



**Adapt, Flee, or Perish:  
Responses to Climate Change for California's Water Sector**

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**WEF Headwaters Tour**

**June 28, 2018**

**Rancho Cordova, California**

# Today's Topics

- Historical and current indications of climate change
- Projected climate change impacts to water resources
- Adapting to climate change



# DWR's Roles & Responsibilities

## *Mission statement:*

"To manage the water resources of California in cooperation with other agencies, to benefit the State's people, and to protect, restore, and enhance the natural and human environments."

- Plan, design, construct, operate, and maintain California's State Water Project, the nation's largest state-built water and power development and conveyance system
- Improve and maintain Central Valley flood management systems and provide statewide flood management financial assistance
- Protect and restore the Sacramento-San Joaquin Delta
- Educate the public about the importance of water and its proper use
- Regulate the safety of 1200 dams
- Regional water management, focusing on technical & financial assistance to local agencies to advance Integrated Regional Water Management
- Statewide planning, focusing on data and updating the California Water Plan (Bulletin 160 Series)





Lyell Glacier, Yosemite National Park, California, USA circa 1903 (upper) and 2003 (lower)

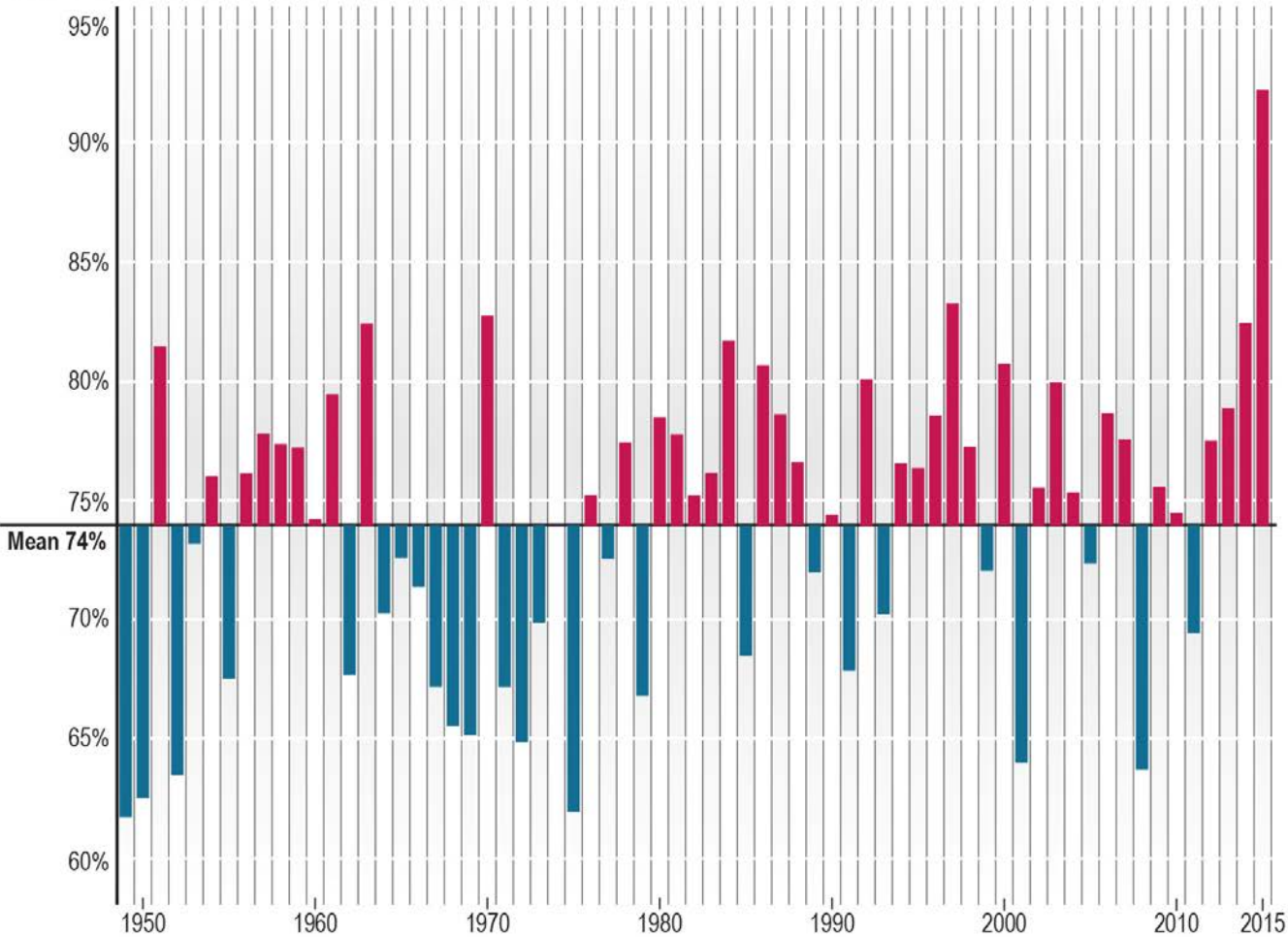
# In the Past 100 years...

