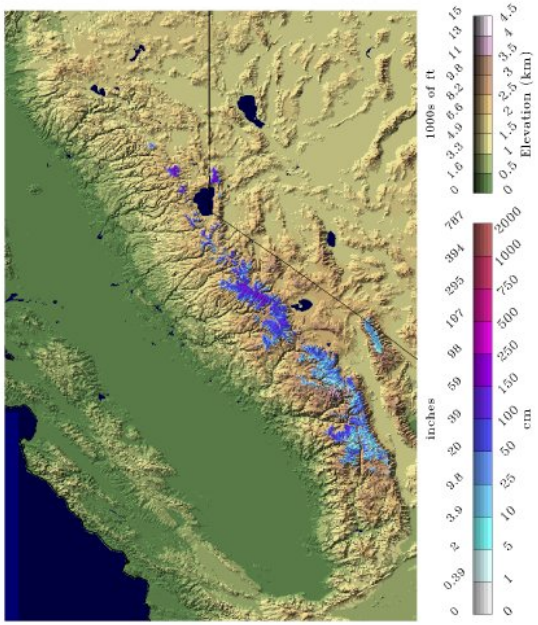
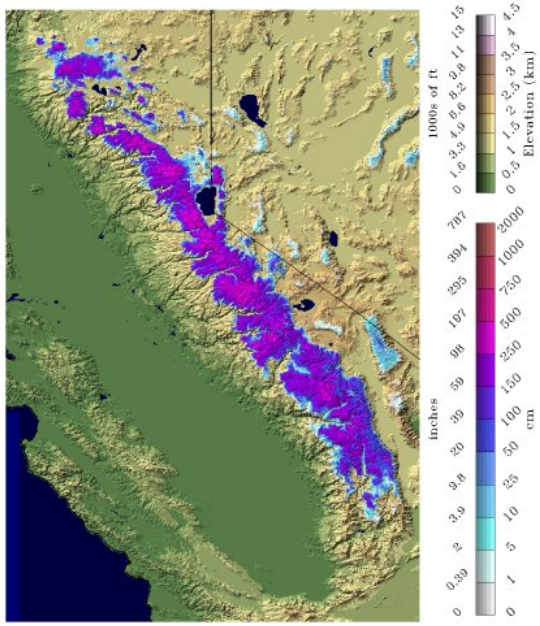
California Climate and Drought Update

Snow Depth
April 1, 2015



Snow Depth
April 1, 2016



Dan McEvoy

Postdoctoral Fellow, Applied Climatology

Western Regional Climate Center

Desert Research Institute

Central Valley Drought and Climate Outlook

October 12, 2016

University of California Merced Center

Fresno, CA

Desert Research Institute

Western Regional Climate Center
Providing climate services since 1986

CNAP
California-Nevada Climate Applications Program
A NOAA RISA team

NIDIS
NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM

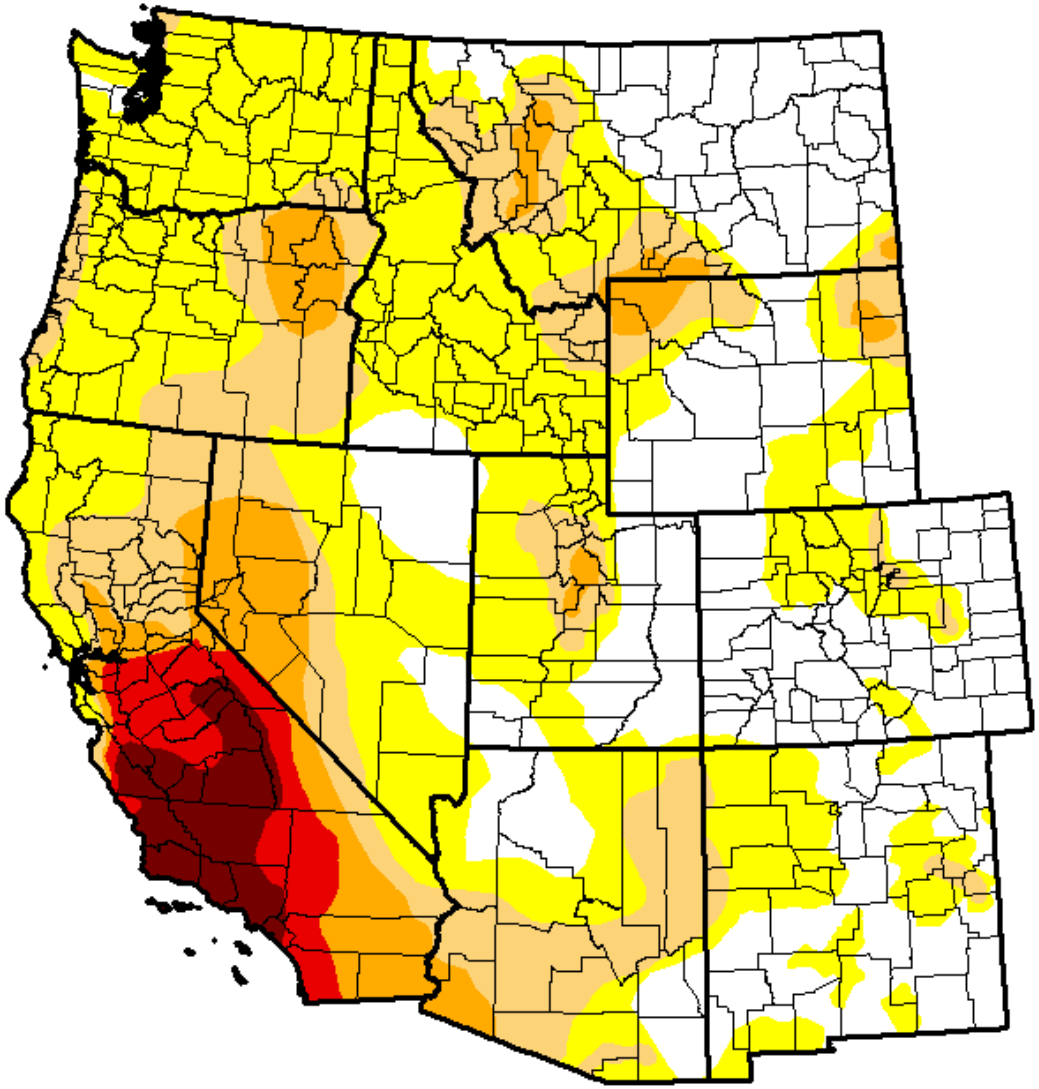
U.S. Drought Monitor

West

October 4, 2016

(Released Thursday, Oct. 6, 2016)

Valid 8 a.m. EDT



Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

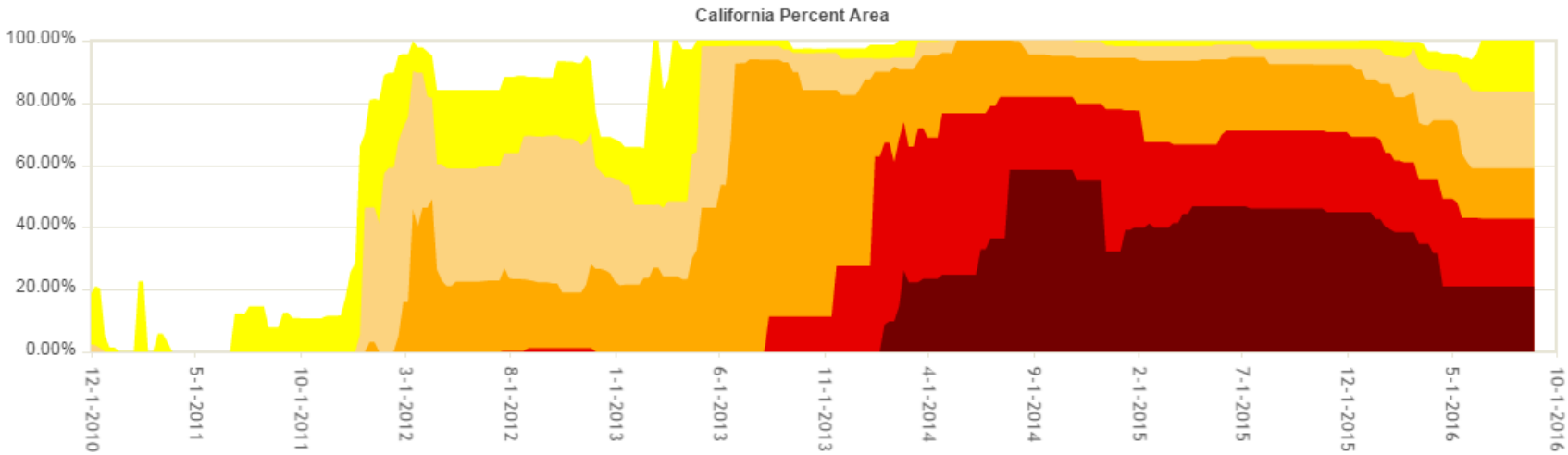
Author:

