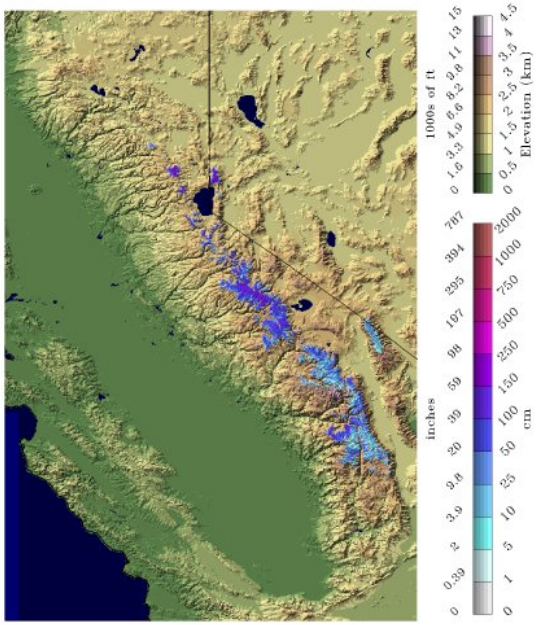
California Climate and Drought Update

Snow Depth
April 1, 2015



Snow Depth
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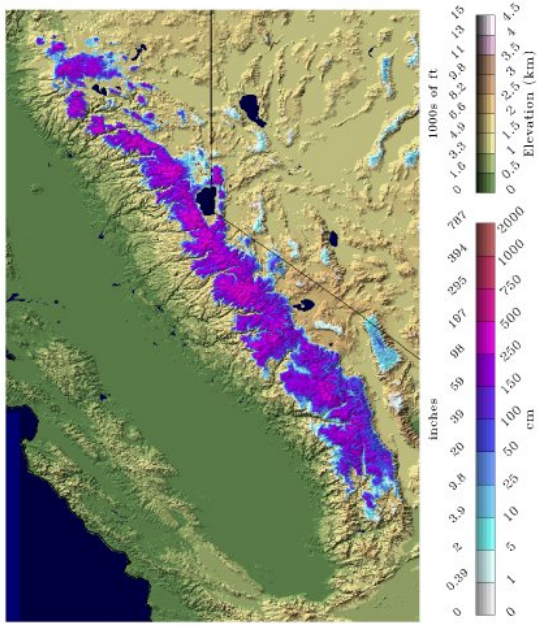


Dan McEvoy

Postdoctoral Fellow, Applied Climatology

Western Regional Climate Center

Desert Research Institute

Southern California Drought and Climate Outlook

September 15, 2016

Riverside Convention Center

Riverside, CA

Desert Research Institute

Western Regional Climate Center
Providing climate services since 1986

CNAP
California-Nevada Climate Applications Program
A NOAA RISA team

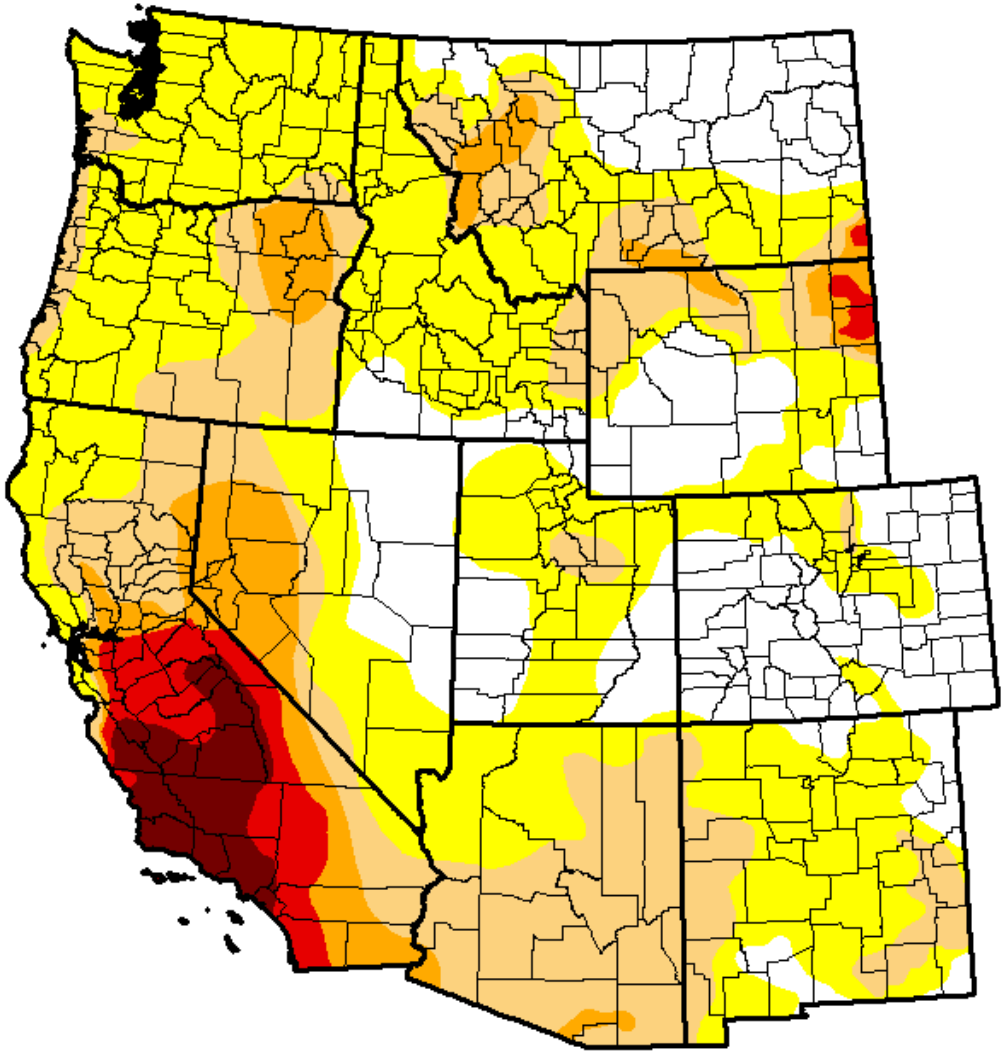
NIDIS
NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM

U.S. Drought Monitor
West

August 30, 2016

(Released Thursday, Sep. 1, 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.

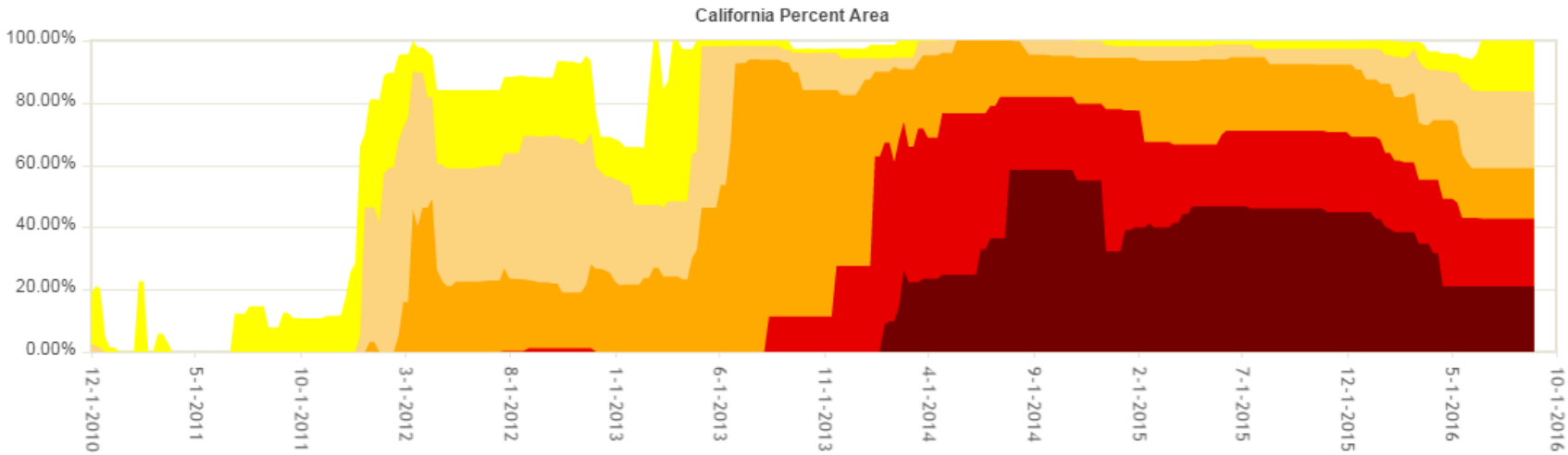
Author:

Chris Fenimore

NCEI/NESDIS/NOAA

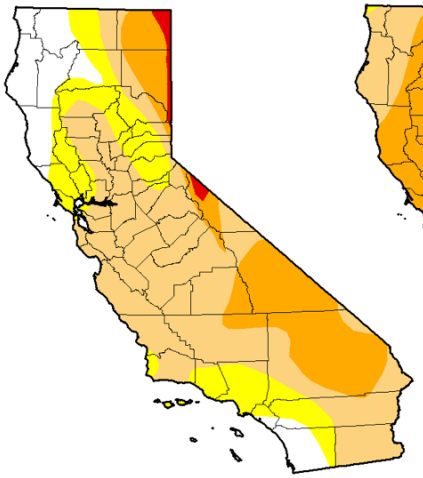
http://droughtmonitor.unl.edu/

U.S. Drought Monitor

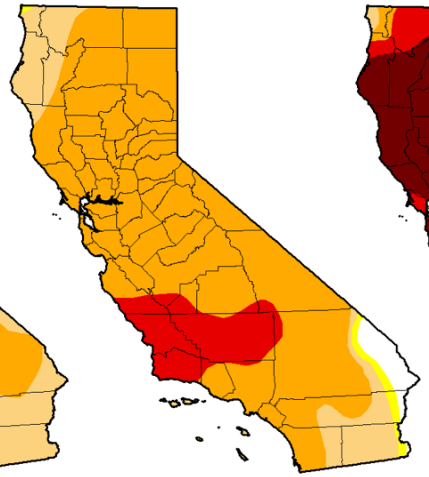


2011 → 2016

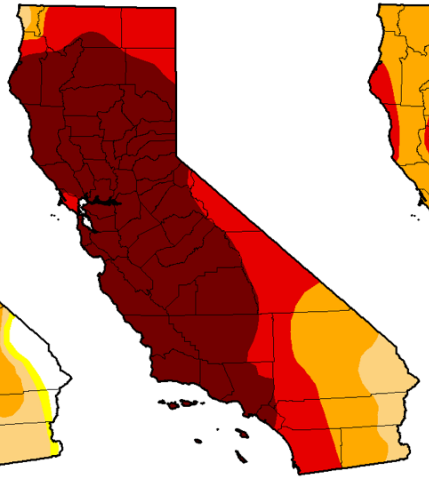
October 2, 2012



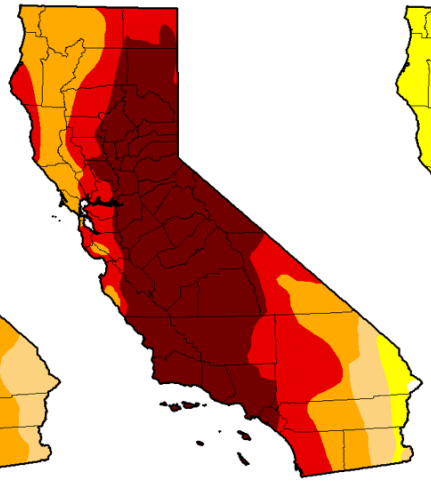
October 1, 2013



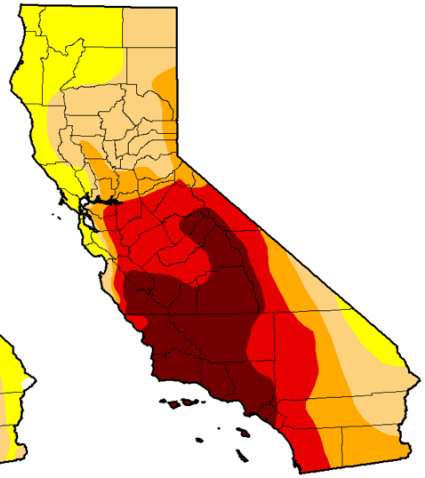
September 30, 2014



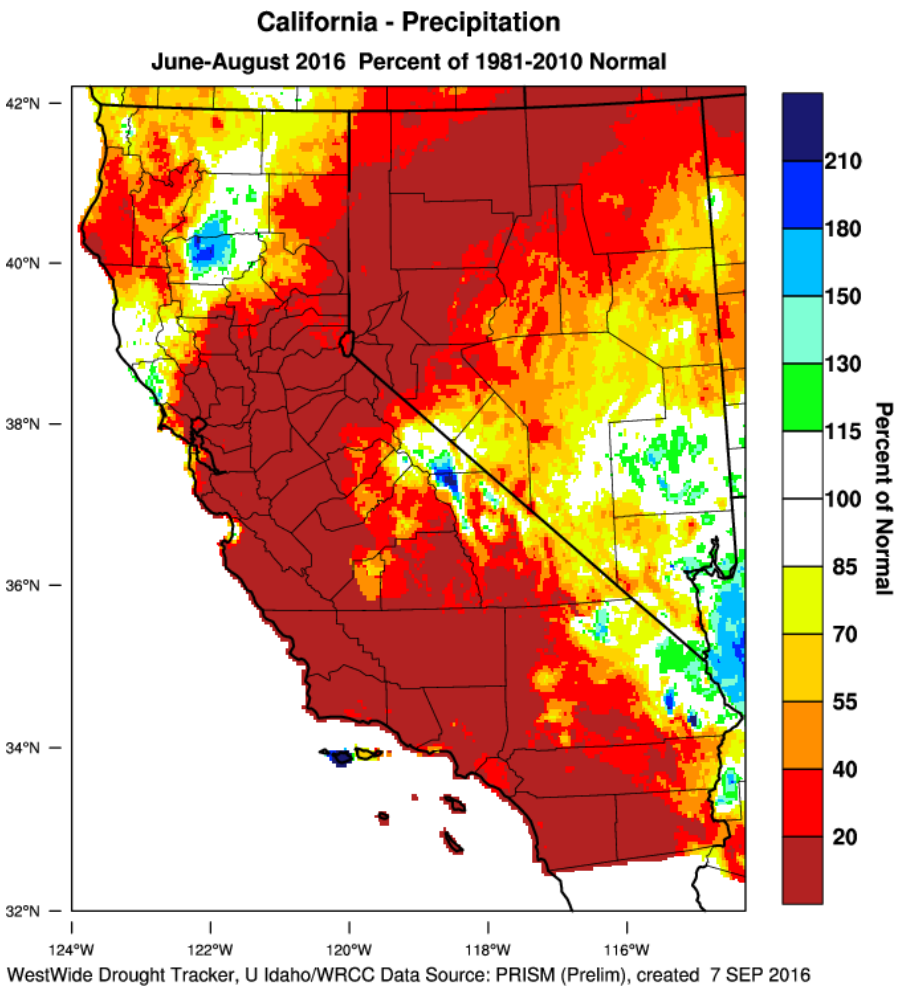
September 29, 2015



August 30, 2016

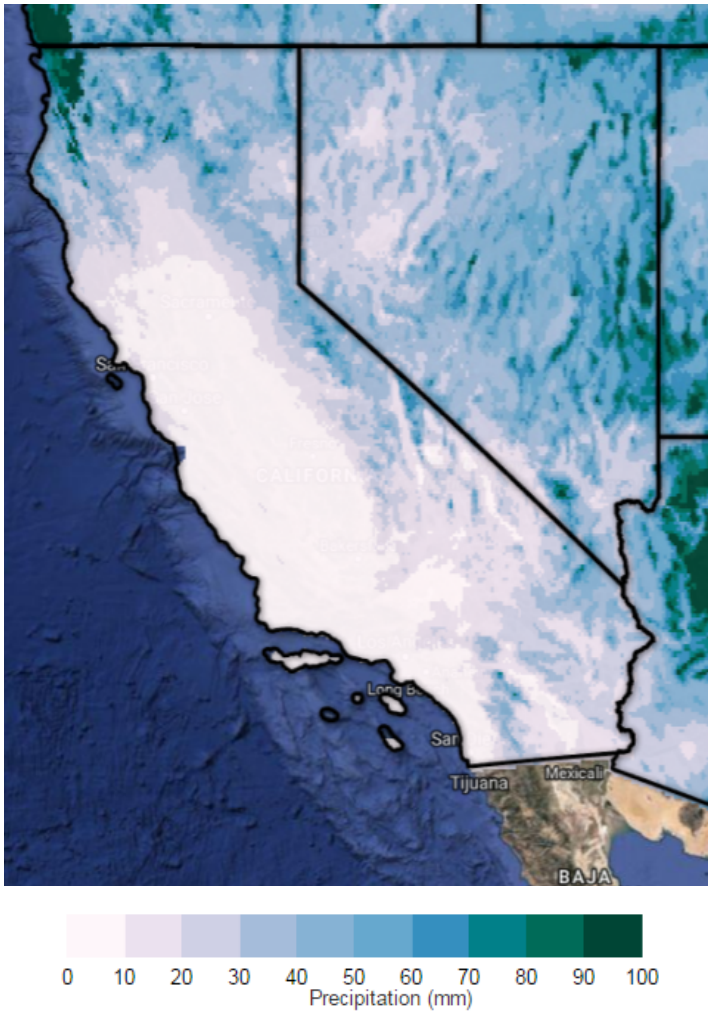


Precipitation



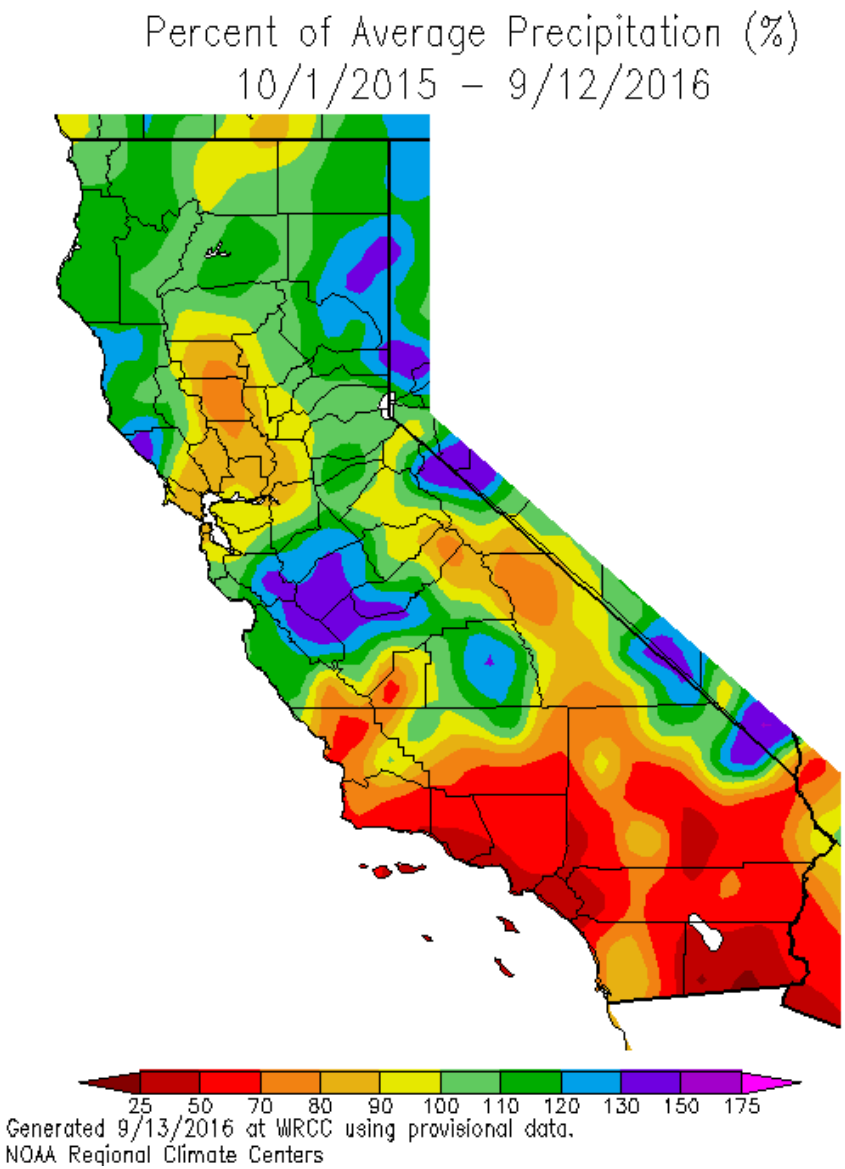
http://www.wrcc.dri.edu/wwdt/

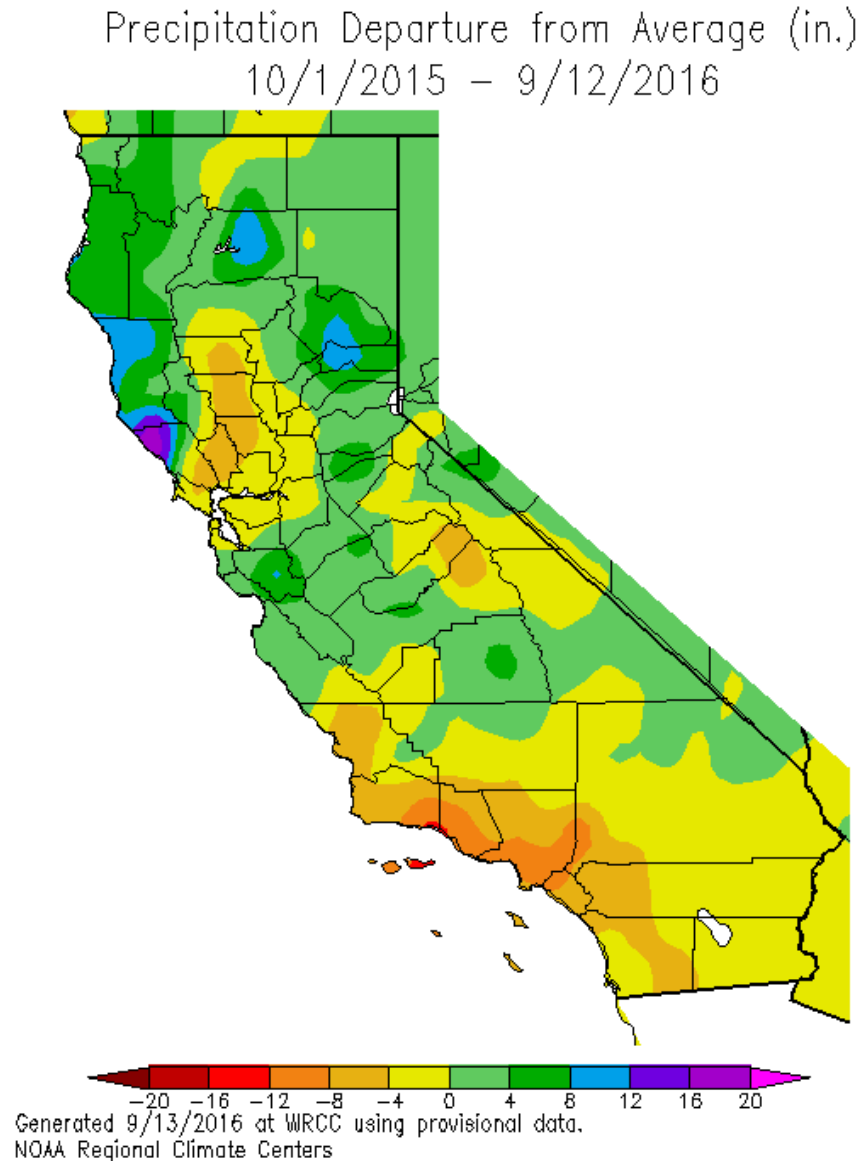
June-August gridMET
Average Precipitation
1981-2010



