

CALIFORNIA DEPARTMENT OF WATER RESOURCES

# 2023 Final State Water Project (SWP) Delivery Capability Report (DCR)



Credit: DWR Photo Team

Nicole Osorio, E.I.T

2024 CWEMF Annual Meeting  
September 24, 2024

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# Outline

- Introduction - DCR
- Assumptions
  - DCR 2021 Differences
  - Existing Conditions
  - Future Conditions
- Key Findings
- Q&A



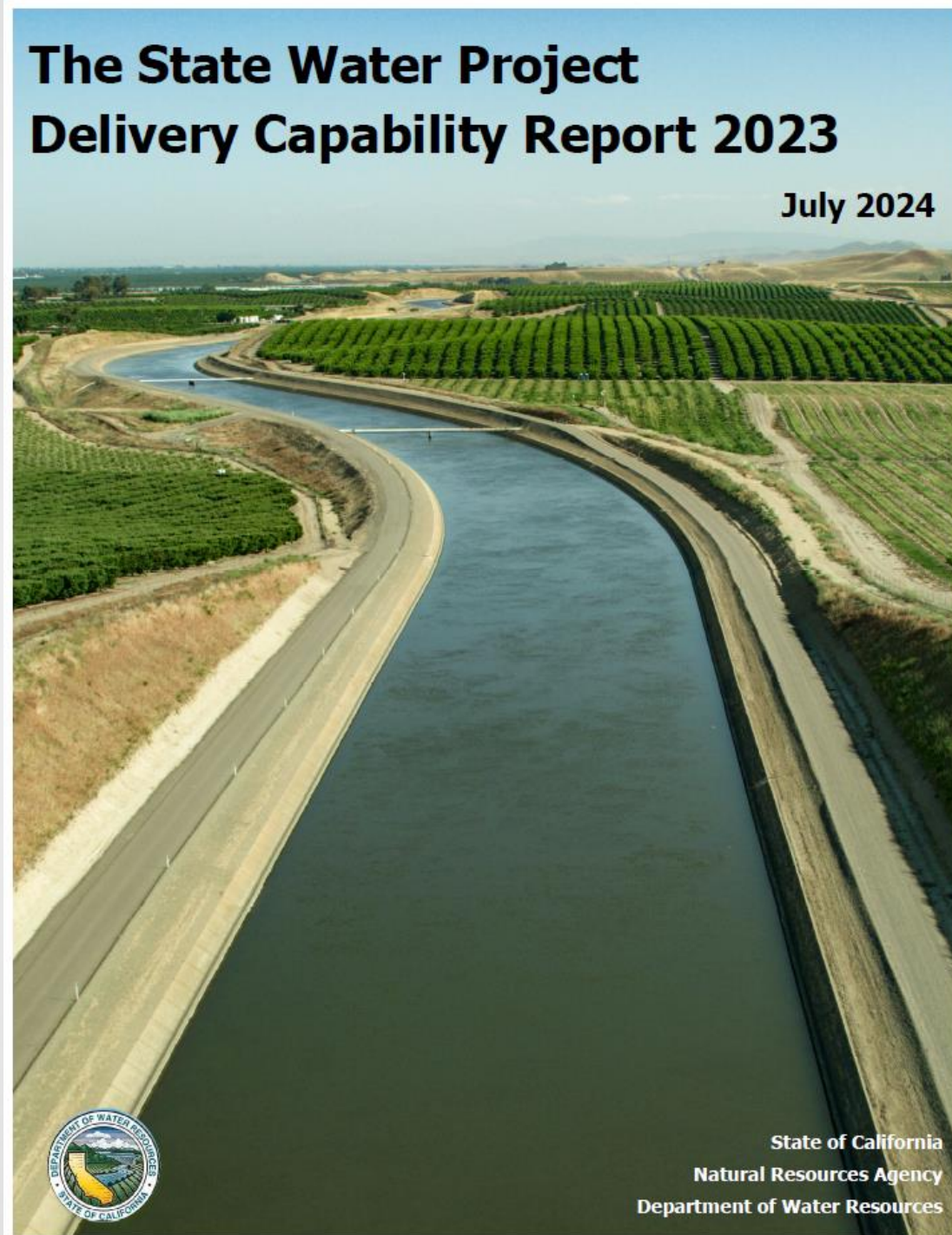
# Delivery Capability Report (DCR)

- Bi-annual report of Existing delivery capability
  - Over a range of hydrologic conditions
    - Historic extended dry cycle
    - Long-term average
- Future delivery capability added in 2007 looking 20-years into the future (business as usual + climate change)



