CLIMATE CHANGE(D): WEATHERING EXTREMES *TOGETHER*
MODULE 1

ONEWATER ONEBAY

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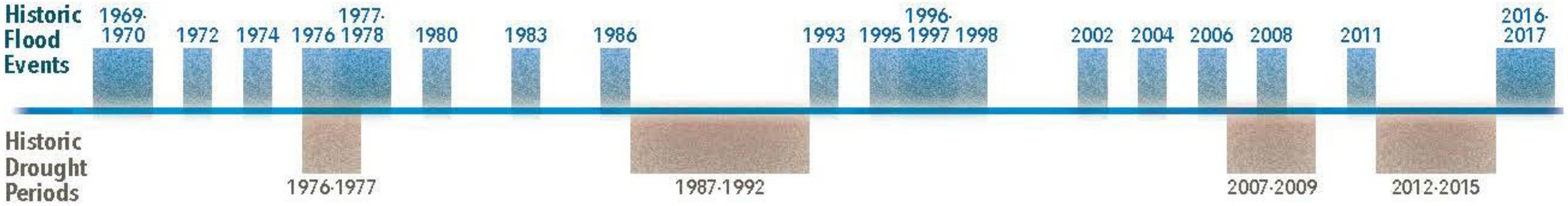
NBWA
NORTH BAY WATERSHED ASSOCIATION

CALIFORNIA DEPARTMENT OF WATER RESOURCES

Managing for Watershed Resilience

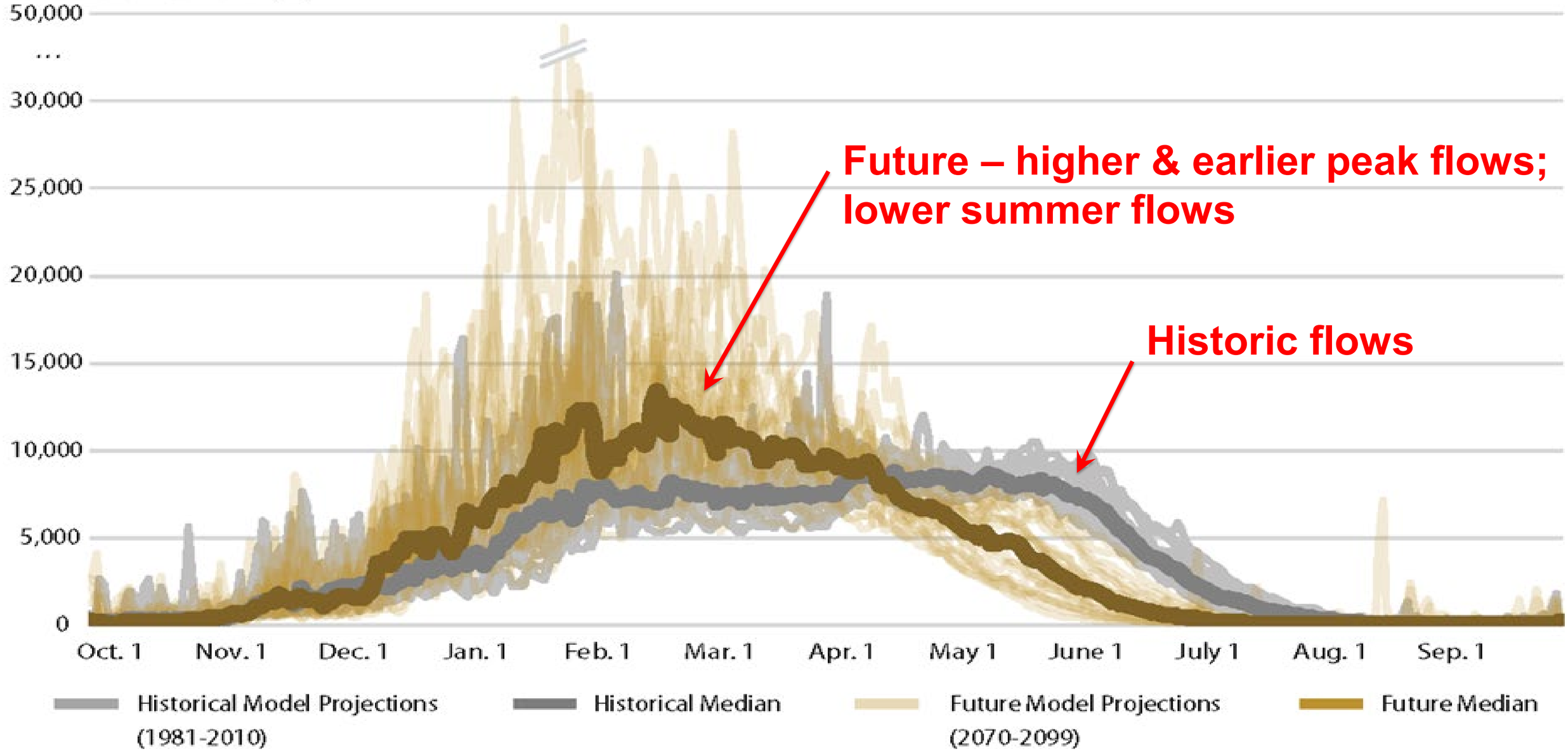
North Bay Watershed Association Conference
April 8, 2022