Brian Fuchs

National Drought Mitigation Center

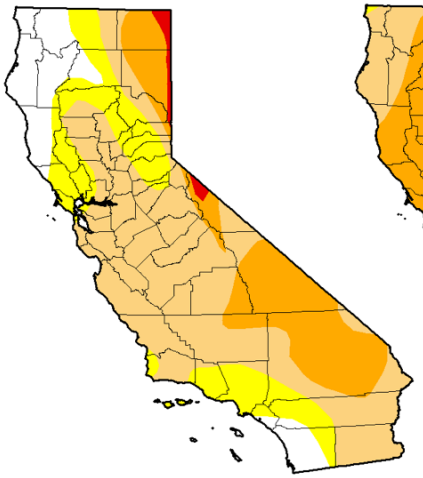
http://droughtmonitor.unl.edu/

U.S. Drought Monitor

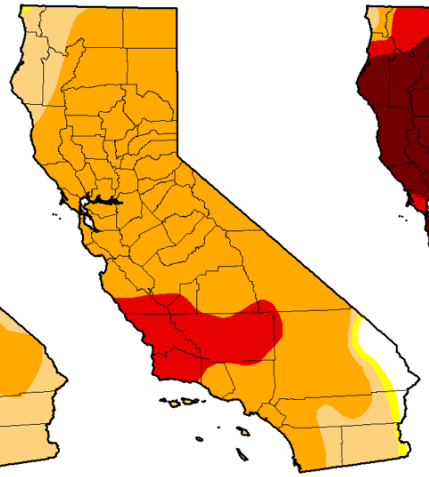


2011 → 2016

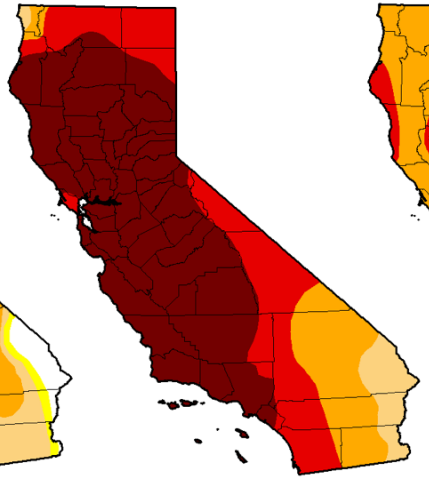
October 2, 2012



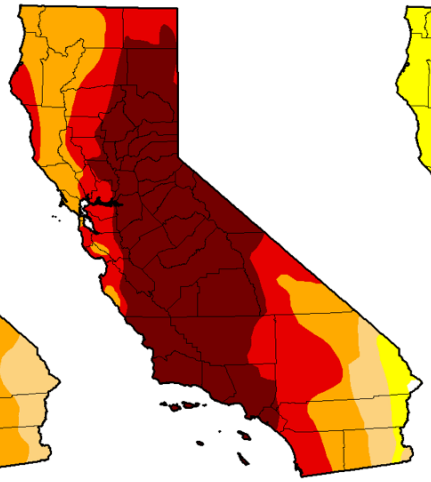
October 1, 2013



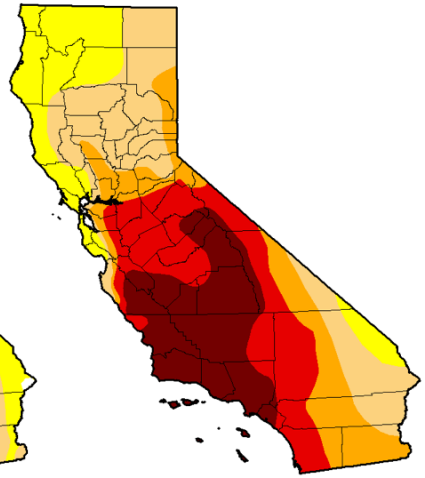
September 30, 2014



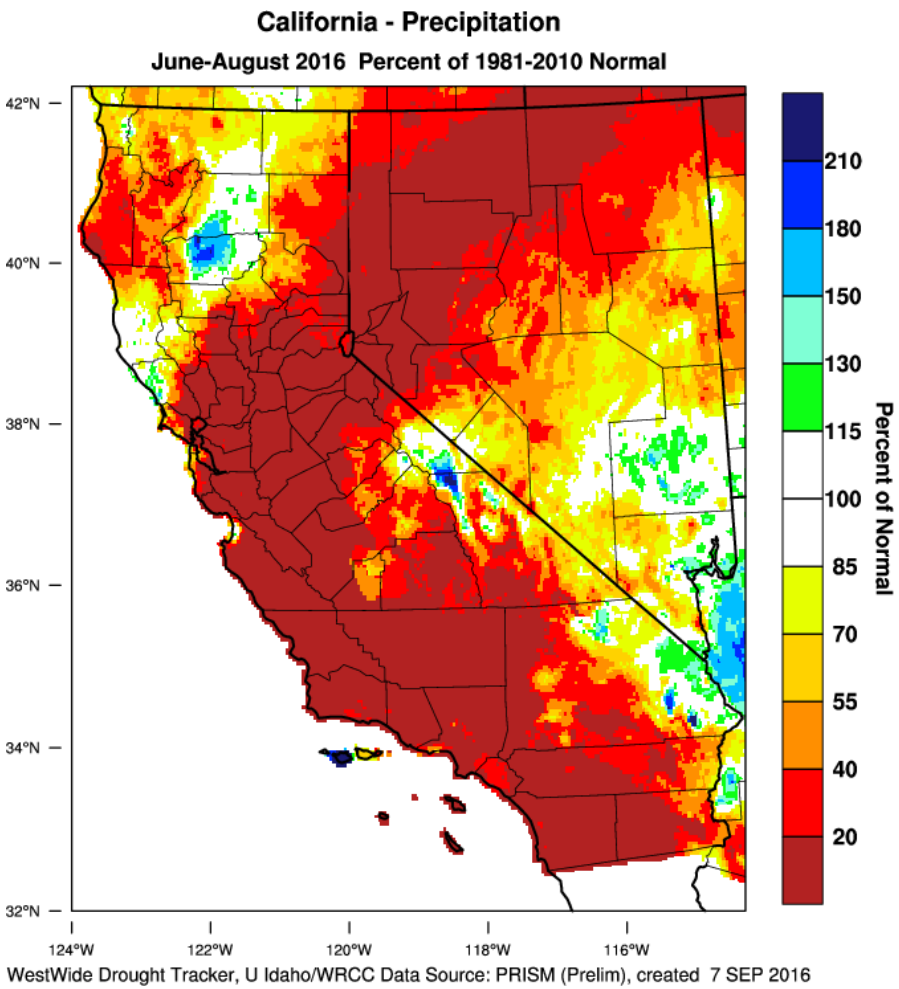
September 29, 2015



August 30, 2016

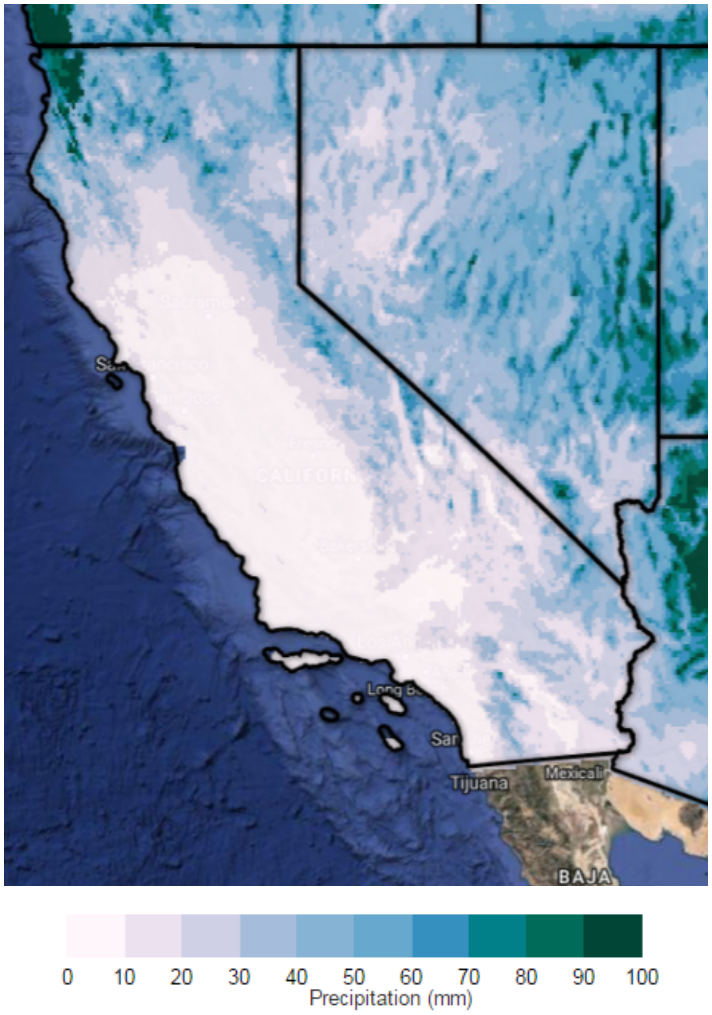


Precipitation



http://www.wrcc.dri.edu/wwdt/

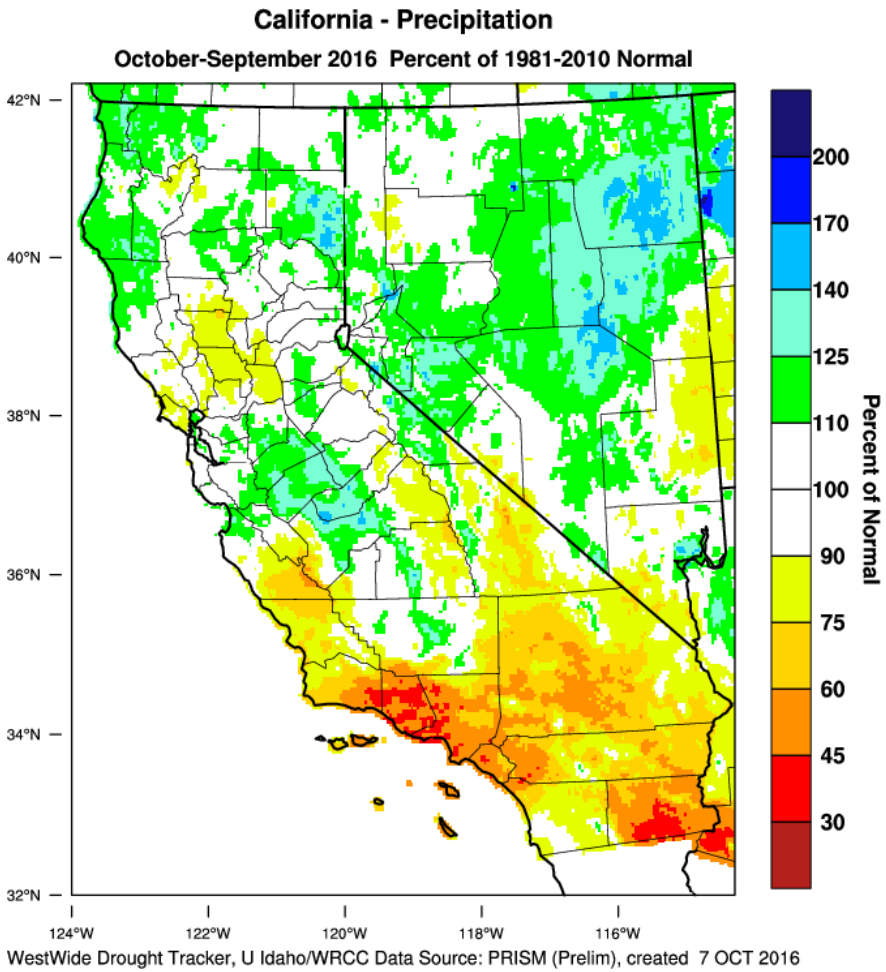
June-August gridMET
Average Precipitation
1981-2010



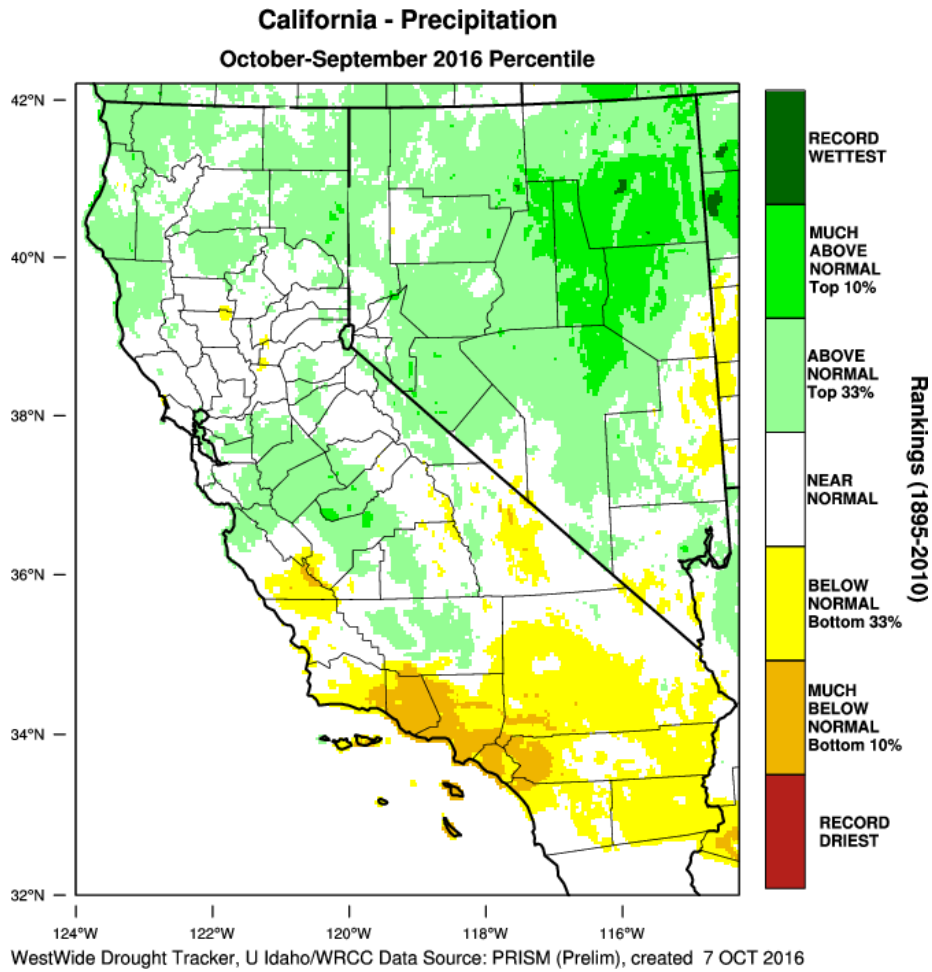
http://clim-engine.appspot.com/

Precipitation

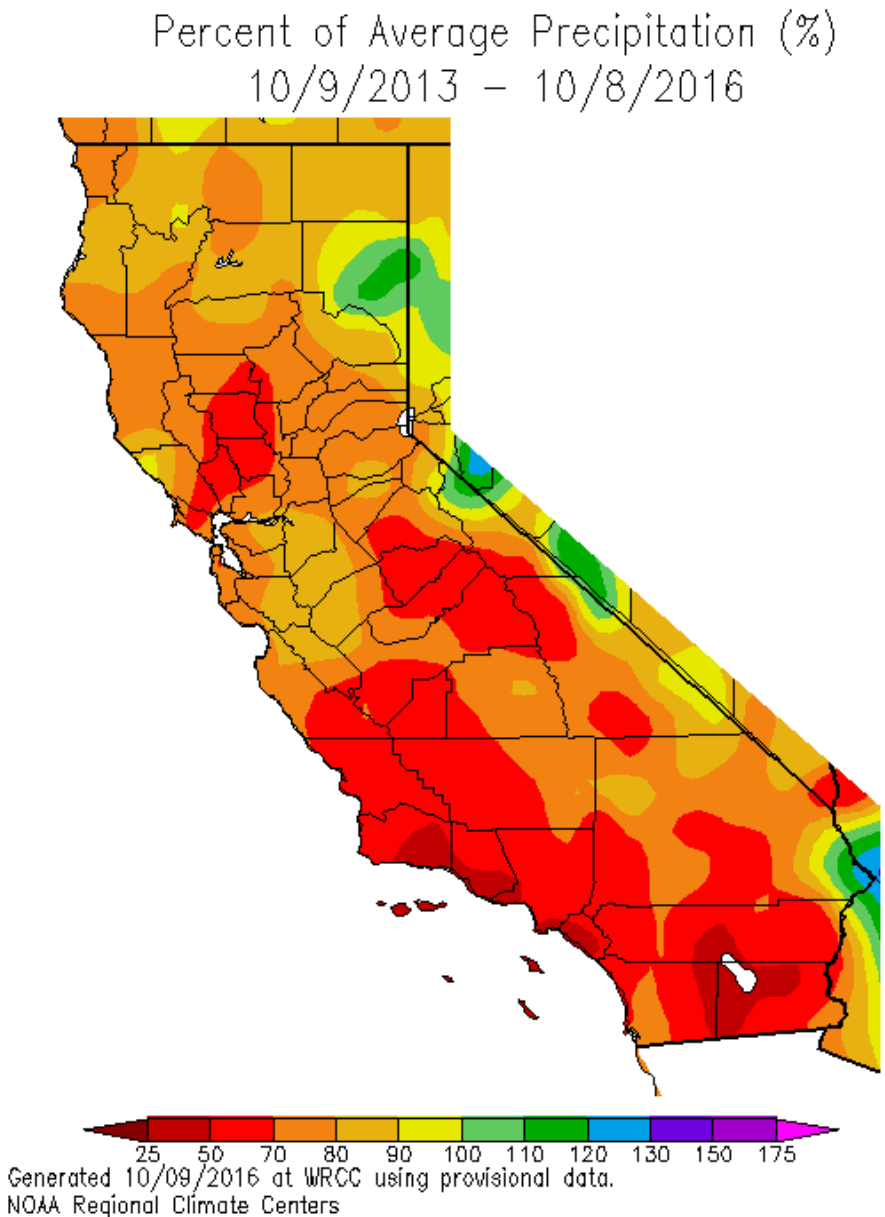
Water Year 2016 precipitation percent of normal (1981-2010)

