



CALIFORNIA'S FOURTH  
**CLIMATE CHANGE**  
ASSESSMENT

94 pages

9 authors

15 other contributors

11 stakeholder advisors

Sierra Nevada  
Region Report



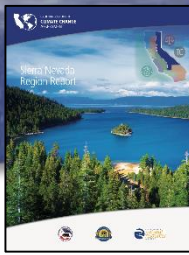
# California 4<sup>th</sup> Climate Assessment SIERRA NEVADA REGION REPORT

*Mike Dettinger, convening author  
US Geological Survey (retired), Carson City*



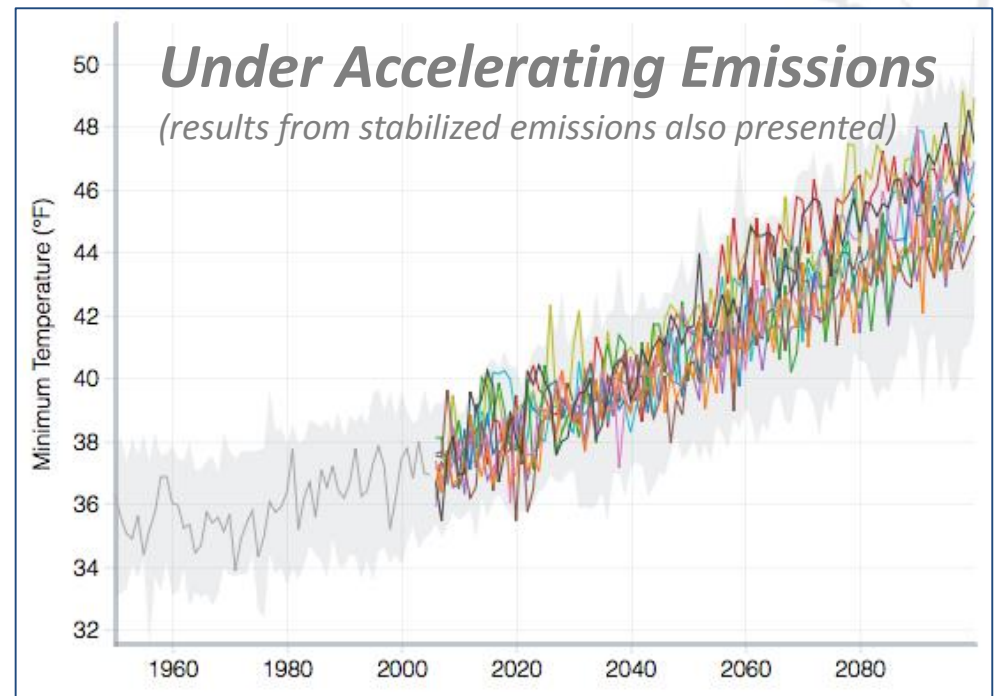
[www.ClimateAssessment.ca.gov](http://www.ClimateAssessment.ca.gov)

Released:  
27 Aug 2018



## Temperature Projected to Rise Substantially under plausible future greenhouse gas emissions

BY 2100  
AVERAGE ANNUAL  
TEMPERATURES  
ARE PROJECTED TO  
INCREASE BY  
**6 – 9° F**





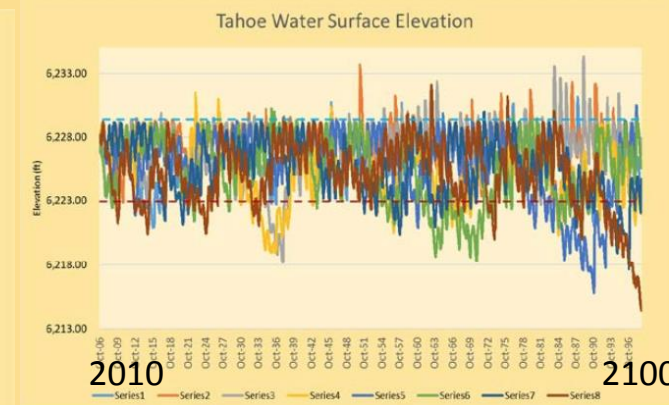
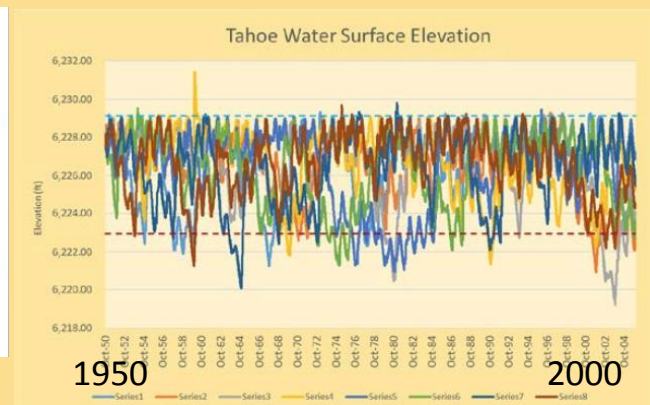
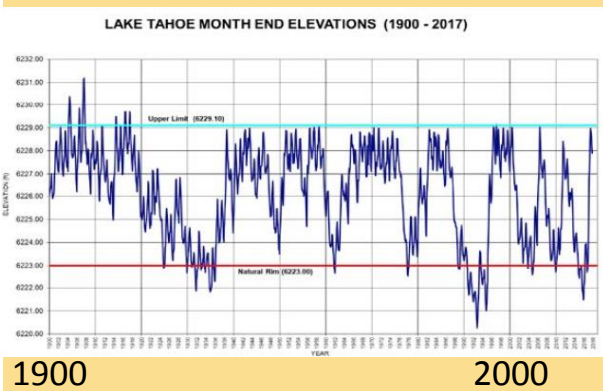
- More extreme weather/climate
- More frequent droughts
- Drought-flood whiplash
- Water stress & weakened forests