- ❖ 1°F 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

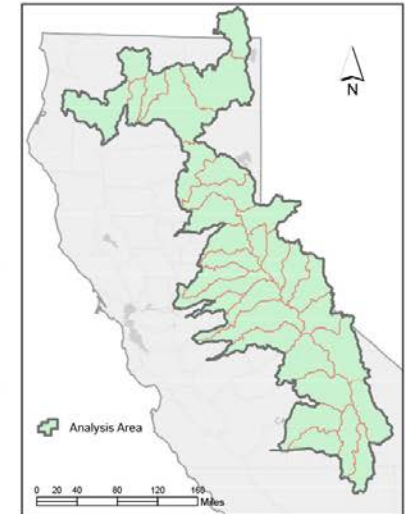


# Changing Trend of Rain vs. Snow

Rain as Percentage of Total Precipitation



Location of 33 watersheds sampled



**It's tough to make predictions, especially about the future.**

**--Yogi Berra**

# In the Next 35 years...

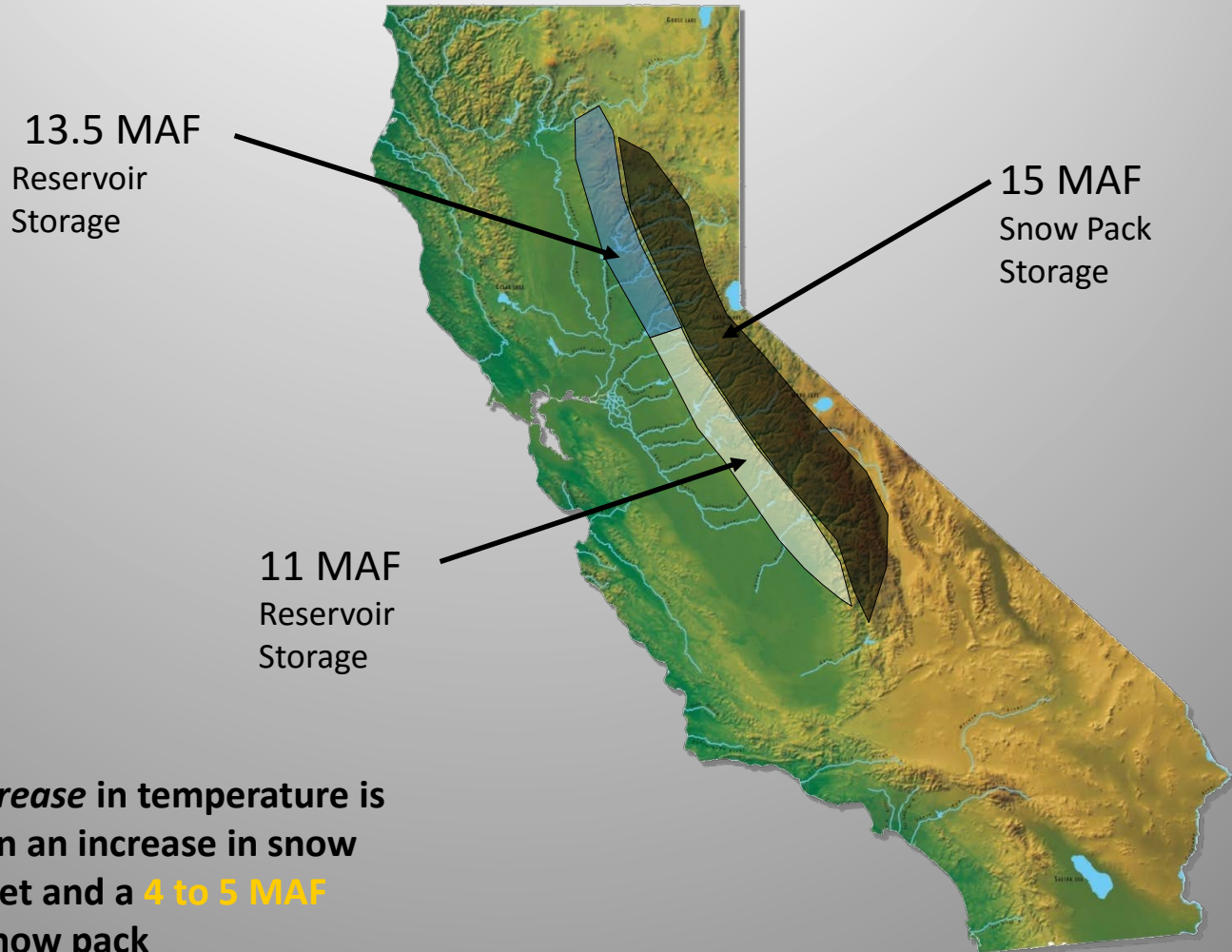
- ❖ **1 – 3.6°F temperature rise**
- ❖ 25 - 40 % reduction in snowpack
- ❖ **Sea level rise: 5"-24"**
- ❖ Less summer/fall runoff
- ❖ **More intense wet and dry periods**