California's Water Management
A Tale of Extremes



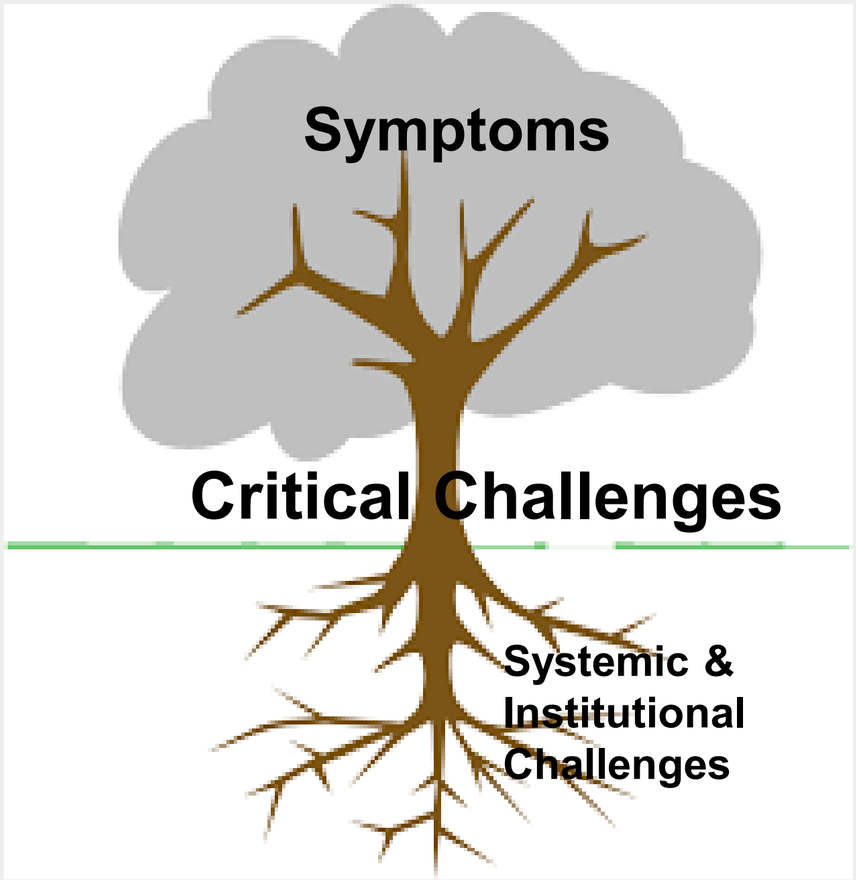
Effects of Climate Change Requires Wholesale System Changes

American River Simulated Flows (cfs) – Historic (Grey) & Future (Amber)



Systemic & Institutional Challenges
Overcoming them Increases Return on Investment

- Fragmented and uncoordinated decisions, initiatives & actions
- Inconsistent, inflexible, & conflicting regulations
- Insufficient capacity for data-driven decisions
- Insufficient & unstable funding
- Inadequate performance tracking
- Inequities in water management decisions, benefits, and impacts



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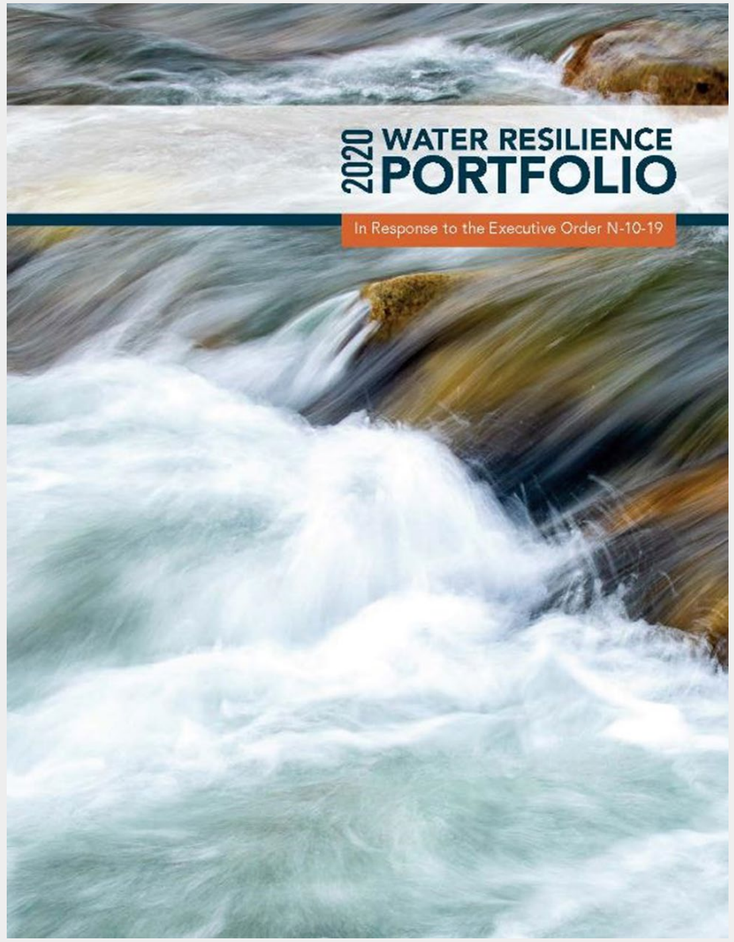
Water Resilience Portfolio
Advancing Regional Networks With State Support

- ❖ Maintain & Diversify Water Supplies
  - ✓ Diversify regional supplies to strengthen water security
- ❖ Protect & Enhance Natural Systems
  - ✓ Restore environmental health to sustain fish & wildlife
  - ✓ More adaptive & holistic environmental management
- ❖ Build Connections
  - ✓ Improve physical infrastructure to store, move & share water
  - ✓ Integrate water management with shared science, data & technology
- ❖ Be Prepared
  - ✓ Respond to flashier floods, deeper droughts & hotter temperatures



Principles of Water Resilience Portfolio

- **Prioritize** - *multi-benefit approaches* that meet multiple needs at once
- **Utilize** - *natural infrastructure* such as forests and floodplains
- **Embrace** - *innovation* and *new technologies*
- **Encourage** - *regional approaches* in watersheds
- **Incorporate** - *successful approaches* from other parts of the world
- **Integrate** - *investments*, *policies* and *programs* across state government
- **Strengthen Partnerships** - with *local*, *federal* and *tribal* governments, *water agencies* and *irrigation districts*, and *other stakeholders*

