TEXAS CoCoRaHS OBSERVER

Summer 2022

Vol. 8 - 2

Welcome to The Texas CoCoRaHS Observer Newsletter

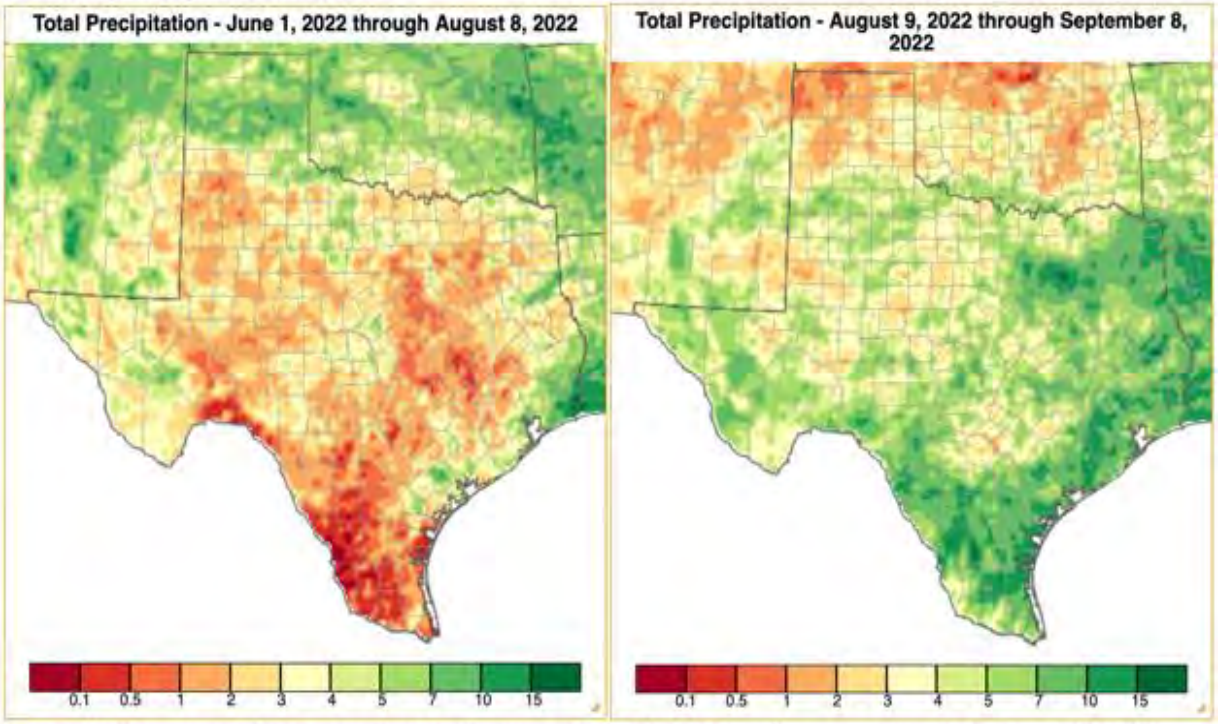
The purpose of this newsletter is to keep observers informed of the latest news, events, training, and happenings related to the CoCoRaHS program here in Texas, as well as news about the latest weather patterns affecting each region of Texas seasonally.

Inside this issue

Texas State Summary for Summer 2022

By: John Nielsen-Gammon, Texas State Climatologist

Ordinarily, we lead with a map of the total rainfall for the season. But that won't do this time. Instead, it's a tale of two seasons:



Precipitation maps for Texas using Oregon State PRISM analyses, generated from SC-ACIS. Left: June 1 through August 8, 2022. Right: August 9 through September 8, 2022.

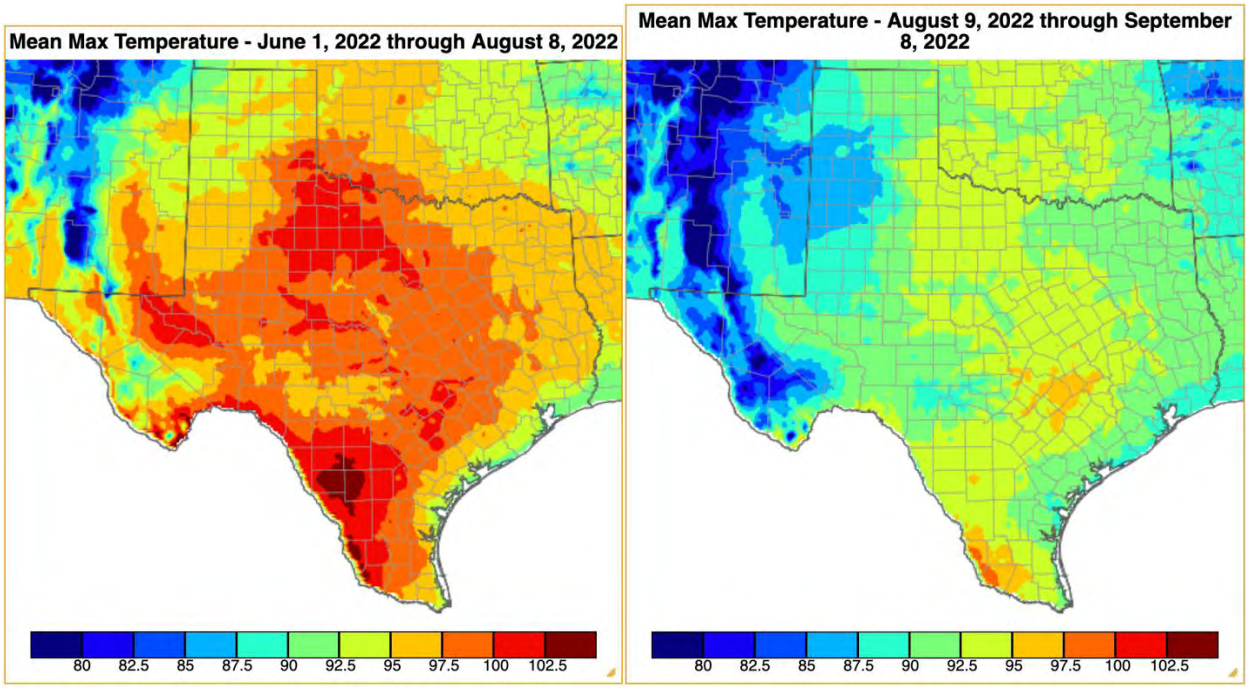
The first season covered June, July, and the first part of August. After 3/4 of the summer, rainfall totals for most of the state were less than three inches, well below normal. South Texas in particular had some areas that received nothing or almost nothing, but very dry conditions also existed up through east-central and north-central Texas, as well as locations farther west. The Beaumont area received decent amounts of rain, as did the Texas Panhandle, albeit too late to do much good for this year's winter wheat crop. Page 2→

Texas Summer Weather Summary (continued)

Around that time, I issued a press release saying that, even though we were forecasted to have an active hurricane season, we can't expect or even hope for a hurricane to come along and end the Texas drought. For one thing, hurricanes are a problem in their own right. But for drought purposes, hurricanes are not good because the rain they produce is isolated, only dumping on a small fraction of the state. Instead, I said, what we need would be widespread rain events, at least several, over an extended period of time.

Little did I know that we would proceed to have just that. From August 9 through the first few days of September, just about everywhere in the state received more rain than they had in the first 3/4 of the summer. In some cases, it was too much, too fast. In the Dallas area, widespread 9"-11" totals led to substantial flooding; there was also flooding in West Texas. My personal favorite statistic from the period: a cooperative observer station near I-10 in West Texas picked up almost 14" of rain from mid-August to early September. Not only was this more than they had received all year, it's more than they receive in an entire year under normal circumstances. All of this wasn't enough to end the drought in most of the state, but it did make a significant dent in it.

Temperatures provided an even greater contrast between the first 3/4 of the summer and the following month.



Average daily maximum temperature maps for Texas using Oregon State PRISM analyses, generated from SC-ACIS. Left: June 1 through August 8, 2022. Right: August 9 through September 8, 2022.

For most of the summer, much of the state averaged high temperatures over 100 °F. Then, with the rain, came cloudiness, moisture, and some air from the north. High temperatures were below 95 °F almost everywhere.

In the spring 2022 newsletter, I said: "I'm wondering whether Texas might manage to have its second hottest summer on record." Well, it did. The average temperature was 84.8 °F, well behind 2011's 86.8 °F but still warm enough to be the fifth-warmest summer ever recorded in any state. I do regret using so many weasel words in my forecast, but if the rainy period had come at the beginning of the summer rather than the end, the entire summer would have been much milder. I could have pretended to be confident, I suppose: no guts, no glory. On the other hand, no guts, no worry. Color me wimp.

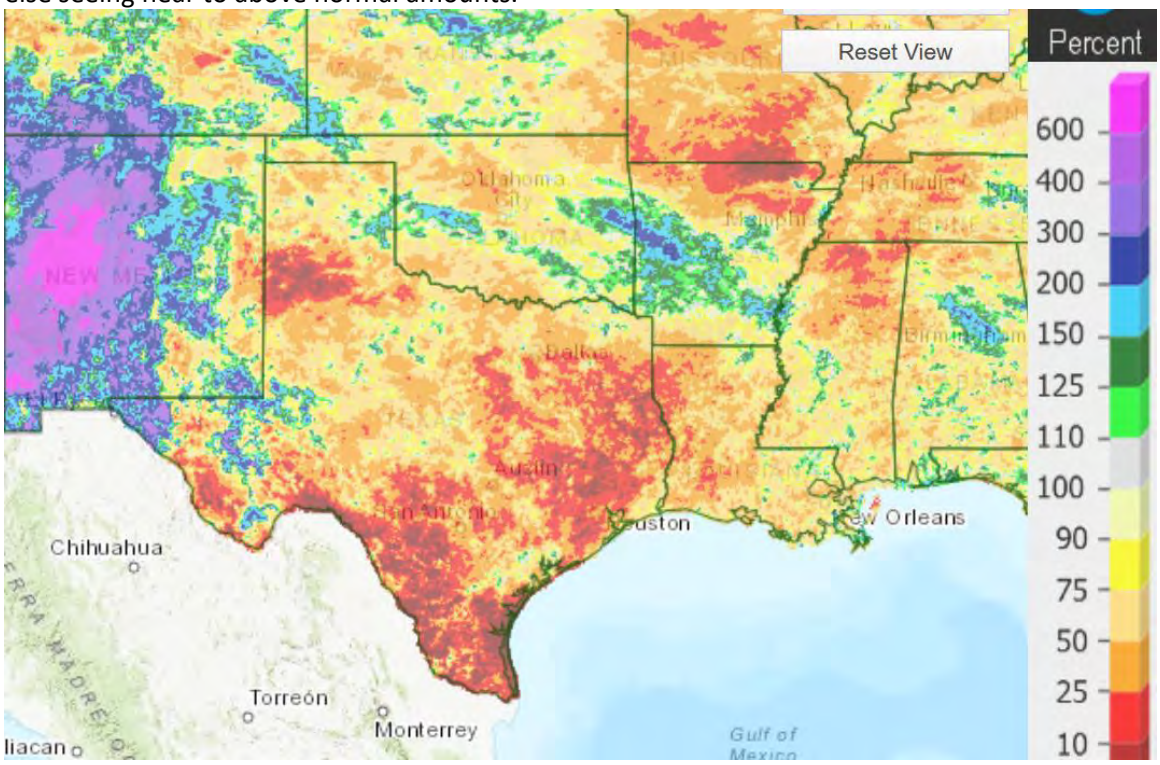
North Texas Regional Summary

North Texas Summary/ State Hydrology Roundup

By: Greg Story, North Texas CoCoRaHS Regional Coordinator, Retired NWS

Greetings CoCoRaHS observers from the North Texas Regional Coordinator! After a winter and spring that was quite dry, summer also started out hot and very dry. But, at least for some parts of North Texas, such as the DFW metroplex, that all changed by the end of August. In fact, a good part of North Texas started the summer with a moderate to severe drought, which became extreme to exceptional by early August. But because of the rainfall at the end of August the worst drought conditions became limited to the Texas Hill Country and parts of Central and Western Texas. It reminds me that your rainfall reports are as valuable as ever in determining areas of drought as well as floods, as we saw both in August. Your reports continue to be invaluable to the National Weather Service and other entities (such as the Texas State Climatologist and the National Drought Mitigation Center). I am thankful to each one of you for reporting your rainfall via CoCoRaHS!

Reviewing the past several months, in February 2022 there were precipitation deficits, but they weren't nearly as bad as the previous month. Much of Texas did have near to below normal amounts. A small area of North Texas had above normal precipitation. In March 2022 it was extremely dry over western and southern Texas. Meanwhile, there were some locations that had above normal precipitation over East Central and Southeast Texas. Most of North Texas had near or below normal rainfall. In April 2022 it was very dry from Central into Northwest Texas. However, there were a few spots that got above normal precipitation. In May most of Texas again had below normal rainfall. Only the Texas panhandle and the lower Rio Grande valley near Laredo saw above normal precipitation. Near normal rainfall was noted over East Central Texas, but it was dry most elsewhere else. In June it was dry with below normal precipitation over almost all the state, with only parts of Far West Texas observing above normal rainfall. In July it was very dry with record breaking high temperatures across most of Texas. Some observers had zero rainfall for the entire month. Below or much below normal rainfall was noted particularly along and east of the I-35 corridor from north to south. Only a small part of East Texas west of Shreveport, and the Texas Panhandle, saw near to above normal precipitation. In August the month started out very dry, but a weather pattern change occurred, and parts of Texas turned from drought to flash floods quickly. Much above normal rainfall was noted from the DFW metroplex to Shreveport LA, and over parts of Deep South and Southwest Texas. Only the northern Texas Panhandle had below normal rainfall, with everyone else seeing near to above normal amounts.



Percent of normal precipitation map for June 2022: The dark green, blue, and purple colors indicate above normal precipitation; the beige, dark yellow and light green colors indicate near normal, while the orange and dark red colors indicate below normal precipitation. In June it was dry with below normal precipitation over almost all the state, with only parts of Far West Texas observing above normal rainfall.

North Texas Regional Summary (continued)

At DFW Airport in June 2022 they received 2.64” of rainfall. The normal amount for June is 3.70” so they were -1.06” below normal for the month.

In Waco for June 2022, they picked up 0.86” of rain. The normal amount for June is 3.35” so they were -2.49” below normal for the month.

For each month, I will highlight the more significant weather events. I know there is a lot of information given, and it is intended for you to pick your “favorite” storm or a look at a particular day to see what happened. Which days did you report your heaviest precipitation amounts? You can read about them here and compare what you observed against the maximum amounts. There were about six storm systems which affected our weather in June. Here are the highlights of the weather for the month.

June 1 - 2:
A weak cold front moved into Texas on the 1st. The front was enhanced by outflow boundaries from Oklahoma to produce showers and thunderstorms later the 1st into the 2nd. Locally very heavy rain fell in the early morning hours of the 2nd. Maximum rainfall amounts were at Grapevine with 5.83", south southeast of Flower Mound with 4.62", and south of Sanger with 4.61". Some of the thunderstorms lingered into the 2nd, but with a decrease in areal coverage. Most North Texas rainfall amounts were less than 1".

June 3 - 4:
A complex of thunderstorms developed over West Texas early on the 3rd. A mesoscale vorticity center (MVC) formed and generated additional thunderstorms, especially on the 3rd over North Texas. Prior to dawn on the 3rd, 2.70" fell at Spur over west Texas while north of Goldthwaite they got 1.90". During the late afternoon, extremely intense rainfall occurred over parts of North Texas. The maximum rainfall was over parts of the DFW metroplex where 6.12" fell just west of Richland Hills and 5.31" occurred to the north northeast of Mansfield. Some lingering thunderstorms remained on the 4th over mainly Southeast Texas. 1.87" fell west of Nederland and 1.56" fell north of Port Arthur.

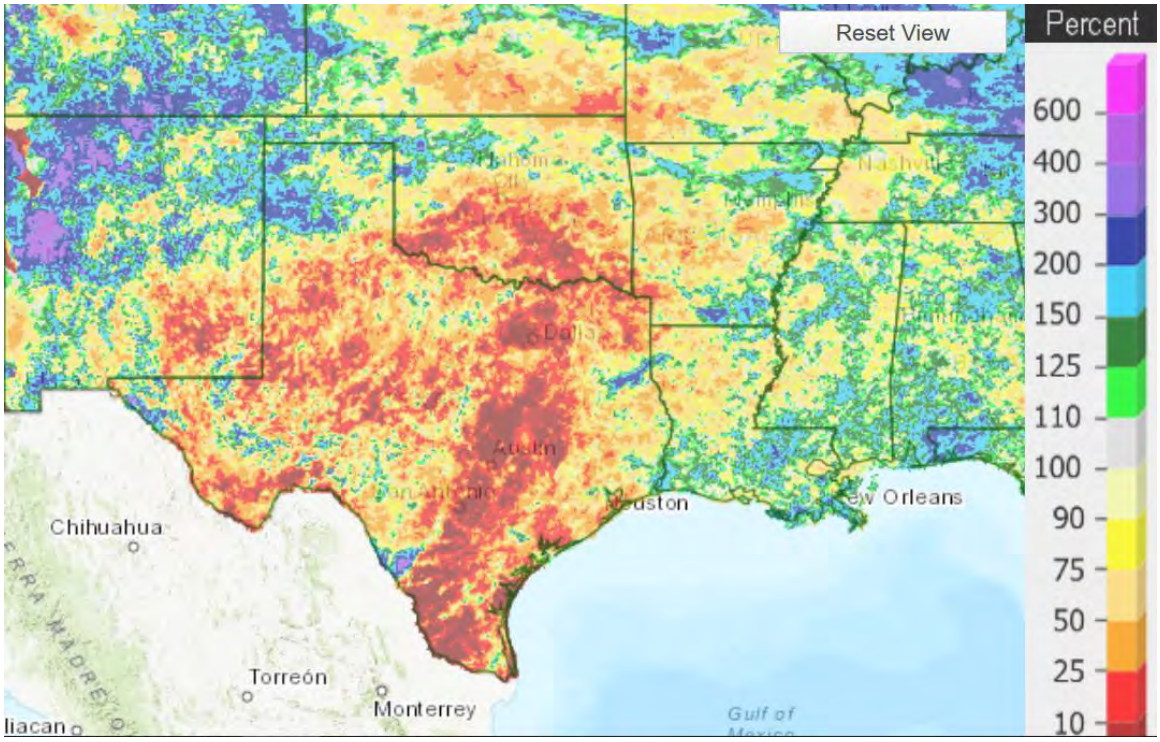
June 10:
A mesoscale convective system (MCS) up in Oklahoma moved southeast and clipped the Red River counties early on the 10th. While most rainfall amounts were very light, they did get 1.35" east northeast of Odell, while Monkstown got 1.34".

June 19:
Isolated thunderstorms developed during the afternoon and evening, especially from the Red River southward to east of Dallas. While rainfall amounts were light, amid the heat wave we were experiencing, any rainfall was welcome. 0.89" was measured to the north northeast of Gordonville and 0.81" was measured to the west northwest of Pottsboro. Winds from a thunderstorm turned deadly on Lake Lavon when a boat was capsized.

June 26 - 28:
A cold front sank southward into North Texas and produced some scattered afternoon and evening thunderstorms later the 26th. While most areas missed the rainfall, 2.10" fell west southwest of Edgecliff and 1.29" fell at Benbrook. Further west 1.36" fell northwest of Knox City. As the cold front slid south, more showers and thunderstorms developed across Central and South Texas on the 27th. Maximum rainfall amounts included 3.74” west of Lampasas and 3.28" northwest of Lorena. Further south, Victoria had 3.72". The front stalled across Central Texas on the 28th, and a few additional showers and thunderstorms developed, especially across south Texas. The heaviest rainfall was 3.76" northwest of Live Oak and 3.12" west northwest of San Antonio.

June 29 – July 1:
An easterly wave of low pressure moved close to the Texas Gulf coast on the 29th. Locally heavy rainfall began to develop near the shore. On the 29th the heaviest rainfall was 2.26" northwest of Bridge City and 2.19" east of La Marque. On the 30th showers and thunderstorms continued over eastern and southern Texas, especially near the upper Texas Gulf coast. To the north of Port Arthur 4.98" fell and 2.80" fell southwest of Mauriceville.

North Texas Regional Summary (continued)



July 2022 percent of normal precipitation map: The dark green, blue, and purple colors indicate above normal precipitation; the light yellow and light green colors indicate near normal, while the orange and dark red colors indicate below normal precipitation. In July it was very dry with record breaking high temperatures across most of Texas. Some observers had zero rainfall for the entire month. Below or much below normal rainfall was noted particularly along and east of the I-35 corridor from north to south. Only a small part of East Texas west of Shreveport, parts of Southwest Texas, and the Texas panhandle saw near to above normal precipitation.

At DFW Airport in July 2022 only a Trace of rainfall was recorded. The normal amount for July is 2.08" so DFW was -2.08" below normal for the month.

In Waco for July 2022, 0.01" was measured. The normal amount for July is 1.82" so Waco was -1.81" below normal for the month.

There were about four storm systems which affected our weather in July. Here are the highlights of the weather for the month.

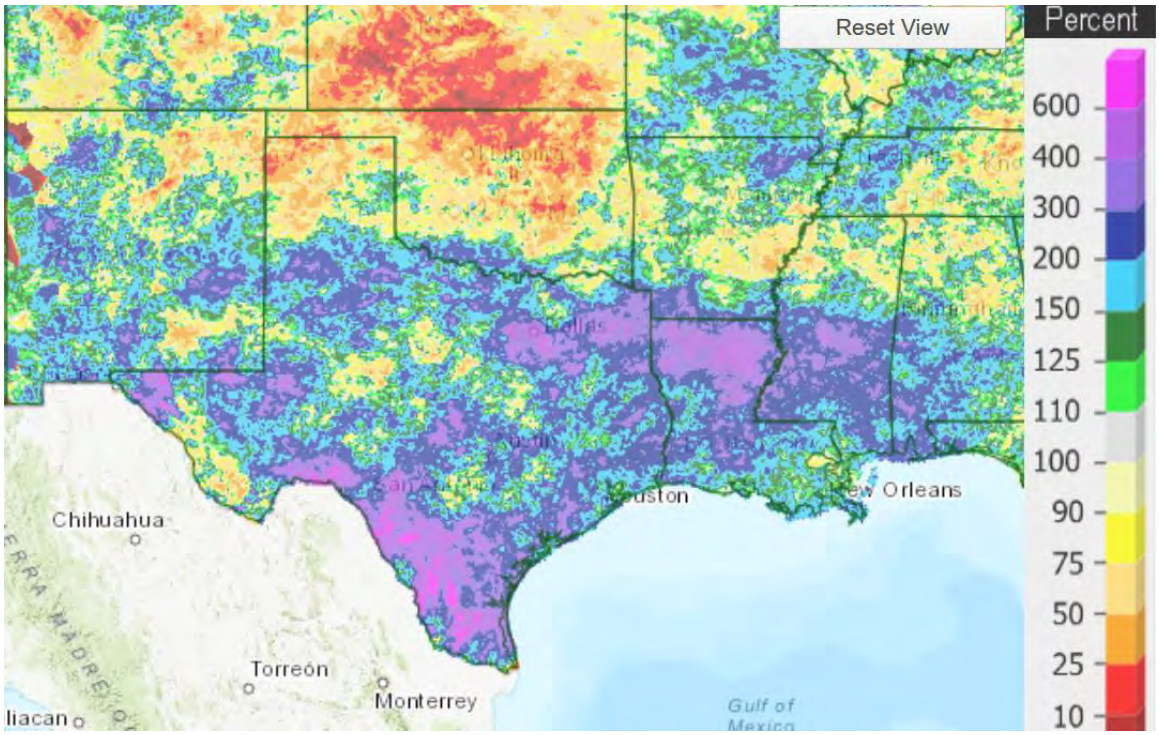
July 1 - 3:
An easterly wave of low pressure was along the Texas Gulf coast on June 30, and this storm drifted northward into the upper Texas coast on the 1st, locally heavy rainfall continued from this storm system. The heaviest rainfall was over Southeast Texas and included 4.98" southwest of Orange, 4.91" north of Port Arthur and 4.54" northwest of Bridge City. As this low moved northward across East Texas, the rainfall continued into the 2nd. The maximum rainfall over East Texas was 2.94" just west of New Salem and 2.42" northeast of Nacogdoches. Much further south they received 4.04" south of El Indio. Thunderstorms developed across mainly North Texas on the 3rd from outflow boundaries left over from storms the previous day. Significant rainfall was spotty. They did pick up 1.94" just south southwest of Runaway Bay and 1.13" northwest of Bridgeport.

July 14 - 15:
An MCS began over Northeast Texas on the morning of the 14th and spread southwestward through the day across the state. The rainfall was spotty, but some areas got a welcome downpour. In North Texas the heaviest rainfall was north northwest of Waxahachie where 2.35" was recorded and east northeast of Goldthwaite where 1.95" fell. Further south 3.59" fell just south of Devine. An outflow boundary, the sea breeze front along with an easterly wave, brought some locally heavy rain on the 15th to the Gulf coast. While no rain fell in North Texas, 4.00" was measured north northeast of Victoria and 3.75" south of Cuero.

North Texas Regional Summary (continued)

July 22:
A couple areas of thunderstorms developed as a short-wave trough moved through North Texas. The heaviest rain was over the western parts of North Texas, and over the eastern portions. Seymour received 2.70" just to its north northwest, and Carthage picked up 2.32" to its northeast.

July 29:
A few showers and thunderstorms developed across North Texas from an outflow boundary out of Oklahoma. While those lucky enough to receive rain at all only saw light amounts, but 1.20" did fall northwest of Sanger.



Percent of normal precipitation map for August 2022: The dark green, blue, and purple colors indicate above normal precipitation; the beige, light yellow and light green colors indicate near normal, while the orange and dark red colors indicate below normal precipitation. In August the month started out very dry, but a weather pattern change occurred, and parts of Texas turned from drought to flash floods quickly. Much above normal rainfall was noted from the DFW metroplex eastward to Shreveport LA, and over parts of Deep South and Southwest Texas. Only the northern Texas panhandle had below normal rainfall.

At DFW Airport in August 2022 10.68” was recorded. The normal amount of rainfall for August is 2.18” so this is +8.50” above normal for the month.

DFW recorded its wettest August of record with 10.68”. The previous record was 10.33” in 1915.

In Waco for August 2022, 2.54” was measured. The normal amount of rain in August is 2.05” so this is +0.49” above normal for the month.

There were about five significant storm systems which affected our weather in August. Here are the highlights of the weather for the month.

August 9 – 10:
A front/outflow boundary moved out of Oklahoma into Texas, and this triggered scattered showers and thunderstorms. The heaviest rainfall on the 9th was 2.40" north of Cumby and 1.64" north northeast of Lindale. On the 10th more scattered showers and thunderstorms formed near outflow boundaries from the previous day. In North Texas the heaviest rainfall was in Frisco where 2.29" fell, while west northwest of Justin received 2.01". Further south 3.20" fell north of Orange.

North Texas Regional Summary (continued)

August 13 - 16:
A low-pressure system moved from the western Gulf of Mexico into South Texas, and it increased in strength as it moved inland. The rainfall rates increased as well. Late on the 13th into the early morning of the 14th 3.34" fell west southwest of Corpus Christi and 3.01" fell at the Corpus Christi Botanical Garden. During the day on the 14th the rainfall intensity increased and 6.68" fell west southwest of Corpus Christi and 6.06" fell in Hebbronville. On the 15th the low-pressure system moved over northern Mexico, but it still produced locally very heavy rainfall over South Texas. Near Cotulla 8.11" fell and 7.00" fell east of El Cenizo. On the 16th the low moved further west into Far West Texas and continued to produce rainfall. North of Pine Springs 3.14" fell and 2.65" fell southwest of Balmorhea.

