

CLIMATE CHANGE AND SOUTHERN CALIFORNIA FORESTS



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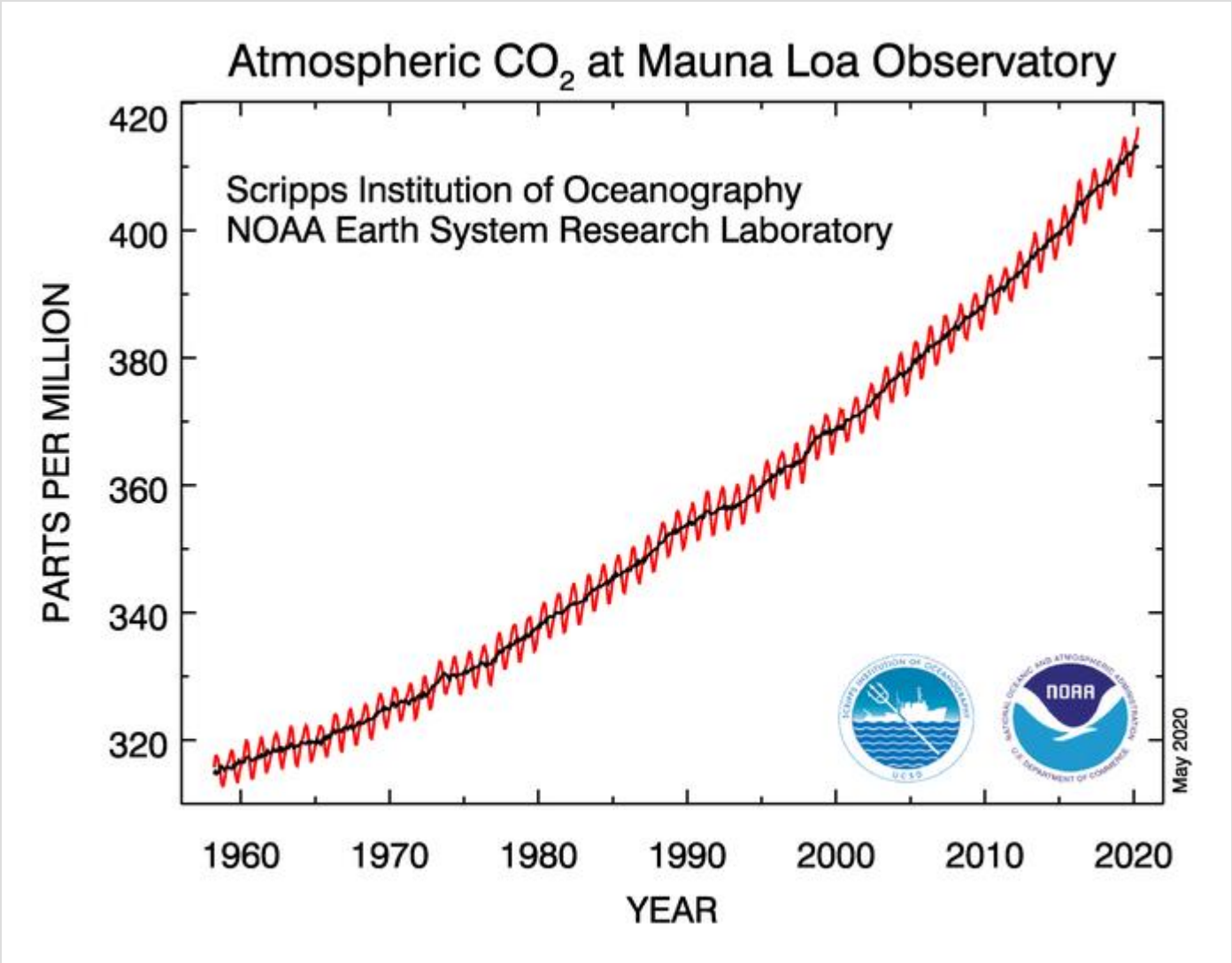


FOR TODAY

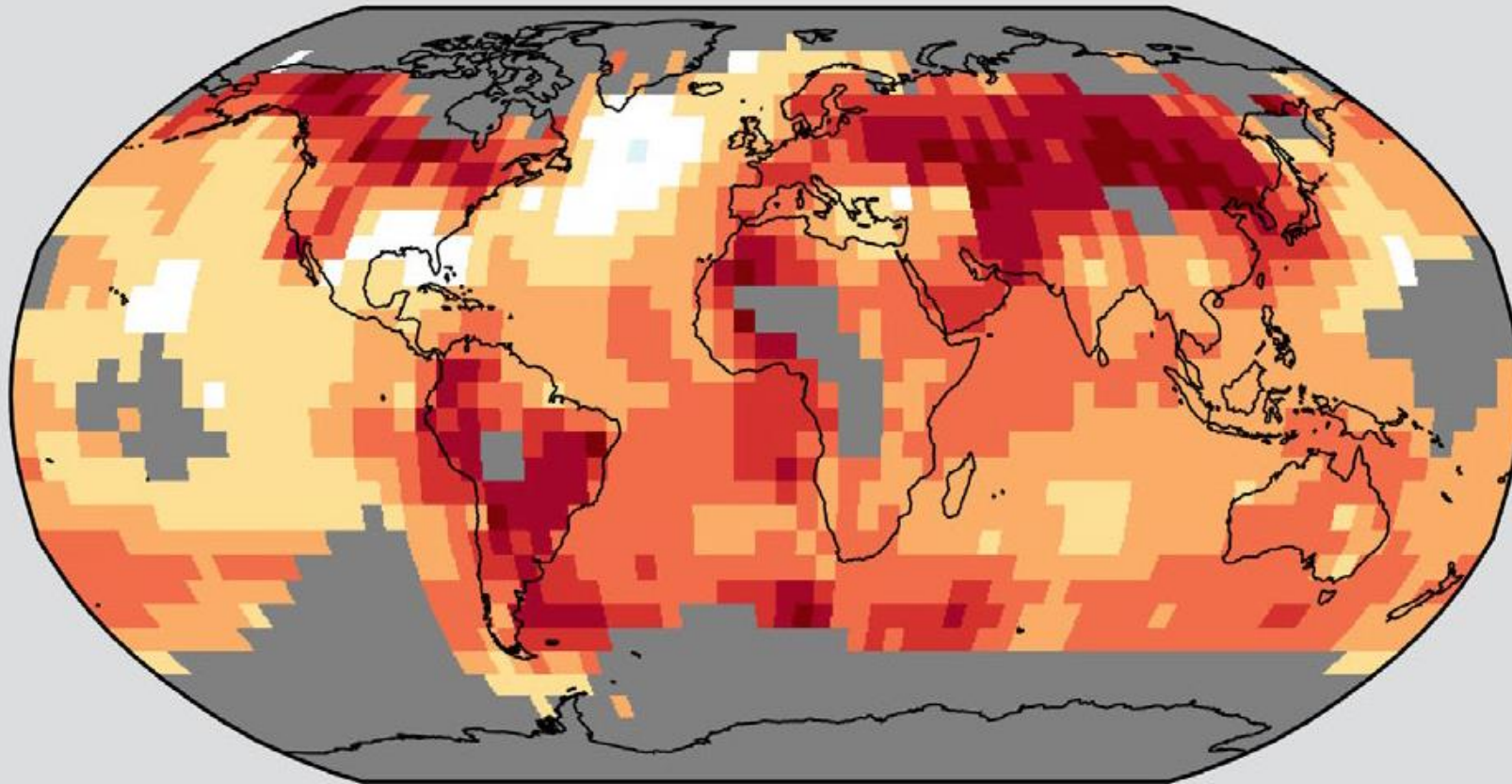


1. A look back at our climate
2. The future of climate change
3. Effects of a changing climate to resource and forest management
4. A primer to forest management through a filter of climate adaptation
5. Resources to support climate-informed decision-making

