



# TEXAS CoCoRaHS OBSERVER

Summer 2019



*"Because every drop counts, as do all Zeros."*

Welcome to  
the  
Texas CoCoRaHS  
Observer newsletter.

The purpose of this newsletter is to keep observers informed of the latest news, events and happenings related to the CoCoRaHS program here in Texas, as well as news about the latest weather patterns affecting each region of Texas.

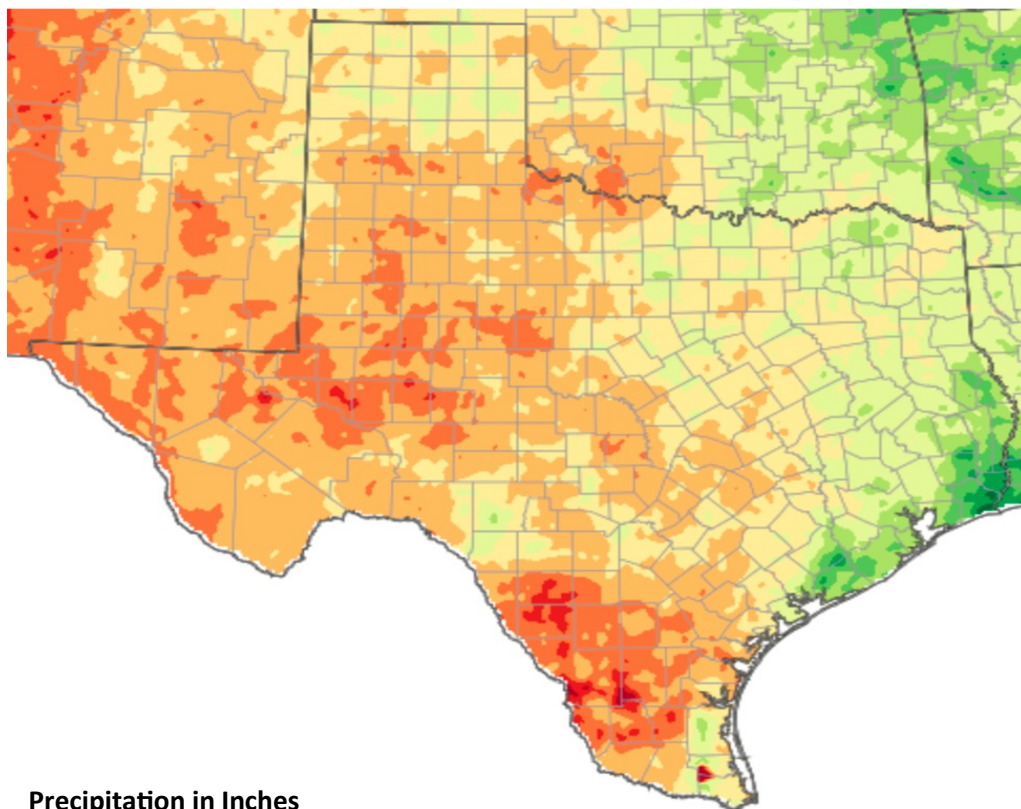
If you would like to have a presentation done for your group or organization about CoCoRaHS please send an e-mail to [Texas@CoCoRaHS.org](mailto:Texas@CoCoRaHS.org)

## Dry summer across much of the state

John Nielsen-Gammon  
Texas State Climatologist

My, what a wet summer! Total rainfall of 30.59"! More than 12" above normal! Or maybe your experience was different. That's what happened in extreme southeast Texas, but most stations didn't manage to record 12" total for the summer. The median precipitation statewide was only about 7", and one unfortunate but dedicated CoCoRaHS observer in Webb County found a total of 0.47" inches of liquid stuff during their 92 daily observations.

### Total Precipitation - June 1, 2019 through August 31, 2019



Precipitation in Inches



### Inside this issue

West Texas Region Summary	3
Wichita Falls Region Summary	7
South Central Texas Region Summary	9
Abilene/ San Angelo Region Summary	12
North Texas Region Summary	16
Rio Grande Valley Region Summary	26
Houston-Galveston Region Summary	30
Fall Weather Outlook	36
CoCoRaHS Tips and Training	38

## “Dry summer across much of the state (continued)”

Along with the dry weather came heat, especially for the western half of the state. Much of the western half recorded a top ten summer for average daily maximum temperatures. That means that what little water there was evaporated quickly, exacerbating the drought conditions. Midland, which has had continuous observations since 1930, tied its all-time August temperature record with 107 °F on August 5. Not satisfied, it proceeded to break its all-time August temperature record with 108 °F on August 25. Like a batter getting used to a new pitcher, Midland then proceeded to hit the sweet spot, shattering the day-old record with 113 °F on August 26.

While western Texas was basking in heat, the Texas Gulf Coast was sweating in humidity. A good rule of thumb in Texas is that if the temperature doesn't drop below 80 °F at night, it's seriously humid. Well, the Beaumont airport tied its all-time highest minimum temperature with 82 °F on June 22 and proceeded to break it with 84 °F on the next day. At the other end of the coast, Brownsville has climate observations going back to 1878. For some reason, there were a whole bunch of high minimum temperature recorded there in the mid-1890s. Probably something to do with where the station was located. Since then, the minimum temperature had only been as high as 83 °F twice. That's until this year, when it was at least 83 °F on eight separate occasions between June 21 and August 26.

The immediate cause of this would be high sea surface temperatures in the Gulf of Mexico and the Caribbean. Temperatures have been running 1-2 °F above normal there all summer. I wonder, though, whether an unusual cause might have jacked up temperatures even higher: the Mississippi River floods. Those floods dumped massive amounts of silty fresh water into the Gulf of Mexico, and that fresh water typically moves on down the coast to Texas and Mexico following the ocean currents. If there was an extra large amount of fresh water sitting close to the coast on top of the normally salty water, that fresh water could have inhibited vertical mixing within the Gulf, allowing the surface waters to heat up more than usual. That's just me speculating at this point, but I don't have to speculate about whether some Texans found this summer to be particularly uncomfortable.

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## Summer 2019 Climate Summary for West Texas and Southeast New Mexico

By Jim DeBerry, Meteorologist

National Weather Service-Midland,

West Texas and Southeast New Mexico had a very active spring, with much severe weather and above-average precipitation most locations.

### June

The synoptic pattern began changing from spring to summer in June. Consequently, precipitation began falling off during the latter half of the month as the summertime ridge began establishing itself. Only one flooding event was reported, when thunderstorms inundated some roadways in Seagraves in Gaines County, stranding several motorists. The Rio Grande saw significant rises for the first time this year due to heavy rainfall from thunderstorms in the vicinity of the river.

Monthly radar rainfall estimates ranged from 1/10<sup>th</sup>" in some parts of the Permian Basin to up to 10" over southeast Brewster County. Highest observed rainfall was 5.72" at Persimmon Gap in Big Bend National Park. Average rainfall was 1.86".

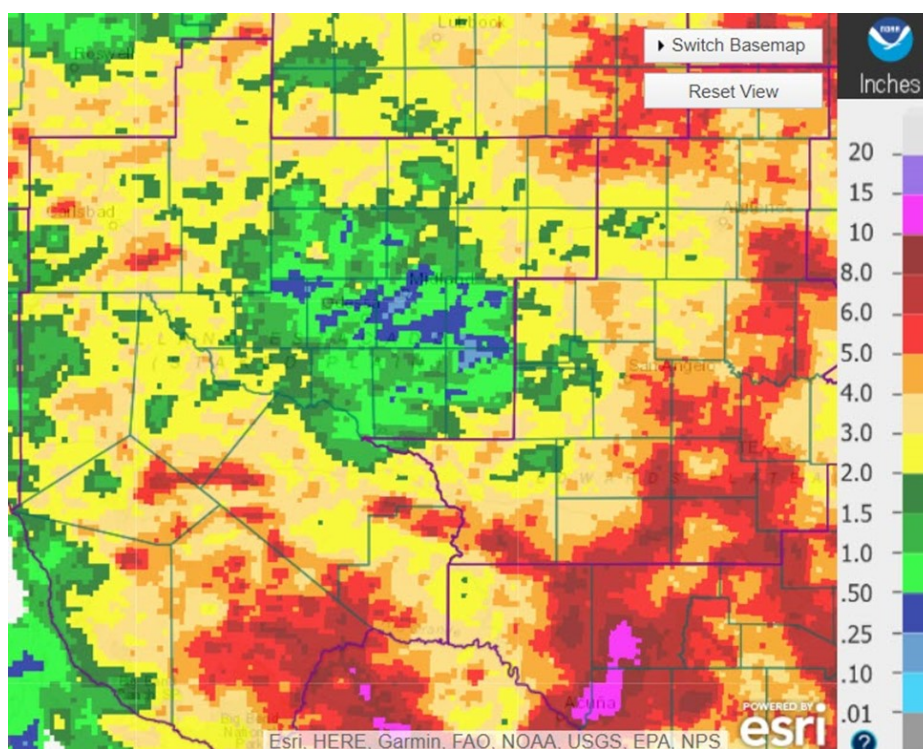


Figure 1: June Precipitation

### July

Despite the upper-level ridge residing over West Texas and Southeast New Mexico during July, convection was fairly widespread, with radar rainfall estimates of ½" or more in most locations.

On July 3<sup>rd</sup>, a line of convection with heavy rainfall moved through the Permian Basin. This stalled many vehicles throughout Midland in Midland County. Runoff buried several frontage roads in several feet of water.



## “Climate Summary for West Texas and Southeast New Mexico (continued)”

On the 22nd, thunderstorms developed in Carlsbad in Eddy County, flooding roads throughout the town. Convection later that evening inundated roads in the vicinity of Seminole in Gaines County, as well as Midland in Midland County.

Near the end of the month, localized convection with heavy rainfall briefly pushed the Rio Grande into minor flood stage above Presidio (PIOT2), but otherwise rivers generally remained near base flow.

Monthly radar rainfall estimates ranged from 1/10<sup>th</sup> in the upper Colorado River basin to up to 8” in Southeast New Mexico. Highest observed rainfall was 3.13” at Mt. Locke in Jeff Davis County. Average rainfall was 1.21”.

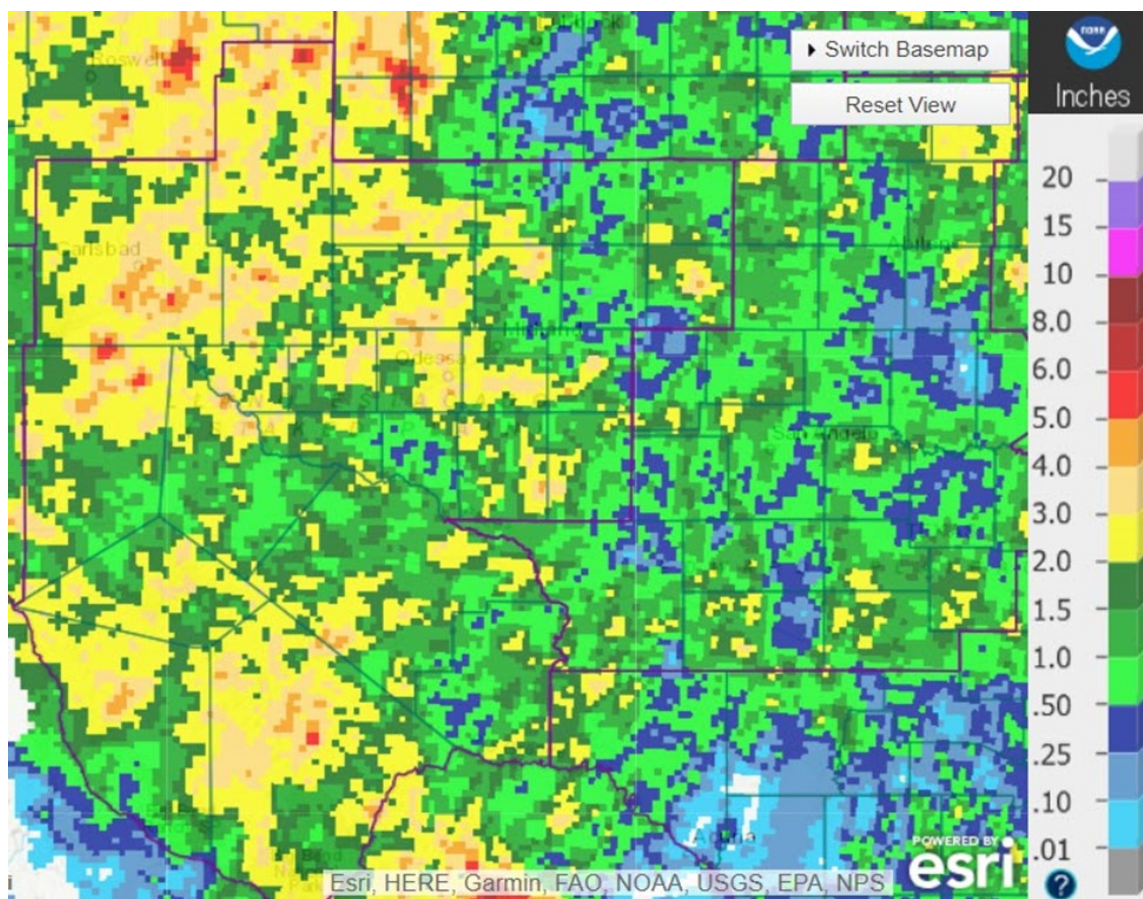
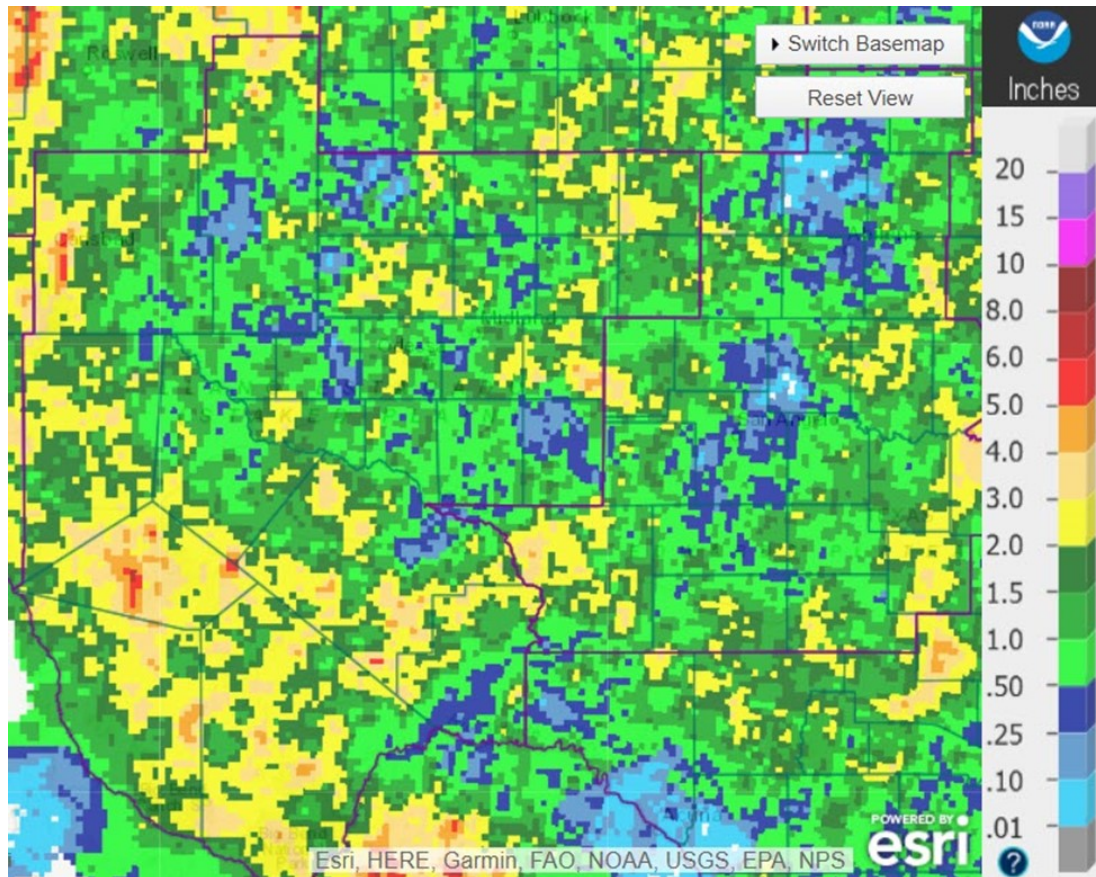


Figure 2: July Precipitation

### August

The upper ridge dominated August, shutting off rain (relative to previous months) for most of West Texas and Southeast New Mexico. Only one flash flood event was reported, on August 22<sup>nd</sup>, when thunderstorms inundated roadways south of Cayanosa in Pecos County with up to 2.5' of runoff.

Monthly radar precipitation estimates ranged from less than 1/10<sup>th</sup> in several locations east of the Pecos to up to 8” in the Davis Mountains. Highest observed rainfall was 4.84” at Persimmon Gap in Brewster County. Average rainfall was 1.00”.

**“Climate Summary for West Texas and Southeast New Mexico (continued)”****Figure 3: August Precipitation**

Overall, Summer 2019 was going good for West Texas and Southeast New Mexico until a dry spell set in during August.

As a result of scant rainfall in August, as of September 1<sup>st</sup>, drought conditions have degenerated across West Texas and Southeast New Mexico. In Southeast New Mexico, moderate drought has developed in portions of eastern Lea County. The rest of the county, as well as Eddy County, were abnormally dry. In West Texas, severe drought had developed into northern portions of Borden and Dawson Counties. Much of the rest of West Texas east of the Pecos was in moderate drought, as was the Presidio Valley and Marfa Plateau. The rest of West Texas was either abnormally dry or out of drought.

Area reservoirs are at 51.2% of conservation capacity as of September 1st.



## June 18th, 2019: Severe Weather in Texas and Oklahoma Panhandles

By Angie Margrave, National Weather Service WFO Amarillo

A compact upper level disturbance and weak frontal boundary supported storm development in what turned out to be a weakly capped environment. Moderate instability and shear supported a few high based supercell structures which moved southeast from near Dalhart all the way down to Wellington. Very large hail, strong winds and a few funnels were reported with these storms. The largest hail was reported in Pampa (slightly larger than baseballs), and the strongest wind was reported in Borger (86 mph). Wind damage was also reported in Borger and Wellington. A more isolated storm also formed near Canyon which produced some hail up to ping pong ball size. A brief land spout tornado also occurred west southwest of Pampa. (Credit: Alex Ferguson)

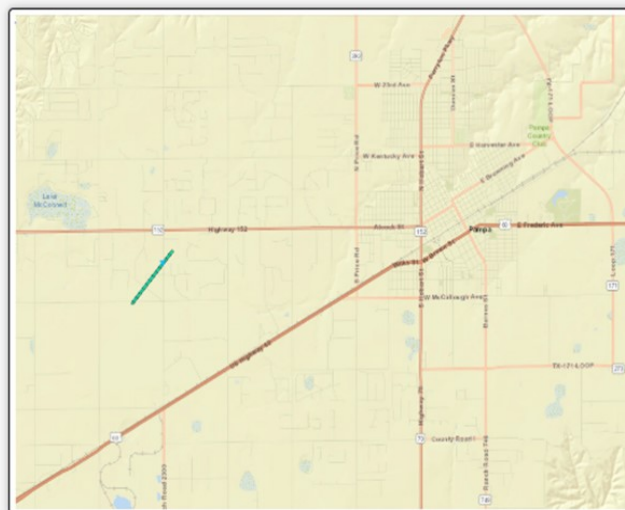
### Tornado - West southwest of Pampa, TX Gray County

<b>Date</b>	June 18th, 2019
<b>Time (CDT)</b>	8:10 PM - 8:12 PM
<b>EF Rating</b>	EF0
<b>Est. Peak Winds</b>	85 mph
<b>Path Length</b>	0.96 miles
<b>Max Width</b>	20 yards
<b>Injuries/Deaths</b>	0

#### Summary:

A very long and narrow rope tornado was reported by a trained spotter and the public. The description provided and movement at nearly a right angle to the storm motion suggests this was a land spout. Some minimal leaning of a power pole was noted where the tornado crossed County Road 3, but no other damage was observed.