## The State Water Project Delivery Capability Report 2023

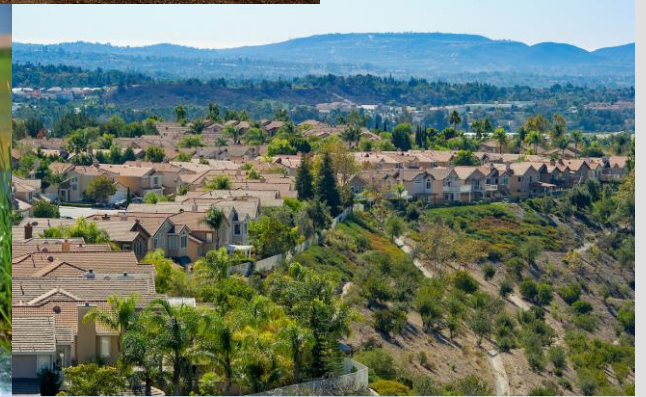
July 2024





# Why the DCR?

- Fundamental for drought planning
- Important input for Groundwater, Urban Water, Agricultural, and Integrated Regional Water Management Plans



# Differences Between 2021 and 2023 DCR

	DCR 2021 (Final)	Final DCR 2023 Historical	Final DCR 2023 Adjusted
Simulation Period	1922-2015	1922-2021	1922-2021
Hydrology	Historical	Historical <sup>1</sup>	<b>Adjusted Historical</b>
Key Operational Updates compared to 2021 DCR	--	<b>Code updates to maintain consistency with the LTO Existing Conditions Study</b>	Same as Final DCR 2023 Historical



1. Updates were made to the historical hydrology since the release of the 2021 DCR. These include updated rim inflows, error fixes/minor corrections, updated Delta Channel Depletion model.

# Assumptions: Existing Condition

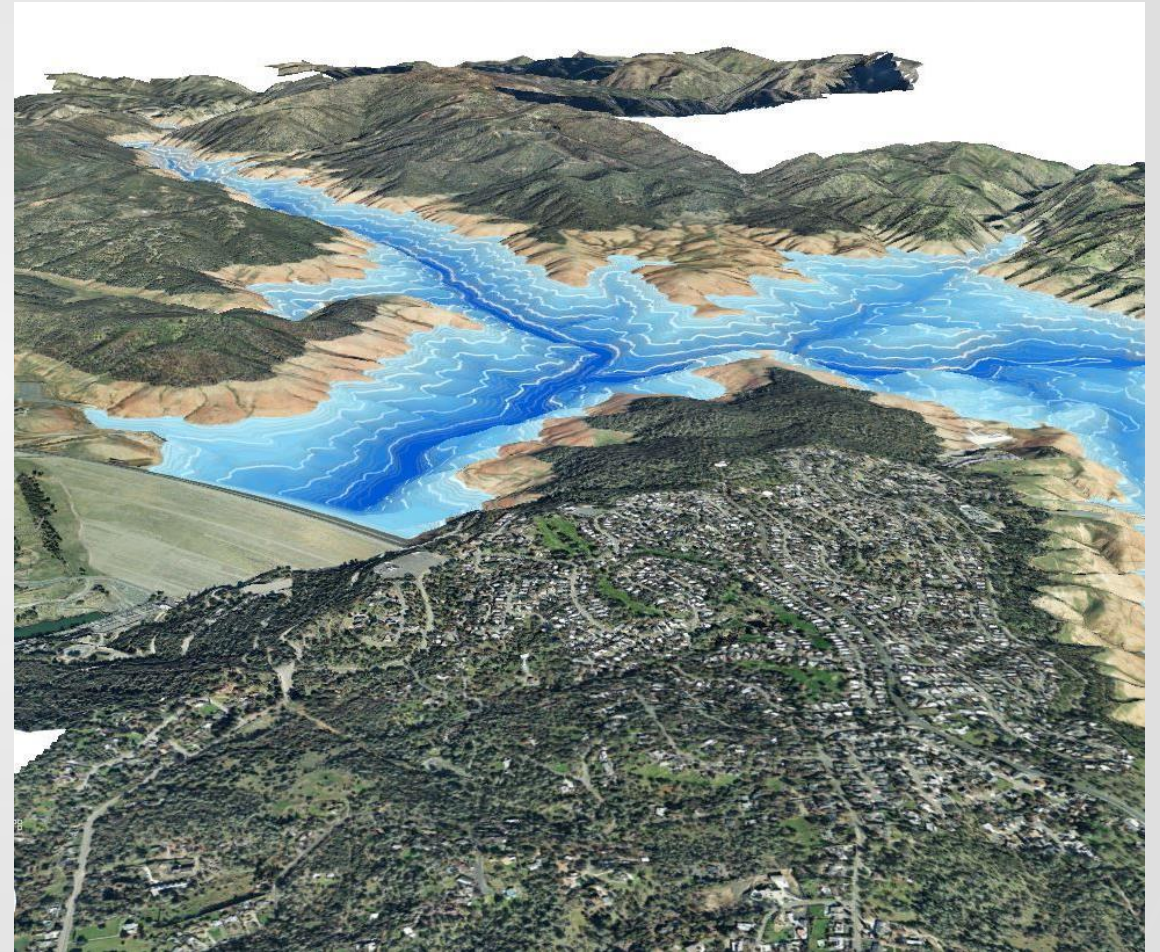
- CalSim 3
- Level of development – 2020
- SWP demand – Full Table A
- Regulations – D1641, 2020 Incidental Take Permit for SWP, and 2019 Biological Opinions
- Simulation period – 100 years (Water Year 1922-2021)
- **DWR and BOR updates, model improvements**
- **Hydrology – Climate adjusted historical hydrology**





