



**CALIFORNIA DEPARTMENT OF**  
**WATER RESOURCES**

# Climate Change Adaptation Strategies and Resources

Wildlife Conservation Board - Lower American River Parkway Advisory Committee

September 1, 2022

# Outline

1. Overview of the CA Dept. of Water Resources Climate Change Program
2. Regional Climate Change Strategies
3. Climate Change Adaptation Measures from the Central Valley Flood Protection Plan (CVFPP) Conservation Strategy





# CLIMATE CHANGE PROGRAM

The DWR Climate Change Program is committed to building resiliency in water management by preventing, preparing for, and adapting to climate change. We perform a wide range of science-based services for water managers and provide technical assistance to improve research, monitoring, and strategies to address the challenges posed by climate change.

## Guiding Principles

1. We ask, "*what else can we do?*" on a continual basis, to facilitate ongoing improvements in carrying out our objectives.
2. We conduct business in an ethical, fiscally sound, and employee-focused manner.
3. Most of all, we lead by example.

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DWR supports numerous partnership initiatives that improve science-practitioner collaboration, foster the use of the best available science in water management, and create unique public outreach on the impacts of climate change on the State of California.

# Who we are



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WATER RESOURCES

## REGIONAL CLIMATE CHANGE SPECIALISTS



**Lindsay Correa**  
*North Central Region Office*  
[Lindsay.Corrae@water.ca.gov](mailto:Lindsay.Corrae@water.ca.gov)  
North Central Region Office  
3500 Industrial Blvd #131,  
West Sacramento, CA 95691



**Peter Coombe**  
*Northern Region Office*  
[Peter.Coombe@water.ca.gov](mailto:Peter.Coombe@water.ca.gov)  
Northern Region Office  
2440 Main St,  
Red Bluff, CA 96080



**Jennifer Morales**  
*South Central Region Office*  
[Jennifer.Morales@water.ca.gov](mailto:Jennifer.Morales@water.ca.gov)  
South Central Region Office  
3374 E Shields Ave,  
Fresno, CA 93726



**Vanessa Velasco**  
*Southern Region Office*  
[Vanessa.Velasco@water.ca.gov](mailto:Vanessa.Velasco@water.ca.gov)  
Southern Region Office  
770 Fairmont Ave,  
Glendale, CA 91203

## STATE CLIMATE CHANGE SUPPORT

### Mitigation



**Michelle Jespersen**  
*Carbon Sequestration*  
[Michelle.Jespersen@water.ca.gov](mailto:Michelle.Jespersen@water.ca.gov)



**Jordi Vasquez**  
*GHG Reporting & Outreach*  
[Jordi.Vasquez@water.ca.gov](mailto:Jordi.Vasquez@water.ca.gov)

### Adaptation



**Romain Maendly**  
*Engineering Studies*  
[Romain.Maendly@water.ca.gov](mailto:Romain.Maendly@water.ca.gov)



**Alejandro Perez**  
*Modeling Approaches*  
[Alejandro.Perez@water.ca.gov](mailto:Alejandro.Perez@water.ca.gov)

### DWR and Program Support



**Andrew Schwarz**  
*State Water Project*  
[Andrew.Schwarz@water.ca.gov](mailto:Andrew.Schwarz@water.ca.gov)



**Emily Alejandrino**  
*Project Mgmt., Tribal & Web*  
[Emily.Alejandrino@water.ca.gov](mailto:Emily.Alejandrino@water.ca.gov)

