



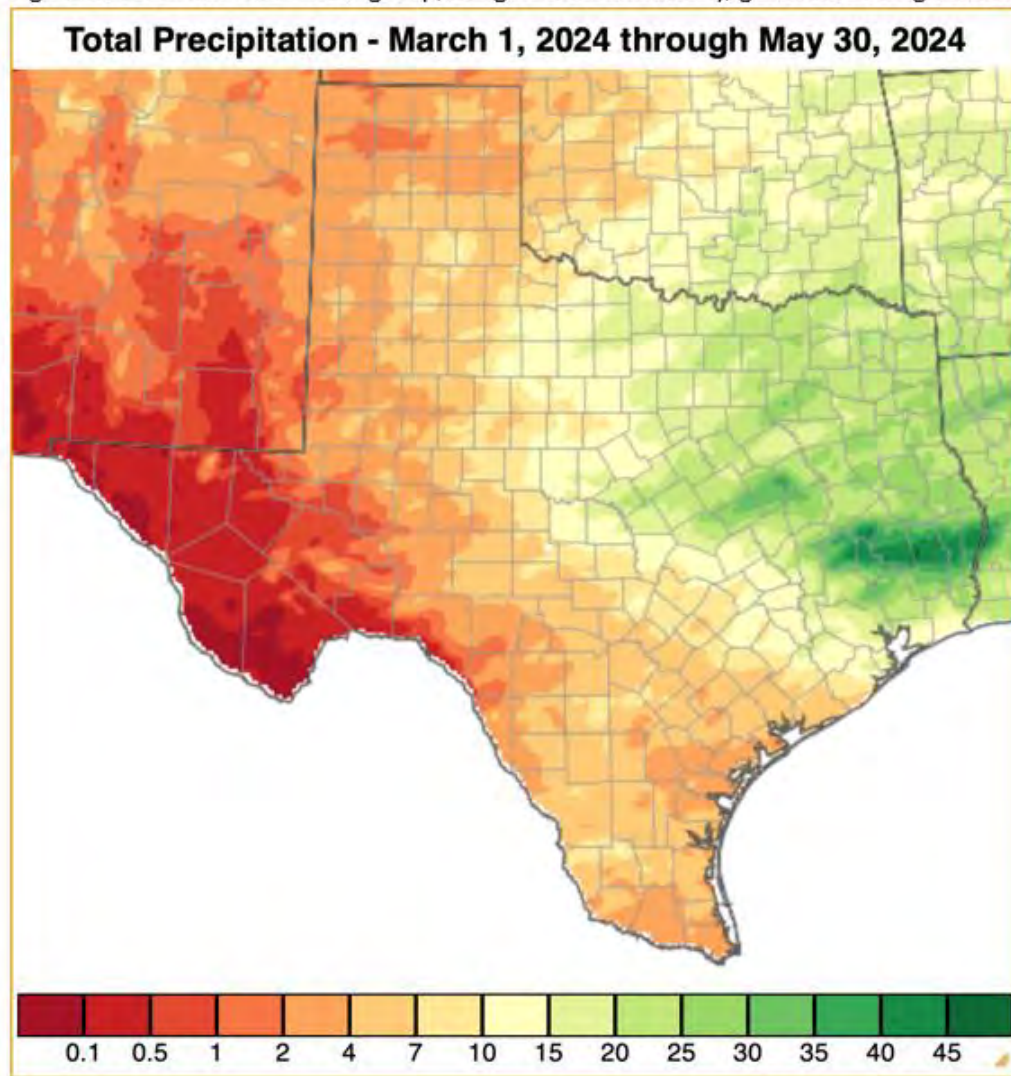
Welcome to
The
Texas CoCoRaHS
Observer Newsletter

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.

Texas Spring Weather Summary

John Nielsen-Gammon, Texas State Climatologist

Figure 1: Data from the PRISM group, Oregon State University, generated using SC-ACIS



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Wet spring or dry spring? It was wet if you lived in the northeastern third of the state, dry if you lived elsewhere.

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“Because Every Drop Counts, As Do All Zeros”

Texas Spring Weather Summary (continued)

Some of the precipitation totals at long-term stations were impressive. Town Bluff Dam, on B. A. Steinhagen Reservoir in Southeast Texas, had its wettest two consecutive months ever, while Waco had its wettest individual month ever. Where it was dry, it wasn't record-setting dry, but it was dry enough to cause drought to develop or worsen in many areas. Along with the wet weather came a cornucopia of severe weather, enough to cause serious blackouts in Houston and Dallas and cause the loss of several lives.

Despite the newsworthy aspects of the weather for the past three months, a lot of eyes seem to be trained toward an outlook for the next five or six months: the Atlantic hurricane season. All the forecasts I could find call for an active hurricane season, with the official NOAA forecast as pessimistic as it ever has been. I'm not at all surprised, because all the ingredients are in place.

First, we look at sea surface temperatures in the tropical Atlantic, specifically a patch of ocean between the Canary Islands and the Windward Islands called the Main Development Region. Temperatures are running 1-2°C above normal, and normal is based on 1991-2020, which is already warmer than the rest of the 20th century. Similarly warm temperatures extend to the Gulf of Mexico. At the end of May, the sea surface temperatures in the Gulf of Mexico were already as warm as they normally would be in mid to late June.

The correlation between tropical Atlantic sea surface temperatures and Atlantic hurricane activity is well-known. So well-known, in fact, that the projections of steady warming in the Atlantic led scientists in the 1990s to expect a massive long-term increase in the number of Atlantic hurricanes. That forecast has been dialed back considerably, or even reversed, as other scientists showed that it wasn't the Atlantic temperatures by themselves that mattered, it was the Atlantic temperatures compared to other tropical temperatures. With the Atlantic warmer than elsewhere, the thunderstorm activity tends to concentrate itself over the Atlantic, planting the seeds for tropical cyclone formation. This year, sea surface temperatures are above normal just about everywhere, but the Atlantic is particularly warm.

One place where temperatures are expected to be cooler than normal is the equatorial Pacific Ocean. That's because a La Niña is in the process of developing. La Niña helps Atlantic hurricanes in two ways. First, the cooler temperatures make thunderstorms even more concentrated over the Atlantic. Second, wind patterns are altered by La Niña, in particular by reducing the difference between the low-level trade winds and the winds aloft over the Atlantic. This reduces the tendency for the winds at different levels to rip apart disturbances that are trying to organize themselves into tropical storms.

So there are favorable temperatures and favorable winds, but that's not all. The final contributing factor is the above-normal rainfall recently in West Africa, which will allow thunderstorm complexes to develop in so-called "African easterly waves" and move westward into the Atlantic, helping to jump-start hurricane development.

Texas Spring Weather Summary (continued)

At this point, those of you on the dry side of Texas may be thinking that an active hurricane season might not be that bad, because at least tropical storms and hurricanes make lots of rainfall. That's a mistake: hurricanes tend to concentrate rainfall without increasing the overall amount. And a fast-moving hurricane doesn't stay around long enough to dump lots of rain. To see this, all you have to do is look back to summer of 2023. In the middle of the season with the fourth-largest number of storms all-time, Tropical Storm Harold made landfall in South Texas. Look at all the drought-busting rain it produced:

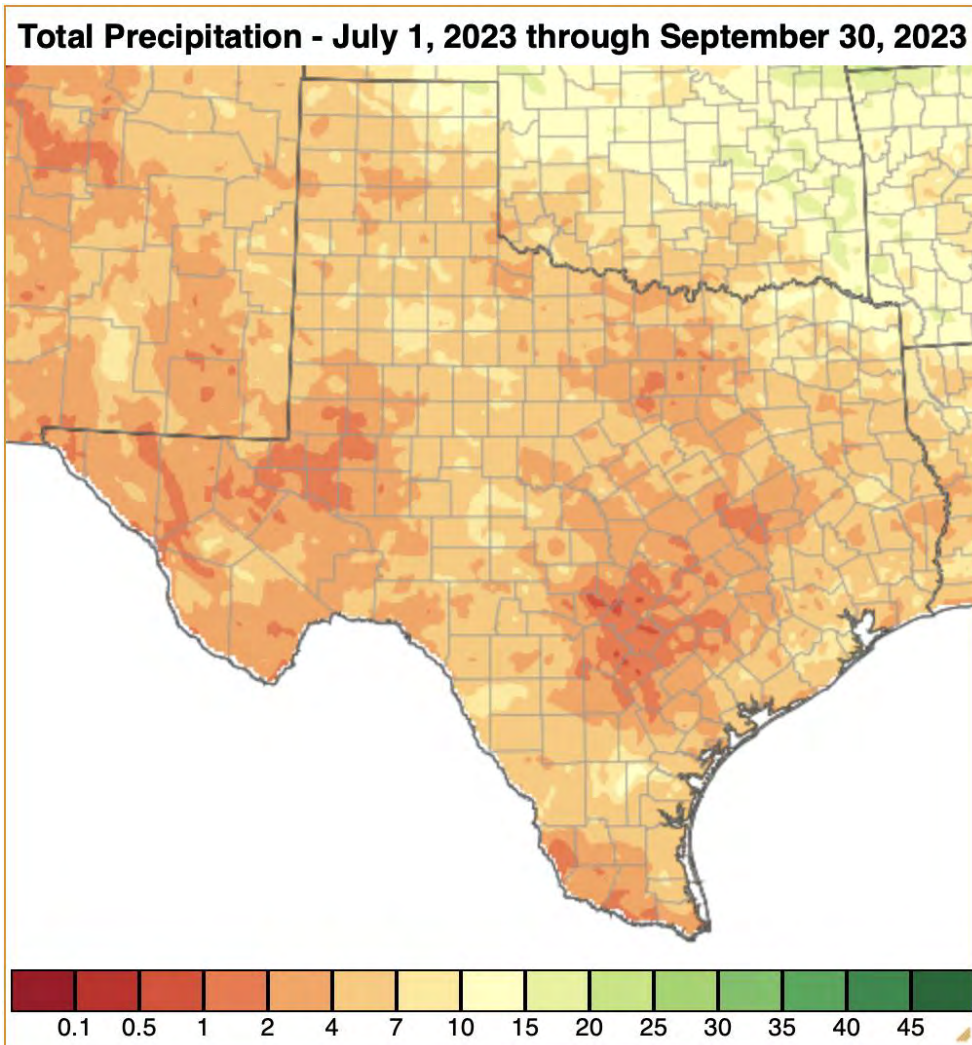


Figure 2: Rainfall during summer 2023, using data from Oregon State PRISM and graphing tools from SC-ACIS.

As I figure it, there are about even odds that a hurricane will strike Texas, and better odds for a tropical storm. But there's a decent chance, about 1 in 6, for a major hurricane landfall, which could be disastrous. So don't wish for a hurricane -- doing so could be as bad as opening a box in Greek mythology.

Far West Texas/ El Paso Regional Summary

West Texas Misses Out on Unseasonably Wet March Further West

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

Springtime in El Paso, TX is typically the driest time of the year. Rain gauges are neglected, plants stay thirsty, and the danger of wildfires reaches its yearly peak. High winds and blowing dust are the typical weather impacts as strong southwest flow keeps moisture from the Gulf of Mexico well off to the east of the region. This season continued the trend of below normal precipitation for far west Texas, with few days of measurable precipitation and several rounds of high wind and dust. The most notable high wind events were recorded on March 24th, April 6th, and April 16th, where observations in El Paso recorded gusts over 60 mph. Gusty afternoon winds were common this season, with the El Paso International Airport recording peak gusts exceeding 40 mph over 21 times. The last freeze in El Paso this year was February 18th, so no lowland snow this spring outside of the New Mexico forests. This spring season saw the decay of El Niño conditions as the equatorial Pacific has begun the transition to La Niña, likely appearing later this summer.



Figure 1: A fiery sunset under a layer of clouds seen from the NWS El Paso office on March 30th, 2024.

Far West Texas/El Paso Regional Summary (continued)

March began quite dry with only one day (March 8) featuring light rain and a few trace reports around El Paso County. Pacific lows tracking across the southern Rockies provided several opportunities for precipitation the second half of March. Stations in El Paso and Hudspeth Counties recorded light rain March 17-20 and again March 24-26. However, these observations were quite low and much less than portions of western New Mexico and Arizona, where monthly totals finished above normal and winter storms added to the mountain snowpack. For El Paso, monthly precipitation totals finished between **0.05-0.15"**, well below normal and disappointing compared to the precipitation totals just to our west and north.

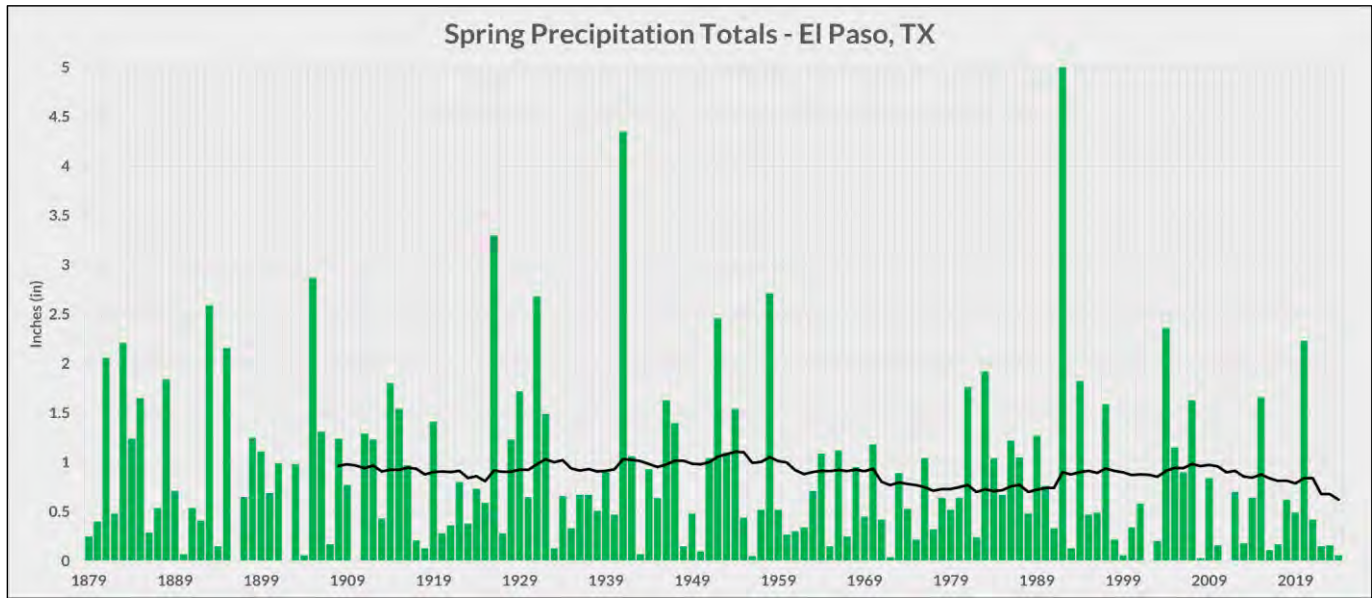


Figure 2: Mar-May precipitation totals for El Paso, TX from 1879-Present. 30-year average is only 0.84", but the past four years have fallen well below normal.

Only one day in April featured measurable rain in El Paso County, the first day. Light rains fell on April 1st, with totals around the county ranging from **0.05-0.15"**. The rest of April was completely dry, beginning a six-plus week streak of dry conditions in the region. At El Paso International Airport, 0.02" was measured on April 1st and remains the last measurable precipitation as of June 1st, a streak of over 60 days and counting.

May was almost completely dry for the region, with the only measurable reports coming in on May 16th, generally less than **0.10"** as scattered showers and thunderstorms briefly occurred in central and northeast El Paso.

Far West Texas/El Paso Regional Summary (continued)

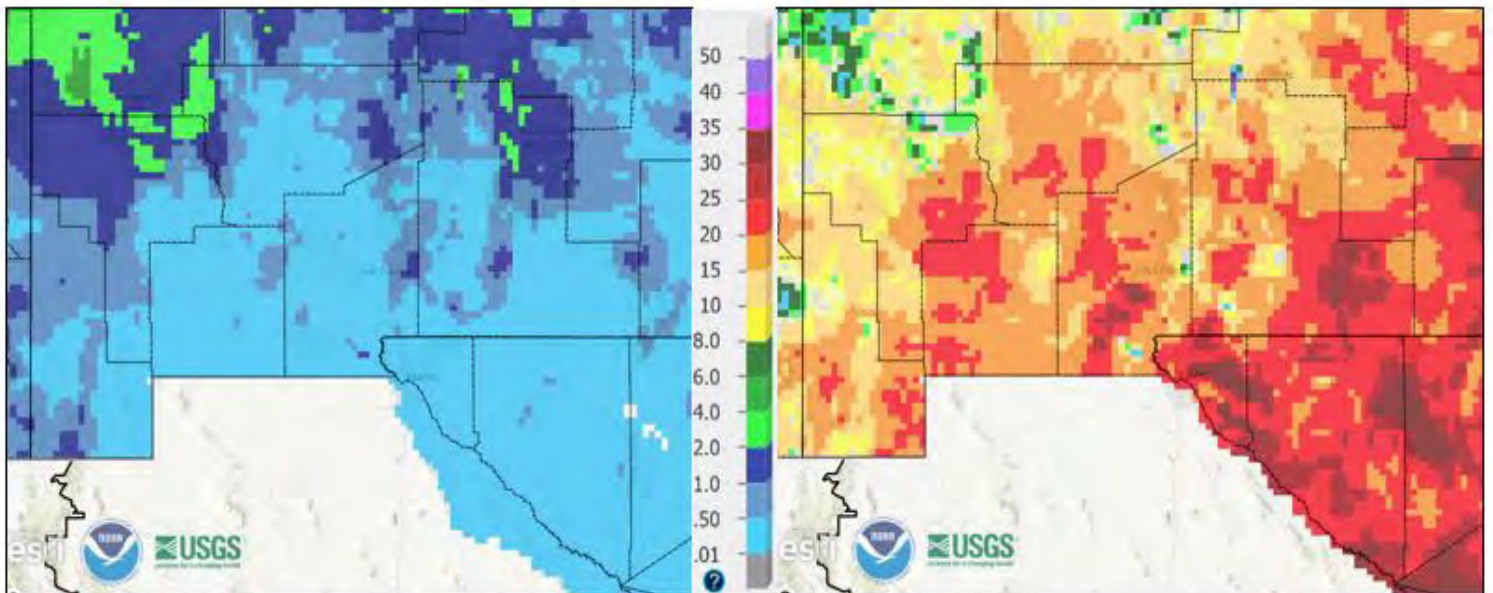


Figure 3: AHPS Precipitation Analysis for March-May 2024 in far West Texas

Season precipitation totals ranged from **0.10-0.25"**, with the highest local precipitation centered in northeast El Paso due to additional rain in mid-May that most other areas missed out on. Precipitation totals finished well below normal for the 92-day season, but the departure from the annual average in El Paso only jumped from **-0.05"** to **-0.84"** due to the typically dry nature of spring in the borderland. El Paso International recorded a season total of only **0.06"**, falling well short of the climate average of **0.84"** and nearly matching the dry spring seasons the past three years. Far West Texas remains in Severe to Extreme drought status and looks to remain that way headed into a monsoon season that's forecasted to be warmer and drier than average.

The spring season featured 34 active observers in El Paso County, and 2 in Hudspeth County. A total of 1,668 daily reports were submitted, along with 39 multiple-day reports. Only 87 daily reports had measurable precipitation, which means 95% of total reports were **T** or **0.00"**. Three Condition Monitoring Reports were submitted by an observer in El Paso County, describing the extreme dryness and ongoing drought conditions that caused stress to outdoor plants and soil moisture. No Significant Weather reports were posted this season. Thanks again to all our local observers who participated in the 2024 spring season!

West Texas/Southeast New Mexico Regional Summary

A Very Dry Spring across the Region

By: Jim DeBerry, Meteorologist, Hydrology Program Manager, NWS Midland

March

March was another relatively uneventful month, primarily due to lack of boundary-layer moisture. No notable hydrologic events occurred, and most precipitation fell east of the Pecos.

Monthly radar precipitation estimates ranged from nothing over much of the Presidio Valley to up to 3" in southern Mitchell County. However, the highest observed rainfall was 1.45 at Tarzan in Martin County. Average rainfall across West Texas and Southeast New Mexico was 0.30".

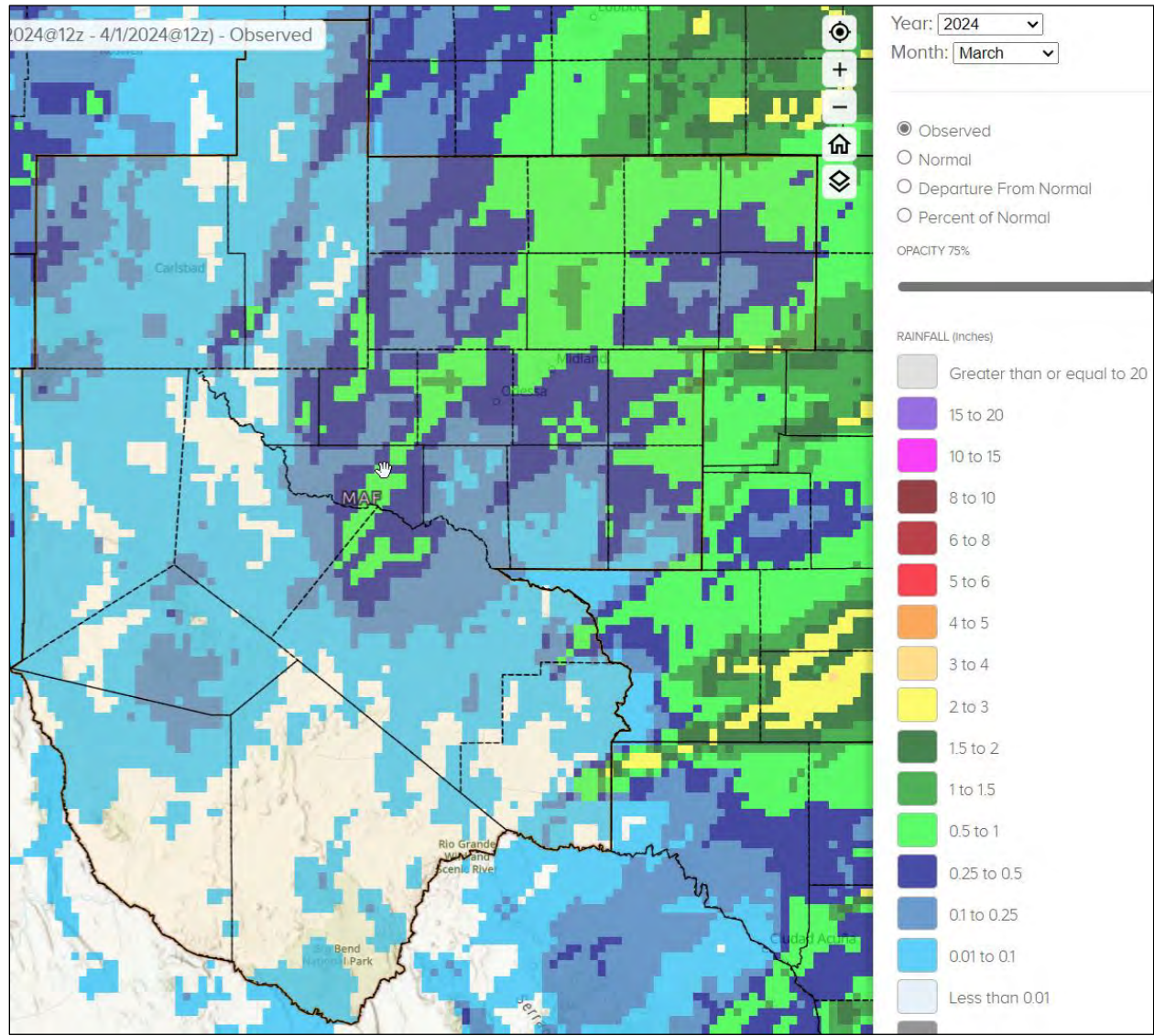


Image 1: March 2024 Precipitation

West Texas/Southeast New Mexico Regional Summary (continued)

April

Hydrologic activity picked up a little in April as the jet stream moved south, and upper-level troughs began moving through West Texas and Southeast New Mexico. As usual, the missing ingredient was low level moisture, but on April 20th, an upper-level trough arrived when a moist airmass was in place, producing numerous showers and thunderstorms across the Permian Basin and Western Low Rolling Plains. Roads in and around Westbrook in Mitchell County flooded completely. Roadways also flooded as thunderstorms flooded roads south of Knott in western Howard County. This was near where MRMS estimated the highest rainfall fell, at 4.31". Otherwise, no other notable hydrologic events were noted.

Monthly radar precipitation estimates ranged from nothing over much of the HSA west of the Pecos to up to 6" over the Colorado River Basin. Indeed, the highest observed rainfall was 2.59" in Colorado City in Mitchell County. Average rainfall was 0.38".

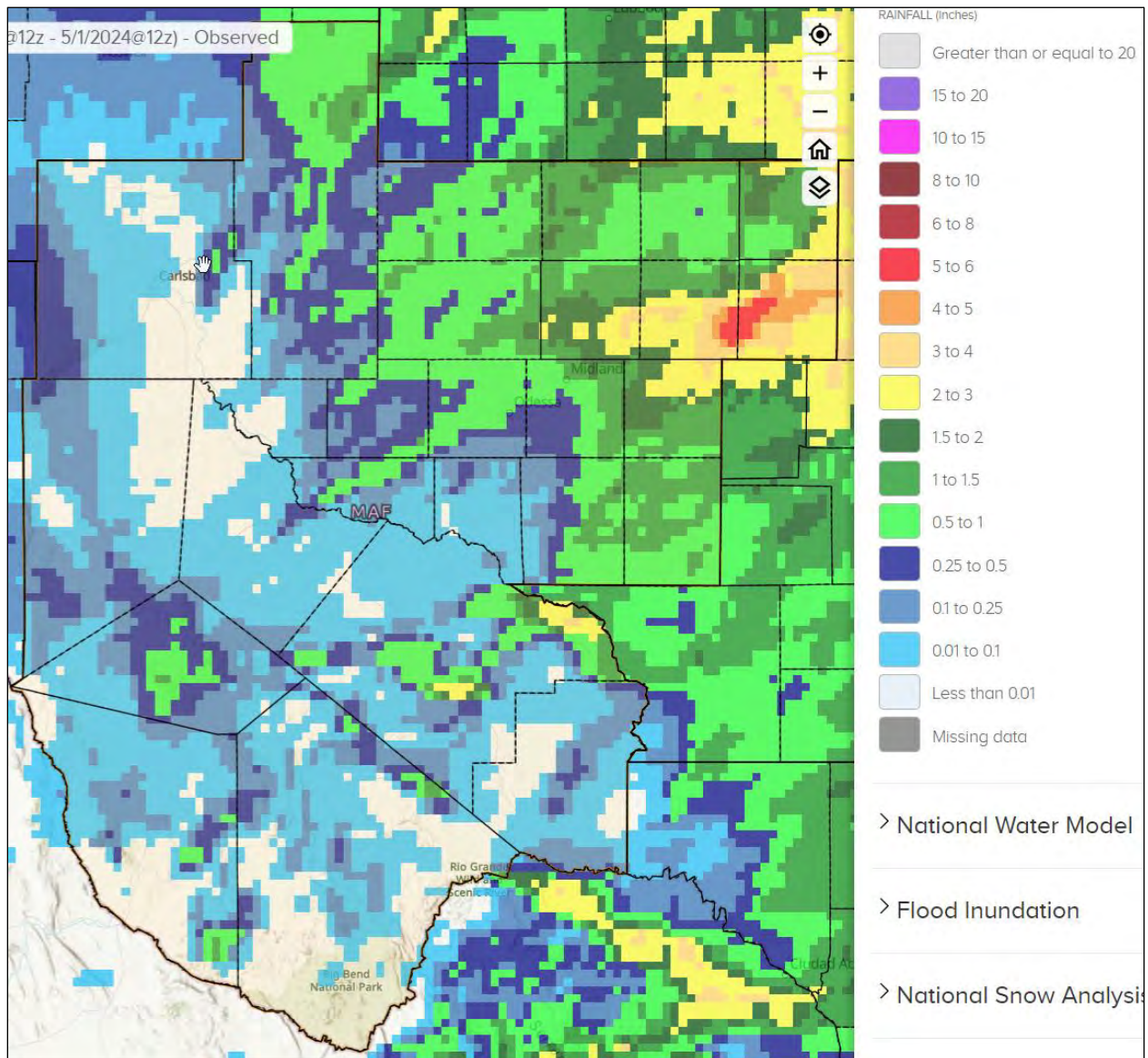


Image 2: April Precipitation

West Texas/Southeast New Mexico Regional Summary (continued)

May

Spring severe season ramped up in May, as is typical, but there was some flooding.

