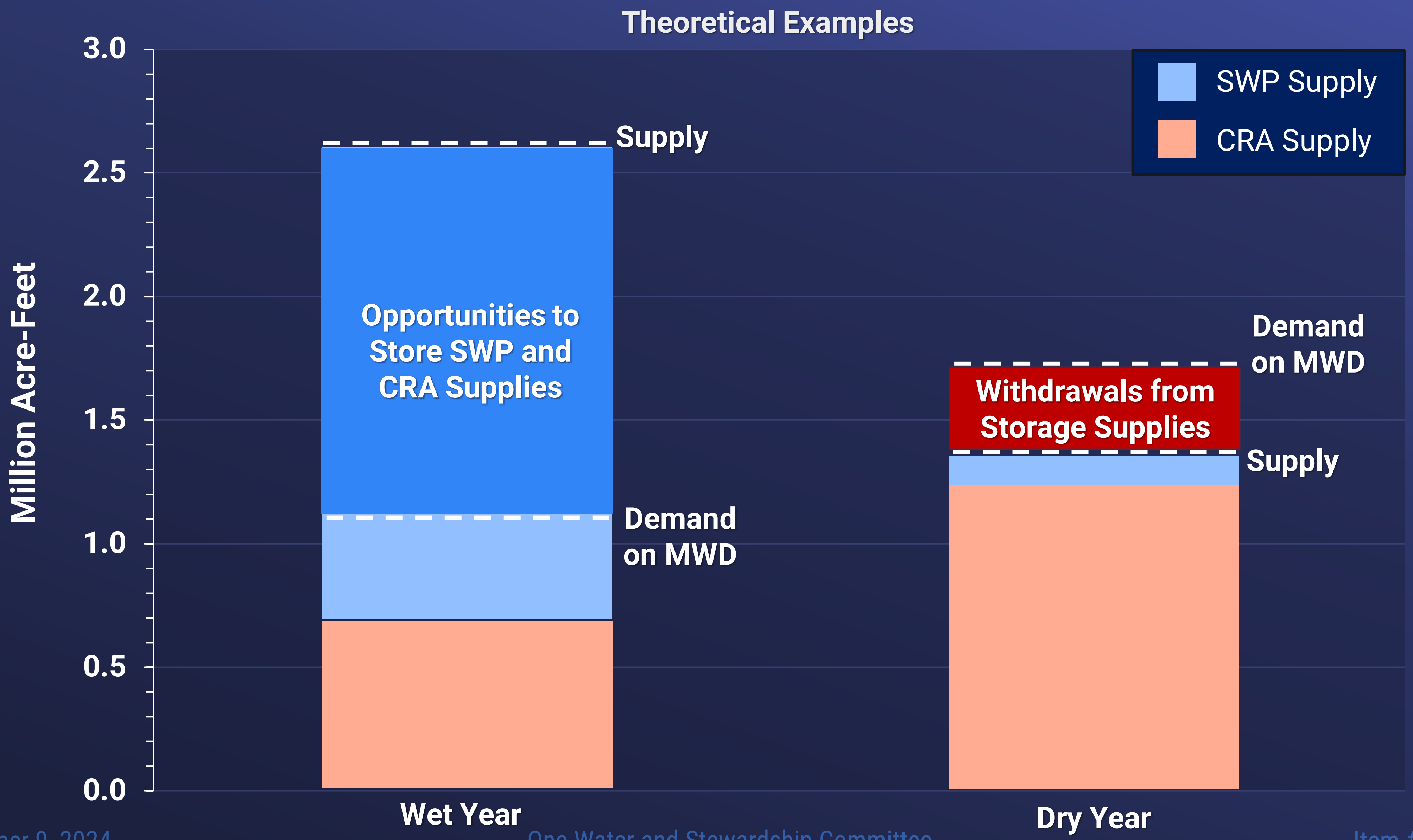
Key SWP storage facilities utilized within Metropolitan's storage portfolio

Metropolitan's SWP system captures, stores, and delivers high-quality water that is accessible to all member agencies across the entire service area

SWP supplies are actively managed to preserve Colorado River water in non-dry years and to make the most of Metropolitan's extensive storage portfolio

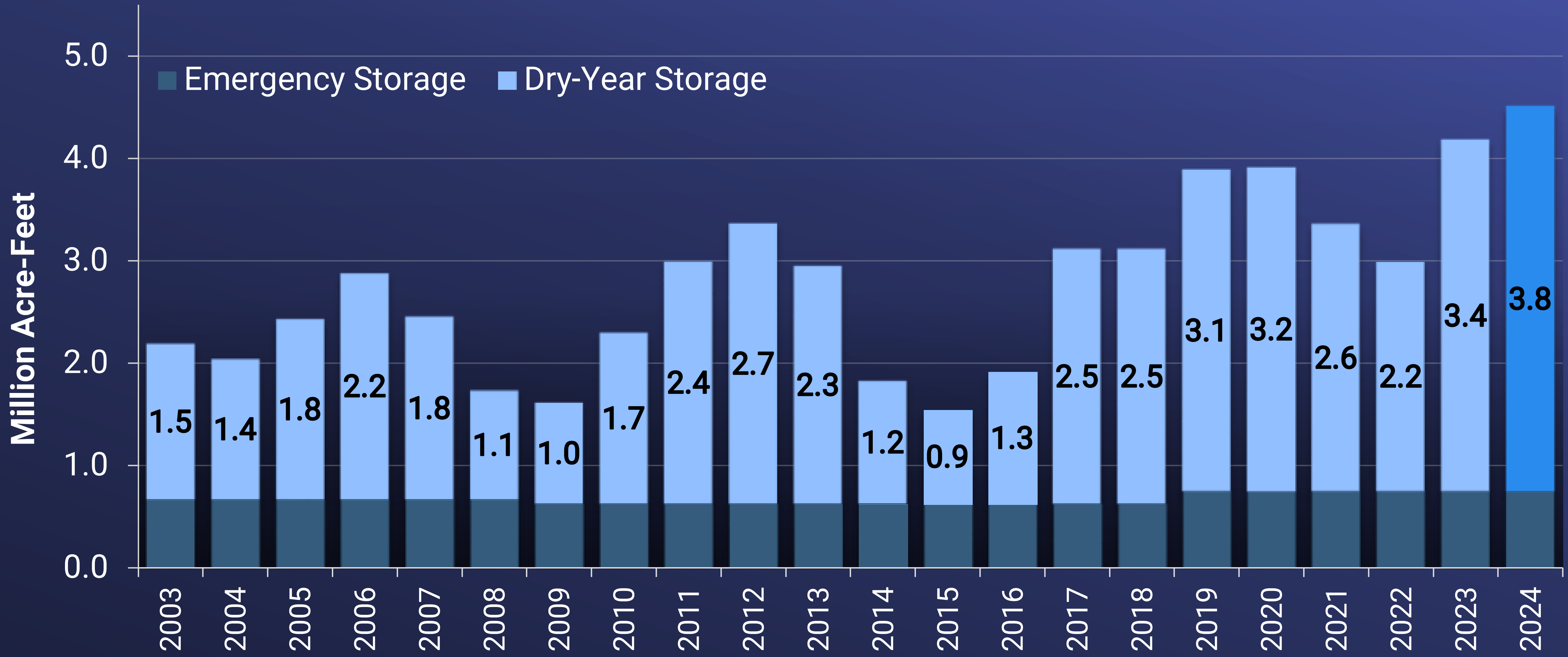
Note: Map not drawn to scale.