## CLIMATE CHANGE PROGRAM MANAGEMENT

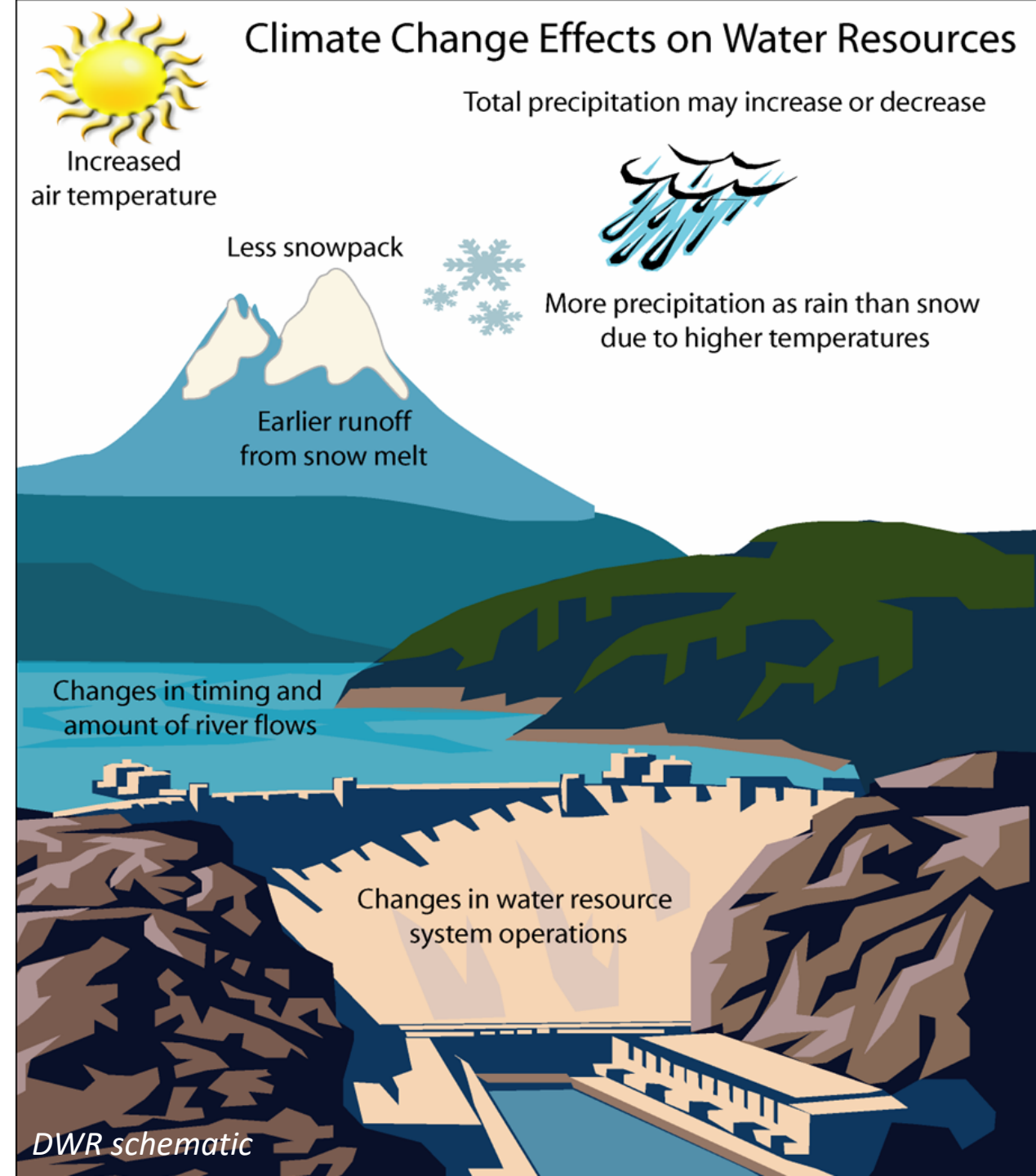
**John Andrew**  
*Deputy Director - Climate Resilience*  
[John.Andrew@water.ca.gov](mailto:John.Andrew@water.ca.gov)

**Elissa Lynn**  
*Program Manager*  
[Elissa.Lynn@water.ca.gov](mailto:Elissa.Lynn@water.ca.gov)



# Anticipated Impacts

- Less snow and earlier spring runoff
- Sea level rise
- More severe storms and flooding
- More frequent droughts
- Increased water demand for crops, environment, and cities
- Too warm water for cold- water fish like salmon and steelhead





## Relevant DWR Climate Change Program Goals

- Anticipate and prepare for future climate change impacts to infrastructure, the environment, and people by facilitating decision making under deep uncertainty.
- Provide assistance to improve climate resilience with a special focus on disadvantaged communities, local collaboration, small systems, and Tribes.

# Regional and Local Support



GRANT AND PLAN REVIEW



TECHNICAL ASSISTANCE




OUTREACH AND EDUCATION



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# Resources for Water Managers



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Resources for Water Managers

## Resources for Water Managers

As the atmosphere warms and impacts the hydrologic cycle, developing resiliency strategies to prepare for climate change is crucial. We encourage water resource managers to minimize greenhouse gas emissions to halt manmade global warming, assess the potential future impacts of climate change on their resources, and develop planning strategies for adapting to these impacts while building resiliency in their communities.