### Track Map



Large supercell near Borger, TX  
(Photo Credit: Justin Noonan)



Supercell near Lake Merideth  
(Photo Credit: Marcus Diaz)

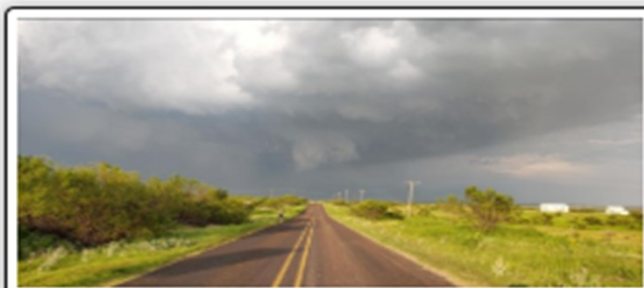


Figure 1: Rotating wall cloud east of Fritch, TX (Photo Credit: Jeff Frame)

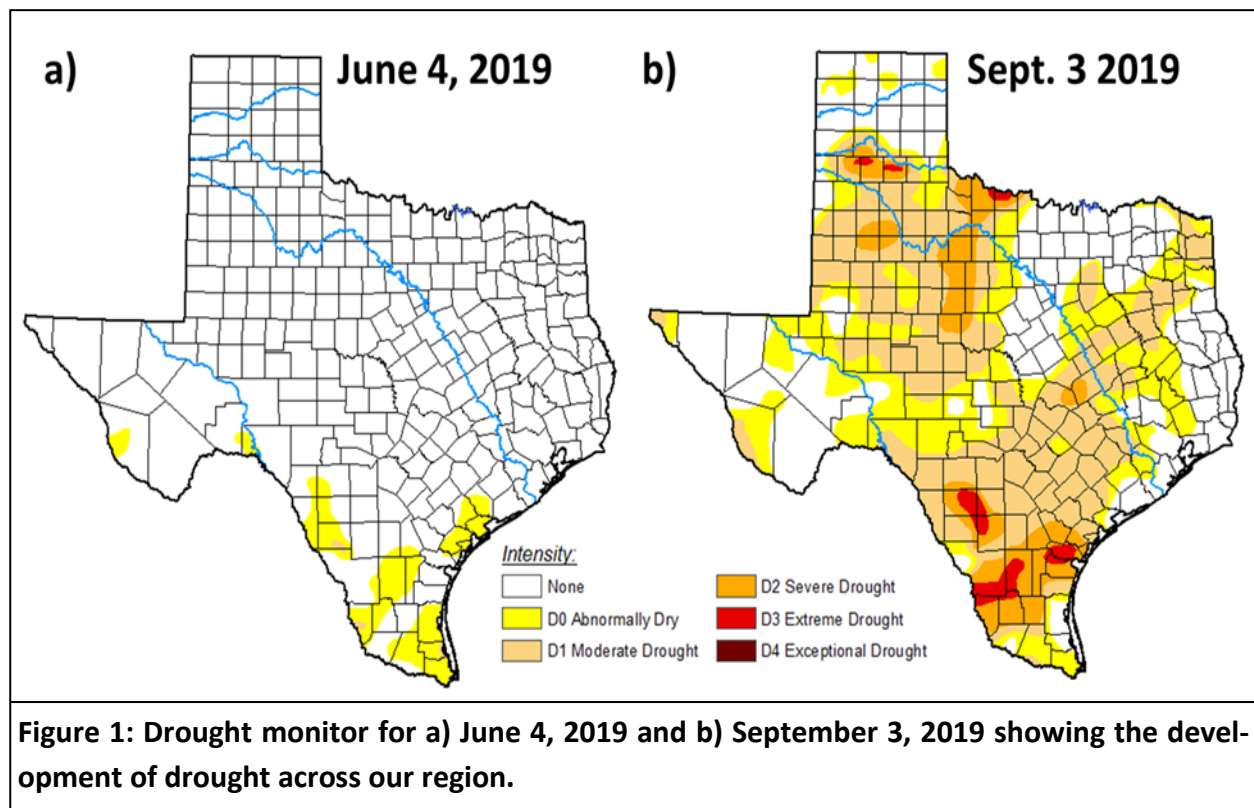
## Climate Summary for Wichita Falls Region

### Drought Returns as Wichita Falls Region Experiences Hot and Dry July and August

By Charles Kuster

CIMMS/NSSL

Drought returned to the Wichita Falls region this summer thanks mostly to a rather hot and dry July and August (Fig. 1). In total, the region experienced 63 dry days (all CoCoRaHS stations reported less than 0.05 inches) and 29 wet days (at least one CoCoRaHS station reported 0.05 inches or more). These numbers are close to the average number of wet and dry days during the past three years, but this year, most of the wet days occurred during the first 25 days of June. After June 25, there were 51 dry days and only 16 wet days. As a result, drought rapidly developed and now nearly the entire Wichita Falls region is under some level of drought according to the U.S. Drought Monitor (Fig. 1; <https://droughtmonitor.unl.edu/>). Overall, temperatures were above average and precipitation was below average for the region this summer.



Despite the dry conditions, there were some notable precipitation and severe weather events especially during June. A line of severe storms moved across the region on June 15<sup>th</sup> (Fig. 2) and reports of severe winds and wind damage were received from Hardeman, Knox, and Archer County including reports of power poles down and roof damage in and near Knox City. Every CoCoRaHS station across the region also reported at least 0.50" of rain on this day. On June 23<sup>rd</sup>, tennis ball size hail was reported in Baylor County and quarter size hail was reported in Wichita County.

## “Climate Summary for Wichita Falls Region (continued)”

Let us also take this time to thank all of the National Weather Service forecasters who provide vital information to us during times of severe weather as well as tranquil weather. We were all better informed about the severe weather threats of this past summer thanks to the hard work and dedication of the forecasters and the accurate forecasts they produce.

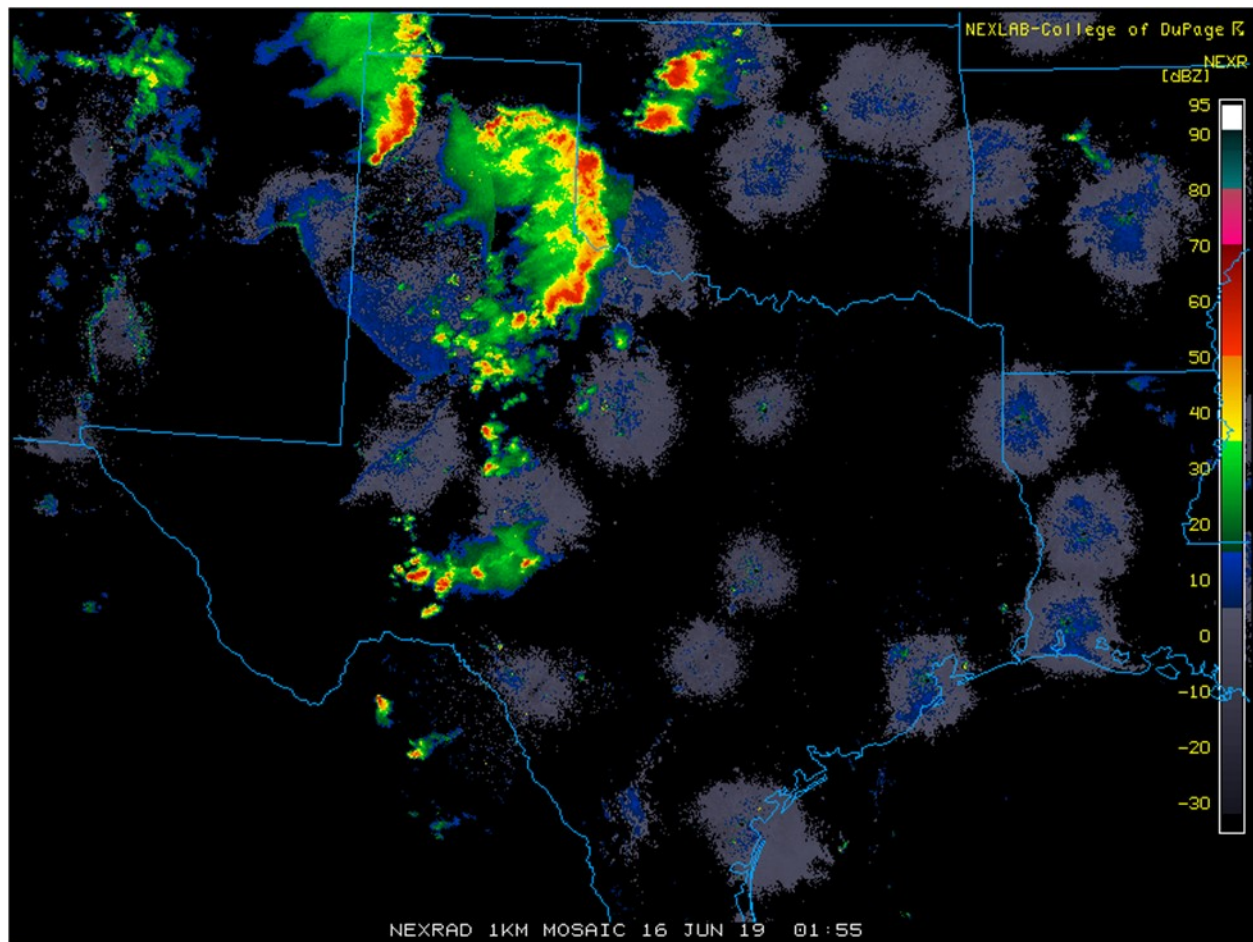


Figure 2: Radar imagery of severe storms in the Wichita Falls region at 8:55pm CDT on June 15, 2019.

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## Climate Summary for Austin/San Antonio Region

Cool and Wet June Transitioning to a Hot and Dry July and August across South-Central Texas

By Brett Williams – WFO Austin/San Antonio

September has arrived and meteorological summer has come to an end. Summer 2019 began cool and wet with several severe weather and flash flooding events in June, but transitioned to hot and dry in July and finished with near record heat (with dry conditions continuing) in August. There were no tropical systems impacting the region (and the state of Texas as a whole) this summer, with the Gulf of Mexico remaining relatively quiet through the end of August. June's rains had almost completely wiped out any drought conditions, but by the end of August abnormally dry (D0) and drought conditions (D1+) had returned to almost the entirety of South-Central Texas (Fig. 1). A look at the percent of normal rainfall for the summer shows the vast majority of the region receiving below normal rainfall, with only a few isolated locations receiving above normal rainfall (Fig. 2).

San Antonio tied for its 19<sup>th</sup> hottest summer on record, with a temperature departure of 0.9 °F above normal and a total of 16 triple digit days. For total rainfall, San Antonio came in at tied for its 51<sup>st</sup> driest summer on record, with only 66% of normal rainfall. Austin Camp Mabry turned in its 7<sup>th</sup> hottest summer on record, with a temperature departure of 1.9 °F above normal and a total of 38 triple digit days. Camp Mabry received only 74% of normal rainfall, which tied for 52<sup>nd</sup> driest summer on record. At Austin Bergstrom International Airport the summer temperature departure was 1.8 °F above normal, good for 19<sup>th</sup> hottest summer on record. There were 21 days with high temperatures at or above 100 °F. Austin Bergstrom came in at its 33<sup>rd</sup> driest summer on record, receiving only 62% of normal rainfall. Out west at Del Rio, warmer than normal temperatures were also observed, with Del Rio registering its 9<sup>th</sup> hottest summer on record with a temperature departure of 2.2 °F above normal and 55 triple digit days. However, Del Rio was a bit wetter than normal this summer, tying for 24<sup>th</sup> wettest summer on record with 124% of normal rainfall. It is worth noting that all of Del Rio's rain this summer fell in June, with only a trace falling in both July and August.

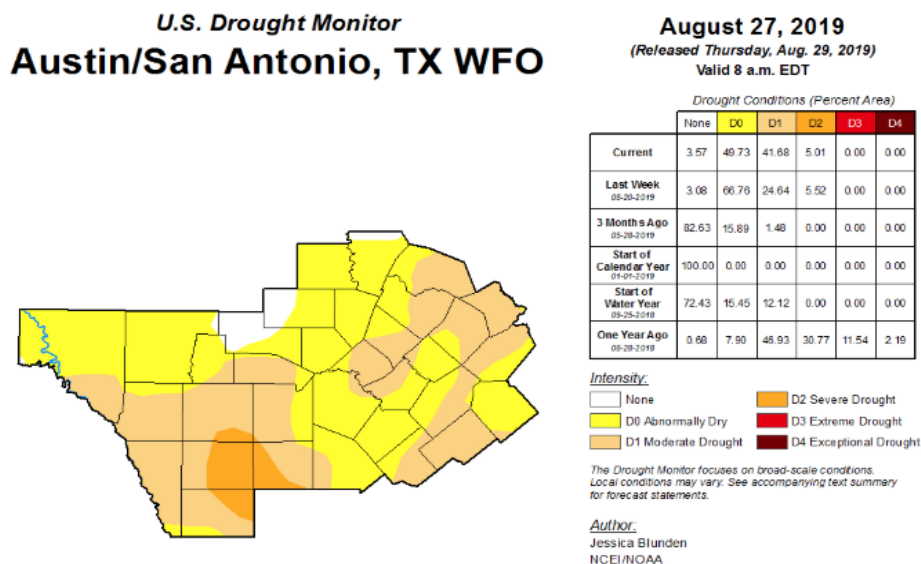
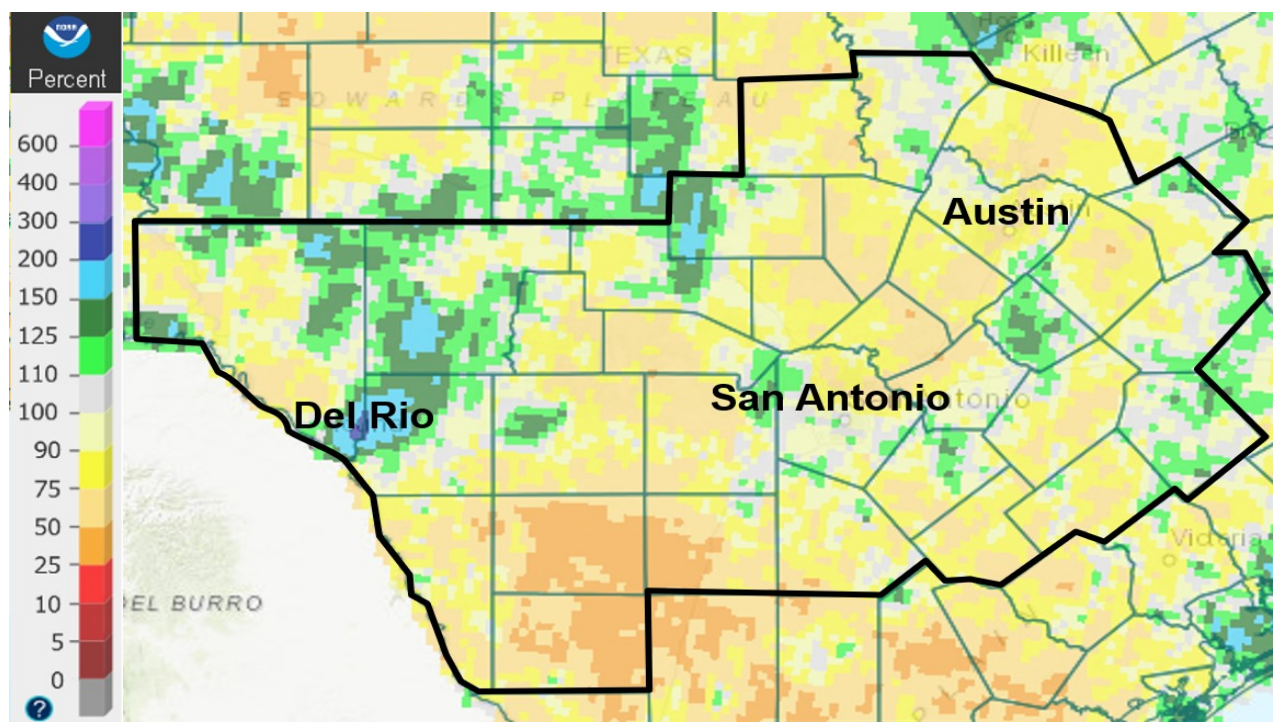


Figure 1: Drought conditions as of August 27<sup>th</sup>, 2019 across South-Central Texas

## “Climate Summary for Austin/San Antonio Region (continued)”



**Figure 2: 90-day percent of normal rainfall across South-Central Texas ending on September 1<sup>st</sup>, 2019**

June was characterized by a fairly active weather pattern across the region, with heavy rain, flash flooding, and severe weather throughout the month. On June 4th, heavy rain fell from Del Rio to San Antonio, leading to flash flooding. Del Rio recorded 4.23" of rain alone on June 4th (setting a daily record). On June 6th, widespread thunderstorms brought severe weather to the area with both large hail and damaging winds. Just three days later on June 9th, a line of severe thunderstorms moved north to south across the region, bringing another round of widespread severe weather. Just one week later on the evening of June 16th and into the early morning hours of June 17th, another round of severe thunderstorms impacted the region. By the end of June, 57 severe thunderstorm warnings and 19 flash flood warnings had been issued by WFO Austin/San Antonio. There were 38 wind damage reports, 17 measured severe wind gusts ( $\geq 58$  mph), 30 severe hail reports, and 17 flash flood reports in June across South-Central Texas. For the month, San Antonio recorded its 24<sup>th</sup> wettest June on record, with 133% of normal rainfall. With respect to temperatures, San Antonio came in at 66<sup>th</sup> coldest June on record with a temperature departure of 0.7 °F below normal. Austin Camp Mabry registered its 31<sup>st</sup> wettest June on record and was tied for its 49<sup>th</sup> warmest June with temperatures precisely at normal. Del Rio was exceptionally wet in June, coming in at 2<sup>nd</sup> wettest on record with 334% of normal rainfall for the month with 7.85" of rain. Temperatures were also a bit cooler than normal, coming in at 52<sup>nd</sup> coldest June on record with a temperature departure of 0.9 °F below normal.

## “Climate Summary for Austin/San Antonio Region (continued)”

As we entered into July, the subtropical ridge began to take over the weather pattern, with temperatures trending to above normal and rainfall largely coming to an end. However, toward the end of July, an unusually strong cold front traversed completely through the region bringing historically cold temperatures to South-Central Texas. Numerous weather observation stations across the region experienced their coldest July temperatures on record on the mornings of July 25<sup>th</sup> and July 26<sup>th</sup>, with temperatures dropping into the mid-50s to low 60s across the region. Carrizo Springs in Dimmit County recorded a morning low of 55 °F on July 25<sup>th</sup>, demolishing the previous all-time coldest July temperature of 62 °F (period of record beginning in 1912). Temperatures at Austin Bergstrom fell to 58 °F, breaking the previous coldest July temperature record of 60 °F (period of record beginning in 1943). Other sites across the region setting all-time coldest July temperature records include Hondo Municipal Airport, and the Cooperative Observer (COOP) stations of Austin Great Hills, Cheapside, Pleasanton, Taylor 1NW, Brackettville 22N, Dripping Springs 6E, Nixon, Floresville, Hondo, New Braunfels WFO, Johnson City 2N, and Prade Ranch (Real County). For the month, San Antonio came in near normal for temperatures, but was very dry, with only 5% of normal rainfall for the month. This was tied for 19<sup>th</sup> driest July on record. Austin Camp Mabry and Austin Bergstrom both saw above normal temperatures for the month, with temperature anomalies of +1.5 °F and +0.8 °F, respectively. Rain was scarce for both Austin sites, with Camp Mabry picking up only 0.39” and Bergstrom only seeing a trace of rain. This was good for 28<sup>th</sup> driest at Mabry and tied for driest July on record at Bergstrom. July in Del Rio was also hot and dry, with a temperature departure of 2.1 °F above normal, good for 15<sup>th</sup> warmest July on record. Only a trace of rain fell at Del Rio in July, tying for driest July on record.

