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CLIMATE IMPACTS & OUTLOOK

August 2018

Summary

Forecasts favor above-average temperatures for the entire Rio Grande/Bravo region through November, and above-average precipitation for most of New Mexico and West Texas.

AT A GLANCE

1. **New Mexico**
Drought conditions eased across the state over the past month, but the northern part of the state is still experiencing extreme to exceptional drought conditions.

2. **New Mexico/Texas**
From January-July, New Mexico experienced record warm average and maximum temperatures. A heat wave on July 18-24 broke numerous maximum temperatures records from Santa Fe, NM to Brownsville, TX.

3. **Del Rio, TX**
On August 11th, over 3.5 inches of rain fell, putting the area at well above-average for the monsoon season, at about 6.85 inches, as of August 16th.

REGIONAL CLIMATE OVERVIEW
MAY I JUNE I JULY

Temperatures over the past three months (May-July) were 2-6 °F (1.1-3.3 °C) above average for most of New Mexico and Texas (Figure 1; left). Precipitation over the same time period was well below average for most of both states, except for the southern tip of Texas which received precipitation 150-300% of average, mostly due to a slow-moving low-pressure system on June 18-21 that dropped record-setting rainfall and resulted in widespread flooding (Figure 1; right). Near Premont, TX, the rain gauge reached its capacity at 11 inches before overflowing (NOAA State of the Climate).

From January-July, New Mexico experienced record warm average and maximum temperatures. Texas temperatures were much above average. In Texas during July, there were several reports of strong wind gusts across the state, including an 82-mph gust on July 13th, reported at the El Paso International Airport, Texas (NOAA State of the Climate). Monsoon storms led to flooding in the Southwest. In San Antonio, New Mexico on July 15th, about 20 homes were damaged by flash floods.

Temperatures from August 1-15 were 0-3 °F (0-1.7 °C) above average in most of New Mexico and westernmost Texas, while the rest of Texas and easternmost New Mexico experienced temperatures 0-4 °F (0-2.2 °C) below average (figure not shown). Precipitation over the same time period was 0-50% of average for most of New Mexico and western, southern, and northern Texas, while Central Texas experienced precipitation 200-800% of average.

Northwest Mexico continued to experience below-average temperatures from May to July, with anomalies 0.9-1.8 °F (0.5-1.0 °C) below average for most of Sonora and southern Chihuahua. The rest of the northern part of the country was warmer than normal, with Chihuahua and Durango recording the largest positive anomalies (Figure 2, left). Parts of Chihuahua and Durango recorded more than 50 days with temperatures at or above 104 °F (40°C) in the period from May to July (Figure 2, right).

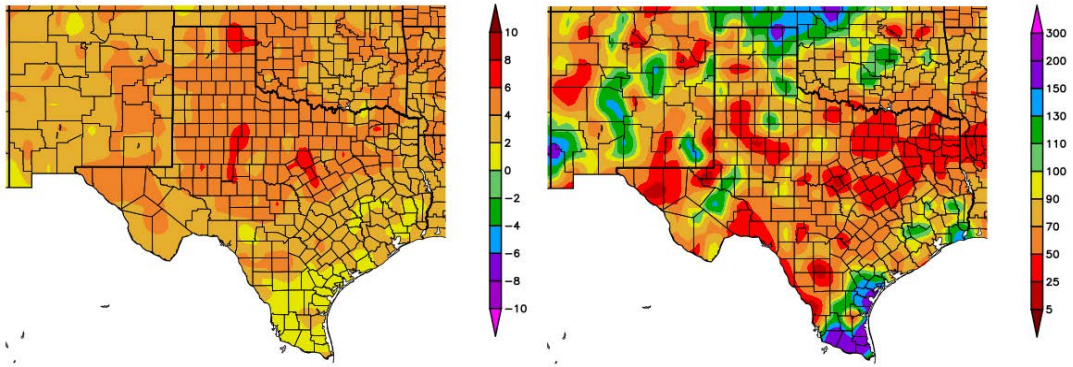


Figure 1 (above): Departure from average temperature in degrees F (left) and percent of average precipitation (right), compared to the 1981–2010 climate average, for 5/1/2018–7/31/2018. Maps from HPRCC

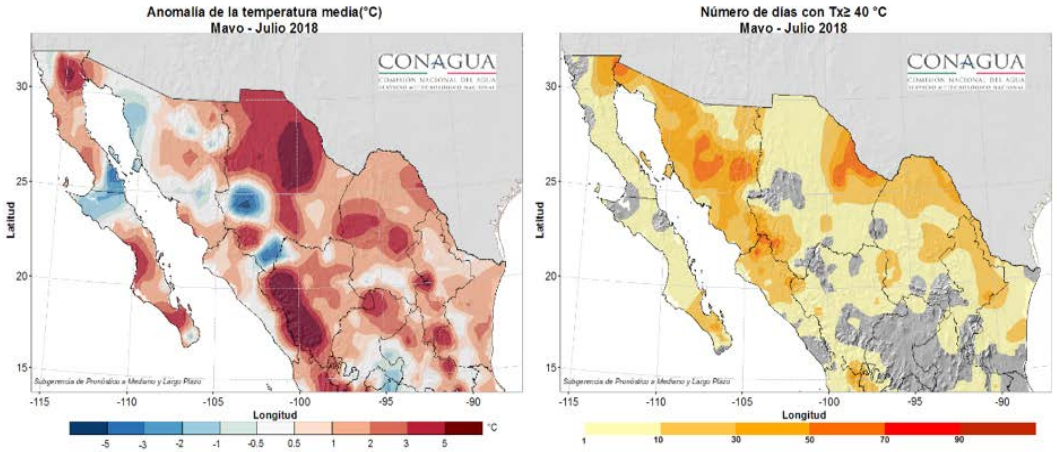


Figure 2 (above): Temperature anomalies in °C (left) and number of days with maximum temperatures at or above 104 °F (40 °C) (right) for May–July. Maps from SMN.