### DWR Climate Action Plan

The [DWR Climate Action Plan](#) can help water managers structure an approach to considering

## Contact Us

Reach out to the [team](#) and connect with your climate change regional specialist. If you need project or planning assistance, have questions or comments, please contact us.

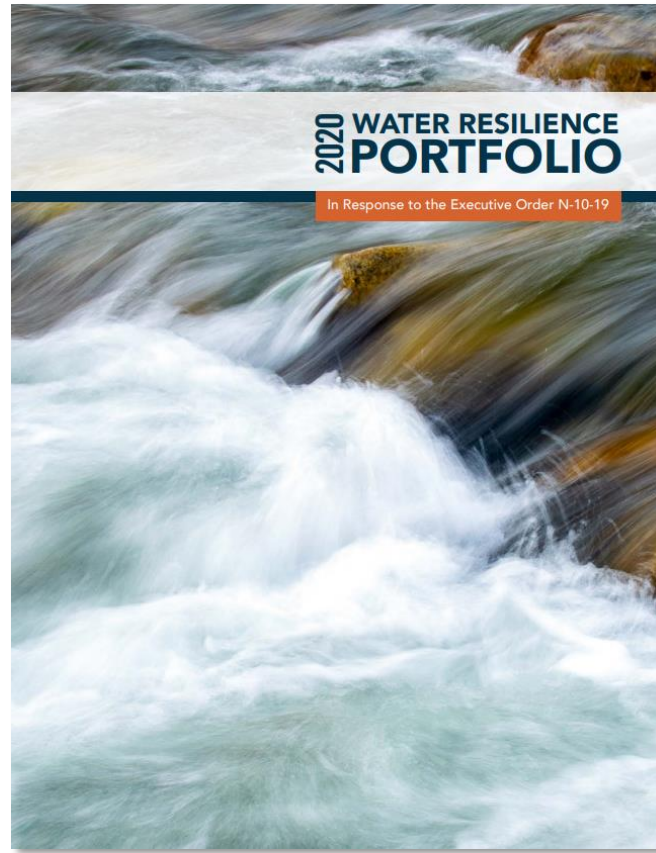
Email

## Tags

<https://water.ca.gov/Programs/All-Programs/Climate-Change-Program/Resources-for-Water-Managers>

