

Climate Change and Water in California

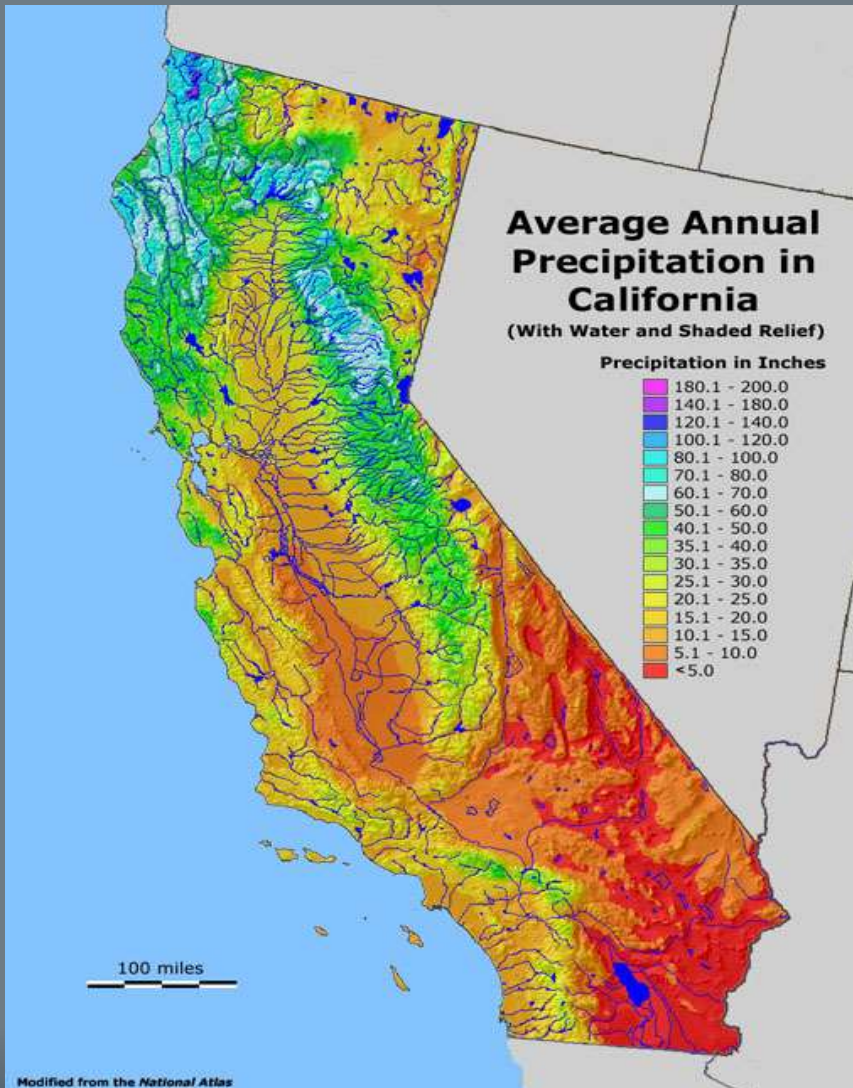
Napa County Watershed Symposium
May 24, 2017

Michelle Selmon, Senior Environmental Scientist
California Department of Water Resources