## Observed & Projected Lake Tahoe Levels

Observed Historical

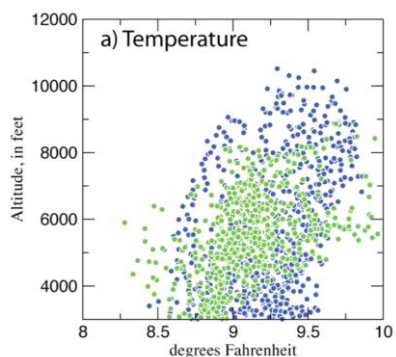
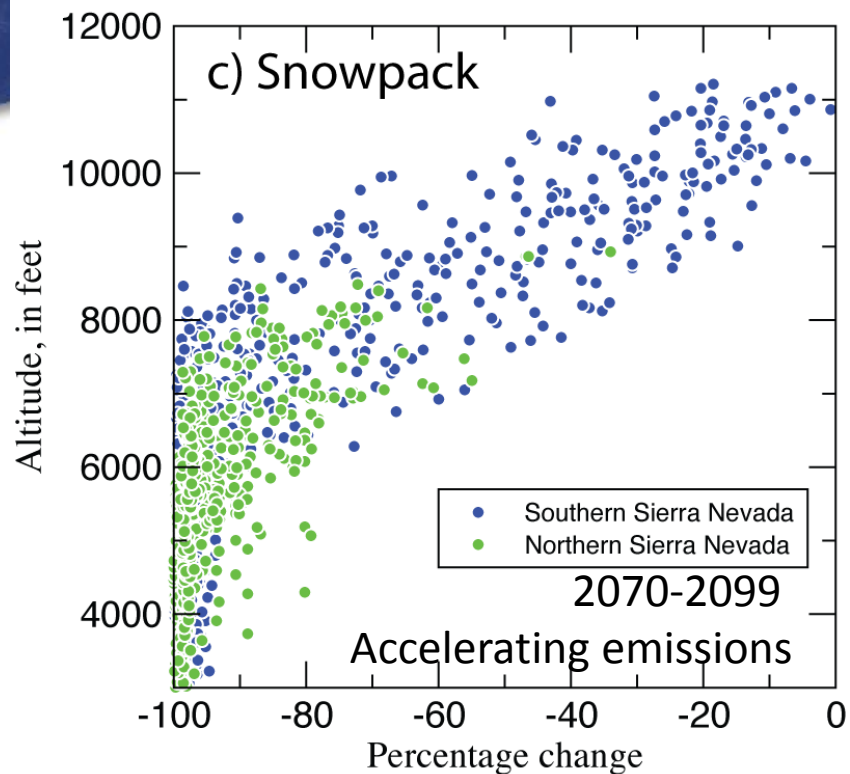
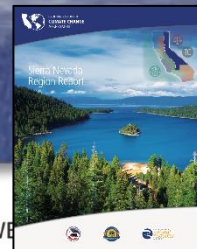
Simulated Historical