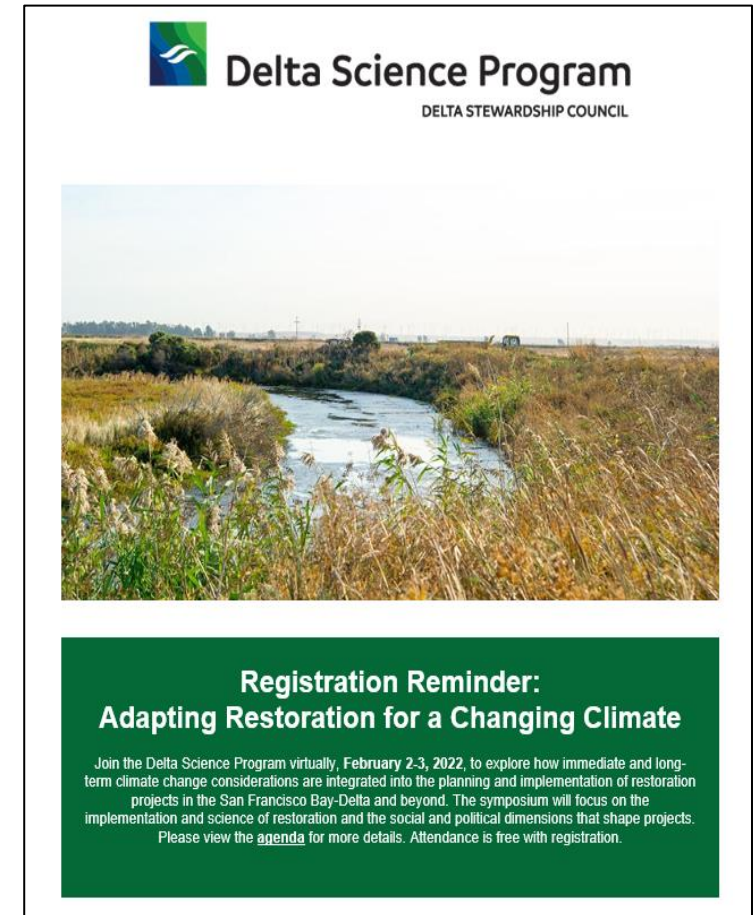
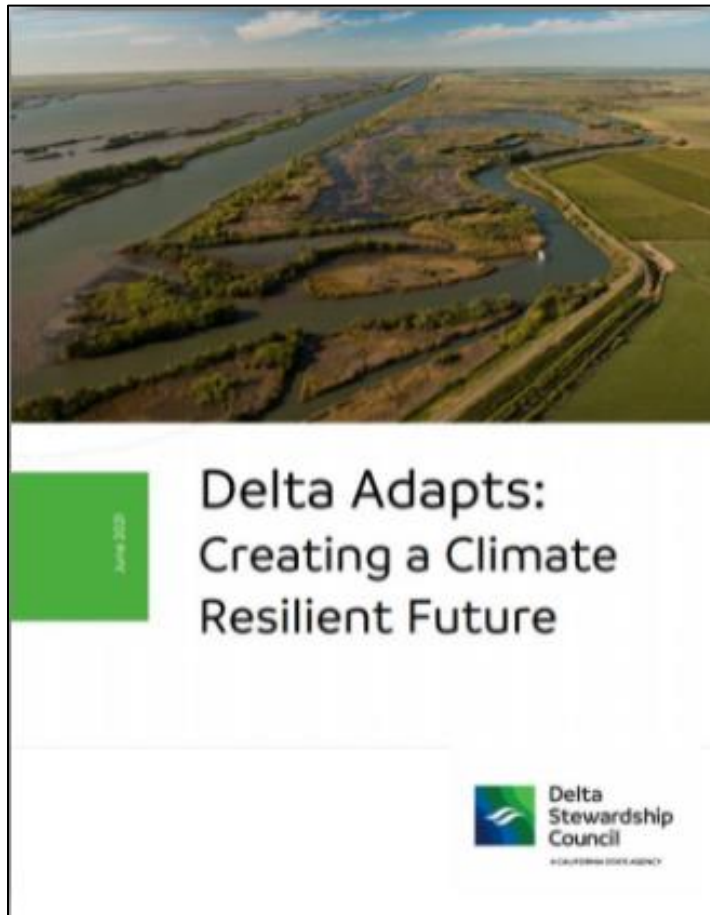


