



CLIMATE CHANGE

AT THE DEPARTMENT OF WATER
RESOURCES

Adapting to California's Changing Climate

Michelle Selmon

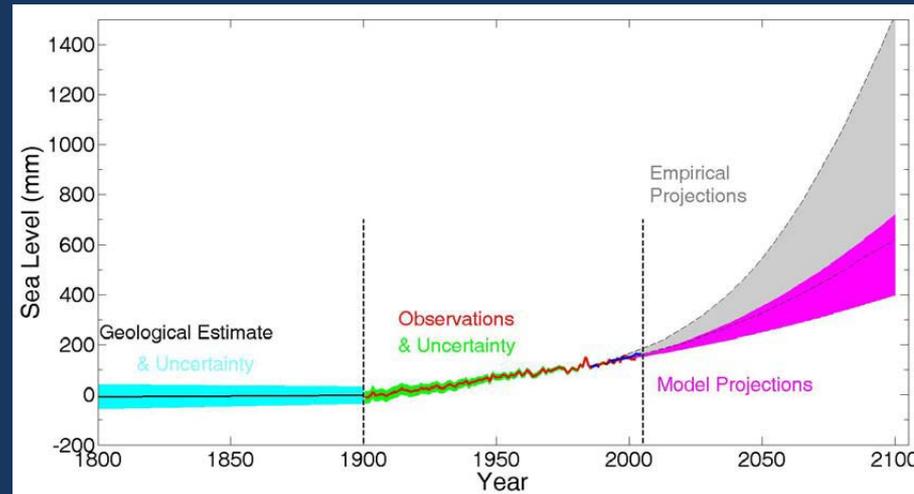
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April 28, 2016