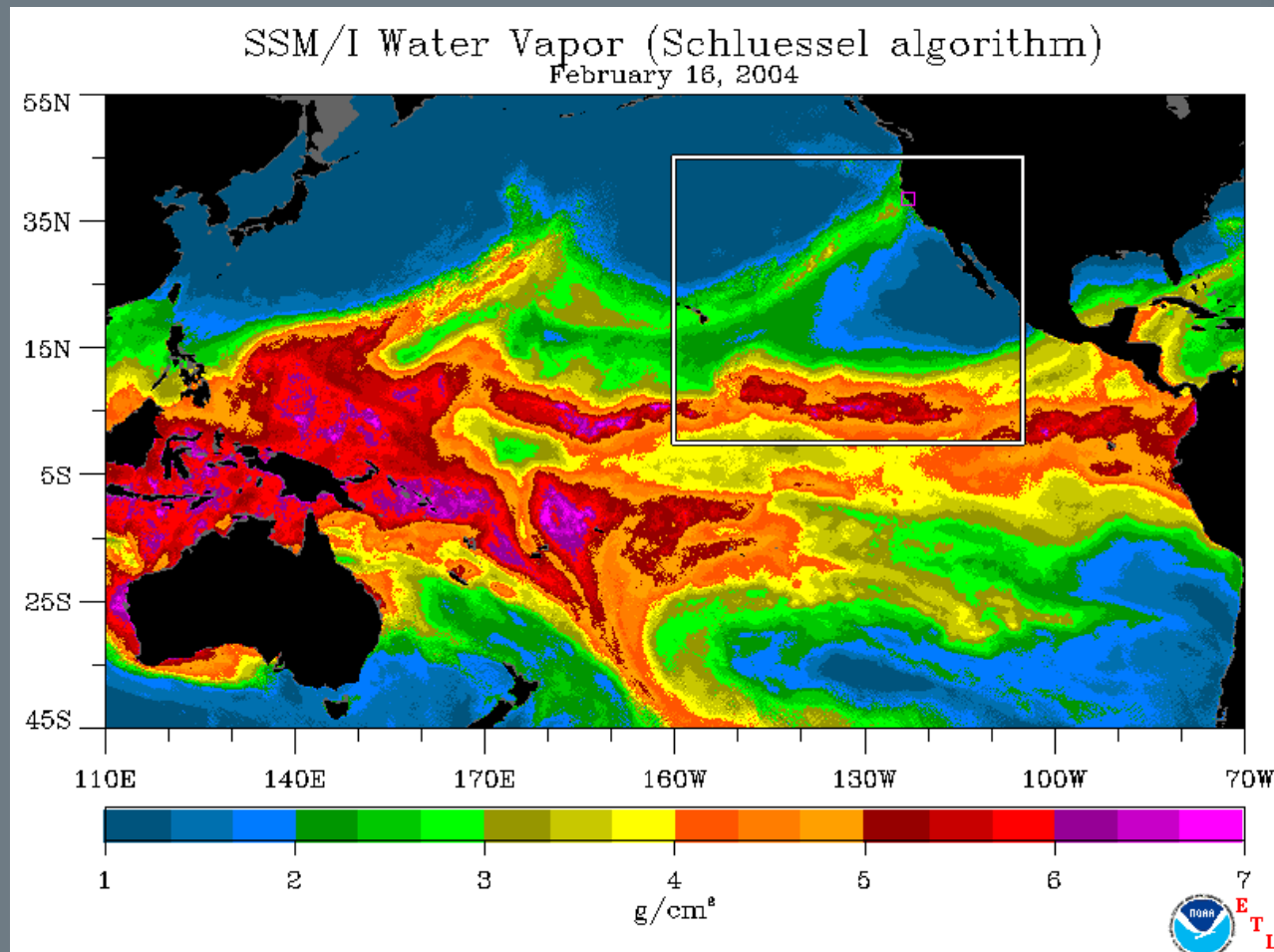
Precipitation in California

Greatest precipitation falls in northern mountains in CA

Biggest population centers are along coasts and southern part of CA

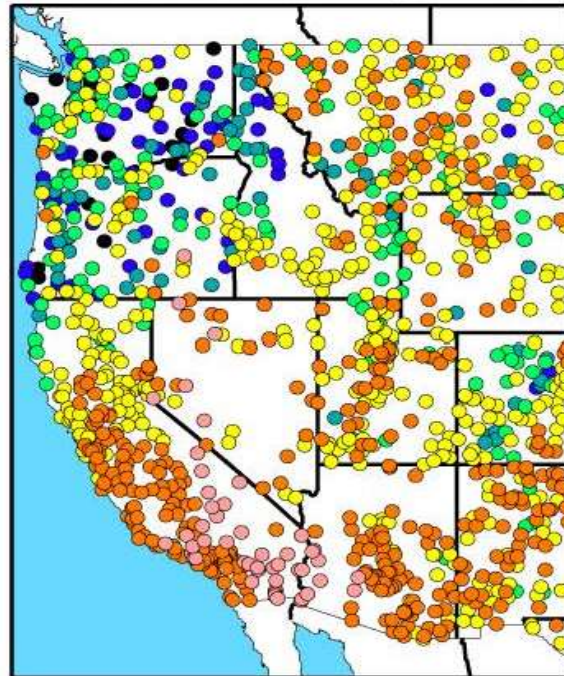


The Importance of Atmospheric Rivers

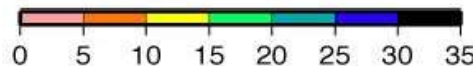


