

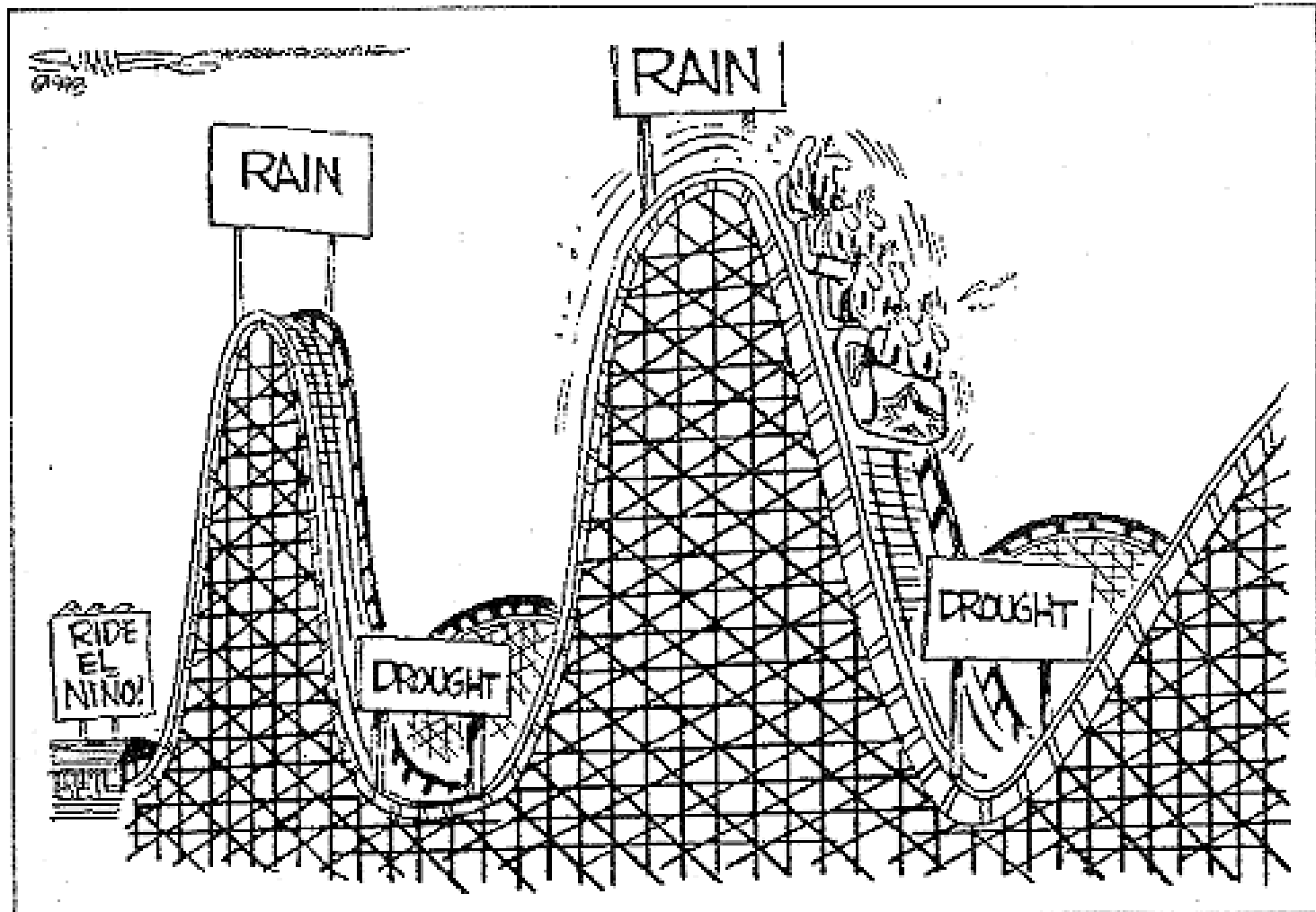
# **Water Supply Outlook: How El Niño is Affecting California's Water Supply**