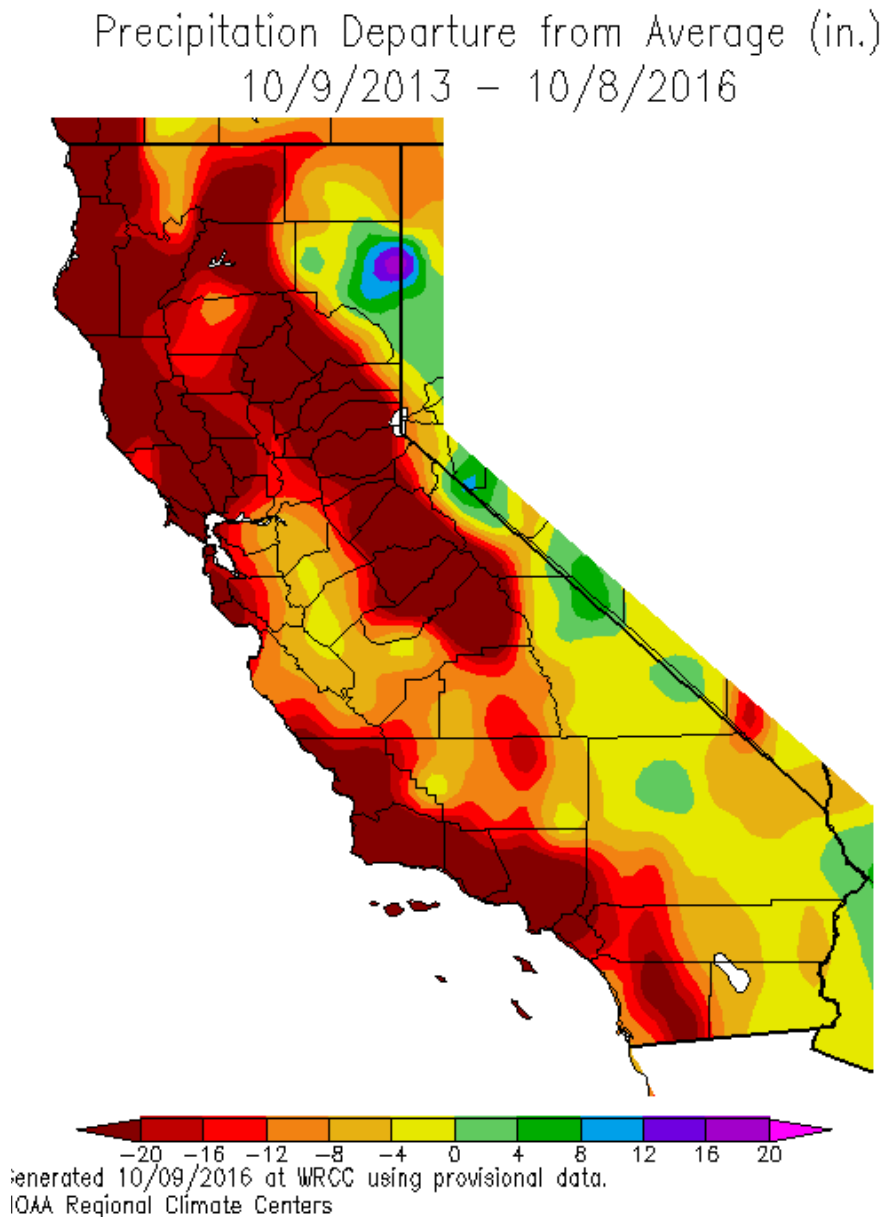


Water Year 2016 precipitation percentile rankings (1895-2010)