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# Expected Storage Capacity Impacts from Runoff Changes

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A moderate 3<sup>o</sup>C increase in temperature is projected to result in an increase in snow elevation of 1500 feet and a **4 to 5 MAF decrease** in Sierra snow pack

**Adapt or perish, now as ever, is nature's  
inexorable imperative.**

**--H.G. Wells (1945)**

# Climate Adaptation

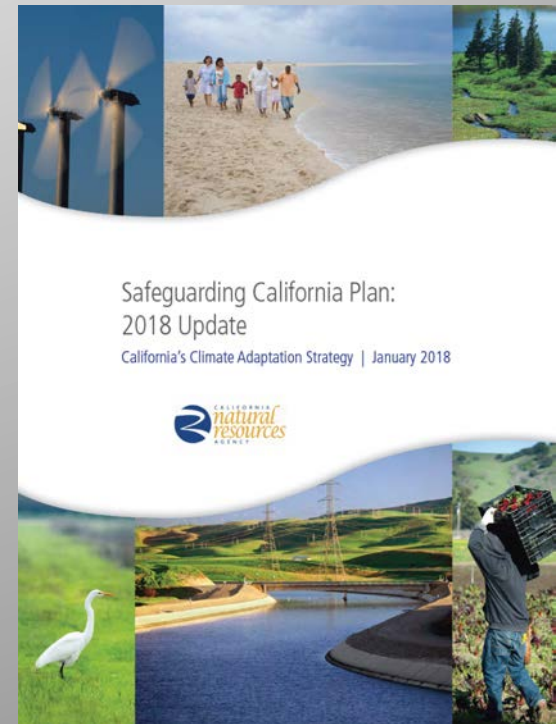
*'Climate adaptation' refers to efforts by society or ecosystems to prepare for or adjust to changes in the climate*

- ❖ **Protective** – guarding against negative impacts of climate change
- ❖ **Opportunistic** – taking advantage of any beneficial effects of climate change