# Baseline Model Updates

- Forecast methodology
- Old and Middle River constraints
- Delta Cross Channel Refinements
- Fremont Weir Adult Fish passage project
- Yuba River representation
- SWP
  - Oroville bathymetry
  - Operational availability
  - Dos Amigos pump sharing
  - Table A and Article 21 demands
- CVP
  - San Joaquin River Restoration and Recapture refinements
  - Sacramento River Settlement Contractors representation



# Climate Adjusted Historical Hydrology

- Account for climate changes that have ***already*** occurred
- Estimation of ***current*** SWP capacity and reliability for use in operations and planning studies
- Moving forward-future climate changes would be mapped onto this new baseline





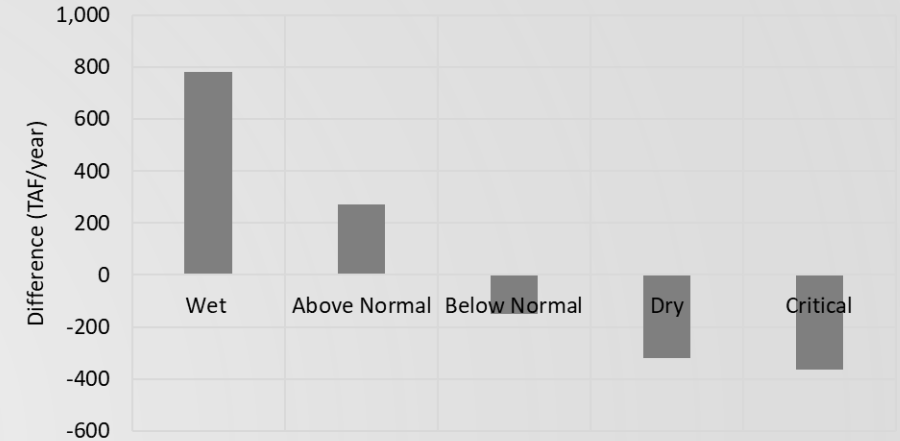
# Climate Adjusted Historical Hydrology: Inflow Changes

- Minimal change in long-term annual average.
- More variability in year-year runoff
- More seasonal variability.
  - Higher winter flows.
  - Lower spring flows.

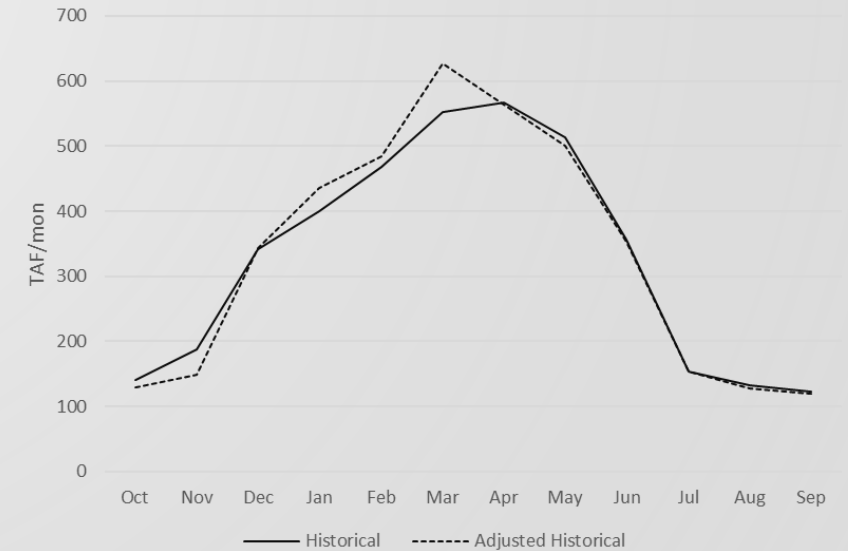
Average Long-Term (1922-2021) Annual Inflows to Major Reservoirs (TAF/year)

