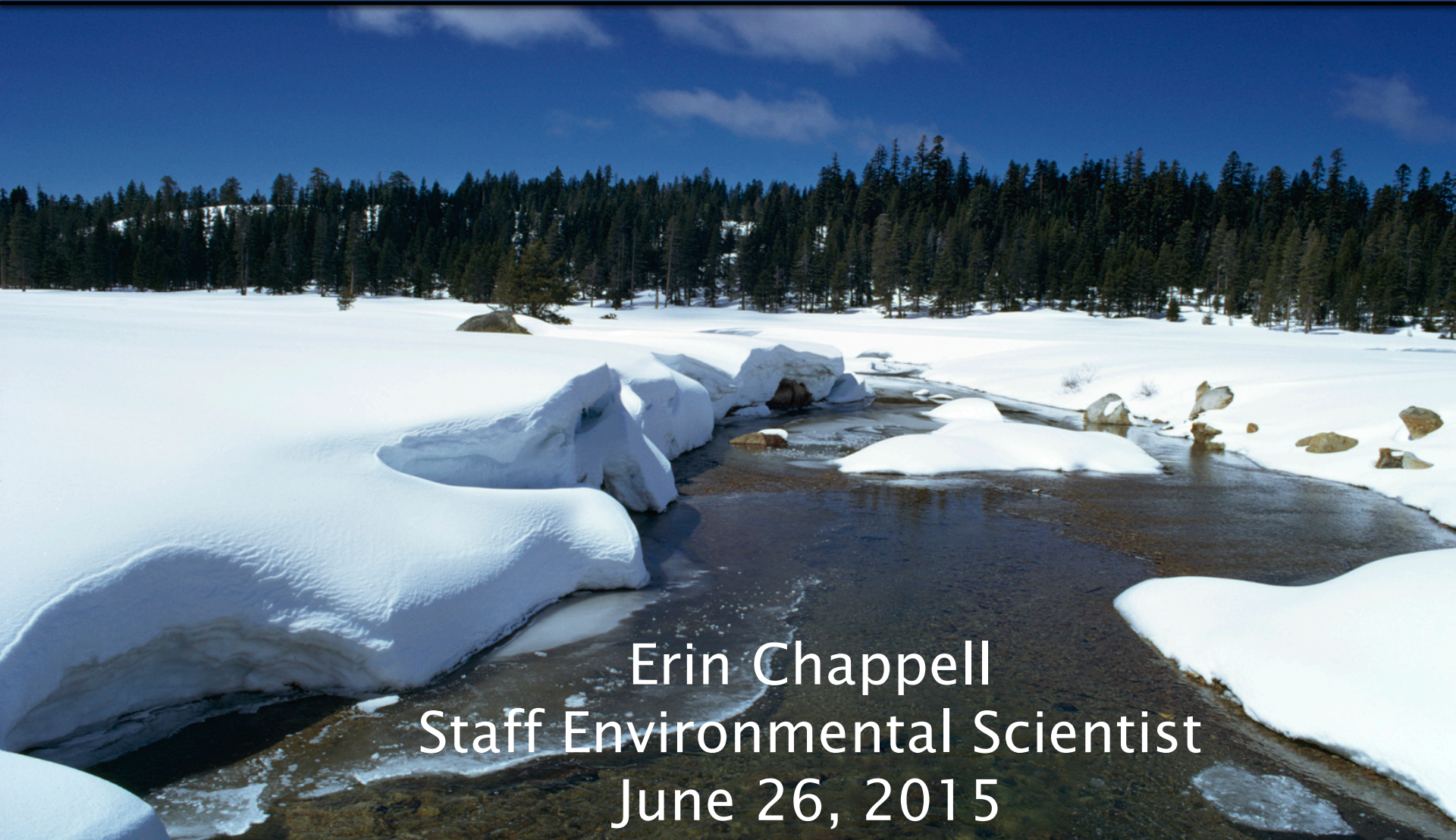
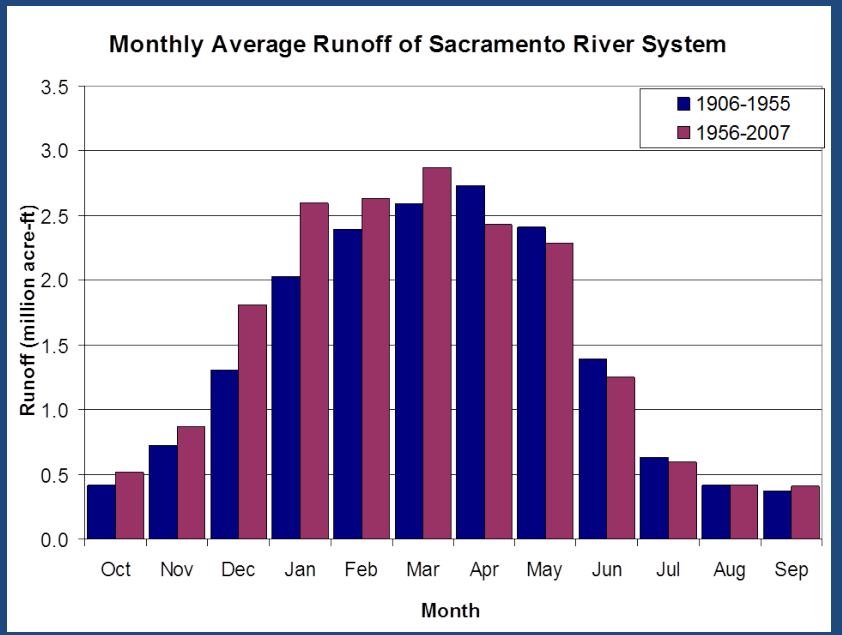
Climate Change Impacts
~Bay-Delta Region~