Precipitation from May to July remained above average in southern Sonora, western Chihuahua, and from Zacatecas to southern Nuevo León. The highest rainfall accumulations, around 20 inches (500 mm), fell over Nayarit (Figure 3, left). Below-average precipitation continued in most of the Baja California peninsula, in addition to a strip from Sinaloa to northern Coahuila. Southern Tamaulipas and eastern San Luis Potosí also experienced below-average precipitation (Figure 3, right).

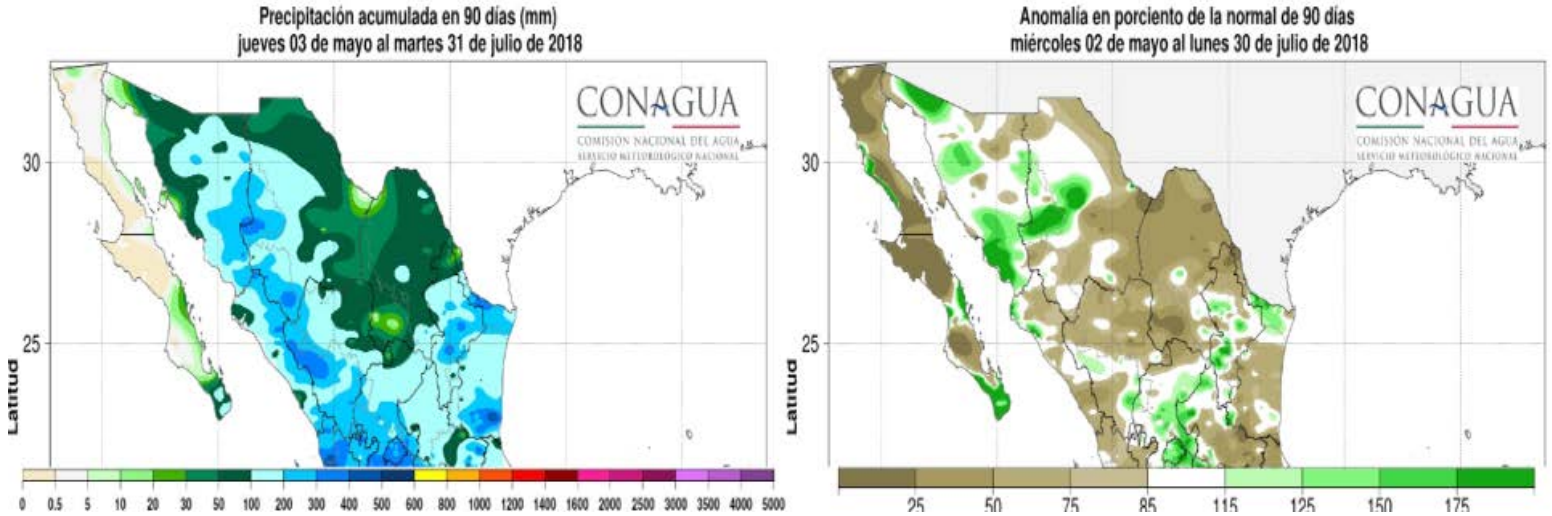


Figure 3 (left): Accumulated precipitation in mm (left) and percent of normal (right) for May–July. Maps from SMN.

DROUGHT

Monsoon precipitation lessened drought conditions slightly in New Mexico over the past month, according to the North American Drought Monitor (NADM) (Figure 4). However, severe to exceptional drought still covers over half of the state. In Texas, severe to extreme drought conditions persist, mostly in the central and northern parts of the state, and near Laredo. In Mexico, abnormally dry conditions now exist in Chihuahua, Coahuila, and Tamaulipas. Moderate to extreme drought conditions persist in northern Coahuila and Nuevo León. Drought conditions are predicted to remain, but lessen in most of New Mexico and the Texas panhandle, by the end of November, according to the U.S. Seasonal Drought Outlook. In southern New Mexico, drought removal is likely during this time. For Central, Northeast, and Southwest Texas, drought conditions are predicted to persist.