Metropolitan's Water Supply/Demand Balance Strategy



Metropolitan's Record-High Storage

End-of-Year Balances



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

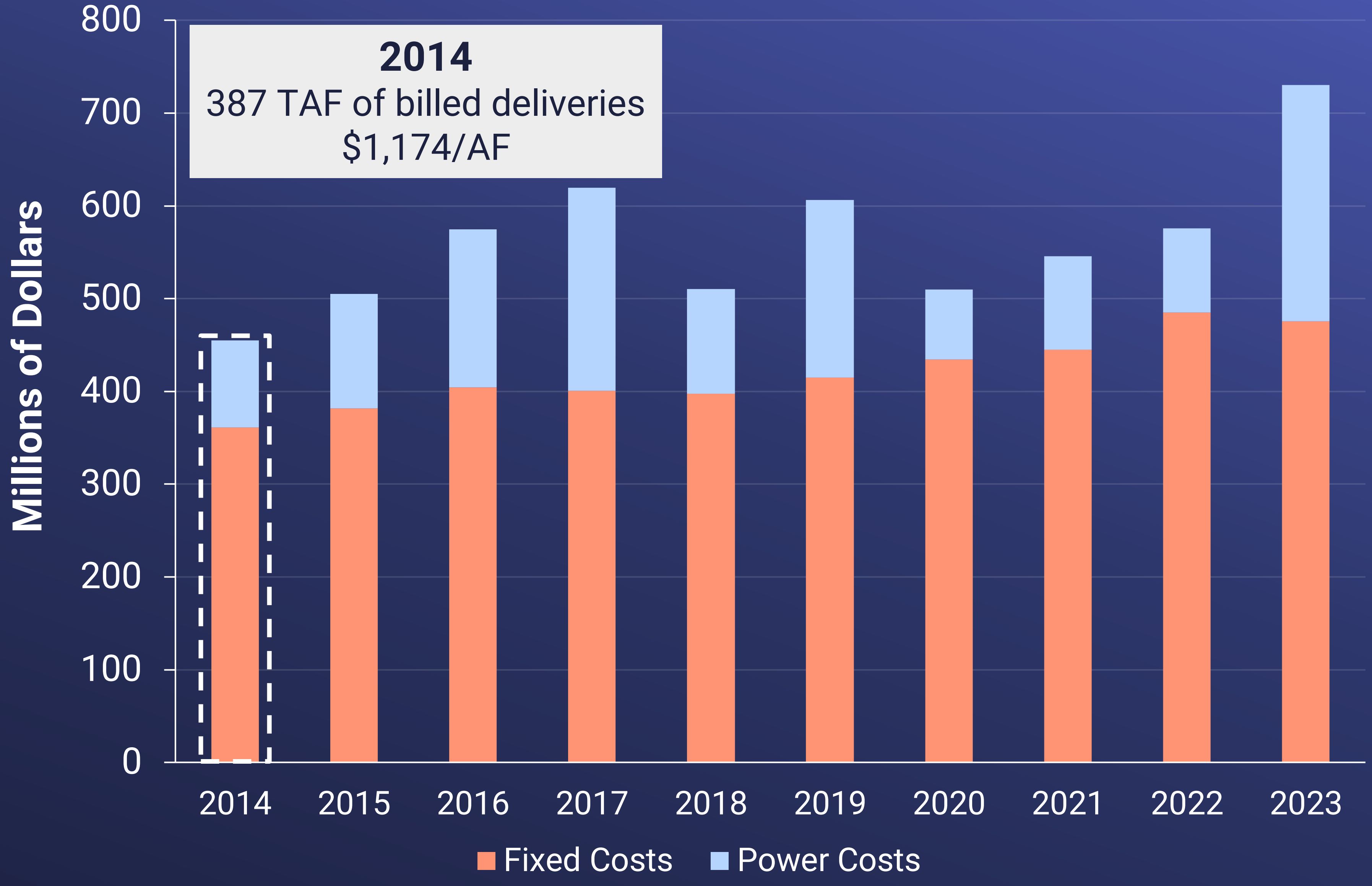
California Aqueduct (May 13, 2023)