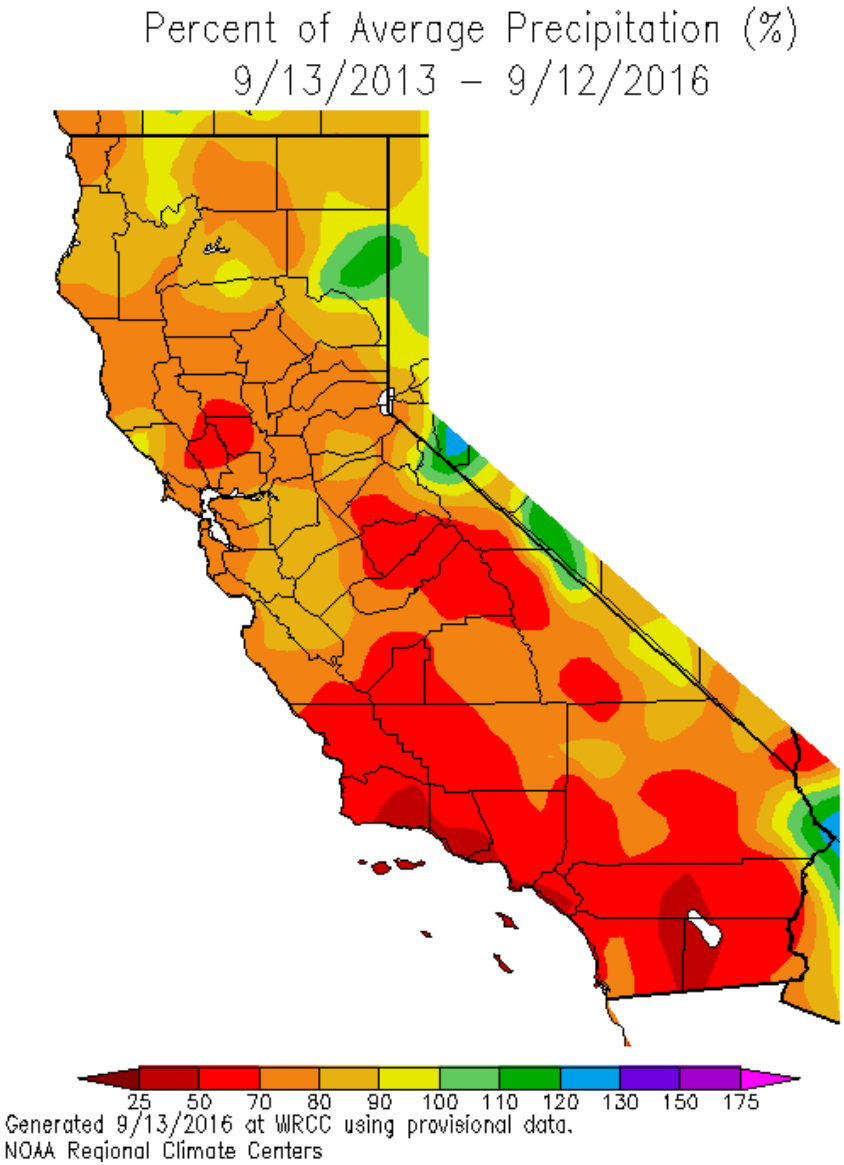
http://clim-engine.appspot.com/

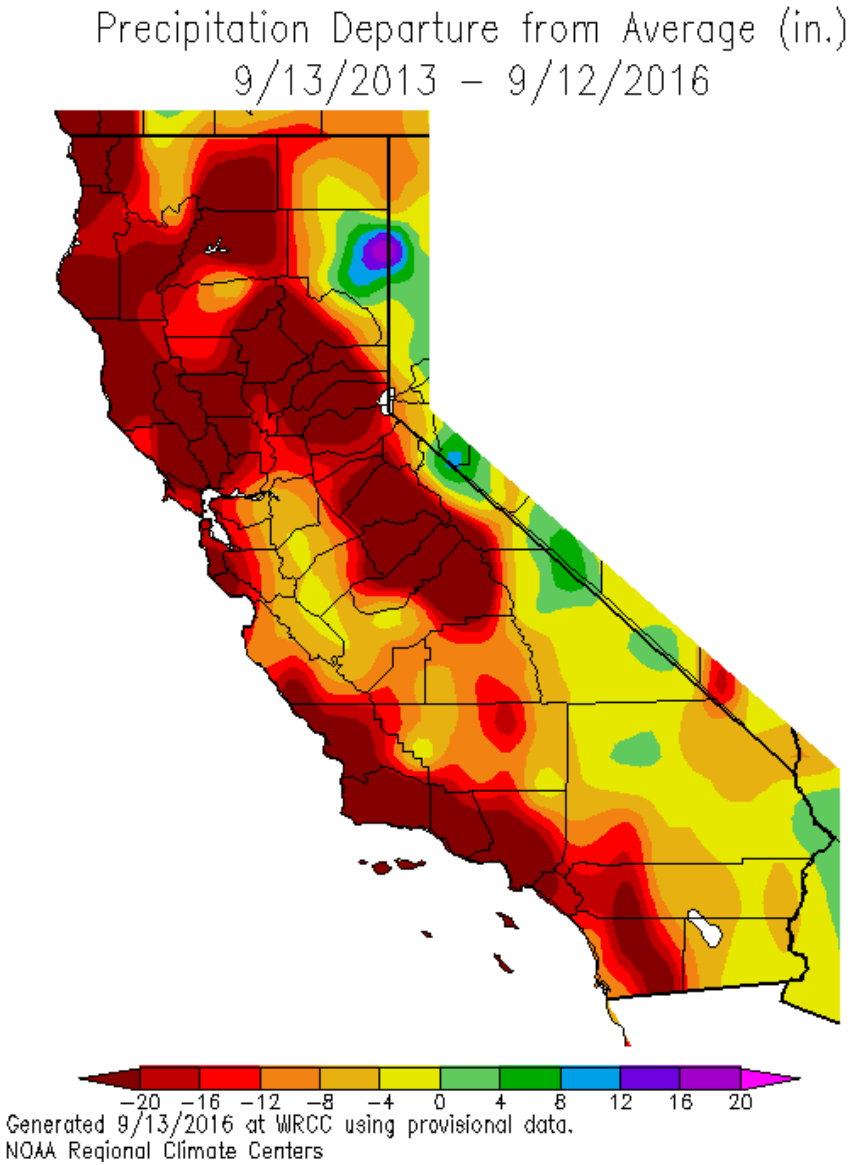
Precipitation





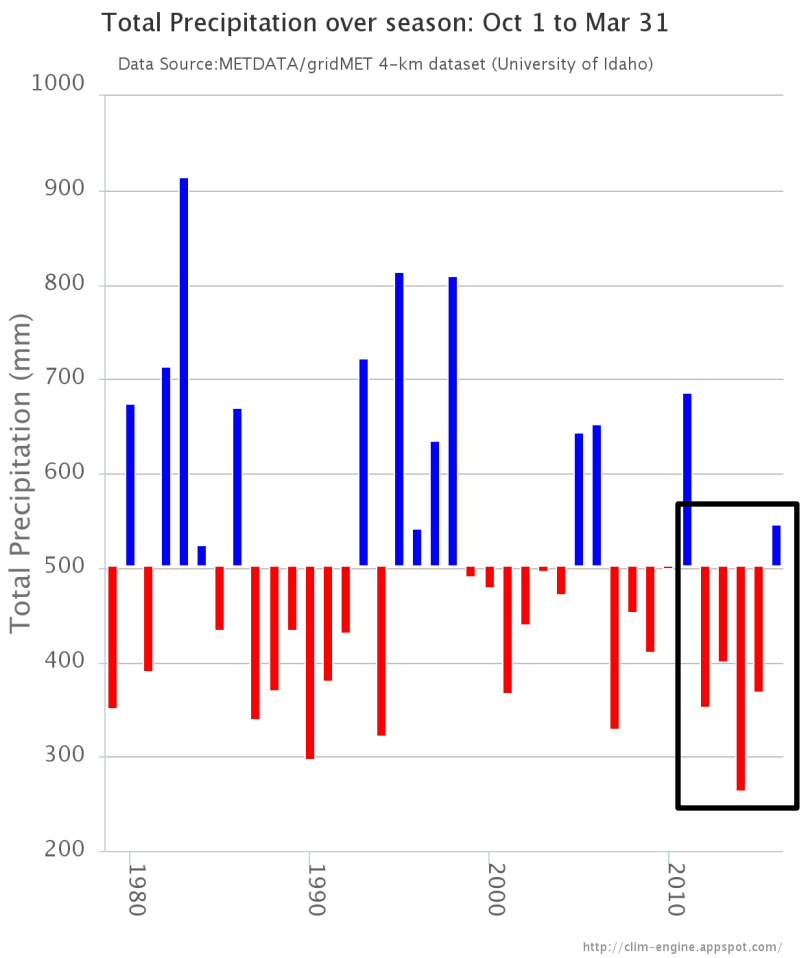
Precipitation



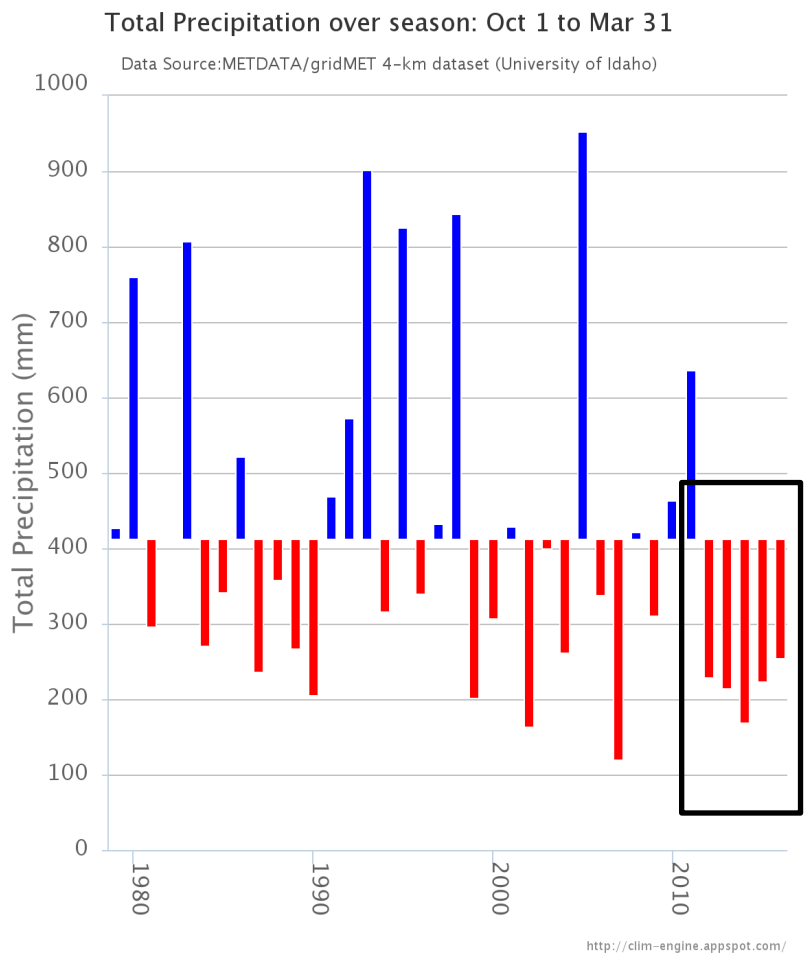


Oct-Mar Precipitation Variability

CA Statewide



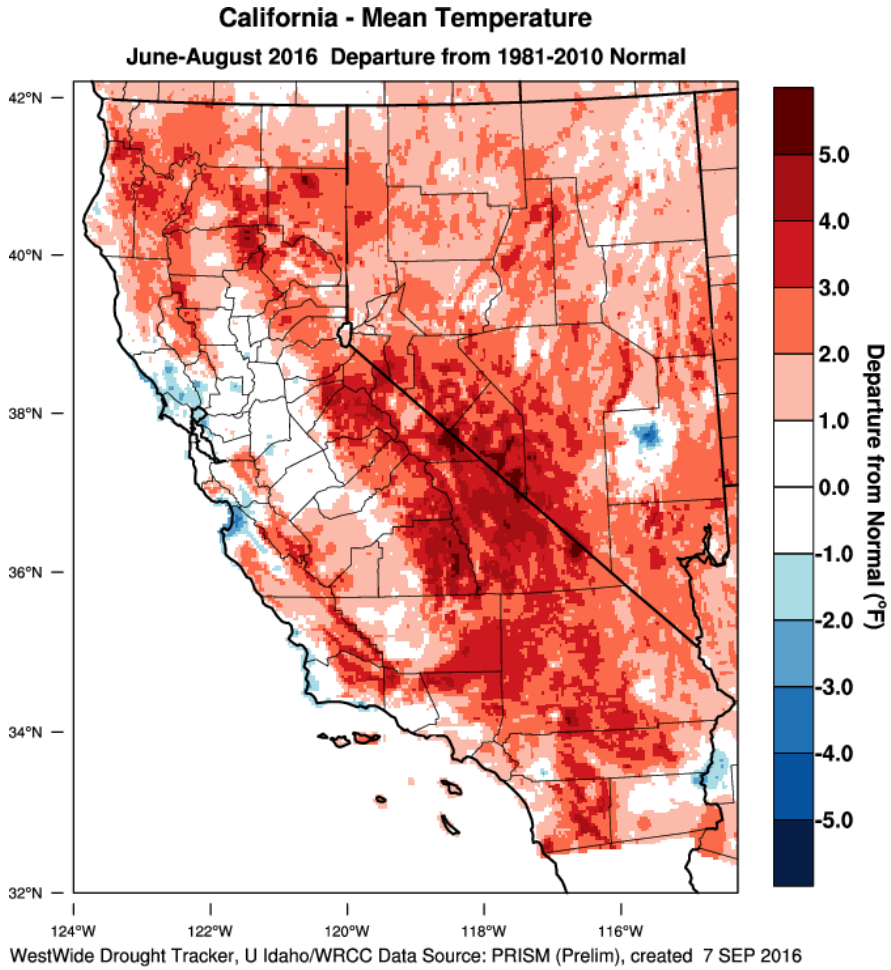
CA Southern Coast Climate Division



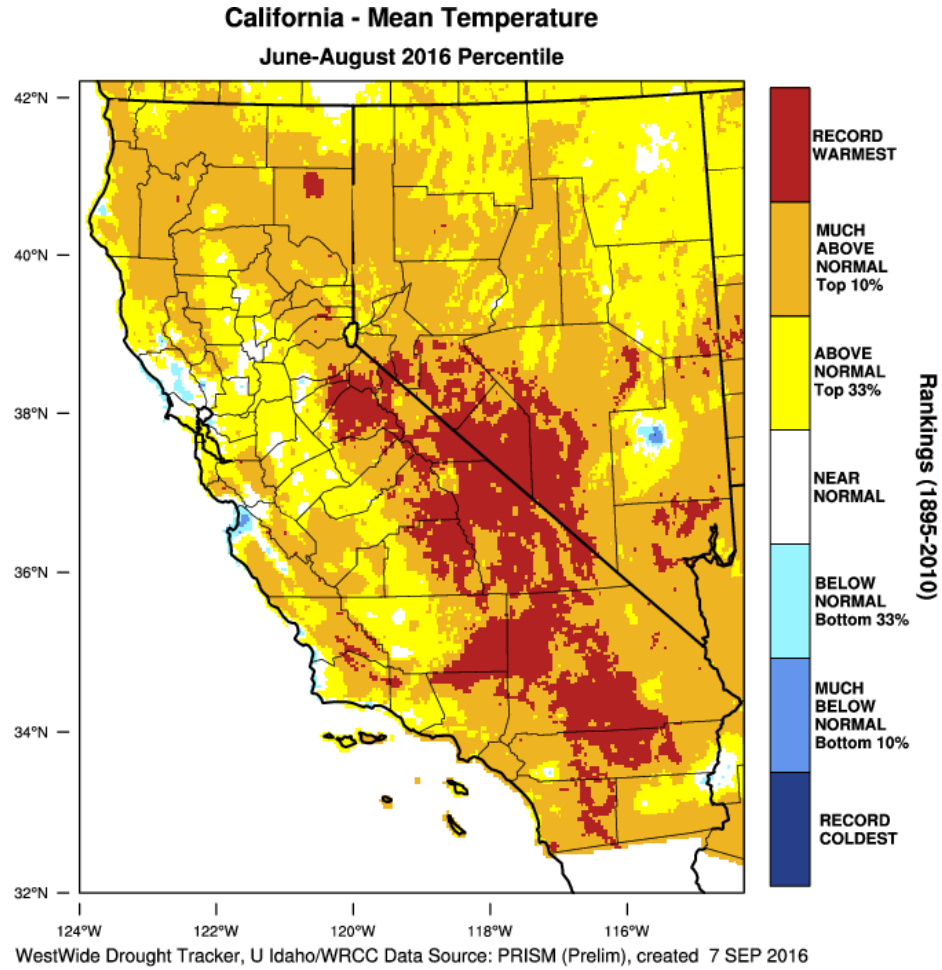
Graphs made by Climate Engine: http://clim-engine.appspot.com/

Temperature

Summer 2016 temperature anomalies

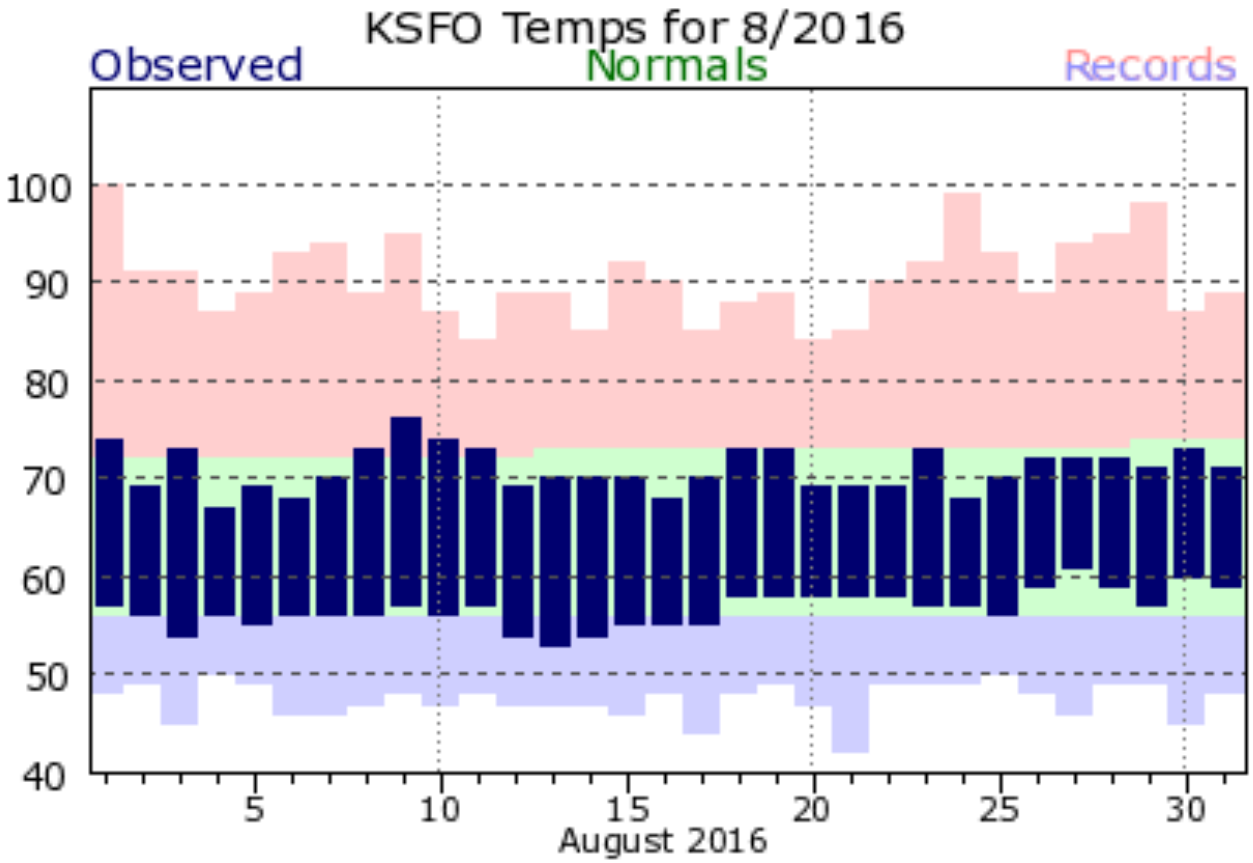


Summer 2016 temperature percentile rankings



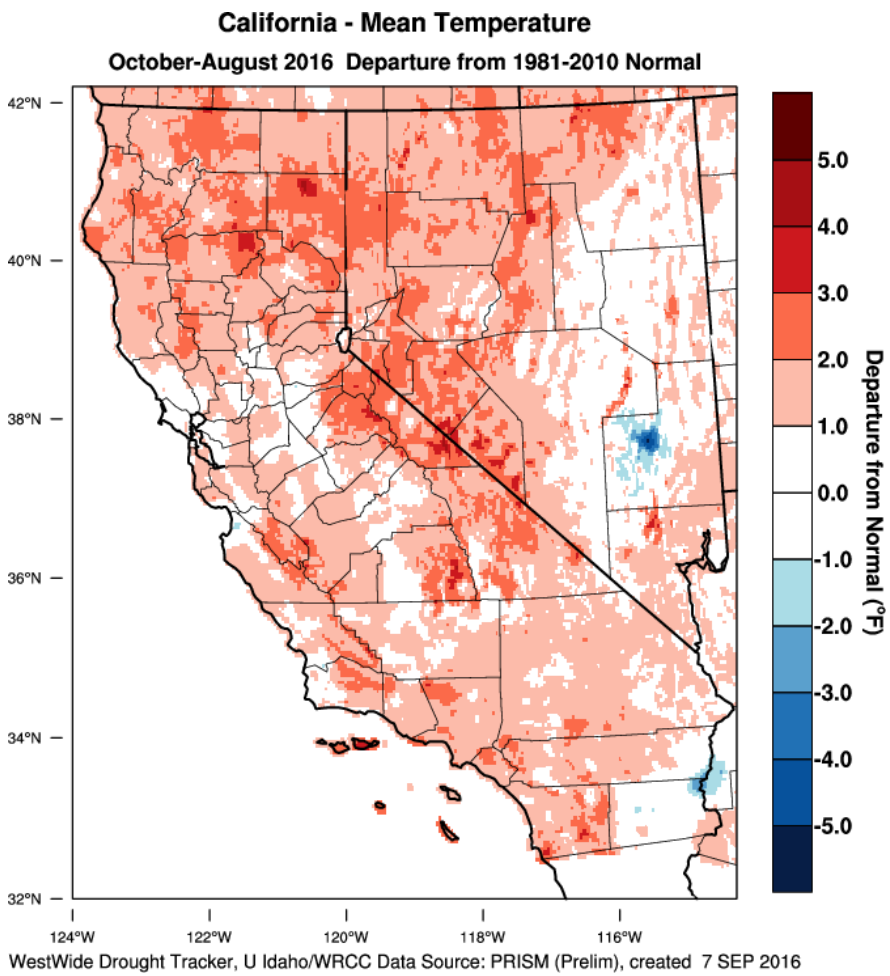
Temperature

August max/min daily temperatures at San Francisco Airport

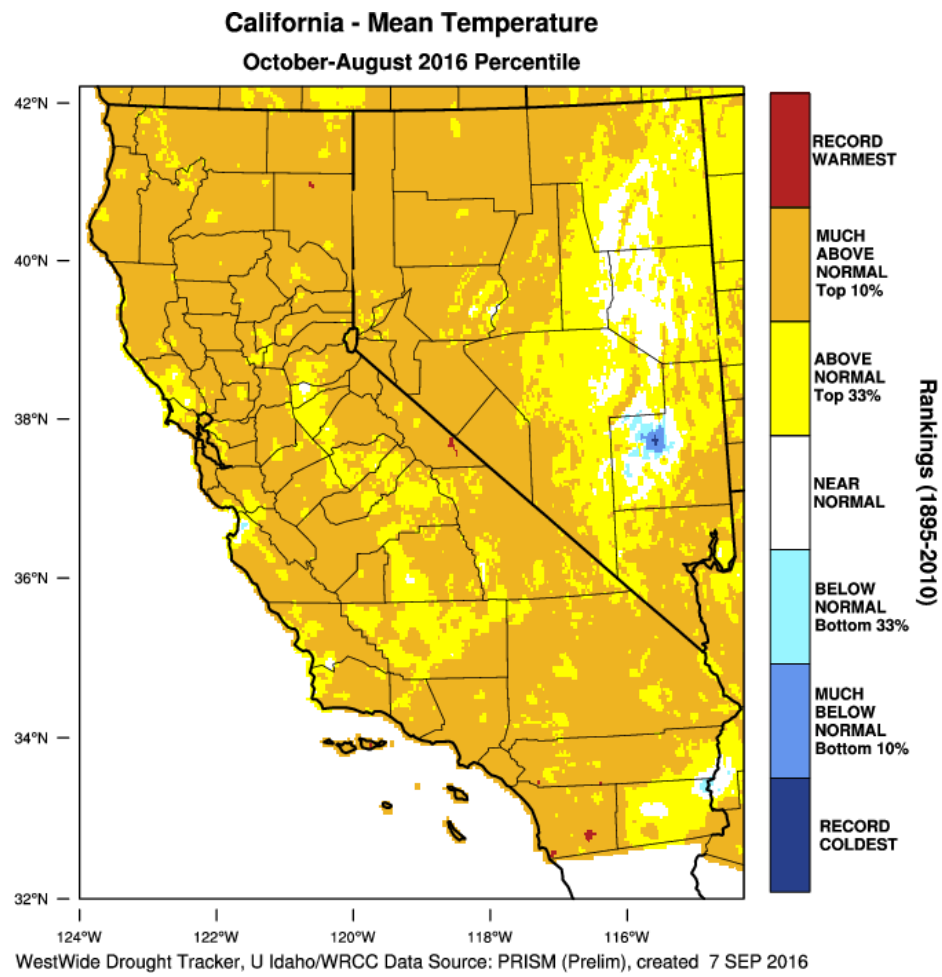


Temperature

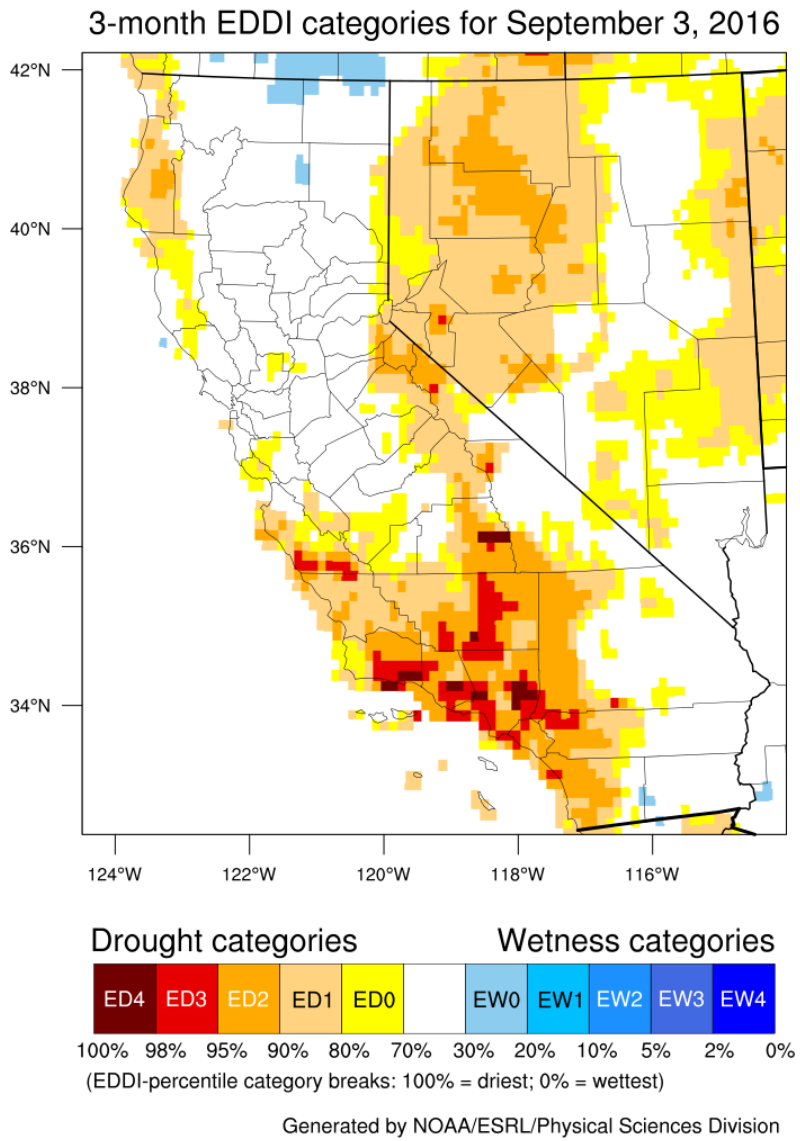
Water year (Oct-Aug) 2016
temperature anomalies



Water year (Oct-Aug) 2016
temperature percentile rankings

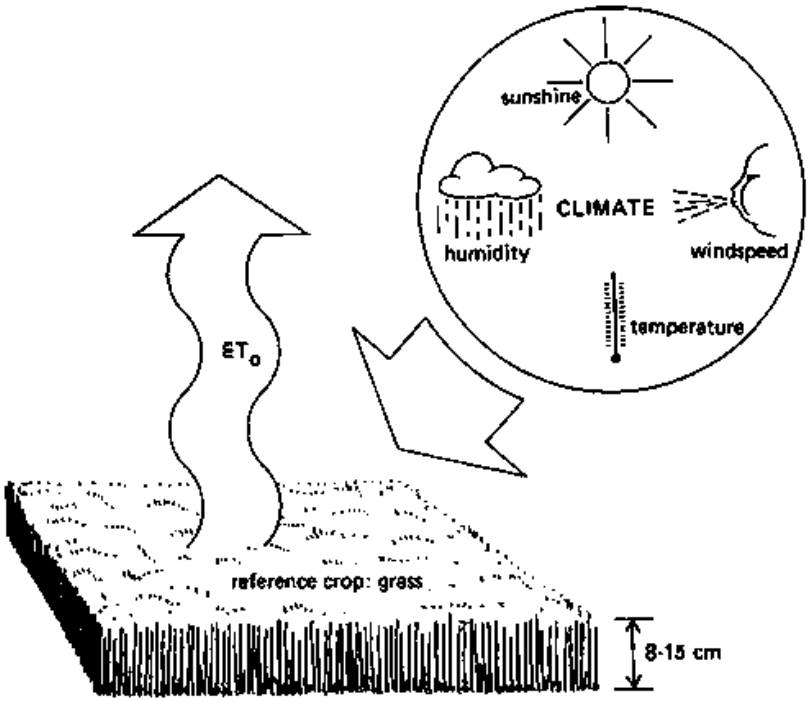


Evaporative Demand (ET_o)



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

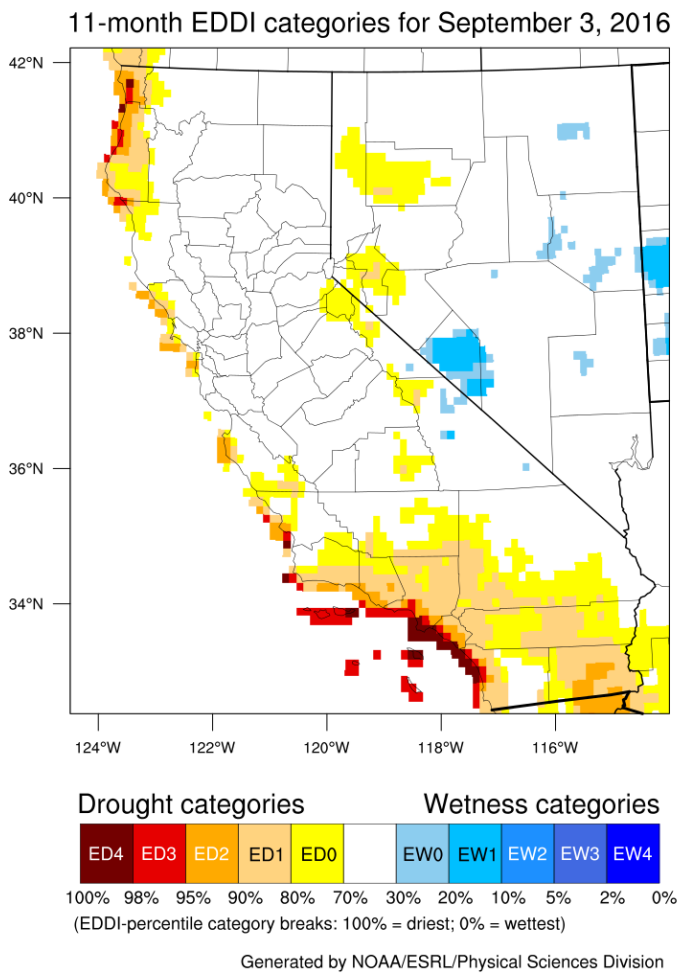
"Atmospheric Thirst"



