TEXAS CoCoRaHS OBSERVER

Summer 2024

Vol. 10 - 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 Summer Weather Summary

Texas State Summary
John Nielsen-Gammon, Texas State Climatologist
Texas A&M University

Did that seem like a normal summer to you?

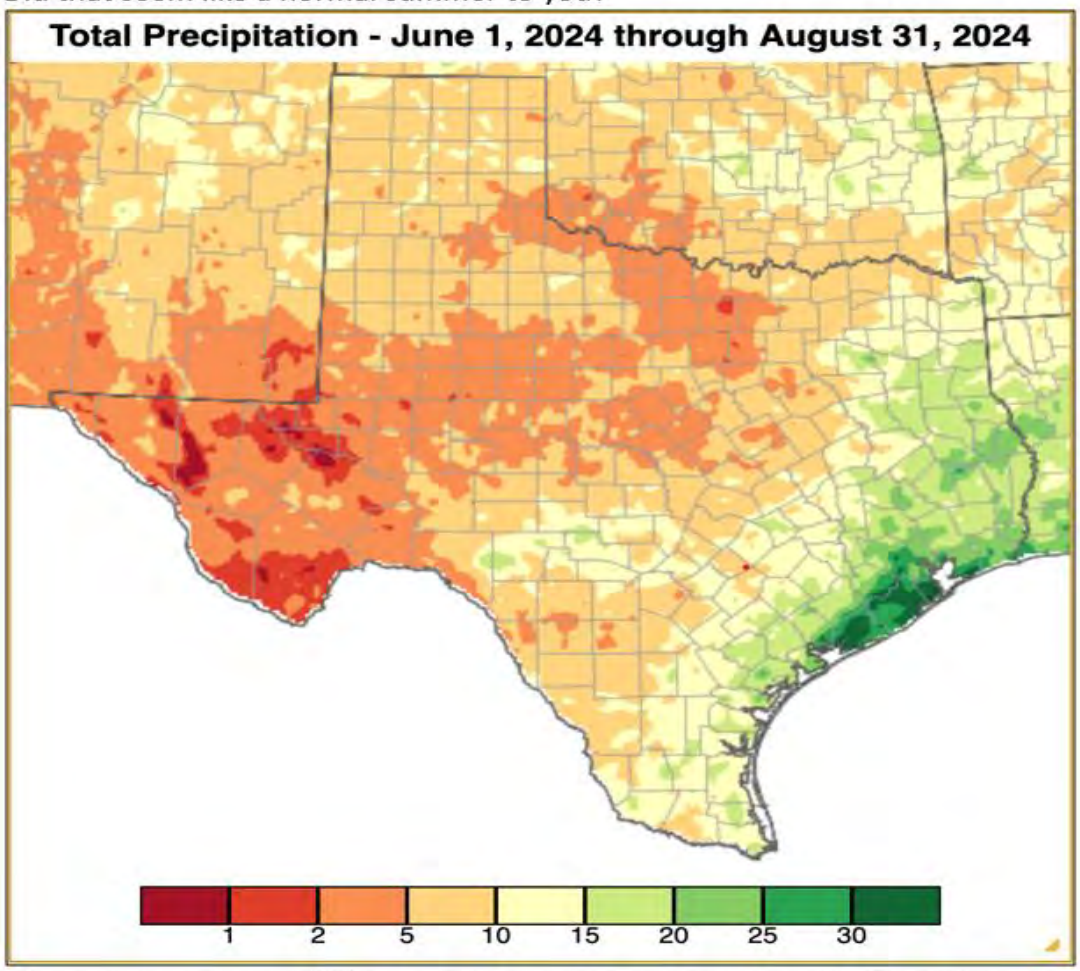


Figure 1: June-August 2024 precipitation (inches), generated by SC-ACIS from Oregon State University PRISM analyses.

As far as rainfall goes, it was actually the *normalest* (is that a word? it should be a word) summer since 1995.

Continued page 2 >

Texas Summer Weather Summary (continued)

Normal rainfall averaged across the state of Texas is 8", and the summer of 2024 came in at 7.77". But, as is normal for Texas rainfall, it wasn't evenly distributed across the state. Coastal regions saw up to 35" or so, while several locations came in less than 2". That includes parts of the Dallas-Fort Worth metropolitan area, which normally (there's that word again) are much closer to the statewide average.

It seems like the last several summers have been unusual, and for me this summer felt unusual too. Yet it was normal! To try to figure out how it could be both normal and unusual, I plotted the previous sixteen summers (from 2008 through 2023) onto a postage stamp plot:

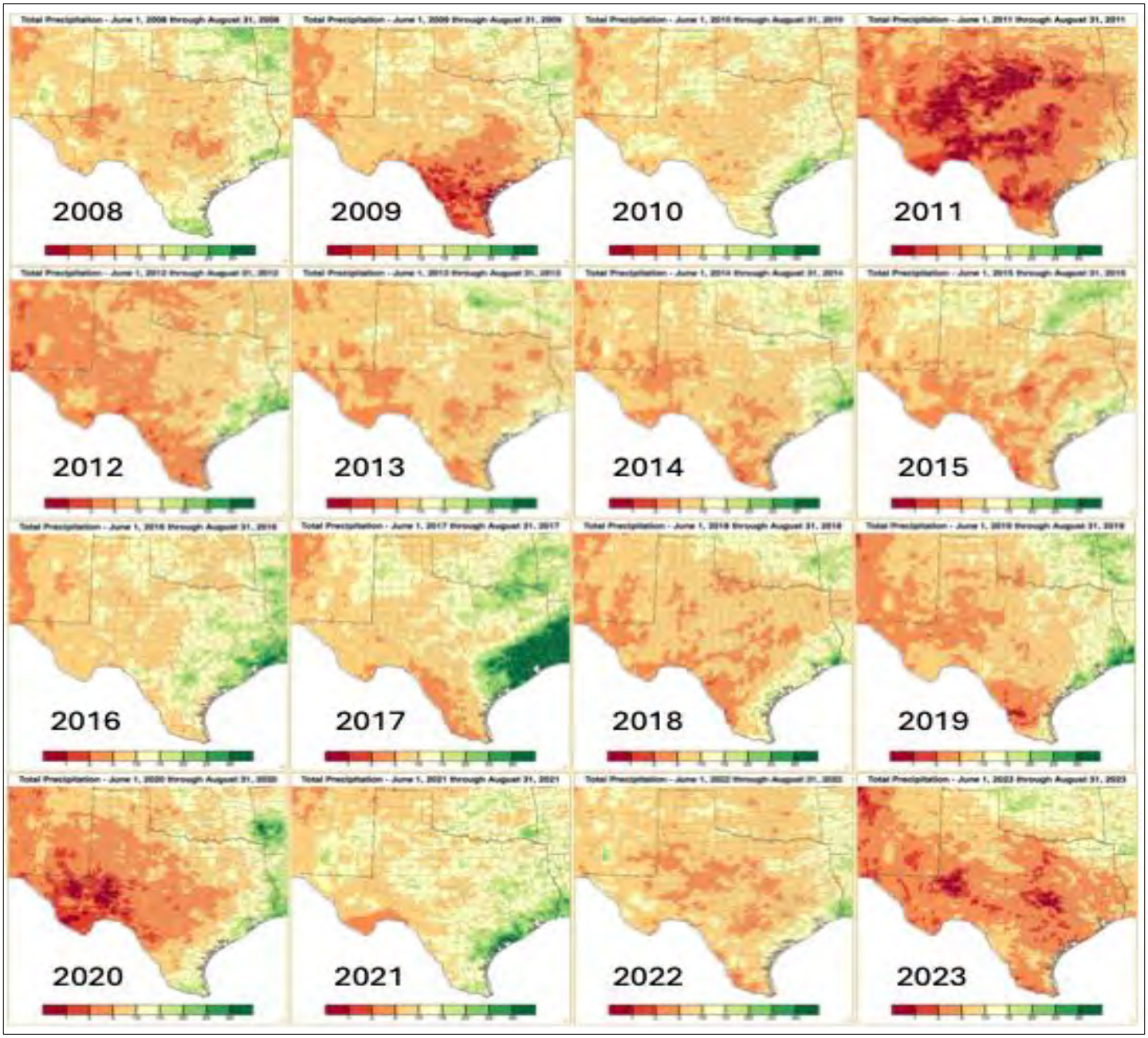


Figure 2: Maps of the precipitation distribution across Texas for each of the past sixteen summers, generated by SC-ACIS from Oregon State PRISM data.

Texas Summer Weather Summary (continued)

Wow, 2011 was sure dry, wasn't it? The drought of 2011 certainly stands out on a statewide basis, but there were a few other years that rivaled it in certain locations, such as 2009 in South Texas, 2020 in West Texas, and 2023 in both West Texas and Central Texas. By comparison, 2024 was also quite dry in West Texas, but also featured quite a bit of rainfall in Southeast Texas, partly associated with Hurricane Beryl. That contrast, from extreme wet to extreme dry in the same summer, does indeed seem unusual historically: none of the previous sixteen years had such large variations. Well, unless you count the 50"-60" inches from Hurricane Harvey in 2017. Harvey was a one-person rainfall contrast machine.

The summer of 2011 was the driest summer on record for Texas. For the wettest summer on record, we only have to go back one more year, to 2007.

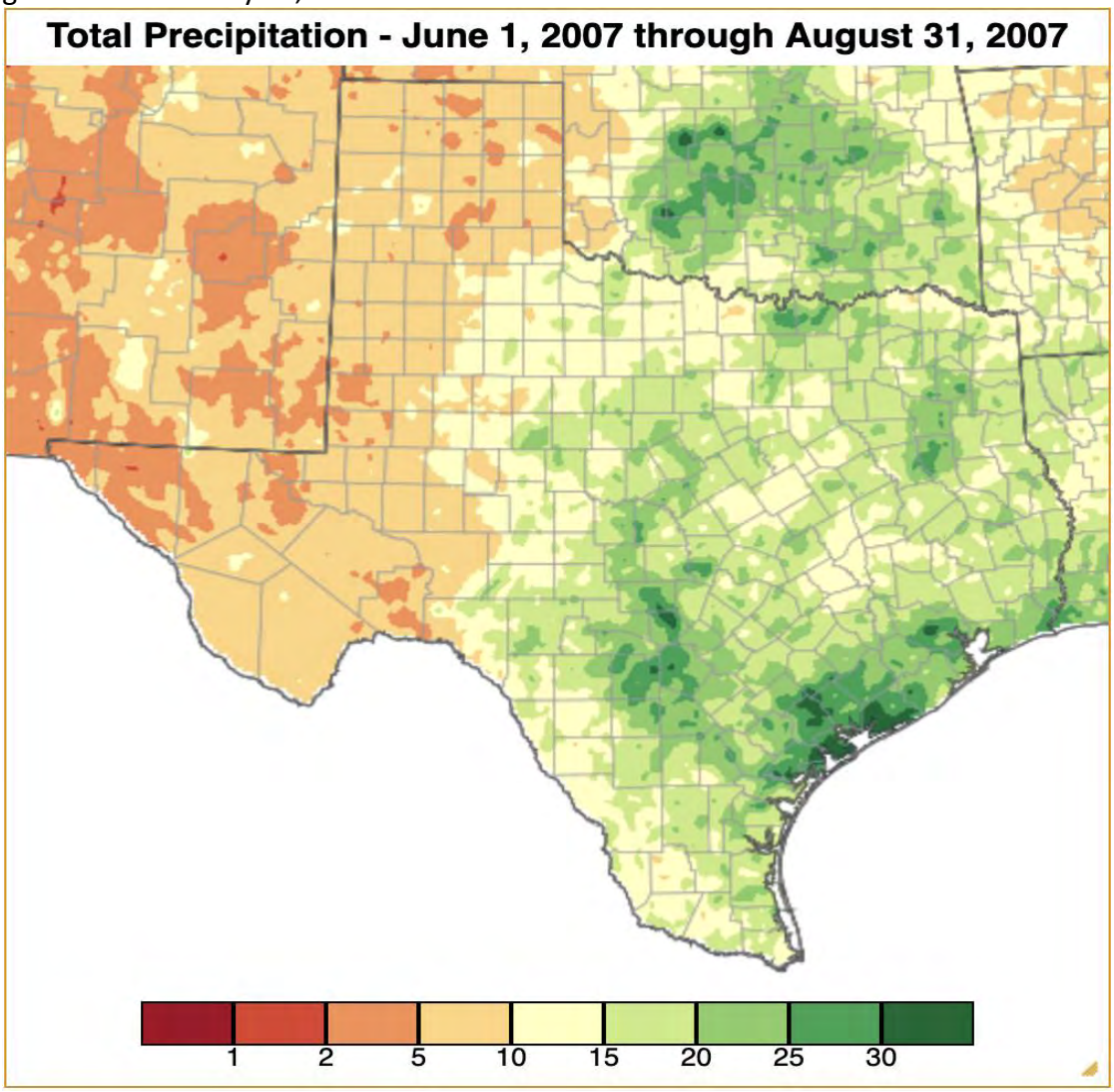


Figure 3: A map of summer 2007 Texas precipitation, generated by SC-ACIS from Oregon State PRISM rainfall analyses.

Now that was a wet summer! Summer 2017 came close, but because of Harvey it didn't have nearly the equitable distribution of rainfall.

There's one other way that the weather of summer 2024 was unusual. It was tied for the sixth hottest summer on record. That's not unusual by itself, especially in the context of climate change, but it was the wettest of all summers that had top 20 heat. So this summer was exceptional for its combination of heat and rainfall.

Amarillo Regional Summary

June 19, 2024 Flood event from Texhoma to Guymon

By: Angela Margrave, WFO Amarillo, TX

Overview

A slow-moving cold front moved south out of Kansas into the northern Panhandles during the evening of June 18 into the morning of June 19, 2024. The cold front along with upper-level dynamics and abundant moisture throughout the atmosphere, combined to form a line of showers and thunderstorms across the northern half of the Panhandles, in particular for the Oklahoma Panhandle. Due to weak flow aloft, the storms moved very slowly and when attached to the cold front, were able to keep moving over the same locations for hours at a time. With moisture near or above the climatological maximum in place over the Panhandles, the stronger thunderstorms were able to produce rainfall rates upwards of 3 to 4 inches per hour at times. With these rain rates and several hours of rainfall occurring at some locations, rainfall totals upwards of 5 to 9 inches were recorded across the north central Texas Panhandle into Texas and Beaver counties of the Oklahoma Panhandle. A majority of this rainfall fell in 1 to 2 hours, which maximized the flash flood potential. This resulted in many roads were closed or completely washed-out, high-water rescues were performed due to stranded motorists, and many citizens woke up to feet of water outside, and in some cases inside, their homes. Additionally, some of these storms were able to take advantage of the unstable airmass across the Panhandles and produced large hail and damaging winds. Although many hail reports ranged from penny to quarter size, some locations did have hail upwards of 2 to potentially 2.5 inches (tennis ball) across the same areas that received historic levels of flash flooding.

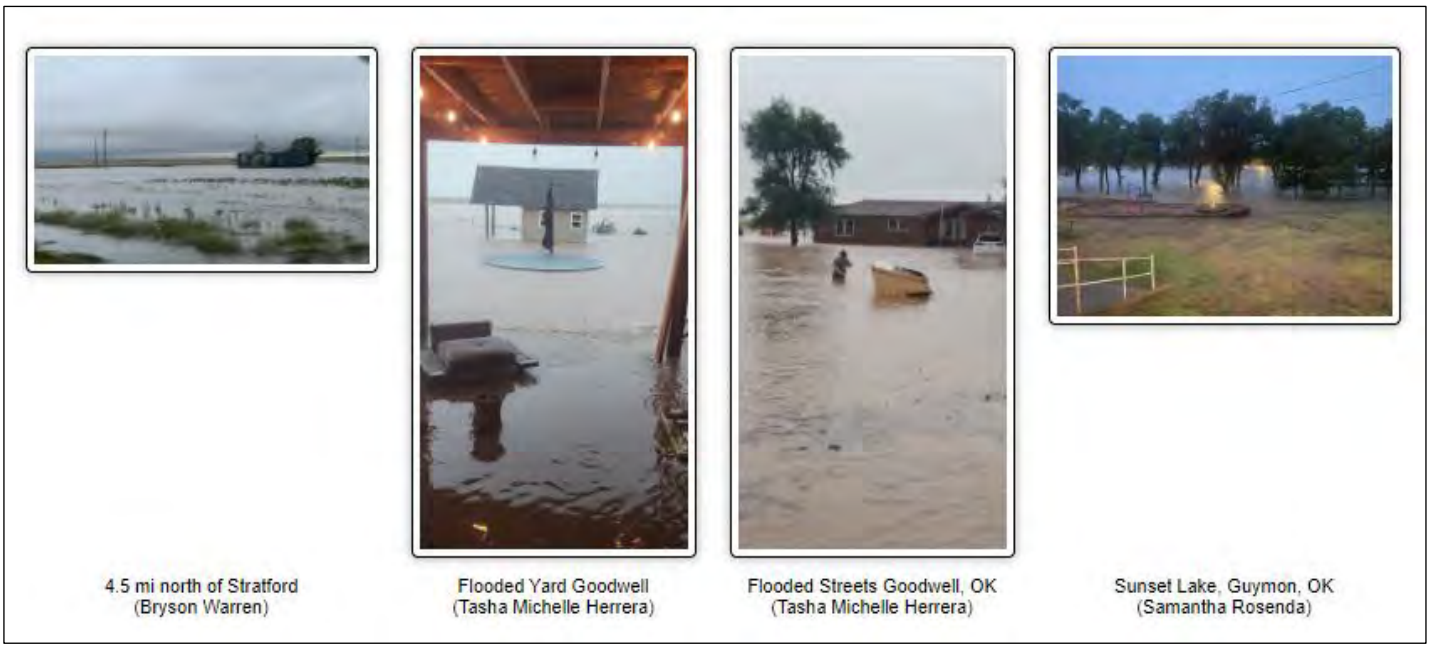


Figure 1: Pictures of flooding from Stratford, Goodwell, and Guymon.

Amarillo Regional Summary (continued)

Passing through Goodwell, OK
(Jocelyne Gomez)

Panhandle State University, Goodwell, OK
(Jennifer Brdar)

HWY 54 Outside Goodwell
(Jason Strick)

Sunset Lake, Guymon, OK
(Dakota Gomez)

Figure 2: Pictures of flooding from Goodwell and Guymon.

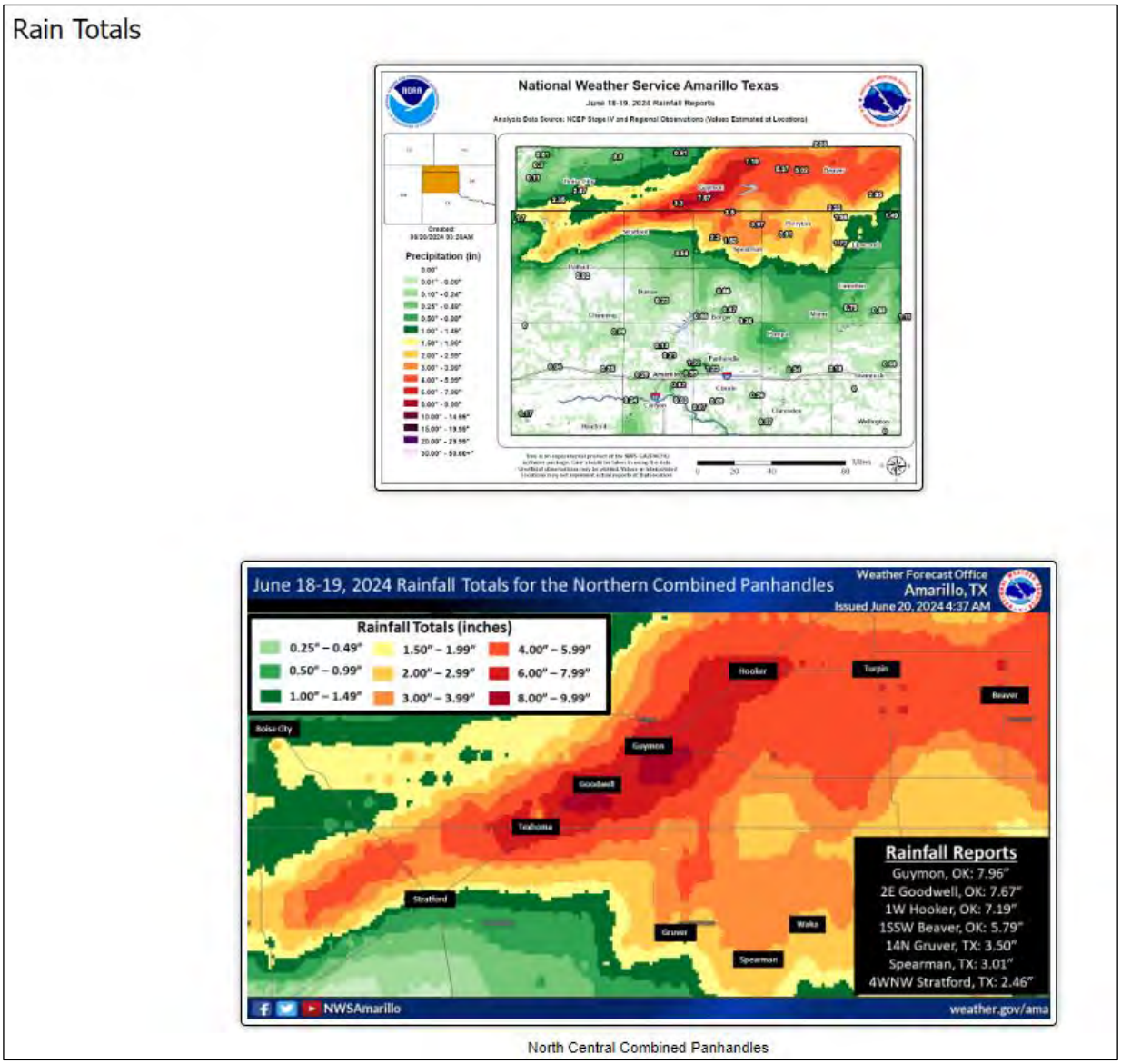


Figure 3: Rainfall totals from event.

Far West Texas/El Paso Regional Summary

Drier-Than-Normal Season as Monsoon Rains Miss West Texas

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

After a historically hot and dry 2023 summer season, the 2024 monsoon has been a close repeat for far west Texas. The subtropical high aloft focused over central Texas several times throughout the season, pushing the main plume of monsoonal moisture further west and aligning more consistently with eastern Arizona, northern New Mexico, and the Four Corners region. Precipitation analysis shows 90-day rainfall totals much closer and even above climatological normals in those areas. El Paso and Hudspeth Counties aligned more closely with the rest of west Texas where suffocating high pressure aloft led to lack of consistent July and August rainfall and a below-normal finish to the season. Thunderstorm chances were short-lived and isolated in coverage when they did occur. Nearby outflow boundaries which would typically lead to greater storm coverage instead resulted in blowing dust due to the lack of sufficient moisture and instability.

Far west Texas sites only recorded 10 to 15 days with measurable precipitation throughout the entire season, with 90-day precipitation totals ranging from **1.50-3.00”**, well below the 4.00” climate normal. Most locations in far west Texas finished with around **30-60%** of expected rainfall.

Figure 1: Spotty rain showers fall over east El Paso, TX with the sunset as a backdrop on August 13th, 2024

Far West Texas/El Paso Regional Summary (continued)

This summer was the second hottest on record for El Paso, surpassed only by last year. An average high temperature of **100.4 degrees** and **54 triple-digit highs** were recorded. The hottest day of the year occurred on June 13th, with a high temperature of **109 degrees** in El Paso. Drought conditions remained more or less the same throughout the season, with the U.S. Drought Monitor status ranging from Severe (D2) to Extreme (D3) Drought.

The monsoon season began on time in late June this year, just days after historic wildfires devastated the town of Ruidoso, New Mexico. Strong thunderstorms formed across much of Hudspeth County on June 19th, creating a large haboob and moving all the way to Arizona. Additional days of scattered thunderstorms occurred on June 26th and 30th, with highly variable rainfall totals across El Paso County. One observer in east El Paso recorded a one-day total of **1.21”**, the highest report of the month. Monthly totals ranged from **0.10-0.50”** with localized higher amounts.

A wet start to July didn’t last long. Most of far west Texas saw rainfall the evening of July 2nd, generally resulting in **0.25-0.50”**. The next couple weeks were quite dry as the region fell behind on seasonal normals, only isolated thunderstorms occurred and precipitation was quite light. Storm coverage improved the latter half of the month, with measurable precipitation across El Paso County on July 20th, 21st, and 29th. Monthly totals ranged from **0.75-1.25”** with localized higher amounts.

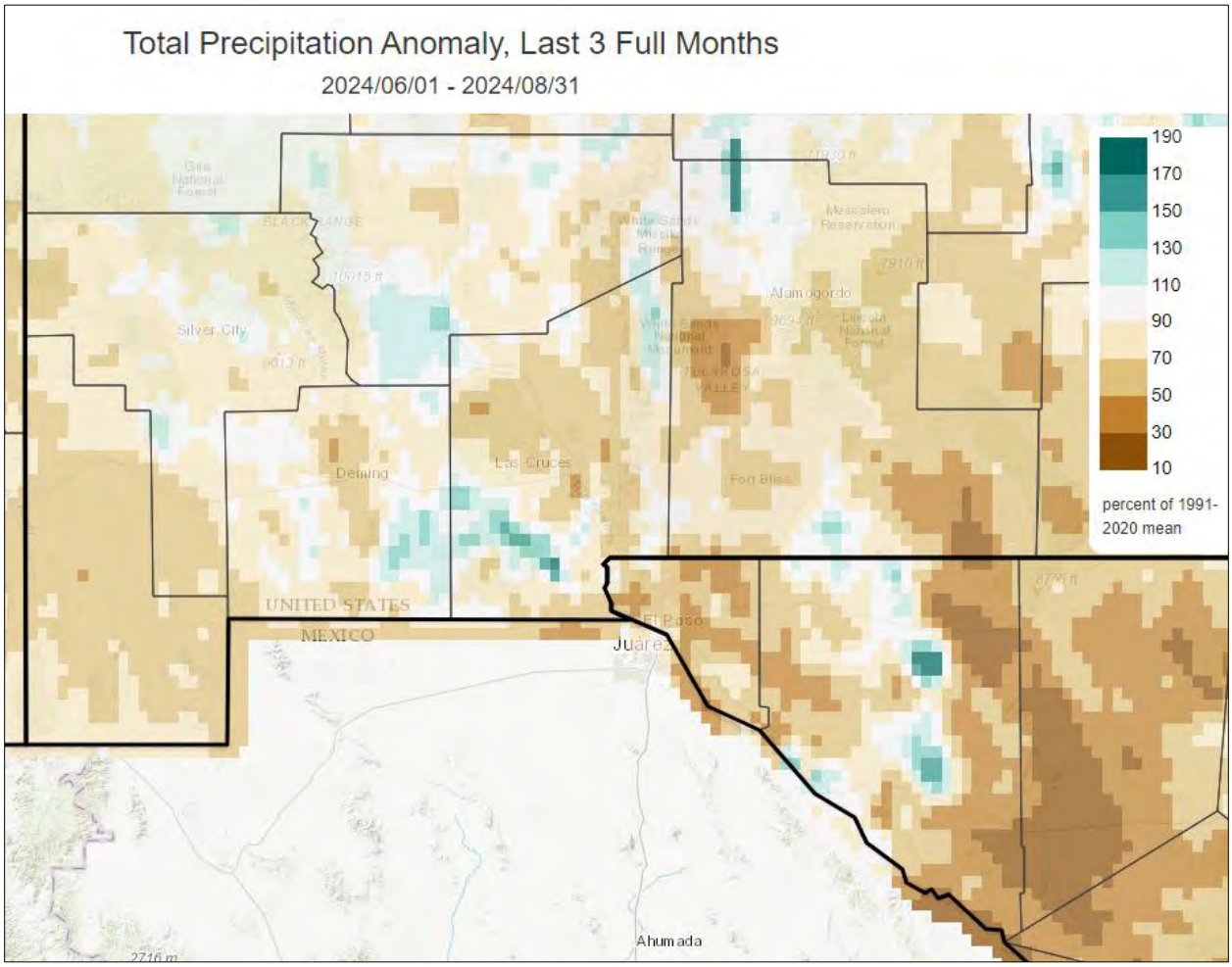


Figure 2: 90-Day Precipitation Percent of Normal for southern New Mexico and Far West Texas

Far West Texas/El Paso Regional Summary (continued)

Hot and dry weather dominated the weather pattern through the first two weeks of August. Most observers didn't see rainfall until August 13th and 15th. Excessive rainfall from thunderstorms led to urban flooding in El Paso those days, with one observer in central El Paso capturing **1.09"** of rain in just a few hours. The most severe flood of the monsoon season occurred on August 30th in downtown El Paso. **1-2"** of rain fell with a slow-moving storm, causing I-10 to shut down and multiple vehicles to become submerged. Eastern Hudspeth County missed out of virtually all rainfall, leading to an upgrade in drought status. Monthly totals ranged from **0.50-1.00"** with localized higher amounts.