Credit: DWR

Costs & Value of the SWP

Metropolitan SWP Charges

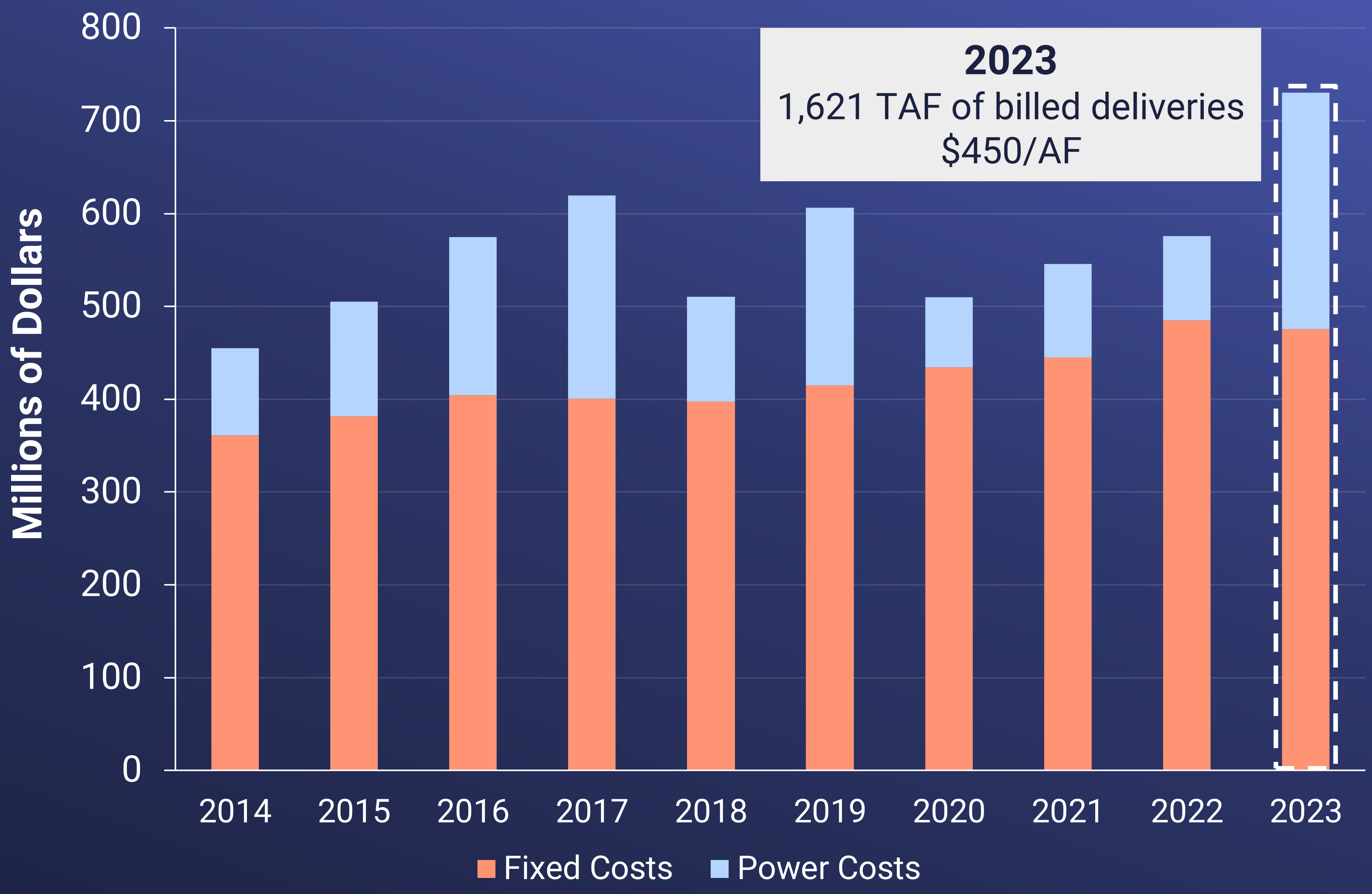
2014-2023
(in nominal dollars)



Note: Data compiled from Department of Water Resources Bulletin-132-23 Appendix B. Dollar per acre-foot calculation utilizes total billed deliveries from Table B-5B.

Metropolitan SWP Charges

2014-2023
(in nominal dollars)



Note: Data compiled from Department of Water Resources Bulletin-132-23 Appendix B. Dollar per acre-foot calculation utilizes total billed deliveries from Table B-5B.

Metropolitan SWP Charges

1963-2023
(in 2023 $)

