



CLIMATE CHANGE

AT THE DEPARTMENT OF WATER
RESOURCES

A photograph of a snowy landscape with a partially frozen stream and a dense forest in the background. The stream is in the foreground, with snow-covered banks and rocks. The background is a dense forest of evergreen trees under a clear blue sky.

Using Vulnerability Assessments to Inform Agency Decisions

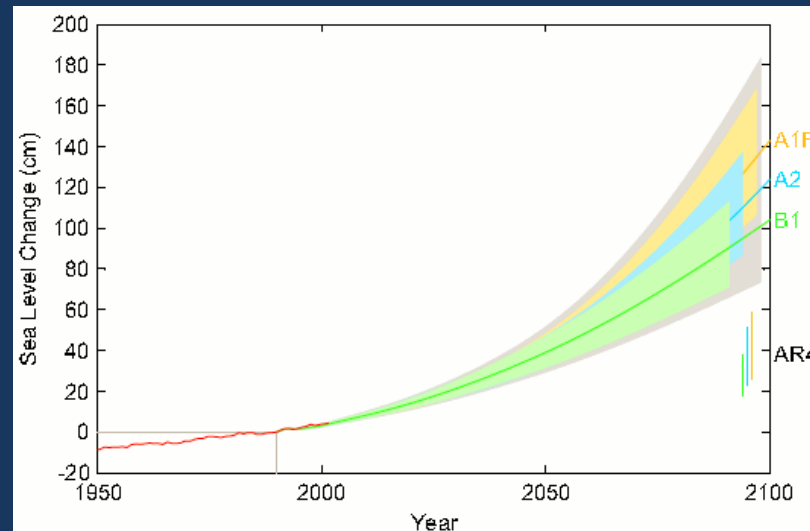
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November 6, 2012

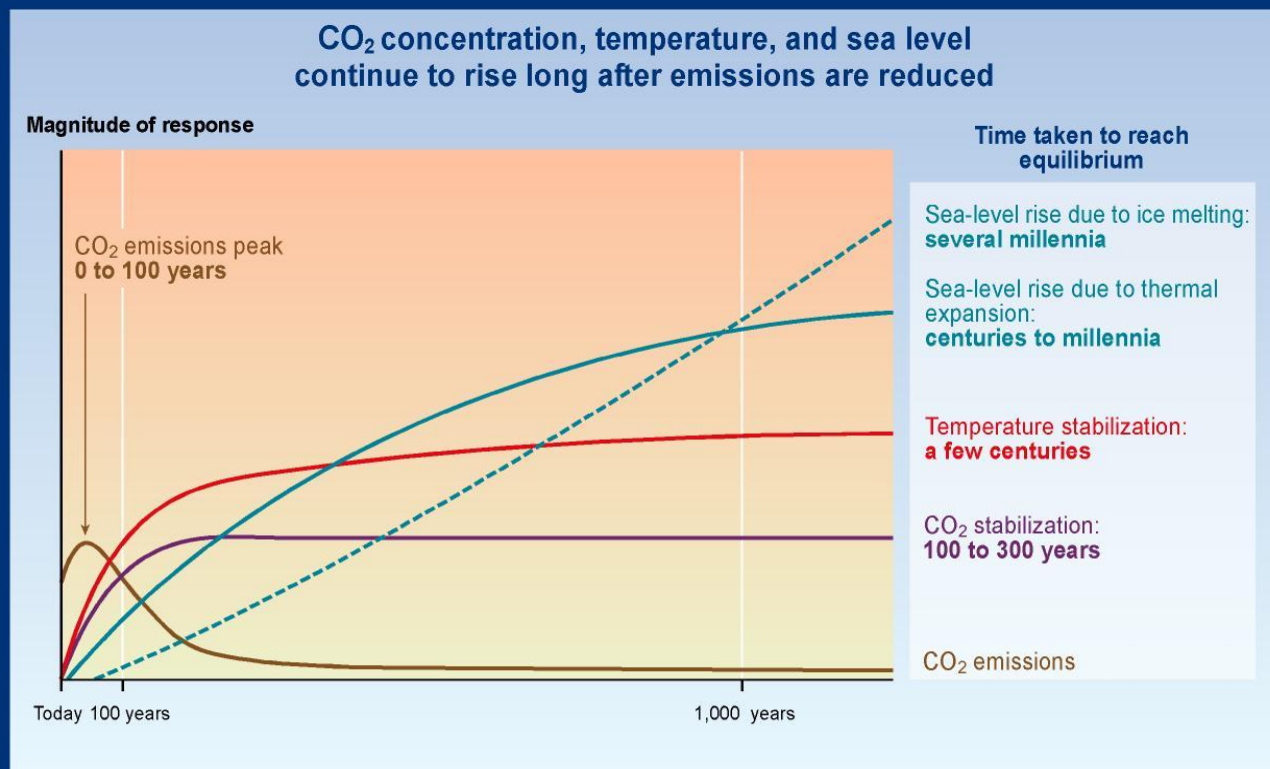
In the Past 100 Years...

