



Climate Change Impacts on California

Scenario Assessment Findings of the Climate Action Team

November 20, 2008



California Air Resources Board

California Environmental Protection Agency

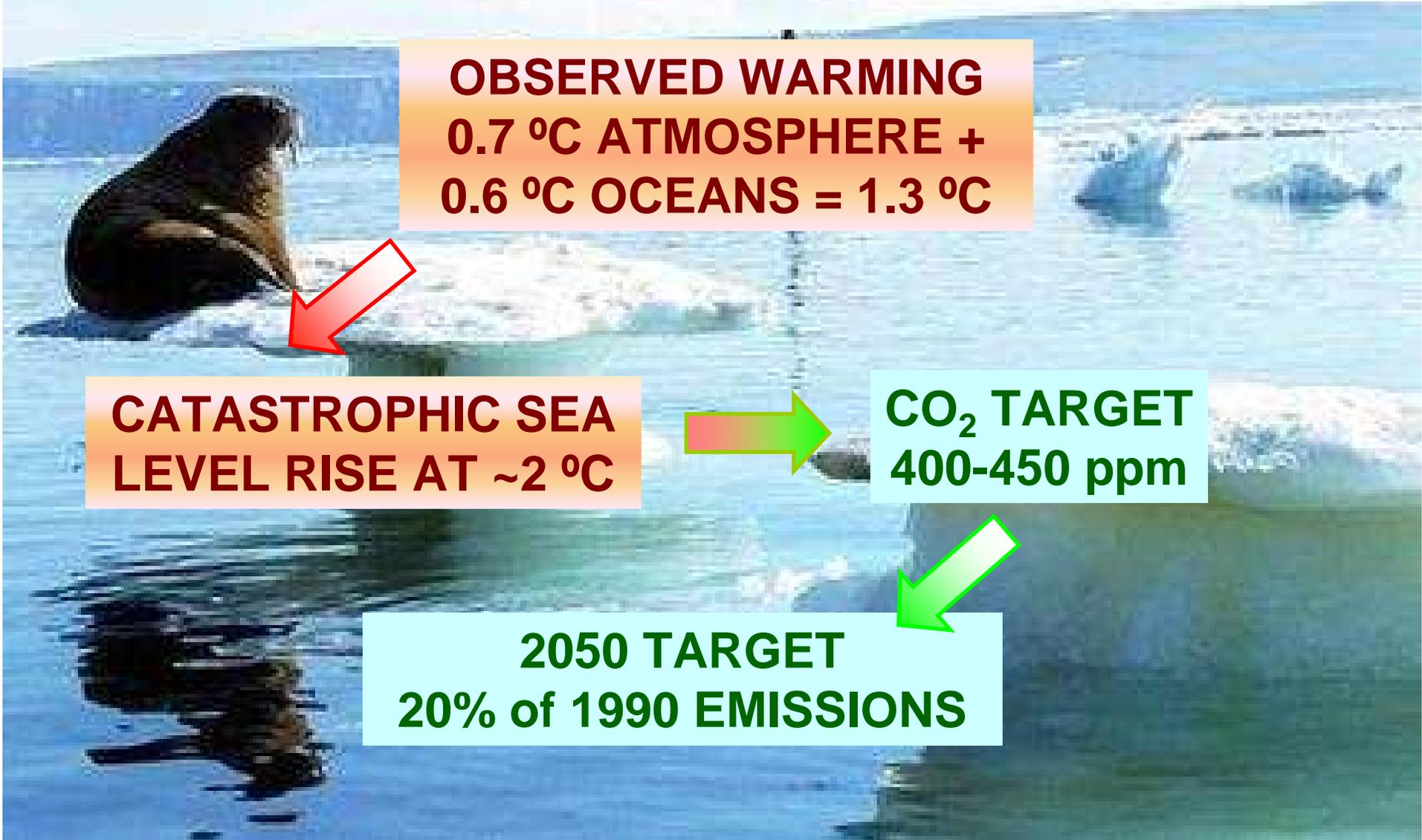
Achieving 2050 Target is Essential

**OBSERVED WARMING
0.7 °C ATMOSPHERE +
0.6 °C OCEANS = 1.3 °C**

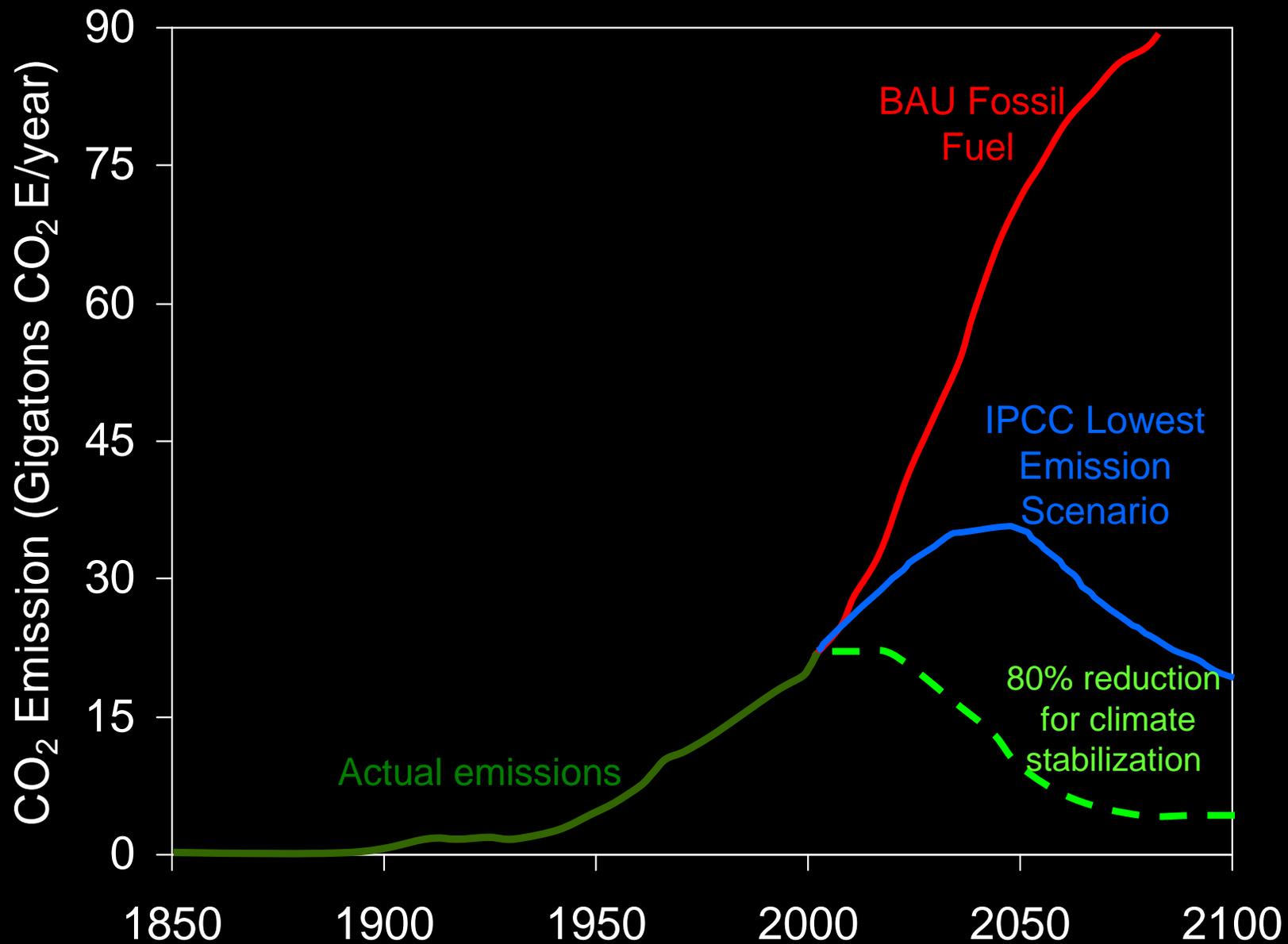
**CATASTROPHIC SEA
LEVEL RISE AT ~2 °C**

**CO₂ TARGET
400-450 ppm**

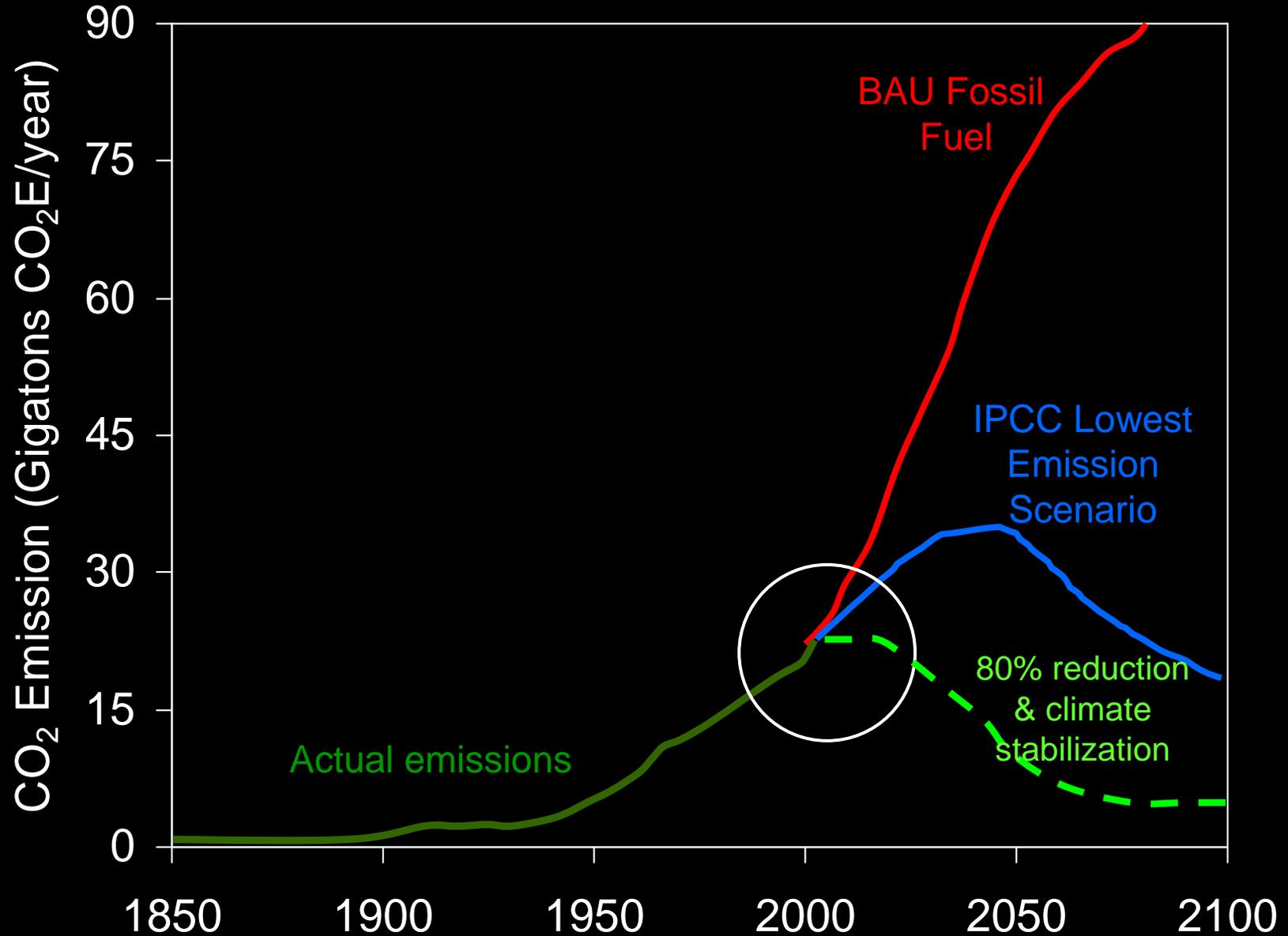
**2050 TARGET
20% of 1990 EMISSIONS**



Global CO₂ Emissions Growth Accelerating



Global CO₂ Emissions Growth Accelerating



California Climate Impacts over the past 100 years



**1.3°F (0.7°C) higher
temperatures**

7 inch sea level rise

**12% decrease in fraction
of runoff between April
and July**

**snowmelt and spring
blooms advanced
2 days/decade since 1955**

**4-fold increase in wildfire
frequency (over 34 years)**

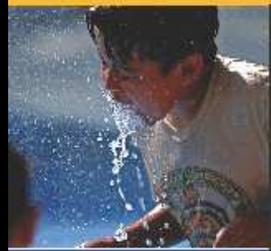
California Climate Change Scenarios Assessment