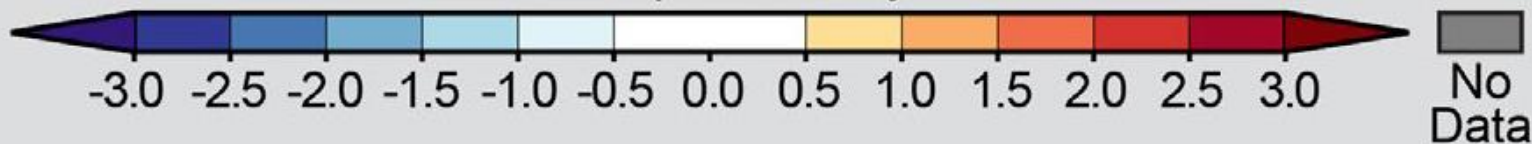
BENDING THE CURVE



TEMPERATURE TREND FROM 1900 TO 2012

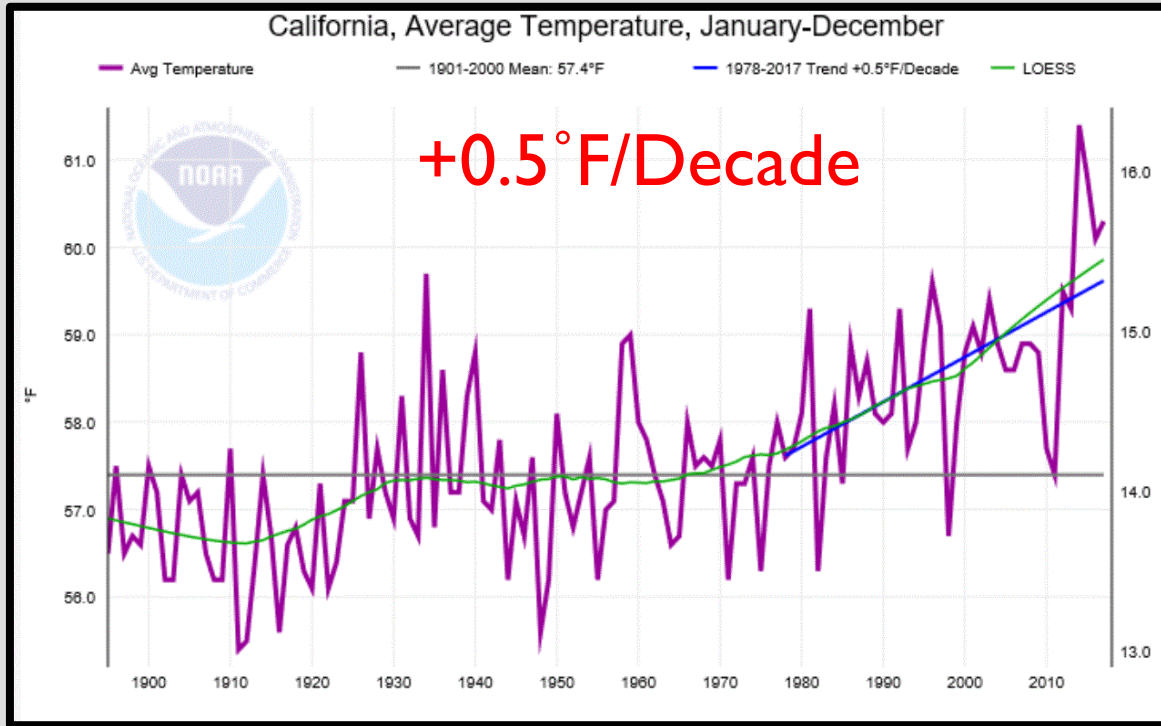


°F per Century



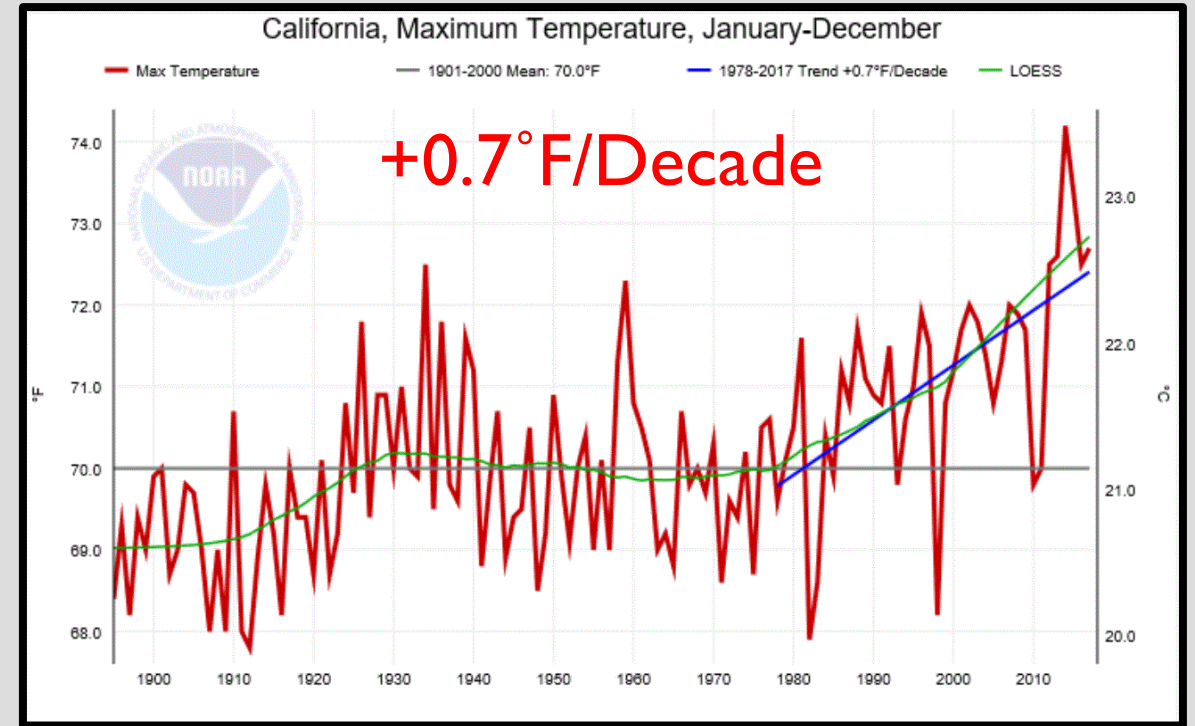
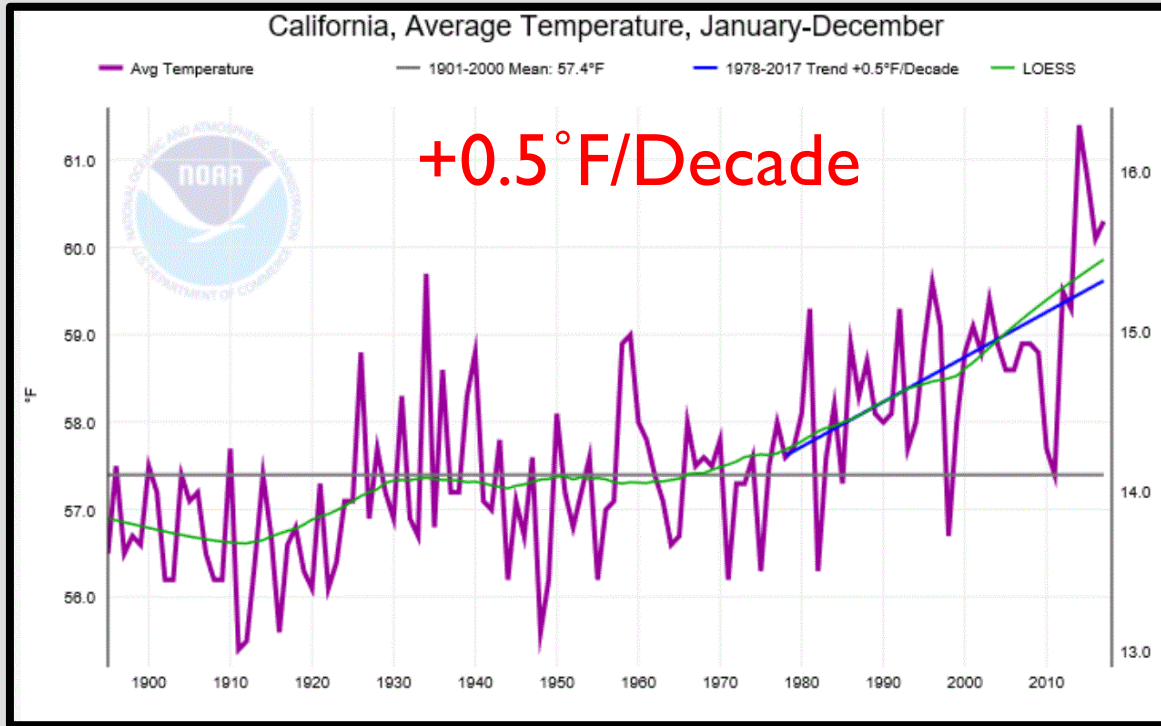
Source Map from FAQ appendix of the 2014 National Climate Assessment. Originally provided by NOAA NCDC.

Historic Temperature Trends



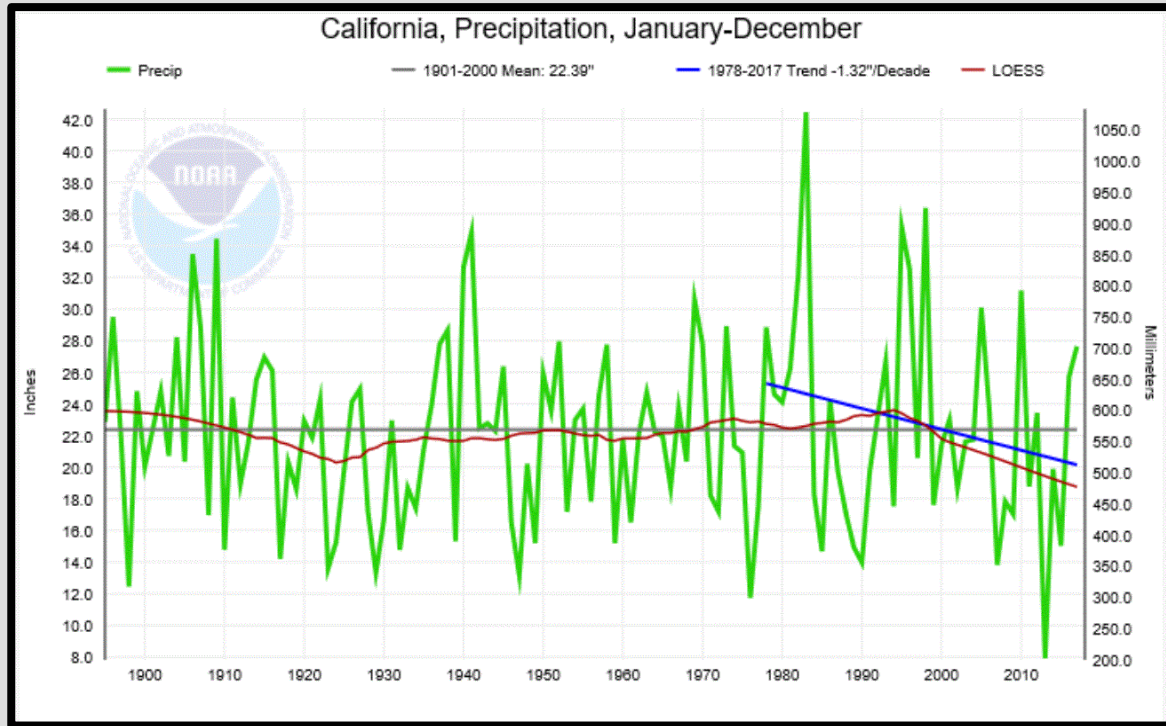
Source: NOAA

Historic Temperature Trends



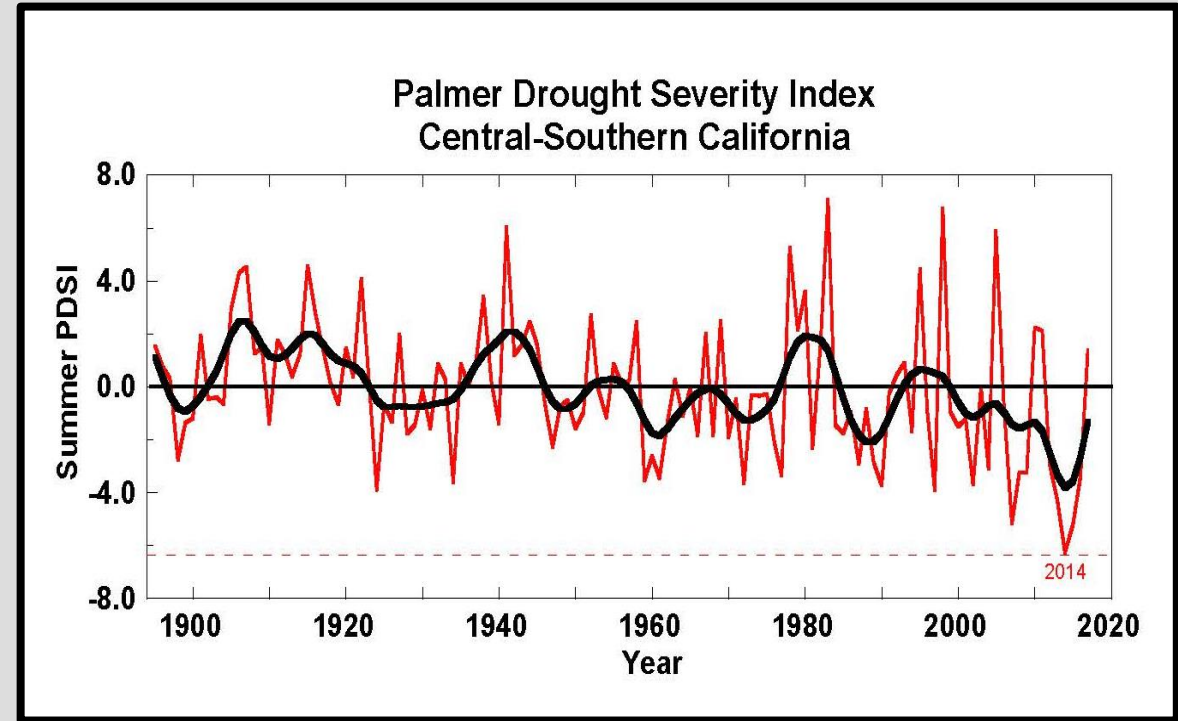
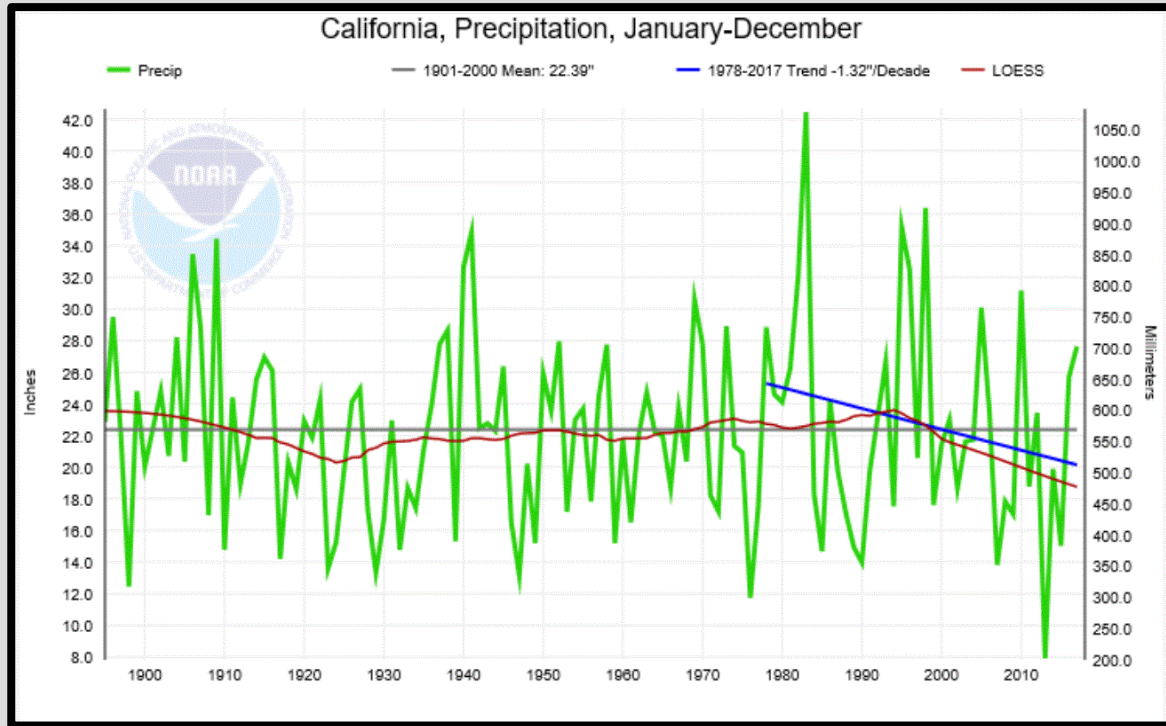
Source: NOAA