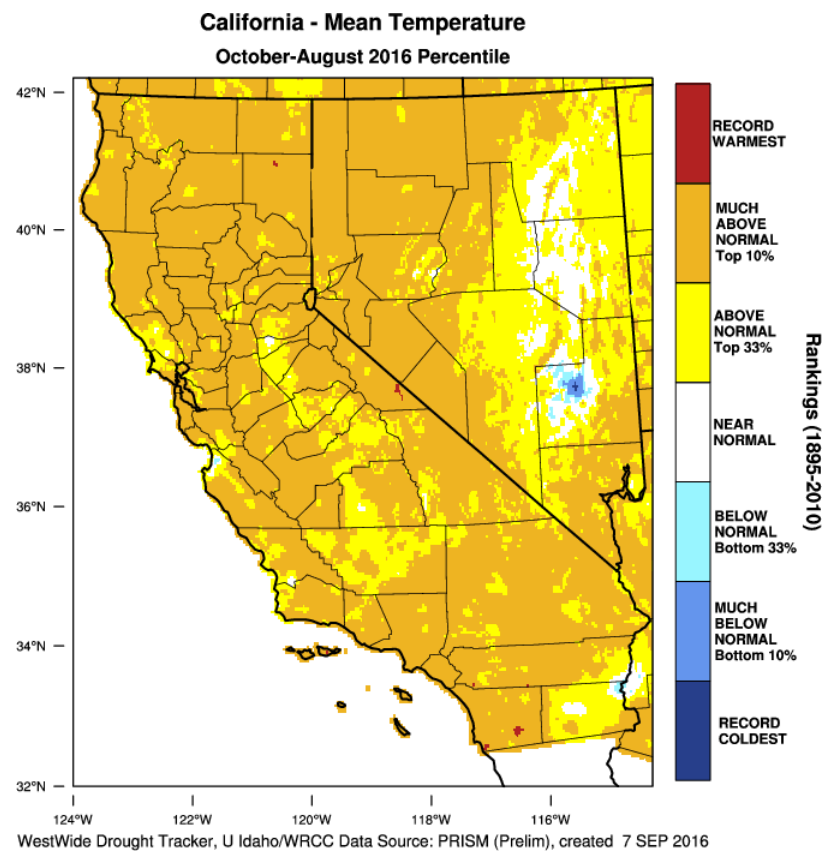
Maps (developed by Mike Hobbins) available at: ftp://ftp.cdc.noaa.gov/pub/Public/mhobbins/EDDI/CN_DEWS/

Evaporative Demand

Water year EDDI (Oct 1 – Sep 3)

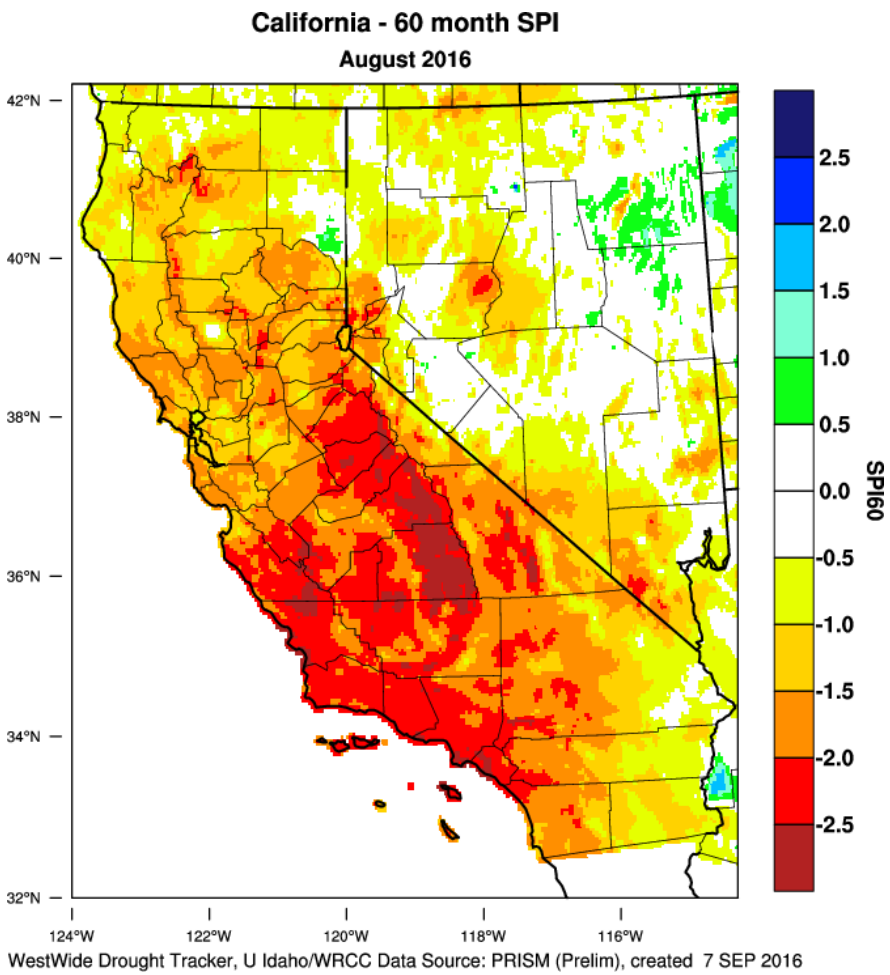


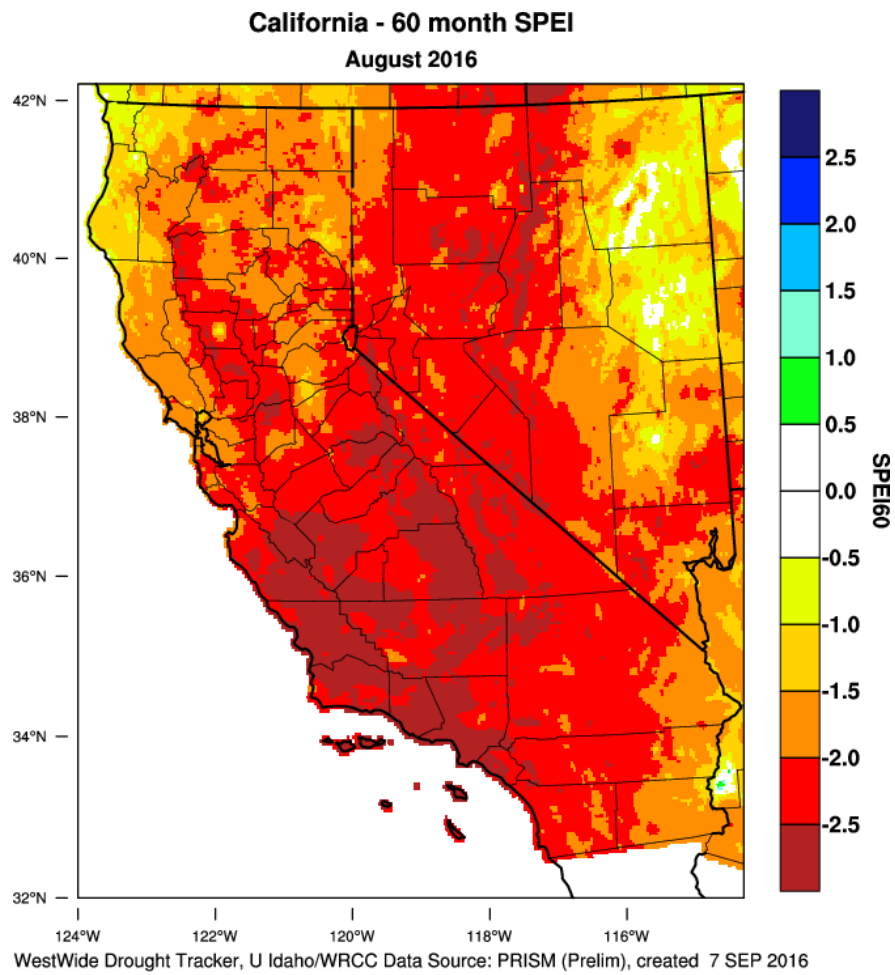
- EDDI spatial patterns often much different than temperature
- Dominant evaporative demand drivers vary depending on region and season



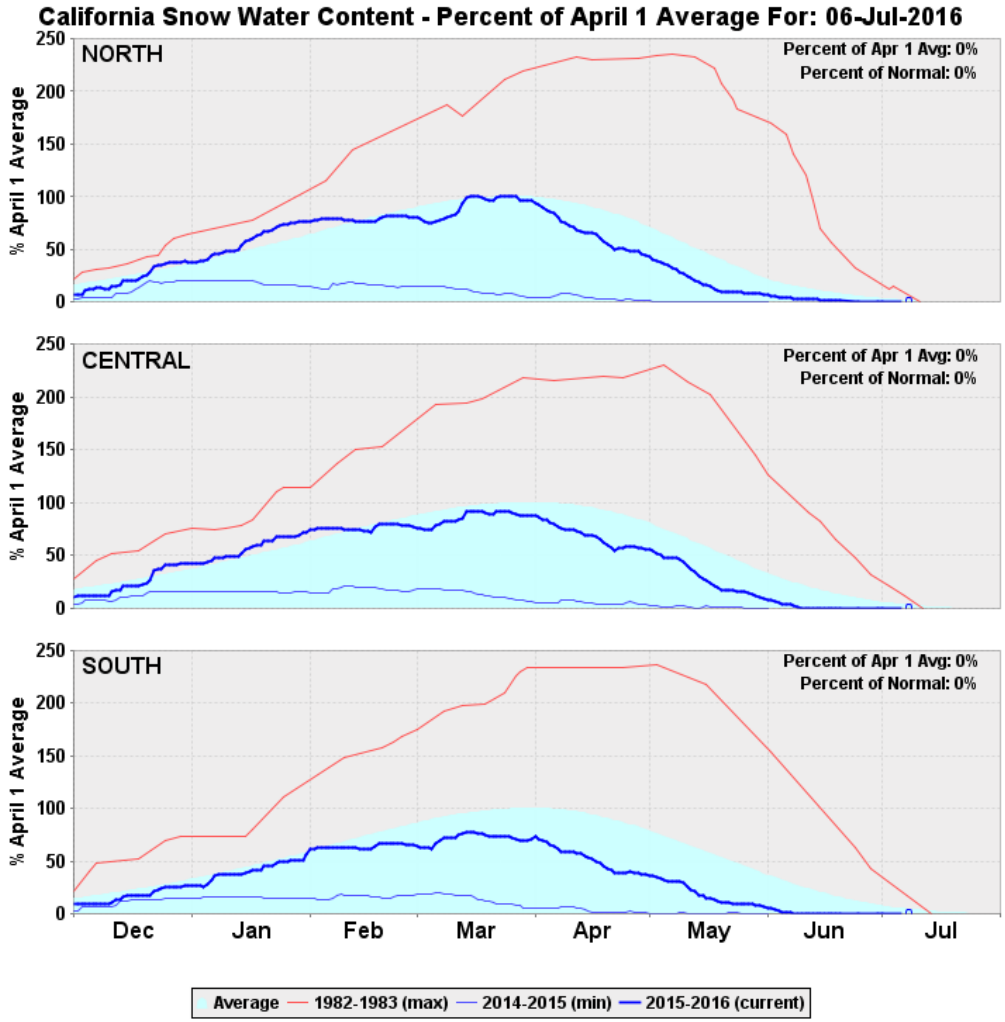
SPI and SPEI

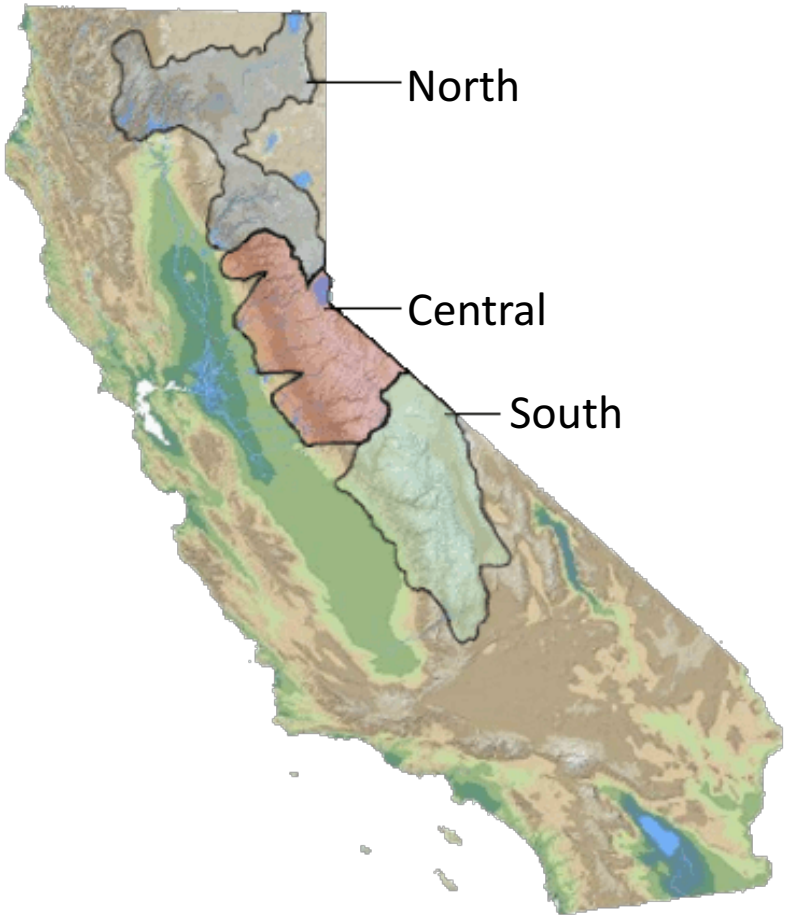
- SPI: Standardized Precipitation Index **(precipitation only)**
- SPEI: Standardized Precipitation Evapotranspiration Index **(precipitation + temperature)**
- 5-year (Sep 2011 – Aug 2016) accumulated deficit/surplus
- Temperature and evaporative demand greatly intensifying drought severity





Snowpack



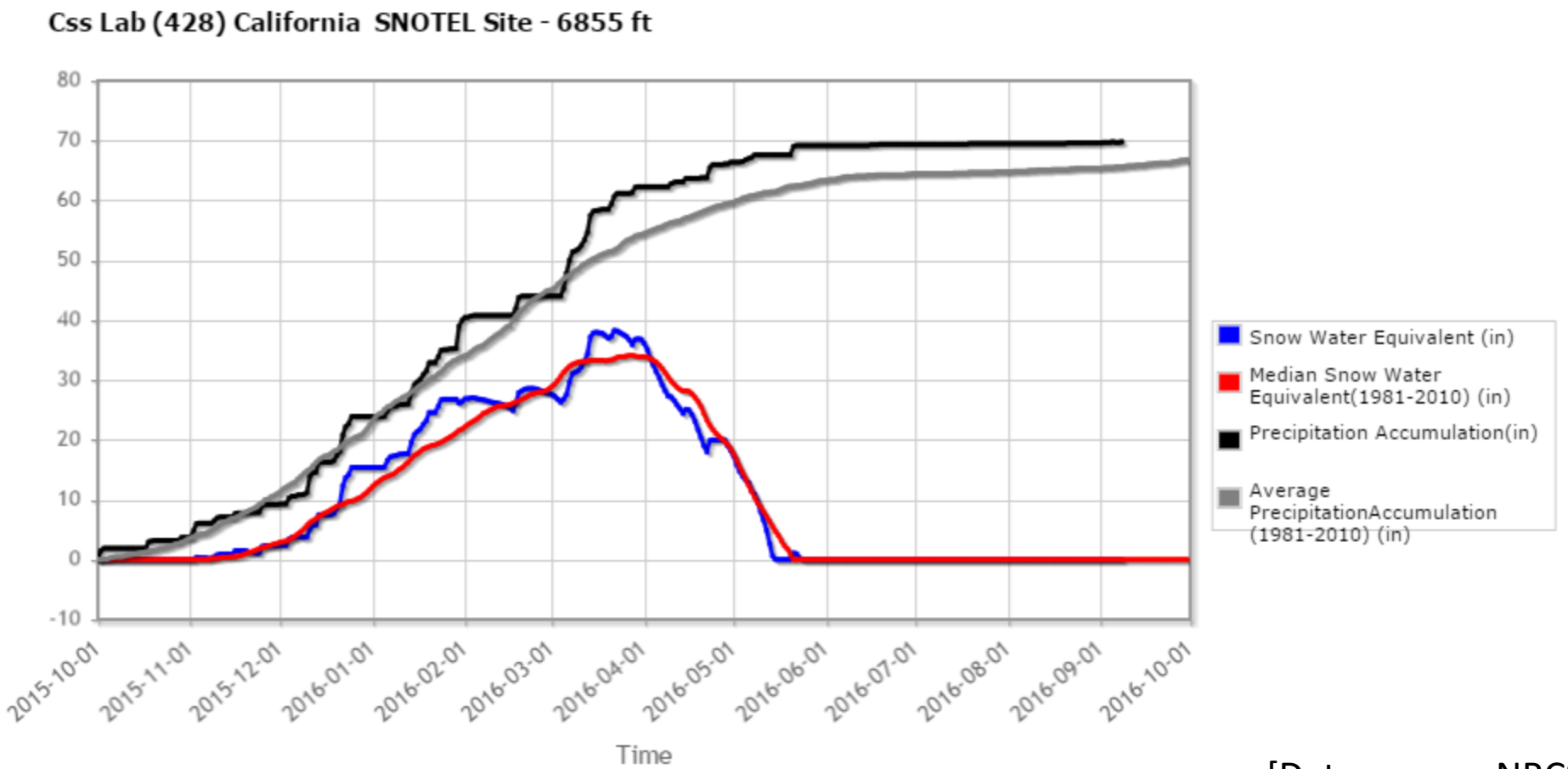


1982-1983 2014-2015 2015-2016

[Data source: CA DWR]