Water Resilience Portfolio Priorities

Water Supply, Quality, and Equity

Environmental Stewardship

Climate-Smart Agriculture

Disaster Preparedness and Response

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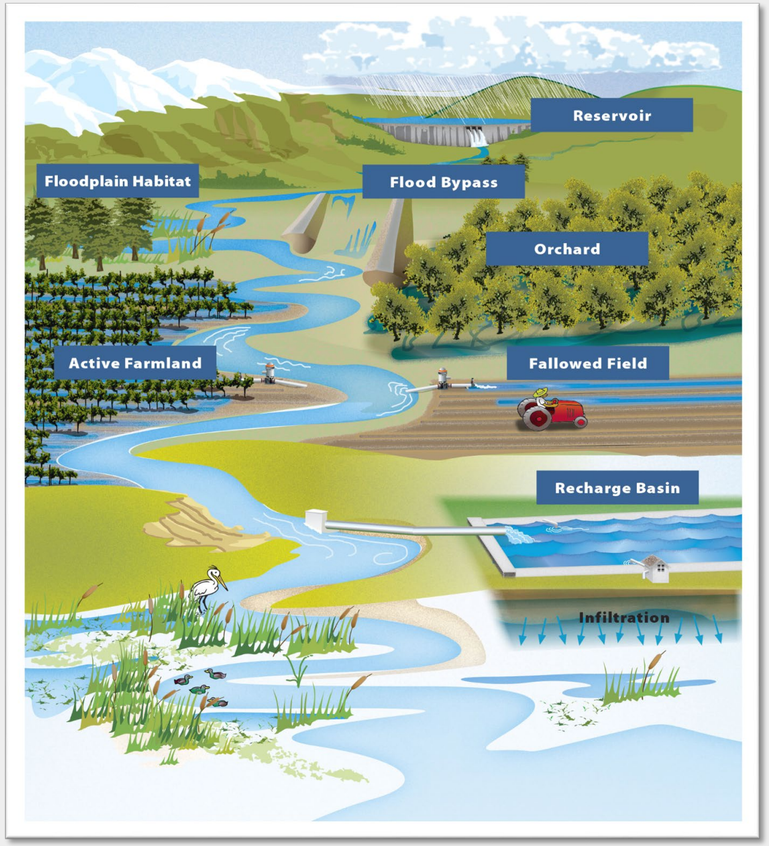
California Water Plan Update 2023

Advancing Themes of the Water Resilience Portfolio With State Agency Alignment & Watershed Networks

Climate Adaptation

Watershed Resilience



Equity in Water Management

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Resilience Requires Big Collaboration, Agency Alignment & Sector Co-Management

Integrated Watershed Management (IWM)

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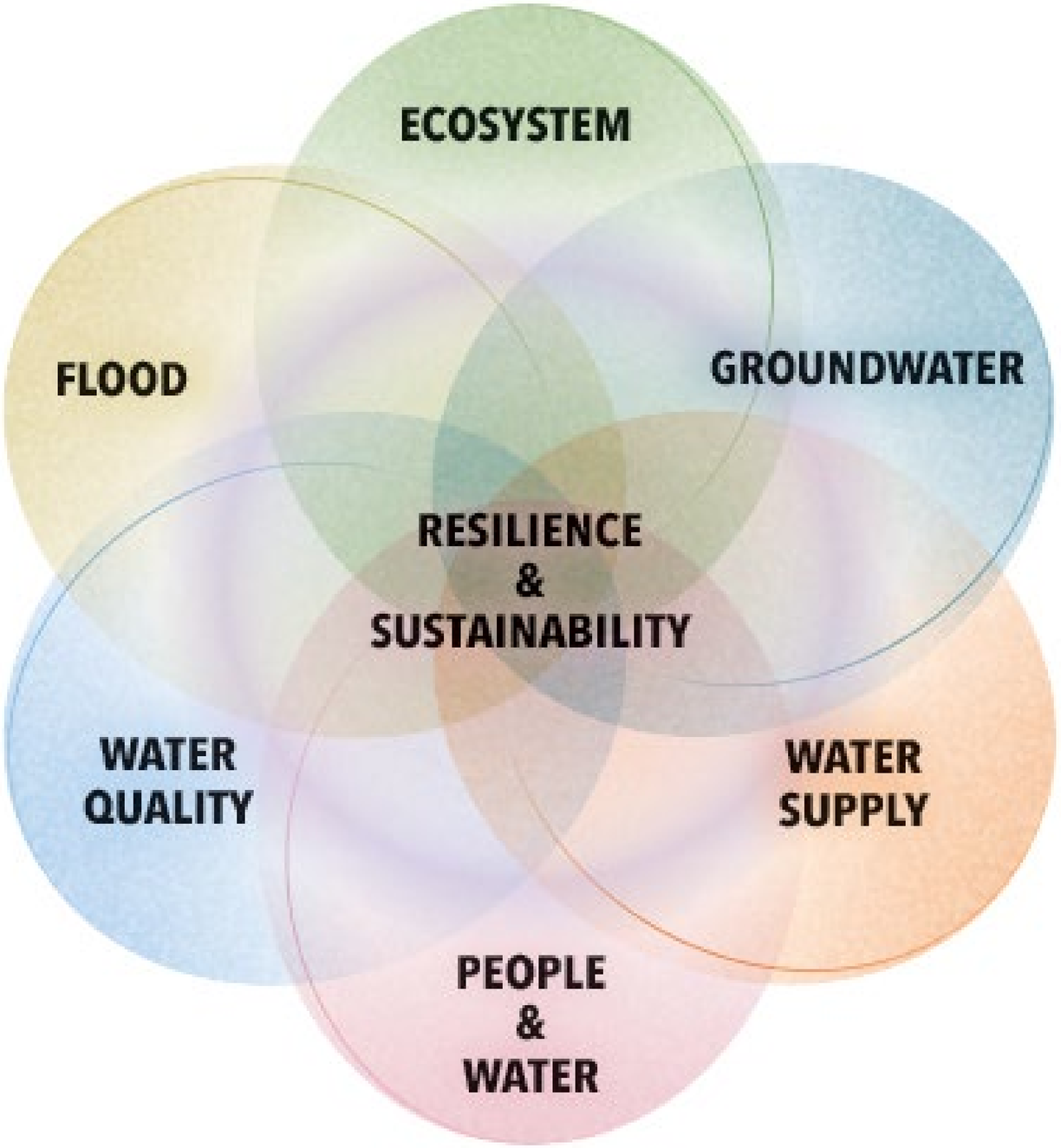
Multi-Sector Collaboration