Historic Precipitation Patterns



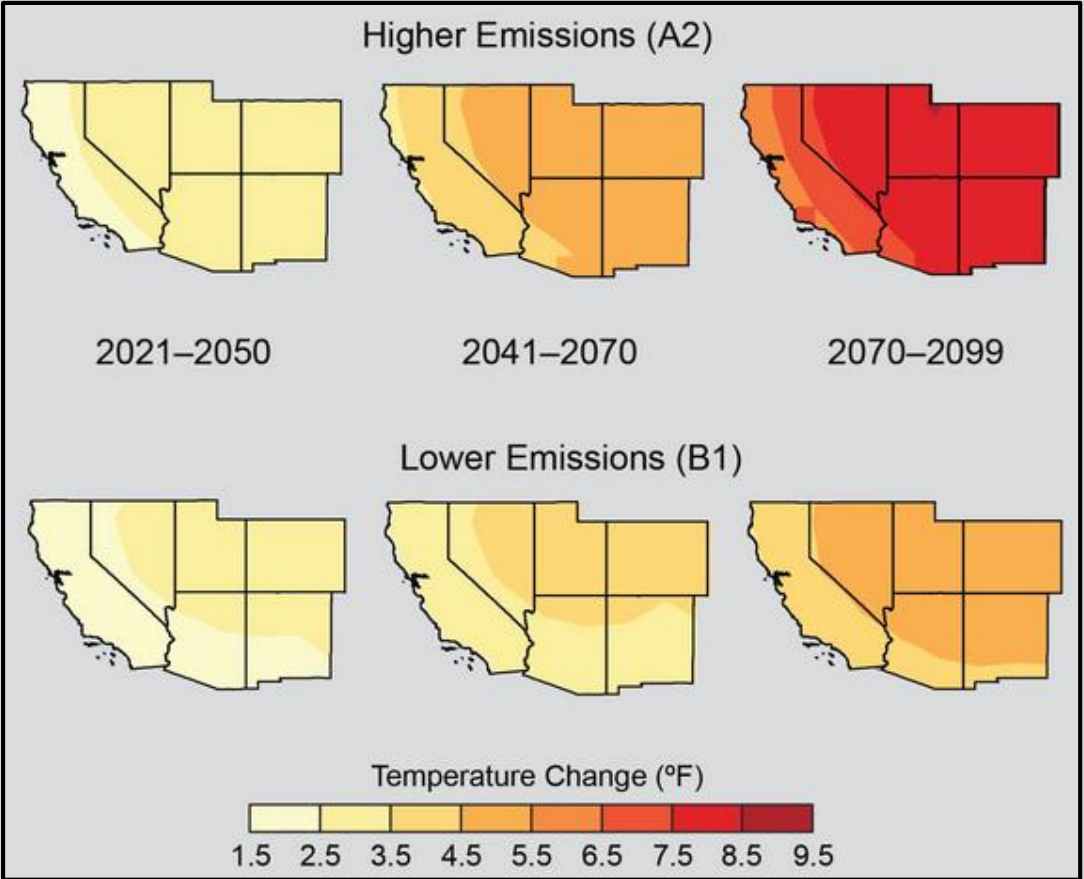
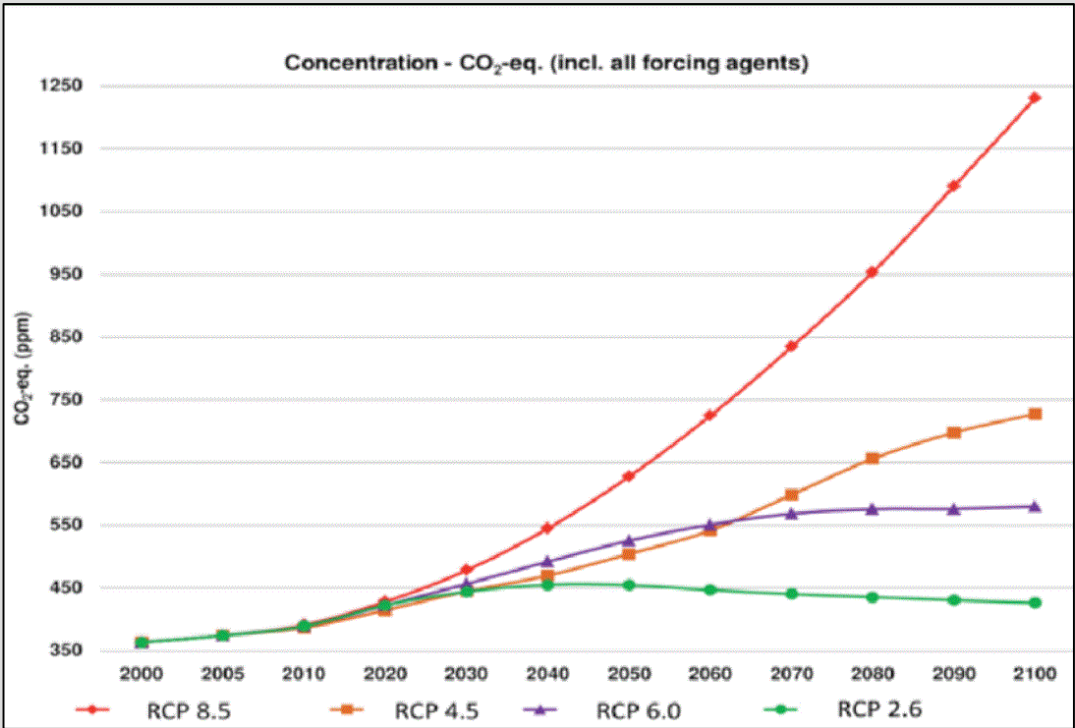
Source: NOAA

Precipitation & Drought - Historic



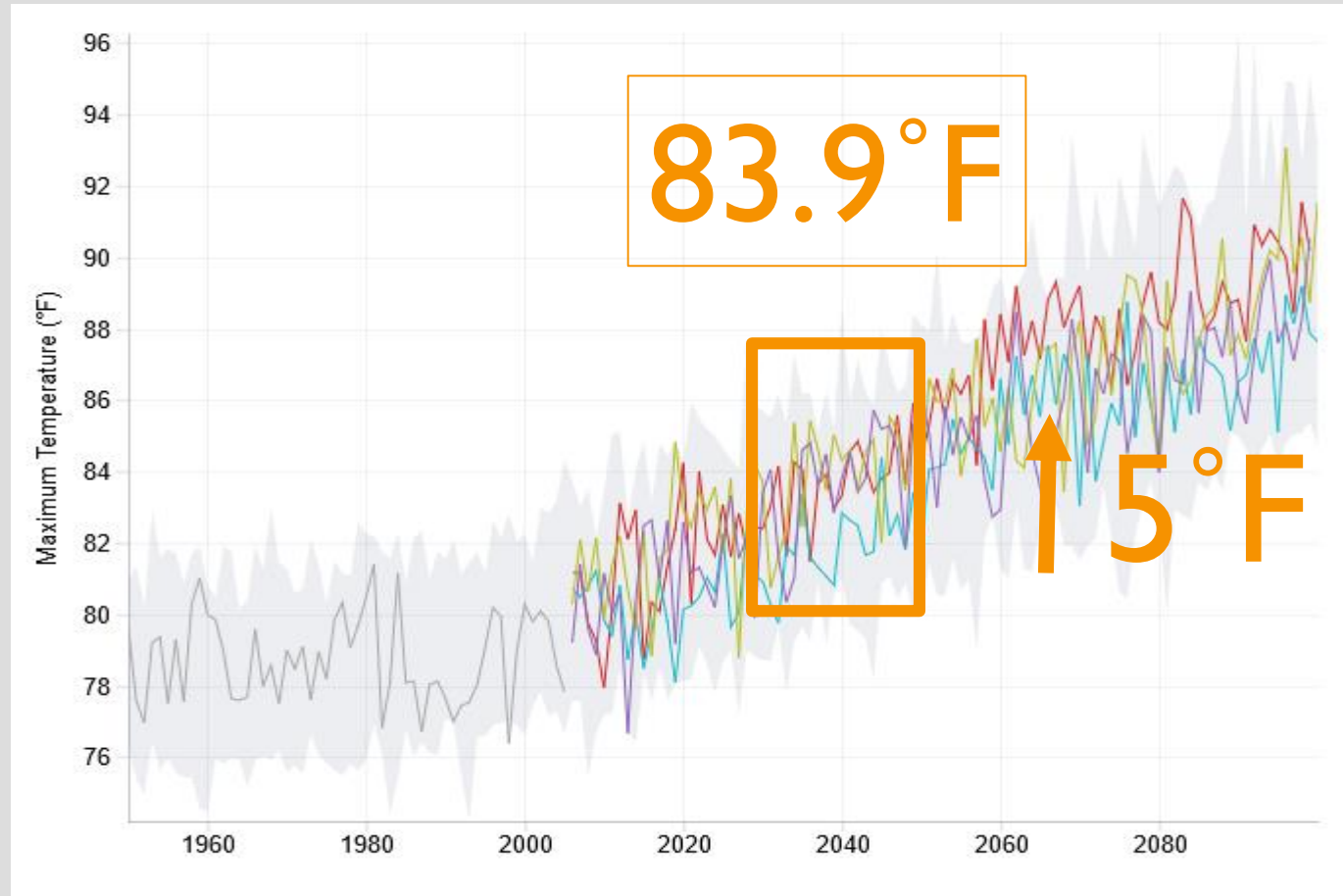
Source: NOAA

CLIMATE MODELS AND GREENHOUSE GAS EMISSIONS



A WARMING FUTURE (2040-2050)