Erin Chappell
Staff Environmental Scientist
June 26, 2015

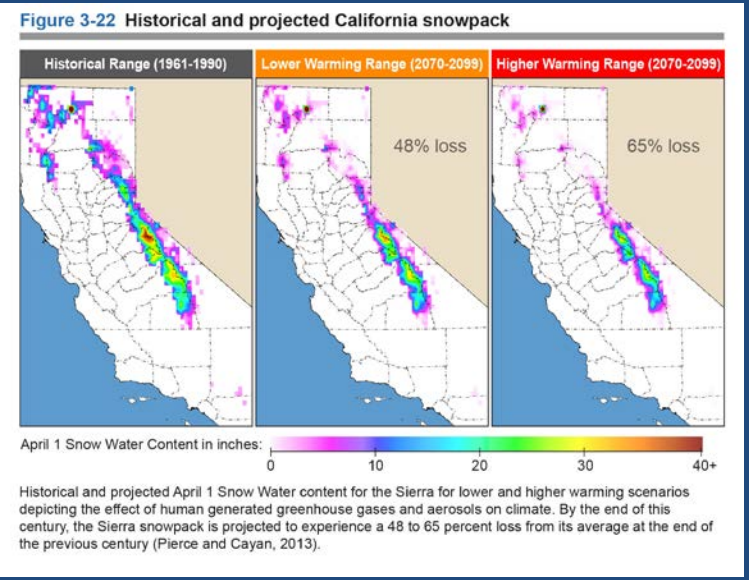
In the Past 100 years…

- 1ºF rise in average temperatures
- 10% overall loss of snowpack in the Sierra Nevada
- Changes in runoff timing
- An average sea level rise of 7” along the California coast



In the Next 40 years…

- 1 – 3.6ºF temperature rise
- 25 - 40 % reduction in snowpack
- Sea level rise: 5-24”
- Less summer/fall runoff
- More intense wet and dry periods



“…depending on the vulnerability of human and natural communities and their abilities to respond to these growing risks through adaptive changes, the San Francisco Bay Area could experience either significant impacts or maintain its resilience in the face of a rapidly changing environment.”