WaterReuse Association  
Northern California Chapter Meeting

Mark Bluestein  
Supervising Administrative Engineer

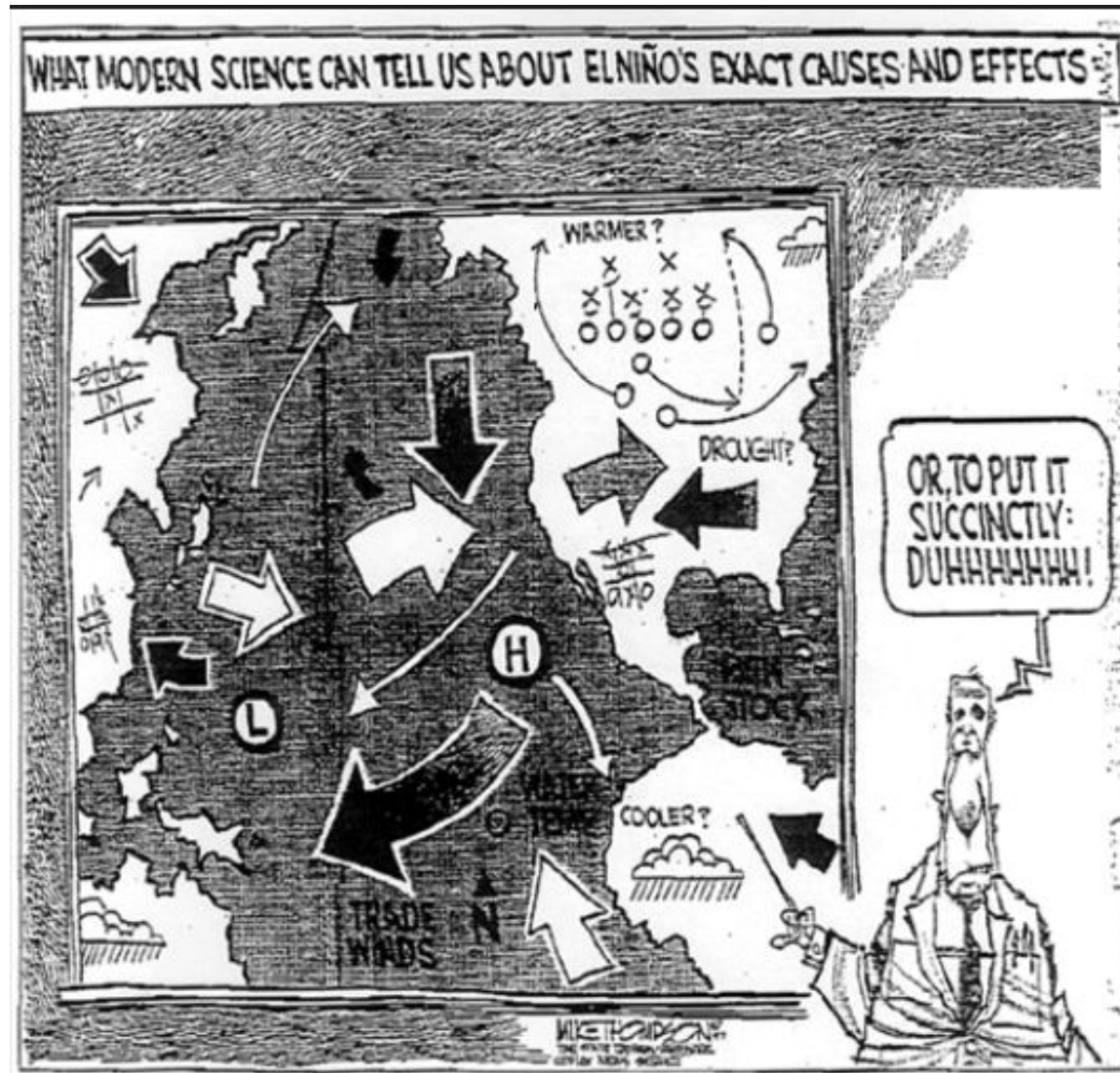
February 26, 2016

# What is El Niño?

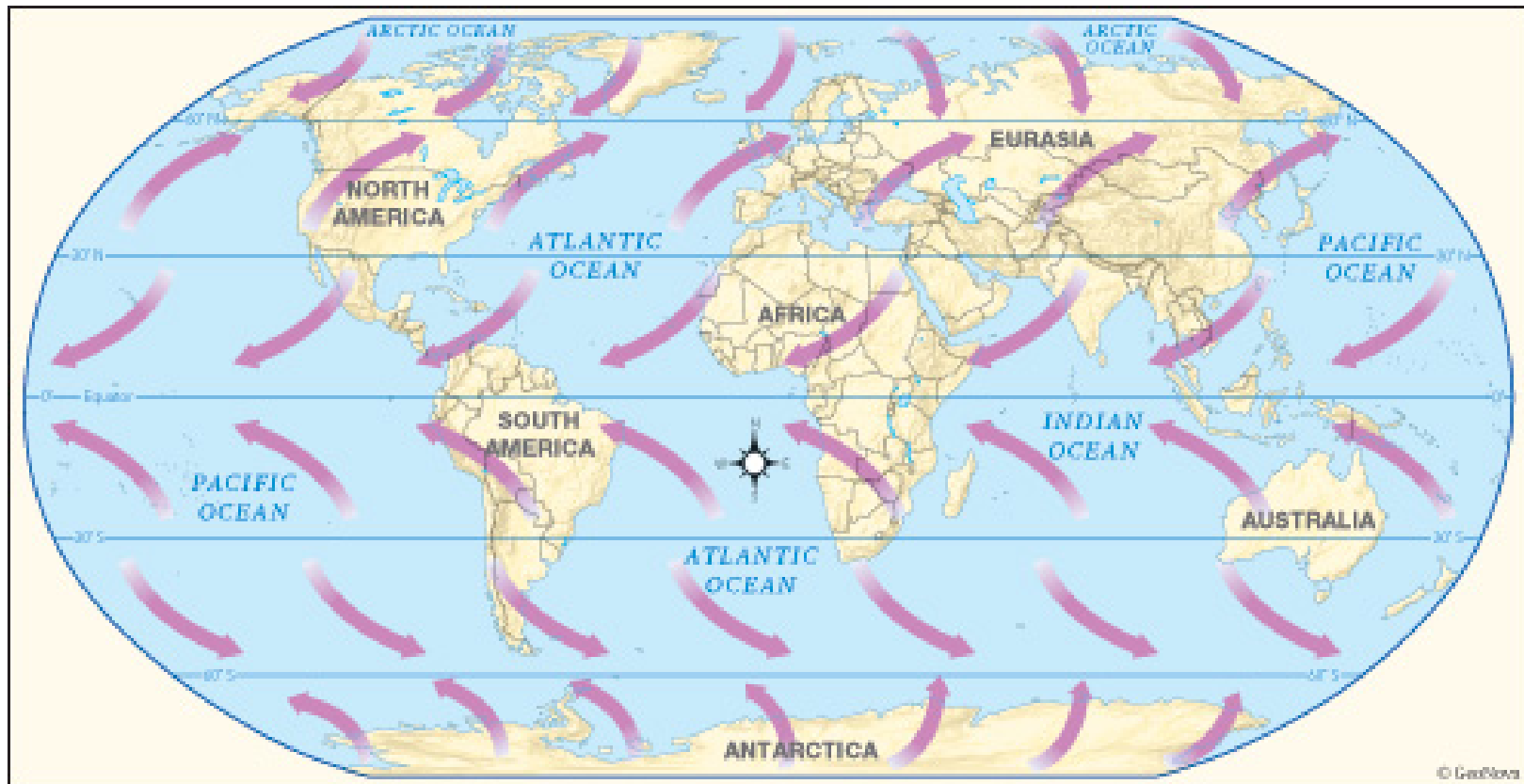


By Dana Summers, The Orlando (Fla.) Sentinel, Tribune Media Services

# What is El Niño?

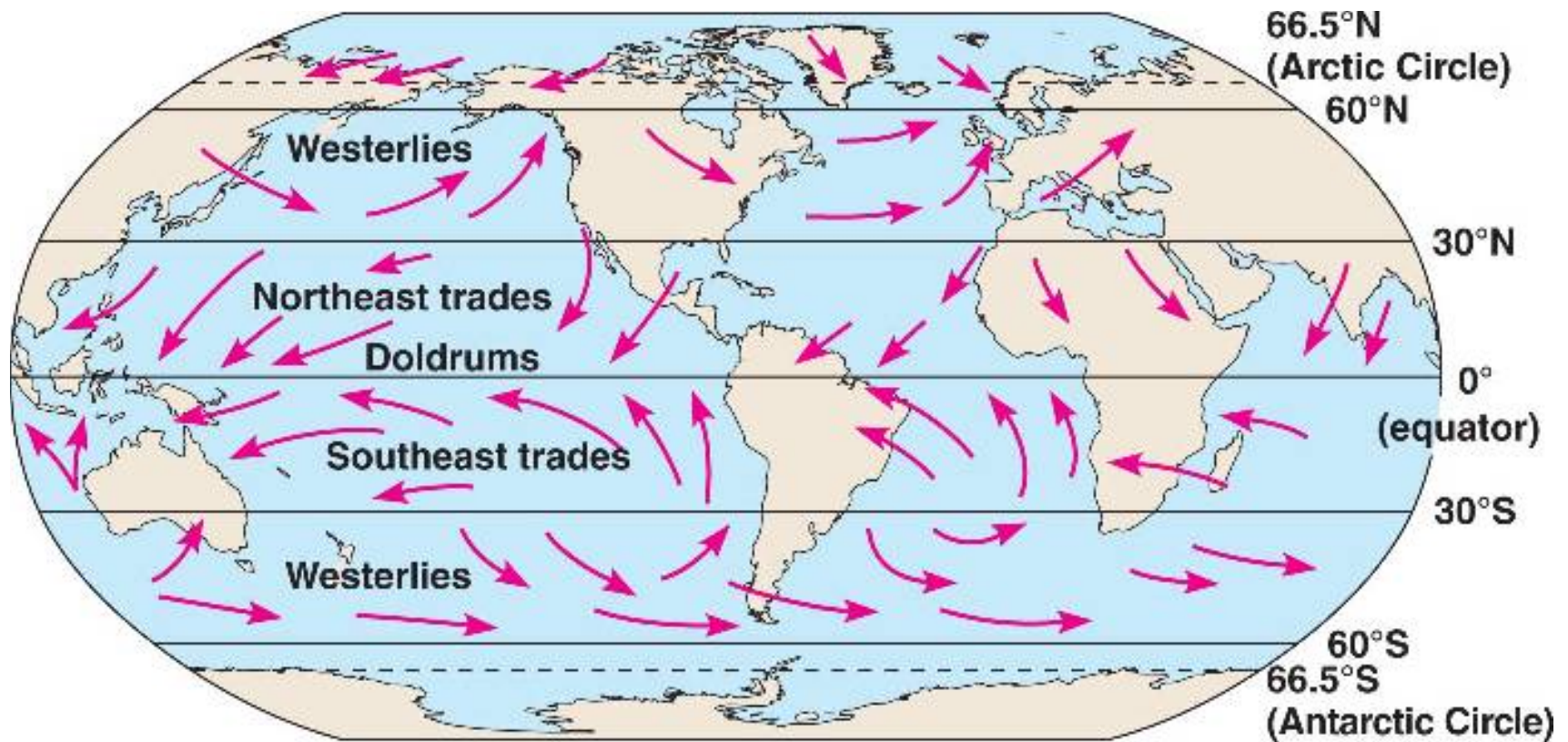


# Global Prevailing Winds

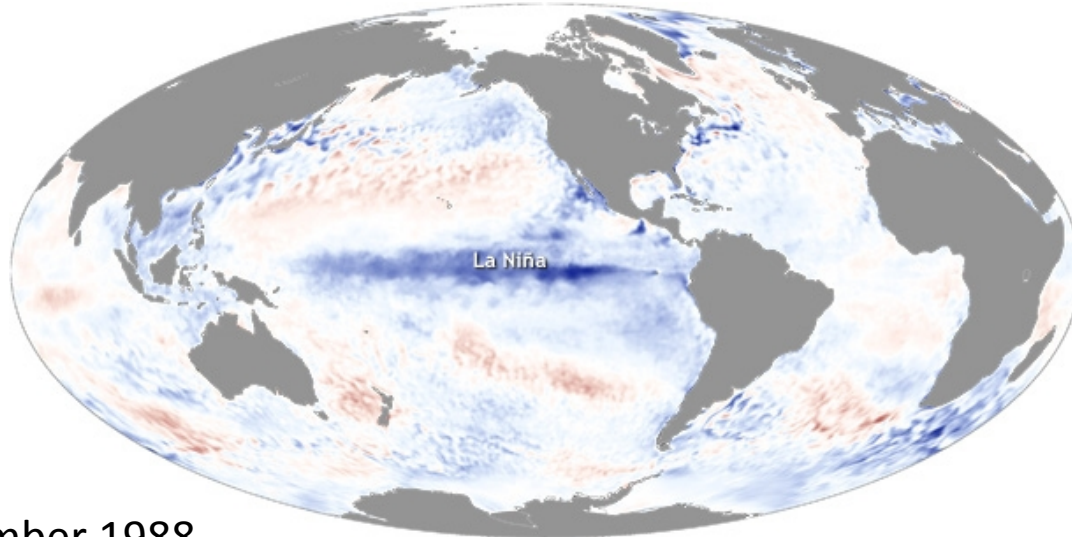