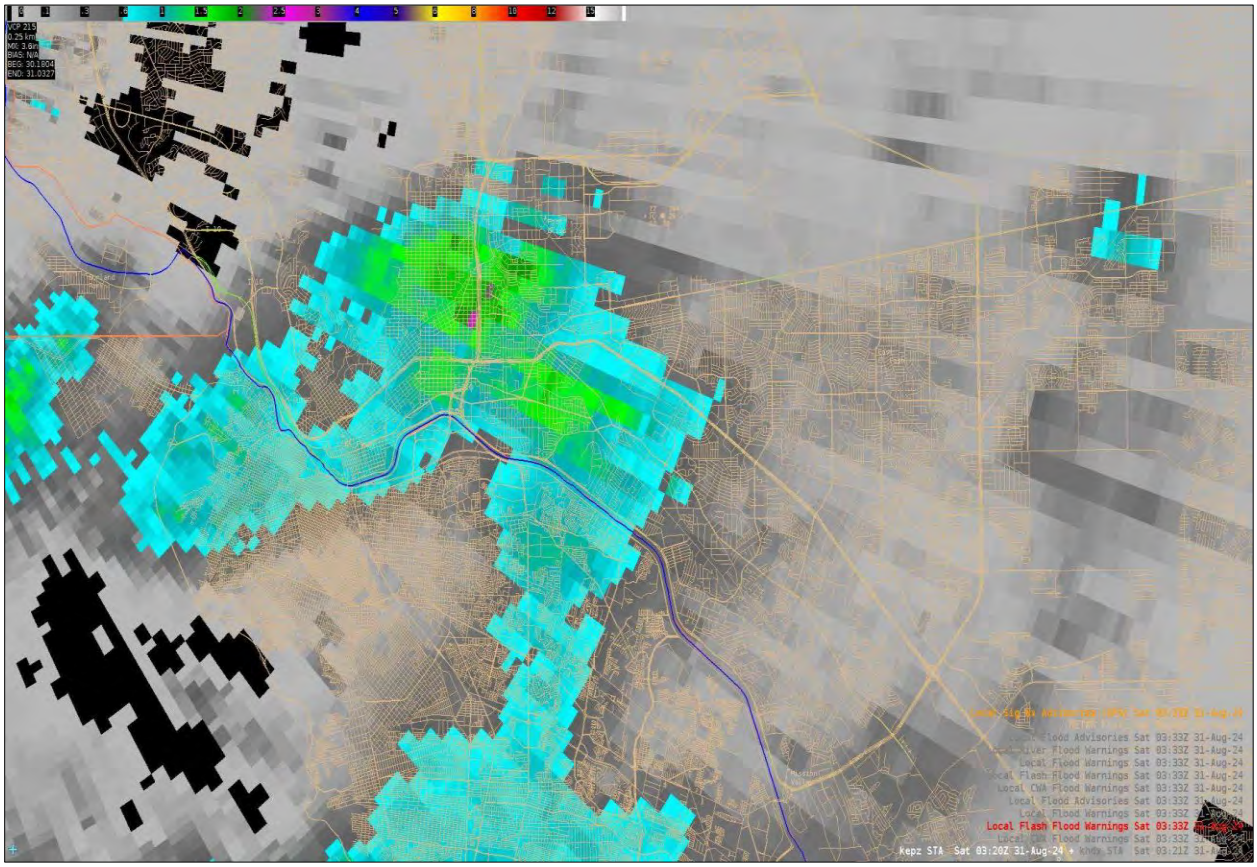


Figure 3: Dual-pol radar rainfall estimates in central El Paso this evening of August 30th. 1.5-2.0" (green shades) caused severe street flooding and the temporary closing of Interstate 10.

The summer season featured 39 active observers in El Paso County, and 2 in Hudspeth County. This monsoon season garnered a total of 1,992 daily reports submitted, along with 40 multi-day reports. Only 17% of these daily reports were measurable precipitation, so thanks to everyone for reporting zeroes. No Significant Weather Reports or Condition Monitoring Reports were submitted this season. Thanks again to all our local observers who participated in the 2024 summer season!

North Texas Regional Summary

Variable Rainfall Across the Region

By: Greg Story, North Texas CoCoRaHS Regional Coordinator

Greetings CoCoRaHS observers from the North Texas Regional Coordinator! In this newsletter article I like to review the weather from the past several months, emphasizing the importance of your weather observations in letting the users of CoCoRaHS data know the amount of rain that actually fell.

Reviewing the weather of the past several months, in January we started 2024 with above normal precipitation for much of eastern and southern Texas, as well as the western parts of North Texas. Only Southwest Texas had below normal precipitation. In February the weather pattern turned drier. Much of Texas had near to below normal precipitation, with only parts of South Texas observing above normal rainfall. In March there was above normal rainfall from north central into Northeast Texas, as well as over parts of Deep South and Southeast Texas. Only Southwest Texas and the Texas panhandle saw below normal precipitation. In April all of northern and eastern Texas saw above normal rainfall, as well as portions of the Texas panhandle. Some parts of Southeast Texas received much above normal rains. In May all of northern, central and eastern Texas had above normal rainfall. And some locations in Central and Southeast Texas picked up much above normal precipitation. In June the weather started to dry out after the wet spring season. The rainfall was above normal over northeast Texas and Deep South Texas. The precipitation was below normal from the western parts of North Texas down into Southwest Texas. Near normal rainfall was observed elsewhere. In July it turned wet again over parts of the state. Above too much above normal rainfall was noted over central and Southeast Texas. Meanwhile, much of Northwest and Southwest Texas saw below normal precipitation. In August most of Texas had below normal rainfall. Only the Northwest Texas Panhandle saw above normal precipitation.

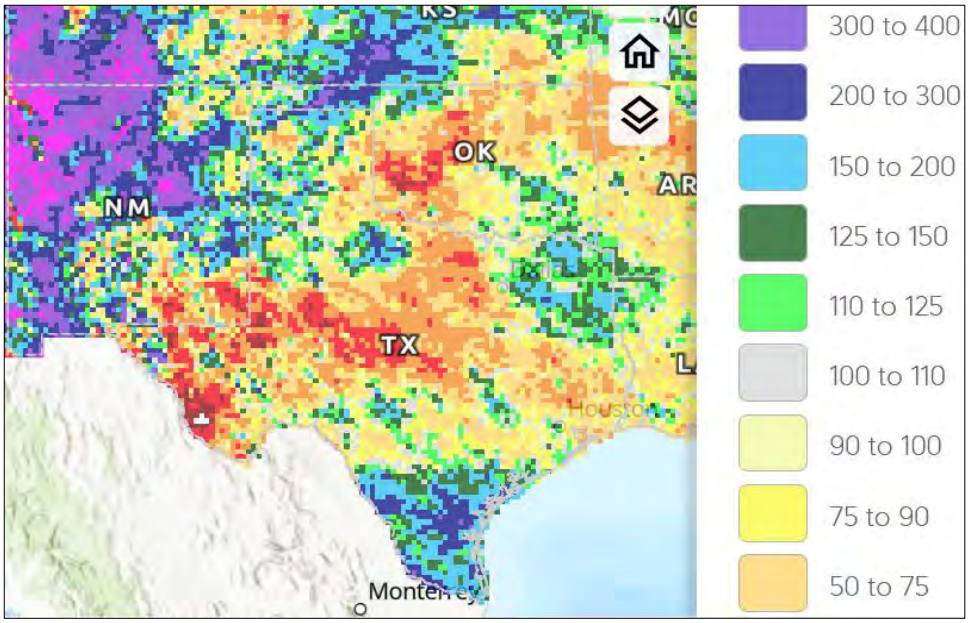


Figure 1: Percent of normal precipitation map for June 2024. The dark green, blue and purple colors indicate above normal precipitation; the beige, yellow and light green colors indicate near normal, while the orange, red and dark red colors indicate below normal precipitation.

In June the rainfall was above normal over northeast Texas and Deep South Texas. The precipitation was below normal from the western parts of north Texas down into southwest Texas. Near normal rainfall was observed elsewhere. At DFW airport in June 2024 observed 3.67”. The normal amount of precipitation in June at DFW is 3.70” so this is near normal at -0.03” for the month. In Waco for June 2024, rainfall was 0.93”. Normal amount of precipitation in Waco in June is 3.35”, this is -2.42” below normal.

For each month, I will highlight the more significant weather events. I know I am giving you a lot of information, and it is my intent for you to pick your “favorite” storm or to look at a particular date each month to see what happened. Which days did you report your heaviest precipitation amounts? You can read about those days here and compare what you observed against the maximum amounts.

North Texas Regional Summary (continued)

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

June 1:
A complex of thunderstorms developed over the western parts of North Texas during the late morning on the 1st, then got stronger and moved across eastern Texas through the afternoon and evening. The heaviest rain in North Texas on the 1st was south southeast of Flower Mound with 2.14" and at Justin with 1.56". Elsewhere in Texas there was 5.86" northwest of Bridge City and 4.20" north northeast of Palacios.

June 2 - 3:
Yet another complex of thunderstorms moved out of Oklahoma into Texas the afternoon of the 2nd. In North Texas on the 2nd the heaviest rainfall was north northeast of Dawson with 3.05" and southwest of Lewisville with 2.62". Elsewhere in Texas the maximum rainfall was 4.38" east of Alto and 4.20" southwest of Jasper. The thunderstorm complex continued into the 3rd over northern and eastern Texas before moving out of the state. In North Texas on the 3rd, there was 3.06" northeast of Paris and 2.42" at Monkstown. Elsewhere in Texas there was up 5.37" at Marshall and 3.88" north northeast of Aquilla.

June 5:
A thunderstorm complex moved out of Oklahoma into Texas very early in the morning of the 5th, and this complex moved southeast through the morning hours. Prior to dawn on the 5th, there was 3.43" east of Van Alstyne and 3.22" east southeast of Point. The thunderstorms moved across Southeast Texas and into the Gulf of Mexico by the afternoon of the 5th. Residual rainfall amounts included 1.95" east southeast of Beaumont and 1.91" northwest of Jersey Village.

June 9 – 12:
A slow-moving upper air disturbance over eastern New Mexico generated some showers and thunderstorms over primarily western and southern Texas on the 9th. Some locally heavy rainfall occurred. The two heaviest rainfall amounts on the 9th were 4.74" north northeast of Weinert and 3.65" west of San Antonio. Scattered showers and thunderstorms continued on the 10th as the low pressure system moved slowly across northeast New Mexico. The maximum rainfall on the 10th was 3.66" south southwest of Houston and 3.36" south southwest of Graham. There were unofficial reports of over 5" near Seymour. As the low pressure system advanced into North Texas on the 11th, showers and thunderstorms continued over especially Central Texas. South of McGregor there was 3.71" and east of Belton there was 3.37". In Southeast Texas there was up 4.61" northwest of Bridge City. The low pressure system finally advanced into southeast Texas and the thunderstorms became much more isolated on the 12th. Rainfall of 2.26" fell in Central Texas on the 12th south of Harker Heights while 2.24" fell northeast of Copperas Cove. There was 2.52" east of Granger and 2.44" east of Red Rock.

June 17 – 20:
A tropical disturbance developed over the southwest Gulf of Mexico early on the 17th and moved slowly north on the 18th. This disturbance became tropical storm Alberto on the 19th. Some rainfall developed over primarily the middle and upper Texas Gulf coast by the early morning of the 18th. Maximum rainfall amounts were 1.34" southwest of Diboll and 1.16" at Freeport. The rainfall became heavier and more widespread on the 18th and continued across especially South Texas through the 19th as Alberto headed toward northeast Mexico. The heaviest rain on the 18th was 3.45" southwest of Angleton and 2.07" at Brownsville. Very heavy rainfall occurred on the 19th in association with Alberto. Rains of 8.35" fell north northwest of Rockport and 7.10" south of Woodsboro. Some locations, especially near Rockport, had three-day totals of 10.50". Meanwhile, south of the border, Monterrey Mexico had more than 22". Alberto moved over northeast Mexico and dissipated on the 20th. Nevertheless, rainfall continued especially across the southern third of Texas. Maximum rainfall amounts on the 20th included 2.49" at Corpus Christi and 2.34" at Rio Grande City.

June 22 - 23:
A tropical wave formed over the southern Gulf of Mexico on the 22nd and moved over northeast Mexico on the 23rd. This brought some locally heavy rainfall to Deep South Texas. On the 22nd the heaviest rainfall was 2.15" southeast of Brownsville and 1.99" at San Benito. On the 23rd they received 1.91" southeast of San Ygnacio and 0.89" northwest of Kingsville.

North Texas Regional Summary (continued)

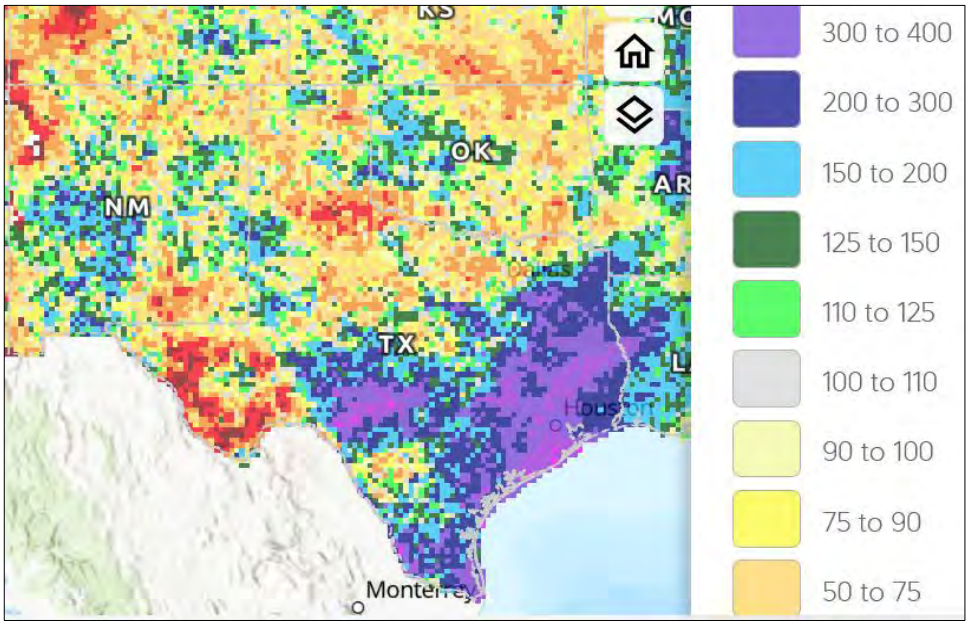


Figure 2: July 2024 percent of normal precipitation map. The dark green, blue and purple colors indicate above normal precipitation; the light yellow and light green colors indicate near normal, while the orange, red and dark red colors indicate below normal precipitation.

At DFW airport in July 2024 there was 2.55”. The normal amount of rainfall in July is 2.08” so DFW was +0.47” above normal for the month. In Waco for July 2024, there was 1.76”. The normal amount of rainfall in Waco in July is 1.82” so that is near normal at -0.06” for the month.

There were about six storm systems which affected our weather in July. Highlights are for the month below.

July 5 - 6:
A weak cold front moved across northern and Central Texas, and this front produced scattered to numerous showers and thunderstorms. The rain was mostly over North Texas on the 5th and over Central Texas on the 6th. On the 5th the heaviest rainfall was 3.83" northeast of Glen Rose and 3.73" at Wills Point. On the 6th the maximum rainfall amounts were 5.06" south of Luling and 5.00" north of Belmont.

July 7 - 8:
Tropical system Beryl approached Texas on the 7th, then made landfall as a category 1 hurricane near Matagorda and moved inland on the 8th. Rainfall began along the Texas coast the morning of the 7th. Very heavy rainfall resulted from Beryl. The maximum rainfall from the 7th was 10.16"east of Lake Jackson and 7.86" at San Bernard. In North Texas there was 4.48" northeast of Breckenridge and 3.81" north of Caddo. On the 8th the heaviest rain shifted to East Texas where west northwest of Wake Village fell 7.46", west of Jefferson had 7.43", 6.70" fell northeast of Longview and 6.48" was measured west northwest of Henderson. As Beryl moved northeast the rainfall ended near midnight of the 8th.

July 9:
A weak short wave trough interacted with a stationary front to produce showers and thunderstorms over south Texas. The heaviest rainfall was 2.85" south southeast of New Braunfels and 2.65" east of Goliad.

July 17 - 19:
A cold front advanced into Texas from Oklahoma on the 17th. In North Texas the maximum rainfall amounts were at Wills Point with 2.22" and at Glen Rose with 1.90". Elsewhere in Texas there was 3.72" at Sulphur Springs and 3.63" south of Ranger. Showers and thunderstorms continued or redeveloped over primarily northern and Central Texas on the 18th. In north Texas Bonham received 1.75" and south southwest of Anna there was up to 1.29". But elsewhere in the state there was 4.79" west of Brenham and 4.55" east northeast of Elgin. As the front remained over South Texas on the 19th more showers and some locally heavy thunderstorms redeveloped. There was 6.95" northeast of Galveston and 4.06" at Hallettsville.

North Texas Regional Summary (continued)

July 20 – 23:
Another cold front moved into Texas late on the 20th which generated some showers and thunderstorms. Prior to dawn on the 21st there was 1.70" in downtown Fort Worth. The rainfall increased after dawn on the 21st and became more widespread. A daily record rainfall of 1.85" was set at the Dallas Fort Worth airport on the 21st. The old record for July 21 was 1.77" set in 1985. In North Texas on the 21st there was 2.01" northwest of Sherman while east northeast of Van Alstyne there was 1.99". Elsewhere in Texas there was up 3.90" northeast of Galveston and 3.44" at Fort McKavett. The showers and thunderstorms continued into the 22nd, especially across Central Texas where the frontal boundary became stationary. In North Texas the area south southwest of Ovilla received 3.53" while the station south southeast of Athens picked up 2.75". But the rain was much heavier over the western Hill country and the Edwards plateau in Texas. The heaviest rain was 8.61" north northwest of Ingram and 7.46" at Comstock. The rain continued over primarily southern and eastern Texas on the 23rd, but isolated showers affected parts of North Texas as well. Rainfall of 2.23" fell east southeast of Kaufman and 2.20" northwest of Sherman. Outside of North Texas the maximum rainfall amounts were 7.39" north northwest of The Woodlands and 4.87" west southwest of Kerrville. There were 2-day rainfall totals on the 22nd and 23rd of 9.41" northwest of Ingram and 8.46" east of Bandera. Most of the rainfall dissipated by midnight of the 23rd.

July 24 - 28:
A lingering surface trough moved closer to southern and eastern Texas on the 24th, and more rainfall developed near this trough. The heaviest rainfall was over Deep South Texas where 6.99" fell south southeast of Corpus Christi and 6.88" occurred at San Benito. Scattered showers and thunderstorms again occurred on the 25th over roughly the southeast half of Texas. Very heavy rainfall fell along the upper Texas Gulf coast where 6.71" fell east of La Marque and 6.00" was measured south southeast of Bacliff. Some rain lingered over Southeast and Deep South Texas on the 26th. On the 26th the heaviest rainfall was 3.65" north northwest of Bunker Hill Village and 3.35" at Columbus. Most of the rainfall dissipated late on the 26th, but a new wave of rain developed along and near the middle and upper Texas Gulf Coast the morning of the 27th and continued through the day. The maximum rainfall on the 27th was 3.10" north northeast of Palacios and 2.70" west southwest of Premont. Some rainfall continued into the 28th for one last day over South Texas. The heaviest rainfall reports were 3.13" northeast of Hollywood Park and 2.37" northeast of Beeville.

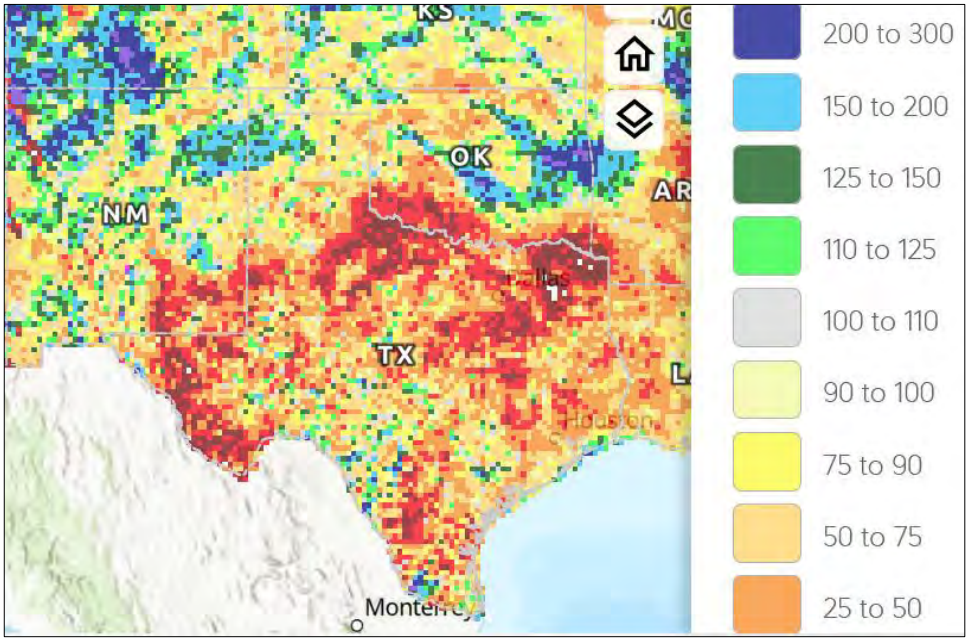


Figure 3: Percent of normal precipitation map for August 2024. The dark green, blue and purple colors indicate above normal precipitation; the beige, light yellow and light green colors indicate near normal, while the orange, red and dark red colors indicate below normal precipitation. In August most of Texas had below normal rainfall, and it was much below normal over northeast Texas.

North Texas Regional Summary (continued)

At DFW airport in August 2024 there was 0.41”. The normal amount of precipitation in August at DFW is 2.18” so this is -1.77” below normal for the month. In Waco for August 2024, there was 0.20”. The normal amount of rainfall in Waco in August is 2.05” so this is -1.85” below 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 3 - 4:
A weak front passed through North Texas early on the 3rd, then stalled across Central Texas later in the day. Prior to dawn on the 3rd some isolated heavy rain fell near the front in North Texas. Rainfall of 3.48” fell in North Richland Hills and 2.93” west of Hurst. The rain shifted to Central and Southeast Texas during the day on the 3rd. The maximum rainfall amounts were 2.10” northeast of Galveston and 1.81” south southwest of Jasper. Some of the rain lingered into the 4th across Central Texas, and some brief heavy rainfall occurred. There was 2.64” near Austin and 2.30” northwest of Bandera.

August 9:
A weak frontal boundary was just strong enough to generate scattered showers and thunderstorms across northern and Central Texas. The heaviest rainfall amounts were 3.31" northwest of Sherman and also southwest of San Marcos.

August 23:
An easterly wave of low pressure moved inland from the Gulf of Mexico and produced scattered showers and thunderstorms across Central Texas and the area near Abilene. The maximum rainfall amounts were 1.53" west of Bluffton, 1.45" northeast of the Lake Buchanan Dam, and 1.38" at Lake Mexia.

August 26 - 28:
A slow-moving easterly wave produced scattered showers and thunderstorms across mainly South Texas on the 26th and 27th. On the 26th the heaviest rainfall was east of Circle D-KC Estates with 3.36", and 2.62" fell just south of Moulton. On the 27th the rain actually made it as far north as North Texas, but was heaviest down south. In North Texas there was 1.01" near Saginaw. But elsewhere in the state they picked up 2.79" at La Grange and 2.46" east of Losoya. On the 28th the easterly wave shifted a bit further to the west, meaning the heaviest rainfall was confined to Central and Deep South Texas. On the 28th there was 4.20" north northeast of D`Hanis, while further south there was 2.61" west northwest of Brownsville.

August 29 – 31:
A slow moving cold front moved slowly across Oklahoma toward North Texas starting on the 29th. Additionally, a new easterly wave of low pressure developed off the upper Texas Gulf coast and produced more showers and thunderstorms over Southeast Texas. The maximum rainfall on the 29th was over east Central and Southeast Texas where 3.46" fell at Freeport, 3.36" occurred northeast of Galveston, and 3.01" was measured just west of New Salem. The showers and thunderstorms continued to increase in areal coverage on the 30th. The heaviest rain was 3.53" north northwest of High Island and 2.90" west southwest of Midland. The tropical wave continued just offshore of the upper Texas Gulf coast on the 31st so the rain continued over especially Southeast Texas. Also, a weak upper air disturbance formed across west Texas. The maximum rainfall was 2.14" east of Brownsville, 1.99" at La Peurta by Falcon Lake, and 1.98" southeast of Comstock.

North Texas Regional Summary (continued)

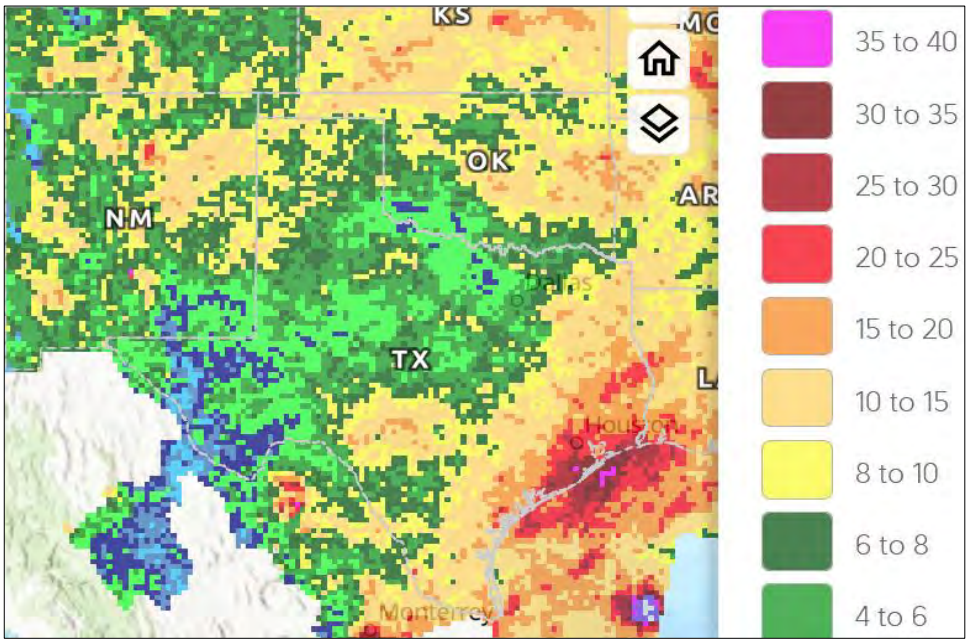


Figure 4: Summer season observed precipitation map for 2024. The purple, dark brown, and dark red colors indicate the higher precipitation totals, while the light green, blue and beige colors show the lightest amounts. Note that parts of the upper Texas Gulf coast exceeded 35" for the season.

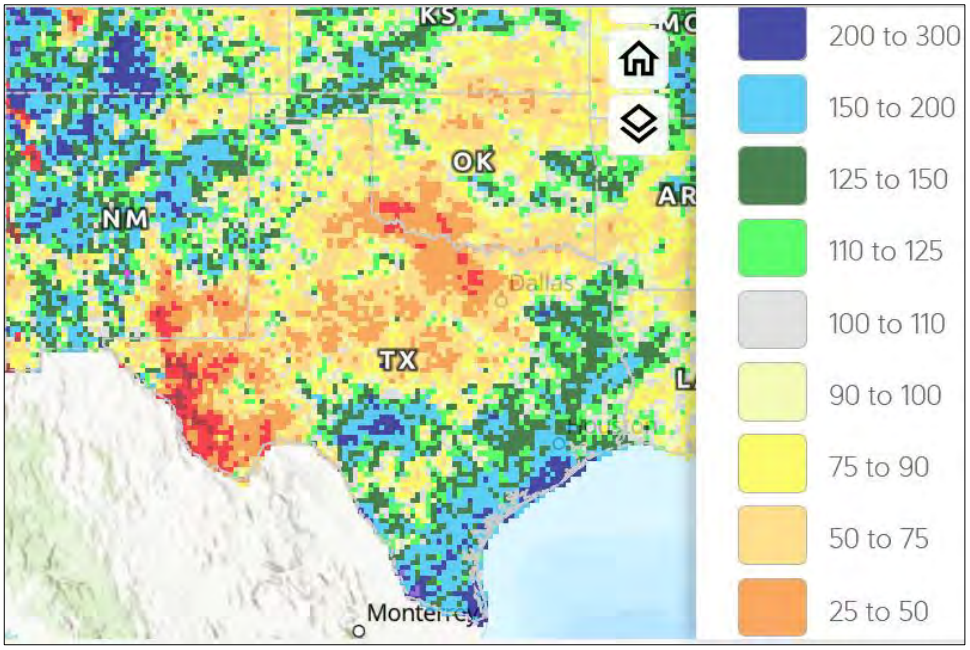


Figure 5: Percent of Normal Precipitation map for summer 2024. The purple, blue and dark green colors indicate above normal precipitation. The brown, orange and red colors indicate below normal amounts. A wet summer for south central and southeastern Texas and severely dry summer over Southwest Texas, as well as parts of Central Texas.

For the summer season at DFW airport, a total of 6.63" of rain fell. The normal amount of precipitation in summer at DFW is 7.96" so this is -1.33" below normal for the season. For summer in Waco, a total of 2.89" of rain fell. The normal amount of rainfall during the summer season in Waco is 7.22" so this is -4.33" below normal for the season. So far in 2024 (through August) DFW airport has received 31.70". The normal amount is 24.55" so this is +7.15" above normal for the year. So far in 2024 in Waco (through August) 31.49" of rain fell. The normal amount in Waco through August is 23.54" so this is +7.95" above normal for the year.

North Texas Regional Summary (continued)

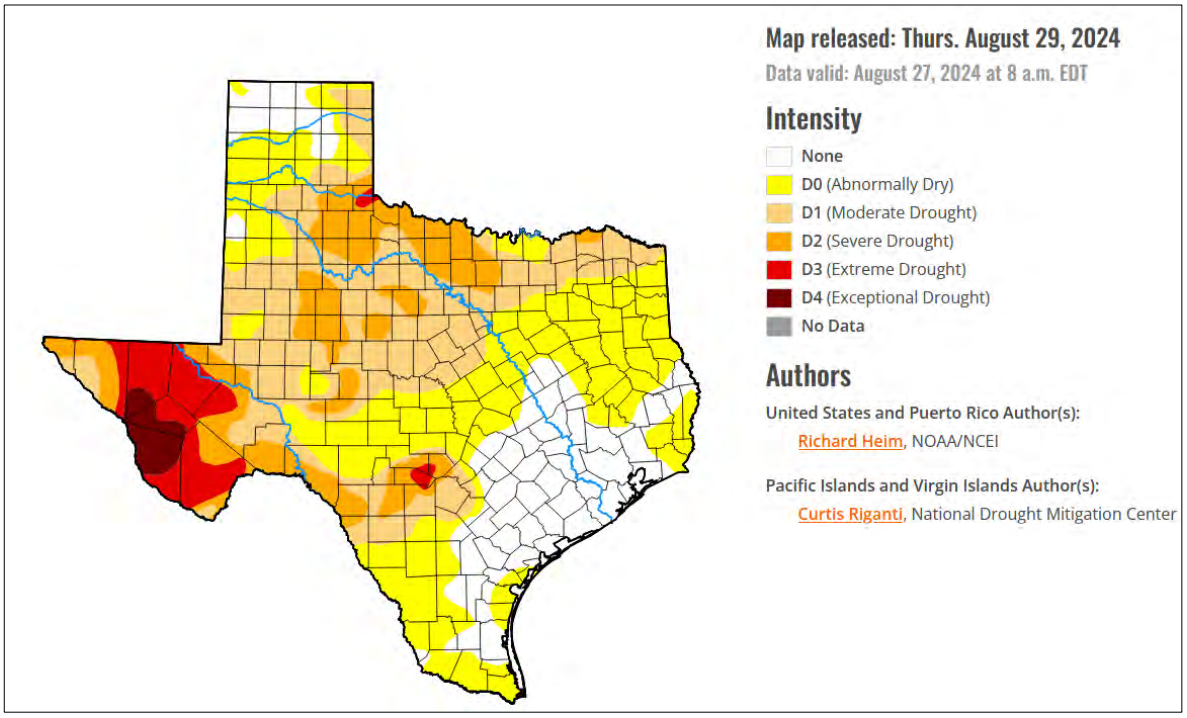


Figure 6: Drought Monitor for Texas as of August 29. The results of the wet weather of the past three months show up well on this drought monitor, with moist soil moisture conditions over southeastern Texas. But the results of the dry weather from this summer also show up well over northern and western Texas. The areas in Texas that are abnormally dry (or worse) has jumped from 49% to 81% in the past three months. Only 19% of the state is free from any drought category. About 48% of the state is experiencing some level of drought. Portions of far West Texas are experiencing the worst drought category, exceptional drought (covering 2% of the state).