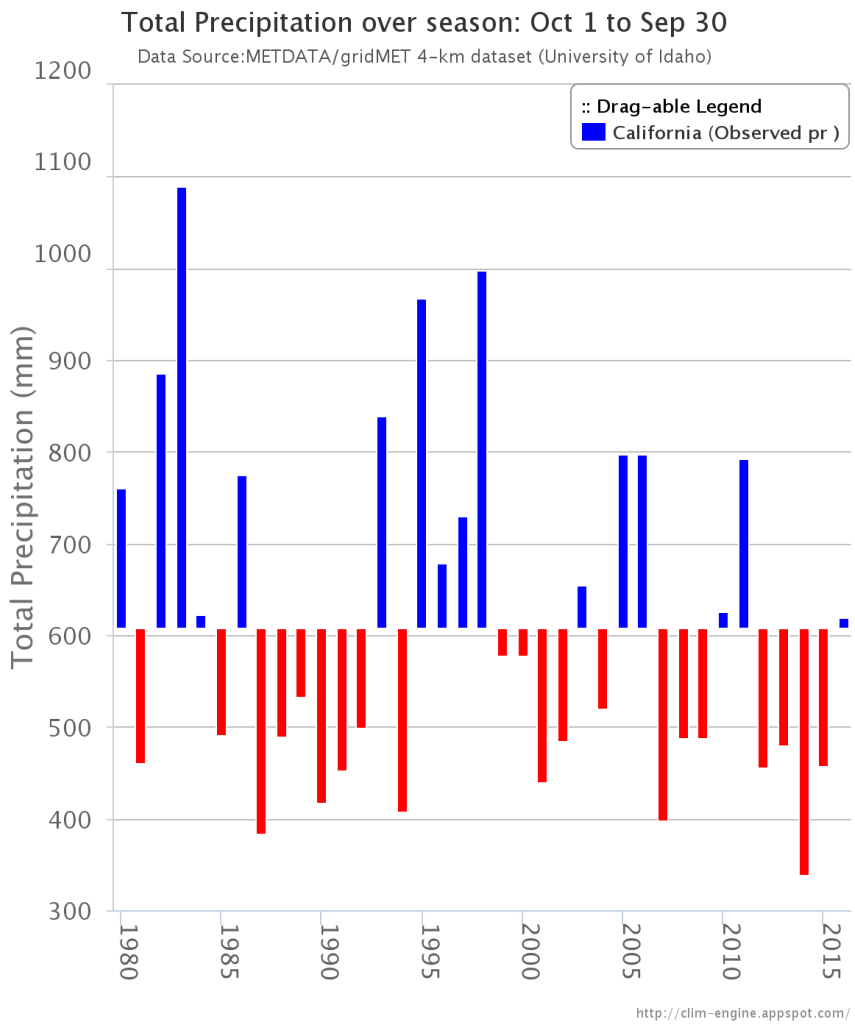
Precipitation



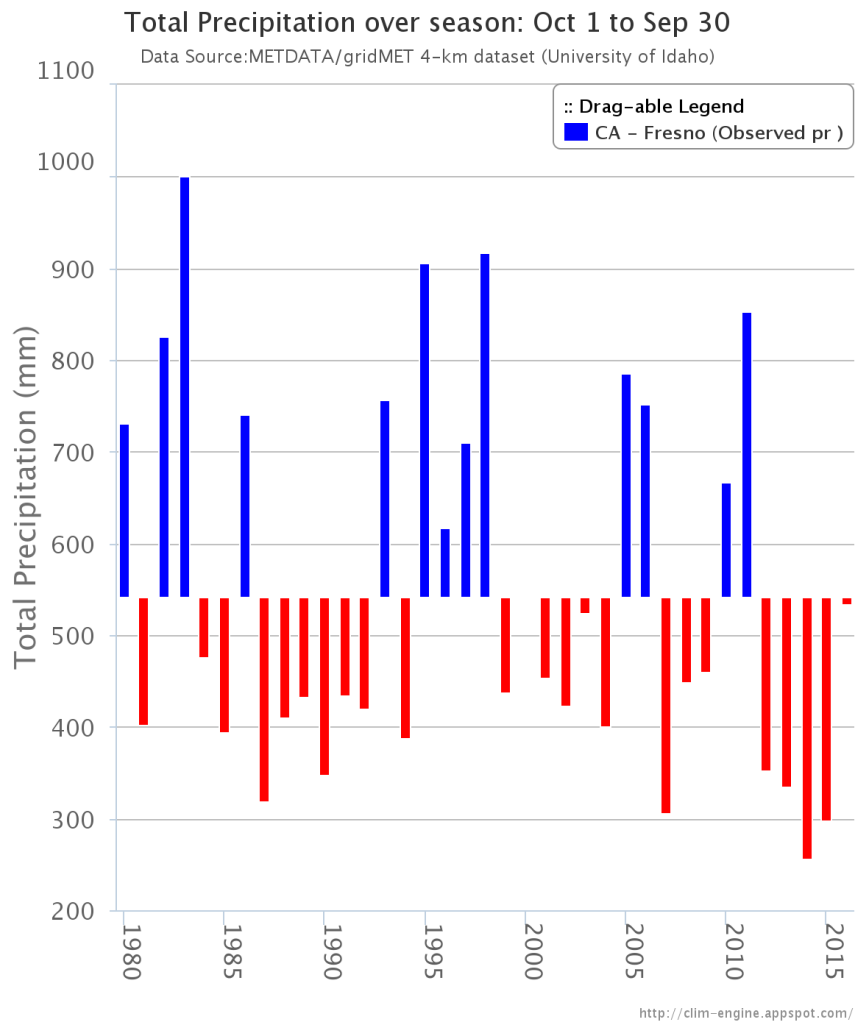


Water Year Precipitation Variability

CA Statewide

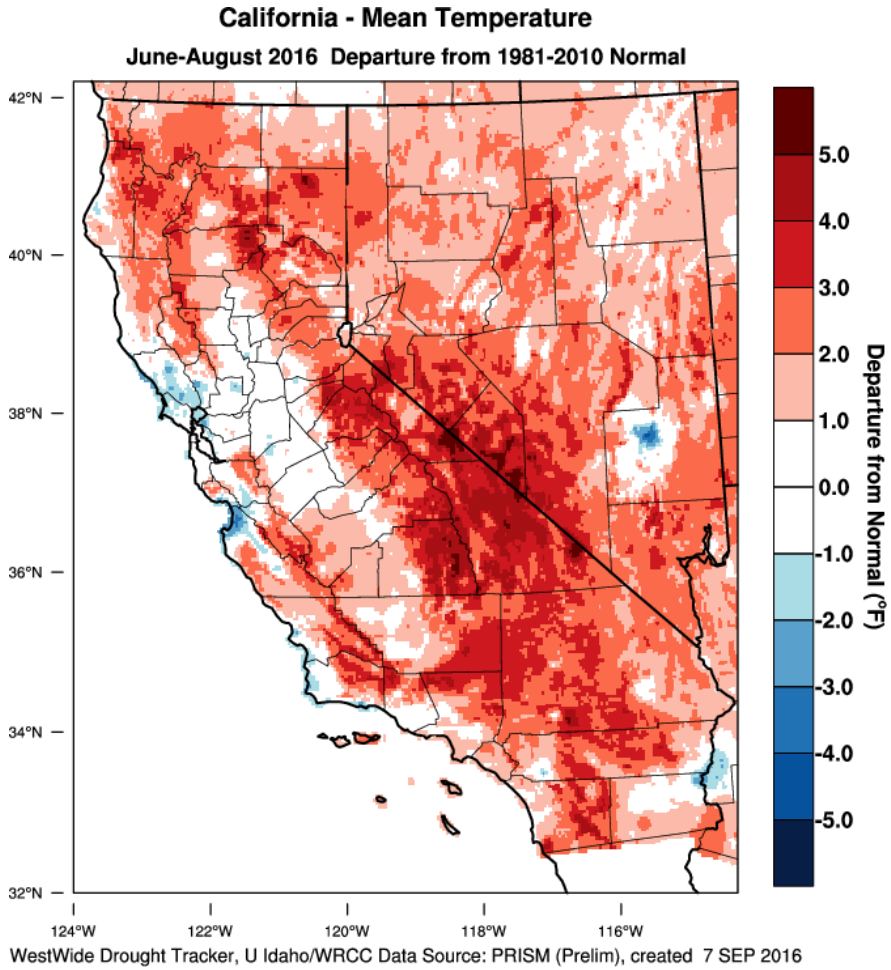


Fresno County

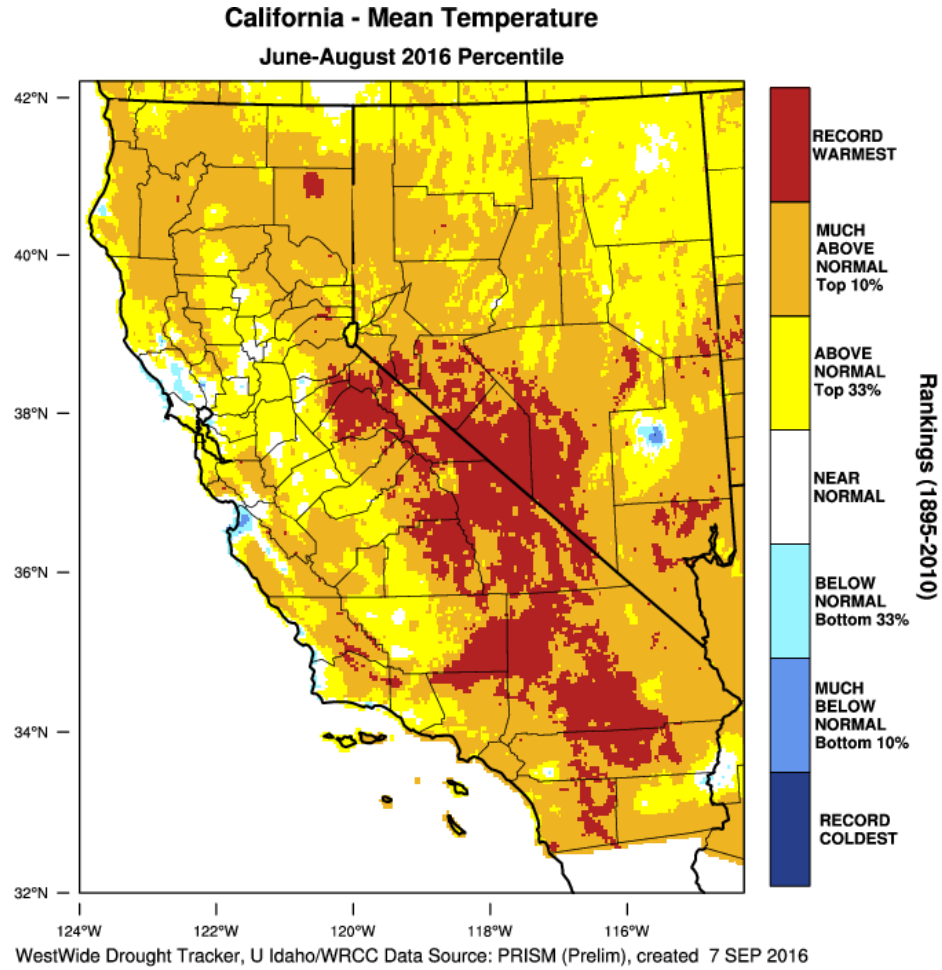


Temperature

Summer 2016 temperature anomalies

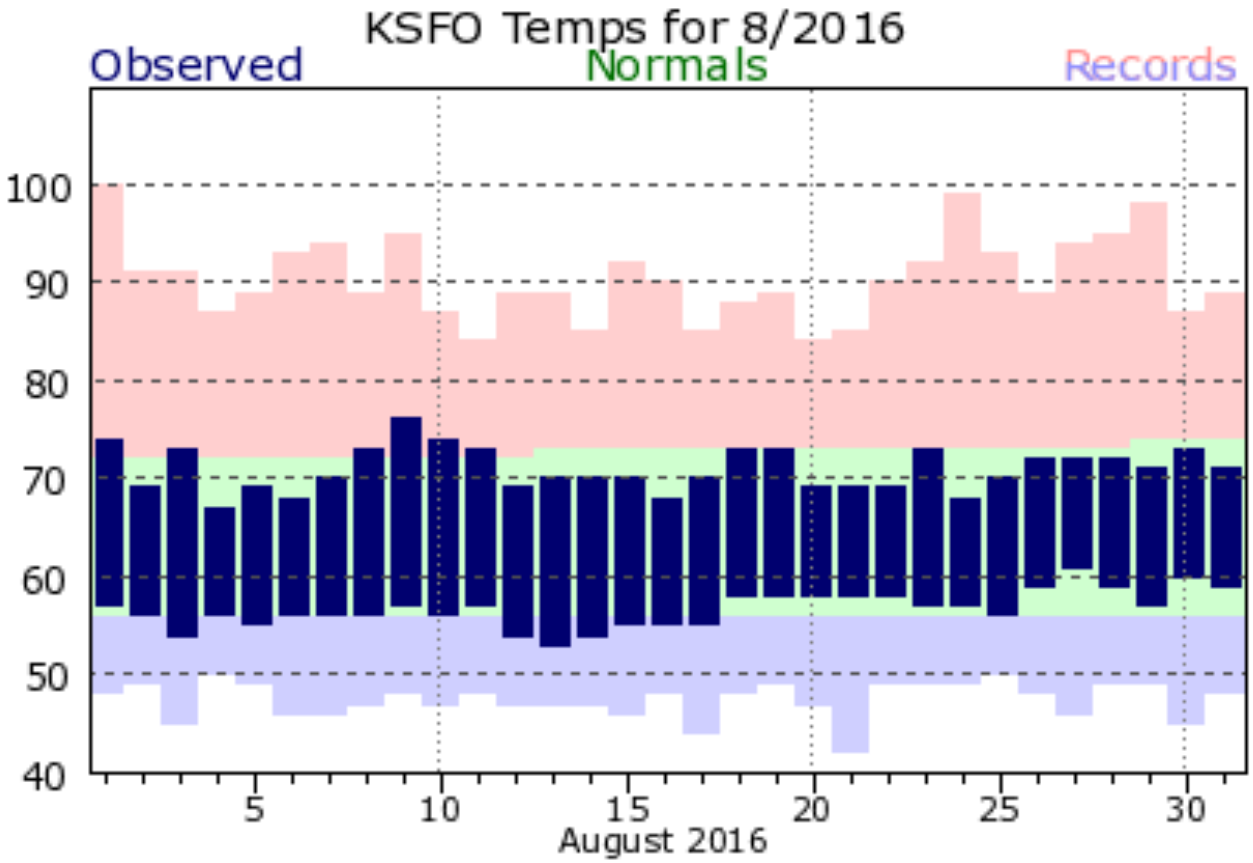


Summer 2016 temperature percentile rankings



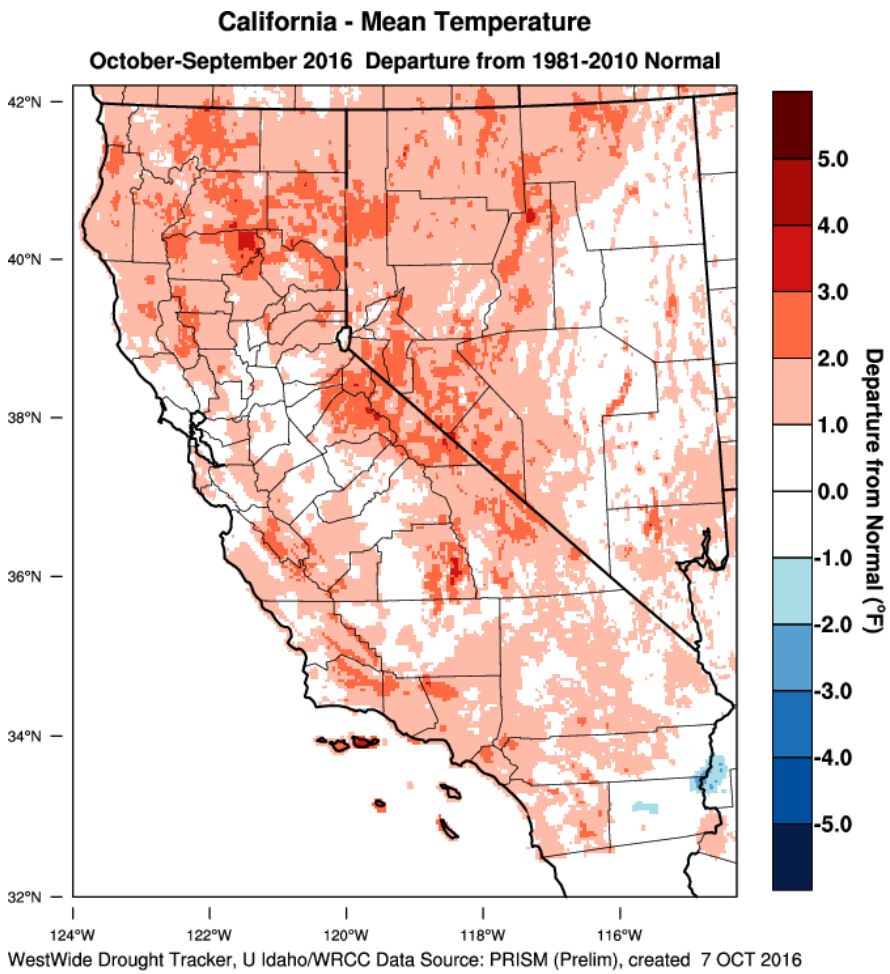
Temperature

August max/min daily temperatures at San Francisco Airport

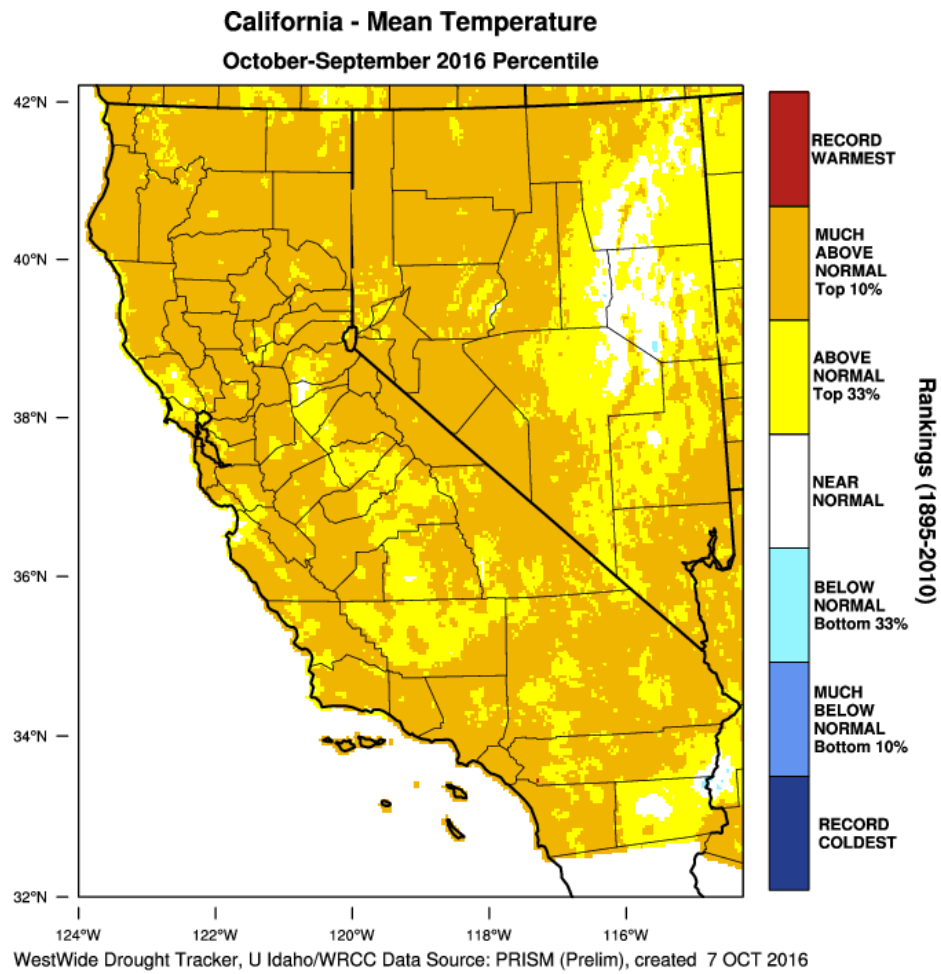


Temperature

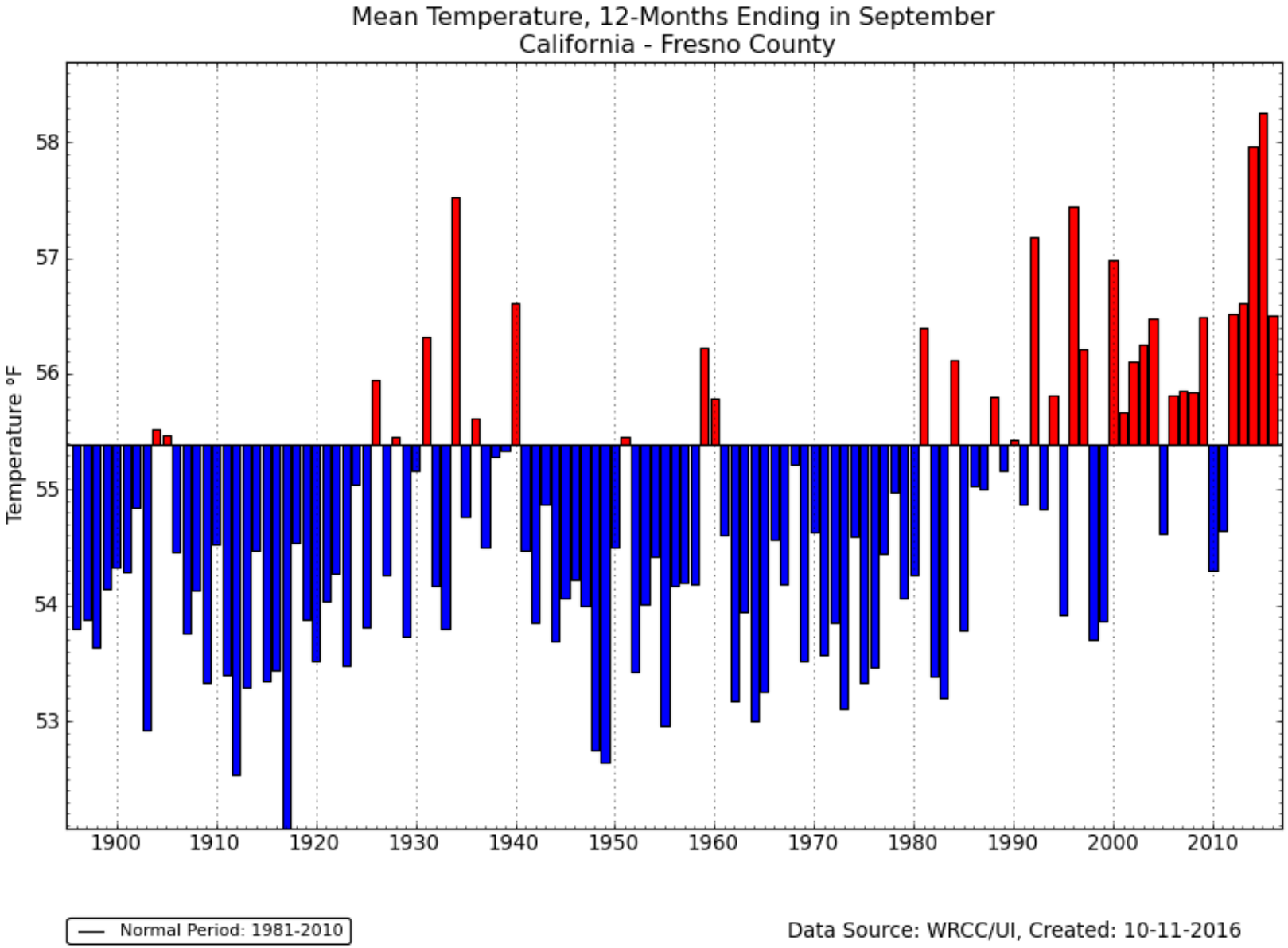
Water year 2016 temperature anomalies



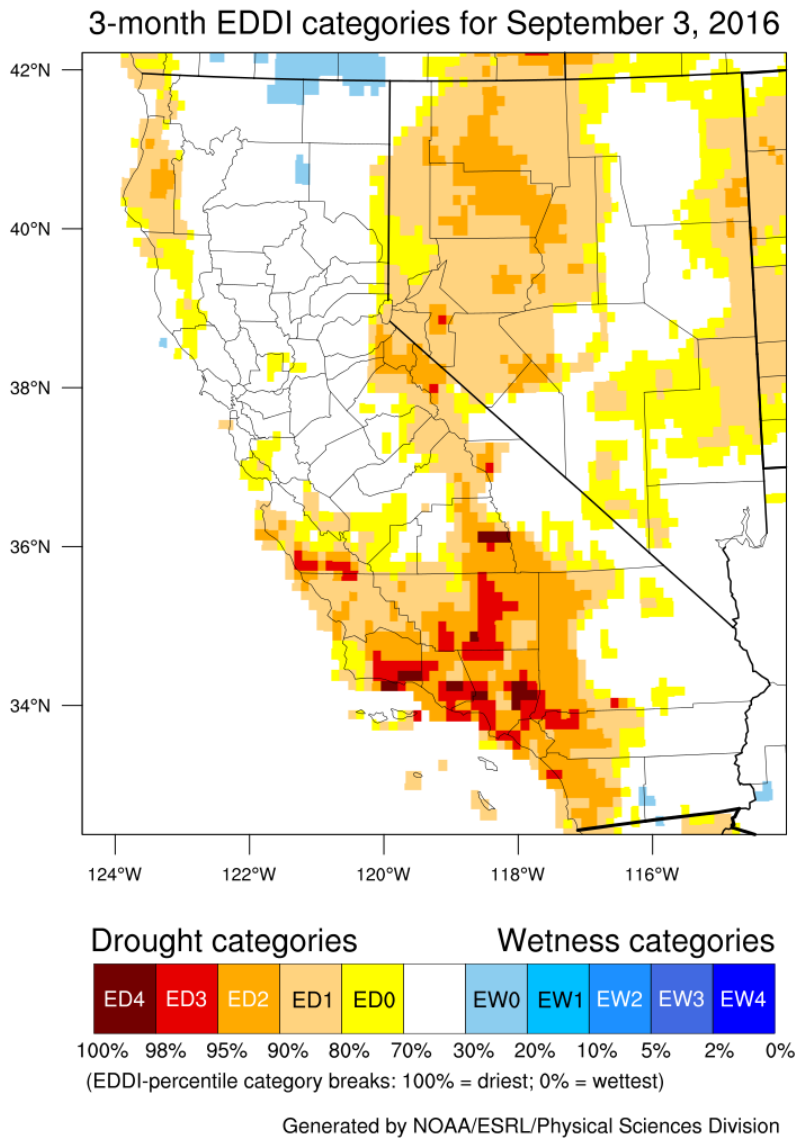
Water year 2016 temperature percentile rankings