The strong subtropical ridge continued to dominate in August, bringing exceptional heat and continued dryness to South-Central Texas. El Niño, which had been officially declared in February, came to an end by early August. San Antonio experienced its 2<sup>nd</sup> hottest August on record, with a temperature departure of 3.3 °F above normal. August 2019 was the 3<sup>rd</sup> hottest month on record at San Antonio, only trailing August 2011 and July 2009. 0.31” of rain fell in San Antonio in August, only 15% of normal and good for tied for 25<sup>th</sup> driest August on record. In Austin, both official climate sites were well above normal for temperatures. Austin Camp Mabry came in at 4.1 °F above normal, making it the 2<sup>nd</sup> hottest August on record. Austin Bergstrom was 3.5 °F above normal, making it the 7<sup>th</sup> hottest August on record. Austin Mabry experienced its 2<sup>nd</sup> hottest month ever, only behind August 2011. Both Austin climate sites recorded below normal rainfall again in August, with Mabry receiving 64% of normal rainfall and Bergstrom receiving only 2% of normal rainfall, good for 6<sup>th</sup> driest August on record. Del Rio was exceptionally hot in August, coming in a 5.4 °F above normal, making it the hottest August on record. August 2019 was the second hottest month on record in Del Rio, coming in just slightly cooler than July 1998. August 2019 was the first month on record in which daily high temperatures met or exceeded 100 °F every single day at Del Rio. On August 26<sup>th</sup>, Del Rio reached a high of 109 °F, which tied the all-time highest temperature in August (tied with August 17, 1969). Furthermore, by the end of August, Del Rio had 35 consecutive triple digit days, which was the 2<sup>nd</sup> highest such streak all time (this streak would end the following day on September 1<sup>st</sup>. The record is 50 consecutive days from June through August 1980). Same as July, only a trace of rain fell at Del Rio in August, making it 68 consecutive days without measurable rainfall by the end of August.

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## Climate Summary for Abilene/San Angelo Region

### Summer across West Central Texas

By Joel Dunn

#### Observation Program Leader, National Weather Service-WFO San Angelo

Summer across West Central Texas started out rather wet and slightly cooler than normal. As the summer progressed, the average temperature began to climb. By mid-July San Angelo had three 100° days and Abilene had had two. At the end of July, however, the high pressure had set in and kicked off a flash drought across West Central Texas. Triple digit high temperatures would become prolific, with lows scarcely making it into the 70s.

#### June

June in particular was more of an extension of spring rather than the beginning of summer, with average temperatures slightly below normal and precipitation well above normal. On the 2<sup>nd</sup> of June San Angelo received 2.72" of rainfall, breaking the record (1.30") set in 1951. The month was so wet that some areas received as much as 9" of rainfall.

#### June 01, 2019 Monthly Observed Precipitation

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Valid on: July 01, 2019 12:00 UTC

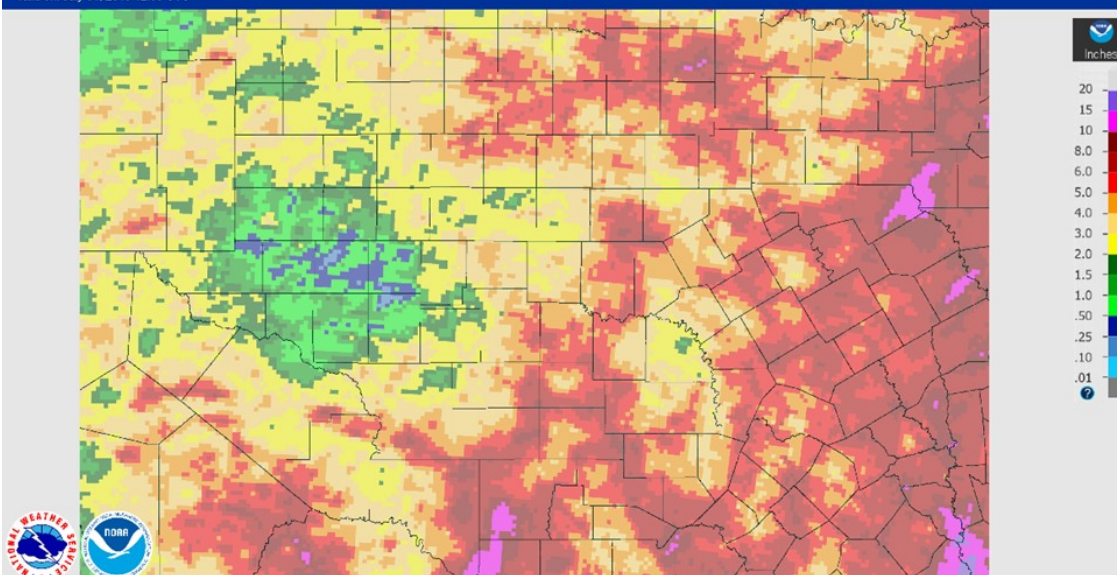


Image 1 - June Monthly Rainfall

#### June 01, 2019 Monthly Percent Precipitation

Created on: August 26, 2019 - 15:53 UTC  
Valid on: July 01, 2019 12:00 UTC

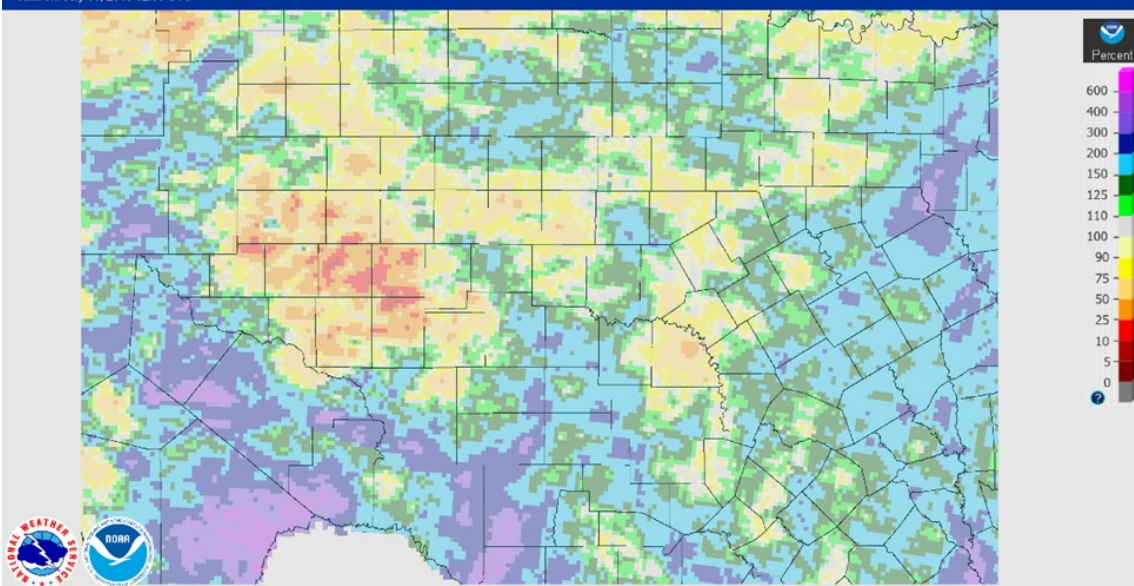


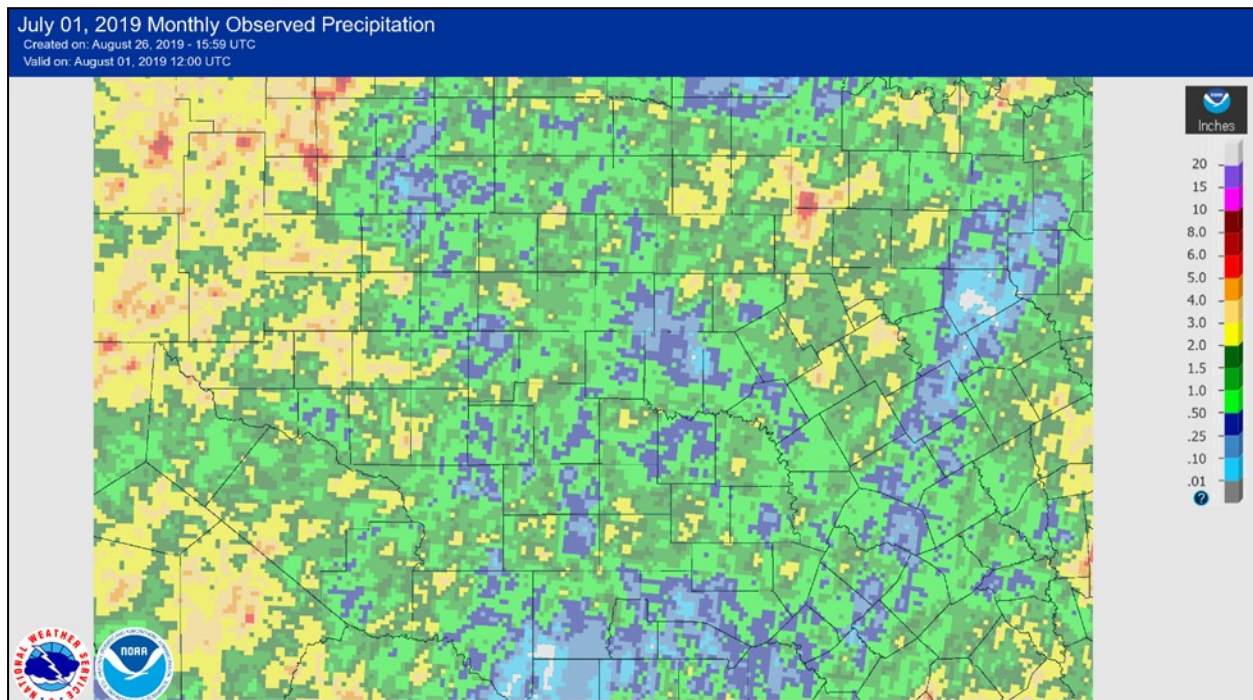
Image 2 - June Percent of Normal



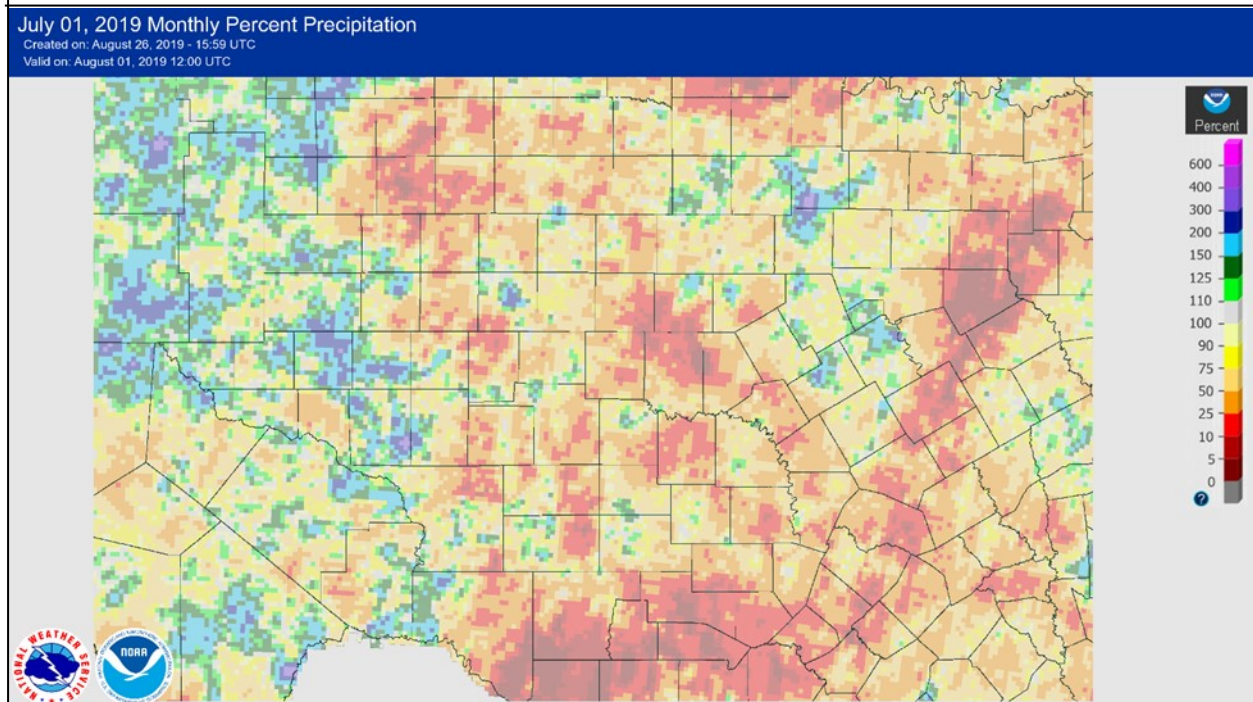
## “Climate Summary for Abilene/San Angelo Region (continued)”

### July

This wet and cool trend continued into early July. However, as July progressed the high pressure that is expected this time of year began to build into the area. Yet, before the normal hot and dry conditions set in, a late season cold front pushed through. High temperatures remained warm, with values in the low 90s, however, the low temperatures would reach down into the upper 50s. By the end of July all signs of spring had vanished, and fire danger was on the rise, with highs securely in the triple digits.



*Image 3 (Above)- July Rainfall  
Image 4 (below) - July Percent of Normal*





## “Climate Summary for Abilene/San Angelo Region (continued)”

### August

August was dominated by triple digit temperatures and remained there for the majority of the month. Average temperatures were nearly 6°F above normal, and 0.50” – 2.00” below normal for precipitation. August would attempt to break the record for most consecutive days of 100°F or higher, but would ultimately fall short, reaching 4<sup>th</sup> place in San Angelo with 24 consecutive days and Abilene would reach 22<sup>nd</sup> place with 9 consecutive days.

In Abilene, the average August temperature was 88.4°F, which is the 4<sup>th</sup> hottest August on record, and a monthly total precipitation of 0.18”, the 11<sup>th</sup> driest on record. In San Angelo, the average August temperature was 88.5°F, which is the 2<sup>nd</sup> hottest August on record, and a monthly total precipitation of 0.33 was the 20<sup>th</sup> driest on record.

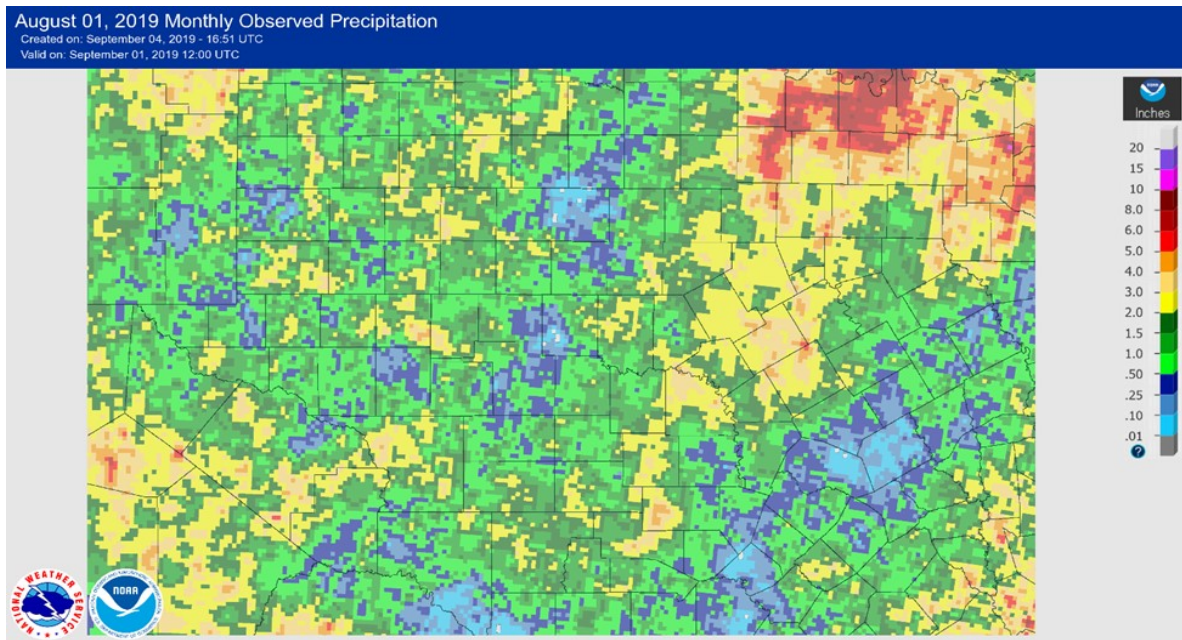


Image 5: August Rainfall

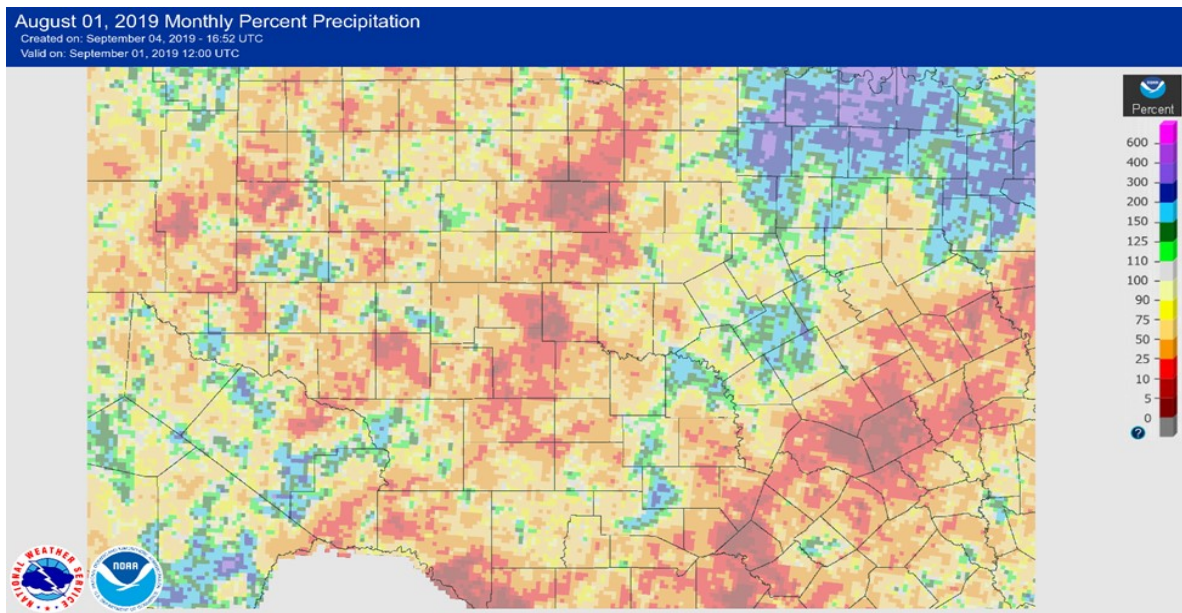


Image 6: August Percent of Normal



## Climate Summary for Brazos Valley Region

### Summer 2019 Precipitation Summary Bryan-College Station/Brazos Valley Region, Texas

By: Autum Boehnlein, Brandon Gale, & William Shipman, Student Assistants for the Office of the State Climatologist  
John Nielsen-Gammon, Texas A&M University, Texas State Climatologist, Regional CoCoRaHS Coordinator

#### Summary:

The summer season began with wet conditions and a considerable amount of precipitation. The precipitation events specifically occurred on June 1st, 5th and 6th, 17th, 21st and 27th. Precipitation amounts varied quite a bit during the month of June, ranging from a minimum of 4.76" to a maximum of 10.83". Despite this notable rainfall in June, precipitation quickly came to a halt on the Fourth of July, with only two reports of an inch or more of rainfall in a single day in the remainder of July. The dryness continued through the end of August, with many stations in Washington County going several weeks without precipitation. What little precipitation that did occur was due to isolated thunderstorms across the area. Precipitation totals during July and August combined ranged from 0.37" to 4.02", so the driest station in June received more rainfall in one month than any observer recorded in the following two months. Out of the 6 active counties across the Brazos Valley Region, Walker County received on average the most precipitation while Washington County on average received the least.

