

## ACKNOWLEDGEMENTS

### United States

**Gregg Garfin**  
Climatologist  
Climate Assessment for the Southwest  
(CLIMAS)

**Sarah LeRoy**  
Research Associate  
Climate Assessment for the Southwest  
(CLIMAS)

**Ben McMahan**  
Associate Research Scientist  
Climate Assessment for the Southwest  
(CLIMAS)

**Mark Shafer**  
Director of Climate Services  
Southern Climate Impacts Planning Program  
(SCIPP)

**Meredith Muth**  
International Program Manager  
Climate Program Office  
(NOAA)

**Victor Murphy**  
Climate Focal Point  
NOAA-National Weather Service  
Southern Region

**Isaac Palomo**  
Research Assistant  
Climate Assessment for the Southwest  
(CLIMAS)

### México

Mexico National Meteorological Services  
(SMN)

**Martín Ibarra | Idalia Ledesma | Alberto Chablé**  
Seasonal Forecasts

**Reynaldo Pascual | Minerva López**  
Drought

**Julio Martínez**  
Diagnostic Observations

**Darío Rodríguez Rangel**  
Fire

# Rio Grande | Bravo

CLIMATE IMPACTS & OUTLOOK

October 2018

## Summary

Forecasts favor above-average temperatures and precipitation for the entire Rio Grande/Bravo region through January.

## AT A GLANCE

- 1 Northern New Mexico**  
Severe to exceptional drought conditions persisted over the past month. Drought conditions are predicted to continue, but decrease in severity by January.
- 2 New Mexico**  
From January-September, New Mexico experienced record warm average temperatures.
- 3 Texas**  
September was the wettest September on record for Texas, mostly due to Tropical Storm Gordon.
- 4 Northern Mexico**  
Drought conditions are no longer present in the region.



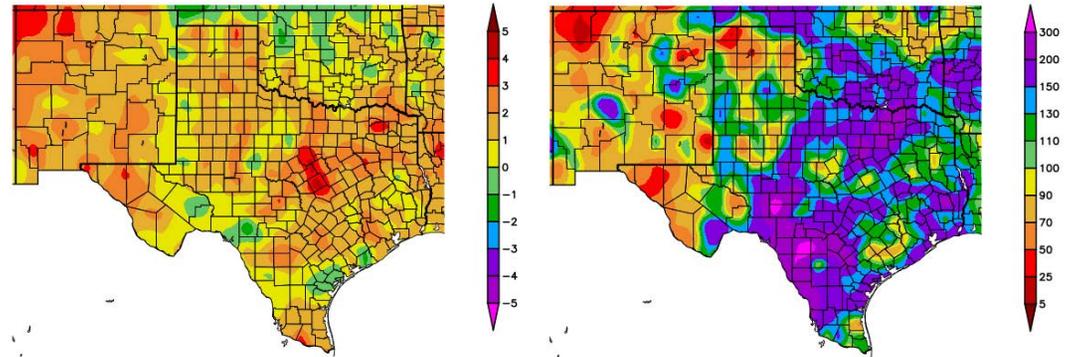
## REGIONAL CLIMATE OVERVIEW JULY | AUGUST | SEPTEMBER

Temperatures over the past three months (July-September) were 1-3 °F (0.6-1.7 °C) above average for almost all of New Mexico and most of Texas (Figure 1, left). Precipitation over the same time period was 25-90 % of average for most of New Mexico and western and northern Texas (Figure 1, right). For the remainder of Texas, however, precipitation was 150-300% of average, mostly due to Tropical Storm Gordon in September, which was the wettest September on record for Texas. From January-September, New Mexico experienced record warm average temperatures ([NOAA State of the Climate](#)).

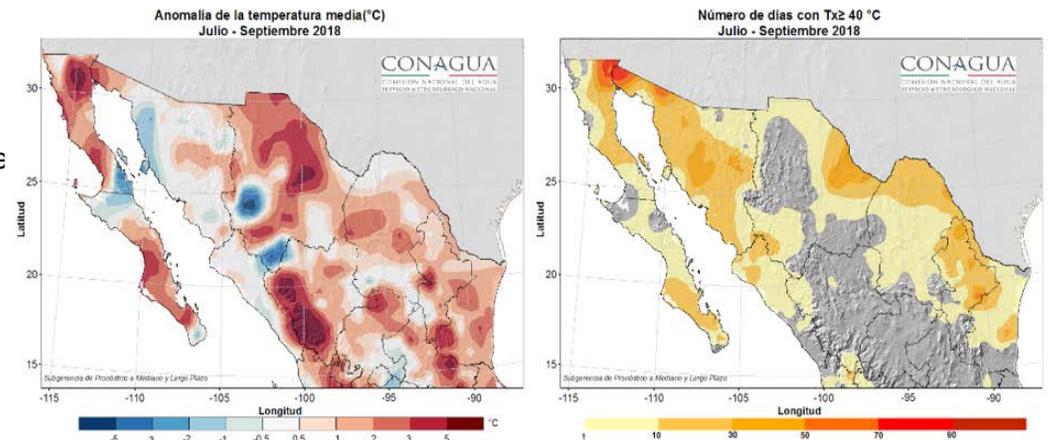
Temperatures from October 1 through 17 were 0-4 °F (0-2.2 °C) below average in most of New Mexico and northern Texas, and 0-4 °F (0-2.2 °C) above average for eastern and southern Texas (figure not shown). Precipitation over the same time period was 200-800% of average for most of Texas and 100-200% of average for most of New Mexico, except for Central New Mexico where precipitation was 25-75% below average.