Water Year Temperature Variability

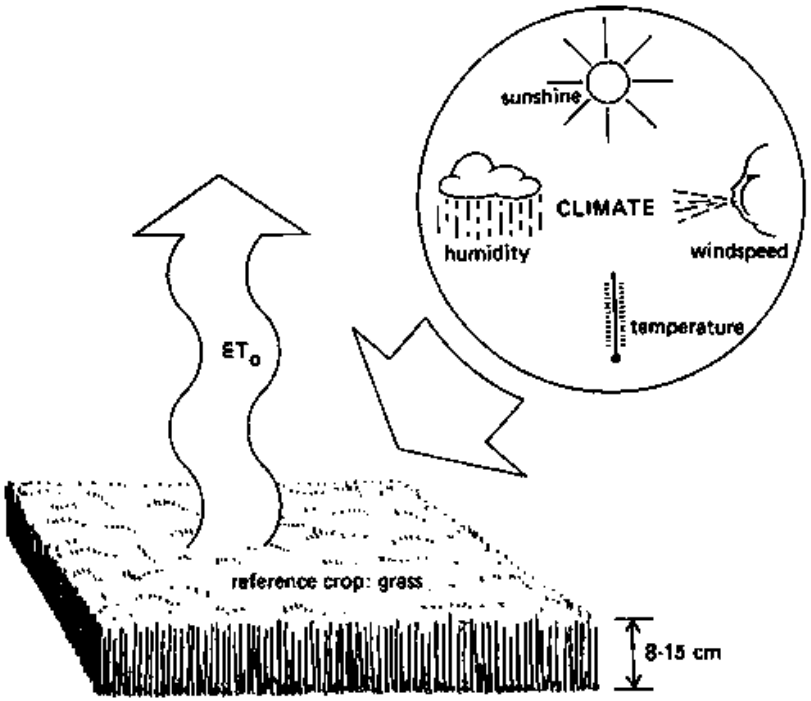


Evaporative Demand (ET_o)



- Evaporative Demand Drought Index (EDDI)
- Penman-Monteith ETo driven by temperature, humidity, wind speed, and solar radiation

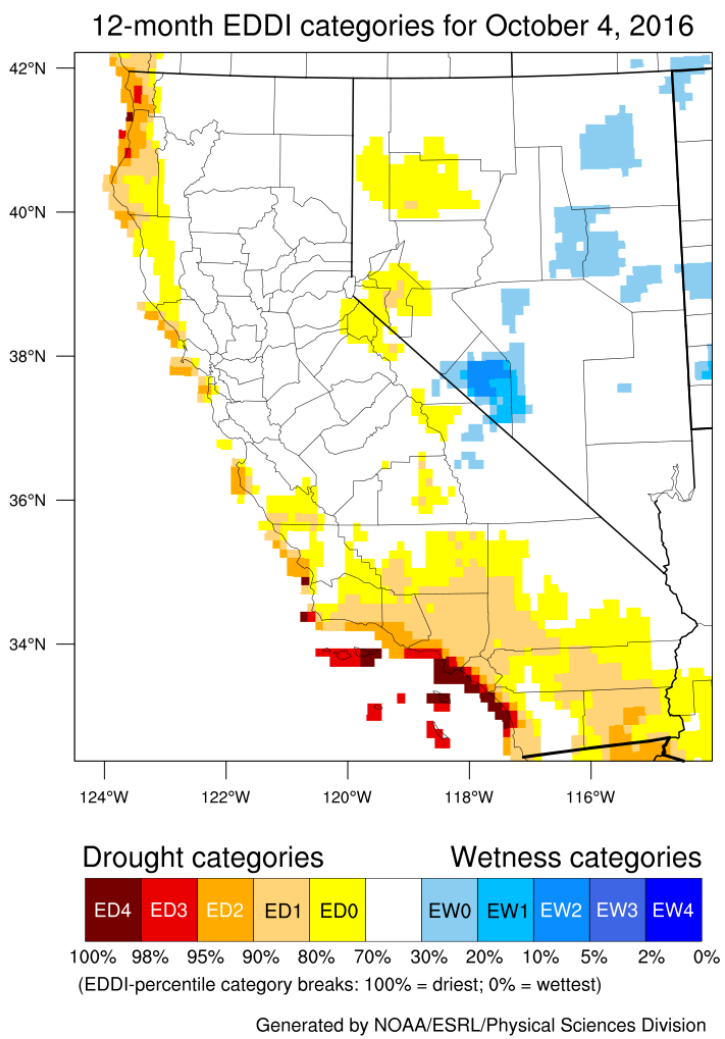
"Atmospheric Thirst"



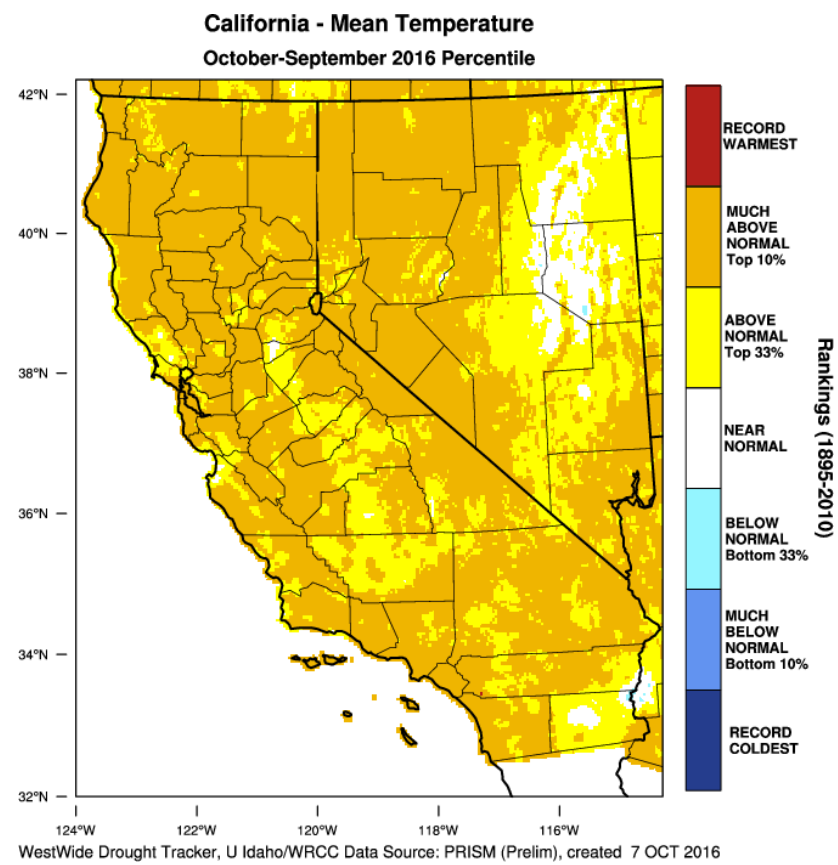
Maps (developed by Mike Hobbins) available at: ftp://ftp.cdc.noaa.gov/pub/Public/mhobbins/EDDI/CN_DEWS/

Evaporative Demand

Water year EDDI

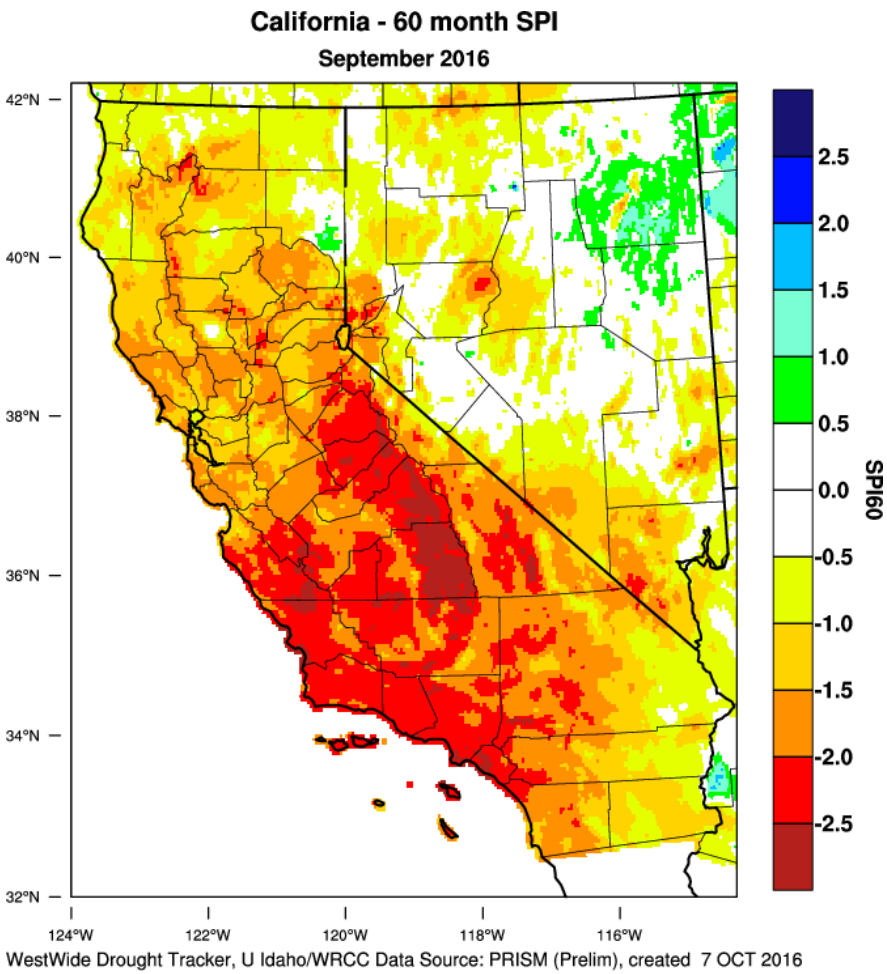


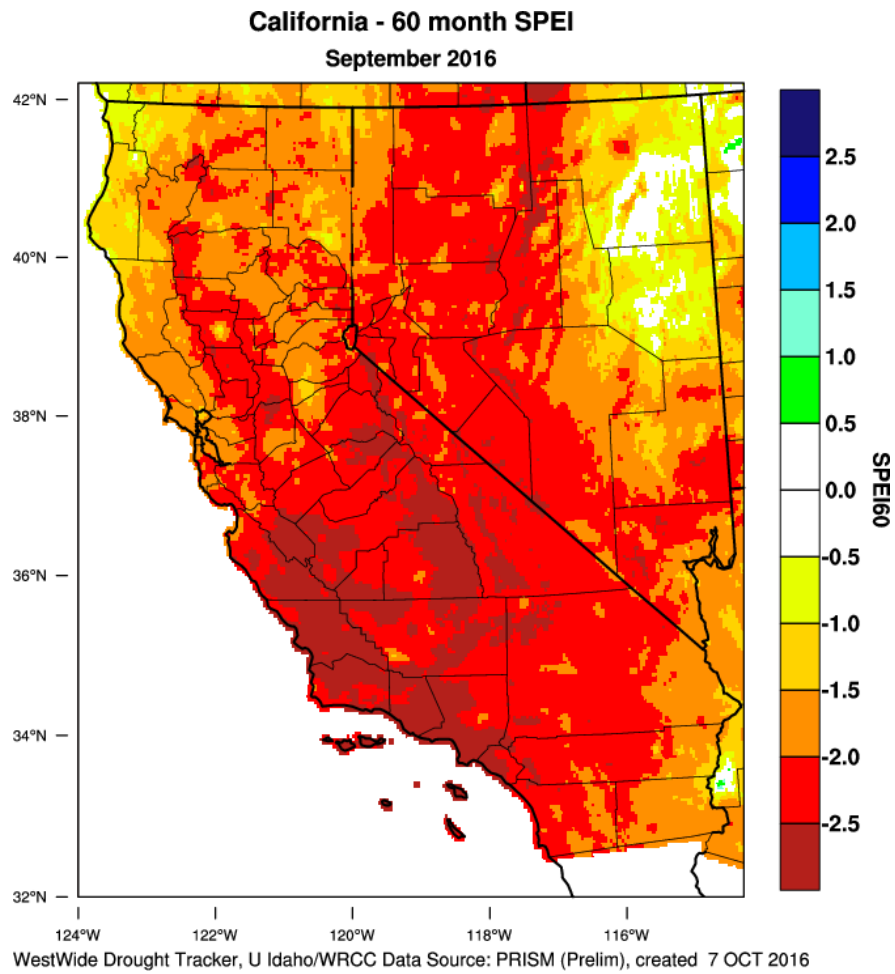
- EDDI spatial patterns often much different than temperature
- Dominant evaporative demand drivers vary depending on region and season