# Global Prevailing Winds



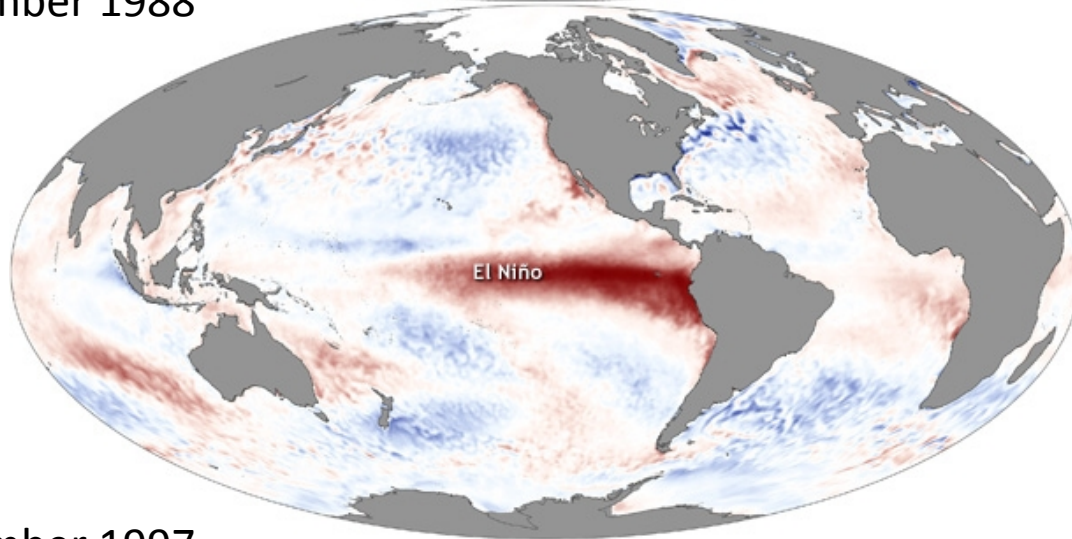
# La Niña vs El Niño



## La Niña

Stronger trade winds

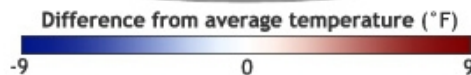
December 1988



## El Niño

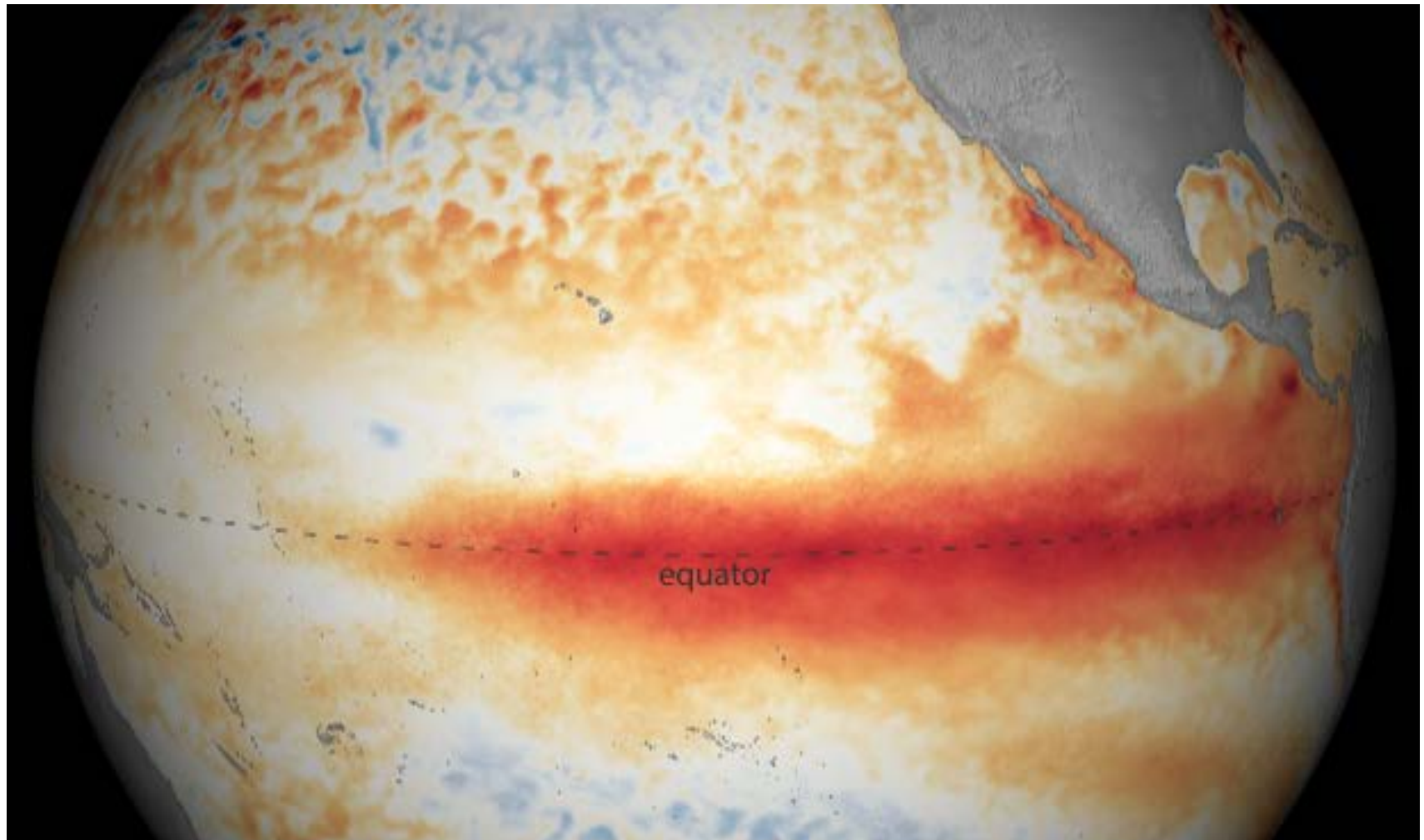
Weaker trade winds

December 1997



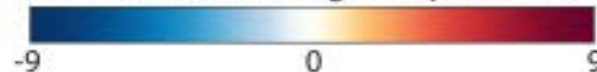


# 2016 Conditions: Strong El Niño



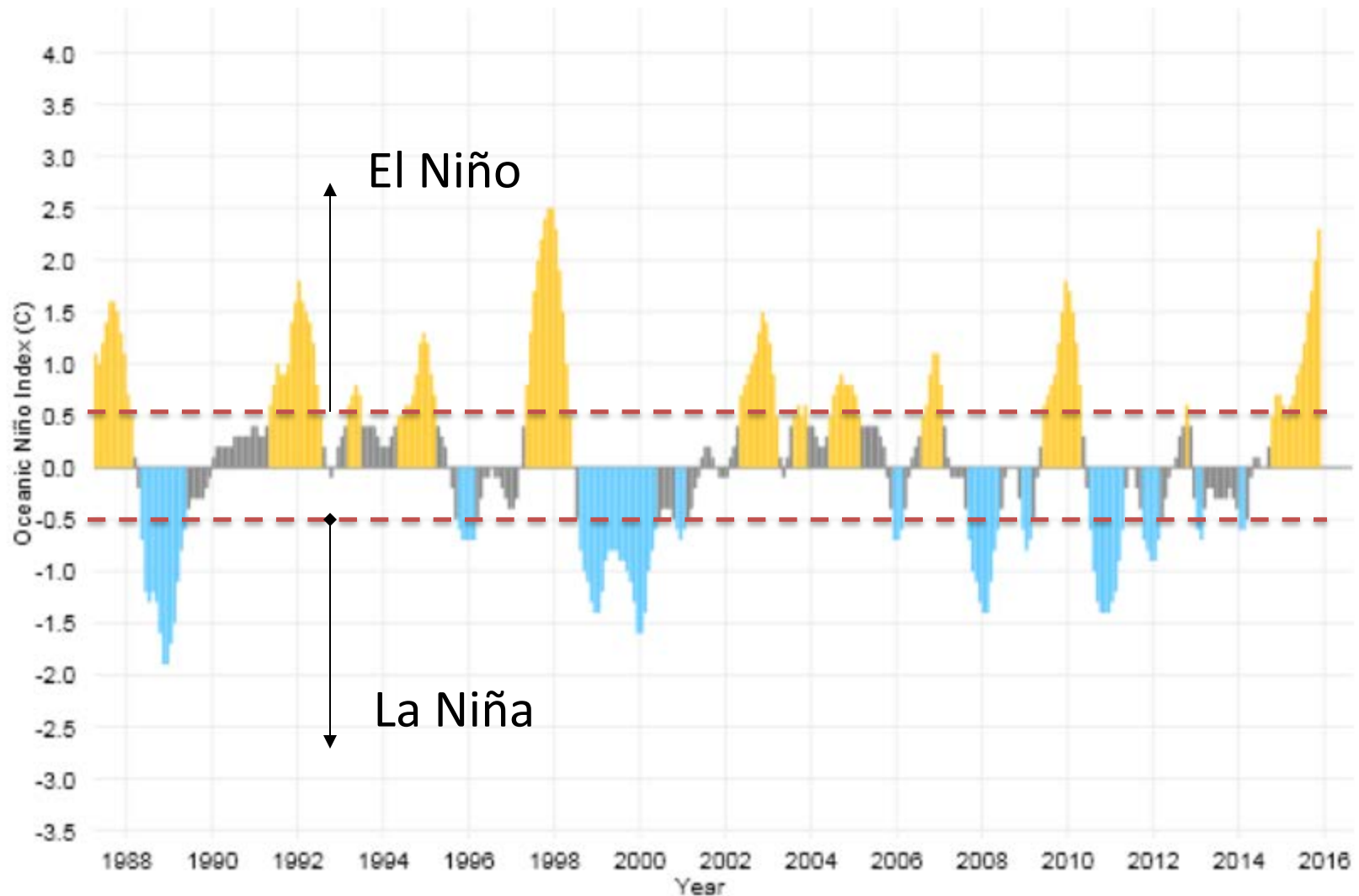
January 2016  
compared to 1981-2010

Difference from average temperature (°F)