Multi-Discipline Planning

Multi-Benefit Projects

Multi-Fund Investments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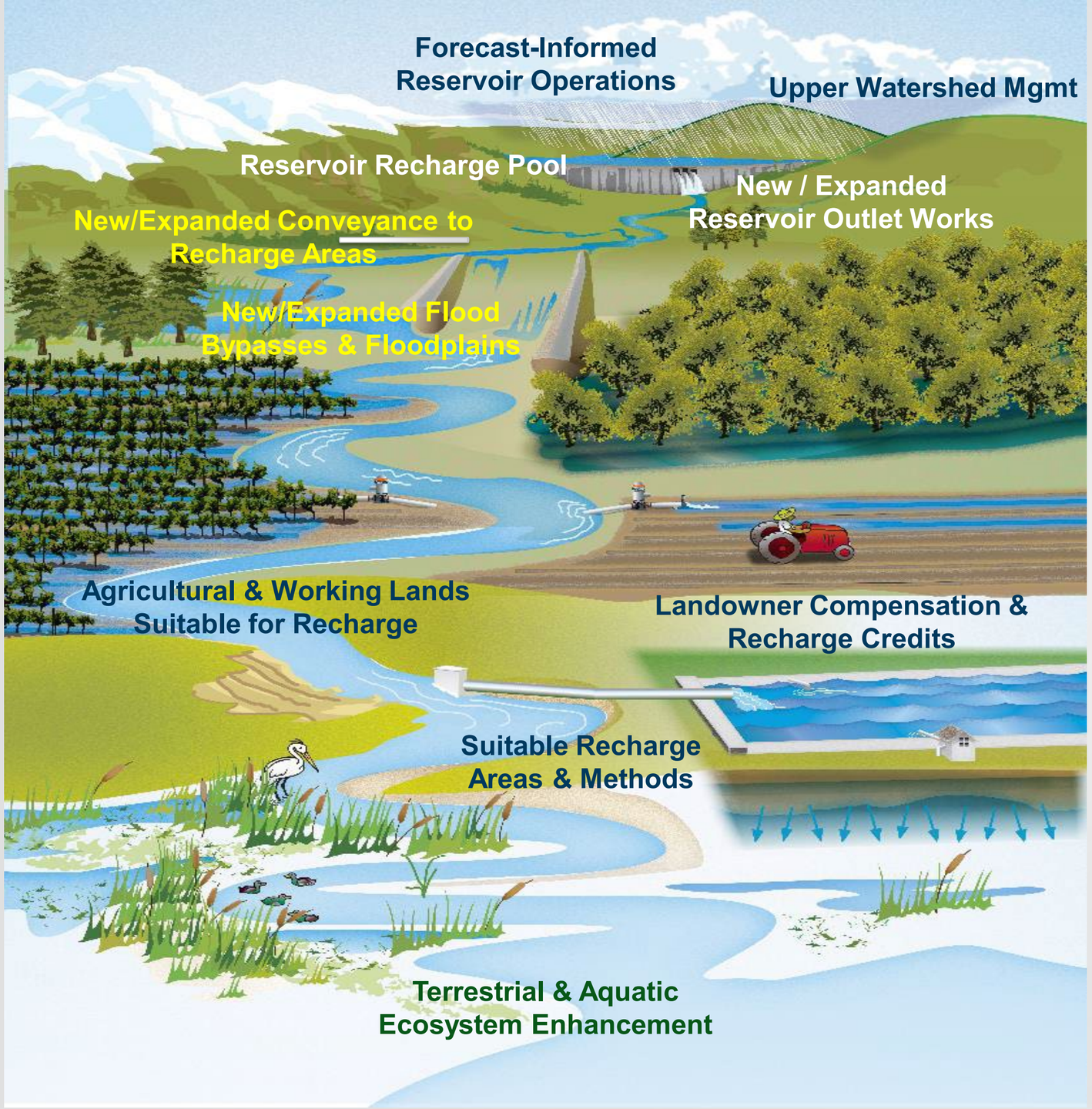

Flood-MAR
Epitomizes Integrated Watershed Management

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Headwater to Groundwater Approach