Future—Business as Usual

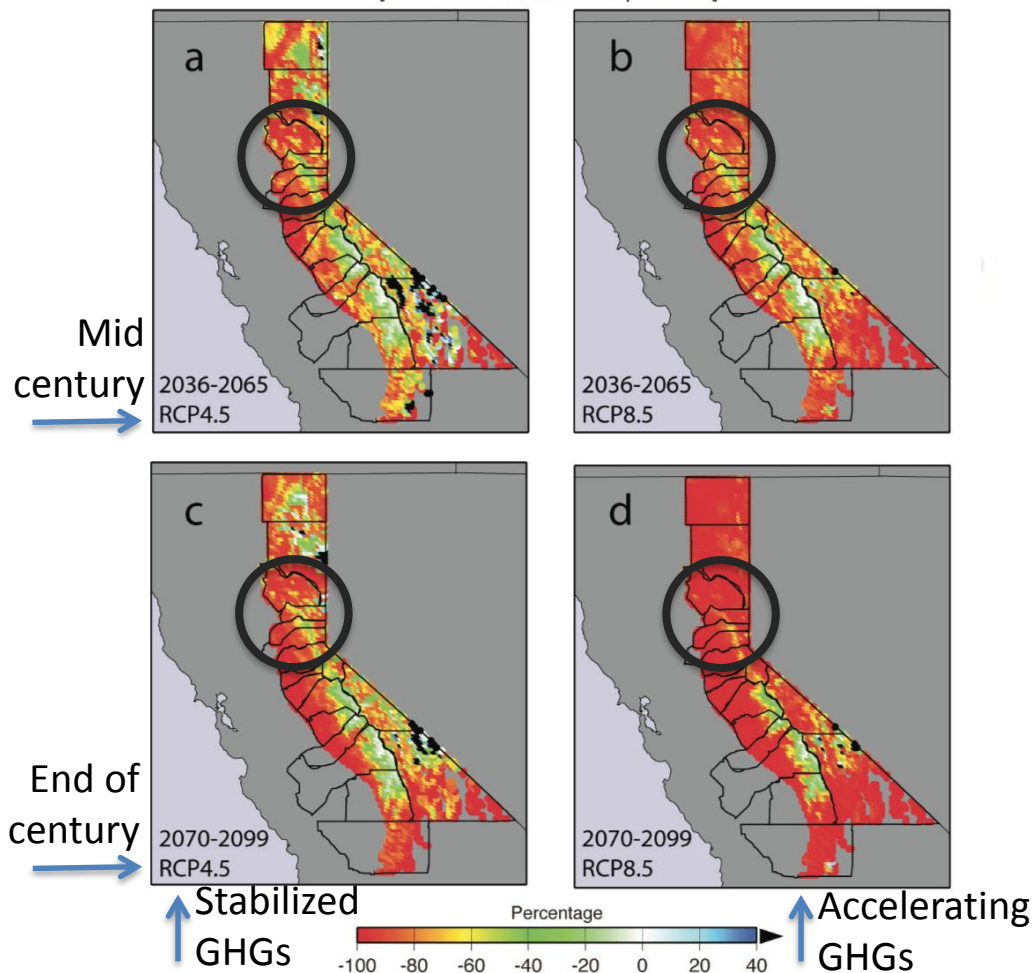




# SNOWPACK CHANGE



10-GCM Ensemble-Mean Percentage Changes in April SWE  
[from 1961-1990 Mean April SWE].



Changes in snow-water content projected for 2036-2065 (a, b) and 2070-2099 (c, d), under two greenhouse-gas concentration pathways into the future.