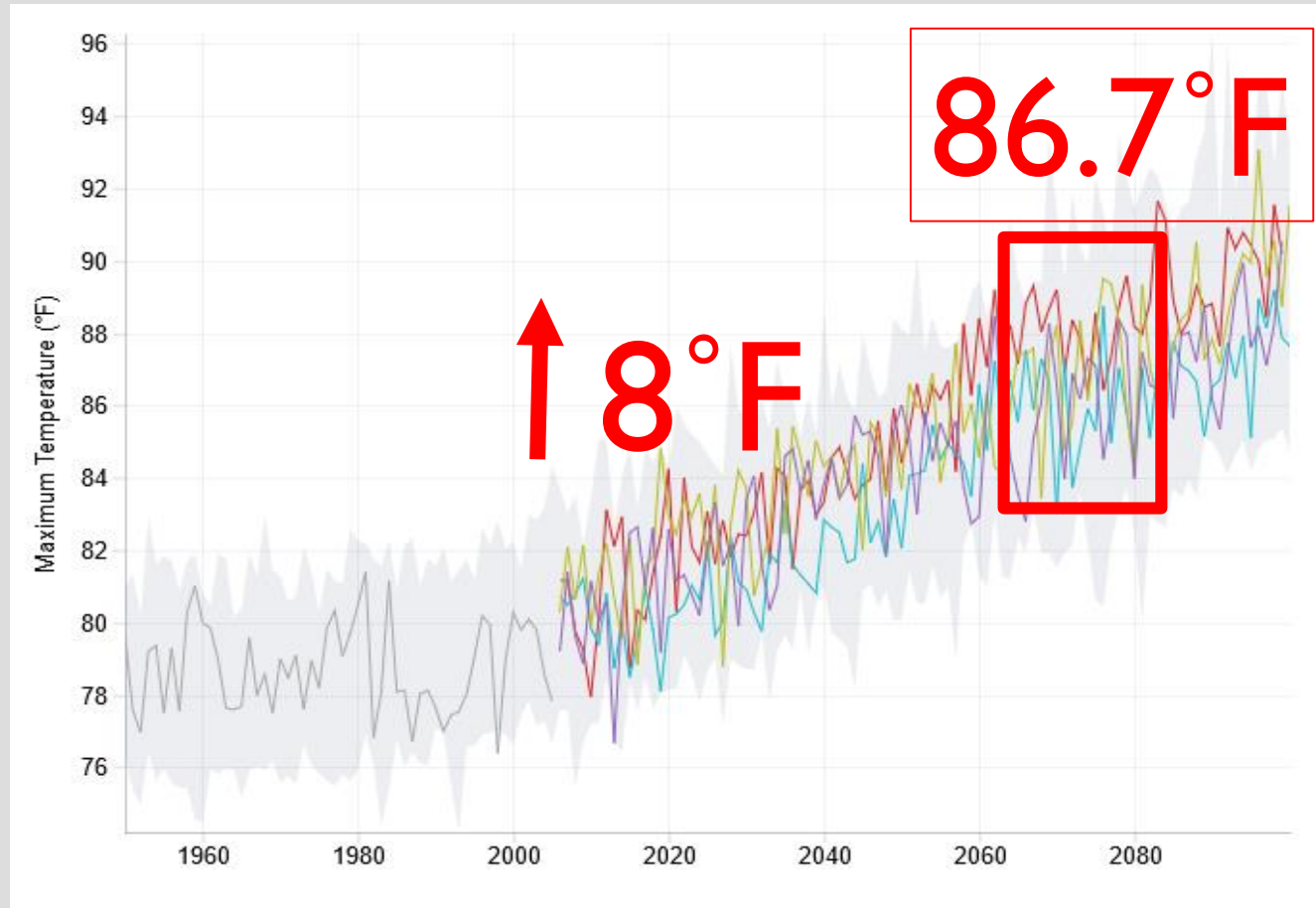
Future Max Temp: Four Climate Models & RCP 8.5 (San Bernardino)



Source: Cal Adapt accessed 2019

A WARMING FUTURE (2070-2080)

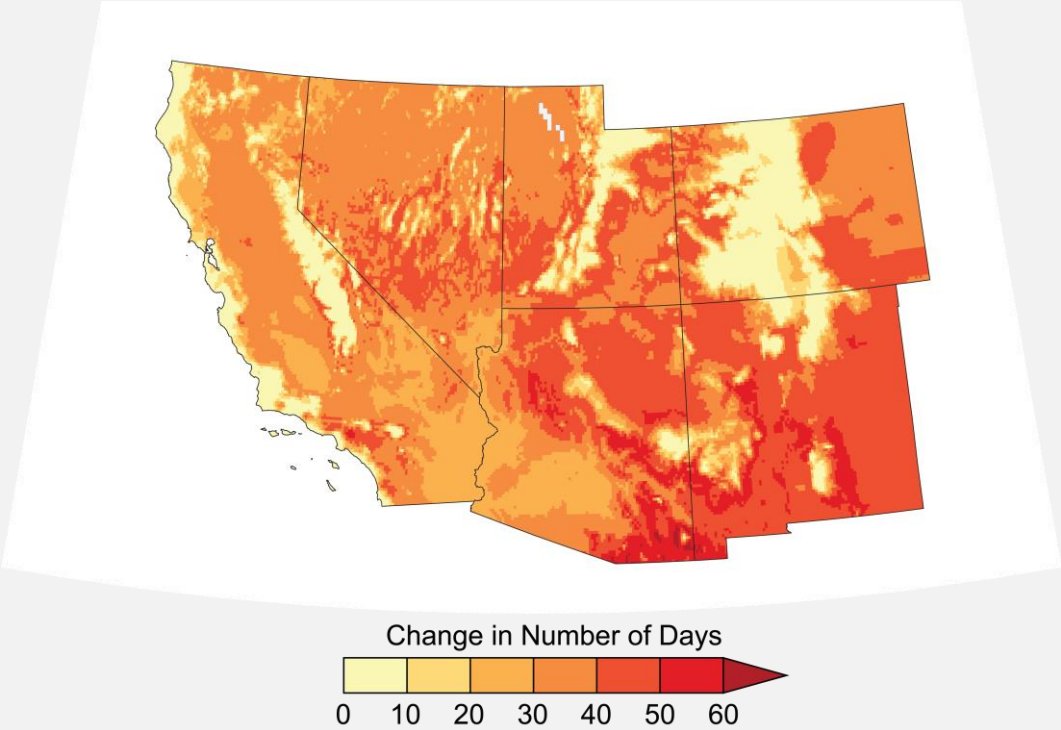
Future Max Temp: Four Climate Models & RCP 8.5 (San Bernardino)



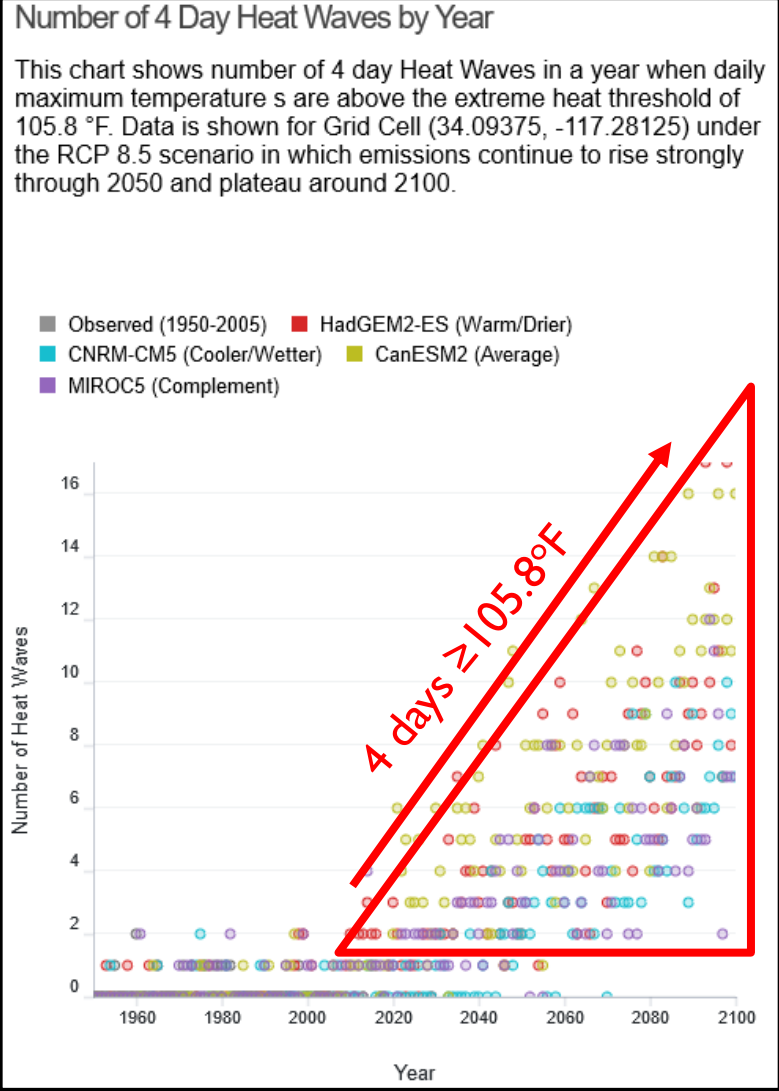
Source: Cal Adapt accessed 2019

EXTREME HEAT EVENTS WILL INCREASE

Projected Increases in Extreme Heat



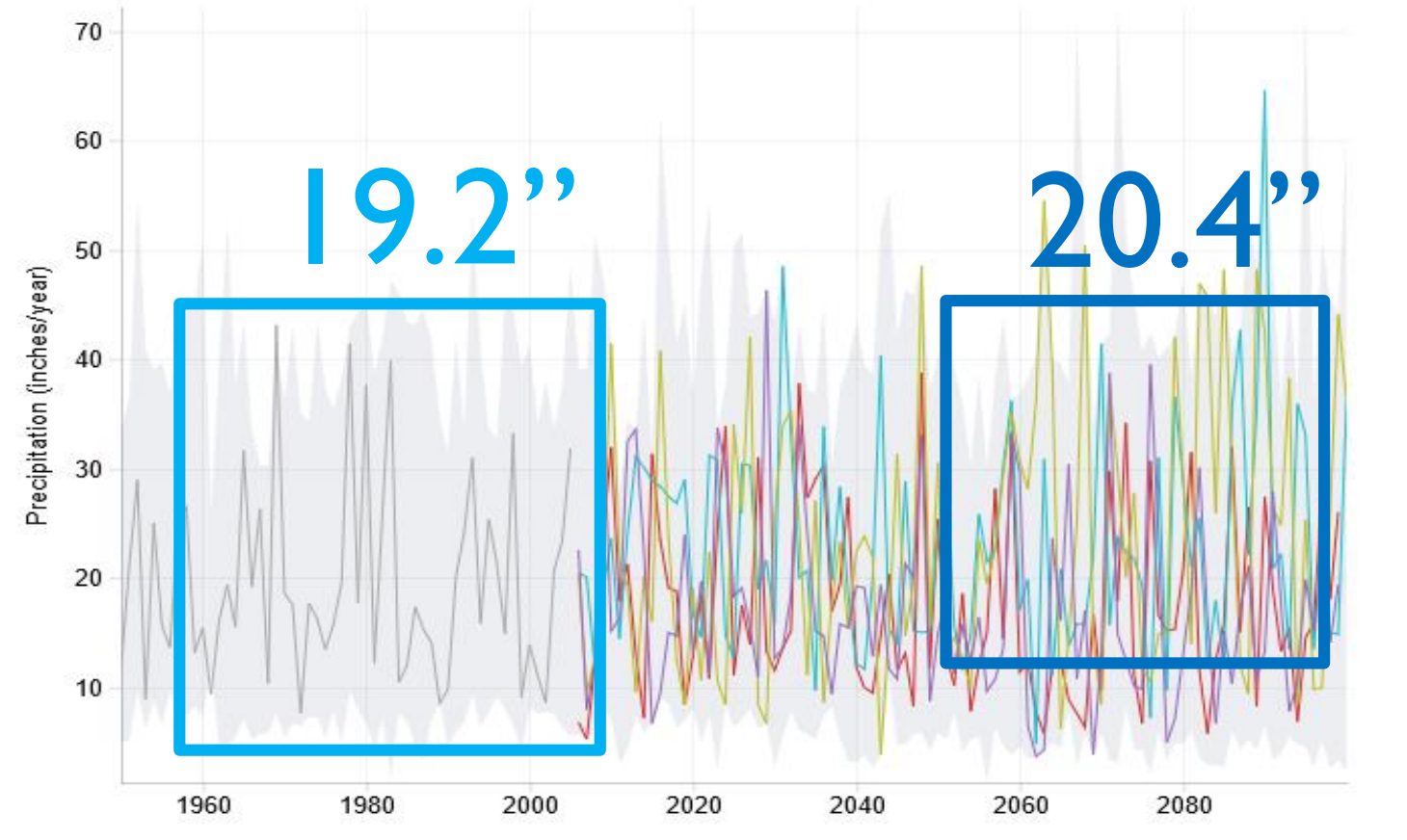
Source: <https://nca2018.globalchange.gov/chapter/25/>