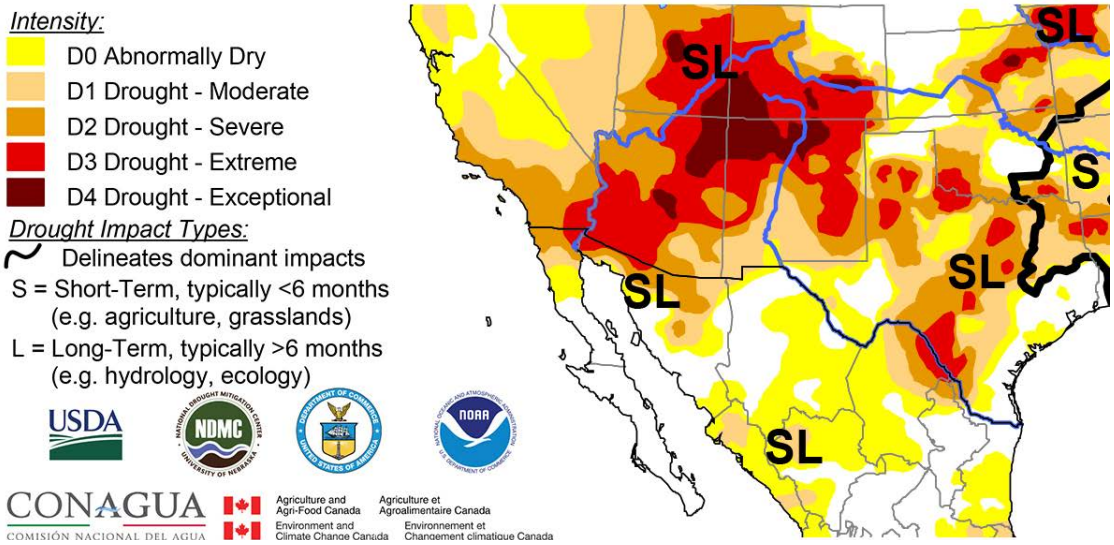


Figure 4 (above): North American Drought Monitor, released August 16, 2018.

FORECAST
SEPTEMBER | OCTOBER | NOVEMBER

TEMPERATURE

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

The SMN outlook for September predicts above-average maximum temperatures in Baja California, Chihuahua and Northeast Coahuila, and below-average maximum temperatures for southern Nuevo León and Tamaulipas. For October, SMN predicts above-average anomalies in Northeast Chihuahua, Northwest Coahuila, northern Nuevo León and Tamaulipas, and below-average anomalies in parts of the Baja California peninsula, Sonora and western Chihuahua (Figure 6).

This month, we have included an additional forecast commonly used by scientists. 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 September-November favors chances for above-average temperatures for the entire Rio Grande-Bravo region (Figure 7).

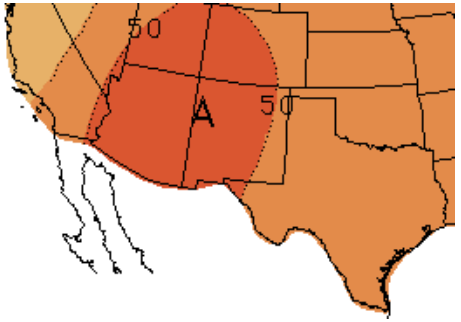
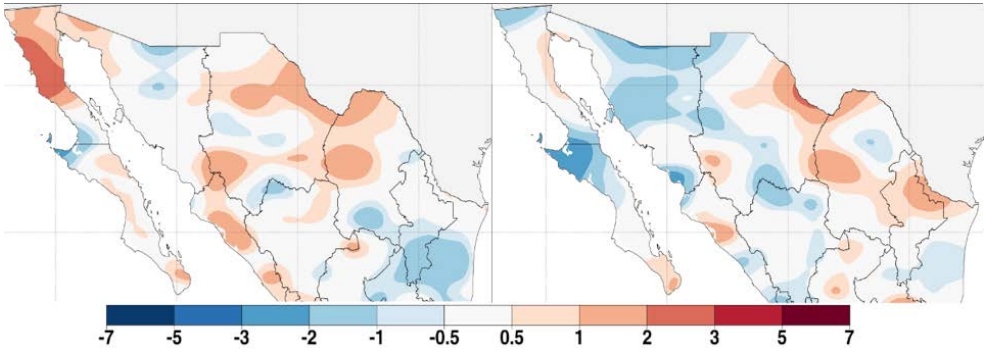


Figure 5 (left): NOAA three-month temperature outlook (September-November). Forecast made on August 16, 2018 by CPC.

Figure 6 (below): Predicted maximum temperature anomalies for northern Mexico in (°C), September (left) and October (right). Forecast made on August 1, 2018 by SMN.



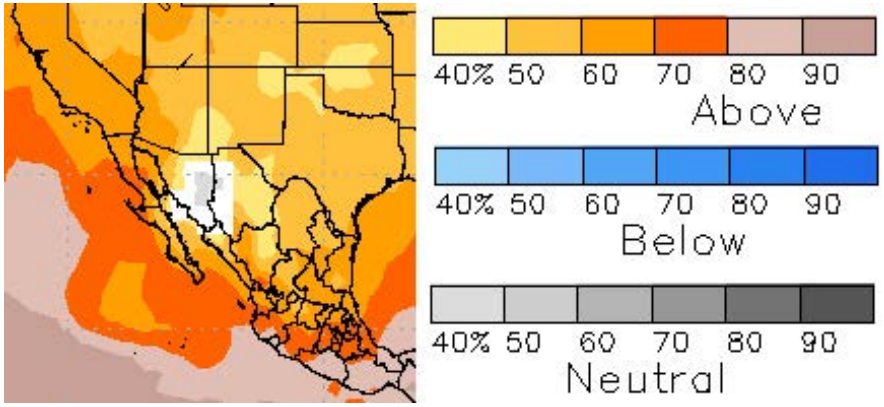


Figure 7 (left): NMME temperature forecast for September-November. Forecast made by CPC.

PRECIPITATION

The NOAA three-month precipitation outlook (September-November; Figure 8) predicts increased chances of above-average precipitation for most of New Mexico and westernmost Texas through November, due to the predicted transition to El Niño during the fall. The forecast calls for equal chances for below-average, average, or above-average precipitation for eastern New Mexico and almost all of Texas through November.