California's Precipitation Regime

c) AVERAGE NUMBER OF DAYS/YR TO OBTAIN HALF OF TOTAL PRECIPITATION, WY 1951-2008



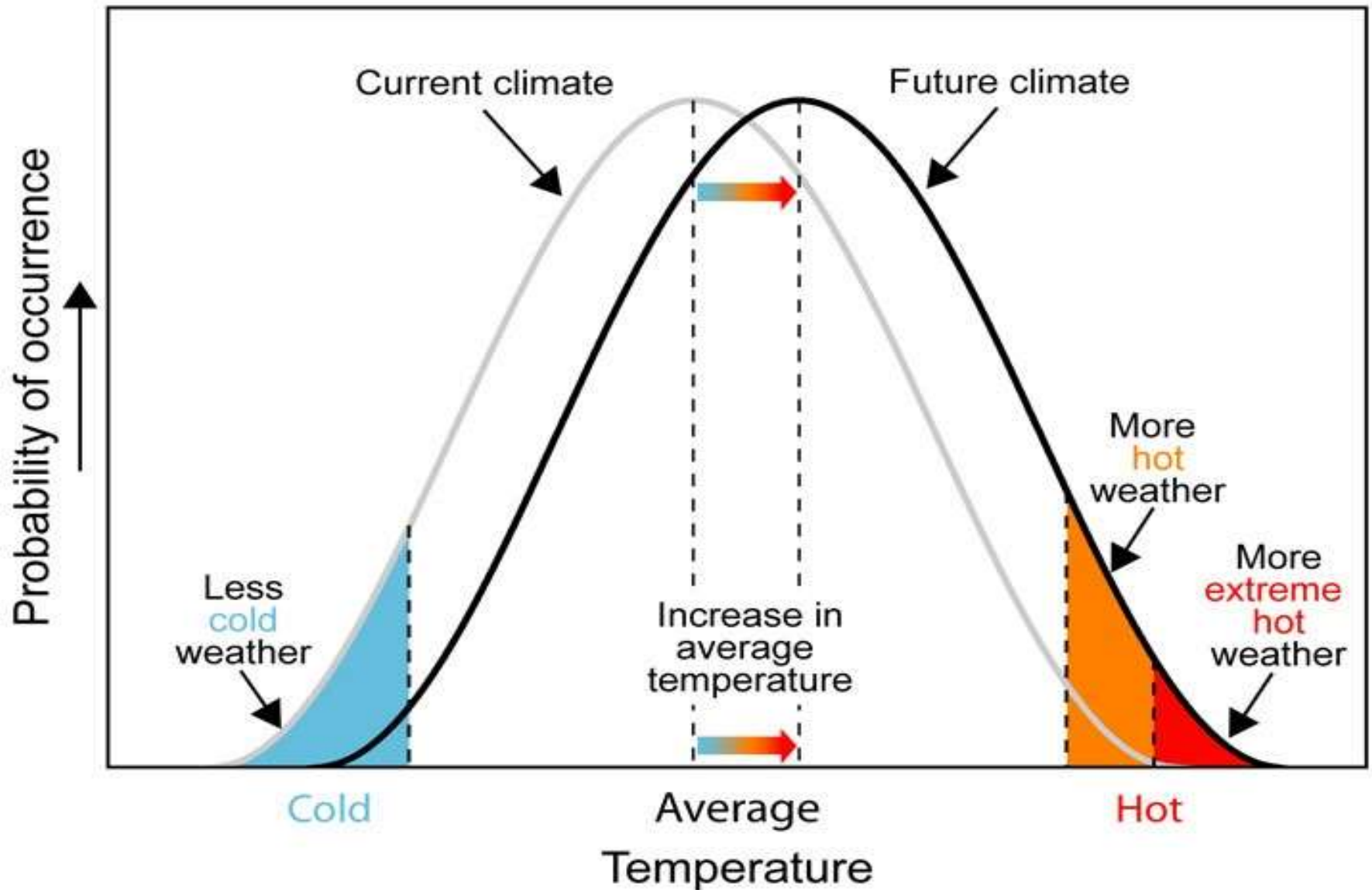
days/year



Just a few storms each year are the core of California's water supplies

Dettinger et al, 2011

Future Climate Shift

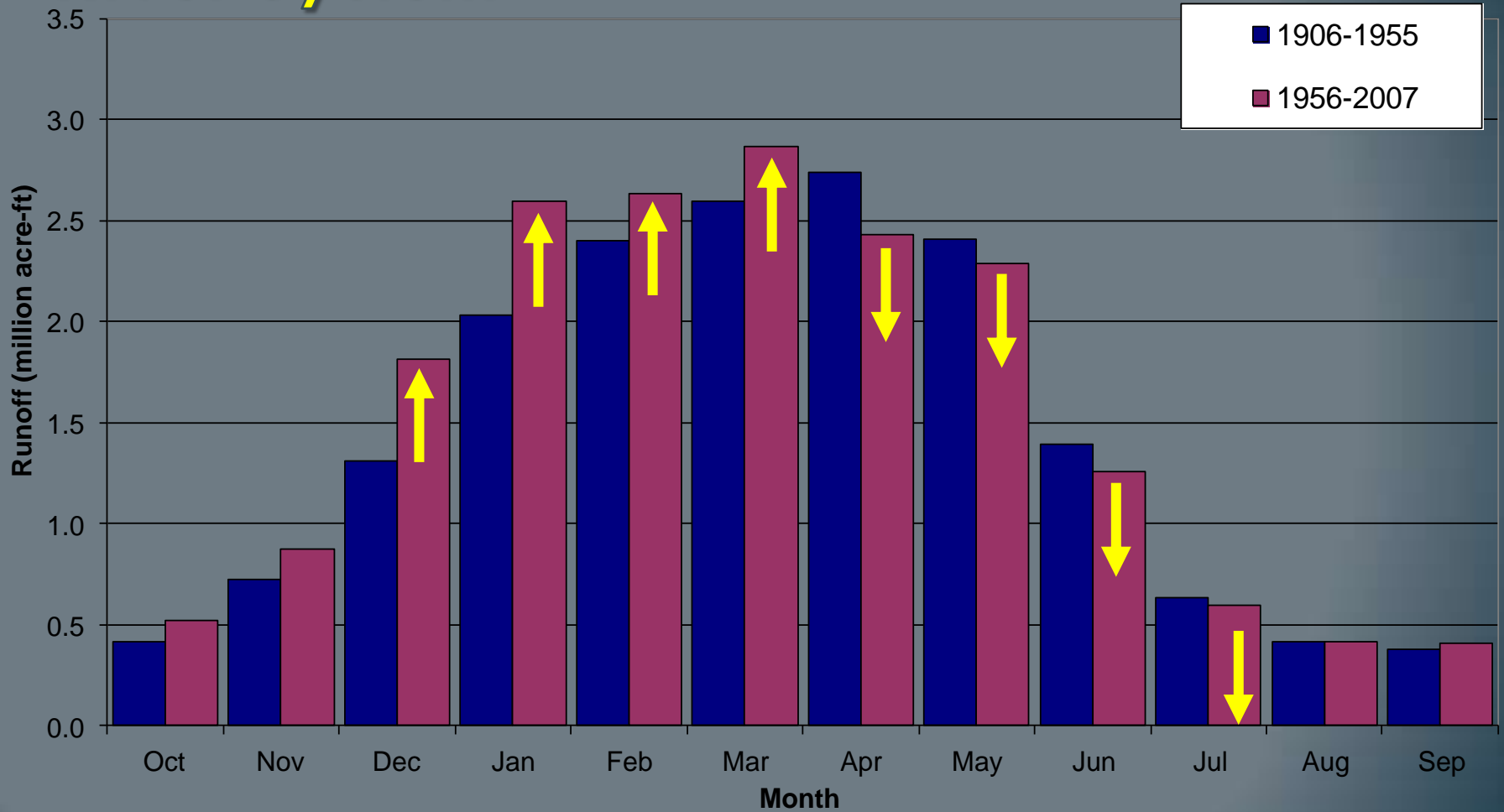


Measured California Impacts

- ❖ 10 % reduction (1.5 maf) in Sierra – Nevada snowpack
- ❖ Shifts in runoff and precipitation
- ❖ Decreasing spring snowmelt runoff
- ❖ Rising sea levels along the coast ; 7” in a century
- ❖ Shrinking glaciers
- ❖ Increasing wildfires
- ❖ Warming lakes and ocean waters
- ❖ Species migration to higher elevations