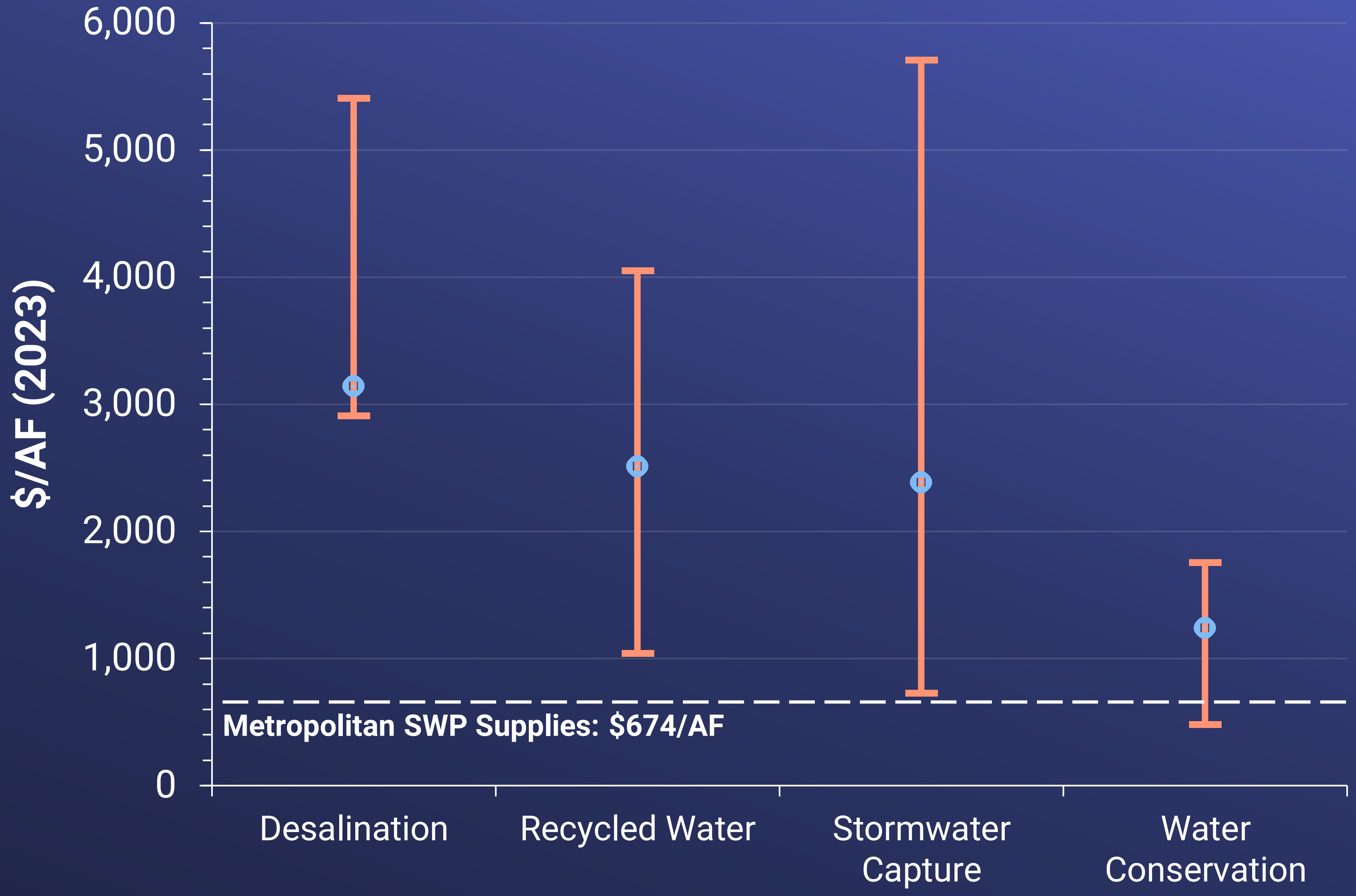
$29.9 Billion
Total Charges

44.3 Million AF
Total Billed Deliveries

$674/AF
Average

Note: Data compiled from Department of Water Resources Bulletin-132-23 Appendix B. Total deliveries and dollar per acre-foot calculation utilizes total billed deliveries from Table B-5B.

SWP Costs vs. Alternative Supplies
(in 2023 $)



Sources: Metropolitan SWP costs calculated from DWR Bulletin-132 and adjusted to 2023 dollars. Other values from previous studies by the Pacific Institute, PPIC, and CPUC and adjusted to 2023 dollars as published in “Facts About the Economic Value of the Delta Conveyance Project”

Present & Future Challenges


Lake Oroville (April 26, 2024)

Credit: DWR

Key Challenges

Regulatory Restrictions

Climate Change

Regulatory Restrictions

Water Quality

Endangered Species

Note: Photos courtesy of DWR.

Effects of Climate Change


Declining Snowpack


Wildfires


Extreme Precipitation

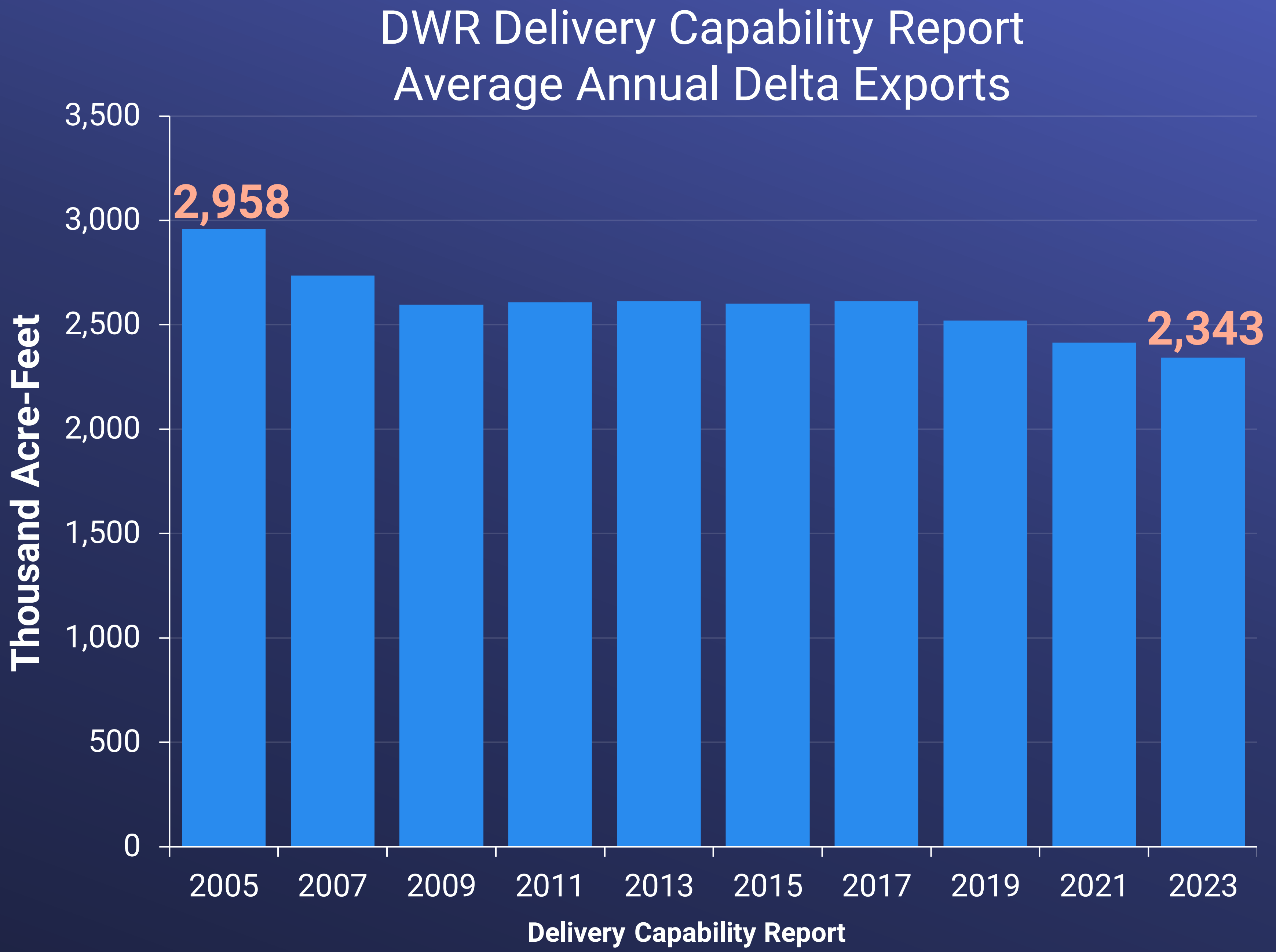
Higher Temperatures


Infrastructure Stressors

Note: Photos courtesy of DWR, Cooperative Institute for Research in the Atmosphere (CIRA) at Colorado State University, and East Bay Times.