By Governor Executive Order
(2005)

Commissioned this peer-reviewed study (released in March 2006) of potential climate change impacts, and

Provided key scientific input to California's landmark greenhouse gas reduction legislation, AB 32

www.climatechange.ca.gov



Our Changing Climate
Assessing the Risks to California

A Summary Report from
the California Climate Change Center

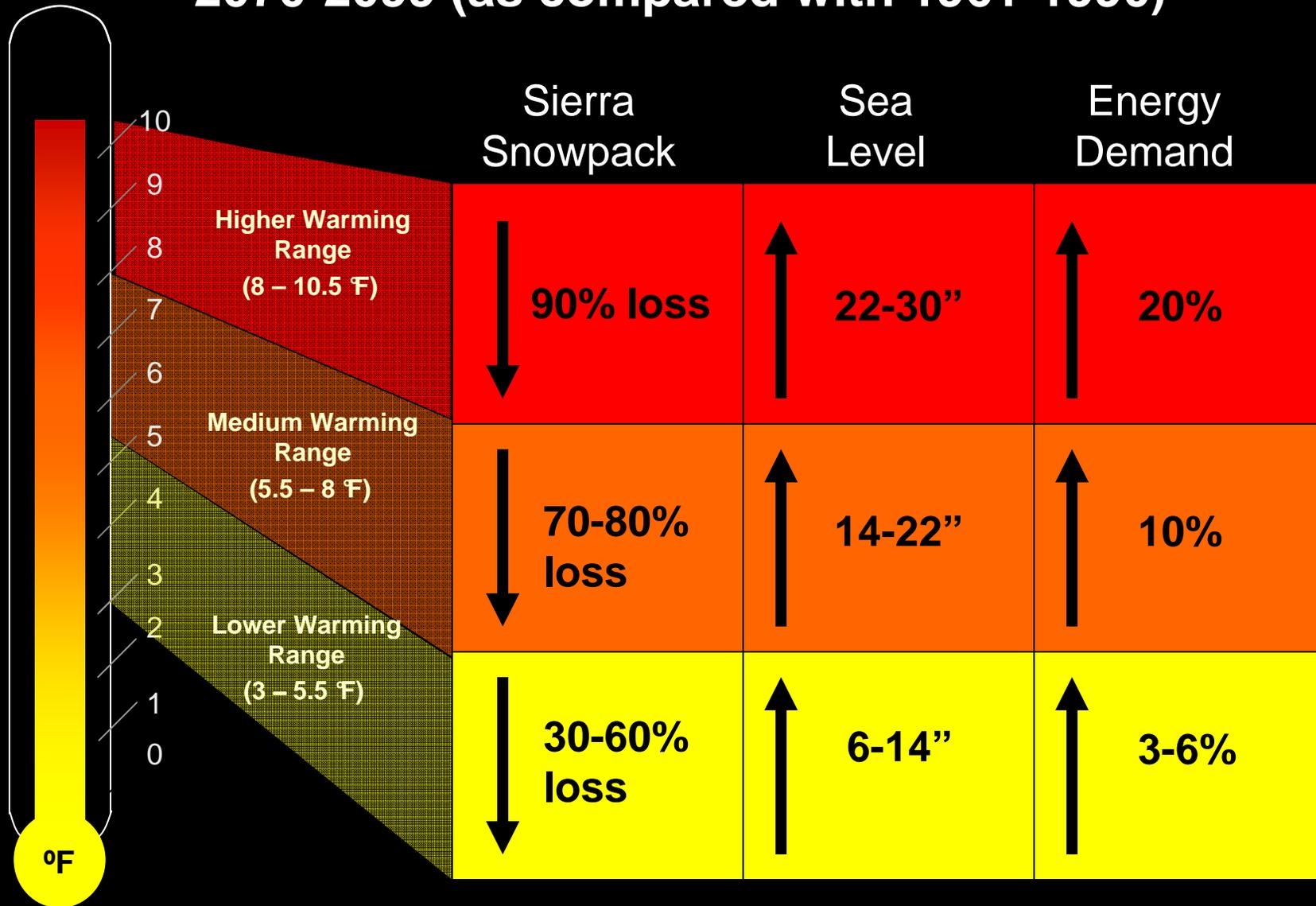
2008 Climate Action Team Scenarios Assessment

(work in progress)

Builds on 2006 study to:

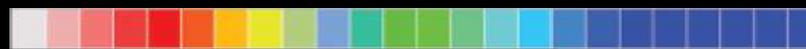
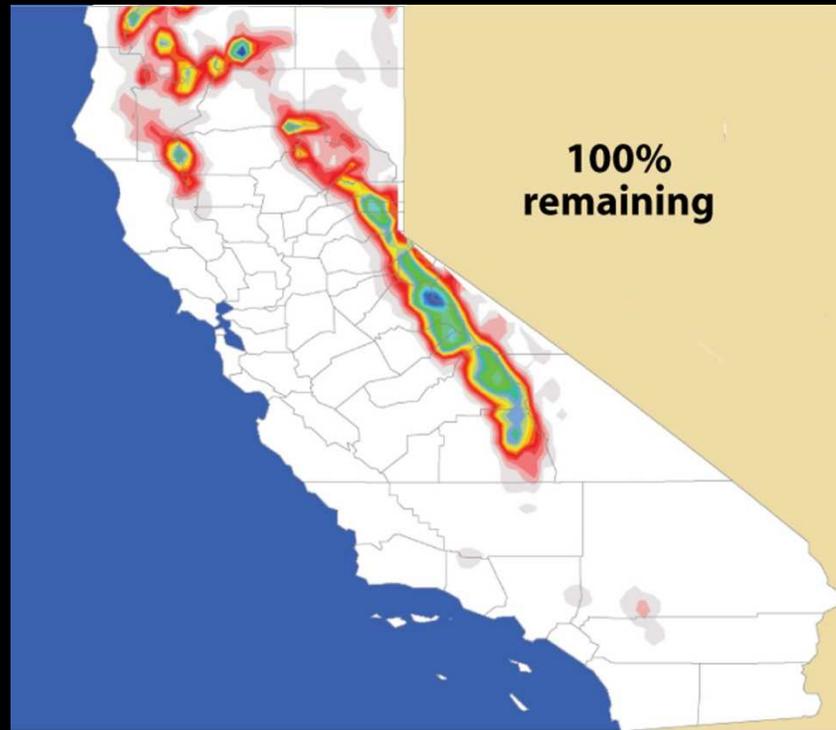
- 1. Improve assessment of climate change impacts**
- 2. Translate impacts into costs**
- 3. Develop adaptation strategies**

Projected Climate Impacts on California, 2070-2099 (as compared with 1961-1990)



Decrease in Sierra Nevada Snowpack 2070-2099

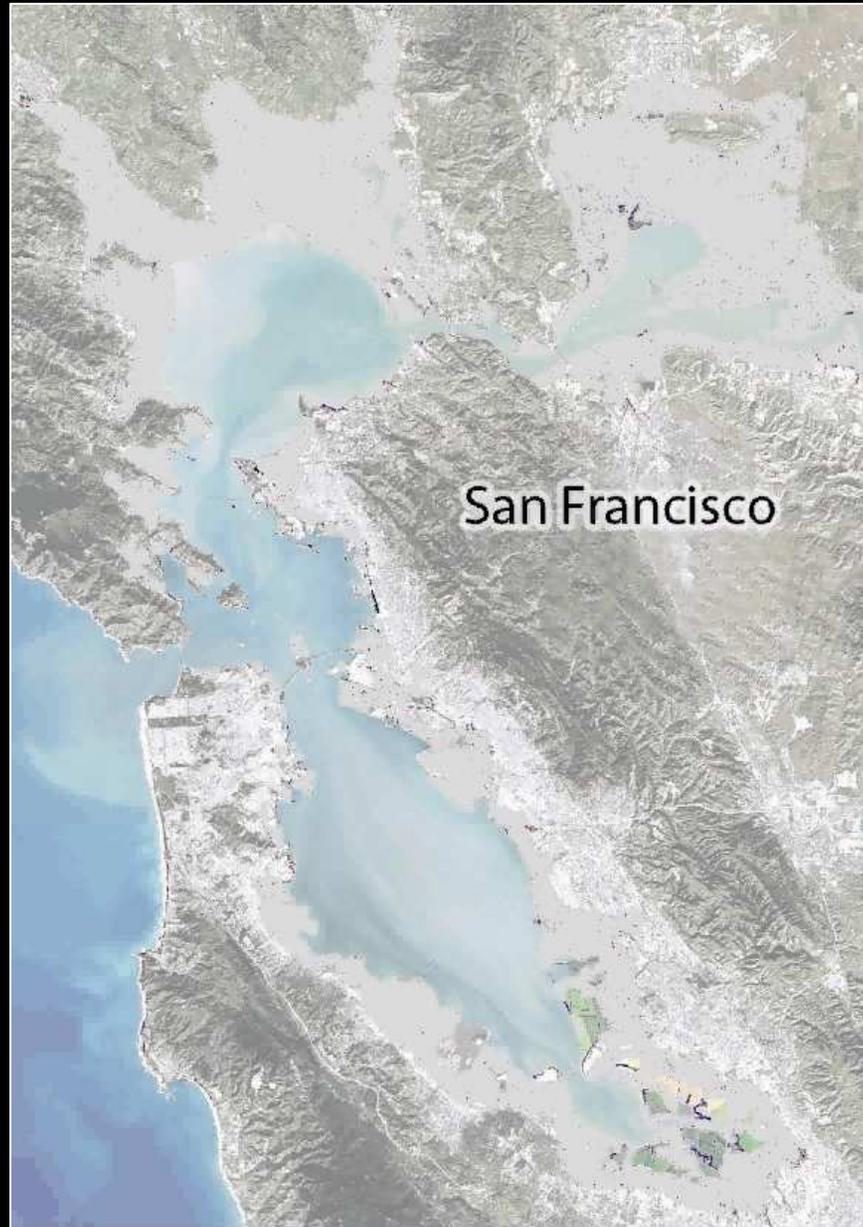
Historical Average (1961-1990)



~0 15 30 45

April 1 snow water equivalent (inches)