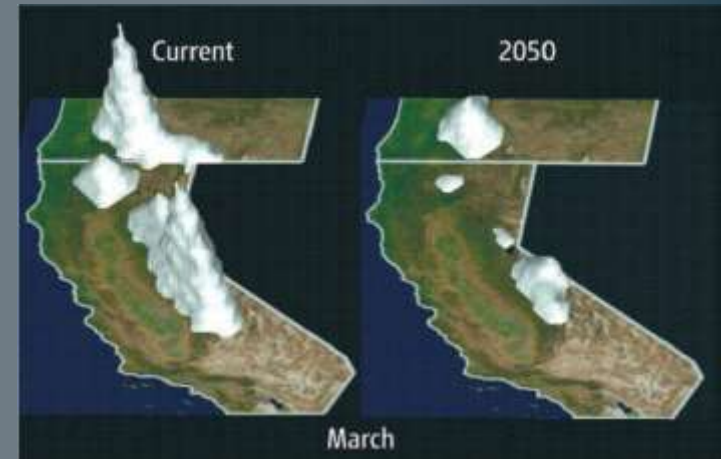


Monthly Average Runoff of Sacramento River System



In the Next 35 Years...

- **5 to 24 inches rise in sea level**
- **Increased salinity in the Delta**
- **25-40% reduction in snowpack**
- **Less summer runoff**
- **More intense wet and dry periods**
- **More frequent and intense wildfires**
- **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”