<https://cal-adapt.org/tools/extreme-heat/>

SIMILAR PROJECTED PRECIPITATION

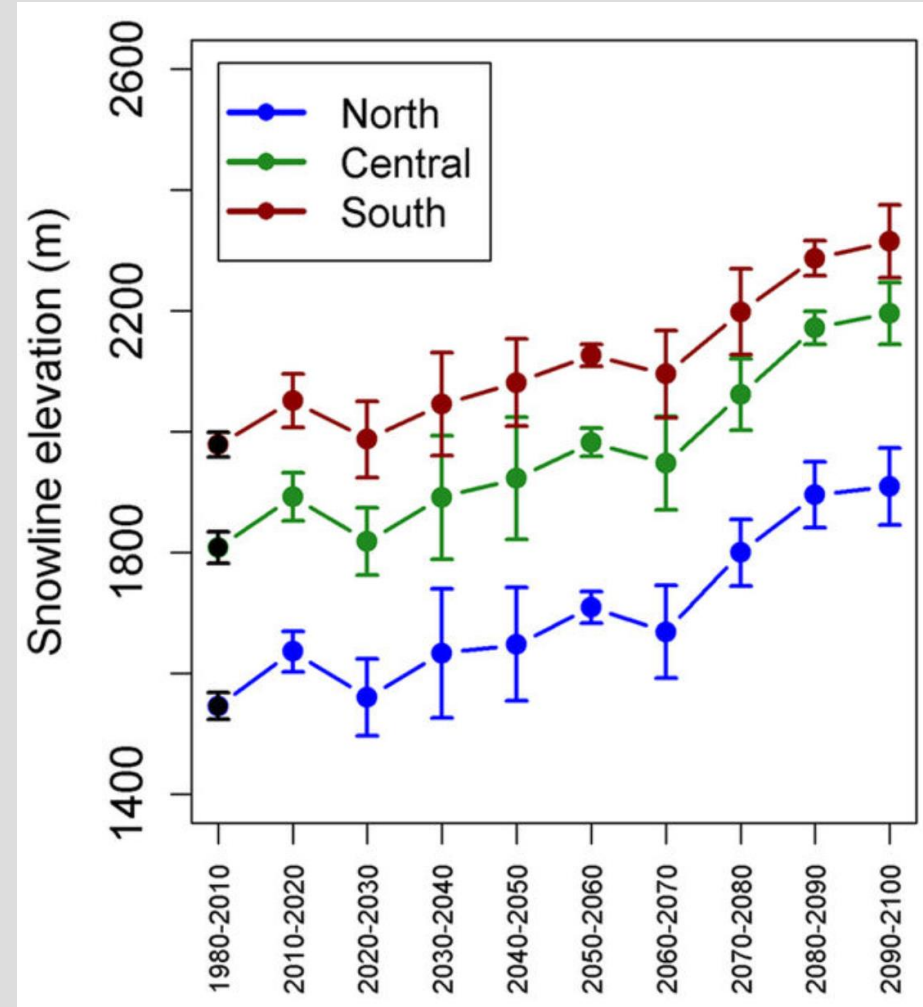
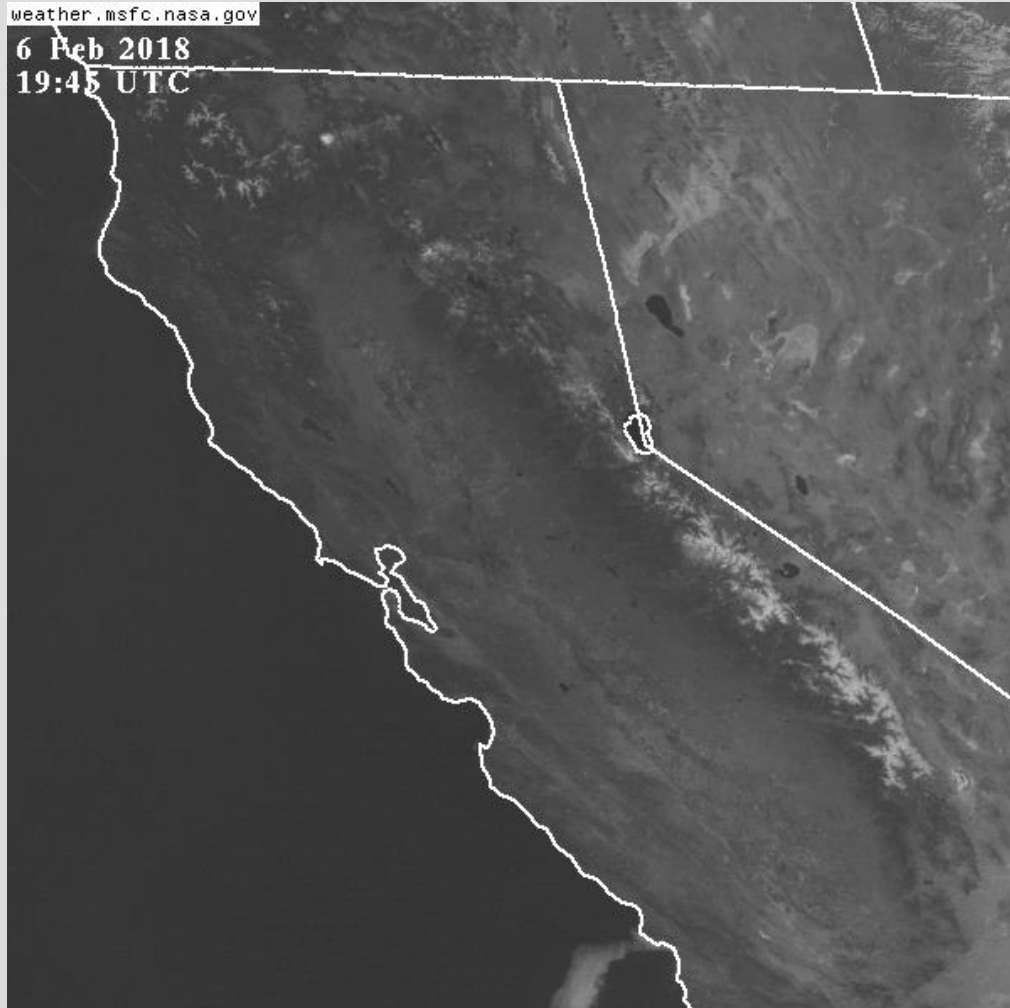
Future Mean Precipitation: Four Climate Models & RCP 8.5 (San Bernardino)



With higher future temperatures increases in climatic water deficits maybe likely...

Source: Cal Adapt accessed 2019

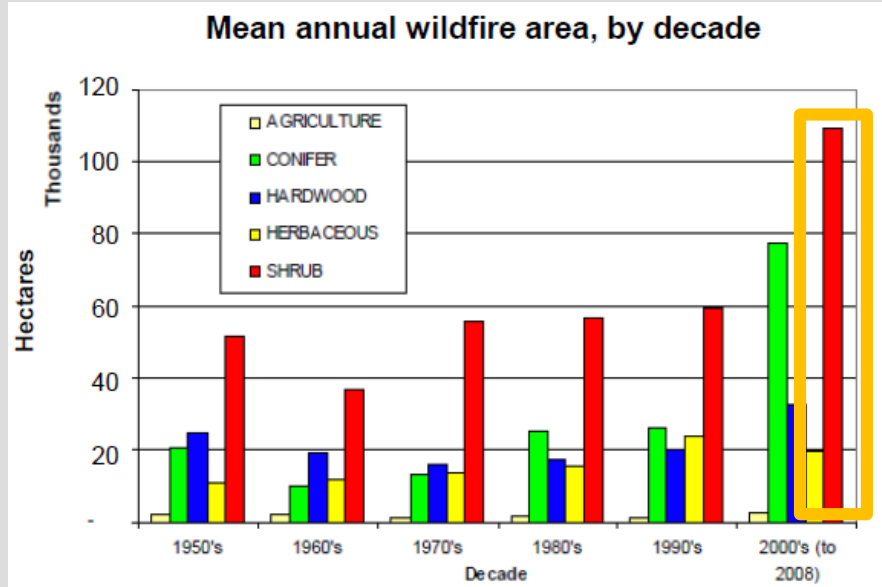
SHIFT FROM SNOW TO RAIN



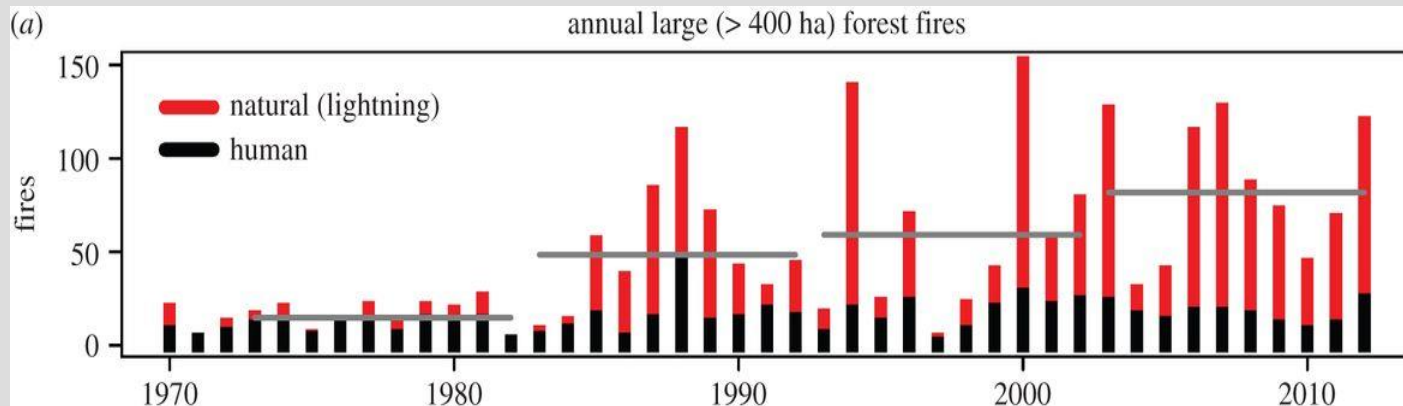
↓ Snow Cover
by 20–84%

WILDFIRE ACTIVITY

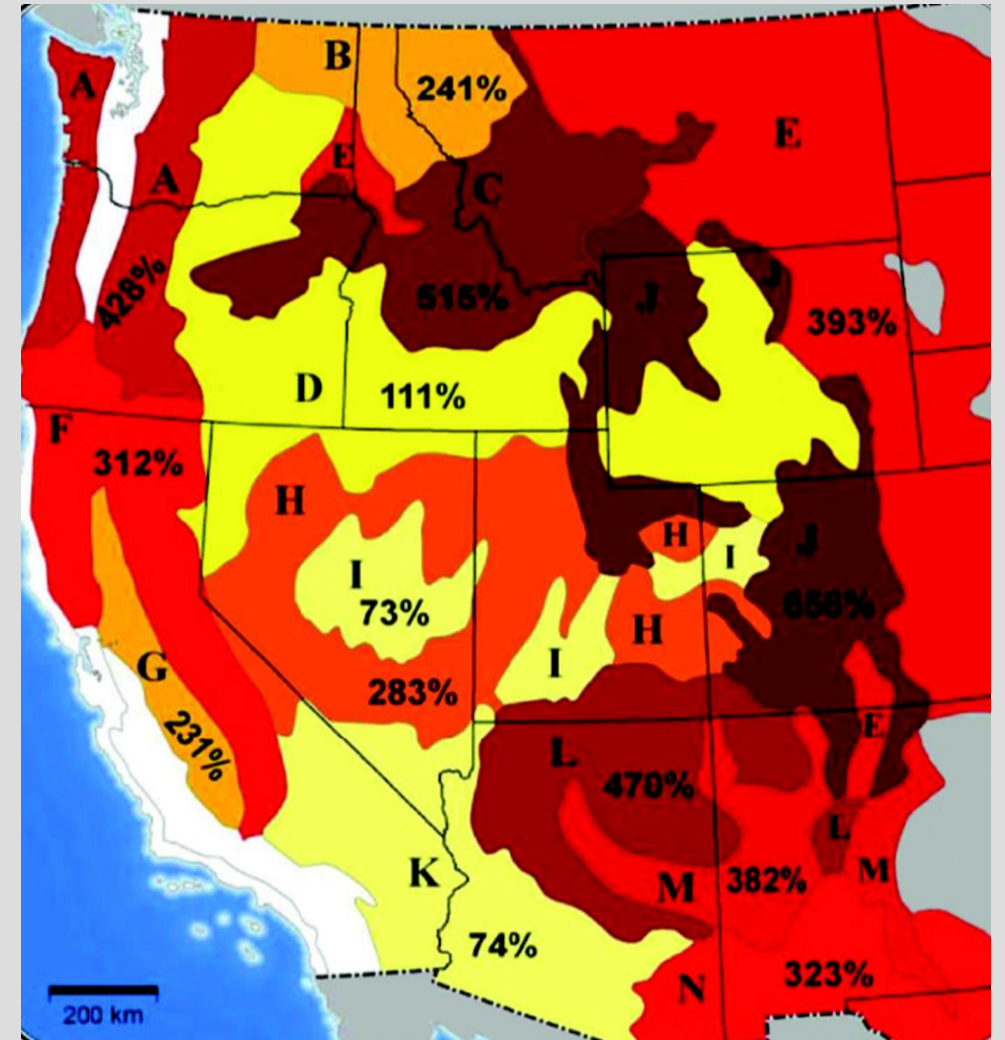
1.8°F increase = >300% increase in area burned