Thanks again for your dedication in making all your weather observations! I'd like to share a few reminders in closing. First, we know there will be days you may not home to report your 24-hour rainfall observation. Upon your return, you can make. There is a link on the CoCoRaHS reporting page you can use for this purpose. Second, all CoCoRaHS data is quality controlled each day. The intent is for us to recognize reporting errors that may occur. So, one of us may contact you one day in case we have any question about one of your reports. If you have difficulty making your observations or have questions on how to report them, please feel free to contact me or your county coordinator. Third, be confident in knowing your rainfall reports are looked at and used every day. As one example, CoCoRaHS data is incorporated by the National Weather Service at the West Gulf River Forecast Center for use in their soil moisture accounting flood forecasting models. So please continue to submit your reports. The more rainfall reports that our collected, the better the chances are of determining the highest rainfall totals during rainfall events. And when it doesn't rain, your zero reports makes it easier to determine the exact location of and the magnitude of drought. We appreciate it when you report zero rainfall daily on the dry days.

Thanks to all of you, and have a great autumn season!

Greg Story

East Texas Regional Summary

Very Active Weather this Summer Season in East Texas

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

A very active weather pattern developed over the region as we moved into the summer months of 2024. The upper-level flow became northwesterly over the first five days of June. This set-up resulted in several Mesoscale Convective Systems (MCS's) or thunderstorm complexes moving over the region each day. These complexes brought widespread wind damage, a few reports of quarter size hail, and very heavy rainfall. There were several reports of flash flooding across the region, with several road closings and some stalled vehicles. After the 5th, upper ridging settled over the region bringing dry weather for most of the remainder of the month. The one exception was on the 26th, when a line of thunderstorms developed ahead of a cool front, bringing widespread rainfall and several reports of thunderstorm wind damage to the region. Despite most of the precipitation occurring during the first 5 days of the month, most of the East Texas CoCoRaHS sites reported between 5" to 8" of rainfall for the month, which is well above the National Weather Service's June average of about 4.5" for East Texas.

Fig.1: June 3, 2024
Flooding on Main Street – Atlanta, TX
Image Courtesy of Cass County HAM Radio Coordinator- Bryan Loper

East Texas Regional Summary (continued)

Fig.2: June 3, 2024
Stalled Vehicles in Parking Lot – Texarkana, TX
Image Courtesy of Texarkana, TX Police Department

The month of July may go down as one of the most memorable July's in recent history. Conditions were quiet for the first week of the month, then came July 8th. On July 8th at 4 AM CDT, Hurricane Beryl made landfall near Matagorda, TX as a Category 1 storm. After landfall, Beryl began to move north/north east, eventually weakening to a tropical storm north of Houston, TX. Beryl continued to weaken as it moved northward into East Texas, however, that didn't diminish its impacts. With many landfalling tropical cyclones, tornadoes are possible, and Beryl was no exception. The National Weather Service in Shreveport confirmed forty-three tornadoes in its county warning area, including fifteen across East Texas all on July 8th. All but two of the tornadoes were rated EF-1, with the others being ranked as EF-0. There were damage reports to trees, power lines, and many structures across the area. In addition to the tornadoes, all of the National Weather Service East Texas climate locations set daily rainfall records for July 8th, with Longview, Lufkin, and Texarkana recording top 10 all-time rainfall amounts for any day in the month of July. Dry weather returned for several days in wake of Beryl, with our next widespread rainfall not occurring until July 17th, as a cold front moved into the region. Many of our CoCoRaHS sites reported rainfall amounts from 1" to 3" on this day, with the highest amounts generally across areas north of the Interstate 20 corridor. Following the 17th, we transitioned to a more active weather pattern, with a series of boundaries and disturbances bringing additional rainfall to the region through the 27th of the month. Some CoCoRaHS locations across Deep East Texas received 4" to 5" of rainfall between the 25th and 26th of the month, which resulted in the National Weather Service issuing flash flooding reports on many roads in Angelina and San Augustine counties. The National Weather Service also reported a record rainfall amount on the 26th of 2.34" at their climate site at the Angelina County Airport in Lufkin, TX, which broke the previous record of 2.27" set in 1951. Upper-level ridging moved into the region by the 28th, bringing dry conditions through the remainder of the month.

East Texas Regional Summary (continued)

Fig.3: July 3, 2024
Tornado on Toledo Bend near Holly Park Marina
Image Courtesy of Fred Oden

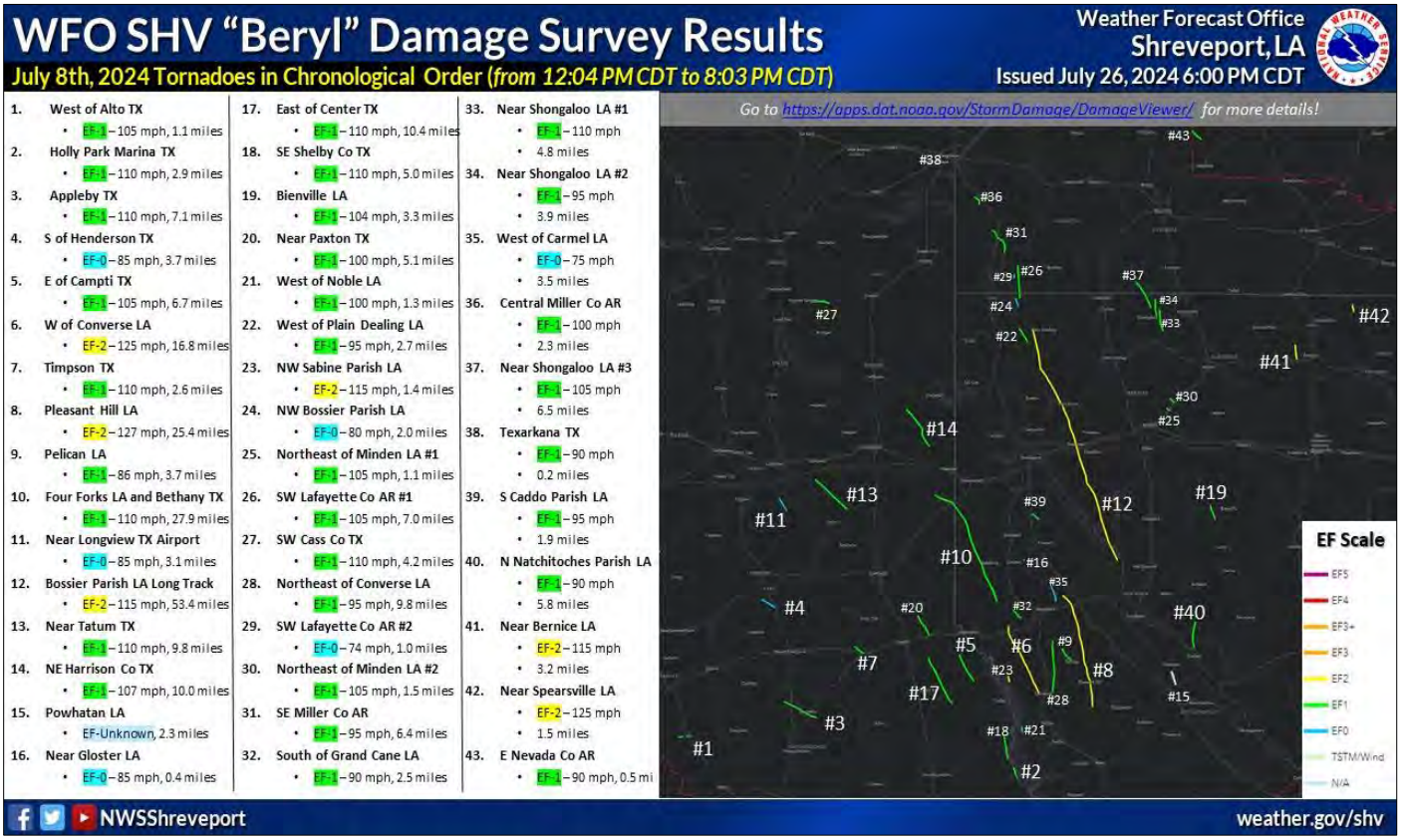


Fig.4: July 26, 2024
Confirmed Tornado Map from July 8th, 2024
Image Courtesy of National Weather Service - Shreveport

East Texas Regional Summary (continued)

RECORD EVENT REPORT
NATIONAL WEATHER SERVICE SHREVEPORT LA
404 AM CDT TUE JUL 9 2024

...PRECIPITATION RECORDS BROKEN ON JULY 8 2024...

LOCATION	OLD RECORD	NEW RECORD	YEARS OF DATA
SHREVEPORT LA	1.83 IN 1905	2.57 IN 2024	RECORDS SINCE 1874
TEXARKANA AR	1.51 IN 1953	4.75 IN 2024	RECORDS SINCE 1896
TYLER TX	1.70 IN 1931	2.24 IN 2024	RECORDS SINCE 1896
LONGVIEW TX	2.76 IN 1997	5.19 IN 2024	RECORDS SINCE 1902
LUFKIN TX	0.85 IN 2004	3.45 IN 2024	RECORDS SINCE 1906

Fig.5: July 9, 2024
Broken Rainfall Records on July 8, 2024
Image Courtesy of the National Weather Service - Shreveport

The month of August was much quieter than the previous two months. In fact, 95% of our CoCoRaHS sites didn't see any precipitation until the 28th of the month. These dry conditions resulted in many locations seeing triple digits during this period. A series of upper-level lows moved across the region during the last few days of the month, bringing a return in widespread rainfall to the CoCoRaHS sites. Despite the above normal rainfall during the first couple months of the summer, the extended dry conditions for the month of August resulted in the return of drought conditions into the region for the start of the meteorological fall.

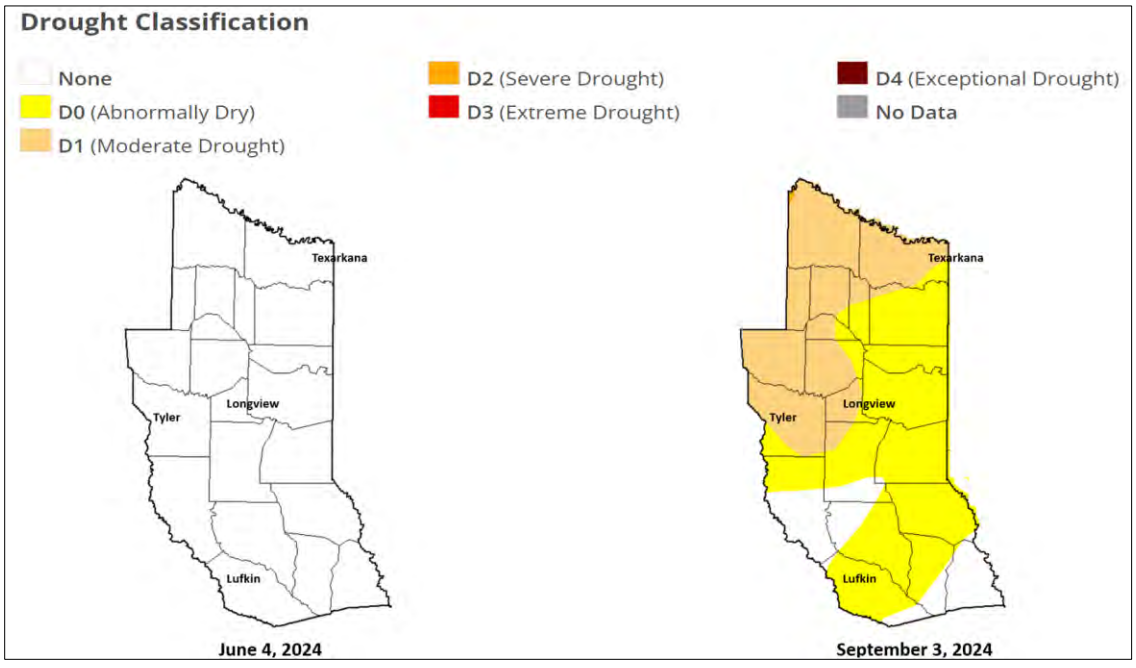
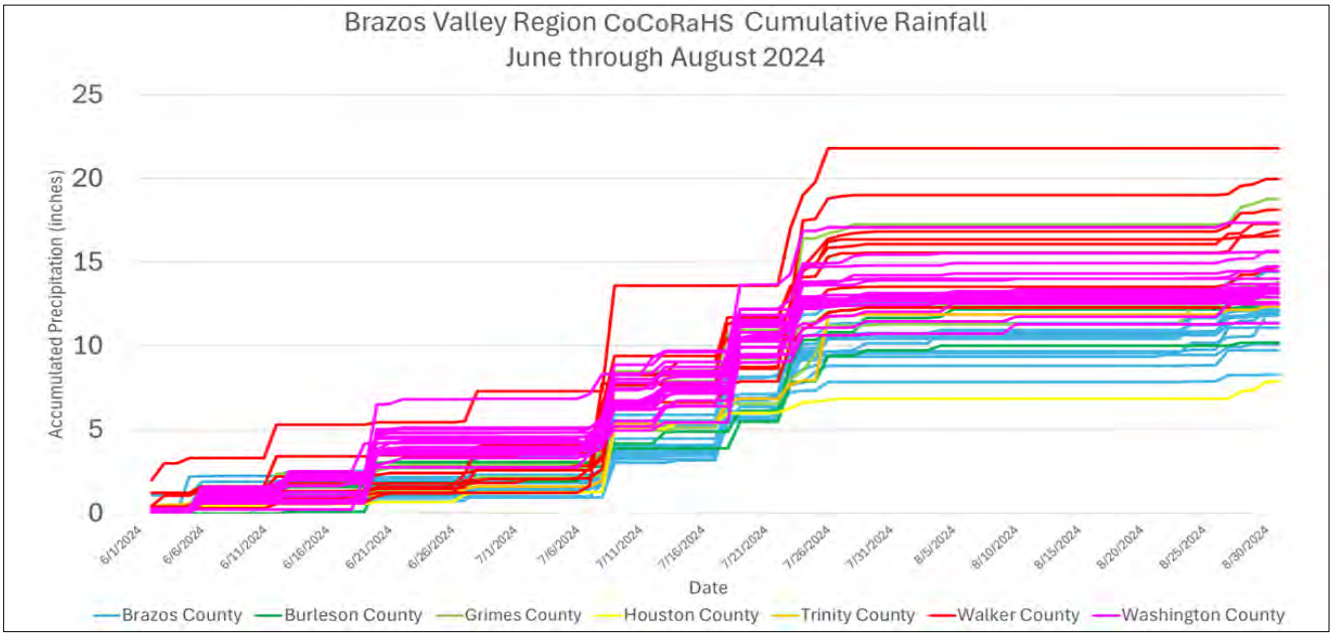


Fig.6: Drought Monitor
Comparison Map (June 4, 2024 to Sept 3, 2024)
Image Courtesy of NDMC/USDA/NOAA

Brazos Valley Regional Summary

Summer 2024 Precipitation Summary
Bryan-College Station/Brazos Valley Region, Texas

By: Alonso Lopez, Texas A&M University, Office of the State Climatologist of Texas



Summary:

Following the drenching that was spring 2024 for the Brazos Valley (BV), June opened in a very lackluster manner for the region. June is typically one of the rainier months of the year for the BV region, yet 2024 saw few notable precipitation events for the area. Mid-June, Tropical Storm Alberto threatened to bring substantial rainfall for the area, yet was shunted to the south, taking any appreciable precipitation amounts and relegating them to the Rio Grande region. While on the topic of tropical cyclones, Hurricane Beryl brought substantial amounts of rain to parts of the region along with powerful winds on July 8-9. With a track traced across our eastern counties, a sizable spread of precipitation amounts were seen across BV. On July 9, 2024, the highest single day rainfall total occurred from this event, where over six inches of rain was seen in Walker County. After Beryl's departure, an active weather pattern took hold for much of the rest of July, allowing the month to stand out as a unique personality, one where temperatures were cooler than normal, and precipitation was ample. August brought many Texans back to a more familiar environment that characterizes the typical Texas summer, as "precipitation free" was essentially the rule for most of the month. Such a reality allowed temperatures to skyrocket, landing the month well above normal in the temperature department. Precipitation had a bit of a last hurrah to close out the (meteorological) summer, as the breakdown of the pattern responsible for the heat and drought allowed scattered showers and storms to douse parts of the region. Overall, the story arch of the summer was two hot and dry months separated by a rather cool and rainy July.

Observer Statistics:

Throughout the summer season, we had 65 active observers reporting their precipitation totals with 28 observers missing no more than 10 days of reporting. Of these, 16 did not miss a single day. Overall, 48 stations were used to calculate this season's records. We thank you for your valuable contributions! In weather and climate, continuity in observations is crucial for properly assessing the past, the present, and the future. Your participation in CoCoRaHS allows meteorologists and climatologists to make connections that would otherwise be overlooked, so you, the observer, are an invaluable part of our efforts to get to know the atmosphere around us!

Season Statistics:

Wettest Day: **6.30" on July 9, 2024 in** Walker County

-This was almost 30% of the station's three month total

Wettest Seasonal Total: **21.81"** in Walker County

Driest Seasonal Total: **7.89"** in Houston County

Soggy Socks Award: (longest spell with measurable rain): **9 days; July 22-30, 2024**, in Grimes County

Dusty Soles Award: (longest spell without measurable rain): **36 days from July 27- August 31, 2024** in Walker County

Austin/San Antonio Regional Summary

Another Hot Summer, but Periodic Rainfall keeps Temperatures and Drought from Getting out of Control

By: Mack Morris, Meteorologist at NWS Austin/San Antonio

Summer 2024 will go down as a far more bearable one than last year. After the hottest summer on record last year, several heavy rain events "sprinkled" throughout the summer months led to some cooler temperatures and breaks from the heat.

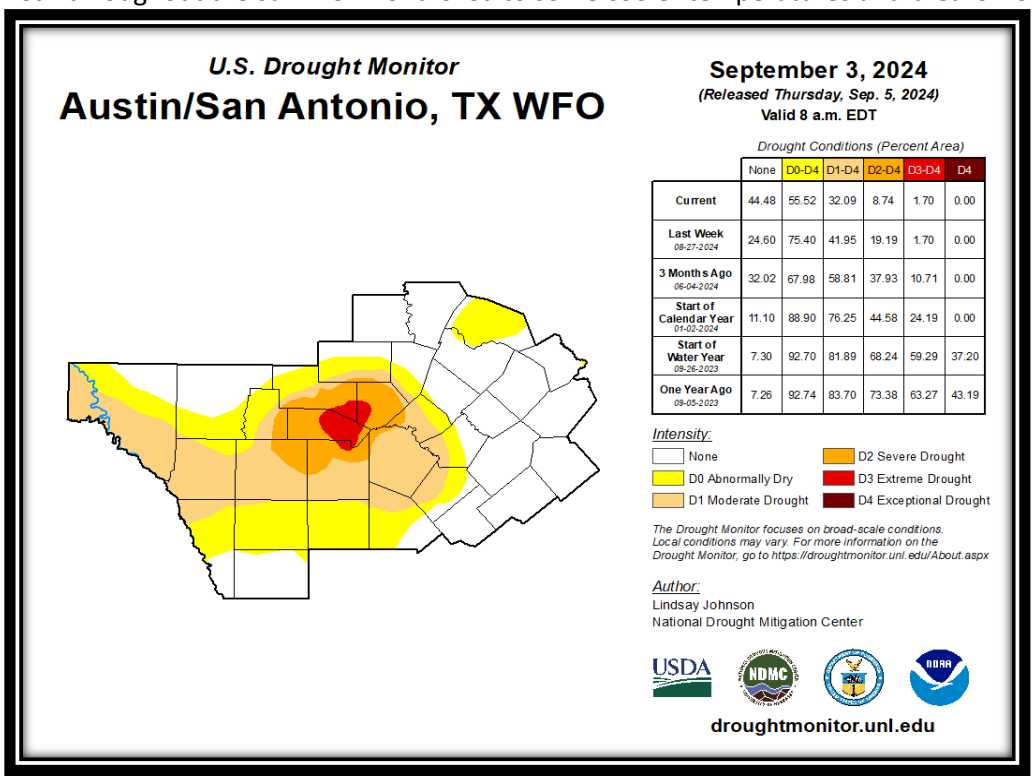


Figure 1: U.S. Drought Monitor valid 7am September 3rd

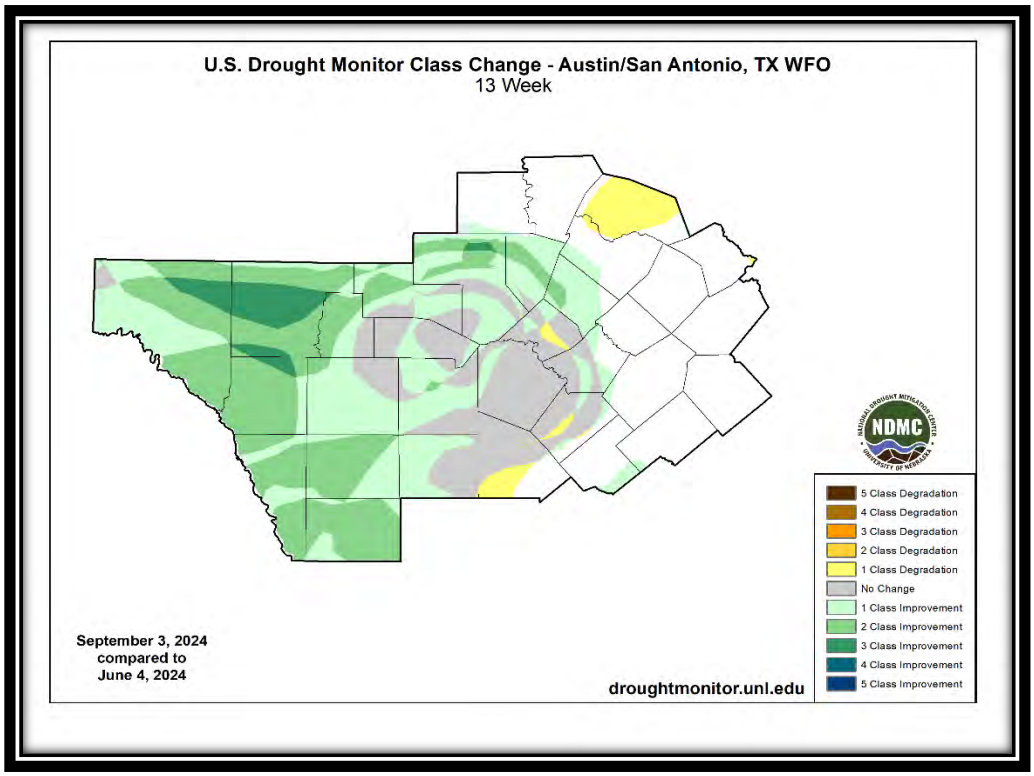


Figure 2: U.S. Drought Monitor 13 week change map valid 7am September 3rd

Austin/San Antonio Regional Summary (continued)

The first such rain event occurred the second week of June, when an upper- level low moved from west to east over north Texas. A relatively impressive disturbance rounded this upper-level low June 9-11th, resulting in some impressive rainfall totals across western Bexar, Blanco, Bandera, Kerr, and Medina Counties. Several locations in and around Alamo Ranch in western Bexar County topped out with 3-4" of beneficial rainfall. Meanwhile, near Ingram in central Kerr County, from 2-3" of rainfall was reported by area CoCoRaHS observers. The following day, June 10th, heavy rain occurred once again over north central and western Bexar County, with totals ranging from 1-3". On June 11th, the final day of this 3 day rainfall event, more widespread rainfall totals of 1-2" occurred from the I-35 Corridor northward through Williamson County and back westward through the Hill Country. Totals ranged from 0.5-2.5".

The third week of June brought some rainfall from Tropical Storm Alberto to a large chunk of South Central Texas. A swath of 2-3" of rainfall occurred from Fayette, Bastrop, southern Travis, northern Hays, northern Blanco, and eastern Gillespie Counties on June 19th. Additionally, most observers outside of the Rio Grande Plains received up to 1-2" of rainfall out of Alberto, despite its rather quick movement. Despite missing out on heavier rainfall than originally anticipated, temperatures in the lower 80s for highs in mid to late June. That's in stark contrast to the same stretch of days in June 2023, where highs in the triple digits were observed with record highs falling at area climate sites.

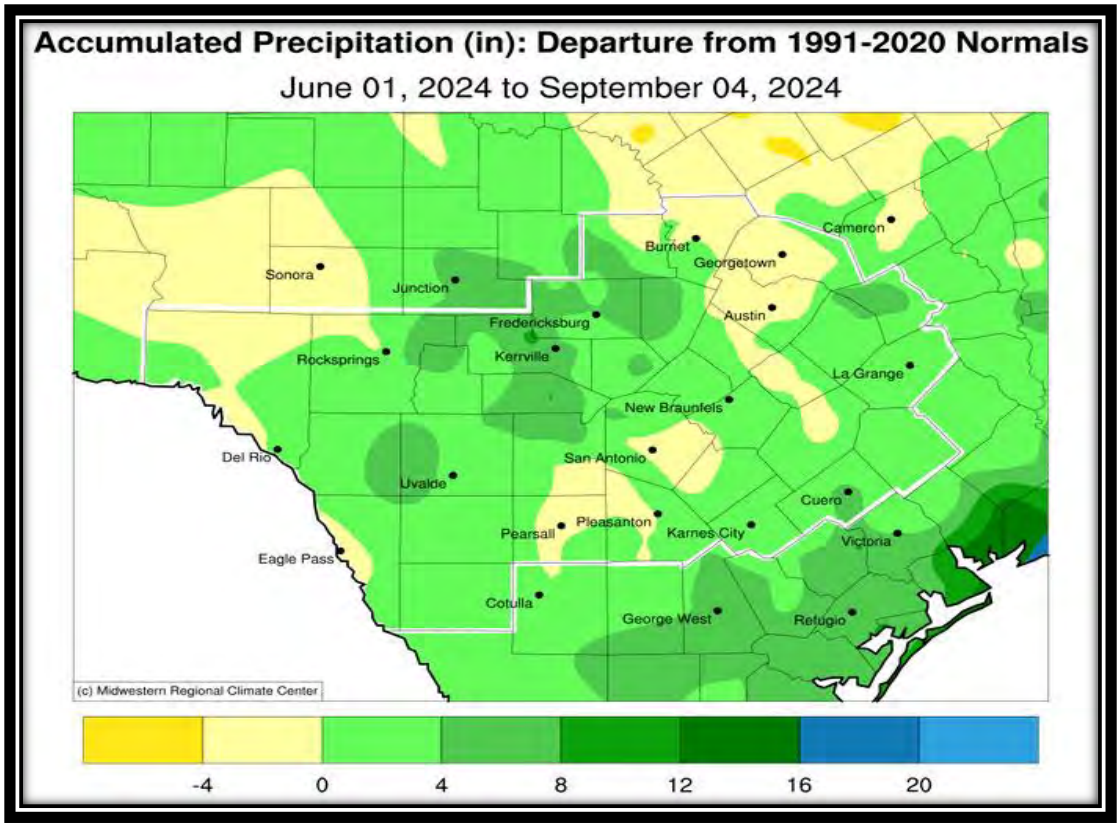


Figure 3: Observed Departure from normal June-August 2024

The last week of June and first week of July got off to a hot start, with highs in the upper 90s and low 100s. A stalled frontal boundary resulted in heavy rainfall for portions of the Hill Country, I-35 Corridor, and Southern Edwards Plateau on the 6th of July. Coop observers in and around New Braunfels picked up from 2-4" during this event. Further south and east into Guadalupe County, several CoCoRaHS sites received from 3-4" of rainfall. Some of the bigger winners were in northern Gonzales County where an observer reported over 5" of rain near Luling. A couple other areas, including Gillespie, Blanco, Travis, and Williamson Counties received from 2-5" out of this system. With the rain from Beryl that was expected not panning out as the storm track shifted further east, the rainfall from this frontal boundary was greatly appreciated. Some heavier rainfall was measured with Beryl, but for the most part, the precipitation remained east of the region.

Yet another cold front, unusual for July, arrived the 17th-18th of July. The front came in as a rare backdoor cold front, moving in from northeast to southwest over the northern portions of the Austin/San Antonio CWA. Portions of Lee, Bastrop, Williamson, Travis, and Burnet Counties observed 1-3" of beneficial rainfall on the 17th. The 18th brought even better rainfall to the region, and in fact, significant rainfall for many locations north of Interstate 10. CoCoRaHS observers in Fayette, Lee, and Bastrop Counties saw anywhere between 2 and 5 inches of soaking rain. One of the big winners in the rainfall department was near West Point in western Fayette County with 5" of rain on the dot.

Austin/San Antonio Regional Summary (continued)

The final week of July brought much cooler than normal temperatures and several rounds of rain to South Central Texas. Highs were routinely in the 80s from the 23rd through the 28th, some 10-15 degrees below normal for late July. From the 21st to the 23rd, 1-8" was observed, bringing significant short term drought relief to the region. Kerr, Bandera, NW Bexar, western Comal, and Kendall Counties saw the most significant totals, with 4-8." Increased stream levels and reservoirs were aided by the rain that fell.

August ended up being the hottest month of the Summer, but not nearly as hot as last August, where all 3 of 4 climate sites (Austin Bergstrom, San Antonio International, and Del Rio) recorded their hottest August ever. Austin Camp Mabry topped out as the 2nd hottest August all-time. Temperatures this August were hot but we had periodic relief the second week of the month and the last week or so of the month when an upper-level low teamed up with a tropical disturbance to produce rainfall in the region. On August 9th, a back door cold front moved in from the northeast on the eastern periphery of the upper level high. Some spots, including San Marcos, northern Comal County, and northern Guadalupe County received between .5-3" of rainfall from storms that moved southwest with the surface flow. The hottest stretch of the year occurred August 16-23rd with triple digit days and record highs being set on the 21st and 22nd at our climate sites.