Temperatures were warmer than normal in most of the northern part of Mexico, with the exception of the Northwest where anomalies were around 1.8 °F (1.0 °C) below average. The highest positive anomalies exceeded 9 °F (5 °C) above average in western Durango and northern Chihuahua (Figure 2, left). The greatest number of warm days, more than 70 days above 104 °F (40 °C), were in the Mexicali-San Luis Rio Colorado area between Baja California-Sonora States. The area with more than 10 days above 104 °F (40 °C) spread to southern Sonora in the Northwest and in a large part of the Rio Grande/Bravo basin (Figure 2, right).

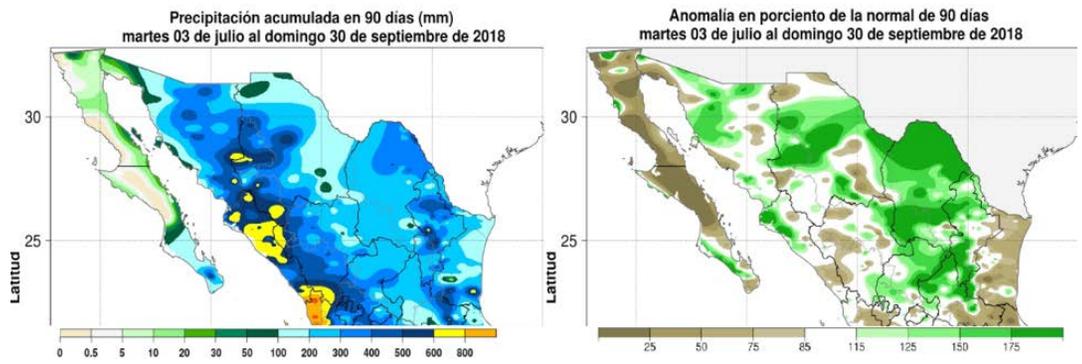
Over the last three months, and especially September, there was above-average precipitation from Zacatecas to northern Coahuila and Nuevo León. The greatest precipitation was in Nayarit and Sinaloa, with more than 600 mm in the region (Figure 3, left). Sonora and Chihuahua also experienced above-average precipitation, as well as portions of San Luis Potosi in the Northeast (Figure 3, left). Drought was eliminated in most of the country, except for the Baja California Peninsula and to a lesser extent in Tamaulipas (Figure 3, right).



**Figure 1 (above):** Departure from average temperature in degrees F (left) and percent of average precipitation (right), compared to the 1981–2010 climate average, for 7/1/2018–9/30/2018. Maps from [HPRCC](#).



**Figure 2 (above):** Temperature anomalies in °C (left) and number of days with maximum temperatures at or above 104 °F (40 °C) (right) for July-September. Maps from [SMN](#).



**Figure 3 (above):** Accumulated precipitation in mm (left) and percent of normal (right) for July-September. Maps from [SMN](#).

DROUGHT

Drought conditions persisted at levels similar to last month in New Mexico, but decreased in severity for most of Texas, according to the [North American Drought Monitor](#) (NADM) (Figure 4). Severe to exceptional drought still covers over half of New Mexico. In Texas, severe to extreme drought conditions persist in the panhandle, and moderate to severe drought is still present in a small portion of the Central part of the state. Drought conditions have been fully alleviated from the northern Mexico states, with only small areas in Chihuahua and Tamaulipas experiencing abnormally dry conditions. Drought conditions are predicted to continue, but decrease in severity across most of New Mexico, by the end of January, according to the [U.S. Seasonal Drought Outlook](#). In southern New Mexico, drought is likely to dissipate during this time.