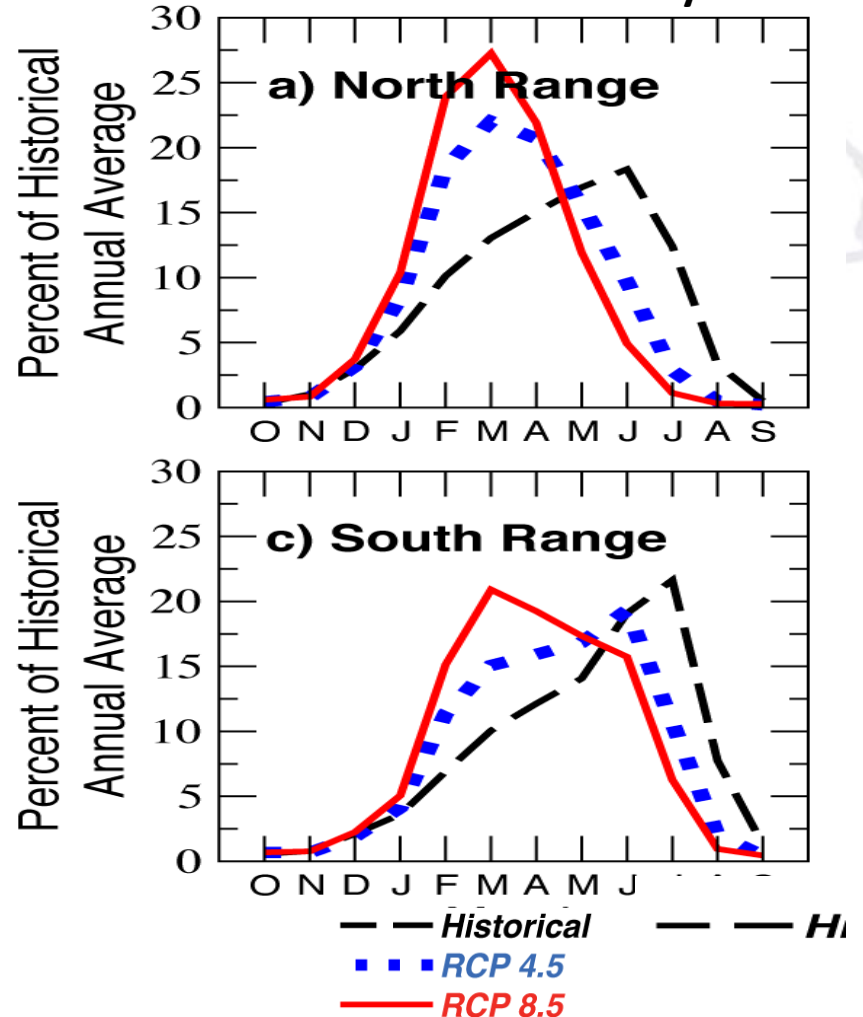
# SURFACE-WATER CHANGE

**Water-Year Runoff Totals by 2071-2099**  
 (as percents of 1961-1990 norms  
 ± 1 std deviation)

<u>Subregion</u>	RCP4.5	RCP8.5
North Range	103±17%	107±26%
South Range	100±20%	105±36%