Snowpack

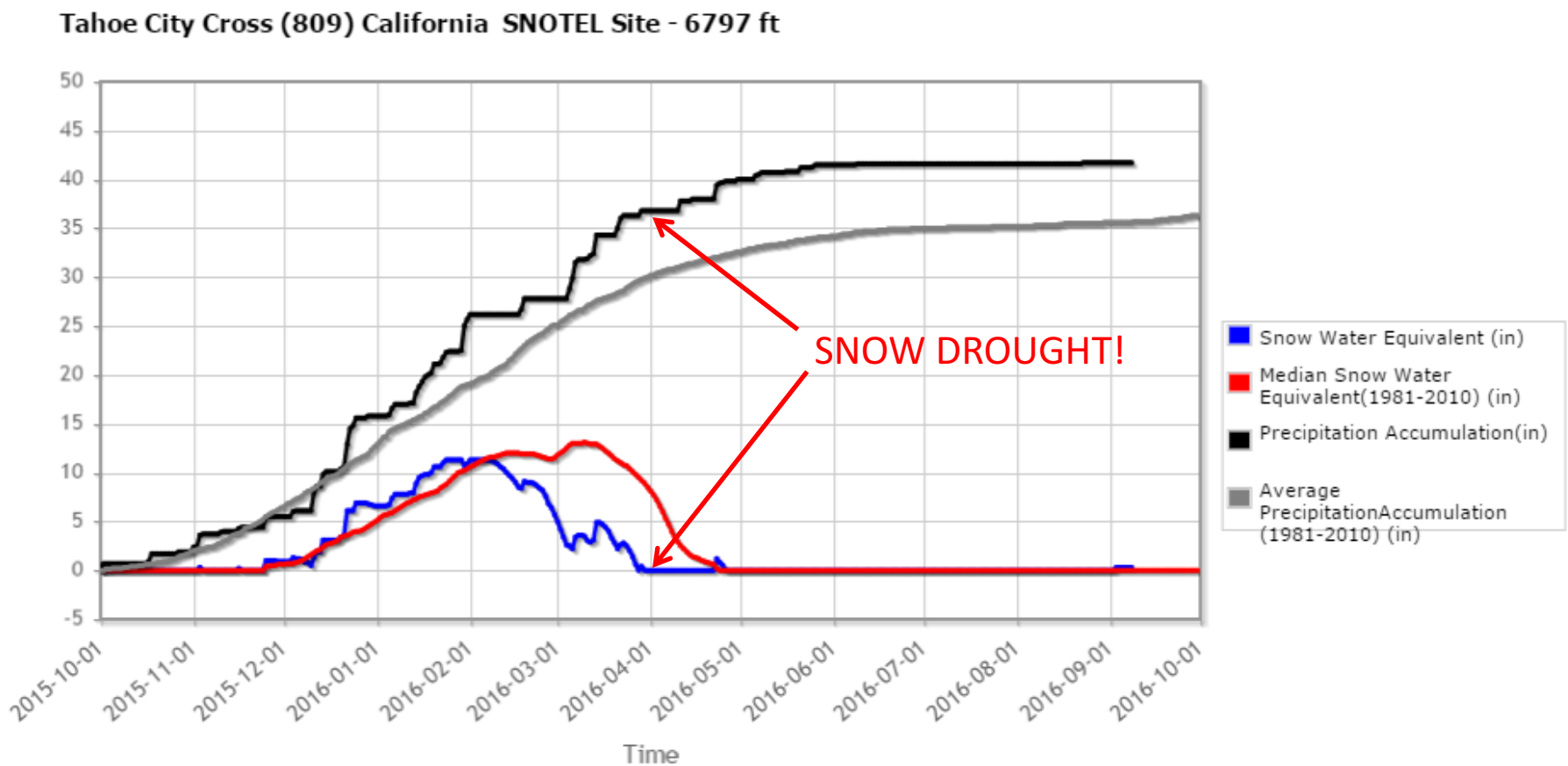
- Donner Summit SNOTEL
- Just about average
- Melt out slightly early
- West of Sierra crest, March storms boosted snowpack



[Data source: NRCS]

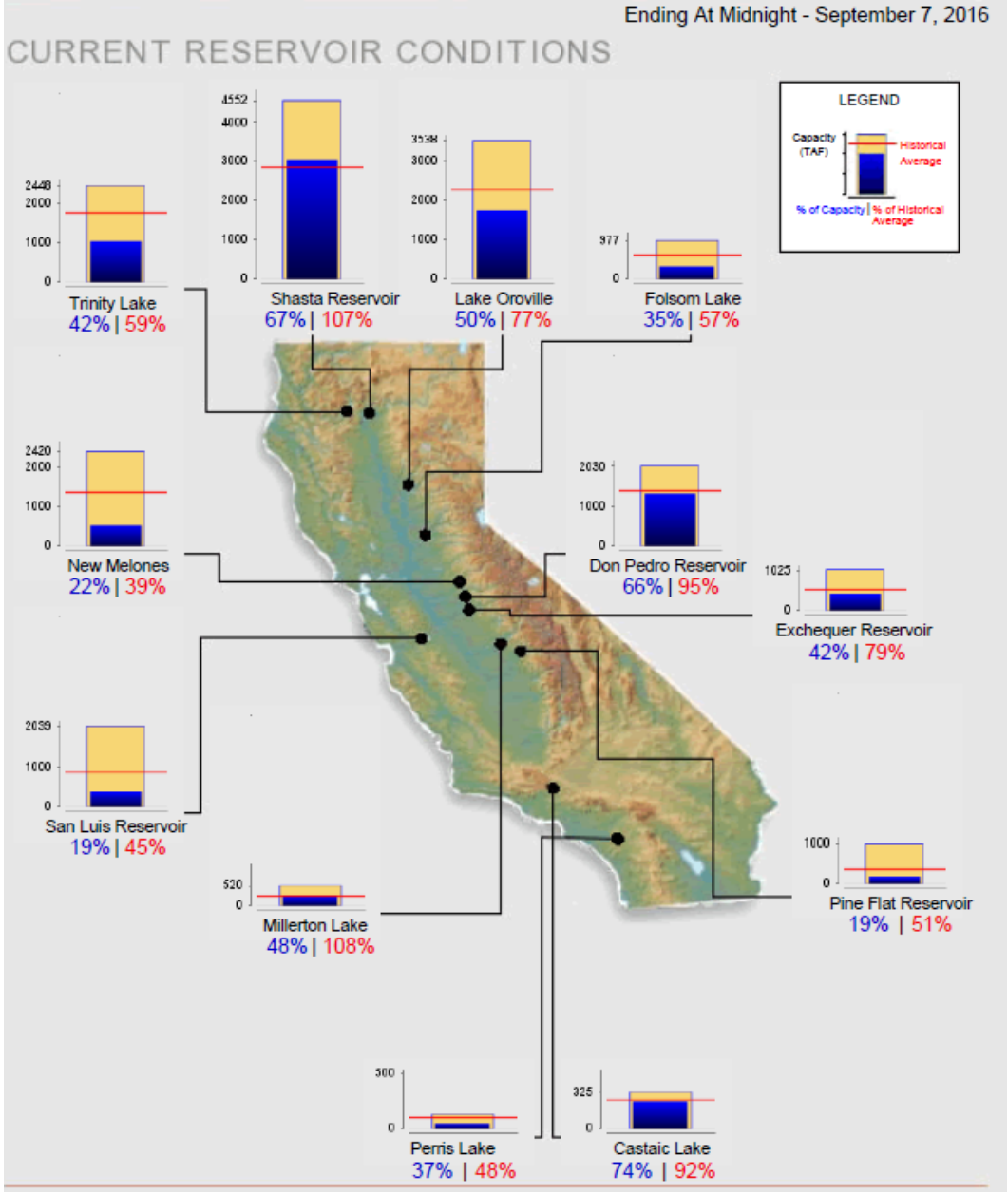
Snowpack

- 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

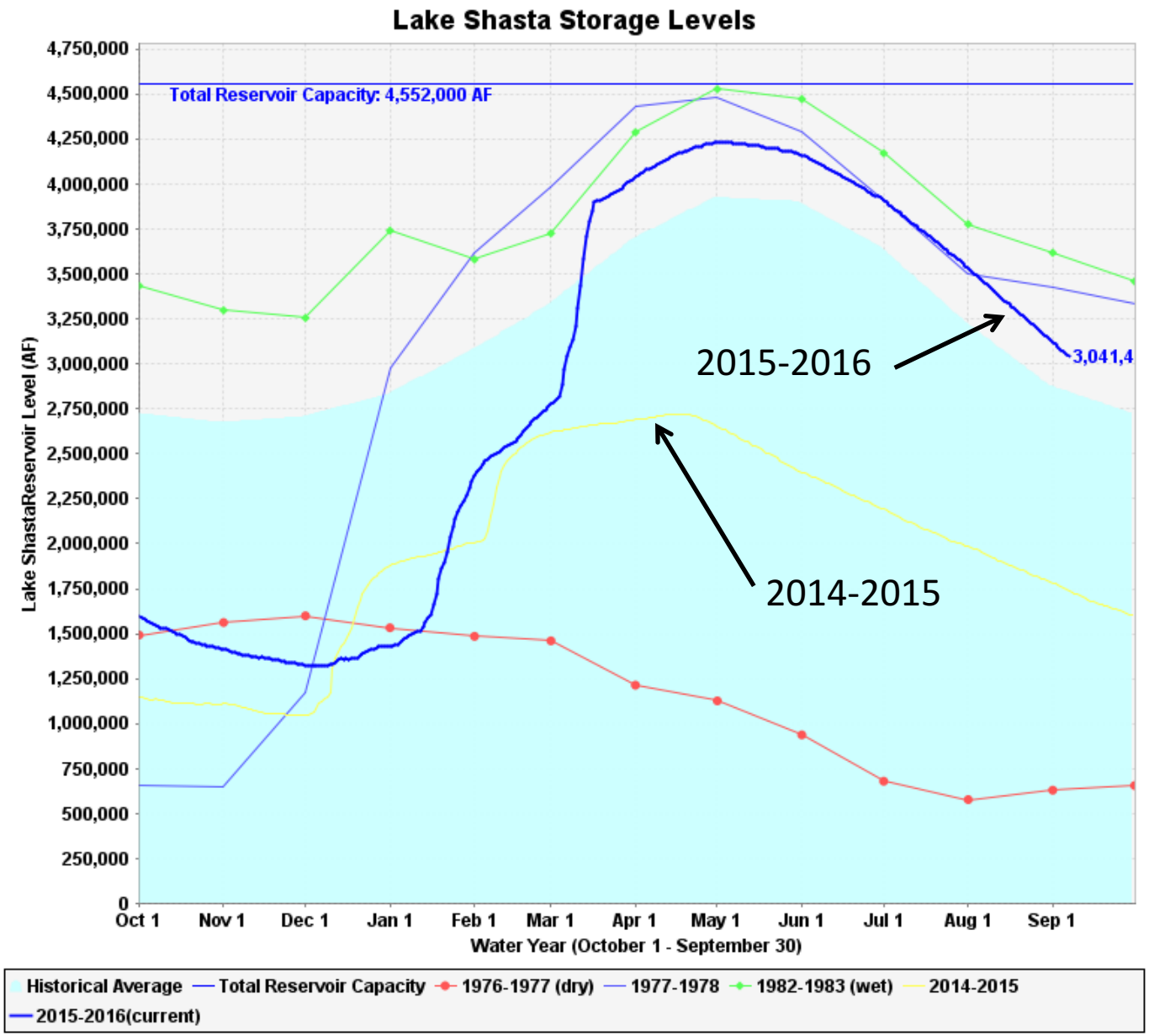


- Highly variable statewide
- Reservoir operations can have big impact on levels
- Millerton and Shasta only two above historical average
- Red line = historical average
- “Bucket” indicates reservoir capacity

[Data source: CA DWR]

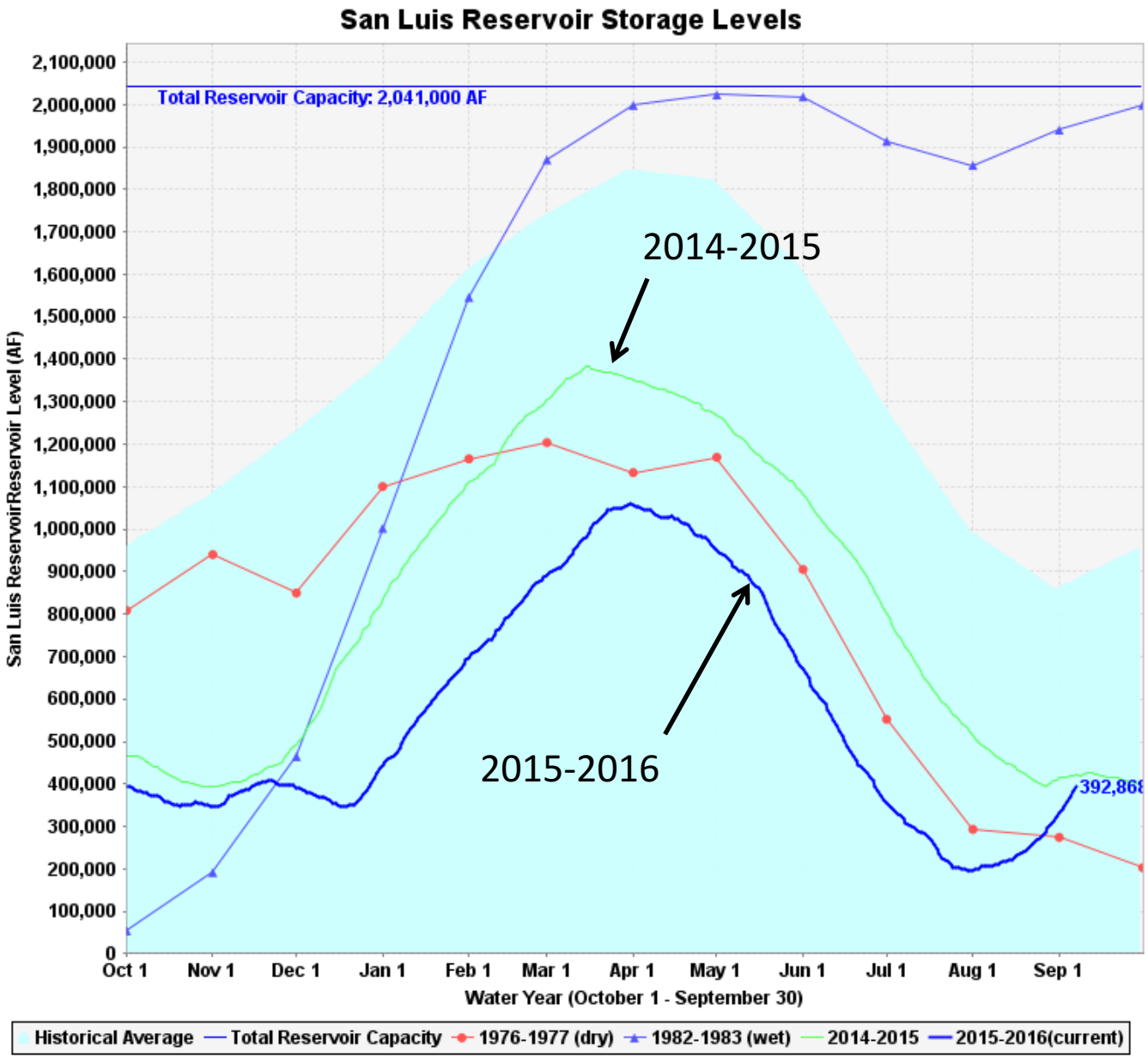
Reservoir Conditions

[Data source: CA DWR]



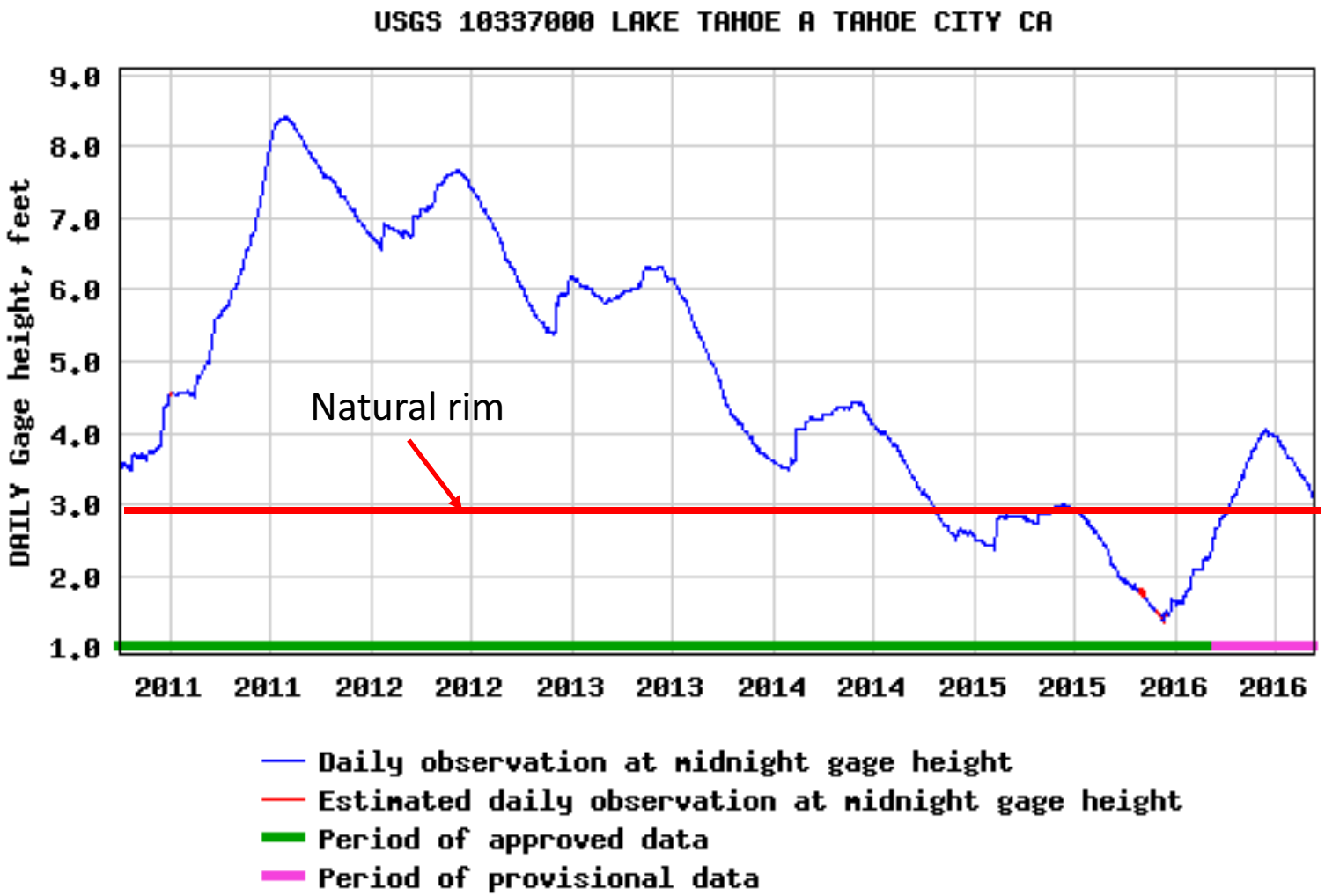
Reservoir Conditions

[Data source: CA DWR]