# California Climate Change Guidance



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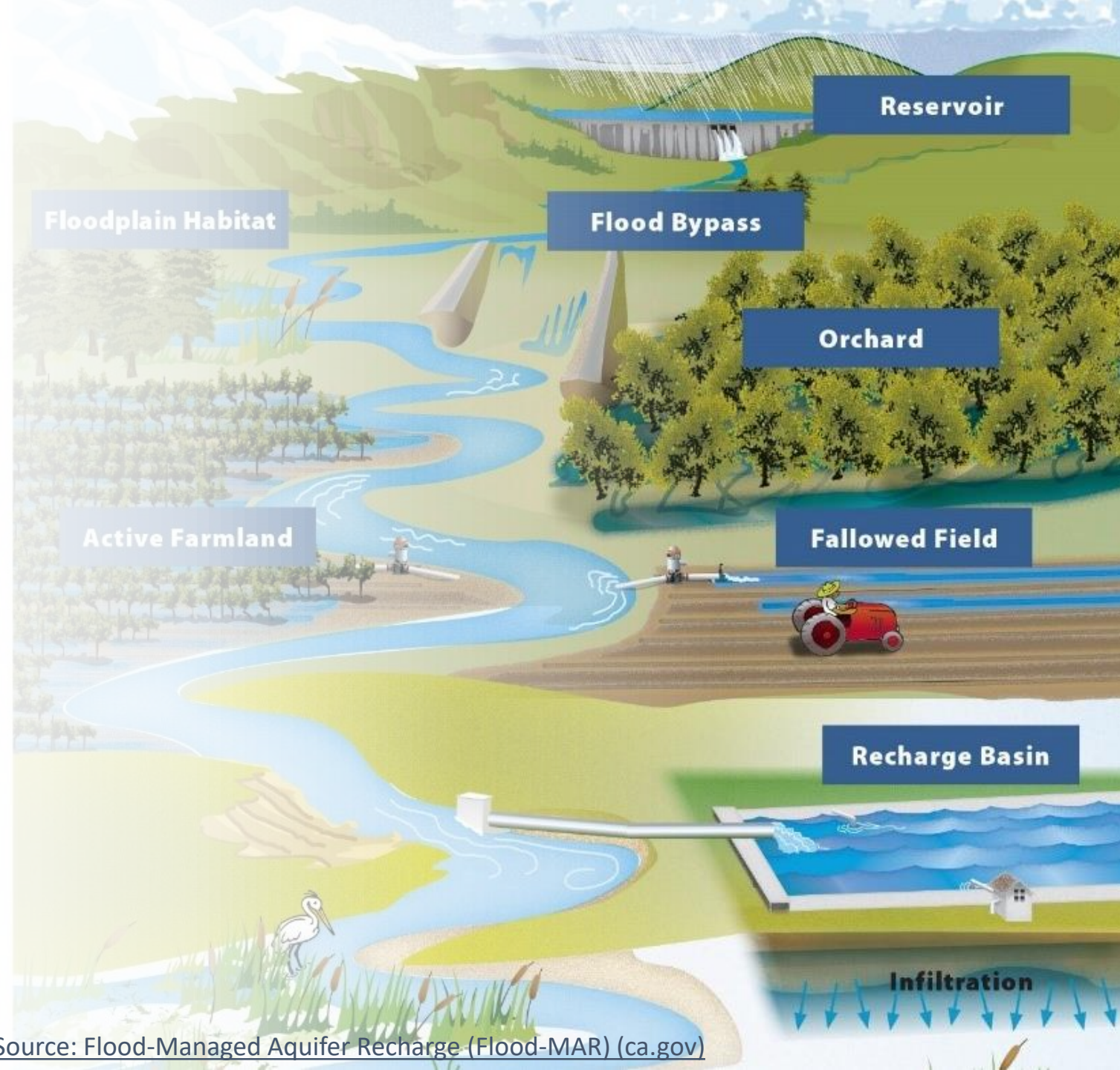
# Regional Planning and Engagement





# Watershed Vulnerability and Adaptation Planning Studies

- Merced River Basin Flood-Managed Aquifer Recharge Reconnaissance Study
- Tuolumne River Watershed Vulnerability Assessment and Adaptive Planning Study



Source: Flood-Managed Aquifer Recharge (Flood-MAR) (ca.gov)



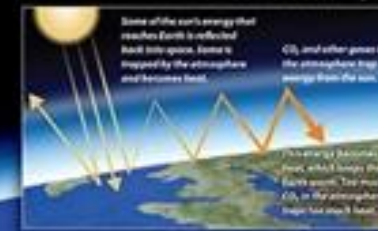
# Outreach and Education

## Climate Change and the Future of California's Water

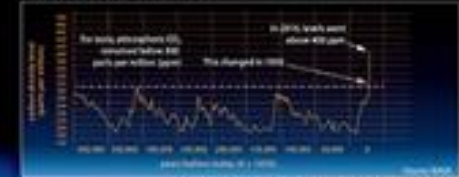
California's Mediterranean climate – with its hot, dry summers and cool, wet winters – makes managing water a challenge. A complex system of dams and aqueducts stores and distributes water to help protect communities from floods and provides a reliable supply of water throughout the year. However, this system is at risk from climate change. Increased temperatures, reduction of the Sierra snowpack, and sea level rise are already impacting water supply and demand, and the impacts are expected to become more pronounced in the coming decades. Understanding why climate change is happening, how it will impact our water resources, and what we can do to minimize its effects is essential for managing our water resources and protecting our future.

### What Causes Climate Change?

When we burn fossil fuels such as coal, oil, and gas to power our homes, factories, and cars, we release carbon dioxide (CO<sub>2</sub>) into the atmosphere. CO<sub>2</sub> is a heat-trapping gas. Regular CO<sub>2</sub> released through the carbon cycle helps the atmosphere act like a blanket, keeping the Earth warm enough to live on. However, burning fossil fuels releases additional CO<sub>2</sub> into the atmosphere. This rampant CO<sub>2</sub> causes the atmosphere to act like a thicker blanket, which traps too much heat and disrupts the climate.



### Changes to Atmospheric CO<sub>2</sub>



Discover how scientists know about Earth's past climate, and predict future change.