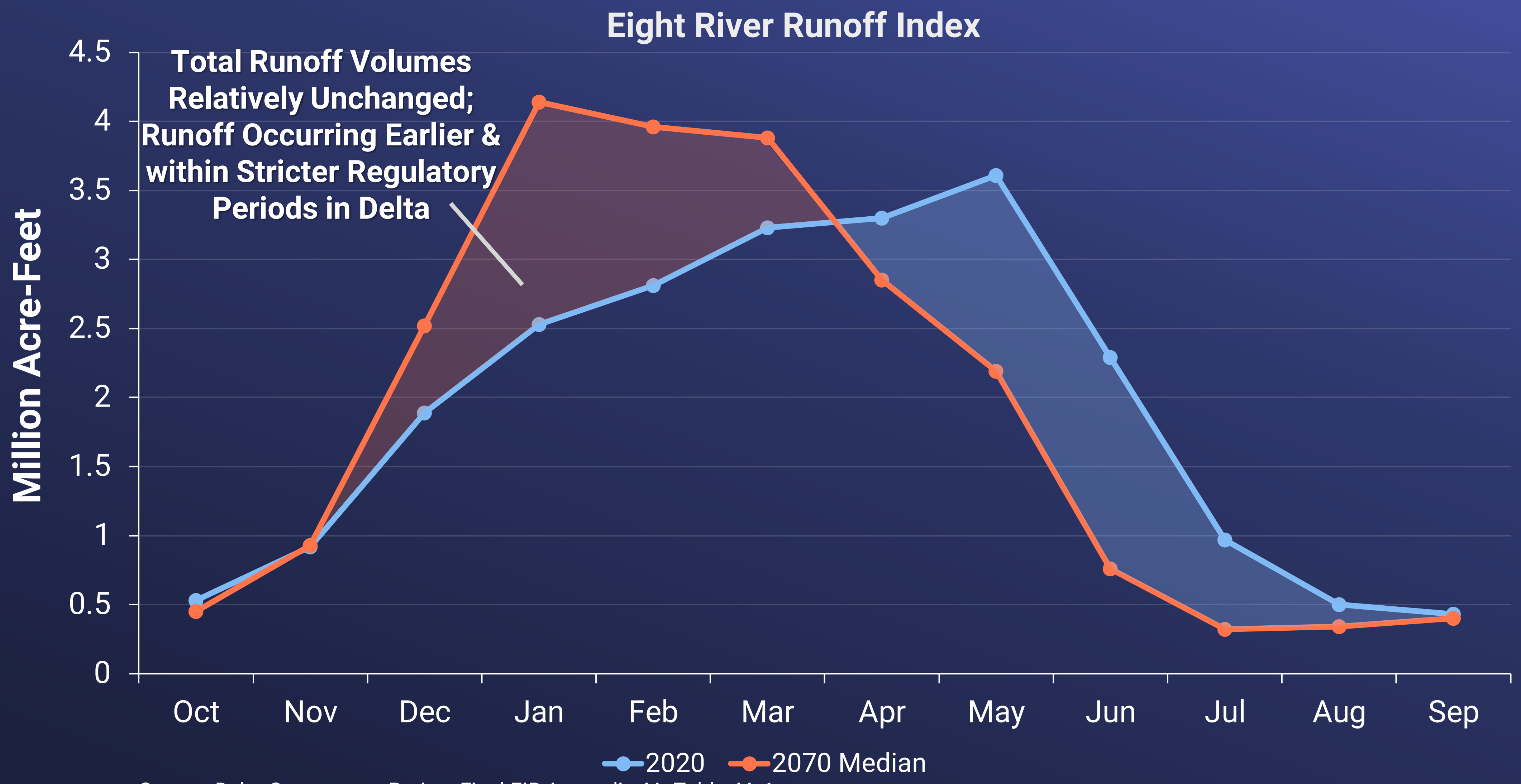
Reliability Estimates Trending Downward

Graph depicts modeled average annual SWP Delta Exports, which have declined by 600,000 AF since 2005.
This volume is equivalent to a 15% SWP Table A Allocation.



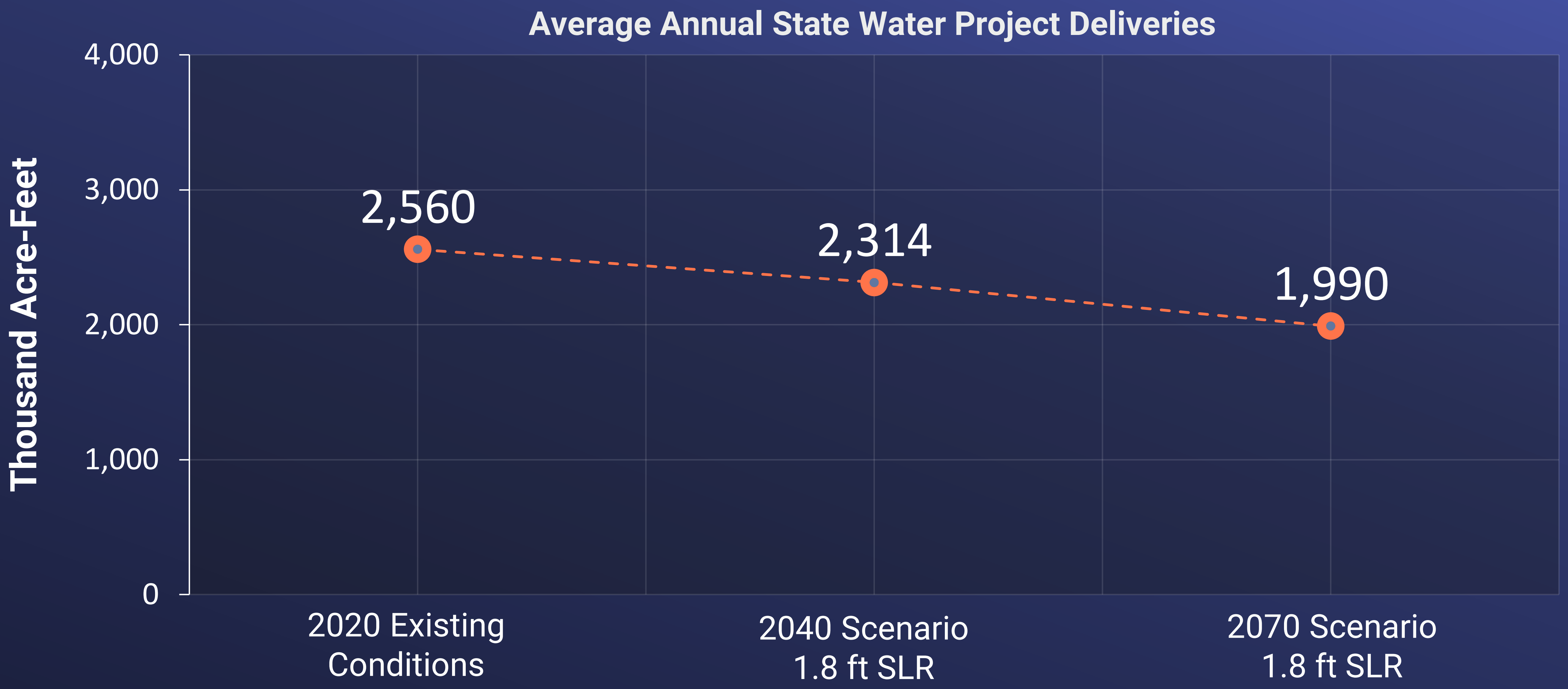
Source: Data from SWP Delivery Capability Report 2023, Figure 6-1.

