

## El Niño Impacts on Northern California Fishing

El Niño is a recurring climatic pattern that occurs every two to seven years involving a warming of the waters in the central and eastern equatorial Pacific Ocean and a weakening in the easterly trade winds. The warmer than normal sea surface temperatures (SST) off the coast of South America inhibit the upwelling of colder water to the surface. Once El Niño conditions are present it triggers an atmospheric response that can alter weather patterns globally. For the west coast this usually results in wetter than normal conditions in portions of southern California like San Diego and drier than normal conditions in portions of Washington State. Figure 1 shows this tendency but it also shows that northern California is not typically as wet as southern California during El Niño years. What does this mean for California? Plain and simple, El Niño will bring an exceptionally stormy winter with above normal precipitation to southern California. The resulting copious amount of rain will bring an increase in the occurrence of flooding and mud and rockslides. Though southern California experiences the greatest impacts during El Niño events, model simulations suggest a strong El Niño will bring above normal precipitation to central California. The 2015-16 El Niño is forecast to be a strong event and the winter outlook does favor above normal precipitation for northern California. This could be good news for salmon spawning since they have struggled with below average stream flow for the last few years. Of course, this is dependent on this year's El Niño producing the expected impacts for this region. It turns out that each event has different characteristics that can affect the way it impacts any particular region of the United States.

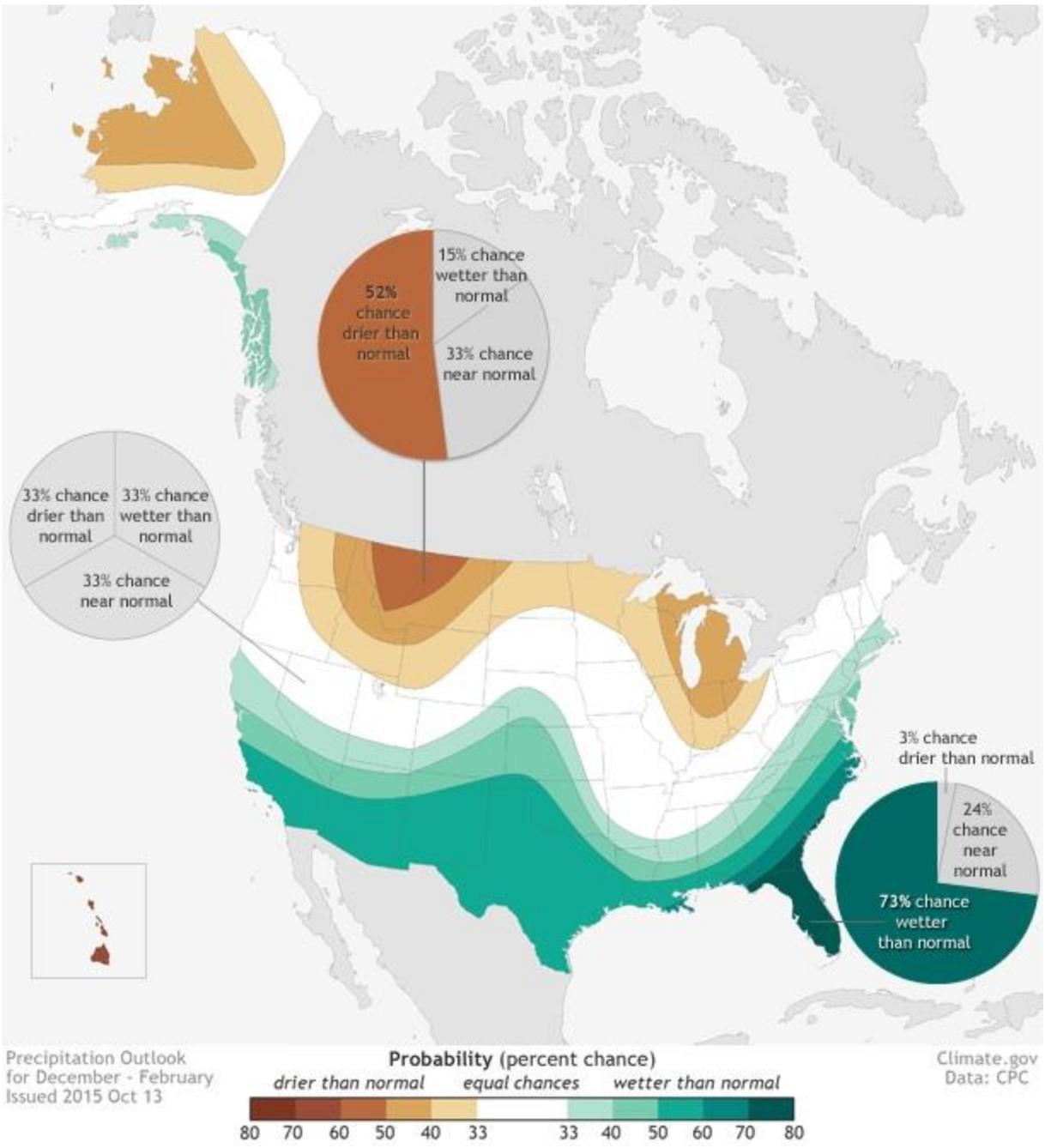
One characteristic that sets this El Niño apart from others is something that is increasingly referred to as the *Blob*. The *Blob* is a region of well above normal SSTs in the northeast Pacific. Warming in this region is not uncommon during El Niño events yet a persistent ridge of high pressure over the past few years has furthered the warming process (See Figure 2). This ridge was also to blame for the lack of rainfall across California over the past 4 years. The blob is not expected to have any impacts on how this winter's El Niño impact on rainfall amounts but will still have compounding impact on west coast fisheries from elevated water temperatures.