Coastline Changes



Decreasing Wine Grape Quality, 2070-2099

Optimal

Marginal

Impaired



Wine
Country

Cool
Coast

Central
Coast

Central
Valley

1961-1990
Levels

Lower
Warming
3-5.5° F

Medium
Warming
5.5-8°F

Higher
Warming
8-10.5°F

Increasing Emissions



Public Health Concerns

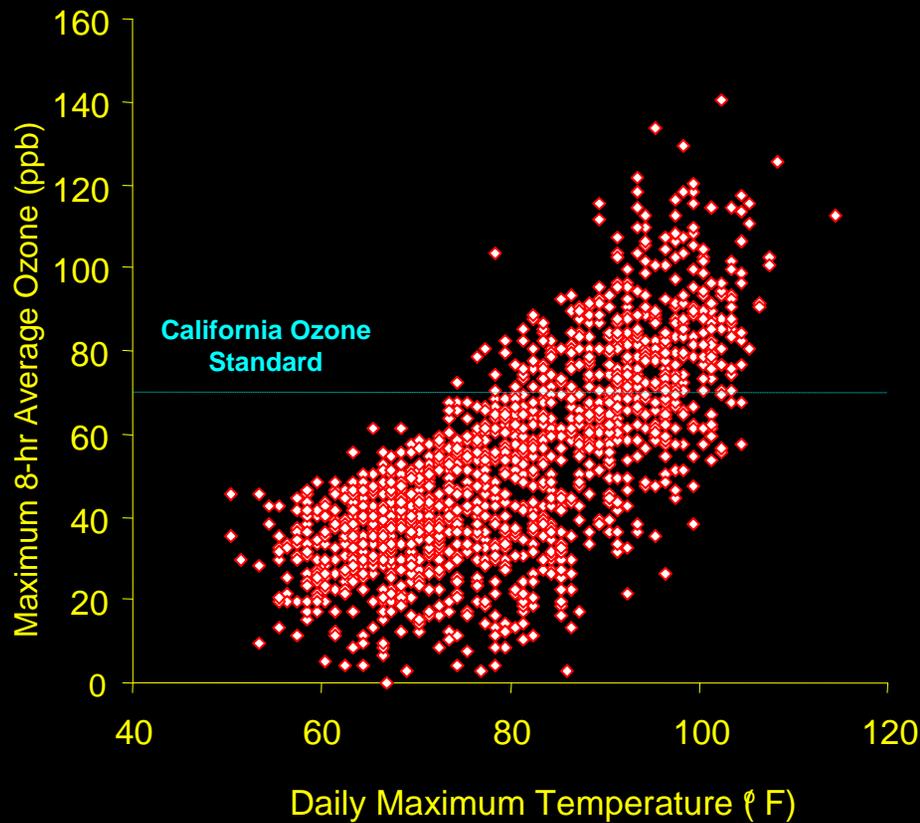
Air Quality

Heat Extremes

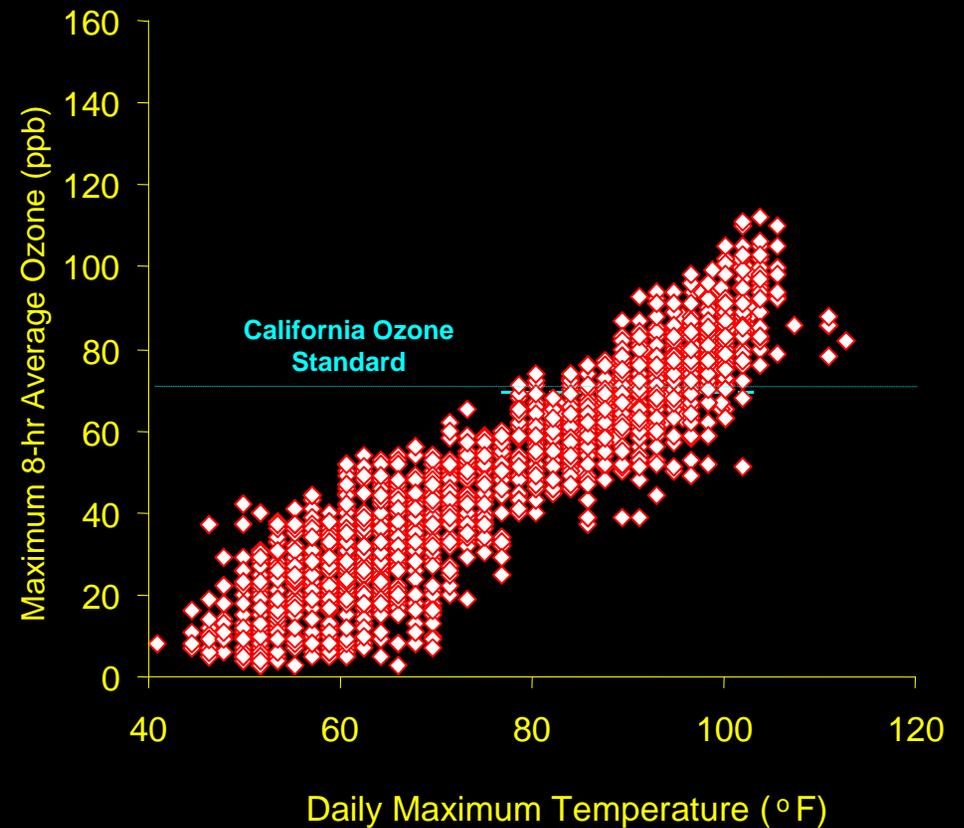
Wild Fire Smoke

Vulnerable Populations