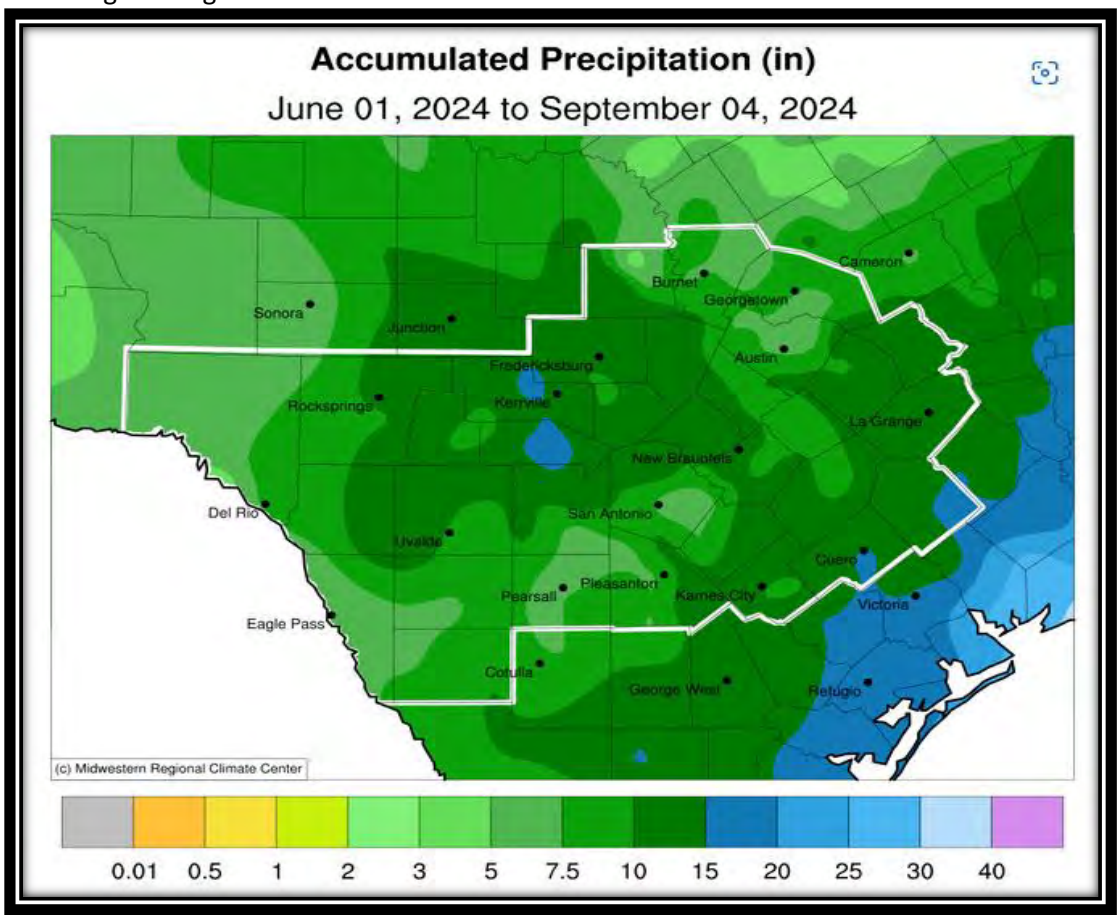


Figure 4: Observed Precipitation June-August 2024

Storms blew through bringing an end to the hottest stretch of the year on the evening of August 23rd, with much needed rainfall falling in sporadic locations. Temperatures fell some 15-20 degrees in locations that were lucky enough to see rain. Bastrop County, eastern Llano, and northern Burnet were the big winners with CoCoRaHS observers noting between 0.5-2". Yet another rainfall event occurred on the 26th where significant rainfall was observed in a swath stretching from the Coastal Plains north and westward into the northern I-35 Corridor. Round Rock was the big winner, with several observers noting nearly 2" of rain. Meanwhile, to the east and northeast of Bastrop, from 2-4" of rain fell. A little over 2" also fell in Schulenburg and to the northwest of town. Additional sporadic rainfall amounts of locally 3"+ occurred on both the 28th and 29th as well, with a weak disturbance meandering along the SE Texas Coast and an upper level low to our west helping to produce widespread lift across South Central Texas. The first few days of September are included in the drought monitor released on the 3rd of September. Significant rainfall occurred across much of the region, helping to alleviate short term drought impacts, along with potentially bringing long term relief to portions of the Rio Grande Plains. More on this event will be detailed in the fall recap article.

Wichita Falls Regional Summary (continued)

Drought Returns Due to Abnormally Dry August

By: Charles Kuster, National Severe Storms Laboratory

Overall, our region experienced a summer with only slightly below normal precipitation and well above normal temperatures (Fig. 1). There was, however, a large difference between the first two months of the season and the last month of the season. June and July had several days with soaking rainfall over 1". June and July both had 22 dry days (all CoCoRaHS stations reported less than 0.05") and 8 and 9 wet days, (at least one CoCoRaHS station reported 0.05" or more) respectively. Then came August. During this month, we only experienced 2 wet days to go along with 29 dry days and precipitation was between 1.5 and 3" below normal for the month. In total, this season, our area saw 73 dry days and 19 wet days. For comparison, the region experienced 66 dry days and 26 wet days last summer.

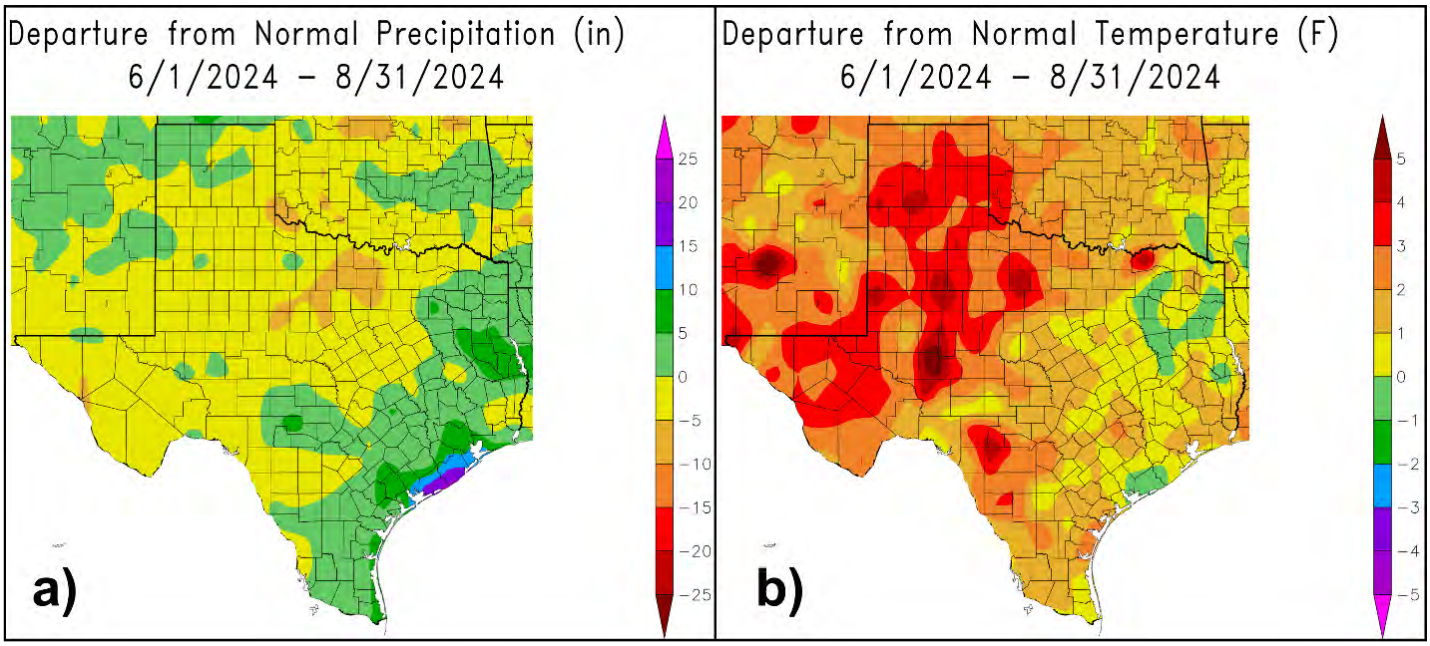


Figure 1. Departure from normal a) precipitation and b) temperature for the beginning of June through the end of August. Warm colors indicate below normal precipitation (a) and above normal temperatures (b), while cool colors indicate above normal precipitation (a) and below normal temperatures (b).

The dry August fueled the return of drought to our region according to the U.S. Drought Monitor (available at https://droughtmonitor.unl.edu). At the beginning of the season, our region was drought free (Fig. 2a). Drought slowly began creeping back in during July (Fig. 2b, c) and then became widespread during August. By September 3, our entire area was experiencing moderate to severe drought with small portions of Hardeman County experiencing extreme drought (Fig. 2d).

Wichita Falls Regional Summary (continued)

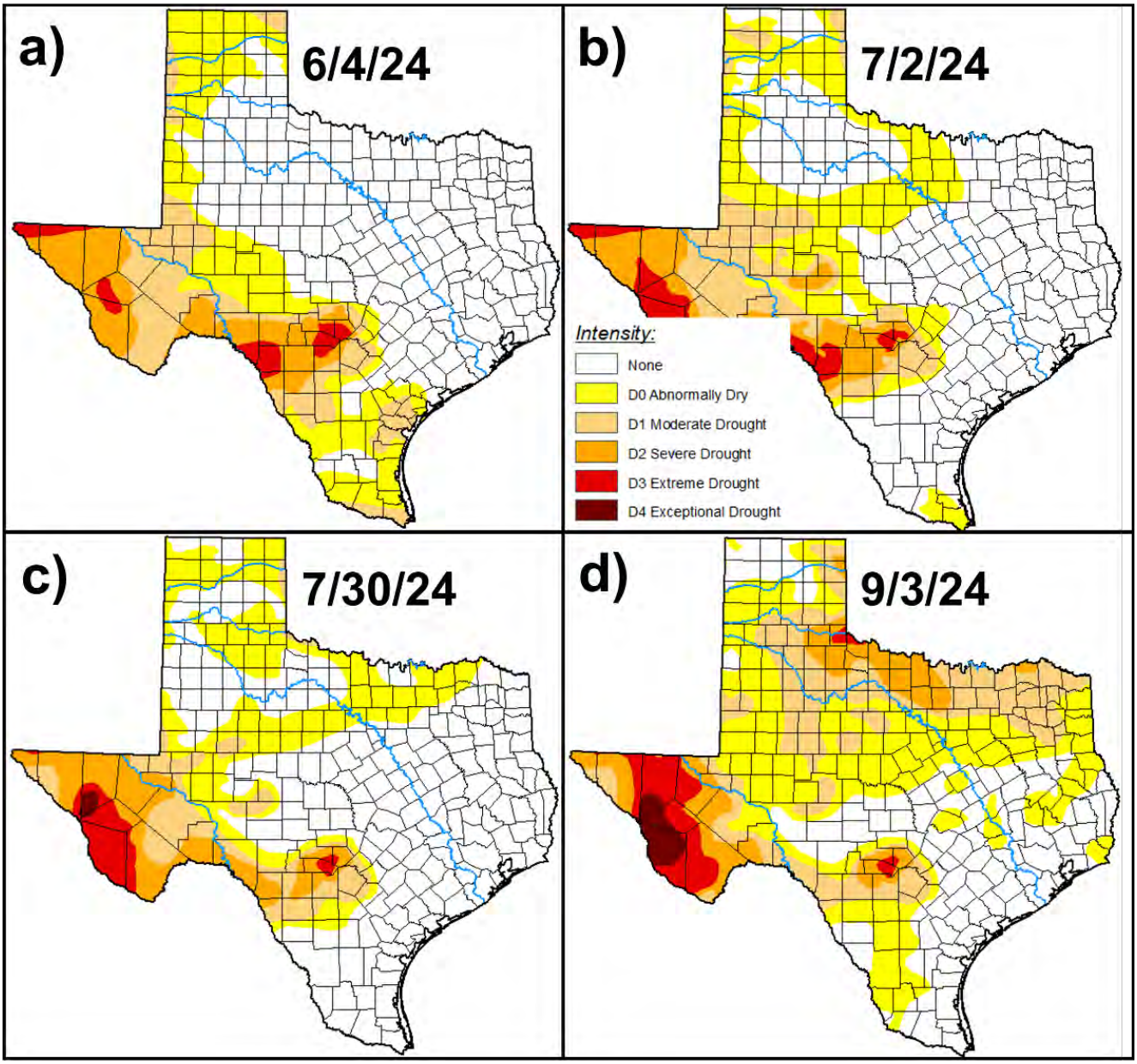


Figure 2. Changes in drought conditions over the summer according to the U.S. Drought Monitor for Texas on a) June 4, 2024, b) July 2, 2024, c) July 30, 2024, and d) September 3, 2024.

Southeast Texas Regional Summary

Wet July with Beryl and a Hot/Dry August

By: Ron Havran, Southeast Texas CoCoRaHS Regional Coordinator, HCFCD

June

This June was rather average: temperatures were near or slightly above normal, and slightly below normal precipitation. There were a few isolated strong thunderstorms that developed along the sea breeze that left pockets of above normal precipitation as along coastal counties in southwestern parts. Eastern sections of Southeast Texas were the driest around the Golden Triangle. Very humid conditions combined with high temperatures in the 90's this month to bring about high heat index readings to all areas of Southeast Texas. Counties in the Houston/Galveston Section with an average rainfall over 4 inches this month included Harris (4.49"), Brazoria (4.45"), Matagorda (4.26"), Austin (4.17"), and Colorado (4.03"). These amounts are close to average while all other counties were below average this month. In the Golden Triangle section Orange County had 6.22" for the highest average amount while Tyler had the driest average amount with 2.40". All counties except Orange County were below average.

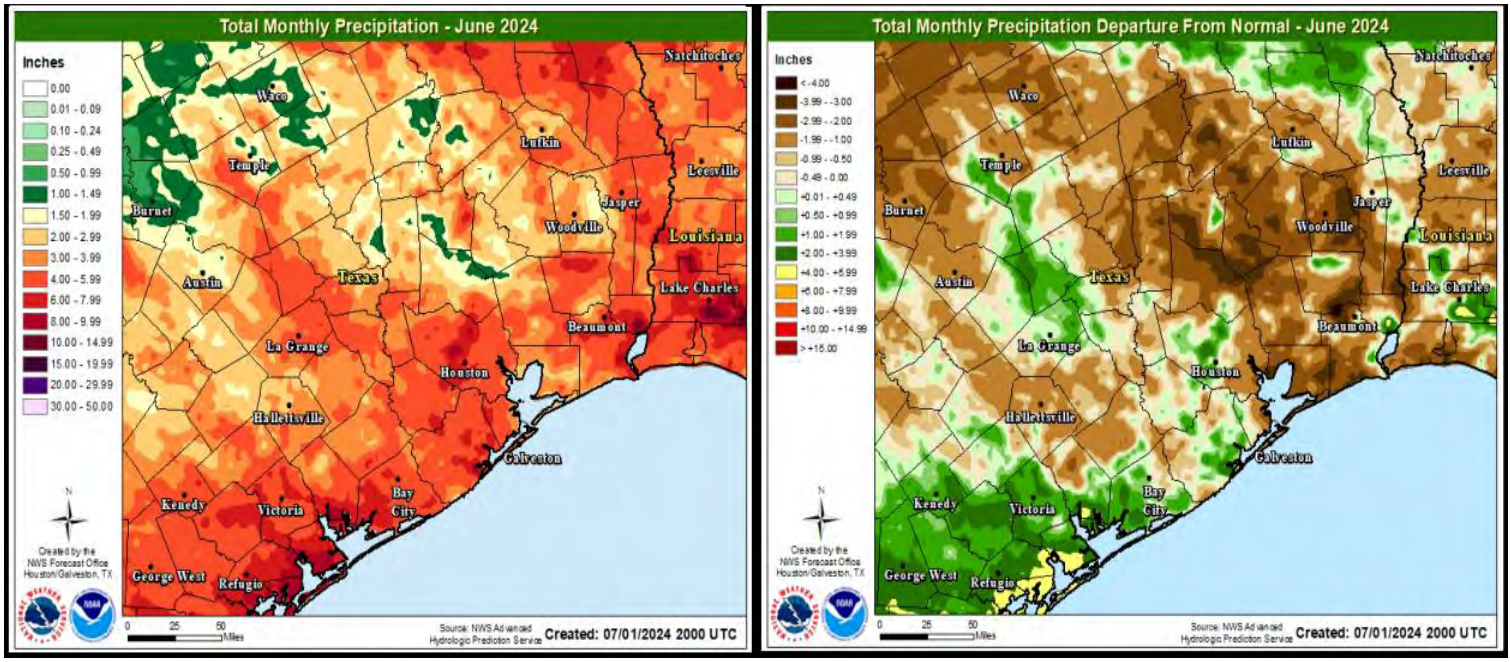


Figure 1: June 2024 Total Precipitation and Departure from Normal across Southeast Texas.

July

The main story this month was the devastating impacts from Hurricane Beryl that made landfall near Matagorda during the early morning hours on July 8th. Beryl caused widespread tree and vegetation damage, power outages, heavy rainfall, and coastal flooding. After Beryl quiet conditions lasted about two weeks, rainy weather returned to most areas seeing an additional several inches of rainfall. Because of the overcast and rainy weather, temperatures were near to slightly below normal across the region. Rainfall totals were around 6 to 15 inches above normal by the end of the month for much of Southeast Texas and several locations saw their wettest July on record. More on Beryl at the end of the article. All counties in Southeast Texas had an average CoCoRaHS observer measured rainfall well over 10.00" of rain except for 3 counties. See tables 1 and 2 on the following page 27 which has this data. Thanks to all observers with complete months of data this summer season. Your data is very valuable in determining rainfall totals, storm effects on rivers and flooding, and documented areas with a shortage of precipitation with the reporting of daily zero amounts. Those average amounts on those tables in Southeast Texas is your reported data. Thank you!

Southeast Texas Regional Summary (continued)

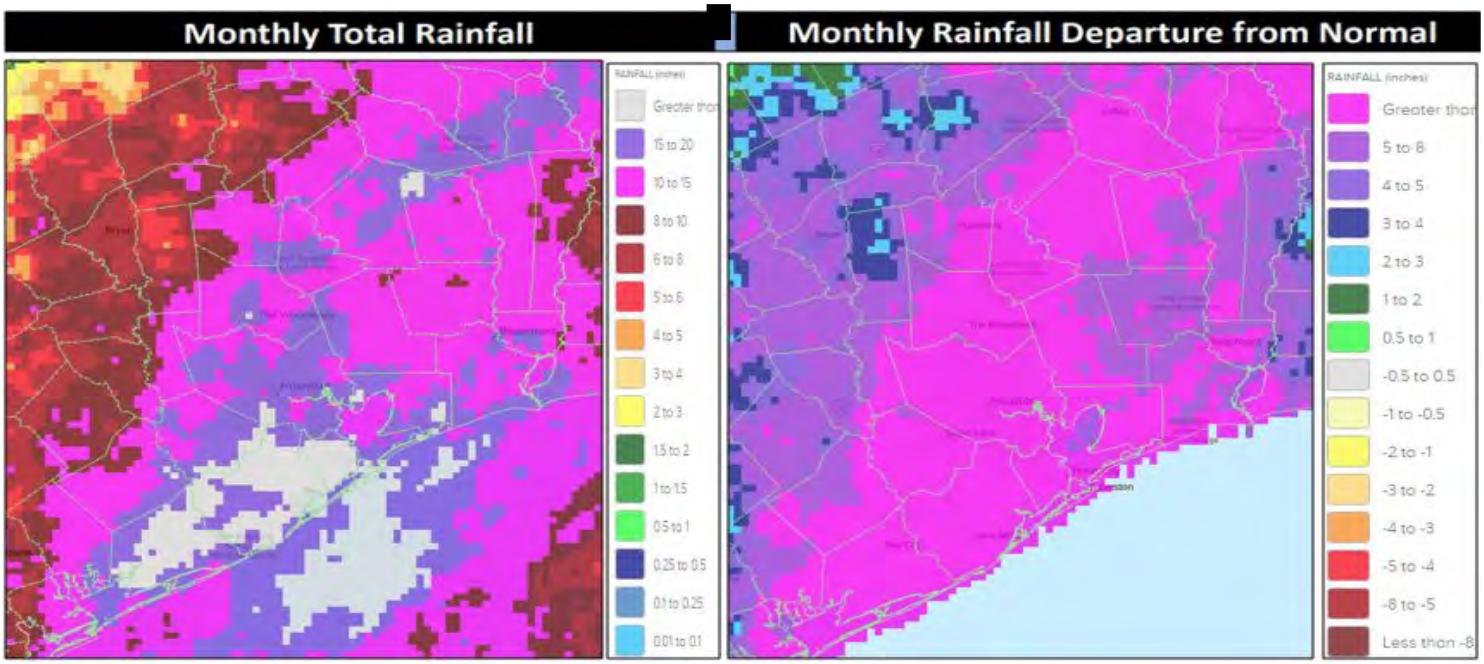


Figure 2: July 2024 Total Precipitation and Departure from Normal across Southeast Texas.

August

After a busy July, August was more a bit more summer-like with high pressure providing SE Texas with hot and dry conditions. Temperatures were around one to three degrees above normal with many locations seeing their first triple digit heat this month. Rainfall was generally around two to four inches below normal with the exception of the coastal counties which saw a wet end of the month that brought it closer to normal. Counties with the most rainfall included Galveston, Brazoria, and Jefferson counties. Also isolated far southwestern areas in Jackson County had four to five inches of rain. Extreme heat indexes were observed across all of Southeast Texas with dew point readings topping out in the lower 80's nearly every day of the month. Very warm gulf waters were the source of the 80 degree dew points. See tables 3 and 4 for how hot and dry August turned out.

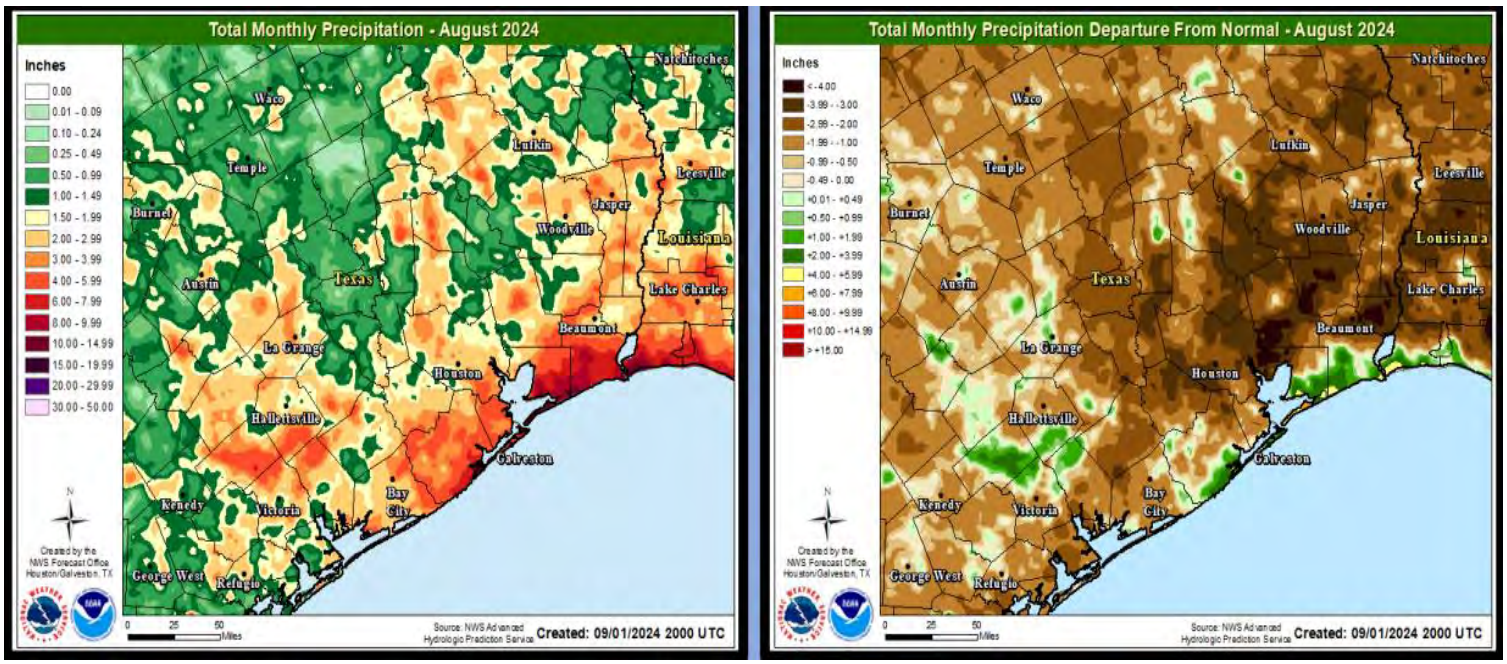


Figure 3: August 2024 Total Precipitation and Departure from Normal across Southeast Texas.

Southeast Texas Regional Summary (continued)

Summer 2024 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	4.17	9.26	1.02	14.45
Brazoria	4.45	17.93	3.46	25.84
Chambers	2.49	12.55	2.11	17.15
Colorado	4.03	7.75	1.32	13.10
Fort Bend	3.50	13.27	0.82	17.59
Galveston	3.80	19.49	4.98	28.27
Harris	4.49	13.03	2.05	19.57
Jackson	2.93	10.52	1.51	14.96
Liberty	2.30	12.13	0.89	15.32
Matagorda	4.26	19.31	1.33	24.90
Montgomery	2.18	13.72	1.65	17.55
Polk	1.95	12.64	0.80	15.39
San Jacinto	1.98	11.04	1.08	14.10
Wharton	3.63	8.38	2.82	14.83
Region Totals	3.30	12.93	1.85	18.07

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.

Table 1: Houston/Galveston Section Rainfall in Southeast Texas for summer 2024.

Summer 2024 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	4.21	10.51	1.59	16.31
Jasper	3.56	10.85	2.92	17.33
Jefferson	4.72	11.82	3.14	19.68
Orange	6.22	12.02	2.63	20.87
Tyler	2.40	13.80	1.94	18.14
Region Totals	4.22	11.80	2.44	18.47

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.

Table 2: Golden Triangle Section Rainfall in Southeast Texas for summer 2024.

Southeast Texas Regional Summary (continued)

Houston/Galveston Temperature & Rainfall Data for 2024 Summer Season

Site Location (record start)	Hi	Lo	Mean	Departure	Rain	Normal	Departure
June Climate							
Bush Airport (1888)	93.1	76.1	84.6	1.6	7.80	6.00	1.80
Hobby Airport (1930)	93.0	78.4	85.7	2.8	3.05	6.09	-3.04
Galveston (1871)	89.3	80.2	84.7	0.9	2.24	4.23	-1.99
Sugar Land (2000)	93.7	76.6	85.2	2.0	4.51	4.22	0.29
July Climate							
Bush Airport (1888)	91.7	76.5	84.1	-1.0	10.89	3.77	7.12
Hobby Airport (1930)	92.1	77.6	84.9	0.1	12.09	4.59	7.50
Galveston (1871)	88.9	79.0	84.0	-1.5	18.68	3.41	15.27
Sugar Land (2000)	92.3	74.7	83.5	-1.9	10.15	4.16	5.99
August Climate							
Bush Airport (1888)	97.0	78.2	87.6	2.4	1.82	4.84	-3.02
Hobby Airport (1930)	96.6	79.6	88.1	3.0	1.70	5.44	-3.74
Galveston (1871)	92.3	81.8	87.1	1.2	4.62	4.71	-0.09
Sugar Land (2000)	97.3	77.0	87.1	2.1	1.44	5.27	-3.83

Table 3: Temperature & Rainfall Data for First Order Climatological Stations in the Houston/Galveston Section

Golden Triangle Temperature & Rainfall Data for 2024 Summer Season

Site Location	Hi	Lo	Mean	Departure	Rain	Normal	Departure
June Climate							
Beaumont Port Arthur	95.2	75.2	83.7	1.7	5.26	6.70	-1.44
Beaumont Research Center	91.7	74.3	83.0	1.7	4.31	7.57	-3.26
Orange 9N	90.3	73.6	81.9	2.6	3.47	6.84	-3.37
July Climate							
Beaumont Port Arthur	90.4	75.4	82.9	-0.7	11.59	6.85	4.74
Beaumont Research Center	89.9	75.6	82.7	-0.5	10.87	5.39	5.48
Orange 9N	89.9	72.6	81.3	-0.7	11.57	5.82	5.75
August Climate							
Beaumont Port Arthur	95.3	76.9	86.1	2.3	3.06	6.89	-3.83
Beaumont Research Center	94.3	75.8	85.0	1.8	2.06	6.43	-4.37
Orange 9N	93.1	74.9	84.0	2.7	1.87	6.71	-4.84

Table 4: Temperature & Rainfall Data for First Order Climatological Stations in the Golden Triangle Section

Southeast Texas Regional Summary (continued)

Hurricane Beryl Summary

Hurricane Beryl made landfall near Matagorda, Texas on July 8, 2024, causing at least 42 deaths due to strong winds and heavy rainfall knocking over trees and causing drownings. Hurricane Beryl was also significant for causing over 2.7 million households and businesses near the Gulf Coast, primarily in the Houston metropolitan area, to suffer from prolonged power outages during high temperatures and high humidity. The post-storm power outages played a contributing factor in at least ten deaths.

Parts of the Greater Houston area received over 8.00" of rain. See rainfall storm radar estimates in image 5 on page 31.

Storm surge at Surfside Beach reached between 3–7 feet, with several 18-wheeler trucks reported being flipped over in Freeport due to recorded wind gusts reaching up to 94 miles per hour. Several streets in Rosenberg were reported to be flooded, with great amounts of debris scattered. A National Ocean Service station in Galveston Bay recorded sustained winds of 73 mph with wind gusts of up to 82 mph, and with a peak gust of 97 mph in Brazoria. A USGS stream level gauge at Galveston Railroad Bridge recorded a 3.6 foot increase above its highest diurnal tidal level. Strong winds tore windows and window frames out of the walls of a hotel in Galveston.

Image 1: Hurricane Beryl radar image after landfall.

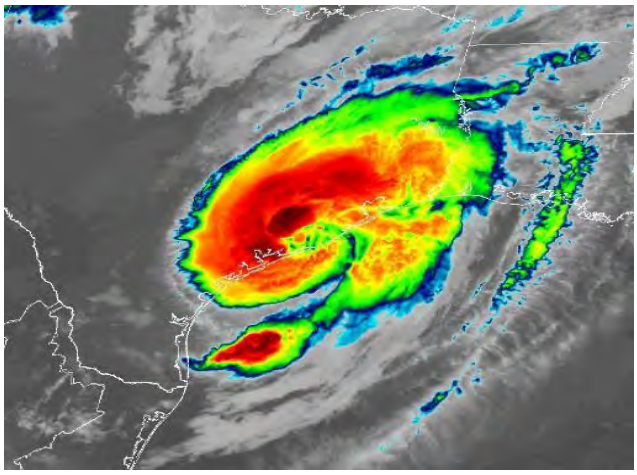


Image 2: Satellite photo of Beryl at landfall.