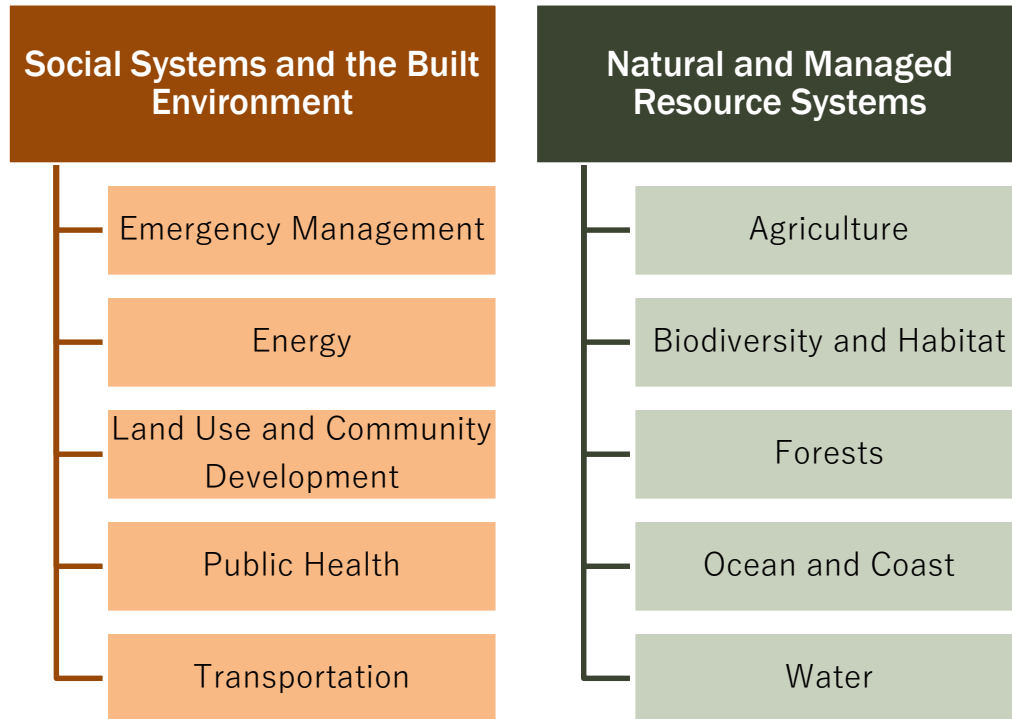


# Recent climate adaptation and watersheds policy and legislation

- EO B-30-15 and AB 1482: prioritize natural infrastructure
- AB 2480: defines watersheds as infrastructure
- Safeguarding California Plan: emphasize the benefits of protection and restoration of source watersheds



# Safeguarding California Plan: 2018 Update





# Integrated Regional Water Management

## 48 Regional Water Management Groups



- Foster partnerships & expand solution opportunities
- Diversify water portfolios & integrate supplies
- Leverage resources & economies of scale to reduce costs
- Integrate data, tools & resources management
- Implement multi-benefit actions with sustainable outcomes





**State of California Climate Change Portal:**

**[www.climatechange.ca.gov](http://www.climatechange.ca.gov)**

**Indicators of Climate Change in California:**

**[oehha.ca.gov/climate-change/document/indicators-climate-change-california](http://oehha.ca.gov/climate-change/document/indicators-climate-change-california)**

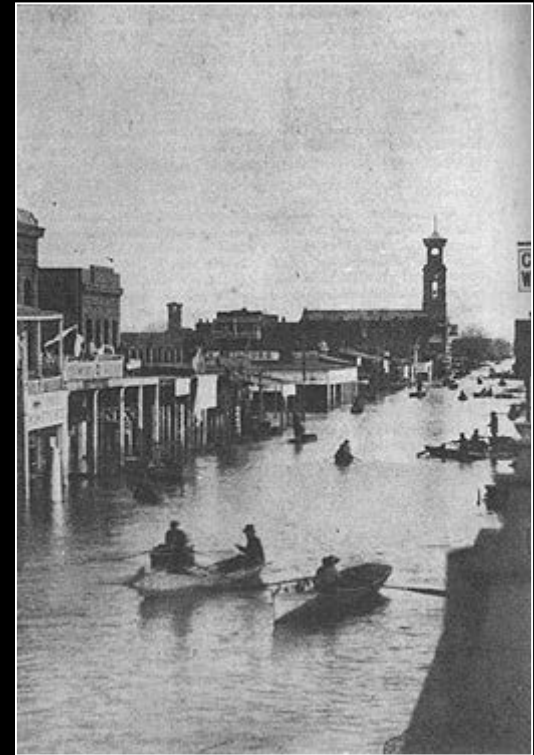
**Safeguarding California Plan: 2018 Update**