On May 3rd, thunderstorms developed over Mitchell County, drifting slowly southeast. Flooding was reported south of Westbrook.

On the 4th, a late spring cold front met up with a dryline to produce widespread supercells across the Permian Basin, Western Low Rolling Plains, and lower Trans Pecos. During the afternoon, thunderstorms flash flooded and closed roads 4 miles west of West Odessa in Ector County, stranding vehicles there. Storms then moved into Howard County, where rainfall brought creeks out of their banks and flooded croplands 4 miles west of Luther. Later that evening, thunderstorms developed into Scurry County, flash flooding the intersection of US Hwy 180 and FM 1269, making it difficult to cross. Hail of up to 4" in diameter contaminated radar rainfall estimates quite a bit, but the highest storm total estimate was 5.41" in eastern Borden County, right in the Lake J.B. Thomas watershed. This is a small watershed, and so it is usually missed by rainfall. The Colorado River near Gail, normally bone dry, rose to over 9', and this will help to replenish J.B. Thomas. Up to 3.64" fell in the Independence Creek watershed, bringing the creek just under flood stage overnight. The Pecos River at Brotherton, just downstream of the confluence with Independence Creek, rose over 6' overnight. The highest reported rainfall for this event was 2.51" at Andrews in Andrews County.

On May 16th, thunderstorms developed in the wake of a cold front. During the afternoon, a thunderstorm flooded streets in southeast Hobbs in Lea County, stranding vehicles. That evening, storms moved into Odessa and Gardendale in Ector County, and Midland in Midland County, resulting in widespread flooding of roadways. A gymnasium northwest of Midland International Air and Space Port also flooded.

On the 28th, an outflow boundary traveled all the way into West Texas from the Metroplex, colliding with a dryline and developing supercells in the afternoon. Radar estimates as much as 3.73" of rain fell on the Stockton Plateau. A supercell moved through the Independence Creek watershed, dumping as much as 2.69" of rainfall in places in a very short amount of time. This sent a flash flood wave down Independence Creek briefly bringing it into moderate flood stage (SFIT2). At one point, the creek rose over 8' in 15 minutes. Farther south, multiple roads flooded in Terrell County as a result of Independence Creek flooding.

Finally, on the evening of May 30th, supercells again developed in the Permian Basin, flooding roadways throughout Midland in Midland County. Radar estimates as much as 4.95" fell in southeast Midland County. However, the highest reported rainfall for the 30th was 1.65" in Midland. At the Midland/Odessa National Weather Service Office, baseball-size hail fell for 45 minutes, damaging vehicles in the parking lot and the upper air building. Unfortunately, there was at least one hail casualty (Pic. 1). Runoff flooded a western diamondback rattlesnake out of its burrow, then large hail promptly killed it.

Monthly radar precipitation estimates ranged from no rain over most of Presidio County to up to 8" in the Colorado River Valley. Highest observed rainfall was 5.68" in Fluvanna in Scurry County. Average rainfall was 1.05".



Picture 1: Hail casualty on May 30th.

West Texas/Southeast New Mexico Regional Summary (continued)

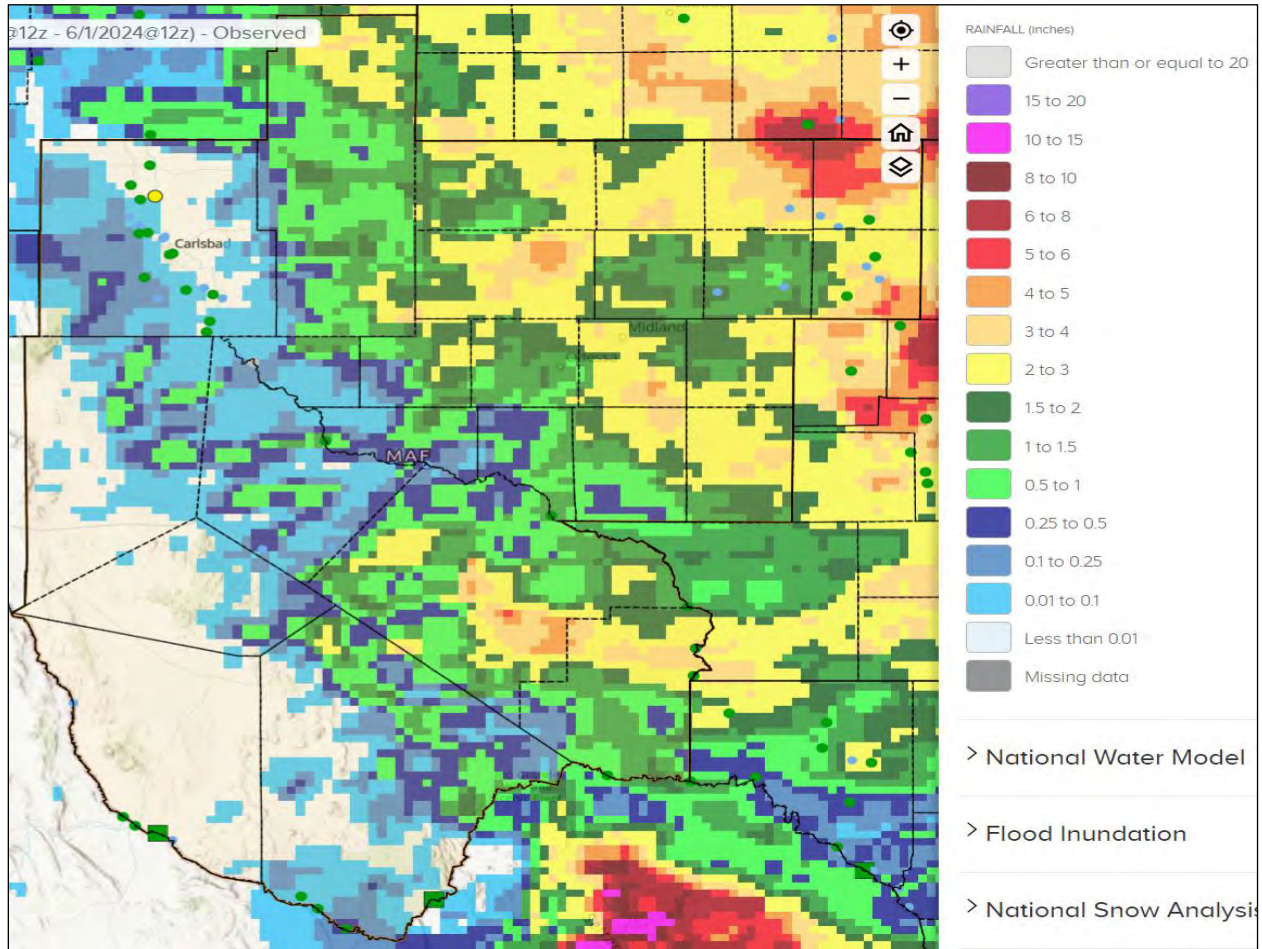


Image 3: May Precipitation

At the end of spring, an east-to-west gradient of deteriorating drought conditions exists across West Texas and Southeast New Mexico, with the worst drought over the plains of Eddy County. Area reservoirs are at 46.6% conservation capacity as of June 1st.

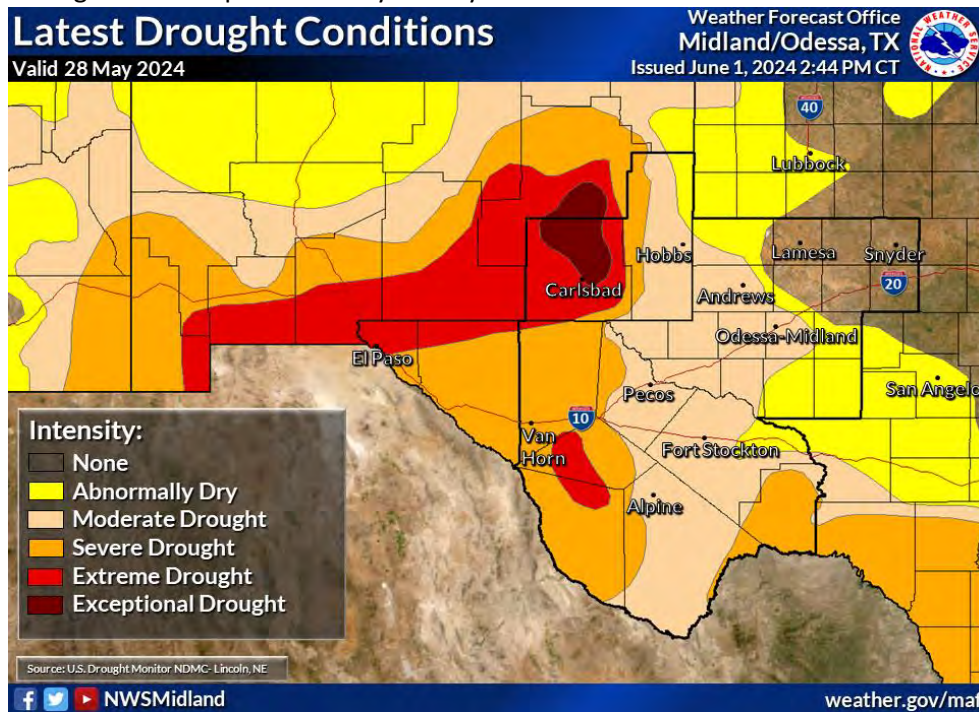


Image 4: Drought Monitor Conditions for West Texas at the end of spring 2024.

North Texas Regional Summary

Wet Spring across North Texas

By: Greg Story, North Texas CoCoRaHS Regional Coordinator

Greetings CoCoRaHS observers from the North Texas Regional Coordinator! Wow! What a wet spring season we've had! In this newsletter article I like to review the weather from the past several months, emphasizing the importance of your weather observations in us knowing the amount of rain that actually fell.

Reviewing the weather of the past several months, in November much of Texas experienced below normal rainfall. However Deep South Texas and parts of Southwest Texas had above normal rains. In December they observed above normal precipitation over the Texas panhandle into the western parts of North Texas, but much of eastern, southern and far western Texas recorded below normal precipitation. 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. Only far Southwest Texas and Deep South Texas experienced below normal precipitation. In May all of northern, central and eastern Texas got above normal rainfall. And some locations in central and southeast Texas picked up much above normal precipitation. Only far southwestern Texas had below normal rainfall.

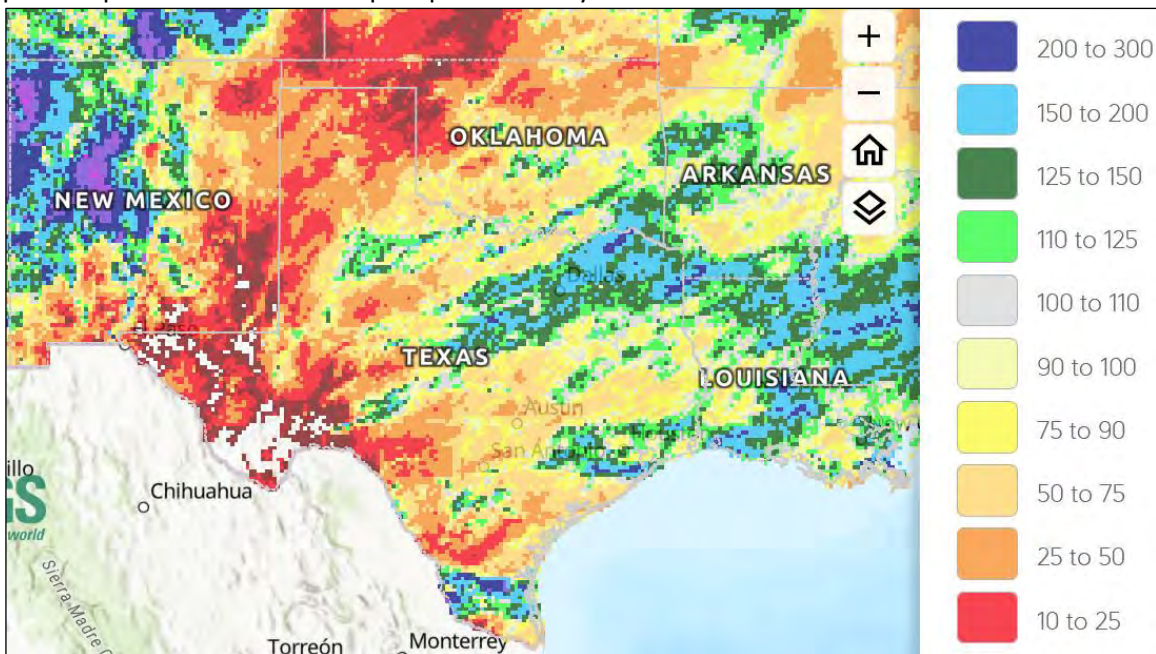


Figure 1: Percent of normal precipitation for March 2024. The dark green, blue and purple colors indicate above normal precipitation; the beige, yellow and light green colors indicate near normal, while the orange, red and dark red colors indicate below normal precipitation.

At DFW airport in March 2024 5.66" fell. The normal amount of precipitation in March at DFW is 3.30. DFW was +2.36" above normal for the month.

In Waco for March 2024, 2.82" fell. The normal amount of precipitation in Waco in March is 3.31". Waco was -0.49" below normal for the month.

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 March.

March 4 - 5:

A weak cold front moved across much of Texas on the 4th. There were some showers and thunderstorms along and ahead of this front, especially over East Texas. The maximum rainfall amounts on the 4th were 1.24" northeast of Neches and 1.14" along the Texas/Louisiana border at Logansport. Some residual showers and thunderstorms redeveloped on the 5th over primarily northeast and east central Texas. The heaviest rainfall was 1.68" northwest of Sherman and 1.60" southwest of Alto.

March 6 - 8:

A couple rather strong upper air disturbances moved across Texas later on the 6th and continued through the 8th. This helped to generate periods of showers and thunderstorms. The first round of rain started late on the 6th, but really increased in coverage and intensity on the 7th. Prior to dawn on the 7th the maximum rainfall amounts were 0.75" east northeast of Merkel, 0.74" north northeast of Water Valley, and 0.72" northwest of Godley. During the day on the 7th some locally heavy rainfall developed over North Texas. A daily record rainfall of 2.67" was set at DFW airport on the 7th. This broke the old record of 1.12" set in 1947. The largest rainfall amounts on the 7th were 3.06" west northwest of University Park, 3.01" at Glen Rose, and 2.76" northwest of Springtown. Rain continued over especially East Texas on the 8th. The heaviest rainfall reports were 2.13" at Gilmer and 1.93" south southwest of Kilgore. The precipitation ended or moved out of Texas by around midnight late on the 8th.

March 14 - 18:

A strong upper level low pressure system developed over southern California on the 14th, and this low moved slowly eastward. Upper disturbances ahead of this low produced periods of showers and thunderstorms, some of which produced large hail and heavy rainfall. The heaviest rainfall on the 14th into the early morning of the 15th was over Northeast Texas. There was 3.75" north of Karnack, 2.36" at Carthage, and 2.34" just south of Van Alstyne. During the day on the 15th a cold front also crossed the state, with showers and thunderstorms developing ahead of it. Locally heavy rainfall occurred, especially across Southeast Texas. While rainfall amounts in North Texas were generally less than 1", there was 4.30" north of Beaumont and 4.25" south southwest of Port Aransas. More rain developed on the 16th, initially starting over western and southern Texas but the rainfall became widespread across all of Texas in the afternoon. The maximum rainfall amounts over North Texas were at Weatherford with 1.87" and south of Aquilla with 1.76". But over South Texas there was 3.98" southeast of La Marque and 2.70" north northeast of Three Rivers. Some lighter precipitation continued on the 17th across Texas as another short wave trough lifted out. The maximum rainfall amounts weren't quite as heavy and were largest over South Texas. In North Texas the biggest rainfall amount was 0.53" west northwest of Salado and south of Harker Heights. But further south on the 17th there was 1.26" south southwest of Lockhart and 1.20" southwest of Angleton. A few light showers persisted into the 18th before ending late in the day, especially over far South Texas. The residual rainfall was under 1", with the highest amount being 0.96" west of Harlingen.

March 21 – 22:

An upper air disturbance moved across North Texas on the 21st. Before dawn on the 21st, showers and thunderstorms developed across Southeast Texas, with some light rain across North Texas. The heaviest rainfall was 1.11" south southeast of Corpus Christi and 0.82" northeast of Somerset. The showers and thunderstorms became widespread during the day on the 21st, with locally heavy rainfall occurring over Southeast Texas. In North Texas the maximum rainfall on the 21st was southeast of Greenville with 2.04", southeast of Streetman with 1.86", and northeast of Paris where 1.80" was measured. The heaviest rainfall in Texas was 5.50" east of Texas City and 5.34" southwest of Alvin. Some residual light rain continued over primarily Northeast Texas on the 22nd. The rainfall amounts were mostly less than 0.25", but they did receive 0.45" southeast of Cooper and 0.28" northeast of Paris.

March 24 – 25:

A strong upper level storm system passed through Texas on the 24th and 25th. Showers and thunderstorms developed over West Texas on the 24th, and this rainfall spread eastward on the 24th through the 25th. The maximum rainfall on the 24th was 2.14" south southwest of Ennis, 2.12" southwest of Waxahachie, and 2.10" south southwest of Terrell. The rainfall on the 25th was mainly confined to East Texas, and the heaviest of the rain moved east of the state late in the evening. The rainfall amounts over North Texas were all less than 1". But elsewhere over the state there was 1.71" southwest of Beaumont and 1.69" north of Hawkins.

North Texas Regional Summary (continued)

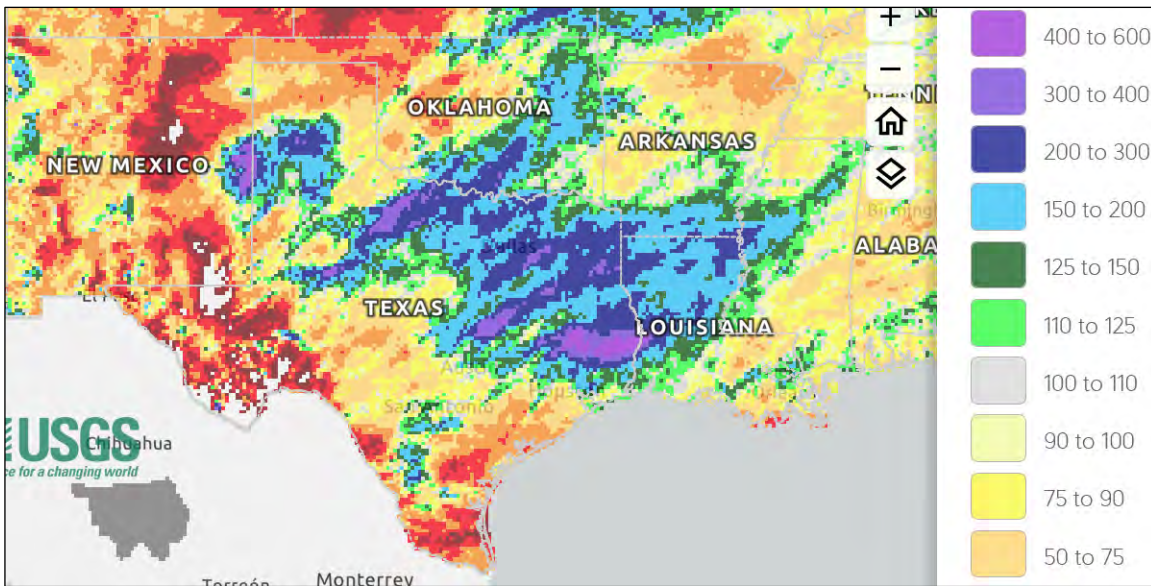


Figure 2: Percent of normal precipitation for April 2024. The dark green, blue and purple colors indicate above normal precipitation; the light yellow and light green colors indicate near normal, while the orange, red and dark red colors indicate below normal precipitation.

At DFW airport in April 2024 6.47" fell. The normal amount of rainfall in April at DFW is 3.22". DFW was +3.25" above normal for the month.

In Waco for April 2024 4.33" fell. The normal amount of rainfall in Waco for April is 3.30". Waco was +1.03" above normal for the month.

There were about six storm systems which affected our weather in April.

April 1 - 2:

A vigorous upper air disturbance caused the dryline and a cold front to move eastward across Texas late on the 1st. This produced showers and thunderstorms in the afternoon that persisted through the night. The heaviest rainfall on the 1st was 1.07" southwest of Waxahachie and 1.02" north of Justin. Some very large hail accompanied some of the thunderstorms just north and west of the DFW metroplex. The showers and thunderstorms moved out of the state the morning of the 2nd as the cold front advanced. The residual rainfall amounts were all less than 0.50".

April 8 - 10:

A closed low pressure system developed just south of Arizona and New Mexico on the 8th. This low moved slowly eastward toward North Texas by the 10th and produced periods of showers and thunderstorms. Thunderstorms initially developed over Southeast Texas on the 8th, which moved north across eastern Texas. Additional thunderstorms developed over the western parts of North Texas into the Big Country, and these storms moved east across North Texas. The maximum rainfall on the 8th was over the eastern portions of North Texas where 5.74" fell at Tatum, 5.60" occurred southeast of Marshall, and 5.51" was measured northeast of Bonham. Near the DFW metroplex, the area south of Sanger received 4.57". The rainfall continued into the 9th across a good part of the state, with extremely heavy rainfall observed in Central and East Texas. The rainfall total on the 9th at DFW airport has been 0.81". That broke the daily rainfall record for April 9, which was 0.77" in 1926. That record remains the only daily precipitation record during April that is under 1". Most of the DFW area received under 1" on the 9th, but the maximum rainfall over the rest of North Texas included 7.55" west southwest of Belton and 4.57" northeast of Neches. But over Southeast Texas there was 12.31" northeast of Town Bluff and 12.00" west southwest of Woodville. Rain continued on the 10th over Central and East Texas, although the excessive rainfall had moved east before dawn. Some locally heavy rain still occurred across the eastern portions of the DFW metroplex and into East Texas. The heaviest rainfall on the 10th was 3.85" south southwest of Kilgore, 3.52" north of Mesquite, and 3.20" west of Rockwall. The rain moved out of Texas by midnight of the 10th.

North Texas Regional Summary (continued)

April 15 - 16:

A deep low pressure system moved inland over the western US on the 15th. This low then moved northeast into the central plain states on the 16th. This low combined with the dry line to produce a few showers and some thunderstorms across western and far northern Texas into Oklahoma later on the 15th. The rainfall amounts on the 15th were all less than 0.25". A few showers continued into the 16th before moving out of the state or dissipating later in the day. Rainfall amounts were light and under 0.15".

April 18 - 21:

A cold front moved into Texas on the 18th. As the front moved into Central Texas a couple thunderstorms formed. There was 1.44" at San Saba and 0.90" east southeast of Mason. There wasn't much rain on the 19th as the front stalled across the state. But late on the 19th into the 20th an upper air disturbance moved in from the west and interacted with the front to produce showers and thunderstorms across primarily western and northern Texas. Prior to dawn on the 20th the maximum rainfall amounts were 1.50" east southeast of Blue Ridge and 1.45" west southwest of Sanger. Widespread rainfall continued on the 20th especially over northern and eastern parts of the state. Some of the rain was very heavy. In North Texas Dallas Love Field received 4.22", and northeast of downtown Fort Worth there was 3.87". Elsewhere in Texas, 5.20" was measured east of Trinity and 5.00" fell north northwest of Brenham. On April 20 DFW set a daily rainfall record of 2.34". The previous rainfall record was 1.52" set in 1942. And the 4.22" at Dallas Love Field destroyed their old daily rainfall record of 2.09". The rain moved out of the state on the 21st. Residual rainfall over South Texas on the 21st was all measured at under 0.65".

April 26 – 29:

A long wave upper atmospheric trough of low pressure moved from Utah into the central plain states during this period. This low brought periods of showers and thunderstorms as it moved across the US. The first round of thunderstorms moved across North Texas on the 26th and produced locally heavy rains east of the DFW metroplex. The heaviest rainfall was 5.64" east southeast of Kaufman, 5.63" northeast of Cottonwood, and 5.36" south of Rosser. The showers and thunderstorms moved out of Texas late on the 26th, but new thunderstorms developed the morning of the 27th over Northwest Texas. These thunderstorms progressed slowly east across northern and Central Texas through the day and night of the 27th (with several tornadoes over Oklahoma). The largest rainfall observations were 4.67" northwest of Seymour, 4.00" northwest of Rule, and 3.81" east of Ferris. Showers and thunderstorms continued into the 28th over eastern and Central Texas. Extremely heavy rainfall occurred over Southeast Texas, with one gage reporting slightly over 6" in one hour near Trinity. On the 28th the heaviest rainfall over North Texas was over the southern parts where west of Rosebud there was 5.36" and south southeast of Bruceville-Eddy there was up 4.99". But elsewhere in Texas there was 11.80" east of Trinity and 8.47" west of Livingston. The rain moved out of Texas by noon on the 29th.

April 30:

The dryline became quite active across west and extreme northern Texas the afternoon and night of the 30th, with scattered showers and thunderstorms developing. Rainfall amounts were not heavy, however, and were under 1". The area north of Gainesville measured 0.93", the region west northwest of Pottsboro measured 0.76", and to the north northwest of Gordonville there was up 0.76".