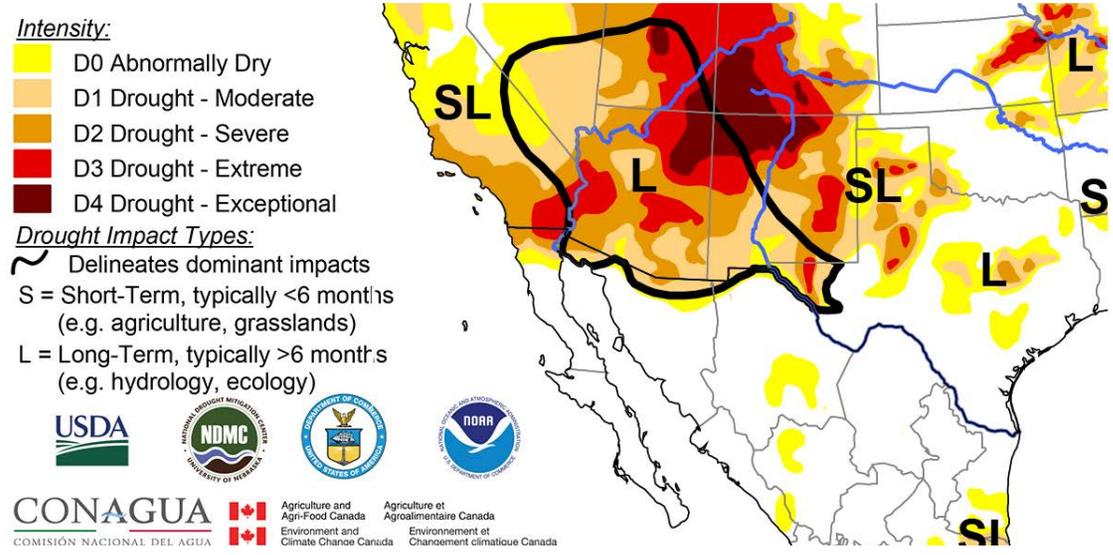


Figure 4 (above): North American Drought Monitor, released October 10, 2018.

## FORECAST

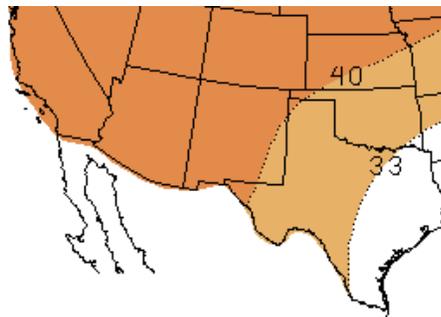
NOVEMBER | DECEMBER | JANUARY

### TEMPERATURE

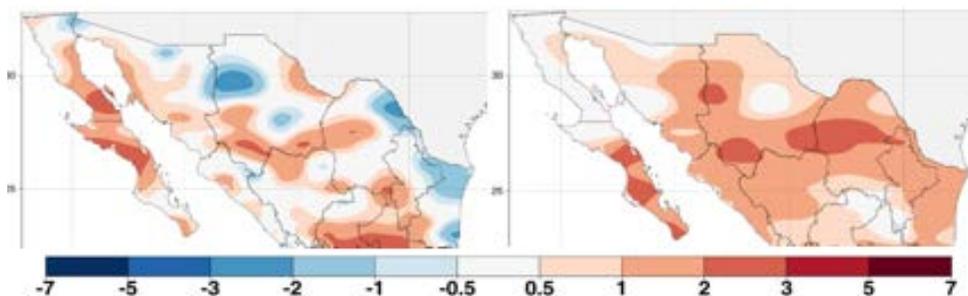
The three-month NOAA temperature outlook (November-January; Figure 5) favors chances of above-average temperatures for all of New Mexico and most of Texas, through January. The one-month outlook favors chances for above-average temperatures in all of both states for November (figure not shown).

The SMN outlook for November predicts minimum temperatures with above-average anomalies in a large part of the Baja California Peninsula, western and southern Sonora, Northeast and southern Chihuahua, regions of North-Central and southern Coahuila, and southern Nuevo León. In western Tamaulipas, below-average minimum temperatures are expected for Northeast Baja California, parts of northern Sonora, West-Central Chihuahua, Northeast Coahuila, parts of Northeast Nuevo León, and North and Southeast Tamaulipas (Figure 6, left). For December, above-average minimum temperatures are expected in the central regions of Baja California and a large part of Baja California Sur, a large part of Sonora and Chihuahua, and most of Coahuila, Nuevo León and Tamaulipas (Figure 6, right).

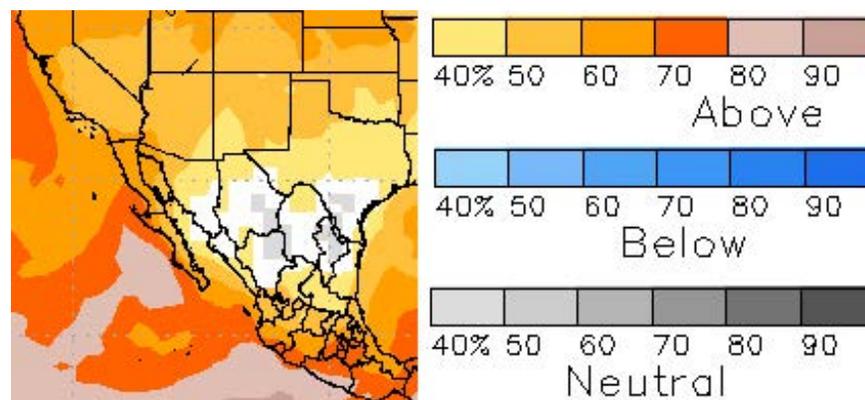
The North American Multi-Model Ensemble (NMME) is an experimental seasonal forecasting system that incorporates forecasts from several different runs of individual models, to create a multi-model ensemble of predictions. This method has been shown to produce better prediction quality, on average, than the ensemble of runs from any single model (CPC). The temperature forecast for November-January favors chances for above-average temperatures for New Mexico and most of Texas, and average temperatures for South Texas and most of the northern states in Mexico (Figure 7).



