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WATER YEAR 2015

Western Regional Climate Center

Will El Niño Make a Difference? Maybe Not

July 2015

Making seasonal climate forecasts of precipitation—the ability to predict now if water year 2016 will be wet or dry (and how wet or dry)—is scientifically difficult, and the accuracy of such predictions is very low, much less accurate than that of a seven-day weather forecast. Scientists consider teleconnections (recurring and persistent, large-scale patterns of pressure and circulation anomalies over important regions of the globe that correlate with climate at a site of interest) when attempting to make seasonal climate forecasts.

The El Niño-Southern Oscillation (ENSO) is one of the most studied climate phenomena, and one that can provide some predictive guidance in parts of the United States under certain conditions. ENSO is characterized by year-to-year fluctuations in sea surface temperatures along the equator in the Pacific Ocean between Peru and the International Date Line, and concomitant fluctuations in sea level air pressures between Tahiti and Darwin, Australia. The ENSO cycle is expressed as three states: neutral conditions, El Niño (warm ocean phase), and La Niña (cold ocean phase).

The National Oceanic and Atmospheric Administration's Climate Prediction Center ENSO diagnostic discussion presently calls for a 90 percent chance of El Niño conditions in the fall and early winter. Forecaster consensus is for an event with a sea-surface temperature anomaly greater than 1.5 degrees Celsius which is the threshold for a strong event.

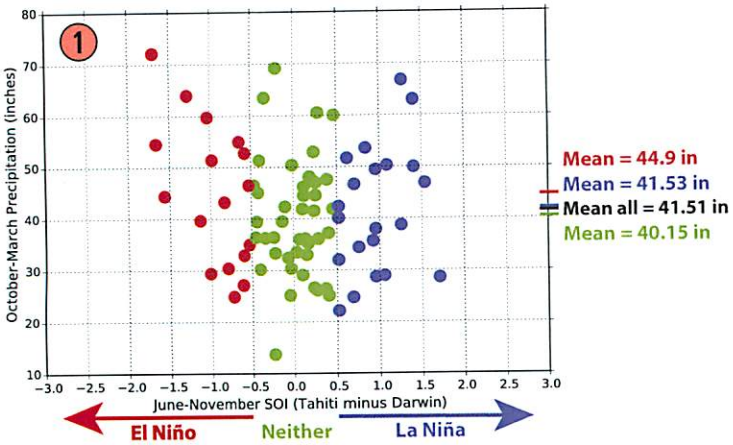
> "... a strong El Niño can result in a continuing drought year..."

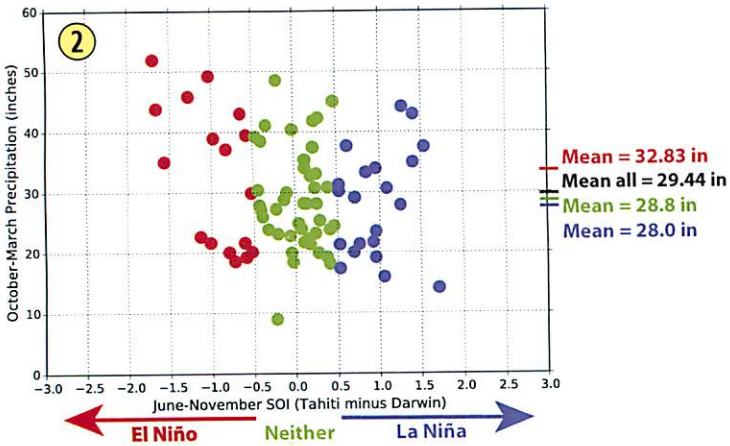
The graphics on the reverse show the relationship over an 80-year period between measured precipitation in each of California's climate divisions (see map key) and ENSO conditions, which are expressed as the Southern Oscillation Index, a measure of air pressure fluctuations between Tahiti and Darwin. The strongest El Niño and La Niña events plot on the far left and far right sides of the graphics, respectively.

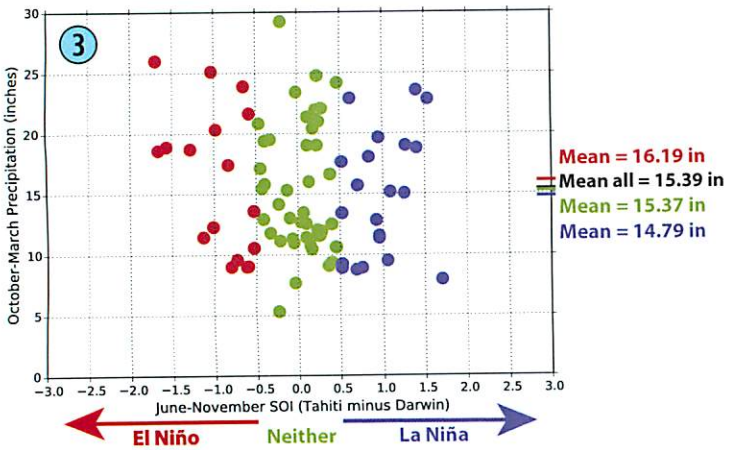
As illustrated on the reverse, there is almost no correlation between precipitation and El Niño conditions in Northern and Central California. ENSO's strongest signal in California is for Southern California to be drier than average in La Nina years.