## What Climate Change Means for California

### Future Flooding with Sea Level Rise



### Sea Level Rise

As the climate warms, land ice melts and oceans undergo thermal expansion. These both contribute to rising sea levels. In California, sea level rise threatens coastal communities with flooding and poses risks to groundwater reservoirs and the health and quality of the Sacramento-San Joaquin Delta – the primary source of fresh water for 27 million Californians from the San Francisco Bay Area to San Diego. Find out more about sea level rise.

### Reduction in Snowpack

The Sierra snowpack acts as a frozen reservoir that, as it melts, provides water during the hot, dry summers. Warming temperatures, leading to rain instead of snow, have already reduced the snowpack by 25 percent in the last 100 years. Climate models indicate snowpack will continue to decline in the 21st century. This loss, combined with earlier and faster melting, decreases how much water we have during our hot, dry summer months. More facts about the Sierra snowpack.

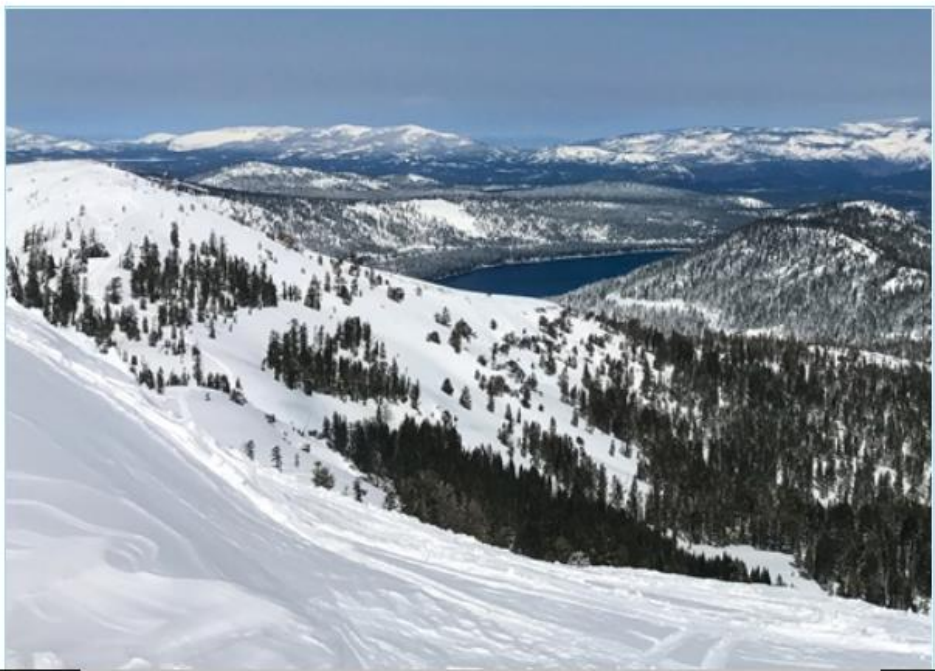
### Changes to California's Snowpack





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# Climate Change Basics



Climate change is impacting California's water resources, evidenced by changes in snowpack, stream flows, and sea level, and river flows. As we seek to adapt to and respond to the impacts of climate change, responsible management of our water resources is essential for the long-term health of our state.

## Climate Basics

Climate refers to conditions, such as temperature and precipitation, measured over an extended period of time. Most of California has a "Mediterranean climate," with hot,

- Climate Change Basics Webpage
- Presentations
- Educational Materials



# Dept. of Water Resources Climate News Digest



Credit: Getty Images

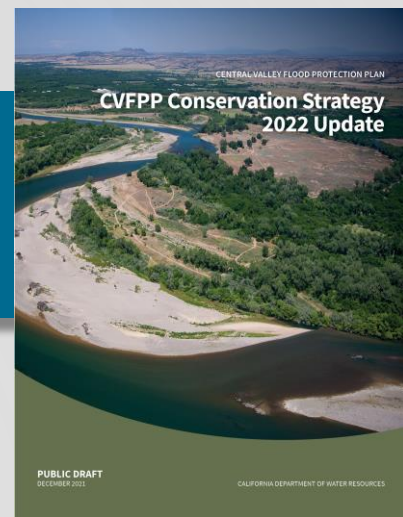
California's largest reservoirs at critically low  
levels – signaling a dry summer ahead