There were 16 tornadoes ranging from EF0 to EF2 in intensity were confirmed in the state; another tornado tracked out of Louisiana and into Texas. An EF1 tornado caused considerable damage southwest of Jamaica Beach while an EF2 tornado caused major damage on the west side of Jasper, injuring one person. A high-end EF1 tornado moved through the town of Timpson, causing roads to become unpassable with one person being trapped. Two EF0 tornadoes and 11 other EF1 tornadoes were also confirmed in the state; the tornado that tracked into Texas out of Louisiana was rated EF1 as well and caused an injury near Bethany, Louisiana and Texas. Two tornadoes were also reportedly spotted in Beaumont, one of which caused some roof damage.

At least 18 people were killed in the Houston area from damages caused by Hurricane Beryl. More than 2.26 million households and businesses lost power as Beryl's eyewall struck Houston, striking down at least ten transmission towers and destroying or knocking over large numbers of power lines in the area. Many trees fell onto power lines throughout Southeast Texas. Power remained out for many days before being restored in many areas.

Image 3: A tree blown down in Southeast Texas.

Image 4: A home damaged in Freeport Texas.

Southeast Texas Regional Summary (continued)

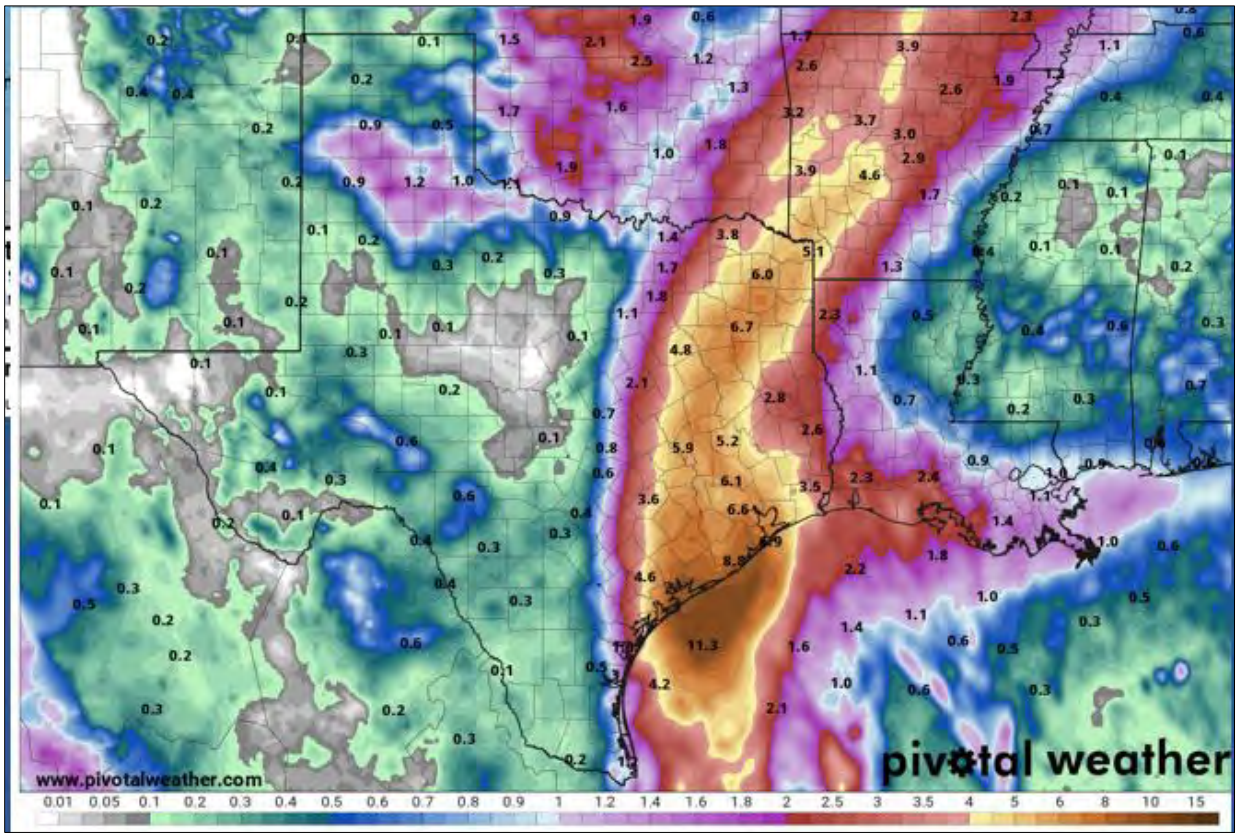


Image 5: Hurricane Beryl total rainfall radar estimate.

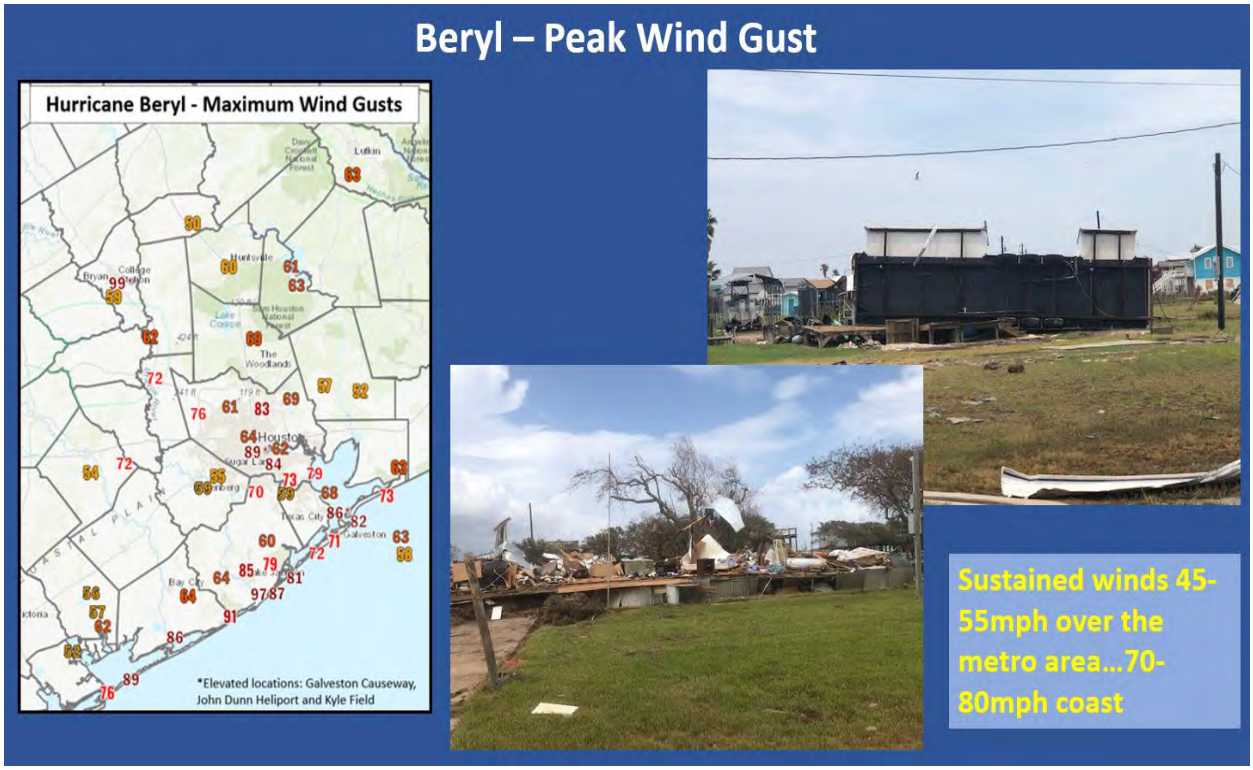


Image 6: Beryl peak wind gusts.

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Brownsville/Rio Grande Valley Regional Summary

Rains Return in June-July but Sweltering Heat is Maintained

Tropical Cyclones/Energy Disturbances Bring Welcome Rain but Water Supply Crisis Holds

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

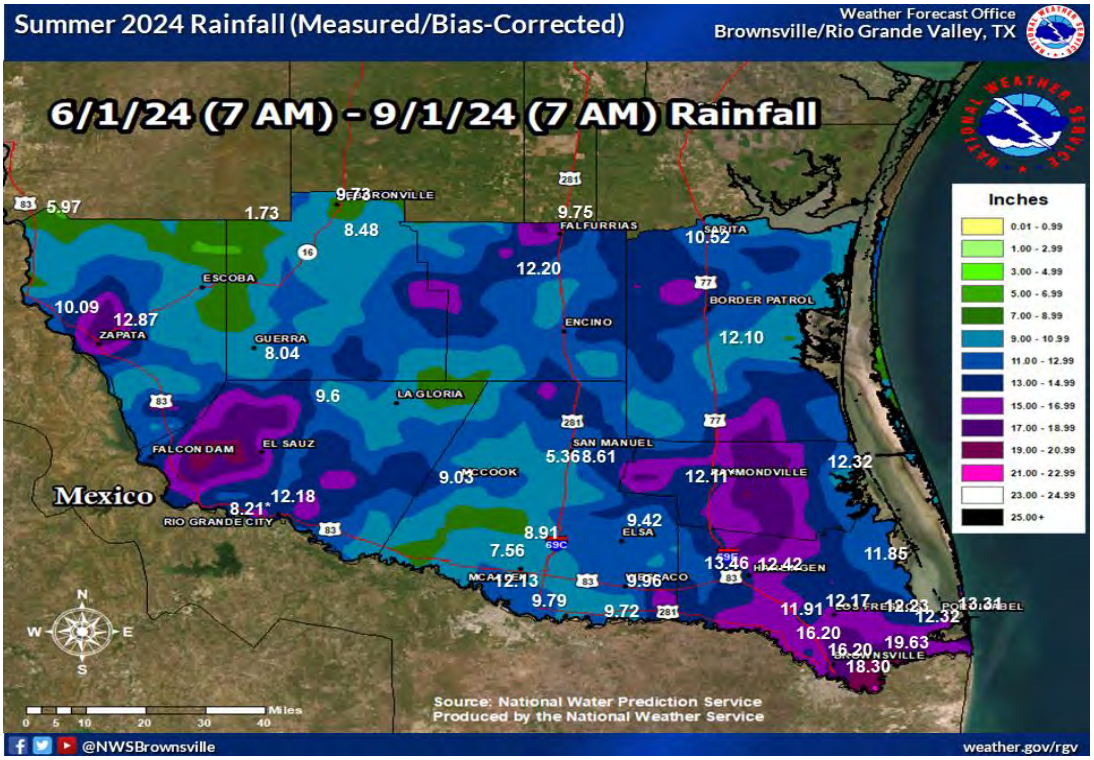


Figure 1: Welcome and locally beneficial rainfall arrived after June's very hot start. Above too much above average rainfall quenched the drought, but largely missed the watershed locations necessary to recharge Amistad and Falcon International Reservoir. Annotated values are a combination of CoCoRaHS, ASOS (NWS), AWOS (FAA), and the Texas Mesonet.

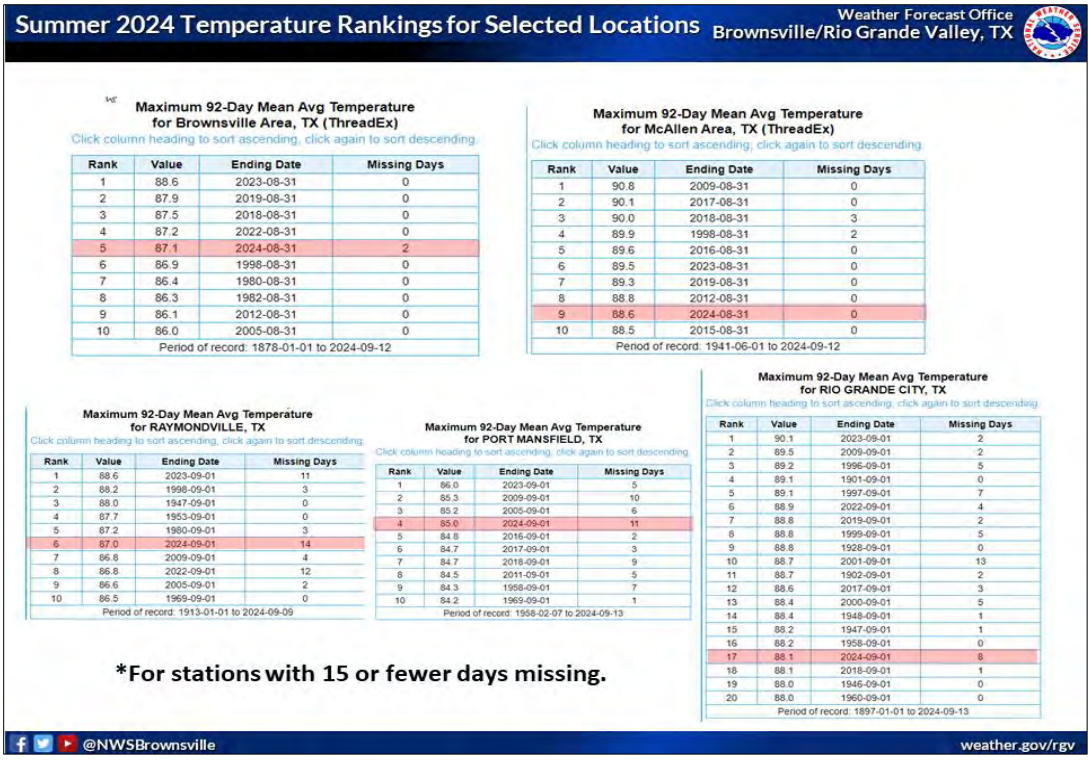


Figure 2. Despite helpful rains in parts of June, July, and late August, sweltering temperatures between June and August ensured a top-five hottest 2024 would become more certain. For all but Rio Grande City, temperatures ranked among the top ten hottest on record for the period for most available Rio Grande Valley locations.

Brownsville/Rio Grande Valley Regional Summary (continued)

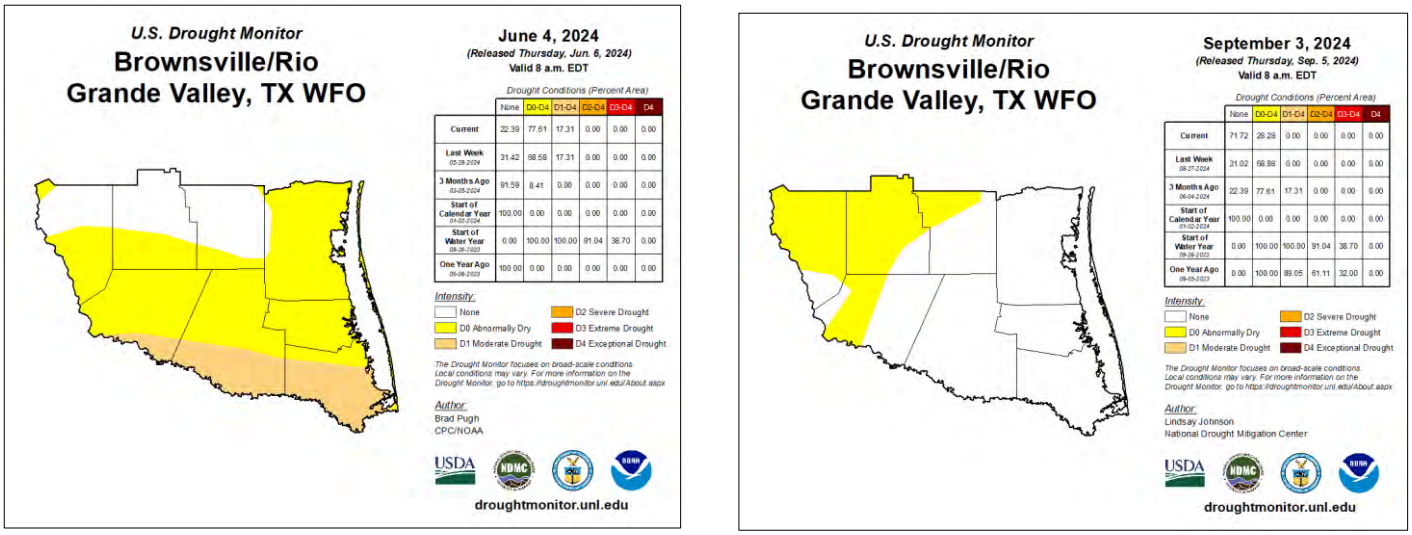


Figure 3. U.S. Drought Monitor general improvement from June 4th, 2024 (left) and September 3rd, 2024 (right). Overall, the most beneficial and heavier rain favored locations from eastern Starr/Brooks to the coast. By the start of August, drought was removed from all areas – but a dry and top-ten hottest August for most returned periodic dryness (yellow).

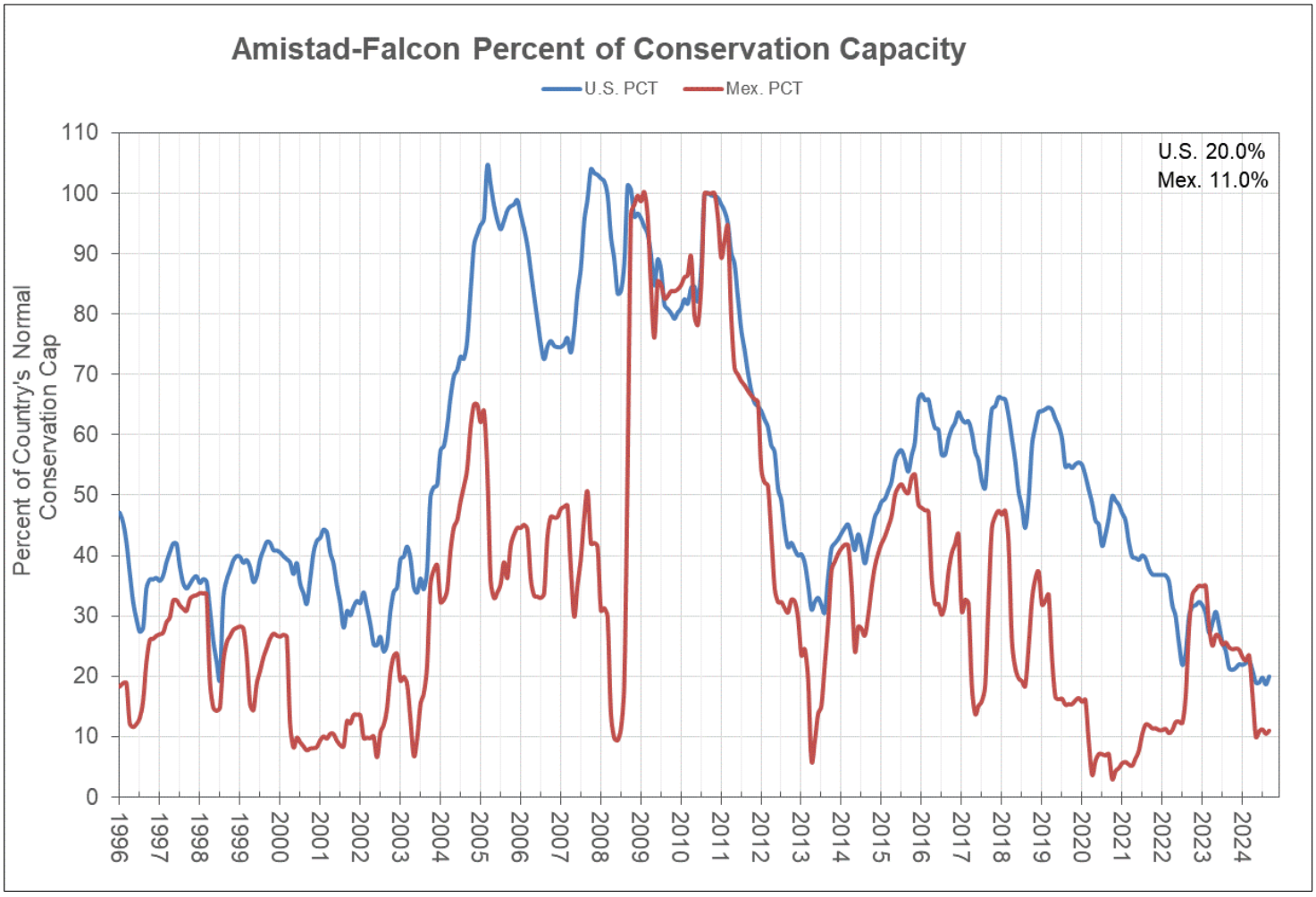


Figure 4. U.S. International Boundary and Water Commission (IBWC) combined percentage of conservation capacity for Amistad and Falcon International Reservoirs, as of the start of September 2024. The combined low values remained the lowest on record since each dam was constituted (Falcon in 1954; Amistad in 1971) – as meager inflows compared with average in late summer were insufficient to make a real dent in levels.

Brownsville/Rio Grande Valley Regional Summary (continued)

Month-by-Month Summary

June started where May left off – near record heat and oppressive apparent, or "feels like", temperatures for which local values exceeded 115°F for a few hours across the populated Rio Grande Valley on June 4th and 5th. Ambient temperatures would peak between the 11th and 14th, with afternoon highs in the low to mid 100s from Brooks/Hidalgo to the Rio Grande Plains, and upper 90s closer to the coast – with the only local notable rain from afternoon thunderstorms in Hidalgo County on the 10th. The pattern would temporarily change the following week, as unseasonably strong Canadian high pressure moved across most of the eastern seaboard while a broad area of low pressure formed in the far western Caribbean and moved into the southwestern Gulf. The difference in pressure systems would produce a prolonged easterly fetch that brought high surf, dangerous rip currents, and ultimately tidal run-up to South Padre Island that began on June 18th. The broad low eventually consolidated into Potential Tropical Cyclone #1 a day earlier in the Bay of Campeche. The system would ultimately consolidate into Tropical Storm Alberto on the 19th – tightening the pressure gradient and bringing more coastal impacts to South Padre Island, including beach erosion. Gusty winds to tropical storm force (39 mph or higher) impacted the coastal portion of the region on the 19th, and farther inland on the 20th due to mixing of dry air into showers after Alberto made landfall near Tampico, Tamaulipas Mexico. The month's first widespread rain dominated the 19th. Between the 18th and 20th, widespread 2 to 4" fell, with pockets of 4-6" across northern Brooks/Kenedy County and near McAllen. A detailed report can be found here.

Additional rains fell through the 23rd, courtesy of another tropical wave that rolled across northern Veracruz and southern Tamaulipas a couple days following Alberto. The rains and relatively saturated ground that followed lowered daily temperatures closer to late June averages (mid to upper 90s by afternoon, upper 70s each morning) but the second-half of June shift was not enough to stop the month from ending up above average.

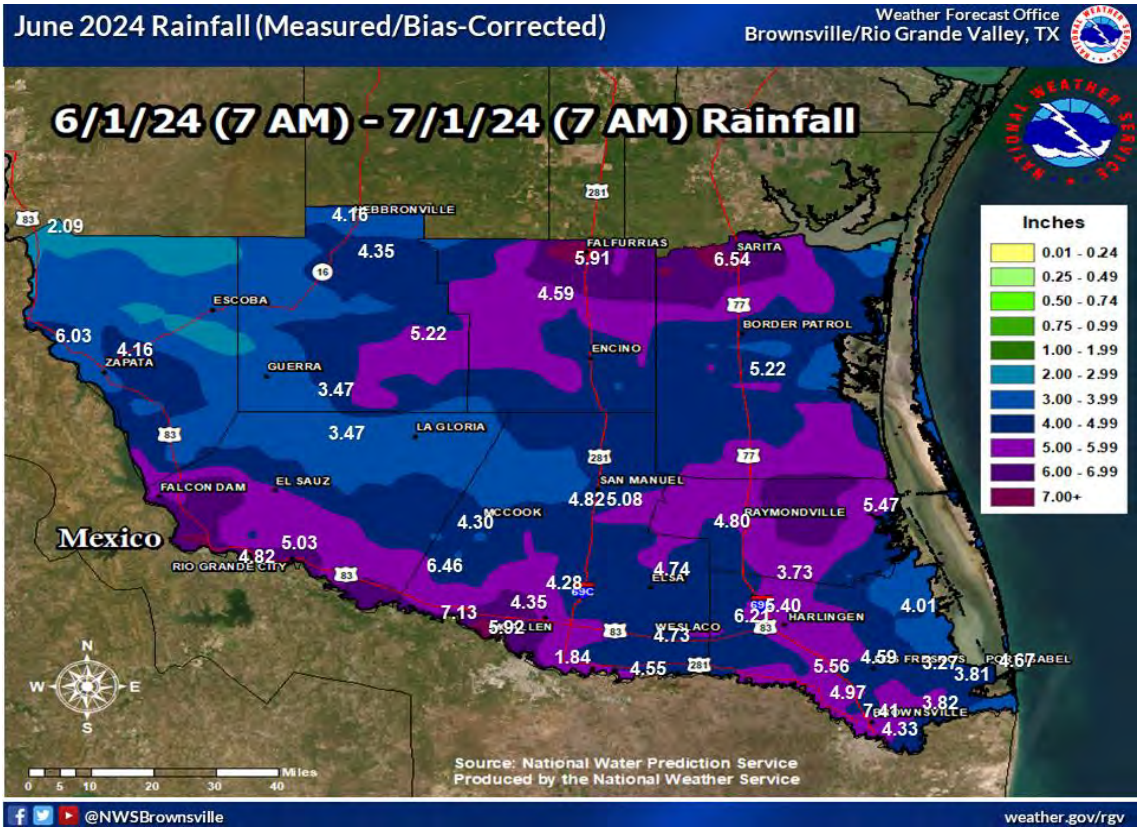


Figure 5. Measured and estimated rainfall for June 2024. Annotated values are a combination of CoCoRaHS, ASOS (NWS) and AWOS (FAA) four-day totals.

Brownsville/Rio Grande Valley Regional Summary (continued)

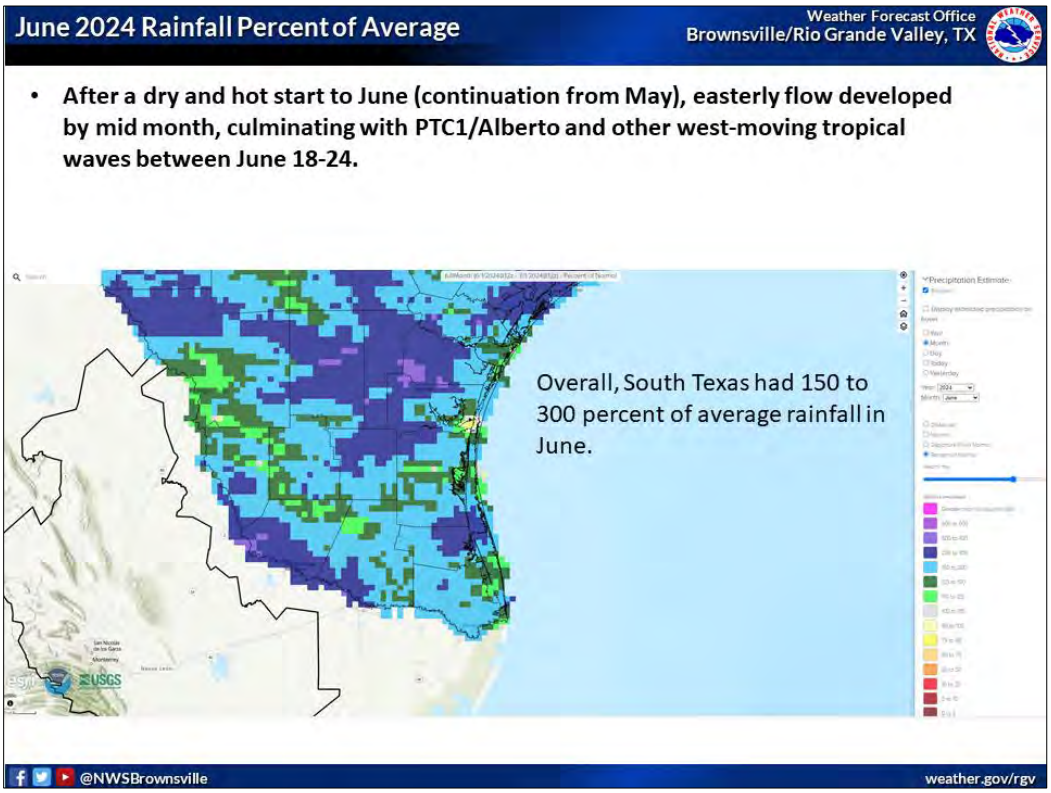


***Figure 6*. Departure from average rainfall for June 2024 across the south Texas Brush Country through the Lower Rio Grande Valley.**

July is typically the peak of a combination of heat and low rainfall, and 2023 was such a case. 2024, however, broke that mold, as the expected pattern of general east to southeast atmospheric flow tapping the deep tropics of the Caribbean and southwest Gulf for August arrived a month earlier. In fact, the months would "flip" in 2024, with August featuring heat and limited rainfall as the steering pattern was more like a typical July (Figure 13, below) . Non-descript conditions started the month before weakened Tropical Storm Beryl approached on the 6th and 7th. Beryl recurved away from the Lower Texas coast – about 100 miles east of South Padre – on the 7th before ultimately making landfall on the middle Texas coast near Matagorda early on the 8th. Though precipitation was limited with Beryl, leftover moisture and weak upper level disturbances impacted the Lower Valley, ultimately dropping periodic heavy rainfall between the 8th and 12th. A period of slightly below average temperatures from the 13th through the 21st would be followed by more rounds of locally heavy – but beneficial – rainfall between the 22nd and 27th. Local minor flooding occurred, mainly from the 24th through 26th. Total rainfall (Figure 7) generally range from 5 to 10" from Brooks and Hidalgo County east to locations just east of IH-69E, and 3 to 6" elsewhere with higher pockets. For most areas, the rainfall ranked among the top five wettest July's on record – and in the ballpark of July 2020 (Hanna) and 2021 (early month tropical wave), and just below 2008 (tropical waves and Hurricane Dolly).

For the month, temperatures ended up 0.5 to 2°F below average – a far cry from the searing July of 2023, when temperatures were generally 1 to 3°F *above* the 1991-2020 average – and ranked among the top ten at all locations.