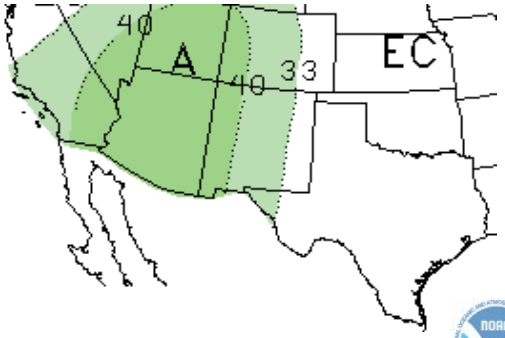


Figure 8 (left): NOAA three-month precipitation outlook (September-November). Forecast made on August 16, 2018 by CPC.

The one-month NOAA outlook (September; figure not shown) shows a pattern of forecast probabilities similar to the three-month outlook, but favoring chances for below-average precipitation across Southeast Texas, and above-average precipitation for all of New Mexico and the Texas panhandle.

For September, the SMN precipitation outlook predicts above-average conditions for southern Baja California Sur, Southeast Sonora, Chihuahua and Durango, and below-average precipitation for Baja California, Northeast Sonora, Nuevo León and Tamaulipas. The precipitation forecast for October favors above-average conditions for the Baja California peninsula, Northwest and southern Sonora, Sinaloa, Durango and parts of Coahuila and Nuevo León, while the rest of the region is expected to experience conditions similar to average (Figure 9).

NMME forecasts increased chances of above-average precipitation for the entire Rio Grande-Bravo region, for September-November (Figure 10). The forecast likely reflects the predicted transition to El Niño in the fall.

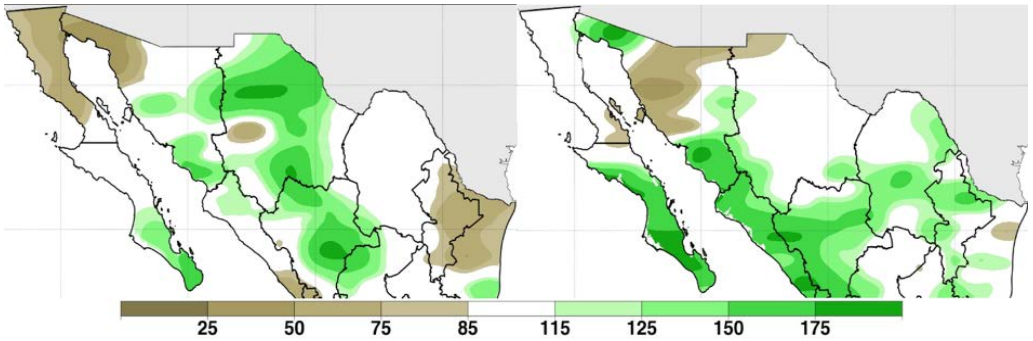


Figure 9 (above): Predicted precipitation anomalies for northern Mexico (in %), September (left) and October (right). Forecast made on August 1, 2018 by SMN.

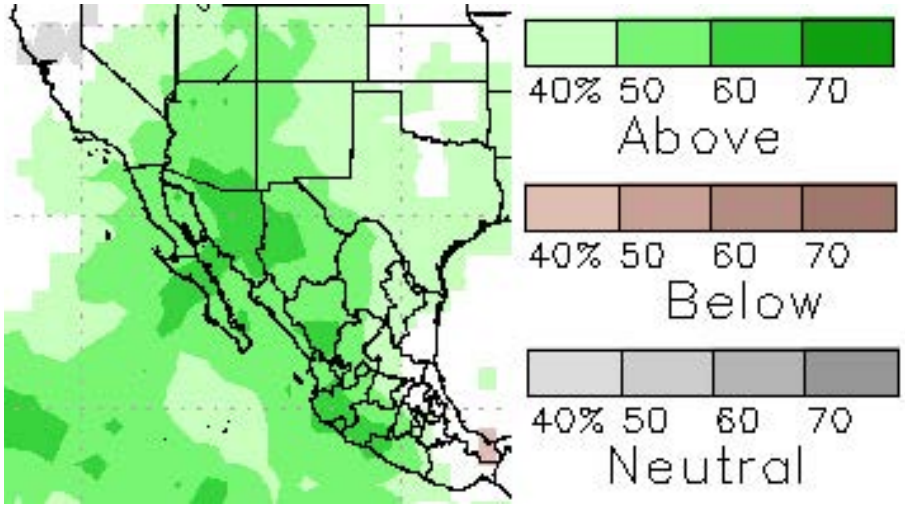


Figure 10 (left): NMME precipitation forecast for September-November. Forecast made by CPC.

FIRE

Monsoon precipitation in the Southwest U.S. and northern Mexico in July has eliminated prospects for above-average fire potential across the region, according to the North American Seasonal Fire Assessment and Outlook. Since the end of June, 196 fires burned about 138,000 acres (56,000 hectares) in Mexico. Chihuahua has the most burned area since the beginning of the year, with about 400,000 acres (161,000 hectares) burned. Forecasts for September and October indicate average fire potential for all of the Southwest U.S. and Mexico, except for the Baja California peninsula (Figure 11).