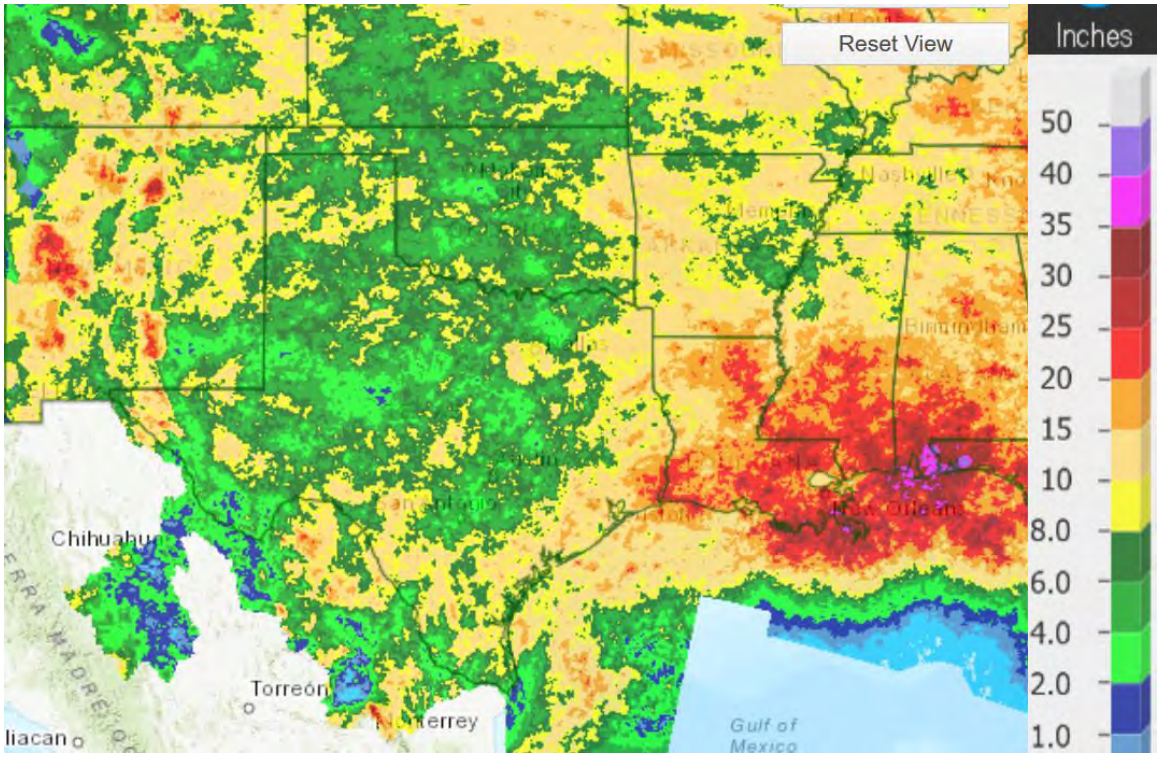
August 17 - 19:
A cold front moved into Texas from the north on the 17th. This front stalled over Central Texas on the 18th and 19th. On the afternoon and evening of the 17th showers and thunderstorms developed, with the heaviest rainfall occurring over the southern sections of the DFW metroplex. South of Midlothian 3.56” fell and 2.70" fell north of Cedar Hill. Some rain continued the 18th especially across Central and Southeast Texas. And while lingering rain of 2.37" occurred northeast of McKinney, west of Lufkin 4.38" fell and 4.14" fell north northeast of Friendswood near Houston. On the 19th more scattered showers and thunderstorms continued across the central third of the state. The heaviest rainfall was over the Hill Country with there being 4.93" south southwest of the Lake Buchanan Dam and 4.52" at Glen Flora.

August 20 - 24:
A short-wave trough moved out of the southwestern US. This trough, along with a stalled front, moved slowly across Texas over time. The result was the training of showers and thunderstorms across North Texas. Widespread rainfall began late on the 20th. In North Texas the rainfall was heaviest over the western parts of North Texas where the area west southwest of Burkburnett received 3.64" and the region east northeast of Odell got 1.66". Further west 4.58" fell northeast of Amherst and 4.54" south of Olton. On the 21st the rain was heaviest over the Dallas/Fort Worth metroplex where extremely heavy rainfall led to flash flooding. The heaviest rain from late on the 21st into the early morning of the 22nd was just south southeast of Mesquite where 10.88" fell and west northwest of downtown Dallas received 9.80". The DFW airport got 7.17", which included 3.01" of rain in 1 hour, which was an all-time hourly rainfall record. A daily maximum calendar day record rainfall of 3.53" was also set at DFW for the 21st. Very heavy rainfall that was widespread continued on the morning of the 22nd over North Texas. DFW had 9.19", the second heaviest 24-hour rainfall ever. DFW also set a record for the heaviest rain on August 22 as the airport measured 5.66". The previous record was 2.47" set back in 1916. Further east, 15.31" fell northeast of downtown Dallas on White Rock Creek. Of the 24-hour reports for the 22nd, 7.55" fell northeast of Cottonwood and 7.08" south southwest of Canton. Further southeast, 11.68" fell east southeast of Zavalla and 7.57" at Rosser. While the heaviest rainfall shifted to Louisiana on the 23rd, some lingering rainfall continued over southern and eastern Texas. While the area southeast of Midlothian got 1.37", a total of 4.43" fell north northeast of Carrizo Springs and 4.01" was observed north northwest of Cross in South Texas. The rain was lighter on the 24th, and the most widespread rain was confined primarily to South Texas. Columbus recorded 4.58" and northeast of Kountze had 4.37".

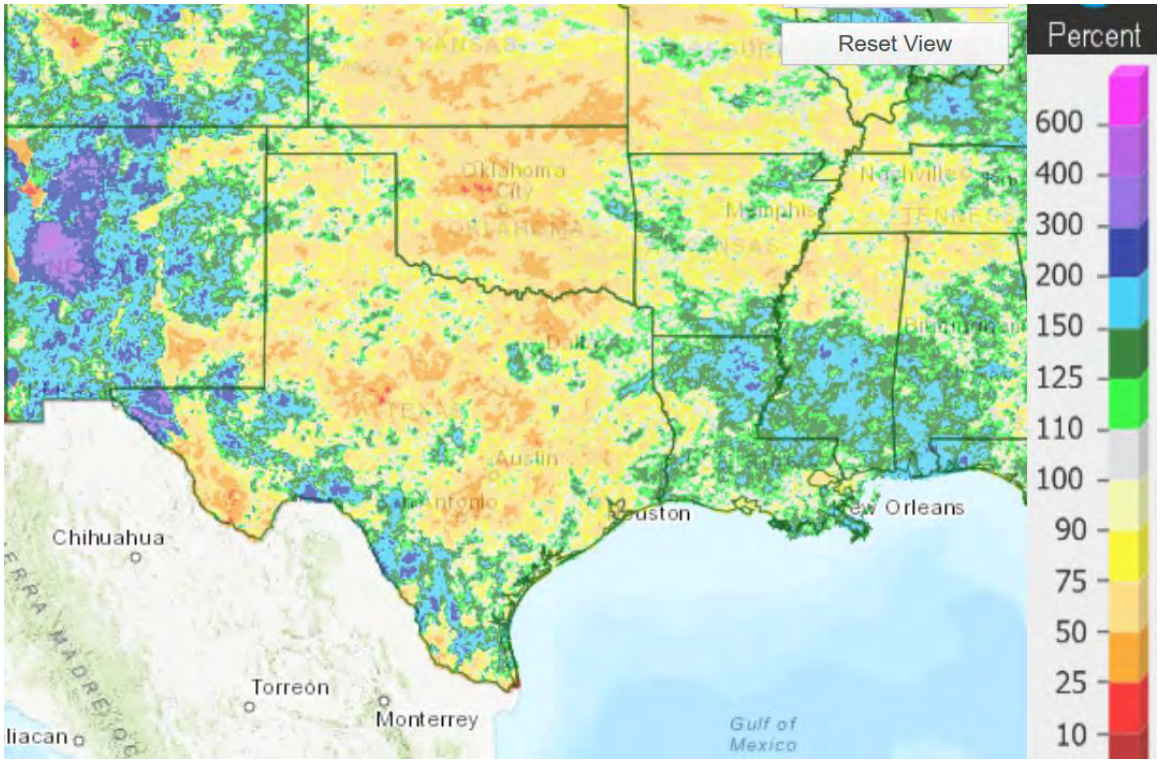
Total rainfall for the 21st through the 24th from official weather stations was heaviest at the NWS office in north Fort Worth with 12.73".

August 29 – 31:
An outflow boundary from thunderstorms in Oklahoma moved south into North Texas and generated additional showers and thunderstorms. Also, an easterly wave of low pressure moved westward from the Gulf across South Texas which produced widespread rainfall. These systems stalled out through the 31st. In North Texas the heaviest rainfall was along and near the Red River on the 29th. Gordonville had 3.92" north northwest town. The western part of North Texas received 3.10" west southwest of Mullin. In South Texas Del Rio measured 5.50". Widespread rains continued the 30th, with the maximum amounts being over South Texas. There were isolated heavy rainfall amounts in North Texas, however. 5.76" was recorded southwest of Freestone, 4.60" northeast of Easterly, 4.14" south of Harker Heights, and 3.96" northwest of Belton. But further south Barksdale received 7.64" at Barksdale. Rain continued over primarily southern and western Texas on the 31st. The western parts of North Texas had up 2.73" north of Cisco and 2.60" east southeast of San Saba. But in West Texas 4.25" fell east of Kent and 4.19" southwest of Throckmorton.

North Texas Regional Summary (continued)



Summer season precipitation for 2022. The brown, orange and bright red colors indicate the largest precipitation totals, while the light green and blue colors show the lightest amounts.

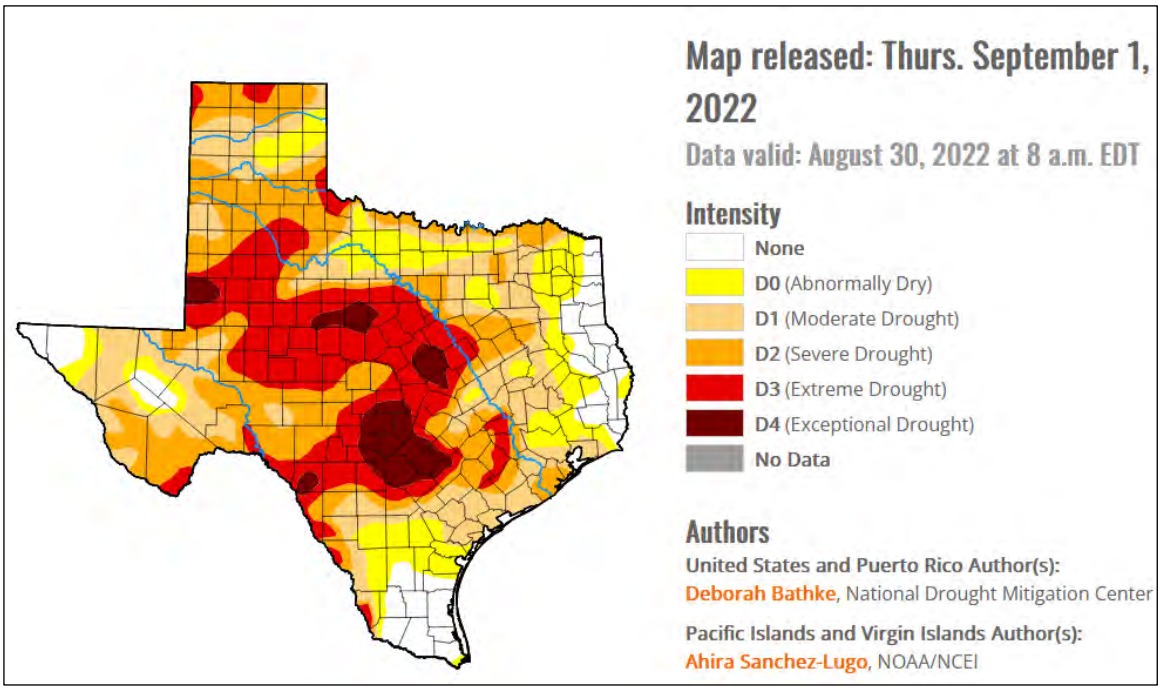


Percent of Normal Precipitation for summer 2022: The purple, blue and dark green colors indicate above normal precipitation. The brown, orange and red colors indicate below normal amounts. As you can see, it was a drier than normal summer over a good part of Texas. There was some prolonged dryness over the Texas Hill Country and parts of Central and West Texas. Also of note was the isolated spots over North Central and Northeast Texas, and over South Texas from Del Rio to Corpus Christi that received above normal amounts.

North Texas Regional Summary (continued)

For the summer season, DFW airport received 13.32” of rain. The normal amount of rain during summer is 7.96”, this is +5.36” for the season. But even with the wet August, DFW airport is still below normal for 2022 by about 1.50”.

For the summer season, Waco observed 3.41” of rain. The normal amount of rain during summer is 7.22”, this is 3.81” below normal for the season. And Waco is running a rainfall deficit of over 12” for 2022 so far.



Current Drought Monitor for Texas as of September 1: The dry weather of this past summer and previous months shows up well on this drought monitor. Except for the far eastern counties, a few sections over the far west, and Deep South Texas, everyone is experiencing abnormally dry conditions or worse. Exceptional drought is occurring west of Waco, over the Hill Country, and over a few locations in western Texas. Improving drought conditions were noted over North Texas.

Thanks again for your dedication in making all your weather observations! Now that much of the North Texas region is receiving rainfall again, those reports allow meteorologists and hydrologists to “zero in” on the locations of maximum rainfall and potential sites for flooding. And we appreciate it if you report zero rainfall on the dry days, like we had most of this summer. Why? Because if you go a month without measurable rainfall as many did, that tells us a lot, too! And don’t forget that on days you are not home or unable to report your 24-hour rainfall observation for any reason, you can make a multi-day accumulation report upon your return. This is important information as well. And that includes zero rainfall.

I want to give a special shout out to those who are new to CoCoRaHS. Welcome! You may wonder if anyone looks at your weather reports day in and day out. Rest assured; someone is! This data is carefully examined and incorporated by the National Weather Service at the West Gulf River Forecast Center each day.

Everyone, please consider inviting your neighbors, relatives, and friends to join CoCoRaHS! The more rainfall observers we have, the better our chances are of determining the highest rainfall totals during rainfall events, and the location of drought when it isn’t. If we can help you with your observations or reporting in any way, please let us know! Either I or your county coordinator are here to help you.

Have a great autumn season and enjoy the cooler fall temperatures!

Greg Story

Austin/San Antonio Regional Summary

Heat, Drought Dominate, then Begin to Subside

By Keith White – WFO Austin/San Antonio

Back in May, long-lead climate outlooks for Meteorological Summer (June 1 through August 31) were clear: South-Central Texans could expect a likelihood of a warmer than normal summer. Odds leaned in the direction of drier than usual conditions as well, although the signal was murkier. It soon became apparent that this was going to be an extreme summer, as monthly temperature records in Austin and San Antonio fell not just in May, but also in June, and then in July! July finished as the 2nd warmest of ANY month ever at both locations (behind August 2011). With over 125 years of data collection, this was the first occurrence of back-to-back-to-back monthly high temperature records in Austin and second in San Antonio. From April through June 1892, they accomplished the feat, beating out the 7 years of available data.

While there were occasional summer storms prior to mid-August, most of the region received less than half their normal rainfall through the first 5/6th of summer, which exacerbated existing drought and contributed to the extreme heat. A pattern shift in mid-August finally brought some wetter, cooler weather to the region. While August still finished warmer than average for most locations, it was cool enough in many areas to allow 2022 to end in 2nd place all time, a touch cooler than 2011. San Antonio, however, missed out on many of the rain events and as a result did see their warmest summer on record. Below is a rundown of weather events from this summer.

We did see some rain in the area right away on June 1st, with some sea breeze showers in the Coastal Plains and an isolated storm in eastern Val Verde County. Isolated to scattered activity developed across mainly areas north of I-10 on the 2nd. More appreciable rainfall amounts came late on the 3rd into the 4th as storms moved across the southern Edwards Plateau, Hill Country and into the I-35 corridor. Radar and rainfall observations showed the heaviest totals fell across Llano and Burnet counties where some isolated 1.5-3” amounts were observed by CoCoRaHS volunteers. A dry and hot pattern then took over from the first full week of June through the last full week of the month, with multiple high temperature records tied or broken. Between June 5th and the 26th, almost no rain fell anywhere in the region.

A brief pattern change did occur late in the month as a cold front moved in on the 27th and 28th. Some widespread rainfall did occur across South Central Texas. However, most of the area saw amounts of 1” or less. There were a few exceptions, including most of northern Burnet county and near Kyle, where some 2-4” amounts were reported. The big winner for single day rainfall for the month was an observer northwest of Burnet who measured 3.71” on the morning of the 28th. While Bexar County missed out on the 27th, they did pick up widespread 0.5-1.5” rains on the 28th with locations on the west and northeast sides of San Antonio seeing 2-3.5”.

The number of days the high temperature reached or exceeded 100 degrees wound up establishing a new record for the month of June at San Antonio, Austin Camp Mabry, and Del Rio. The heat would only worsen in July, and very dry conditions dominated in most areas. Isolated light showers developed on July 1st in the Hill Country/southern Edwards Plateau, with some heavier, more widespread storms for locations west of Hondo to Kerrville on the 2nd as deep moisture and a weak upper-level low pressure system moved into the region. Some of the higher measured totals fell over southern Edwards and Real into central and northern Kinney where several 3” amounts were reported. One observer in northeastern Uvalde County measured 3.74”! Radar data also estimated some totals in the 4-5” range over rural areas in southern Maverick county along Farm to Market Road 1051 and over south-central Dimmit county. Most of the rain fell over areas hardest hit with drought conditions, but relief was only temporary. The weather pattern quickly turned back to a hot and dry regime after July 4th, and several days of record-breaking heat and high heat index values would follow.

Weak outflow boundaries brought isolated afternoon and evening storms to the area from July 9th through 13th. A few small areas of 1-2” rains fell across mainly the Edwards Plateau and the Hill Country most days. Some higher rainfall amounts spread southward into the Winter Garden region on the 14th into the 15th where some radar estimated amounts of 2-4” fell from southwestern Dimmit into northeastern Frio county. While these rains provided localized drought relief, the overall drought trends continued to worsen for the area. Although a few flood advisories were issued in the first half of the month, all were in rural areas, and no actual flooding reports were received.

Austin/San Antonio Regional Summary (continued)

The remainder of the month turned hot and dry again with only a few isolated pockets of rain in areas mainly east of Interstate-35. Daily maximum temperatures continued to flirt with or break daily records.
In July, parts of the area needed an Excessive Heat Warning on 5 separate days, and at least a Heat Advisory was needed on a total of 11 days. Three out of our four climate sites reach 100 degrees at least 29 out of the 31 days of July, and in addition to numerous daily high temperature records, all-time single-day heat records for the month of July were tied at both Austin Camp Mabry and in San Antonio.

Above-normal temperatures and relative dryness continued into August. By the 5th, upper-level ridging weakened enough to allow for isolated afternoon showers and storms each afternoon through the middle of the month. This was mainly sea-breeze activity relegated to the Coastal Plains until the 10th, then a couple days of more widespread, but generally light to moderate showers and storms to most areas. Much of Travis and Williamson Counties were left high and dry, though. The heat and dryness exacerbated ongoing drought conditions significantly. The Drought Monitor valid August 16th depicted almost half the area in exceptional drought conditions (D4) and nearly 95 percent of the area in extreme (D3) or worse drought conditions (Figure 1, right). This is the worst the drought had been here since late 2011.

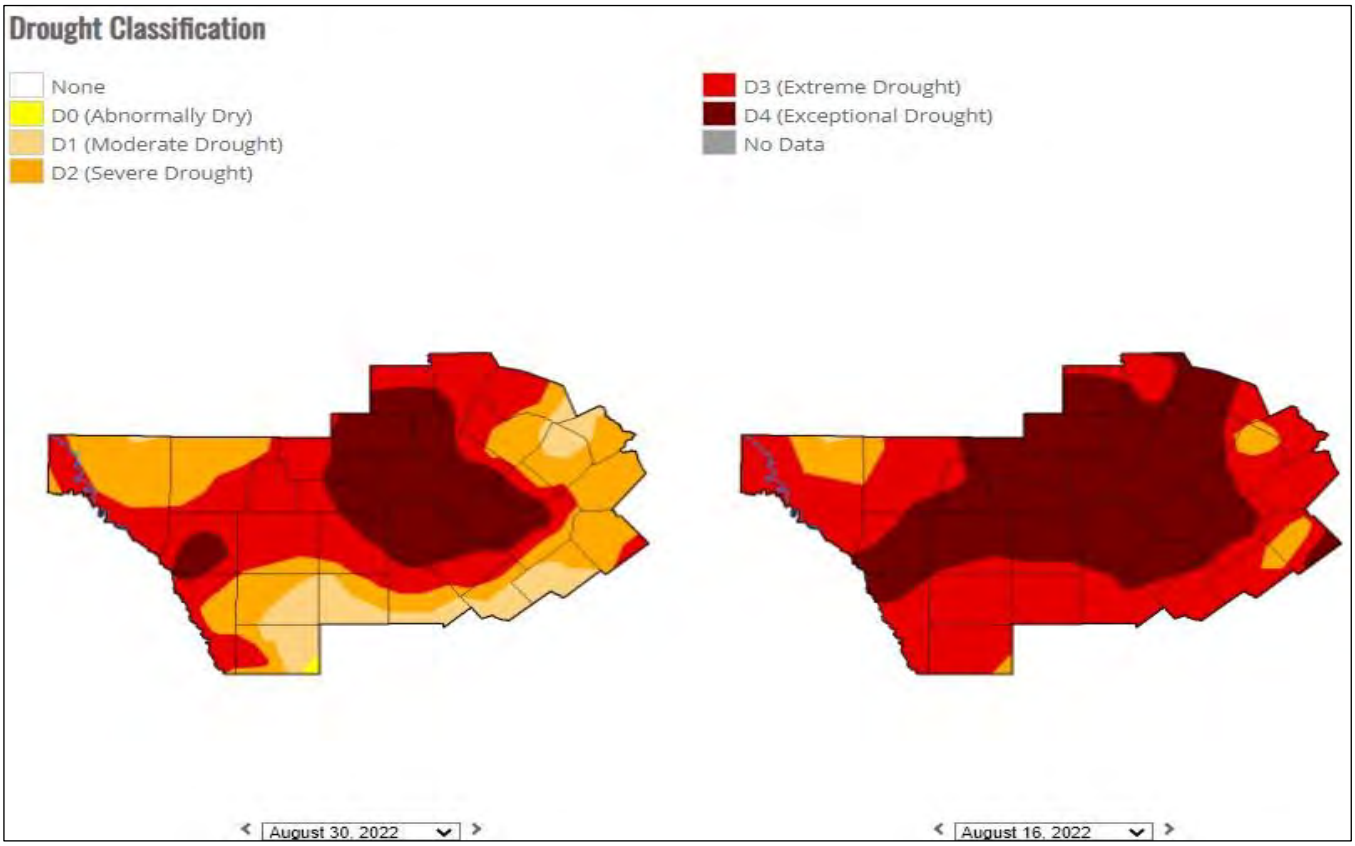


Figure 1: Comparison of the United States Drought Monitor valid August 30th (left) and August 16th (right).

The first half of August is typically the warmest part of the year based on 30-year normals, and although it wasn't the hottest two weeks stretch of *this* year it was still anomalously warm and dry for the most part. That all changed on the 14th, as a tropical system moved into south Texas. While it never formed a defined center of circulation offshore to gain the title of Tropical Depression, this was a potent rainmaker for south TX. Its cloud shield also finally brought some relief from the heat, with the coolest high temperature since May in San Antonio. This system turned northwestward, producing much needed heavy rain over southwestern portions of our area on the 15th as it tracked northwestward, with its center of circulation just west of the river. Heavy rains overnight into the 16th just west of Val Verde County prompted the first River Flood Warning of the year for our area on the Rio Grande at Foster Ranch. But given the lack of development near the river in this area and the large amount of vacant storage capacity downstream in Lake Amistad there were little to no impacts from this flood.

Austin/San Antonio Texas Regional Summary (continued)

The wet weather wasn't done yet. On the 18th, a weak cold front dropped into the Hill Country and Austin Metro and areas of showers and thunderstorms brought decent rains to locations that missed out over the prior several weeks. In fact, Austin Camp Mabry recorded measurable rain (0.66") for the first time in 51 days, ending the 8th longest streak on record at the site. Additional moderate to heavy rain fell the next day over many of the same areas. But the best was yet to come.

On August 22nd, yet another cold front approached from the north, this time with better support for widespread thunderstorm development at upper levels of the atmosphere. Although there were a few holes with lower totals, the vast majority of south-central TX received at least 0.5" of rain, while many areas received more than 1.5" and a few locations in the Coastal Plains as well as in Austin received 3-5" per CoCoRaHS reports that came in the next morning. Flash flooding occurred in Austin, and Shoal Creek recorded its 4th highest crest on record because of these rains. With the frontal boundary lingering in the area and gradually fizzling out, scattered storms with isolated locally heavy rains would then continue for the next several days, decreasing in coverage each day through the 27th. That evening, however, one lone stationary thunderstorm sat over Cedar Park and the Brushy Creek basin and dropped up to 5.5" of rain.

Another couple of rounds of showers and thunderstorms would end the summer on August 30th and 31st and brought widespread 1.5-4+" totals to portions of the Hill Country and Rio Grande Plains, with isolated amounts approaching 10"! Flash flooding occurred in some locations including near Eagle Pass and Camp Wood, and in western Bandera and rural Val Verde counties. In all, the 10-day period from the 22nd through the 31st was the wettest of the summer by far (Figure 2 below).

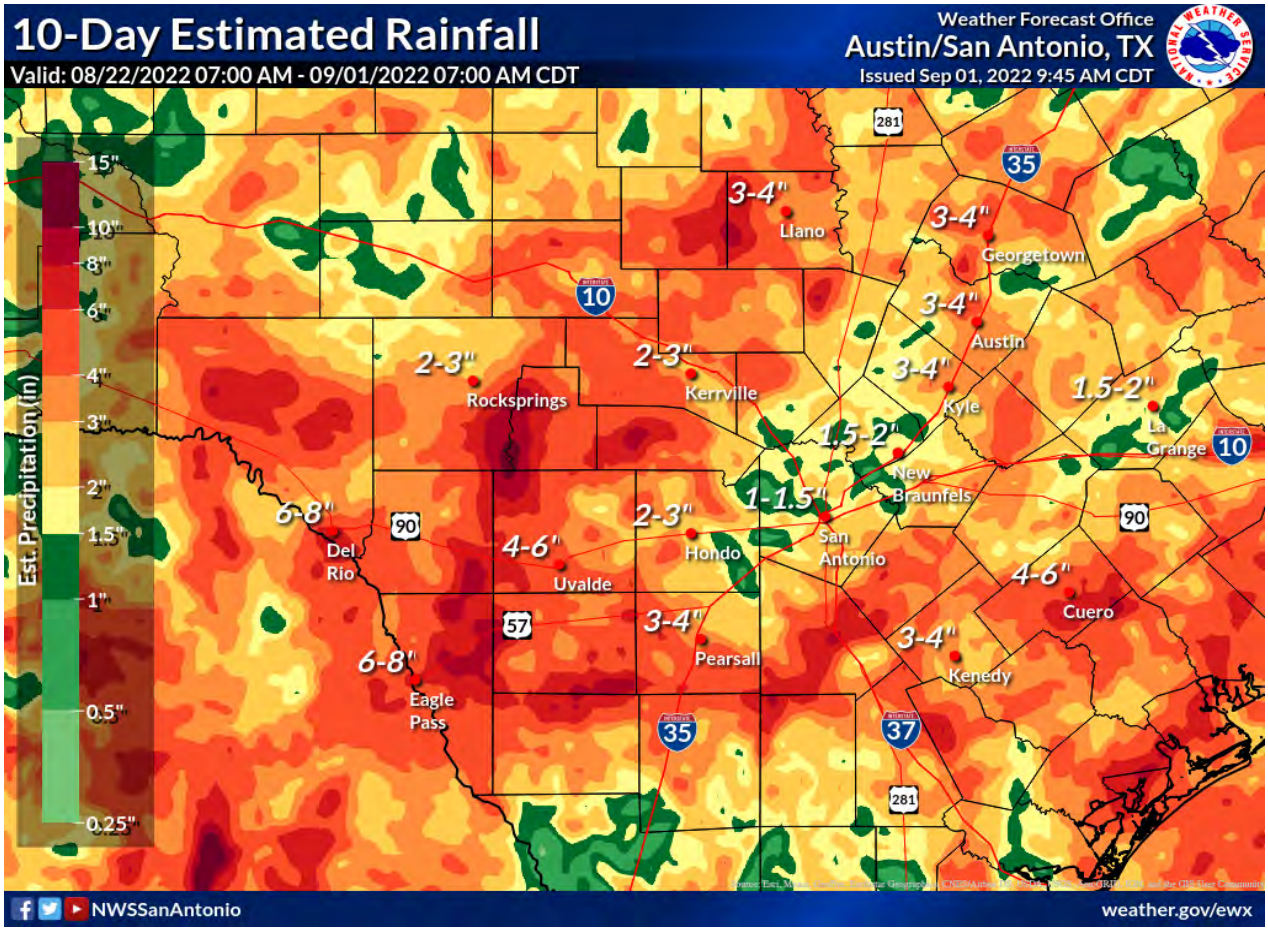


Figure 2: Estimated 10-day rainfall totals from 7am on 8/22/2022 to 7am on 9/1/2022.