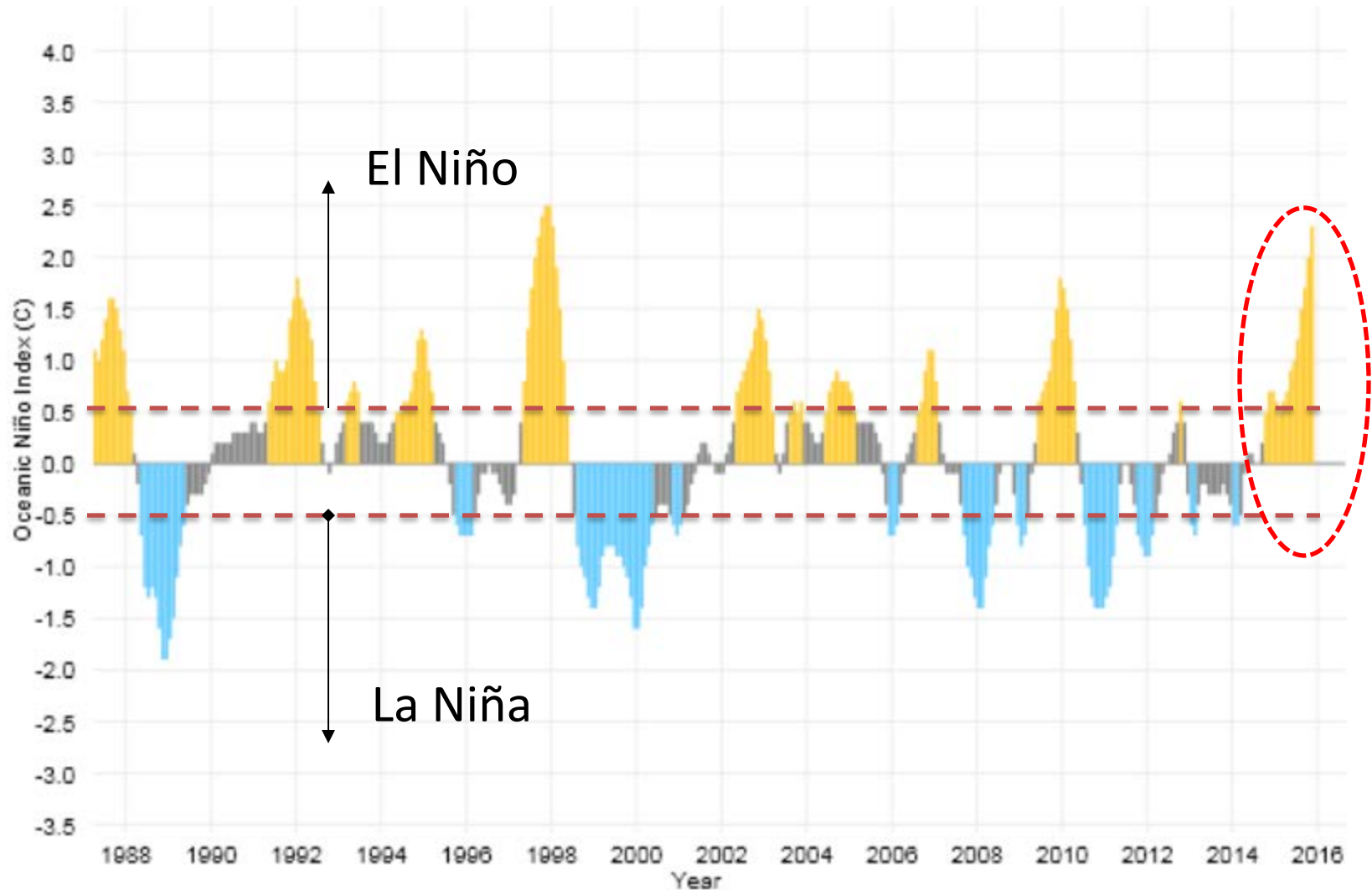
Climate.gov/NNVL  
Data: Geo-Polar SST

# El Niño - Southern Oscillation ENSO





# El Niño - Southern Oscillation ENSO

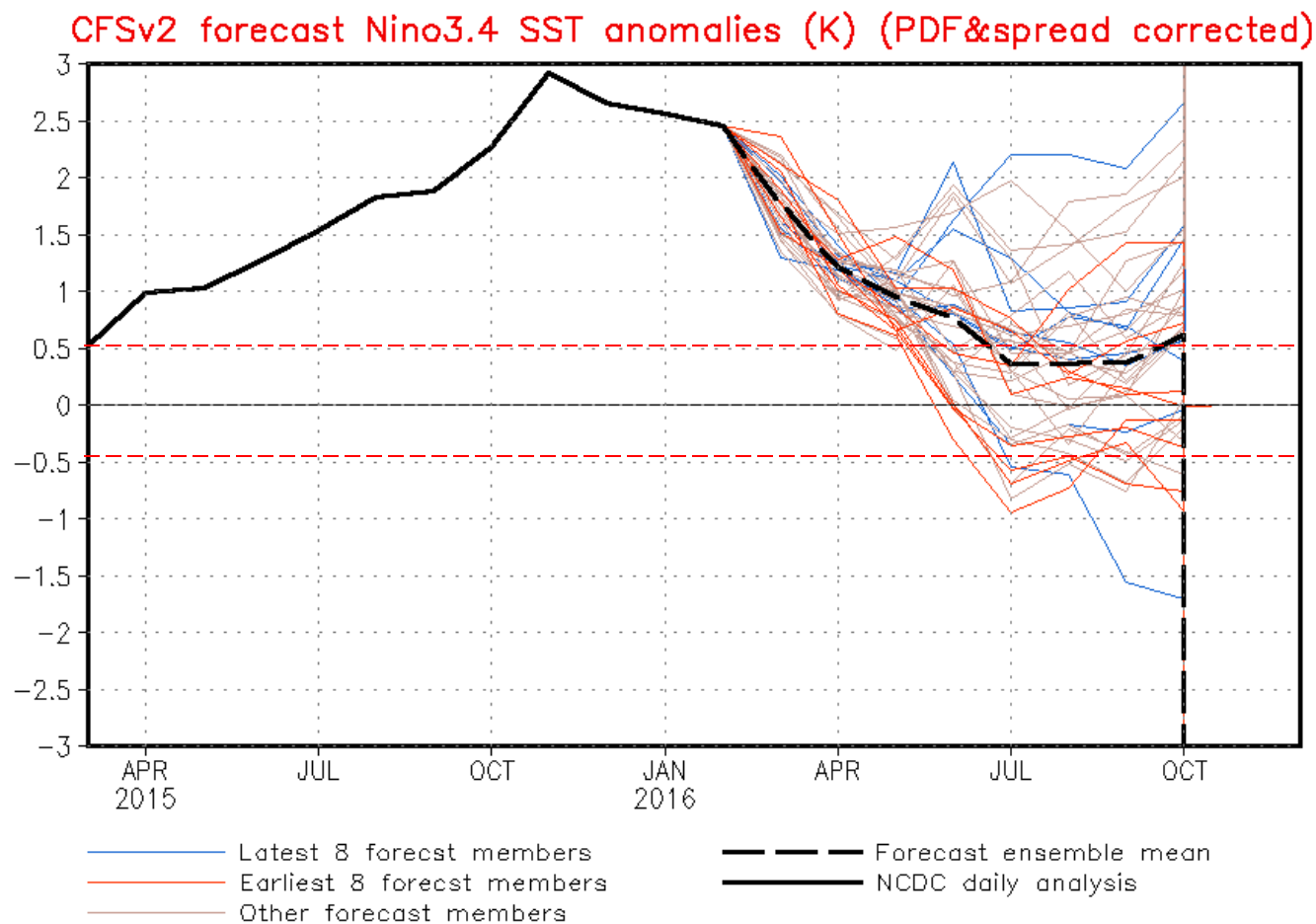


# El Nino Conditions Are Weakening



NWS/NCEP/CPC

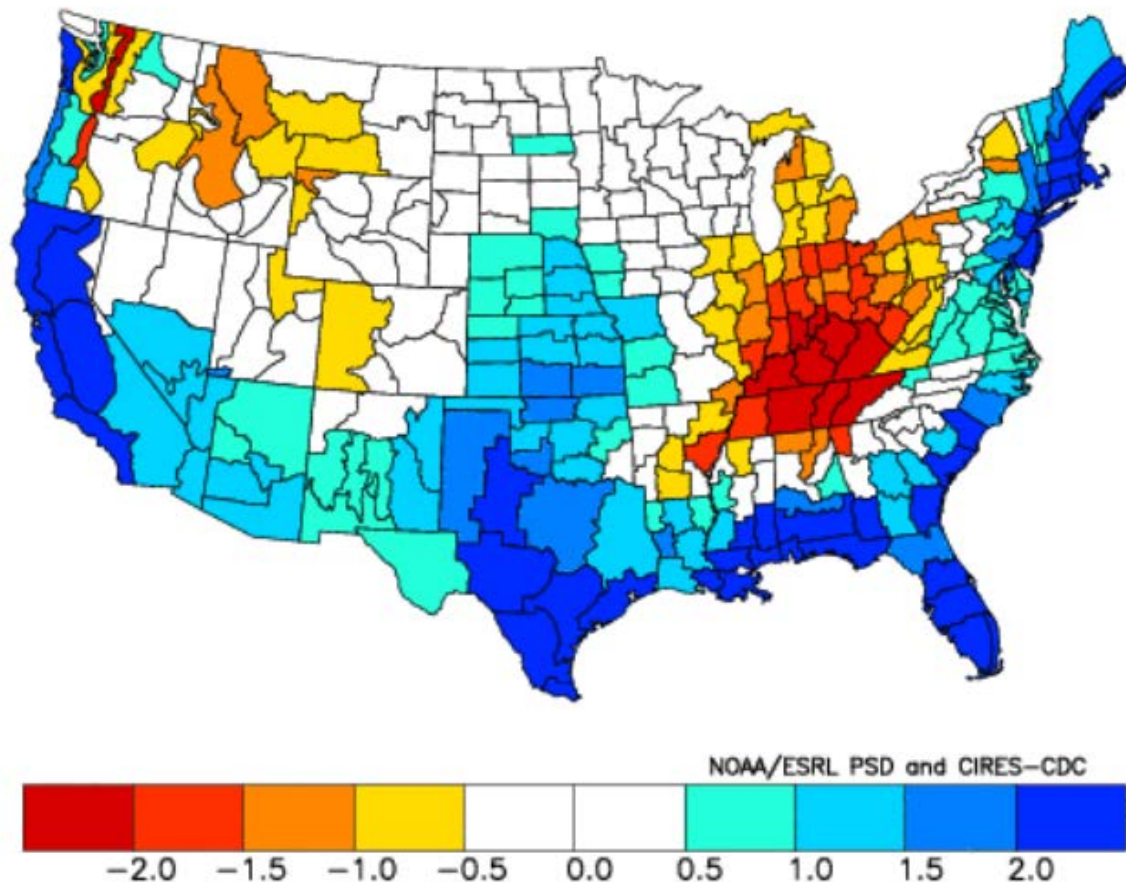
Last update: Wed Feb 24 2016  
Initial conditions: 25Jan2016–3Feb2016



(Model bias correct base period: 1999–2010; Climatology base period: 1982–2010)

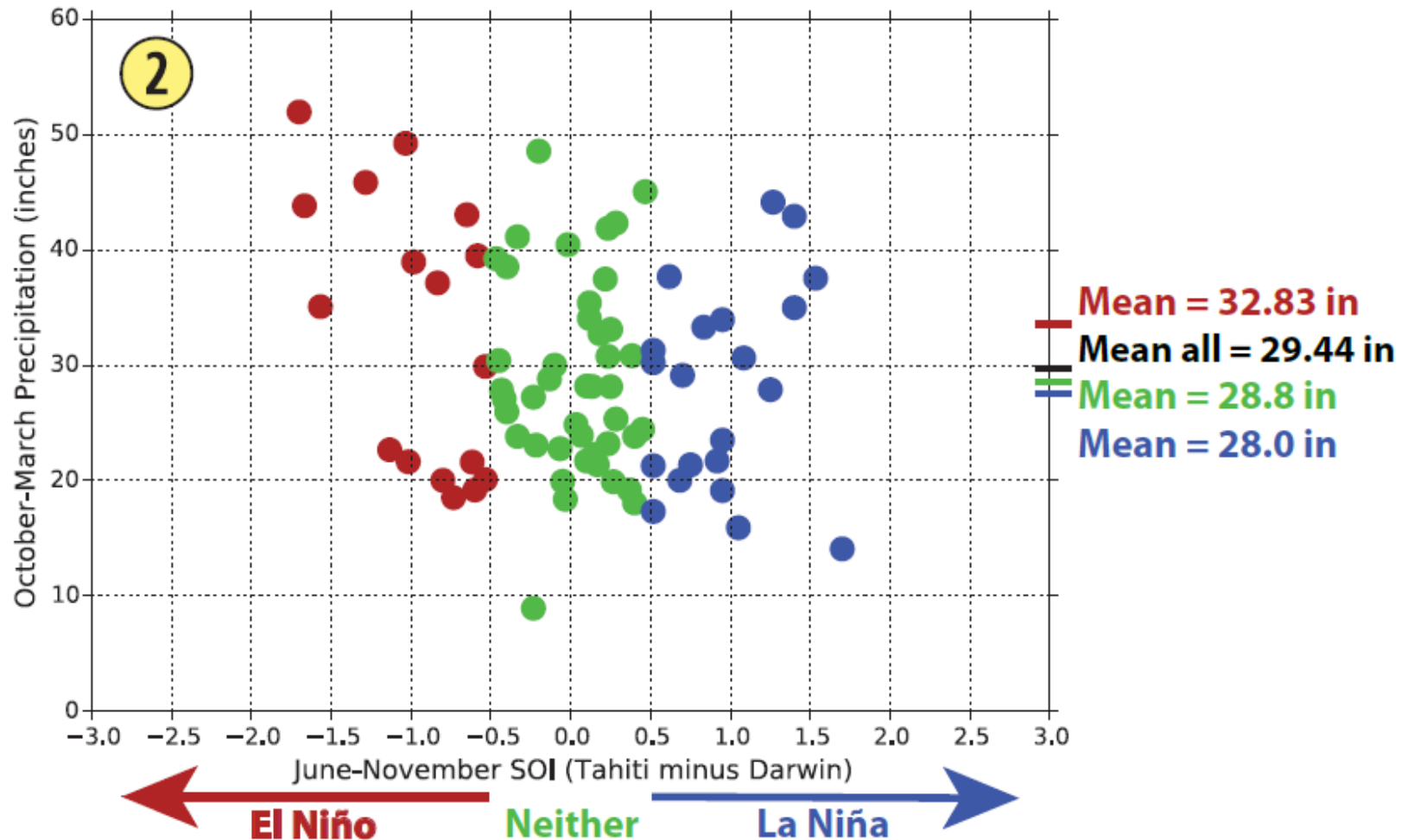
# Precipitation in California is usually greater during El Niño conditions

Composite Precipitation Anomalies (inches)  
Jan to Mar 1958, 1966, 1973, 1983, 1992, 1999, 2010  
Versus 1950–1995 Longterm Average