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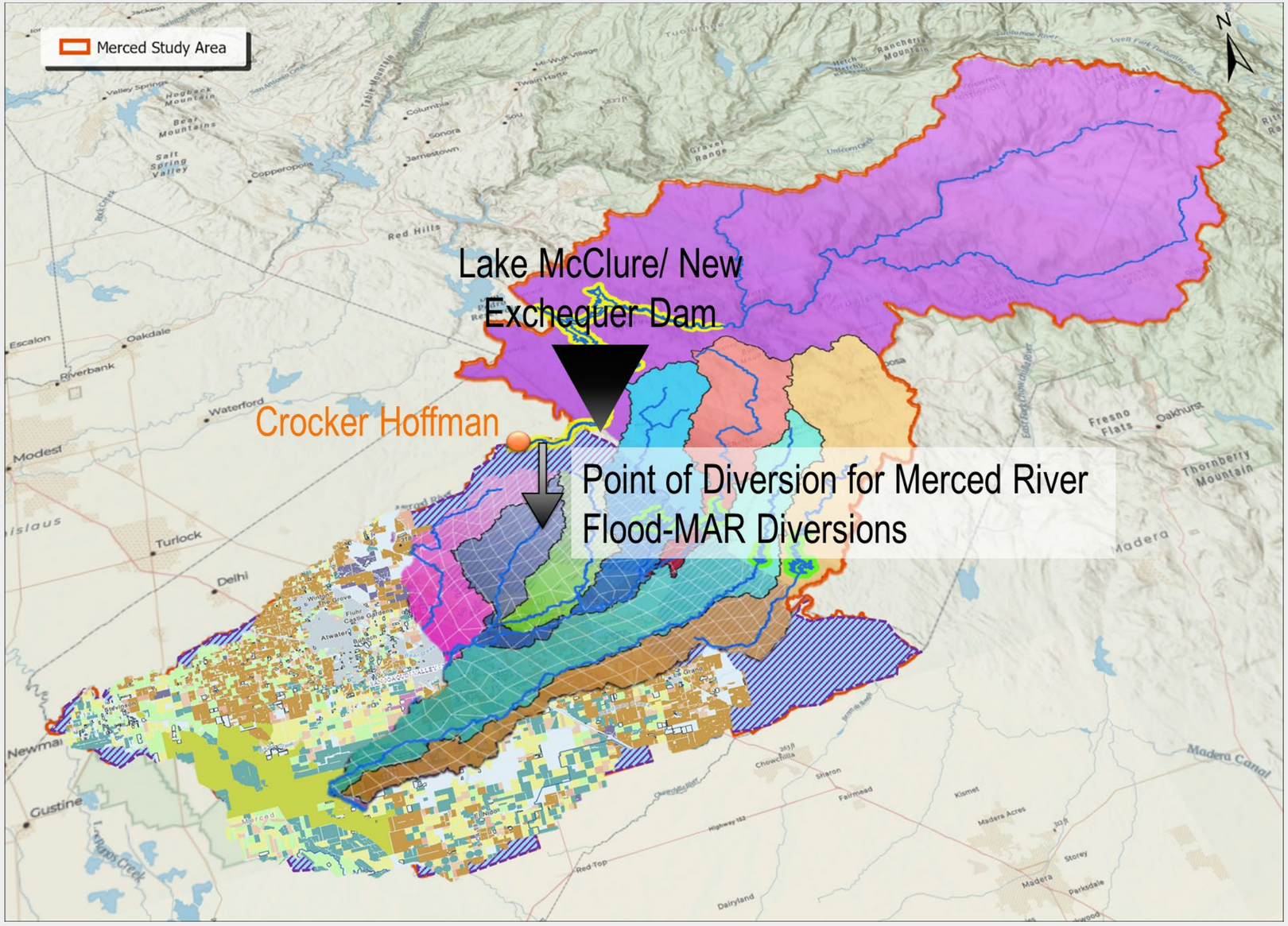
Example Strategies & Projects

How State Can Increase & Fast-Track Flood-MAR Projects

- Recognize aquifers as natural infrastructure
  – Replenishment with public funding
- Protect prime recharge areas
- Provide fiscal and regulatory incentives for aquifer replenishment & repurposing land use
- Promote Watershed Networks & Studies to build knowledge and capacity for implementing multi-sector, multi-benefit projects

Merced Flood-MAR Study

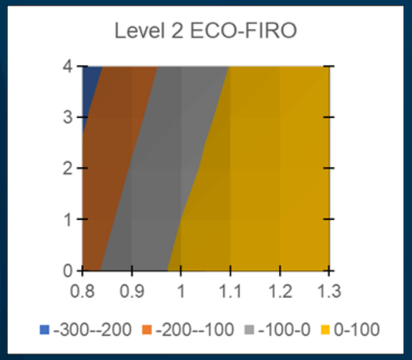
Demonstrates Watershed Vulnerability & Adaptation Potential

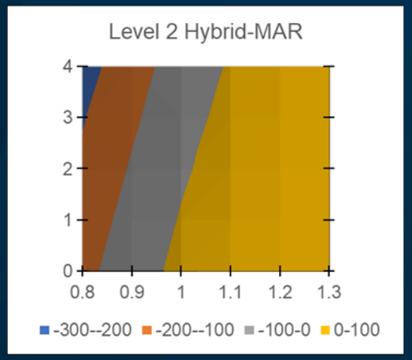


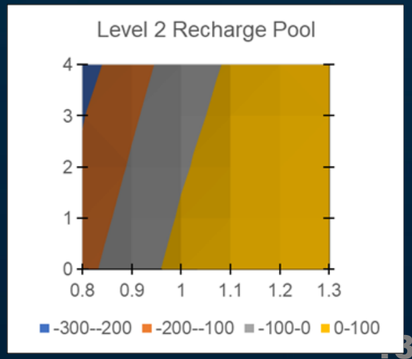
- Watershed scale analysis
- Integrated toolset – 9 models
- Risk-based climate change vulnerability assessment
- Adaptation strategies evaluation
- Initiating other San Joaquin Valley watershed studies
- Motivation & guidance for watershed studies elsewhere