Hotter Days Lead to Higher Emissions and More Smog

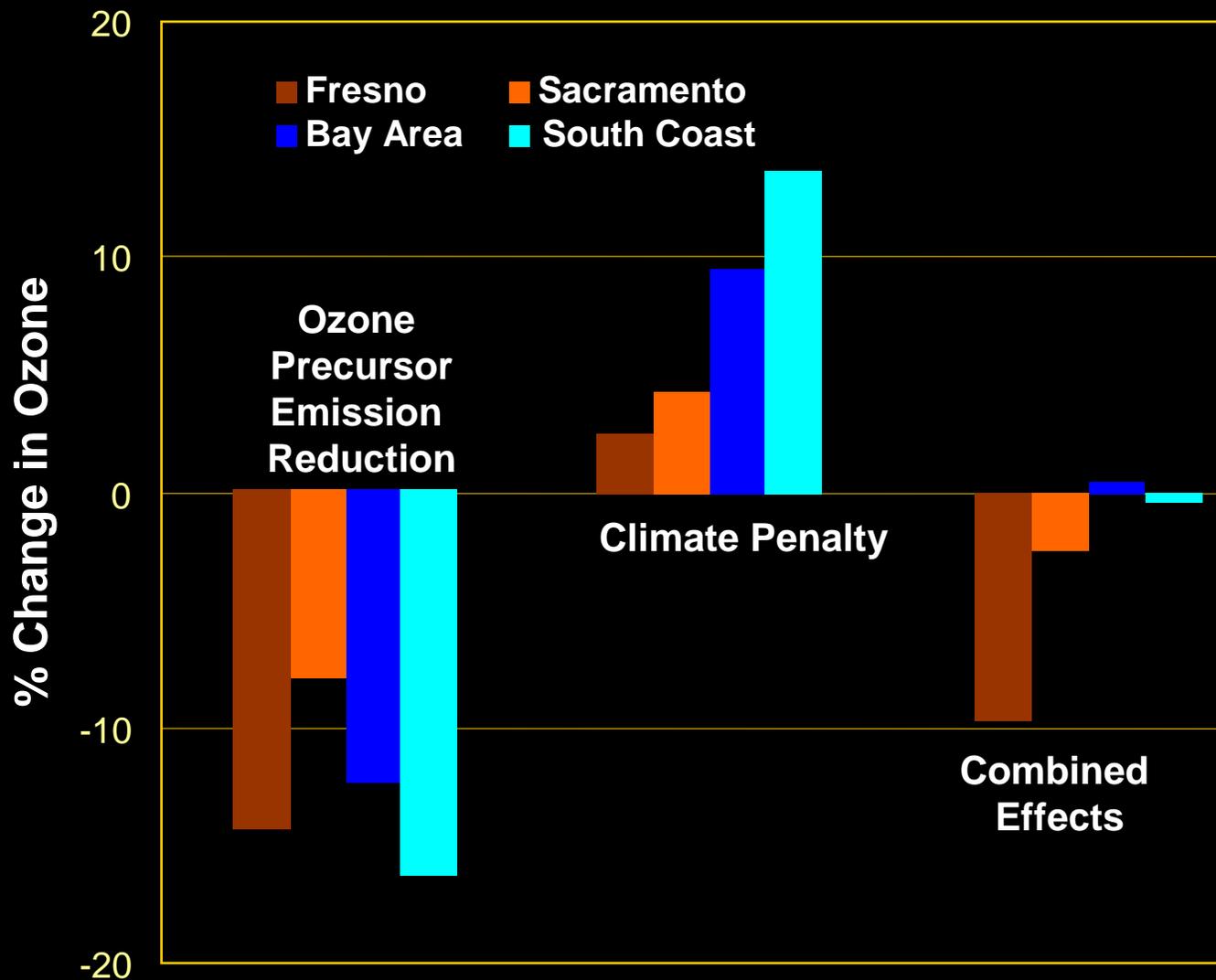


Riverside, 2003-2006



Fresno, 2003-2006

Projected Ozone Response to Climate - 2050

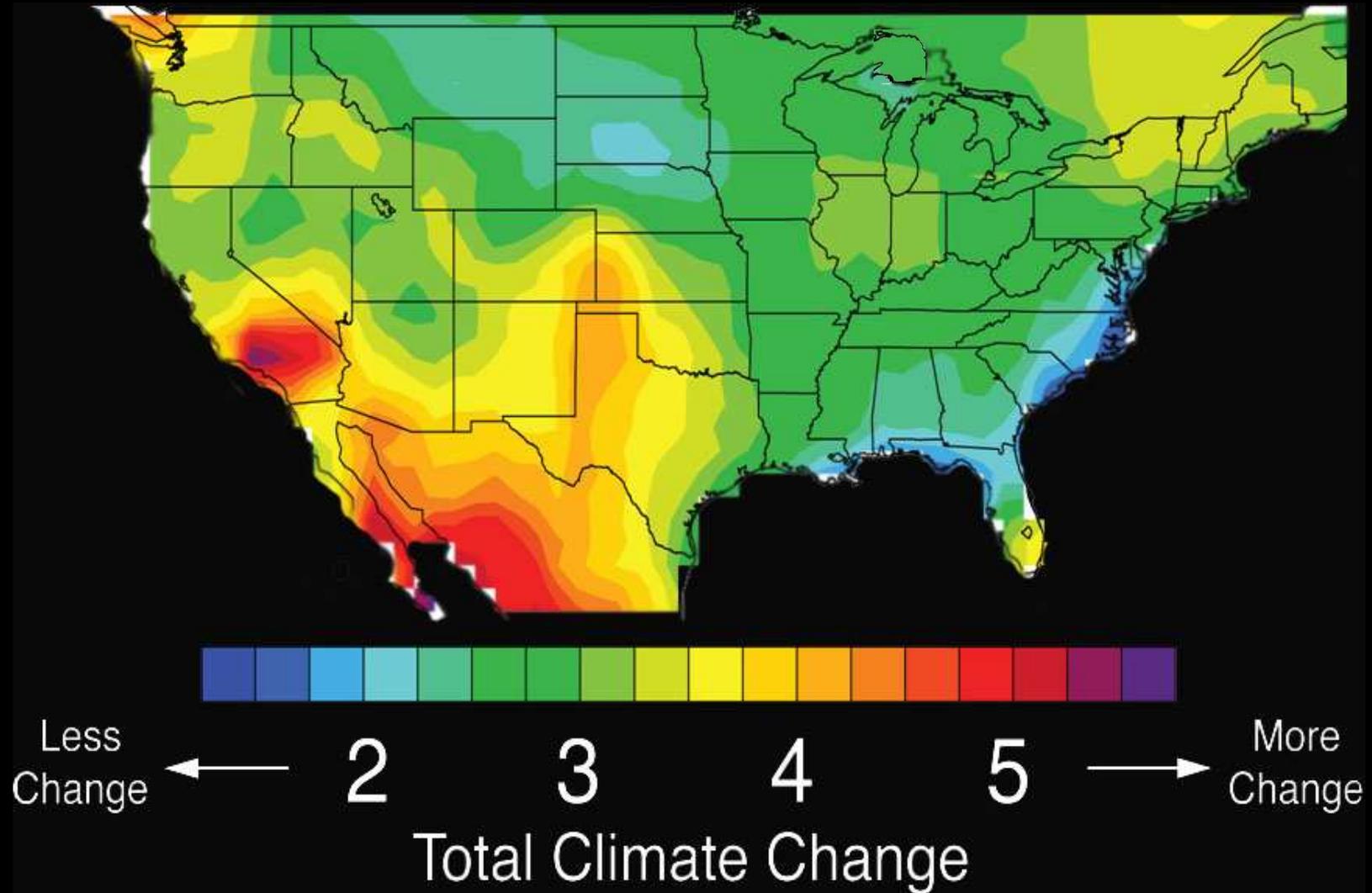


Steiner et al., "Influence of future climate and emissions on regional air quality in California", *JGR* (2006)

Millstein D.E. and R. A. Harley (2008) Impact of Climate Change on Photochemical Air Pollution in Southern California.