After going over 1.5 months without rainfall, Del Rio saw 7.57" of rain from the 15th-31st and ended with its 4th wettest August on record. Meanwhile, San Antonio International has received less rain than that (7.22") all year through Aug 31st and is currently experiencing its 3rd driest year-to-date on record. Drought improvements occurred for portions of South-Central TX (Figure 1, left) and more are expected as the data cutoff for the monitor was 7am on the 30th, and more rain was in the forecast for the start of September!

West Texas Regional Summary

Not Much Thunderstorm Activity Resulted in Below Normal Rainfall

By: James DeBerry, Meteorologist/Hydrology Program Manager, NWS Midland

West Texas and Southeast New Mexico had a typical summer, characterized by little convective activity and below-normal rainfall.

June

Rainfall picked up in June, despite the continued presence of La Nina. Several hydrologic events were noted.

On June 2nd, thunderstorms developed over the Big Bend. Rises on the Rio Grande and Alamito Creek briefly brought the river into minor flood stage at Presidio 5SE (PRDT2).

Early in the morning of the 3rd, thunderstorms rolled through Colorado City in Mitchell County, resulting in street flooding and stranded vehicles.

On June 8th, thunderstorms developed in the Davis Mountains. One cell dumped up to 3.5" south of Balmorhea Lake. A motorist was swept 1000' downstream when she drove through a low water crossing. Fortunately, she was rescued and survived.

A few convective events occurred the rest of the month, but the heaviest rainfall was in mostly rural areas, and no flooding was reported.

Monthly radar rainfall estimates ranged from no rainfall in extreme southeast Terrell County to up to 8" in parts of Southeast New Mexico. Highest observed rainfall was 4.99" at Fort Davis in Jeff Davis County. Average rainfall was 1.68".

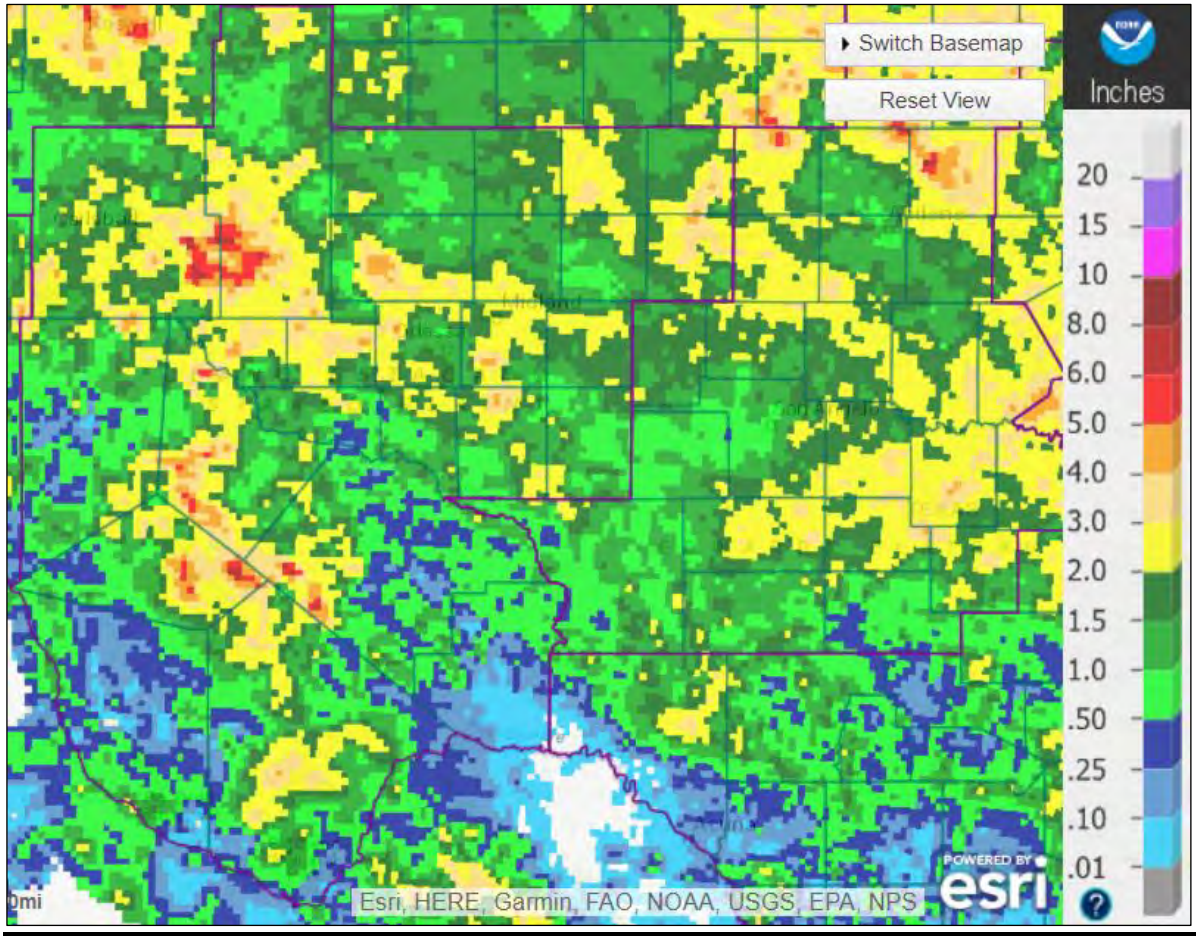


Figure 1: June precipitation across West Texas.

West Texas Regional Summary (continued)

July

Upper-level ridging dominated the weather most of July, yielding less rainfall than June. No notable hydrologic events were reported.

Monthly radar rainfall estimates ranged from nothing near Lajitas in Presidio County to up to 8" in the Davis Mountains. Highest observed rainfall was 5.44" at Mount Locke in Jeff Davis County. Average rainfall was 0.76".

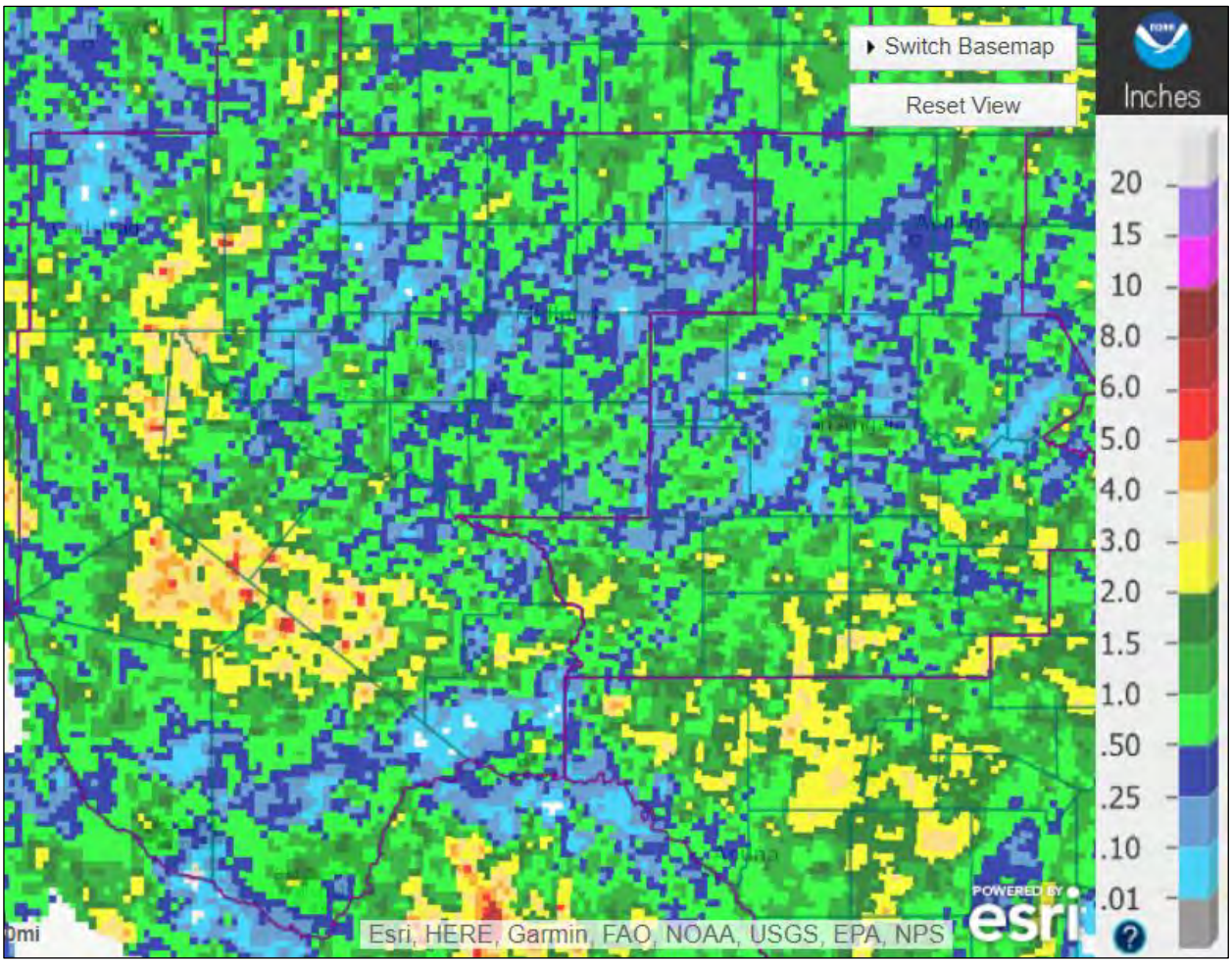


Figure 2: July precipitation across West Texas.

August

In mid-August, remnants of a tropical system moved up the Rio Grande, bringing abundant tropical rainfall to West Texas and Southeast New Mexico, mainly along and west of the Pecos. Intense convection along the Rio Grande, as well as its tributaries, resulted in notable rises from Candelaria downstream through Dryden. The Rio Grande briefly rose into minor flood stage just below Presidio on August 17th. Monsoonal rains continued on the 18th and 19th, especially in Mexico in the Rio Conchos watershed. This sent additional elevated flows into the Rio Grande at Presidio, bringing the Rio Grande there to moderate flood in some locations. Flooding along the Rio Grande continued off and on throughout the rest of the month.

West Texas Regional Summary (continued)

The aforementioned tropical system drifted into the desert southwest and then curved back and moved east through New Mexico and the South Plains of Texas on August 20th. Thunderstorms first developed in Dark Canyon in Eddy County, and washed a vehicle away from a low water crossing there. Fortunately, the occupants were safely rescued, and Dark Canyon Road was closed. Various roadways and low water crossings were closed near Lakewood, Seven Rivers, Loving, and Malaga. At Carlsbad Caverns National Park, a thunderstorm developed over the upper end of Walnut Canyon, dumping a radar-estimated 3.5" of rain in 1-2 hours. This flash-flooded the canyon, stranding some 160 visitors to the park well into the night. Farther east that evening, thunderstorms flash-flooded Midland in Midland Country with over 2.5" of rain in some locations, flooding numerous roadways and necessitating multiple water rescues.

On the 28th, thunderstorms developed over the Permian Basin, flooding Odessa in Ector County over a foot deep in some places, and stranding numerous vehicles.

On August 31st, thunderstorms developed over the Western Low Rolling Plains, necessitating road closures near Dunn, Ira, and China Grove. Later that afternoon, thunderstorms resulting in flash flooding near Toyahvale in Jeff Davis County, and several roads were closed there, as well. Thunderstorms also inundated roads in and around Carlsbad in Eddy County.

Overall, August was a good month, hydrologically. Whereas the Pecos River had been bone-dry in places at the beginning of the month, abundant rainfall replenished it, as well as the Rio Grande and Colorado River. Drought conditions improved most places.

Monthly radar precipitation estimates ranged from as little as ¼"in western Brewster County to up to 15" in Guadalupe Mountains National Park in northern Jeff Davis. However, highest observed rainfall was 10.19" southeast of Kent in Jeff Davis County. Average rainfall was an impressive 3.75".

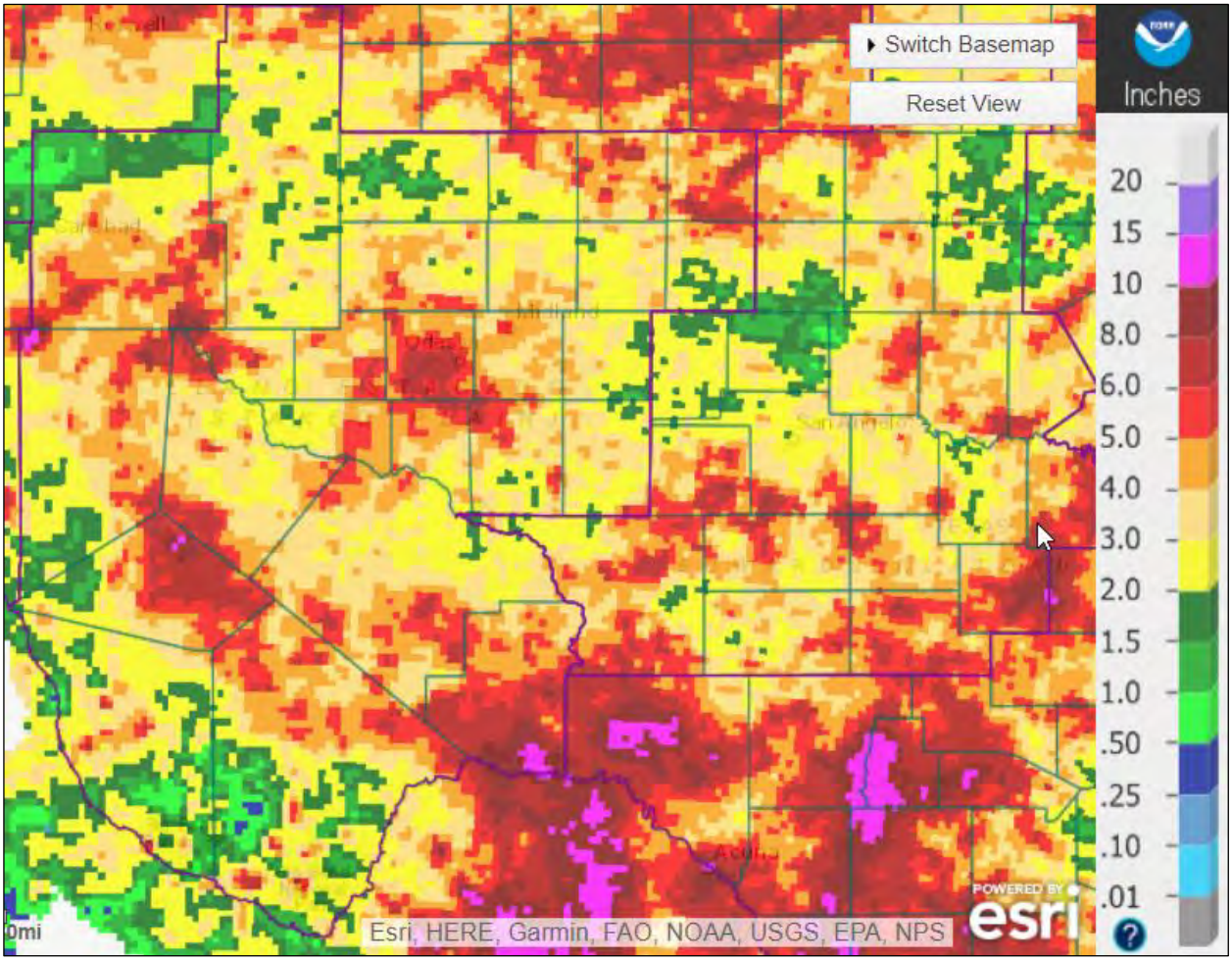


Figure 3: August precipitation across West Texas.

West Texas Regional Summary (continued)

Overall, summer 2022 began dry, but ended wet for West Texas and Southeast New Mexico.

Due to abundant summer rainfall, as of August 30th, in Southeast New Mexico, only Gaines County was in exceptional drought. Most of West Texas and Southeast New Mexico had improved to severe drought or better.

Area reservoirs are at 50.8% of conservation capacity as of September 1st.

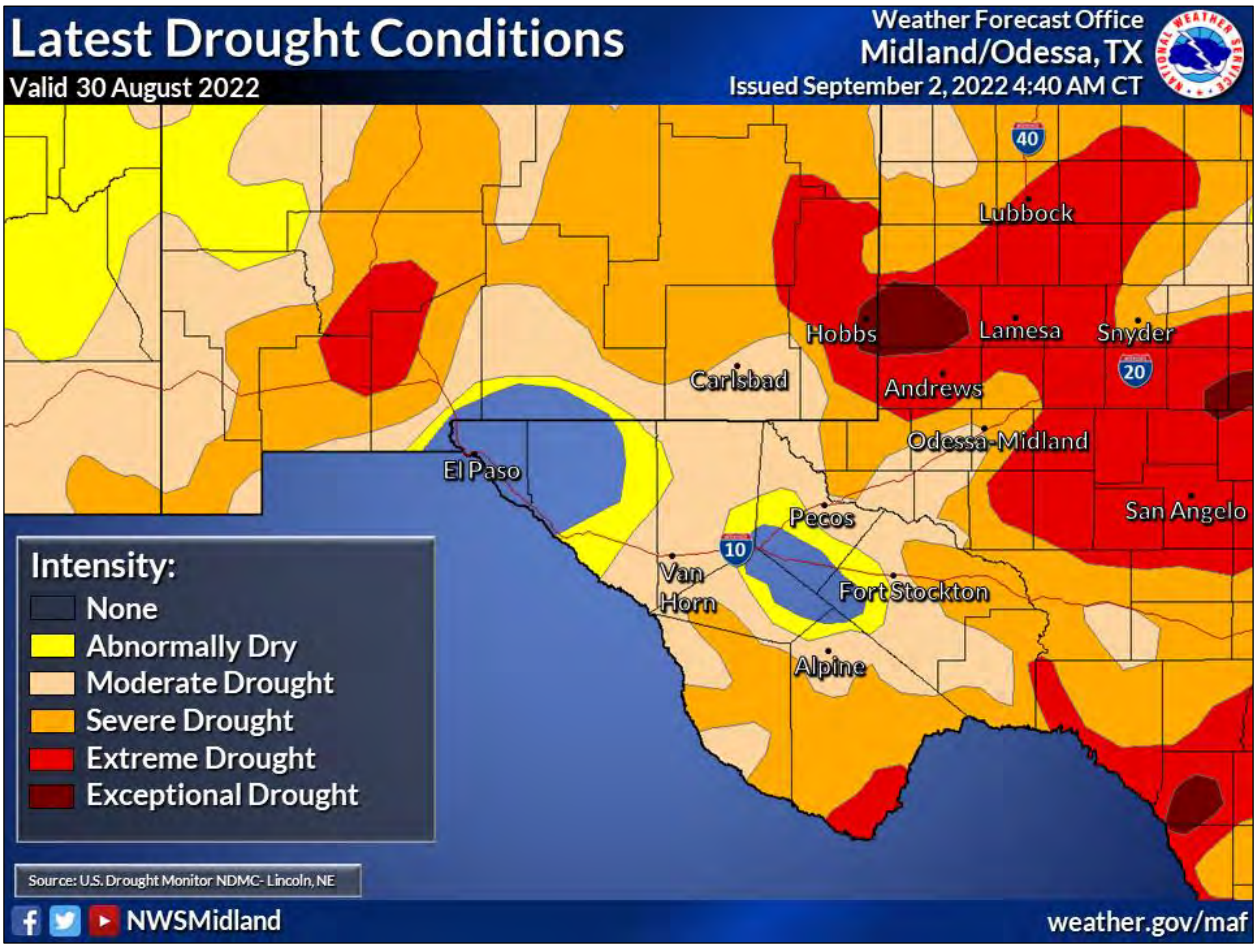


Figure 4: Drought Conditions across West Texas as of August 30th 2022.

Amarillo Panhandle Regional Summary

Summer Brings Welcomed Drought Relief across the OK/TX Panhandles

By: Trenton Hoffeditz, Meteorologist at NWS Amarillo

A large part of the combined Oklahoma and Texas Panhandles have seen month after month of below normal precipitation since October of 2021. In fact, the last time the entire combined Panhandles were free of drought conditions, as classified by the US Drought Monitor, was July into August of 2021. By March, the entire combined Panhandles were classified in either extreme drought (D3) or exceptional drought (D4). There were some improvements in the eastern Panhandles through the latter part of March into the first half of April. However, the latter part of April into early May continued to see an unusually dry period, and the entire combined Panhandles dropped back into at least extreme drought (D3) during the first half of May. This led to a prolonged wildfire season not just for the combined Panhandles, but also for much of the Southern Plains. Wildfires normally become less of a concern by mid-April, but the dry conditions remained favorable for wildfires well into June. Farmers and ranchers were impacted by this long period of drought as well, with many crops being planted late or extremely stressed without irrigation. Supplemental feeding for livestock has continued to add additional cost to ranchers as grasslands were left barren.

May through August is considered the wet period during the year for the combined Panhandles. It was a slow start to recovery as May was unusually dry, as well as the first half of June. Beneficial rainfall events were very spotty during the last half of June. It wasn't until July where beneficial rainfall events were more widespread across the combined Panhandles. July was a good month thanks to some monsoonal moisture making into the northern and western portions of the combined Panhandles. The southeastern Texas Panhandle missed out on some of the July rains, but were able to make up for it during the month of August thanks to some upper level pattern changes in the atmosphere. By the end of August the vast majority of the combined Panhandles managed to improve in drought status with areas being reduced to severe drought (D2) conditions or even lower. Much of the central to southern Texas Panhandles managed to improve to the moderate drought (D1) or abnormally dry (D0) category. Unfortunately, there are some isolated areas across the Panhandles that remain in extreme drought (D3). There is an isolated area in central Texas County, Oklahoma that has slipped back into exceptional drought (D4), having missed some of the more beneficial rains.

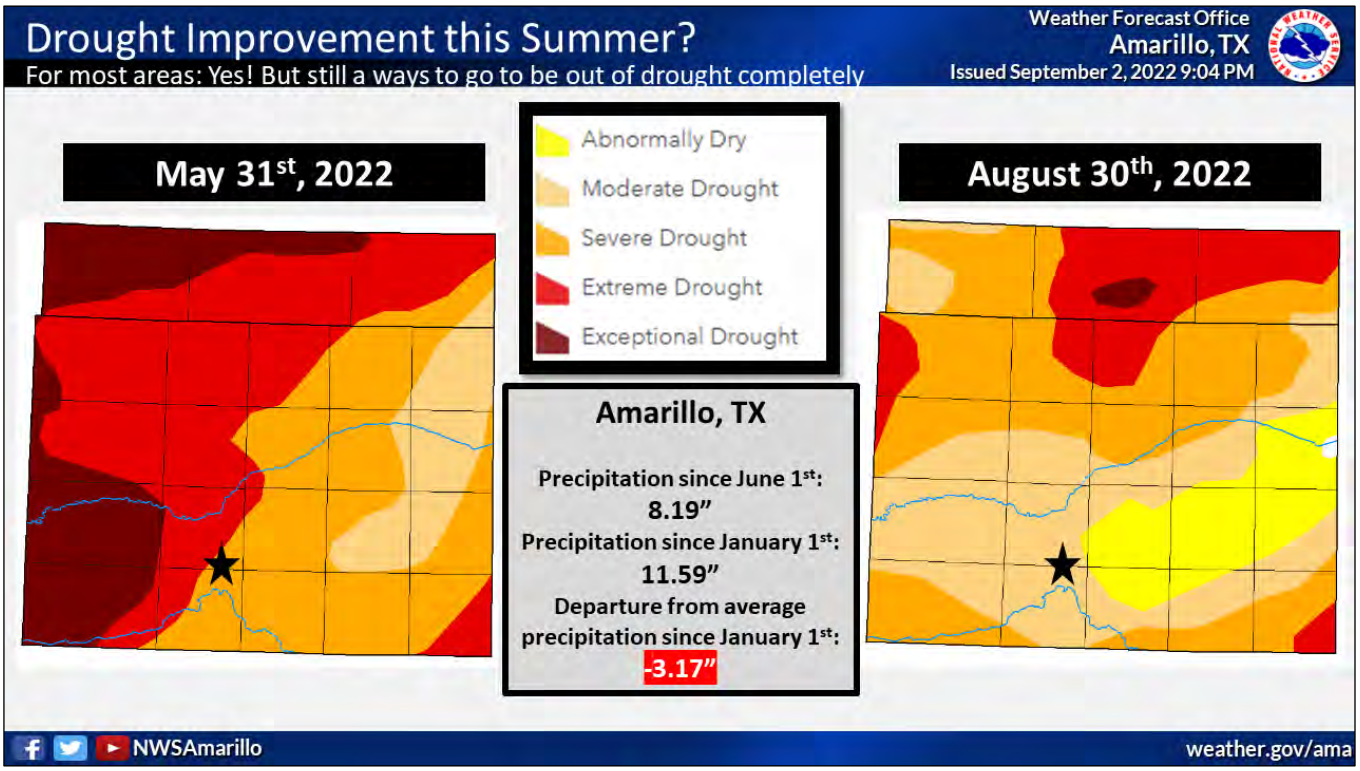


Figure 1: Summer Drought Improvements.

Amarillo Panhandle Regional Summary (continued)

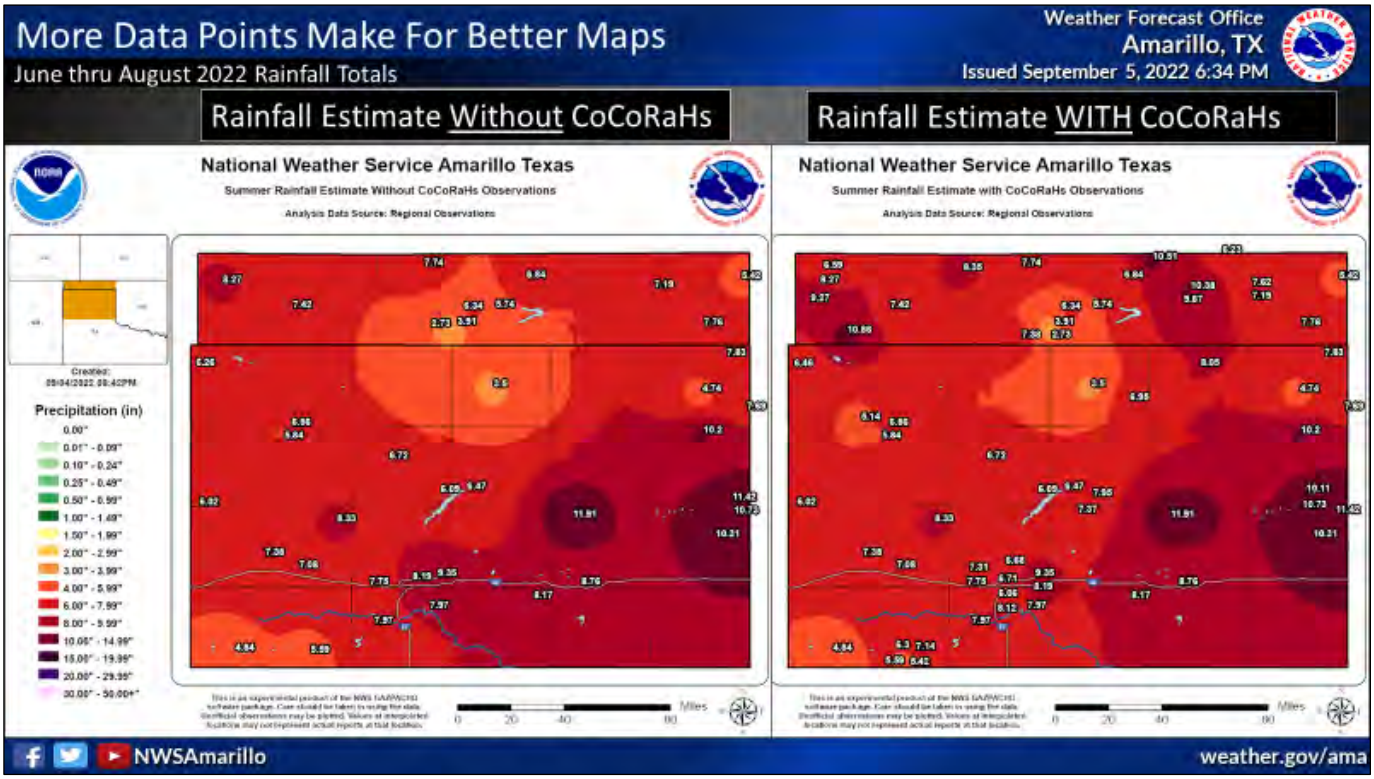


Figure 2: With and Without CoCoRaHS Observations.