Source: CAL FIRE FRAP

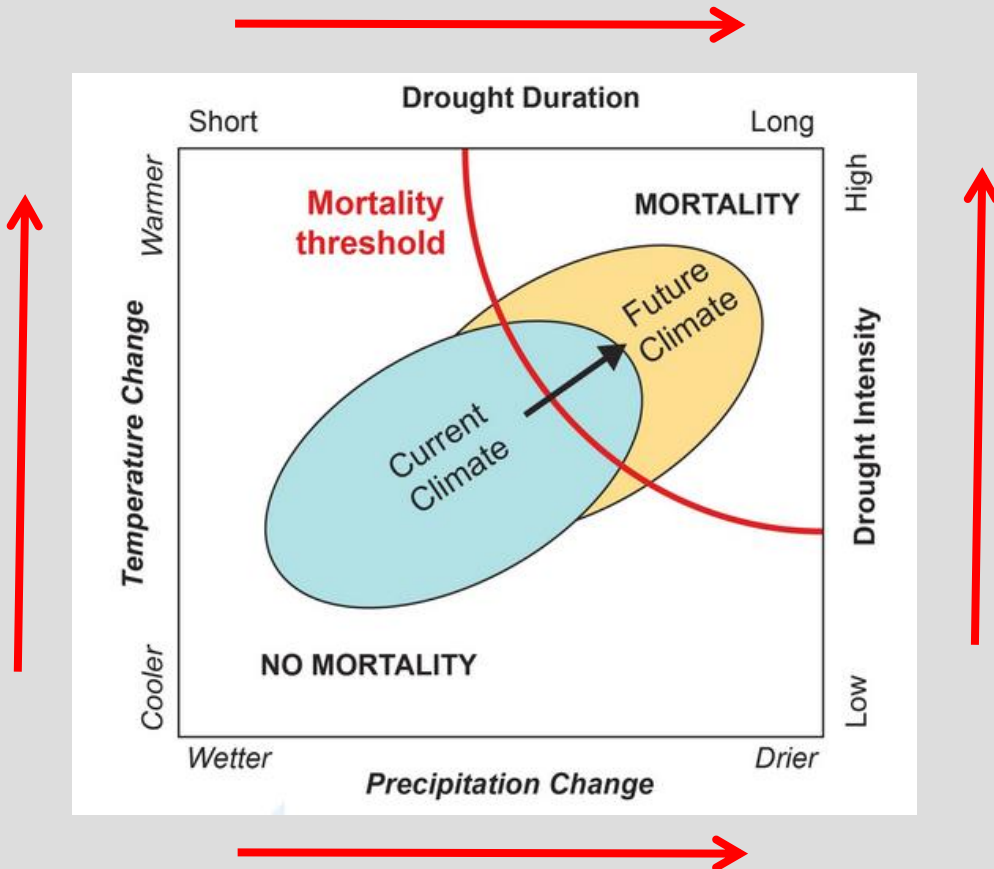


Westerling 2016 Phil. Trans. R. Soc. B



National Research Council. 2011; Taylor and others 2016 PNAS

CLIMATE CHANGE AND EXTREMES DEMAND WILL FORCE CLIMATE ADAPTATION

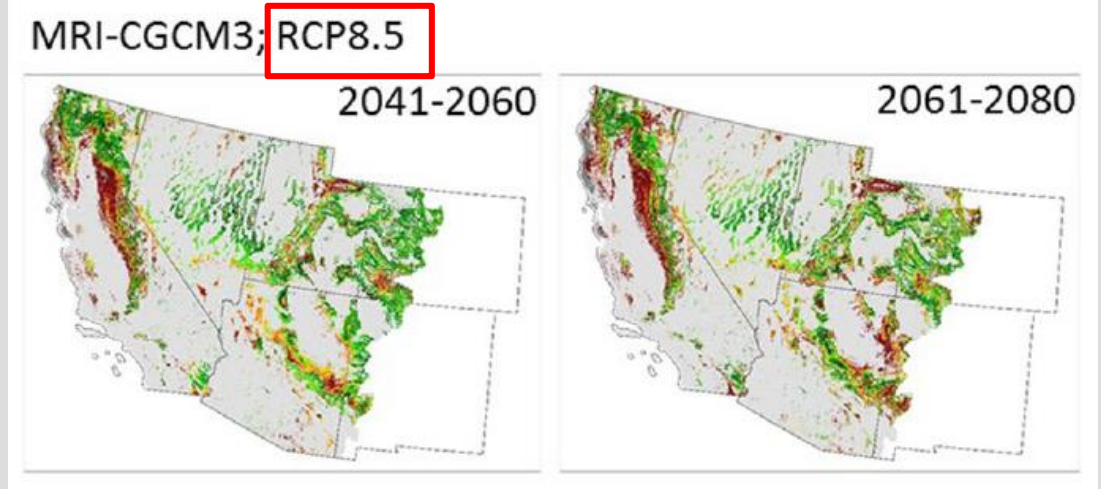
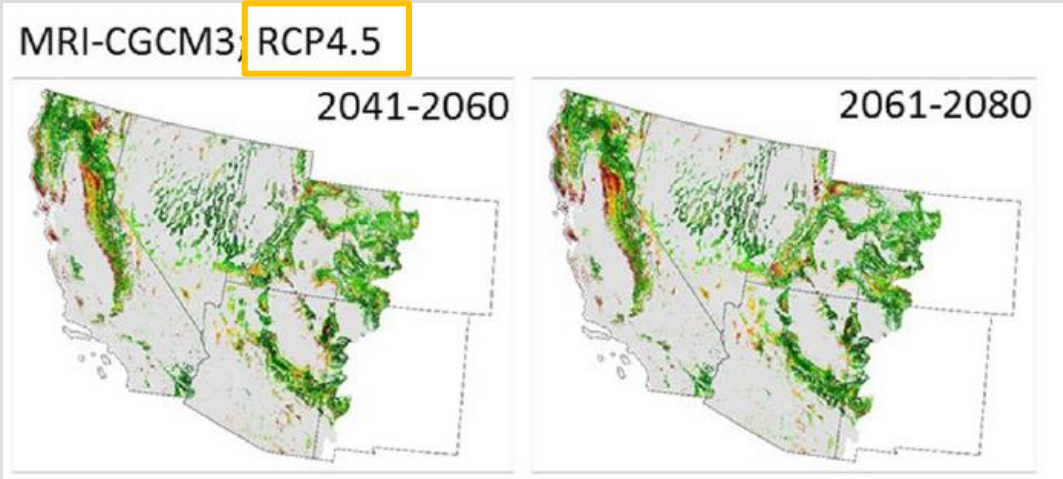


Allen and others 2010 Forest Ecology and Management

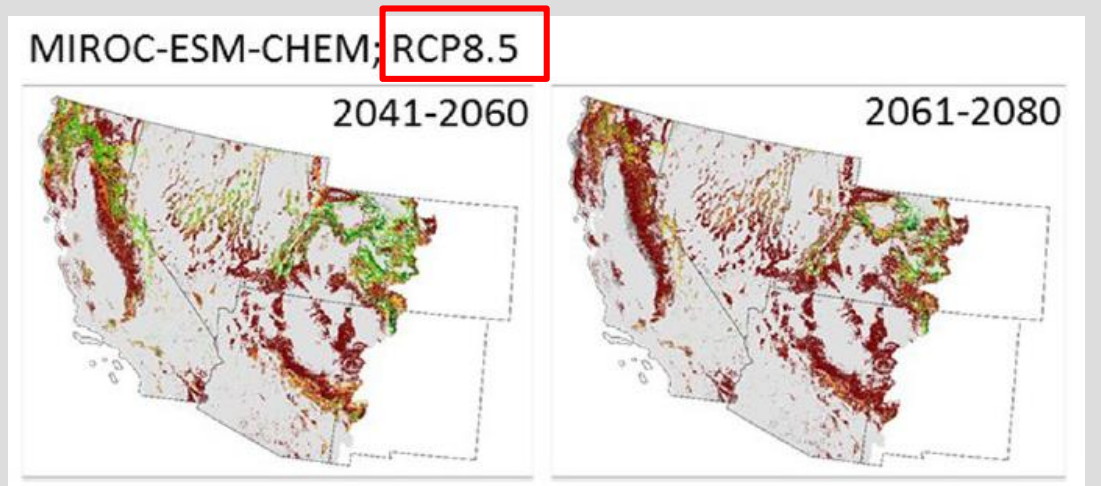
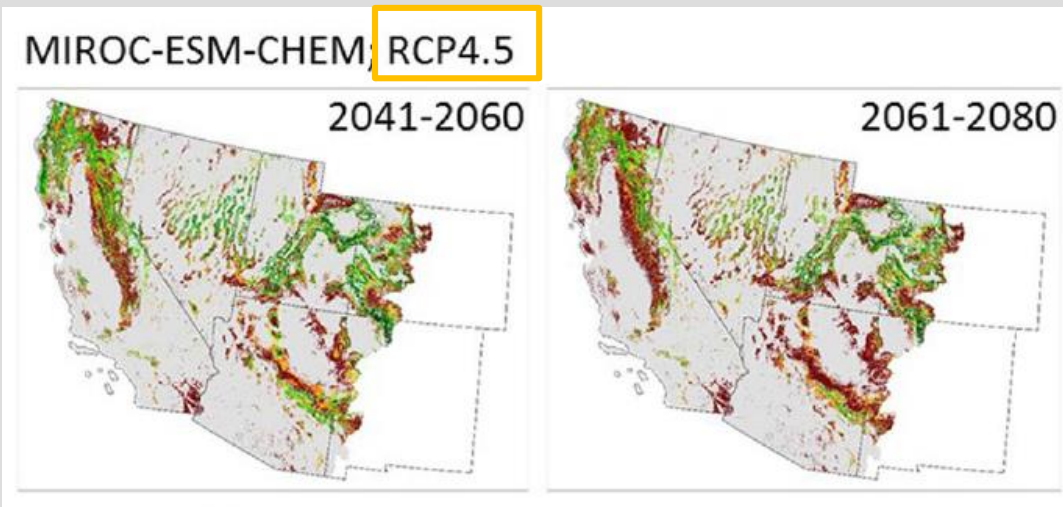