Brownsville/Rio Grande Valley Regional Summary (continued)

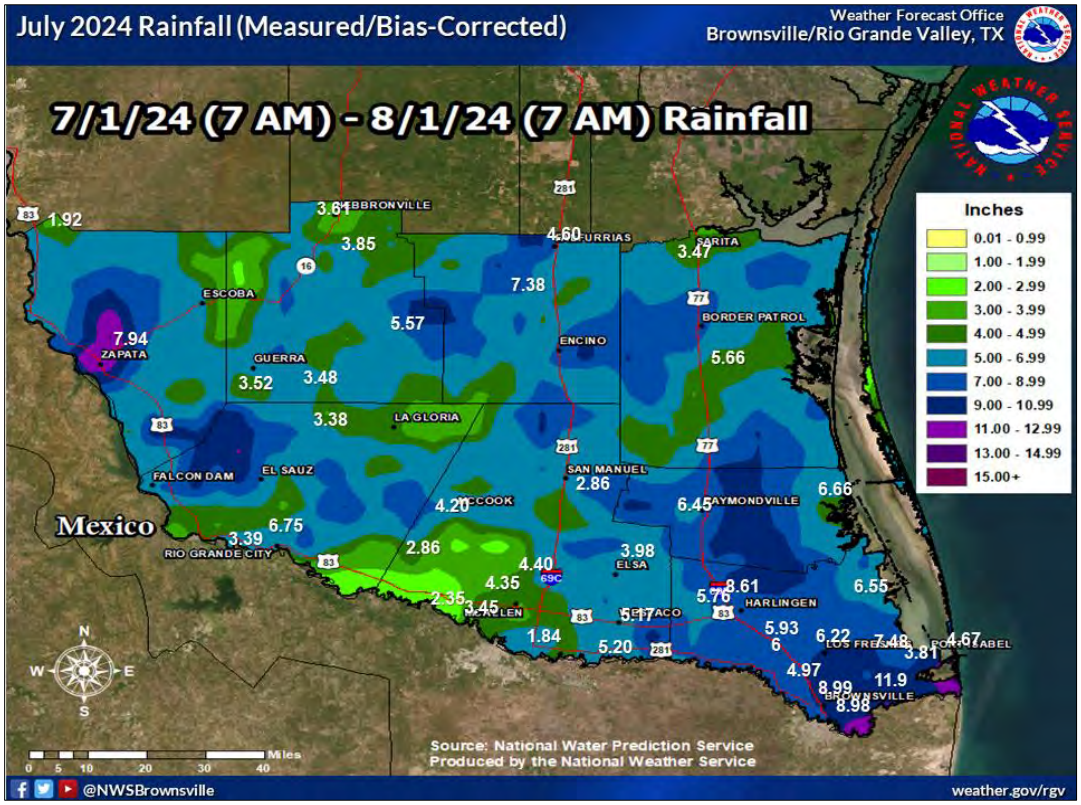


Figure 7. Measured and estimated rainfall for July 2024. Annotated values are a combination of CoCoRaHS, ASOS (NWS) and AWOS (FAA) four-day totals.

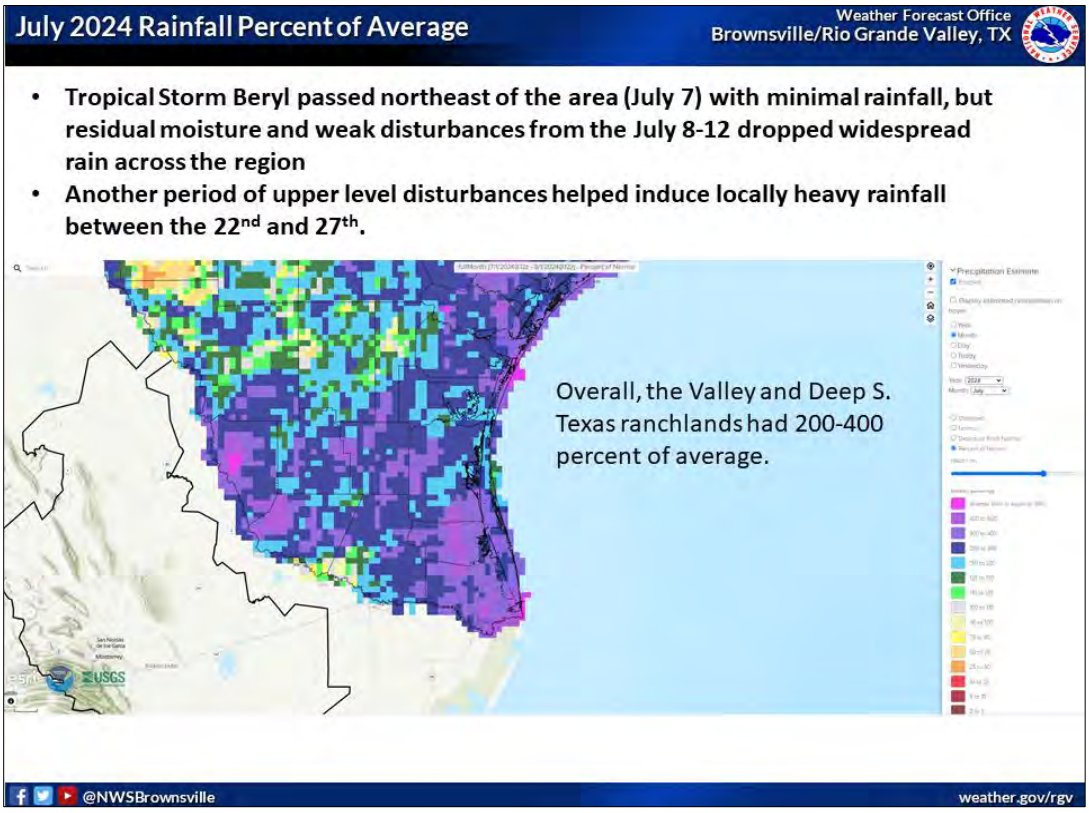


Figure 8. Departure from average rainfall for July 2024 across the south Texas Brush Country through the Lower Rio Grande Valley.

Brownsville/Rio Grande Valley Regional Summary (continued)

The mean upper level steering pattern helped tell the tale of June-July 2024. Unlike June-July 2023, when "La Canicula" (the pattern of the Dog Days of summer, which peaks between July 3 and August 11 each year), June-July 2024 features a pattern more familiar to September: A typical "La Canicula" was coupled with a robust western Atlantic ridge (this year, strong all the way to the Bahamas). Persistent east-southeast steering flow brought the repeated intrusions of deep tropical moisture from the Caribbean and southwest Gulf – resulting in the much wetter than average June-July period and holding temperatures down – a little.

Needless to say, drought/dryness was eliminated in all areas by the end of July. A far cry from the dryness/drought that began August of 2023.

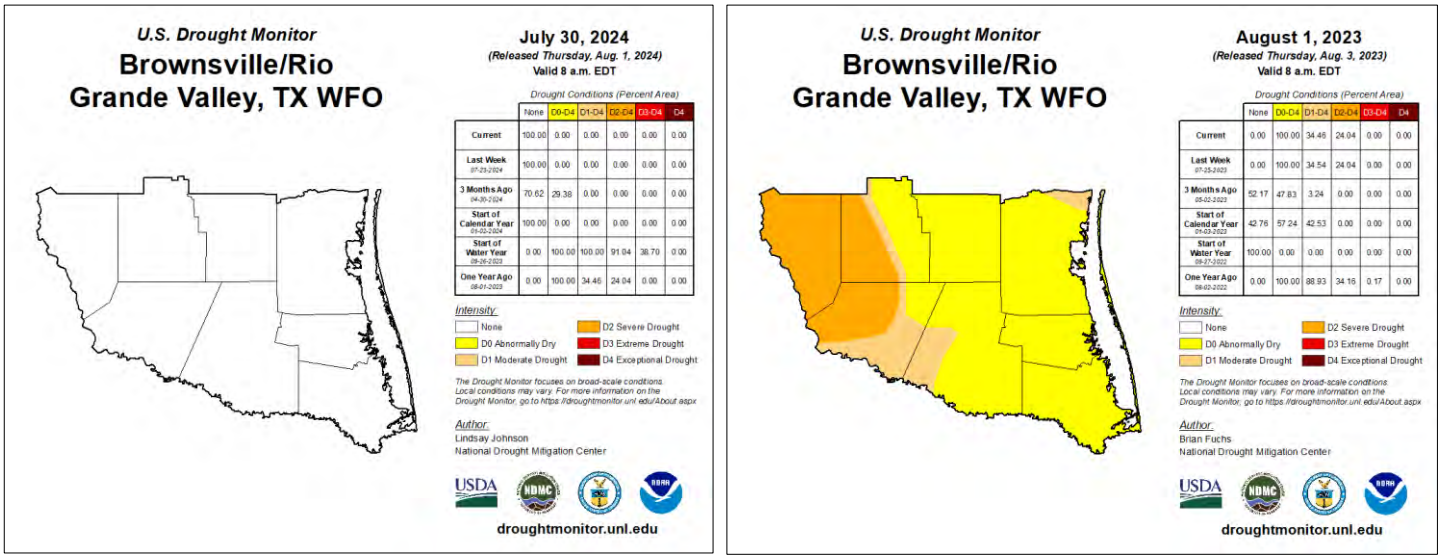


Figure 9. Drought monitor comparison between the end of July 2024 (left) and end of July 2023 (right).

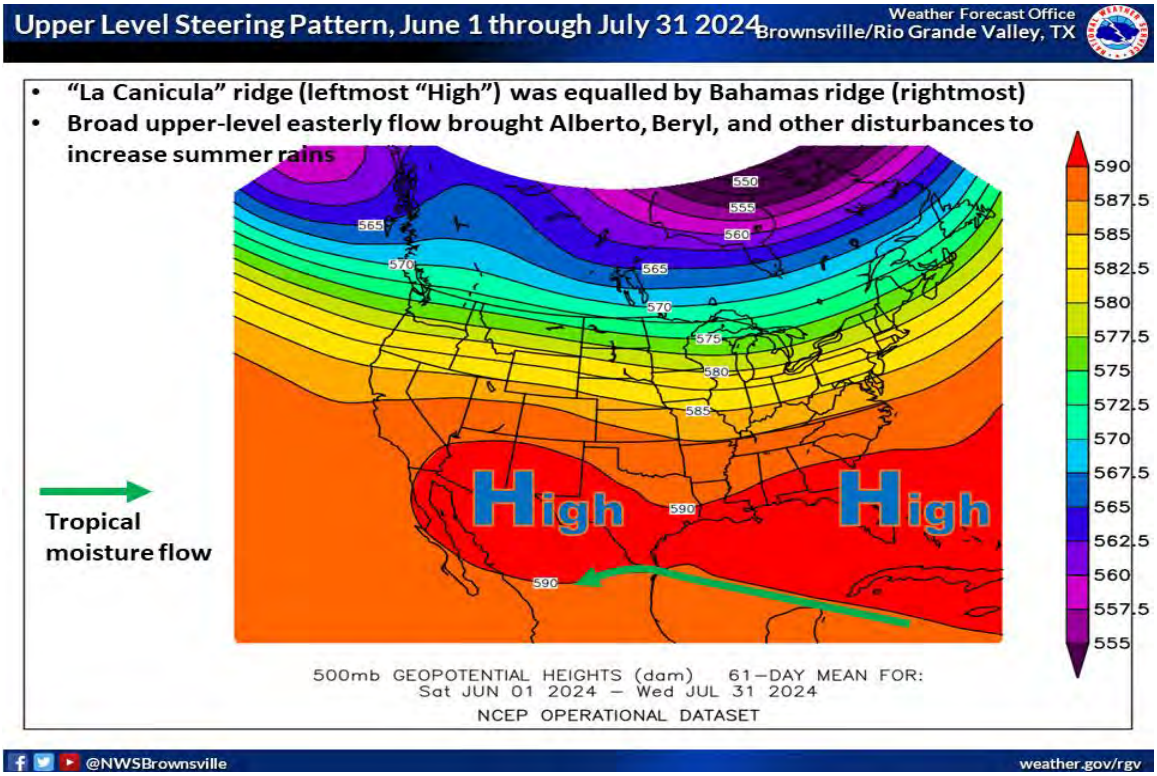


Figure 10. Average steering pattern at around 18,000 feet above the surface for June and July

Brownsville/Rio Grande Valley Regional Summary (continued)

August, for the most part, acted like it should. Following two consecutive months where rainfall ended up among the top-five to top-ten wettest on record, drier and hotter conditions returned for nearly all of the month. This is not unusual, as the first three weeks of August are among the lowest daily average rainfall values during the calendar year. Rain would return during the last few days of the month, mainly in western Starr County and portions of Cameron and Willacy County – again, a typical occurrence as average daily rainfall more than doubles from the first three weeks of the month.

Temperatures ran right around the 1991-2020 30-year averages – but related to the full period of record, were among the top-the hottest.

The combination of top-decile heat with limited rainfall returned abnormal dryness to most of the region before the end-of-month rains trimmed back the areas of concern.

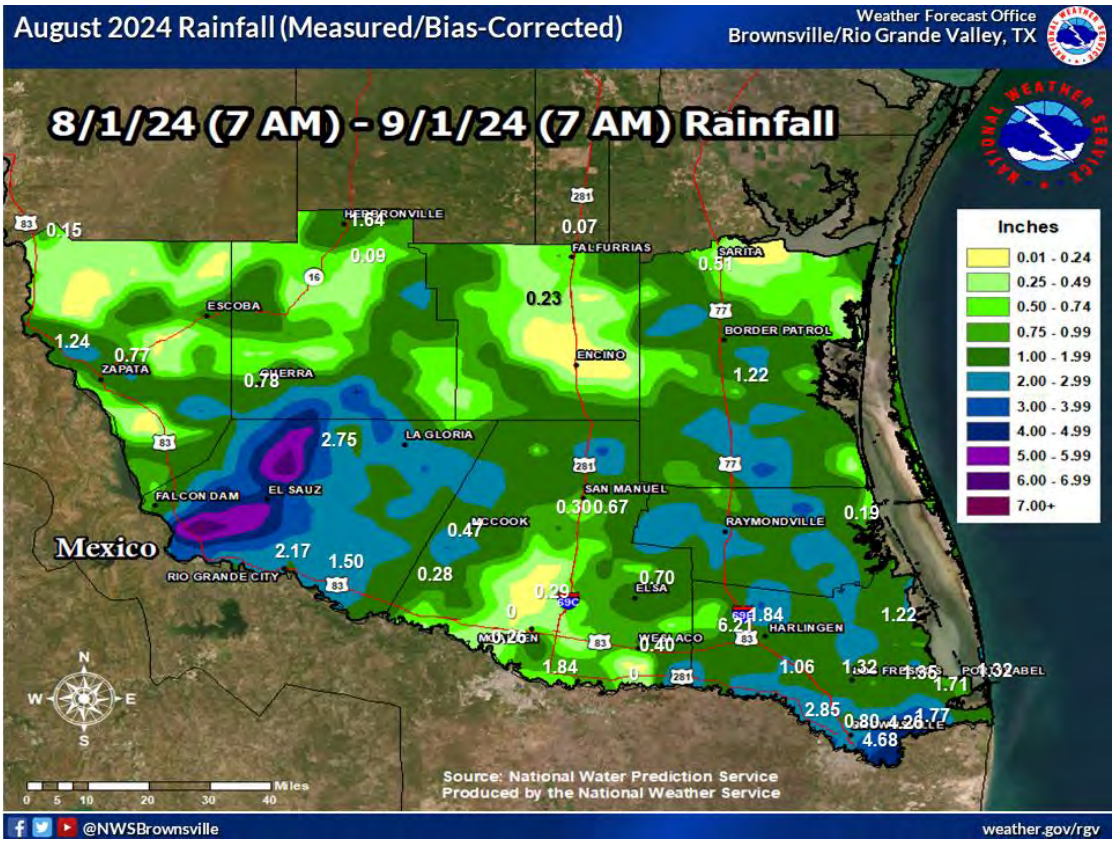


Figure 11. Measured and estimated rainfall for August 2024. Annotated values are a combination of CoCoRaHS, ASOS (NWS) and AWOS (FAA) four-day totals.

Brownsville/Rio Grande Valley Regional Summary (continued)

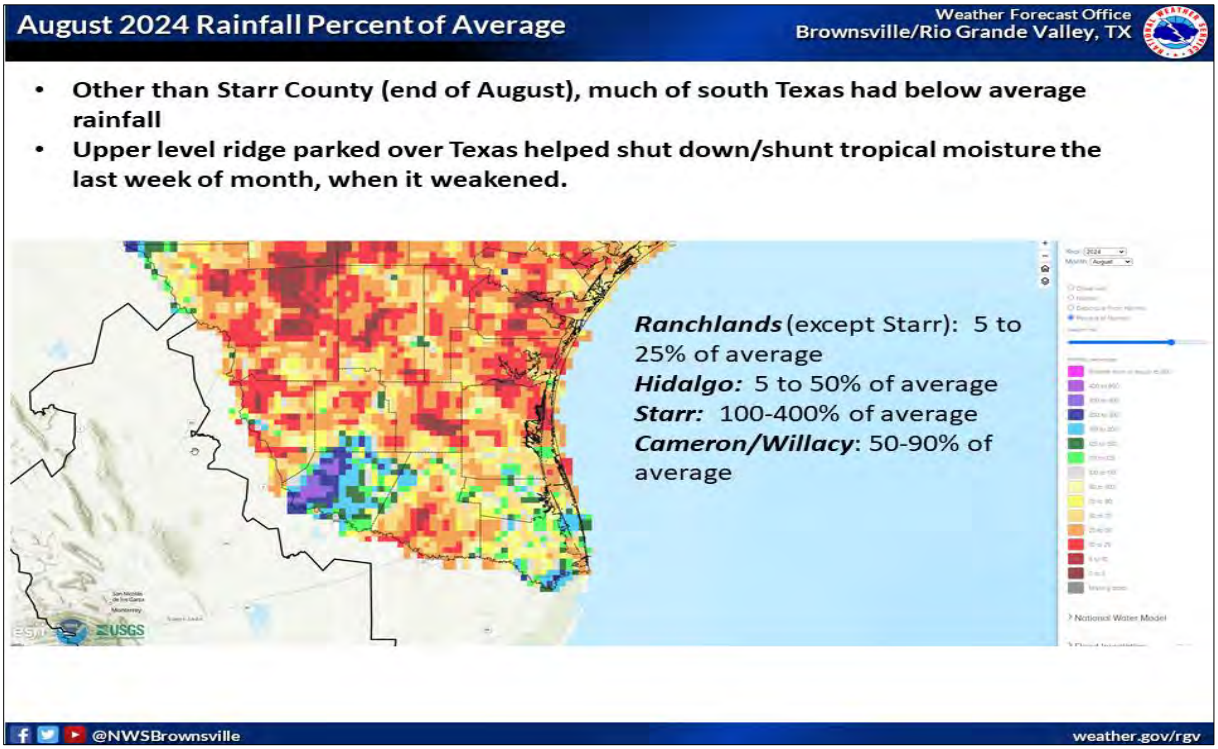


Figure 12. Departure from average rainfall for August 2024 across the South Texas Brush Country through the Rio Grande Valley.

The upper level steering pattern returned to one expected from mid-July through early-mid August, as a broad "heat dome" covered the state for nearly all of the month (Figure 13). Many observation stations recorded a top-ten hottest August across the state.

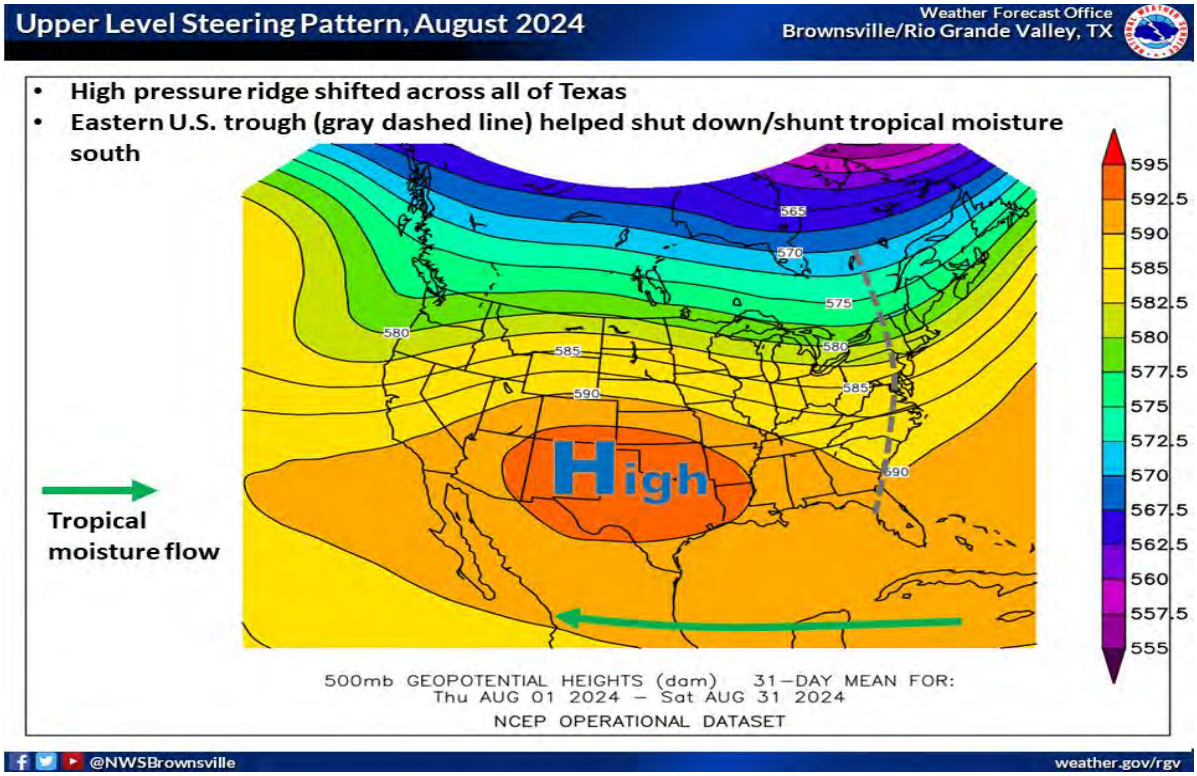


Figure 13. Average steering pattern at around 18,000 feet above the surface for August.

Brownsville/Rio Grande Valley Regional Summary (continued)

Summer 2024 provided necessary and beneficial rainfall following a record hot late spring that was severely stressing water resources across the region due to record low combined reservoir levels at Amistad and Falcon, which account for up to 90% of the agricultural and municipal water supply. The water, however, only temporarily replenished area retention/detention ponds – and the lack of remnants of a tropical cyclone over the headwaters/inflow region to each reservoir meant that mere "drops in the bucket" was provided from infrequent rain events that reached these areas. Following late August and early September rainfall, levels at Amistad had only risen from 19.3 to 20.1 percent (total share) of conservation capacity, while Falcon had only risen from 10.1 to 11.1 percent. The combined share remained at or near historic lows, and with a seasonal outlook favoring dryness in mid to late autumn, the need for smart water usage across the Lower Rio Grande Valley remained a front-and-center issue until further notice.

Figure 14: Photo taken in north Brownsville in late July following another round of beneficial rains during summer 2024.

Corpus Christi Regional Summary

Summer Began Wet before Drying Out

By: Nicholas Price, Meteorologist, National Weather Service, Corpus Christi

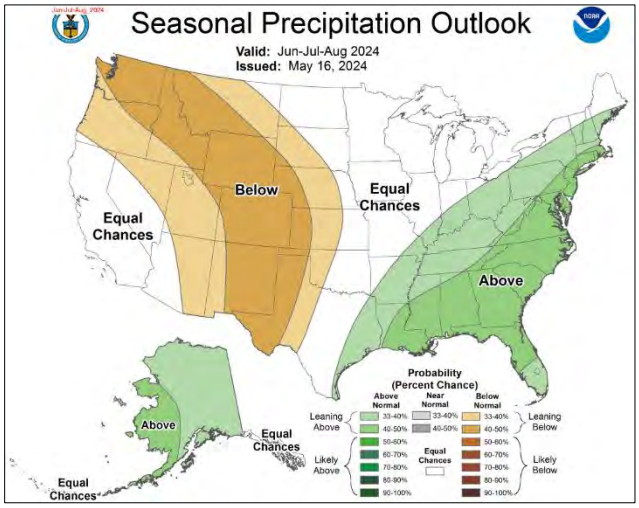


Figure 1: Summer Season Precipitation Outlook

The season was predicted to be normal to leaning above normal for South Texas (Figure 1). That was the case somewhat for June. Most of the rain fell as a result of above normal moisture interacting peak heating as well as a tropical system that affected the region around the middle of the month. Observers this month in the Coastal Plains stretching into the Victoria Crossroads saw between 6.00-9.00" of rain with some isolated areas receiving about 10.00" of rain (Figure 2). Tropical Storm Alberto dropped 2.00-5.00" on the 19th and 20th of this month. The influx of this rainfall led to some sizeable departure from normal values. Areas along the Coastal Bend saw a 3.00- 6.00" departure from normal rainfall (Figure 3). The associated rainfall from Alberto brought some much needed rain out west which helped alleviate drought conditions we were experiencing from the previous season.

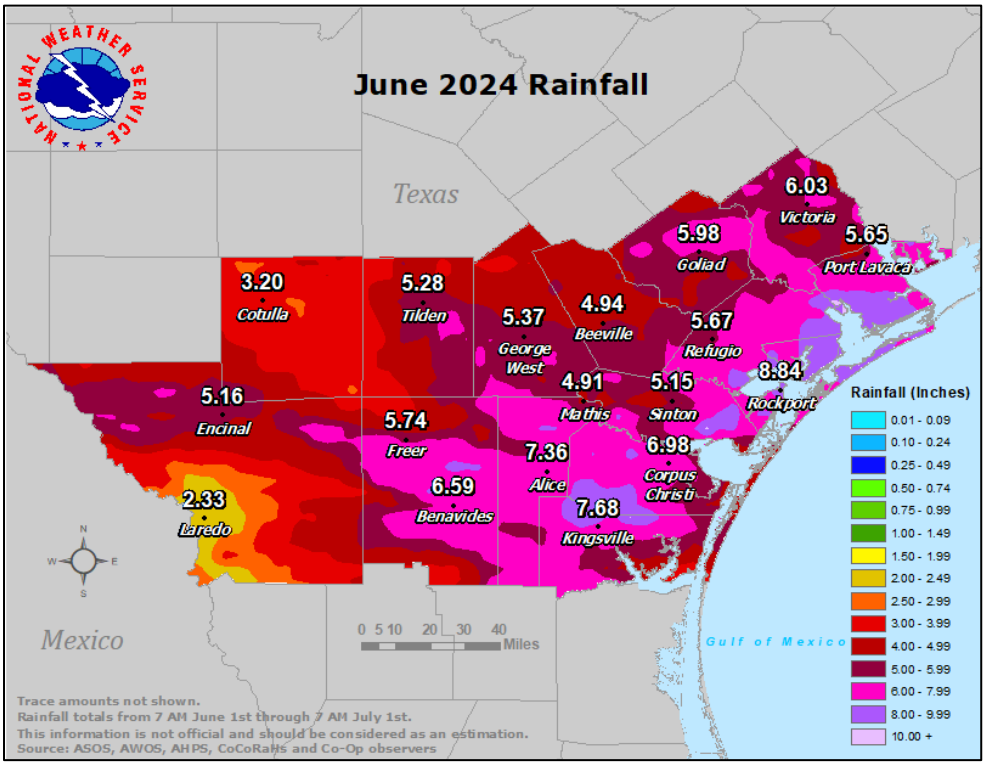


Figure 2: June 2024 Precipitation

Corpus Christi Regional Summary (continued)

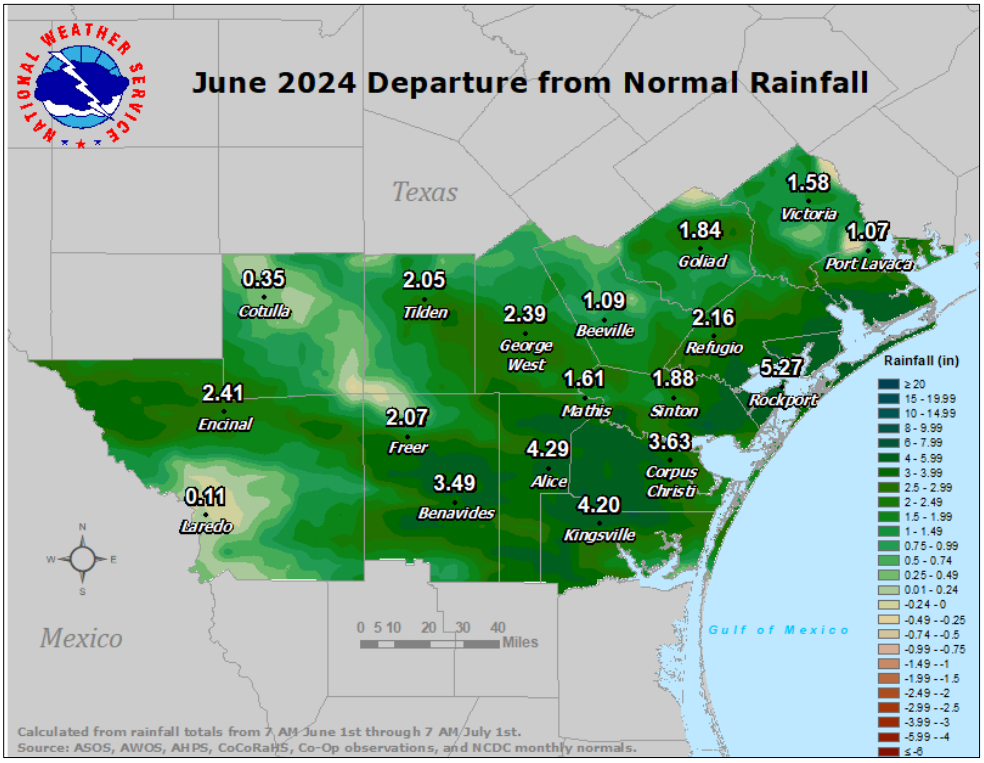


Figure 3: June 2024 Departure from Normal Precipitation

The month of July saw a similar outcome to June with majority of the rain falling in the Coastal Plains into the Victoria Crossroads. Though thanks to an active unstable pattern to go along with above normal moisture throughout the month, some observers to the east saw from 13.00”-17.00” with isolated higher amounts (Figure 4). These higher amounts were seen on the Nueces islands, near Refugio, and Port Lavaca. The departure from normal was slightly higher this month with values 7.00-10.00” across portions of the Coastal Bend (Figure 5). The highest departure from normal values were in Refugio where they saw a whopping 9.43”. The passing disturbances didn’t make it as far west as last month resulting in slightly above normal departures. Observers in Cotulla, Encinal, and Laredo saw departure from normal values less than 0.50”. Majority of the rain fell earlier in the month with the latter portions of the month not receiving nearly as much measurable rainfall. This allowed for abnormally dry conditions to begin creeping back in the northwestern portions of our region around Cotulla (Figure 6). This was a precursor to what was in store for the next month.