## June – 2022

To subscribe, send an email to:  
**[climatechange@water.ca.gov](mailto:climatechange@water.ca.gov)**

# CVFPP Conservation Strategy

Update



- A primary component of the CVFPP
- Contributes to CVFPP goals – focused on improving ecosystem quality, quantity, function, and sustainability
- Helps CVFPP meet Water Code Requirements
- 2016 Conservation Strategy adopted by Central Valley Flood Protection Board in Aug 2017
- 2022 CVFPP Update anticipated to be adopted by the Central Valley Flood Protection Board, (October 28th, 2022)

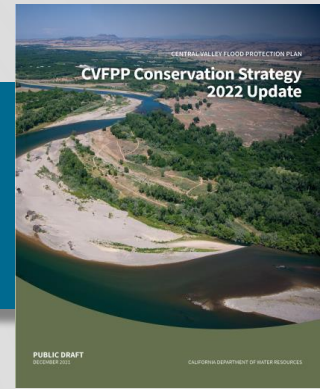


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# CVFPP Conservation Strategy part 2

Update



- Purpose - **integration of ecological principles with flood risk reduction projects**
- Provides guidance to floodplain managers **integrating project components and management strategies that benefit native species and their habitats**





# CVFPP Conservation Strategy part 3

## STATE LEGISLATION

### ECOLOGICAL GOALS

CALIFORNIA WATER CODE SECTION 9616A



#### Ecosystem processes

Improve and enhance dynamic hydrologic and geomorphic processes in the SPFC.



#### Habitats

Increase and improve quantity, diversity, and connectivity of riverine aquatic and floodplain habitats.



#### Species

Contribute to the recovery and sustainability of native species populations and overall biotic community diversity.



#### Stressors

Reduce stressors related to the development, operation, and maintenance of the flood management system that negatively affect at-risk species.

## ALIGNED TO EXISTING POLICIES AND PLANNING

**Governor's Water  
Resilience Portfolio**

**California Water Plan**

**Delta Plan**

**DWR's Environmental  
Stewardship Policy**

## DESIRED OUTCOMES

### MEASURABLE OBJECTIVES

Floodplain inundation

Riverine geomorphic processes

Shaded riverine aquatic (SRA) habitat and cover

Riparian

Marsh (and other wetlands)

Improvements are linked to actions that improve ecosystem processes and habitats.

Improvements are linked to actions that reduce:

- Retention (unnecessary for flood protection)
- Fish passage barriers
- Invasive plants

## IMPLEMENTATION OF MULTI-BENEFIT PROJECTS



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# 2022 CVFPP Conservation Strategy Update: Focus on Climate Change

- Uses current climate modeling data to estimate impacts
- Considers ecological, habitat, and species-specific responses
- Identifies preliminary adaptation strategies and methods for increasing resiliency
- Identifies data gaps and additional tools or analyses that could be used to inform development of adaptation strategies
- **Conservation Strategy-specific adaptation approaches inform the development and implementation of multi-benefit projects**



# CVFPP Conservation Strategy: Guiding Principles for Adaptation

- Reintroduce physical processes and reconnecting rivers to their floodplains
- Protect remaining habitats from loss and fragmentation
- Provide for species movement and migration
- Reduce other (non-climatic) stressors on species
- Use adaptive management to act under uncertain and changing climatic conditions
- Increase institutional capacity for effective management