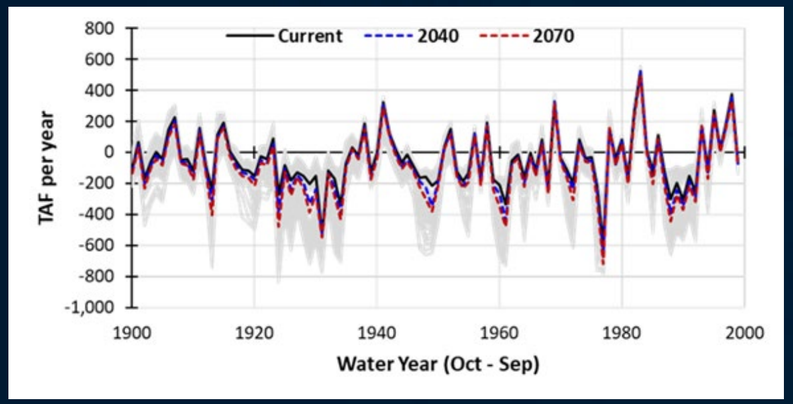
Many Options for Evaluating System Performance

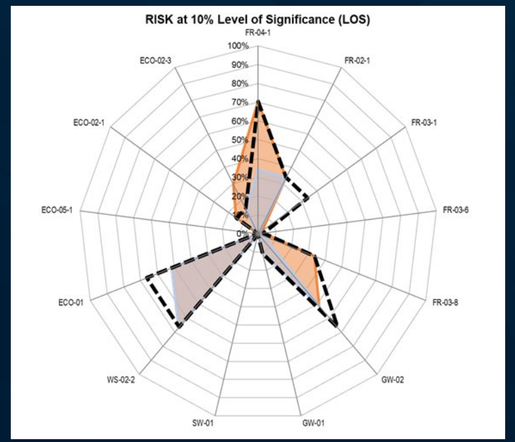
- Scenario comparison – a climate or strategy scenario vs base case
- Planning horizon – wt. average of multiple scenarios at time horizon
- Multiple climate scenarios – trend & contour plots using all climates
- Risk – probability of deterioration relative to a level of significance
- Robustness probability of improvement relative to a benefit threshold
- Resilience – buffer to sustain level of performance for temp. threshold