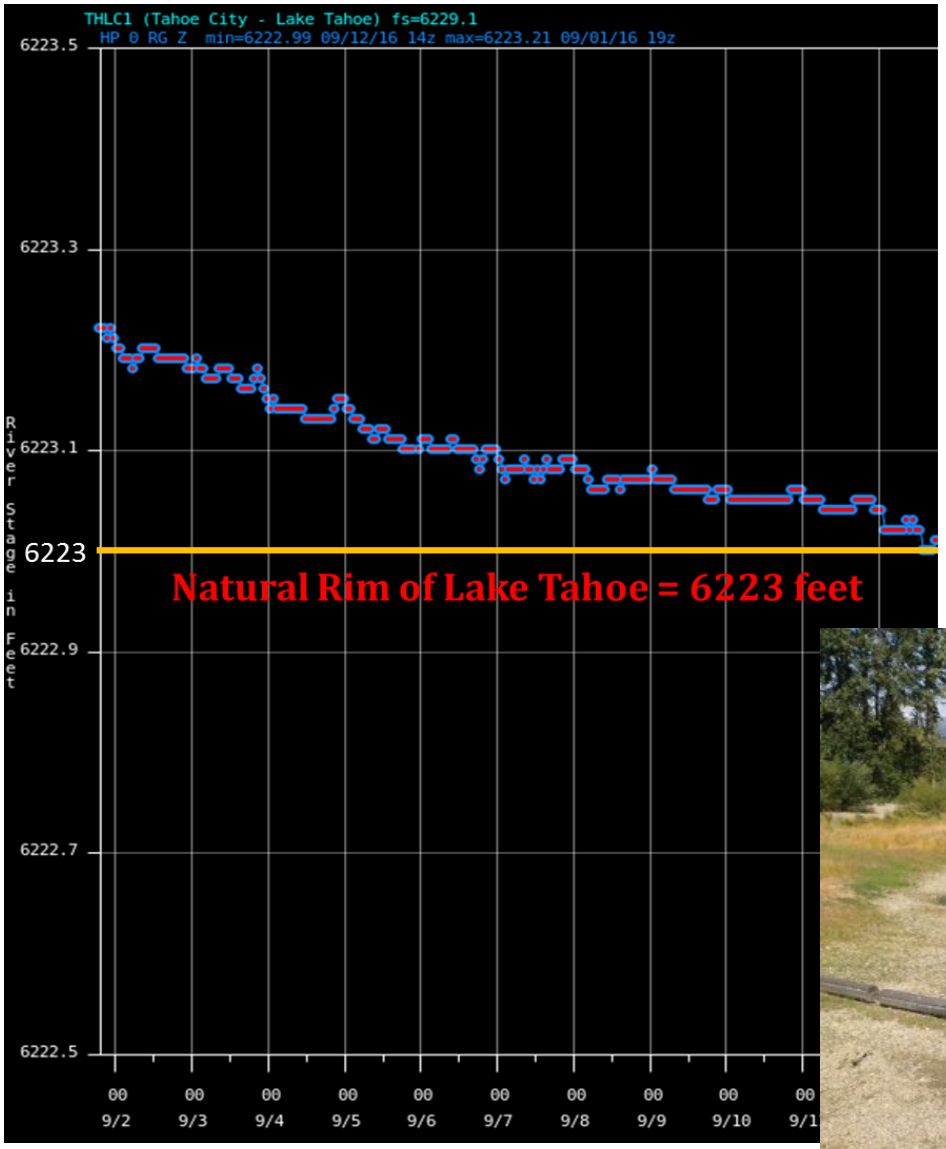


Reservoir Conditions

Lake Tahoe gage elevation, Oct 1, 2010 – Sep 9, 2016



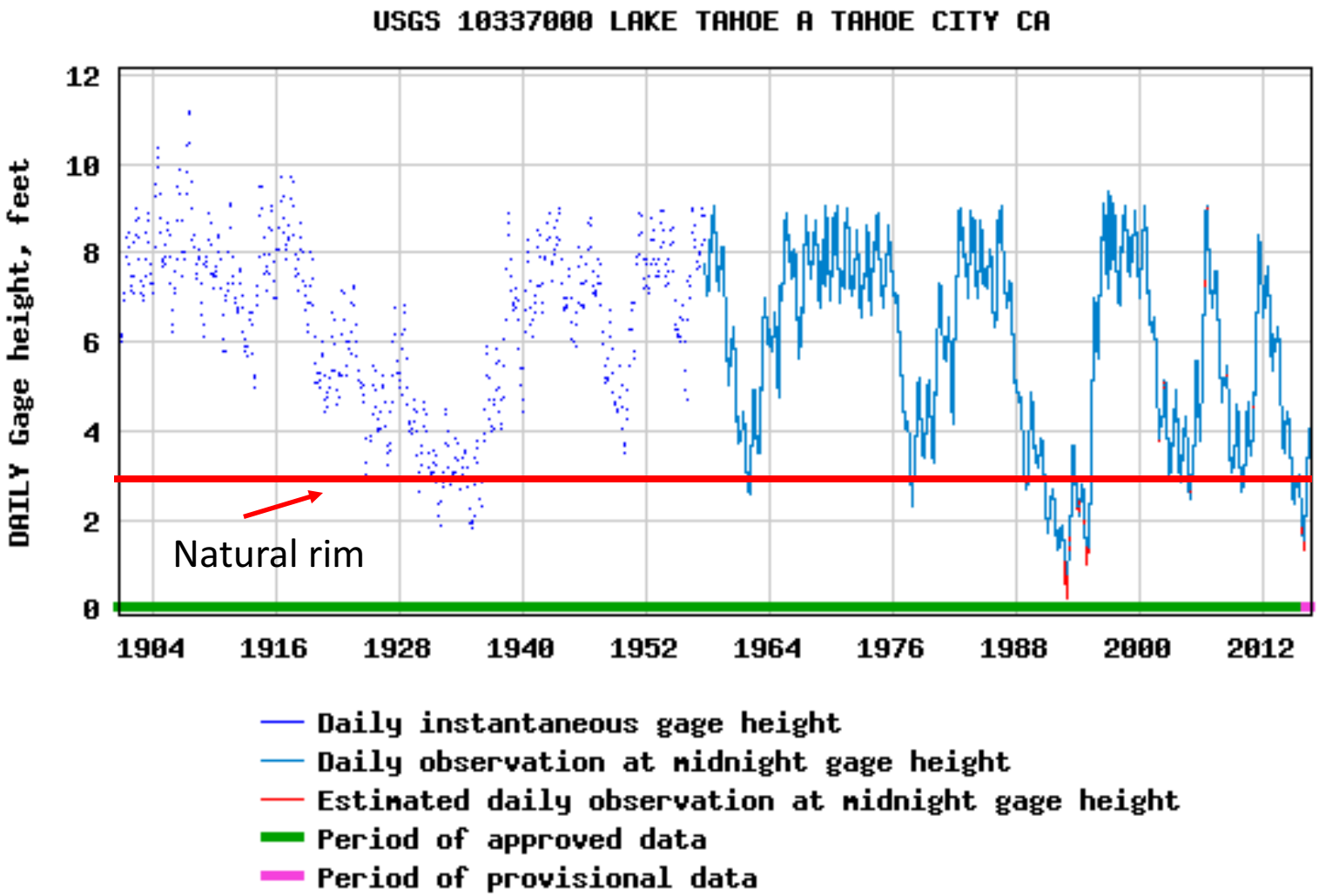
Reservoir Conditions



- September 12, 2016: Lake Tahoe falls back below the natural after being above for several months
- Graphic and picture credit: NWS Reno

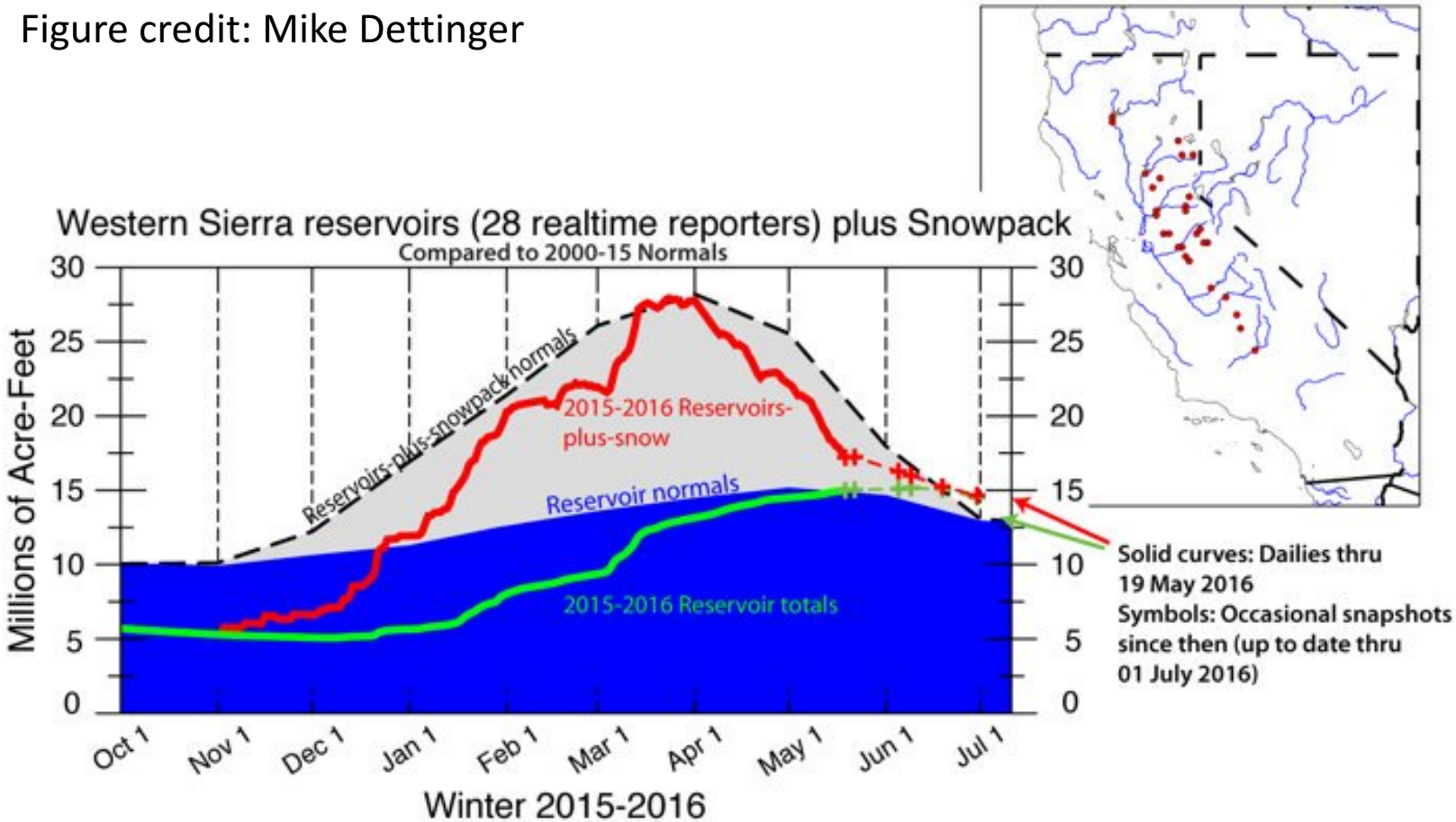
Reservoir Conditions

Lake Tahoe gage elevation, Oct 1, 1900 – Sep 9, 2016



Reservoir + Snowpack Conditions

Figure credit: Mike Dettinger

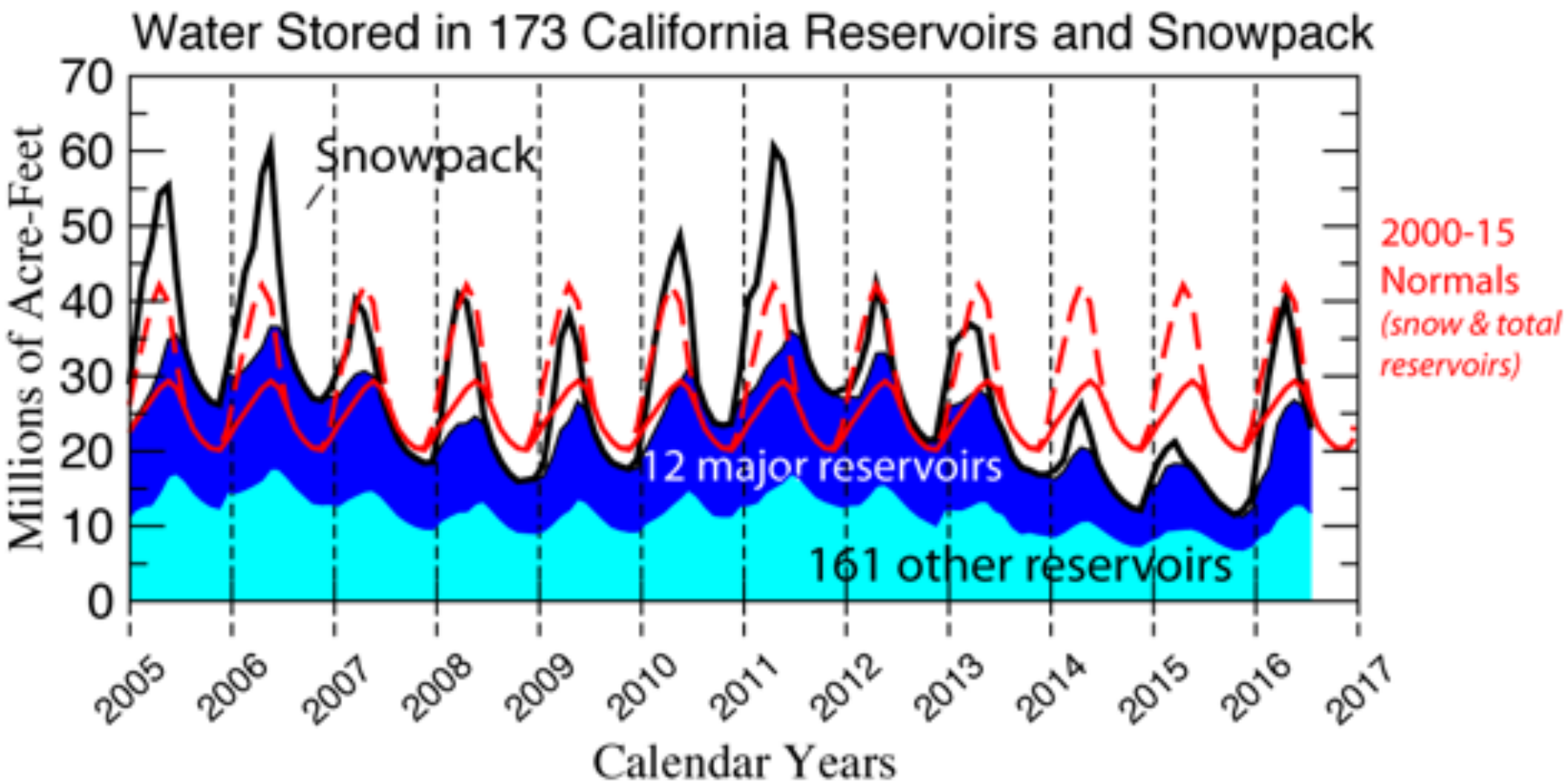


Caveat: *The recent-normal 2000-15 average April 1 snowpack storage is estimated to be only 81% of the longer term 1951-2000 average usually used by DWR. Thus getting back to the 2000-15 "normals" is not as good as one might assume, in longer historical terms.*