- **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**



Vermeer, M., Rahmstorf, S. Global sea level linked to global temperature. Proceedings of the National Academy of Sciences, December 2009

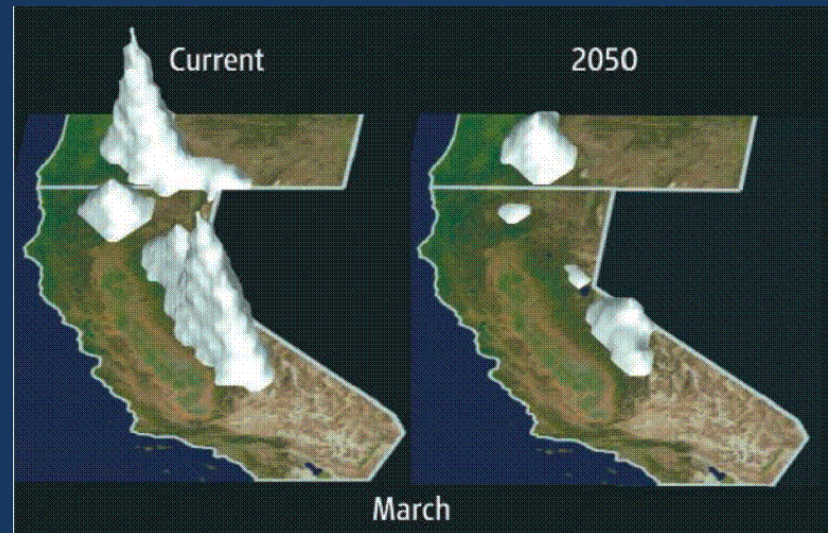
Adaptation is a Necessity



SYR - FIGURE 5-2

In the next 40 years...

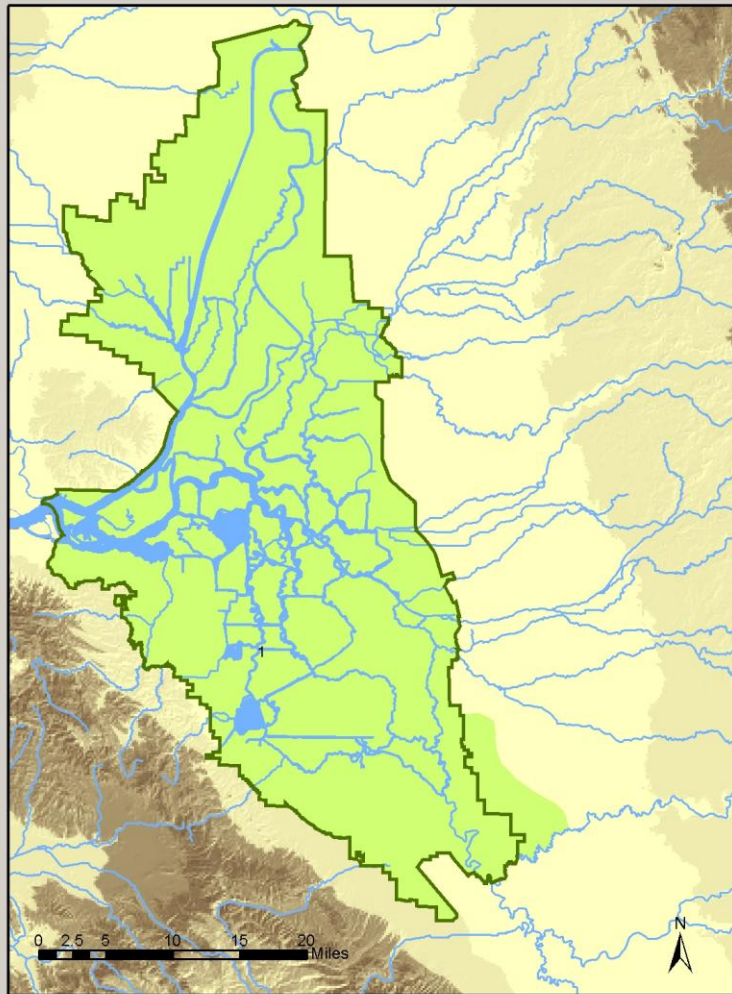
- **Sea level rise: 5-24" (17-66" by 2100)**
- **25-40% reduction in snowpack**
- **Less summer runoff**
- **More intense wet and dry periods**
- **Increased salinity in the Delta**
- **Less supply and predictability of water resources for urban, agricultural and environmental uses**



What Could Happen to Bay-Delta Estuary?