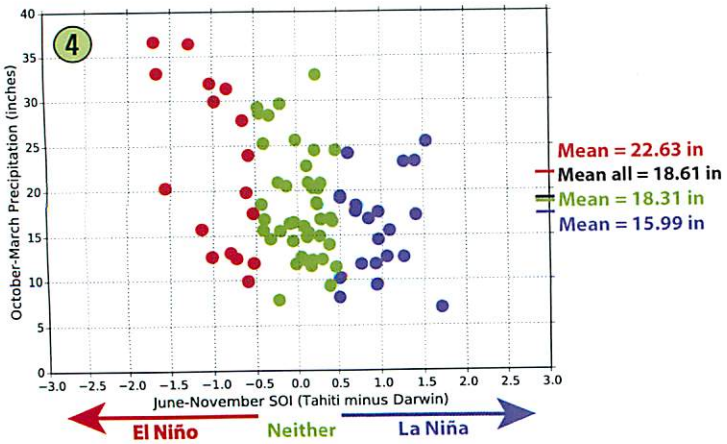
Since 1950 there have only been five events with an Ocean Niño Index value greater than 1.5 for the winter months of December through February (ONI value greater than 1.5 signals a strong El Niño). Those events occurred during the 1958, 1973, 1983, 1992, and 1998 water years. Looking at the Northern Sierra 8-station index (a precipitation index for the mountainous regions extending from east of Sacramento to above Shasta Dam) water year precipitation totals range from 36 inches (72% of average) in 1992 to 88.5 inches (177% of average) in 1983 while 1973's total was 51.6 inches (103% of average). Thus a *strong* El Niño can result in a continuing drought year like water year 1992, an average year like 1973, or a wet year like 1983.

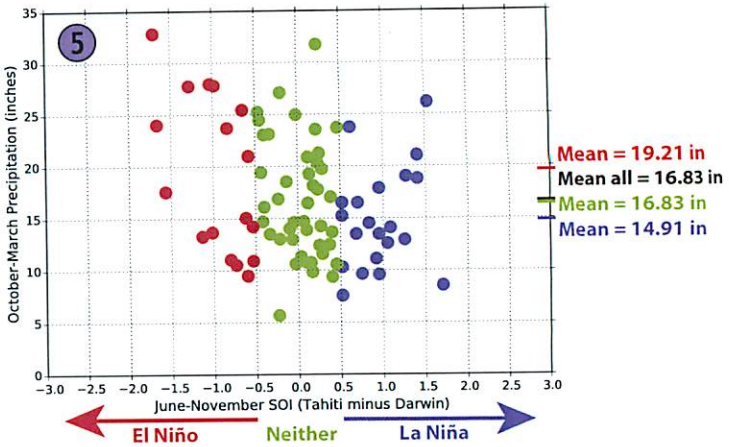
Years 1933/34 through 2013/14 • October - March (winter) precipitation by Climate Division versus Southern Oscillation Index for immediately proceeding June - November

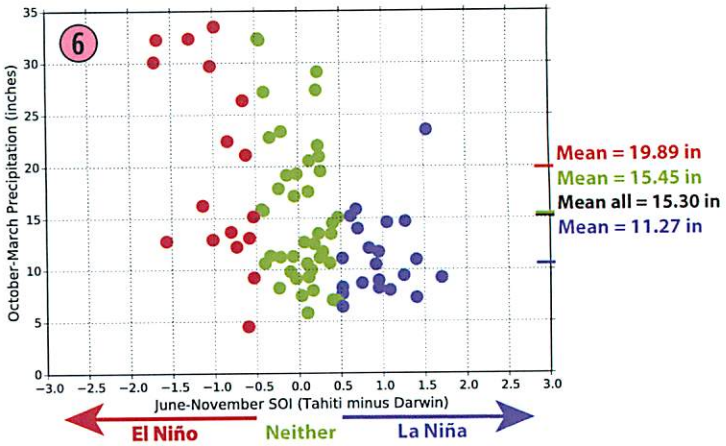


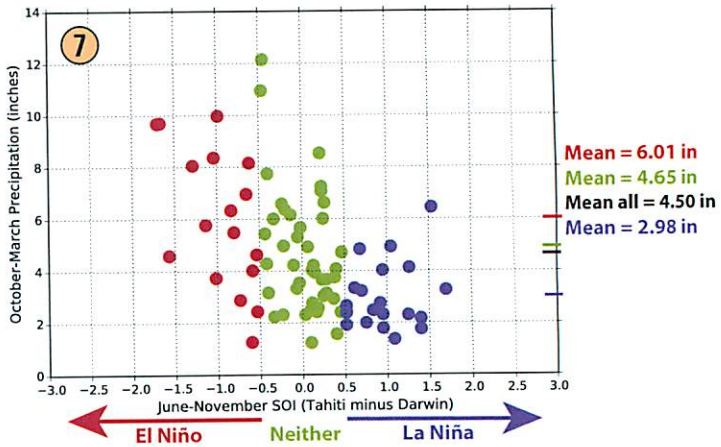
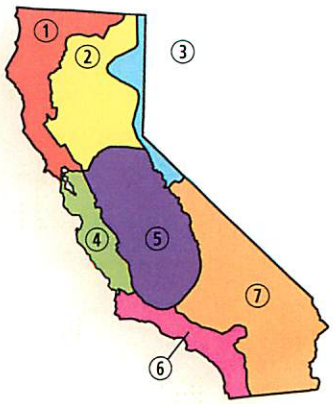












Key: climate divisions