North Texas Regional Summary (continued)

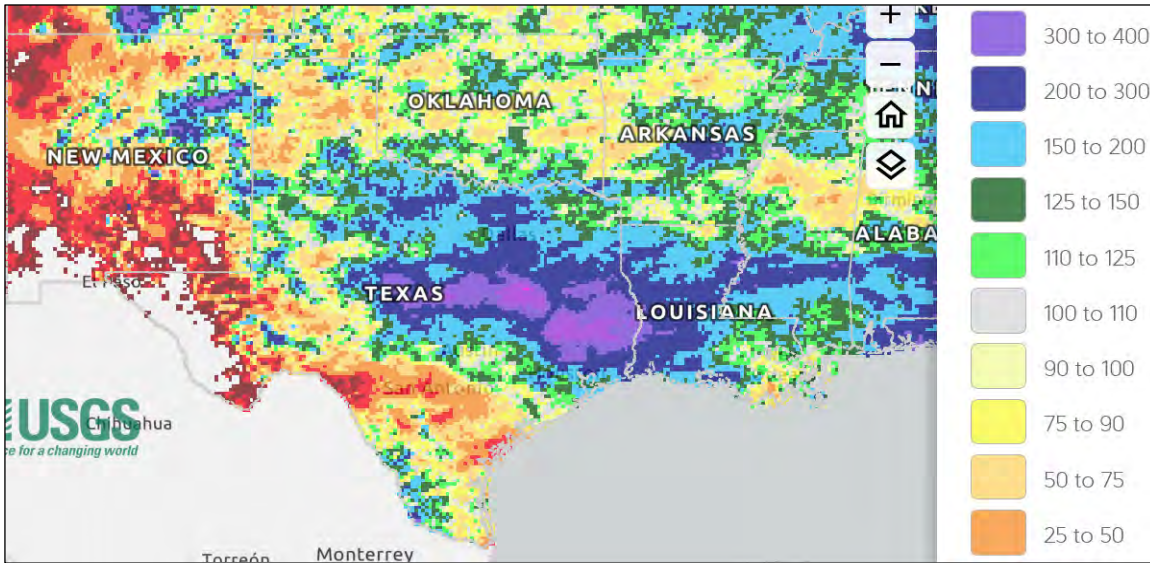


Figure 3: Percent of normal precipitation for May 2024. The dark green, blue and purple colors indicate above normal precipitation; the beige, light yellow and light green colors indicate near normal, while the orange, red and dark red colors indicate below normal precipitation.

At DFW in May 2024 7.80" fell. The normal amount of rainfall in May at DFW is 4.78". DFW was +3.02" above normal.

In Waco for May 2024, 15.28" of rainfall fell. This was the wettest May of record (the previous record was 15" in 1965). The normal amount in Waco in May is 4.44". Waco was +10.84" above normal for the month.

There were about eight significant storm systems which affected our weather in May.

May 1 - 5:

A series of upper air disturbances created periods of showers and thunderstorms through this period. On the 1st, showers and thunderstorms developed over central and western Texas. Locally very heavy rain occurred. There was 4.01" in one hour north northeast of Blanco. By the evening of the 1st and into the 2nd a mesoscale convective complex (MCS) formed and brought very heavy rainfall to especially East and Southeast Texas. On the 1st in North Texas, there was 4.53" west southwest of Waco and 2.28" at Mineral Wells. But elsewhere in Texas there was 9.16" south southeast of Mexia and 9.05" at Huntsville. On the 2nd the rainfall continued over Southeast Texas but eventually dissipated later in the day. But new thunderstorms developed along the dryline over West Texas during the late afternoon. Those storms moved East through the evening and brought more rain to east central and Southeast Texas by the morning of the 3rd. On the 2nd the maximum rainfall amounts were 11.50" north of Spring and 11.14" east northeast of Tomball. Southwest of Groveton there was a 5-day total rainfall of 23.56". Huntsville and surrounding areas received 16" to 22" the past 7 days. The rain persisted on the 3rd over Southeast Texas, and new showers and thunderstorms formed over the Concho Valley and the western Hill Country. The largest rainfall amounts on the 3rd were 3.25" northwest of Junction, 2.84" southwest of Junction, and 2.17" east southeast of Point Blank. On the 4th more showers and thunderstorms formed over West Texas, and the rain spread east through the night. Once again locally very heavy rainfall occurred, this time from southwest into north Central Texas. In the DFW area, the heaviest rain was east southeast of Burleson where 5.45" was measured and west northwest of Duncanville where there was 5.20". Elsewhere in Texas the maximum rainfall on the 4th was 9.45" northwest of Rising Star and 9.18" west southwest of Mullin. All the rainfall of the past several days resulted in major and even record flooding on some rivers in Central and Southeast Texas. The rainfall persisted on the 5th across eastern and southern Texas, but ended by midnight. The heaviest residual rainfall amounts on the 5th were 4.12" east southeast of Dilley and 2.60" north of Seven Sisters.

May 8 - 10:

The dryline and a cold front advanced into North Texas on the 8th. As this occurred some showers and thunderstorms developed over especially North Texas. This rainfall moved out of Texas late on the 8th. The heaviest rainfall amounts were 1.27" east southeast of Blue Ridge and 1.17" north northwest of Josephine. New showers and thunderstorms developed along and near a

North Texas Regional Summary (continued)

warm front on the 9th across northern and central Texas. The maximum rainfall in North Texas on the 9th was 2.15" northwest of Sherman. Elsewhere there was 2.90" east of Trinity and 2.78" north northeast of Groesbeck. Additional showers and thunderstorms redeveloped on the 10th near the stalled frontal boundary across Central Texas. This rain weakened or dissipated late on the 10th.

May 11 - 13:

A new, deep low pressure system developed over the western US on the 11th. Some showers and isolated thunderstorms developed over West Texas the morning of the 11th. These showers spread into Central Texas throughout the day. The maximum rainfall amounts on the 11th were 2.40" west southwest of Lometa and 1.85" northeast of Brady. Showers and thunderstorms continued across northern and eastern Texas on the 12th, but moved out of the state (except over the deep south) by midnight. Locally heavy rain occurred in many locations. In North Texas there was 3.24" south of Valley View and 2.98" east northeast of Decatur. But elsewhere in Texas on the 12th the maximum rainfall amounts were 6.40" north of Kennard and 6.06" east southeast of Colmesneil. A cold front moved into Texas on the 13th which helped to produce more showers and thunderstorms, especially across southern and eastern parts of the state. This rain moved out of the region by midnight. In Northeast Texas the heaviest rainfall amount was north northwest of Cumby with 1.25". But elsewhere in Texas on the 13th there was 3.64" south southeast of Katy and 3.26" south of Kountze.

May 15 - 17:

An upper air disturbance moved across the western US into New Mexico on the 15th into the 16th. A mesoscale convective system (MCS) developed over northwest Texas late on the 15th and spread into North Texas early on the 16th. The maximum rainfall reports for late on the 15th were 1.51" at the Lubbock airport station and 1.41" just south of Plainview. The rainfall increased on the 16th especially across Central and into Southeast Texas near an old frontal boundary. Once again, locally very heavy rainfall occurred. In North Texas the heaviest rain was south southwest of Itasca with 1.40" and the area north northeast of Cleburne got 1.04". But elsewhere in the state the maximum rainfall on the 16th was 6.90" at Romayor and 5.85" east northeast of Bon Wier. The majority of the showers and thunderstorms moved out of the state late on the 16th (after producing significant wind damage in Houston). Thundershowers remained over Deep South and extreme Southeast Texas on the 17th. The heaviest rainfall was 2.50" south southeast of Hebbronville and 2.00" south southwest of Port Aransas.

May 22 – 23:

A couple of short wave troughs interacted with an old frontal boundary to create showers and thunderstorms, beginning over West Texas early on the 22nd. The rainfall amounts were around 0.50" around Brownwood prior to dawn. Showers and thunderstorms increased in areal coverage and strength across northern and western Texas through the 22nd and shifted across Central and East Texas through the evening. The heaviest rainfall over North Texas was south southeast of Flower Mound with 2.23" and at Paris with 2.21". The maximum rainfall in Texas was 3.07" west southwest of Mullin and 3.05" southeast of Pidcoke. While the first area of rain moved out of the state, new showers and thunderstorms developed across the central and northern portions of Texas on the 23rd. Most of the showers and thunderstorms ended by midnight on the 23rd or early on the 24th. The heaviest rain on the 23rd was 3.37" northwest of Sherman and 2.76" at Evant.

May 24 – 25:

More showers and thunderstorms formed across mainly North Texas on the 24th along and ahead of the dryline. The maximum rainfall amounts on the 24th in North Texas were east southeast of Kaufman with 3.45" and north northwest of Gordonville with 1.69". Elsewhere in Texas there was 3.62" south southwest of Tehuacana and 3.16" northeast of Eustace. New showers and thunderstorms developed on the 25th, thanks again to the dryline plus leftover boundaries from previous storms. The thunderstorms produced tornadoes across extreme North Texas especially in southern Montague County, around Valley View and Celina. The heaviest rainfall on the 25th in North Texas was 1.60" southeast of Collinsville and 1.47" east northeast of Van Alstyne. Elsewhere in the state there was 2.00" in Water Valley and 1.44" west northwest of Cross Plains.

May 27 – 29:

Afternoon showers and thunderstorms developed over northern and Central Texas on the 27th as a weak upper disturbance interacted with an old frontal boundary. Some locally heavy rainfall occurred with these storms, but they dissipated by midnight. A new complex of thunderstorms (an MCS) developed during the early morning hours of the 28th over Southern Oklahoma, and

North Texas Regional Summary (continued)

these storms moved across northern and eastern Texas through the morning. Again, very heavy rainfall and high winds occurred. The heaviest rainfall amounts on the 27th were 4.02" south southeast of Flower Mound, 3.02" south southeast of Princeton, and 3.01" northeast of Denton. Showers and thunderstorms continued into Southeast Texas through the day as the MCS progressed, then new thunderstorms developed over western and southern Texas. In North Texas on the 28th the heaviest rainfall was north northeast of Dallas with 2.80" and south southwest of Canton where there was 2.24". Elsewhere in Texas the maximum rainfall was 3.53" south of El Indio and 2.95" north northeast of Carrizo Springs. Some thunderstorms persisted through the 29th over Southeast Texas, with some of these storms producing heavy rain. 6.07" fell southeast of Warren and 3.78" just south of Fred TX on the 29th.

May 30 – 31:

Another complex of thunderstorms formed early on the 30th over Northwest Texas, which moved southeast across the state. Additional thunderstorms formed over West Texas during the afternoon and evening of the 30th, and these storms also moved from northwest to southeast late on the 30th into the morning of the 31st, resulting in heavy rain. The largest rainfall amounts on the 30th were 5.67" east southeast of Valley Mills and 5.62" east northeast of Waxahachie. Most of the thunderstorms moved out over the Gulf of Mexico the morning of the 31st. Residual rainfall on the 31st was heaviest at Palacios with 2.65" falling.

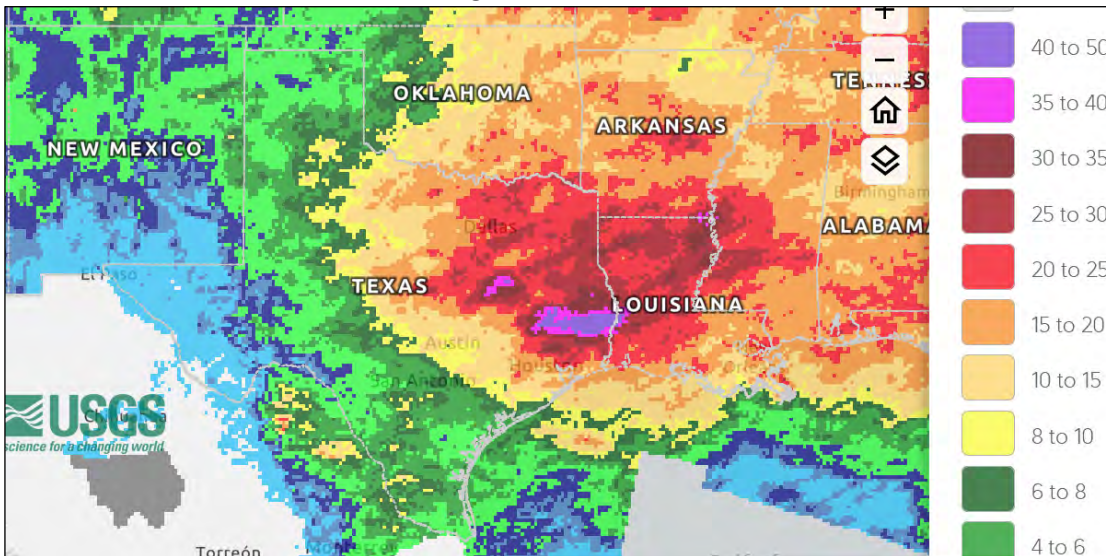


Figure 4: Spring season observed precipitation for 2024. The purple, dark brown, and dark red colors indicate the higher precipitation totals, while the light green, blue and beige colors show the lightest amounts.

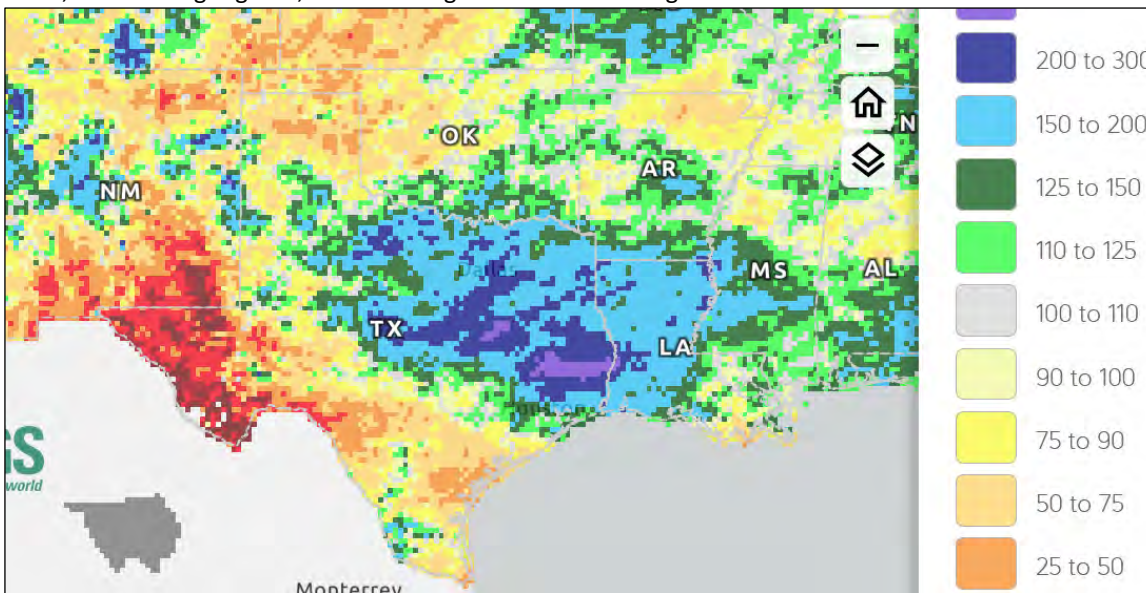


Figure 5: Percent of normal precipitation for spring 2024. The purple, blue and dark green colors indicate above normal precipitation. The brown, orange and red colors indicate below normal amounts.

North Texas Regional Summary (continued)

For the spring season at DFW there was 19.93" of rainfall (this was the 8th wettest spring of record). The normal amount from March through May is 11.30". DFW was +8.63" above normal for the season.

For the March through May period at Waco there was 22.45" of rainfall (this was the 5th wettest spring). The normal amount for the spring season is 11.05". Waco was +11.40" above normal for the season.

So far in 2024 DFW has measured 25.07". The normal amount is 16.59". DFW is running +8.48" above normal for the year (the 7th wettest year to date rainfall through May).

And so far in 2024 Waco has picked up 28.60" (this was the 4th wettest year to date rainfall through May). The normal amount is 16.32". Waco is running +12.28" above normal for the year.

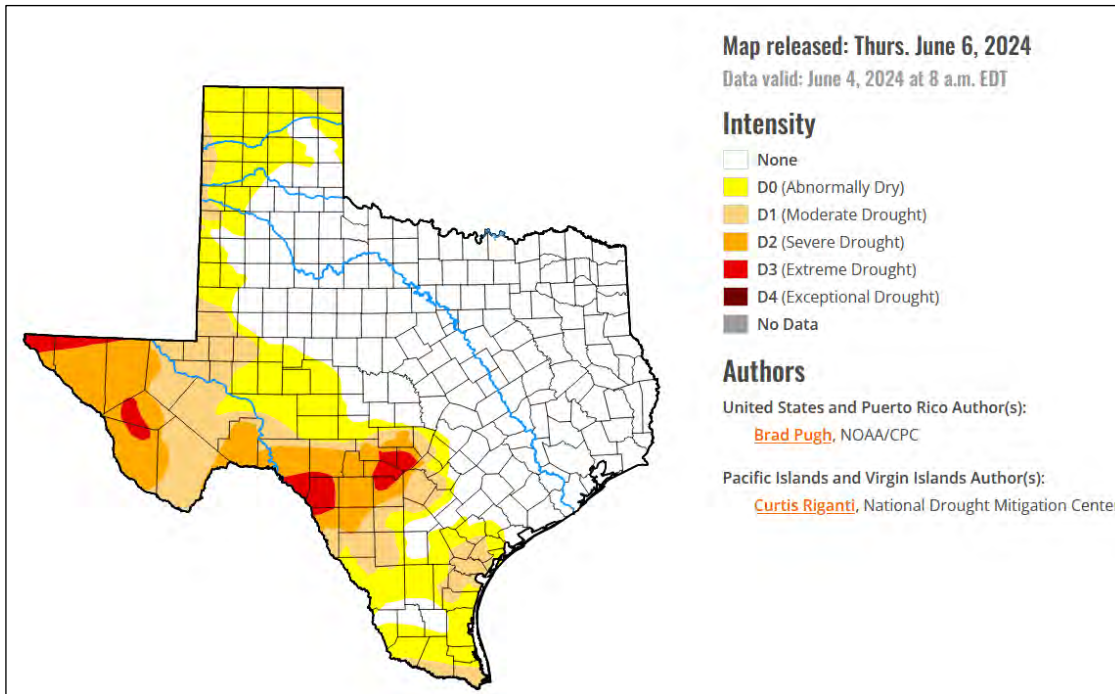


Figure 6: Current Drought Monitor for Texas as of June 6.

The results of the wet weather of the past three months show up well on the drought monitor map (fig.6), with moist soil moisture conditions over northern and eastern portions. There are more parts of Texas that are free from drought now than there were six months ago, and a little over half of the state is free from any drought category. About 45% of the state is still experiencing abnormally dry conditions or worse. But no locations are experiencing the worst exceptional drought category. Much of western and southern Texas continues to be in moderate to extreme drought.

Thanks again for your dedication in making all your weather observations! I'd like to share a few reminders in closing. First, with summer vacation season upon us, there will be days you may not be home to report your 24-hour rainfall observation. Upon your return, you can make a multi-day accumulation report. 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 are collected, the better the chances are of determining the highest rainfall totals during rainfall events. And on the flip side, with your zero reports it is easier to determine the exact location of drought when it doesn't rain. We appreciate it when you report zero rainfall daily on dry days.

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

Greg Story

Wichita Falls Regional Summary

Active Spring across the Wichita Falls Region

By: Charles Kuster, National Severe Storms Laboratory

This spring saw active severe weather and heavy rainfall across much of the central United States including Texas and the Wichita Falls region. Some of the most intense severe weather did occur in locations like the Houston and Dallas metro areas as well as north Central Texas, but we also experienced a lot of severe weather in our region (Fig. 1). There were at least 12 separate days with severe weather reported in our region and tornadoes were reported in Archer, Baylor, and Knox County. Other instances of significant severe weather include 78 mph winds near Knox City on April 9 and 2.0" hail near Sheppard Air Force Base on May 9.

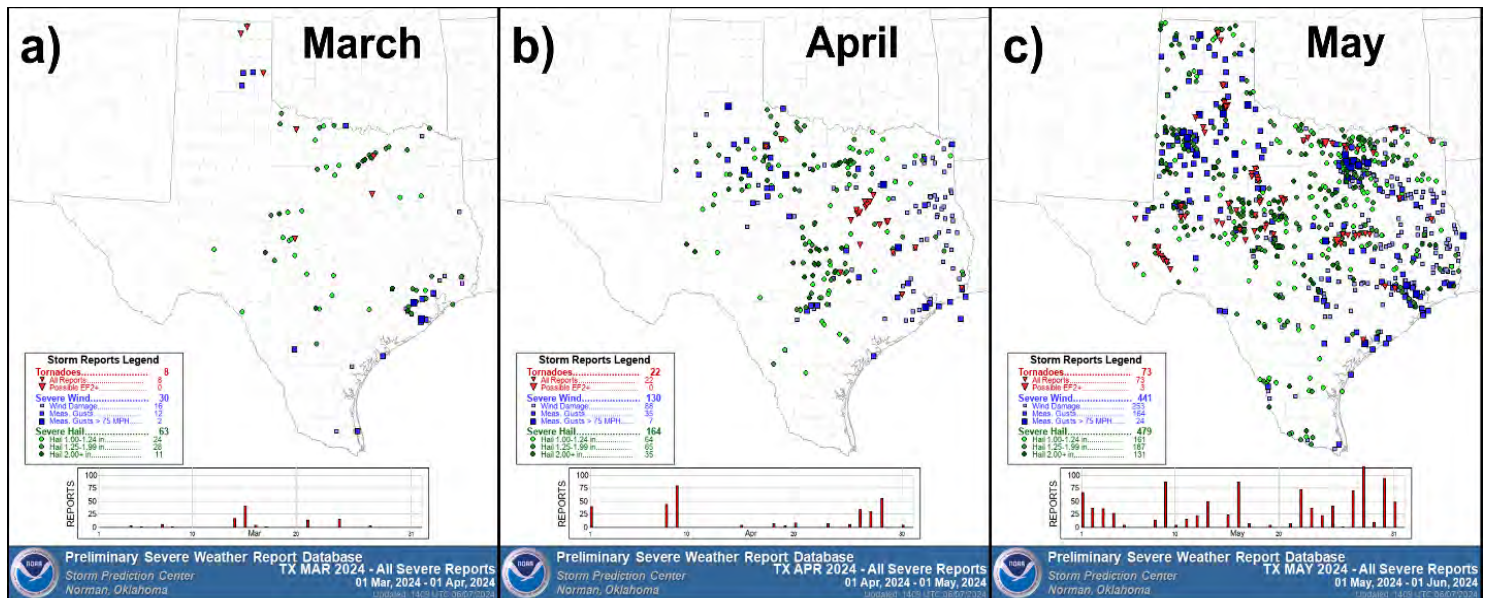


Figure 1: Preliminary storm reports from the Storm Prediction Center for a) March, b) April, and c) May of 2024. Red triangles are tornado reports, green circles are hail reports, and blue squares are wind reports.

We also experienced above normal rainfall across our region, especially in Archer, Baylor, Knox, and Wichita County (Fig. 2a). Some areas in Archer County were more than 8.0" above their normal precipitation. The day with the heaviest rain occurred on April 27 where multiple CoCoRaHS stations in Wichita County reported 24-hour rainfall totals of 2–5". Despite all of the rainfall, our region still experienced above normal temperatures (Fig. 2b).

Wichita Falls Regional Summary (continued)

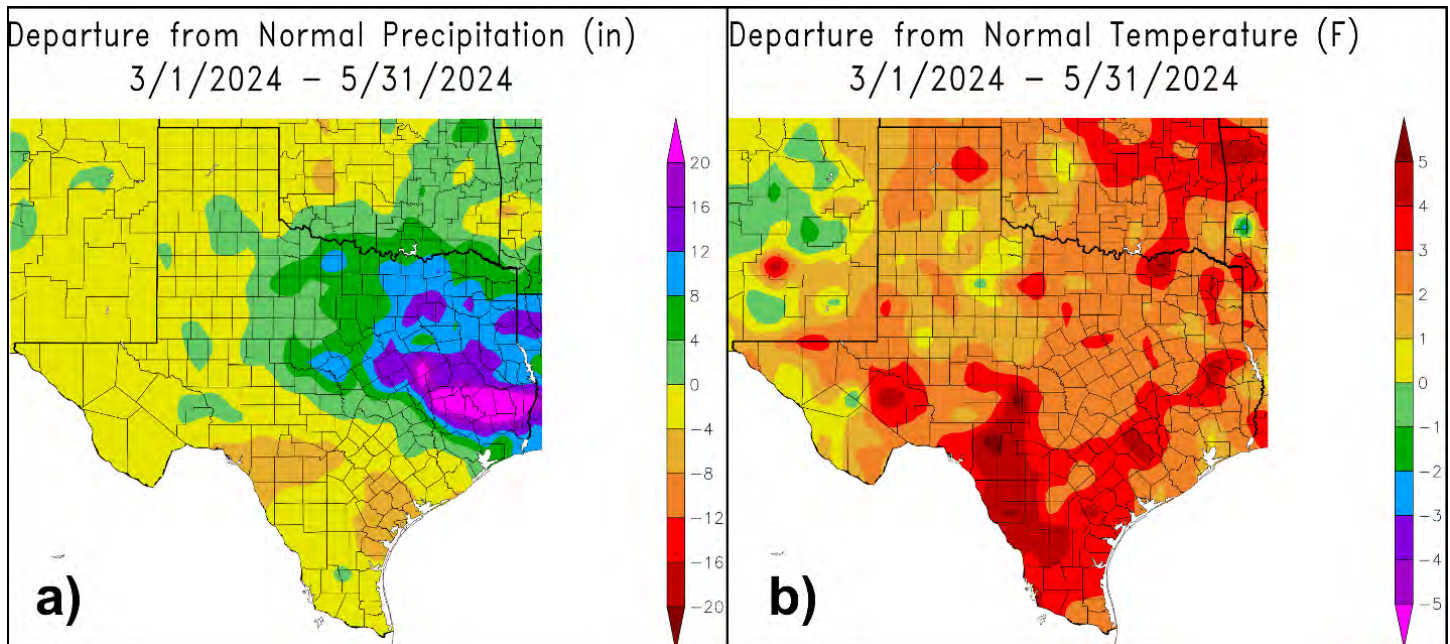


Figure 2: Departure from normal a) precipitation and b) temperature for the beginning of March 2024 through the end of May 2024. Warm colors indicate below normal precipitation (a) and above normal temperatures (b), while cool colors indicate above normal precipitation (a) and below normal temperatures (b).