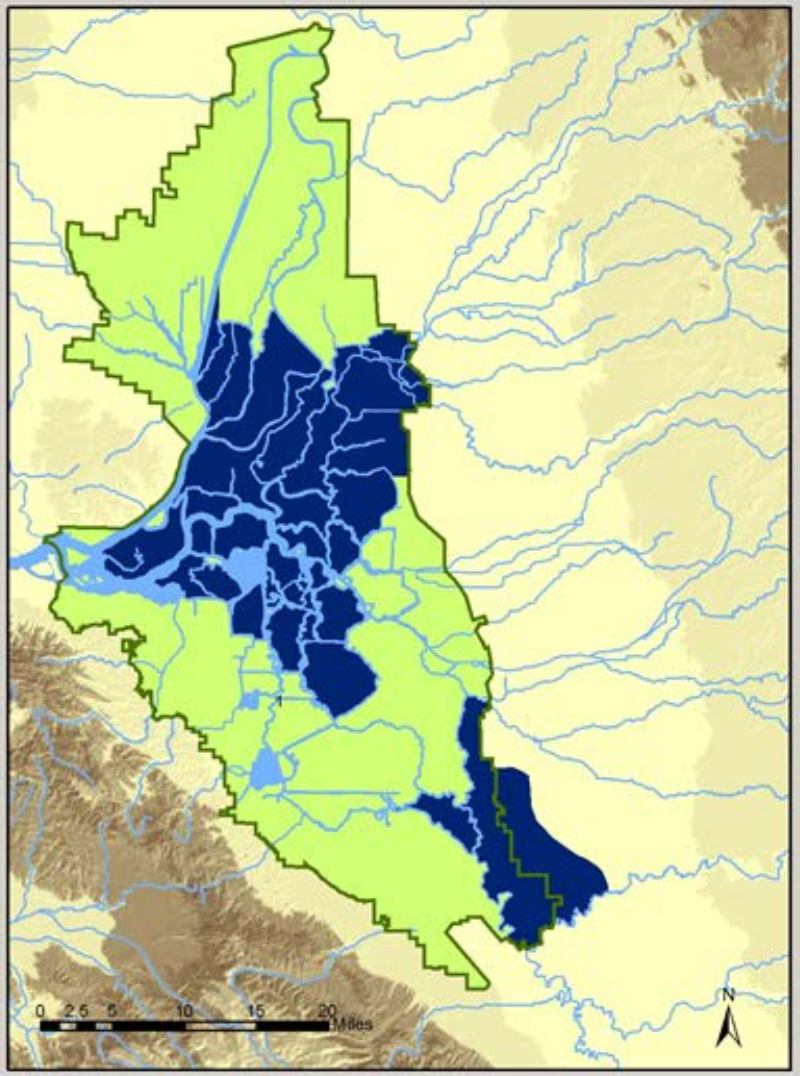
- Ekstrom & Moser

CEC-500-2012-071

Bay Area Climate Change Projections

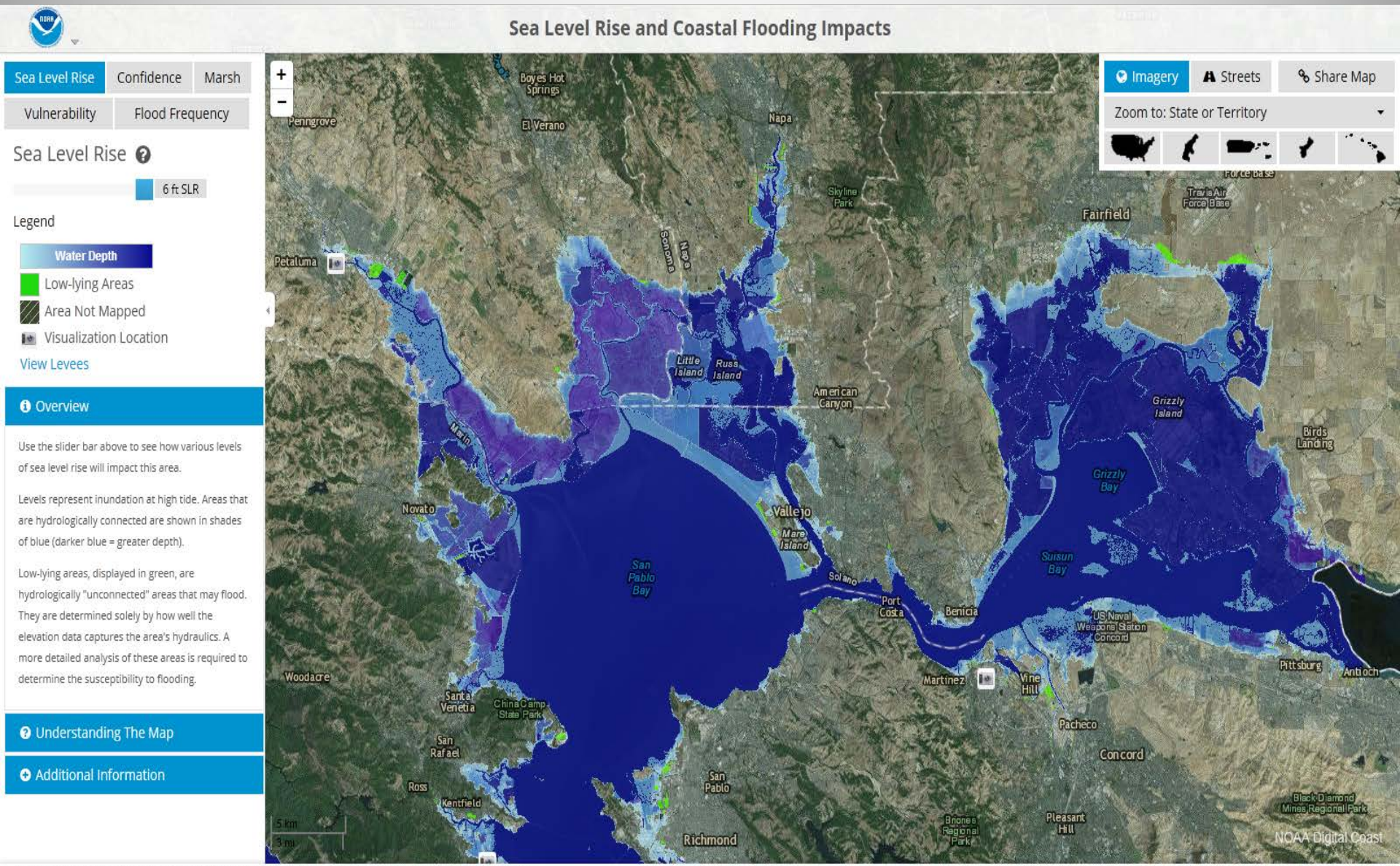
- **Temperature**
  - 2050 ⬆ 2.7ºF; 2100 ⬆ 3.6-10.8ºF
  - Longer period of heat extremes (June-Sept)
- **Precipitation**
  - Annual total relatively unchanged
  - Increase in frequency & intensity of extreme storms
- **Sea level rise**
  - 2050 5-24”; 2100 17-66”
  - Increase in number & duration of extreme SL events
- **Fire**
  - Increase in risk
  - Longer fire season