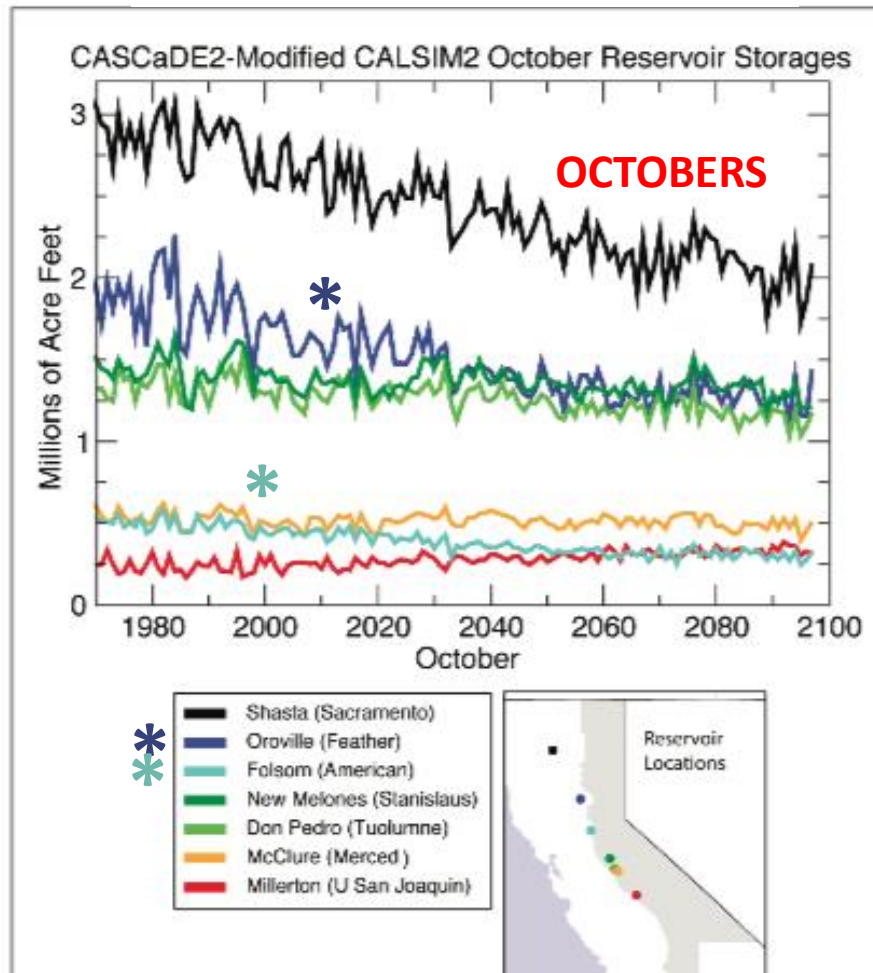
*10-climate-model averages ± std dev*

## PROJECTIONS of End-of-Century Runoff Seasonality

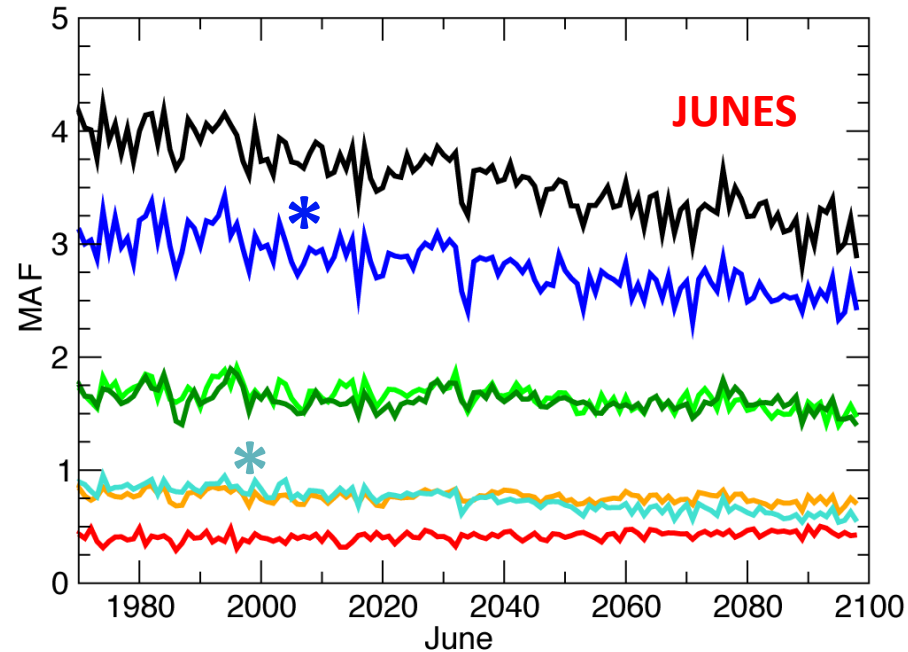


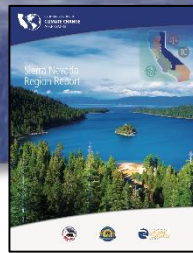


## 20-projection average changes in major reservoir storages

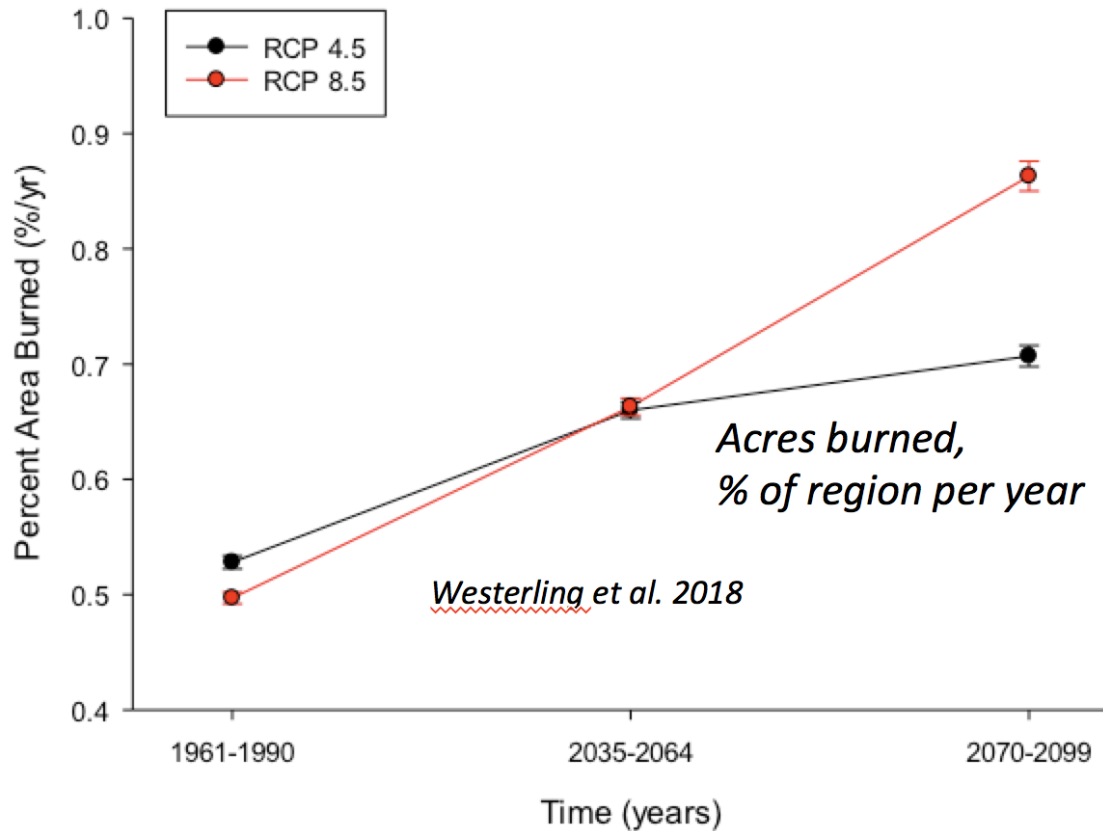


- Direct climate impacts on region's water supplies, surface-waters, groundwaters, water quality and demands