Reservoir + Snowpack Conditions

Data through July 2016

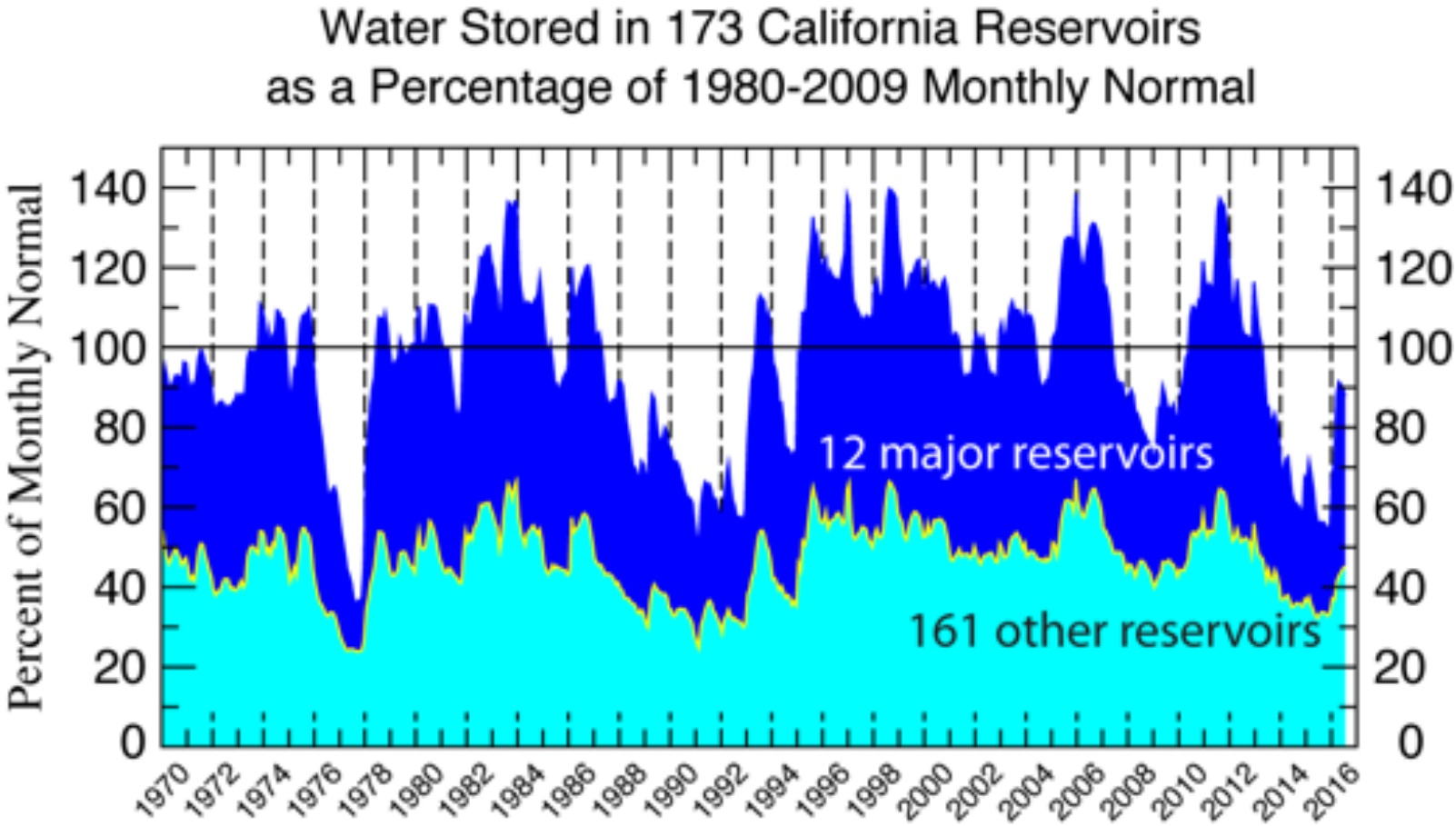
Figure credit: Mike Dettinger



Reservoir + Snowpack Conditions

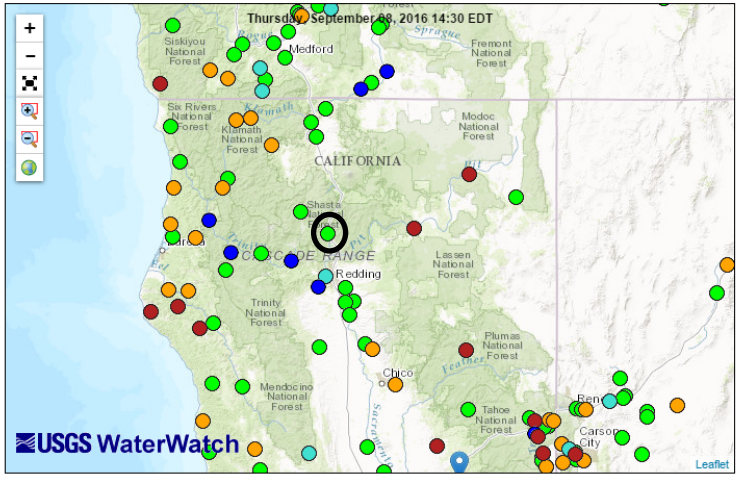
Data through July 2016

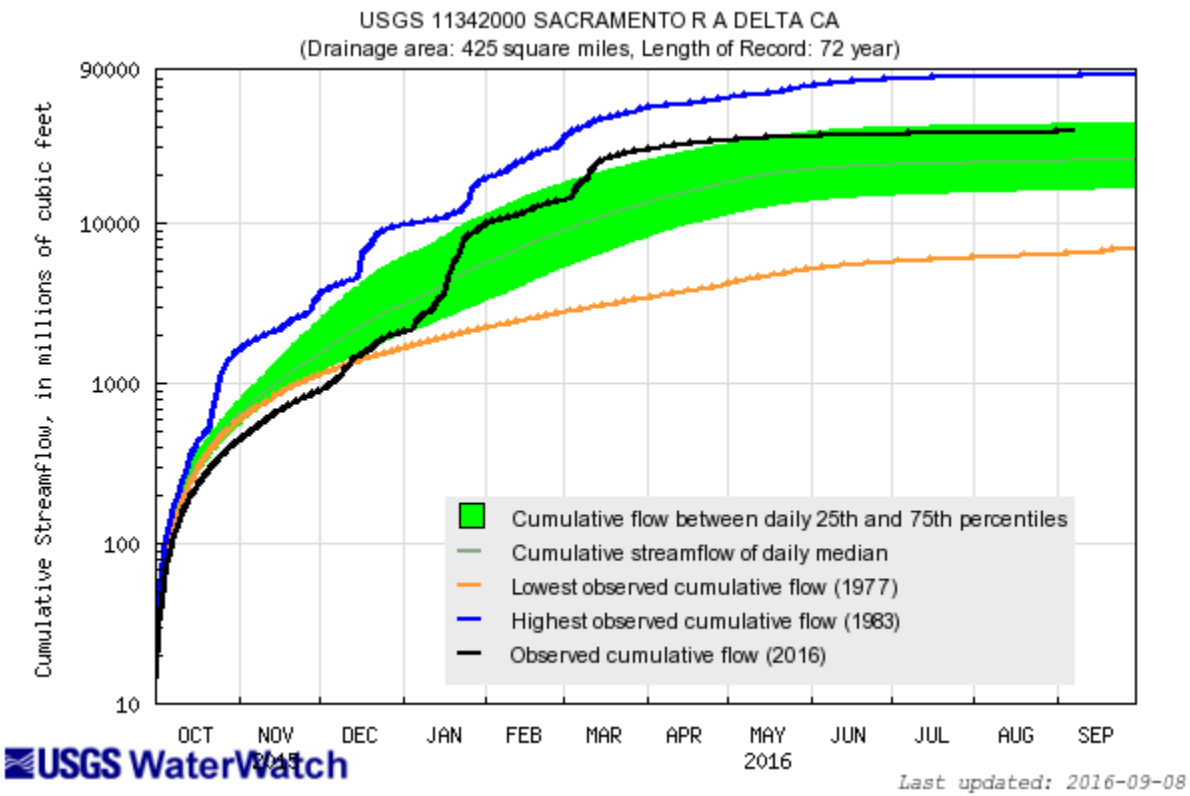
Figure credit: Mike Dettinger



Streamflow

- Sacramento River at the Delta
- Daily cumulative water year streamflow





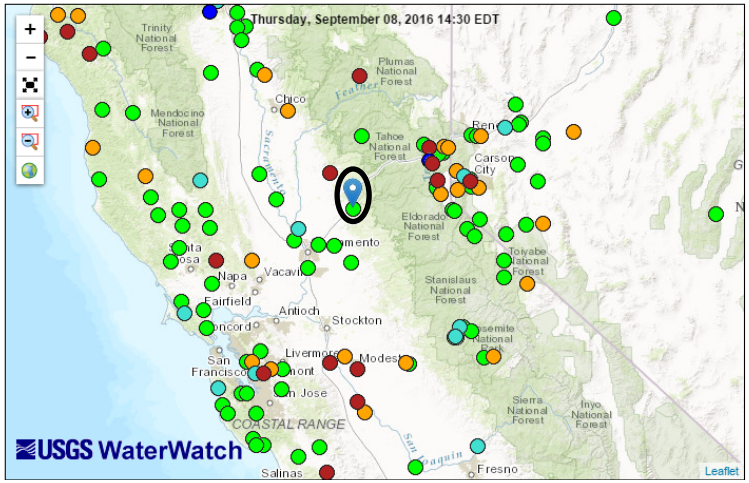
Current: 2016

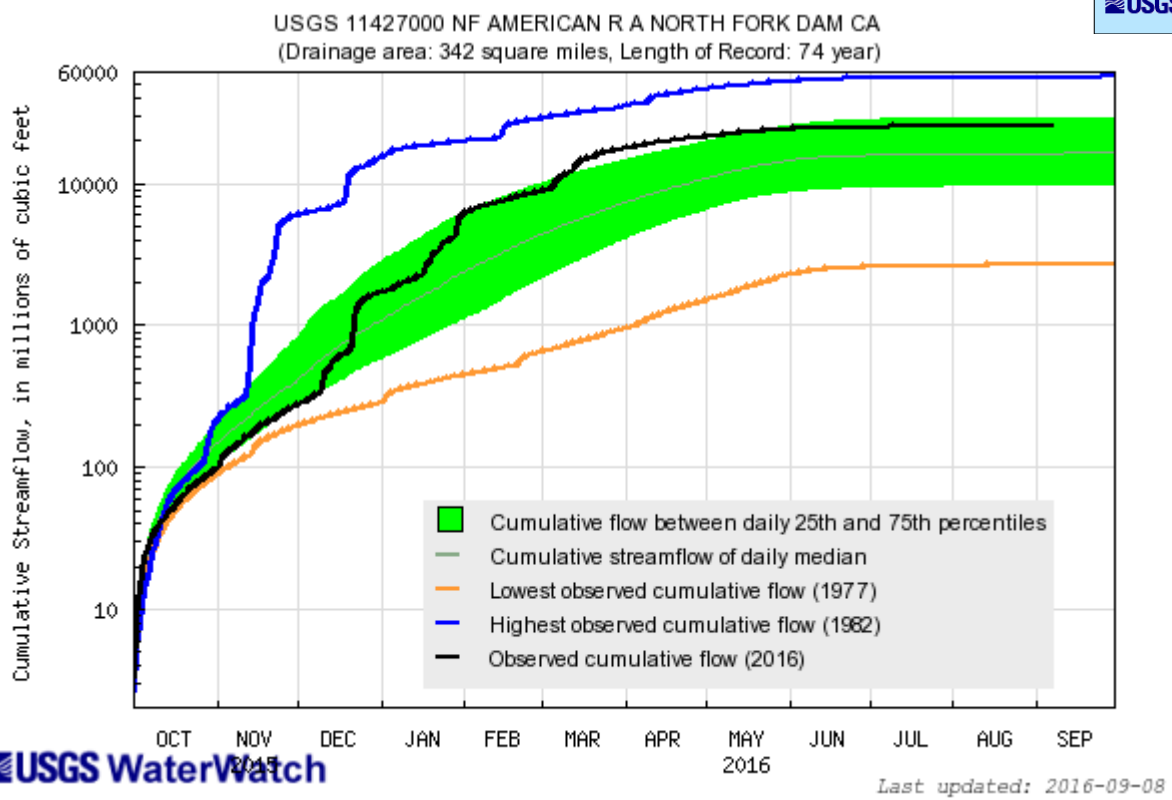
Maximum: 1983

Minimum: 1977

Streamflow

- North Fork American River at North Fork Dam
- Daily cumulative water year streamflow





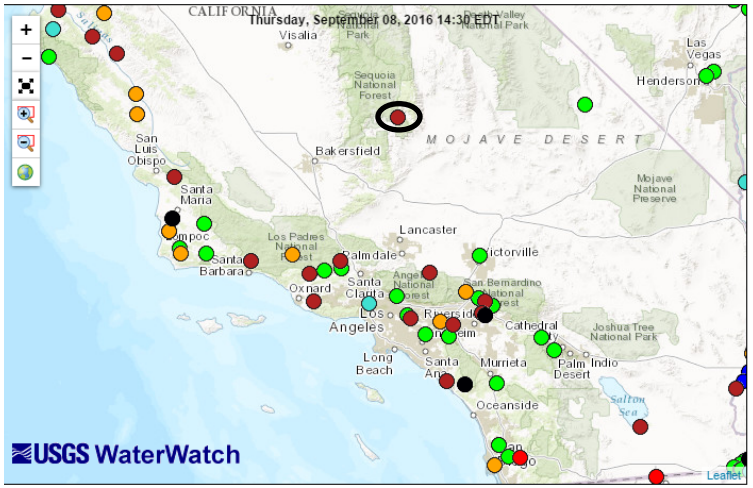
Current: 2016

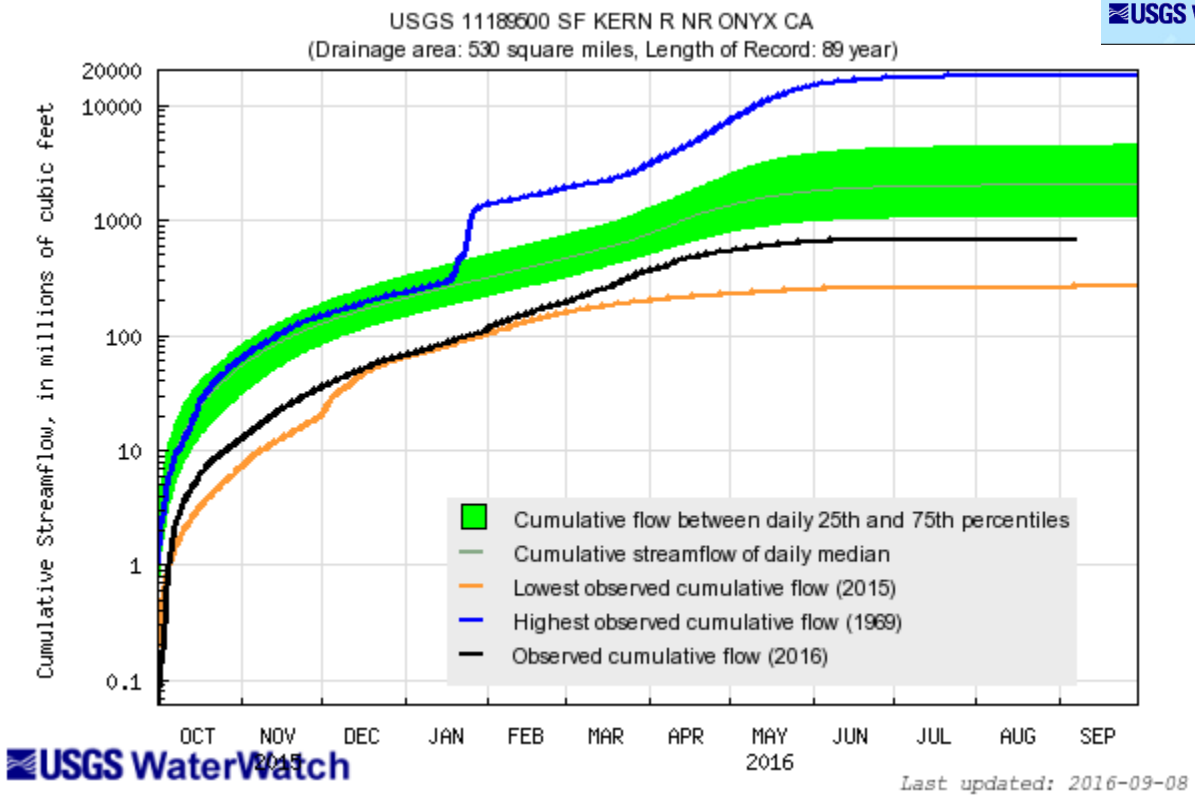
Maximum: 1982

Minimum: 1977

Streamflow

- South Fork Kern River near Onyx
- Daily cumulative water year streamflow





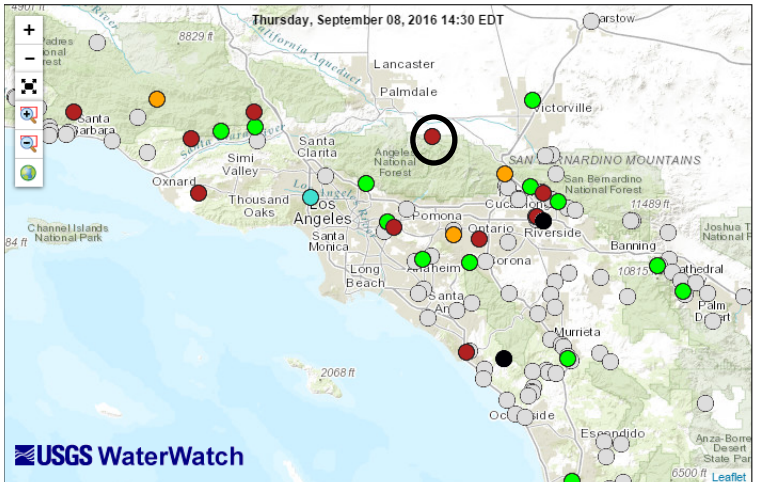
Current: 2016

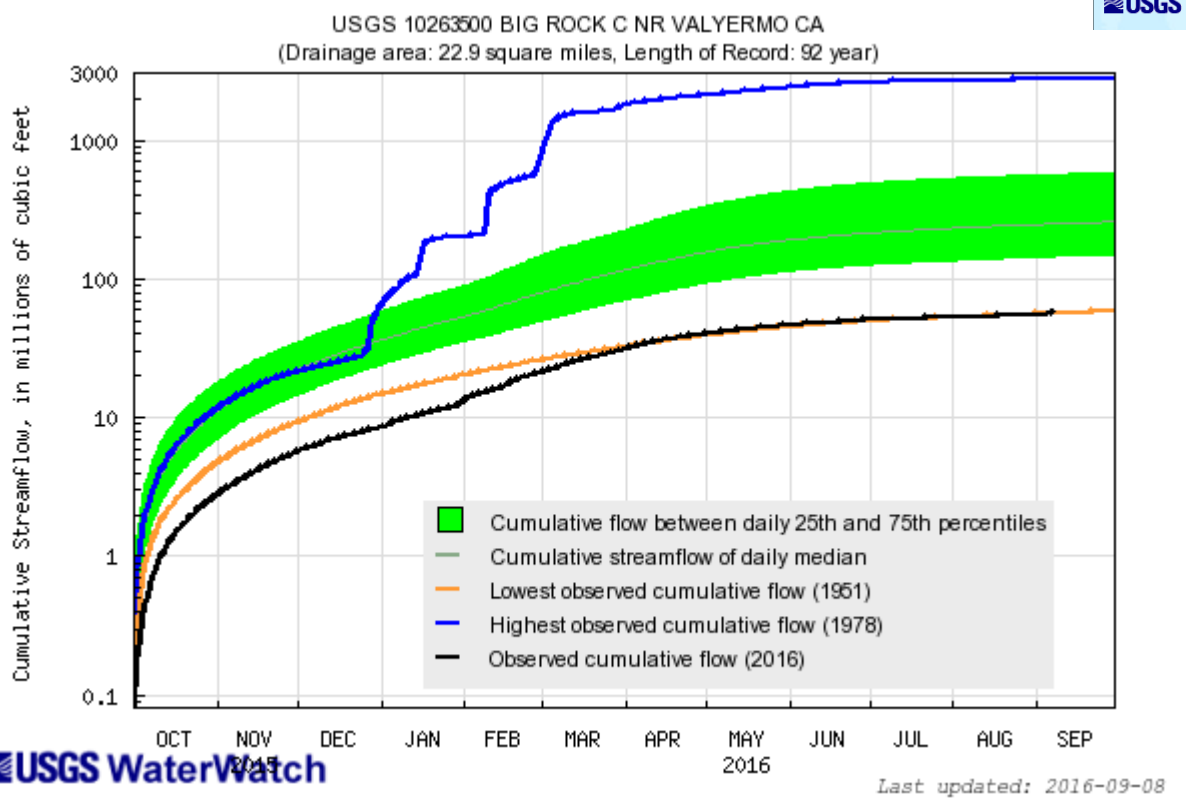
Maximum: 1969

Minimum: 2015

Streamflow

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





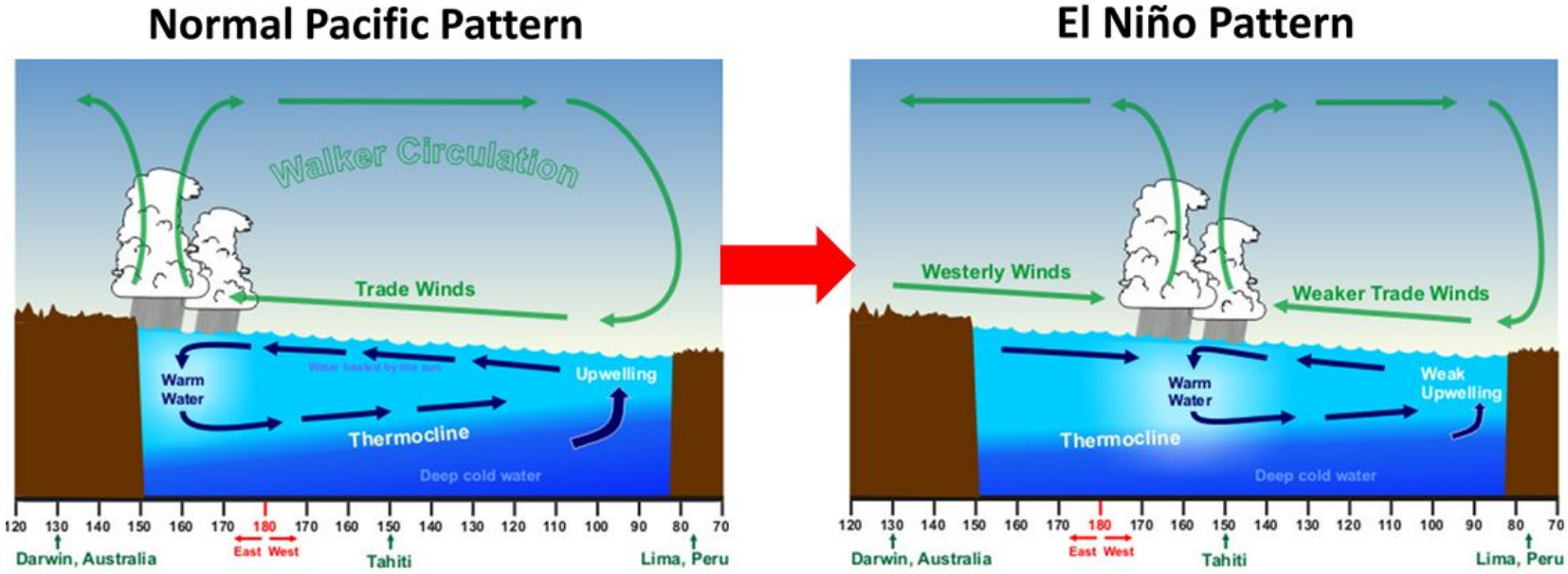
Current: 2016

Maximum: 1978

Minimum: 1951

El Niño Southern Oscillation (ENSO)