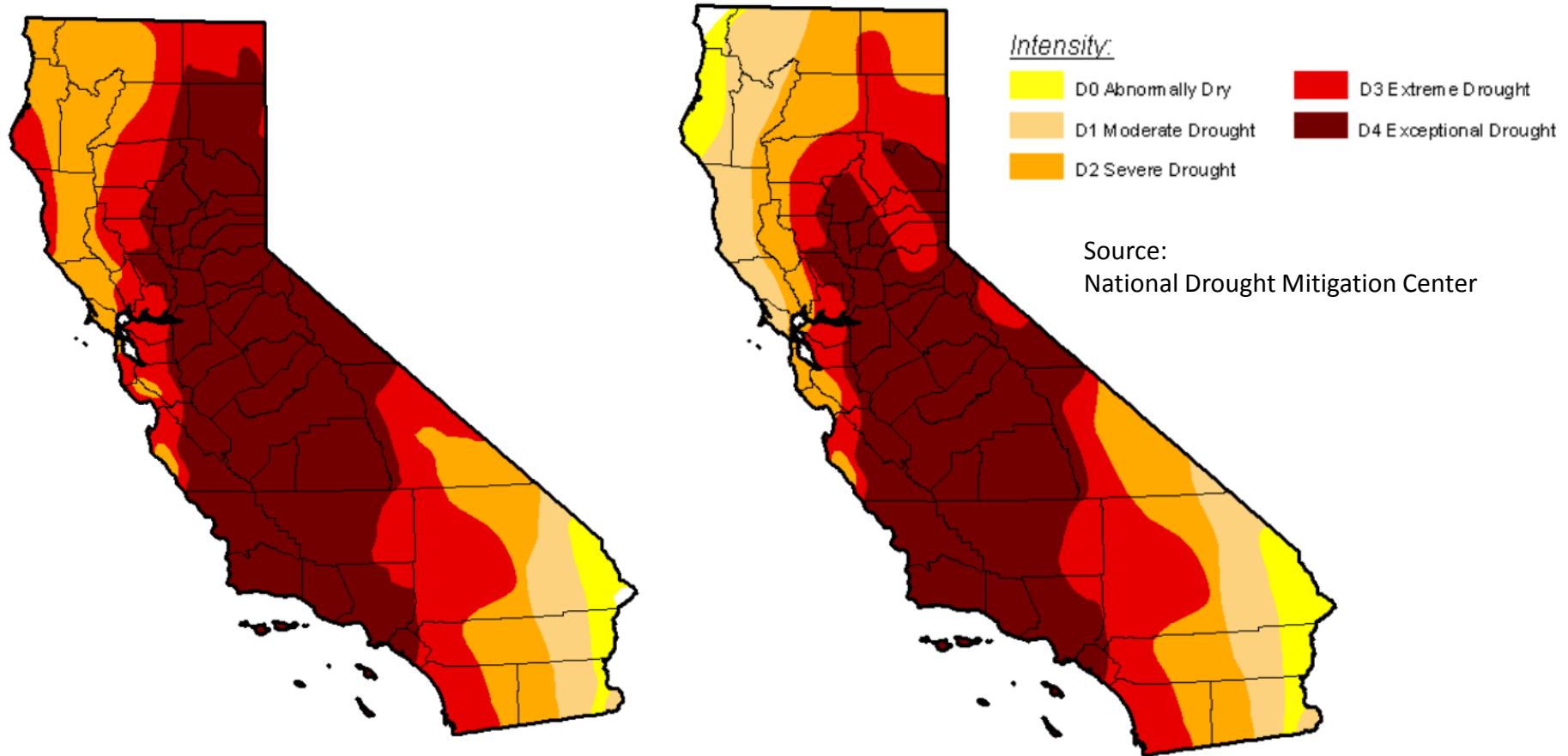


# Precipitation in California is usually greater during El Niño conditions



**Sacramento Valley**

# Drought Conditions Remain But Are Improving

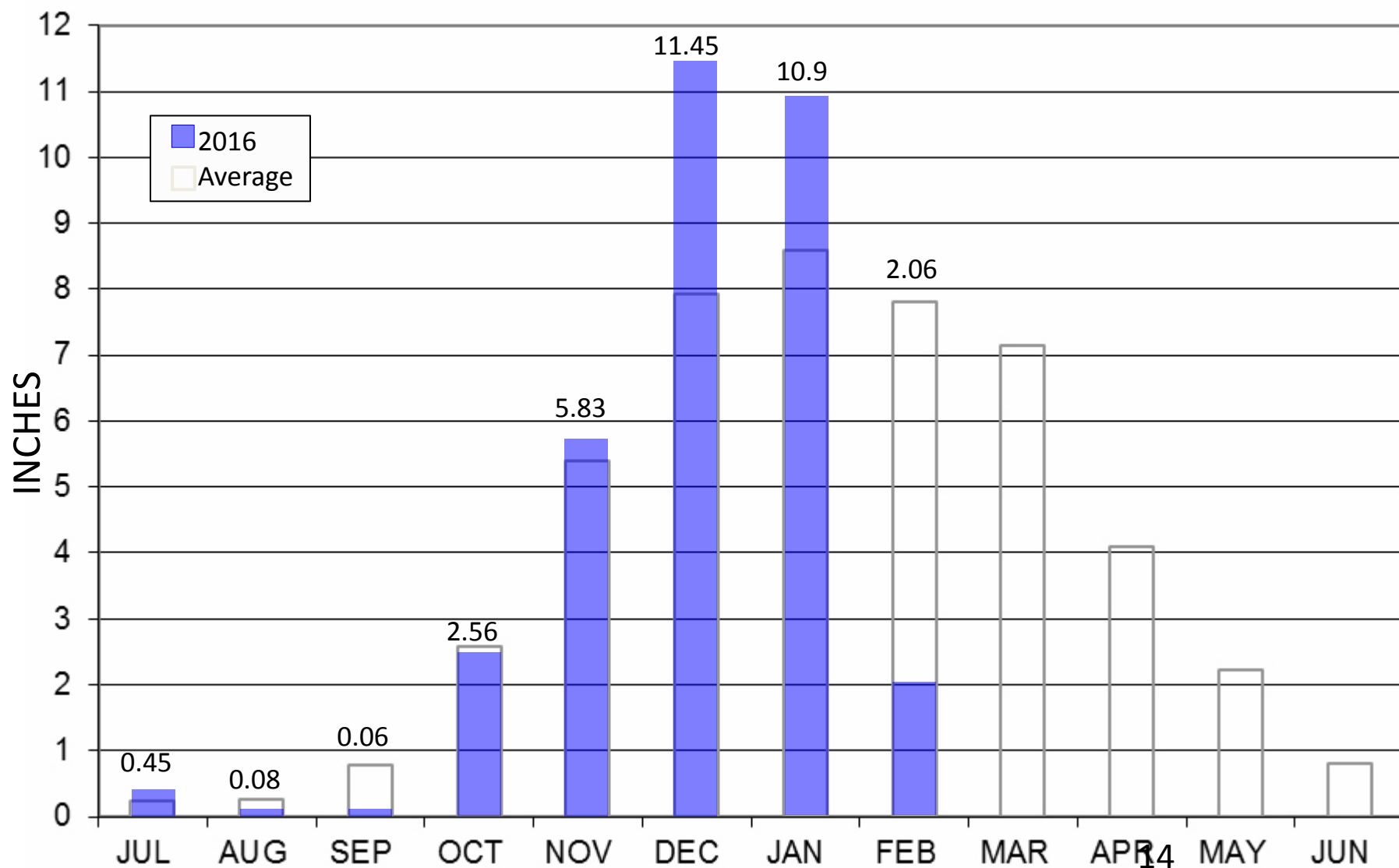


September 29, 2015

February 16, 2016

# Precipitation To Date

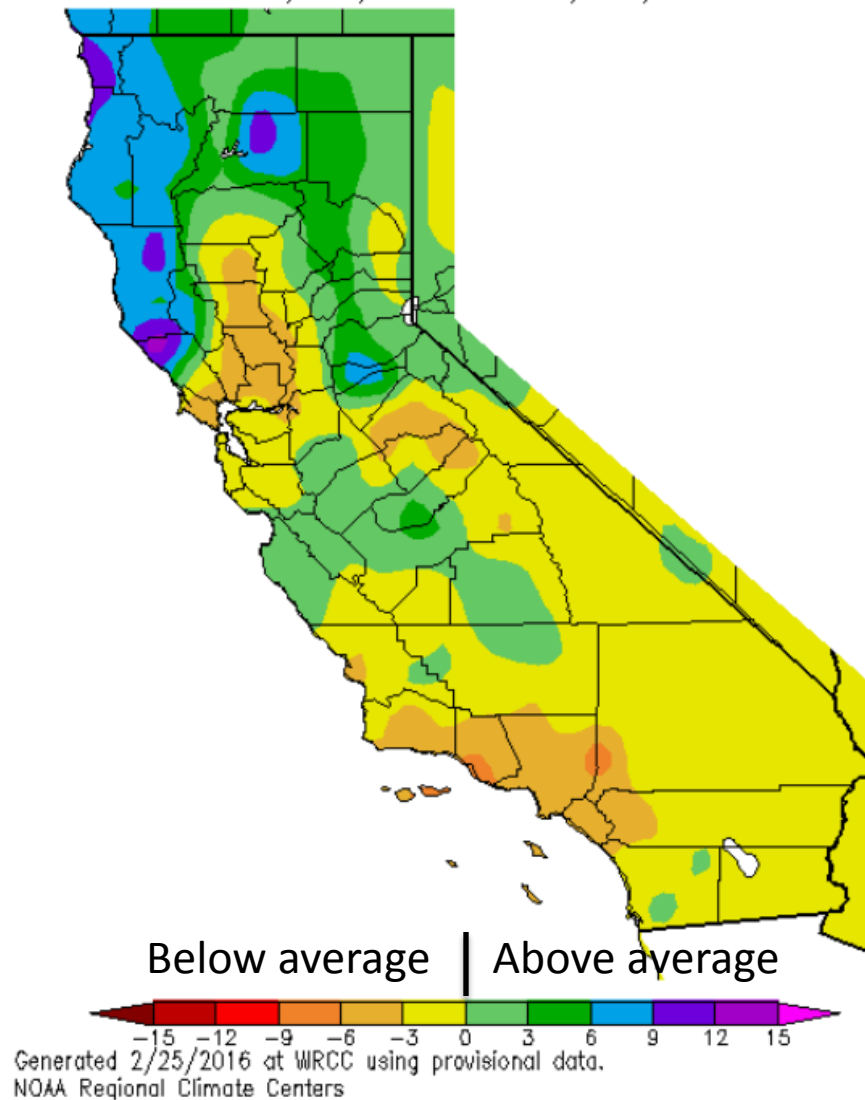
## Mokelumne River Watershed



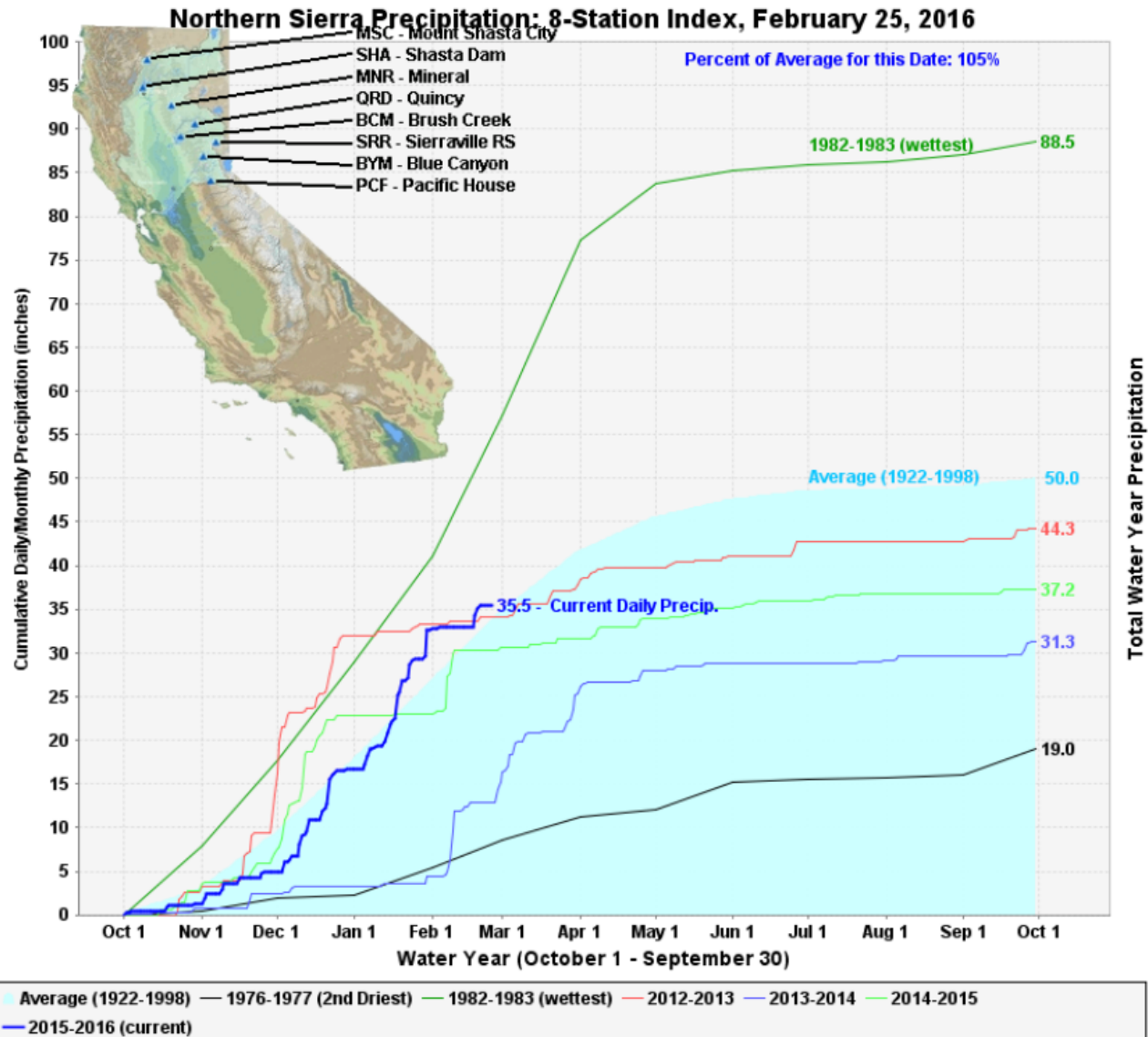


# Precipitation Departure from Average

11/27/15 – 2/24/16

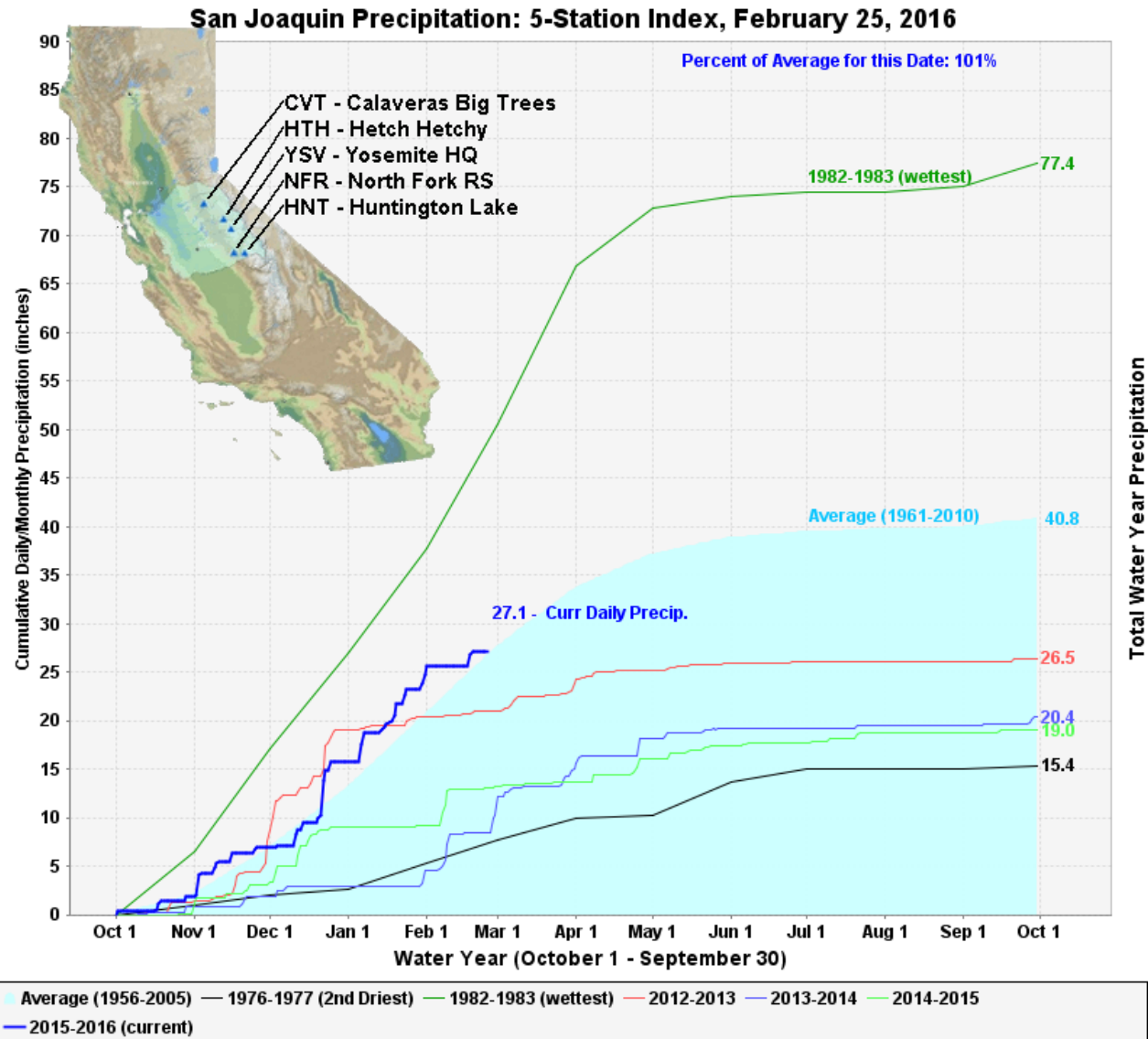