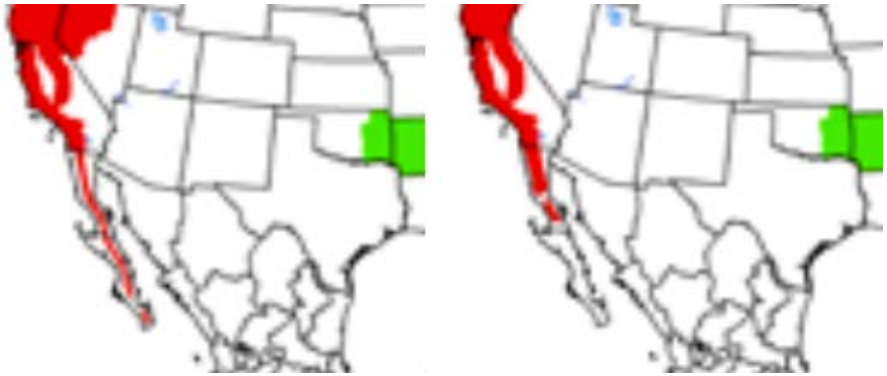


Figure 11 (above): Fire outlook for September (left) and October (right). Red shading indicates conditions that favor increased fire potential. Green shading indicates conditions that favor decreased fire potential. Forecast made on August 13, 2018 from NIFC and SMN.

EL NIÑO-SOUTHERN OSCILLATION (ENSO)

As of mid-July, sea-surface temperatures in the tropical Pacific Ocean were slightly above average, and continue to indicate ENSO-neutral conditions. Neutral conditions are forecast through the summer, with El Niño conditions forecasted to develop by the fall (IRI; NOAA). Chances of El Niño have increased from last month's forecasts, nearing 65% during the fall and ~70% during winter (Figure 10). There is considerable uncertainty in ENSO forecasts made during the spring, but that barrier has mostly passed and forecasters have come to a consensus that El Niño will develop later this year. If forecasts are correct, chances of a wet winter in the Southwest U.S. and northern Mexico are likely to increase.

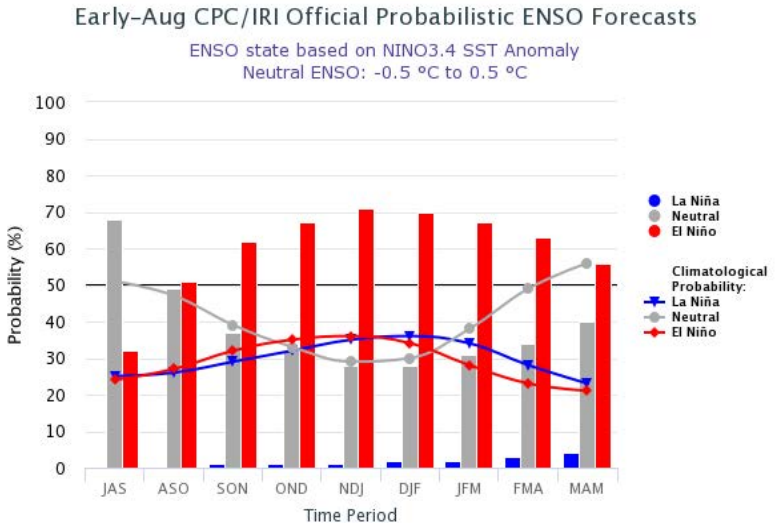


Figure12 (above): Probabilistic ENSO Forecast from IRI.

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

HEAT WATCH

Temperatures reached record levels along the Rio Grande-Bravo during July. Figure 13 shows the daily temperature anomalies for Albuquerque, NM and El Paso, TX, as well as several other Southwest U.S. cities. The histograms (on the right) show the number of days when temperatures reached levels above or below average. For example, in El Paso there were 7 days where temperatures were 7-8 °F above average.

One heat wave in particular (July 18-24) broke numerous records across the basin. In Santa Fe, NM, the temperature reached 98 °F (36.7 °C) on July 21, and 99 °F (37.2 °C) on July 22, both of which set a new record high. In El Paso, TX, the temperature ranged from 103 °F (39.4 °C) to 107 °F (41.7 °C) from July 19-23, breaking the previous record on 4 of the 5 days. Del Rio, TX and Laredo, TX broke the record on almost every day from July 18-24, with temperatures ranging from 106 °F (41.1 °C) to 110 °F (43.3 °C). And in Brownsville, TX, the temperature reached 101 °F (38.3 °C) and 102 °F (38.9 °C) on July 23 and 24, respectively, both of which broke the previous record.