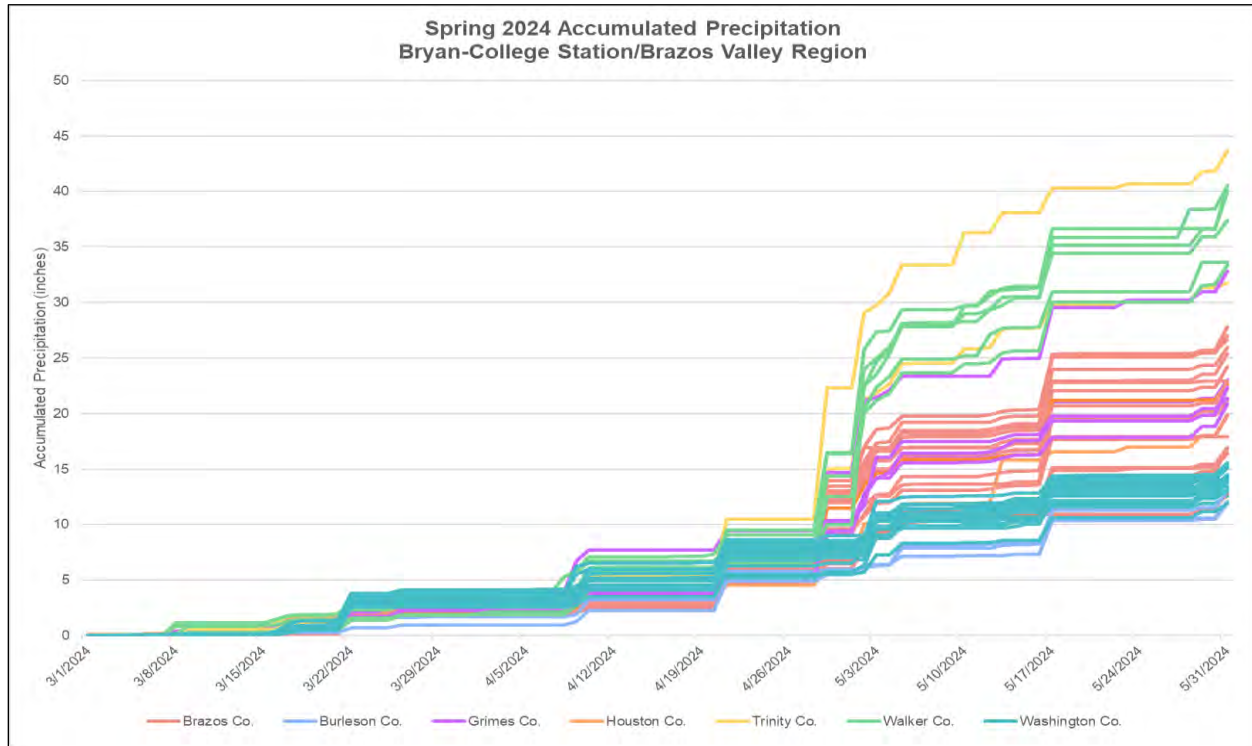
April and May were the wettest months, especially May where all CoCoRaHS stations reported over 3.0" of rain in the month (Fig. 3). May also saw nearly equal dry (all CoCoRaHS stations reported less than 0.05") and wet (at least one CoCoRaHS station reported 0.05" or more) days, with 16 and 15 days, respectively. In total, we experienced 63 dry days and 29 wet days this spring. For comparison, last spring the region experienced 58 dry days and 34 wet days. The wet spring also resulted in no areas currently in drought conditions according to the U.S. Drought Monitor (available at <https://droughtmonitor.unl.edu/>).

Brazos Valley Regional Summary

Spring 2024 Precipitation Summary

Bryan-College Station/Brazos Valley Region, Texas

By: Victoria Elliott Ford, Texas A&M University, Office of the State Climatologist of Texas



Summary:

Spring 2024 shaped up to be a very wet season! Rain was moderate but consistent for March and April, while May saw a drastic increase in precipitation events. The overall average rainfall accumulation for our region was 23.92" while the normal seasonal amount is 11.87". As a result, we were 12.05" above what is normally expected for spring in our area. On a county level, everyone saw above-average precipitation totals. The largest anomaly was in Walker County at 25.42" above normal, followed by Trinity (24.72"), Grimes (12.54"), Brazos (10.56"), Houston (7.30"), Washington (3.18"), and Burleson (1.59"). The Climate Prediction Center is currently expecting warmer and wetter than normal conditions for summer 2024 in our region, so hopefully our wet spring coupled with these precipitation predictions will fend off any impending drought development.

Observer Statistics:

Throughout the spring season, we had 67 active observers reporting their precipitation totals with 32 observers missing no more than 10 days of reporting. Of these, 12 did not miss a single day! Overall, 53 stations were used to calculate this season's records. We thank you for your vital contributions!

Season Statistics:

Wettest Day: 12.51", May 2, Walker County

Wettest Seasonal Total: 43.64", Trinity County

Driest Seasonal Total: 11.91", Burleson County

Soggy Socks Award: (longest spell with measurable rain): It's a tie! - 6 days

May 1-6, Washington County

May 2-7, Brazos, Burleson, and Grimes Counties

May 12-17, Brazos County

Dusty Soles Award: (longest spell without measurable rain): 18 days - April 3-20, Brazos County

Lower Rio Grande Valley Regional Summary

Record to Near Record Heat Dries Up Infrequent Rains
Heat Builds in April and May; Water Supply Crisis Ensues

By: Barry Goldsmith

Warning Coordination Meteorologist
NWS Brownsville/Rio Grande Valley

Figure 1: Record to near-record warmth was the story for spring 2024 across the Lower Rio Grande Valley. April, and especially May, tilted the scales toward new records.

Lower Rio Grande Valley Regional Summary (continued)

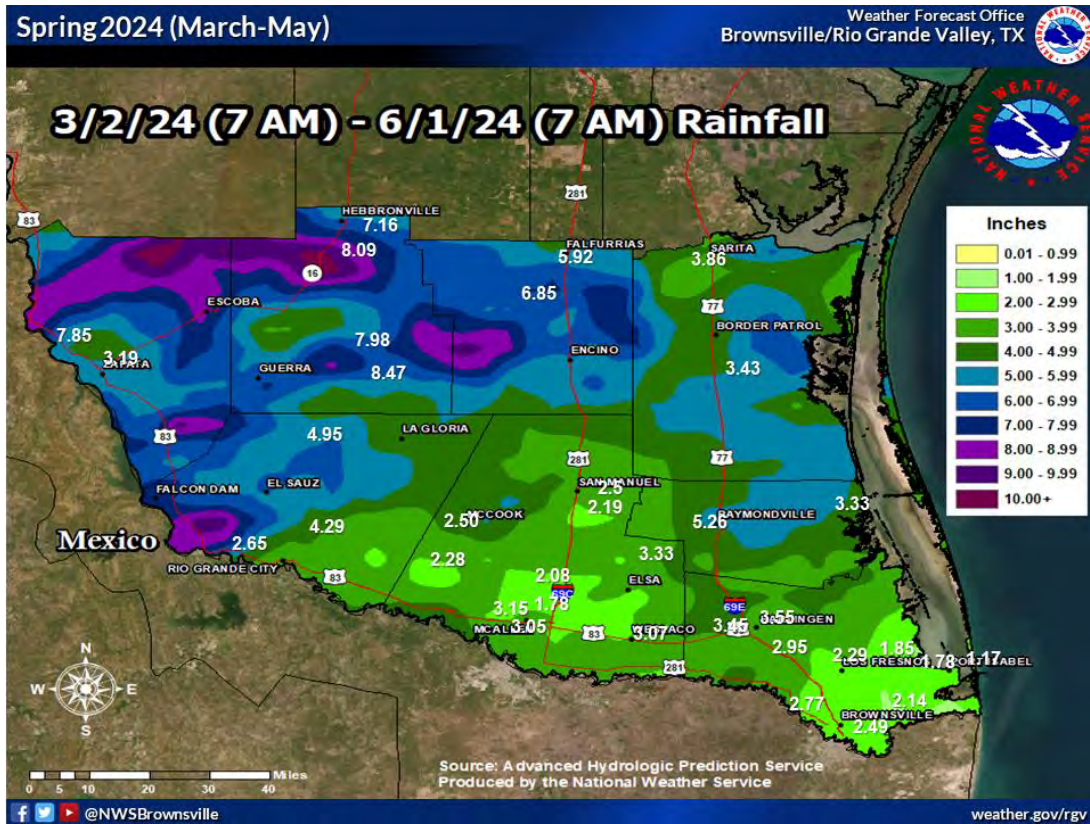


Figure 2. Annotated rainfall map for spring 2024 across the Lower Rio Grande Valley/Deep South Texas region. Annotated values are a combination of CoCoRaHS, ASOS (NWS), AWOS (FAA), and the Texas Mesonet.

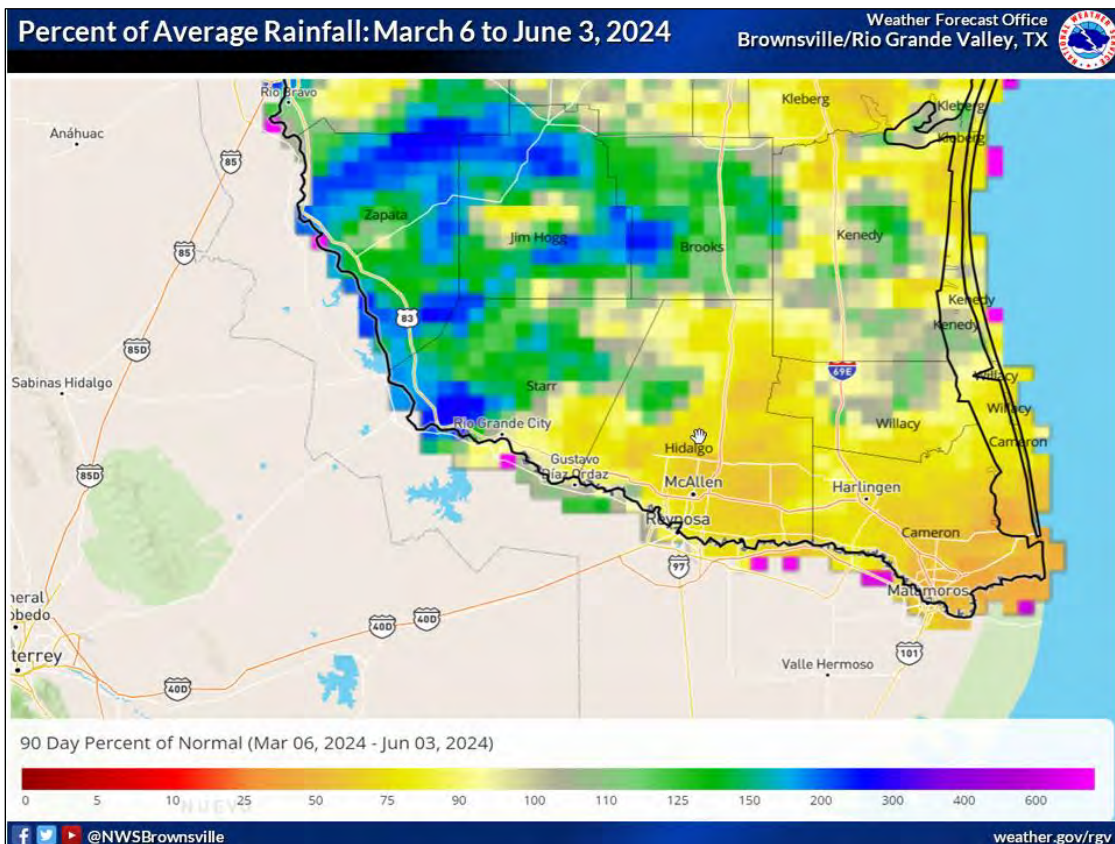


Figure 3. Rainfall percentage of average, March 6 through June 3, 2023. Heavier rainfall favored the Brush Country, upper Valley, and Rio Grande Plains, but persistent heat countered the rainfall with rapid evaporation in these areas.

Lower Rio Grande Valley Regional Summary (continued)

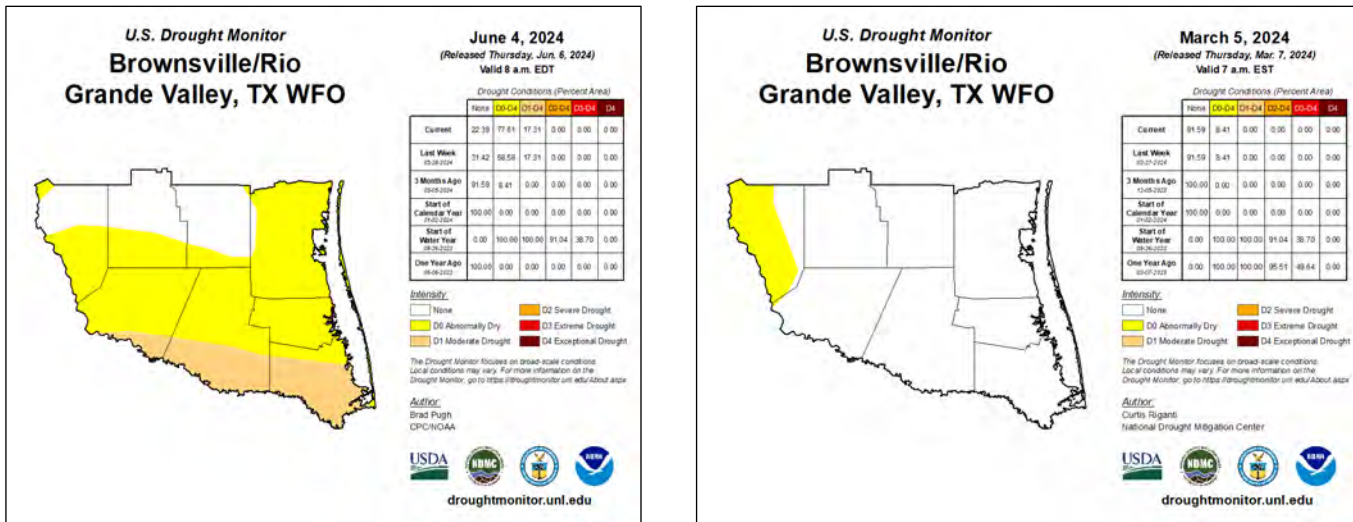


Figure 4. U.S. Drought Monitor degradations between March 5th, 2024 (right) and June 4th, 2024 (left). Despite periodic rainfall across Starr, Jim Hogg, and Zapata County, near-record heat countered the soil’s ability to retain the moisture and kept dryness and moderate drought at times.

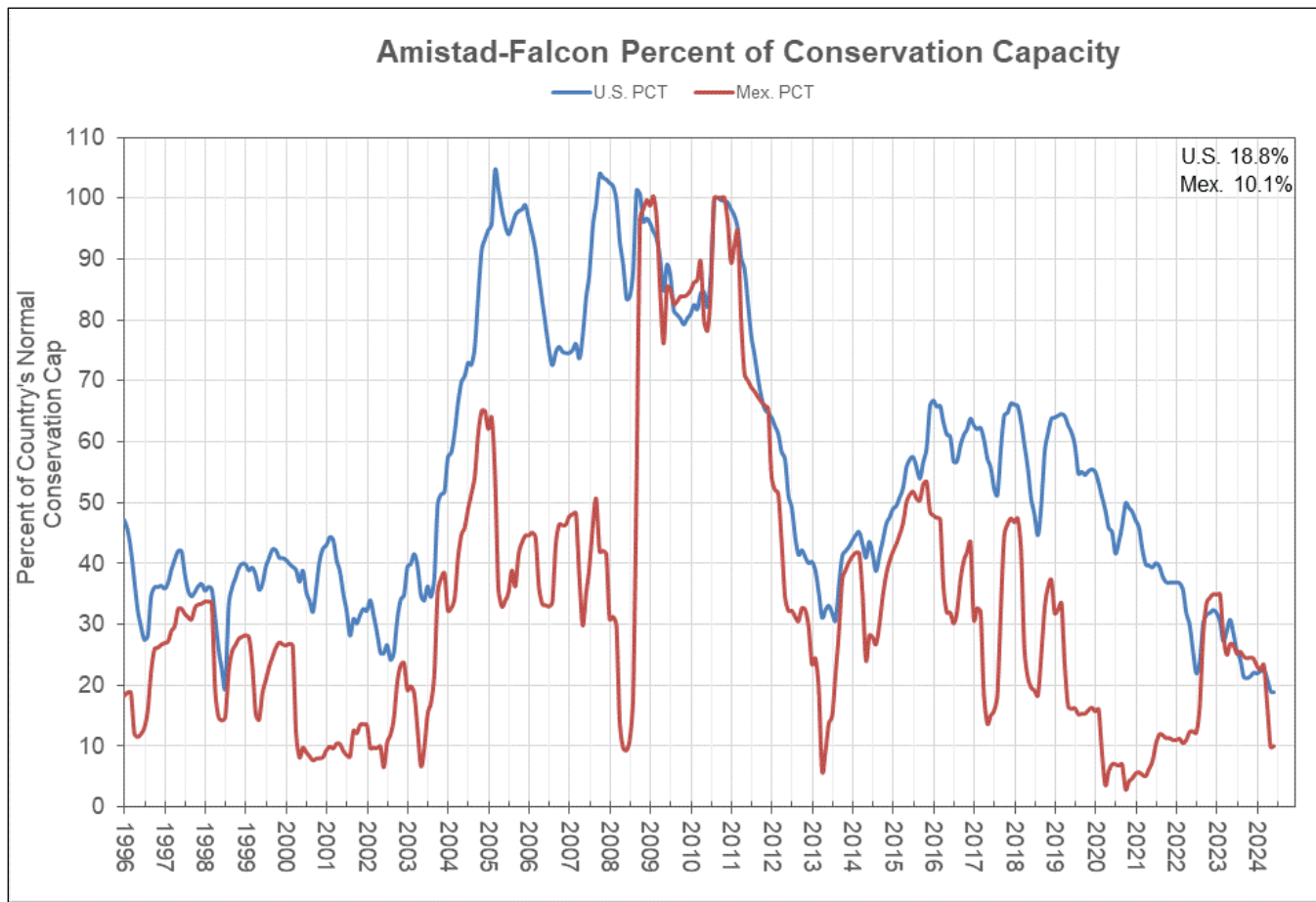


Figure 5. U.S. International Boundary and Water Commission (IBWC) combined percentage of conservation capacity for Amistad and Falcon International Reservoirs, as of the start of June 2024. The combined low values were the lowest on record since each dam was constituted (Falcon in 1954; Amistad in 1971).

Lower Rio Grande Valley Regional Summary (continued)

Month-by-Month Summary

March featured periods of warm to very warm weather interspersed with periods of slightly cooler than average conditions, with the end result an above average month (temperatures generally 1 to 2.5 degrees above the 1991-2020 30-year benchmarks). This continued a trend that began in February, as the average temperature ended up within the top twenty all-time warmest for locations in Hidalgo, Cameron, and Willacy County (lower/mid Valley). The first of just three notable spring rain/thunderstorm events for the Rio Grande Valley and Deep South Texas ranch country impacted the Rio Grande Plains to the King Ranch late on March 15th and early on March 16th, as a developing mesoscale convective system (MCS) eased from Zapata through Kenedy County, dropping 3 to more than 6" of rainfall. These would be the highest sub-area rainfall totals for a single event in spring 2024. The populated Rio Grande Valley (Starr through Cameron County) missed out on the heaviest rainfall (Figure 6). The rainfall likely came with large hail that fell over open ranch country, though no reports were logged in near-real time. Ranchers in the area reported the rainfall as "welcome", but rapidly absorbed by mid-morning of March 16th, with no field flooding despite the high amounts and short-fused high rainfall rates.

Monthly rainfall values were 150 to 300 percent of average across the Zapata to Kenedy and Willacy County area, but 10 to 50 percent of average across the more populated Starr through Cameron County region along and near the Rio Grande.

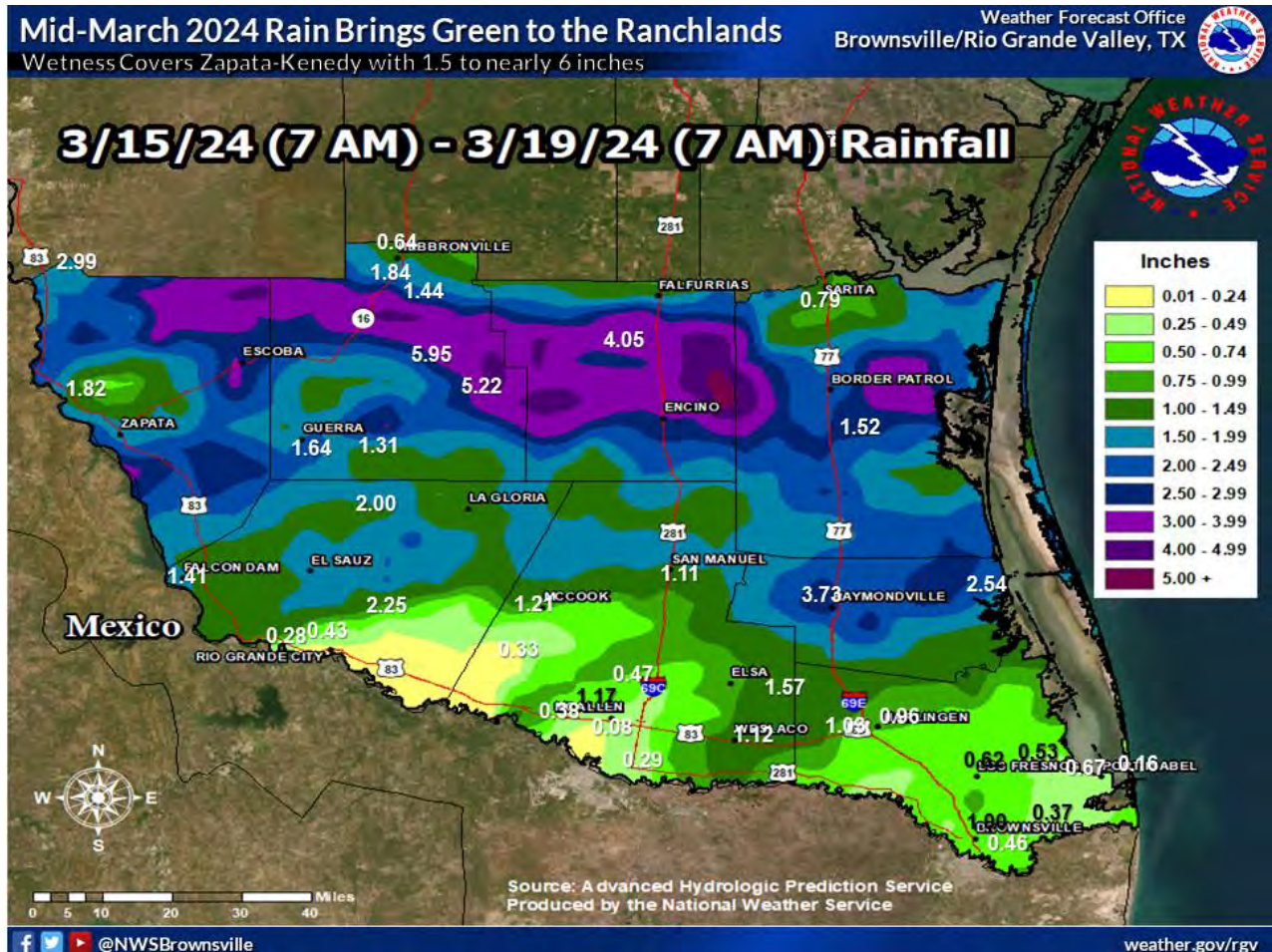


Figure 6. Measured and estimated rainfall for March 15th through early March 19th, 2024. Annotated values are a combination of CoCoRaHS, ASOS (NWS) and AWOS (FAA) four-day totals.

Lower Rio Grande Valley Regional Summary (continued)

April

April began rather pleasant, with warm days but generally comfortable overnights, with minimal rainfall through mid-month. More notable warming arrived around the 15th and continued through the 21st, before the season’s last true cooling front arrived (21st and 22nd) that was also accompanied by the only notable rainfall on those days. The short period of clouds and unseasonable cool temperatures was erased by the 25th through the end of the month, when hot days and sultry nights arrived – a harbinger for May.

Other than periodic light-moderate rainfall that developed along/behind the late month front, rain was scarce in all areas. That rain was “heaviest” across Jim Hogg County, where estimated/measured rainfall ranged from 0.5 to 2” in the northern portion of the county. Otherwise, monthly rain totals were generally 0.5” or less, equating to 5 to 25 percent of average for the month. The lack of rainfall, combined with gradual accumulation of heat, began to stress dryland (un-irrigated) crops.

The development of a persistent south/southeast low level flow during the last week of the month combined with seasonal agricultural burning in southeast Mexico, as well as ongoing wildfires in Central America, to worsen air quality across the populated Valley. Daily average air quality levels of “Unhealthy for Sensitive Groups (USG)” became commonplace – a harbinger of conditions to follow in May.

May will be remembered as the month that was quite literally “hotter than July”! The persistent southeasterly to southerly flow that opened the month did not abate; as the atmosphere heated up, so did the surface temperatures – to the tune of records shattered by 1 to more than 3 degrees above **prior records** (Figure 7). In fact, Brownsville’s 87.4 degrees total average (day/night combined) temperature was equivalent to the **fifth hottest JULY** on record! McAllen, Rio Grande City, and Port Mansfield also ranked among their top-twenty hottest JULYs...in May. Century-mark temperatures got off to a jackrabbit start in spring 2024, with new or tied records for numbers of such days set in McAllen (11; prior record was 8 in 2028), Harlingen/Valley International Airport (4; prior record was 3 in 2028 and 1952), and Brownsville (3; prior record of 3 in 1919 was tied). Sultry overnights, featuring “feels like” temperatures remaining above 90 for most of the night on most days in May, were record-setting as well: Actual temperatures remaining at or above 80 degrees shattered prior records. Brownsville had 17 such mornings, shattering the prior record of 12 in 2019. Harlingen/Valley International Airport had 7, breaking 2019’s mark of 4; McAllen had 12, breaking the prior record of 8 in 2017 and 2019, Port Mansfield had 14 such days, destroying the prior record of 4 such days (multiple years). Rural Rio Grande City matched its more than 100 year record (1902) of 8 days.