Source: NWS Los Angles/Oxnard



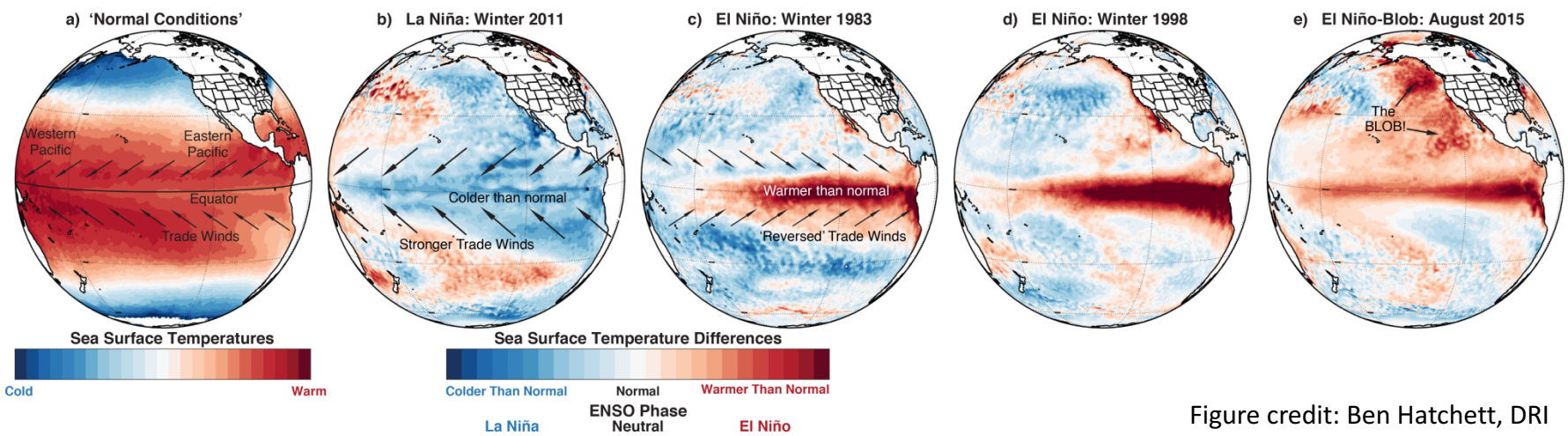
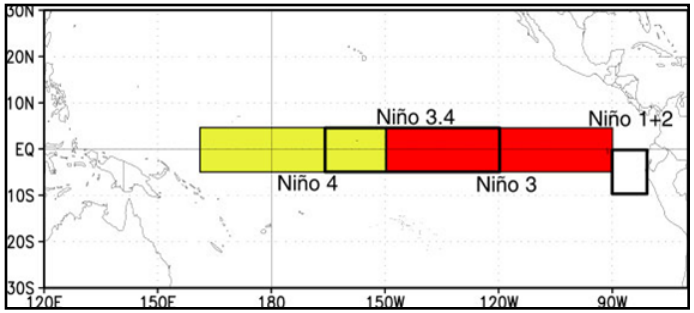


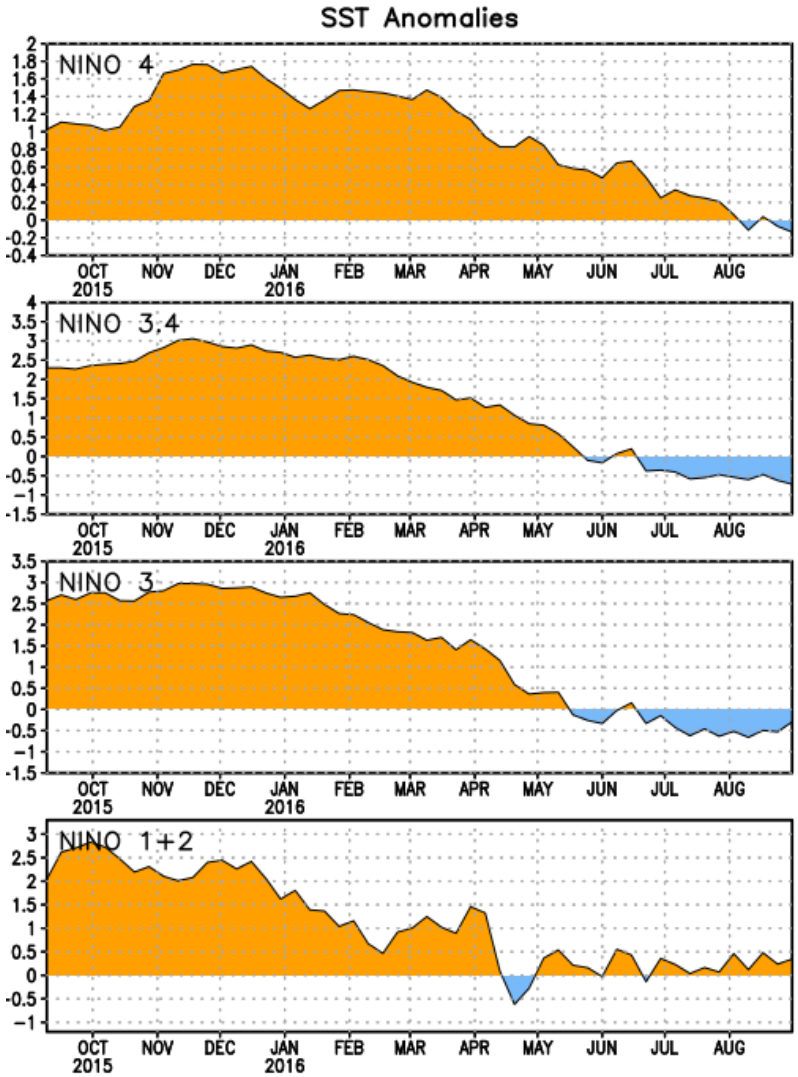
Figure credit: Ben Hatchett, DRI

El Niño Southern Oscillation (ENSO)

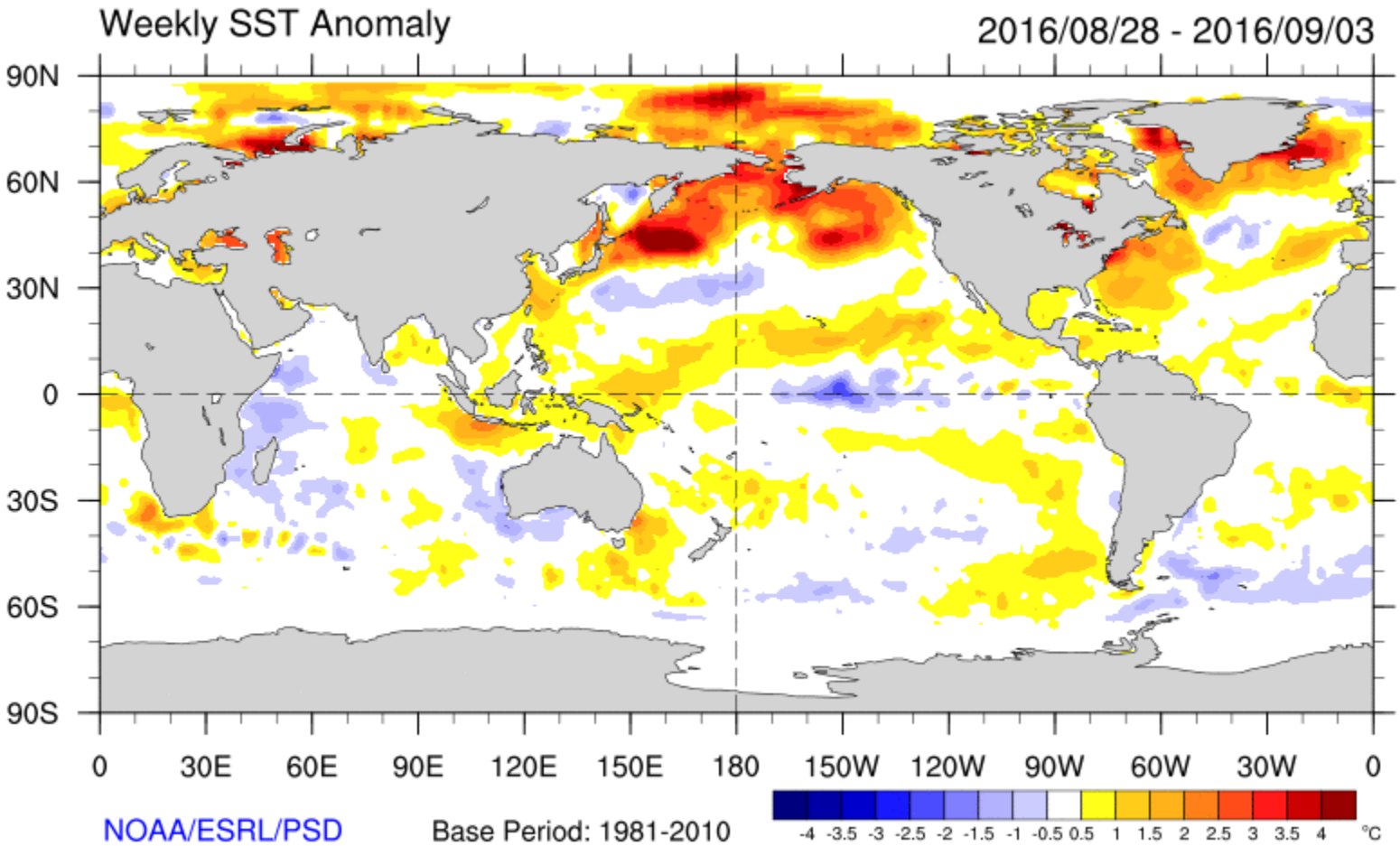
The latest weekly SST departures are:

Niño 4	**-0.1ºC**
Niño 3.4	**-0.7ºC**
Niño 3	**-0.3ºC**
Niño 1+2	**0.3ºC**

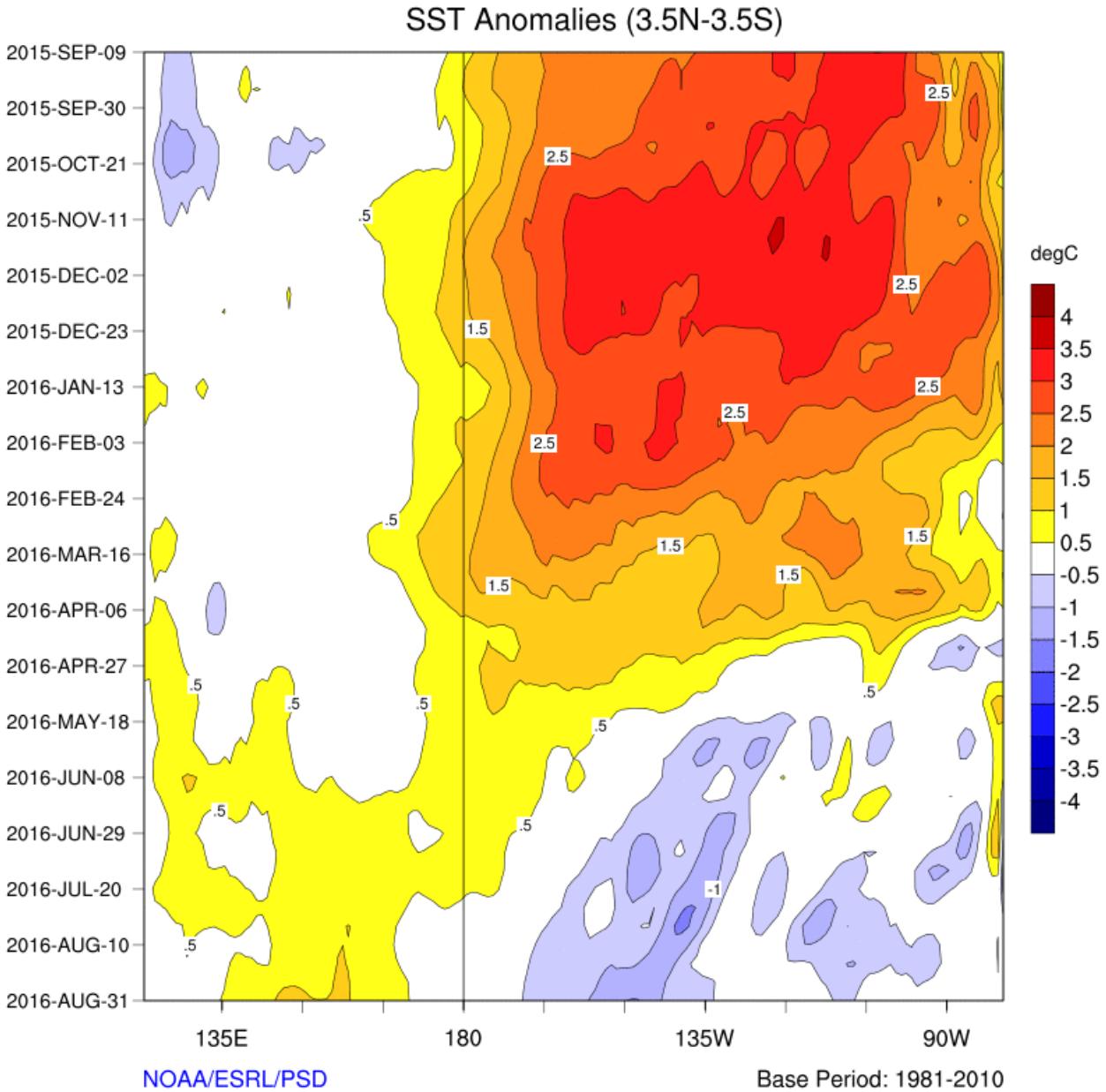




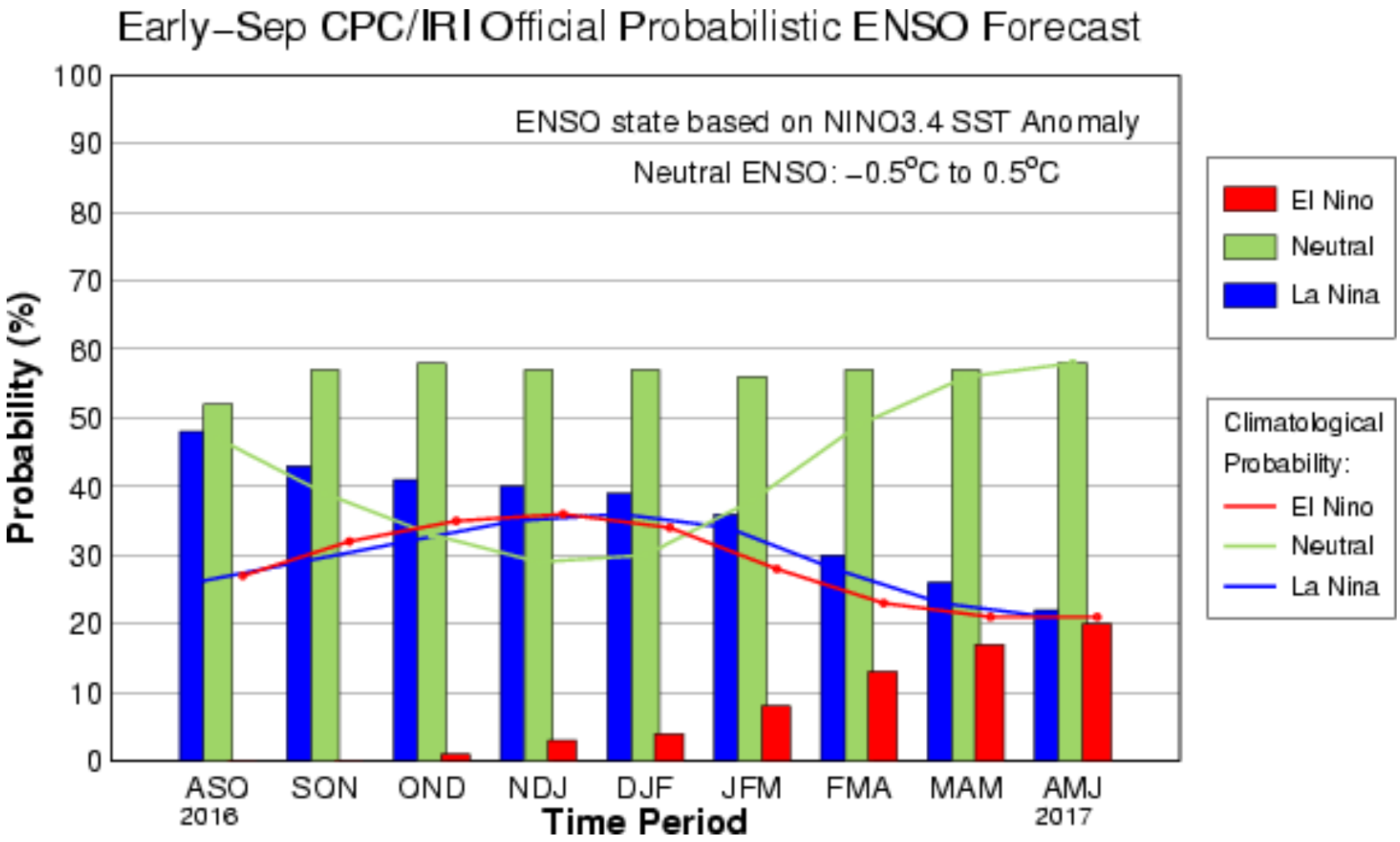
El Niño Southern Oscillation (ENSO)



El Niño Southern Oscillation (ENSO)



El Niño Southern Oscillation (ENSO)



Thank you!

Questions?

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