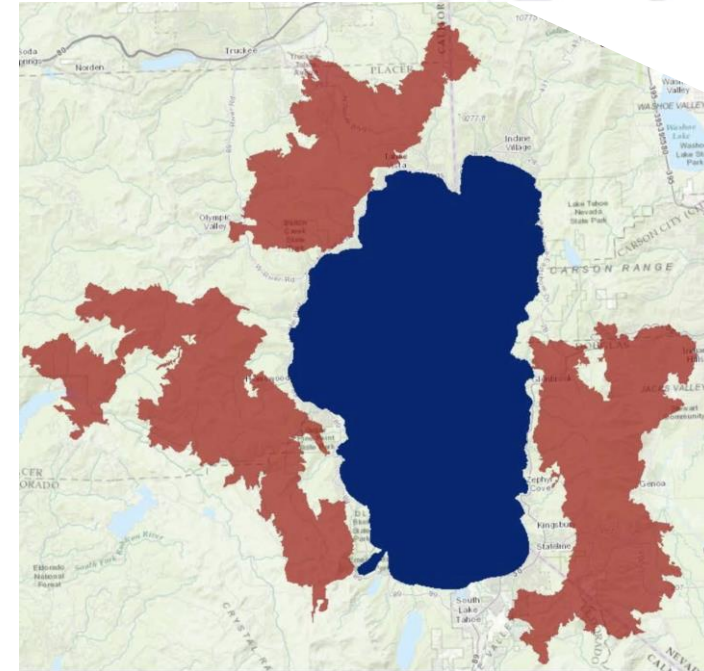




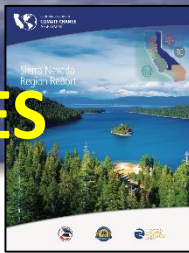
## Acres burned PER YEAR → 50% to 90% increase by end of century



## Size of three major fires in 2018



*h/t Chris Anthony, CALFIRE*



## Impacts on Sierra Nevada Communities

*12 of 20 Sierra Nevada counties are rated Disadvantaged or Economically Distressed  
(122 disadvantaged communities)*

Many **forest dependent communities** have lagged behind their urban counterparts in recovery from the 2008-2009 recession and have a reduced capacity to respond to economic and ecological changes that climate change is bringing.

**Agriculture dependent communities** are especially dependent on stable water supplies and reliable weather and are vulnerable to droughts and floods.

**Tourism dependent communities** depend on snowpack, stream and lake conditions, and forest health; wildfire can be particularly devastating.





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**ADAPTATION EFFORTS**  
are already underway

## **BUT THE REPORT ISN'T JUST BAD NEWS**

- Sierra Nevada Watershed Imprvmt Program
- French Meadows Forest Restoration Project
- Tahoe Climate Adaptation Plan
- Lake Tahoe West Restoration Partnership
- Tahoe Central Sierra Initiative
- Sierra Meadows Partnership
- Native Youth Conservation Corps
- Integrated Regional Water Mgmt Program
- Sustainable Groundwater Mgmt Act
- Fire MOU Partnership
- Climate-Smart Land Trusts
- Climate-Smart Land Management



# • Climate Change & FIRO



## Lake Mendocino

- Warmer, greater evaporative demands
- More dry days at expense of small to large storms
- Enhanced very-large/AR storms

**→ FIRO increases capacity to accommodate these kinds of changes**

## Yuba-Feather (Sierra Nevada)

All of that, plus...