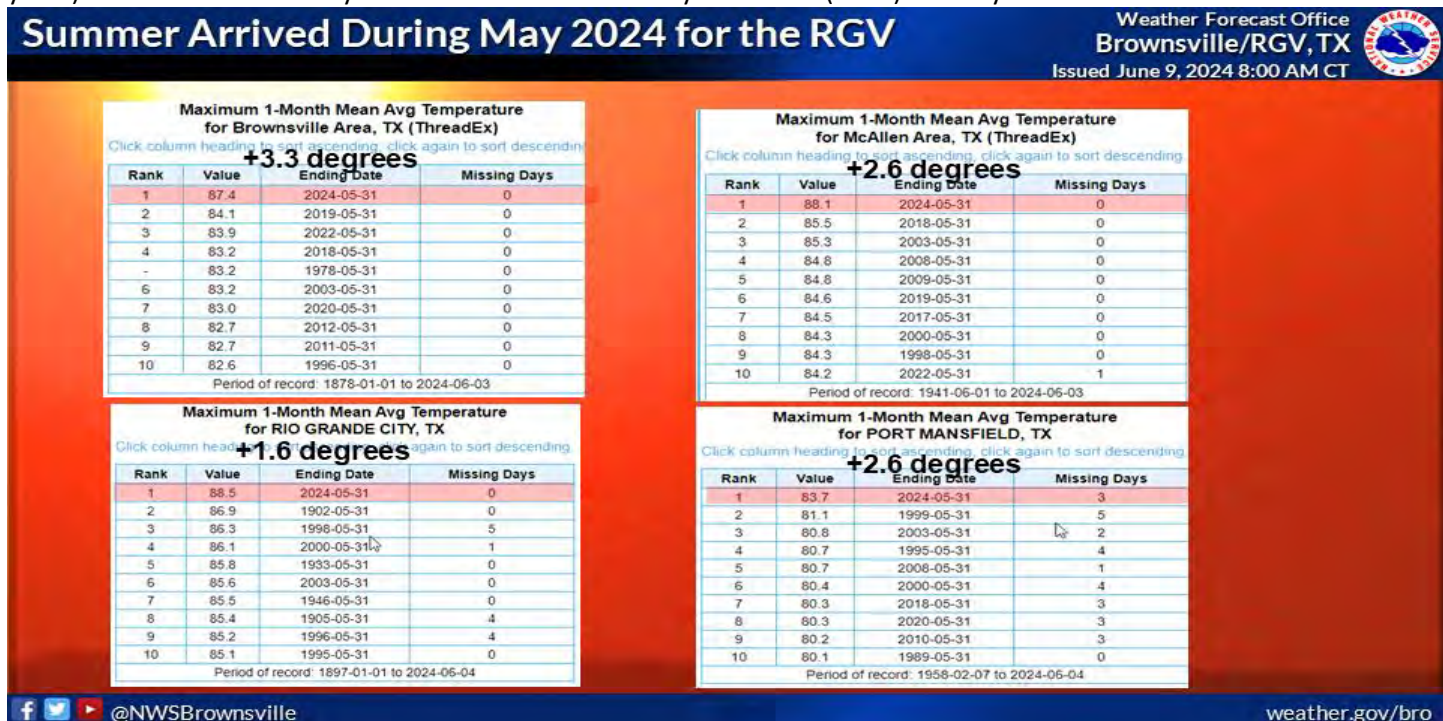


Figure 7: Record-shattering heat was the story of May 2024 across the Lower Rio Grande Valley. Day/night combined temperatures were more in line with the hottest time of year (mid-July to mid-August) than the final month of meteorological spring.

Lower Rio Grande Valley Regional Summary (continued)

The persistent southeasterly to southerly flow combined with daily subsidence inversion trapped even more fine particulates (known as “PM 2.5”, or particulate matter of 2.5 micrometers) from the peak of spring agricultural burning in southeast Mexico and continued Central American and southern Mexican wildfires. The majority of days in May were either rated as USG or worse, “Unhealthy” (for all groups, Figure 8). Several hours on a few mornings also showed the Air Quality Index rising above 200 – an unheard-of level outside of nearby wildfires or visible smoke in the area – across the populated Valley. The persistence of USG and Unhealthy air quality in May was unprecedented for the area.

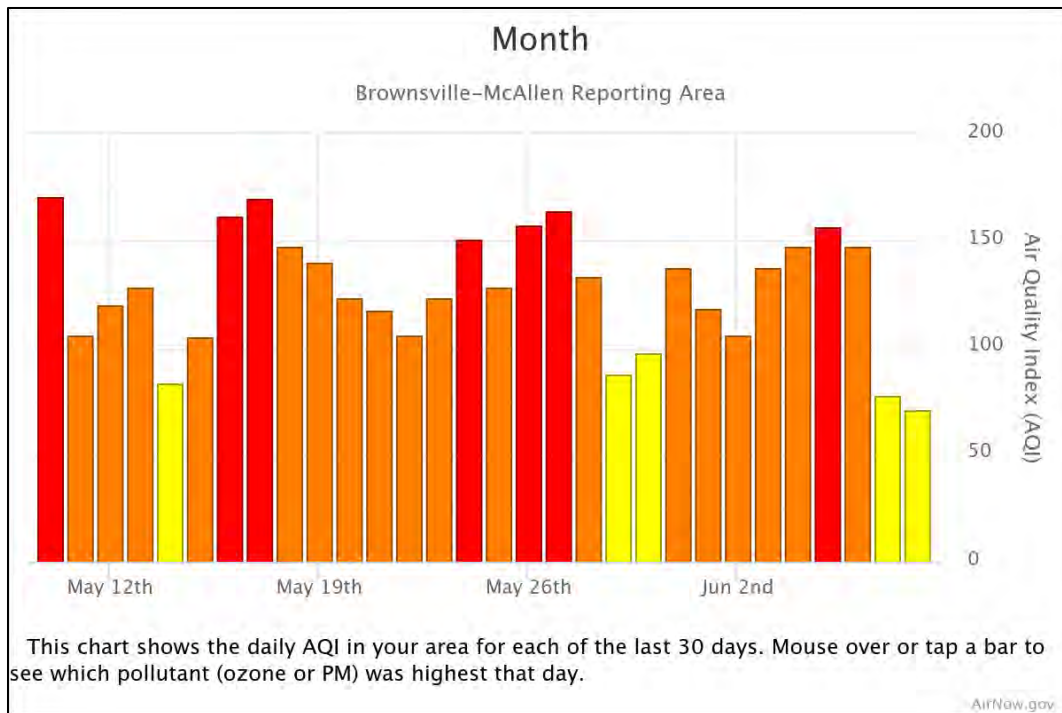


Figure 8: Air quality trends from May 10 through June 9, 2024, for the Brownsville/McAllen reporting area.

May also featured several minor, but notable, weather events. Severe thunderstorms developed during the late afternoon of Monday, May 13th east of the Sierra Madre, and pushed quickly across Zapata, Starr, and Hidalgo County, dropping pockets of hail between the sizes of quarters and baseballs along their eastward track through the region. The hailstorms modified into a small mesoscale convective system near the Cameron and Willacy coast, where wind gusts between 46 and 59 mph developed along the outflow boundaries and caused power line/pole damage in southern Cameron County. Three days later, an early morning round of nickel to ping-pong ball sized hail fell in southern Hidalgo County.

Finally, on the evening of May 28th, the heaviest rainfall since mid-March (Figure 9, below) dropped measured and estimated 1.5 to 3.5 inches across the upper Valley and Rio Grande Plains, with lesser amounts across the populated Valley. The rainfall was only temporarily beneficial, as heat and evaporation immediately returned and held dryness/moderate drought in place.

Lower Rio Grande Valley Regional Summary (continued)

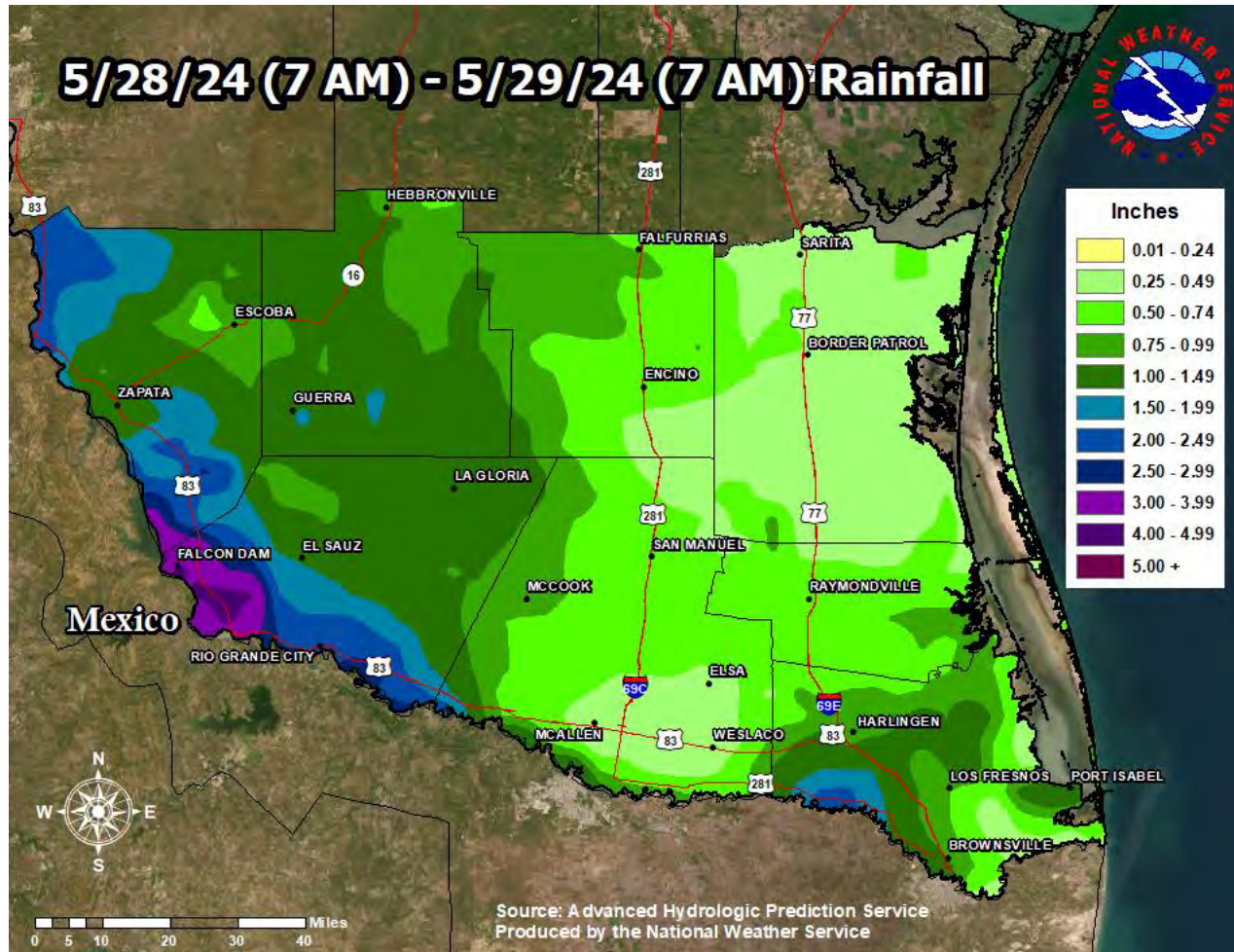


Figure 9. Bias-corrected rainfall for the evening of May 28th, 2024, across the Lower Rio Grande Valley and Deep S. Texas ranch country.

Spring 2024 had quite the variety of weather across Texas – from dry and warm/hot conditions with wildfire threats (and a massive wildfire) in West Texas, to record shattering rainfall in parts of East and Southeast Texas. The same upper-level pattern (Figure 10) that fueled both flooding rainfall and killer severe weather and tornadoes upstate also brought the persistent and record-shattering heat of May 2024 to the Lower Valley (Figure 11). Unknown as of this writing were heat-related health impacts for residents of the Valley, considering just how hot May was compared to average – and whether people accustomed to warm to hot springs were able to acclimate to top 10 percent **July** heat so early in the season.

The pattern that allowed the Valley to “wave” to so many of these storm/flood producers was well forecast, as the region had fewer than half the number of widespread and/or significant rainfall and storm events (Eight vs. four). Unfortunately, that same pattern - one that failed to truly tap any deep layered tropical moisture from the southwestern Caribbean and eastern tropical Pacific – brought record low combined reservoir levels along the Rio Grande by month’s end, and water restrictions and states of emergency were commonplace for an increasing number of communities. Impact on agriculture could be severe, with some studies indicating between nearly \$500 million and \$1 billion in production/loss of crop and livestock.

June 2024 picked up where May left off: Record to near-record heat through the first eight days of the month, and little significant wetting rainfall. The summer outlook does offer a “wildcard” of a very busy Atlantic Hurricane Season – but such welcome rains could come with the host of other dangerous and damaging impacts should a direct strike occur in the Lower Valley. Without sufficient late summer rains, a full-blown water crisis would ensue for the region.

Lower Rio Grande Valley Regional Summary (continued)

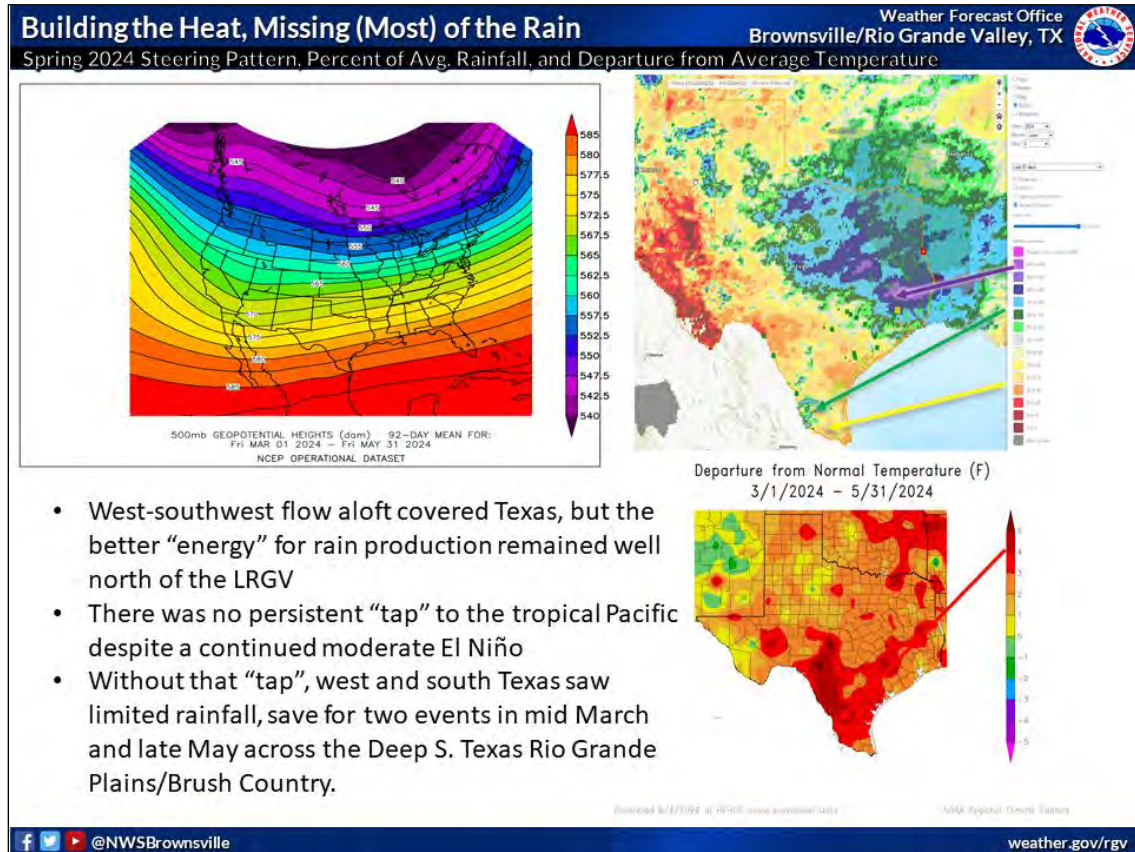


Figure 10. The pattern and resultant rainfall and temperature anomalies for spring 2024. While north, east, and southeast Texas benefited from frequent upper level disturbances that utilized the warm to hot and humid air flowing into them, the Lower Rio Grande Valley could only “wave” to the action, as the region was under the northern edge of a seasonal strong upper level high pressure ridge.

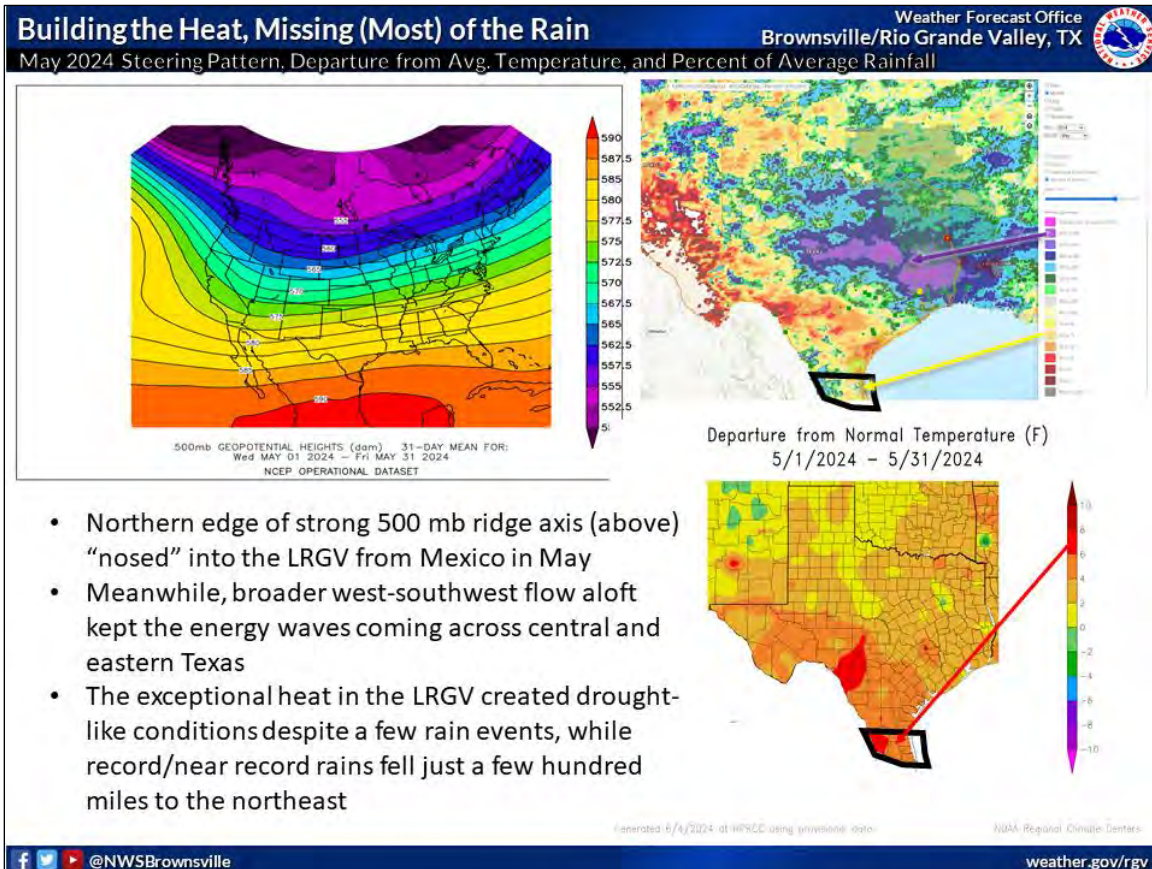


Figure 11. The ridge mentioned in Figure 10 was most dominant in May across northern Mexico, nosing into the Lower Valley.

Corpus Christi Regional Summary

Corpus Christi/South Texas Region below Normal through Spring

By: Nicholas Price, Meteorologist NWS Corpus Christi

The spring season was given equal chances to begin the season though it resulted in below normal rainfall across the region. March's departure from normal rainfall totals were close to 2 inches for the month. April and May were similar to March as well with much of the area not receiving beneficial rains. Looking back at the outlook below.

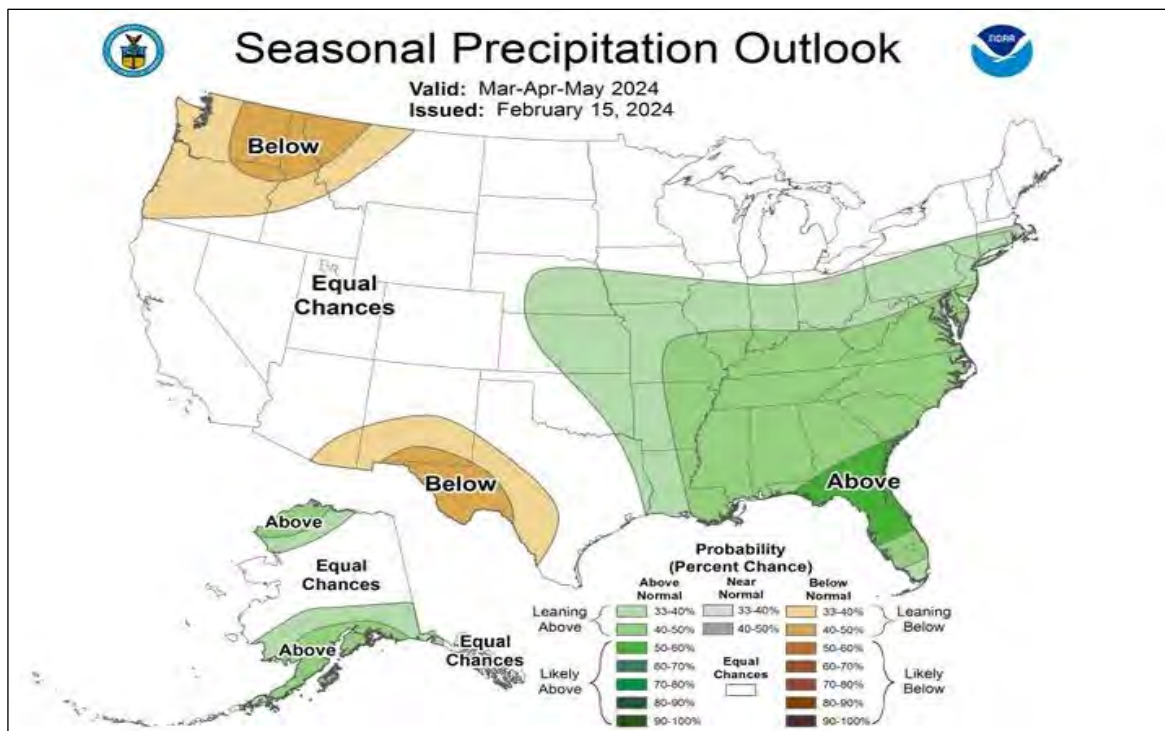


Figure 1: NOAA Climate Prediction Center Seasonal Precipitation Outlook for months Mar-Apr-May

South Texas for the month of March saw well below rainfall totals (Figure 2) across the entirety of the area. The majority of the rain fell due to some short-waves and some associated fronts that moved through the region. This was mainly focused in the northern Brush Country, portions of the Coastal Plains, and the Victoria Crossroads. Alice, TX saw around 80% of their monthly rainfall total in the middle of the month with observers reporting 0.83" falling during the middle of the month. For the entire month of March Alice, TX the area saw only about 1" of rain. The below average rainfall totals can be attributed to the pattern that was over the area during most of the month. High pressure system dominated the area through portions of the month which led to drier conditions. Observers that saw the least amount of rain were the Rio Grande Plains and portions of the Brush Country. In Freer, TX observers only saw 0.40" for the entire month which is a 1.84" departure from normal rainfall (Figure 3). Though the area did see decent rainfall spread out across the area this was still below normal rainfall for the month. We typically expect 2-3" for March and we only received just above 2" in the Coastal Bend. The western portions of the region experienced abnormally dry to moderate drought conditions due to the lack of rainfall in the area (Figure 4).