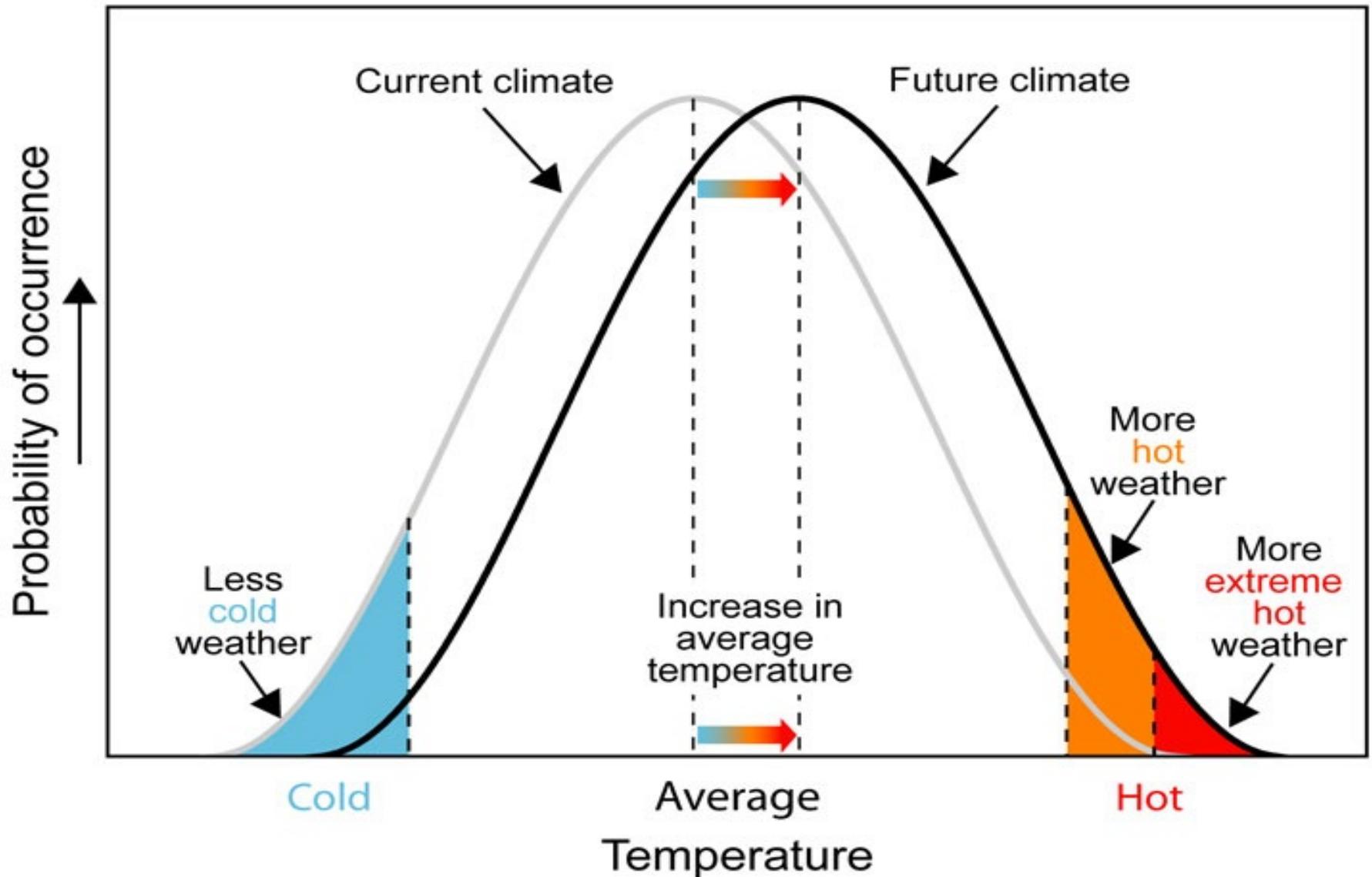
Watershed University

In the Past 100 Years...

- Changes in the timing of peak flood flows
- **10 % overall loss of snowpack in the Sierra Nevada**
- An average of 7 inches of sea level rise along the CA coast

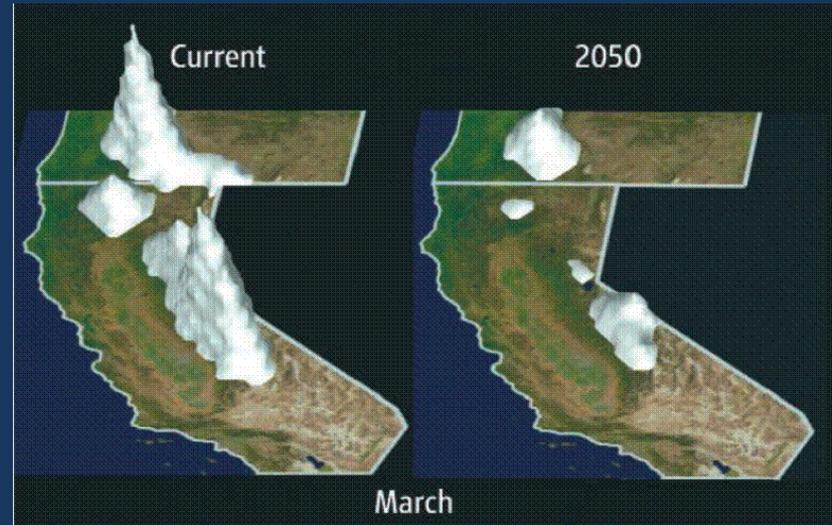


Future Climate Shift



In the next 40 years...

- **Sea level rise: 5-24" (17-66" by 2100)**
- **25-40% reduction in snowpack**
- **Less summer runoff**
- **More intense wet and dry periods**
- **Increased salinity in the Delta**
- **Less supply and predictability of water resources for urban, agricultural and environmental uses**



California Water Plan 2013

- 12 Regional Reports
- 32 Resource Management Strategies
- 17 Objectives to ‘deal with a changing climate and other uncertainties and risks, and provide more adaptive and resilient ecosystems, water, and flood management systems”



CWP 2013 Critical Themes

- Commit to Integrated Water Management
 - Enhance and sustain ecosystems
 - Expand water storage and conjunctive management of surface and groundwater resources
- Strengthen government agency alignment
- Invest in innovation and infrastructure



Helping Local Water Agencies

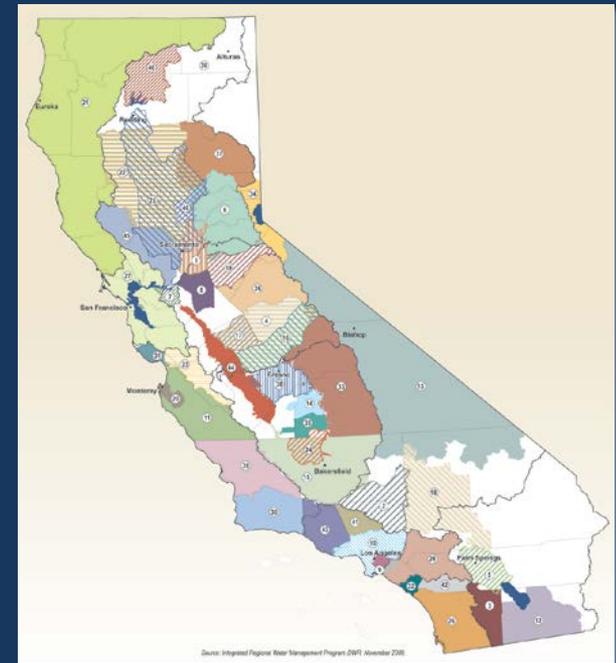
IRWMP Regions

IRWM planning regions

- Approximately 87% of the area of the State
- Approximately 99% of the population