**Figure 5 (left):** NOAA three-month temperature outlook (November-January). Forecast made on October 18, 2018 by [CPC](#).



**Figure 6 (above):** Predicted minimum temperature anomalies for northern Mexico in (°C), November 2018 (left) and December 2018 (right). Forecast made in October 1, 2018 by [SMN](#).



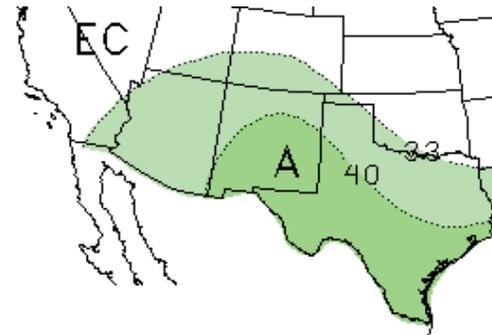
**Figure 7 (above):** NMME temperature forecast for November-January. Forecast made by [CPC](#).

## PRECIPITATION

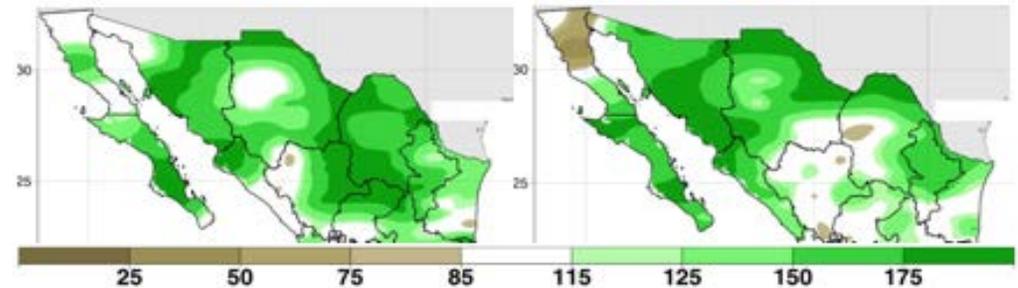
The NOAA three-month precipitation outlook (November-January; Figure 8) shows increased chances of above-average precipitation for all of New Mexico and Texas through January, due to the predicted transition to El Niño during the fall. The one-month outlook (November; figure not shown) also favors chances for above-average precipitation for all of New Mexico and Texas for November.

For November, SMN forecasts show above-average precipitation for Central Baja California, almost the entire state of Sonora, Chihuahua, Coahuila and Nuevo León, and northern and southern Tamaulipas. Below-average precipitation is expected in small areas of Southeast Tamaulipas (Figure 9, left). For December, above-average precipitation is predicted in parts of southern Baja California, much of Sonora, Chihuahua, and Nuevo León, North-East and southern Coahuila, and North and Southeast Tamaulipas. Below-average conditions are predicted for northern Baja California and small areas of Coahuila; the rest of the region is expected to experience precipitation close to the average (Figure 9, right).

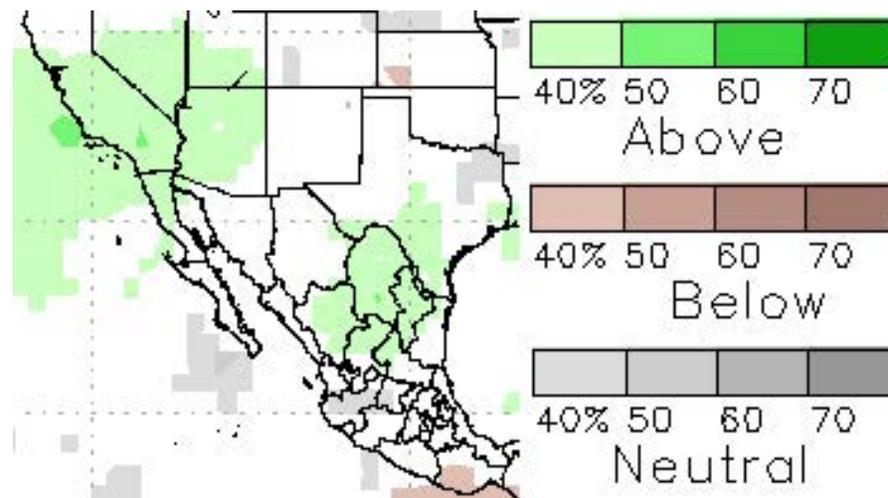
NMME forecasts chances of average precipitation for New Mexico, most of Texas, Chihuahua, and Tamaulipas, and chances of above-average precipitation for Southwest Texas, Coahuila, and Nuevo León, for November-January (Figure 10).