#### Observer Statistics:

There were no CoCoRaHS observer reports in Burleson and Madison counties. Eleven stations within the Brazos Valley region reported precipitation values all 92 days within the summer period and another 13 stations only missed fewer than 12 days of recorded values. In total, there were 36 CoCoRaHS observers with a sufficient number of observations to provide a seasonal total.

#### Seasonal Statistics

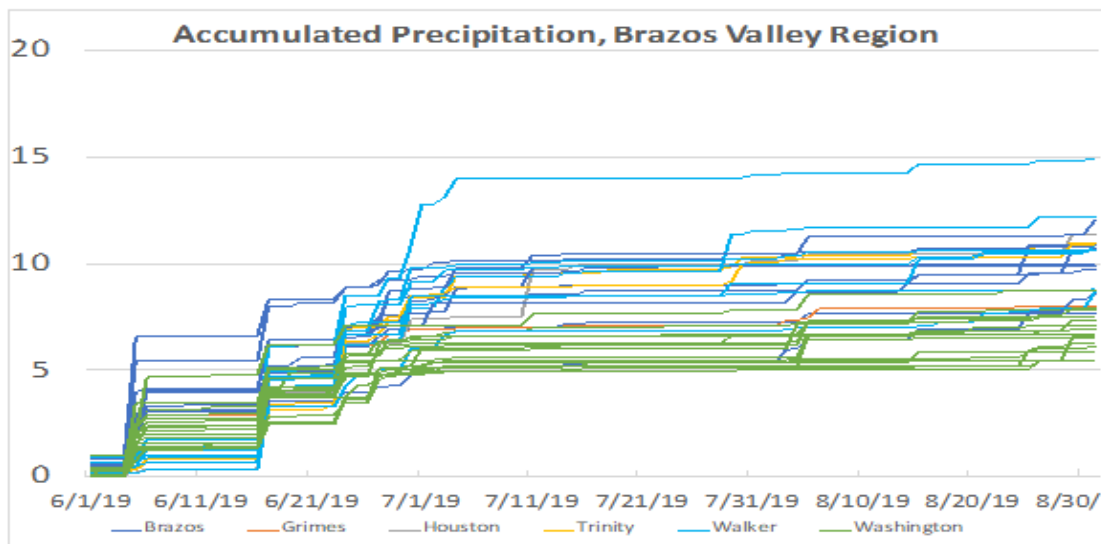
*Wettest Day:* 5.63", June 5th, Brazos County

*Driest Seasonal Total:* 5.41" Washington County

*Wettest Seasonal Total:* 14.93" Walker County

*Longest spell of daily with measurable rain:* 10, June 27th-July 6th, Washington County

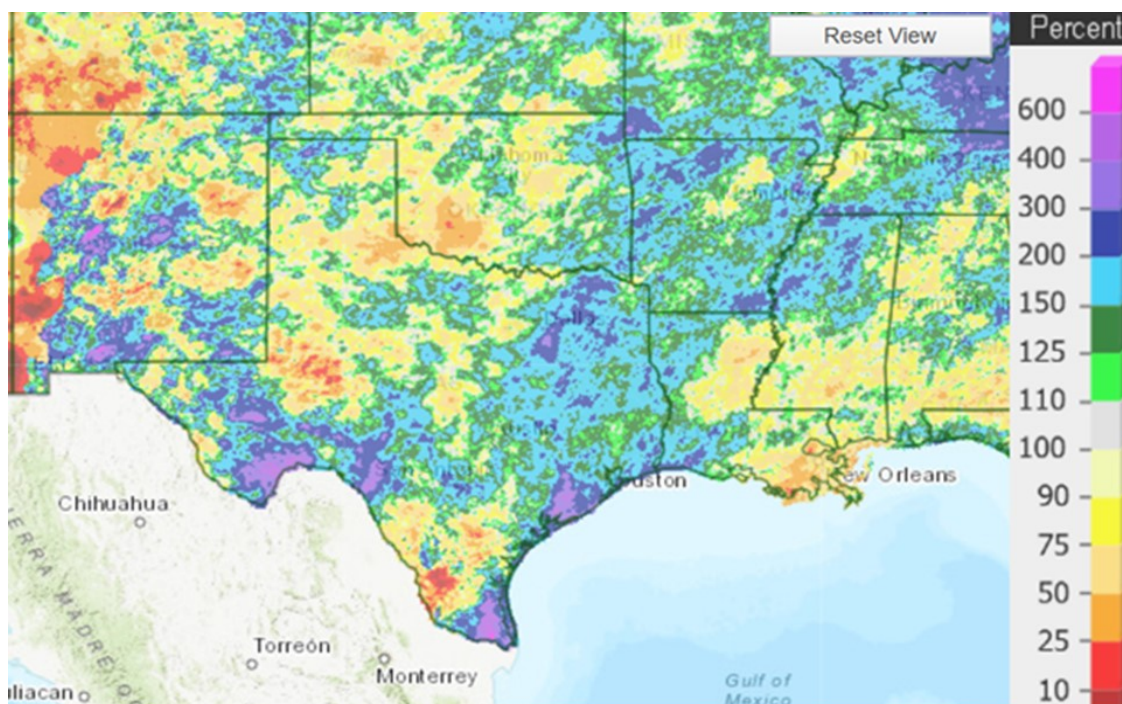
*Longest spell of daily reports without measurable rain:* 29, July 5th-August 2, Washington County



## Climate Summary for North Texas/State Hydrology

By Greg Story  
Meteorologist  
National Weather Service  
WGRFC Fort Worth Texas

Greetings from North Texas! I am thankful to each and every one of you for reporting your rainfall via CoCoRaHS. The weather patterns continue to be as variable as ever, and your reports help the National Weather Service and others to assess this variability. So far in 2019, January saw above normal rainfall over central and east Texas, with near to below normal precipitation elsewhere. February turned drier than normal over most of the state. March continued the dry trend that began in February. It turned wet again in April, as above normal precipitation fell over most of the state, with the Dallas/Fort Worth metroplex being about 3" of rain above normal. The wet cycle continued into May. Above normal rainfall occurred over most of the state, and much above normal precipitation fell from the DFW metroplex to Abilene.



**Figure 1: Percent of normal rainfall for June 2019.** The green and light yellow colors indicate near normal precipitation, the blue and purple colors indicate above normal, while the red indicates below normal precipitation. Above normal rainfall continued into June. Much of the state received above normal rain, especially from central into northeast Texas, along the Gulf coast, and over southwest Texas near and downstream from the Texas Big Bend. Portions of south Texas from Corpus Christi to Laredo had below normal rainfall values, as did the Permian Basin.

At the DFW airport they got 4.13" in June, which was slightly above normal. The normal amount for June is 3.79" so they were above normal by 0.34" for the month. The June temperatures were below normal and it was the coolest June since 2004. This rain kept higher than normal flows on portions of the Brazos, Neches, Trinity and Sabine rivers.

## “Climate Summary for North Texas/State Hydrology (continued)”

The rain caused the north Texas lakes to be persistently full so reservoirs were continuously releasing water to evacuate their flood pools.

As mentioned, there was a wet weather pattern in place from April through June. During June we transitioned from the springtime pattern of long wave troughs of low pressure to more mesoscale convective systems (MCS) moving through the state, along with sea breeze showers and thunderstorms along and near the Gulf coast. The scope and magnitude of the MCS's in June were stronger than previous June months, which aided in the above normal precipitation. There were at least four large storm systems in June. There were a couple smaller disturbances through the month, as well as rain from the sea breeze front. Here are the highlights of the largest storms of the month.

### June 1 - 7:

June started out the way May ended with a rainy weather pattern over most of the state, except for central and south Texas. A long wave trough set up over California to begin June that moved little. This put Texas in a favorable southwesterly upper air flow which caused several short wave troughs to cross the state. These disturbances, combined with an active dryline over west Texas and deep moisture over much of the state, led to some rainfall the first 3 days of June. Locally heavy rain of 2 to 4" fell in the San Angelo area. In the metroplex, 0.45" fell in and around Grand Prairie. This kept many of the river systems across east and north Texas at action stage or into the minor flood category. Scattered showers and thunderstorms continued the next two days. Then on June 5 – 7, the rainfall became widespread and locally heavy. The low pressure system over California finally moved eastward and was over Arkansas on the 7th. Additionally, there was a tropical wave over the Bay of Campeche that moved north, then northeast, which brought heavy rain to the upper Texas Gulf coast. The region was between storm systems June 8 - 9.

### June 10

A strong late season cold front approached Texas. This front produced a derecho which moved through parts of Texas. This storm complex moved so quickly that it did not bring much heavy rain, but widespread showers and thunderstorms did occur.

### June 16 – 18

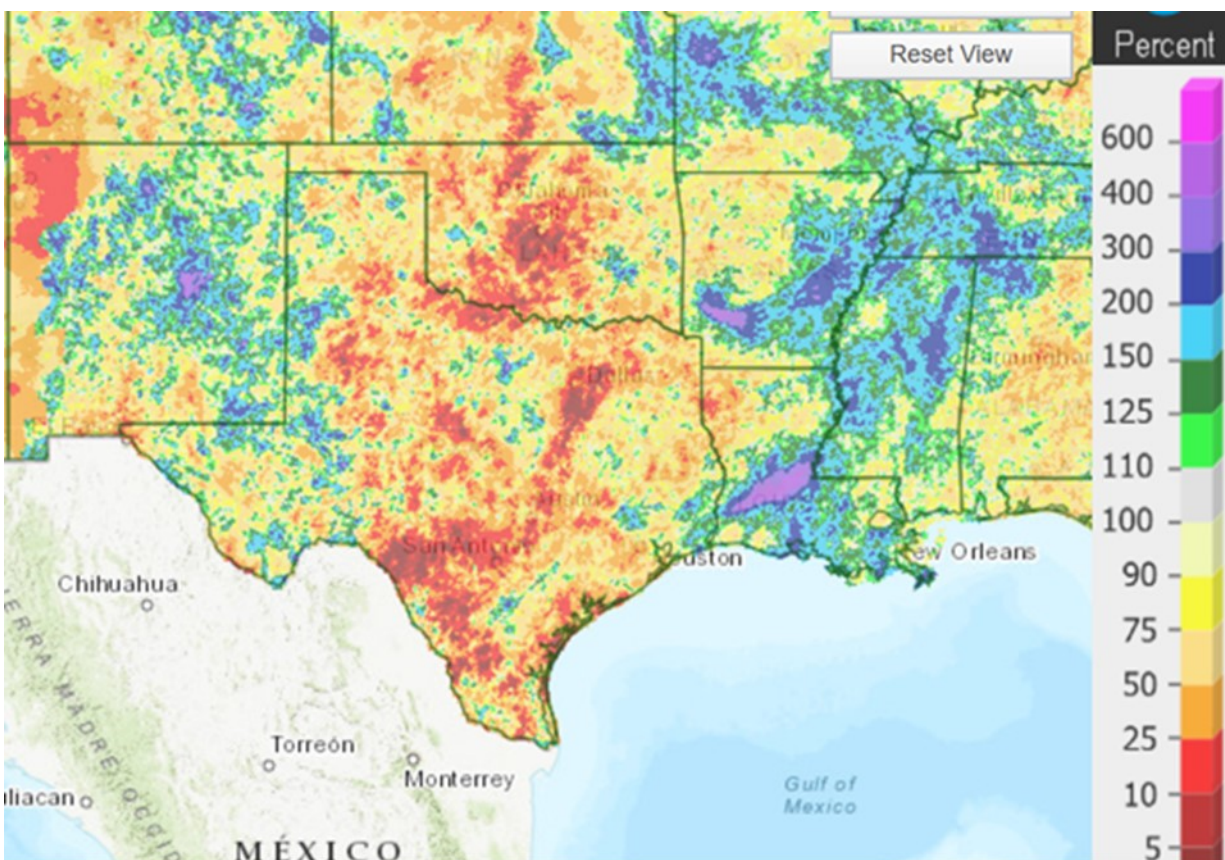
A mesoscale convective system (MCS) moved out of Oklahoma into north Texas. Then the outflow boundary from that complex triggered more showers and thunderstorms. The rain was heaviest over east central and southeast Texas. In the DFW metroplex, with the two rounds of rain and storms June 16 (first early in the morning then again in the afternoon), a record amount of rain fell at DFW Airport. The airport received 2.42" of rain. That shatters the old record of 1.32" that fell on June 16, 1968. This record rainfall at DFW made it the wettest day of 2019. DFW Airport wasn't the only place that had heavy rain. Alliance Airport in far north Fort Worth had a total of 4.60" of rain, and in McKinney, the total for that day was 2.89". Along with the rain, a brief EF1 tornado occurred in Arlington. It dissipated as it before reached the AT&T Stadium and Globe Life Park area. An EF0 tornado hit in North Fort Worth in the Crawford Farms to Vista Meadows subdivisions. Another EF0 tornado was seen over Eagle Mountain Lake near Azle. A total of 1.51" fell in the Grand Prairie area.



## “Climate Summary for North Texas/State Hydrology (continued)”

June 24 - 26:

A weak cold front over southern Oklahoma generated an MCS which moved from Oklahoma into and across the eastern half of Texas into south Texas. As this MCS moved into deep south Texas it produced 7 to 11” of rain in the area west of Brownsville near Harlingen. A total of 0.67” fell in the Arlington/Grand Prairie area. Scattered showers and thunderstorms persisted through the end of the month as a more summer-like pattern began to develop. Sea breeze showers and thunderstorms, combined with outflow boundaries, produced 1.89” inches of rain over San Antonio the last three days of the month.



**Figure 2: This is the July 2019 percent of normal rainfall map.** The red and yellow colors indicate below normal precipitation, while the blue and purple indicate above normal rain. The rainy pattern we had through June finally turned to a drier one in July, more typical of what one would expect in mid-summer. Much of the state received below normal rain, especially from north central into southwest Texas, along the middle Texas Gulf coast, and over deep south Texas. Portions of southeast Texas from Beaumont into southern Louisiana had above normal rainfall values, as did far west Texas along and near the border of New Mexico.

## “Climate Summary for North Texas/State Hydrology (continued)”

At the DFW airport they got 0.78” in July, which was below normal. The normal amount for July is 2.16” so they were below normal by 1.38” for the month. The July average temperature was 84.6 degrees - the “coolest” July since 2014, and they had the latest occurrence in the year of the first 100 degree day since 2007.

There was quite a transition in July from the wet weather pattern in place from April through June to a dry one. High pressure aloft over Texas kept major storms from developing, and only some retrogression of the ridge to the west allowed for weak cold fronts or upper air disturbances to cross portions of Texas. Sea breeze showers and thunderstorms also occurred along and near the Gulf coast. There were at least four storm systems which affected our weather in July. Here are the highlights of the weather for the month.

### July 1 - 9:

July started out with a fairly active summertime pattern. The sea breeze front brought rainfall to parts of southeast and central Texas, while thunderstorms formed each day off the mountains of New Mexico and far southwest Texas resulting in rains to the far west. In the metroplex, 0.09” fell in the Grand Prairie region, but an isolated storm dropped 0.83” at Six Flags Park in Arlington. Once we got past the 4th of July, a ridge of high pressure strengthened over Texas, and this led to suppressed rainfall and warmer temperatures. An isolated storm did drop 0.82” in the Arlington/Grand Prairie region on the 7th, otherwise it was fairly dry.

### July 9 - 11

Two weather factors brought rain to the region during this time period. One was a complex of thunderstorms which moved out of New Mexico, Colorado and western Oklahoma into west Texas. Another was a cold front which generated thunderstorms over Oklahoma which moved south across Texas. A report of 0.78” came from the Grand Prairie area.

### July 14 – 16

Tropical storm Barry occurred during this time period. While the heaviest rain from Barry fell over southern Louisiana, some rain also fell over east central and southeast Texas.

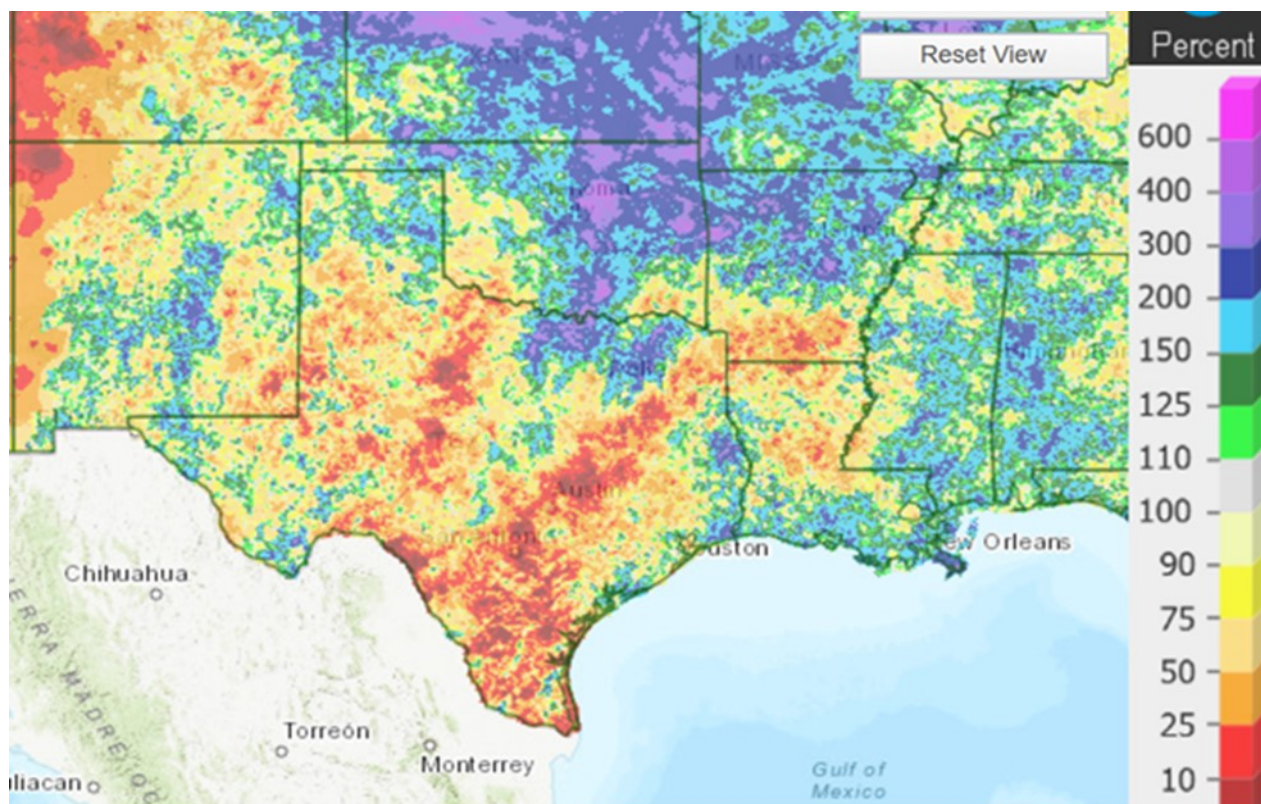
### July 22 - 24

A strong cold front (for July) moved across Texas. While rain was fairly widespread, it was not overly heavy. The heaviest amounts were recorded near the Gulf coast.