**[resources.ca.gov/climate/safeguarding](http://resources.ca.gov/climate/safeguarding)**

**DWR Climate Change Web Site:**

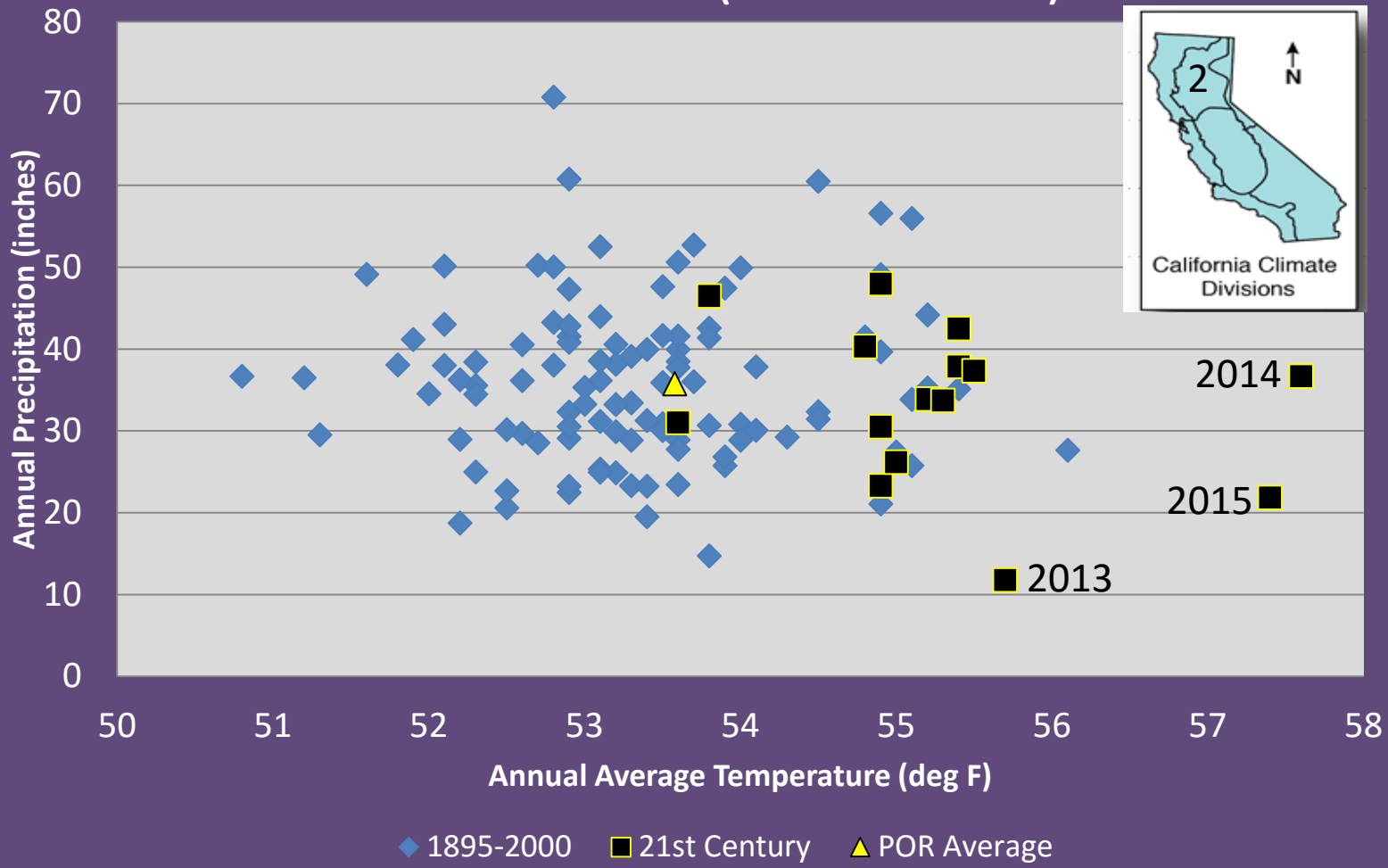
**[www.climatechange.water.ca.gov](http://www.climatechange.water.ca.gov)**