Thanks to CoCoRaHS observers across the Oklahoma and Texas Panhandles, we can see the majority of the precipitation received year-to-date was received over the course of June through August, with totals ranging from 6” to 10” through this period. With radar estimates unreliable especially at distances from the radar, it is important to get ground truth measurements from sources such as CoCoRaHS observers. Even ground stations such as the Oklahoma Mesonet and the West Texas Mesonet are limited in numbers. CoCoRaHS observers add much needed data to fill in the gaps. This added data is especially important for making assessments in order to draft the US Drought Monitor and it has led to the ability to track the changes in drought over the past year.

Wichita Falls Regional Summary

Hot Dry Summer Bookended by Heavy Rain

By: Charles Kuster, CIWRO/NSSL

Generally, our summer was hot and dry this year with temperatures generally 3–4 degrees F above normal (Fig. 1a). The summer started off with a rainy week where several CoCoRaHS stations saw over 2" of rain (Fig. 2a). This early-season rain led to slight improvements in the drought conditions across our area (Fig. 3a–b). We then experienced long dry periods interrupted by a few light to moderate rain events especially from mid-June through mid-August. This dryness ultimately led to worsening drought across the area (Fig. 3b–c).

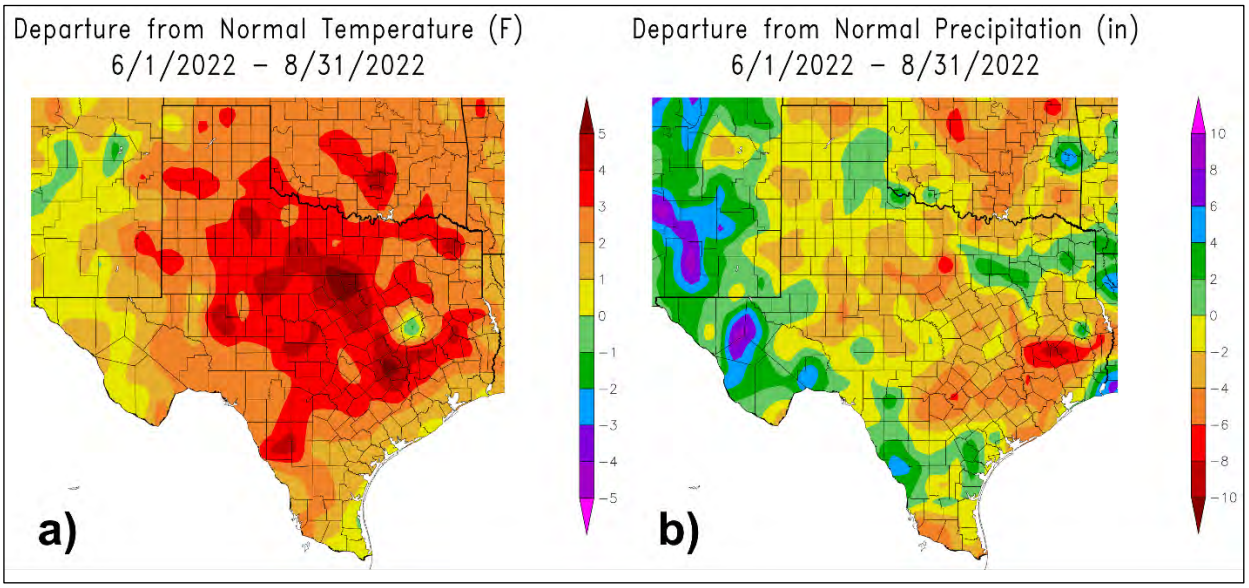


Figure 1. Departure from normal a) temperature and b) precipitation for the beginning of June through the end of August. Warm colors indicate below normal precipitation (b) and above normal temperatures (a), while cool colors indicate above normal precipitation (b) and below normal temperatures (a).

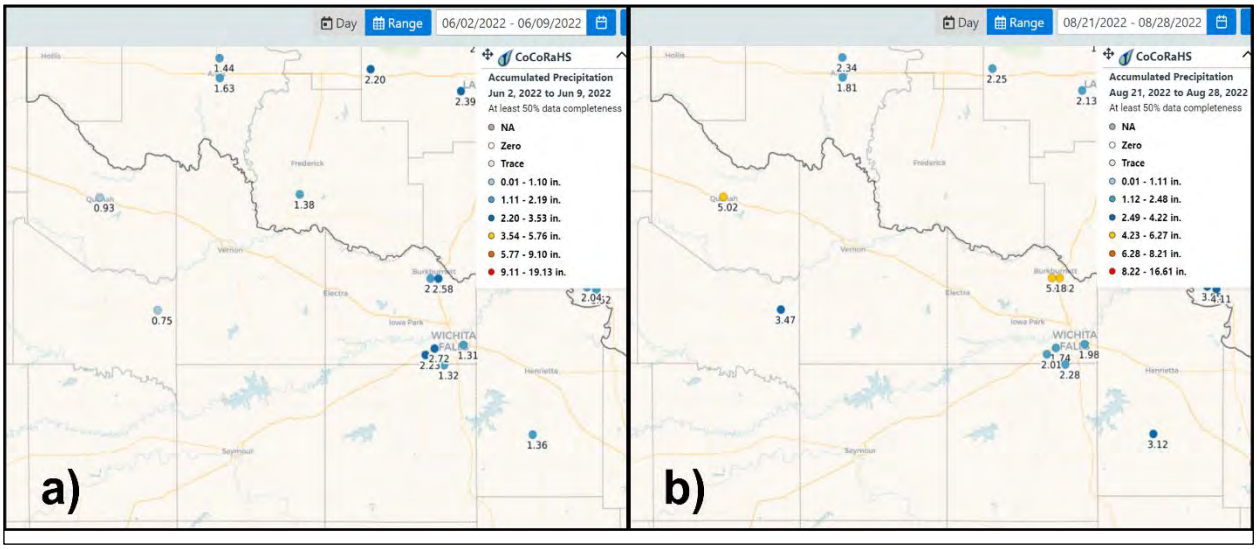


Figure 2. CoCoRaHS rainfall totals for a) June 2–9, 2022 and b) August 21–28, 2022.

Wichita Falls Regional Summary (continued)

Between August 21 and 23, another round of heavy rain occurred. Most CoCoRaHS stations observed over 2" of rain with some even seeing more than 5" of rain (Fig. 2b). This event was the same one that brought widespread flash flooding to the Dallas-Fort Worth area. This heavy rain led to improving drought conditions across our area and much of the state (Fig. 3c–d). Despite the two heavy rain events, our area still experienced slightly below normal precipitation for the season (Fig. 1b). In total, there were 70 dry days (all CoCoRaHS stations reported less than 0.05") and 22 wet days (at least one CoCoRaHS station reported 0.05" or more). For comparison, the region experienced 60 dry days and 32 wet days last summer.

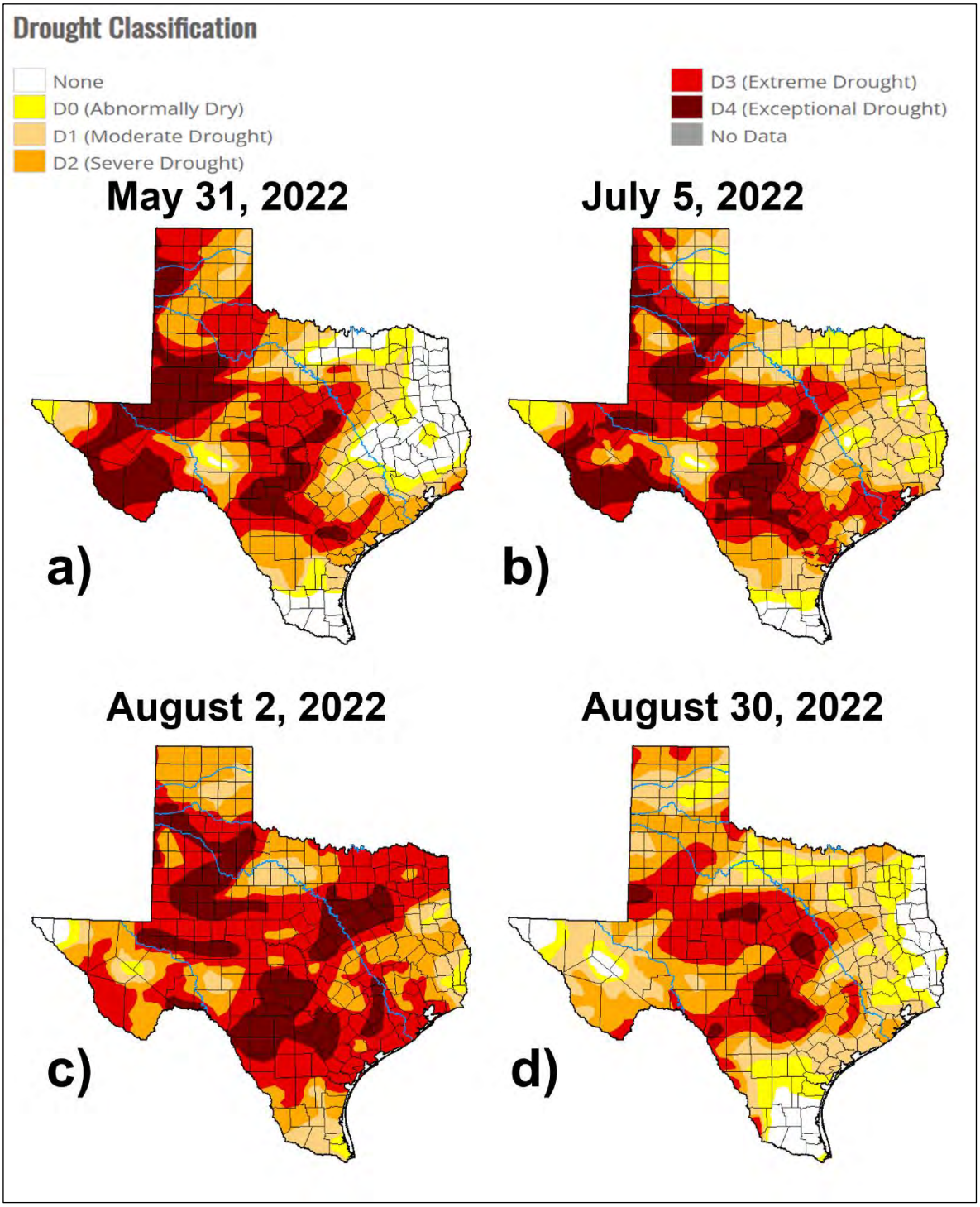
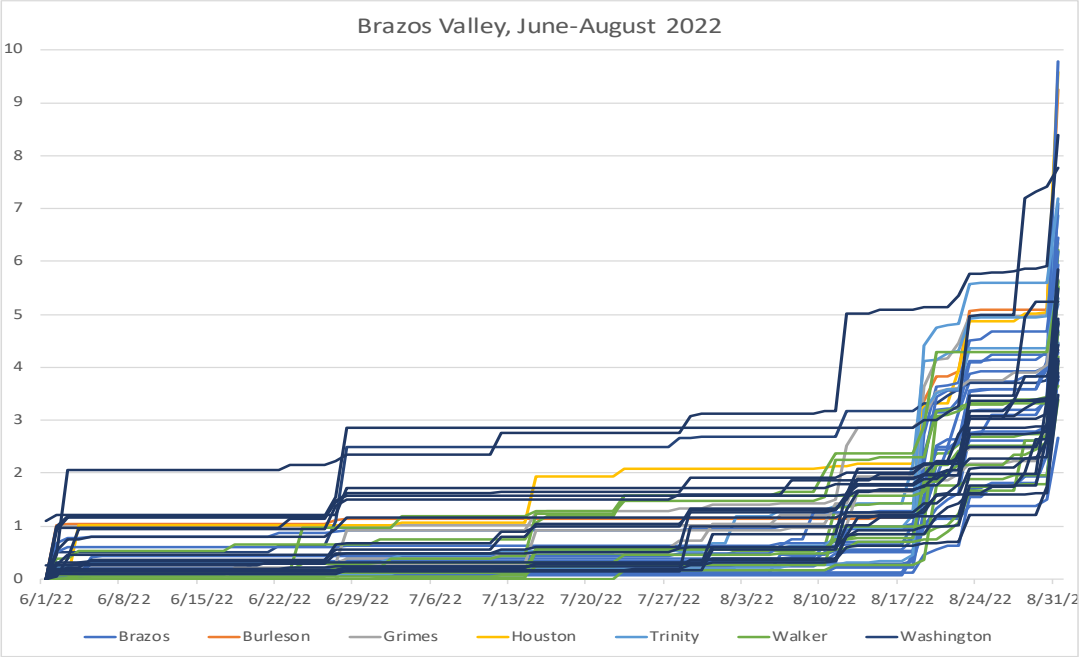


Figure 3. Changes in drought conditions over the summer according to the U.S. Drought Monitor for Texas on a) May 31, 2022, b) July 5, 2022, c) August 2, 2022, and d) August 30, 2022. Data is available at https://droughtmonitor.unl.edu/

Brazos Valley Regional Summary

Summer 2022 Precipitation Summary
Bryan-College Station/Brazos Valley Region, Texas
John Nielsen-Gammon, Texas A&M University, Office of the State Climatologist of Texas



Summary:

This summer featured a rapidly-developing drought. Precipitation was substantially below normal from early May to mid-August, with most stations receiving less than three inches over that time period. Occasional isolated showers helped out locally, but region-wide improvement had to wait for the last two weeks of August, when most stations received more rain than they had during the previous two and a half months. Much of the Brazos Valley had its hottest summer on record overall, despite cooler weather accompanying the late-season rain. At College Station, daily maximum temperatures averaged 100.2°F, just behind 2011's 100.7F, but daily minimum temperatures averaged 77.3°F, ahead of 2011's 76.7°F.

Observer Statistics:

Overall, there were 53 observers who reported during most or all of the spring. Of these, 37 observers missed no more than ten days, with 14 having perfect records. Great job! Overall, we were able to utilize data from 51 stations to compute seasonal totals.

Season Statistics:

Brazos County swept the awards this summer!
Wettest Day: 5.80", August 31, Brazos County
Wettest Seasonal Total: 9.78", Brazos County
Driest Seasonal Total: 2.78", Brazos County
Soggy Socks Award (longest spell with measurable rain): 8 days, August 18-25, Brazos County
Dusty Soles Award (longest spell without measurable rain): 76 days, Brazos County

East Texas Regional Summary

Dry & Hot Most of the Summer then Severe Storms with Beneficial Rains
By: Davyon Hill (Meteorologist-National Weather Service-Shreveport)

Despite a series of weak frontal boundaries moving across the region during the month, mostly dry conditions continued through the first month of the meteorological summer. Generally speaking, most of the East Texas CoCoRaHS sites reported between 1" to 2" of rainfall. However, there were locations near and south of the Interstate 20 corridor that reported monthly totals less than 0.50", and sites in Bowie, Cass, and Harrison counties that reported totals between 3" to 4". These dry conditions resulted in increasing drought across the region, along with hot conditions, as afternoon temperatures started to warm into the 100s by the middle of the month. Despite the lack of precipitation, the region still managed to see some severe weather. On June 26th, isolated showers and thunderstorms developed ahead of a cool front, which resulted in widespread tree damage and large hail in the Texarkana area.

Fig.1: Large Hail in the Texarkana area (Bowie County) on June 26th.
Photo Credit: Clida Hughes Cigainero

Below normal rainfall continued throughout the month of July, as upper-level ridging dominated the weather pattern. This setup allowed for drought and hot conditions to expand across the region, producing one of the hottest July's since 2011. Most of the National Weather Service climate sites in East Texas reported high temperatures at or above 100 degrees for at least half to up to 3/4ths of the days in the month. Although a couple CoCoRaHS sites in Cherokee and Harrison counties reported 3" to 4", monthly precipitation amounts generally range from 1" to 2", which is about half of the normal rainfall average for July. Because of these dry conditions, burn bans were in place across all East Texas (and most of the state of Texas) by the end of the month.

East Texas Regional Summary (continued)

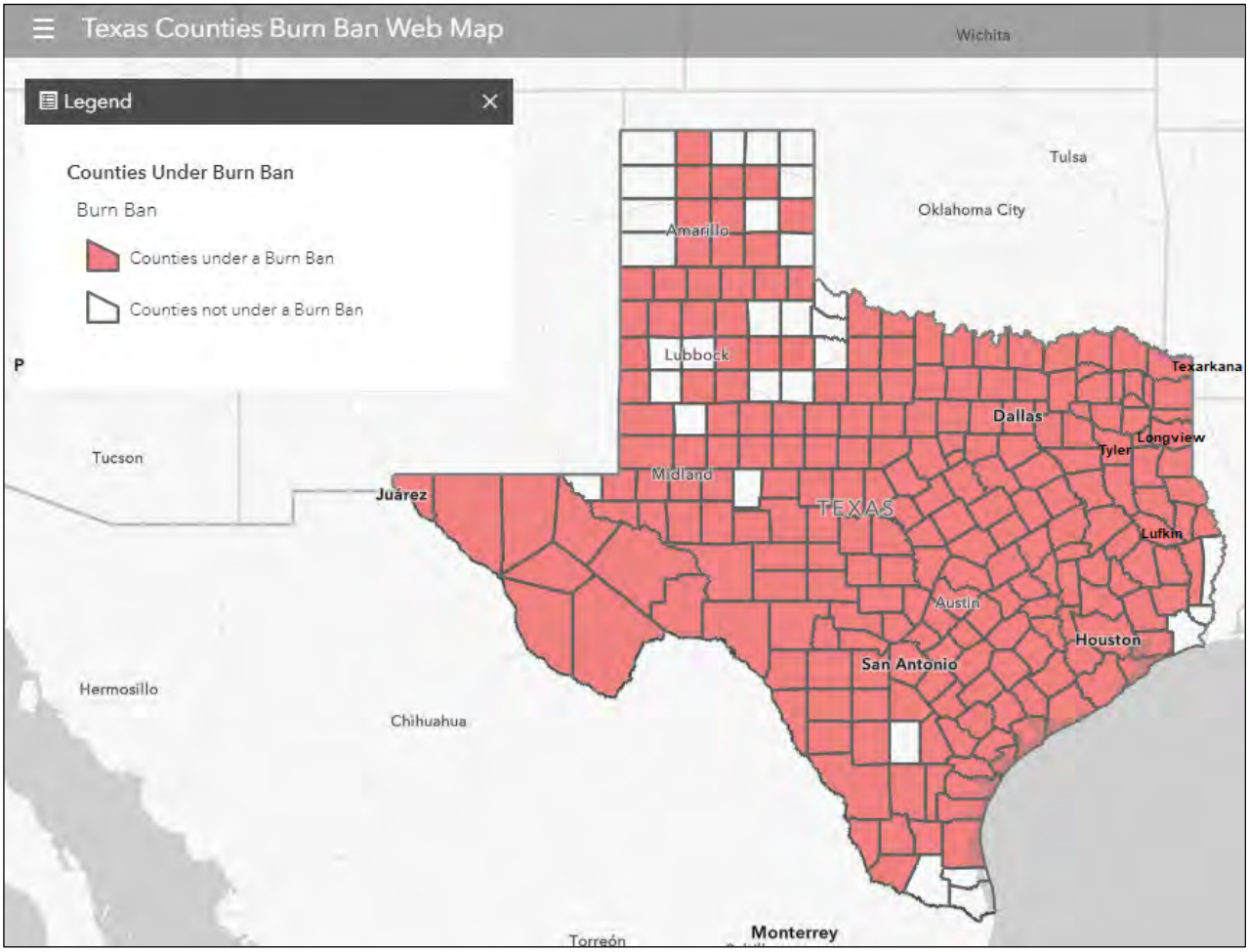


Fig.2: Texas Burn Bans (July 31, 2022).
Image Courtesy: Texas A&M Forest Service

The drought, along with the 100-degree temperatures continued as we moved into the month of August. However, these conditions started to erode as above normal precipitation fell throughout the month. By the 9th and 10th of August, strong thunderstorms moved into portions of extreme Northeast Texas ahead of a frontal boundary. Widespread flash flooding was reported in the Texarkana area, as rainfall amounts of 3" to 4" were reported at several nearby CoCoRaHS sites. Also, a record rainfall amount of 3.94" was reported at Texarkana Airport by the National Weather Service on the 9th. Another cool front moved into the region on the 17th, stalling near the Interstate 20 corridor. Strong to severe isolated storms developed along that boundary, with CoCoRaHS observers and the general public reporting large hail, mainly across portions of Wood County. Some of this hail was as large as golf balls. This front continued to slowly push southward across the region on the 18th, producing additional heavy rainfall across portions of Deep East Texas. The National Weather Service reported 3.72" at the Angelina County Airport near Lufkin, with nearby CoCoRaHS sites also reporting 3" to 4" totals. The combination of the rainfall from the 9th and 18th effectively ended the triple degree temperatures across the region, but the heavy rainfall wasn't done yet. An upper level low, along with another frontal boundary, moved across the region on the 21st and 22nd, bringing widespread precipitation totals of 3" to 6", with some isolated higher amounts as much as 12". These systems brought additional flash flooding to the region, along with a brief tornado in Smith County in the town of Winona.

East Texas Regional Summary (continued)

Fig.3: Hail (Quitman, TX - Aug. 17th).

Fig.4: Tornado (Winona, TX - Aug.22nd).

Images Courtesy: Alexis Whiddon (left) & Garland Harroff (right)

Although long periods of dry and hot conditions resulted in Extreme to Exceptional Drought across portions of the region during the summer, the beneficial and well above normal rainfall from the month of August was able to reverse the course. This resulted in much improved conditions across the region, with some areas drought free by the start of the meteorological fall.

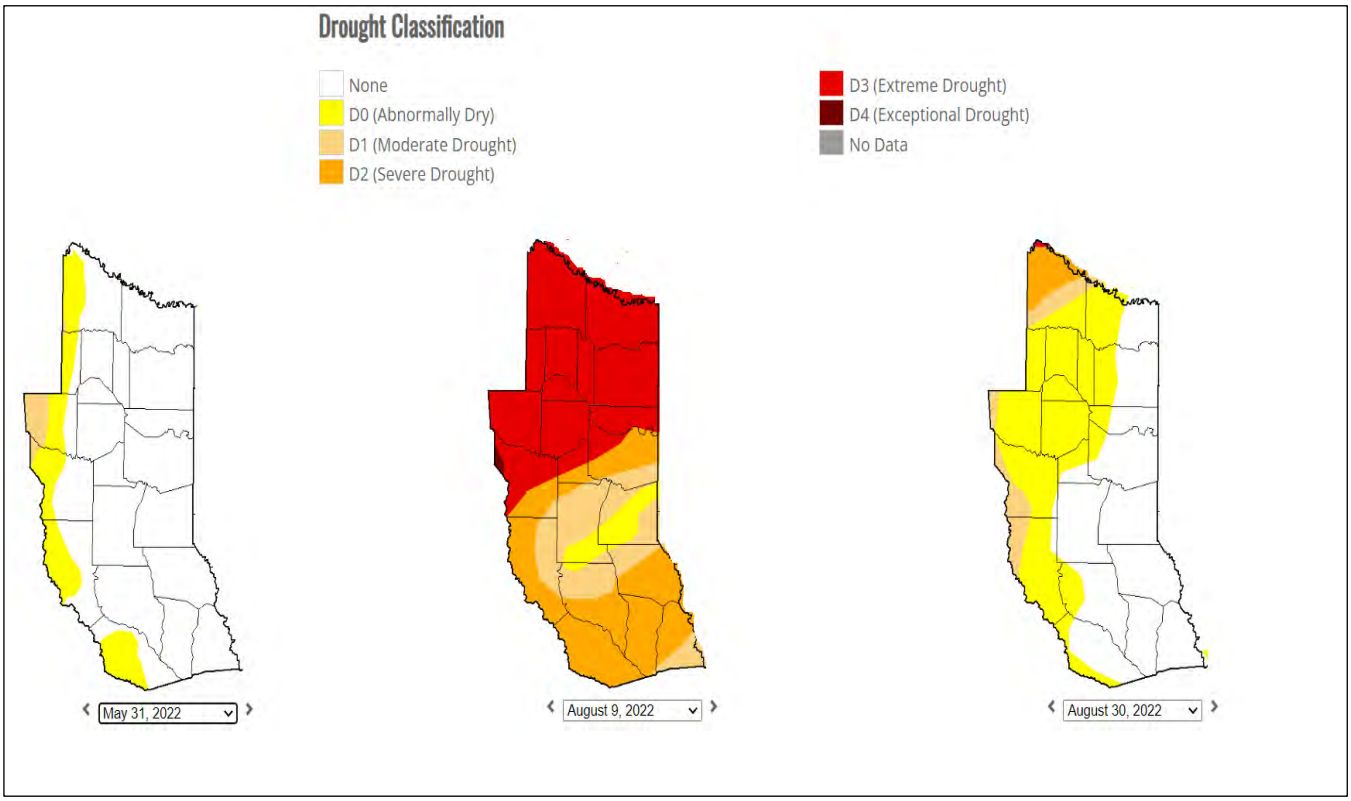


Fig.5: Drought Monitor

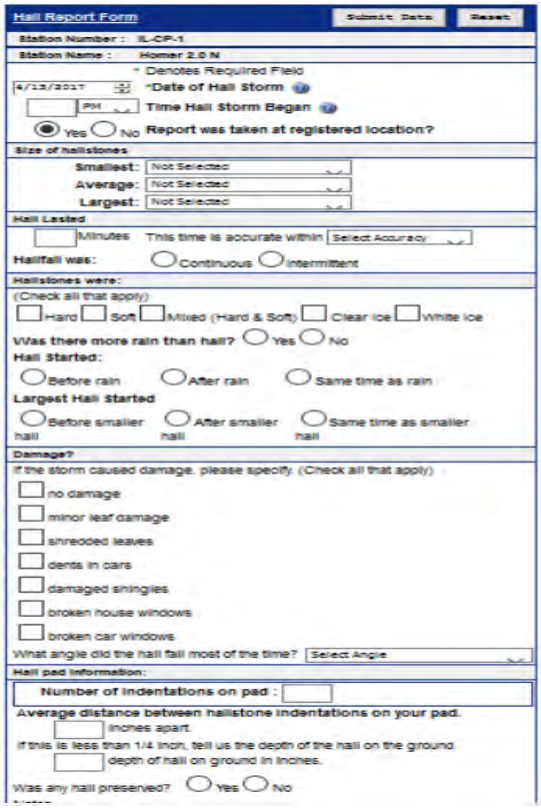
Image Courtesy of NDMC/USDA/NOAA

How to Measure & Report Hail for CoCoRaHS Observers

Observing and Measuring Hail for CoCoRaHS Reporting

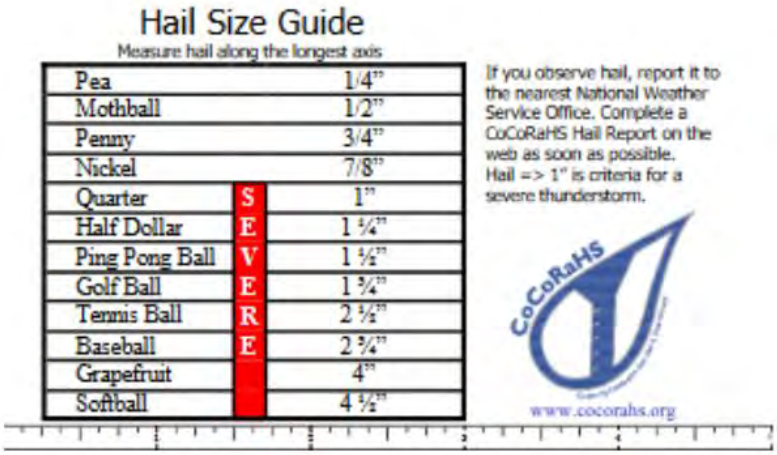
By: Ron Havran, Texas CoCoRaHS Observer Newsletter Editor

Hail is part of the weather in Texas year round as you saw in the previous article. Spring and early summer is prime time for hail, especially the large variety, but hail can occur anytime of the year in Southeast Texas with the right conditions present in the atmosphere. We often see observers mention hail in their comments, but then forget to submit a separate **Hail Report**. The CoCoRaHS hail database is the only one of its kind in the country. When you observe hail, please submit a **Hail Report** as soon as possible with as much information as you can provide (you can always go back and add to or edit your report later). As soon as you submit the **Hail Report** it is also transmitted to your local National Weather Service office. These reports are critical in severe weather situations and may be one of the triggers for a severe thunderstorm warning, for example. You can find the link to the **Hail Report** in the left hand menu once you log in. **Do not** submit hail measurements on **Daily Precipitation Report**.