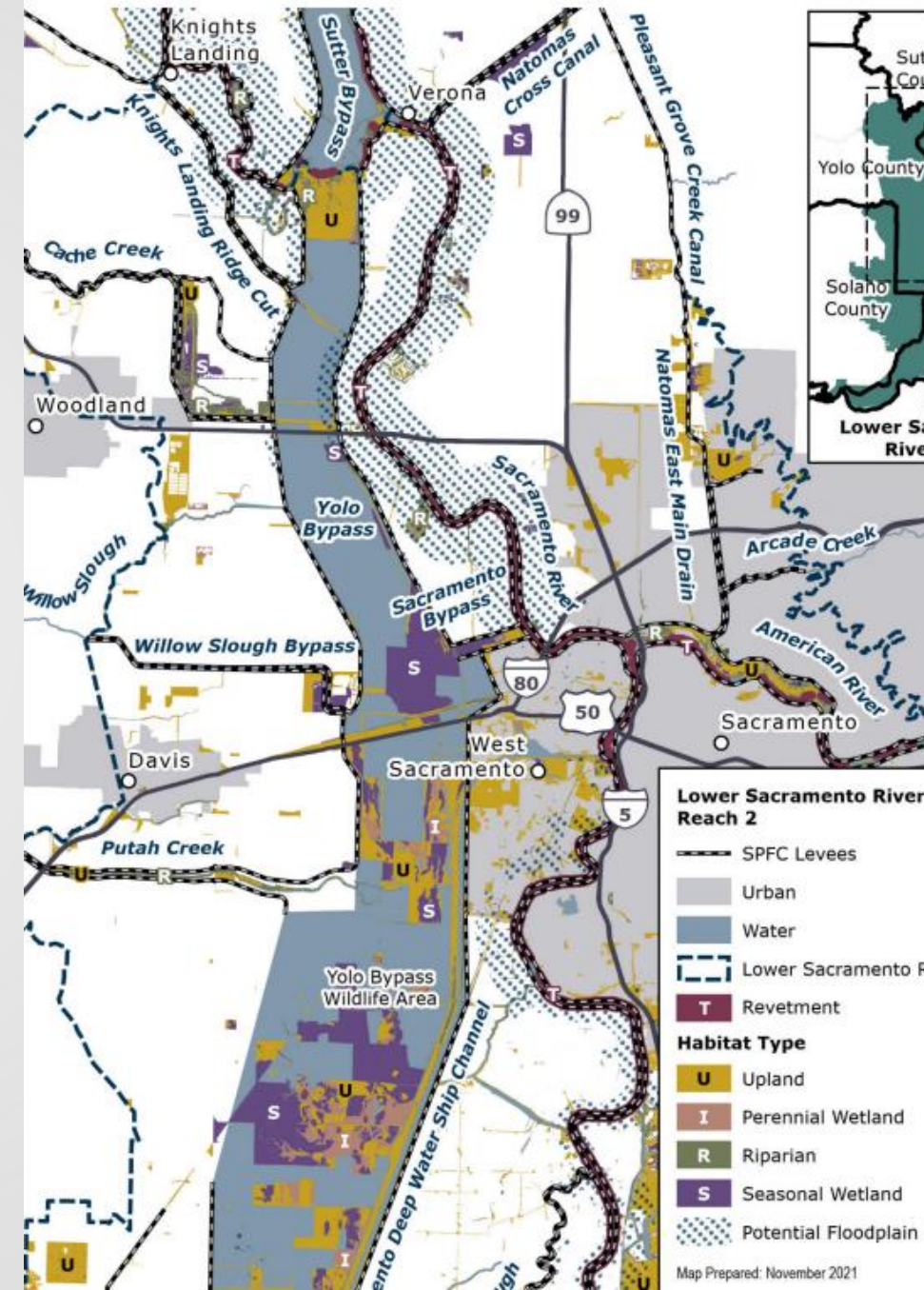
# CVFPP Regional Adaptation Measures

- Build ecosystem resilience
- Further incentivize and prioritize the implementation of multi-benefit projects
- Perform more detailed analyses of climate change impacts to Conservation Strategy processes, habitats, and species
- Better communicate climate change risks and adaptation opportunities to DWR partners and stakeholders



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Figure H-19. Lower Sacramento River CPA Reach 2





# Application to the Lower American River Parkway – Existing Conditions/Challenges

- Highly developed and reduced opportunities for floodplain expansion
- Highly disturbed channel and floodplain—disconnected from river
- Riparian corridor is mostly upland with little vegetative recruitment
- Fires have replaced natural disturbance regime (flooding)
- Engaged community, connected with Parkway



# Application to the Lower American River Parkway – Potential Adaptation Measures

- Microtopography: swales, backwater channels to increase floodplain activation during lower and more frequent flows
- Create areas to support early successional plant species (willows, cottonwood, Oregon ash)
- Replace stands of invasive weeds with native plant populations
- Reduce disturbances to sensitive areas
- Protect and enhance watershed by restoring tributary creeks (remove concrete) and providing natural stormwater retention



# Thank You

**Lindsay Correa**

[lindsay.correa@water.ca.gov](mailto:lindsay.correa@water.ca.gov)

**David Martasian**

[david.martasian@water.ca.gov](mailto:david.martasian@water.ca.gov)



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