El Niño events are known to increase sea surface temperatures but they can also change the vertical thermal structure of the ocean and alter currents and upwelling processes near coastal regions. These changes can affect the composition and abundance of fish species across the northeastern Pacific. Cold water species will typically move north as warmer waters restrict their range. These changes to marine habitat have resulted in a loss of commercially significant species like squid off the California coast. Changes in Pacific salmon migration patterns have also been observed. Equatorial species, on the other hand will spread out with the increasing sea surface temperatures. Equatorial game fish that have been previously observed along the central California coast include mahi mahi, swordfish, and marlin. This year there has been numerous reports of sea snakes, hammerhead sharks, and other tropical species along the southern California coast. According to the National Marine Fisheries, fishes that remain in an affected region experience reduced growth, reproduction, and survival. The delay of the California Dungeness crab season due to unhealthy levels of a neurotoxin is an example of an impact from El Niño. Algal blooms that produce the dangerous neurotoxin domoic acid have flourished in the warmer waters off the west coast of the United States over the past few years. Even though the correlation is very strong there is no direct evidence that these algal blooms are caused by El Niño.

El Niño has consequences that are obvious to the general public which include impacts that come hand in hand with increased rainfall (i.e. flooding, rockslides, etc.) but some of the not so obvious impacts are more strongly noticed by the salt water fishing community. These changes will likely persist through the winter as a strong El Niño is forecast to continue. However, conditions may change by spring 2016 as El Niño is forecast to weaken. Unfortunately, El Niño can be tricky to forecast with multiple sources of variability and uncertainty that can influence its impacts on California.

For more information on El Niño please visit [www.climate.gov/](http://www.climate.gov/) or [www.cpc.ncep.noaa.gov/](http://www.cpc.ncep.noaa.gov/)

More information on west coast fisheries can be found at [www.westcoast.fisheries.noaa.gov/](http://www.westcoast.fisheries.noaa.gov/)



**Figure 1: Precipitation Outlook**

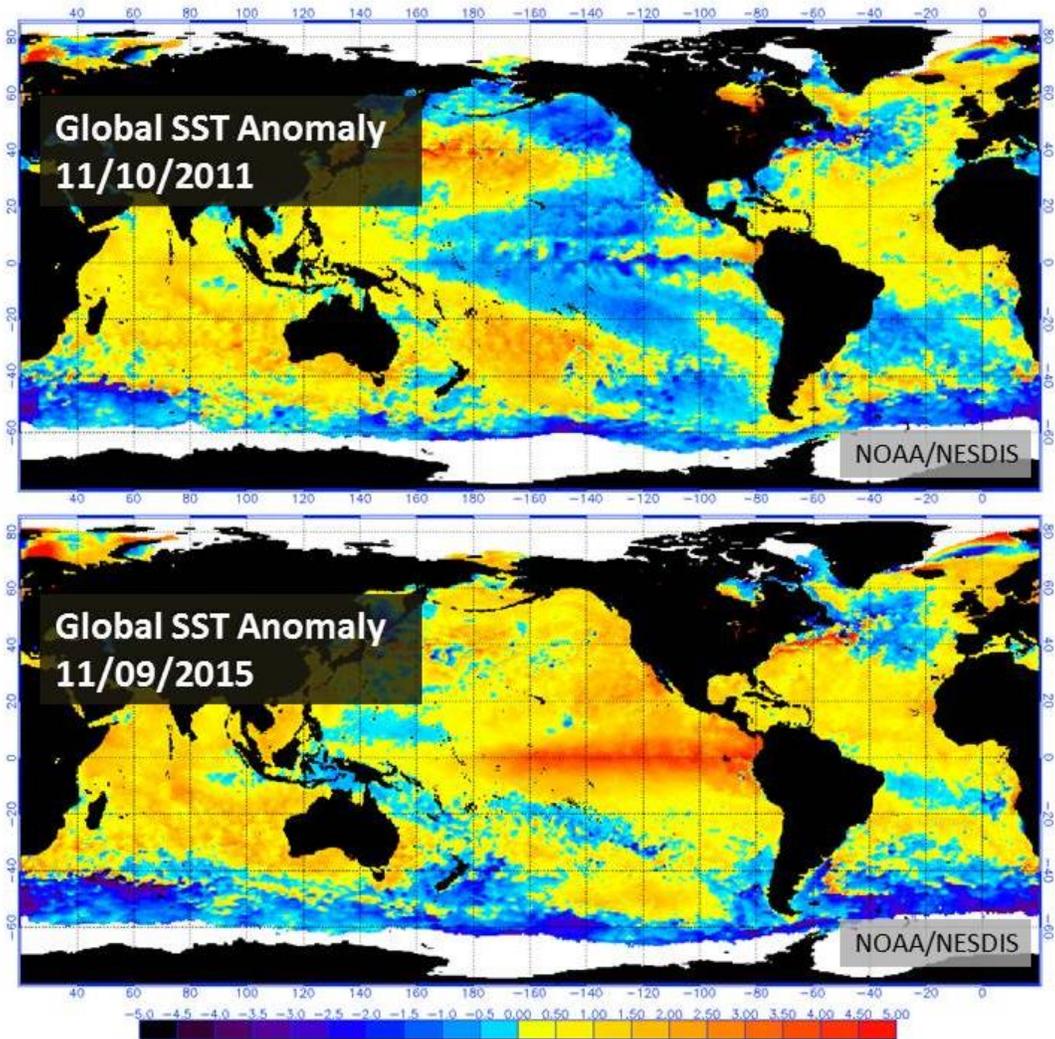


Figure 2: SST Anomaly from 2011 and 2015

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