Climate Change and Water Management Adaptation Strategies

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



Water-Energy Nexus

Figure 3-23 The Water and Energy Connection



DWR's Comprehensive Response to Climate Change



- **Climate Action Plan (CAP)**
 - ❖ **Phase I: GHG Mitigation Plan**

Greenhouse Gas Emission Reduction Plan- Scope




All Operations and
Maintenance of the
SWP

Operations and
Maintenance of State
Flood Protection
Infrastructure




California Department of Water Resources



Climate Action Plan

Phase 1: Greenhouse Gas Emissions Reduction Plan



DWR
Construction
Activities

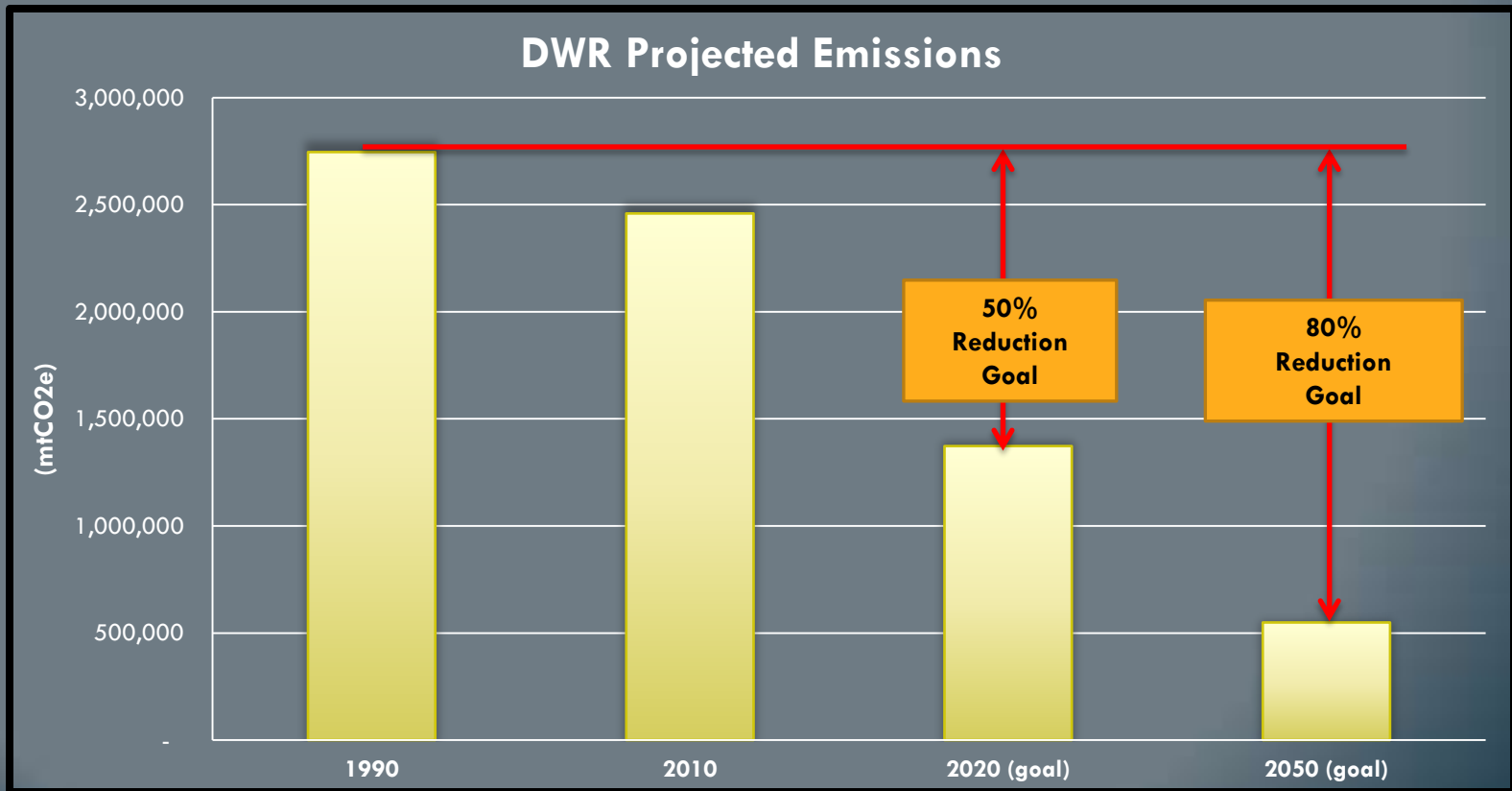


Business
Activities



DWR GHG Reduction Goals

- Reduce GHG emissions by 50% below 1990 levels by 2020
- Reduce GHG emissions by 80% below 1990 levels by 2050