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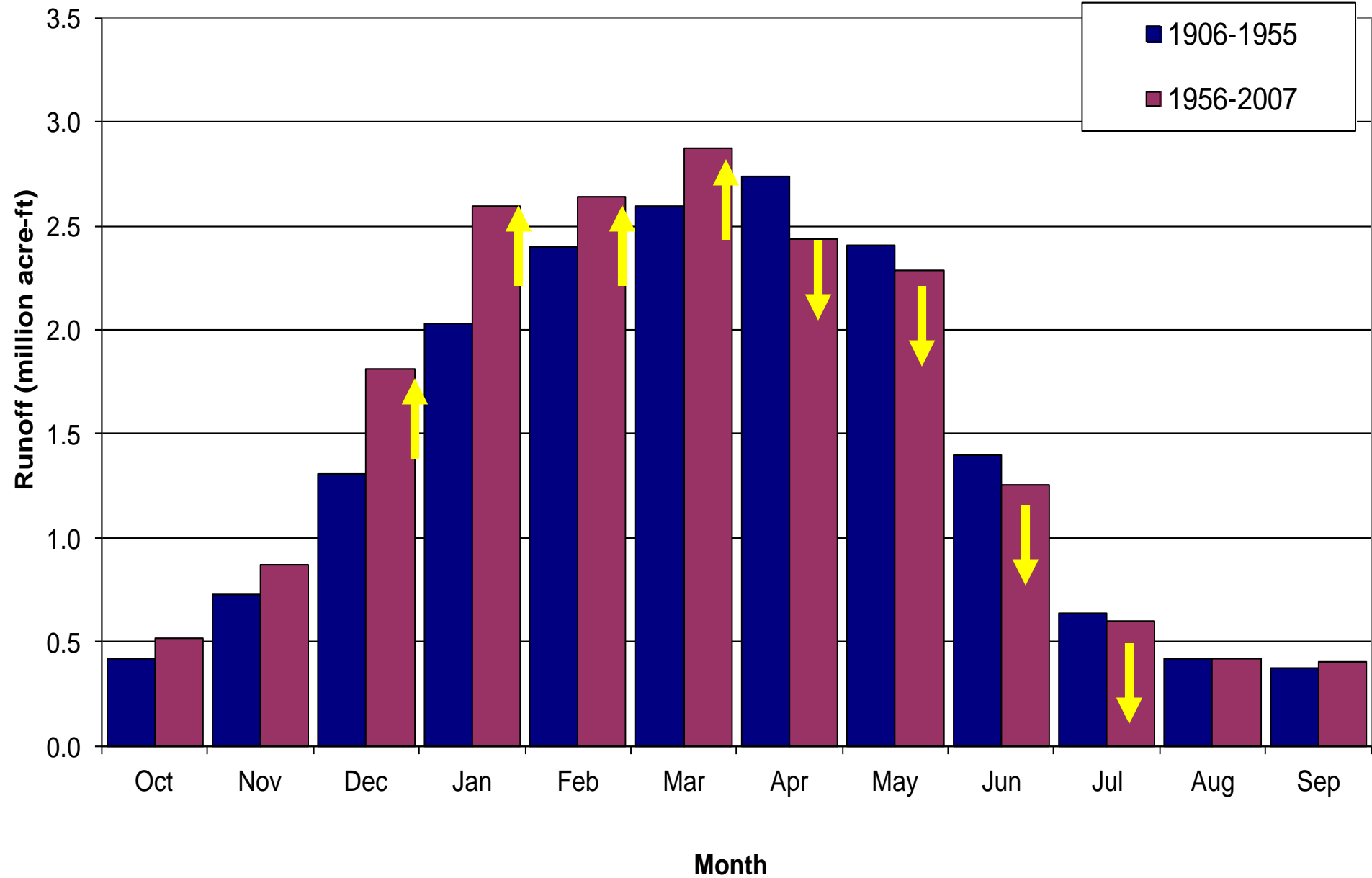
# The Drought, This Time: Hot and Dry