**Figure 8 (left):** NOAA three-month precipitation outlook (November-January). Forecast made on October 18, 2018 by [CPC](#).



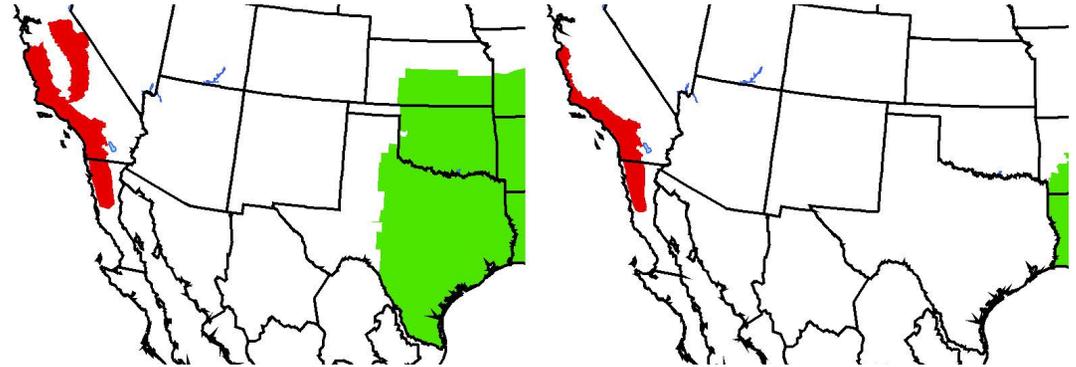
**Figure 9 (above):** Predicted precipitation anomalies for northern Mexico (in %), November (left) and December (right). Forecast made on October 1, 2018 by [SMN](#).



**Figure 10 (left):** NMME precipitation forecast for November-January. Forecast made by [CPC](#).

## FIRE

Monsoon precipitation in the Southwest U.S. and northern Mexico since June has eliminated prospects for above-average fire potential across the region, according to the North American Seasonal Fire Assessment and Outlook. The forecast for November indicates below-average fire potential for Central and East Texas, and average fire potential for the remainder of Texas, New Mexico, and all of the northern Mexico states (Figure 11). Forecasts for December indicate average fire potential for the entire Rio Grande/Bravo region.

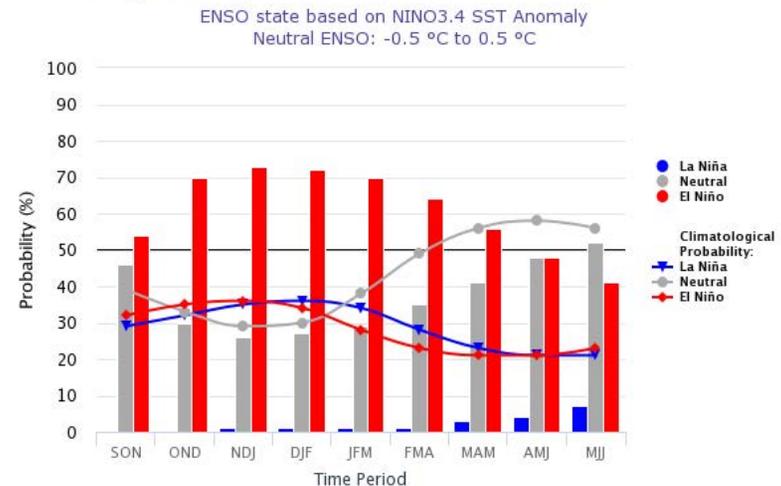


**Figure 11 (above):** Fire outlook for November (left) and December (right). Red shading indicates conditions that favor increased fire potential. Green shading indicates conditions that favor decreased fire potential. [Forecast](#) made on October 10, 2018 from [NIFC](#) and [SMN](#).

## EL NIÑO-SOUTHERN OSCILLATION (ENSO)

As of mid-October, ENSO-neutral conditions prevailed, but sea-surface temperatures in the east-central tropical Pacific and low level wind anomalies began to show signs of El Niño. The official forecast now predicts a 70-75% chance of weak El Niño development by November (Figure 12; [IRI](#); [NOAA](#)). An El Niño watch is officially in effect. Forecasts suggest weak El Niño conditions to persist through winter. If forecasts are correct, chances of a wet winter in the Southwest U.S. and northern Mexico are likely to increase.

### Early-Oct CPC/IRI Official Probabilistic ENSO Forecasts



**Figure12 (above):** Probabilistic ENSO Forecast from [IRI](#).

For more ENSO information:

English: <http://iri.columbia.edu/our-expertise/climate/enso/enso-essentials/> y <http://www.ncdc.noaa.gov/teleconnections/enso/>.

Spanish: <http://smn.cna.gob.mx/es/climatologia/diagnostico-climatico/enos> y <http://www.smn.gov.ar/?mod=biblioteca&id=68>

## MONSOON TRACKER

\*The following summary is adapted from the October 2018 issue of the [CLIMAS Southwest Climate Outlook](#).