Corpus Christi Regional Summary (continued)

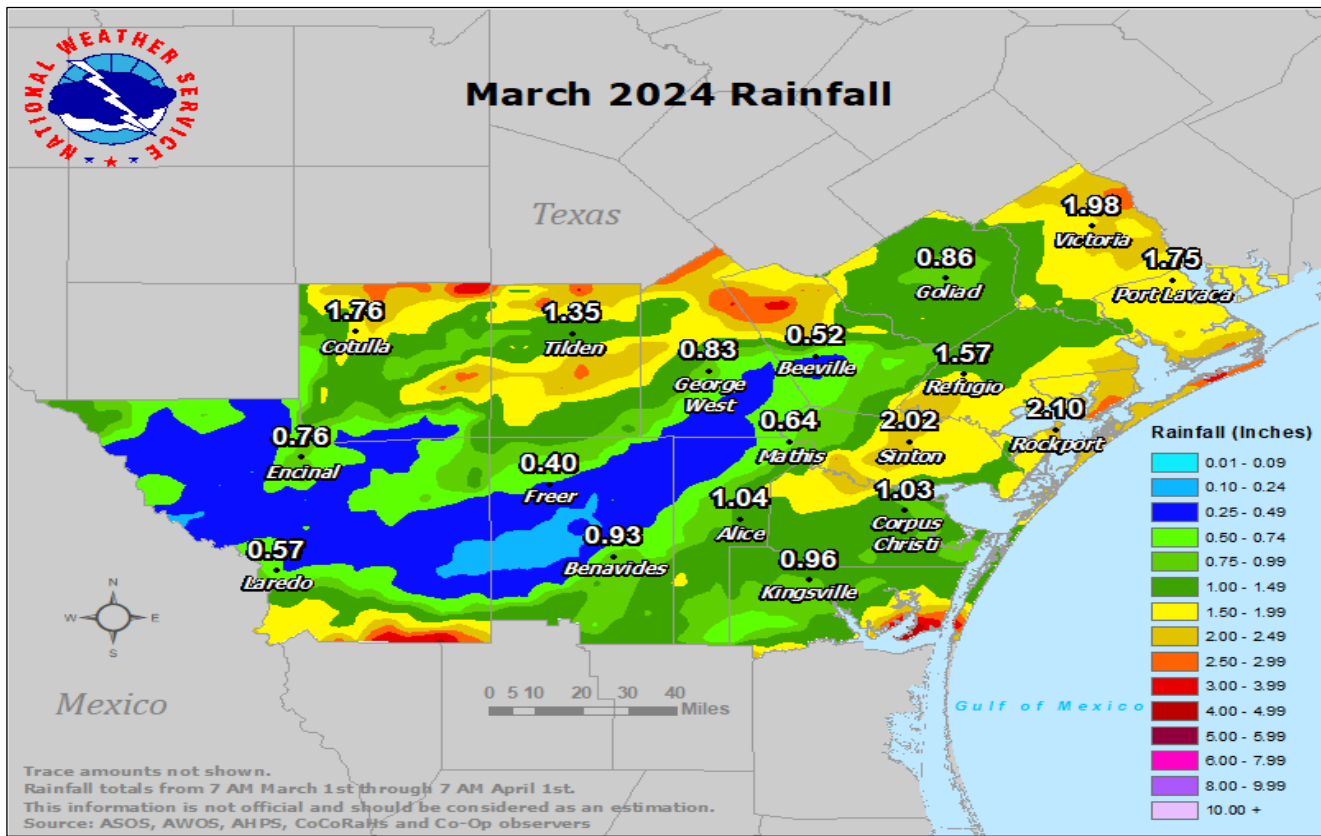


Figure 2: March 2024 Estimated Rainfall Totals

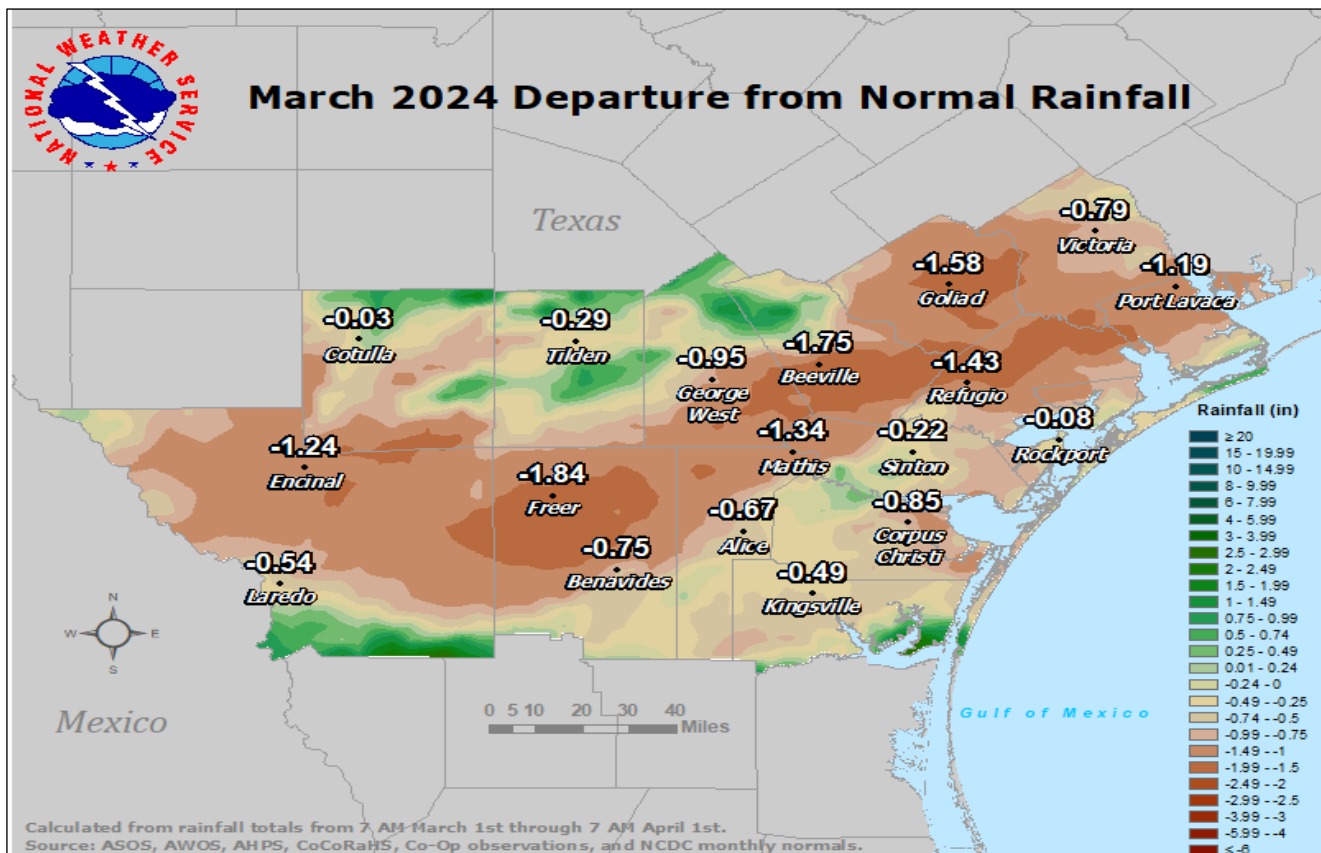


Figure 3: March 2024 Estimated Departure from Normal Rainfall

Corpus Christi Regional Summary (continued)

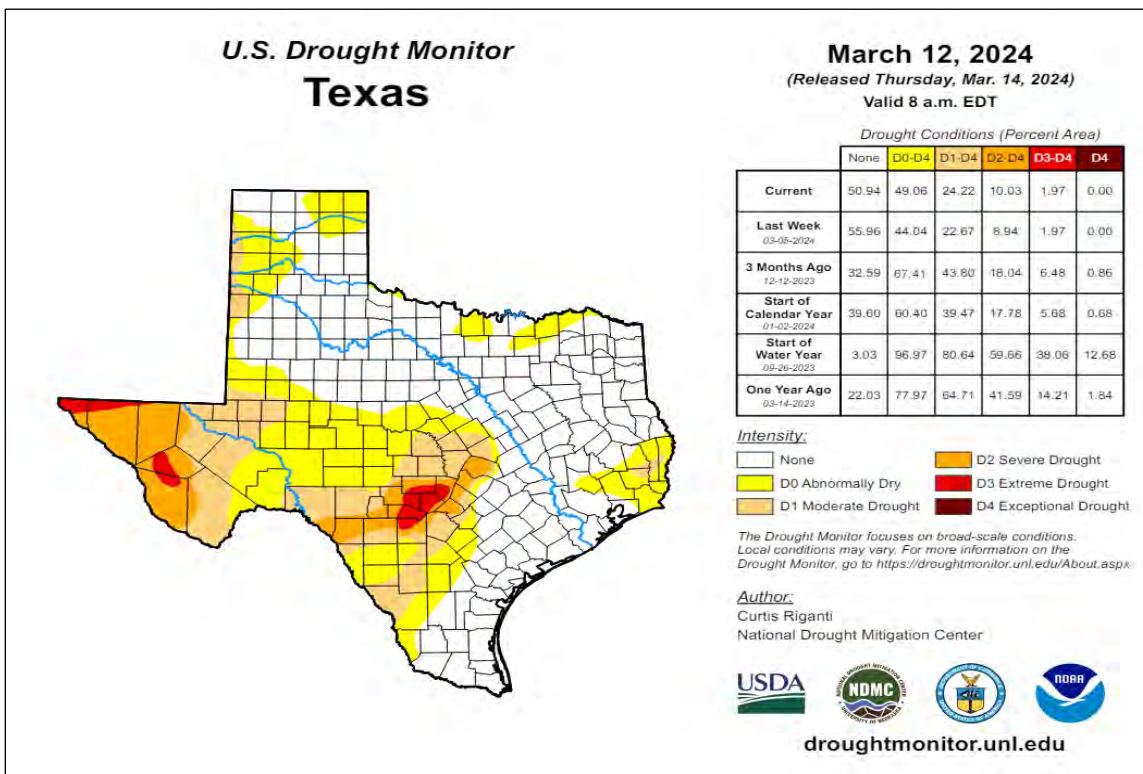


Figure 4: Drought Monitor Summary for the month of March

Much of South Texas remained abnormally dry for the month of April with only an isolated area in the Brush Country who saw above normal rainfall (figure 5). The areas with above normal rainfall were La Salle County and northeastern Webb County as well as isolated spots of Duval and Jim Wells Counties, where they got from twice to three times as much as normal. For the rest of South Texas, only 10-25% of normal rainfall was observed. This trend was evident within the CoCoRaHS observers with the majority providing below normal rainfall with only a few reporting significant rainfall compared to climatology. Observers across La Salle County reported from 2.00-3.00” of rain for the month while select observers reported up to 4.00-5.00” for April. Elsewhere, reports were bleak as observers across the Coastal Plains reported from 1.00-3.00” and the Victoria Crossroads coming in at only 0.50-2.00” for the entire month. Looking at the departures from normal for May (figure 7), you can see that the Brush Country got 1-3” above normal rainfall whereas most of the rest of the area got 2.00-3.00” less than normal.

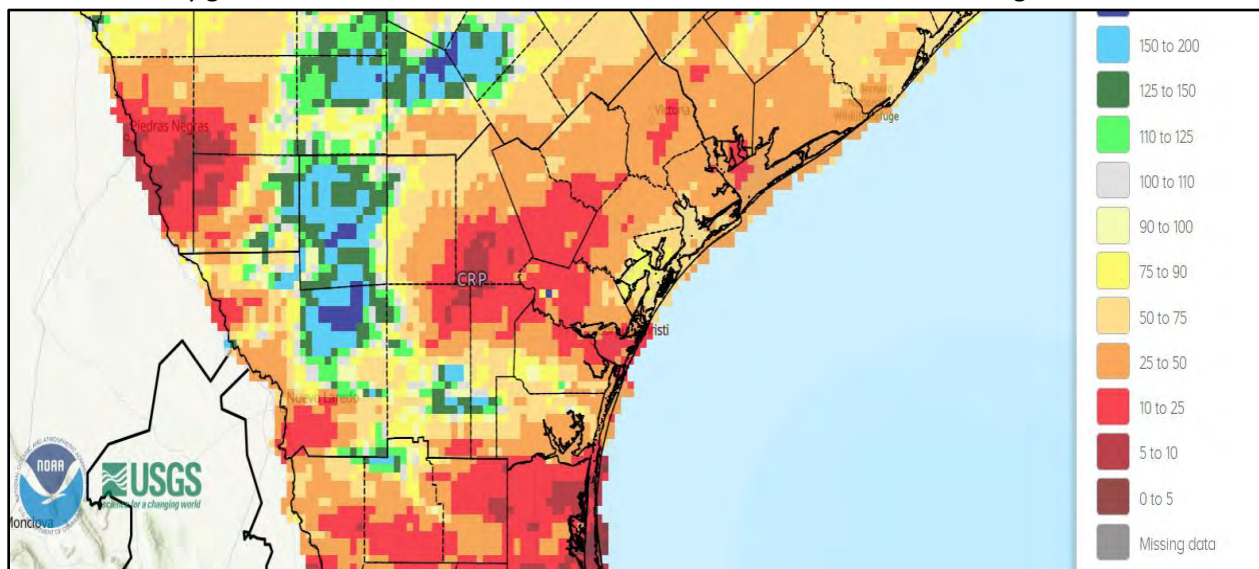


Figure 5: Percent of Normal Rainfall for April 2024

Corpus Christi Regional Summary (continued)

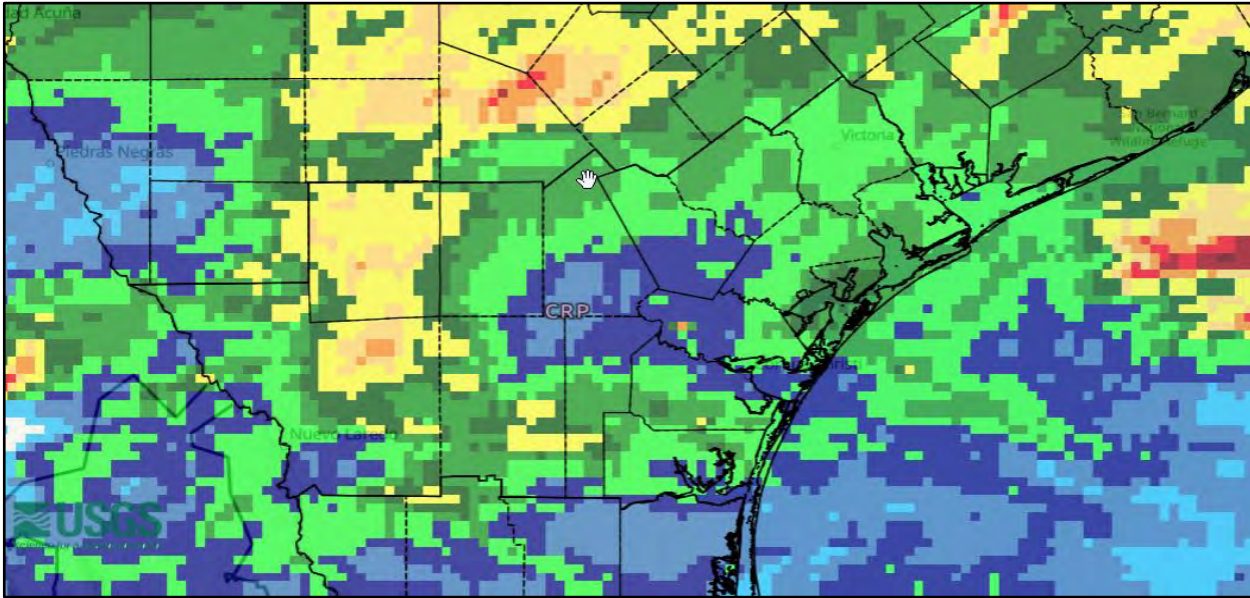


Figure 6: Estimated Observed Precipitation for April 2024

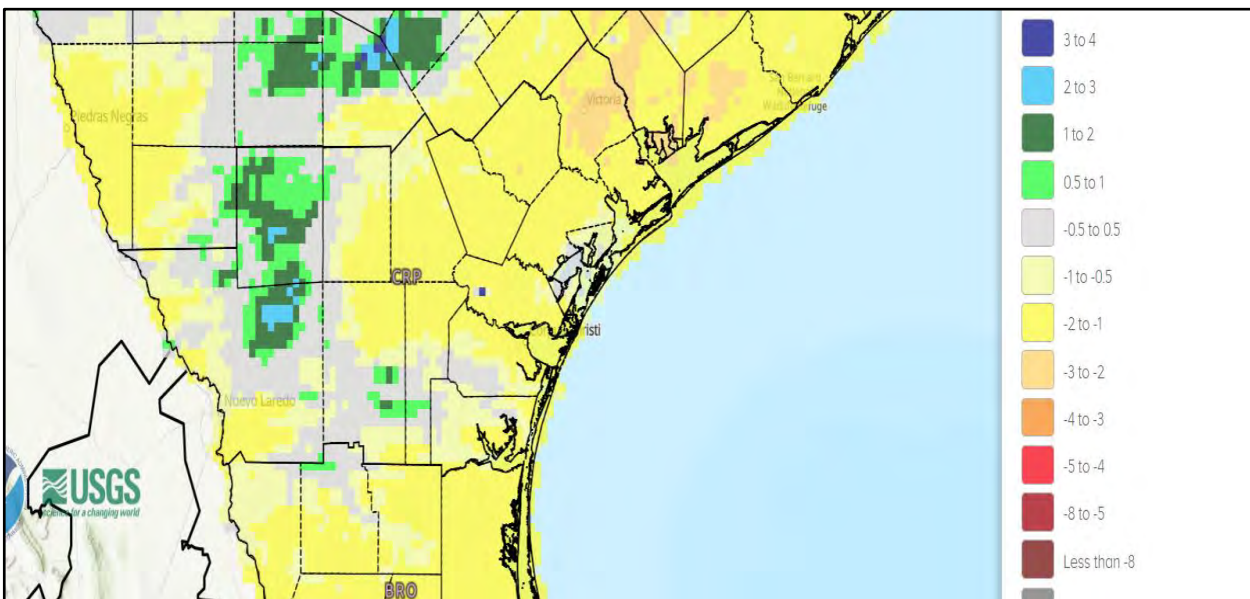


Figure 7: Departure from normal precipitation in April (in inches)

The month of May continued off where April left off, dry for most of the region. The most significant amount of precipitation for May was across the Brush Country with Webb County being the big winners. As shortwaves and upper-level disturbance moved across the region, storms (some severe) developed over Mexico and moved into the South Texas region. Some observers in Webb County saw as much as three times the normal amount of precipitation (up to 300% of normal) while most saw anywhere from one and a half to two times as much as normal (figure 8). Elsewhere across South Texas, less than normal precipitation was observed with locations across the Coastal Bend only receiving 10-50% of normal precipitation, which is less than half of the normal amounts of rain for the month of May. So, what does this translate to as far as rainfall amounts? Well, most observers across Webb County and the Brush Country reported rainfall accumulations between 2.00-8.00" while observers across the Coastal Plains came in at 1.50-3.00" and the Victoria Crossroads at 1.5-4.00". Rainfall observations across the Coastal Bend were the worst with reports of only 0.50-2.00". Looking at the departures from normal for May (figure 10), you can see that the Brush Country got 1-8" above normal rainfall whereas most of the rest of the area got 2.00-4.00" less than normal.

Corpus Christi Regional Summary (continued)

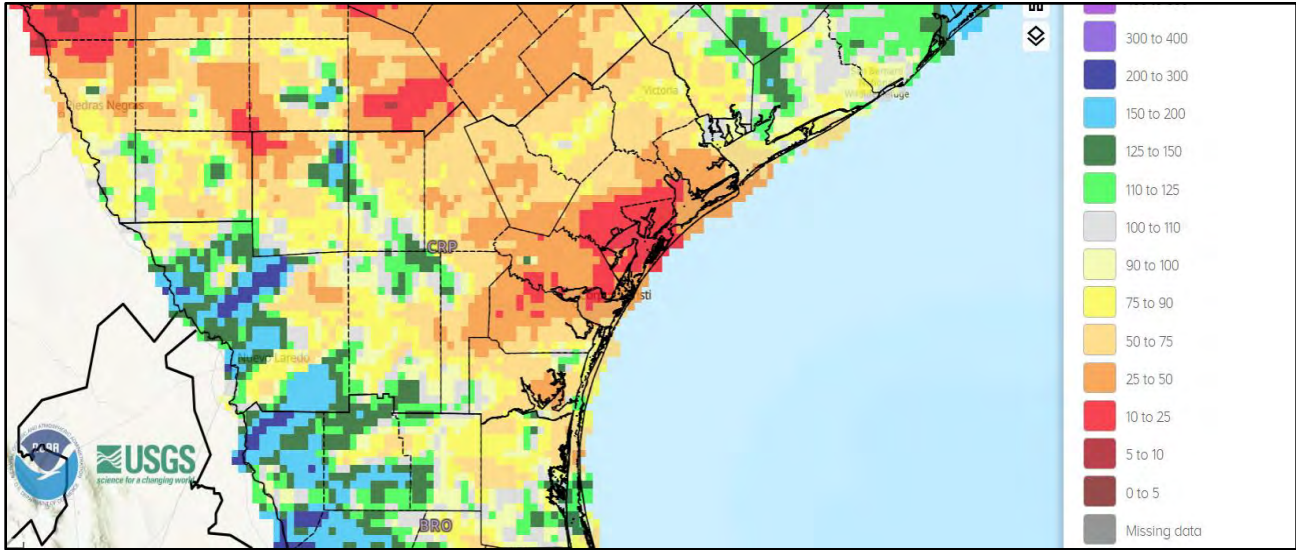


Figure 8: Percent of Normal Rainfall for May 2024

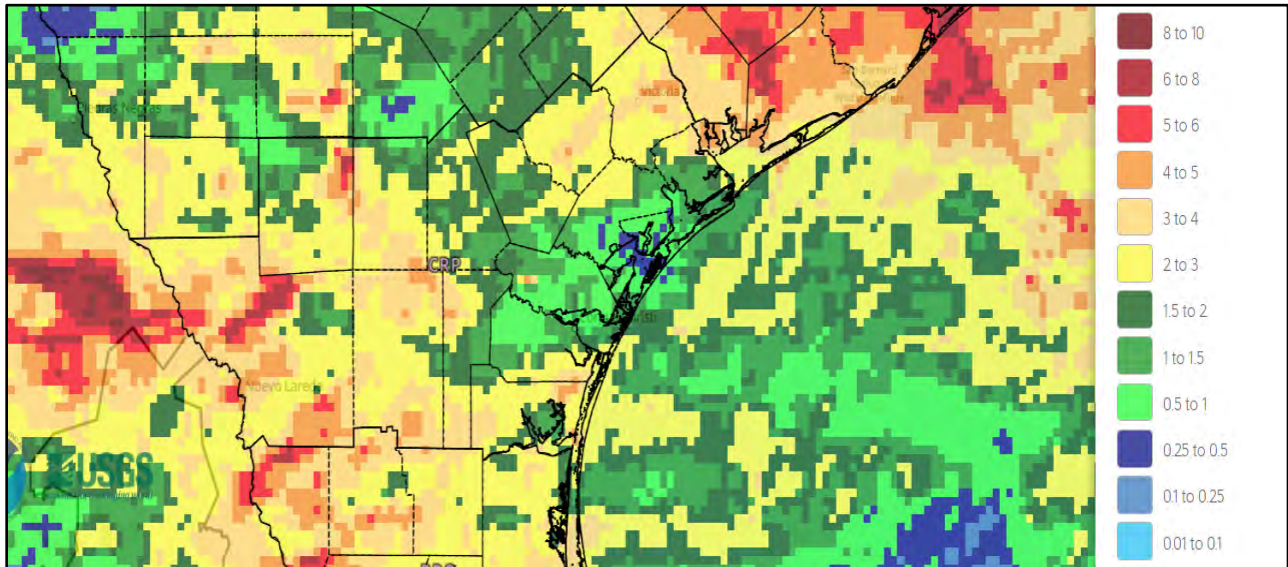


Figure 9: Estimated Observed Precipitation for May 2024

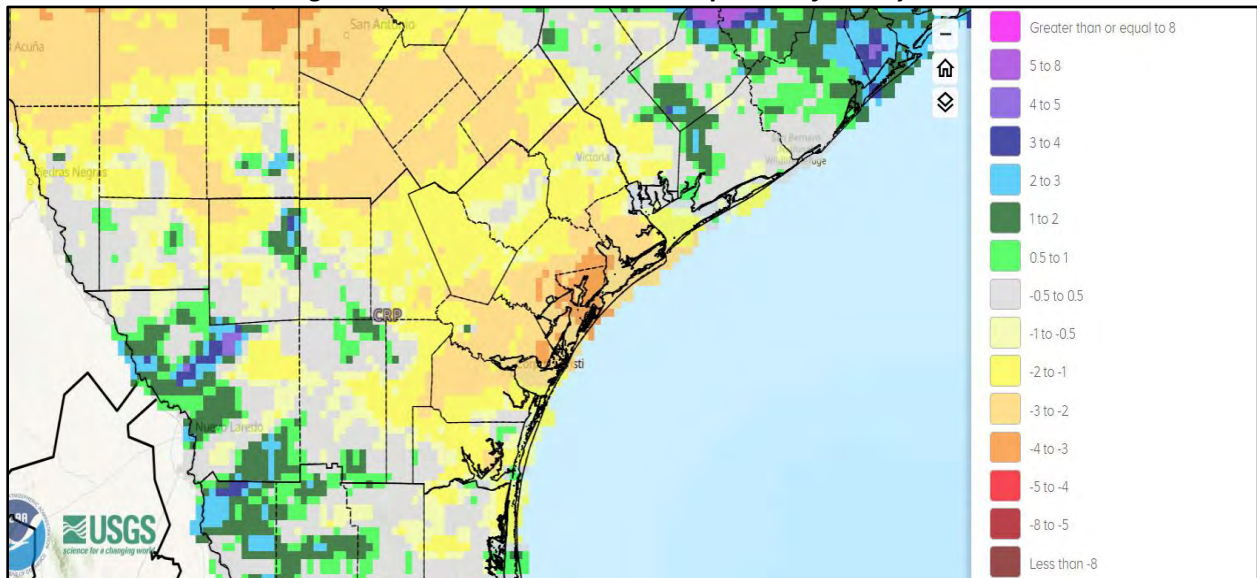


Figure 10: Departure from normal precipitation for May (in inches)

Austin/San Antonio Regional Summary

Long Term Drought Removed from northern Hill Country, while Drought persists for I-35 and points westward.

By: Mack Morris, Meteorologist, NWS San Angelo/Abilene

The spring months brought varied weather to the region, with mainly the eastern half of the region and portions of the Hill Country experiencing significant improvement from long term drought conditions. In fact, Williamson, Travis, Burnet, Llano, Blanco, Hays, and Comal County all saw either 2 or 3 class improvements, with drought removed entirely for Llano, Burnet, Travis, and Williamson Counties. Unfortunately, the same could not be said for the Southern Edwards Plateau and much of the Rio Grande Plains, as beneficial rains mostly missed these areas. Del Rio ended up seeing one of the driest springs on record with only .31" of rain for March, April, and May.

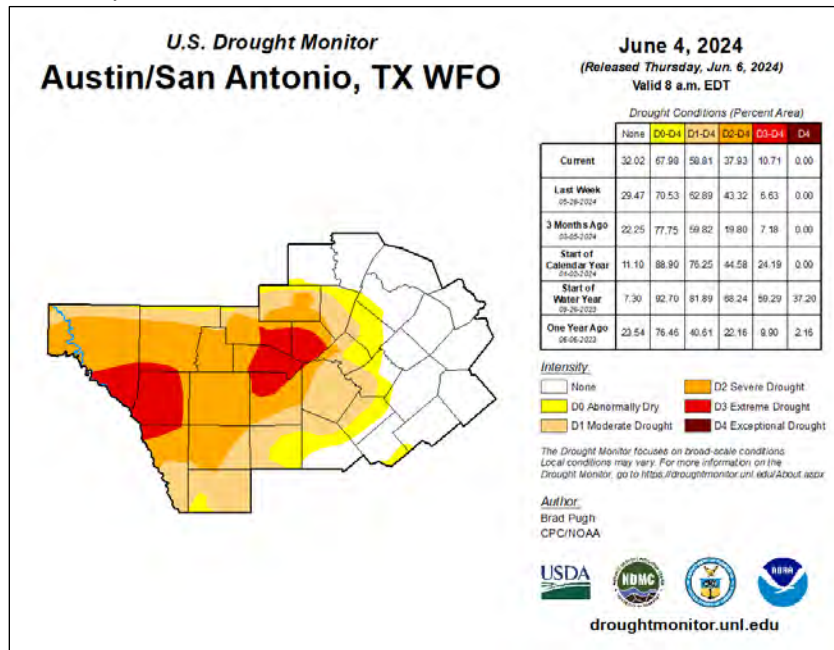


Figure 1: U.S. Drought Monitor valid 7am June 4th

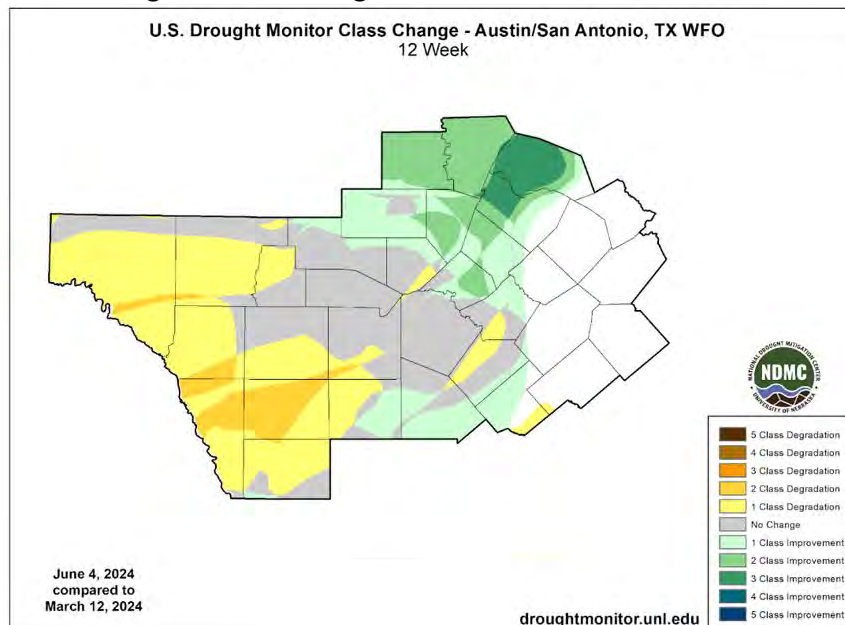


Figure 2: U.S. Drought Monitor 12 week change map valid 7am June 4th

Austin/San Antonio Regional Summary (continued)

Several beneficial rainfall events occurred through mid-March, with March 17th and March 21st being the biggest breadwinners. On the 17th, both Austin sites picked up .74", while San Antonio picked up .44". Many CoCoRaHS sites picked up significant rainfall on the 17th, with sites in NW Bexar, southern Kendall, central and eastern Comal, SW Hays, NW Caldwell, and western Bastrop County picking up between 1-3" of rainfall. CoCoRaHS sites in portions of northwest Pearsall County also picked up over 2 inches. On the 22nd, significant rainfall occurred over the Coastal Plains, primarily over Lavaca and Fayette Counties, with sites between Hallettsville and Shiner picking up 2-2.5" and Schulenburg north to La Grange picking up 1.5-2.5" of rainfall, with sites near Schulenburg and Hallettsville coming in with the biggest totals at 2.29" and 2.48" respectively. Del Rio remained dry once again with only .07" of rain for the entire month. On the 21st, both Austin sites and San Antonio picked up between .13" and .41" of rainfall. Additionally, some significant hail fell in Bexar County in Leon Valley with golf ball to tennis ball size hail reported. However, despite the rainfall, it wasn't nearly enough to put any sort of dent in our long term drought conditions over the Hill Country, Edwards Plateau, and Rio Grande Plains.