### July 28 - 31:

The sea breeze front along the Texas Gulf coast was quite active during this period which brought rain to especially southeast Texas.

## “Climate Summary for North Texas/State Hydrology (continued)”



**Figure 3: This is the percent of normal rainfall for August 2019.** The yellow and red colors indicate below normal precipitation, while the green, blue and purple colors indicate above normal rain.

As mentioned earlier, it finally turned drier in July, more typical of what one would expect in mid-summer. The dry weather regime continued into August. Much of the state received below normal rain, with only a few locations seeing above normal rainfall. Above normal precipitation was observed over north central into northeast Texas, over extreme east central Texas, and along the upper Texas Gulf coast from Beaumont into southern Louisiana. Isolated locations had above normal rainfall values over the Texas panhandle, and over central New Mexico. Rainfall was near to much below normal elsewhere in Texas, especially over the western parts of north Texas as well as from central into deep south portions of the state.

At the DFW airport they got 2.44" in August, which was slightly above normal. The normal amount for August is 1.91" so they were above normal by 0.53" for the month.

High pressure aloft over or near Texas kept major storms from developing, and only some retrogression of the ridge to the west allowed for cold fronts or upper air disturbances to cross portions of Texas. Meanwhile the monsoon was quite prevalent over portions of New Mexico and Colorado, although it was weaker this season than normal. Sea breeze showers and thunderstorms also occurred along and near the Gulf coast. There were about three significant storm systems which affected our weather in August. Here are the highlights of the weather for the month.



## “Climate Summary for North Texas/State Hydrology (continued)”

August 1 - 5:

August started out with a ridge of high pressure over the Texas panhandle region. Aside from some sea breeze frontal showers along the Texas Gulf coast, Texas was free of rain. By August 3 to 4 the ridge retrograded westward. This allowed a weak front and short wave trough to rotate southward and brought some showers and thunderstorms to roughly the eastern third of the state. Thereafter, the ridge of high pressure moved back east into Texas again, which resulted in more hot, dry conditions. However, southeast Texas continued to receive almost daily rainfall from seabreeze showers through the 9th.

August 14 - 15

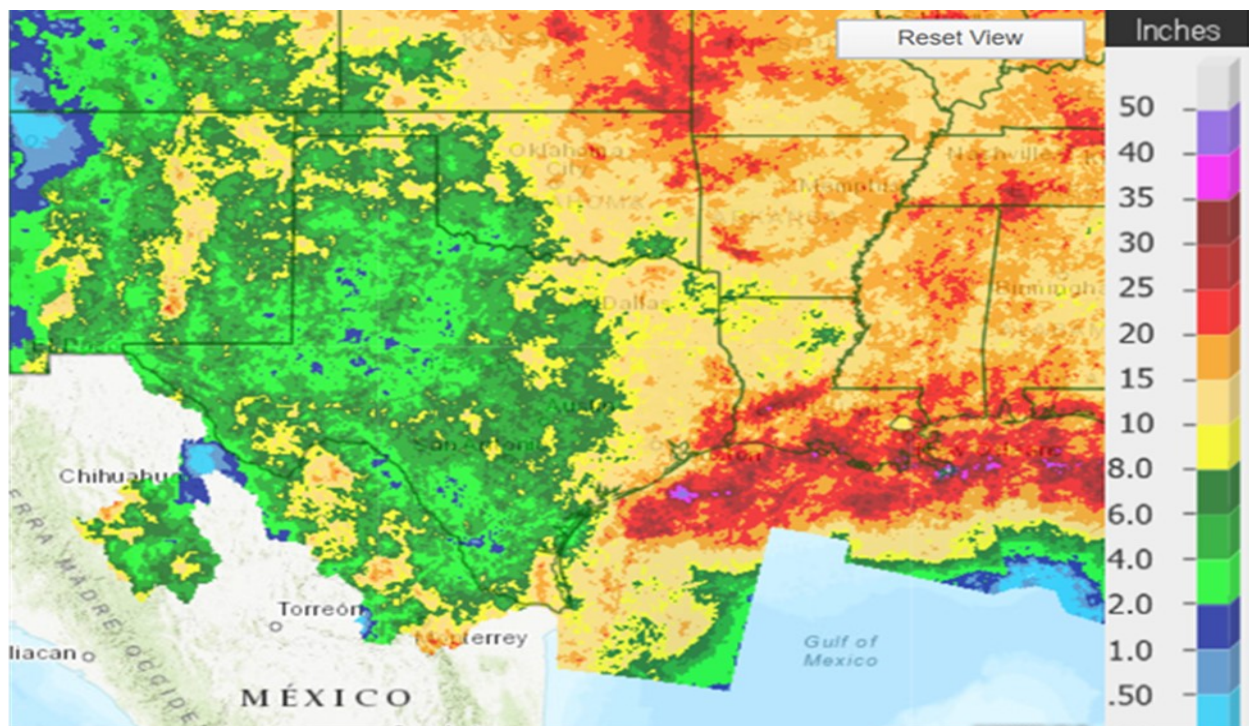
The ridge retrograded westward once again during this time frame. This allowed a weak front and short wave trough to rotate southward into Texas and brought some showers and thunderstorms. Like the front early in the month, the heaviest rain was over roughly the eastern third of the state. Thereafter, the ridge of high pressure moved back east into Texas again, which resulted in more hot, dry conditions.

August 24 – 26

A weak cold front moved into Texas during this time. Thunderstorm outflow boundaries from way up over Kansas moved south and progressed all the way into south Texas which helped to generate some thunderstorms. The heaviest rain was around the Toledo Bend Lake.

August 27 - 29

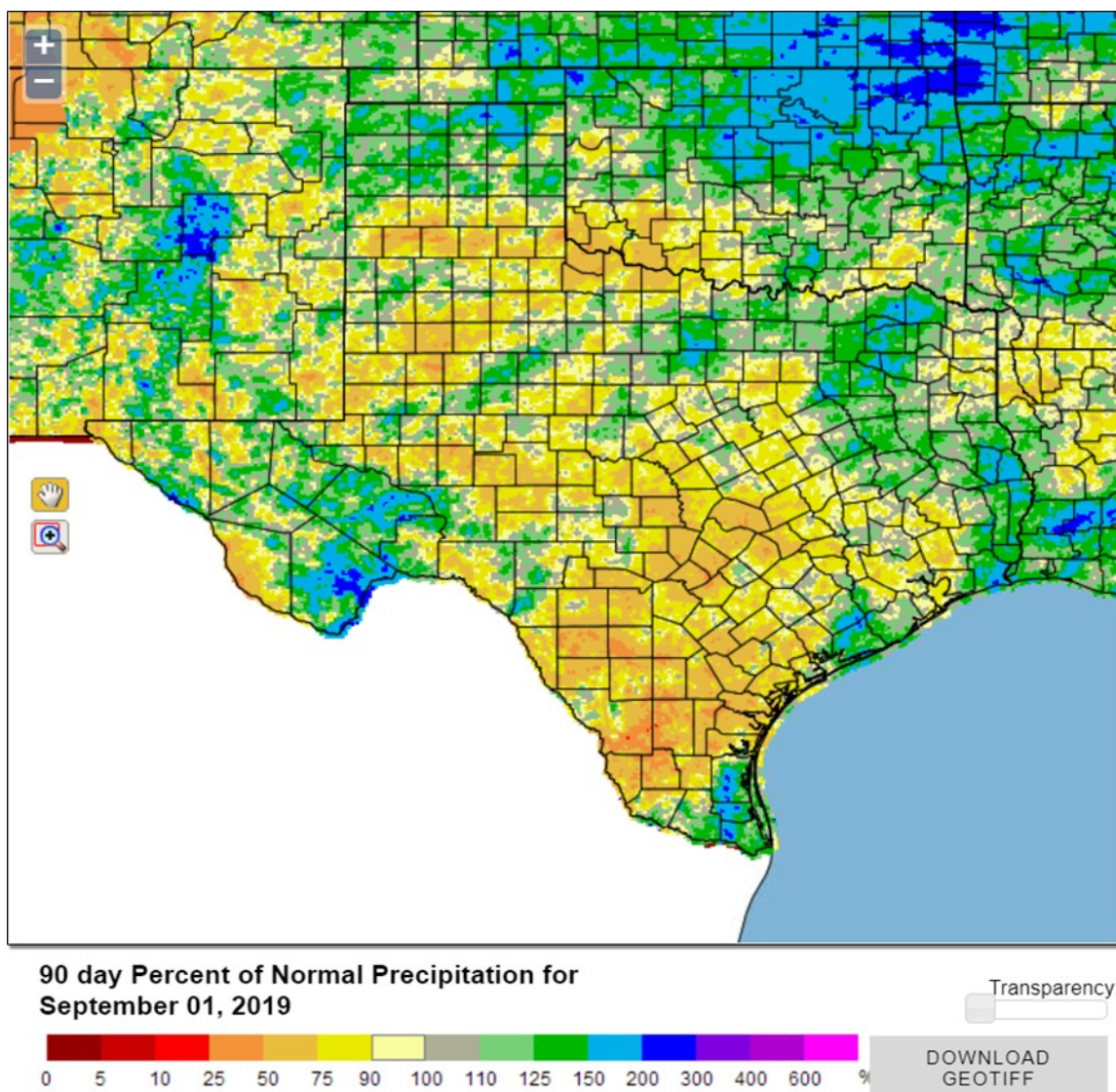
A strong cold front moved across most of Texas. While there was some rain associated with the frontal passage, it was not overly heavy. The heaviest amounts were recorded over east central and southeast Texas with most amounts being less than 0.50”.



**Figure 4: This is the Summer season precipitation 2019.** The bright red colors indicate the largest rain fall totals while the blue colors show light amounts

## “Climate Summary for North Texas/State Hydrology (continued)”

The rainfall the past 3 months started off wet, with drying conditions in July and August. Near or below normal rains are indicated over the western two thirds of Texas into New Mexico, with about the only above normal rainfall noted over southeastern Texas into southern Louisiana.



**Figure 5: This was the Percent of Normal Precipitation for Summer 2019.**

The green and blue colors indicate above normal rainfall. The orange and yellow colors indicate below normal amounts. You can see that after the abundant spring and early summer rainfall, Texas really dried out in July and August. Only small pockets of Texas had wetter than normal conditions. The vast majority of the state has seen below normal rainfall which has led to a large increase to the amount of land experiencing abnormally dry soil conditions. The dryness is most pronounced over deep south Texas around Laredo.

## “Climate Summary for North Texas/State Hydrology (continued)”

At the DFW airport for the summer they received 7.53”. The normal amount is 7.86” so they were 0.51” below normal for the summer. For 2019 the DFW airport has received 27.13”. The normal amount is 24.11” so they are 3.02” above normal for the year.

I want to thank ALL of you for submitting your rainfall readings to CoCoRaHS during this Summer. They continue to be extremely valuable to us at the National Weather Service. It is critical that we see the magnitude of rainfall events, *or the lack of rainfall*, in order to adjust the amounts of rainfall going into our hydrologic models. Knowing the lack of rain is imperative because our hydrologic models “keep track” of the length of time between rainfall events. This soil moisture accounting will lead to a better estimate of runoff from the rainfall the next time precipitation occurs. Therefore, **a report of zero rainfall is just as important as a non-zero one!** Please continue making your daily weather observations, even when the weather at your site had a low amount of rainfall or no rainfall at all.

Your dedication helps us out a lot. Thank YOU so much for your participation in CoCoRaHS. Have a great autumn season!

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**If you would like to have a speaker give a talk to your group or organization about CoCoRaHS, please send us a request with your group’s contact information to e-mail [texas@CoCoRaHS.org](mailto:texas@CoCoRaHS.org)**



# East Texas Regional Climate Summary

## East Texas Regional Summary (Summer 2019)

By: Davyon Hill (Meteorologist-National Weather Service-Shreveport)

It was a tale of two seasons across East Texas, as the region went from above average precipitation in the Spring to hot and dry conditions during the summer months. As a result, drought conditions return to the region along with county burn bans.

Although much of the summer was hot and dry, the month of June was quite the opposite. Several rain events resulted in record daily precipitation records across East Texas at National Weather Service climate location sites. One example of this was on June 16<sup>th</sup>, when a strong line of thunderstorms moved through the region. The NWS climate site at Tyler, TX recorded 3.42" of rain, which tied a daily record rainfall. Also, the NWS climate station at Lufkin, TX set a daily record rainfall of 1.81". Several CoCoRaHS sites also recorded heavy rainfall that day as well, with the highest amounts coming from Angelina County at Lufkin 7.6 WSW (TX-AG-9) and Zavalla 1.1 NNW (TX-AG-11) of 4.00" and 3.63" respectively.

Hot and dry weather dominated July and August. Upper level ridging became quite persistent during both months which resulted in above average temperatures and below average rainfall. Despite some scattered diurnal driven convection during periods of both months, several stations recorded very little rainfall. The NWS climate station at Longview only recorded 0.03" for the entire month of August, which is the 3<sup>rd</sup> lowest of all time for the month. Several CoCoRaHS stations recorded less than 1.00" of rain during both months with only 0.22" at Flint 1.7 ENE (TX-SM-28) in Smith County for the month of July and 0.23" at Hawkins 2.6 N (TX-WD-8) in Wood County for the month of August. As a result, drought conditions along with county burn bans return to much of the region.

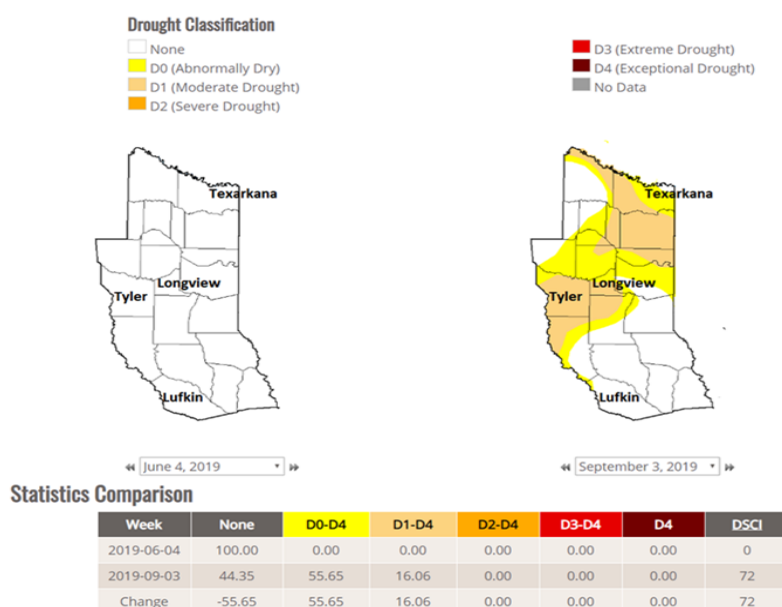


Figure 1: Drought Comparison Map for East Texas on June 4, 2019 and September 3, 2019

## “East Texas Regional Climate Summary (continued)”

Fortunately, there is hope for the region to get out of drought conditions. Near normal sea surface temperatures are occurring in the eastern equatorial Pacific region. El Nino conditions have diminished across the region and ENSO-neutral conditions are favored during the fall months. As a result, the Climate Prediction Center is forecasting an Equal Chance (EC) for above or below normal precipitation this fall.

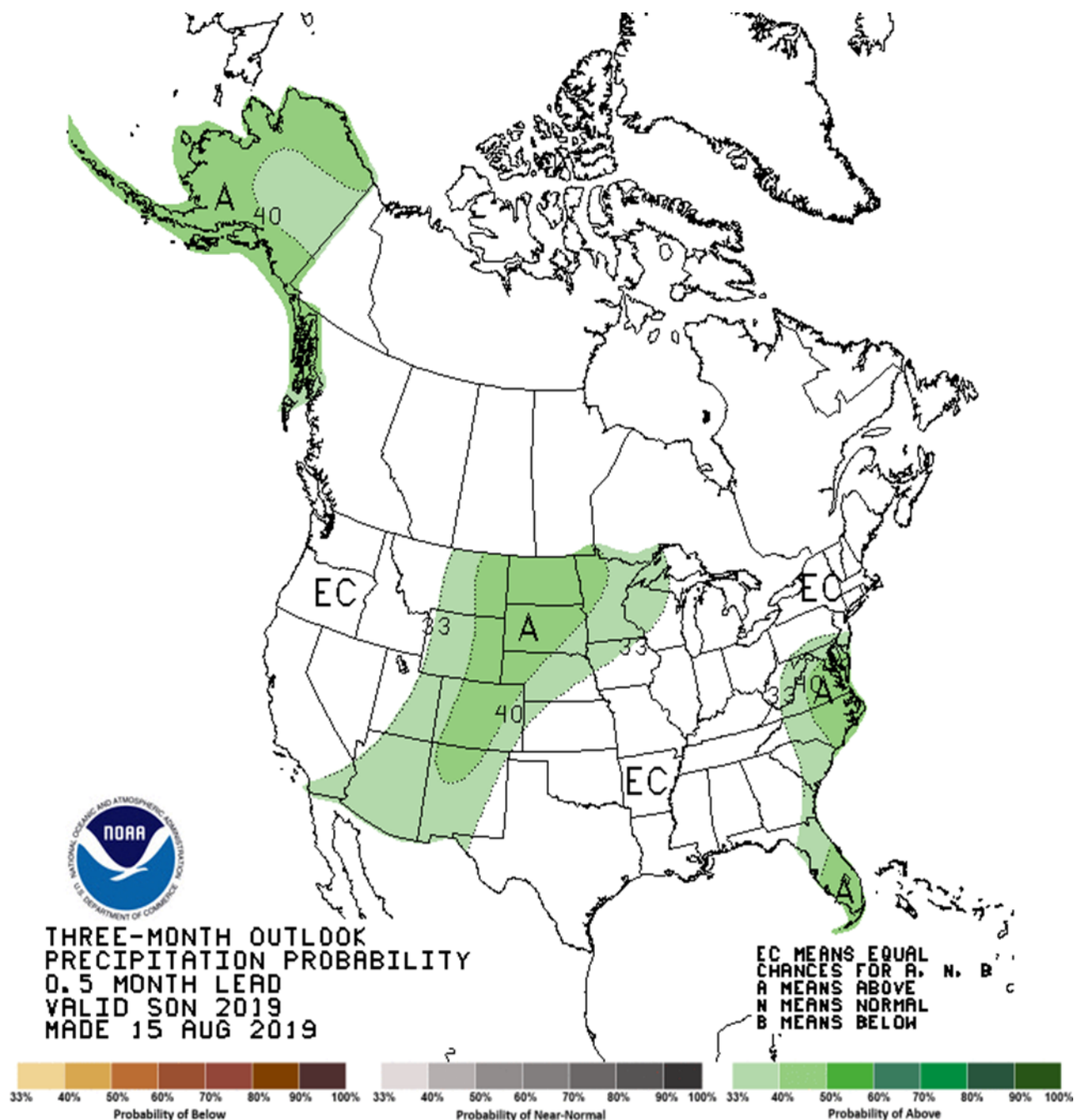


Figure 2: Three-Month Precipitation Outlook for September, October, and November 2019

## Rio Grande Valley Regional Climate Summary

### Summer 2019 Breaks (Another) Heat Record in RGV

#### August Culminates the Heat with New All Time Calendar Month Records

By National Weather Service-WFO Brownsville/Rio Grande Valley

##### Overview

For yet another summer season in an already hot decade, Rio Grande Valley reporting stations set new records in 2019. For August, particularly across the heavier population locations (McAllen, Brownsville, and Harlingen), the new records broke those previously set this decade, including Brownsville (2018) and Harlingen (2016). Most notable was the departure from prior records, equivalent to a horse winning the Kentucky Derby by “pulling away” by 20 lengths. Each side broke their prior records by 1.5 degrees, which is more than a standard deviation along the bell-shaped curve (a standard deviation typically includes 68% of all possible outcomes; two standard deviations closer to 90% of all possible outcomes).