The precipitation rankings for the months that encompass the monsoon period (Figure 13) smooth out the variability over space and time that is characteristic of this season. The cumulative totals for the monsoon for most of the major metropolitan areas in the region (Figure 14) came in at or above average, with the exception of El Paso.

Monthly rankings show that June—which is typically dry, often with little actual precipitation at all in the Southwest—was wetter than normal across much of the borderlands region of Arizona and New Mexico (Figure 15). This was almost entirely due to Tropical Storm Bud, which brought rain to the area in mid-June. Widespread precipitation occurred across the Southwest in July, and while a few areas only received below-average precipitation, most of the region was at or above average for the month (Figure 16). August flipped that script, and while there were wide swaths of Arizona and New Mexico that received average to above-average rainfall, south-central New Mexico, parts of southern Arizona, and the Four Corners region in particular, lagged behind (Figure 17). In September, southeastern Arizona and the lower two-thirds of New Mexico received average to above-average precipitation, but this was largely due to the incursion of tropical moisture in the latter half of the month. Outside that area, the region was generally devoid of widespread precipitation, with the Four Corners region continuing to be the epicenter of below-average to record-driest conditions (Figure 18).

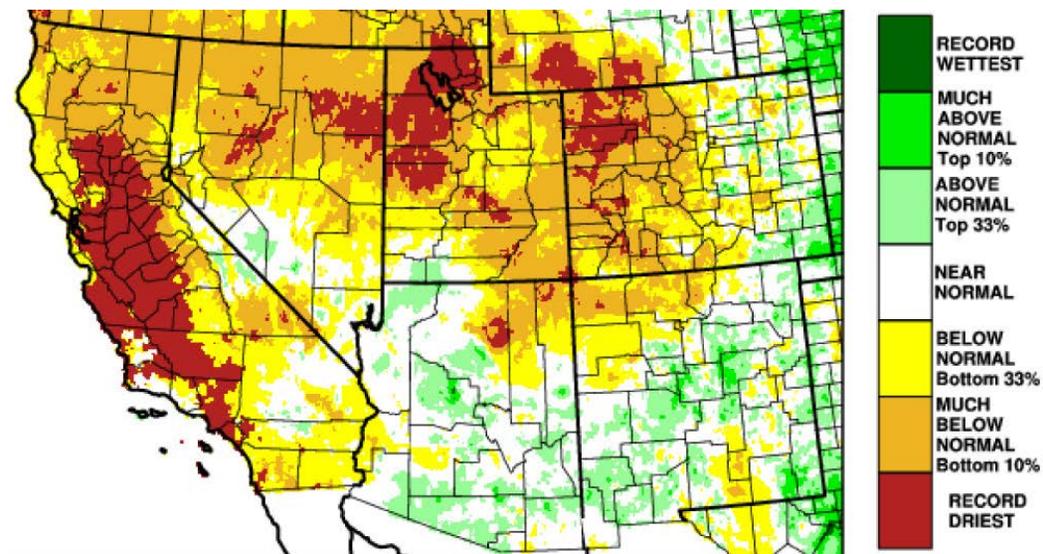


Figure 13 (above): June – September 2018 precipitation rankings.

### Additional Monsoon Resources:

- NWS: [http://www.wrh.noaa.gov/twc/monsoon/monsoon\\_info.php](http://www.wrh.noaa.gov/twc/monsoon/monsoon_info.php)
- CLIMAS: <http://www.climas.arizona.edu/sw-climate/monsoon>
- CONAGUA: <http://www.gob.mx/conagua/prensa/inicio-el-monzon-de-norteamerica-en-el-noroeste-de-mexico>

[ca-en-el-noroeste-de-mexico](http://www.gob.mx/conagua/prensa/inicio-el-monzon-de-norteamerica-en-el-noroeste-de-mexico)

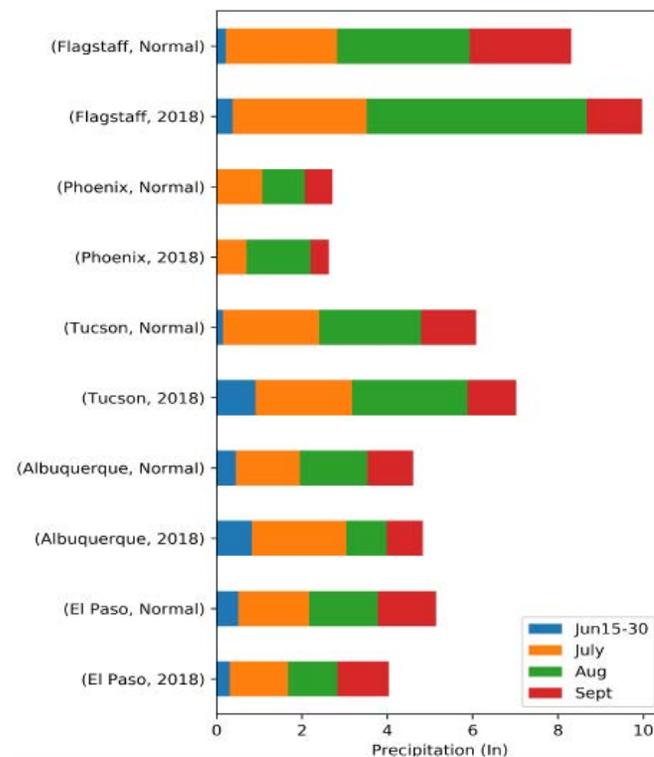


Figure 14 (left): Monthly monsoon precipitation totals – 2018 vs. average.