Benefits of IRWM Planning

- IRWM efforts are long term
- IRWM efforts yield coordination and cooperation
- Relationships between diverse stakeholders



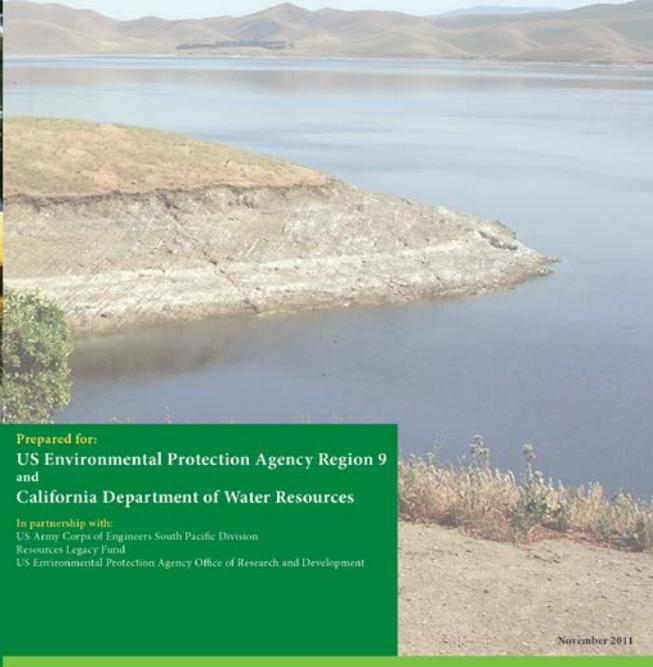
IRWM provides *a critical framework* for actions to address the uncertainties presented by climate change as well as other risks to California's water future.

-Water Plan Update 2009

All IRWM plans should include the following elements to help their region adapt to a changing climate:

- water conservation
- conjunctive management
- integrated flood management
- drought contingency
- ***An assessment of the region's vulnerability to the long-term risk and associated uncertainty associated with climate change***

Climate Change Handbook for Regional Water Planning



Prepared for:
US Environmental Protection Agency Region 9
and
California Department of Water Resources

In partnership with:
US Army Corps of Engineers South Pacific Division
Resources Legacy Fund
US Environmental Protection Agency Office of Research and Development

November 2011

<http://www.water.ca.gov/climatechange/resources.cfm>

CC Handbook for Regional Water Planning

Vulnerability Assessment Checklist

- Water Demand
- Water Supply
- Water Quality
- Sea Level Rise
- Flooding
- Hydropower
- Ecosystem and Habitat Vulnerability



CC Handbook for Regional Water Planning

Vulnerability Assessment Checklist

- Launches key discussions about climate change
- Allows early identification of vulnerabilities to inform planning and project selection
- Brings issues such as species and habitat protection to the table
- Informs all IRWM "interested parties" of implications of climate change in their region
- Potentially spurs additional research and action

Climate Change and Water Management Mitigation and Adaptation Strategies

- Urban infrastructure upgrades
- **Water use efficiency**
- Groundwater recharge
- **Wetland, vernal pool, riparian restoration**
- Floodplain restoration to improve hydrologic function
- **Native plant revegetation**
- Invasive species management
- **Watershed restoration**



Climate Change and Water Management

Communicating Risks and Strategies

- Climate variability is not a new concept for CA water managers, but 'stationarity is dead'!
- Many existing water management strategies are also climate change mitigation and/or adaptation strategies
- There are many 'low-risk' actions that can be taken, even given the uncertainties

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- Climate change response actions can be integrated with water supply reliability, environmental protection, public safety, infrastructure, and public health planning
[“climate smart” planning]

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[“climate smart” planning”]
- “Connected thinking”: a whole-systems approach that recognizes that water, farmland, and habitat are finite and interdependent; integrated thinking and science-based solutions are needed
 - Ex. California Roundtable on Food and Water Supply

Climate Change and Watershed Impacts

- Reduced dissolved oxygen in streams and lakes
- Loss of habitat for cold and cool water fish species
- Reduced riparian/floodplain connectivity
- Reduced extent, diversity, and quality of instream habitat for aquatic biota
- Forest impacts including increased pest outbreaks and more severe wildfires



Healthy Watersheds Provide Climate Resilience!