Corpus Christi Regional Summary (continued)

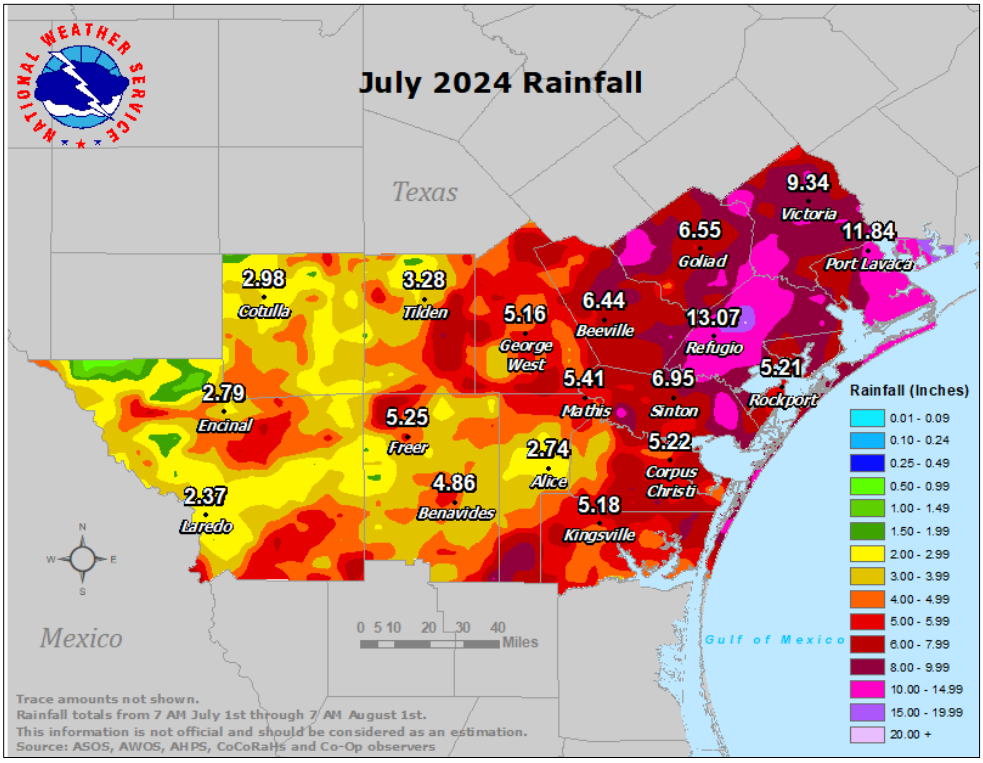


Figure 4: July 2024 Precipitation

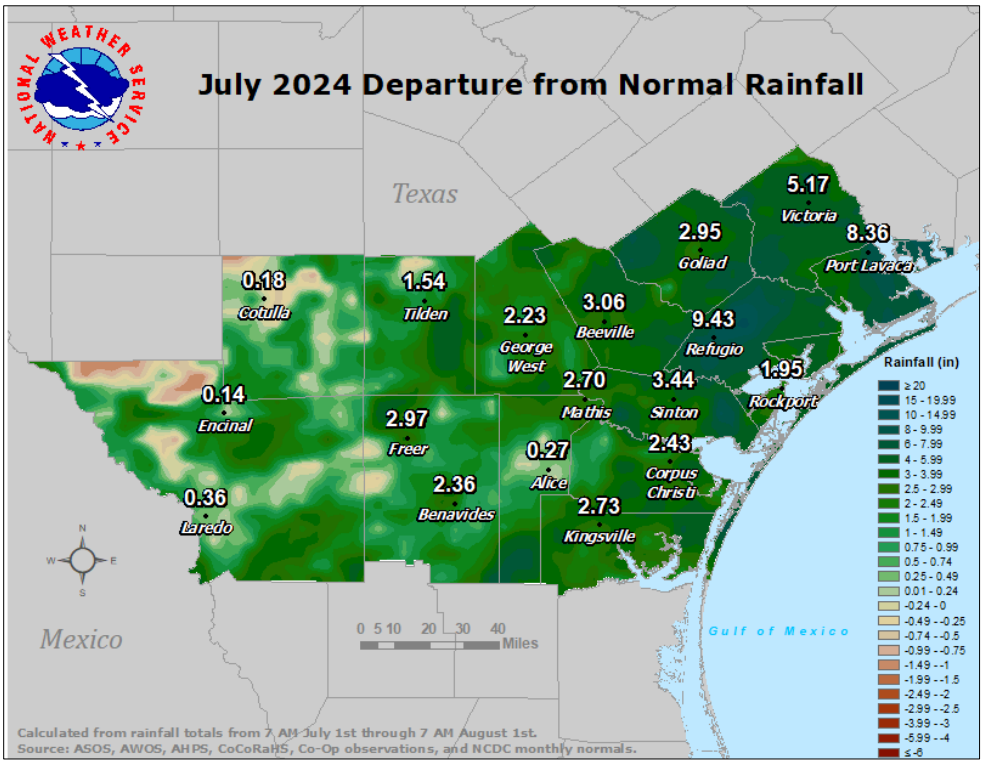


Figure 5: July 2024 Departure from Normal Precipitation

Corpus Christi Regional Summary (continued)

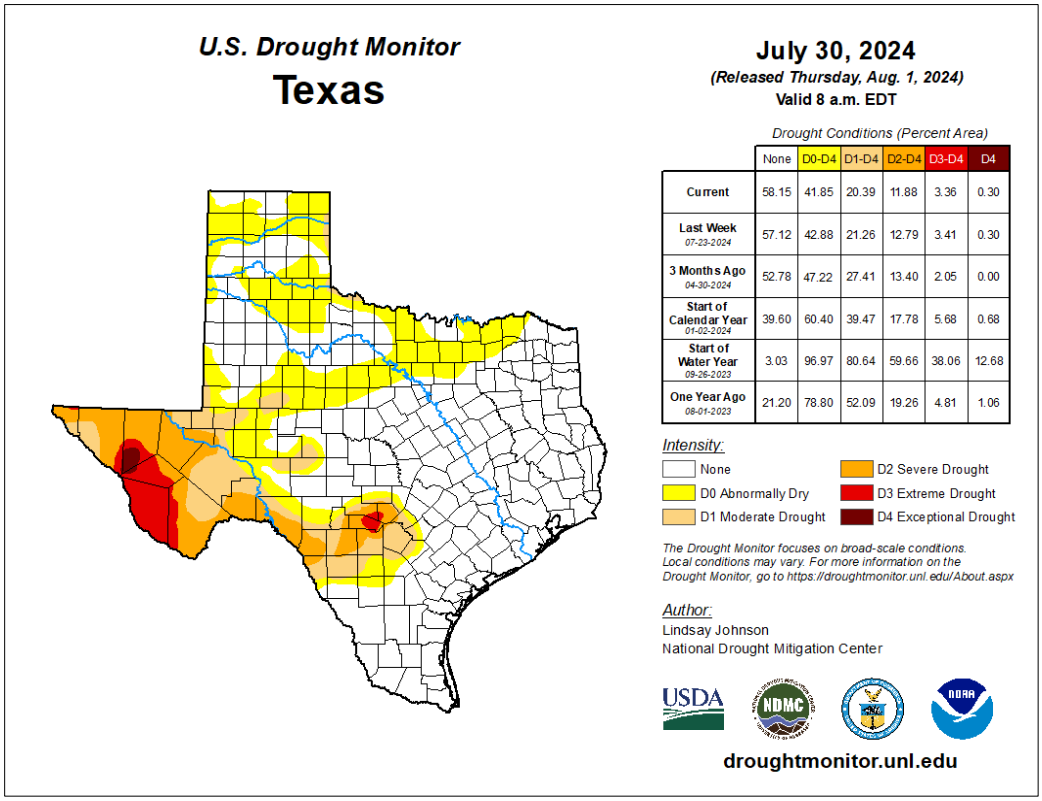


Figure 6: U.S. Drought Monitor Summary for the month of July

The month of August took a different approach than the previous two months. Mid to upper-level ridges dominated much of the month, yielding fairly quiet weather for that time period. Generally across most sites, rainfall fell towards the end of the month though Victoria saw periods of measurable rain through the course of the month. The biggest contributor for the rainfall at the end of the month was a mid-level low that developed over the Gulf of Mexico. Areas in the Victoria Crossroads benefited the most from this disturbance seeing just under 0.50” which is about a third of its total rainfall for the month (Figure 7). Observers saw the least amount of rainfall for the month around the Corpus Christi area with just 0.14”. Given the dry pattern, this set the stage for widespread negative departures from normal (Figure 8). Corpus saw close to a 3.00” departure from normal for this month which led to the inclusion of the area in the Drought Monitor with abnormally dry conditions (Figure 9). Even though Victoria did see the most rain for the month, they were still just below a 1.50” departure from normal. The western portions of the region remained the driest seeing rain only at the end of the month which led to an expansion in abnormally dry conditions down into Webb, Duval, and McMullen counties. Laredo and Encinal received similar low amounts of under 0.50”. Observers in Cotulla were slightly more fortunate nearing 0.70”. On the final day of the month, Cotulla received a little over a half of an inch due to a nearby disturbance in the Gulf. In summary, though the season got off to predominately wet start, the conclusion of the season saw a different story leading to drought conditions for South Texas.

Corpus Christi Regional Summary (continued)

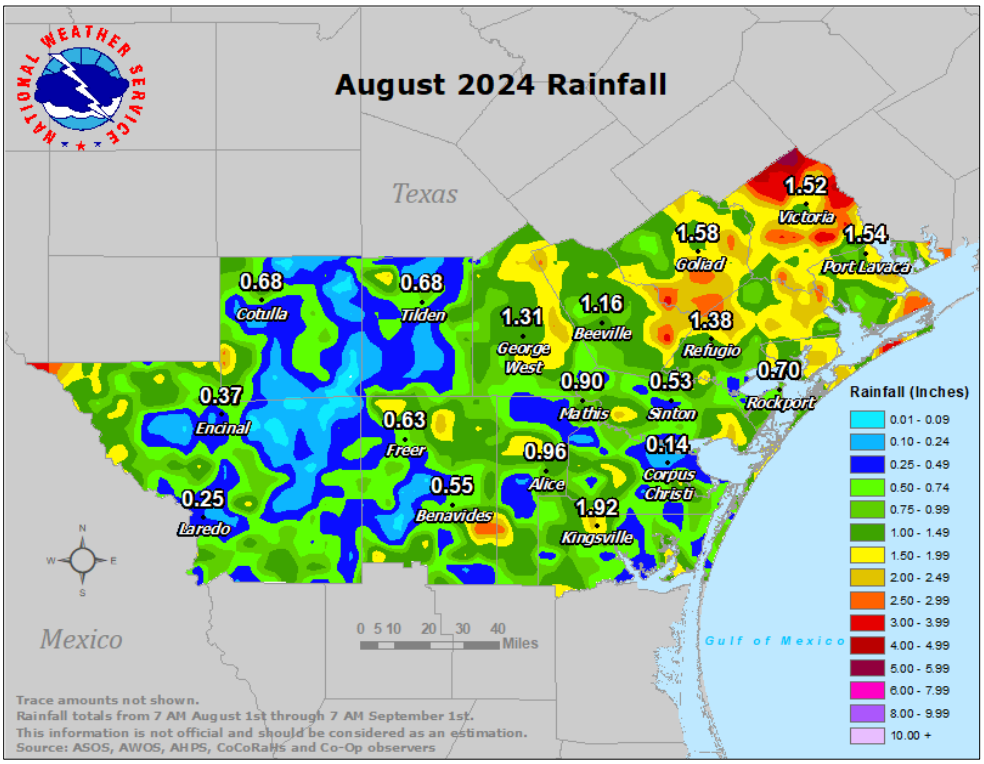


Figure 7: August 2024 Precipitation

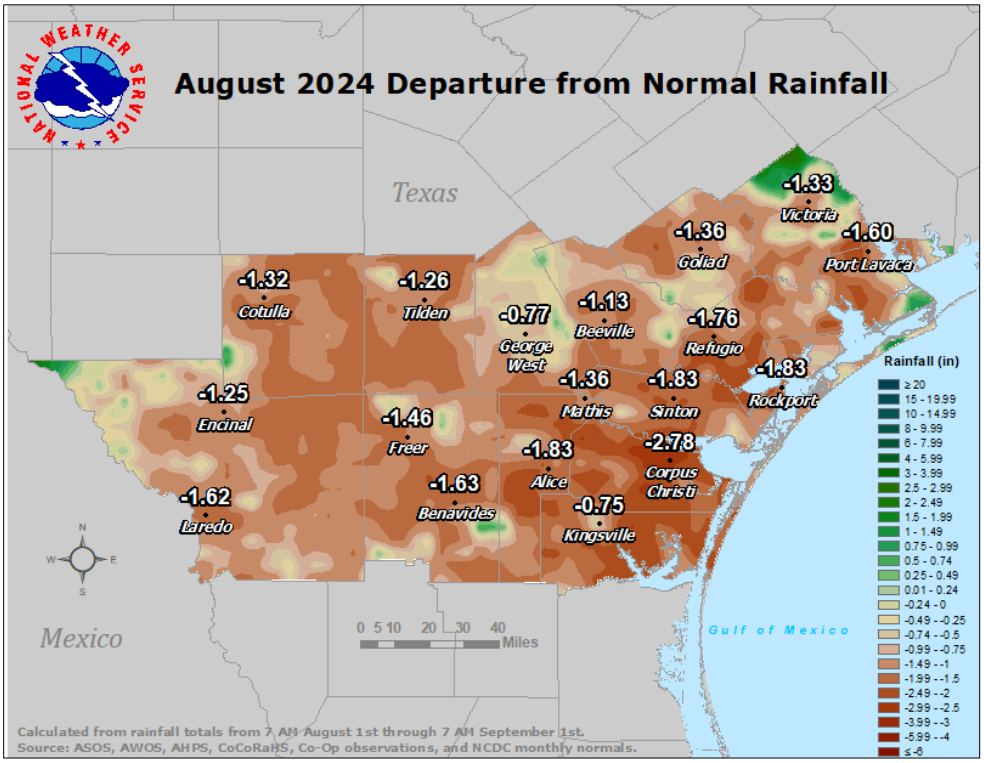


Figure 8: August 2024 Departure from Normal Precipitation

Corpus Christi Regional Summary (continued)

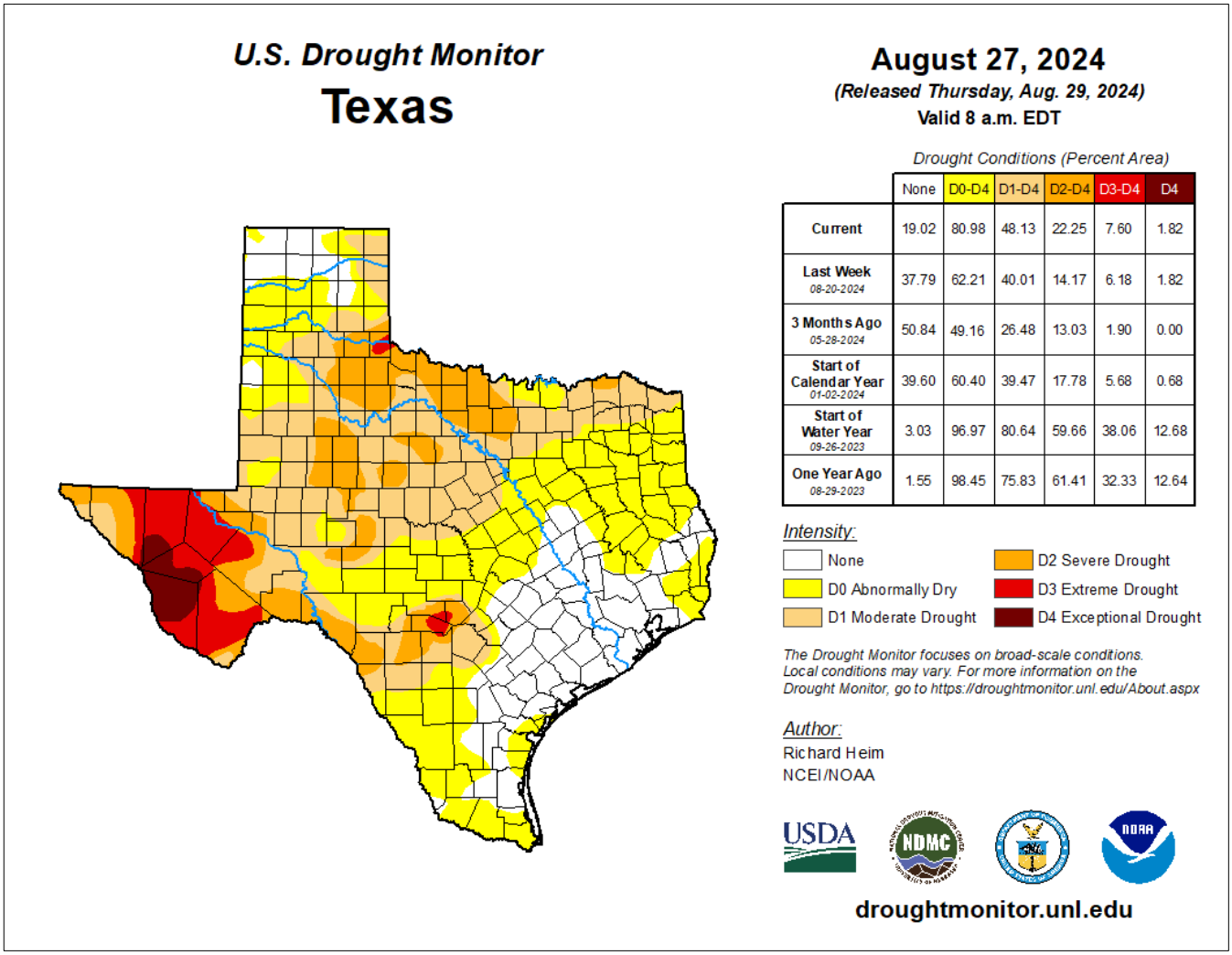


Figure 9: U.S. Drought Monitor Summary for the month of August

West Texas/SE New Mexico Regional Summary

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

By: James DeBerry, Hydrology Program Manager, National Weather Service Midland, TX

June

The quasi-stationary summertime ridge began developing in June, signaling the start of faux-monsoon season. A few hydrologic events were noted.

On June 1st, thunderstorms developed in northern Brewster County, flooding US Hwy 385 northeast of Marathon and stranding vehicles.

On the 9th, thunderstorms developed and moved through Carlsbad, bringing much-needed rainfall to that drought-stricken area, flooding city streets there.

Unfortunately, the upper ridge dominated the area the rest of the month, and no other notable hydrologic activity occurred. However, drought-stricken areas along and west of the Pecos saw more rainfall than they have in quite a while.

Monthly radar rainfall estimates ranged from no rainfall in central Presidio County to up to 5" in southern Pecos County. Highest observed rainfall was 3.60" at the Bowl in Culberson County. Average rainfall of all stations reporting was 0.81".

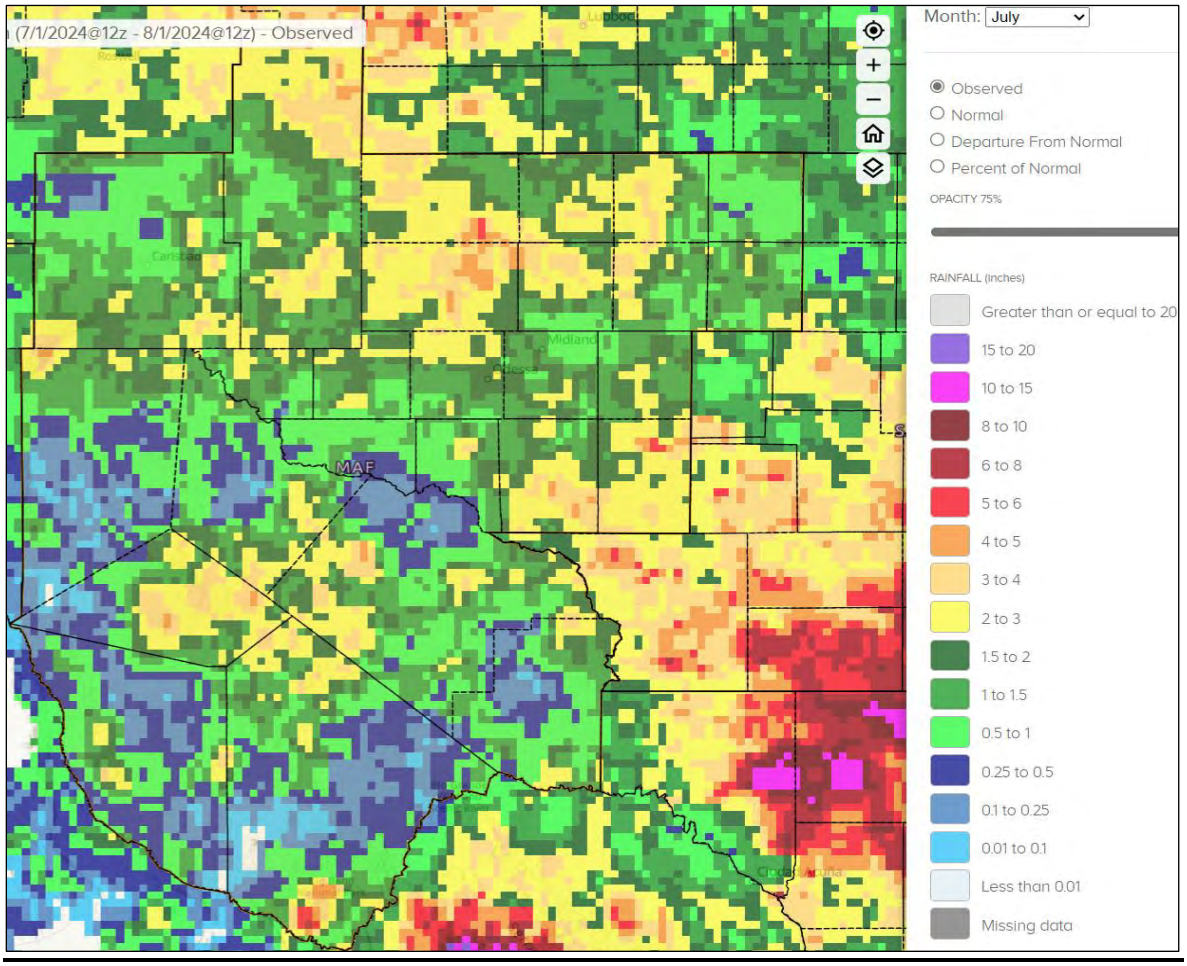


Figure 1: June Precipitation

West Texas/SE New Mexico Regional Summary (continued)

July

July was a good month for rain, as West Texas and Southeast New Mexico were under a col much of the month due to a bifurcated ridge. Even so, the only notable event occurred on July 22nd, when a flood wave came down the Rio Conchos, briefly bringing the Rio Grande into minor flood at Castolon and Johnson Ranch.

Monthly radar rainfall estimates ranged from nothing in southern Culberson County to up to 8" in Big Bend National Park in Brewster County. Highest observed rainfall was 4.62" at Wolf Den DMP in Jeff Davis County. Average rainfall was 1.53".

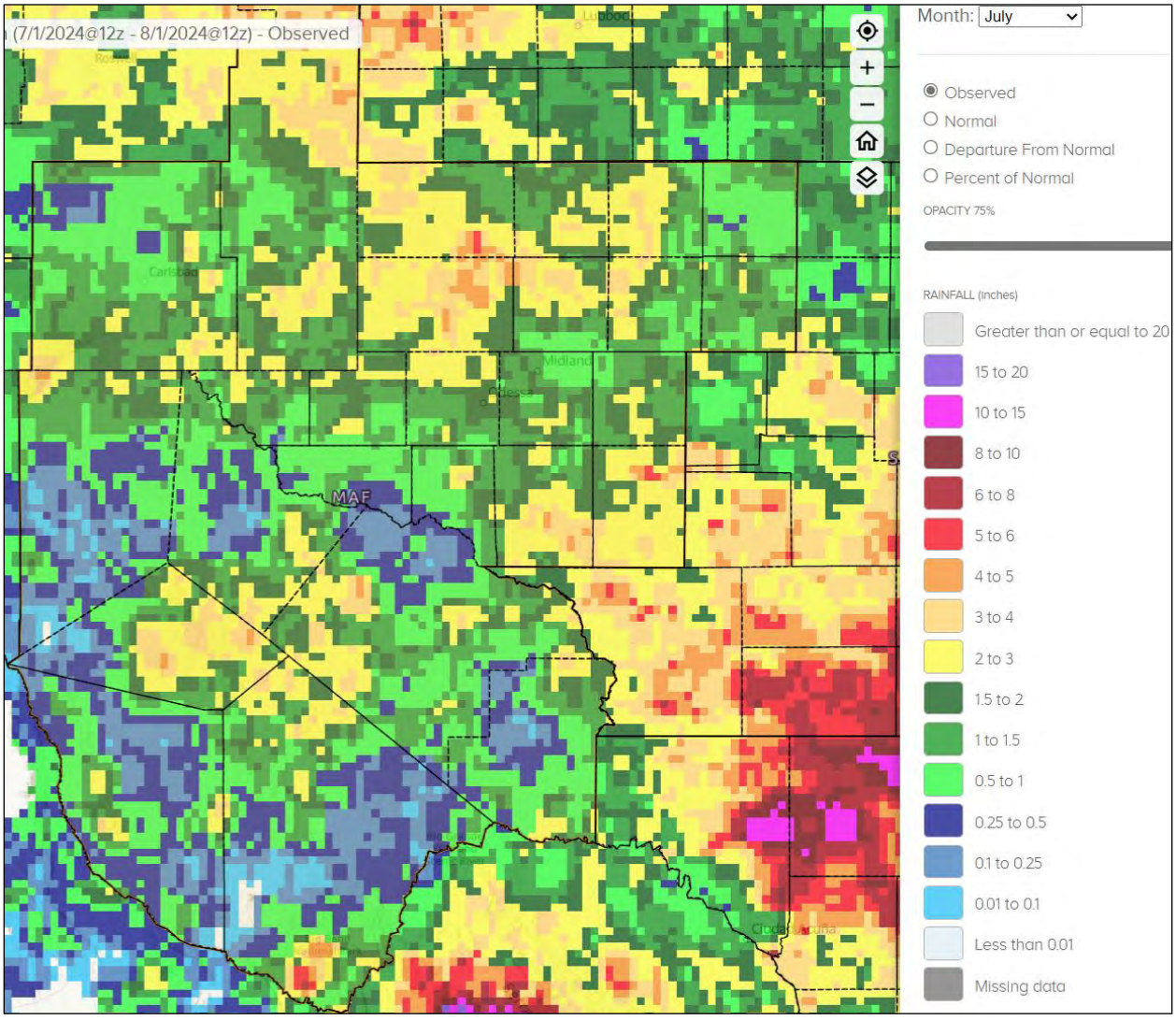


Figure 2: July Precipitation

West Texas/SE New Mexico Regional Summary (continued)

August

August was dominated most of the month by the upper ridge. As a result, little notable hydrologic activity was noted until the end of the month, when the first trough/cold front of the late summer moved through West Texas and Southeast New Mexico.

On August 30th, showers and thunderstorms developed in the vicinity of the cold front. Overnight into the 31st, thunderstorms moved into southwest Eddy County, dropping over 2" of (radar-estimated) rainfall in Dark Canyon. This sent a flood wave down Dark Canyon Draw, resulting in minor flooding in southwest Carlsbad.

Monthly radar precipitation estimates ranged from nothing over southern Culberson County to up to 5" in central Pecos County. However, highest observed rainfall was 4.13" at Mount Locke in Jeff Davis County. Average rainfall was 0.86".

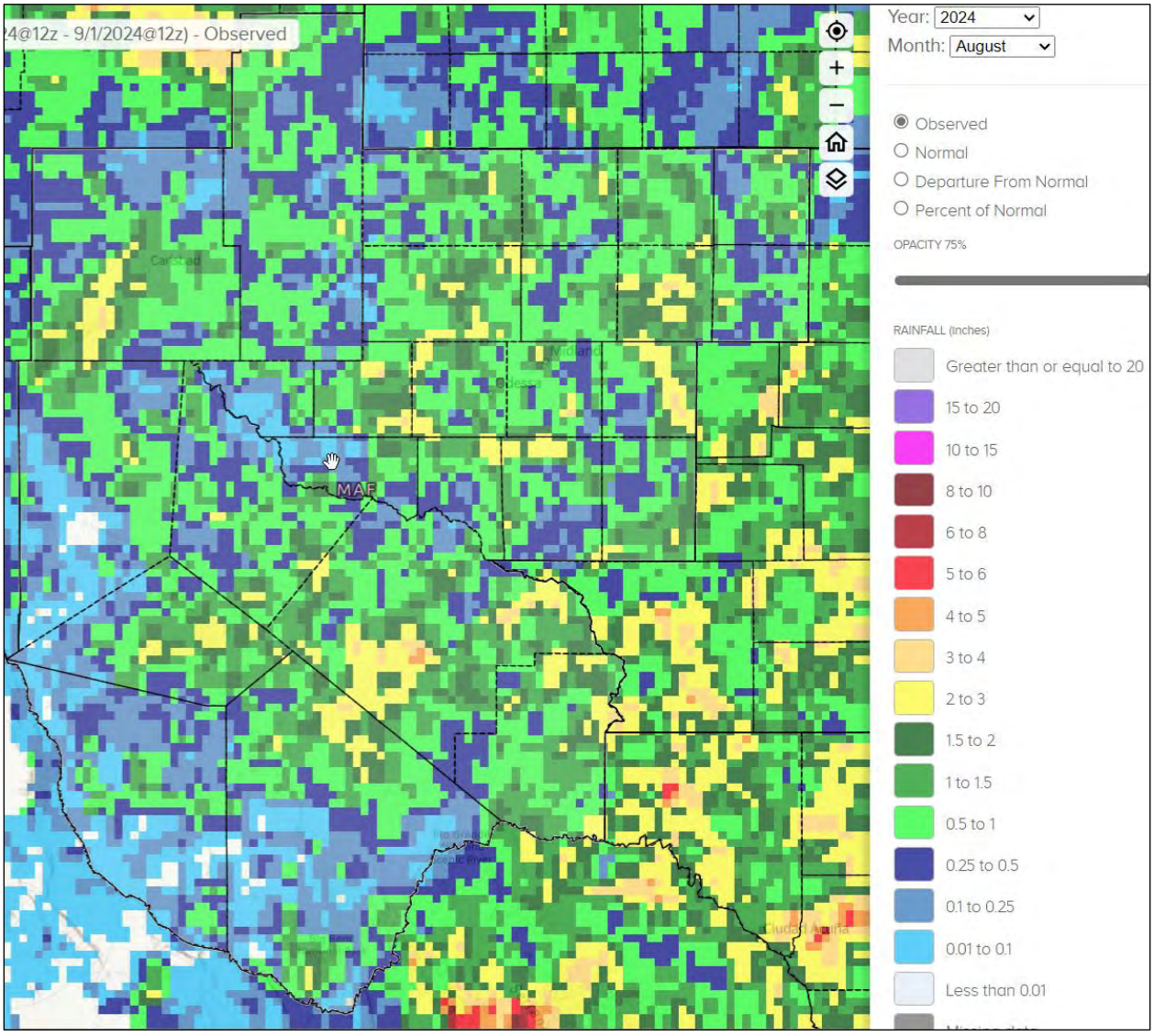


Figure 3: August Precipitation

West Texas/SE New Mexico Regional Summary (continued)

Overall, summer 2024 was dry for West Texas and Southeast New Mexico.