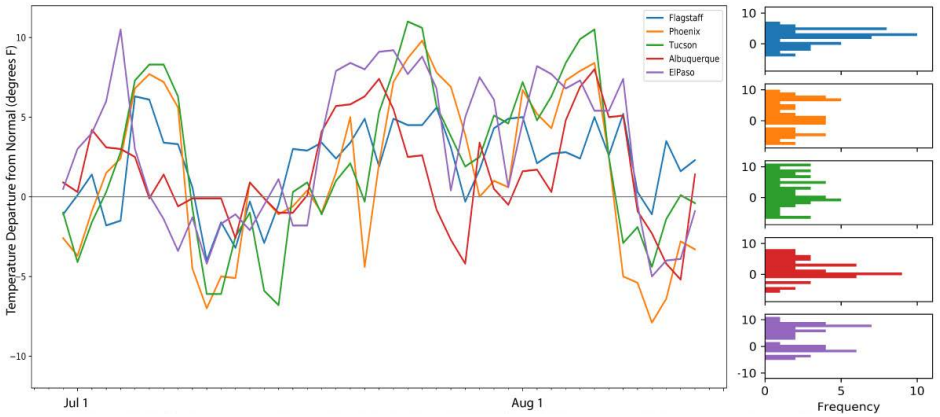


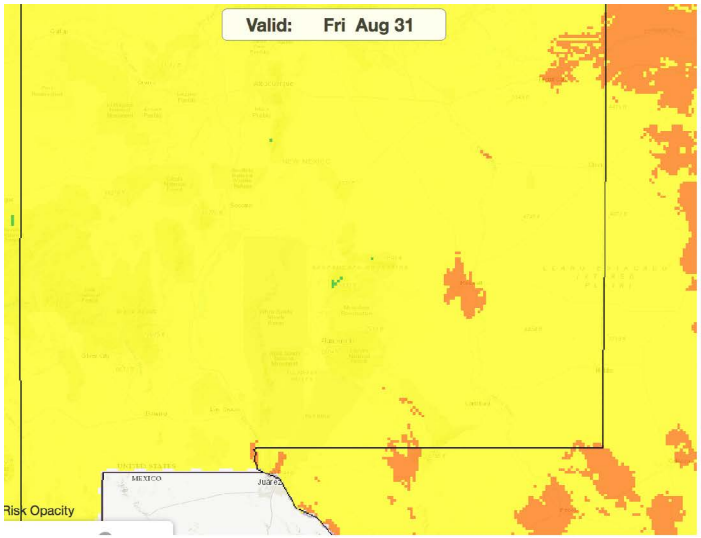
Figure 13 (above): Daily temperature anomalies from July 1 – August 14, 2018 (left) and frequency of temperature anomalies (right). Figure adapted from August Southwest Climate Outlook.

HEAT WATCH CONT'D

A heat wave in late May and early June set new maximum temperature records in some localities in Mexico, such as 117.5 °F (47.5 °C) on May 31, in Urique, Chihuahua, and 113.9 °F (45.5 °C) at Coyote Dam in Torreon, Coahuila. On May 26, 109.4 °F (43.0 °C) was recorded in San Antonio, Baja California Sur, which exceeded a previous record of 107.6 °F (42.0 °C) from 2011. On June 1, Urique, Chihuahua set a new record at 122 °F (50 °C), and in San Bernardo, Sonora, the temperature reached 118.4 °F (48 °C). At the same time, there were five other records that were tied in stations at Durango and Zacatecas. In July, only one record was broken in northern Mexico, with a temperature of 116.6 °F (47 °C) in Linares, Nuevo León.

Looking ahead, forecasts indicate that temperatures will be above average over the next month for both New Mexico and Texas (Figure 5). A new heat forecasting tool produced by the U.S. National Weather Service provides additional insight into near future temperatures. HeatRisk is an experimental forecasting tool for visualizing heat risk potential one-week in advance (Figure 14). It is designed to provide guidance to decision makers and heat-sensitive populations (such as outdoor workers and those with young children) on when to take action to prepare for a heat event. Each color category shown in the map represents different levels of risk and specifies the population that is at risk. For example, yellow is a low-level of risk and means that those who are extremely sensitive to heat should take action to prevent illness. When the highest level (magenta) is forecasted, the entire population is at risk, due to long-duration heat with little to no relief overnight. HeatRisk can be accessed from the National Weather Service page for most cities (https://www.wrh.noaa.gov/wrh/heatrisk/?wfo=epz).

Extreme heat causes the most deaths in the U.S. of any weather-related disaster, according to the National Center for Environmental Information, and it is particularly important to be prepared for the unrelenting heat. Populations typically at increased risk of heat-related illness include children, pregnant women, elderly, those taking medications, those working outdoors, those with disabilities, those without adequate cooling, and the socially isolated. Be sure to check on loved ones and neighbors and call 911 if anyone is experiencing symptoms of heat stroke (e.g., headache, fast pulse, confusion, nausea, loss of consciousness). For more information on vulnerable populations, the symptoms of heat-related illness, and what to do to prepare, visit the CDC extreme heat webpage (en Espanol: https://www.cdc.gov/es/disasters/extremeheat/index.html).



Category	Level	Meaning
Green	0	No Elevated Risk
Yellow	1	Low Risk for those extremely sensitive to heat, especially those without effective cooling and/or adequate hydration
Orange	2	Moderate Risk for those who are sensitive to heat, especially those without effective cooling and/or adequate hydration
Red	3	High Risk for much of the population, especially those who are heat sensitive and those without effective cooling and/or adequate hydration
Magenta	4	Very High Risk for entire population due to long duration heat, with little to no relief overnight

Figure 14 (left): Screenshot of NWS HeatRisk on Friday, August 31. The table (right) describes the meaning of each color.

MONSOON TRACKER

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

Monsoon precipitation totals vary considerably across the Southwest. Monthly totals for select locations reveal near or below-average amounts compared to long-term averages (Fig. 15). There are widespread regions with above-average totals as well, revealing the challenge of characterizing monsoon performance using single stations. The monthly breakdown illustrates the sporadic nature of monsoon activity that affects how each locale reaches its seasonal totals and demonstrates how particular events can boost monthly totals in some locations but not others. Daily precipitation plots for the same stations (Fig. 16) further demonstrates the intermittent nature of monsoon precipitation and distinguishes areas that have had frequent events (e.g. Tucson, Flagstaff) from those with fewer ones (e.g. Phoenix, El Paso).