# Northern Sierra Precipitation



Source:  
California Data  
Exchange Center

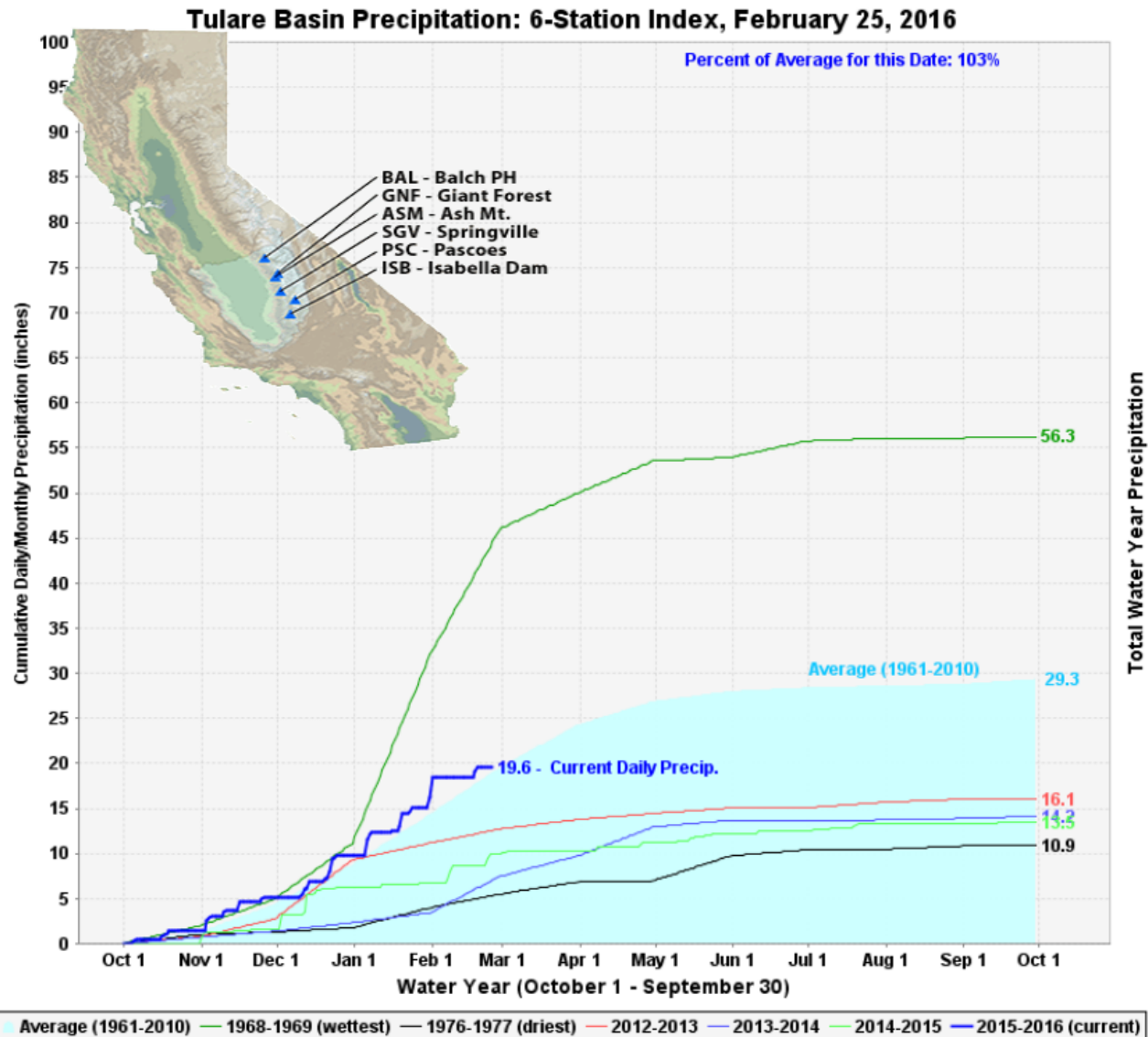
# Central Sierra Precipitation



Source:  
California Data  
Exchange Center



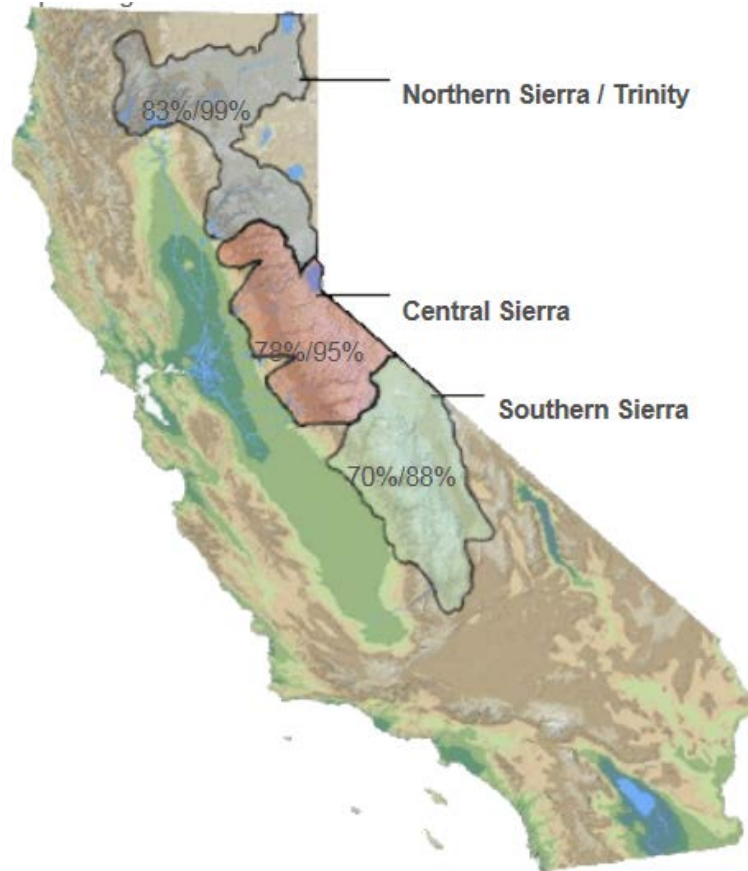
# Southern Sierra Precipitation



Source:  
California Data  
Exchange Center

# Snow Pack Conditions

## February 25, 2016

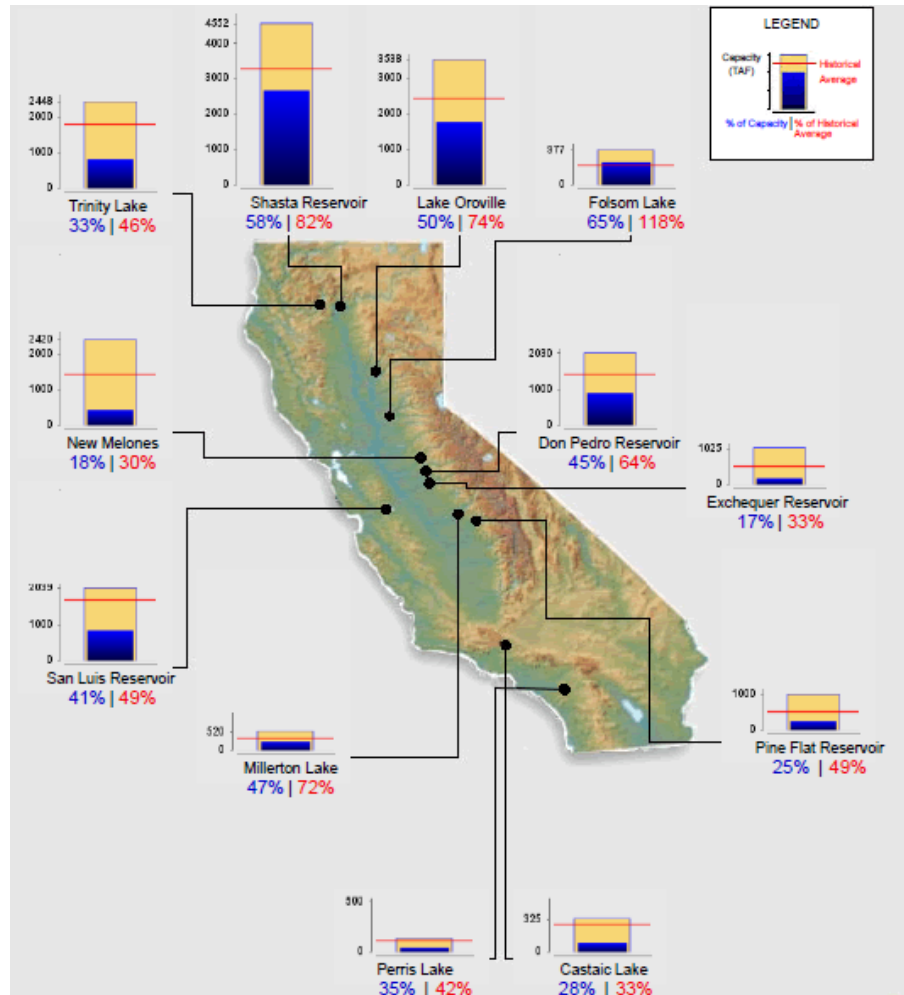


### Snow Water Content

	% of normal for this date	% of April 1 average
North	96%	83%
Central	92%	78%
South	84%	69%
Statewide	91%	77%