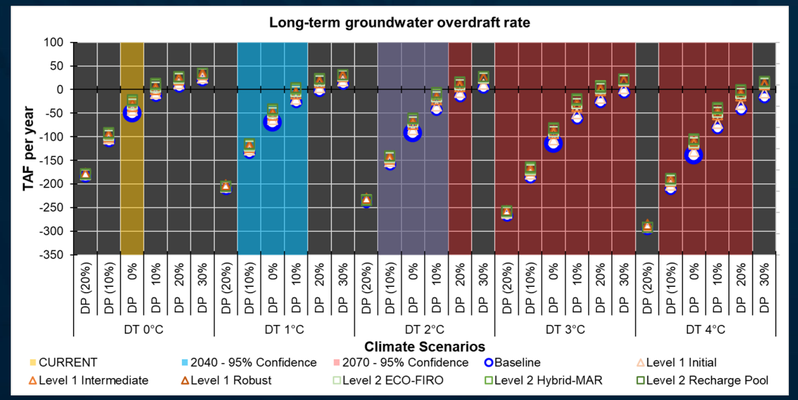






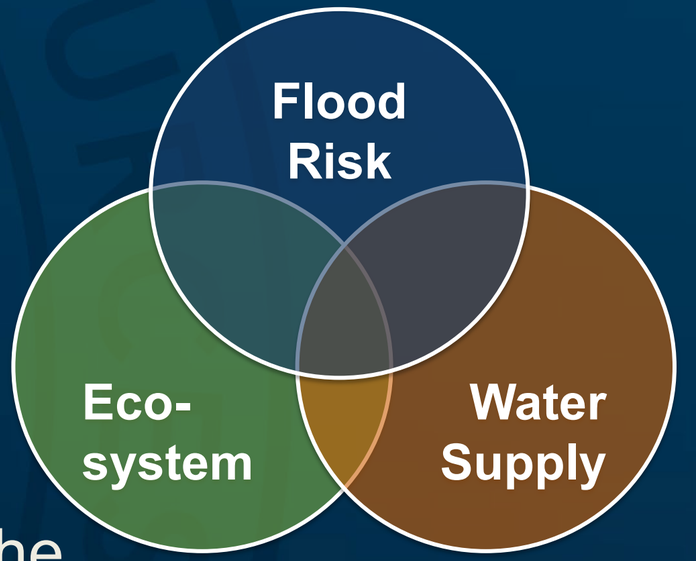






Merced Watershed Study
Climate Vulnerability Summary

Future Climate
+3°C +10% Precip



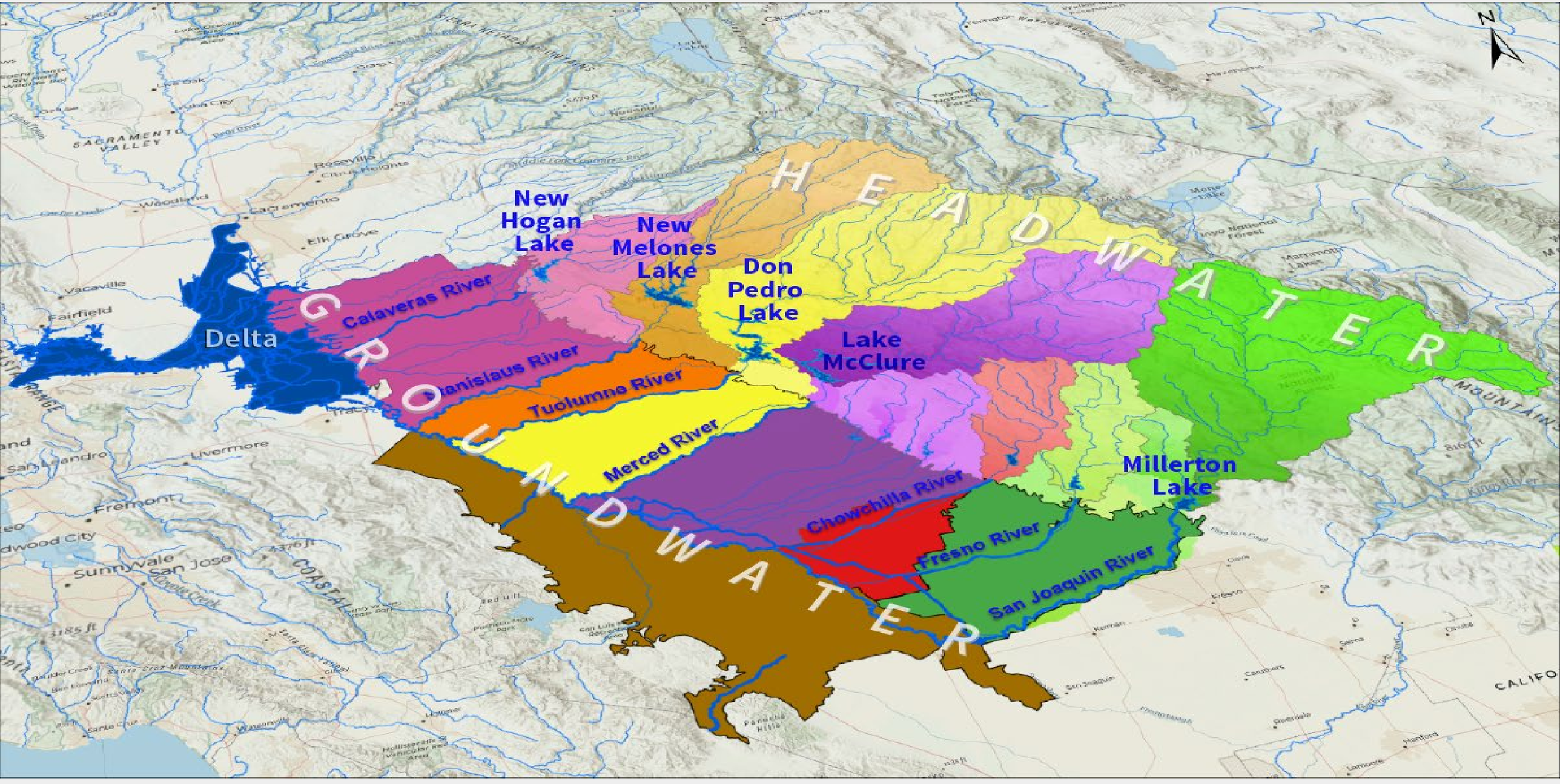
- **600%** increase in peak flood flows in the Merced River
- **20%** increase in groundwater overdraft within the basin
- **9%** fewer months had depth to groundwater less than the 30-foot depth threshold impacting groundwater dependent ecosystems
- **9%** reduction in Lake McClure storage at end-of-irrigation season
- **7%** increase in agricultural water demand from higher temperatures

Merced Watershed Study
Flood-MAR Adaption Potential

Future Climate
+3°C +10% Precip

- **~ 60,000 AF/year** **more recharge** with Flood-MAR, current facilities & operations
- ~ 90,000 AF/year **more recharge & 65% lower flood peak** in Merced River with Flood-MAR & reservoir reoperation (FIRO)
- **~ 120,000 AF/year** **more recharge & 80% lower flood peak** in Merced River with Flood-MAR & more aggressive reservoir reoperation (Recharge Pool)
- On average, **1/2** of recharged groundwater moved into neighboring sub-basins, **1/3** remained in Merced sub-basin & **1/6** flowed into adjacent streams
- Broad array of other benefits -- subsidence mitigation; habitat improvements for salmonids, shorebirds, and groundwater dependent ecosystems; and improved groundwater conditions for disadvantaged communities

More is Coming – San Joaquin Valley Watershed Studies



Update 2023 Watershed Resilience Initiative

Increase **regional climate resilience**
with integrated watershed management

Watershed Resilience Initiative Intended Outcomes

- Understand climate vulnerabilities at watershed scale
- State support for locally-led Watershed Networks across California's diverse regions
- Local implementation of multi-sector, multi-benefit strategies for watershed resilience and sustainability

State-Regional Framework for Watershed Resilience

State	Regions
Fund and provide technical and facilitation assistance, as needed for watershed networks. Model cross sector alignment.	Form and facilitate networks of watershed stakeholders,, define watershed boundaries and conditions, advance watershed resilience plans

State	Regions
Develop water balance guidance Provide future scenarios and climate change analysis guidance	Conduct state of watershed assessments

State	Regions
Develop resilience toolkit and adaptation database Develop decision support approaches and pathways/best practices	Apply and expand resilience toolkit to meet watershed-specific needs Prioritize adaptation strategies

State	Regions
Develop State Vision and goals and align State agencies	Develop watershed-specific problems, vision, goals

State	Regions
Highlight case studies Technical Support Funding Synthesize regional vulnerabilities	Conduct vulnerability and risk assessments by watershed

State	Regions
Funding Establish performance tracking framework to report on resilience	Identify and secure funding Regionalize metrics and report regional resilience performance Develop partnerships and agreements

Essential Role of Watershed Networks

Potential Participants

- Groundwater Sustainability Agencies
- Integrated Regional Water Management Groups
- Regional Climate Collaboratives (ARCCA)
- Regional Conservancies
- Regional Conservation Investment Strategies and Natural Community Conservation Planning
- Regional Flood Management Groups (Central Valley)
- Regional Forest and Fire Capacity Groups
- Other participants, for example tribes and other local agencies