The seasonal totals and percent of average precipitation since July 19th (Fig. 17) and June 18th (Fig. 18) help characterize the spatial variability and intensity of the monsoon thus far. Looking at city totals as of August 17, Laredo, TX has only received 0.75 inches this monsoon, which is well below-average for the area. Meanwhile, nearby Del Rio, TX has received 6.85 inches, which is above average for the city, and half of which (3.6 inches) fell on one day, August 11. El Paso, TX and Albuquerque, NM have received close to average precipitation, and Santa Fe has received about 2.5 inches—below average for the city.

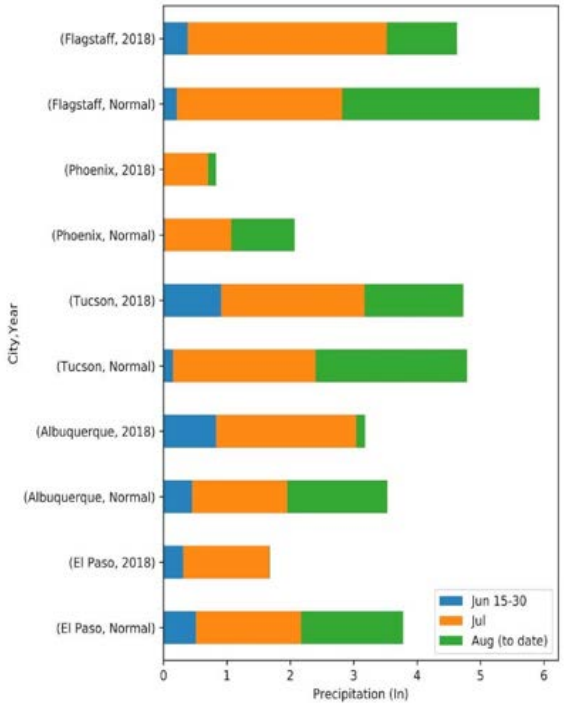


Figure 15 (above): Monthly monsoon precipitation totals – 2018 vs. average.

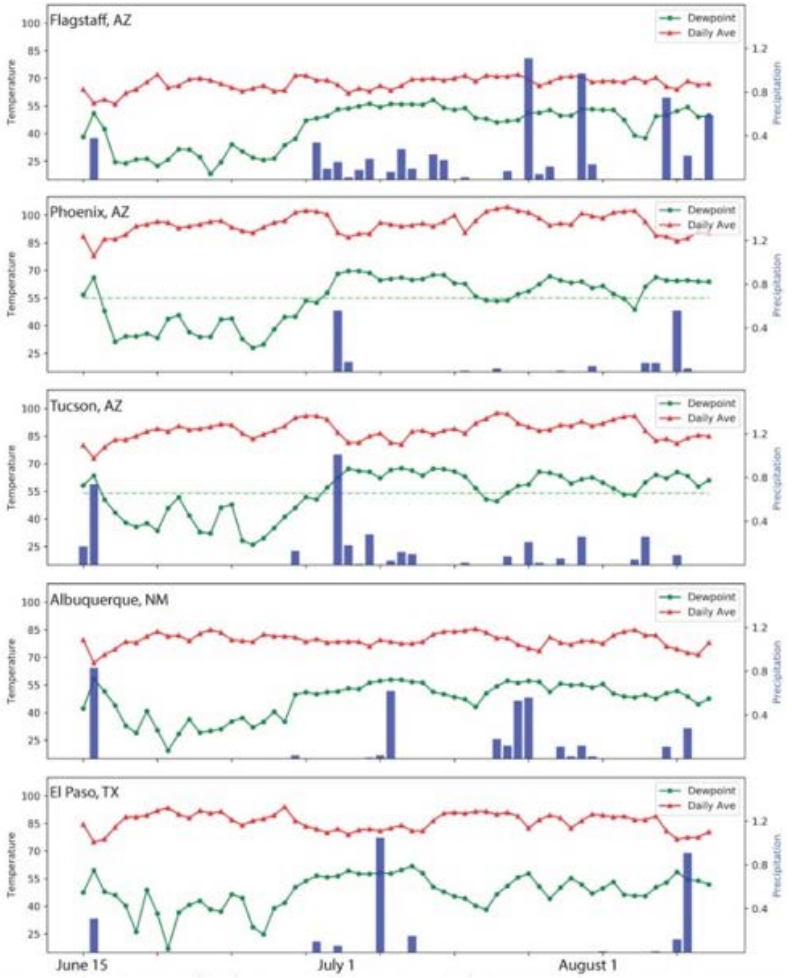


Figure 16: Dewpoint and daily average temperature, daily precipitation, June 15-August 13, 2018.

MONSOON TRACKER CONT'D

As discussed last month, increasing dewpoint temperature was the old metric by which monsoon onset was determined. This year, the onset of monsoon precipitation was relatively closely aligned with increasing dewpoint temperatures in early July, but the precipitation/dewpoint relationship since then illustrates why elevated dewpoint is an imperfect measure of likely precipitation. Although dewpoint temperatures were elevated for much of the last month, precipitation was not consistent. In fact, sustained periods of high dewpoints without precipitation led to extreme heat warnings in the region, with heat indices over 110 degrees F in some locations, and persistent warm overnight temperatures. Without storm-induced cooling, elevated dewpoint temperatures can be downright miserable, especially for households that rely on evaporative coolers for interior climate control.