Projected Sea Level Rise

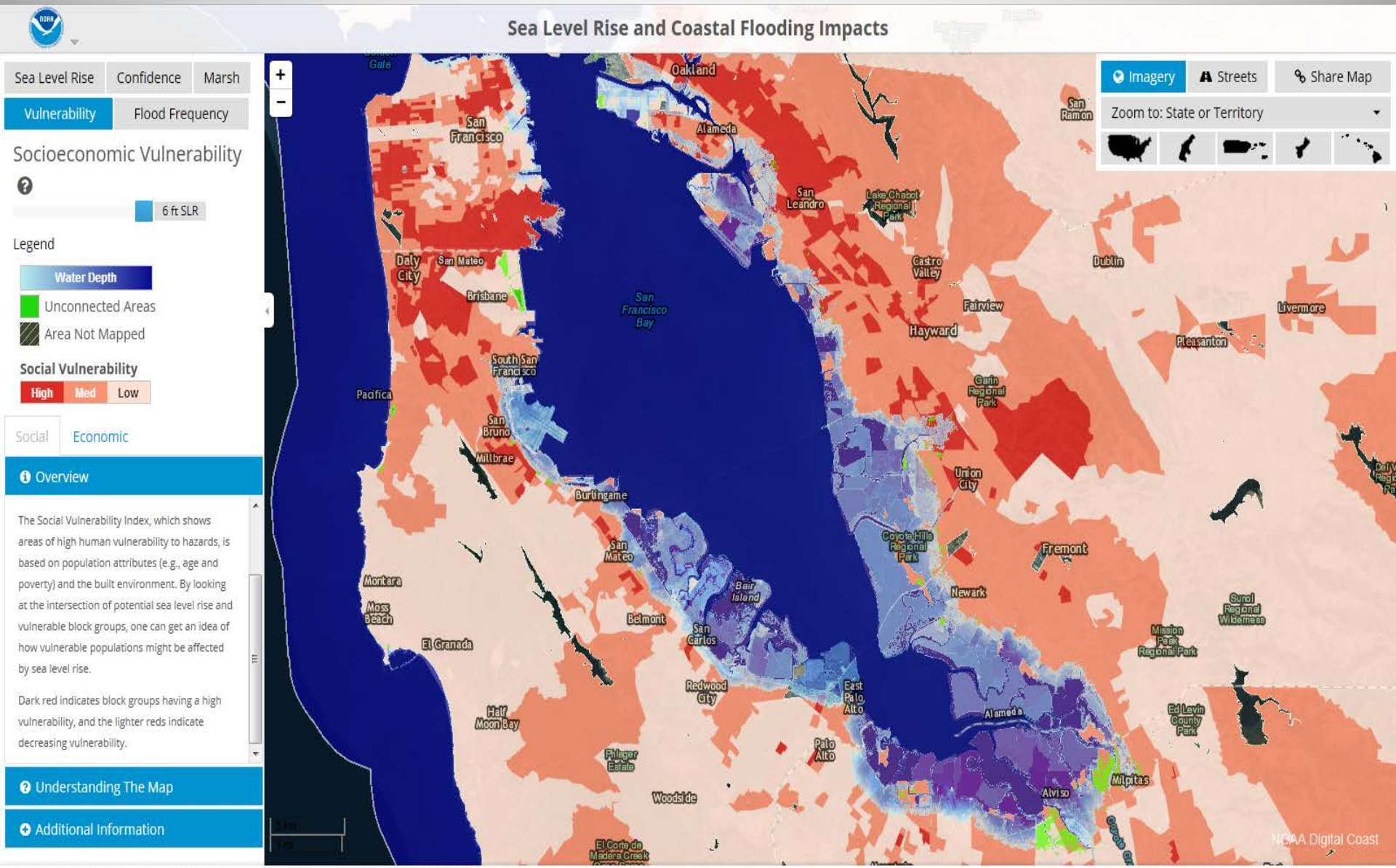


Areas most at risk in the Delta with 2-foot sea level rise.

Projected Sea Level Rise – North Bay



Projected Sea Level Rise – South Bay



Regional Sector Impacts
Water Supply

Marin

- Annual local rainfall

San Francisco/East Bay

- Timing and quantity of Sierra Nevada snowmelt

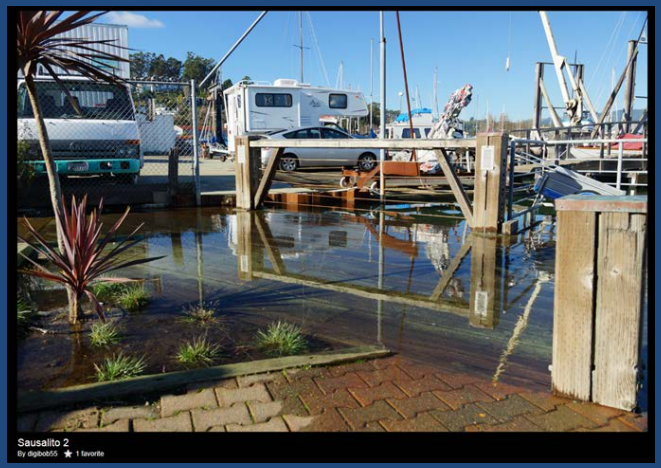
Other Areas

- Changes in Delta and local groundwater supplies

Regional Sector Impacts
Infrastructure & Development

Infrastructure

- Impairment and damage
- More frequent inoperability
- San Mateo & Alameda particularly vulnerable



Development – w/ 55” SLR

- 270,000 people
- $62 billion in assets
- 333 sq. miles of shoreline

Regional Sector Impacts
Agriculture

General Impacts

- Increase in water demand
- Increase in pests/disease
- Shifts in crop type

North Bay

- Suboptimal conditions for high quality wine grapes
- Potential increase in forage production but shorter growing season & decrease in reliability

Regional Sector Impacts
Ecosystems & Biodiversity

Wetlands
- SB - limited landward migration
- NB - more migration potential

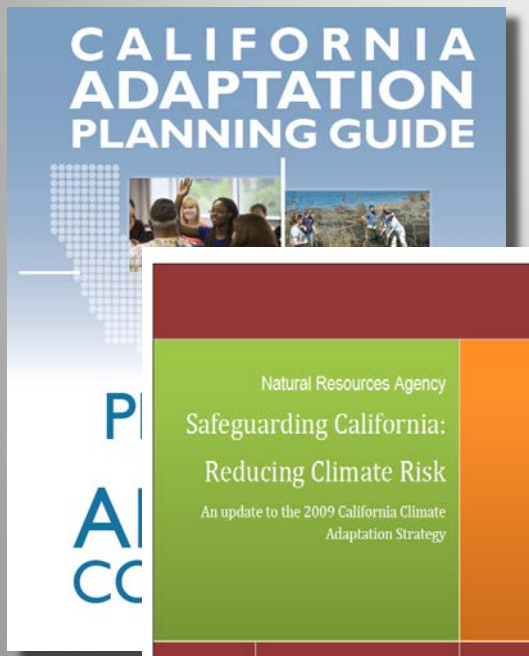
Fisheries
- Threatens 82% of natives
- Benefits non-natives