DWR's Comprehensive Response to Climate Change

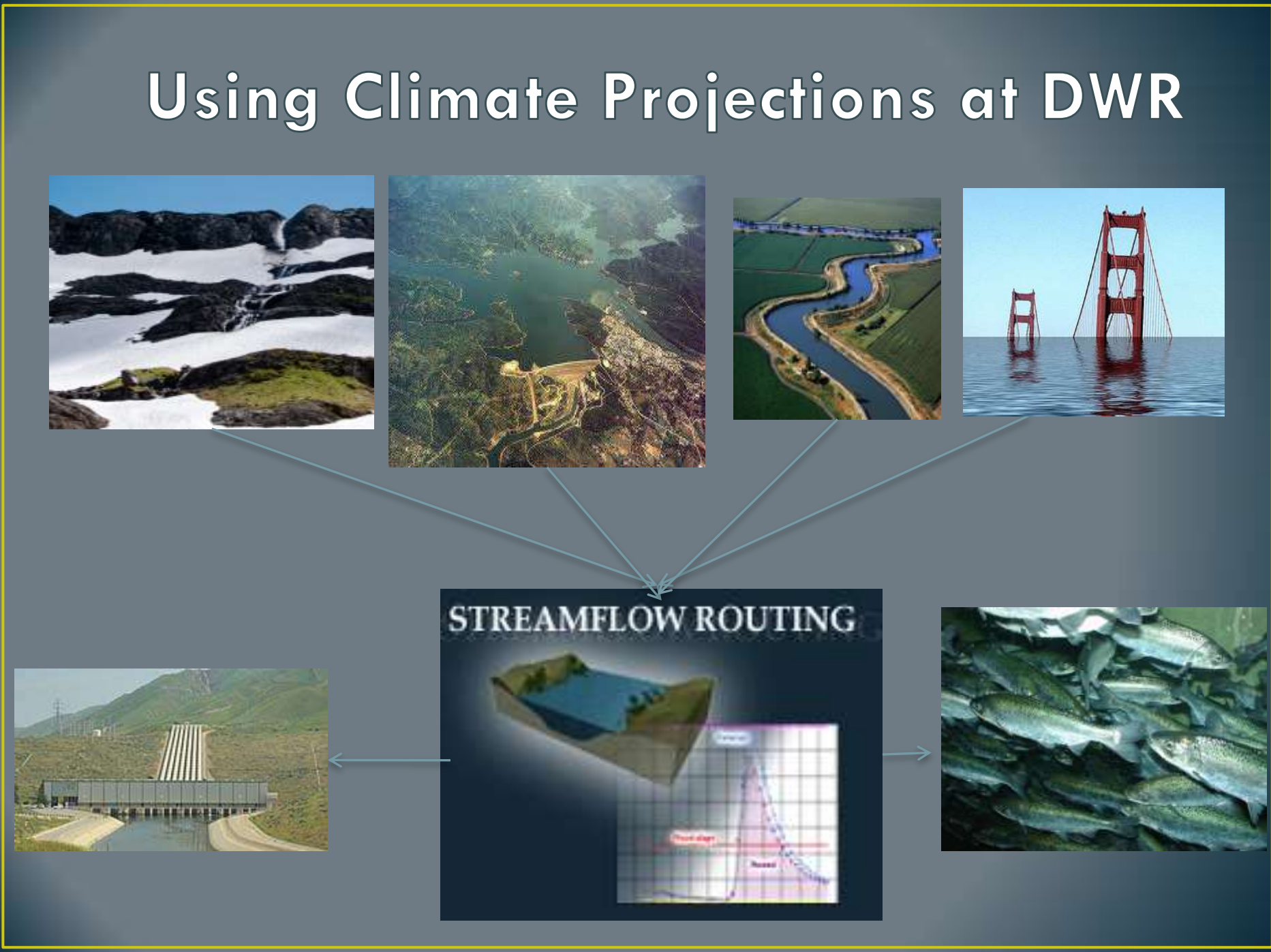
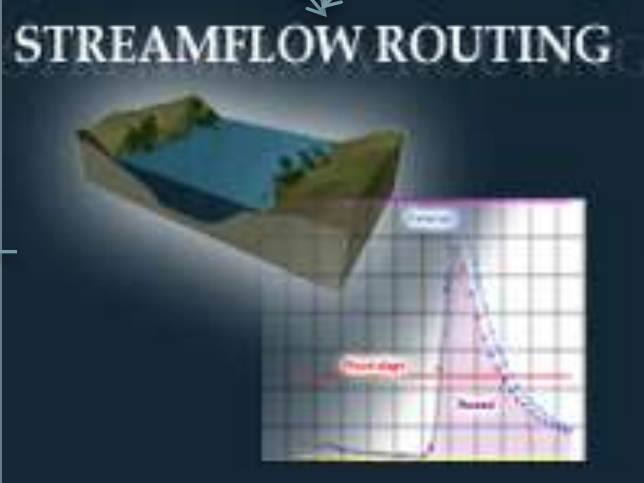


- **Climate Action Plan (CAP)**

- ❖ *Phase I: GHG Mitigation Plan*

- ❖ *Phase II: Consistent, high quality climate change analysis across all DWR programs*