## MONSOON TRACKER CONT'D

Looking at specific locations along the Rio Grande, Santa Fe, NM ended the season with below-average precipitation (4.55 in [116 mm], compared to an average of 6.68 in [170 mm]). Albuquerque, NM and Las Cruces, NM both ended the season at about average precipitation, with Albuquerque receiving 0.22 in (5.6 mm) above the average, and Las Cruces receiving 0.54 in (13.7 mm) below average. El Paso, TX received monsoon precipitation 1.66 in (42 mm) below the city's average for the season, receiving 4.04 in (102 mm) compared to an average 5.7 in (144 mm). Laredo, TX and Del Rio, TX both ended the monsoon season with precipitation totals almost double their respective averages. Laredo received a total of 15.6 in (396 mm) compared to the average 8.07 in (205 mm), and Del Rio received 14.6 in (371 mm) compared to the average 7.21 in (183 mm). Finally, Brownsville ended the season with precipitation 2 in (51 mm) above average (13.9 in [353 mm] compared to an average 11.9 in [302 mm]).

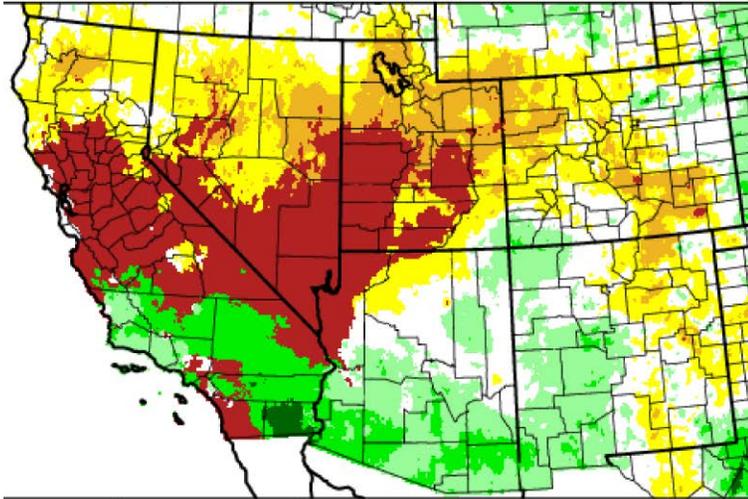


Figure 15 (above): June 2018 precipitation rankings.

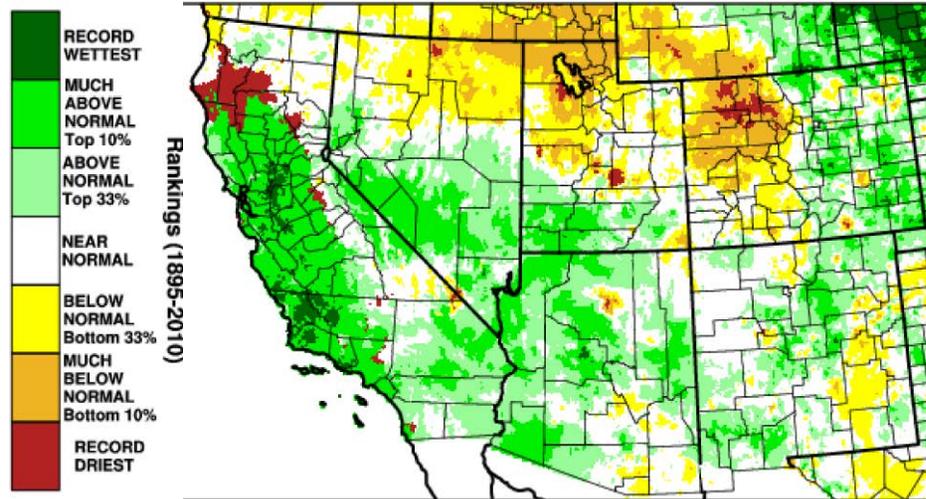


Figure 16 (above): July 2018 precipitation rankings.