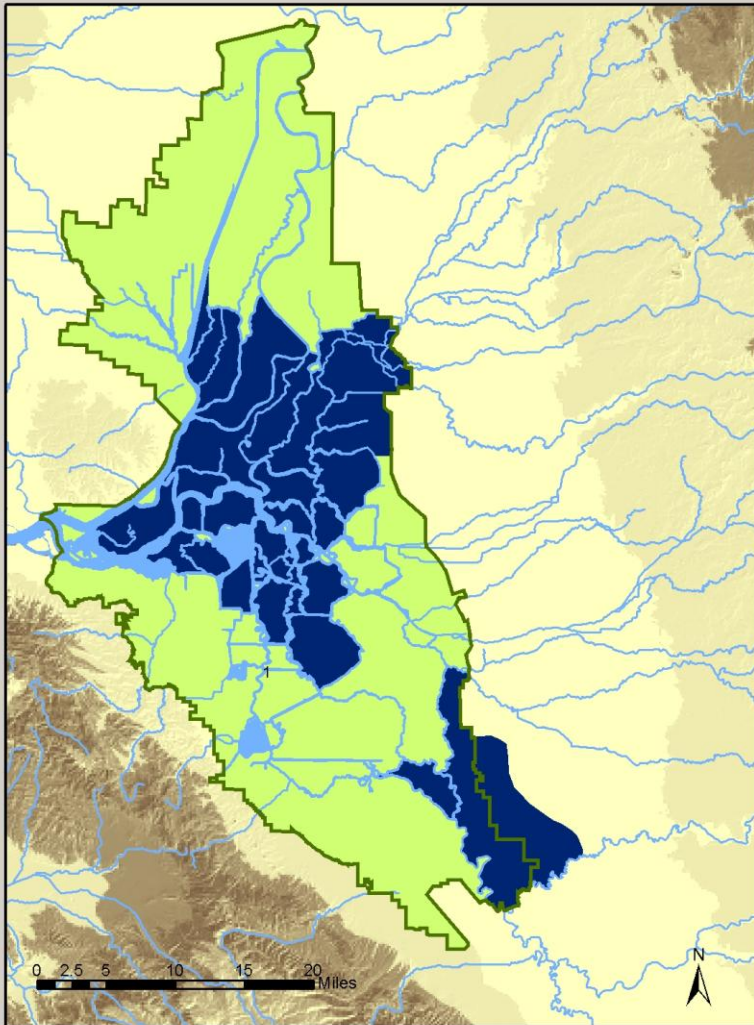


Projected Sea Level Rise



The Delta today.

Projected Sea Level Rise



Areas most at risk in the
Delta with 2-foot sea
level rise.

Land Subsidence

Due to Farming & Peat Soil Oxidation

- 25 ft.

- 20 ft.

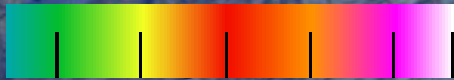
- 20 ft

- 15 ft

- 5 ft

Below Sea Level

-30 -20 -10 -5 ft



DWR's Climate Adaptation Strategy



<http://www.water.ca.gov/climatechange/docs/ClimateChangeWhitePaper.pdf>

EXECUTIVE SUMMARY
2009 CALIFORNIA
CLIMATE ADAPTATION
STRATEGY
DISCUSSION DRAFT

A Report to the Governor of the State of California
in Response to Executive Order S-13-2008



Public Review Draft



California **Water Plan**
Highlights

INTEGRATED WATER MANAGEMENT



Update 2009 • Department of Water Resources

Public Review Draft

January 14, 2009

www.climatechange.gov/adaptation

www.waterplan.water.ca.gov

Statewide Strategies

- Practice and promote integrated flood management
- Enhance and sustain ecosystems
- Expand water storage and conjunctive management of surface and groundwater resources
- Fix Delta water supply, quality and ecosystem conditions



Regional Strategies

- Aggressively increase water use efficiency
- Fully implement Integrated Regional Water Management (IRWM)