The August heat, combined with below to much below average rainfall, erased all benefits provided by the Great June Flood, Sequel, of June 24, 2019 when 8 to more than 15 inches of rain fell in portions of eastern Hidalgo, western Cameron, and western Willacy County. By month’s end, moderate drought to abnormally dry conditions were observed in these areas. Farther west in the South Texas Brush Country, the oppressive heat and lack of rainfall combined to ramp up drought to Extreme Levels (Jim Hogg and Zapata), with Jim requesting a state of emergency for livestock management as cattle were in crisis with water and feed supplies dwindling.

The summer heat, which followed a warming spring that itself followed a alternating mild and frequent chilly winter, brought average temperatures for much of the populated Rio Grande Valley back into the top ten all-time for the first eight months of the year.

- Brownsville: Ranked number 3 (78.0 vs. 78.8, number 1, in 2017). Data from 1878.
- Harlingen: Ranked number 9 (77.5 vs. 78.8, number 1, also in 2017) Data from 1912.
- McAllen: Ranked number 9 (79.0 vs. 81.9, number 1, also in 2017). Data from 1941.

##### La Canícula: The Reason for the Season

The “Dog Days of Summer” barked – rather, howled – in 2019. La Canícula, the period when Sirius Canis (dog star) rises with the sun during the heart of summer (July 3 to August 11), is typically matched with a hot, dry upper level pattern across the Rio Grande Valley and northern Mexico which has deep roots in historical lore. In recent summers, La Canícula has been even stronger than average, and has lasted longer – beginning in May and continuing sometimes as long as October.

In 2019, one of the most intense “Canícula” steering patterns ever seen occurred at the start of June and led to both record high temperatures and very rare “feels like” temperatures – for three days in a row (June 7 to 9) – between 115 and 125, with 120+ values at McAllen, Brownsville, and Harlingen. “Feels like” temperatures between June 17 and 24 reached 111 or higher in many areas, with some readings near 120 on the 23rd and 24th which help feed the instability that led to the “Great Flood, Sequel” later that afternoon and evening. Following the flood, and through most of July, a more “typical” Canícula dominated with temperatures closer to average by day but still well above average at night; July finished in the top third hottest in most areas despite the near “normal” pattern.

September began fairly “normal”; after a blazing start on the 1st, a tropical wave gradually developed into Tropical Storm Fernand on the 2nd and 3rd, which made landfall near La Pesca, Tamaulipas, around noon on the 4th. Welcome rainfall likely took a bit of a “bite” out of the drought and dryness, but not enough to eliminate it. Long range forecasts suggested a good part of September would be hot and largely rain-free, which is critical in a month where totals range from 4.5 to more than 6 inches, Valley-wide.



# "Rio Grande Valley Regional Climate Summary (continued)"



## Hottest Summer for Some; Top Ten For the Rest

Average Temperature (day/night combined) , June-August



### Maximum 92-Day Mean Avg Temperature for Brownsville Area, TX (ThreadEx)

Click column heading to sort ascending, click again to sort descending

Rank	Value	Ending Date	Missing Days
1	87.9	2019-08-31	0
2	87.5	2018-08-31	0
3	86.9	1998-08-31	0
4	86.4	1980-08-31	0
5	86.3	1982-08-31	0
6	86.1	2012-08-31	0
7	86.0	2005-08-31	0
8	86.0	2001-08-31	0
9	85.9	2016-08-31	0
-	85.9	1900-08-31	0

Period of record: 1878-01-01 to 2019-09-01

### Maximum 92-Day Mean Avg Temperature for HARLINGEN, TX

Click column heading to sort ascending, click again to sort descending

Rank	Value	Ending Date	Missing Days
1	88.0	2019-09-01	8
2	87.9	1998-09-01	4
3	87.1	2016-09-01	5
4	86.9	2018-09-01	11
5	86.8	2017-09-01	7
6	86.8	2009-09-01	5
7	86.5	2005-09-01	0
8	86.5	2012-09-01	6
9	86.4	1958-09-01	0
10	86.4	1953-09-01	0

Period of record: 1912-02-07 to 2019-09-02

### Maximum 92-Day Mean Avg Temperature for McAllen Area, TX (ThreadEx)

Click column heading to sort ascending, click again to sort descending

Rank	Value	Ending Date	Missing Days
1	90.8	2009-08-31	0
2	90.1	2017-08-31	0
3	90.0	2018-08-31	3
4	89.9	1998-08-31	2
5	89.6	2016-08-31	0
6	89.3	2019-08-31	0
7	88.8	2012-08-31	0
8	88.5	2015-08-31	0
9	88.1	1980-08-31	1
10	88.0	2014-08-31	0

Period of record: 1941-06-01 to 2019-09-02

### Maximum 92-Day Mean Avg Temperature for RIO GRANDE CITY, TX

Click column heading to sort ascending, click again to sort descending

Rank	Value	Ending Date	Missing Days
1	89.5	2009-09-01	2
2	89.2	1996-09-01	5
3	89.1	1901-09-01	0
4	88.8	2019-09-01	2
5	88.8	1999-09-01	5
6	88.8	1928-09-01	0
7	88.7	1902-09-01	2
8	88.6	2017-09-01	3
9	88.4	2000-09-01	5
10	88.4	1948-09-01	1

Period of record: 1897-01-01 to 2019-09-02

## Several RGV Heat Records Broken/Shattered This August



Average Temperature (day/night combined)



### Maximum 31-Day Mean Avg Temperature for Brownsville Area, TX (ThreadEx)

Click column heading to sort ascending, click again to sort descending

Rank	Value	Ending Date	Missing Days
1	89.3	2019-08-31	0
2	87.8	2018-08-31	0
3	87.3	2011-08-31	0
4	87.1	2010-08-31	0
5	86.8	2016-08-31	0
6	86.7	2005-08-31	0
-	86.7	1900-08-31	0
8	86.7	2017-08-31	0
9	86.6	2014-08-31	0
10	86.6	2012-08-31	0

Period of record: 1878-01-01 to 2019-09-02

### Maximum 31-Day Mean Avg Temperature for HARLINGEN, TX

Click column heading to sort ascending, click again to sort descending

Rank	Value	Ending Date	Missing Days
1	89.7	2019-09-01	2
2	88.2	2016-09-01	3
3	88.1	1958-09-01	0
4	87.7	1940-09-01	0
5	87.7	2011-09-01	0
6	87.5	2005-09-01	0
7	87.5	2002-09-01	2
8	87.5	2017-09-01	3
-	87.5	1998-09-01	3
10	87.4	2012-09-01	0

Period of record: 1912-02-07 to 2019-09-02

### Maximum 31-Day Mean Avg Temperature for McAllen Area, TX (ThreadEx)

Click column heading to sort ascending, click again to sort descending

Rank	Value	Ending Date	Missing Days
1	91.5	2019-08-31	0
2	91.4	2009-08-31	0
3	91.2	2018-08-31	0
4	90.7	2017-08-31	0
5	90.7	2016-08-31	0
6	90.4	2012-08-31	0
7	90.2	2011-08-31	0
8	90.1	2015-08-31	0
9	89.3	1998-08-31	0
10	89.2	2014-08-31	0

Period of record: 1941-06-01 to 2019-09-02

### Maximum 31-Day Mean Avg Temperature for RIO GRANDE CITY, TX

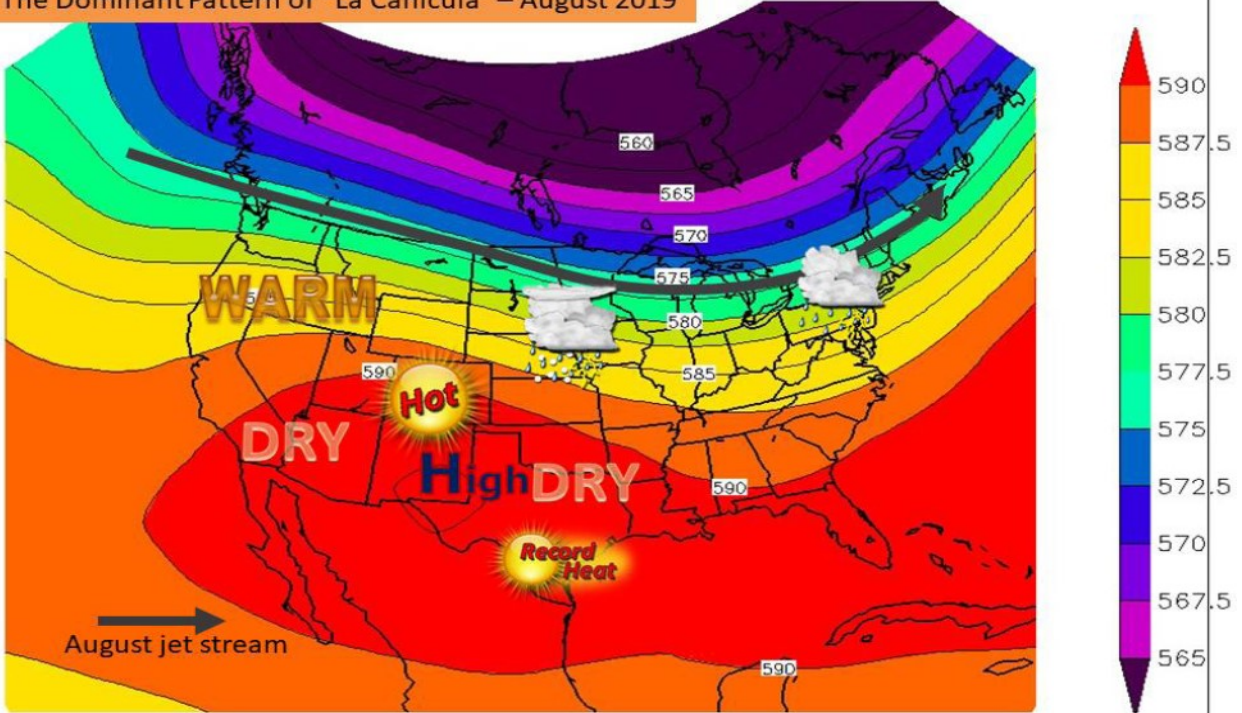
Click column heading to sort ascending, click again to sort descending

Rank	Value	Ending Date	Missing Days
1	92.9	1901-09-01	0
2	90.7	1997-09-01	1
3	90.5	2019-09-01	0
4	89.7	1964-09-01	0
5	89.6	1958-09-01	0
6	89.5	1905-09-01	0
7	89.5	2011-09-01	3
8	89.3	1957-09-01	0
9	89.2	1999-09-01	1
10	89.2	2009-09-01	1

Period of record: 1897-01-01 to 2019-09-02

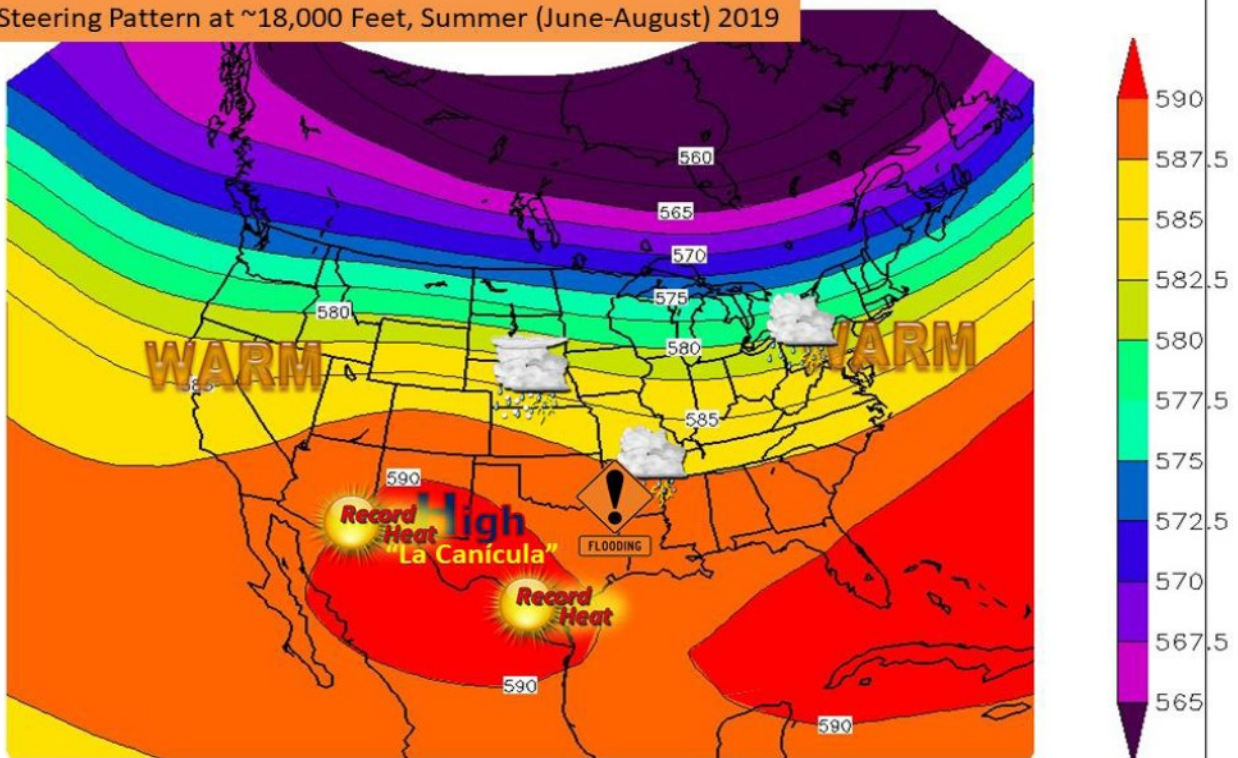
## “Rio Grande Valley Regional Climate Summary (continued)”

The Dominant Pattern of “La Canicula” – August 2019



500mb GEOPOTENTIAL HEIGHTS (dam) 31-DAY MEAN FOR:  
Thu AUG 01 2019 – Sat AUG 31 2019  
NCEP OPERATIONAL DATASET

Steering Pattern at ~18,000 Feet, Summer (June-August) 2019



500mb GEOPOTENTIAL HEIGHTS (dam) 92-DAY MEAN FOR:  
Sat JUN 01 2019 – Sat AUG 31 2019  
NCEP OPERATIONAL DATASET



## “Rio Grande Valley Regional Climate Summary (continued)”

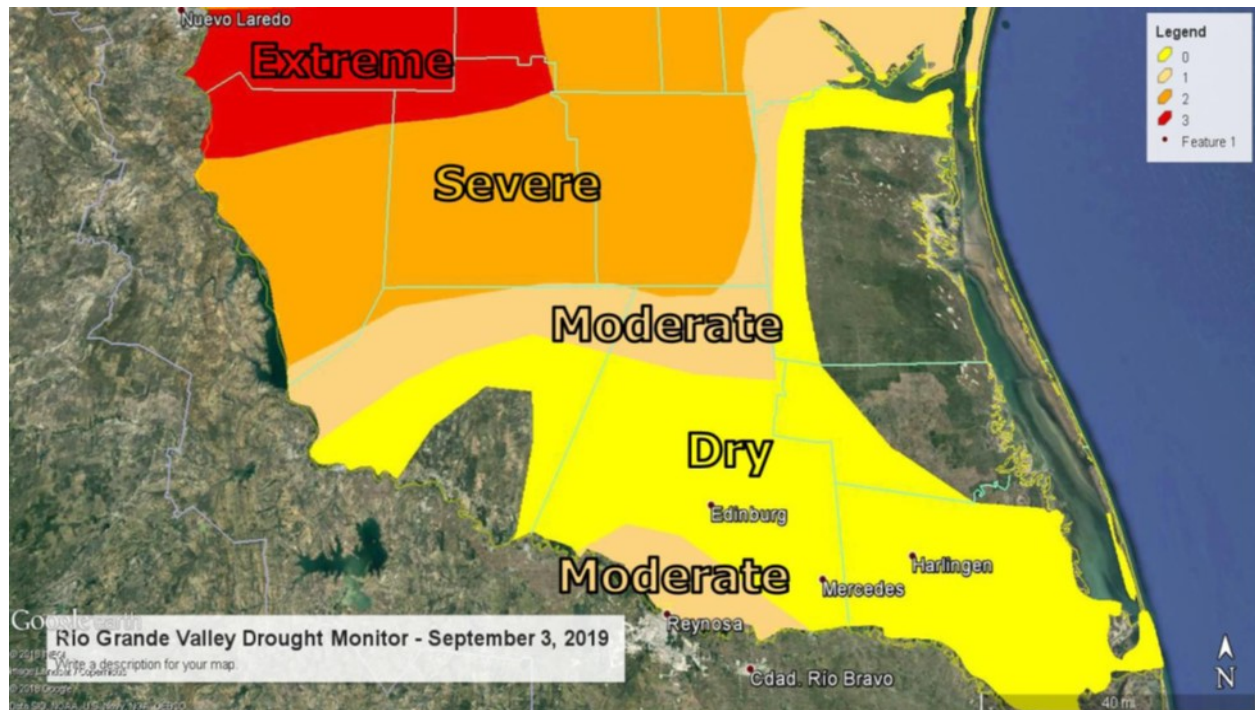


Figure 1. Drought monitor, not including some of the heavier rain bands on the periphery of Tropical Storm Fernand. While rainfall was helpful, it will not be enough to remove drought or dryness from most of the Valley and Deep South Texas. Additional dry weather in September could return dryness, as the month is by far the wettest on average.

If you would like to have a speaker give a talk to your group or organization about CoCoRaHS, please send us a request with your group's contact information to e-mail [texas@CoCoRaHS.org](mailto:texas@CoCoRaHS.org)



# Houston-Galveston Regional Climate Summary

## Wet Start to Summer – Drought Conditions Develop in August

By: Ron Havran

CoCoRaHS Assistant State Coordinator, CoCoRaHS Regional Coordinator, Texas CoCoRaHS Newsletter Editor

June

June rainfall amounts finish well above normal in the southern and southwestern counties in the region to near normal in the northern and northeastern counties. (See Fig. 1 and 2) The first week of June had several upper level disturbances move through the region with between 2.00" to 9.00" along the southern and southwestern counties. Wharton County had the highest CoCoRaHS average rainfall for June with 13.26". Brazoria County had an average CoCoRaHS rainfall of over 10.00" with 10.89". The CoCoRaHS rainfall county average for all counties together in the region was 7.96". With thunderstorms occurring on about 12 to 15 days in the month, most stations had temperatures that were kept lower with cloud cover. Temperatures across the region were near average for the month.