To be submitted to Journal of Geophysical Research.

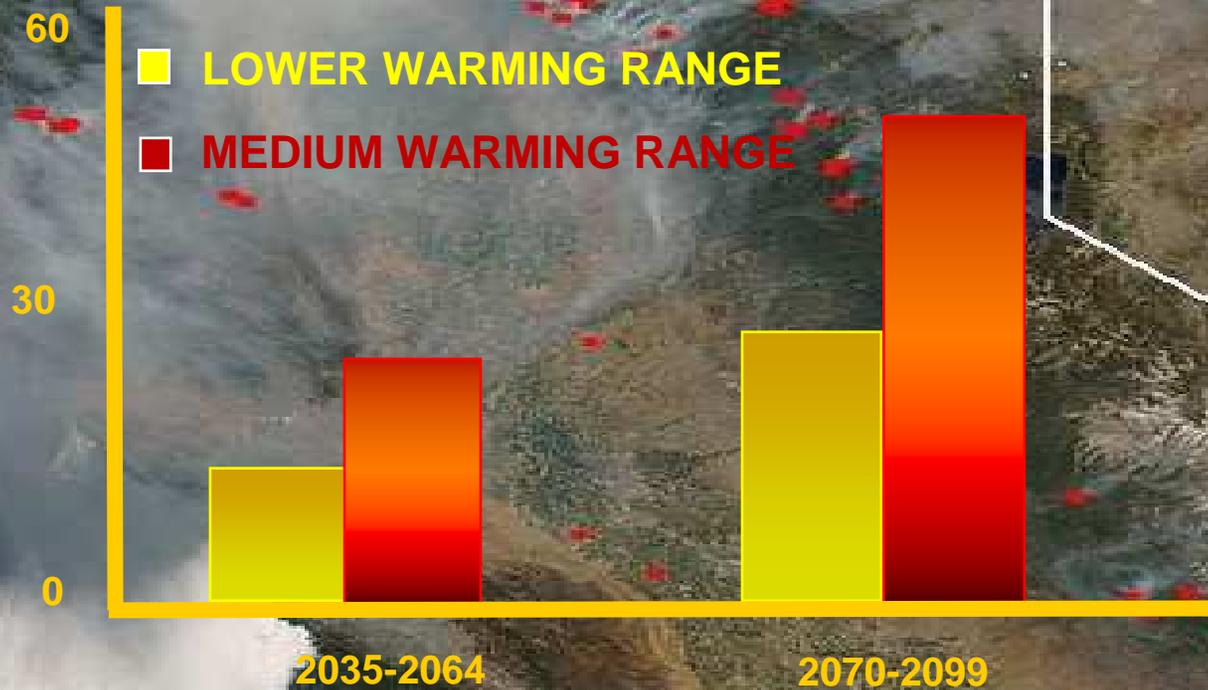
Climate Change Hotspots in U.S.



Diffenbaugh, N. S., et al. (2008). Climate change hotspots in the United States, *Geophys. Res. Lett.*