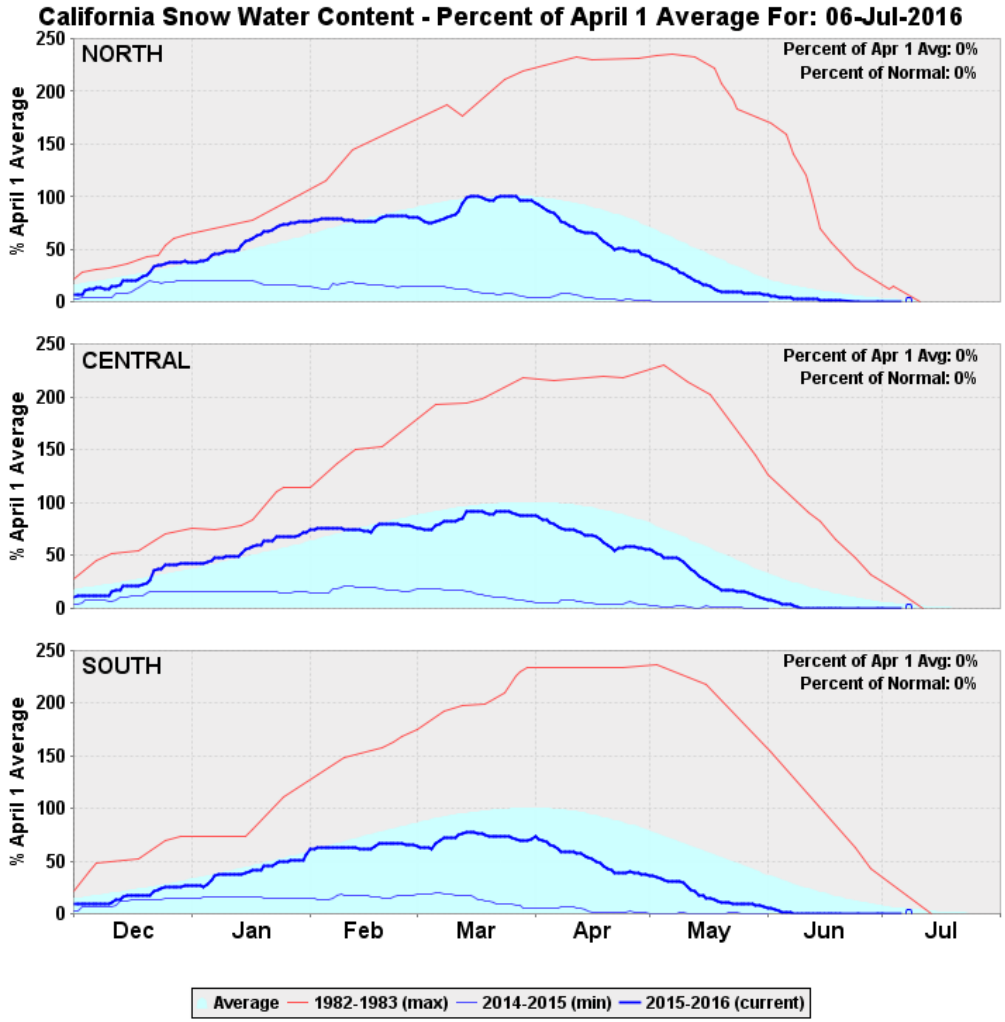
SPI and SPEI

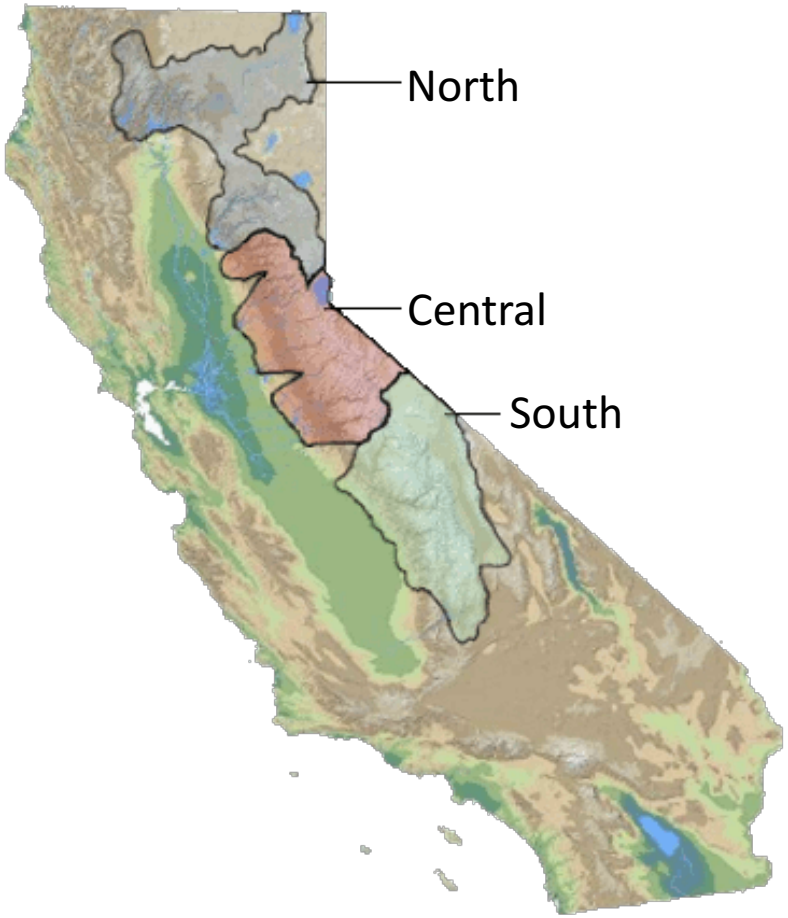
- SPI: Standardized Precipitation Index **(precipitation only)**
- SPEI: Standardized Precipitation Evapotranspiration Index **(precipitation + temperature)**
- 5-year (Oct 2011 – Sep 2016) accumulated deficit/surplus
- Temperature and evaporative demand greatly intensifying drought severity





Snowpack



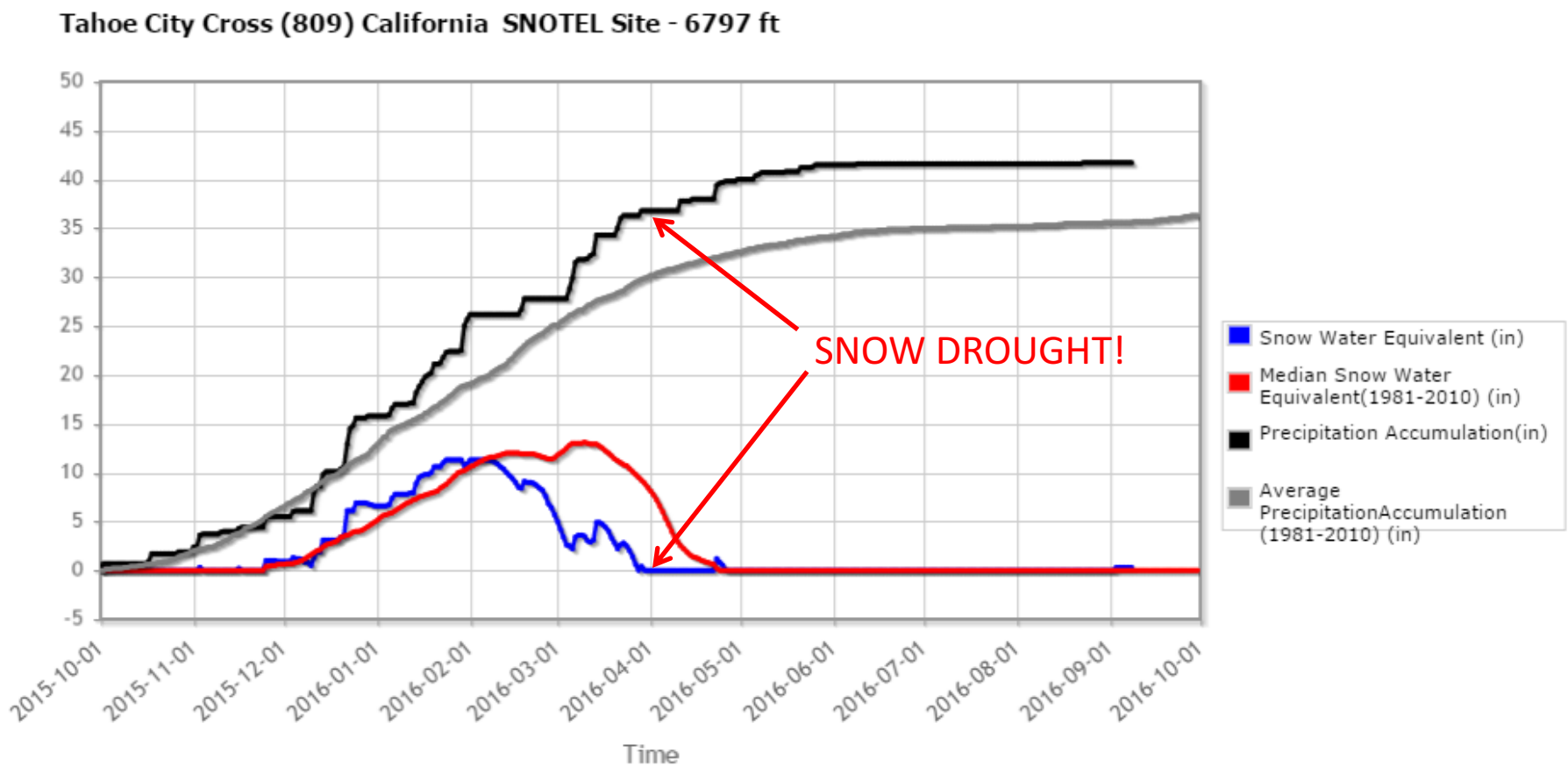


1982-1983 2014-2015 2015-2016

[Data source: CA DWR]

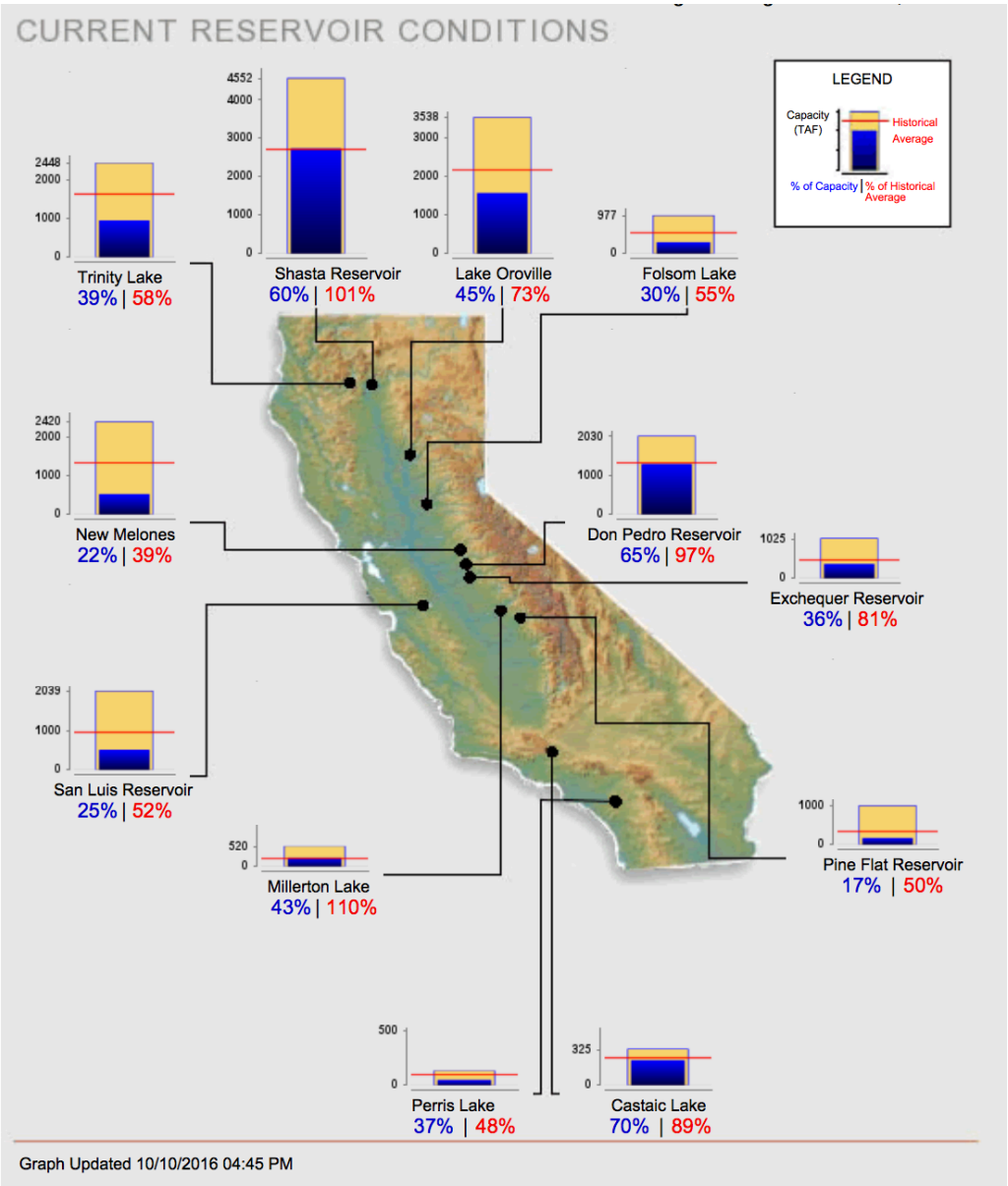
Snowpack

- Tahoe City SNOTEL
- Started off good but major loss of snowpack after January
- Melt out about one month early
- East of Sierra Crest, less intense precipitation, higher snow levels
- March storms did little to boost snowpack