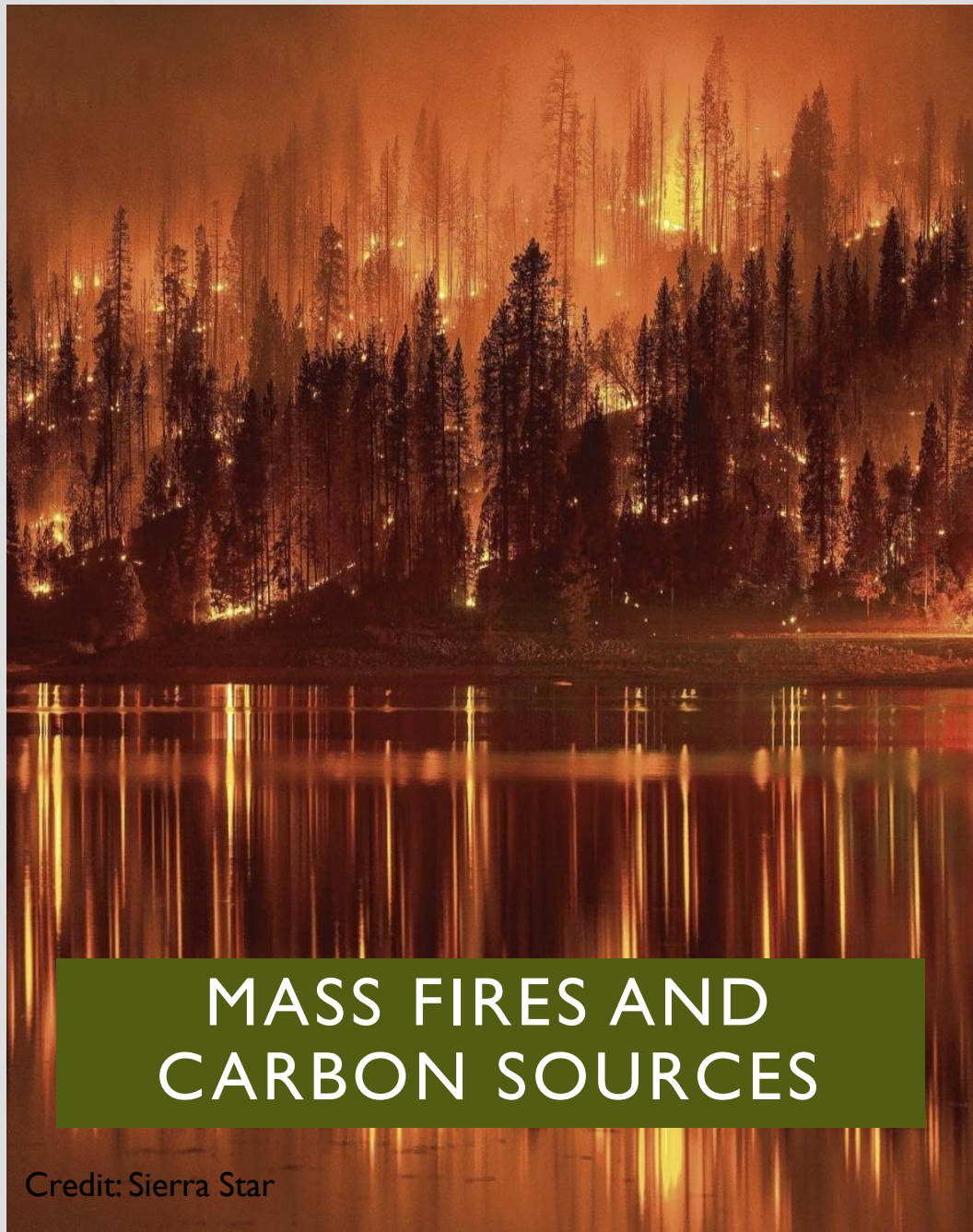
SPECIES DISTRIBUTION HAS, IS & WILL CHANGE

Wet and Warm Future



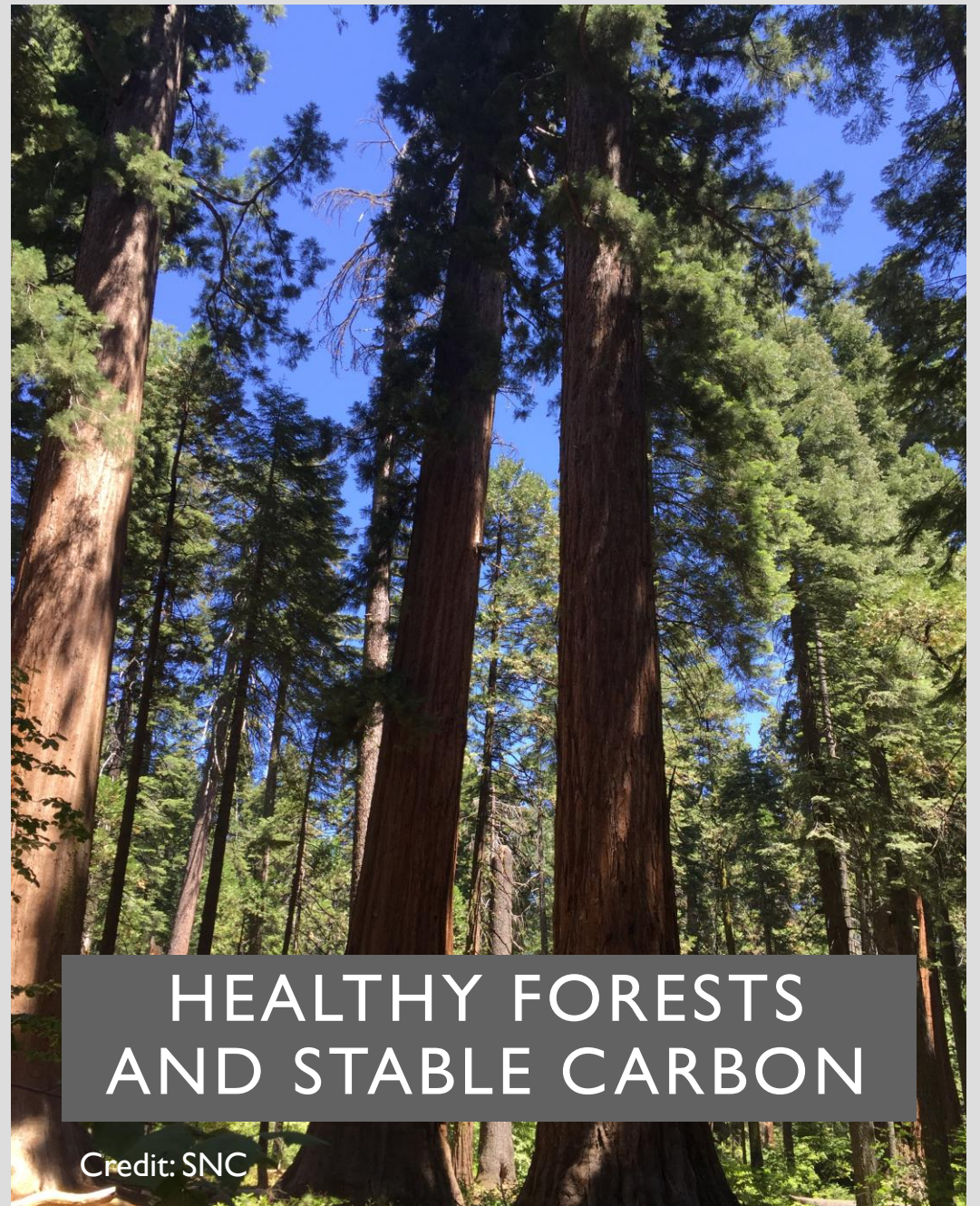
Hot and Dry Future





MASS FIRES AND CARBON SOURCES

Credit: Sierra Star



HEALTHY FORESTS AND STABLE CARBON

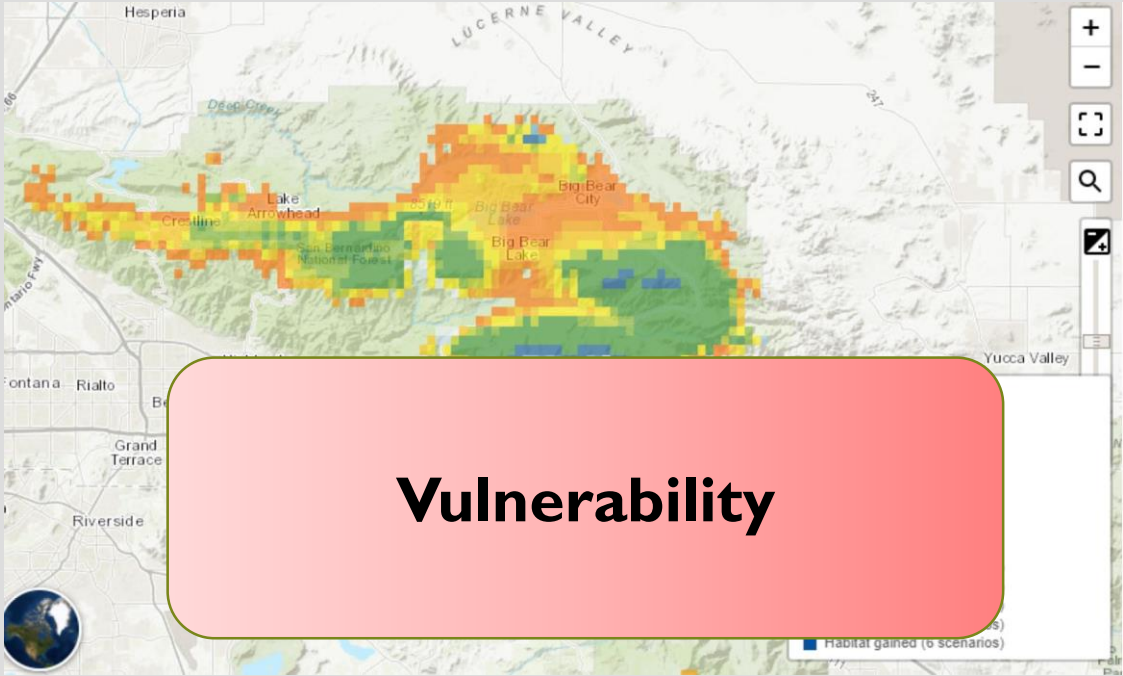
Credit: SNC

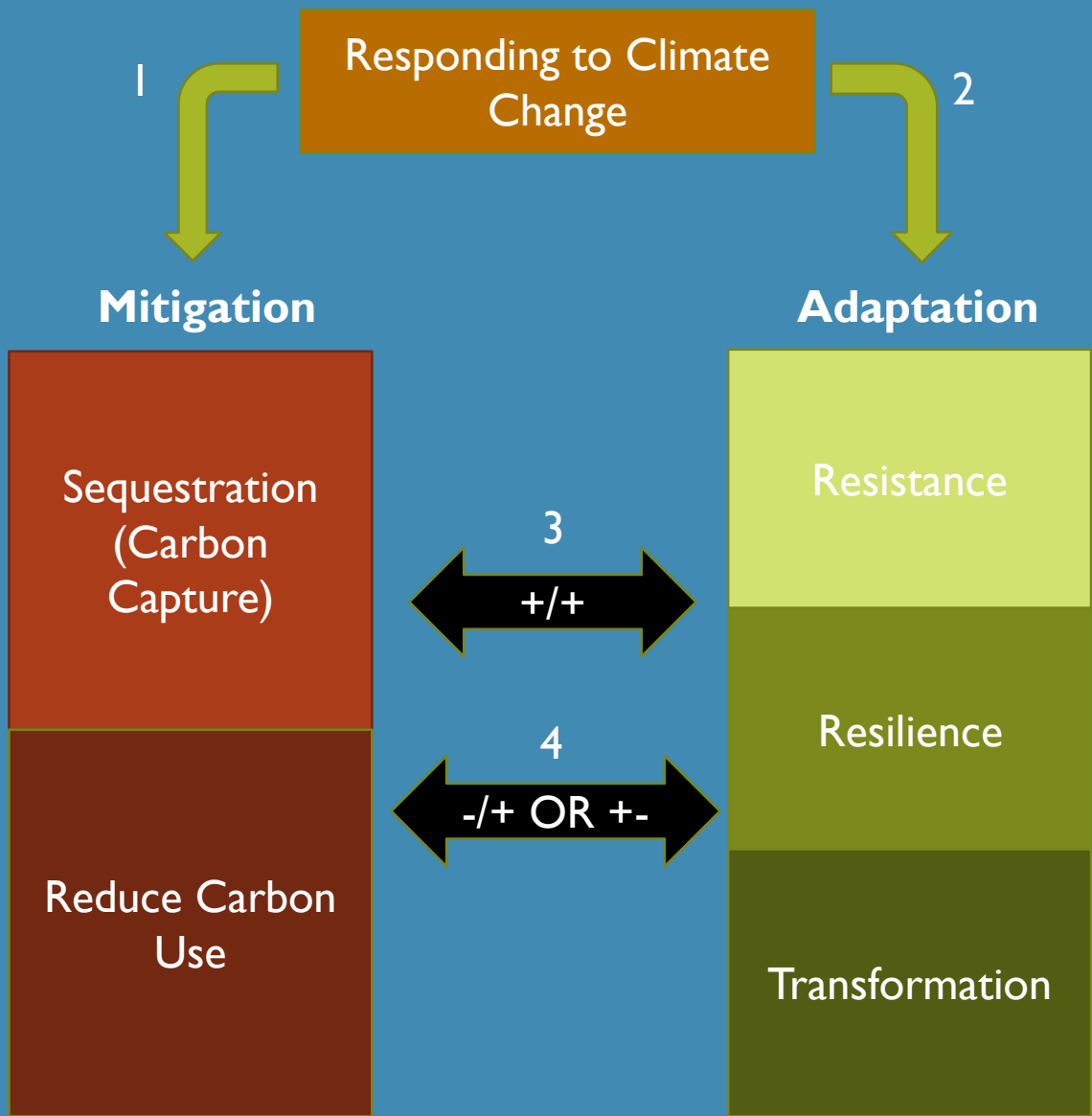


Sensitivity

Exposure

Adaptive Capacity





Hypothetical management approaches to address climate change. It is widely Accepted that actions that results in (1) **mitigation** are highly desirable but that (2) **adaptation** actions are necessary. Often there are (3) **co-benefits** where actions deemed critical to realize adaptation goals also meet mitigation interests as well, hence the term co-benefits. At the same time, efforts to advance a systems adaptive response could come at a carbon savings – these are Considered (4) **tradeoffs** – where one climate change response goal Comes at the sacrifice of another. Details around the various mitigation or adaptation strategies are addressed in the text.