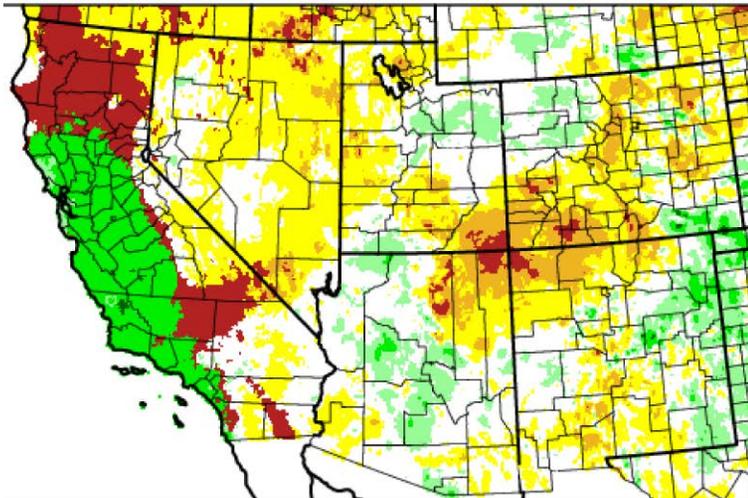


Figure 17 (above): August 2018 precipitation rankings.

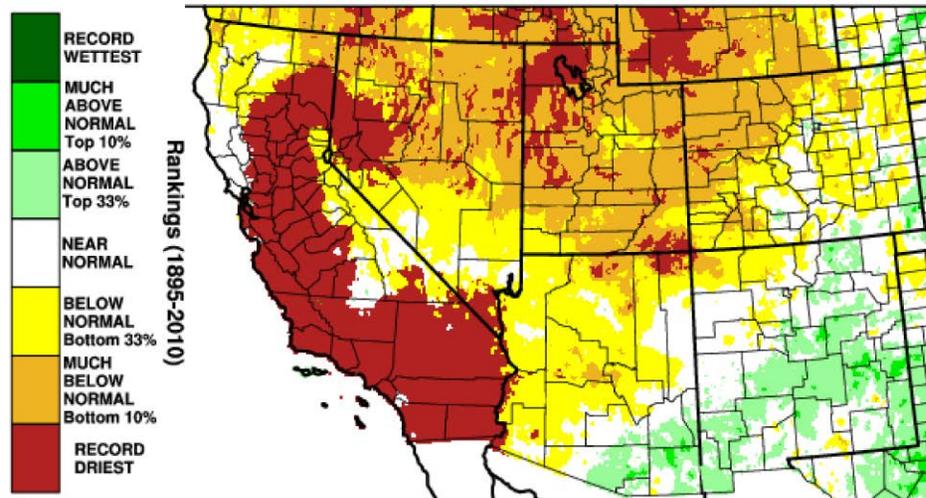
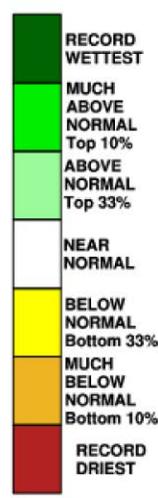
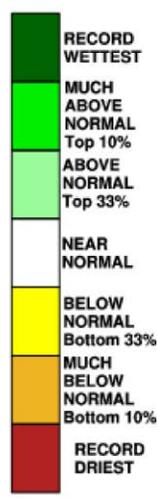
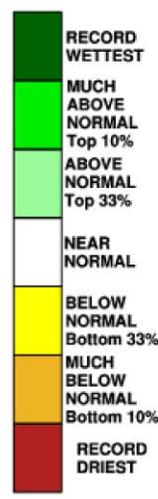
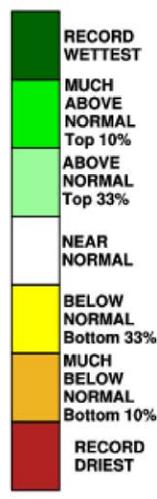


Figure 18 (above): September 2018 precipitation rankings.



## ANNOUNCEMENTS

### [FOURTH NORTH AMERICAN SUSTAINABLE ECONOMIC DEVELOPMENT SUMMIT](#)

The [summit](#) will be held November 12-13, 2018 in Las Colinas-Irving, Texas. Topics include: The U.S.-Mexico-Canada Agreement, Mexico's future economy under the new administration, an overview of Mexican Presidential Elections, and the U.S. Mid-term elections.

### [RESNEXUS 2018 CONFERENCE – RETHINKING URBAN RESILIENCE](#)

The [ResNexus conference](#) will be held at Wageningen University and Research in Wageningen, the Netherlands, on November 7 and 8, 2018. The conference will bring together academics and professionals working in government and civil society working with water and energy.

### [6TH GLOBAL SUMMIT ON CLIMATE CHANGE](#)

The [conference](#) is one of the main conferences on the environment that brings together the largest number of participants in the field of climate change and environmental sciences. This conference offers a specialized meeting and allows participants to learn from advanced research on global warming and climate change. It will take place from November 19 to 20 in Paris, France.

## NEWS

[Weather changes as new water year starts, but drought remains, 10 de octubre, 2018](#)

[Rio Grande ruling challenged as drought persists, 11 de octubre, 2018](#)

[Toman muestras de agua para medir contaminación del Río Bravo, 12 de octubre, 2018](#)

[Environmentalists challenge court ruling over water from Rio Grande, 12 de octubre, 2018](#)

[Drop in Elephant Butte water level no reason for alarm, 16 de octubre, 2018](#)