CLIMATE CHANGE(D): WEATHERING EXTREMES TOGETHER MODULE 1

ONEWATER ONEBAY

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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 \checkmark

Protect & Enhance Natural Systems

- Restore environmental health to sustain fish & wildlife \checkmark
- More adaptive & holistic environmental management \checkmark

Build Connections

- Improve physical infrastructure to store, move & share water \checkmark
- Integrate water management with shared science, data & technology \checkmark

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



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Climate-Smart Agriculture



Environmental Stewardship



Disaster Preparedness and Response



With State Agency Alignment & Watershed Networks

Climate Adaptation



Watershed Resilience





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Equity in Water Management



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

Integrated Watershed Management (IWM)

Multi-Sector Collaboration

Multi-Discipline Planning

Multi-Benefit Projects

Multi-Fund Investments

WATER

FLOOD

ECOSYSTEM

GROUNDWATER

RESILIENCE & SUSTAINABILITY

WATER SUPPLY

PEOPLE & WATER

Forecast-Informed Reservoir Operations

Upper Watershed Mgmt

New/Expanded Conveyance to Recharge Areas

Agricultural & Working Lands Suitable for Recharge

Reservoir Recharge Pool New / Expanded **Reservoir Outlet Works**

Landowner Compensation & **Recharge Credits**

Suitable Recharge **Areas & Methods**

Terrestrial & Aquatic Ecosystem Enhancement

Flood-MAR Epitomizes Integrated Watershed Management

Headwater to Groundwater Approach

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 <u>relative to</u> a benefit threshold
- Resilience buffer to sustain level of performance for temp. threshold











Level 2 Recharge Pool



Merced Watershed Study **Climate Vulnerability Summary**

- 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

Future Climate +3°C +10% Precip



Merced Watershed Study **Flood-MAR Adaption Potential**

- ~ 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 \bullet salmonids, shorebirds, and groundwater dependent ecosystems; and improved groundwater 15 conditions for disadvantaged communities

Future Climate +3°C +10% Precip

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



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State-Regional Framework for Watershed Resilience



	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
nt		5 nplementation & Monitoring	Begiops
ni e la		Funding	
d			Degis and secure funding
		tracking framework to	to regionalize metrics and rep
		report on resilience	Develop partnerships and

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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Climate Change Analysis

Best Practices and **Case Studies**

Watershed Liaisons/ "Connectors" Watershed Studies

> Regional Atlas

> > Facilitation

Assistance

Watershed Networks / Collaboratives

Data/ Models

Guidance/ Framework/ Toolkits

Access California Water Plan Information Subscribe to CA Water Plan eNews Visit the Web Portal



The California Water Plan (CWP), updated every five years, is

managing and developing water resources for current and future generations. Update 2023 will promote climate

resilience across regions and water sectors with a statewide

vision, clear goals, watershed planning framework and toolkit, and progress-tracking dashboard of indicators. It will also include updated resource management strategies,

regional planning and performance tracking tools, water

balances, future scenarios, and other technical and policy-

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

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related activities related to water resilience and

sustainability.

The preparation of Update 2023 provides a venue for aligning State agencies tasked with implementing California's Water

planning framework with strategies and toolkit, and indicators and metrics to track progress, sustainability, and resilience,

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Update 2023 will also be informed by a diverse group of stakeholders. Engagement venues include:

Key Elements Shaping the Process & Context of Update 2023

Resilience Portfolio (WRP). A cornerstone of Update 2023, the WRP is the Administration's roadmap for California water management considering climate change, more extreme droughts and floods, rising temperatures, declining fish populations, groundwater overdraft, and other challenges. Update 2023 will advance a statewide vision, watershed resilience

the State's strategic plan for sustainably and equitably

Contact Us

Tags

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Integrated Regional

Sustainability

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Climate Change Tribal

Update 2018, you can contact us at

Update 2023

The planning process for Update 2023 includes robust stakeholde

alignment and efficiency among State agencies, build support for its

dations, and inform implementation and investments.

engagement to develop a trusted body of knowledge, increase

Intended Outcomes of Update 2023

Promote Climate Change Adaptation

Support California's Regions

Strengthen Water Equity

State Agency Committee

Policy Advisory Committee

 Tribal Advisory Committee Regional forums

Topic and/or place-based workshops

Update 2023

Update 2023 will:

A video of this week's roundtable on the updated California Climate Adaptation Strategy has been posted by the California Natural Resources Agency (CNRA). The update has six priorities that are intended to drive all resilience actions in the state. The priority list includes building a climate-resilient economy, protections for climate-vulnerable communities, and basing decisions on the best available climate science. The roundtable includes representatives from CNRA and several other State agencies and commissions.

New coalition will standardize water-related data in the U.S.

The Lincoln Institute of Land Policy has announced the creation of the Internet of Water (IoW) Initiative at the Center for Geospatial Solutions. The IoW started at Duke University to promote tools and best practices for modernizing the nation's water data infrastructure. The new IoW coalition will standardize water-related data in the U.S. to help policymakers address climate change and make better decisions for building more sustainable and resilient communities.

To subscribe visit DWR email subscription page and select 'Water Plan eNews' option.

CNRA has issued a new report, Transforming Environmental Restoration: Progress on the Cutting Green Tape Initiative. The Cutting Green Tape initiative is designed to make it easier and more cost effective to deliver projects that improve the environment. CNRA has also posted a video of last month's meeting to give stakeholders an update on the initiative process.





Wednesday Update



April 6, 2022

Roundtable discusses updated climate adaptation strategy



CNRA updates progress on Cutting Green Tape initiative