Description	DCR 2023 Historical	DCR 2023 Adjusted Historical	% Difference
Lake Oroville Inflow	3,938	3,986	<b>1.2%</b>
Lake Folsom Inflow	2,642	2,671	<b>1.1%</b>
Lake Shasta Inflow	5,571	5,592	<b>0.4%</b>
Trinity Inflow	1,228	1,234	<b>0.5%</b>

Change in major reservoir inflows compared to historical hydrology



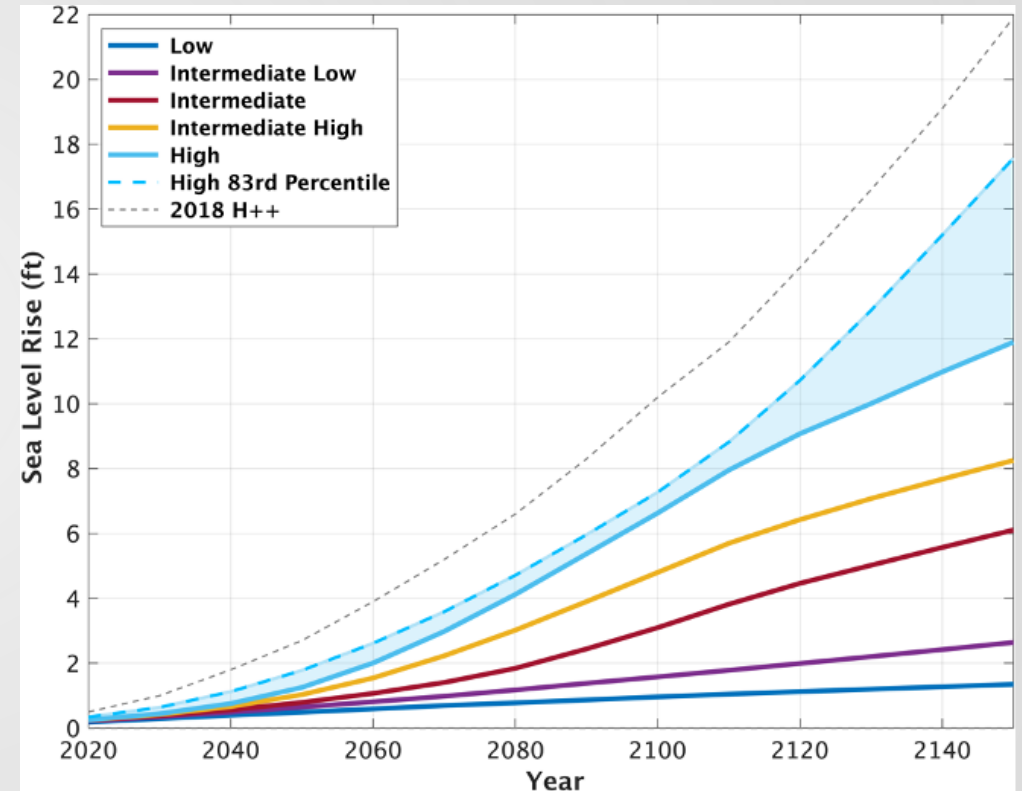
Oroville Monthly Inflow Distributions [WY 1922-WY2021]



# Assumptions: Future Conditions

## ➤ Risk-informed climate change hydrology and sea-level rise

Level of Concern (Percentile)	2043 Change in Temperature	2043 Change in Precipitation	2043 Precipitation Intensification	2043 Sea Level Rise
50 <sup>th</sup>	+1.5°C	+1.5%	11%	15 cm
75 <sup>th</sup>	+1.7°C	+0.1%	12%	30 cm
95 <sup>th</sup>	+1.8°C	-1.8%	13%	30 cm