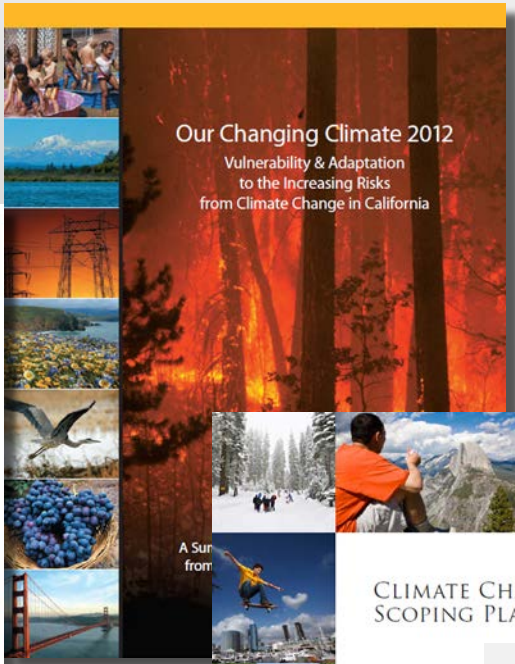
Plant Communities
- Coastal shift
- Less diversity (endemics)

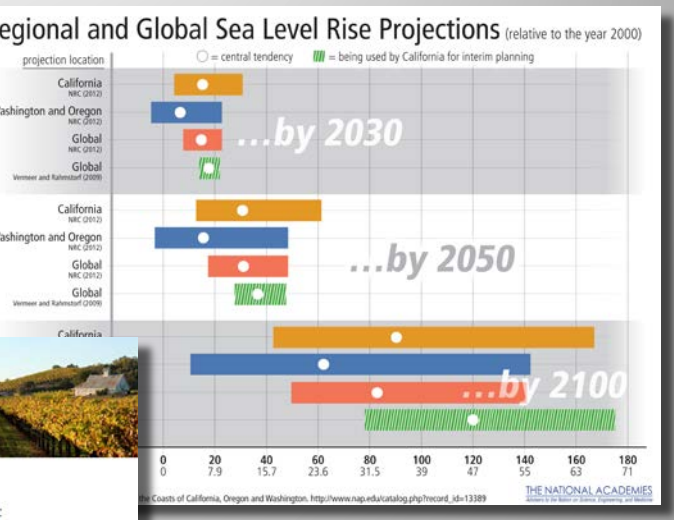



Mitigation & Adaptation Efforts

Statewide

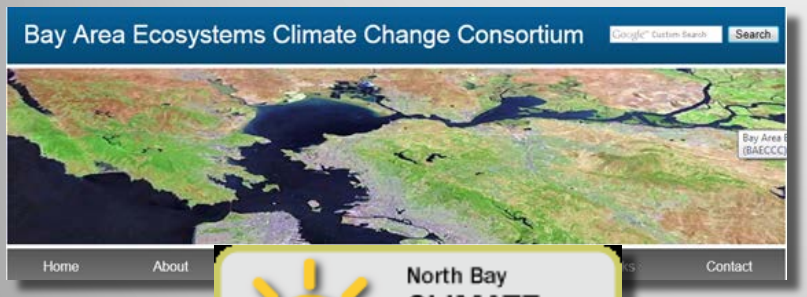


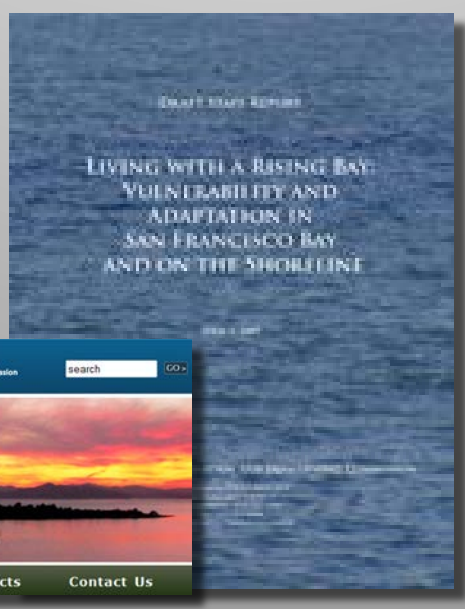


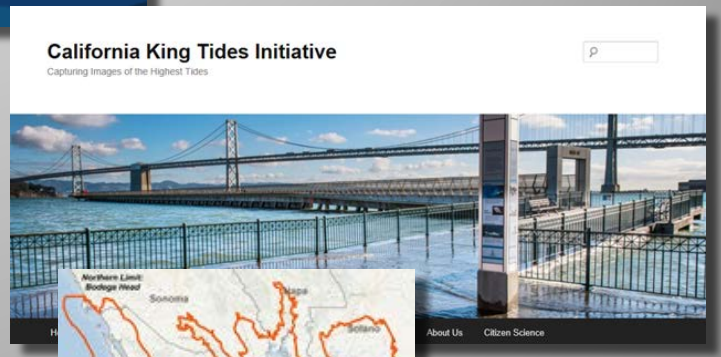


Mitigation & Adaptation Efforts

Bay Area





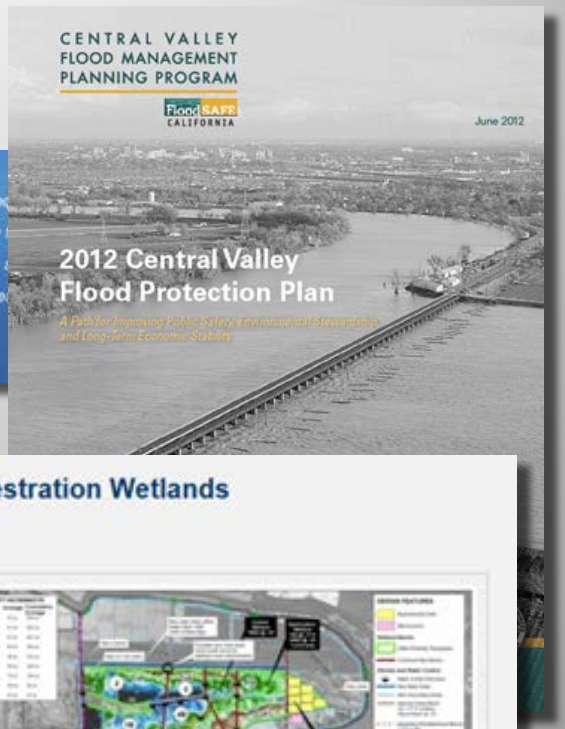


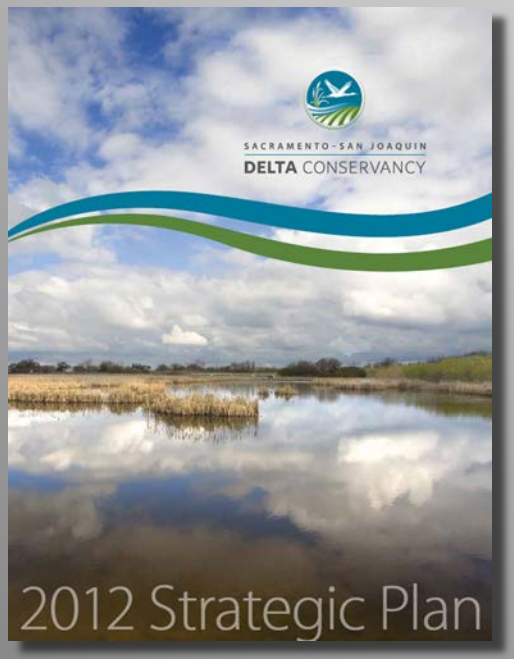
Mitigation & Adaptation Efforts

Delta

DELTA STEWARDSHIP COUNCIL

The Delta Stewardship Council was created in legislation to achieve the state mandated coe
for the Delta. "Coequal goals' means the two goals of providing a more reliable water supply
California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals
achieved in a manner that protects and enhances the unique cultural, recreational, natural re
and agricultural values of the Delta as an evolving place." (CA Water Code §85054)





Twitchell Island Carbon Sequestration Wetlands

CALIFORNIA
WATER FIX
RELIABLE. CLEAN. WATER.