[Data source: NRCS]

Reservoir Conditions

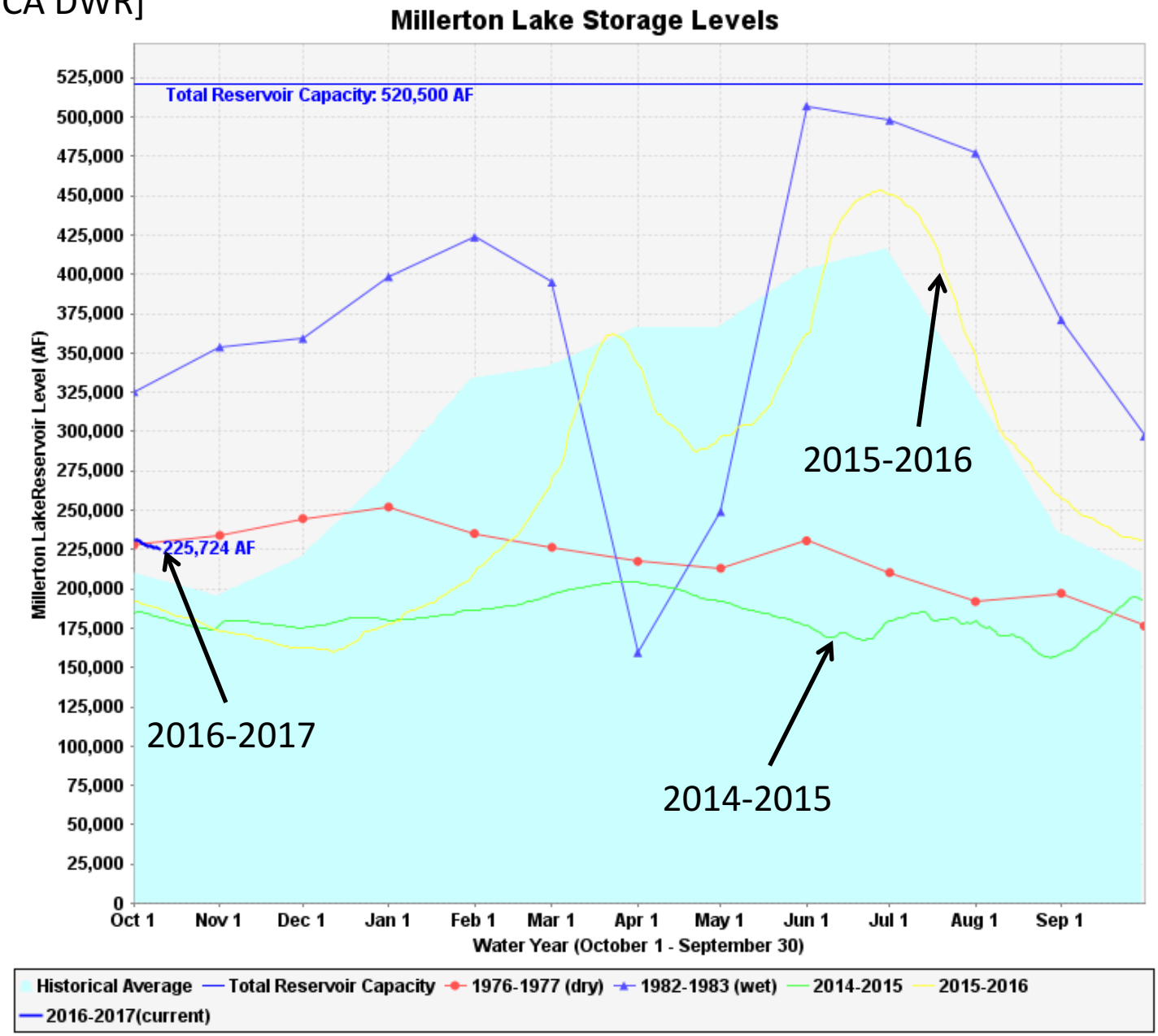


- Highly variable statewide
- Reservoir operations can have big impact on levels
- Millerton and Shasta only two above historical average
- Red line = historical average
- "Bucket" indicates reservoir capacity

[Data source: CA DWR]

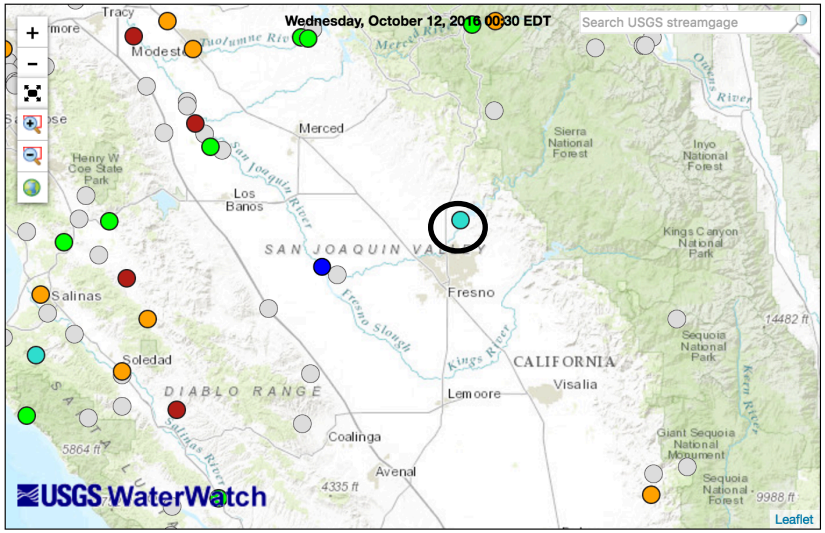
Reservoir Conditions

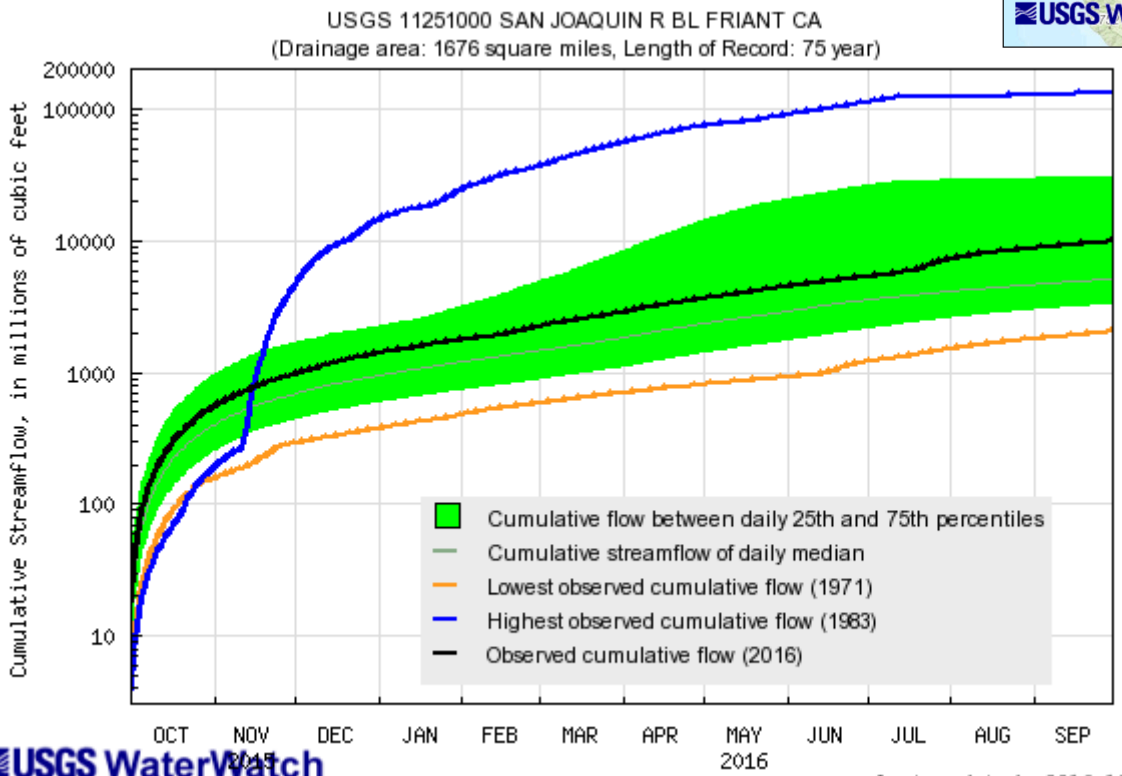
[Data source: CA DWR]