Increase in Wildfires

% CHANGE IN EXPECTED MINIMUM
NUMBER OF LARGE FIRES PER YEAR

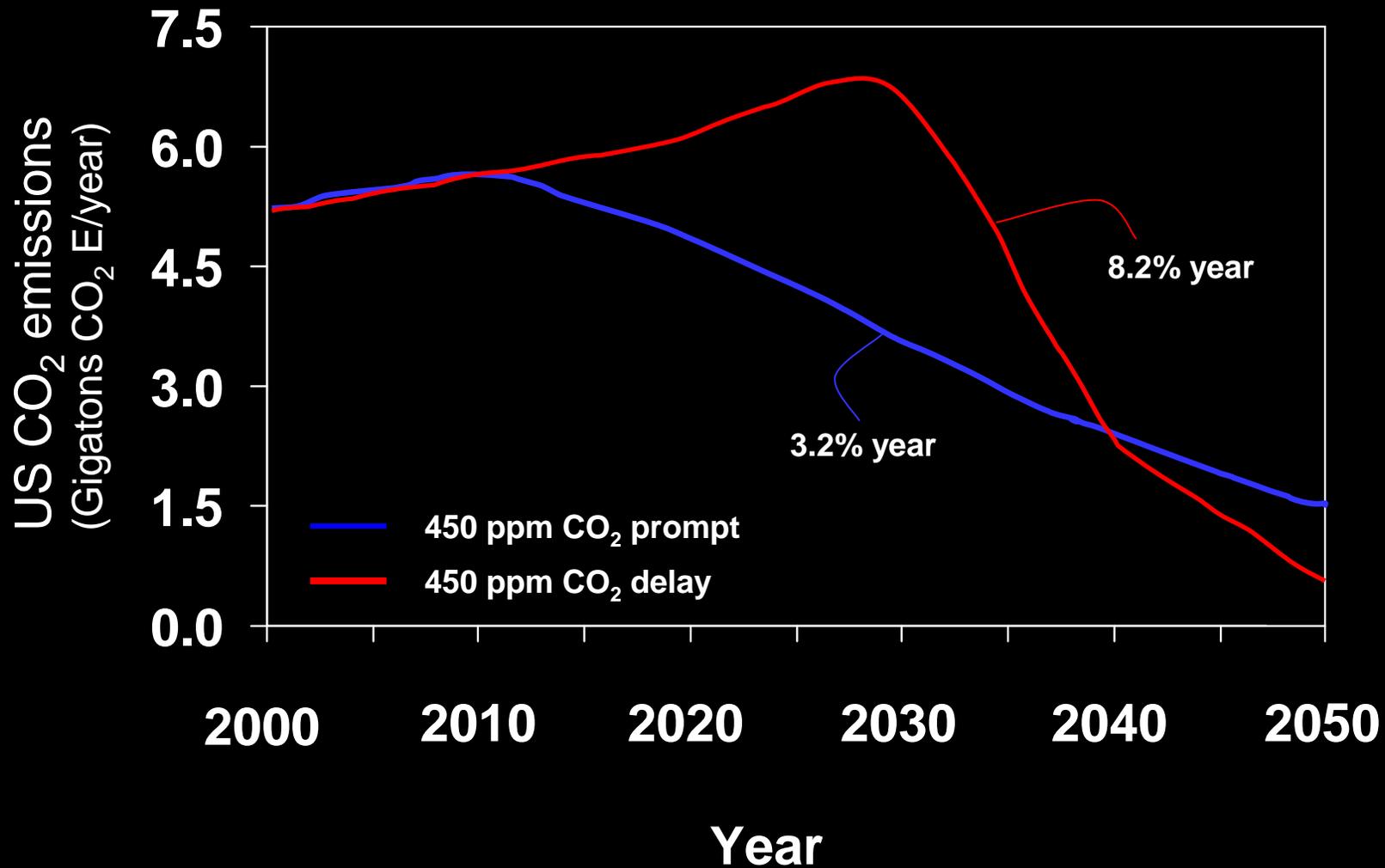


Westerling and Bryant, "Climate change and wildfire in and around California:
Fire modeling and loss modeling" (2006), www.climatechange.ca.gov

Economic Impacts of Climate Change

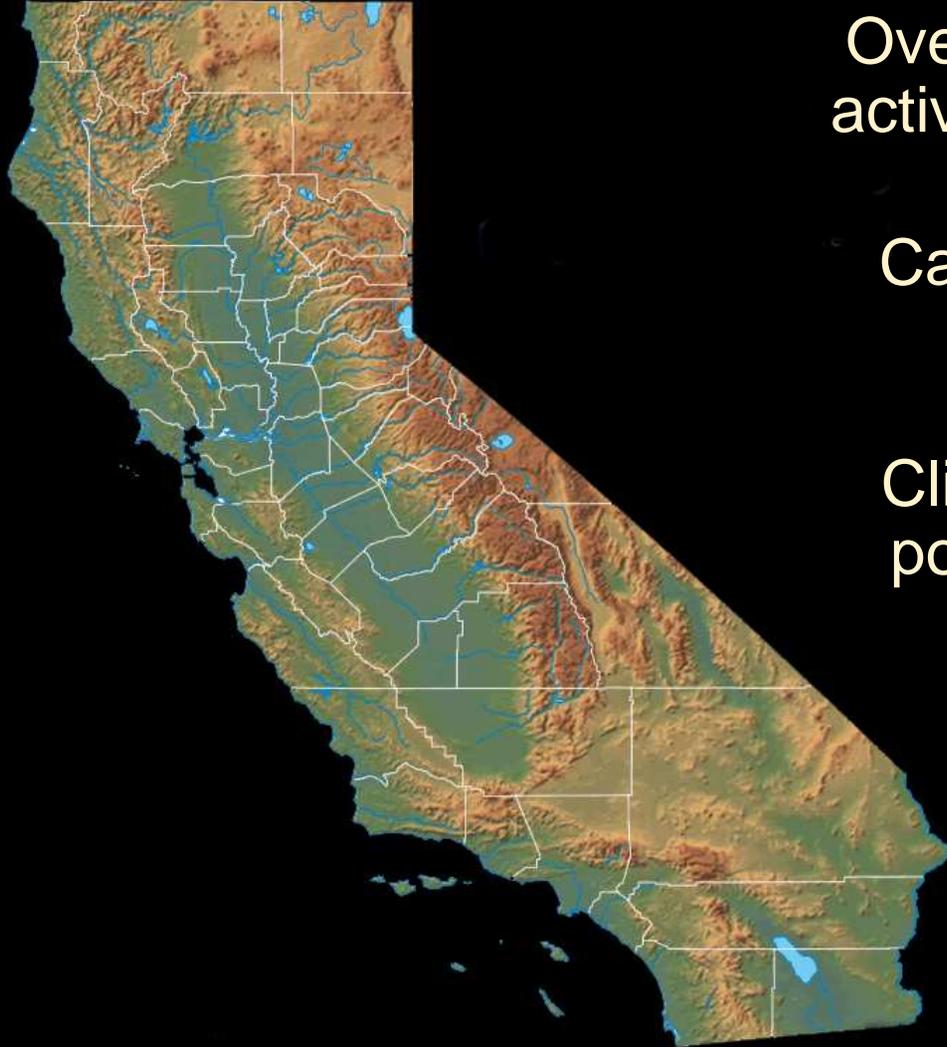
- Cost of unmitigated climate change
 - 2.5 to 5% of global economic product in 2100
 - For California: \$270 to \$540 billion in 2100
- Effective adaptation can limit the cost of climate change impacts

Delay Requires Steep Emission Reductions



Doniger et al., "An Ambitious, Centrist Approach to Global Warming Legislation", *Science* (2006)

Summary



Overwhelming evidence human activities changing Earth's climate

California already affected by climate change

Climate change increases air pollution control requirements

Early action makes targets easier to attain

Acknowledgments

Scientists from:

- Scripps Institution of Oceanography
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- US Forest Service
- Oregon State University
- Union of Concerned Scientists

State Agencies:

- CEC PIER Program
- Cal/EPA
- Cal/Trans
- CARB
- CDF
- CDFA
- DPH
- DWR
- OEHHA
- Resources