Once the hail report displays, fill out as much information as you have at the time, but be sure to include the date, time, and size of the hailstones. Note that often there will be larger hailstones among a fall of smaller stones. For example, you may be observing many 1/4 inch stones (pea-size), and at the same time may see a few larger hailstones falling as well. Again, you may go back and update your report, for example, after you have had a chance to see if there was any damage. Note that the Hail report is NOT available on the mobile app, and you will need to go to the web site to access the form.

Hail size is easy to estimate by comparing the hail to the size of common objects, from coins to softballs. Not all hailstones are round. Some look like oblong potatoes or have jagged spikes protruding. When measuring hail or estimating its size, use the measurement along its longest axis to get the best possible measurement. The handy Hail Size Guide is available below to help you to determine the proper size of the hail to the name description of the hail you measured to enter on your report.



More information is available on the CoCoRaHS web-site: at CoCoRaHS hail measurement training animation.

West Central Texas Regional Summary

Many 100°F days with Below Normal Rainfall

By Joel Dunn: Observation Program Lead, NWS San Angelo/Abilene

June 2022

The month of June began with the passage of a cold front. After experiencing the hottest May on record, a forecast of highs in the 70s and 80s was welcome news, along with increased chances of rainfall.

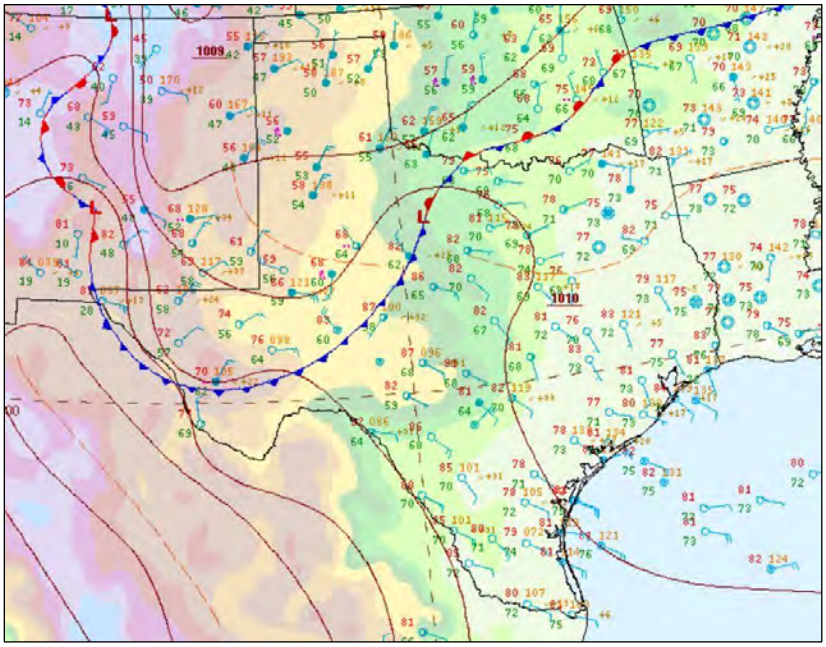


Image 1 - WPC Surface map 03Z June 2, 2022.

With low level moisture streaming into West Central Texas from the Gulf of Mexico ahead of the approaching cold front, chances of rain continued to increase and a few of us allowed ourselves the fickle pleasure of hope.

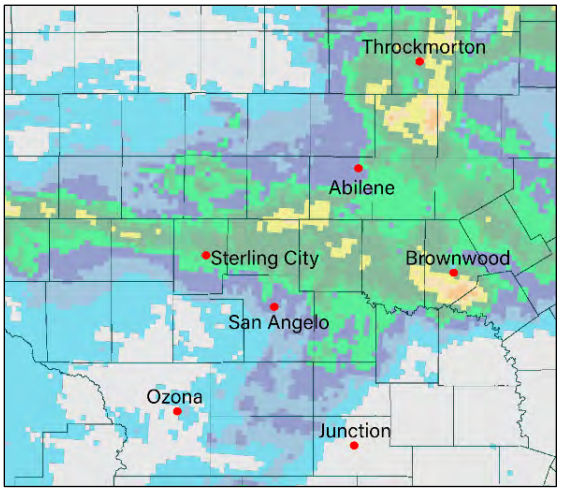


Image 2 – Observed Rainfall June 2nd

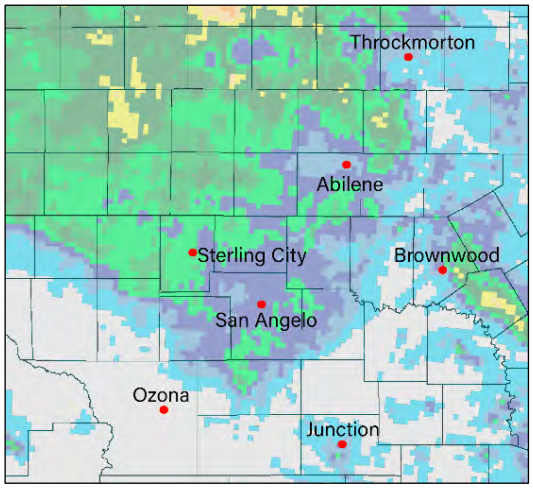


Image 3 – Observed Rainfall June 3rd

Though most of West Central Texas experienced rainfall, areas along and south of the I-10 corridor missed out. Following the brief spell of moisture, the hot and dry pattern that we often experience settled in and dominated the area for the rest of the month. This pattern so closely resembled that of 2011 it was no surprise that the 100° days began piling up. By the end of June, a respectable amount had been tallied.

City	Number of 100° Days	Average Temperature	Departure from Normal
Abilene	21	86.5°F	+5.4
San Angelo	21	86.3°F	+4.1
Junction	16	86.4°F	+5.3

Table 1 - 100° Day information for climate sites.

West Central Texas Regional Summary (continued)

July 2022

The beginning of July often sees a small amount of relief, either in the form of precipitation or cooler temperatures or both. While the southern counties saw the best of the break, with less than 1" of rain and afternoon high temperatures in the 90s, the Concho Valley and counties to the north saw only a little cloud cover and highs near 100°F.

July was not completely dry. The upper-level ridge weakened slightly on the 12th and 13th, allowing an upper-level trough to move south across the northern plains and drop a "cold front" across the area. This front would be a wind shift only, and likely stall south of San Angelo. Scattered showers and thunderstorms were possible, though only areas along Interstate 10 saw much activity. Sadly, this brought no relief as far as temperatures, with highs near 100°F in the areas that remained dry.

The extent of the dry conditions can be seen in the Percent of Normal image below. A few isolated areas saw not only 100% of their monthly rainfall, a few saw as much as 200-300%, yet overall the area remained dry.

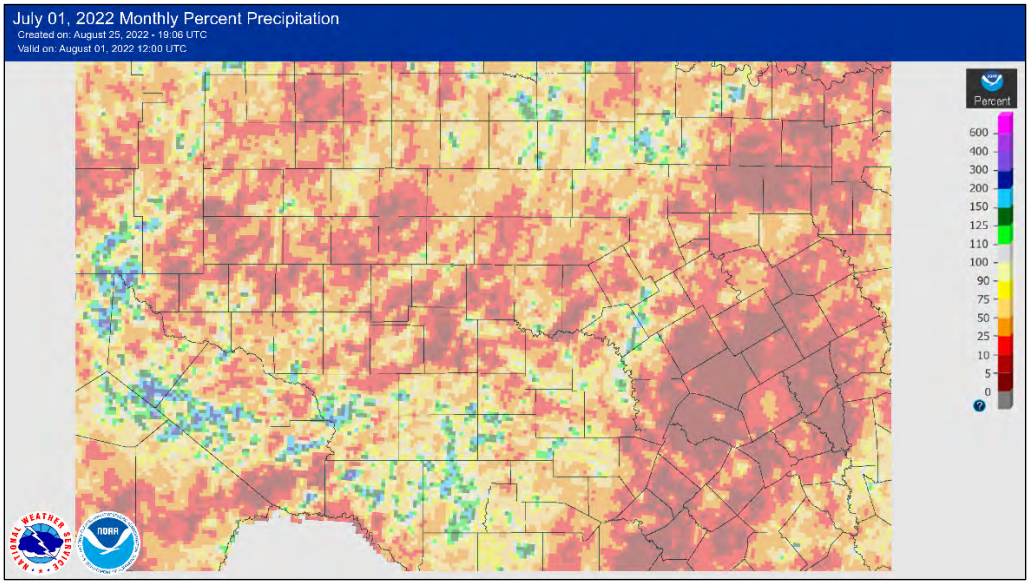


Image 4 - July Percent of Normal.

August 2022

The month of August began the way the month of July ended, hot and dry, with no end in sight. The 100° days continued, and the 7-day outlook was bleak and a sad reminder of the summer of 2011. On August 10th, San Angelo only reached 99°F, ending the stretch of consecutive 100° days with a total of 37 days. This was followed by 0.18" of rainfall and 100°F afternoon highs over the next 4 days. August was not kind and it appeared as if San Angelo was going to make a run at the 2011 record of 100 days of 100°F temperatures. However, the Climate Prediction Center (CPC) issued the 8-14 outlook with optimistic chances of being cooler and wetter than normal.

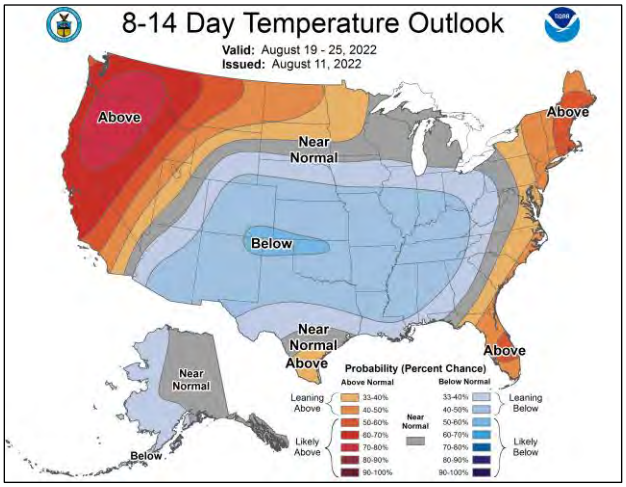


Image 5 – 8-14 Day Temperature Outlook.

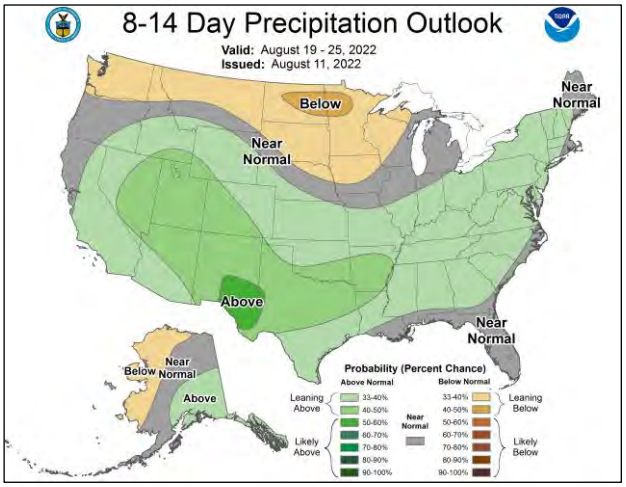


Image 6 – 8-14 Day Precipitation Outlook.

West Central Texas Regional Summary (continued)

Though this would essentially take West Central Texas out of the running for beating the record of 100° days, you would be hard-pressed to find a resident that was upset about the fact. The land was in a bad way and needed the rain and a break from the heat. This is exactly what happened. With an upper level trough moving into the area, afternoon high temperatures remained mainly in the mid-90s, with rain chances nearly every day. This pattern persisted through the 24th, when an upper level ridge began to strength reducing the chances of rainfall and increasing the highs slightly. Despite the strengthening of the upper level ridge, a moist pattern had returned and was sticking around. This would lead to another round of precipitation across West Central Texas and lead to the wettest month of the year thus far.

City	August Precipitation	Average Rainfall	Departure from Normal
Abilene	3.01”	2.53”	0.48”
San Angelo	2.44”	2.42”	0.02”
Junction	3.71”	2.03”	1.68”

Table 2 - Climate Precipitation Data for August.

As can be seen in the table above, though August was the wettest thus far, there were areas that clearly received more rain than others. The image below shows the Percent of Normal for the month of August across the area.

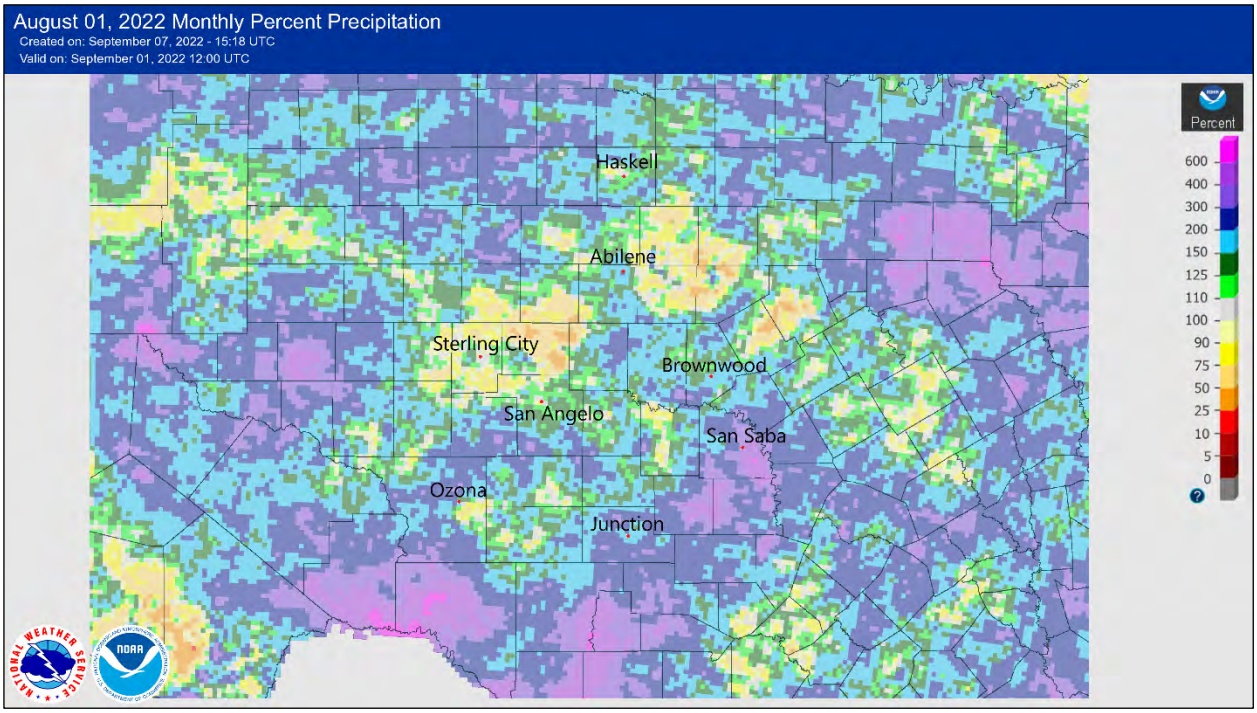


Image 7 - August Percent of Normal.

The moisture was welcome, yet sadly the area has a long was to go if it is to recover from the devastating heat of the past few months. Entering the month of September with some optimism and hope for tropical moisture to pick up where August left off.

Rio Grande Valley Regional Summary

Summer 2022 Weather Story for the Rio Grande Valley: Record to Near-Record Heat Leads to Critical Water Supply Issues…Until Mid-August Rains Bring Some Relief

By Barry Goldsmith
Warning Coordination Meteorologist
NWS Brownsville/Rio Grande Valley

Photo 1: A symbol of summer, 2022: Near record-low water levels at Falcon Lake State Park on the south end of Falcon International Reservoir along the Starr/Zapata County line, August 2, 2022.

Summary

After a second end-of-month soaking in late May 2022 across the Rio Grande Valley/Deep South Texas largely ended the spring 2022 drought, **June** kept the "heat beat" going – with very little rainfall. The three anchor cities (McAllen, Harlingen, and Brownsville) of the Valley ranked among the top 20 warmest on record with rainfall ranking among the top fifteen driest. There were no nearby tropical cyclone threats, and the beach was the place to be – though persistent southeast flow maintained a prolonged longshore (south to north) current on many days.

Rio Grande Valley Regional Summary (continued)

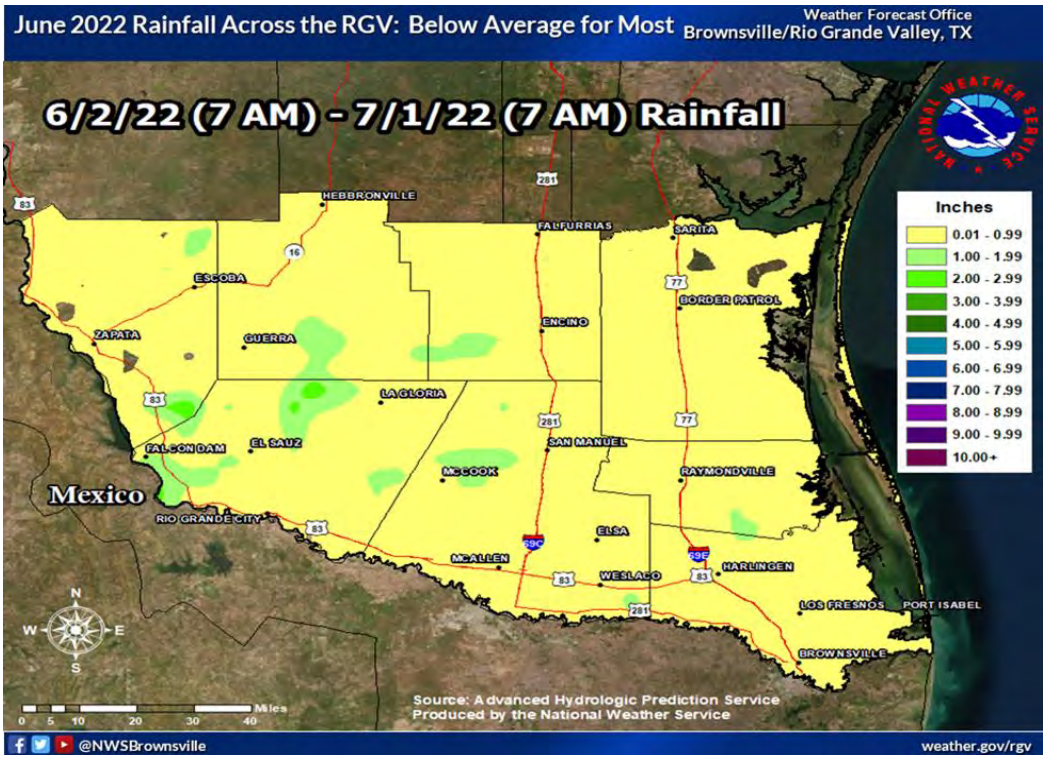


Figure 1. Rainfall map (not annotated) for June, 2022, across the Lower Rio Grande Valley/Deep S. Texas ranch country.

July was a searing-hot month, even by Valley standards. Though not in the league of 2009's incredible heat, it was in range of other Julys in the recent decade, including 2016-2019. All Valley locations ranked within the top ten hottest, with Brownsville in first place (88.0°F) over 2018's 87.5°F. As for rainfall, individual thunderstorms on single days landed on each of the anchor cities airports, keeping the rankings below the top 20 driest – though farther west, little no rain fell and locations such as Rio Grande City ranked driest on record with no measurable July precipitation. A small cluster of storms on July 27th slammed areas around Harlingen with 2 to more than 3 inches, creating temporary minor flood issues but more notably, a pocket of green-up amidst increasingly dry grasses and brush elsewhere in the Valley, Brush Country, and Rio Grande Plains. The back-to-back hot months, however, did rank among the top ten – and the combination of these temperatures with well below average rainfall brought drought conditions back to the region by the start of August.

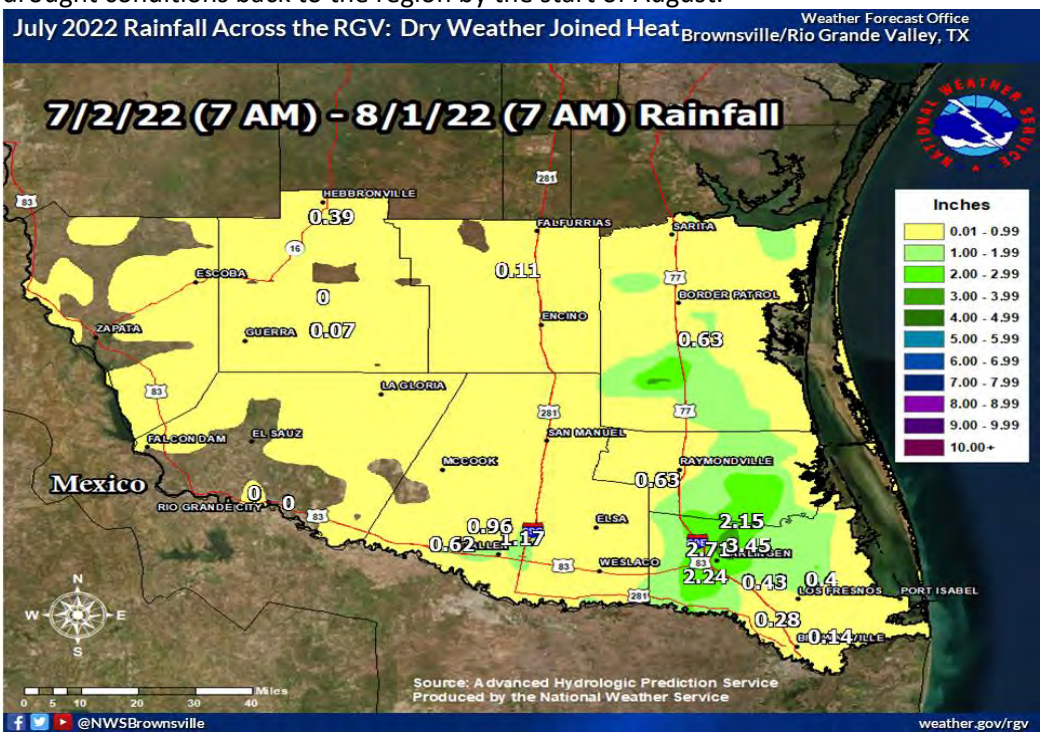


Figure 2. Rainfall map (not annotated) for July, 2022, across the Lower Rio Grande Valley/Deep S. Texas ranch country.

Rio Grande Valley Regional Summary (continued)

August saw heat and dryness continue during the first ten days of the month. Triple-digit temperatures and low humidity across the Rio Grande Plains maintained high evaporation rates that extended along the Rio Grande through the Texas Big Bend region. Between August 13 and 15, both Falcon and Amistad International Reservoirs fell to or near record low levels. Falcon dropped to 350,962 on the 13th (10.75 percent of storage capacity), ranking among the lowest since 1998-2002. Amistad, a much larger reservoir, dropped to 888,857 just after midnight on August 15th – by far the lowest on record since the reservoir was constituted (filled) between 1969 and 1971. The combined shared percentage between the reservoirs fell to 20.7 percent, triggering "Stage 2" water restrictions at many communities from Laredo through Brownsville. At the time of our visit to Falcon (photo above), model forecasts offered little hope of any welcome rain to the reservoirs or the tributaries that feed them. In fact, several Mexican reservoirs were also at low to near record low values, including Venustiano Carranza (Rio Salado, west of Laredo) at 7 percent, and Presa Luis Leon, a notable reservoir in the Rio Conchos basin, which had fallen to 12 percent.

Then came Atlantic tropical wave "98L".

98AL formed as a disorganized mass of convection just south of the Louisiana Coast just after the end of the first week of the month, and oozed southwest by the 13th – remaining disorganized, but containing plenty of tropical "juice". On the 14th and early on the 15th, the wave moved across the South Texas Coastal Plains to the Rio Grande Plains from Rivera to Laredo, before turning northwest and paralleling the Rio Grande through Del Rio and ultimately sliding through the Big Bend region later on the 15th into the 16th. Rainfall of 3 to 7 inches fell across the South Texas Coastal Plains/Brush Country, including Kenedy through Jim Hogg County, on the 14th. Convergent bands formed well southeast of the "center" on the 14th, and dropped pockets of 3 to 7 inches across portions of Cameron, Willacy, and Hidalgo County during the afternoon and overnight. A final burst of convergence developed the following afternoon across the Mexican Rio Grande Plains, which "trained" across northwest Zapata and southern Webb County and dropped an estimated 6 to 10 inches in some locations in just a few hours. By the 16th, rapid "flash" flows on arroyos in northern Zapata County developed – all great news to finally move Falcon International Reservoir off of the "floor" of its low values early on the 15th, over the next few days.

The heavy rainfall from 98L put a notable stop to the worsening drought across the Lower Rio Grande Valley/Deep South Texas Brush Country/Coastal Plains; still, some areas missed the "bigger" rains (which totaled a measured/estimated 8 to 12 inches across eastern Jim Hogg, northeast Starr, northern Hidalgo, and much of Brooks and Kenedy County). Nevertheless, the mid-month rains were a (good) harbinger of things to come. While the month largely ended near average with only spotty rainfall, September would start climatologically on target – and additional rainfall in both the Lower Rio Grande Basin (watershed) and across the Rio Grande Valley would further erode drought.

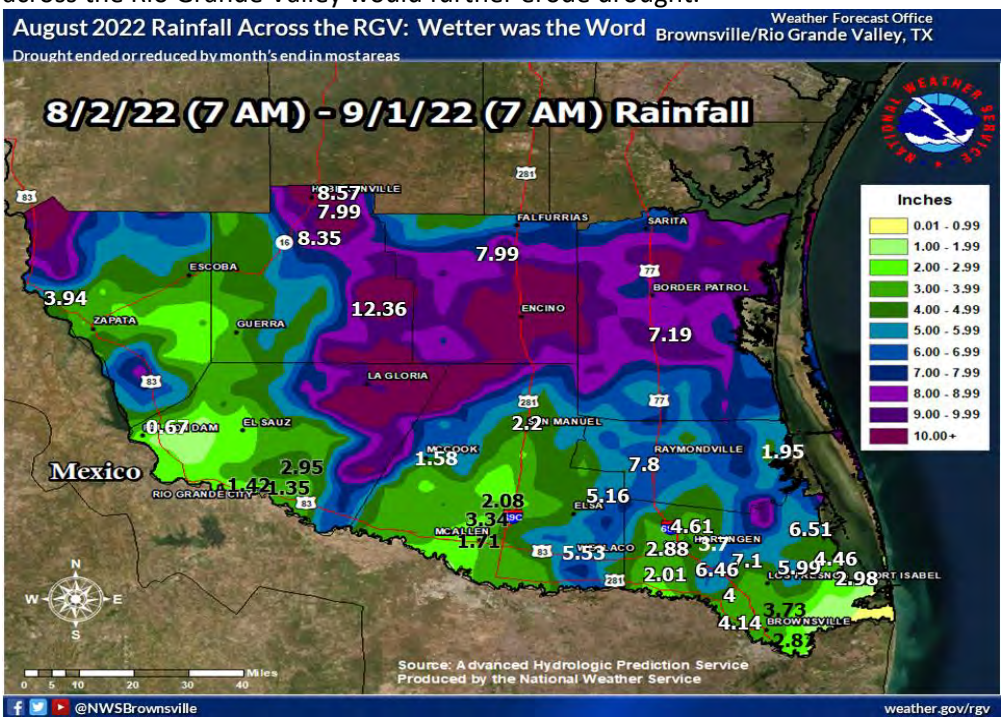


Figure 3. Rainfall map (not annotated) for August, 2022, across the Lower Rio Grande Valley/Deep S. Texas ranch country.