Source:  
California Data  
Exchange Center

# Surface Reservoir Conditions



## Sacramento Region

Reservoir	%Hist.Avg.	%Capacity	*Enrch
Shasta	82%	59%	-1202
Oroville	74%	51%	-1153
New Bullards	109%	70%	-124
Folsom	117%	64%	19

## San Joaquin Region

Reservoir	%Hist.Avg.	%Capacity	*Enrch
New Melones	30%	19%	-1525
Don Pedro	64%	45%	n/a
Exchequer	33%	17%	n/a
Millerton	74%	48%	n/a

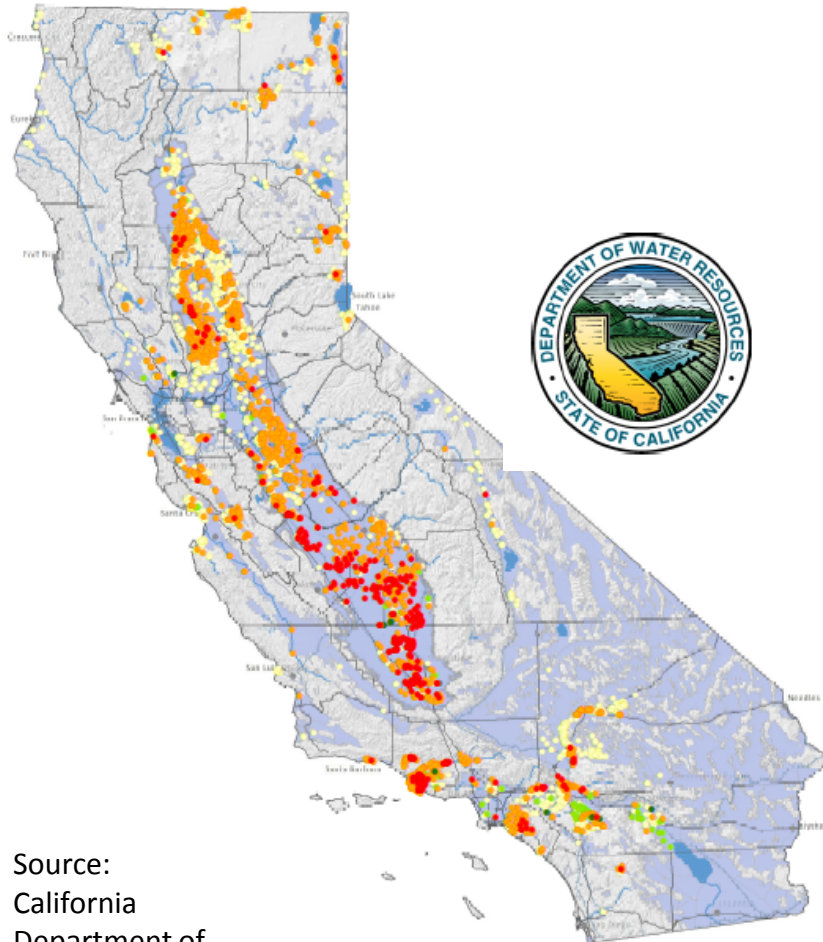
## Tulare Region

Reservoir	%Hist.Avg.	%Capacity	*Enrch
Pine Flat	49%	25%	n/a
Terminus	129%	17%	20
Success	82%	23%	4
Isabella	23%	7%	-203

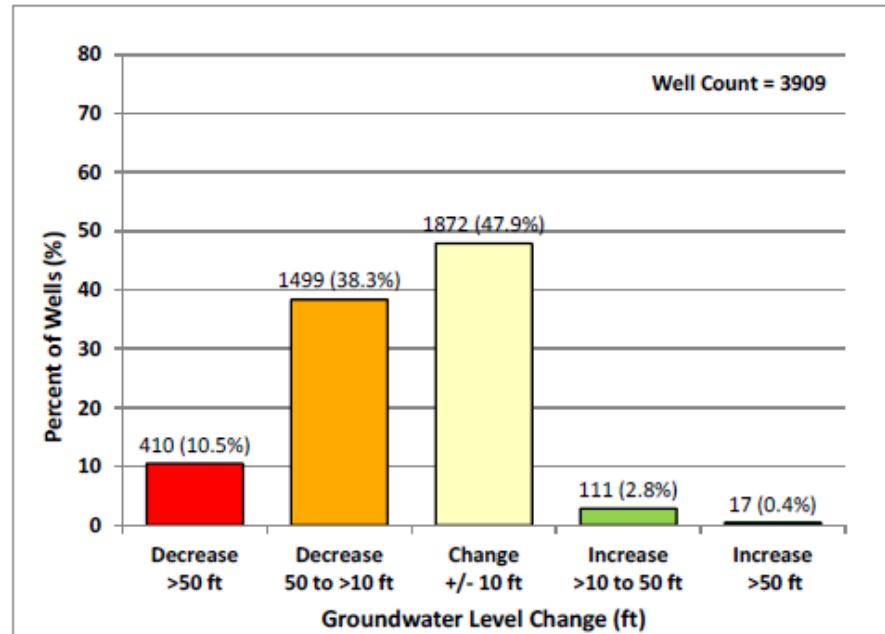
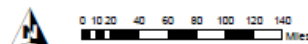
February 23, 2016

Source:  
California Data  
Exchange Center

# Groundwater Level Changes Fall 2011 to Fall 2015



Source:  
California  
Department of  
Water Resources

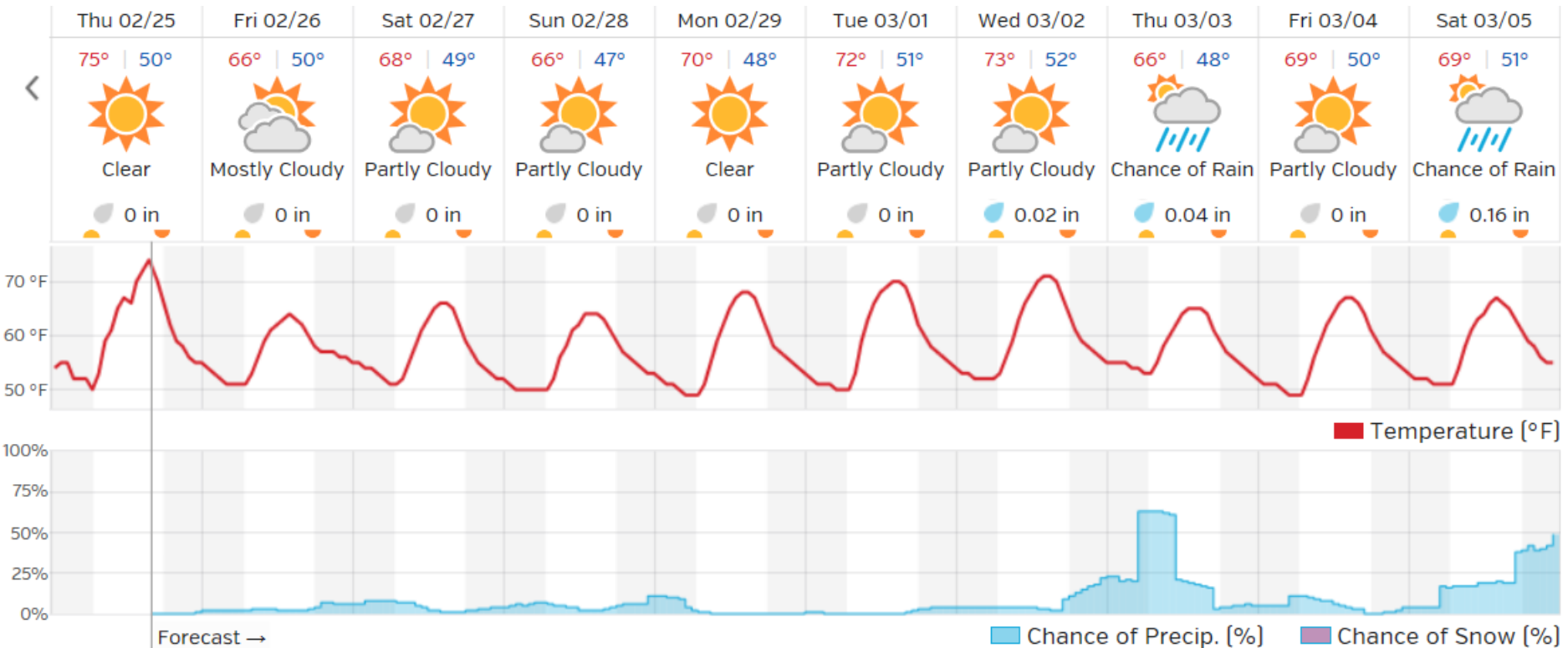


## Groundwater Level Change

- Increase > 50 feet
- Increase > 10 to 50 feet
- Change +/- 10 feet
- Decrease > 10 to 50 feet
- Decrease > 50 feet