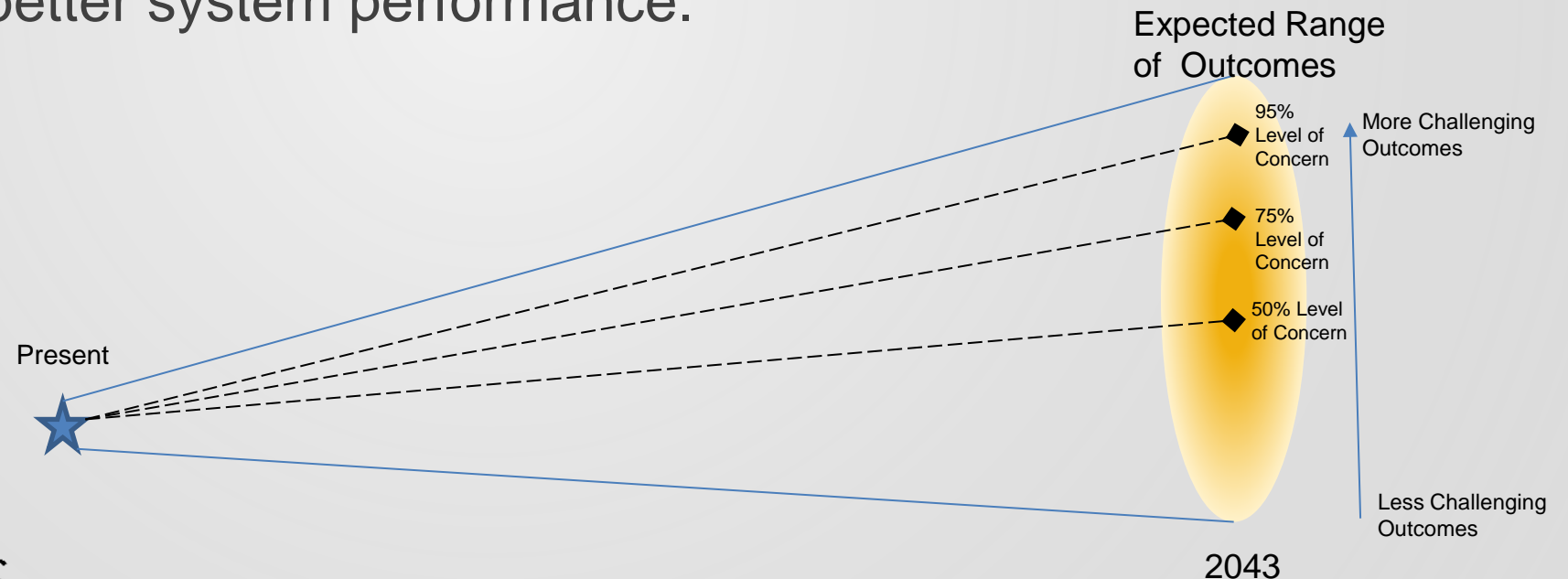


OPC, California Sea Level Rise Guidance: 2024 Science and Policy Update



# Risk Informed Future Climate Scenarios

- Future conditions scenarios evaluate combinations of climate changes (temperature, precipitation, and sea level rise) that represent different levels of risk - Defined as “**Levels of Concern**”. The quasi-probability number describes the percent of model informed climate outcomes that would result in better system performance.