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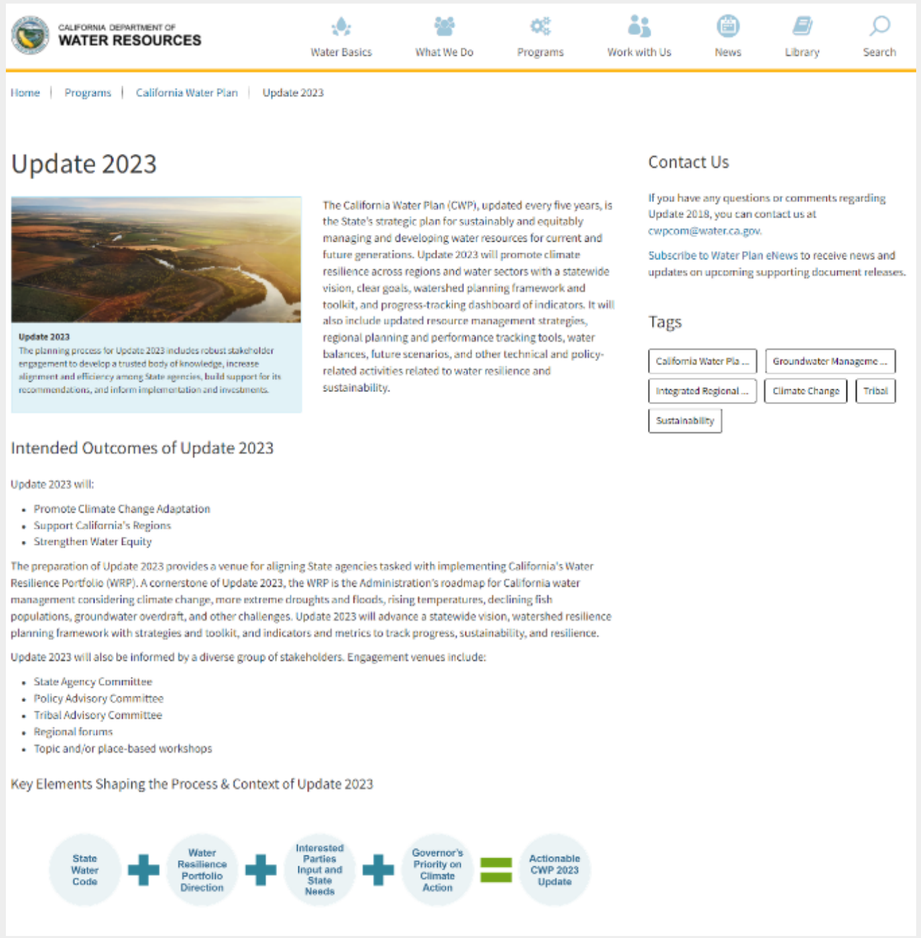
Access California Water Plan Information

❖ *Visit the Web Portal*



https://water.ca.gov/programs/california-water-plan/update-2023

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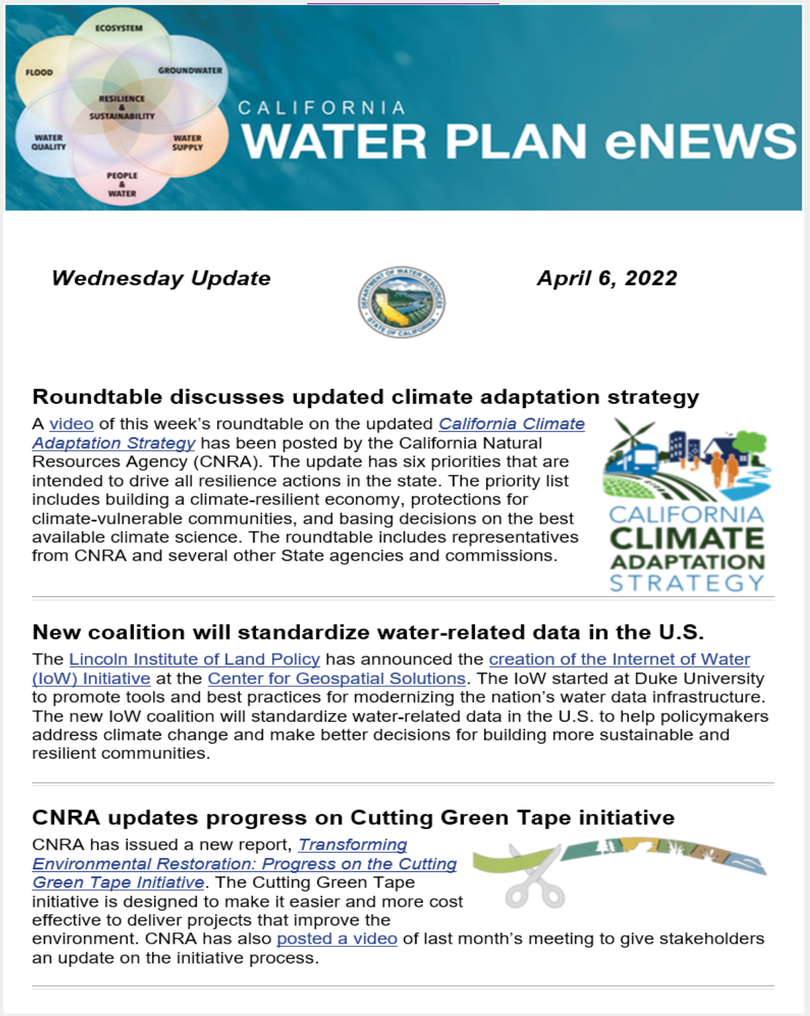

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