SWP System Designed for Hydrologic Patterns that are Shifting with Climate Change



Source: Delta Conveyance Project Final EIR Appendix 4A, Table 4A-1.

Continued Decline in Reliability by 2070



Source: Berkeley Research Group, Benefit-Cost Analysis of the Delta Conveyance Project, Table 2, Analysis 5 and Main Scenario.

Key Takeaways

- Over the last 20 years, estimated reliability has declined by 15%
- Future water supply projections show continued decline over time
- Increased regulations and climate change continue to impact the reliability of the SWP
- More rainfall, less snowpack, and earlier runoff indicative of the climate change impacts to the hydrologic pattern
- The current SWP system is not designed to effectively manage the shifting hydrologic pattern

Lake Oroville (May 09, 2024)

Credit: DWR

Managing Risks & Uncertainty

Increase Resiliency and Reliability of the SWP

Additional Storage

- Meet demands in dry years
- Manage excess supplies
- Improve system flexibility

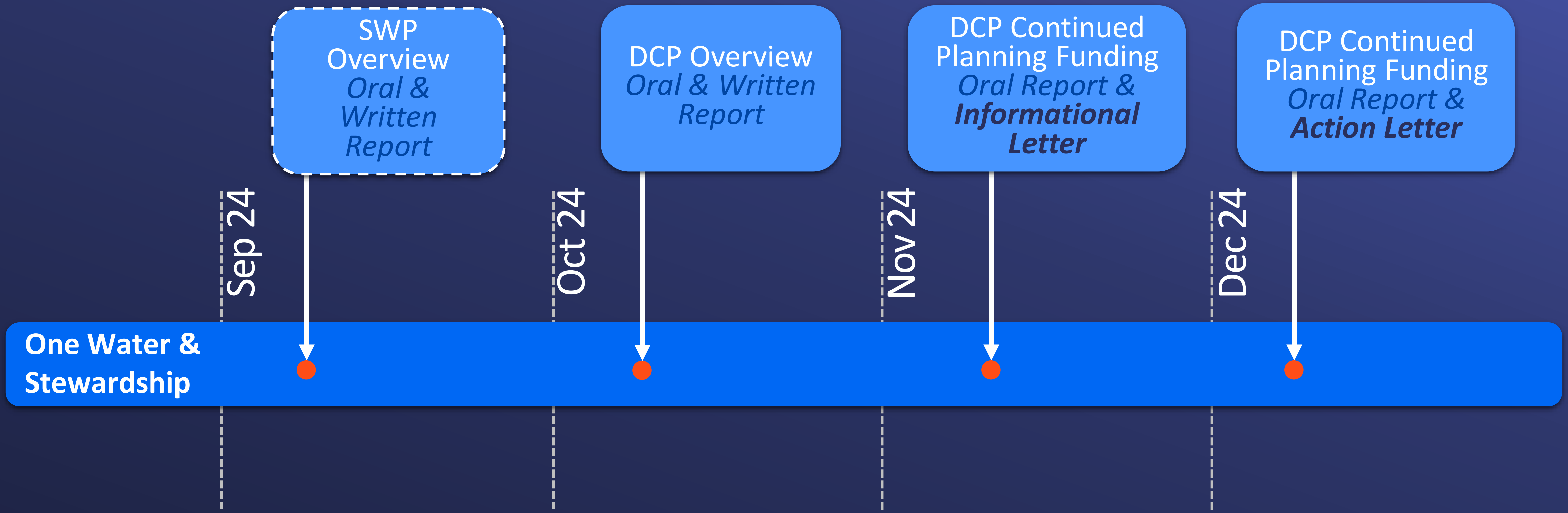
Flexible Conveyance

- Maintain existing capability
- Manage shifts in hydrology
- Optimize project operations

Credit: DWR

Next Steps: Conveyance for the SWP

Delta Conveyance Project – Board Updates and Deliberation for Continued Planning Efforts



THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Board Report

Bay-Delta Resources

- **Bay-Delta Management Report**

Summary

This report provides a summary of activities related to the Bay-Delta for August 2024.

Purpose

Informational

Detailed Report

Long-Term Delta Actions

Delta Conveyance Project

The State Water Resources Control Board issued a notice of public hearing regarding the Delta Conveyance Project on July 31, 2024. The public hearing is set to begin on January 16, 2025, and will address the water right change petition filed by the Department of Water Resources to add two new points of diversion and rediversion[1] to the water rights associated with the State Water Project.

Delta Conveyance Related Joint Powers Authorities

At the August 15th Delta Conveyance Design and Construction Authority (DCA) Board of Directors meeting, the DCA Board elected a slate of new officers which included Martin Milobar, representing Kern County Water Agency, as President; Tony Estremera, representing Santa Clara Valley Water District, as Vice President; Gary Martin, representing Santa Clarita Valley Water Agency, continues as Secretary; and Katano Kasaine continues as Treasurer.

Near-Term Delta Actions

Regulatory and Science Update

Staff provided a tour of the Delta to students and researchers from COEQWAL, the Collaboratory for Equity in Water Allocation. Twenty graduate students and postdocs from several University of California campuses toured the Delta, the Freshwater Pathway, Bouldin Island, and Webb Tract in August 2024.