Rio Grande Valley Regional Summary (continued)

For the summer, the periodic August rains did nothing to quell the seasonal temperatures, which ranked among the top three hottest in Brownsville and Harlingen, and top ten hottest at McAllen and Rio Grande City. For the period from April through August (five months), Brownsville (records since 1878) and Harlingen (since 1912) remained at their hottest on record, with Harlingen nearly *a full degree* above the prior record, set in 1953. The prolonged heat turned what had been a top quintile (20 percent of all records) *coolest* year from January through mid-March into a top quintile *warmest* year, with Brownsville surging back into the top fifteen warmest (January-August), likely headed for another top ten finish which has been common since 2011.

Top Ten Heat for Summer (June-August) 2022

Valley's Anchor Cities Finish High on the Temperature Charts

Weather Forecast Office Brownsville/Rio Grande Valley, TX

Maximum 3-Month 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	87.2	2022-08-31	0
4	86.9	1998-08-31	0
5	86.4	1980-08-31	0
6	86.3	1982-08-31	0
7	86.1	2012-08-31	0
8	86.0	2005-08-31	0
9	86.0	2001-08-31	0
10	85.9	2016-08-31	0

Last value also occurred in one or more previous years.

Period of record: 1878-01-01 to 2022-08-31

Maximum 3-Month 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	2019-08-31	8
2	87.9	1998-08-31	4
3	87.2	2022-08-31	0
4	87.1	2016-08-31	5
5	86.9	2018-08-31	12
6	86.8	2009-08-31	5
7	86.7	2017-08-31	7
8	86.5	2020-08-31	7
9	86.4	2005-08-31	0
10	86.4	2012-08-31	6

Period of record: 1912-02-07 to 2022-09-01

Maximum 3-Month 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	88.2	2022-08-31	0
10	88.1	1980-08-31	1

Period of record: 1941-06-01 to 2022-08-31

Maximum 3-Month 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	89.4	2009-08-31	2
2	89.3	1996-08-31	5
3	89.0	1997-08-31	7
4	89.0	1901-08-31	0
5	88.9	2022-08-31	4
6	88.8	1999-08-31	5
7	88.8	2001-08-31	13
8	88.8	2019-08-31	2
9	88.7	1928-08-31	0
10	88.7	1902-08-31	2

Period of record: 1897-01-01 to 2022-09-01

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Table 1: Average temperatures (ranked) for Brownsville, Harlingen, McAllen, and Rio Grande City, summer (June-August) 2022.

Record/Near Record Heat from April-August 2022

Valley's Anchor Cities Continued at or Near Top of the List

Weather Forecast Office Brownsville/Rio Grande Valley, TX

Maximum 5-Month 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	85.1	2022-08-31	0
2	84.8	2019-08-31	0
3	84.1	2018-08-31	0
4	84.1	2011-08-31	0
5	84.0	2012-08-31	0
6	84.0	2020-08-31	0
7	83.4	2017-08-31	0
8	83.3	2001-08-31	0
9	83.3	2006-08-31	0
10	83.2	2002-08-31	0

Period of record: 1878-01-01 to 2022-08-31

Maximum 5-Month Mean Avg Temperature for HARLINGEN, TX

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

Rank	Value	Ending Date	Missing Days
1	84.9	2022-08-31	2
2	83.9	1953-08-31	2
3	83.7	2002-08-31	2
4	83.5	1998-08-31	5
5	83.3	1950-08-31	0
6	83.3	1945-08-31	2
7	83.2	1943-08-31	0
8	83.2	1957-08-31	3
9	83.1	2003-08-31	2
10	83.1	2006-08-31	3

Period of record: 1912-02-07 to 2022-08-31

Maximum 5-Month 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	87.4	2009-08-31	0
2	87.2	2017-08-31	0
3	86.6	2016-08-31	0
4	86.5	2018-08-31	3
5	85.9	2011-08-31	0
6	85.9	2022-08-31	0
7	85.9	2019-08-31	0
8	85.8	1998-08-31	2
9	85.8	2012-08-31	0
10	85.5	2015-08-31	0

Period of record: 1941-06-01 to 2022-08-31

Maximum 5-Month 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	87.0	1902-08-31	2
2	86.6	1999-08-31	15
3	86.3	2022-08-31	6
4	85.9	1946-08-31	1
5	85.7	2011-08-31	17
6	85.7	2000-08-31	7
7	85.6	1948-08-31	1
8	85.5	1996-08-31	9
9	85.5	1947-08-31	2
10	85.3	1953-08-31	0

Period of record: 1897-01-01 to 2022-08-31

@NWSBrownsville weather.gov/rgv

Table 2: Average temperatures (ranked) for Brownsville, Harlingen, McAllen, and Rio Grande City, April through August 2022.

Rio Grande Valley Regional Summary (continued)

The August rainfall recharged groundwater supplies, at least temporarily, across a good portion of the Brush Country and Kenedy County range area, and helped out pockets of Cameron and Willacy. Other areas of Hidalgo, western Starr, western Jim Hogg, and much of Zapata, remained on the low side, seasonally. That, too, would change during the first week of September. By the end of August, widespread moderate to extreme drought would be trimmed back fairly dramatically. The rainfall had mixed results; cotton growers who experienced the August 14th bursts of rain (Willacy/Cameron/part of Hidalgo) and had not yet picked and rolled the bolls sustained losses; those who either missed the rains or picked early reaped the benefit of the needed dry/hot weather from July through early August. Details on cotton successes or failures across the Valley will be available later this year.

Water levels rose from their record to near-record low levels observed from August 13-15 to slightly higher levels by the end of the month. At Falcon, values as low as 10.75 percent of storage capacity (August 13th) lifted to 13.5 percent on the 31st; at Amistad, values as low as 22 percent of storage (August 15th) lifted to 27.9 percent on the 31st.

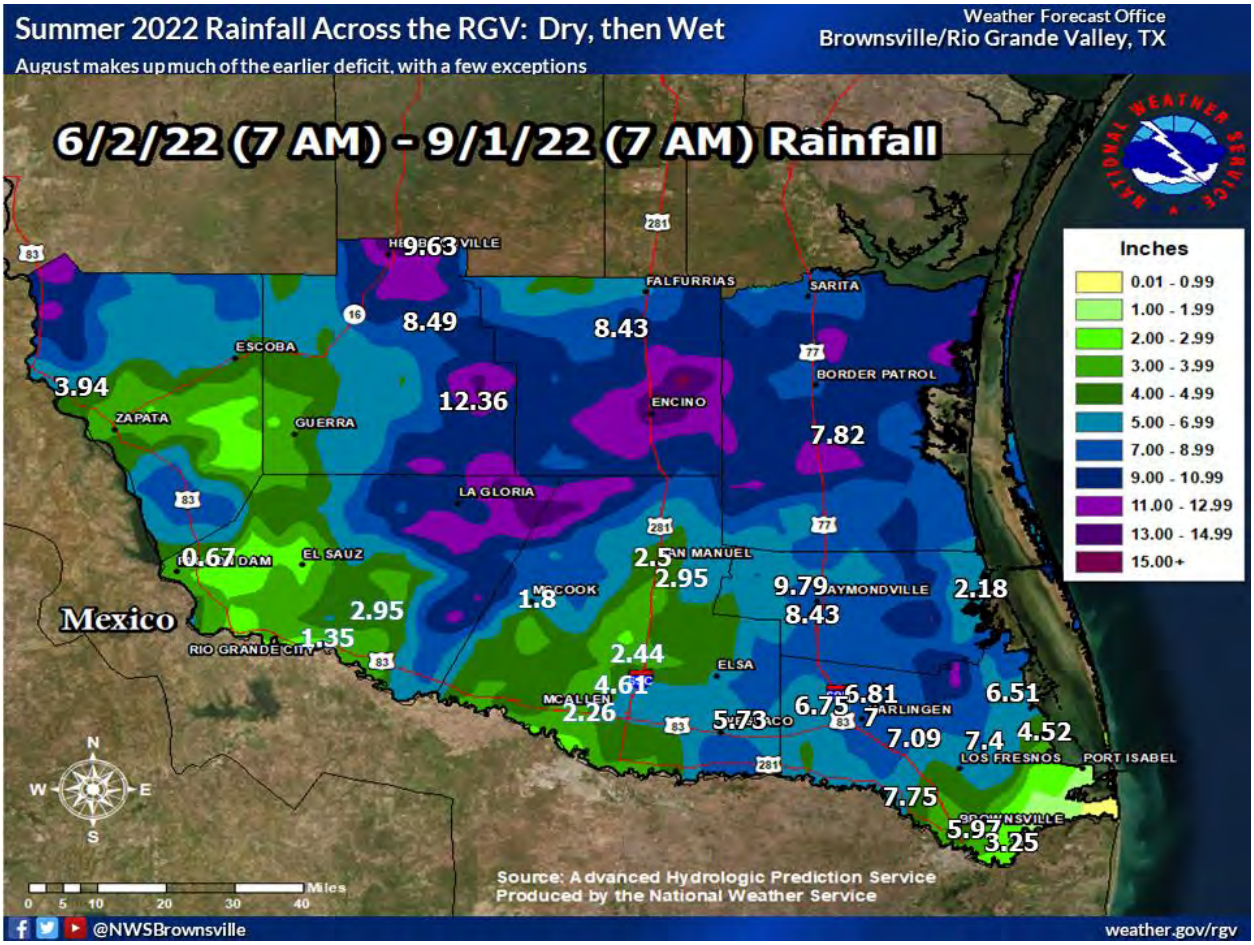


Figure 4: Total Rainfall for summer 2022 (annotated) across the Lower Rio Grande Valley/Deep S. Texas ranch country.

Rio Grande Valley Regional Summary (continued)

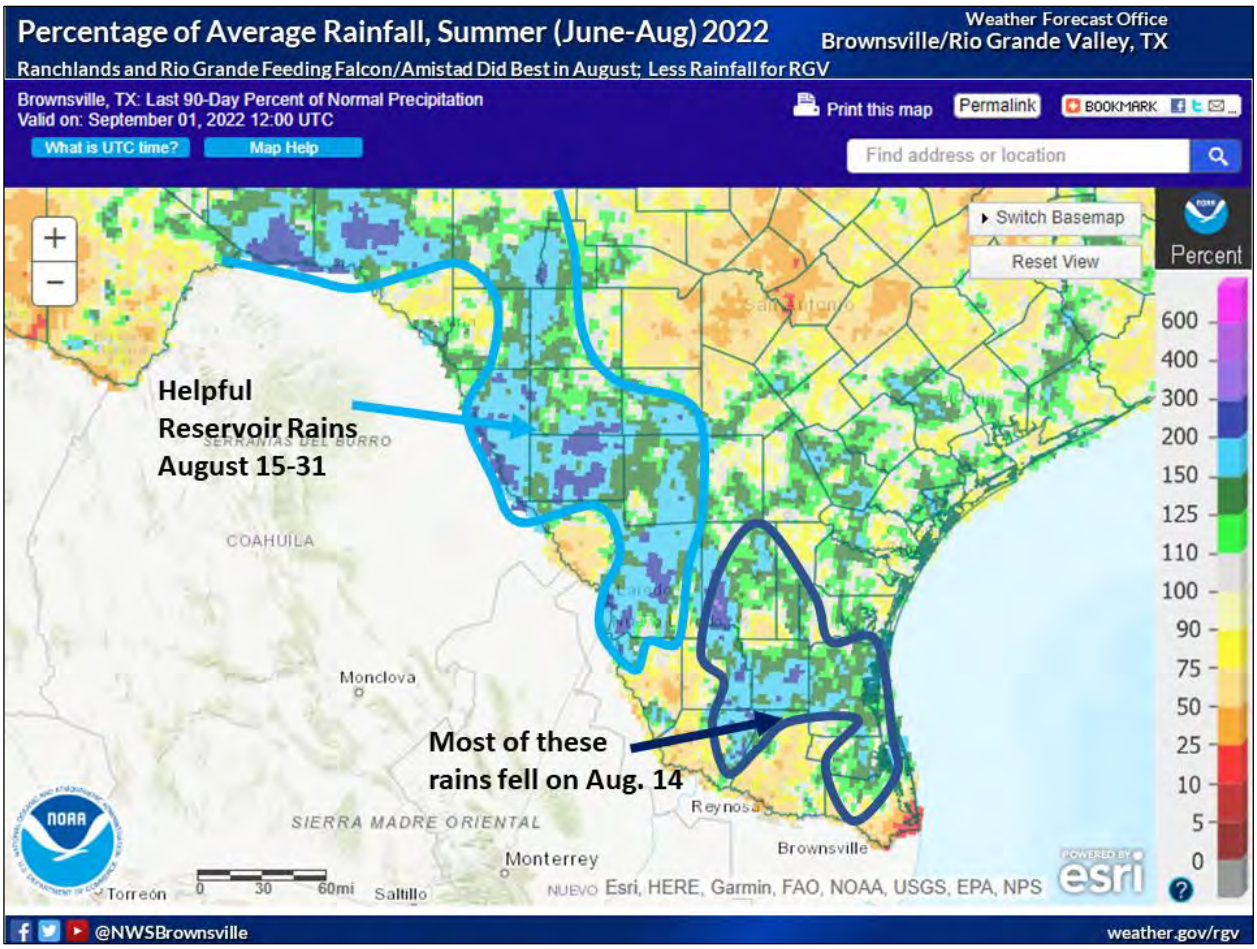


Figure 5: Departure of rainfall from average across the Texas portion of the Lower Rio Grande Basin.

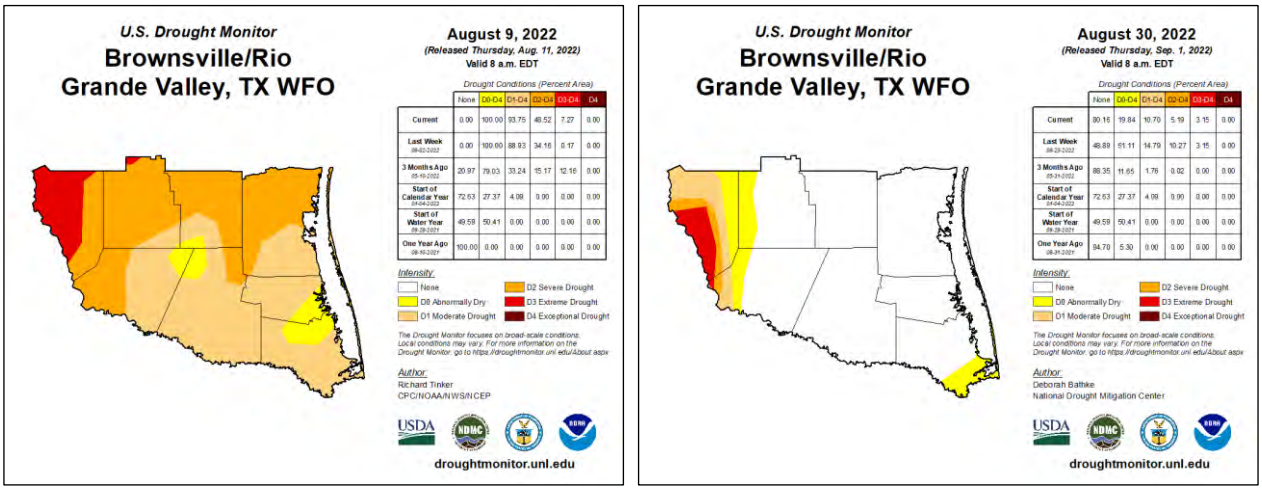


Figure 6. Sharp drought monitor improvements across the Rio Grande Valley/Deep S. Texas ranch country from August 9th and 30th, following the rains from August 12-15 that peaked on August 14th. The heaviest rains missed western Zapata, including over Falcon Reservoir – but torrential rain across many tributaries flowing into Falcon helped nudge levels higher by the end of August.

Corpus Christi Regional Summary

The Return of Rain after the Summer Drought Months

By: Juan Carlos Peña Jr., Meteorologist NWS Corpus Christi

Most of South Texas saw below average rainfall further contributing to the drought conditions with only a couple spots receiving average rainfall. The month of June only brought three rain events, one in the beginning, a second in the middle and a third event toward the end of the month. The first event to open up the month was due to an upper level disturbance and weak frontal boundary. This resulted in isolated showers and thunderstorms, mainly across the eastern counties of South Texas. With the activity being isolated, accumulations mainly ranged from 0.10" to 0.75" with only a couple spots reaching up to 2". The second event was due to an upper level disturbance, and once again, resulted in isolated showers. With this activity observer's reports varied from 0.10" to 0.25". The most significant rain event of the month occurred toward the end of the month as a frontal boundary stalled over the area, resulting in scattered showers and thunderstorms. Three-day total accumulations from this event ranged between 1" to 2" across the Coastal Plains and Victoria Crossroads, with a few lucky spots reporting accumulations as high as 3-4".

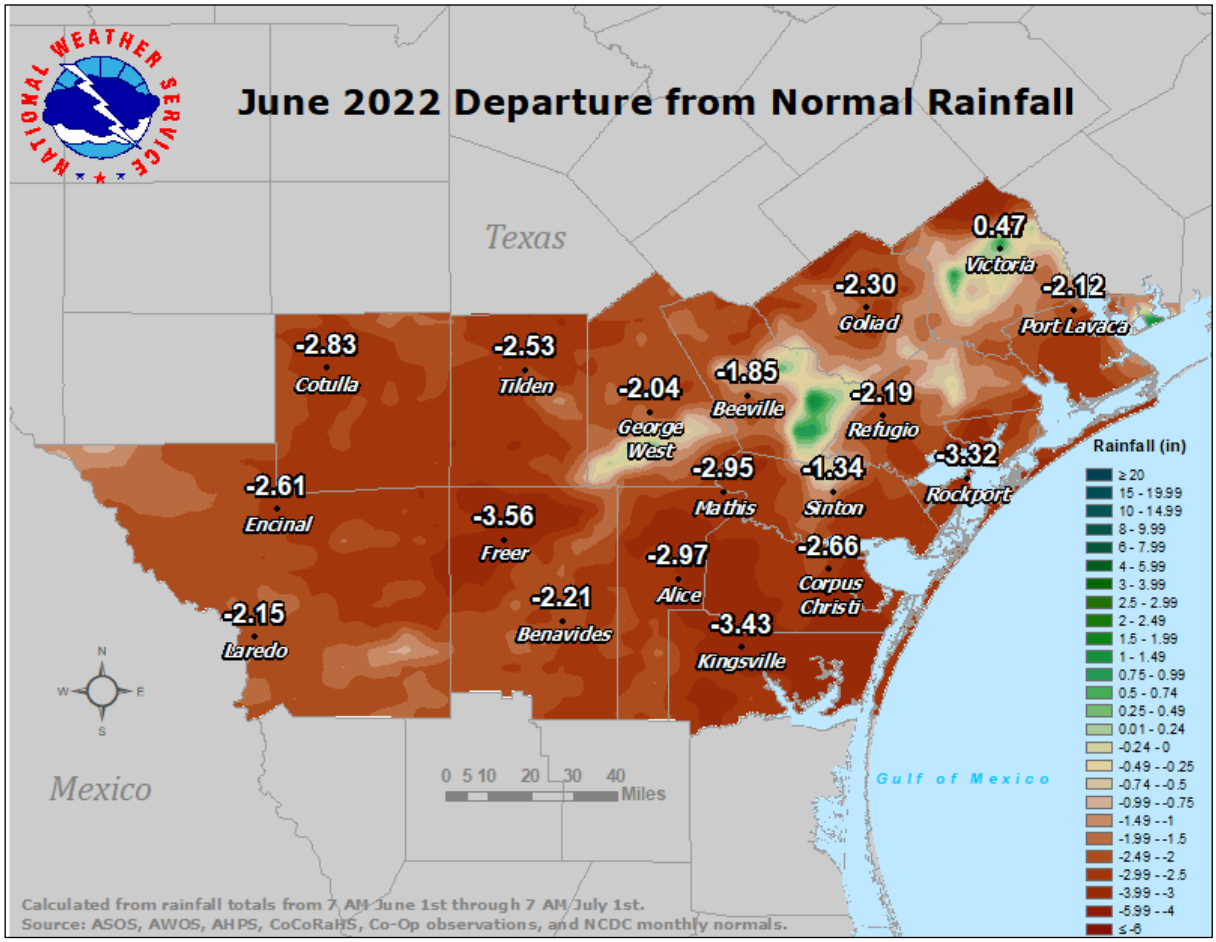


Figure 1: June 2022 Departure from Normal Rainfall.

July was not much better June, actually, it was drier and warmer. Any precipitation that occurred during the month across much of South Texas was isolated in nature. July was so dry that the highest monthly rainfall observation received was between 2.5" and 3" which occurred across the Victoria Crossroads. Other than that, observers across the Coastal Plains and Coastal Bend reported accumulations between 0.30" to 1.5", while observers across the Brush Country reported between 0.03" to 0.50". One interesting tidbit from July was that observers east of Corpus Christi International airport mainly reported 0.00" while other observers near or west of the airport reported amounts up to 1.5" as storms either developed further inland, dissipated while reaching the city or simply just split before reaching the city.

Corpus Christi Regional Summary (continued)

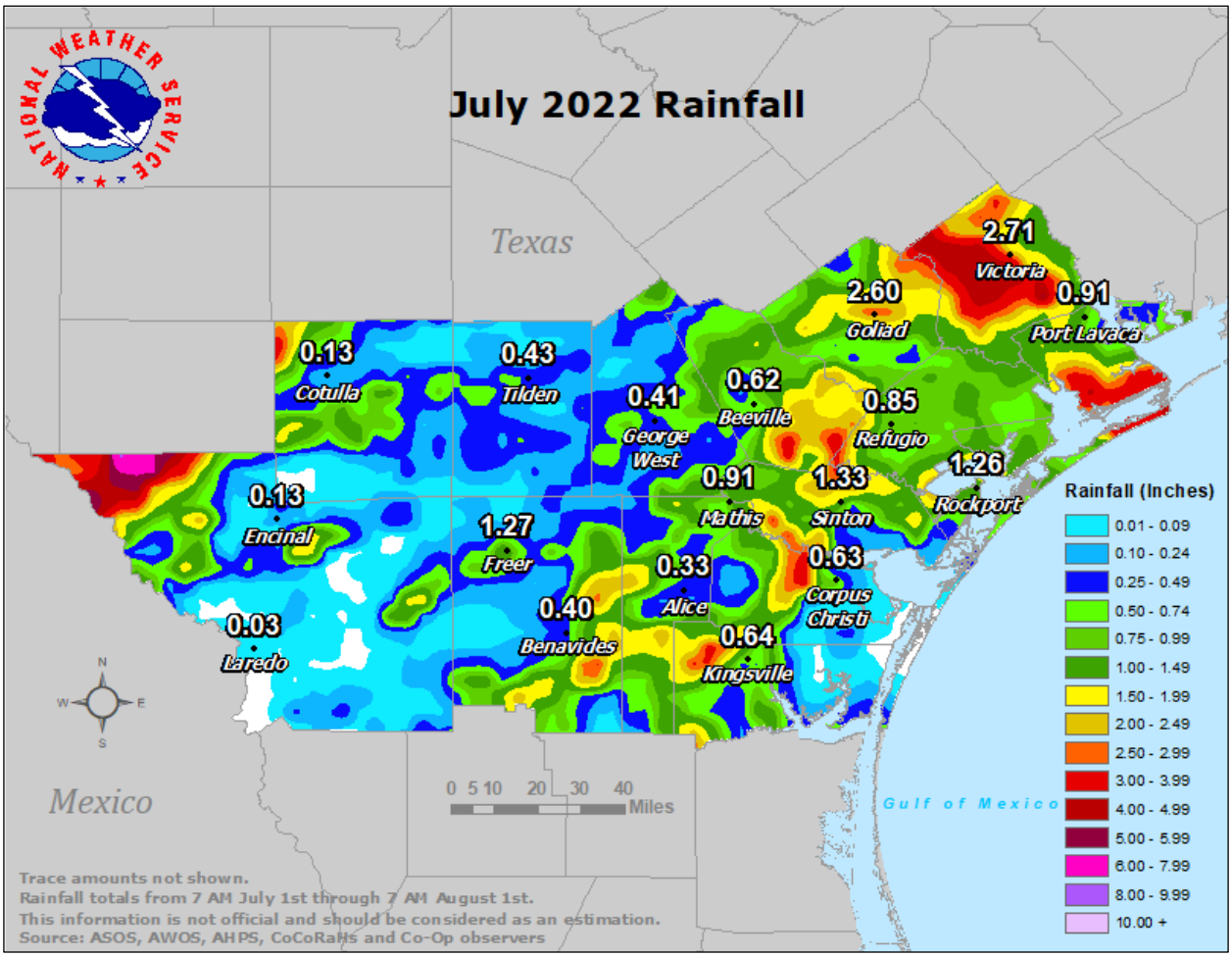


Figure 2: July 2022 Estimated Rainfall Amounts.

A much more active pattern finally blessed South Texas with beneficial rainfall, helping alleviate drought conditions during the month of August. A combination of deep tropical moisture, upper level disturbances and presence of boundaries/weak cold fronts as well as a couple of tropical waves resulted in scattered to widespread showers and thunderstorms across South Texas. Observers across the Brush Country reported accumulations between 7” to 10” with isolated locations reporting 10”to 15” of rain for the month of August. Observers across the Coastal Plains reported between 5” to 8”, across the Coastal Bend between 5” to 10” and across the Victoria Crossroads between 3” to 10”. The bulk of this activity occurred as a tropical wave trekked across South Texas from Corpus Christi westward towards Laredo. The storms associated with this disturbance saw rain rates between 2”to 5” an hour, which coupled with the widespread activity and training (storms developing and affecting the same area,) resulted in these high monthly rainfall totals, especially across the Brush Country. August was so active that locations across the Brush Country saw monthly accumulations 5”to 8” above normal, locations within the Coastal Plains and Coastal Bend saw accumulations 3” to 8” above normal and in the Victoria Crossroads 2” to 4” above normal for the month of August.

Corpus Christi Regional Summary (continued)

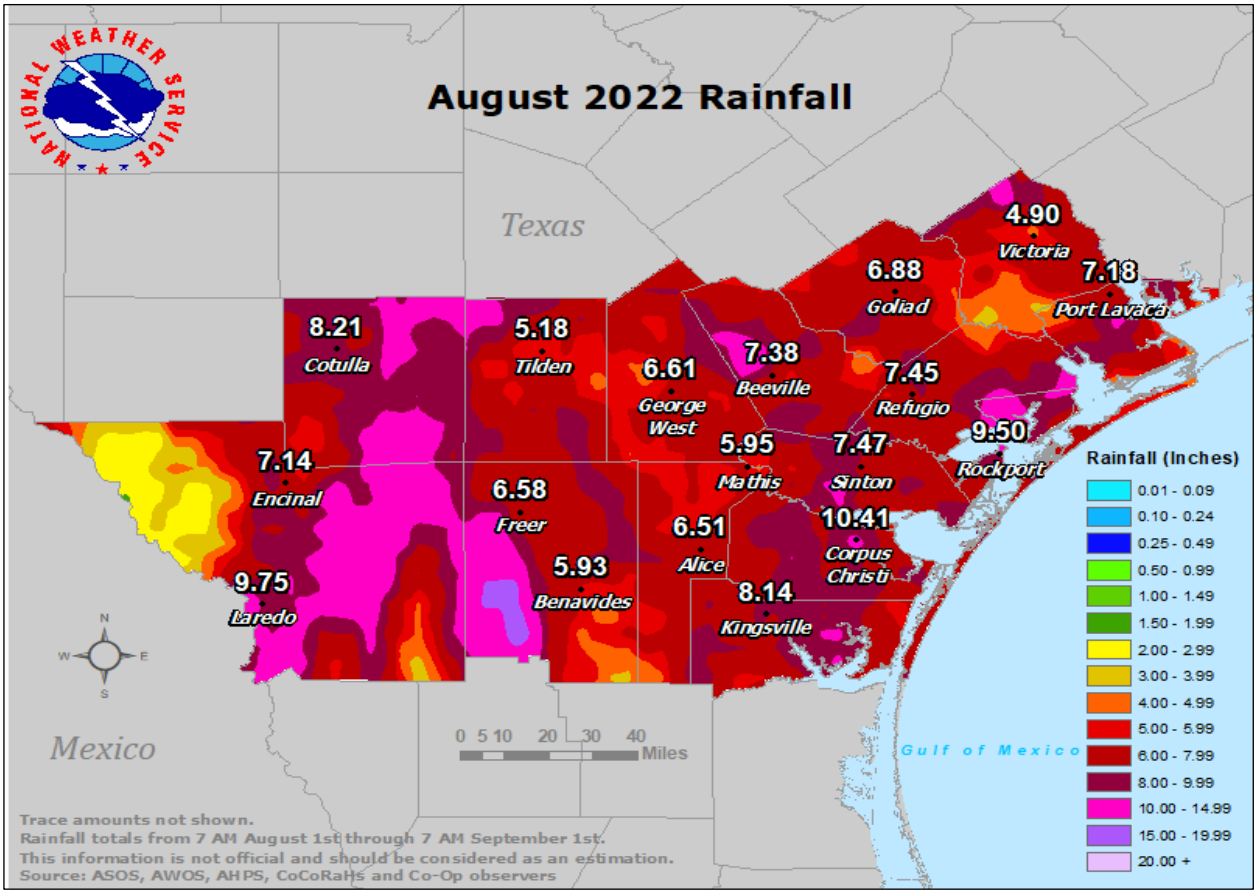


Figure 3: August 2022 Estimated Rainfall Amounts.