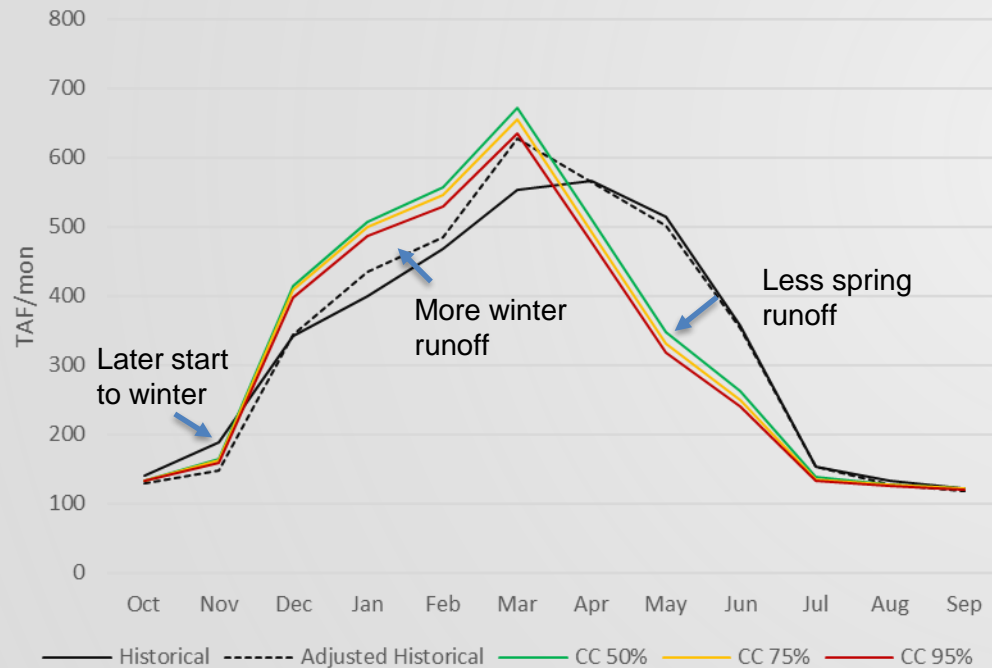




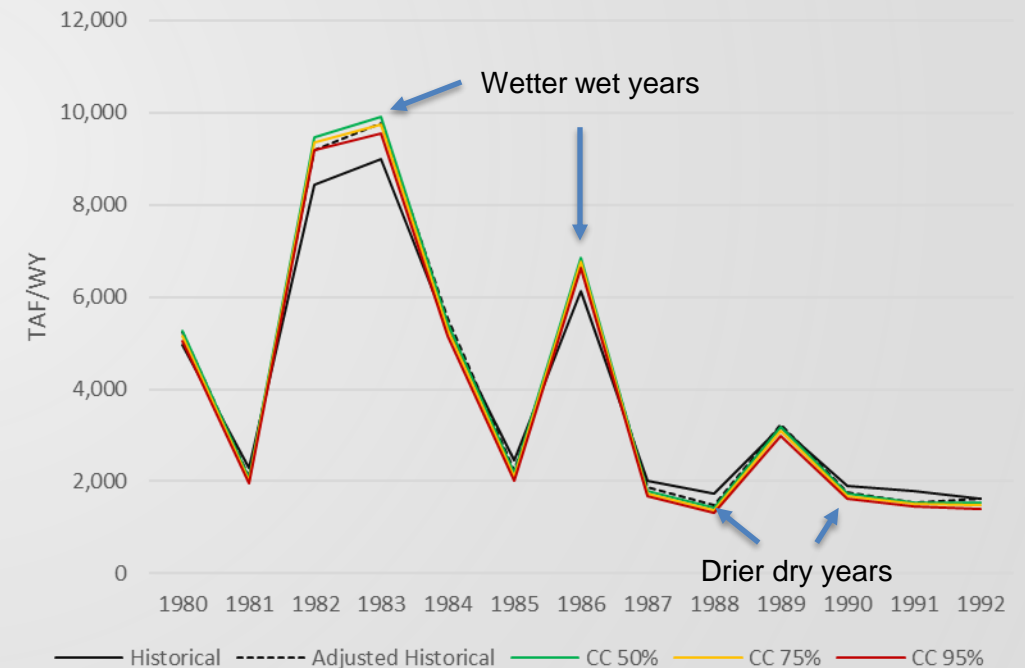
# Climate Change Scenarios: Hydrology Impacts

Level of Concern (Percentile)	2043 Change in Temperature	2043 Change in Precipitation	2043 Precipitation Intensification	2043 Sea Level Rise
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Oroville Monthly Inflow Distributions [WY 1922-WY2021]

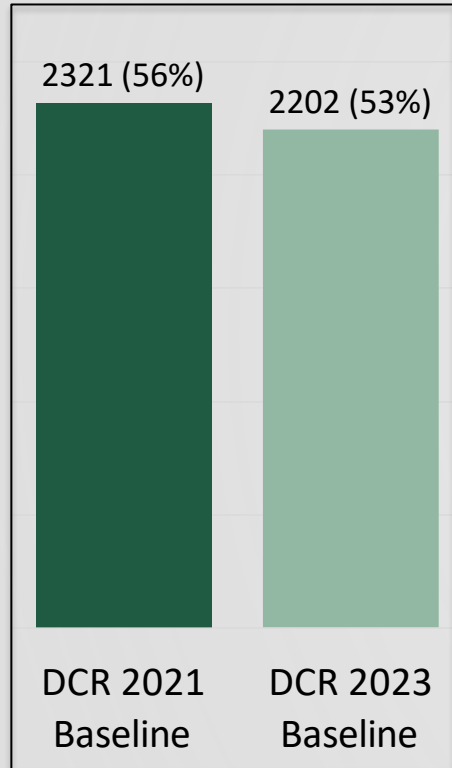


Oroville Annual Inflow Comparison



# SWP Table A Deliveries – Final DCR 2023

Long-term SWP Table A Deliveries [TAF/year] (Percent Allocation)



Under existing conditions, DCR 2023 shows a **119 TAF/year reduction in long-term Table A deliveries** compared to the DCR 2021.