Staff reviewed and provided comments to the California Department of Water Resources Draft EIR and the NMFS Draft Biological Opinion on the Long-term Operations of the State Water Project and Central Valley Project.

Delta Islands

Staff held a pre-bid inspection for the installation of flow meters and telemetry equipment on diversion siphons on Metropolitan's Delta Islands. This project is the fifth and final phase of a project related to SB 88 compliance. Staff continued design activities for the Webb Tract Wetland Restoration Project. Design of a new levee improvement project on Bouldin Island started in August 2024.

[1] A point of rediversion is a point, other than the point of initial diversion (i.e. Lake Oroville), where controlled water is diverted from a natural stream or an artificial water course that serves as a source of water.

Date of Report: 9/9/2024

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Board Report

Colorado River Resources

- **Colorado River Management Report**

Summary

This report provides a summary of activities related to management of Metropolitan's Colorado River resources for August 2024.

Purpose

Informational

Detailed Report

Colorado River Basin August 24-Month Study

The U.S. Bureau of Reclamation (Reclamation) issued the August 24-Month Study for Colorado River Basin for Water Year 2025. The August 24-Month Study projections of January 1 reservoir elevations sets the operating tiers for Lake Powell and Lake Mead and is used to project annual release volumes from Lake Powell to Lake Mead. In the most probable scenario, Lake Powell is projected to be in the Mid-Elevation Release Tier triggering an annual release of 7.48 million acre-feet of water, which is less than the normal annual release of 8.23 million acre-feet. If dry conditions return to the Colorado River Basin, release volumes may be adjusted downward based on the April 24-Month Study. Lake Mead is projected to operate in a Tier 1 Shortage Condition with Lower Basin Drought Contingency Plan contributions and Minute 323 water savings contributions. Metropolitan's water supplies are not impacted during a Tier 1 shortage. Intentionally Created Surplus (ICS) and system conservation water are also projected to be created, and Metropolitan may take delivery of ICS in 2025, if needed, to meet demands in our service area

Colorado River Board (CRB) Staffing Update

Chris Harris, the executive director of the CRB retired at the end of August and at the CRB's August 14 meeting, Jessica Neuwerth was appointed as the interim executive director. Ms. Neuwerth has been the deputy director of the CRB for the last several years. The CRB is expected to conduct a search for the CRB executive director in the coming months. Metropolitan staff is assisting the CRB in its search. Metropolitan plans to honor Chris Harris' career at the Colorado River Water Users Association's annual conference in December 2024.

Date of Report: 9/9/2024

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Board Report

Sustainability, Resilience, and Innovation Group

- **Sustainability, Resilience, and Innovation GM Monthly Report**

Summary

Sustainability, Resilience, and Innovation Office August 2024 Monthly Activities

Purpose

Informational

Detailed Report

SRI Core Activities

To support the development of CAMP4W, SRI participated in several outreach and engagement activities with different constituencies. This included giving presentations, moderating, and participating in panel discussions for the following:

- San Gabriel Valley Council of Governments Water Working Group
- BIA Southern California Water Conference
- MWD GM Listening Session on Equity and Environmental Co-Benefits (in collaboration with External Affairs)
- California Data Collaborative Annual Water Data Summit
- Sustain SoCal Water Solutions Conference
- Listening Session with Eastern Municipal Water District's Agricultural Water Users

With the CAMP4W Planning Team, SRI organized a workshop with the Member Agency Managers on the Evaluative Criteria and continued to receive input through follow-up meetings. SRI also introduced the Policies and Initiatives element to the One Water and Stewardship Committee. It helped facilitate discussion with the CAMP4W Taskforce on a refined approach to the Evaluative Criteria, service area population data, and an update by the Member Agency Ad Hoc Working Group on business model discussions. The CSRIO also participated in the second National Advisory Committee on Climate Adaptation Science meeting, providing recommendations to the Department of Interior and U.S. Geological Services on climate adaptation science needs and priorities.

Sustainability and Resilience

Zero Emission Vehicle Transition: On August 21, 2024, SRI conducted the Zero Emission Vehicle (ZEV) Executive Task Force meeting with the Fleet Services Unit, the Safety, Regulatory, and Training Section, and the Finance, ESG, and External Affairs Groups to continue Metropolitan's efforts to transition to ZEVs from fossil-fueled vehicles. At this meeting, the Task Force debriefed attendees on the August EO&T Committee presentation on ZEV replacement strategy and financing options; this item will be followed by an October action item to the Committee. Other agenda items included ZEV and charging equipment procurement, infrastructure buildout, and funding opportunities. CARB's Advanced Clean Fleets Rule requires the transition to ZEVs to replace 50% of its medium and heavy-duty vehicles with ZEVs.

Sustainable Procurement: SRI and the Contracting Services Unit met with the Legal Department to discuss the new operating policies and sustainable procurement handbook. Legal is reviewing these documents and will provide input in September.

Date of Report:September 9, 2024

Centralized Grants Management Office

Metropolitan staff applied for an unprecedented $212 million in grant funds during FY 2023/2024. As of August 2024, we have been awarded $127 million, and $29 million in applications is still pending award notifications. The Centralized Grants Management Office (CGMO) has begun outreach to all Metropolitan groups to provide a brief overview of the grant services available to staff. Through these outreach efforts, the CGMO will establish grant administrators within each group and gather project information for a Metropolitan grants three-year strategic priorities plan.

On August 29, the CGMO held the second SoCal Water Utilities Grants Network meeting. Attendees learned how to develop and leverage partnerships with non-profits and Community-Based organizations from the Council for Watershed Health and Metropolitan's DE&I office. They also received information on SMART goals. This meeting set the SoCal Grants Network up to develop a regional strategic plan for grants and research.

Innovation, Pilots, and Emerging Technologies

SRI staff worked with Water Supply Operations to facilitate an information exchange with the City of Chicago through our Innovation Partner, Booky Oren Global Water Technologies. The teams discussed their common challenges and strategies related to the transition to zero-emission vehicles. The discussion yielded some important lessons learned on the build-out of charging infrastructure and will continue in the coming months.

The CSRIO participated in a Technology Spotlight session at the Water Data Summit focused on evaluating emerging technologies for their climate resilience potential and value.