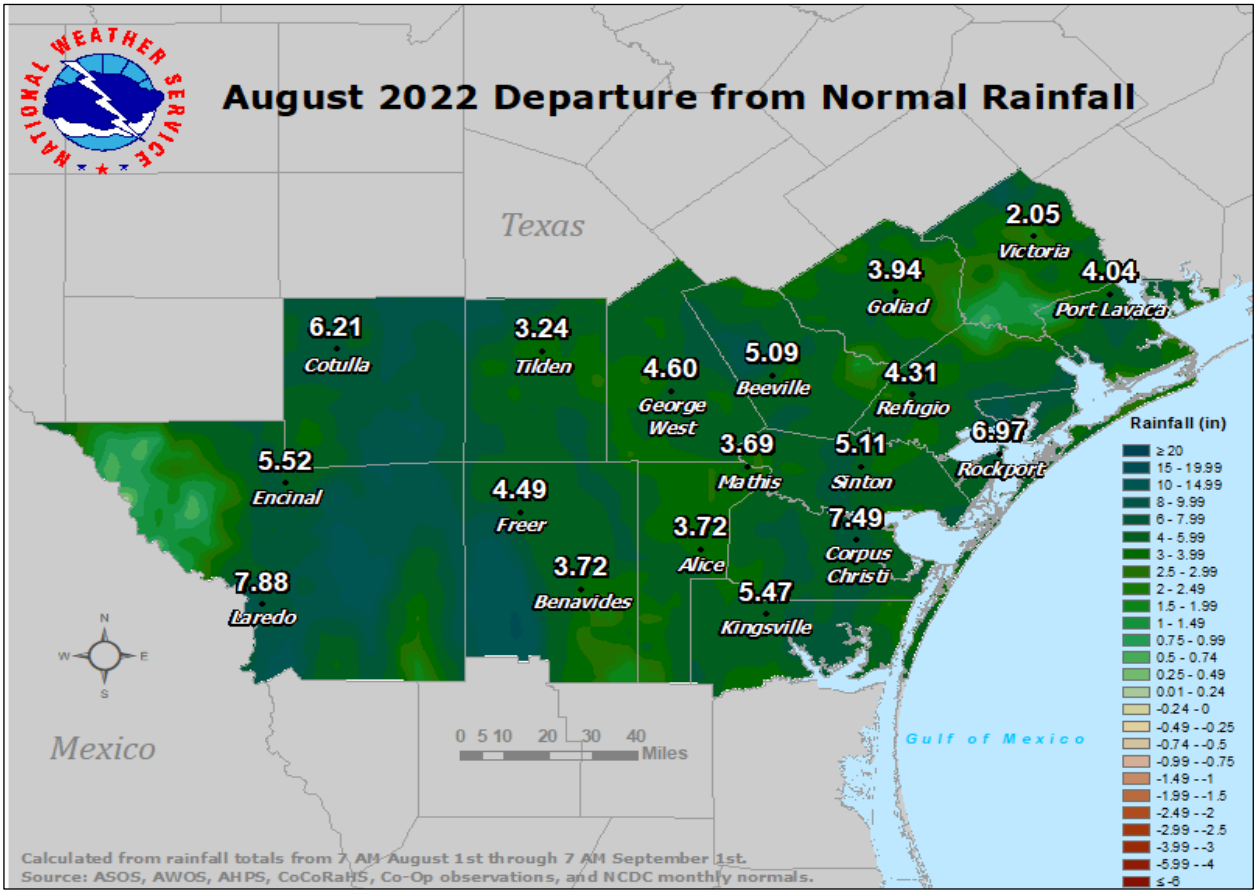


Figure 4: August 2022 Departure from Normal Rainfall.

El Paso-Far West Texas Regional Summary

Wet Starts and Finishes Result in Average Monsoon Season

By: Connor Dennhardt, Meteorologist - National Weather Service El Paso

An early start to the North American Monsoon, which typically begins in early July, resulted in above normal precipitation for June. Active, but disappointing thunderstorm activity in July and early August left the region near climate normals in terms of seasonal totals. Finally, a wave of tropical moisture in late August gave the region some of its most impressive totals so far this year. Overall, the season ended near normal as rain chances struggled to verify between quick starts and finishes.

The first half of June featured hot and dry weather for far west Texas, which is typically the hottest time of the year. Temperatures soared to 107 degrees on June 11th with much of west El Paso and Hudspeth Counties still sitting at **0.00”** for the season. The heat didn’t last for long as moisture moved into the region and daily thunderstorms were recorded through the latter half of the month. The most notable events occurred the week of June 20th, as many CoCoRaHS observers around El Paso and Hudspeth Counties recorded 3-day rainfall totals of **1.00-1.50”**. Much of far west Texas finished the month of June at **200-300%** above normal.

Figure 1: Lightning over the Franklin Mountains from the June 16th thunderstorm in El Paso, TX.

July was a frustrating month for far west Texas, as a plume of monsoonal moisture lingered just out of reach. Higher precipitation totals were recorded across southwest New Mexico and southern Arizona where deeper moisture existed through much of the month. Thunderstorm activity was common for much of the area, but El Paso County missed out on a large share of the precipitation. Most rainfall reports in July were low, with most measurable daily reports falling below **0.50”**. Monthly totals ranged from **0.50”** to **1.00”**, well below the monthly climate average of **1.58”** for El Paso.

El Paso-Far West Texas Regional Summary (continued)

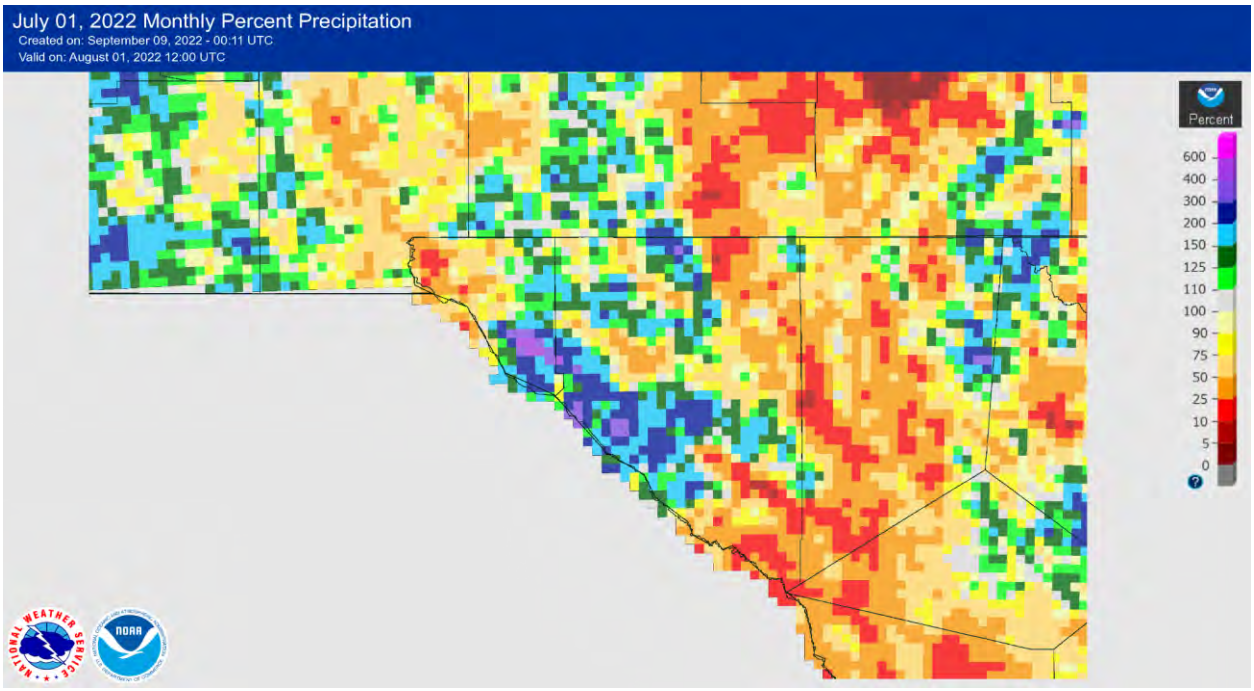


Figure 2: July monthly precipitation analysis showing a notable bullseye of below normal rainfall in western El Paso County.

The most significant rainfall of the season occurred in late August as the remnants of a tropical low moved up the Rio Grande Valley and spread moisture across southern New Mexico and far west Texas. Heavy rains occurred on August 18th and 20th, with many stations in central and northeast El Paso recording 24-hour totals in excess of **2.00"**. Flash flooding occurred in the city of El Paso, as well as many communities along the lower Rio Grande valley and Salt Flats areas in Hudspeth County.

Figure 3: Heavy rain falling over west El Paso, TX from a small monsoon thunderstorm on August 9th.

The summer season featured 42 active observers in El Paso County, and 2 in Hudspeth County. This monsoon season garnered a total of 2,022 daily reports submitted, along with 38 multi-day reports. One hail report was submitted by an observer in northeast El Paso. No Significant Weather Reports or Condition Monitoring Reports were submitted this season. Thanks again to all our local observers who participated in the 2022 summer season!

Southeast Texas Regional Summary

Heat & Drought Conditions Prevailed until Heavy Rains in mid-August

By: Ron Havran - SE Texas CoCoRaHS Regional Coordinator, HCFCD

Exceptionally dry and hot conditions prevailed across Southeast Texas with average temperatures around three to five degrees above normal and around three to six inches below normal for precipitation. Temperatures climbed above of 100°F on many days this month. Houston-Hobby recorded its driest June on record with just 0.35" of rain total. Six counties didn't have CoCoRaHS rain averages above 1.00". See Chart 1 & 2 and Table 1 & 2 on pages 43 and 44 for more information on temperature and precipitation across the region this month. The Golden Triangle Section had a few coastal areas with higher rainfall totals but overall deficits were high. Continued dry and hot weather brought drought degradations across the region with Extreme Drought experienced for much of the region.

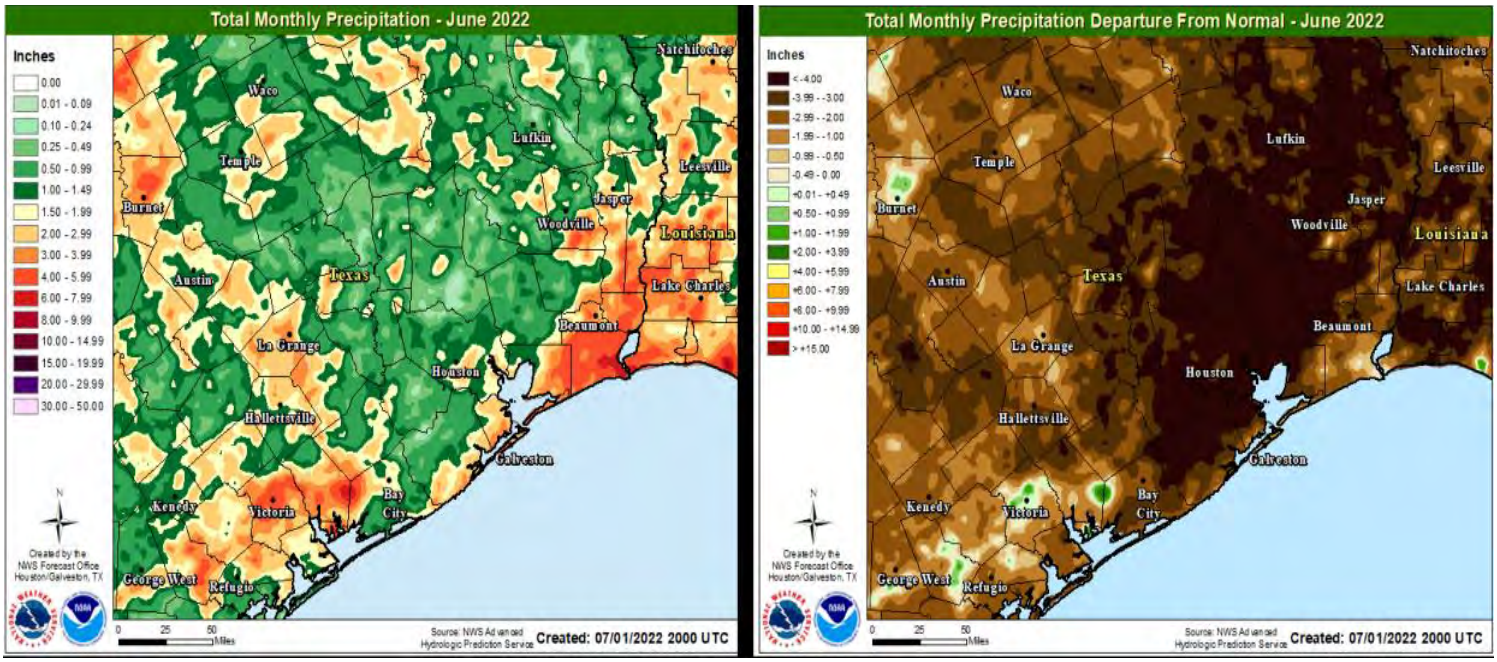


Figure 1: June Total Precipitation and Departure from Normal Precipitation across Southeast Texas.

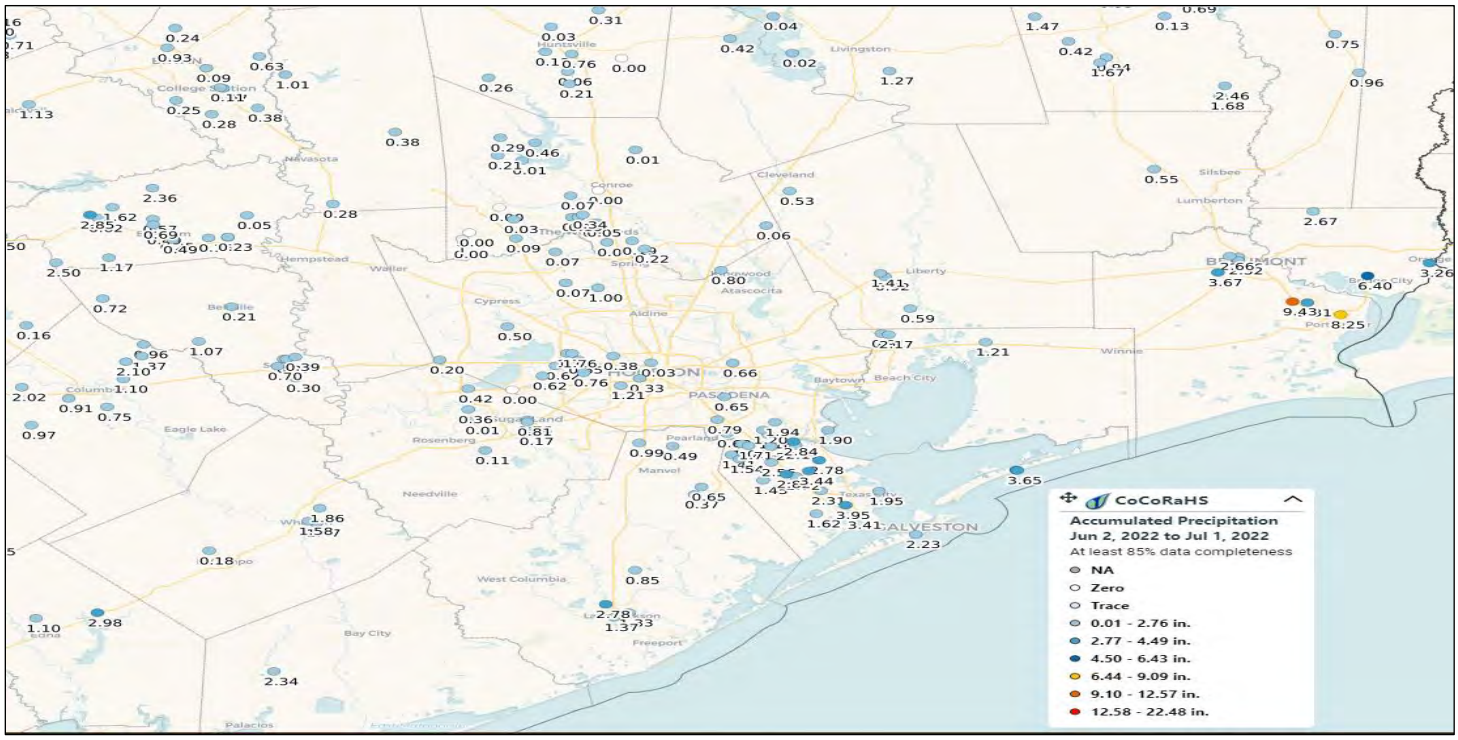


Figure 2: June Total Precipitation recorded by CoCoRaHS observer reports across Southeast Texas.

Southeast Texas Regional Summary (continued)

The extreme heat we saw in June continued into July with most of the region experiencing the warmest July on record with average temperatures three to six degrees above normal. The Golden Triangle section had the start of some better rain producing storms across the area especially in Orange County. Most rainfall was confined to coastal areas where the sea breeze boundary played a big part. The western section of SE Texas baked under 100°F temperatures. The soil moisture in these areas was almost none and temperatures quickly climbed in the morning hours under clear skies. This was the main reason for the extreme heat across SE Texas. There were scattered spots that did receive a few showers, but most of the region was extremely dry. Both maps below show the areas that did get a little more rain than most. Drought conditions degraded across the region with most of the area in either Severe (D2), Extreme (D3), or Exceptional (D4) Drought.

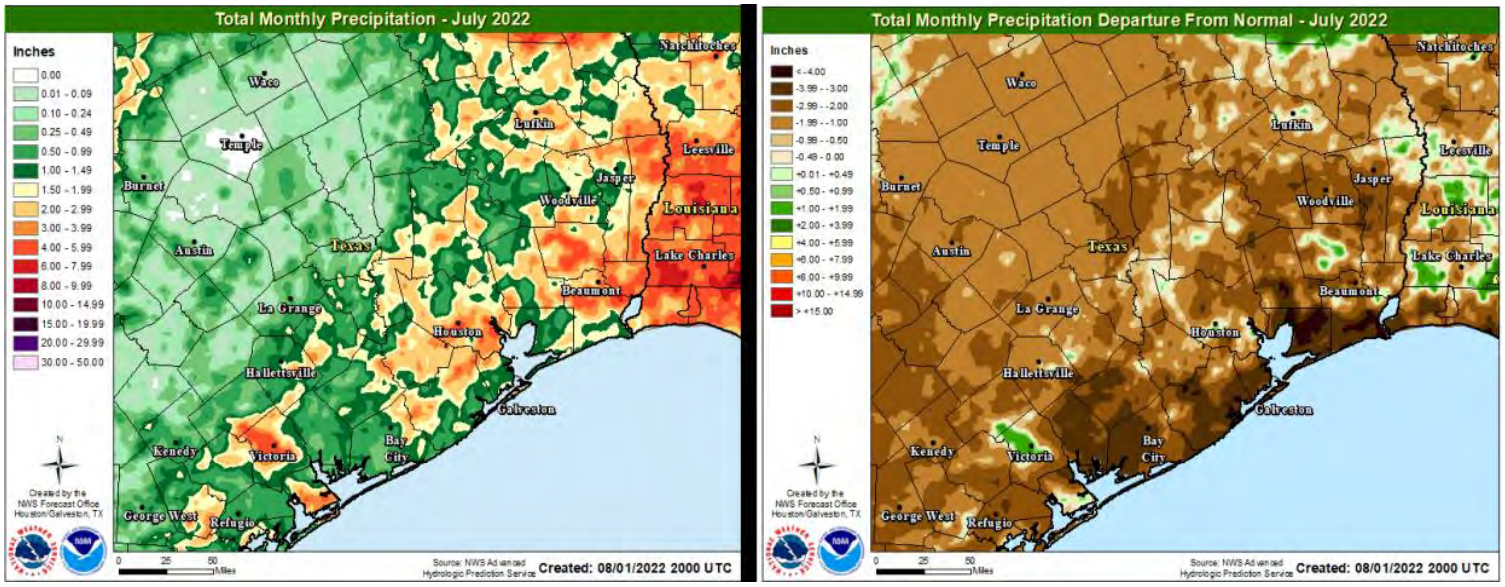


Figure 3: July Total Precipitation and Departure from Normal Precipitation across Southeast Texas.

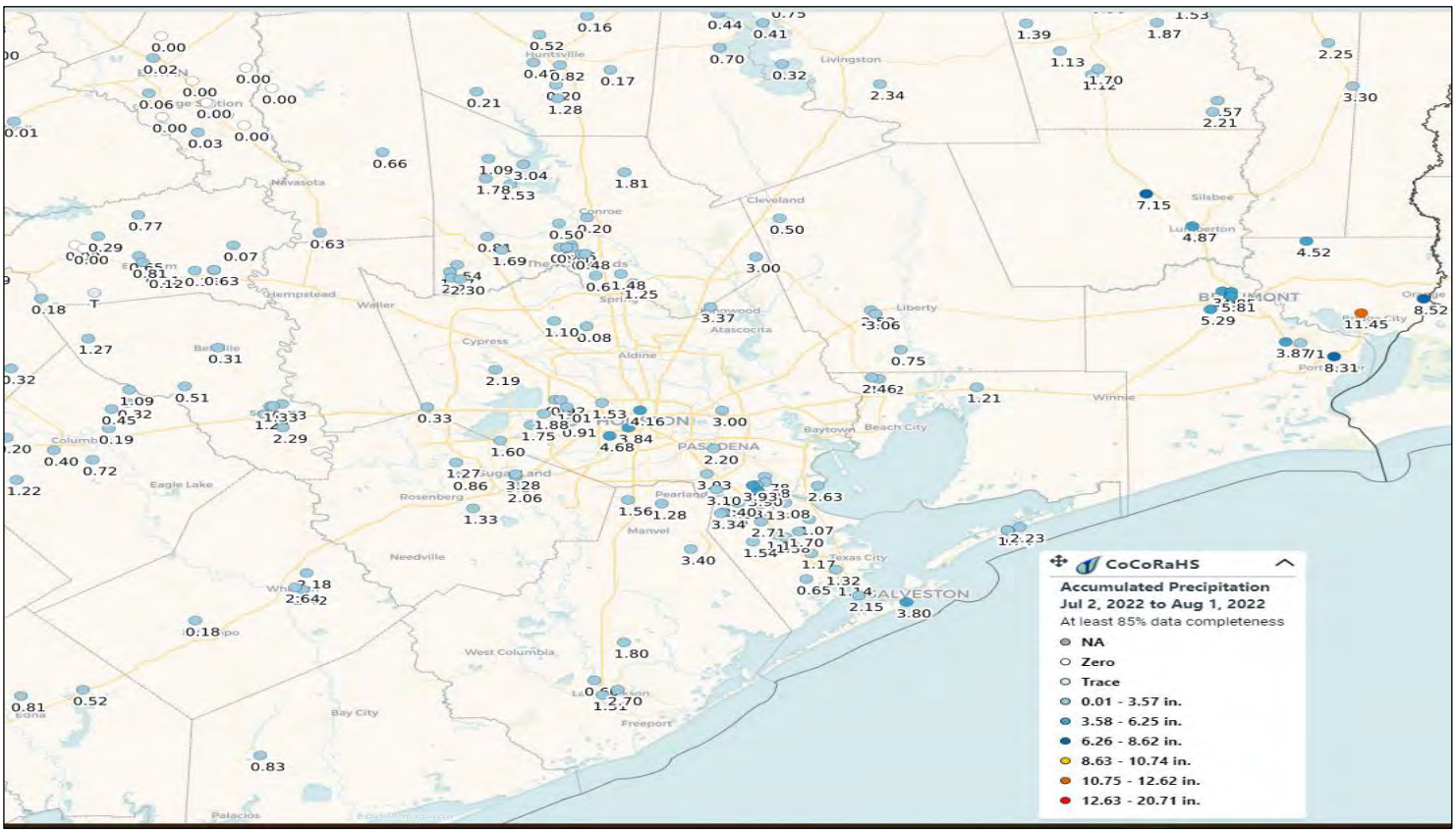


Figure 4: July Total Precipitation recorded by CoCoRaHS observer reports across Southeast Texas.

Southeast Texas Regional Summary (continued)

August 2022 was the opposite of July 2022 when it came to precipitation. While July was one of the driest Julys on record, this August was on the wetter side of the record books with most of the region receiving two to eight plus inches of above normal rainfall. The mostly cloudy skies and continued rainfall led to near normal temperatures. This combination of near normal temperatures and above normal rainfall allowed for the drought conditions to rapidly improve across the region. Exceptional Drought (D4) conditions are no longer being seen in SE Texas with some Extreme Drought (D3) persisting across the western portion of the region. Drought conditions are expected to continue to improve during September as the region remains under a wetter and cooler pattern.

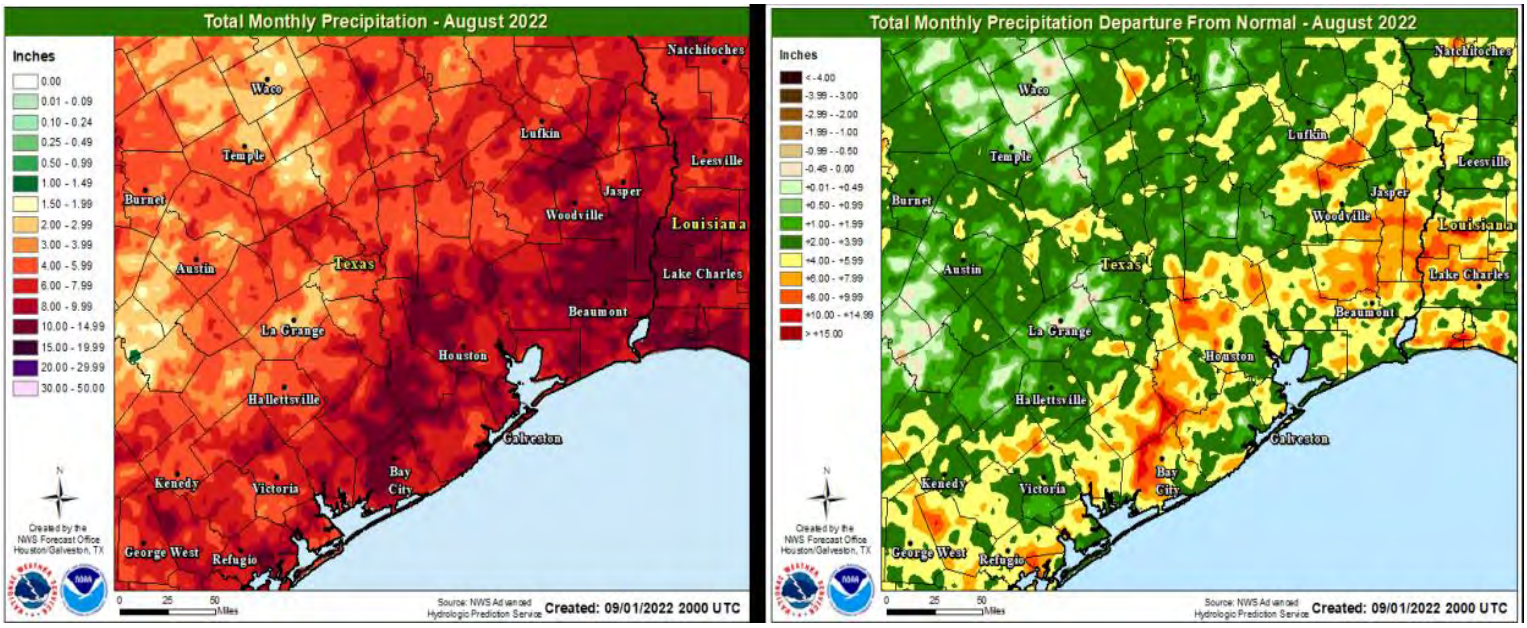


Figure 5: August Total Precipitation and Departure from Normal Precipitation across Southeast Texas.