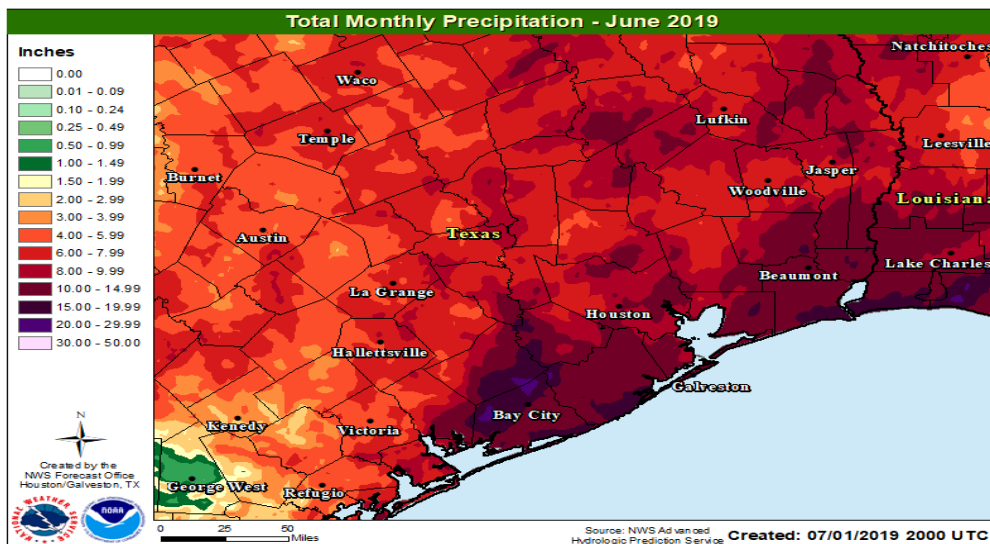


Figure 1: June 2019 total regional rainfall

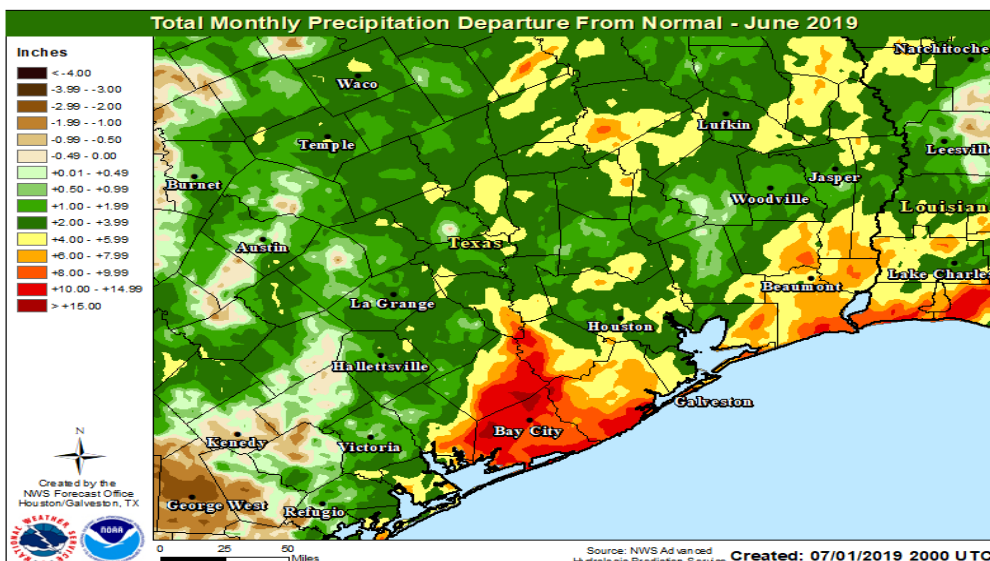


Figure 2: June 2019 total regional rainfall departure from normal

## “Houston-Galveston Regional Climate Summary (continued)”

### July

July had below normal rainfall totals for most of the region. The southwestern and western counties were the driest with Colorado County having the lowest CoCoRaHS station rainfall average with 0.71", followed by Fort Bend County with 1.05" and then Austin County with 1.21". The rainfall that did fall this month originated from localized showers and thunderstorms resulting in variable rainfall totals throughout the region. Montgomery County was one place that received many days of heavy thunderstorms which resulted in an average CoCoRaHS station rainfall average of 4.71". Chambers County had the highest CoCoRaHS station rainfall average at 4.76". Places that didn't receive much rainfall had temperatures that averaged above normal. There was a very rare July cool/dry front that moved the region on the 22<sup>nd</sup>-23<sup>rd</sup> which brought down dew point readings and heat index values for a few days. Temperatures were down to the upper 80's for highs for about 3 days which was about 5-6 degrees below average on those days. Overall temperatures for the month were above average with counties close to the coast not cooling down much below 80 at night.

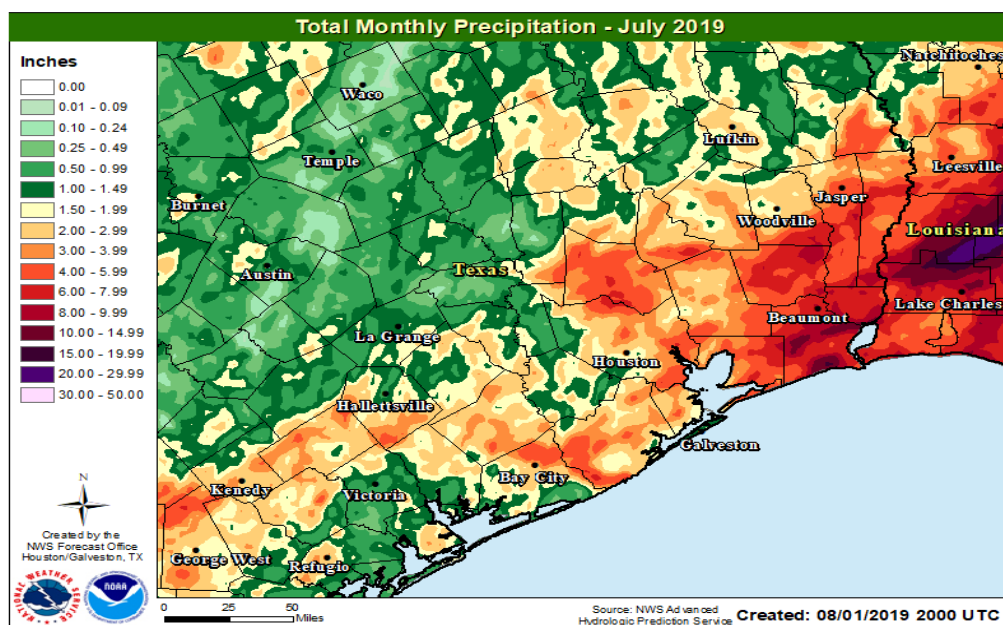


Figure 3: July 2019 total regional rainfall

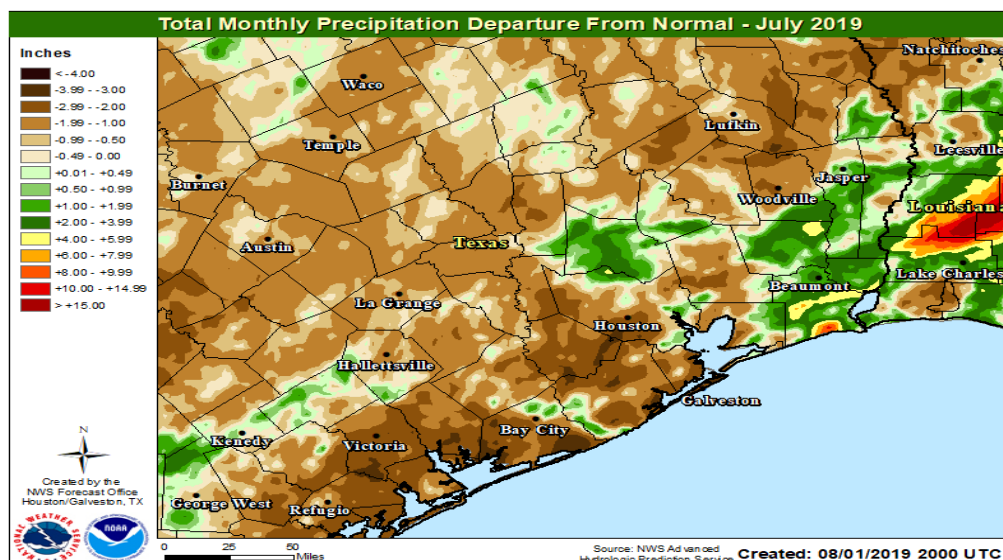


Figure 4: July 2019 total regional rainfall departure from normal

## “Houston-Galveston Regional Climate Summary (continued)”

August

Upper level high pressure remained in control of Southeast Texas weather in August resulting in below rainfall and above normal temperatures. With the dry conditions drought conditions moved into SE Texas from the west with western areas in Moderate Drought conditions by the end of the month. Southern counties nearest the coast managed to get most of the rainfall from afternoon sea breeze convection. This convection didn't move inland any more than 2 counties from the coast. Figures 5 and 6 show this pattern in the rainfall totals and departure from average rainfall for the month in the region. Temperatures were well above normal in most areas for the month with many climate sites having average temperatures for the month in the highest top 10 years all-time.

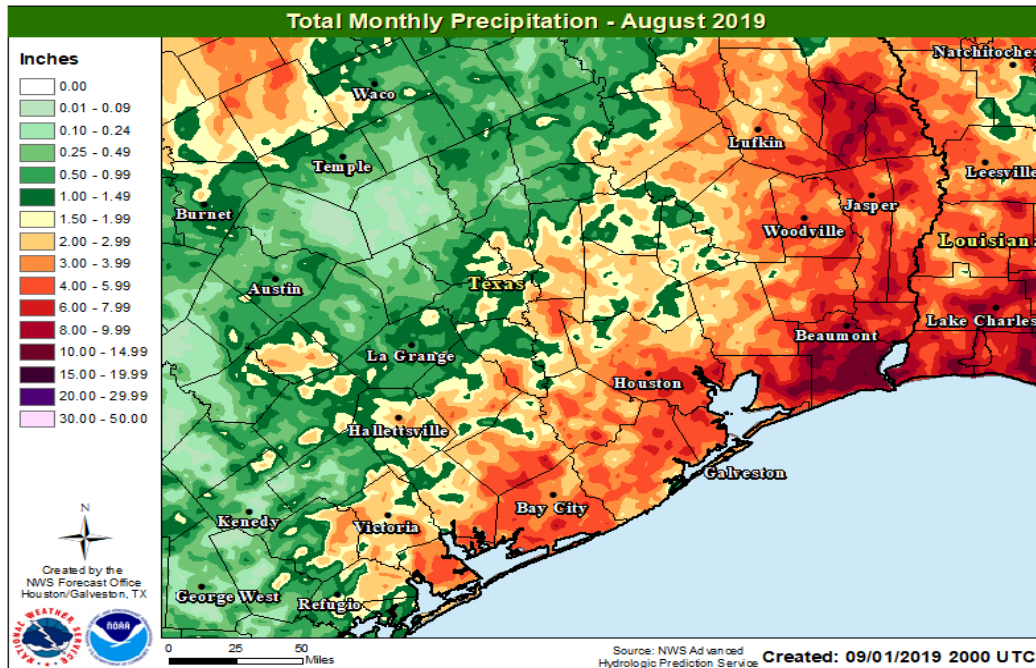


Figure 5: August 2019 total regional rainfall

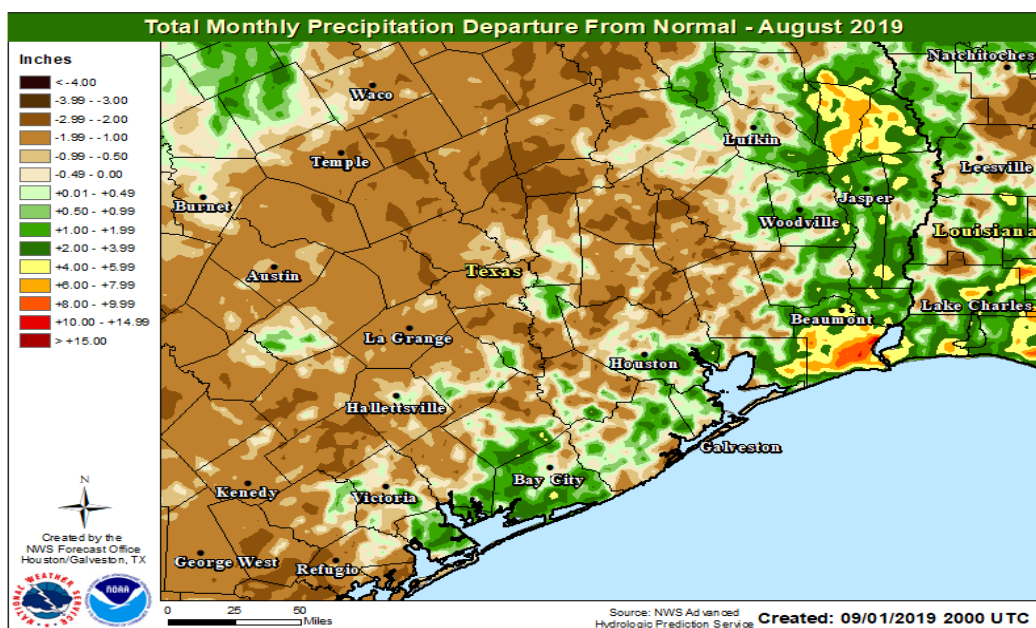


Figure 6: August 2019 total regional rainfall departure from normal



## “Houston-Galveston Regional Climate Summary (continued)”

Summer 2019 CoCoRaHS Houston/Galveston Region Rainfall  
County Rainfall Average and County Station Rainfall Maximum Total in inches per month

County	June		July		August		Summer Total
	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	3-Month Rain Total
Austin	7.61	11.00	1.21	2.28	0.67	1.55	9.49
Brazoria	10.89	13.03	2.21	3.24	4.70	8.11	17.80
Chambers	9.21	10.42	4.76	5.18	3.86	6.47	17.83
Colorado	3.89	4.97	0.71	1.07	0.75	1.43	5.35
Fort Bend	8.38	12.15	1.05	1.54	2.11	3.09	11.54
Galveston	8.96	10.48	2.33	4.47	4.50	8.06	15.79
Harris	7.09	12.36	2.53	6.73	3.37	6.61	12.99
Jackson	2.83	3.40	2.41	2.42	2.10	2.47	7.34
Liberty	7.17	7.50	1.79	2.53	2.36	3.14	11.32
Montgomery	6.41	9.51	4.71	7.30	1.26	2.99	12.38
Polk	7.19	9.60	1.66	2.54	1.35	2.34	10.20
San Jacinto	6.75	7.21	2.27	2.57	0.65	1.27	9.67
Wharton	13.26	16.26	1.70	2.77	1.43	2.93	16.39
Region Totals	7.96	16.26	2.02	7.30	2.10	8.11	12.08

Denotes wettest month for a category  
Denotes driest month for a category

Note: All data taken from the cocorahs website by using the Total Precipitation Summary Report for each county by month.

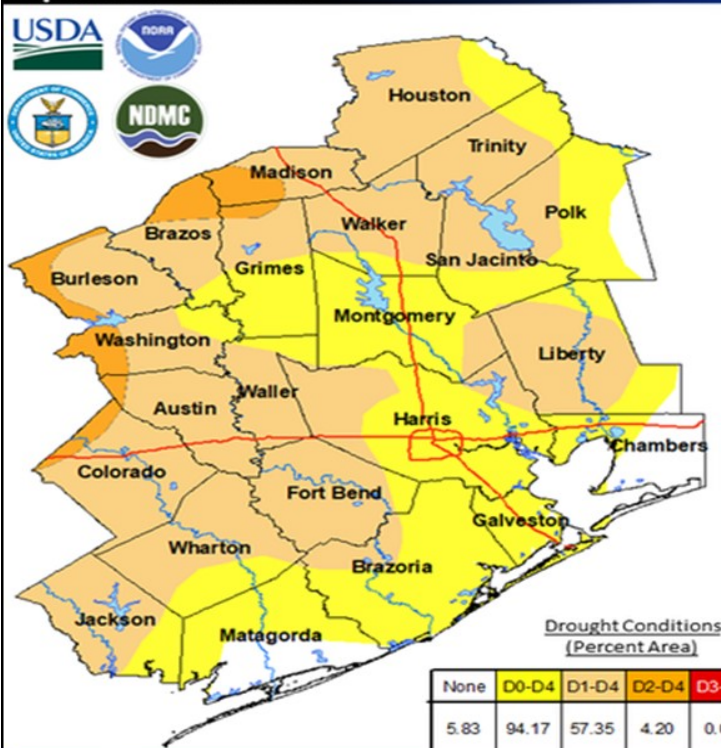
Note: Only counties with more than 1 active observer reporting are displayed in this chart.

### Latest Drought Monitor (USDM) Report

September 10th, 2019

Weather Forecast Office  
NWS Houston/Galveston TX

Issued September 14, 2019 3:30 PM CT



Drastic expansions of drought conditions across southeast Texas were made in this week's USDM Drought Update. **Abnormally dry** conditions have continued to expand through the City of Houston and across most of the coastal counties. Additionally, **D1 moderate drought** conditions also degraded further south and east. Of most significance, **D2 severe drought** conditions have expanded into portions of Madison, Brazos, Grimes, Burleson, Washington, Austin, and Colorado counties. An Outdoor Burn Ban remains in effect for Jackson, Fort Bend, Brazoria, Liberty, Waller, Colorado, Austin, Washington, Burleson, Brazos, Grimes, Madison, San Jacinto, Polk, Walker, Houston, and Trinity counties. Given these significant degradations, roughly 94% of southeast Texas is now experiencing drought conditions.

#### Intensity:

D0 Abnormally Dry  
D1 Moderate Drought  
D2 Severe Drought  
D3 Extreme Drought  
D4 Exceptional Drought

## Wanted: County Coordinators

**By: Ron Havran, Texas CoCoRaHS Assistant State Coordinator**

### **CoCoRaHS County Coordinators Wanted**

Our network consists of over 20,000 individual volunteer observers across all fifty United States, all providing accurate, high-quality precipitation data for our numerous end-users on a timely basis. Our data is used by a wide variety of organizations and individuals, including the National Weather Service, other meteorologists, hydrologists, and many more. We have excellent quality control systems and processes in place to make sure our data is reliable and error-free. Our state and regional coordinators, as well as teams of quality control members, volunteer hours of their time to find potential errors in data across the state. But, in order to have the data to check, we need coordinators at the local level to help fill in the numerous gaps in data points.

That's why we are looking for local coordinators at the county level. Local county coordinators help support the CoCoRaHS network in many ways, primarily to spread the word about the network. Because of the high variability of rainfall over short distances, local county coordinators can help increase the density of precipitation data available throughout the country by encouraging volunteer weather observing. Becoming a citizen scientist in our network is both fun and rewarding, and becoming a local county coordinator is, too.

### **Coordinator Responsibilities**

Local County Coordinators help support CoCoRaHS in the following ways:

- \* Help recruit new volunteers through local press, contacts with local service organizations, social media, or through other creative means
- \* Help organize and attend local training sessions as needed
- \* Provide support for volunteers in their county

Become familiar with the CoCoRaHS website (<https://www.cocorahs.org>)

Other opportunities, if willing:

- \* Help volunteers with the installation of their equipment
- \* Help volunteers who do not have internet access by entering their data
- \* Quality control check the list of observers in your area and check for any stations no longer reporting

The following page has a current listing of counties in the state of Texas without a local county coordinator. Please take a look and see if the county you are in is listed as one without a CoCoRaHS County Coordinator.

If you would like to be considered as a local county coordinator, please feel free to contact Bill Runyon, our Texas state coordinator for CoCoRaHS, at [texas@cocorahs.org](mailto:texas@cocorahs.org)

Remember: you are one of our most valuable resources, and we truly appreciate your time and efforts!