Del Rio continued to miss out on any meaningful rainfall, with only .18" of rain for the entire month of April, while the other three climate sites saw significant rainfall. Both Austin sites picked up beneficial rainfall with 2.57" at Bergstrom, and 3.48" at Camp Mabry and San Antonio ended up with a solid 3.07".

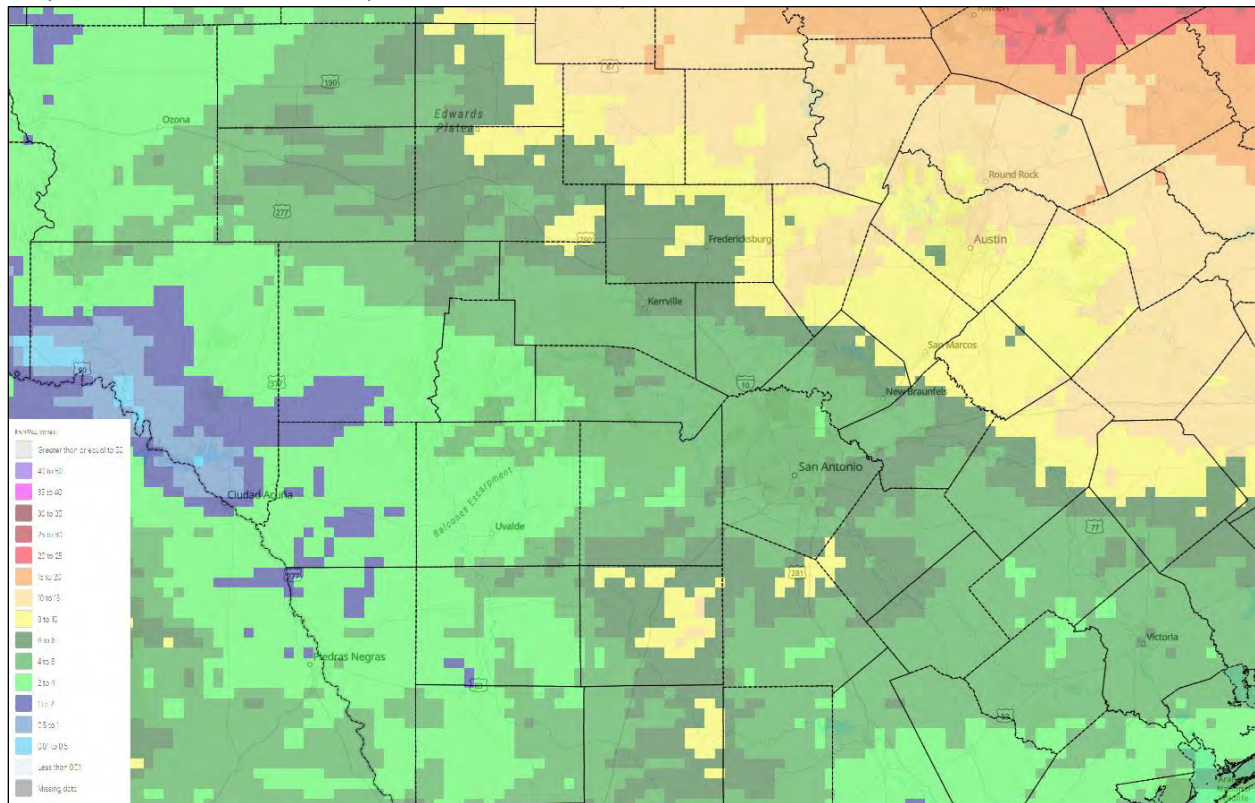


Figure 3: Observed Precipitation March-May 2024

Hail was observed at San Antonio on the 1st, with ½" hail observed between 10:29 and 10:36 PM on the airfield. Large hail up to Quarter size was reported in Fredericksburg in Gillespie County. This storm moved east and additional large hail was reported by CoCoRaHS sites near Johnson City seeing hail between dime and golf ball size. Gusty winds also did some damage in and around the area of Johnson City in Kendall County. Rainfall totals ranged from .4" to .8" at sites in eastern Kerr, southern Gillespie, and central Blanco County.

The next big hail event occurred on April 9th when hail occurred at both Austin Bergstrom and Austin Camp Mabry, with ¼" hail at each airfield. Significant hail reports are noted over Burnet, Travis, and Bastrop Counties with up to grapefruit size hail (4"+) falling near Briggs and NE of Lake Buchanan. Many CoCoRaHS sites in southern Burnet did not report the hail, however, locations in northern Burnet to the SW of Lampasas reported hail between quarter and apple size (3"). As the storms moved east later in the evening on the 9th, hail moved through some Travis County sites, with reports between Quarter and tennis ball size hail. Last, but not least, a CoCoRaHS site near Bastrop reported hail up to ping pong ball size as the storm moved through, completely covering the ground. Rainfall was rather significant as well at three of our climate sites. Austin Camp Mabry recorded 1.54".

Austin/San Antonio Regional Summary (continued)

Austin Bergstrom missed some of the heaviest rain that fell over downtown and north Travis County, but still received 0.51", and San Antonio came in with 1.29". Some of the notable rainfall totals came out of areas within the Hill Country, Coastal Plains, and Travis and Williamson Counties, with amounts of 4", 4.14", 4.17", 4.75", and 4.95". Rainfall amounts across Burnet, Williamson, and Travis County ranged from 1-4", with highly beneficial rain falling. Bexar, Guadalupe, and portions of Gonzales and Fayette Counties also saw from 1-3" of rainfall via the CoCoRaHS network. In fact, just outside of the Austin/San Antonio NWS CWA in Bell County, numerous CoCoRaHS reports of between 4-7" were reported.

Significant rainfall occurred on the night of April 20th through the morning of the 21st along with some hail over the northern San Antonio metro. First, the rain was most significant over Bastrop, southwestern Lee, and much of Fayette Counties. In particular, a CoCoRaHS SSW of Giddings reported a whopping 5.09" of rainfall, while sites in and around Smithville reported between 3.25" and 3.82". Fayette County also saw significant rainfall, from 1-3" falling.

Yet another heavy rain event occurred on the 28th of April over portions of the region, particularly Williamson and northern Travis County as well as western Wilson and northern Atascosa Counties. The big winner was in northern Atascosa County with 4.28" of rainfall. Some other locations in Williamson picked up between 2 and 4 inches of rainfall with amounts of 1.84", 2.26", 2.77", 2.79", 3.19", and 3.43".

Significant rainfall got the month of May started off, with heavy rainfall the afternoon and evening of the 1st, particularly over Blanco County, Travis, and Williamson Counties. A Flood Watch was in place at the time as a vigorous upper level storm system approached from the west. Blanco County had a location in the LCRA network receiving 4.01" of rainfall in 1 hour 5 miles NNE of Blanco in the Lake Travis Watershed. Additional significant amounts that did not show up via CoCoRaHS were noted across Llano, Gillespie, Burnet, Blanco, Travis, Bastrop, and Fayette Counties with widespread totals ranging from 1-3" for May 1st. As far as CoCoRaHS reports go, we had some big winners nonetheless and some flooding developed as a result of the intense rainfall rates. CoCoRaHS in Blanco County picked up several inches, with some spots seeing between 2.95" of rainfall and 3.10". Locations from north Austin through Georgetown, Pflugerville, and Round Rock received between 1.5" and 2.5" via the CoCoRaHS network, with values of from 1.65" to 2.65".

On May 4th, yet another heavy rain event occurred over Burnet, Williamson, Travis, Bastrop, and Fayette Counties. Some of the bigger winners were near Horseshoe Bay with 1.80" of rain, a CoCoRaHS north of Hutton with 2.85" of rainfall, north Austin CoCoRaHS with 1.71", CoCoRaHS near Bastrop with 2.09", and 2.00" of rainfall from a CoCoRaHS near La Grange. Minor flooding was noted over Williamson County and portions of the Austin metro, but rain rates weren't quite as intense as the May 1st event.

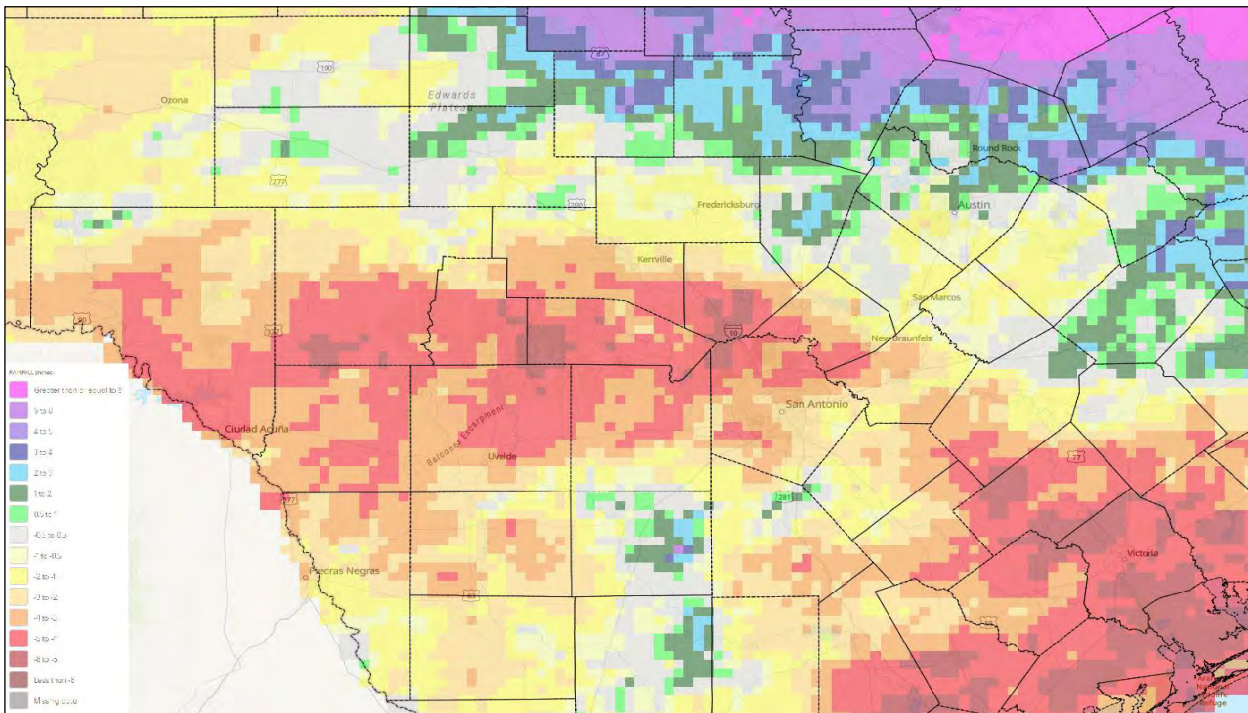


Figure 4: Departure from normal precipitation March-May 2024

Austin/San Antonio Regional Summary (continued)

On May 9th, a significant hailstorm moved from the Hill Country, all the way through the I-35 Corridor and the city of San Marcos. A hailstone fell in Johnson City that measured 6.15" in diameter, coming in as the 2nd largest hailstone in state history behind the 2021 Hondo hailstone which measured 6.4". Sifting through some CoCoRaHS hail reports, we find some rather significant numbers. A few miles north of Johnson City had golf ball size hail, an observer west of Dripping Springs had golf ball to baseball size hail and another observer northwest of Dripping Springs had apple size hail (3"), an observer near Wimberley had tennis ball size hail, and several sites in and around the San Marcos area reported large hail and wind damage with several large trees falling, including a large Chinese Elm that fell on the roof of one CoCoRaHS observer in San Marcos. In addition to those reports, some of the SPC reports received showed giant hail moved through like mentioned above, with reports of softball to DVD size hail in Blanco County, tennis ball to baseball size hail in Hays County near Wimberley, as well as golf ball to baseball size hail in the city of San Marcos. With regard to the rainfall, a swath of 1-2" fell over southern and southwestern Hays County.



Figure 5: A 6.15" Hailstone measured in Johnson City via @MR5JK on X.com

Austin/San Antonio Regional Summary (continued)

On May 13th, a quick round of storms moved through the southern half of the Austin/San Antonio NWS CWA, with portions of Pearsall, Atascosa, Bexar, and Wilson County picking up a solid 1-2.5" of rainfall. CoCoRaHS observers had good totals, with the higher amounts ranging from 1.68" to 2.66".

May 16th was yet another heavy rain event as storms developed north of the region by late morning/early afternoon and transition southward slowly, resulting in heavy rainfall and some significant winds as storms move south and east through the I-35 Corridor and into the Coastal Plains. This round of storms eventually went on to produce the Derecho wind event over Harris County and downtown Houston. We'll detail some of the higher rainfall amounts first, then talk about some of the wind damage that moved through the I-35 Corridor and Coastal Plains. A broad swath of 1-3" of rain was observed from Llano and Burnet, through northern Blanco, Williamson and Travis, eastward through Lee and Bastrop, and finally Fayette Counties. The highest total from each county listed here: In Llano County, an observer west of Bluffton picked up 2.26", in Burnet County, an observer southwest of Bertram picked up 2.40", in Blanco County, an observer south of Spicewood picked up 1.30", in Williamson County, an observer north of Liberty Hill picked up 3.10", in Travis County, an observer near Leander picked up 2.41", in Lee County, an observer near Lexington picked up 2.31", in Bastrop County, an observer west of McDade picked up 2.62", and in Fayette County, an observer just west of Round Top picked up a quick 1.50." As far as storm damage goes, several sites reported wind damage, including in Fayette County near La Grange, with quite a bit of tree damage, an observer near Round Rock reporting a strong line of storms, with heavy rainfall for most of an hour, lots fell in the Colorado watershed. Some of the local storm reports included trees with branches of 3-6" in diameter snapping and several uprooted trees. The city of La Grange had numerous reports of wind damage in addition to power outages. There was also some damage to a barn and carport, along with a flipped RV in Round Top in Fayette County. Last but not least, some damage was reported in Bastrop, with a carport tossed and mangled and a partially removed roof in west Bastrop.

A couple weeks of early season heat were followed by a beneficial rain event on the evening of May 28th. Early in the morning on the 28th, a powerful MCS (Mesoscale Convective System) over north Texas plowed through the DFW metro, knocking out power for 100s of thousands. This complex of storms sent a strong outflow boundary through the entirety of South Central Texas late morning through the mid-afternoon hours, helping to cool things off after several days with heat indices in the 110-120 range. A dryline sharpened up out west of the area the evening of the 28th, firing storms up over the Midland/Odessa NWS CWA. These storms moved eastward and congealed into a line that moved through the Edwards Plateau and southern Hill Country, eventually working into the I-35 Corridor and Coastal Plains after midnight. Several CoCoRaHS observers within the area of greatest long term drought saw significant rainfall, including several locations in northern Edwards County to the east and north of Rocksprings, with between 1.24" to 2.75". Elsewhere, observers from Bandera, Kerr, Gillespie, northern Kendall, southern Blanco, Hays, northern Comal, Caldwell, southern Bastrop, and western Fayette picked up totals from 1" to upwards of 3".

Overall, it was a rather active spring, with several notable heavy rain events in addition to some significant severe weather episodes. Unfortunately, long term drought continues and has actually worsened over the Rio Grande Plains and the Southern Edwards Plateau. Portions of the northern Hill Country from Llano, Burnet, Williamson, and portions of Travis County have actually seen drought entirely removed or drop a full two categories. Additional rainfall opportunities may continue into the month of June, but it looks as if one of the only ways we may be able to make up for long term deficits in area aquifers and reservoirs is through a tropical connection.

Abilene/San Angelo-West Central Texas Regional Summary

Complex Weather Dynamics this Spring

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

March

Throughout the month of March, West Central Texas witnessed a climatic tug-of-war as summer temperatures vied against the persistence of spring-like conditions for dominance over the region's weather patterns. This battle led to a series of showers and thunderstorms. The onset of severe weather season was marked by the early occurrence of a tornado.

On March 15th, a short-lived tornado in McCulloch County touched down close to a house on Private Road 839. It lifted a big metal barn into the air and dropped it onto a neighbor's barn at their property boundary. After a survey team was dispatched, a rating of EF1 was assigned to the damage.

North of Interstate 20, precipitation levels exceeded typical averages, providing a welcome relief for parched lands. Conversely, areas south of the interstate experienced a more hit-or-miss as can be seen in the map below. This incongruity in precipitation distribution underscored the region's complex weather dynamics.

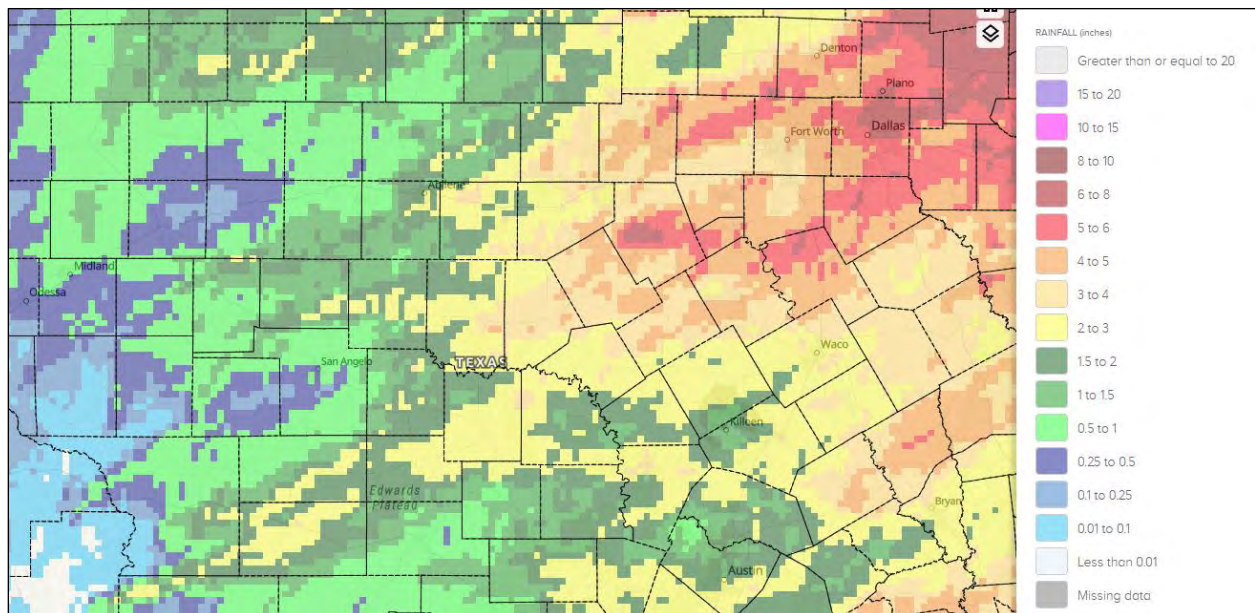


Image 1 - Observed Precipitation for the month of March

Humidity levels remained elevated across West Central Texas, a departure from the typical semi-arid conditions prevalent in the area. The palpable humidity contributed to what locals colloquially referred to as "the air you can wear," a phenomenon uncommon in this arid region.

Abilene/San Angelo-West Central Texas Regional Summary (continued)

As mentioned earlier, severe weather season arrived earlier than usual, marked by the issuance of 26 weather warnings by the month's end. Abilene recorded its 35th wettest March on record, though the rainfall, totaling nearly 2 inches, fell short of making a significant impact.

March drew to a close with temperatures trending warmer than the seasonal norm across the region, hinting at potential shifts in seasonal patterns. Despite the fluctuations and the tumultuous weather narrative, West Central Texas residents remained resilient, adapting to the highs and lows of the weather.

City	Observed Precipitation	Normal Precipitation	Departure From Normal
Abilene	1.94"	1.73"	0.21"
San Angelo	0.40"	1.48"	-1.08"
Junction	0.79"	2.02"	-1.23"

Table 1 - Comparison between observer rainfall and departure from normal for March

April

April in West Central Texas showcased a transitional interplay between spring and summer, as temperatures steadily ascended towards warmer thresholds while intermittent reminders of April's temperate nature persisted.

The month witnessed a notable milestone as San Angelo and Junction recorded their first triple-digit temperatures on the 18th, signaling the encroachment of summer heat. Meanwhile, Abilene maintained a semblance of spring-like conditions, resisting the advance of the sweltering temperatures.

Precipitation patterns mirrored those of March, with regions north of Interstate 20 receiving above-average rainfall, offering relief to drought-stricken areas. Conversely, southern areas of the interstate experienced precipitation deficits, perpetuating a trend from the previous month.

Abilene/San Angelo-West Central Texas Regional Summary (continued)

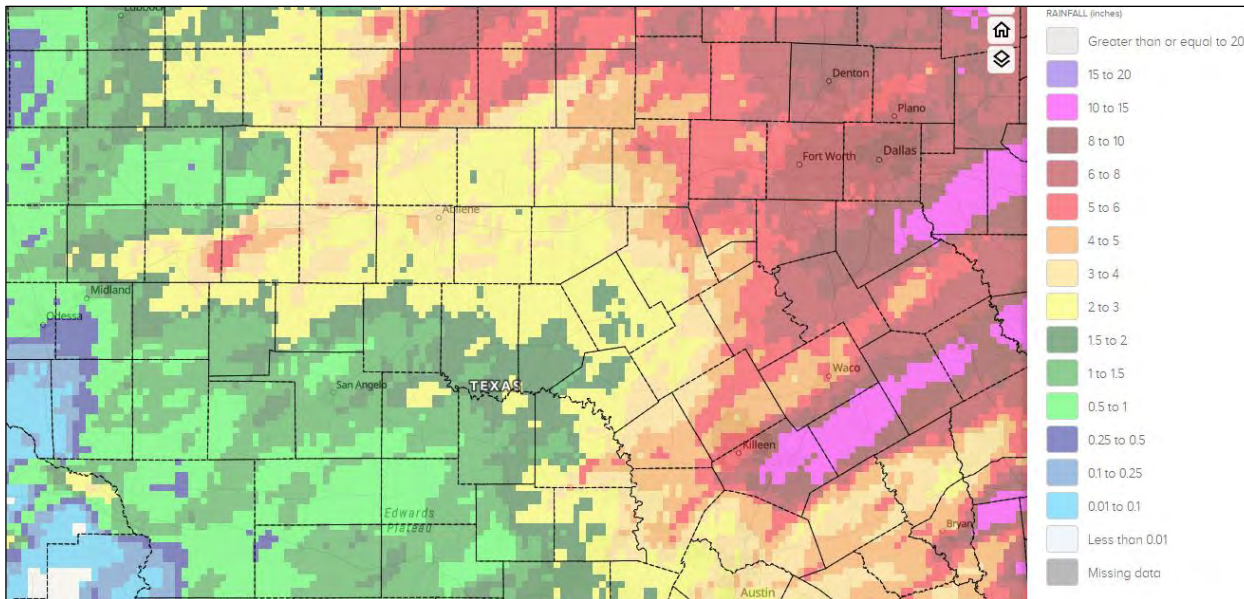


Image 2 - Observed Precipitation for the month of April

Severe weather activity intensified across the region, marked by a surge in weather warnings. A total of 85 warnings were issued, including two tornado warnings and the season's inaugural Flash Flood warning. Elevated dew points and heightened humidity levels contributed to this active severe weather pattern, amplifying the atmospheric instability.

Despite the incipient transition towards summer, April maintained a dynamic meteorological profile, characterized by a delicate balance between lingering spring elements and the encroaching warmth of summer. As West Central Texas navigated through the caprices of April's weather, residents remained vigilant, bracing for the unpredictable nature of the region's climatic tapestry.

City	Observed Precipitation	Normal Precipitation	Departure From Normal
Abilene	2.41"	1.86"	0.55"
San Angelo	1.35"	1.47"	-0.12"
Junction	0.98"	1.82"	-0.84"

Table 2 - Comparison between observer rainfall and departure from normal for April

Abilene/San Angelo-West Central Texas Regional Summary (continued)

May

May was an eventful month in terms of severe weather activity with a staggering 231 warnings issued, marking 38% increase compared to May 2023. It's clear that May lived up to its reputation as a month of intense weather phenomena.

Among these warnings, nearly 15% were tornado warnings, highlighting the prominence of these violent storms during the period. Additionally, 8% of the warnings pertained to flash floods, while the remainder focused on severe thunderstorms. The residents of West Central Texas clearly experienced a variety of weather threats during this year's severe weather season.

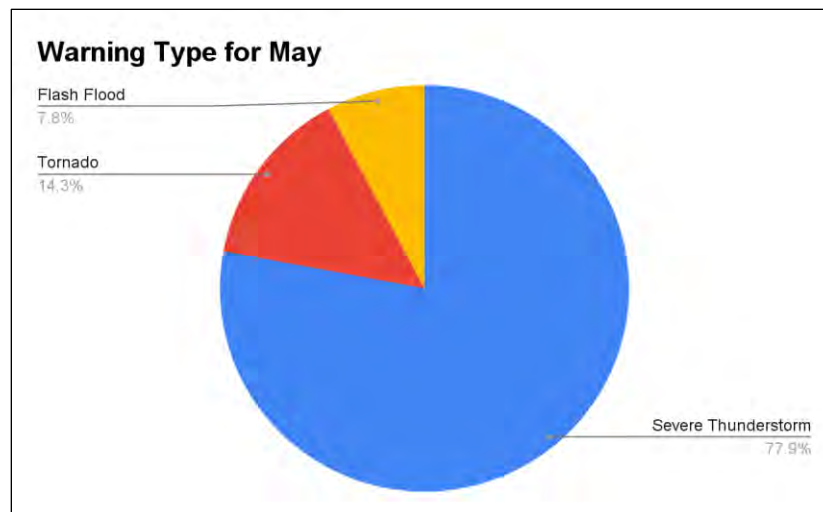


Image 3 - Pie chart showing the breakdown of warning types issued during May

The severity of tornadoes was underscored by the occurrence of 6 tornado damage surveys, with notable devastation witnessed in Hawley, TX, and 18 miles south-southwest of Sterling City, where the damage warranted an EF3 rating. These events contributed to an above-normal tally of tornadoes for the month.