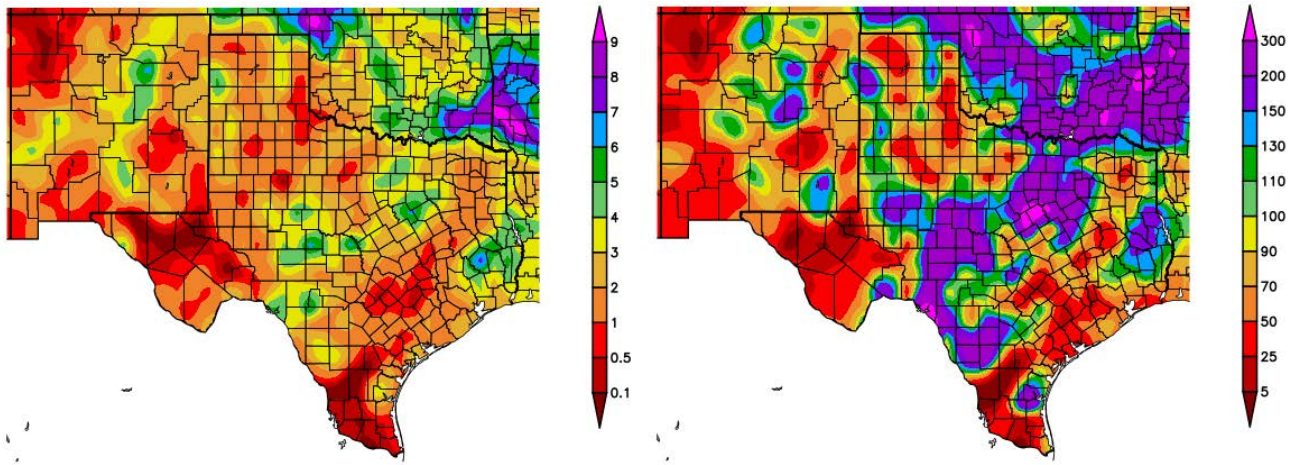


Figure 17 (above): Total precipitation (in inches) (left), and percent of average precipitation (right), for July 18-August 16. Maps from HPRCC.

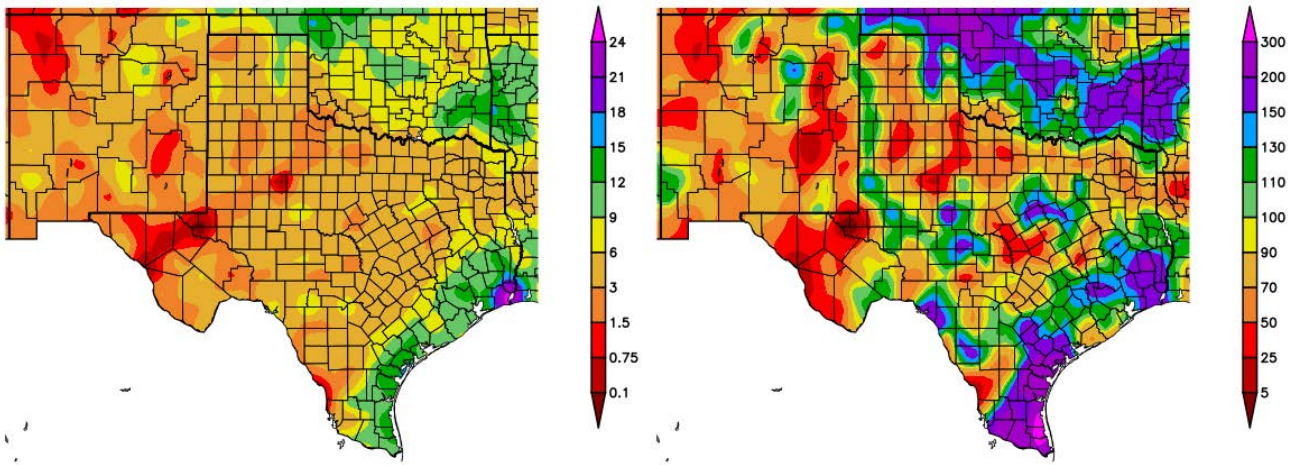


Figure 18 (above): Total precipitation (in inches) (left), and percent of average precipitation (right), for June 18-August 16. Maps from HPRCC.

Additional Monsoon Resources:

- NWS: 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

ANNOUNCEMENTS

33RD ANNUAL WATEREUSE SYMPOSIUM

The symposium will be held September 9-12, 2018 in Austin, Texas, and will address advancing the policy, technology, innovation and public acceptance of water reuse.

SHAPING OUR WATER FUTURE – WORLD WATER CONGRESS & EXHIBITION 2018

This international conference will bring together water and environment professionals in Tokyo, Japan, September 16-21, 2018, to discuss new insights into pioneering science and technological innovation related to water management.

BORDER ENERGY FORUM XXII

Hosted by the North American Development Bank, the Border Energy Forum brings together local and state officials, private sector developers and investors, academics, and energy experts from the U.S. and Mexico to discuss topics including energy prosperity, innovation, financing, and cross-border opportunities. The forum is September 26-27 in San Antonio, TX.

NEWS

How Ranchers Are Getting by With Less Water Across the West, August 16, 2018
N.M. officials consider options to reuse oilfield water, August 12, 2018
Ondas tropicales traerán lluvias intensas, August 15, 2018
Más lluvias para esta semana en México, August 13, 2018