As of August 27th, most of West Texas and Southeast New Mexico along and west of the Pecos was in exceptional to extreme drought, while areas to the east ranged from severe to abnormally dry.

Area reservoirs are at 46.5% of conservation capacity as of September 1st.

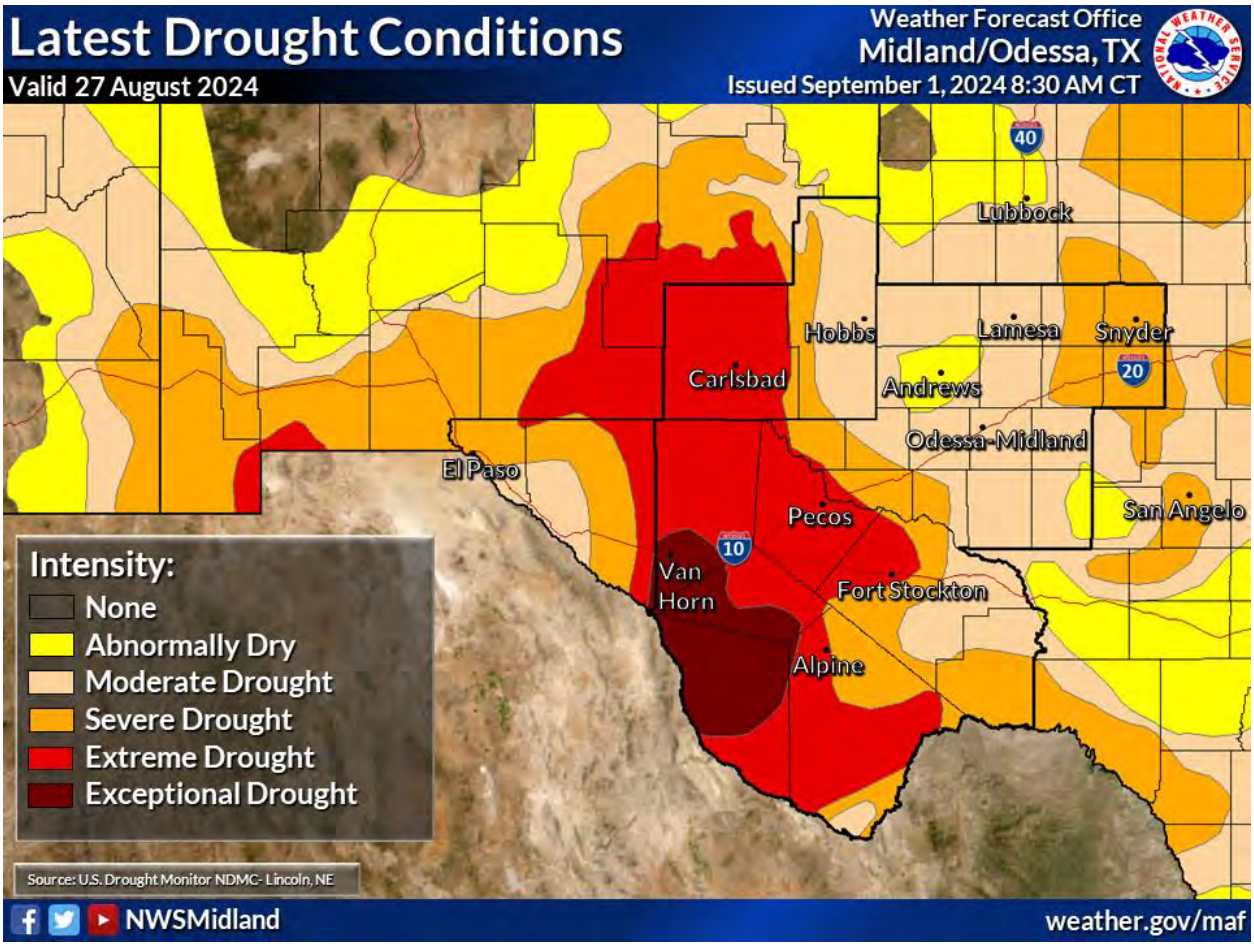


Figure 4: End of Summer Drought Conditions

Abilene/San Angelo Regional Summary

June Heatwave with Areas of Heavy Rain in July followed by Hot & Dry August

By: Joel Dunn, Meteorologist, Observation Program Leader, NWS Abilene/San Angelo TX

June

June began with a dramatic spike in temperatures, marking the start of a notably warm month for the region. Both Abilene and San Angelo experienced record-breaking heat on the 4th, with Abilene hitting a scorching 106°F. This temperature shattered the previous record set in 2013. San Angelo saw even more extreme conditions, reaching an oppressive 111°F, surpassing a century-old record set in 1916. The intense heat set the tone for what would be a month of fluctuating, but generally above-average temperatures.

As the month progressed, the intense heat of early June gave way to more moderate conditions. Afternoon highs began to hover in the upper 80s to low 90s, offering a much-needed respite from the triple-digit temperatures. This moderation was a welcome relief for residents who had been grappling with the early summer heatwave. Despite the cooler conditions, the overall warmth persisted, keeping the month on track for a warmer-than-usual June.

Mid-June brought a shift in the weather pattern, with increased chances of precipitation providing some relief from the dry conditions that had dominated the early part of the month. The arrival of moist air not only contributed to cooler afternoon temperatures but also led to higher humidity levels. As a result, heat indices climbed, making the cooler air feel more oppressive. The rain was a double-edged sword, offering much-needed moisture while also intensifying the summer heat.

Another wave of precipitation chances swept across the region, particularly affecting areas along and south of Interstate 20. The bulk of the rainfall was concentrated along Interstate 10, providing some localized relief from the ongoing dry spell. These rains, though beneficial, were not evenly distributed, leaving some areas still parched and in need of more consistent rainfall.

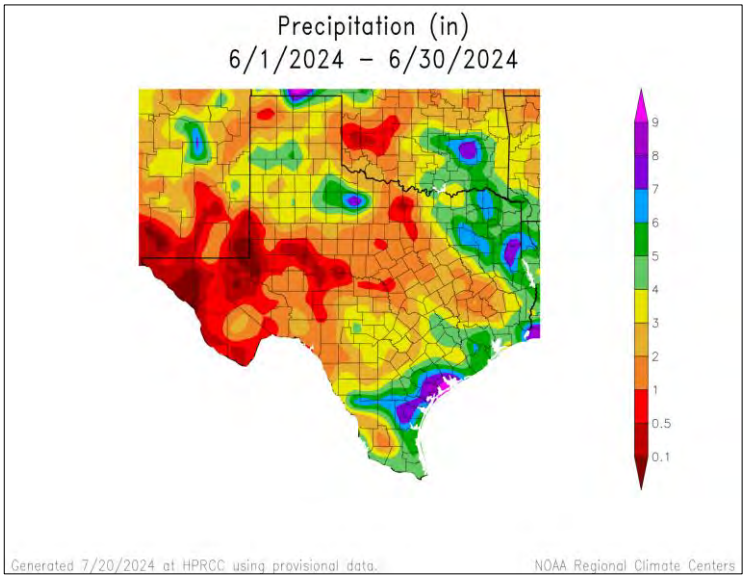


Image 1 - June 2024 Precipitation

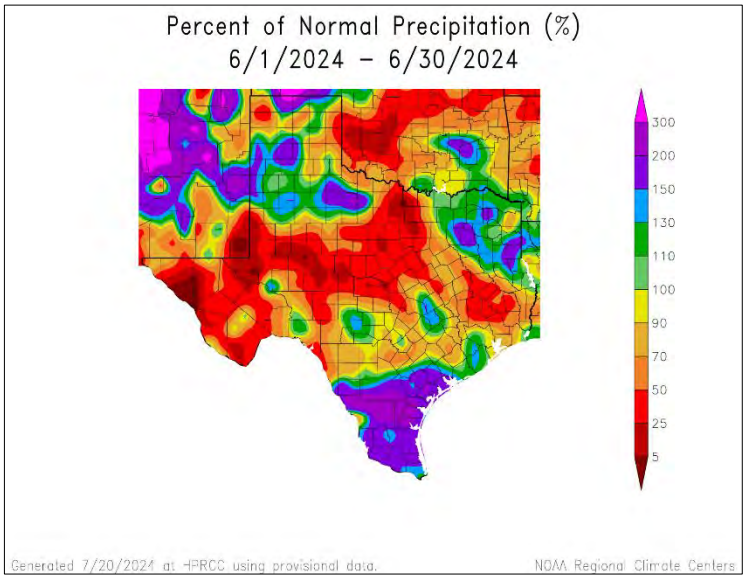


Image 2 - June 2024 Percent of Normal

Abilene/San Angelo Regional Summary (continued)

As June neared its end, the temperatures began to climb once again. Afternoon highs steadily increased, signaling a return to the heat that had marked the beginning of the month. Despite the periodic rainfall, the overall trend was toward warmer and drier conditions. The late-month heat served as a reminder that summer was far from over, with the hottest months still to come.

Overall, June ended warmer and drier than normal, a trend that has become increasingly common in recent years. The scattered rainfall was not enough to offset the higher-than-average temperatures, particularly in the Big Country, where the driest conditions persisted. This pattern of brief relief followed by renewed heat suggests that the region may continue to experience challenging weather conditions as summer progresses.

City	Observed Precipitation	Normal Precipitation	Departure From Normal
Abilene	1.98”	3.41”	**-1.51**
San Angelo	0.96”	2.31”	**-1.35**
Junction	2.48”	2.83”	**-0.35**

Table 1 - Observed, Normal and Precipitation Departure from Normal for June 2024

The combination of record-breaking heat, intermittent rainfall, and increasing humidity made June a month of contrasts. While the early spike in temperatures was extreme, the subsequent periods of cooler, wetter weather provided some relief, even as the heat indices climbed. The month was a reminder of the unpredictability of summer weather in this region, where intense heat and sudden storms can follow one another in quick succession.

As the region moves into July, the weather outlook suggests a continuation of the warm and dry trend that characterized June. With summer now fully underway, residents will need to remain vigilant, prepared for both the intense heat and the potential for sudden storms. The lessons of June—expect the unexpected and be ready for anything—will be crucial in navigating the summer months ahead.

July

The month kicked off with intense heat, leading to above-normal temperatures that prompted the issuance of heat advisories. This made for an exceptionally hot Independence Day celebration, with residents enduring sweltering conditions during the holiday. The combination of summer heat and limited cloud cover made it necessary for people to take extra precautions to stay cool and hydrated during outdoor activities.

At the same time, meteorologists were closely monitoring Hurricane Beryl as it moved through the Caribbean. The storm's progression was of particular interest due to its potential to impact weather patterns across a wide area, including West Texas. Initially, Beryl's track posed a threat of bringing some much-needed moisture to the region, but as the storm's path became clearer, the outlook began to change.

Hurricane Beryl's track eventually shifted eastward, placing West Texas under a subsidence zone. This atmospheric condition suppressed cloud formation and precipitation, leaving the area hot and dry. As a result, afternoon temperatures remained above normal, exacerbating the already intense summer heat. The lack of rain and persistent high temperatures contributed to an extended period of dry conditions, further stressing local water resources and vegetation.

Abilene/San Angelo Regional Summary (continued)

A significant pattern shift occurred during the last third of the month, bringing relief in the form of near-normal afternoon high temperatures and increased rainfall. This change was especially welcome in areas south of Interstate 20, which reported above-normal precipitation levels. The shift in weather patterns provided much-needed moisture to the parched landscape, with some regions experiencing substantial rainfall that far exceeded the norm.

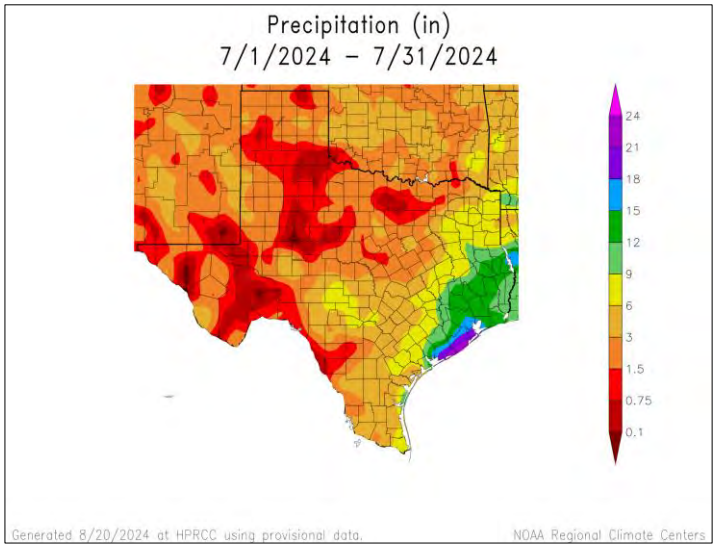


Image 3 - July 2024 Precipitation

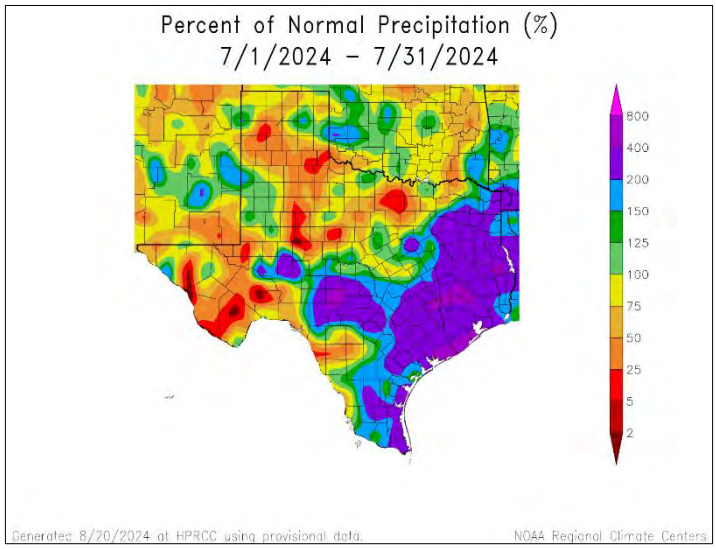
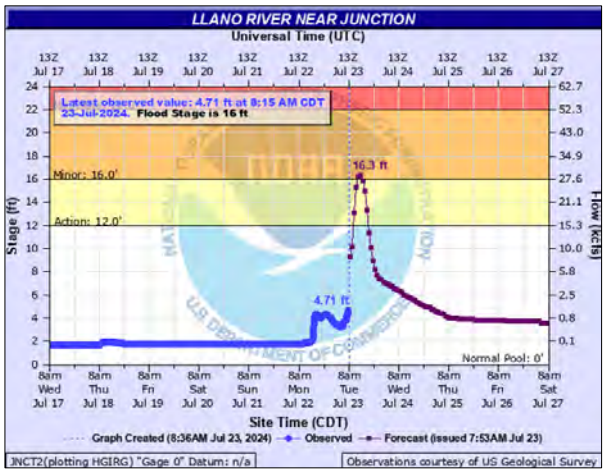
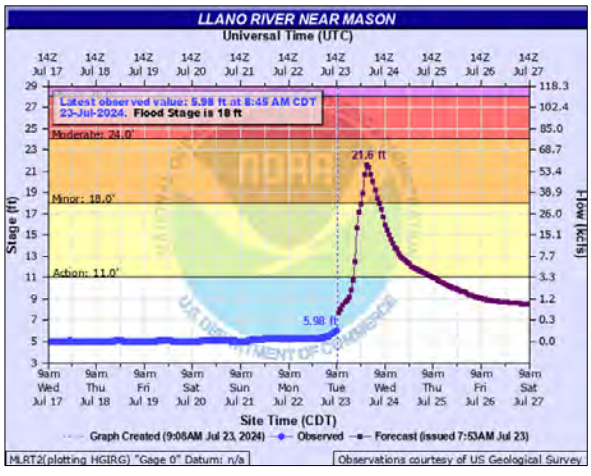


Image 4 - July 2024 Percent of Normal

The most notable rainfall totals were recorded along and just north of Interstate 10, where amounts surpassed 6 inches. This excessive rainfall led to significant hydrological impacts, with two river gauges reaching flood status. The Llano River near Junction rose to Minor flood stage, while the Llano River near Mason reached Moderate flood stage. These flooding events highlighted the dramatic shift from dry to wet conditions and underscored the volatility of the weather patterns during the month.





Images 5 and 6 - Hydrograph for the Llano River near Junction and the Llano River near Mason

Abilene/San Angelo Regional Summary (continued)

As the month drew to a close, the heat made a strong return, once again prompting the issuance of Heat Advisories for the Big Country. The brief respite from the oppressive temperatures was over, and residents had to brace for the return of summer's intensity. The reemergence of the heat signaled the persistence of challenging weather conditions as the area continued to navigate the peak of the summer season.

The month's weather was marked by extreme fluctuations, from intense heat and dryness early on to significant rainfall and cooler temperatures later in the month. The shift in patterns brought both relief and challenges, with flooding impacting some areas even as others continued to experience dry conditions. This variability is a hallmark of the region's summer climate, where rapid changes in weather can occur over short periods.

Looking ahead, the return of high temperatures and the ongoing threat of heat advisories suggest that the area is not yet done with summer's heat. The experiences of this month serve as a reminder of the importance of staying prepared for both the intense heat and the potential for sudden, heavy rainfall. As the summer progresses, residents will need to remain vigilant and adaptable in the face of West Texas's dynamic and often unpredictable weather.

City	Observed Precipitation	Normal Precipitation	Departure From Normal
Abilene	0.13"	1.92"	**-1.79"**
San Angelo	1.34"	1.10"	**+0.24"**
Junction	6.84"	1.48"	**+5.36"**

Table 2 - Observed, Normal and Precipitation Departure from Normal for July 2024

August

August weather in West Central Texas presented a stark contrast between the northern and southern portions of the region. For areas south of the Big Country, including cities like Junction, the month began near normal with daily high temperatures mostly in the mid to upper 90s. Meanwhile, along and north of Interstate 20, above-normal temperatures persisted, with many areas recording highs in the triple digits. This split in weather conditions reflected the influence of upper-level high pressure systems and the region's varying rainfall patterns.

As the first week of August passed, the region received a sharp reminder that summer was far from over. Forecasters predicted that afternoon high temperatures would remain above normal for the entire month, a prediction that held true. The oppressive heat was largely driven by a persistent upper-level high-pressure system, keeping temperatures elevated and staving off any significant rainfall.

In fact, August recorded the most days over 100°F for the year. San Angelo and Abilene both reported a staggering 23 days of triple-digit temperatures, while Junction, thanks to beneficial rainfall earlier in the summer, saw fewer hot days with only 12 days at or above 100°F. The disparity in rainfall contributed to this temperature difference, highlighting how critical rain can be in moderating the summer heat.

Record-breaking heat was another hallmark of August in West Central Texas. Abilene, in particular, saw six daily high temperature records fall during the month, showcasing the severity of the heatwave in the northern part of the region. San Angelo also experienced unusually hot conditions, breaking three daily high temperature records.

Abilene/San Angelo Regional Summary (continued)

Interestingly, it is uncommon for the northern portion of West Central Texas to be consistently warmer than the southern portions. However, the Big Country region, which includes Abilene, experienced just that due to the severe lack of rainfall. The persistent dryness temperatures could soar well above normal, particularly compared to the relatively wetter southern areas.

As August came to a close, a welcome shift in the weather pattern brought some relief to the region. Moisture began to move into West Central Texas, and with it came increased chances of rain. The last few days of the month saw a noticeable uptick in cloud cover and rainfall, offering respite from the oppressive heat that had dominated the majority of August.

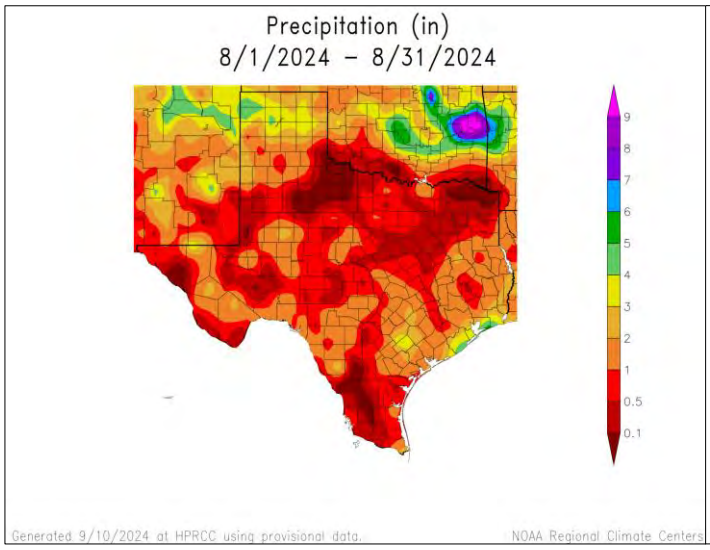


Image 7 - August 2024 Precipitation

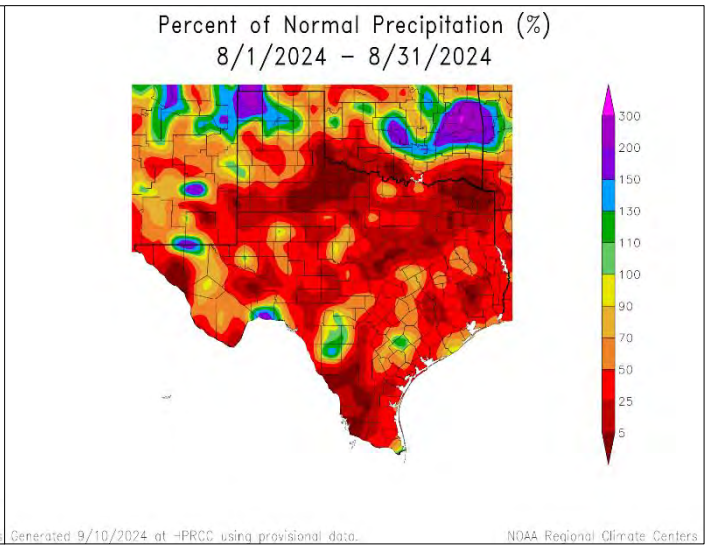


Image 8 - August 2024 Percent of Normal

Despite this late-month rainfall, it was not enough to balance out the high temperatures or the overall dry conditions that had persisted throughout the month. On average, temperatures remained several degrees above normal for August, and rainfall totals were still 1 to 2 inches below the monthly average. The late showers were simply not enough to offset the dominant weather pattern that had gripped West Central Texas for most of the month.

In summary, August was a month of extreme heat for West Central Texas, particularly for areas along and north of Interstate 20. Record-breaking temperatures, limited rainfall, and a prolonged high-pressure system contributed to a challenging weather pattern. While late-month rains offered some relief, they came too late to significantly impact the overall hot and dry conditions that defined the month.

City	Observed Precipitation	Normal Precipitation	Departure From Normal
Abilene	0.33”	2.53”	**-2.20”**
San Angelo	0.44”	2.42”	**-1.98”**
Junction	0.15”	2.08”	**-1.88”**

Table 3 - Observed, Normal and Precipitation Departure from Normal for August 2024

Autumn Weather Outlook

How will La Niña impact Texas?

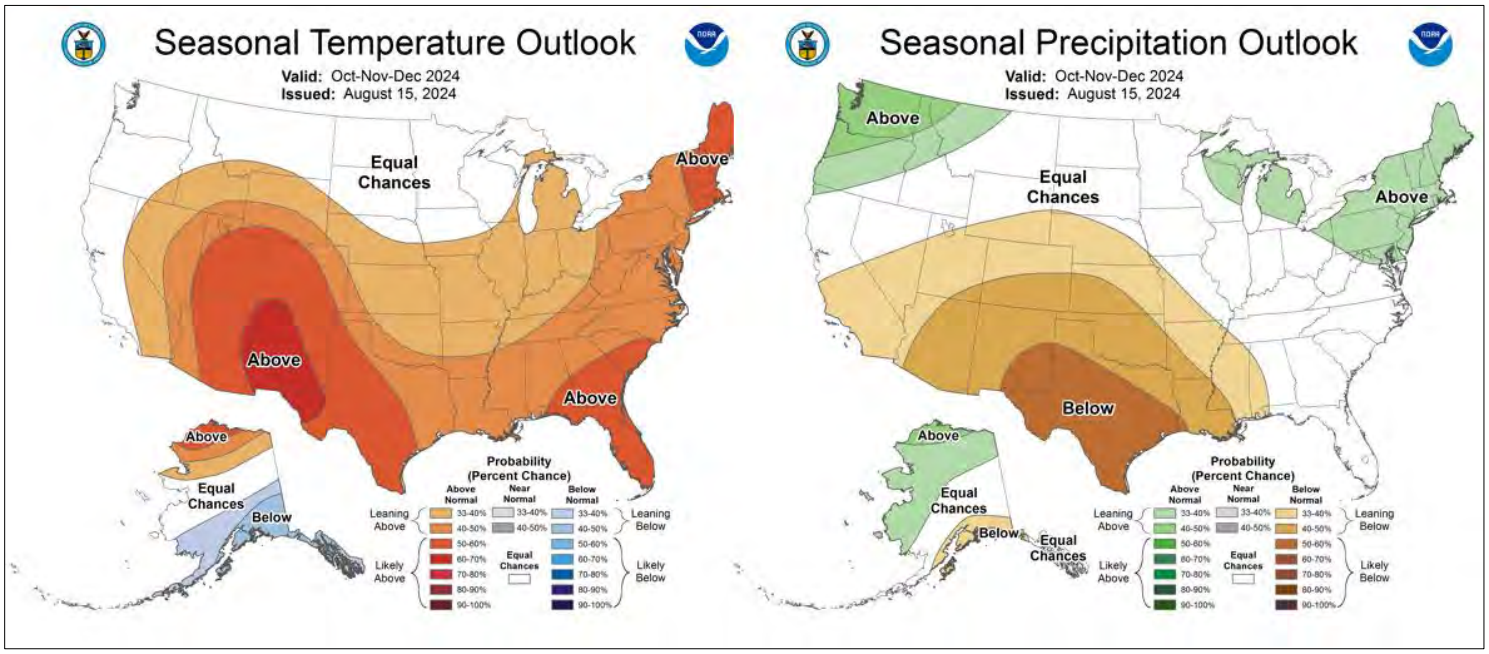
By: Bob Rose, Meteorologist, Lower Colorado River Authority

For much of Texas, summer 2024 wasn't nearly as hot or dry as the summers of 2022 and 2023. While less extreme, this summer still tied for the sixth hottest on record. The summer featured periods of very hot and dry weather, interrupted by a little rain and temperatures that were somewhat tolerable. Thankfully, summer is finally beginning to wind down. This usually means cooler, fall-like temperatures and fall rain are on the horizon. But this year, summer is looking to hang on a bit longer than usual, delaying the arrival of those refreshingly cooler temperatures and significant rain.

The El Niño which developed in the summer of 2023 came to an end back in June. In most El Niño years, the El Niño helps to direct cold fronts and storm systems in the Texas during the fall and winter months, leading to wet and cooler conditions across Texas. But El Niño faded back in June and was replaced by a neutral Pacific, where neither El Niño nor La Niña are in place. Although waters in the tropical Pacific are slowly cooling, a neutral Pacific is expected to continue into the first half of fall. Forecasters are fairly confident the tropical Pacific waters will continue to cool, leading to the development of a La Niña sometime in the latter half of autumn. In most years with a La Niña in place during the fall and winter, La Niña tends to direct most cold fronts and storm systems to north of Texas, resulting in warmer and drier than normal conditions across Texas.

Although a La Niña is not expected to officially be in place until the latter part of fall, typical autumn/winter La Niña weather impacts are still predicted across Texas due to the cool waters in Pacific and a persistent area of high pressure located over the eastern Pacific and northern Mexico. Both features are expected to direct many of the approaching storm systems and cold fronts to the north of Texas, limiting the outbreaks of cool air and the opportunities for rain. The result is expected to be a pattern of warmer than normal temperatures and less rainfall compared to normal.

Climate Prediction Center forecasters have been watching this mild and dry pattern evolve in September and they feel it will likely continue through much of fall. CPC's outlook for October, November, and December shows strong odds the temperature will average above normal, and rainfall will average below normal across all of Texas.



Climate Prediction Center's Temperature and Precipitation Outlook for October-November-December.

Fall's cooler temperatures will likely be slower than usual to arrive this year as the cold fronts will have a harder time making it into Texas. Cooler, less hot readings will eventually take hold in October and November, but there are also going to be plenty of warm days sticking around as well. Meanwhile, below-average rainfall this fall may lead to drought development and drought expansion by the start of winter. But at least the temperature won't be in the triple digits.

Scheduled CoCoRaHS Webinars & Information

Webinar #92 - Thursday, November 2024

Meteorology and the Law: The Use of Weather Experts in Litigation

Alicia Wasula
President
STM Weather
Cropseyville, NY

(Biography)

While most people think of meteorologists as scientists who spend their time looking forward into the future to make a forecast, forensic meteorologists spend their time looking backward at weather events that have already occurred. Many types of litigation involve the weather in some way: personal injury, property damage claims, wrongful death, and even criminal cases. Forensic meteorologists are retained by attorneys as 'expert witnesses' to explain to them and to the court what the weather conditions were like relating to a particular incident. Sometimes, expert meteorologists must give opinions as to how the weather conditions played a role in an event involved in the lawsuit. Observational data from many sources, including CoCoRaHS observers, is synthesized into a chronology of weather events. Although many cases settle outside of court, forensic meteorologists are at times required to appear in court to discuss their research and explain their opinion to a judge or a jury. Many forensic meteorologists hold the AMS Certified Consulting Meteorologist certification, which attests to their knowledge, ethics and experience. In addition to conducting scientific analysis, forensic meteorologists must be excellent communicators who are able to explain their findings clearly to non-scientists.

In this webinar, we will discuss the long history of the field of forensic meteorology, learn how observational data is used to understand the meteorological conditions, and look at several interesting examples which demonstrate how forensic meteorologists help attorneys understand the weather as it relates to a specific case.

Questions, Comments, and Suggestions about this newsletter are welcomed at the above email addresses.

Texas CoCoRaHS Observer

The official newsletter of Texas CoCoRaHS

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