Using Climate Projections at DWR



DWR's Comprehensive Response to Climate Change



- **Climate Action Plan (CAP)**

- ❖ *Phase I:* GHG Mitigation Plan

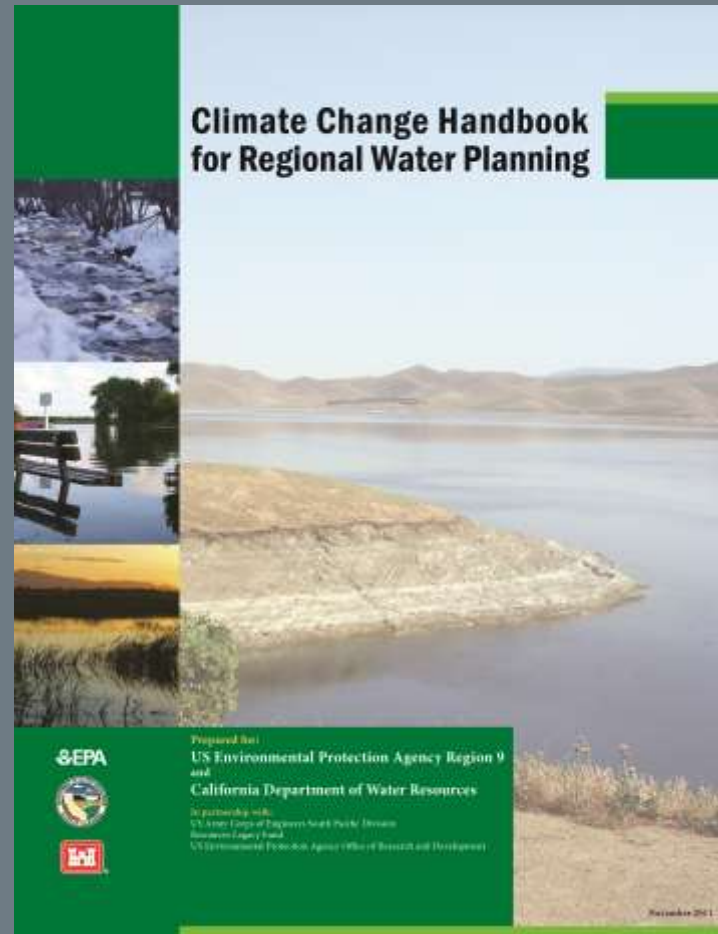
- ❖ *Phase II:* Consistent, high quality climate change analysis across all DWR programs

- ❖ *Phase III:* Comprehensive Vulnerability Assessment and Adaptation Plan

Climate Change-Driven Hazards

- Wildfire
- Extreme Heat
- Sea Level Rise
- Habitat and Ecosystem Services Impacts
- Hydrologic Impacts on *Water Supply*
 - Declining snowpack, changing runoff timing, extended drought

Guidance for IRWM Groups(and others!)



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

A tool for exploring future climate change...

The screenshot displays the cal-adapt website interface. At the top left is the 'cal-adapt' logo. To the right, the text reads 'EXPLORING CALIFORNIA'S CLIMATE CHANGE RESEARCH'. Below this are navigation arrows. The main content area is divided into six panels:

- Video Tour:** 'VIEW THE DIFFERENT TOOLS AND DATA AVAILABLE IN CAL-ADAPT'. Includes a video player showing a map of California.
- Explore Climate Tools:** 'INTERACTIVE MAPS & CHARTS'. Includes four icons representing different tools: a sun, a star, waves, and a flame.
- About Cal-Adapt:** 'SUBSCRIBE TO THE CAL-ADAPT NEWSLETTER'. Includes three options: 'WHAT'S NEW?' (with a 'NEW' badge), 'WHAT'S TO COME?' (with a gear icon), and 'FAQS' (with a question mark icon).
- Access Data:** 'ACCESS THE RAW DATA USED IN CAL-ADAPT'. Includes a download icon and the text: 'Select and download data in a variety of tabular and GIS formats'.
- Resources:** 'RESEARCH, PUBLICATIONS & LINKS'. Includes an icon of books and the text: 'Find out more about climate change research in California, explore peer reviewed publications and learn more about how to use climate projections.'.
- Community:** 'CAL-ADAPT BLOG, CLIMATE CHANGE NEWS & EVENTS'. Includes an icon of three people and the text: 'Find out more about how climate change in California is relevant to your community and share your thoughts and findings'.

<http://cal-adapt.org/>

Department of Water Resources

DWR Climate Change webpage

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



DWR Climate News Digest

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

[1800 years of global ocean cooling halted by global warming](#) [Science Daily – August 17, 2015]

Agriculture/Food Production

[Climate change blamed for Australia's increased frost risk for cereal crops](#)
[ABC.net.au – August 20, 2015]

[How small farmers are adapting to climate change](#)
[Christian Science Monitor – August 21, 2015]

[Risk of food shortages to rise with climate change](#) [CBS News – August 14, 2015]

Extreme Weather Events

[Extreme weather events of 2015: Is climate change to blame?](#) [RTCC – August 21, 2015]

[California drought is made worse by global warming, scientists say](#)
[New York Times – August 20, 2015]

[Did climate change, El Niño make Texas floods worse?](#) [CBS News – August 19, 2015] (“...when an extreme event occurs one must factor in some role/influence that the underlying changes are exerting on things. For example, making a wet spell somewhat wetter, a heat wave longer and more extreme, a drought more extreme and covering a larger geographic area”)

CA Turf Replacement Initiative- <http://www.water.ca.gov/turf/>



Questions?

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