Environmental Planning Services

Core Business: Environmental Planning and Regulatory Compliance Support

Environmental Planning Section staff continued to prepare California Environmental Quality Act (CEQA) documentation for capital projects, including an addendum to the Program Environmental Impact Report (EIR) for the PCCP Rehabilitation Program for the relining of Sepulveda Feeder South Reach. Staff filed Notices of Determination with the San Bernardino County Clerk and State Clearinghouse for the Inland Feeder/Foothill Pump Station Intertie Project Mitigated Negative Declaration following the August Board action to adopt the document. Staff continued to prepare the draft Program EIR for the Pure Water Southern California program, including reviewing draft technical reports, preparing draft resource sections of EIR, and completing biological resource surveys. For the Webb Tract Wetland Restoration Project, staff completed archaeological surveys, contacted Native American tribes regarding tribal resources, and continued preparing documents to support the determination that the project is exempt from CEQA under the Statutory Exemption for Restoration Projects.

Critical operations and maintenance activities were supported by Environmental Planning Section staff, including providing CEQA and regulatory clearances, conducting pre-construction surveys, and construction monitoring for operations and maintenance activities throughout the service area. Staff continued to participate in planning meetings for the Foothill Feeder shutdown and gave a presentation on environmental planning coordination for shutdowns at the annual shutdown planning meeting. Staff provided legislative analysis for a discussion draft of proposed amendments to the federal Endangered Species Act and for SB 868 (Safe Drinking Water, Wildfire Prevention, Drought Preparedness, and Clean Air Bond Act of 2024). Staff reviewed 24 CEQA notices for external projects and prepared comment letters for those that may affect Metropolitan facilities and/or operations.

Environmental Planning Section continued oversight of reserve management activities to protect valuable natural resources and meet Metropolitan’s mitigation obligations. Security patrols were conducted throughout both reserves to prevent trespassing, vandalism, poaching, and theft and to protect the reserves’ natural and cultural resources, facilities, and equipment. Activities at the Lake Mathews Multiple Species Reserve included establishing sites for a rare plant enhancement project to study how vegetation maintenance impacts rare plant recruitment and conducting Stephens’ kangaroo rat (SKR) monitoring as part of the Riverside County Habitat Conservation Agency’s range-wide monitoring efforts. Activities at the Southwestern Riverside County Multi-Species Reserve included the removal of non-native plants for fire and habitat management and coordination with researchers conducting burrowing owl and SKR surveys.

Stephens' Kangaroo Rat (***Dipodomys stephensi***)

Land Management

A film permit has been issued for a one-day film shoot at Diamond Valley Lake. The film shoot entailed a television commercial advertisement for Volvo cars.

Metropolitan recorded a permanent easement for public road purposes involving Wilson Street. The City of Rancho Cucamonga requires the developer of tract homes to extend the improvement of Wilson Street and facilitate the easement transaction as a condition of approving the development project.

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Board Report

Water Resource Management Group

- **Water Resource Management August Activities**

Summary

The Water Resource Management Group August 2024 Monthly Activities

Purpose

Informational

Detailed Report

Implement Regional Conservation Program

On August 8, 2024, the Water Efficiency Team (WET) staff was notified that two projects submitted for consideration to the United States Bureau of Reclamation (USBR) WaterSMART Water and Energy Efficiency Grant Program were selected for fiscal year 2024 funding. Metropolitan was selected to receive $250,000 for a Direct Install Turf Replacement Program to benefit Disadvantaged Communities and $1.75 million in funding to support our ongoing Residential Direct Install Partnership with the Southern California Gas Company (SCG). The Residential Direct Install Partnership with SCG replaces outdated showerheads, aerators, toilets, and irrigation controllers with new, water-efficient measures in low-income and disadvantaged communities.

The WET staff held a "Water Budgeting for Your Landscape" webinar in partnership with SCG for 115 attendees.

From August 6 to 8, 2024, WET staff participated in the "2024 Water Efficiency & Conservation Symposium: Alliance for Water Efficiency" in Chicago, Illinois. Metropolitan was one of the sponsors of the symposium, which brought together water efficiency professionals from all over the United States and Canada to discuss topics including reaching commercial and multi-family sectors, championing equity, and understanding/addressing utility water loss. The WET staff presented, participated in panel discussions, and represented Metropolitan on the Alliance for Water Efficiency Board of Directors. *(Strategic Priority 3.2.8: "Increase outdoor water use efficiency.")*

Position Metropolitan as a Leader in Open Water Data

Water Resource Management staff attended the 9th Annual California Water Data Summit at the University of San Diego from August 15 to 16, 2024. Staff attended both policy-based and technical-focused tracks, which covered themes of governance and standardization of data systems, data pipelines and workflow automation, technologies for climate resiliency, compliance for the Making Conservation a CA Way of Life water efficiency regulation, groundwater management, among other topics. The WET staff also participated on a career networking panel discussing career paths in the water industry. Implementation Projects and Studies staff were on the planning committee for the Data Summit and facilitated Metropolitan's platinum sponsorship of the event. *(Strategic Priority 3.2: "Advance the long-term reliability and resilience of the region's water sources through a One Water approach that recognizes the interconnected nature of imported and local supplies, meets both community and ecosystem needs, and adapts to a changing climate.")*

Date of Report: 9/10/2024

Explore Opportunities to Leverage Metropolitan's SWP and Colorado River Supplies and Storage Assets

Staff met with Reclamation to provide a technical briefing on the High Desert Water Bank in support of efforts to obtain Bucket 2 federal funding. Reclamation's technical reviewers were able to ask clarifying questions on the program features and operation. Metropolitan has applied for $80 million in grant funding under the Bucket 2 umbrella. These discussions lead the way into an initial draft funding agreement, which is expected to be available in September. *(Strategic Priority 2.2.3: "Secure Inflation Reduction Act funding that supports Colorado River water use objectives.")*

Promote Metropolitan's Technical Capabilities and Innovation Efforts to Advance the Understanding of Water Resources Management

Staff will be starting a healthy soils project adding biologicals to a newly planted alfalfa field in the Palo Verde Valley with our tenant, Nisha Noroian. We are working with Performance Resource Management biological products for the soil through the WaterStart program to build healthy soils and improve the soil water holding capacity. *(Strategic Priority 3.2.2 "Implement and promote agricultural water-conservation best practices")*