- Extra warming at higher altitudes
- Loss of snowpack & effective loss of much other storage
- More & floodier winter streamflow
- Drier summer landscapes
- More wildfire, with resulting changes to watershed properties
- Struggling local communities and economies

**→ Performance-of/demands-on FIRO likely change at basic levels**

**Y-F FIRO “manual” should be flexible enough to accommodate changing watersheds IN ADDITION TO changing forecast capabilities**

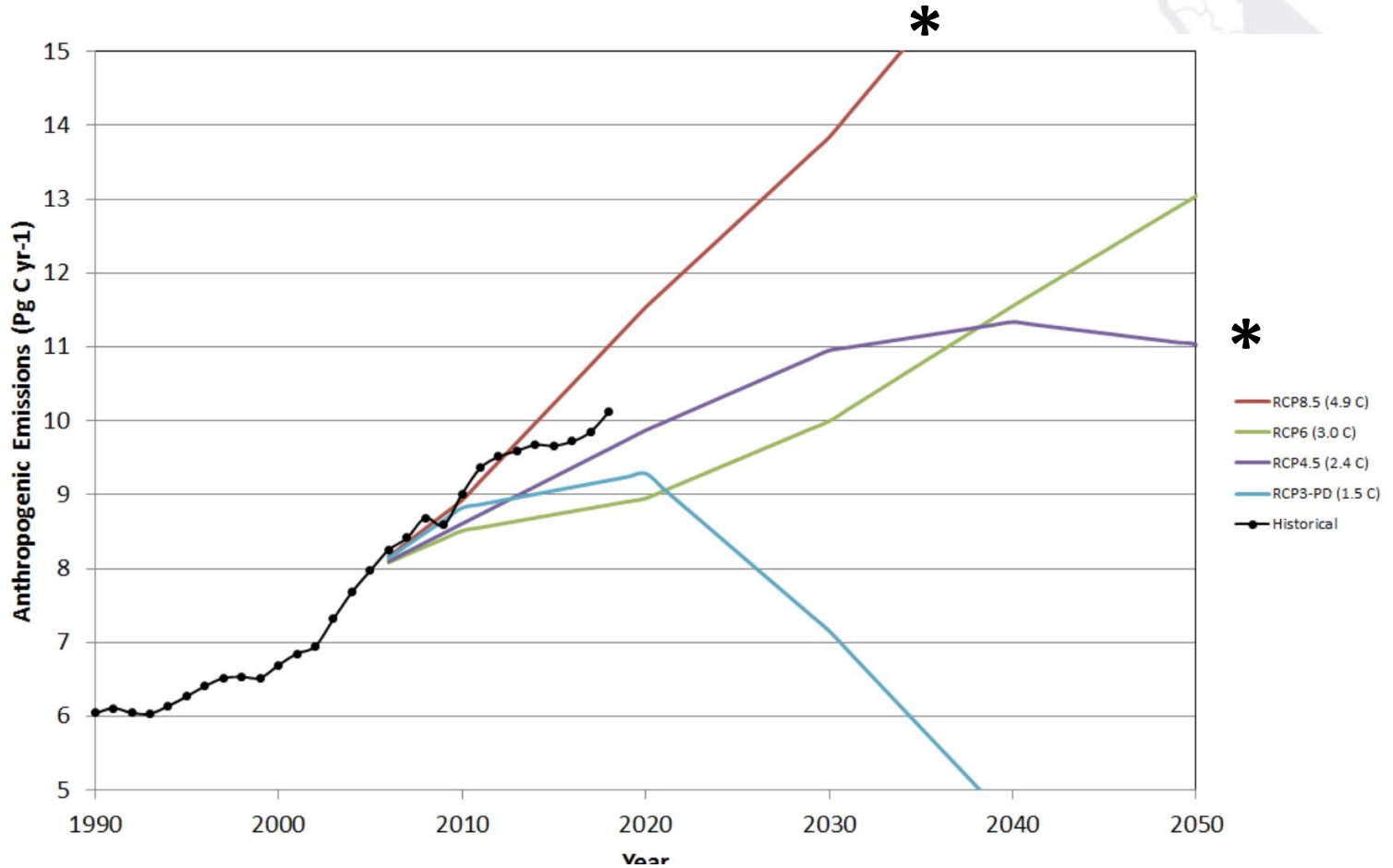


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**SO...How is (Sierra) FIRO going to handle these climate-change changes?**

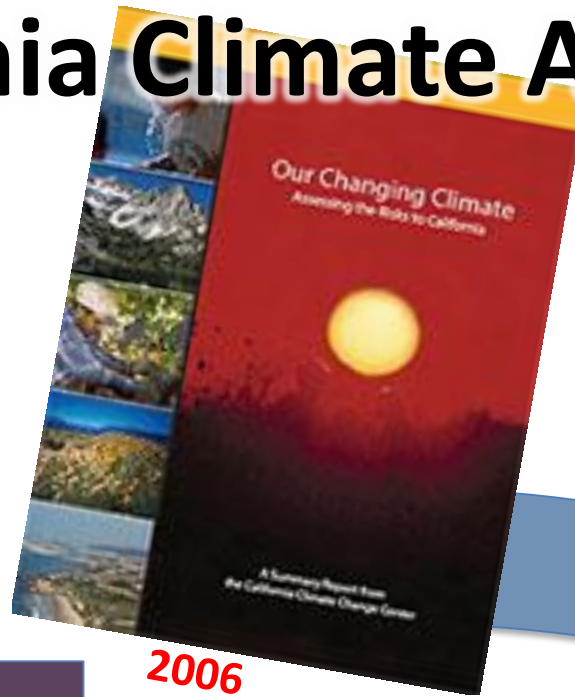


*And one last time, the url for the Sierra Nevada report is [www.ClimateAssessment.ca.gov](http://www.ClimateAssessment.ca.gov)*