Mitigation & Adaptation Efforts

DWR

Addressing Climate Change
A Cross-sector Approach in the Bay-Delta Region

- Regional planning needs to include considerations of vulnerabilities to climate change and risks
- We must embrace an entirely new way of thinking about planning and management
- We need to focus on both mitigation & adaptation
- The decisions and investments we make *now* will play a large role in determining the region's resiliency in the face of a changing climate

Climate Change

- Climate Change Home
- Climate Change 101
- Climate News
- Publications & Video
- Local and Regional Resources
- DWR Climate Action Plan
- Water-Energy Nexus
- Related Links
- Internal CC Website
- Climate Change Technical Advisory Group
- Contact Us

Climate change is having a profound impact on California water resources, as evidenced by changes in snowpack, sea level, and river flows . These changes are expected to continue in the future and more of our precipitation will likely fall as rain instead of snow. This potential change in weather patterns will exacerbate flood risks and add additional challenges for water supply reliability.

The mountain snowpack provides as much as a third of California's water supply by accumulating snow during our wet winters and releasing it slowly when we need it during our dry springs and summers. Warmer temperatures will cause what snow we do get to melt faster and earlier, making it more difficult to store and use. By 2050, scientists project a loss of at least 25 percent of the Sierra snowpack. This loss of snowpack means less water will be available for Californians to use.

Climate change is also expected to result in more variable weather patterns throughout California. More variability can lead to longer and more severe droughts. In addition, the sea level will continue to rise threatening the sustainability of the Sacramento-San Joaquin Delta, the heart of the California water supply system and the source of water for 25 million Californians and millions of acres of prime farmland.

The Department of Water Resources (DWR) is addressing these impacts through mitigation and adaptation measures to ensure that Californians have an adequate water supply, reliable flood control, and healthy ecosystems now and in the future. Below are some of DWR's climate change activities.

- In 2015, DWR received the Climate Leadership Award for Excellence in Greenhouse Gas Management: Goal Setting for its work on the DWR Climate Action Plan. The award, given by the U.S. EPA, the Association of Climate Change Officers, The Climate Registry, and The Center for Climate and Energy Solutions, is the highest national award given for greenhouse gas management. DWR is the first public agency to be honored with the award.
- In 2014, DWR released up-to-date climate change information, including hydrologic impacts and projections at the statewide and regional levels, adaptation strategies, and energy intensity of water supplies in California Water Plan Update 2013
- In 2013, DWR completed its ownership divestment of a coal-fired power plant in Nevada and ceased taking electricity from it. By replacing this electricity with electricity generated by high-efficiency gas-fired power plants and renewables, DWR reduced its GHG emmissions by over 800,000 metric tons per year (equivalent to removing 170,000 cars from the road).
- In 2012, DWR adopted phase 1 of its Climate Action Plan, a Department-wide Greenhouse Gas Emissions Reduction Plan
- In 2011, DWR in cooperation with the U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, and Resources Legacy Fund completed the Climate Change Handbook for Regional Water Planning
- In 2010, DWR adopted an Environmental Stewardship Policy which supports a Department-wide "Total Resource Management" approach to planning activities and projects. Clear and measurable Goals for sustainability implementation were also adopted in 2010 following the 2009 adoption of DWR's Sustainability Policy to promote a departmental change in the way DWR does business. (Visit DWR's Sustainability Portal and Watch DWR's Sustainability Videos)
- Between 2007 and 2009, DWR was a member of the California Climate Action Registry and made the list as a Climate Action Leader by reporting its GHG emissions and having the data verified through a third party audit. In 2010, DWR transitioned to The Climate Registry, a North America-wide climate registry, and continued to provide third party verified GHG emissions inventory data.
- DWR adopted a Climate Change Adaptation Strategy (2008)

Other Climate Change Activities

Adapting to the current and future effects of climate change is essential for DWR and California's water managers. DWR addresses climate change in its California Water Plan, which is updated every five years. The California Water Plan provides a framework for water managers, legislators, and the public to consider options and make decisions regarding California's water future. DWR continues to improve and expand the analysis of climate change in the California Water Plan. The 2013 California Water Plan Update includes multiple scenarios of future climate conditions and stresses the inclusion of uncertainty, risk, and sustainability.

Climate Change Technical Advisory Group

Featured Link

Climate Leadership Award: Press Release

CLIMATE LEADERSHIP AWARDS

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CLIMATE ACTION LEADER

The Climate Registry

SACRAMENTO AREA SustainableBusiness

www.water.ca.gov/climatechange