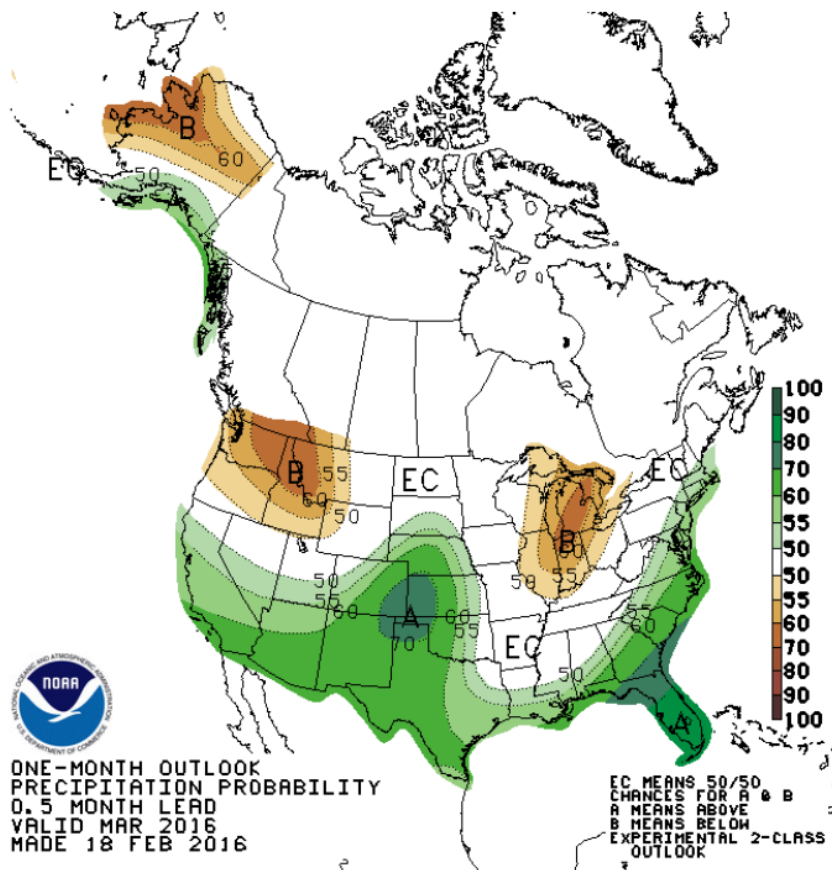


# Ten-day Forecast Oakland, CA

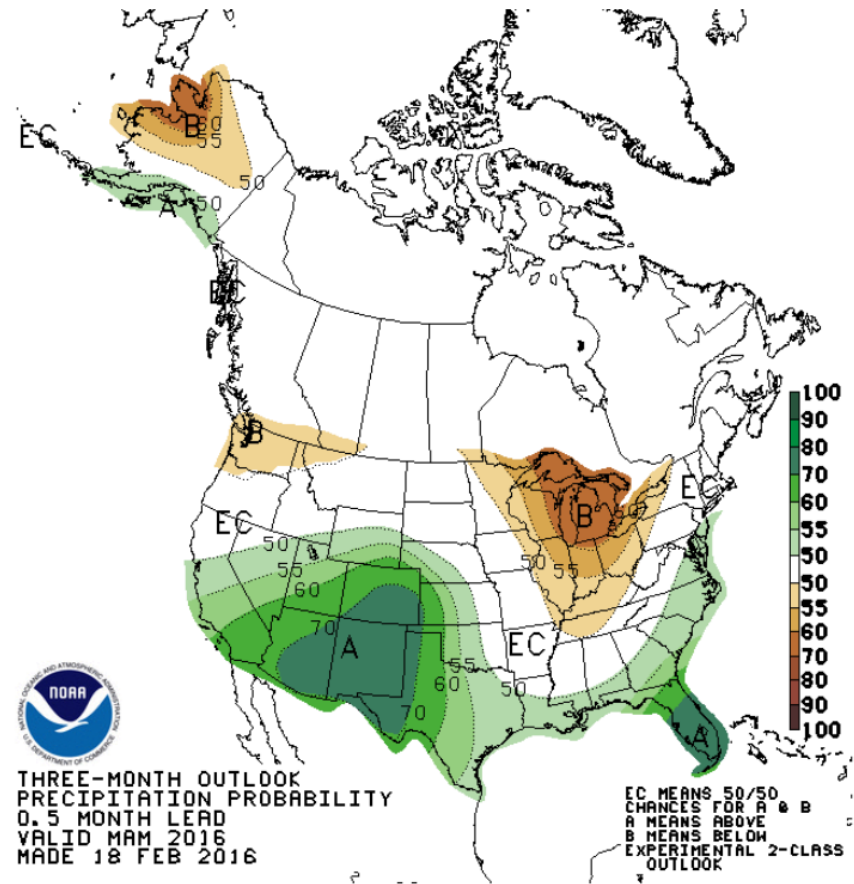


Source: Weather Underground

# Longer-Term Precipitation Forecast

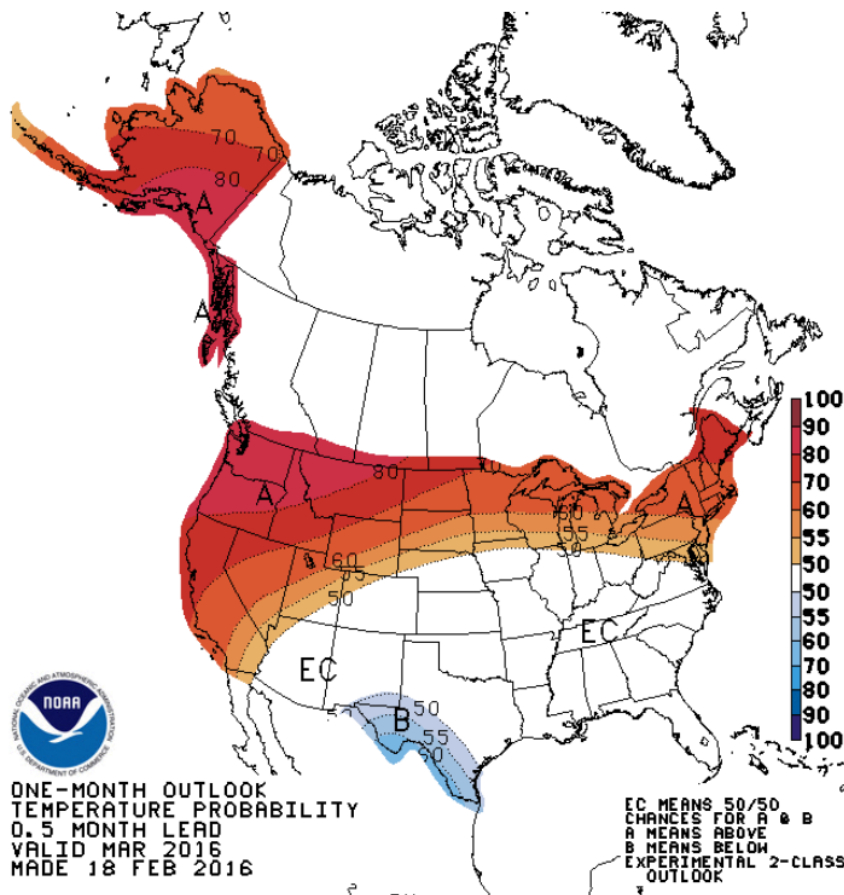


One-month outlook

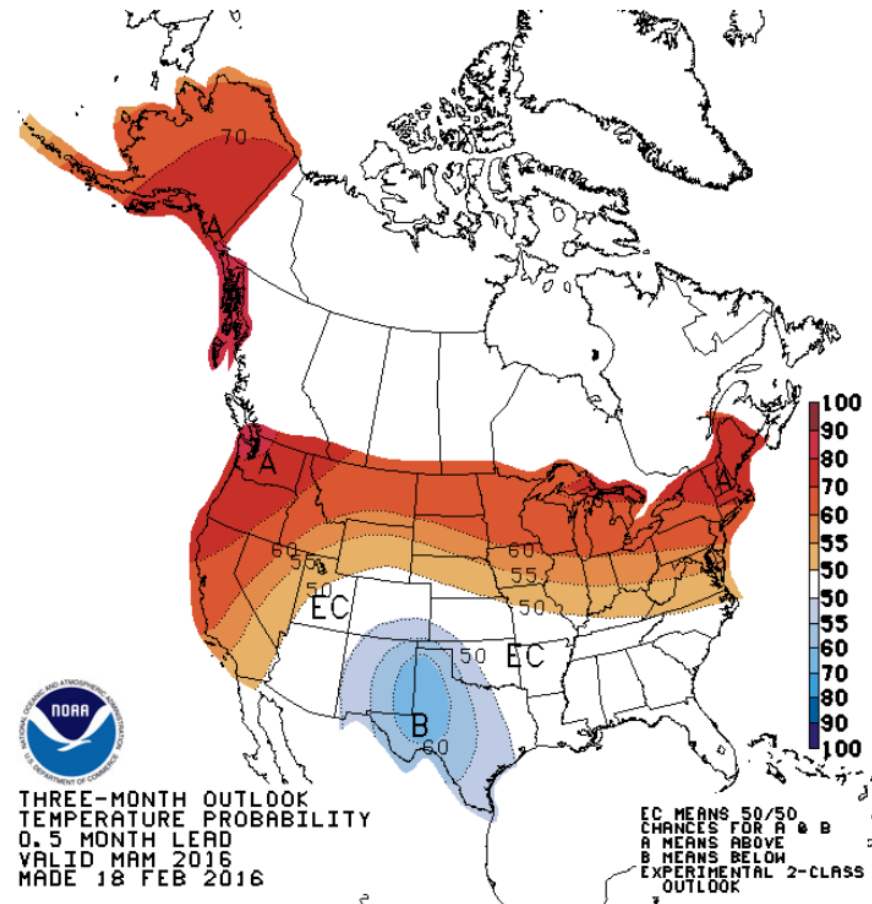


Three-month outlook

# Longer-Term Temperature Forecast

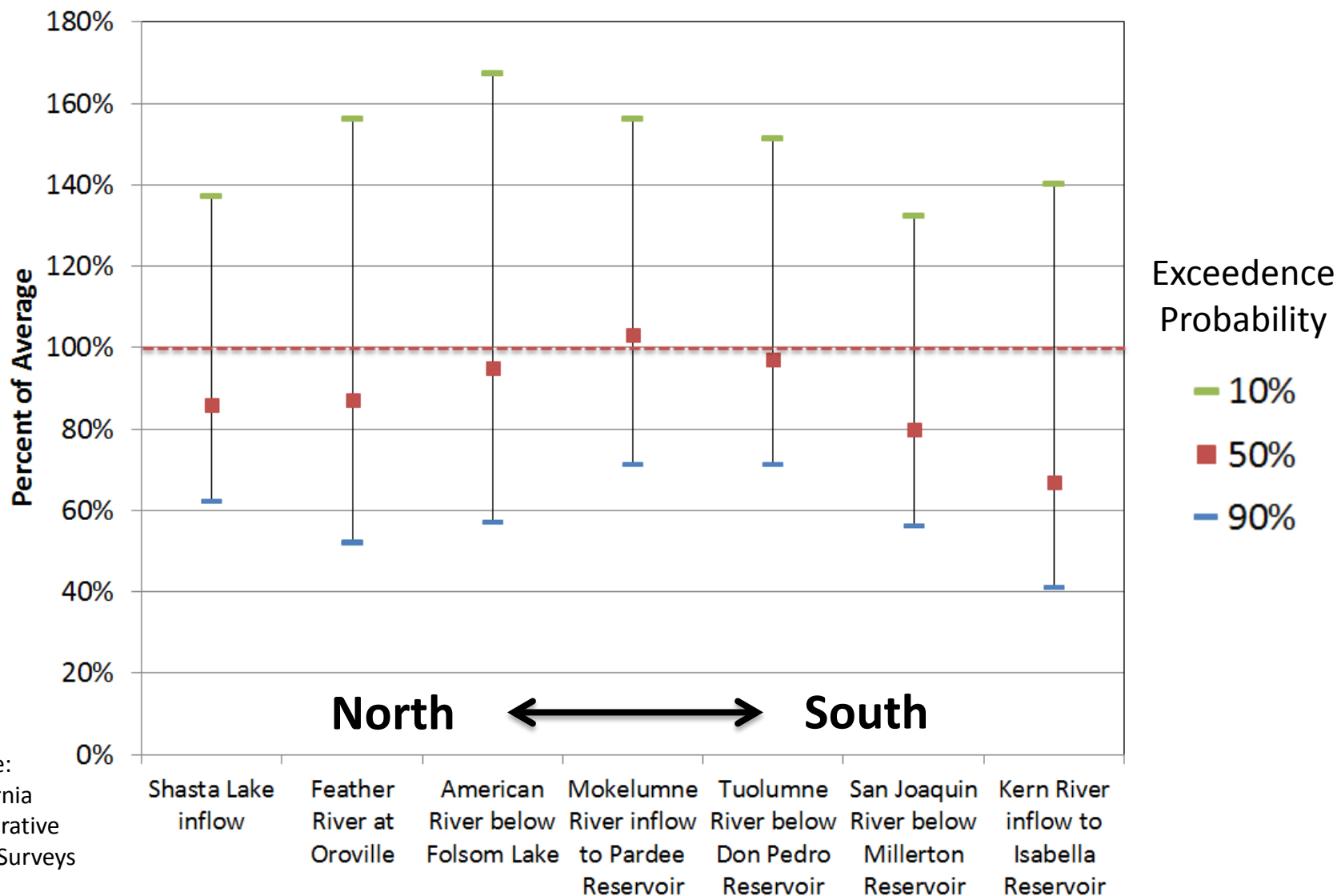


One-month outlook



Three-month outlook

# Unimpaired Runoff Forecast April-July 2016



Source:  
California  
Cooperative  
Snow Surveys



# Summary



- Strong El Niño this year, but ENSO Index is not as good a predictor of precipitation in California as thought
- Precipitation was above normal in December and January, but February has been very dry
- Above-average precipitation in March and April is forecasted
- Snow pack greatly improved from last year, but may melt earlier than normal
- Surface reservoir storage is improving from the preceding dry years, but likely will not recover fully this year
- Groundwater levels were significantly lowered during the recent drought and will take several wet-normal years to recover
- La Niña conditions may occur next year
- The effect of the drought is not over