Streamflow

- San Joaquin River Below Friant
- Daily cumulative water year streamflow





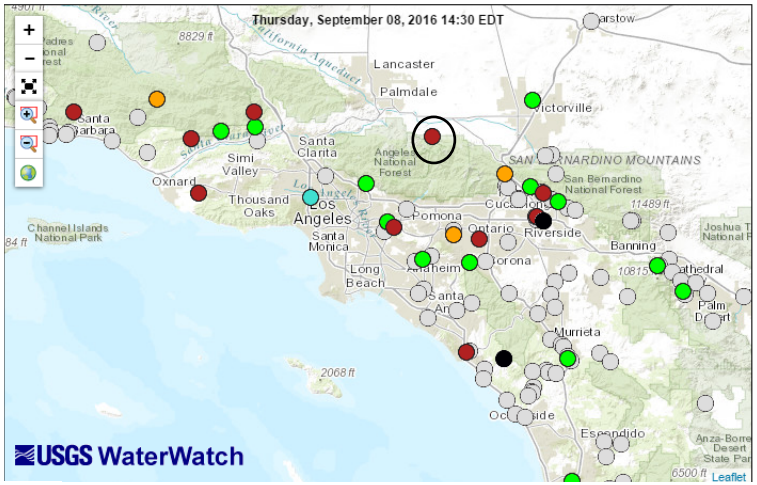
Current: 2016

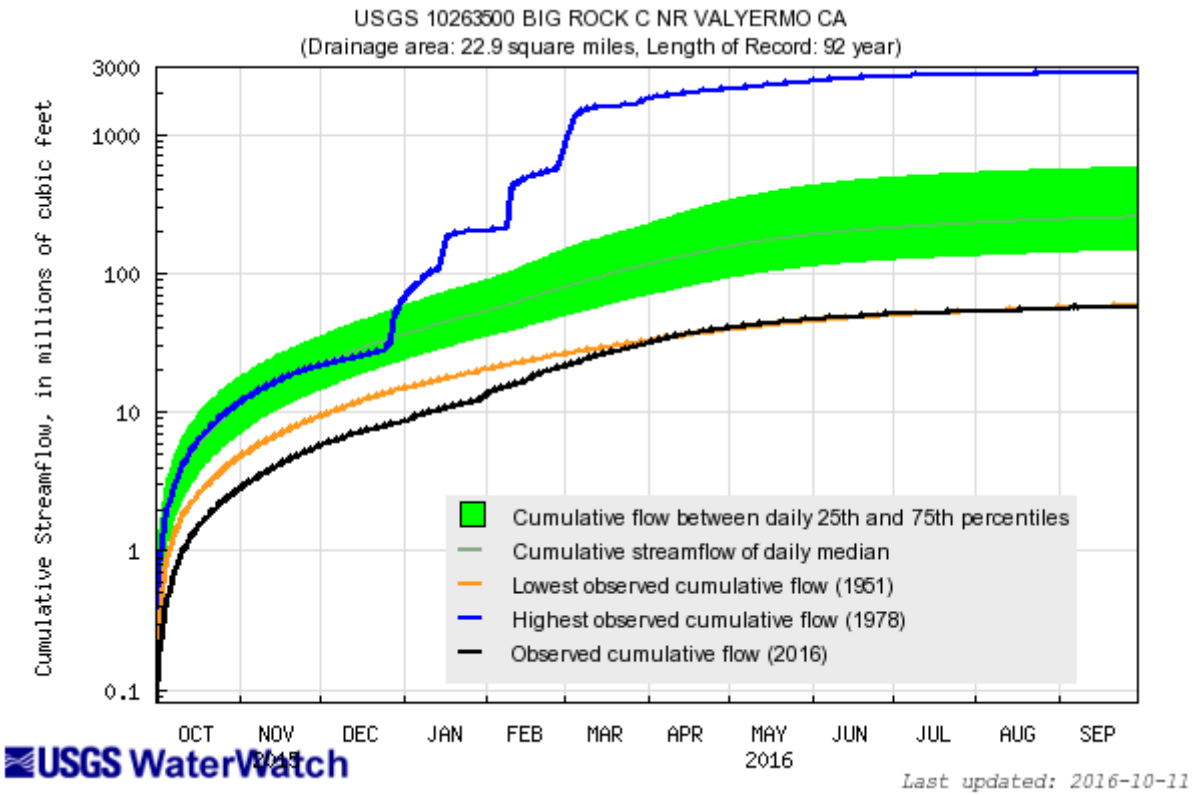
Maximum: 1983

Minimum: 1971

Streamflow

- Big Rock Creek near Valymero
- Daily cumulative water year streamflow



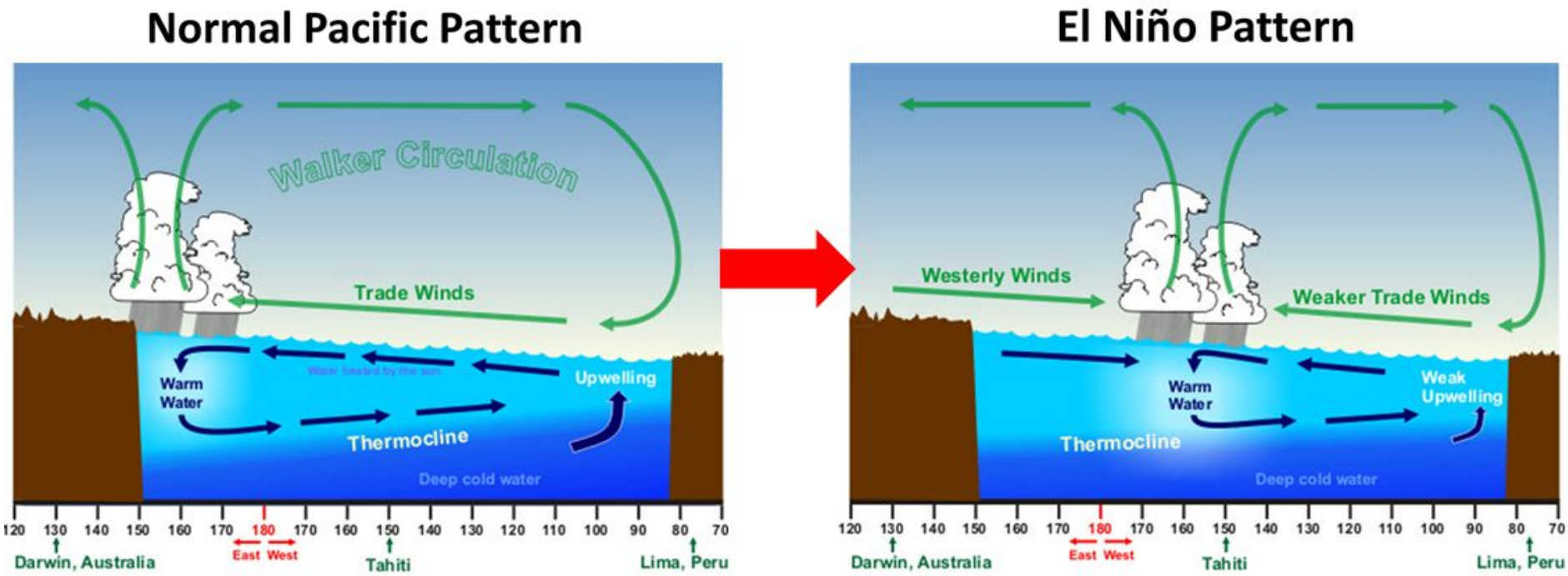


Current: 2016

Maximum: 1978

Minimum: 1951

El Niño Southern Oscillation (ENSO)



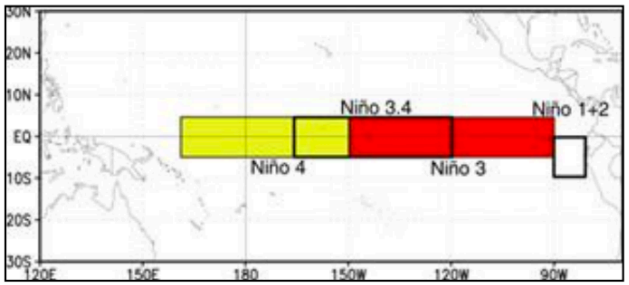
Source: NWS Los Angles/Oxnard

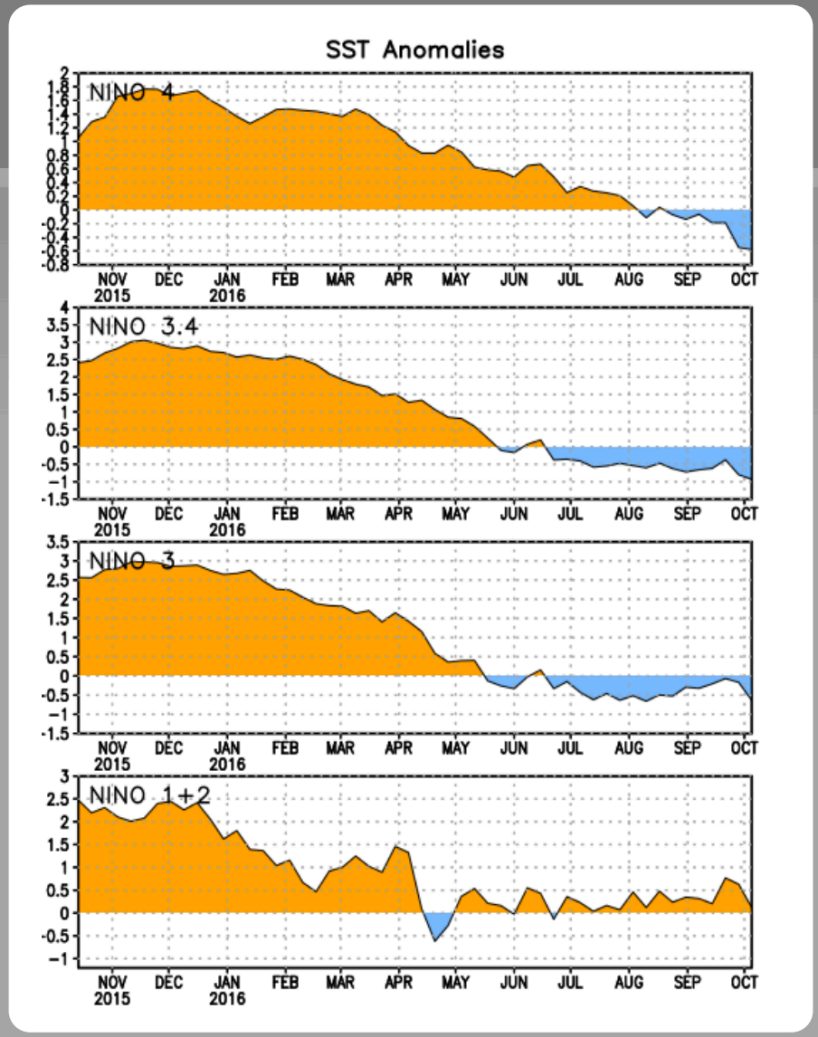
El Niño Southern Oscillation (ENSO)

Niño Region SST Departures (ºC) Recent Evolution

The latest weekly SST departures are:

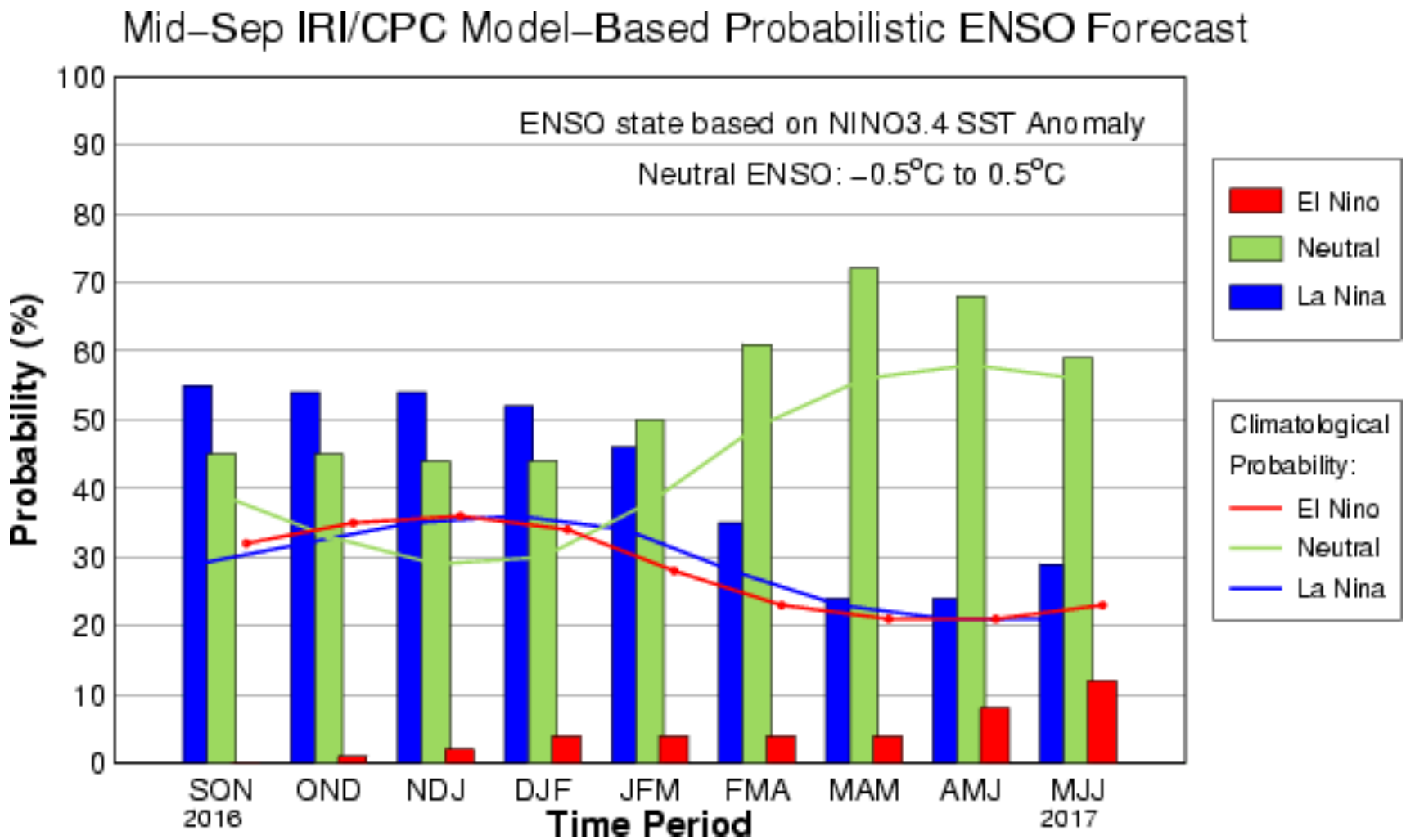
Niño 4	-0.6ºC
Niño 3.4	-0.9ºC
Niño 3	-0.6ºC
Niño 1+2	0.1ºC



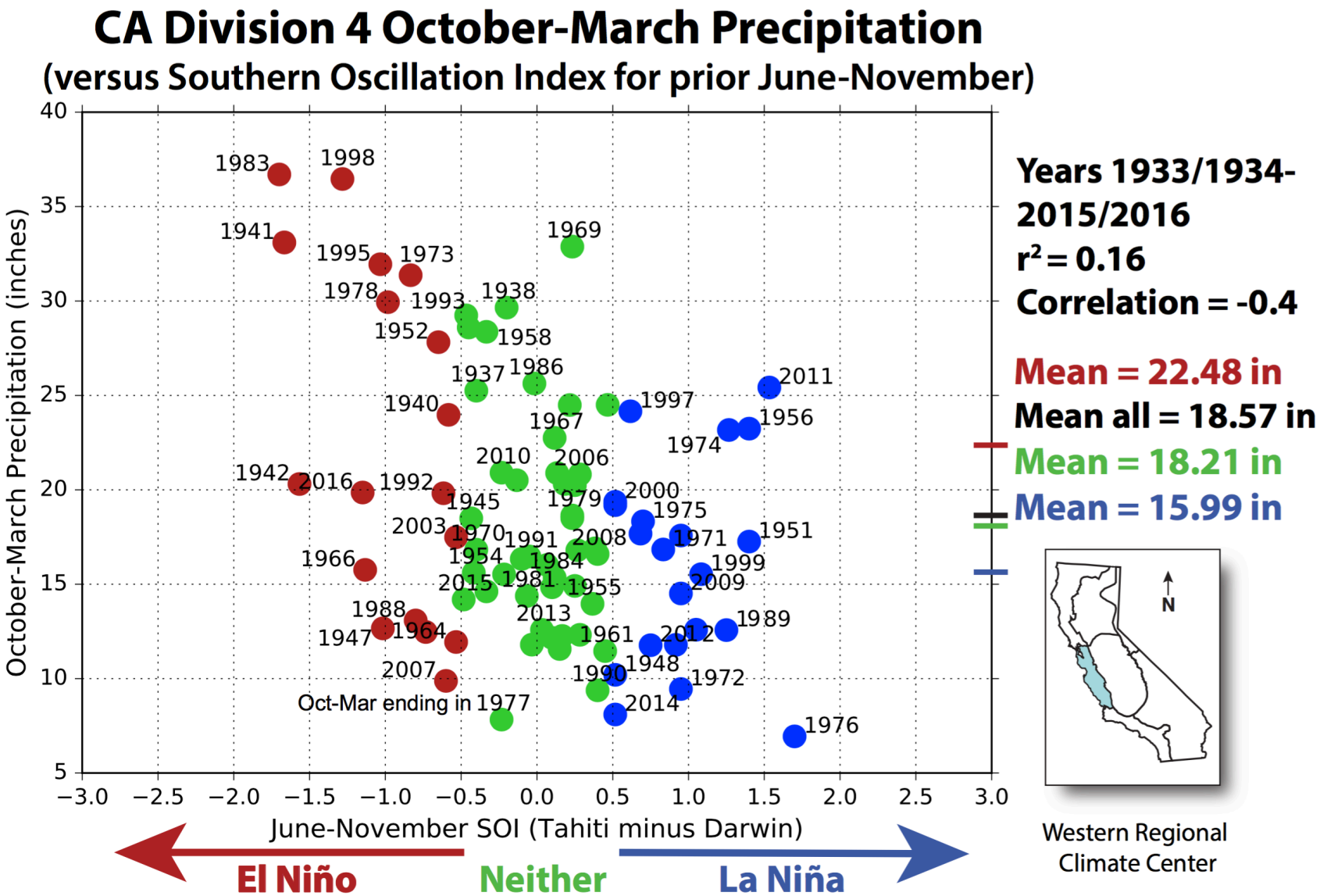


[Data source: CPC]

El Niño Southern Oscillation (ENSO)



ENSO-precipitation relationships



Thank you!

Questions?

daniel.mcevoy@dri.edu