## Climate Division 2 (Sacramento Basin)



Source: NOAA Climate Division 2 Calendar Year Data

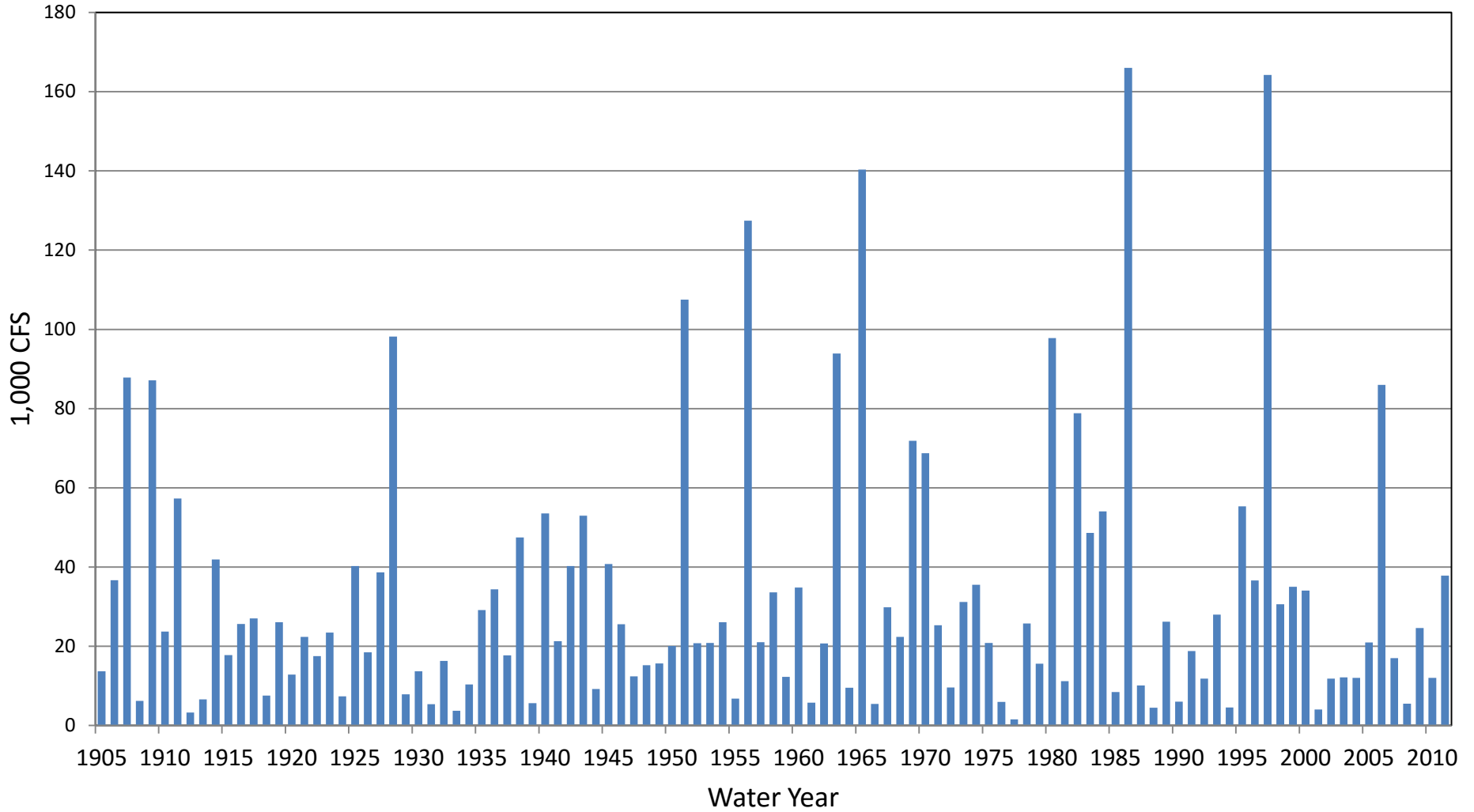
# Monthly Average Runoff of Sacramento River System



# American River Runoff

## Annual Maximum 3-Day Flow

Unimpaired Runoff at Fair Oaks



Data from Corps of Engineers Sacramento District



“Adapt or perish, now as ever, is nature’s inexorable imperative.”  
--H.G. Wells, *Mind at the End of Its Tether*, 1945



“The Climate of California on a Rampage”  
by Charles Nahl, 1878