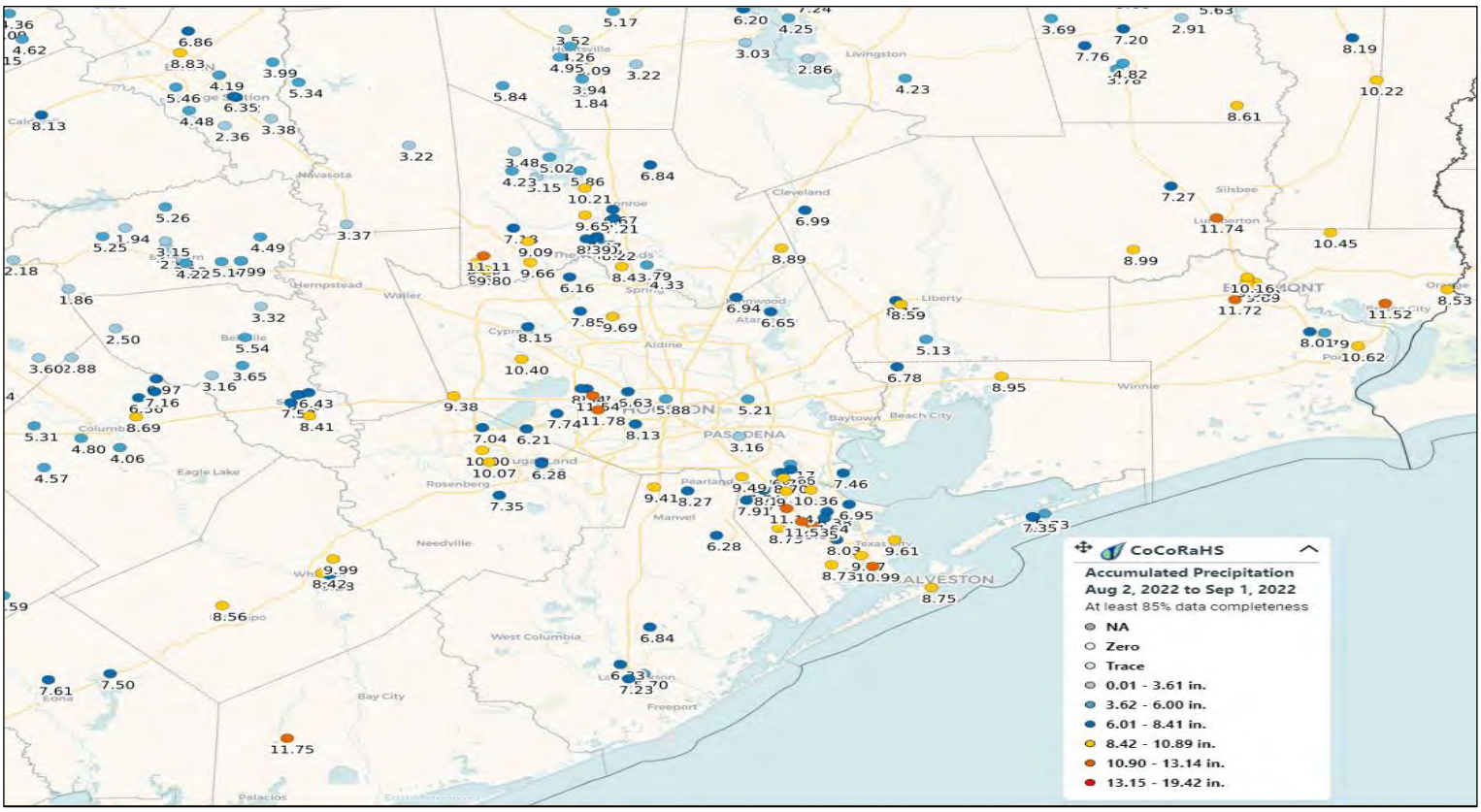


Figure 6: August Total Precipitation recorded by CoCoRaHS observer reports across Southeast Texas.

Southeast Texas Regional Summary (continued)

Summer 2022 CoCoRaHS SE Texas Houston/Galveston Section Rainfall

CoCoRaHS Station measured county rainfall averages in inches per month

County	June	July	August	Summer Total
	AVG.	AVG.	AVG.	Jun - Aug.
Austin	0.61	0.87	4.93	6.41
Brazoria	1.10	1.75	6.57	9.42
Chambers	2.04	1.72	6.55	10.31
Colorado	1.44	0.75	5.46	7.65
Fort Bend	0.54	1.54	8.03	10.11
Galveston	2.49	1.85	8.27	12.61
Harris	0.89	1.93	7.67	10.49
Jackson	2.04	0.67	7.55	10.26
Liberty	1.23	1.75	6.90	9.88
Montgomery	0.19	1.15	7.14	8.48
Polk	0.67	0.96	4.48	6.11
San Jacinto	0.26	0.57	4.70	5.53
Wharton	1.07	1.44	7.75	10.26
Region Totals	1.12	1.30	6.62	9.04

Color indicates highest avg. rainfall total for a county in a month

Color indicates lowest avg. rainfall total for a county in a month

Note: Counties without a significant # of observers reporting are not listed on the chart.

Chart 1: Houston/Galveston Section CoCoRaHS Observers average rainfall per county.

Summer 2022 CoCoRaHS SE Texas Golden Triangle Section Rainfall

CoCoRaHS Station measured county rainfall averages in inches per month

County	June	July	August	Summer Total
	AVG.	AVG.	AVG.	Jun - Aug.
Hardin	1.41	5.71	9.33	16.45
Jasper	1.17	3.51	8.29	12.97
Jefferson	5.07	5.27	9.38	19.72
Newton	No data	No data	No data	No data
Orange	4.11	6.64	9.03	19.78
Tyler	1.32	1.54	6.11	8.97
Region Totals	2.62	4.53	8.43	15.58

Color indicates highest avg. rainfall total for a county in a month

Color indicates lowest avg. rainfall total for a county in a month

Note: Counties without a significant # of observers reporting are not listed on the chart.

Chart 2: Golden triangle Section CoCoRaHS Observers average rainfall per county.

Southeast Texas Regional Summary (continued)

Houston/Galveston Temperatrure & Rainfall Data for 2022 Summer Season

	June Climate						
Site Location (record start)	Hi	Lo	Mean	Departure	Rain	Normal	Departure
Bush Airport (1888)	96.9	76.5	86.7	3.7	0.13	6.00	(-5.87)
Hobby Airport (1930)	95.7	77.2	86.4	3.5	0.35	6.09	(-5.74)
Galveston (1871)	92.7	82.3	87.5	3.7	2.26	4.23	(-1.97)
Sugar Land (2000)	96.9	75.1	86.0	2.8	0.46	4.22	(-3.76)
	July Climate						
Site Location (record start)	Hi	Lo	Mean	Departure	Rain	Normal	Departure
Bush Airport (1888)	98.5	77.6	88.0	2.9	1.35	3.77	(-2.42)
Hobby Airport (1930)	97.5	78.7	88.1	3.3	1.90	4.59	(-2.69)
Galveston (1871)	93.0	84.2	88.6	3.1	4.14	3.41	0.73
Sugar Land (2000)	99.3	76.7	88.0	2.6	1.80	4.16	(-2.36)
	August Climate						
Site Location (record start)	Hi	Lo	Mean	Departure	Rain	Normal	Departure
Bush Airport (1888)	94.4	75.7	85.1	-0.1	8.58	4.84	3.74
Hobby Airport (1930)	93.7	77.5	85.6	0.5	4.52	5.44	(-0.92)
Galveston (1871)	91.9	81.6	86.8	0.9	7.40	4.71	2.69
Sugar Land (2000)	94.3	76.1	85.2	0.2	5.41	5.27	0.14

Table 1: Temperature and Rainfall for select sites in the Houston/Galveston Section of Southeast Texas.

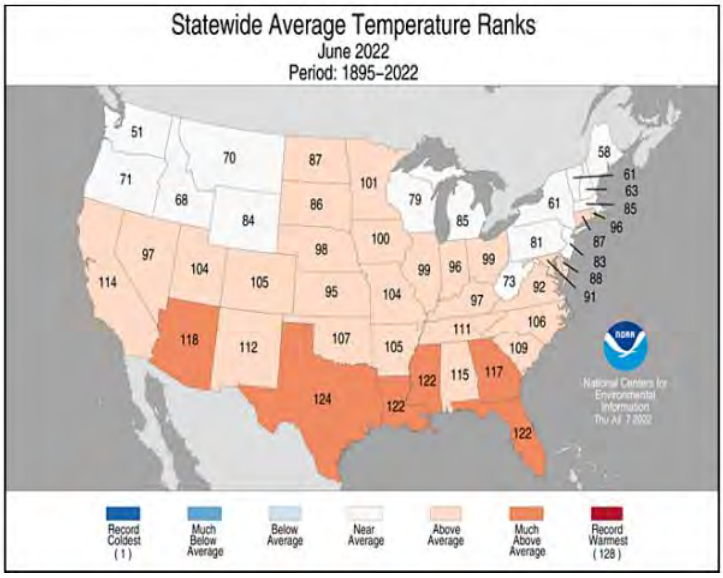
Golden Triangle Temperatrure & Rainfall Data for 2022 Summer Season

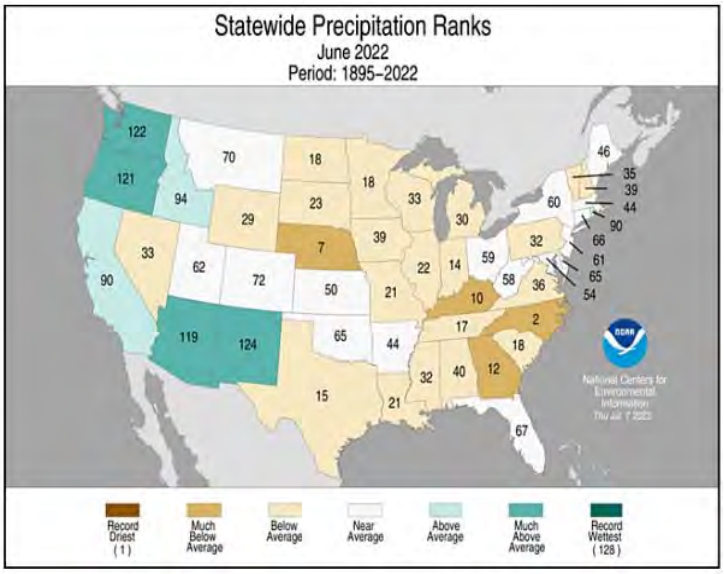
	June Climate						
Site Location	Hi	Lo	Mean	Departure	Rain	Normal	Departure
Port Arthur Airport	94.1	74.4	84.3	2.3	3.54	6.70	(-3.16)
Beaumont Research Center	94.6	74.7	84.6	3.3	0.88	7.57	(-6.69)
Orange 9N	92.8	73.3	83.1	3.8	0.36	6.84	(-6.48)
	July Climate						
Site Location	Hi	Lo	Mean	Departure	Rain	Normal	Departure
Port Arthur Airport	93.5	75.5	84.5	0.9	10.52	6.85	3.67
Beaumont Research Center	93.8	76.0	84.9	1.7	4.57	5.39	(-0.82)
Orange 9N	91.7	74.5	83.1	1.8	8.93	5.82	3.11
	August Climate						
Site Location	Hi	Lo	Mean	Departure	Rain	Normal	Departure
Port Arthur Airport	91.4	75.4	83.4	-0.4	6.73	6.89	(-0.16)
Beaumont Research Center	91.1	75.0	83.1	-0.2	9.87	6.43	3.44
Orange 9N	89.0	74.2	81.6	0.3	12.35	6.71	5.64

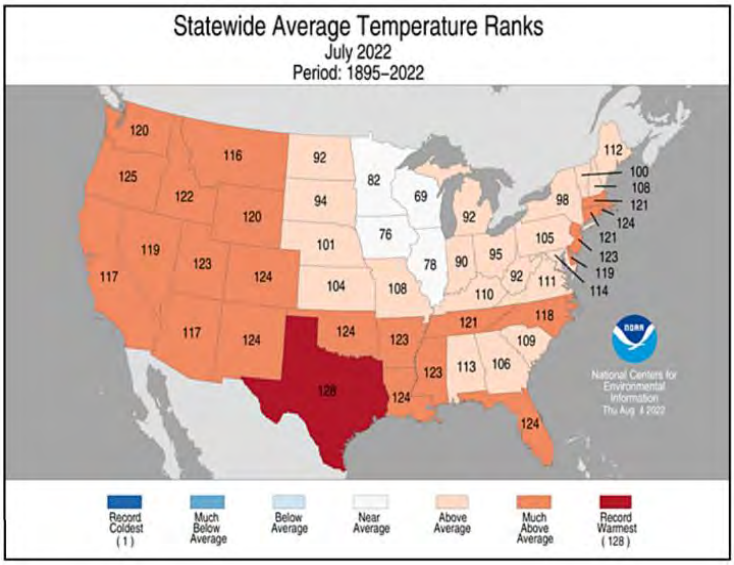
Table 2: Temperature and Rainfall for select sites in the Golden Triangle Section of Southeast Texas.

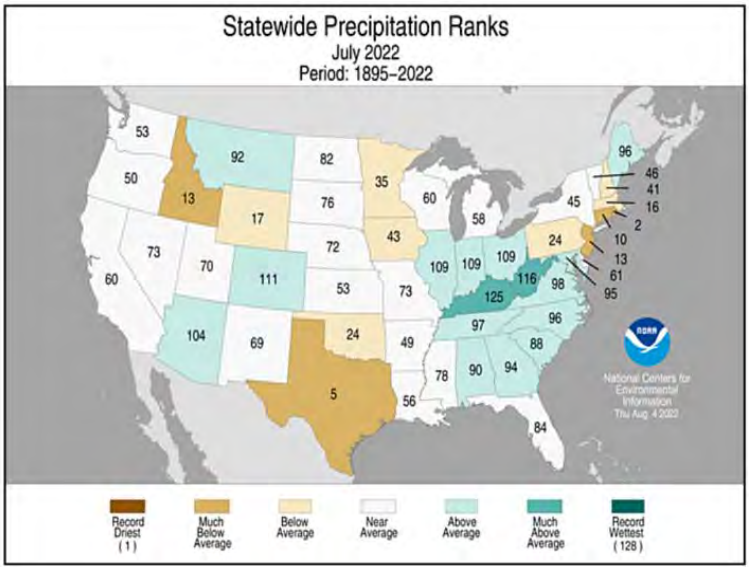
Southeast Texas Regional Summary (continued)

If you are wondering just how extreme the heat and dryness was in June and July in Southeast Texas I have provided maps below of how the heat and dryness rank in all-time recorded meteorological data from first order stations in the U.S. since 1895. Note the rankings that Texas had for heat and dryness and this gives you an idea of how extreme June and July were this summer. Thankfully mid- August began a pattern change in the upper levels that allowed storms to return to most of Texas. A special thanks to all CoCoRaHS observers across Southeast Texas for your reports of daily zeros and of rainfall amounts each morning. Your observations are extremely valuable to the meteorological forecasting and database systems that are very important to improving our life in so many ways. Please reference the latest **Drought Monitor Map as of September 1st on Page 9** that utilizes your data report each and every day.









Autumn Weather Outlook for 2022

By: Bob Rose, Meteorologist
Lower Colorado River Authority

We survived the second hottest summer in Texas history! While conditions weren't quite as extreme as the summer of 2011, summer 2022 sure seemed every bit as hot and uncomfortable. The dangerous heat was persistent in all corners of the state up until late August, when widespread clouds and rain brought about a temporary reprieve from the four-month very hot and mostly dry weather pattern.

This summer's extreme pattern can be traced in large part to the presence of La Niña going back to the fall of 2021. La Niña often causes a pattern of drier than-normal weather across Texas in the fall, winter, and spring months. Weather conditions remained drier than-normal this past winter and spring and by May 2022, a dry, parched landscape covered much of Texas. This dry landscape allowed the summer heat dome to set up early, gain strength, and persist throughout the summer.

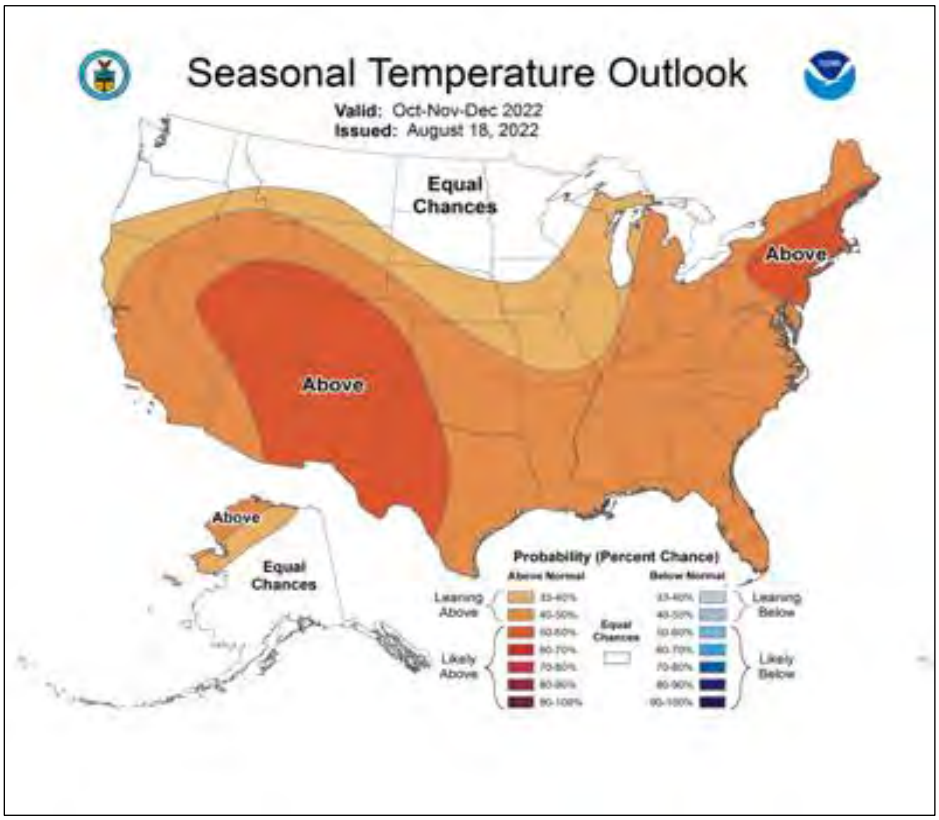
Unfortunately, the La Niña from last fall is still with us and it is as strong as it was last fall and winter. Climate Prediction Center (CPC) forecasts call for La Niña to continue this fall and even into the winter of 2023. Similar to last fall and winter, sinking air across the eastern Pacific is expected to create an area of high pressure in the upper atmosphere that will build north to Alaska and western Canada. The Jet stream coming east from Asia will be forced to bend north into Alaska and Canada instead of coming east into Texas. With the jet staying further to the north, it is expected to limit the number of storm systems that would otherwise track east across Texas through the fall and winter months. This pattern is also expected to limit the number of cold fronts and outbreaks of cooler from spreading into Texas.

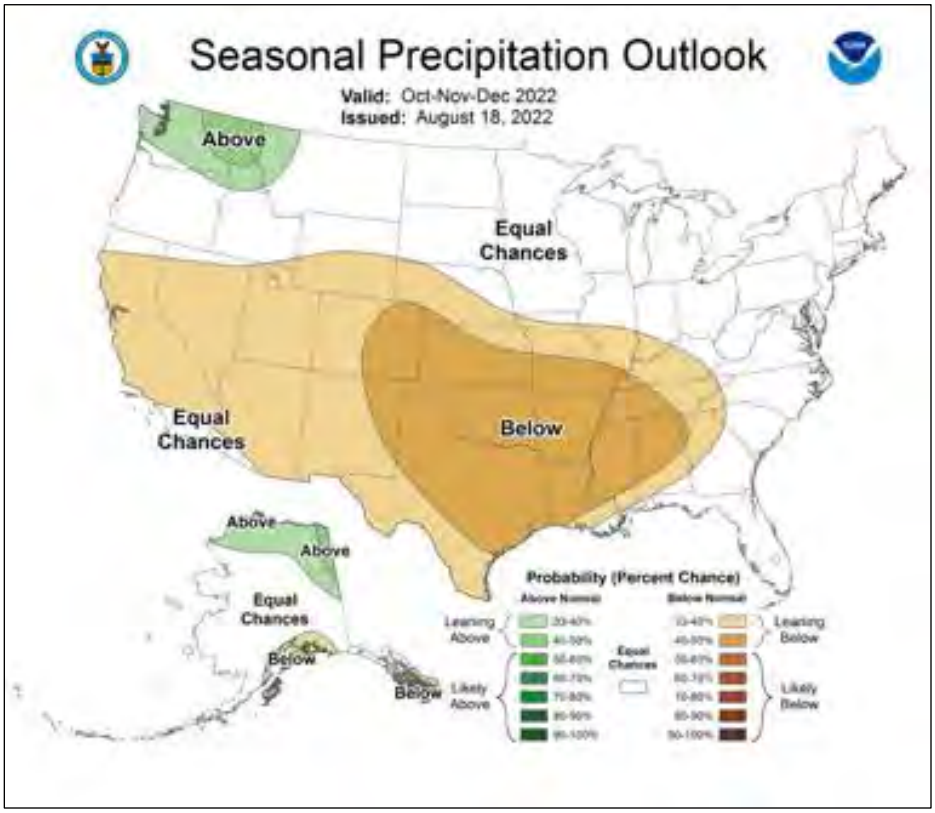
Based on the current late summer pattern with a weak heat dome still over our area, and the expected drier and warmer than-normal signal from La Niña, CPC's autumn outlook shows increased odds temperatures will average milder than-normal, and rainfall will average below-normal across all of Texas.

Autumn's cooler, pleasant temperatures may be slow to arrive this year as cold fronts will have a hard time making it through Texas. Warm temperatures are forecast to persist through September and much of October. While several cold fronts will eventually press into the state, the cool air isn't expected to remain in place for extended periods. Meanwhile, drought conditions are forecast to expand and grow worse this fall as rainfall generally remains below normal.

Do keep in mind that every La Niña event is different as other oscillations in the oceans and atmosphere can at times overwhelm the typical milder than-normal and drier than-normal La Niña response. In addition, activity from the Atlantic and eastern Pacific Oceans could still potentially affect Texas weather into November.

Autumn Weather Outlook for 2022 (continued)





Climate Prediction Center Temperature and Precipitation Outlook for period of October-November-December.

Observer Tips, Information & Training Material

By: Ron Havran, CoCoRaHS Assistant State Coordinator

Entering Observations One or More Days Late

CoCoRaHS prefers you enter your observation each day but realize that's not always possible. Some observers don't use their computer each day and so will go back and enter data for the last week or two weeks when they get the opportunity. If you do this, please be careful when entering your data. Please write down your observations and dates. When you log in, the Daily Report form will have today's date. When entering your data, it's probably best if you start with the most recent and work backwards. You have to pull up a new Daily Report form to enter each observation, and it will have today's date. Be sure you enter the correct date for the correct observation

"Catching up" on data entry is a large source of errors in the CoCoRaHS database. If you are not careful it can result in a number of errors in CoCoRaHS data, including:

- **False Zeros** - A zero is entered on a day when all surrounding stations had precipitation. Perhaps the zero was meant for the day before or the day after. This also sometimes occurs due to checking the wrong date on the Monthly Zeros form.
- **Day Shifting** - Precipitation is entered for the day it occurred, not the day it was measured. For example, an observer notes that rain fell on Wednesday afternoon, and reports it for Wednesday, instead of Thursday, the day it was measured. Or, observers accidentally transpose one day with another. Either way, often the red flag for this is a station has precipitation when all surrounding stations have none, or they have no precipitation when all surrounding stations have significant precipitation.
- **Multi-day accumulations entered on the Daily Form** - If you have a precipitation amount that was accumulated over two or more days, be sure to use the Multi-Day Accumulation form and NOT the Daily Report to enter your data. After you log in, select Multi-Day Accumulation in the left-hand menu under **Enter My New Reports.**

Finally, please go back and double-check that everything was entered correctly. It only takes a minute using the Station Precipitation Summary.

Don't Be "Dewped" by Dew

Now that we are into fall we'll have more days with warm afternoons and cool nights. Dew formation becomes more common, especially on those clear, cool 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. You're certain it didn't rain, so what to report?

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. Zero is the correct report. 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!

Observer Tips, Information & Training Material (continued)

Zeros and Drought

Drought is a fact this summer in Texas. Knowing where it has not rained is as important as knowing where it did rain when it comes to monitoring the development and decay of drought. The many users of the observations you take and enter into the CoCoRaHS database appreciate the efforts that you make to report your rainfall. Every report is important, even on the days it does not rain or only rains in a few spots. That is especially true this time of year, when showers and thunderstorms can drop vastly different amounts of rain across short distances. The missing observations leave more questions than answers as to what occurred at your location. This data is then not useful for determining the total amount of precipitation for the month at your location.

The reports of zero rain are just as important as the reports of two inches of rain. Zeros are a measurement - it means "I observed that I had no precipitation." In other words, if you do not report on a day we cannot assume zero. It takes only seconds to enter that zero report. If you haven't been on the computer for a few days and need to enter zero reports, an easy way to do this is with the Monthly Zeros report. Select this report, and just check the box on the days on which you had zero. Hit Submit, and you're done! The Monthly Zeros report is not available on the mobile app.

The Importance of Significant Weather Reports

With all of the heavy rain events this summer I want to reiterate the importance of Significant Weather Reports. Significant Weather Reports submitted by CoCoRaHS observers are a huge help to the National Weather Service. All SWRs are automatically routed to your NWS office, and forecasters use these reports to monitor the progress of storms. This is one way observers can provide useful data in real time. Questions we get from time to time are "What is significant weather?" and "How often should I submit a Significant Weather report?" First, Significant Weather Reports are supplementary reports and DO NOT replace your Daily Report nor should it be submitted in lieu of a Daily Report. The SWR is great for updating rainfall after your regular observation time. You should not be updating your daily report once it is submitted, except to make a correction or add additional information.

What is "significant weather"? In general, it is heavy rain (falling at a rate of an inch an hour or more), flooding, high winds, damage from storms, icing from freezing rain, or snow accumulations. However, you are not limited to this list - use your best judgment. How often should you report? You should report as often as needed to convey what is happening. Comments included with your Significant Weather report are very useful. Significant Weather Reports can only be submitted on the web. The option is not yet available on the mobile app.

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.

Scheduled CoCoRaHS Webinars

Upcoming WxTalk Webinars:

Webinar #83 - **October 20, 2022 1PM EDT**

The Graphics Boom – How Not to Go Bust

Todd Glickman, Craig Allen
WCBS Radio
New York, NY

The first TV weather graphics systems were introduced in the early 1980s. At the 14th AMS Conference on Weathercasting in Clearwater Beach, FL (June 1984), Todd Glickman gave a presentation that suggested best practices TV weathercasters could use to keep their audience engaged, primarily using radio weathercasting techniques. Now 35 years later, TV weathercasters show on-air sophisticated model presentations, high-resolution radar displays, and present forecasts farther into the future. But what has not changed is that they are challenged with telling a story that their viewers will understand, appreciate, and remember. In this presentation, we'll look at techniques to best connect with the viewer – and surprise! – In this regard, not much has changed.

Webinar #84 - November 2022

Flood Warning Systems
Mark Moore
National Hydrologic Warning Council

Texas CoCoRaHS Observer

The official newsletter of Texas CoCoRaHS

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