Compared to the 2021 DCR, this represents:

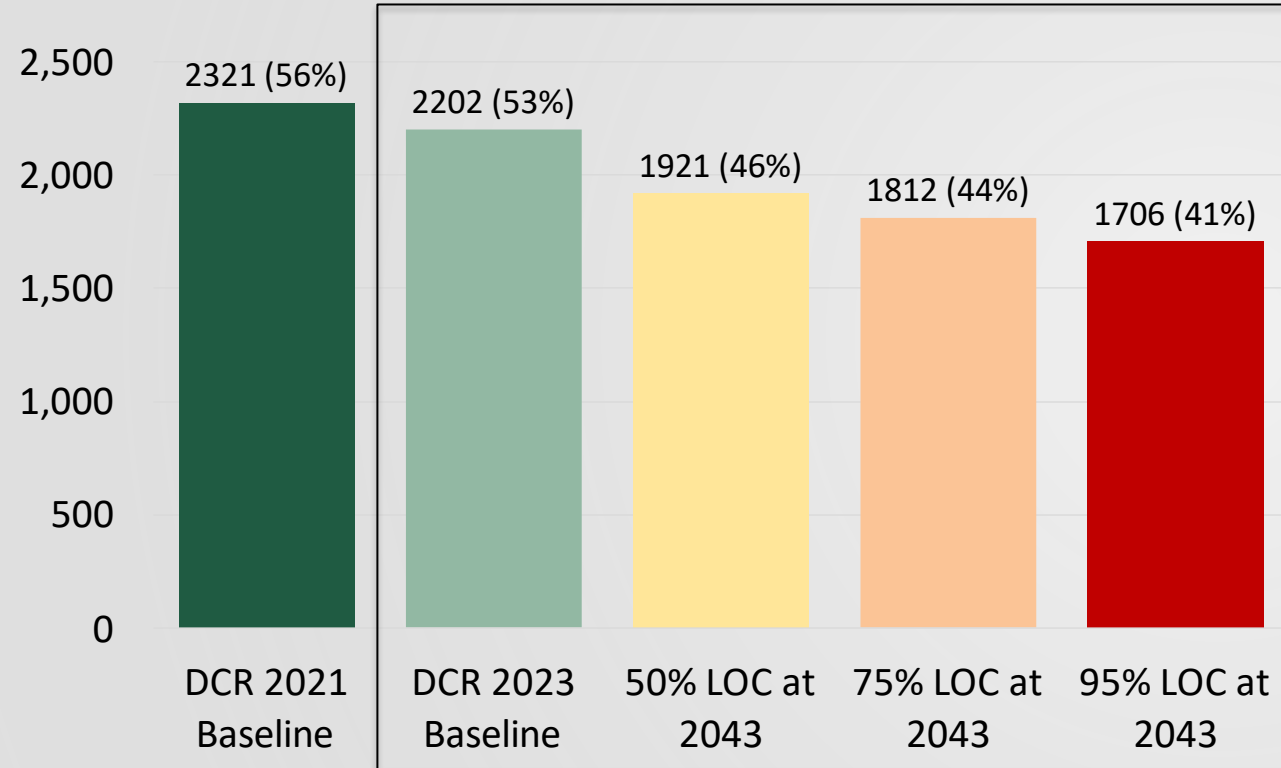
- 5% reduction in delivery volume  
(2,321 → 2,202 TAF/year)
- 3% reduction in allocation  
(56% → 53%)

These impacts are due to using Adjusted Historical Hydrology and updating Oroville reservoir bathymetry.



# SWP Table A Deliveries – Final DCR 2023

Long-term SWP Table A Deliveries [TAF/year] (Percent Allocation)



Under future conditions, DCR 2023 shows up to **23% reduction in long-term Table A deliveries** compared to the existing conditions.

Compared to the 2023 DCR existing conditions, this represents:

- 13-23% reduction in delivery volume  
(2202 → 1706-1921 TAF/year)
- 7-12% reduction in allocation  
(56% → 41-56%)