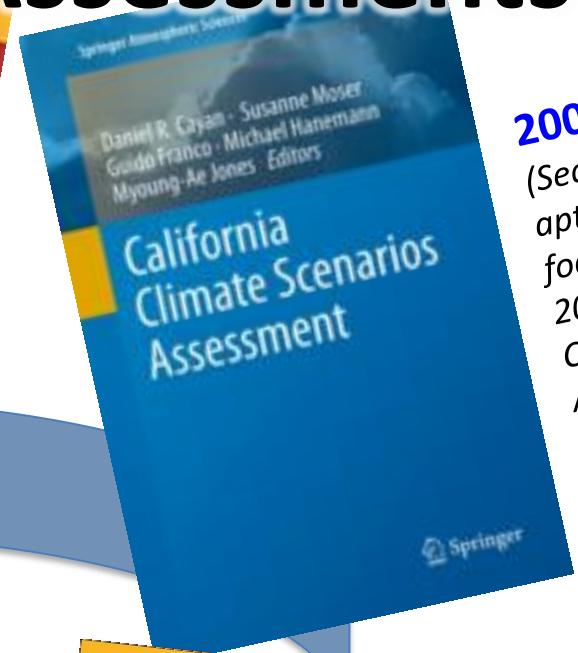
# California Climate Assessments

- Executive Order S-3-05, from Schwarzenegger (June 2005) → preparation of regular assessments of the science



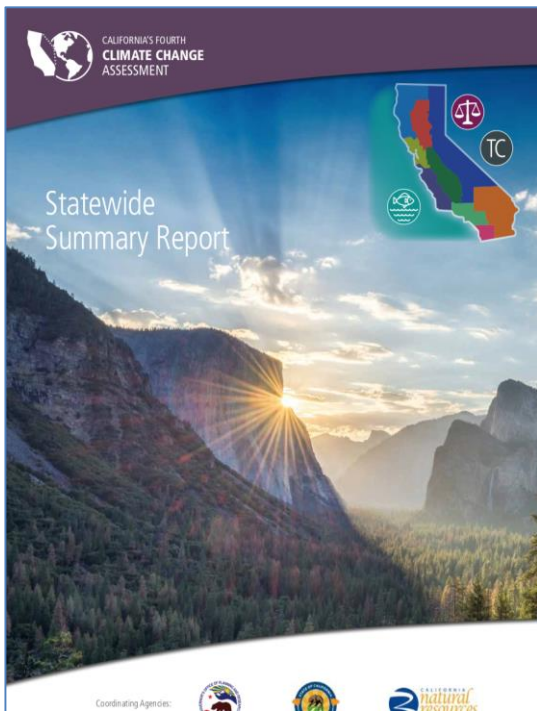
2006

(Impacts focus → AB32)

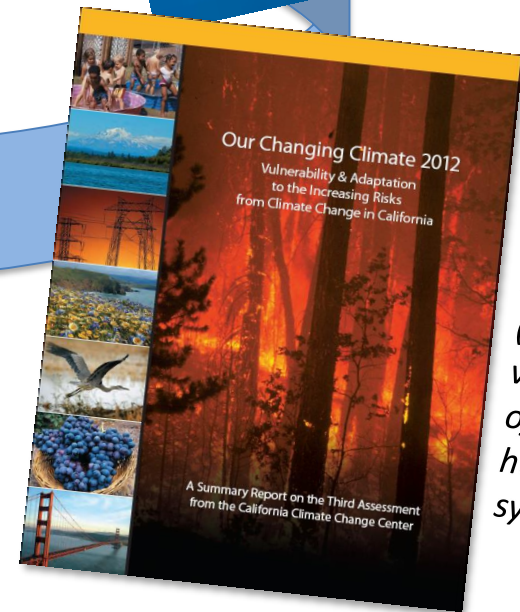


2008/9

(Sectors/adaptation focus → 2009 Climate Adaptation Strategy)



2018 (Topical & regions scales → Implementation of AB2800 → getting down to action)



2012

(Focus on vulnerabilities of natural & human systems)