## “Wanted: County Coordinators (continued)”

Texas Counties without a CoCoRaHS County Coordinator

### Amarillo

Armstrong  
Carson  
Collingsworth  
Deaf Smith  
Donley  
Gray  
Hansford  
Hartley  
Hemphill  
Hutchinson  
Lipscomb  
Moore  
Ochiltree  
Oldham  
Potter  
Randall  
Roberts  
Sherman  
Wheeler

### Lubbock

Bailey  
Briscoe  
Castro  
Childress  
Cochran  
Crosby  
Cottle  
Floyd  
Garza  
Hale  
Hall  
Hockley  
Kent  
King  
Lamb  
Lubbock  
Lynn  
Motley  
Parmer  
Stonewall  
Swisher  
Terry  
Yoakum

### Midland/Odessa

Andrews  
Borden  
Brewster  
Crane  
Culberson  
Dawson  
Ector  
Gaines  
Glasscock  
Howard  
Jeff Davis  
Loving  
Martin  
Mitchell  
Pecos  
Presidio  
Reagan  
Reeves  
Scurry  
Terrell  
Upton  
Ward  
Winkler

### El Paso Region

Hudspeth

### Abilene/San Angelo

Brown  
Coleman  
Coke  
Concho  
Crockett  
Fisher  
Haskell  
Irion  
Jones  
Menard  
Nolan  
Schleicher  
Shackelford  
Sterling  
Sutton  
Taylor  
Throckmorton

### Wichita Falls

Baylor  
Clay  
Foard  
Hardeman  
Knox  
Wilbarger

### Dallas/Fort Worth

Anderson  
Cooke  
Eastland  
Falls  
Fannin  
Freestone  
Hamilton  
Henderson  
Hill  
Jack  
Leon  
Limestone  
Milam  
Mills  
Palo Pinto

Parker  
Robertson  
Somervell  
Stephens  
Wise  
Young

### Austin/San Antonio

Bastrop  
Bexar  
Blanco  
Caldwell  
Dimmit  
Edwards  
Val Verde  
Zavala

### Corpus Christi/Victoria

Bee  
Duval  
Goliad  
Jim Wells  
Live Oak  
McMullen  
Nueces  
Refugio  
San Patricio

### Brownsville/McAllen

Brooks  
Cameron  
Jim Hogg  
Kenedy  
Starr  
Willacy  
Zapata

### Brazos Valley

Brazos  
Burleson  
Grimes  
Houston  
Madison  
Trinity  
Walker

### Houston/Galveston

Brazoria  
Chambers  
Fort Bend  
Jackson  
Matagorda  
Polk  
San Jacinto

### Beaumont/Golden Triangle

Jasper  
Newton

### East and Northeast Texas

Marion  
Panola  
Sabine

\* *CoCoRaHS State Regions in bold and underlined*



## Texas Fall Weather Outlook

**By Bob Rose, Lower Colorado River Authority**

The summer of 2019 was one of the hottest on record. Although the heat really didn't get going until July, it cranked up to an almost unbearable level in August and early September. I think all of us are now anxiously awaiting the cooler temperatures of autumn. But this year, we may be waiting a little longer than usual. In most years, the persistent summertime ridge of high pressure weakens and diminishes in September, allowing cold fronts to become more frequent in October and November. But this year, the summertime heat ridge is not backing down very easily and unfortunately, it appears the cooler, autumn temperatures are not going to be in any hurry to settle in across the state.

Although the summer started off somewhat wet, the rain trended well below normal across most of the state in July and August as that strong ridge of high pressure set up over the state, keeping storm systems away. By early September, the combination of below normal rainfall and hotter than normal temperatures caused more than half of Texas to be in some level of drought.

The trend toward drier than normal weather beginning in July coincided not only with the typical slowdown of rain in middle of summer, but also with the demise of El Niño. Since last fall, waters in the tropical equatorial Pacific have been running warmer than normal. Beginning around mid-winter, these warm waters connected with the circulation of the atmosphere, and the National Weather Service declared the beginning of a weak El Niño. El Niño's quite often cause a pattern of above normal rainfall across Texas in the fall, winter and spring months. Much of Texas enjoyed a wet winter and spring, thanks to El Niño. But El Niño began to weaken in June, and by July, the NWS declared the El Niño had ended and the Pacific moved to ENSO-neutral. ENSO-neutral refers to the period when neither El Niño nor La Niña is present. In other words, the tropical Pacific waters are neither warmer, nor cooler than normal.

Forecasters with the National Weather Service's Climate Prediction Center (CPC) indicate there are currently no strong forcing factors in place to cause the tropical Pacific waters to trend warmer or cooler than normal over the next few months, meaning the Pacific will likely stay ENSO-neutral. During ENSO-neutral periods, conditions across equatorial tropical Pacific Ocean are near the long-term average. But this doesn't necessarily mean our weather will be average—it just means that other, non-ENSO forces will govern the weather without ENSO's relatively predictable impact.

As of early September, Texas weather was being heavily influenced by a persistent, stable ridge of high pressure in the upper atmosphere situated over the south central and southwestern U.S. This ridge was keeping most storm systems away from the state, limiting widespread rainfall. At the same time, the ridge was also keeping cold fronts up to the north and causing temperatures to be warmer than normal.

Long-range climate forecast solutions are indicating this ridge will likely persist in a weakened state through much of fall, causing rainfall to be near or possibly somewhat below normal. With no help from an El Niño, the weather pattern is not shaping up to be unusually wet like last fall.

The October/November/December rainfall forecast from the CFSV2 (Climate Forecast System) model is calling for near normal rainfall across most of the state and slightly drier than normal rainfall across the eastern third of the state. (See Figure 1)

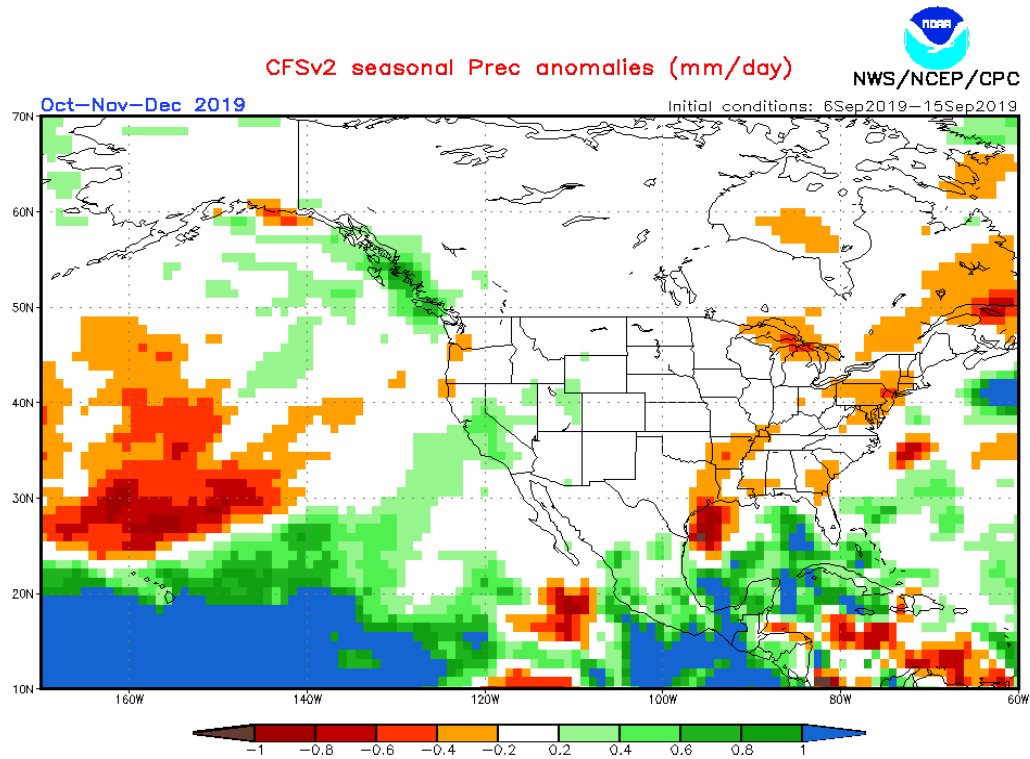
The persistent high pressure ridge is expected to limit the number of cold fronts moving into Texas. As a result, temperatures are forecast to average warmer than normal. (See Figure 2) The October/November/December CFSV2 forecast solution calls for above normal temperatures not only across all of Texas, but also across a large part of North America as well.

Of course in any year, fall's weather pattern can be interrupted or changed by a possible tropical cyclone moving into the state out of the Gulf of Mexico or the eastern tropical Pacific. Widespread, heavy rain from these systems will have the potential to cause considerable flooding.

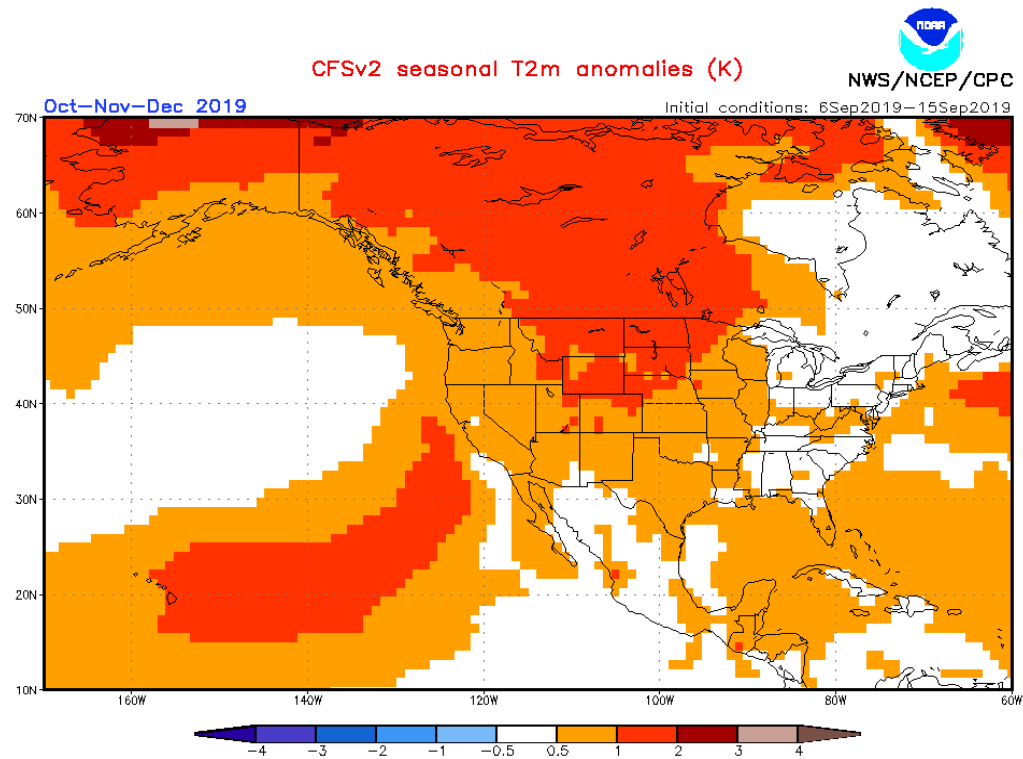
As autumn begins, we can all breathe a sigh of relief as the scorching temperatures of summer begin to fade. And while the fall outlook calls for warmer than normal temperatures, these readings will be significantly lower than what we experienced over the summer. Some cool, crisp nights will certainly be in the mix. And despite the outlook calling for near normal to slightly below normal rainfall, most areas should still see some periods of soaking rain that will provide a little relief for areas that have been suffering from drought. Summer is now behind us; enjoy the trend toward cooler temperatures.

## “Texas Fall Weather Outlook (continued)”

CFSv2 Rainfall Forecast for October-November-December:



CFSv2 Temperature Forecast for October-November-December:



## CoCoRaHS Tips and Training

By Steve Hilberg  
CoCoRaHS Quality Control

### Don't Do the Dew!

In the past few weeks there has been very little rain across much of Texas. The heat dominated the months of July and August, with night times on the humid side in many areas. I noticed that on a few of those very humid mornings a smattering of Trace precipitation reports. In most cases there was clearly no rain, so more than likely it was accumulation from dew that was being reported. We are in the time of year where we can have hot days followed by very humid nights, or on days following rain. Dew formation becomes more common, especially on those clear, humid nights. Some nights it just puts a haze on your car windshield and rain gauge, and other mornings you can soak your shoes walking ten feet through the grass. Dew accumulates on the outside and inside the funnel of your rain gauge, and if heavy enough droplets of water will run down the funnel into the inner measuring tube. You might come out one morning with heavy dew and find a Trace, 0.01 or even 0.02 of water in your gauge. What do you do?

Since dew is condensation (forms on the surface of an object) and not precipitation (falls from the sky), you do not report dew as Daily Precipitation. Don't report a Trace, either. You can, however, mention heavy dew and what was in your gauge in the comments. Not sure whether or not it rained? If there was rain in the forecast, or you have other reasons to think it might have rained (clouds, overcast), you can enter the amount of water in the gauge as precipitation and include a note about the dew and uncertainty about rain. If you have the means and desire, you can also look online to see what radar is showing. Sometimes being an observer means you might need to do a little detective work!

### Another Reminder About Observation Time

When you originally registered with CoCoRaHS you selected a "default" observation time. The time you chose is automatically entered on your Daily Report form or Multi-Day Report form when you open them. Although this is your default time, this field CAN be modified when you submit your observation. The actual time of observation should be entered when your observation is not at your regular time. For example, if your normal observation time is 7:00 a.m. and you make your observation at 8:30 a.m. on a particular day, then you should change your observation time for that day to 8:30 a.m. This is really important when precipitation is occurring near or at your observation time.

Sometimes circumstance are such that you cannot make your observation at your normal time, for example, if thunderstorms are in progress. In this case you can wait until the rain has stopped and it is safe to go out and make a measurement. Be sure to change the observation time on your report accordingly. However, there is one thing to keep in mind: ***If your observation is more than 4 hours past your normal observation time (for example, observation at 11:30 a.m. and your normal time is 7:00 a.m.), then do not submit a daily report for that day. Instead, wait until the next day and submit a 2-day total using a Multi-day Report.*** At times we see observers wait until rain has stopped to make an observation, thinking that it will be more helpful to capture the entire "event" than make an observation during it. That is not the case. Remember, we are trying to compare rainfall data that was collected in observations 24 hours apart. If an observer waits until the afternoon to make a measurement and report it, then it cannot be compared to observations made that morning (too much precipitation), nor to observations made the next morning (too little



## “CoCoRaHS Tips and Training (continued)”

precipitation). Consistency in observations is important to interpretation of the precipitation data. You can, however submit a Significant Weather Report to report the rainfall you received.

If you ever want to change your default observation time, drop your county or regional coordinator a line and let us know. This is not a field that can be changed by the observer.

### **New Training Animation on CoCoRaHS Quality Assurance and Quality Control**

There is a new video on the CoCoRaHS YouTube channel the subject of the animation is CoCoRaHS quality control and quality assurance. CoCoRaHS prides itself on data quality - it's extremely important for our users. This video explains the general process of the quality control of CoCoRaHS data, why data quality is important, and why it is important for observers to respond to inquiries about their observations. There are many times we hear an observer say something like "I didn't know anyone was looking at my data!" mostly in response to an inquiry about their observation. On the other side of the coin, we do have observers who are very miffed that anyone could possibly question their observation. Quality data begins with each observer, but in the event an error creeps in, we have your back! There is a team of people looking at the data each day and a whole list of things that are checked to keep those errors to a minimum. With anywhere from 10,000 to 14,000 observations coming in per day, quality control (QC) is a big task. I encourage all of you to view this 3 minute video when you have some time. You can click this link to see it.

### **If You Move, or Change Your Email Address**

If you are moving to a new home and want to continue to participate in CoCoRaHS, please let us know as soon as possible. Your observations are tied to a specific location, so we don't want observations from your new location associated with your previous location. The value of the observations are increased by their continuity at a location, so consider suggesting to the buyer or new tenant of your home that they participate in CoCoRaHS! We have a brochure that you can download, print and give to them.

When you know your new address, let us know. When you are ready, we will close your old station and open a new station at your new address. (DO NOT sign up for CoCoRaHS again). Once that's done, you can enter observations from your new location. If you are moving to a different state, we can help you get in touch with that state coordinator so you can get started there.

Let us know if you change your email address so that your record is up to date. You can update your email address in the CoCoRaHS database yourself by logging in and clicking on My Account in the top line menu. Click on Edit in the My Information box. Make any corrections, then click save.

## “CoCoRaHS Tips and Training (continued)”

### **Message of the Day**

After you enter your observation on the web site you will see the Message of the Day (MOD) after you submit your observation. The MOD is used to convey observing tips and other interesting information to observers. Mobile app users have to choose to see the MOD after submitting their observation, and if you pass on that opportunity there was no way to go back and view the MOD. Well, now there is! Once you login, you can press the menu button on the top left side of the screen, and you will now see Message of the Day as one of the menu options. Select it to view the current Message of the day.

### **Mobile App Users—You Could Be Missing Out!**

Speaking of the mobile app, I have been told by a few newer observers that they don't use the web site for CoCoRaHS, just the mobile app. The mobile app is really convenient for submitting your observation each day, but it doesn't go much further than that. If you are relatively new to CoCoRaHS and have only used the app so far, you are missing out on a lot of great information and data that is not available through the app. The web site has a comprehensive menu of products observers can access, including listings of your data, maps (local, county, and state), a portal to PRISM products where you can not only view your monthly amounts but obtain monthly normal precipitation amounts for your location, and means to report hail, significant weather, evapotranspiration, and local conditions. You are also able to edit ANY report you submit, something not yet available on the app. Other information available through the web site are links to all of our CoCoRaHS training, the WxTalk Webinars, and many other resources. Check it out!

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**If you would like to have a speaker give a talk to your group or organization about CoCoRaHS, please send us a request with your group's contact information to e-mail [texas@CoCoRaHS.org](mailto:texas@CoCoRaHS.org)**

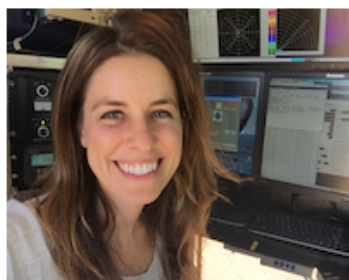
## CoCoRaHS Webinars

**Webinar #66** - Thursday, October 3, 2019

### Doppler On Wheels: Part Two

Karen Kosiba





Center for Severe Weather Research  
Boulder, CO



#### (Biography)

*There was so much to cover during our March Webinar regarding the Doppler on Wheels, that we've invited Karen back for a "part two" on this interesting subject. As part of this webinar, Karen will pick up where she left off, with more about tornadoes, hurricanes, winter storms, and other high impact weather from over a decade of field work.*

*The Doppler on Wheels (DOW) mobile radars have been used, often in tandem with other instrumentation, to study tornado formation and structure, the boundary layer of landfalling hurricanes, the internal structure of lake effect snow bands, the gust front structure of potentially severe-wind producing MCSs, and other mesoscale phenomena. Some key findings include the existence of rear-flank downdraft surges, which may impact tornadogenesis, the existence of strong winds in tornadoes very close to the surface, small scale structures that may impact energy distribution and wind speeds in the near surface hurricane boundary layer, and the existence of misovortices in intense lake-effect snow bands.*

	<p><b><i>Texas CoCoRaHS Observer</i></b> The official newsletter of Texas CoCoRaHS</p>	
	<p>Newsletter Editors: <b>Juan Alanis Jr.</b>, Co-Regional Coordinator - Corpus Christi Region cocorahsstx@gmail.com <b>Ronald Havran</b>, Regional Coordinator - Houston/Galveston Region Assistant State Coordinator cocorahs.hou.galv@gmail.com Assistant Editor: <b>Billy Forney</b>, Harris County CoCoRaHS Coordinator forney.cocorahs@gmail.com Texas CoCoRaHS: <b>William (Bill) Runyon</b>, Texas State Coordinator texas@cocorahs.org</p>	<div>  Texas CoCoRaHS </div> <div>  @Texas_CoCoRaHS </div>