# El Niño Impacts and Outlook

# Missouri Basin Region

February 2016

## Winter 2015/16 El Niño Update

### El Niño Winter Pattern

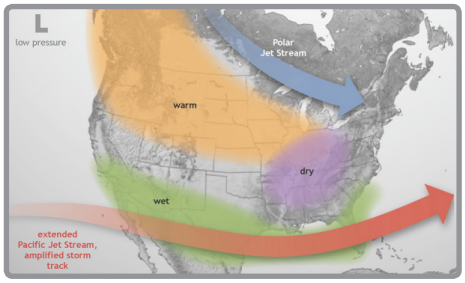



*Image courtesy of NOAA*
*www.climate.gov/news-features/department/enso-blog*

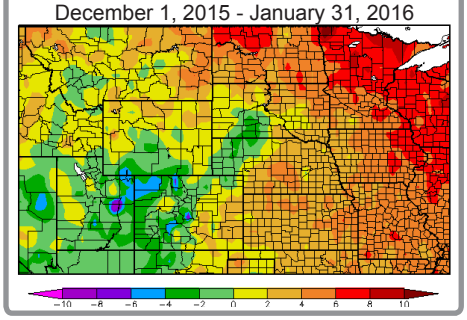
The image above shows the typical pattern in the winter during El Niño events. Although each El Niño is not the same, there are some general patterns that are predictable. For instance, the polar jet stream is typically farther north than usual, while the Pacific jet stream remains to the south.

This pattern brings above-normal temperatures to much of the Missouri Basin region, particularly in the north. Keep in mind that this does not mean that cold weather will not occur. Extreme cold weather may be milder and less frequent, however.

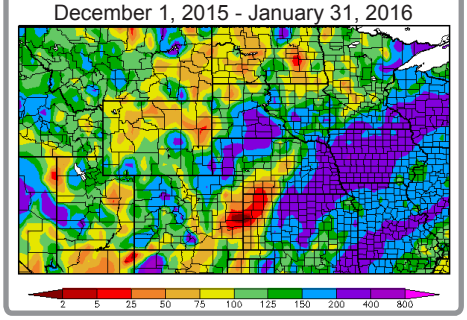
### Winter 2015/16 To Date

A combination of factors led to a warm start to the winter, with El Niño and the Arctic Oscillation (AO) both contributing to these conditions. As we see to the left, we would expect this from a typical El Niño winter, but a positive phase to the AO was also present and this signals above-normal temperatures for areas east of the Rockies as well. These unseasonably warm temperatures had interesting impacts, such as green lawns and heavy rain, instead of snow. Because what normally falls as snow actually fell as rain, this allowed for higher precipitation totals than would be expected for this time of the year - the driest season for the Plains areas of the region. January was quite different from December, however, with much of the region having below-normal temperatures, with the main exception of North Dakota. Meanwhile, precipitation totals showed that the region was generally on the dry side, with only a few above-normal pockets. Mountain snowpack this season has generally been near normal in Colorado and below normal in parts of Montana and Wyoming, with some local variation within each state. This snowfall pattern is in line with earlier outlooks for the winter. Luckily, there are still chances for the snowpack to build through the spring.

Departure from Normal Temperature (°F)
December 1, 2015 - January 31, 2016



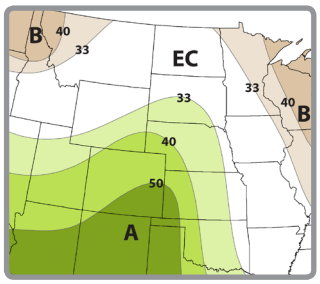

Percent of Normal Precipitation (%)
December 1, 2015 - January 31, 2016



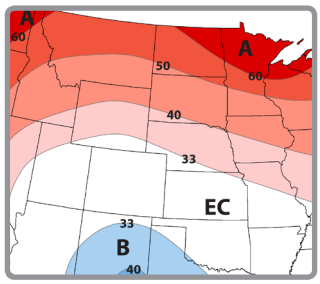

*Maps courtesy of the High Plains Regional Climate Center*

## El Niño Outlook

### Temperature and Precipitation Outlooks




Precipitation




Temperature

Outlooks valid for
February - April 2016

**EC:** Equal chances of above, near, or below normal

**A:** Above normal

**B:** Below normal

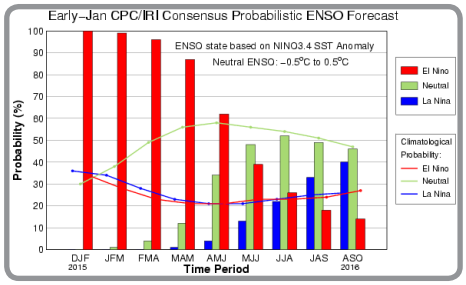
*Percentages represent the probability for above-normal, below-normal, or equal chances.*

The late winter/early spring outlook for the Missouri Basin is typical for an El Niño event with increased chances of above-normal temperatures from Montana and Wyoming east across the northern Plains and down through Nebraska, Iowa, and northern Missouri. The rest of the basin has equal chances for above-, below-, or near-normal temperatures. The precipitation outlook shows increased chances of above-normal precipitation across much of the central Plains and Rocky Mountains, with below-normal chances of precipitation confined to the upper reaches of the Missouri River in Montana. Season-to-date snowpack for the upper Missouri River and tributaries has been below normal, but areas of the central and southern Rockies have been above normal. This could have implications for many sectors, in both positive ways (increased snowpack to the south could be welcomed by ski resorts) and negative ways (reduced snowpack to the north could impact spring runoff). Although the peak of the event was reached in the equatorial Pacific (November), impacts in the Missouri Basin are typically realized in winter and early spring.

The seasonal outlooks above combine many factors including dynamical models, the effects of long-term trends, soil moisture, and the El Niño Southern Oscillation cycle (ENSO). To learn more, or to retrieve the latest temperature, precipitation, and drought outlooks, please visit the Climate Prediction Center at: http://www.cpc.ncep.noaa.gov.

### El Niño Evolution

El Niño conditions were officially declared in Spring 2015. Conditions strengthened as predicted through November 2015, when the sea-surface temperature anomalies peaked at around 2.3°C on the Oceanic Niño Index (ONI). The peak makes this El Niño one of the strongest on record, tied with the El Niño of 1997/98. The bar chart below shows the likelihood of El Niño, La Niña, or neutral conditions over the upcoming seasons. The odds are highest for El Niño (red bars) through late spring, when the highest odds shift toward neutral (green bars) or La Niña (blue bars) through the summer and into the fall. This is a typical evolution of the ENSO pattern.




*The letters along the bottom are abbreviations for three-month periods, from December-January-February (DJF) through August-September-October (ASO).*

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