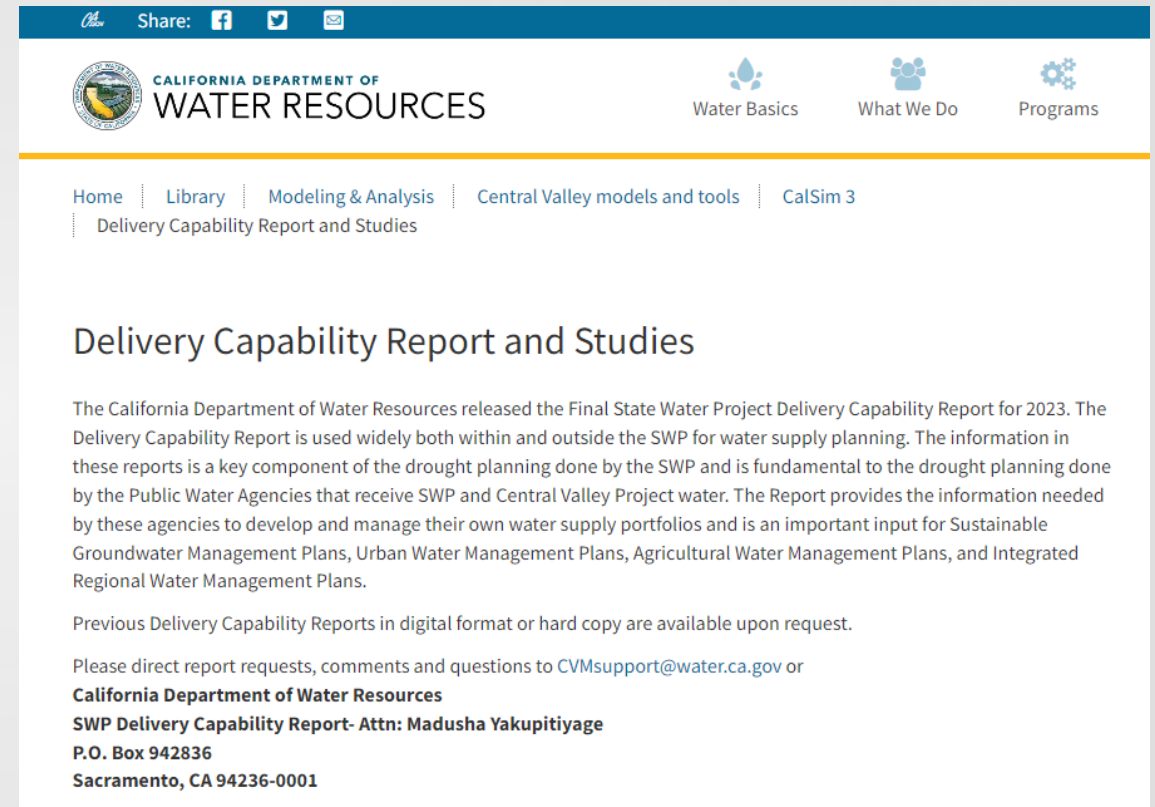
These impacts are due to changing flow patterns and extreme weather shifts.









# Final 2023 DCR Products




- Main Report
- Technical Addendum
- Hydrology Report
- Peer-Reviewed Additional Technical Reports
- Models
- Input Data



The screenshot shows the top portion of a web page. At the top is a blue navigation bar with a 'Share:' button and icons for Facebook, Twitter, and Email. Below this is the California Department of Water Resources logo and name. To the right are three menu items: 'Water Basics', 'What We Do', and 'Programs'. A secondary navigation bar contains links for 'Home', 'Library', 'Modeling & Analysis', 'Central Valley models and tools', and 'CalSim 3'. The main content area is titled 'Delivery Capability Report and Studies' and contains a paragraph of text explaining the report's purpose. Below the text are contact details for report requests, including an email address and a physical address in Sacramento, CA.

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| [Delivery Capability Report and Studies](#)

## Delivery Capability Report and Studies

The California Department of Water Resources released the Final State Water Project Delivery Capability Report for 2023. The Delivery Capability Report is used widely both within and outside the SWP for water supply planning. 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 water. The Report provides the information needed by these agencies to develop and manage their own water supply portfolios and is an important input for Sustainable Groundwater Management Plans, Urban Water Management Plans, Agricultural Water Management Plans, and Integrated Regional Water Management Plans.

Previous Delivery Capability Reports in digital format or hard copy are available upon request.

Please direct report requests, comments and questions to [CVMSupport@water.ca.gov](mailto:CVMSupport@water.ca.gov) or  
**California Department of Water Resources**  
**SWP Delivery Capability Report- Attn: Madusha Yakupitiyage**  
**P.O. Box 942836**  
**Sacramento, CA 94236-0001**

<https://water.ca.gov/Library/Modeling-and-Analysis/Central-Valley-models-and-tools/CalSim-3/DCR>



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# For more information:

- **Tuesday, 3:15-5pm Session 16: Hydrology/Climate Change (Ryan Lucas, BOR)**
  - Risk-Informed Climate Change Development – Andrew Schwarz (DWR)
  - USBR 2022MED Hydrology Development: Detrending Methodology – Drew Loney (USBR) & Tapash Das (Jacobs)
  - A New Normal: Adjusted Historical Hydrology – Richard Chen (DWR)
  - A New Normal: Climate Change Adaptation – Andrew Schwarz (DWR)
  - Climate Change Development: BOR and DWR Approaches – Drew Loney (USBR)



# Acknowledgements

## DWR

- Andrew Schwarz
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## Consultant Support

- Tapash Das (Jacobs)
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- Andy Draper (Stantec)
- Dan Easton (MBK)
- Shankar Parvathinathan (MBK)



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**Jacobs**