Reforestation



Regeneration



Climate Filter

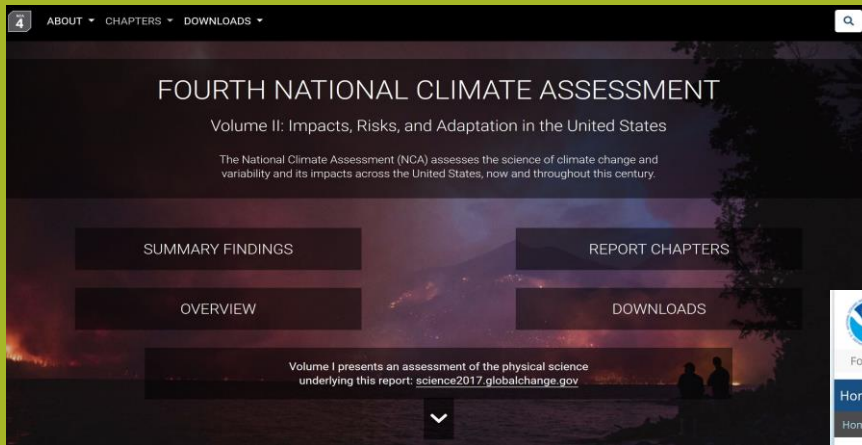




CONTACT US:
[HTTPS://WWW.CLIMATEHUBS.OCE.USDA.GOV](https://www.climatehubs.oce.usda.gov)

CLIMATE RESOURCES

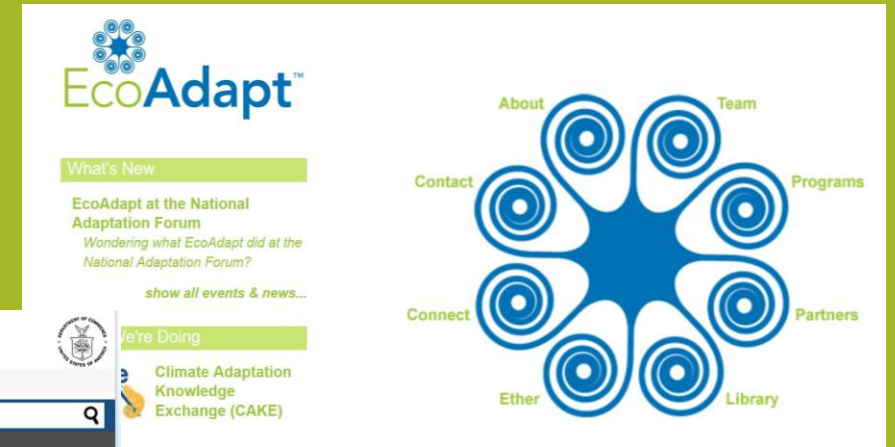
National Climate Assessment 2014 & 2018



NOAA Climate At a Glance



EcoAdapt



California Climate Assessment 2018



CalAdapt



INCREASING TEMPERATURES – REGIONAL AND HISTORICAL

State of the Climate
Temp, Precip, and Drought
Climate at a Glance
Extremes
Societal Impacts
Snow and Ice
Teleconnections
Monitoring References

Mapping Time Series Rankings Haywood Plots Data Information Background

County Time Series

Choose from the options below and click "Plot" to create a time series graph.
Please note, Degree Days and Palmer Indices are not available for Counties.

Parameter: Maximum Temperature
Time Scale: 12-Month
Month: August
Start Year: 1895
End Year: 2019
State: California
County: San Bernardino County

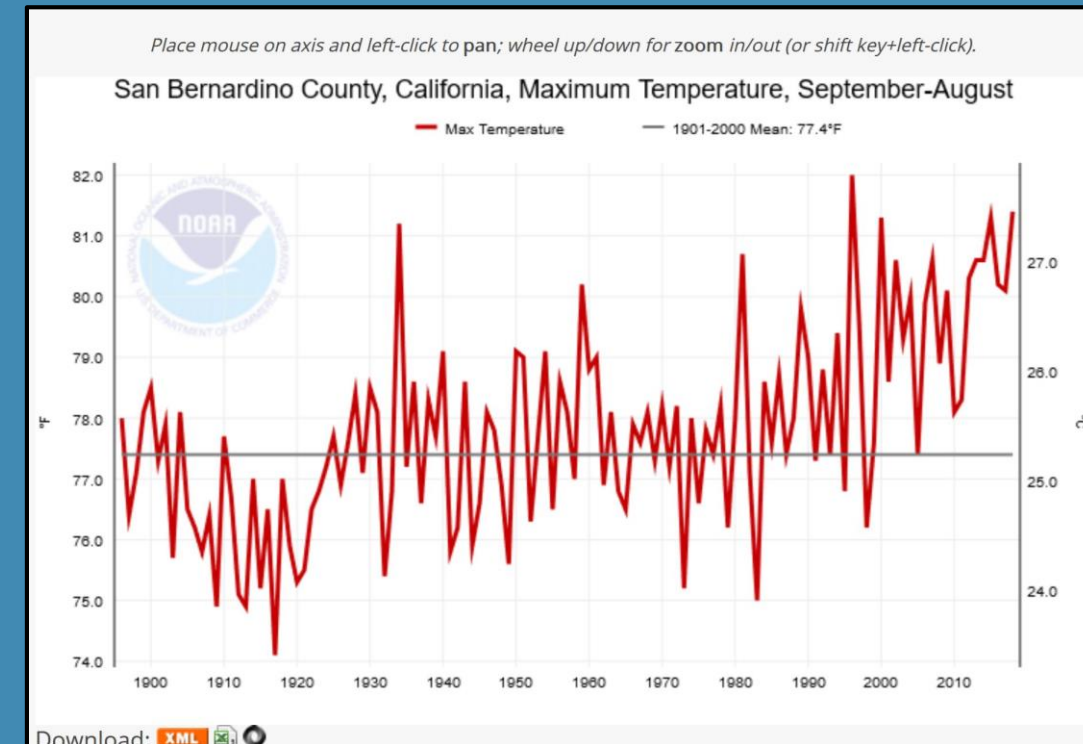
Options

Display Base Period
Start: 1901 End: 2000

Display Trend
 per Decade per Century
Start: 1895 End: 2019

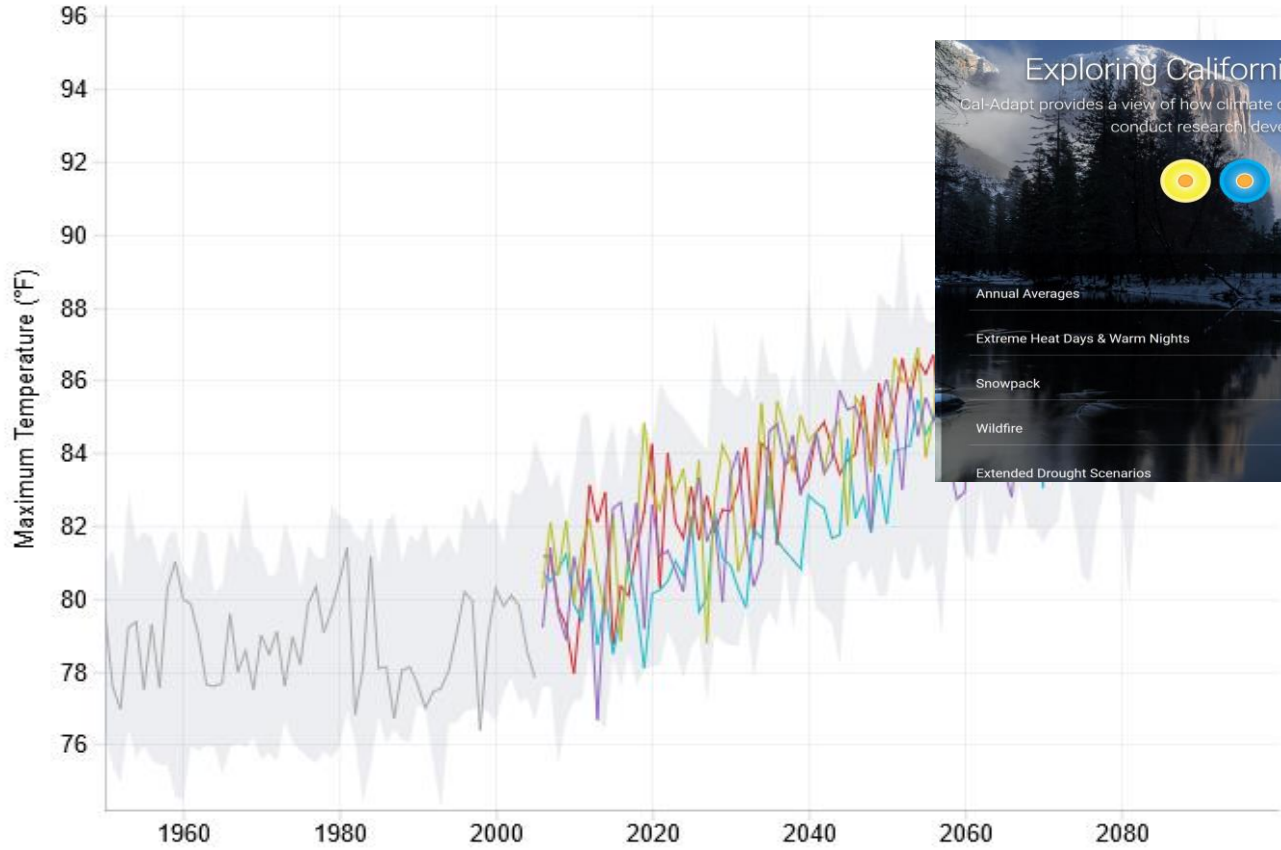
Smoothed Time Series
 Binomial Filter LOESS

Plot



Centers for Environmental information, Climate at a Glance:
County Time Series, published June 2019, retrieved June 9,
2019 from <https://www.ncdc.noaa.gov/cag/>

PROJECTING TEMPERATURE, EXTREME HEAT & PRECIPITATION



Exploring California's Climate Change Research

Cal-Adapt provides a view of how climate change might affect California. Find tools, data, and resources to conduct research, develop adaptation plans and build applications.

- Annual Averages
- Extreme Heat Days & Warm Nights
- Snowpack
- Wildfire
- Extended Drought Scenarios
- Extreme Precipitation Events
- Cooling Degree Days & Heating Degree Days
- Sea Level Rise - CalFioD-3D
- Streamflow
- Hourly Projections of Sea Level

Number of 4 Day Heat Waves by Year

shows number of 4 day Heat Waves in a year when daily temperature s are above the extreme heat threshold of Data is shown for Grid Cell (34.09375, -117.28125) under .5 scenario in which emissions continue to rise strongly 050 and plateau around 2100.

red (1950-2005) ■ HadGEM2-ES (Warm/Drier)
 -CM5 (Cooler/Wetter) ■ CanESM2 (Average)
 25 (Complement)