- Maintenance of baseflow during periods of drought
- **Flood attenuation**
- Air and water temperature regulation
- **Riparian and stream habitat corridors for species migration to more suitable environments**
- Carbon sequestration in native flora and soils



<http://footage.framepool.com/shotimg/278064628-sierra-nevada-usa-yosemite-national-park-mountain-stream-tranquillity.jpg>



<http://www.sierranevada.ca.gov/our-work/sierra-nevada-wip/ColStreamTrailinmeadow.JPG/@images/82981147-5213-4540-aced-b1e6a1f1e9d8.jpeg>

“Water, Climate Change, and Forests: Watershed Stewardship for a Changing Climate”

USFS, 2010



<https://californiaimages.files.wordpress.com/2008/09/p1000472.jpg>

Resilient watersheds are more likely to supply desired ecological services in the face of climate change

Specific actions include:

- Advancing and sharing knowledge about water and climate change
- Incorporating climate change into planning
- Implementing practices to protect and restore key watershed processes and services
- Connecting water users to their watersheds through markets and outreach programs



http://www.americanrivers.org/wp-content/uploads/2015/01/013015-The-forested-Yuba-River-watershed-in-the-Sierra-Nevada_Gary-Reedy.jpg?463339

Grant Opportunities for Increasing Watershed Resilience

- Proposition 1 – Includes \$1.89 billion for “habitat and watershed programs, enhancement for rivers and creeks, watersheds in designated areas, state commitments to restoration and statewide flood management
 - DFW Watershed Restoration grants
 - DWR IRWM Implementation grants
 - Sierra Nevada Conservancy Watershed Improvement Program (WIP)

Sierra Nevada Conservancy Funding Chart

	A	B	C	D	E	F	G	H
1	SIERRA NEVADA CONSERVANCY FUNDING TEAM: CALENDAR OF UPCOMING GRANTS February-March 2016							
2	Deadline	Deadline	Grant Name	Funder	Purpose	Maximum Grant	Match?	Eligible Applicants
1	07/13/2016	Estimated	Environmental Enhancement and Mitigation Program	CA Natural Resources Agency	Provide additional environmental mitigation for impacts caused by highway construction in the vicinity of recreational lands. The following categories of mitigation projects may be supported: 1) urban forestry projects that offset vehicular emissions of carbon dioxide; 2) resource lands projects for the acquisition or enhancement of resource lands to mitigate the loss of or detriment to resource lands that lie within or near the right-of-way acquired for transportation improvements; 3) mitigation projects beyond the scope of the lead agency responsible for assessing the environmental impact of the proposed transportation improvement.	\$500,000	Not required; however, additional points will be given to applications which include other sources of funds for the proposed project.	Local, state, and federal governmental agencies and nonprofit organizations
2	07/15/2016	Accurate	Rivers and Trails Conservation Grant - Technical Assistance and Facilitation Assistance	National Park Service	Develops and/or improves connections to parks, rivers, trails, and greenways; advances the protection and stewardship of open spaces through partnerships; expands public access to water resources and the development of water trails.	Technical assistance only	Not required, community and stakeholders must agree to participate	State or local agencies, tribes, nonprofit organizations, or citizen groups
3	07/15/2016	Estimated	Integrated Regional Water Management (IRWM) Implementation Grants	CA Department of Water Resources	Very broad – the project must address statewide priorities and be listed in the region’s IRWM Plan. The IRWM Grant Program is designed to encourage integrated regional strategies for management of water resources and to provide funding for programs and projects that support integrated water management planning and implementation.	Depends on solicitation	50% match required, but may be reduced for projects that benefit disadvantaged communities or economically distressed areas	Public agencies, nonprofit organizations, public utilities, federally-recognized Indian tribes, California Native American tribes, mutual water companies

<http://www.sierranevadaconservancy.ca.gov/other-assistance>

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 - Sierra Nevada Conservancy Watershed Improvement Program (WIP)
- USBR WaterSMART
 - Cooperative Watershed Management program – up to \$750,000 available in 2016 (\$100,000 max. per applicant)



https://upload.wikimedia.org/wikipedia/commons/7/7d/Lake_Oroville.jpg

Questions?
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