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

Helping Local Water Agencies

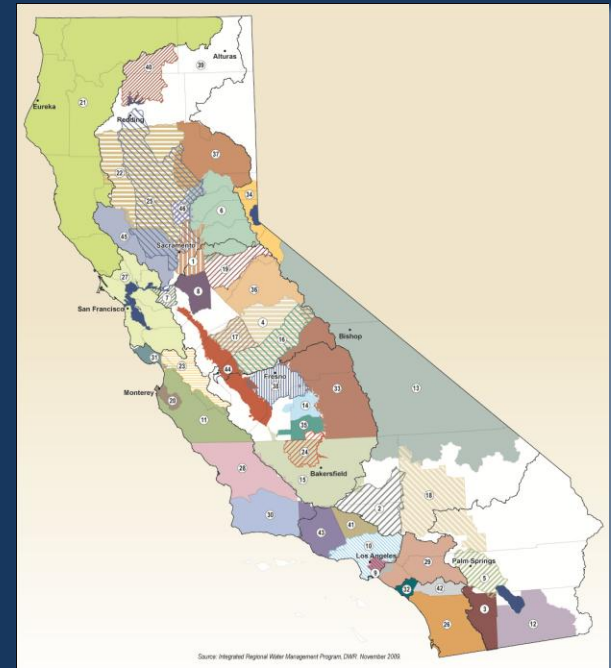
IRWMP Regions

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



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

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

-Water Plan Update 2009

Helping Local Water Agencies

IRWMP Program Objectives

Direct Objectives

- Improve water supply reliability
- Protect and improve water quality
- Ensure sustainability through environmental stewardship

Higher-Level Objectives

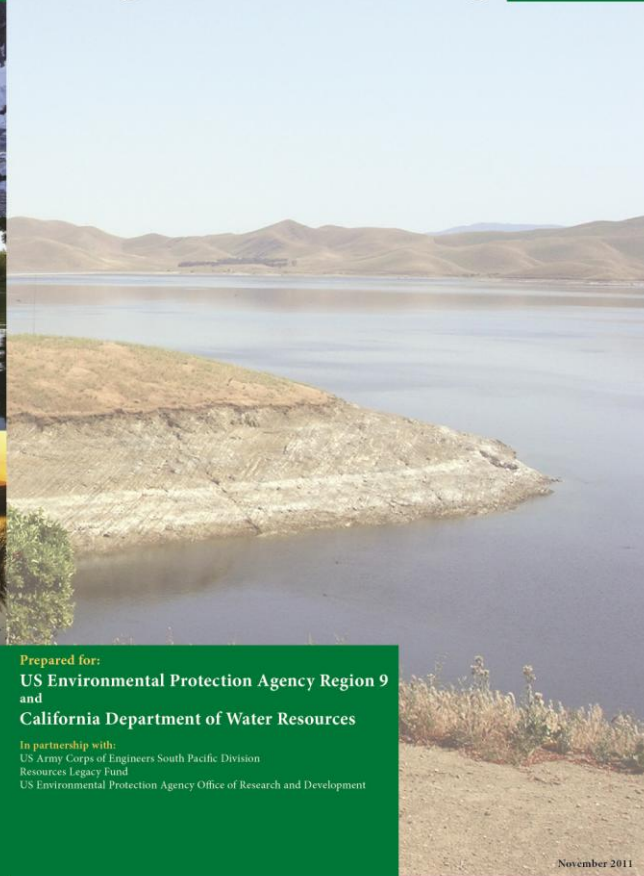
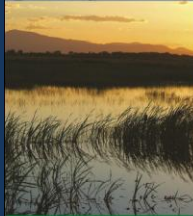
- Promote regional planning
- Financial incentives to promote integration and regional cooperation and collaboration

Helping Local Water Agencies

IRWM Regional Strategies

- Advance and expand conjunctive management of multiple water supply sources
- Use and reuse water more efficiently
- System modifications that address rising sea-level and other anticipated impacts of climate change
- Proposals that contain projects that reduce GHG emissions

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

CC Handbook for Regional Water Planning

Vulnerability Assessment Checklist

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

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 on the issue

Climate Change and Water Management

A Cross-sector Approach to Addressing Vulnerabilities

- We must embrace an entirely new way of thinking about water resources planning and management –
“stationarity is dead!”
- Regional water planning needs to include considerations of vulnerabilities to climate change
- We need to focus on mitigation as well as adaptation
in all sectors
- Climate change response actions must be integrated with water supply reliability, environmental protection, public safety, and public health actions

Climate Adaptation for Local Governments

- Strive to be a ***climate resilient*** community
- Assess regional vulnerabilities to climate change
- Prioritize risks from vulnerabilities based on current level of resilience and flexibility to make changes
- Identify ways risks can be addressed through existing planning processes
- Integrate climate resilience into overarching goals and policies
- Include the community in the planning process
- Commit to action in the face of uncertainty



Questions?
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