Temperature-wise, May continued the trend of above-normal conditions, reinforcing the onset of warmer weather. Triple-digit temperatures became increasingly prevalent, particularly south of Interstate 20, signaling the impending arrival of summer, despite its official commencement not until the Solstice on June 20th.

Precipitation patterns also varied across the region, with San Angelo and Junction experiencing drier-than-normal conditions, while Abilene saw above-average rainfall, maintaining a balance that's indicative of the broader climatic trends. The noteworthy exception is across the Northwest Hill Country where precipitation totals were exceptionally high, some between 15" to 20" for the month (see image below).

Abilene/San Angelo-West Central Texas Regional Summary (continued)

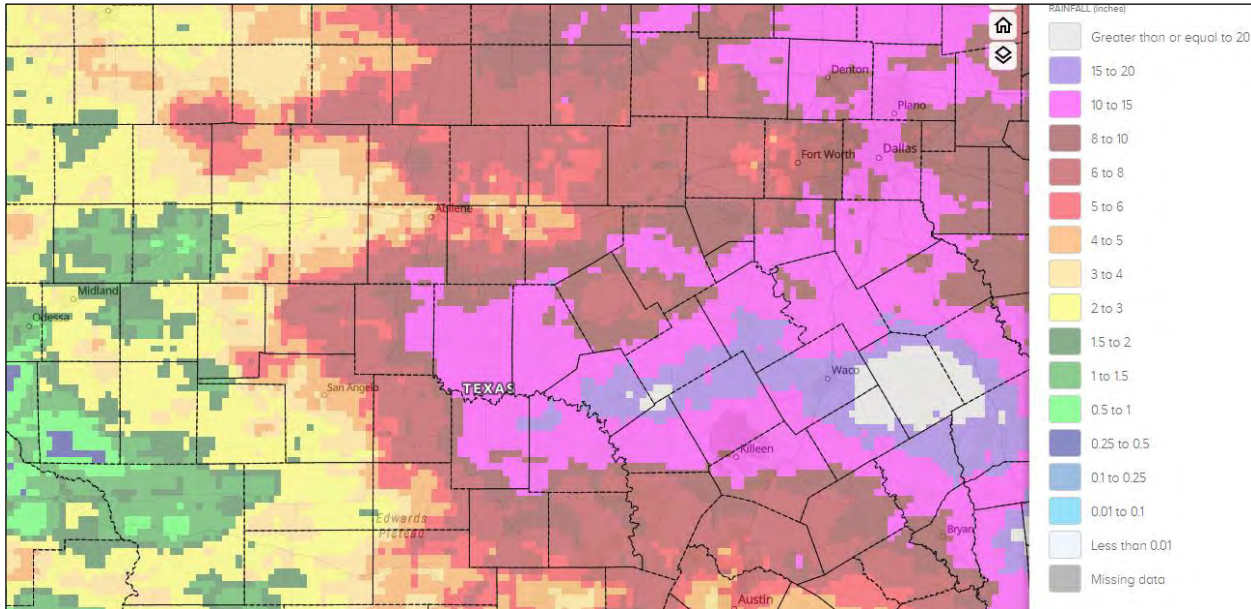


Image 1 - Observed Precipitation for the month of May

In summary, May was a month characterized by heightened meteorological activity, with an abundance of severe weather events, above-average temperatures, and mixed precipitation patterns, setting the stage for the transition into the summer season.

City	Observed Precipitation	Normal Precipitation	Departure From Normal
Abilene	5.04"	3.21"	1.83"
San Angelo	2.34"	3.05"	-0.71"
Junction	2.03"	3.16"	-1.13"

Table 3 - Comparison between observer rainfall and departure from normal for May

Abilene/San Angelo-West Central Texas Regional Summary (continued)

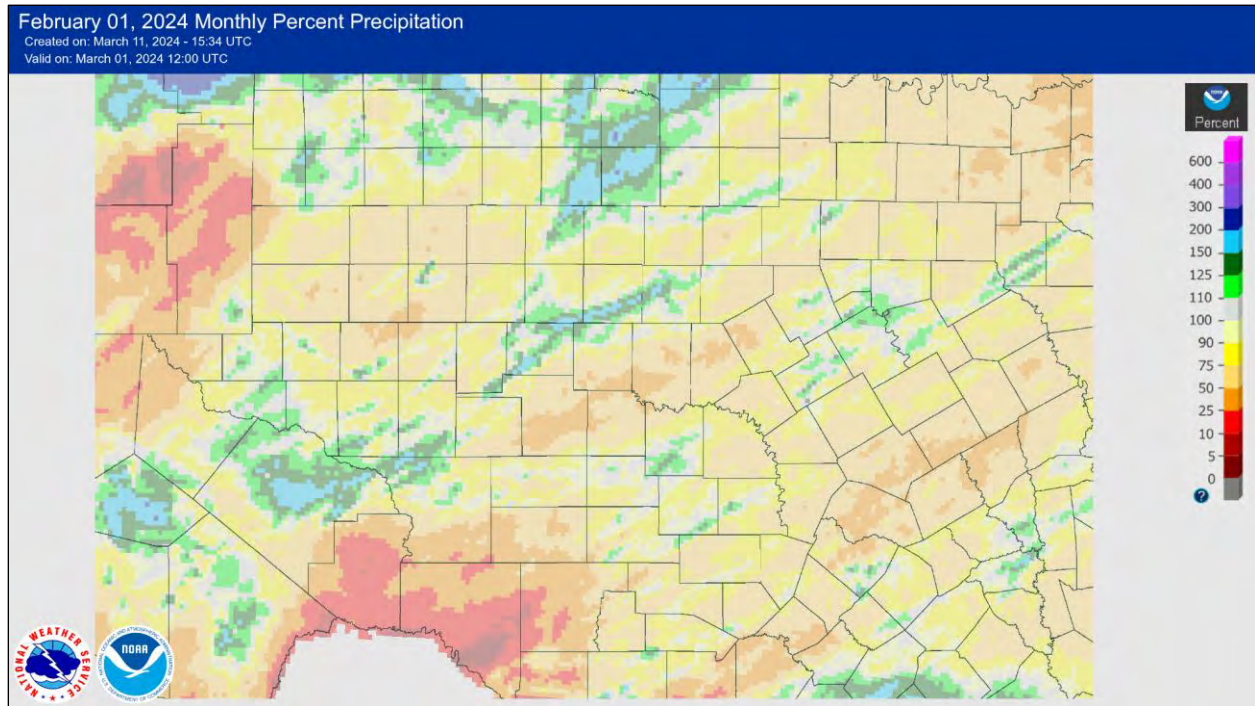


Image 3 - February Percent of Normal Precipitation

Winter made a brief return during the weekend of February 18th, as overnight low temperatures dropped below freezing, reminding residents of the season's unpredictability.

A notable deviation from the typical weather patterns occurred this February, as the average first 90-degree day, which usually arrives around the 1st of April, surprisingly occurred on February 26th, marking an early onset of warmer temperatures.

The month turned out to be a rollercoaster of temperatures, showcasing the variability that can be expected during February. As the month concluded, it was no surprise that February finished drier than normal, underscoring the unpredictable nature of this transitional winter-to-spring period.

City	Observed Precipitation	Normal Precipitation	Departure From Normal
Abilene	1.12"	1.29"	-0.17"
San Angelo	0.63"	1.20"	-0.57"
Junction	1.01"	1.12"	-0.11"

Table 3 - Precipitation statistics for February

East Texas Regional Summary

Above Normal Rainfall and Plenty of Severe Weather

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

A very active pattern resulted in above normal rainfall and plenty of severe weather for East Texas during the spring of 2024. However, the start of the spring was quiet. But, by the 5th of the month, a potent disturbance moved into region ahead of a stalled cool front. This resulted in our first bout of severe weather for the spring season, when quarter size hail was reported by the public in the Flint and Bullard areas of Southern Smith County. A couple of cool fronts brought more widespread rainfall to the region from the 7th-9th, followed by more quiet weather. By the late evening hours of the 14th, and through the early morning hours on the 15th, another cool front brought more severe weather to the area, with the public reporting golf ball size hail near the Albion community in Northern Red River County. There were also public flash flood reports in Marion and Cass Counties, where several CoCoRaHS stations in both counties reported rainfall amounts from 3.75" to 4.49". A record rainfall report from the National Weather Service of 1.47" was reported on the 15th at Texarkana, which broke the previous record of 1.35" in 1892. Although additional frontal boundaries and disturbances brought more widespread precipitation, no additional severe weather was reported during the month.

The month of April brought more severe weather and heavy rainfall to the region, with all of the National Weather Service East Texas sites reporting above normal rainfall for the month. The first bout of severe weather for the month moved into the region on the 8th with another stalled frontal boundary. Quarter size hail was reported by the public in the town of Lindale in Smith County, and in the city of Texarkana in Bowie County. Another round of severe weather hit the region on the following day, with large hail reported in the Beulah Community in Angelina County. This system also brought heavy rainfall to the region, with numerous reports of flash flooding on the 8th and 9th. Many CoCoRaHS stations in Smith, Rusk, Gregg, and Harrison counties reported rainfall totals well above 7" between the 8th and 10th of the month, with a few isolated 10" to 11" totals. More widespread heavy rainfall hit the region on the 20th, but no severe weather was reported. However, the National Weather Service reported a record rainfall of 2.12" at Longview, TX, which broke the previous record of 1.58" in 1979. Another round of severe weather moved into the region on the 26th of the month, bringing quarter size hail reports in Bowie and Titus Counties, and golf ball size hail at Lake Bob Sandlin in Camp County. Flash Flooding was also reported in Wood, Franklin, and Titus counties, where CoCoRaHS stations reported rainfall amounts between 3" to 5". Unfortunately, this wasn't the last of the severe weather for the month, as a strong line of storms move across the area, bringing damaging winds and more heavy rainfall. Several reports of flooding were reported in Nacogdoches and Angelina Counties, where several CoCoRaHS sites in those counties reported over 3" of rainfall.

East Texas Regional Summary (continued)



The active weather pattern continued into the month of May, with storm systems bringing a couple of tornadoes, and numerous reports of damaging winds and quarter size hail on several days throughout the month. Unfortunately, there was also reports of larger hail throughout the month, with golf ball size hail reported in the Bogata community in Red River County and the Burke community in Angelina County on the 9th. The 22nd produced ping pong size hail in the Leesburg community in Camp County and the Diana community in Upshur County, along with the largest hail report of the month, which was tennis ball size just east of Winnsboro in Wood County. Many of these storm systems also brought significant rainfall to the CoCoRaHS sites on many days throughout the month. However, a couple of days stand out a little more than the others. This includes the 12th, where a stalled-out boundary, and strong upper-level disturbance, brought 4" to 6" of rainfall to CoCoRaHS sites in Nacogdoches and Angelina counties in Deep East Texas. There were also many locations just north of the Interstate 20 corridor that reported 3" to 4" of rainfall on the 30th. A record rainfall report of 3.77" was reported in Longview on the 30th by the National Weather Service, breaking the previous record of 2.08" in 1950. This heavy rainfall resulted in widespread flooding reports in Gregg and Rusk counties on this day.

East Texas Regional Summary (continued)



Fig.3: May 12, 2024
Flooding on Copeland Street – Lufkin, TX
Image Courtesy Lufkin Daily News



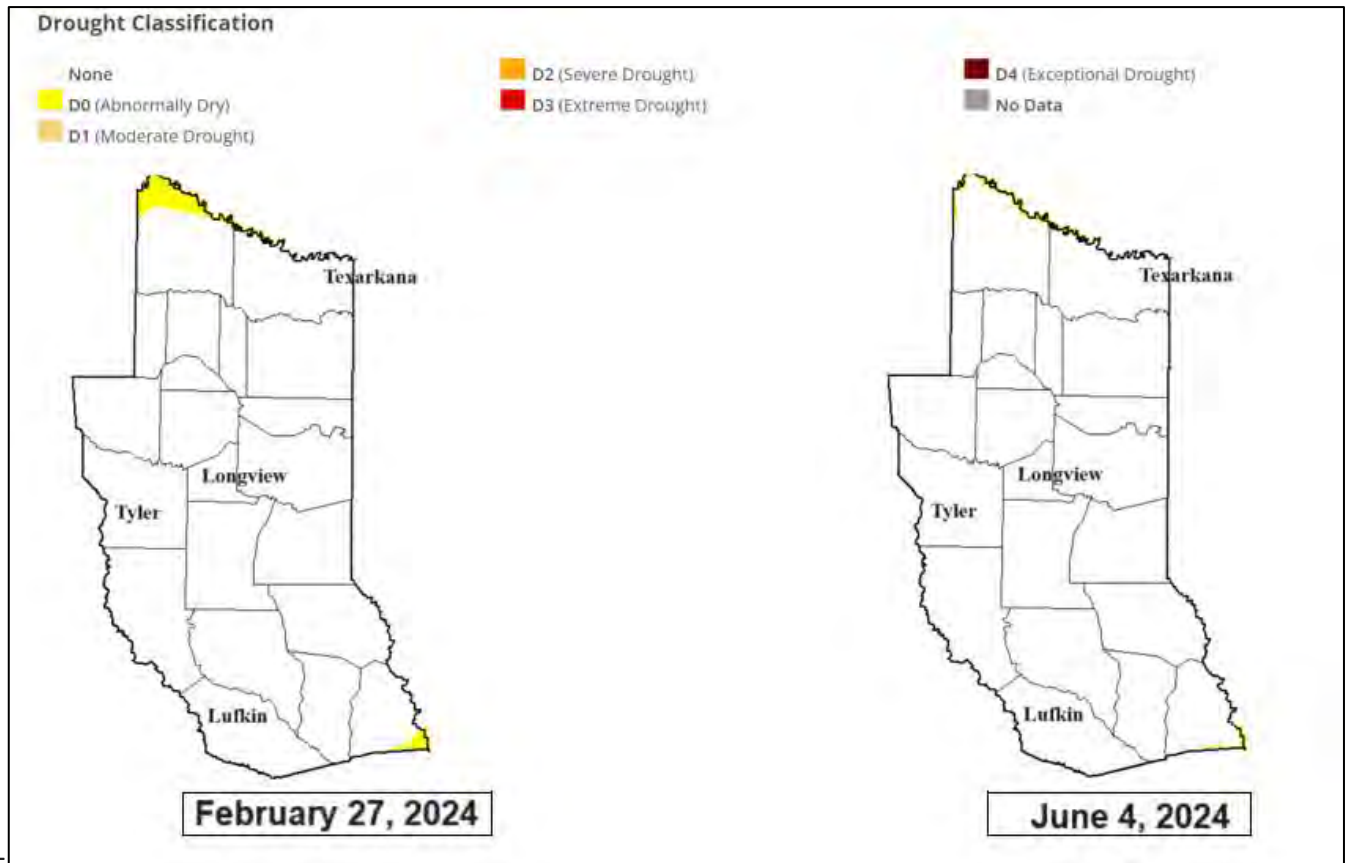
Fig.4: May 22, 2024
Tennis Ball size hail near Winnsboro, TX
Image Courtesy Randy Nelson



Fig.5: May 24, 2024
Tornado near Texarkana, TX
Image Courtesy Carson Holden

East Texas Regional Summary (continued)

In summary, an active severe weather spring resulted in a very wet season across East Texas, with many locations reporting well above normal precipitation. In fact, the National Weather Service climate stations at Lufkin and Longview reported top 10 all-time rainfalls for the spring season months (March-May). These rainfalls ended all drought across the region and will essentially put us into a rainfall surplus entering the summer months. This could be positive news, as the summer are typically the driest months for the East Texas region.



6+

**Fig.6: Drought Monitor
Comparison Map (Feb. 27, 2024 to June 4, 2024)
Image Courtesy of NDMC/USDA/NOAA**

Southeast Texas Regional Summary

Large Variation in Rainfall across Southeast Texas

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

March

Rainfall was very uniform across both sections in Southeast Texas this March, but there were a couple of days of heavy rainfall in mid-March that led to river flooding along the San Bernard River Basin as being an area with higher rainfall totals. Most areas received from 2.50" to 3.75" rainfall totals which was beneficial in keeping all of Southeast Texas out of any drought categories. See Tables 1 and 2 on page 53 for more details of CoCoRaHS observer county rainfall totals. Temperatures were above normal across all of Southeast Texas for all three months this spring. To see more details about temperatures recorded this spring go to Tables 3 and 4 on page 54 for Climatological Stations across Southeast Texas.

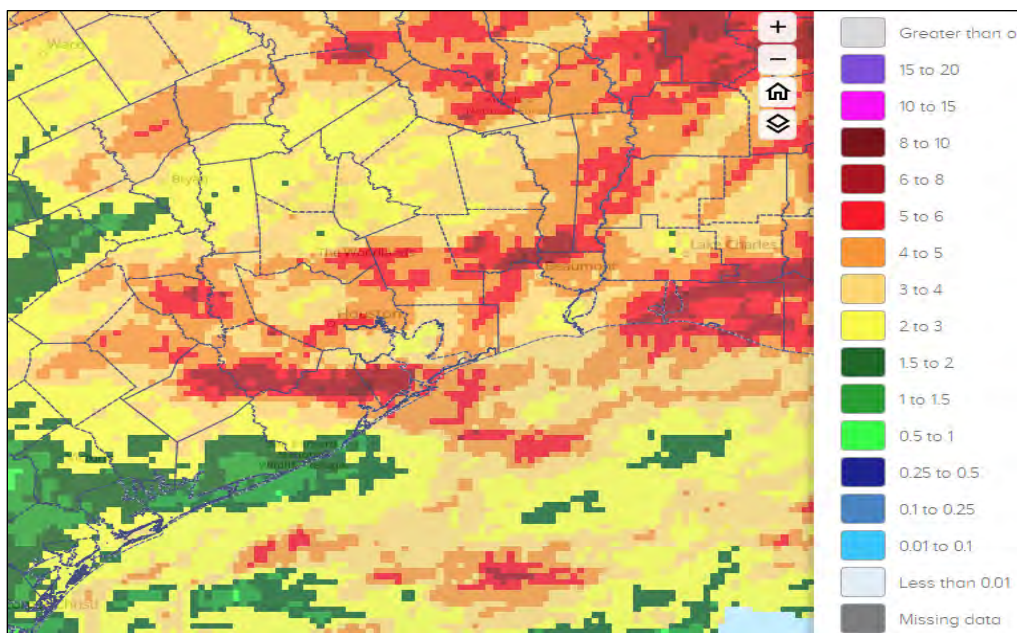


Figure 1: March Rainfall across Southeast Texas.

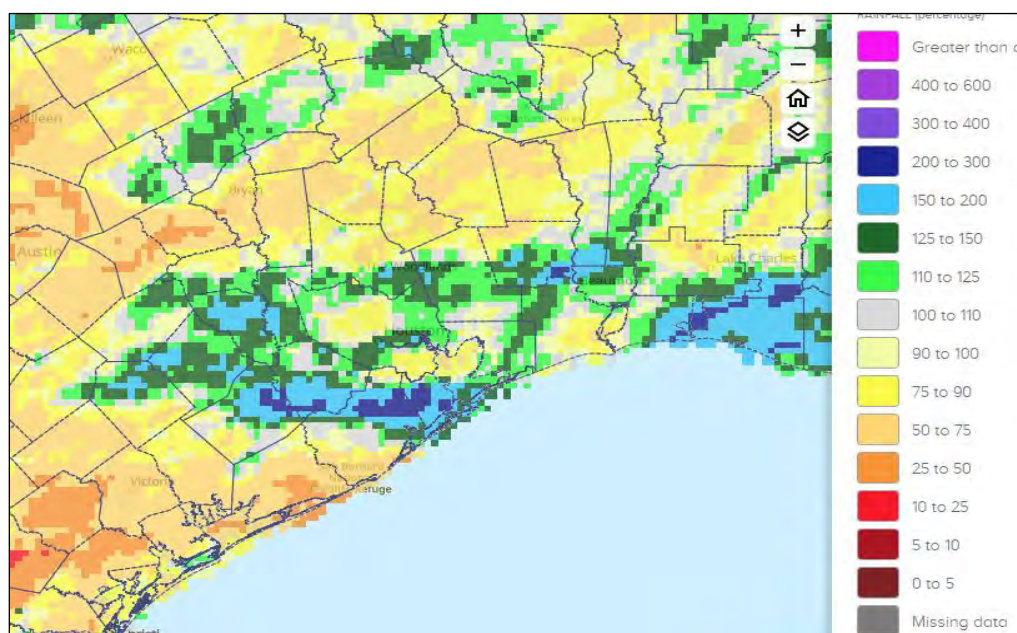


Figure 2: March Rainfall Departure from Normal across Southeast Texas.

Southeast Texas Regional Summary (continued)

April

April was highlighted by the first of multiple heavy rainfall events towards the end of the month where 10+” of rain fell across portions of Polk and San Jacinto Counties in the Houston/Galveston Section. The Golden Triangle Section had 10+” of rain in Hardin, Jasper, and Tyler Counties. Rainfall variation was the theme this spring across Southeast Texas. Southwestern counties didn’t get much rain in locations around Matagorda Bay. Jackson, Matagorda, and Wharton Counties didn’t get over 2.00” for the month of April. Northeastern counties had extreme amounts of rainfall. See Table 1 and 2 on page 53 for detailed county rainfall totals by CoCoRaHS observers.

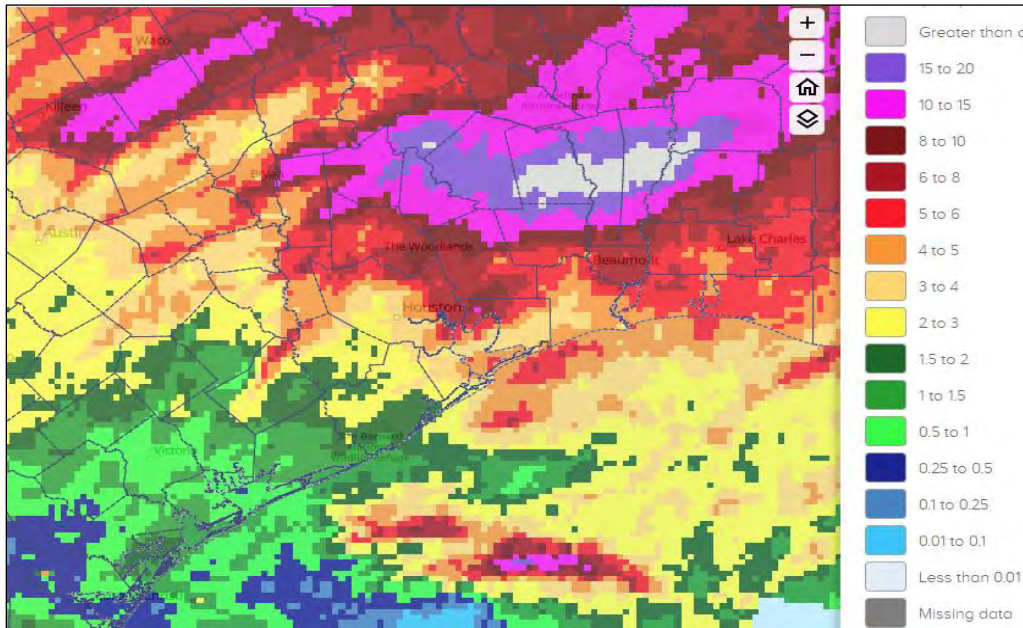


Figure 3: April Rainfall across Southeast Texas.

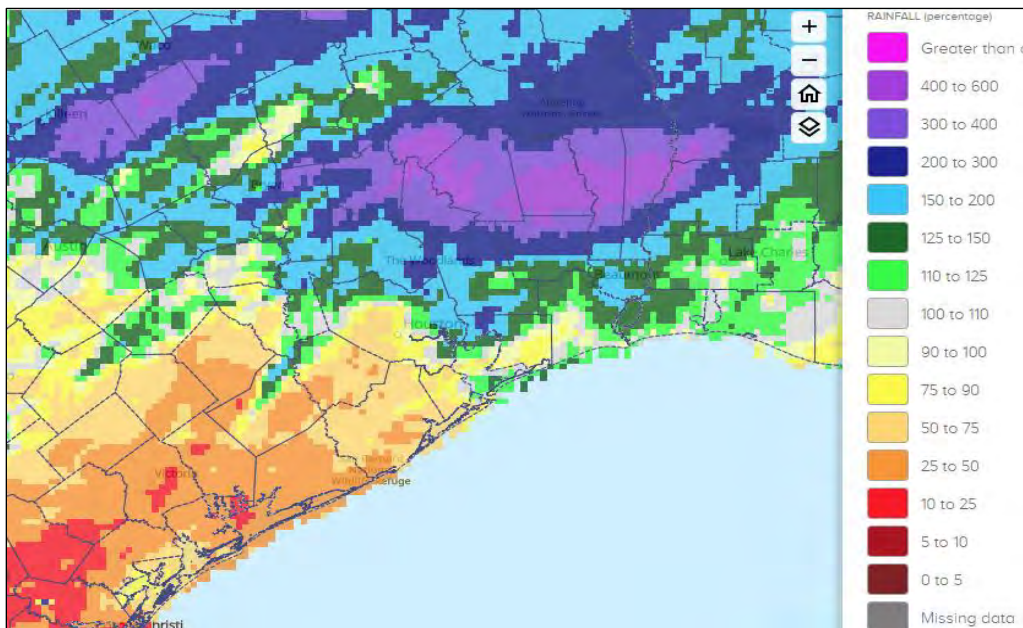


Figure 4: April Rainfall Departure from Normal across Southeast Texas.

Southeast Texas Regional Summary (continued)

May

May being wet is typical, but multiple heavy rainfall events over portions of the Brazos Valley and the Piney Woods had rainfall totals being extreme. Monthly rainfall totals exceeded 15" for portions of Polk, San Jacinto, and Montgomery Counties. Continual storm systems with excessive rainfall led to widespread river flooding of moderate to major levels especially along the Trinity, San Jacinto, and portions of the Brazos River. Also counties in the Golden Triangle over 15" plus included Hardin, Jasper, and Tyler Counties with flooding along the Sabine River. Figure 5 and 6 show the path in the upper levels storm systems kept taking over the northern and northeastern counties in Southeast Texas with the extreme rainfall amounts in purple and white. See pictures on page 55 from flooding in Liberty and Montgomery Counties.

There are 247 active observers in the Houston/Galveston section and 52 active observers in the Golden Triangle section. Data from 195 observers in the Houston/Galveston section and data from 41 observers in the Golden Triangle section was used in calculations for this season. Thanks to all observers for taking your time to read your gauge every day and send in your data to the CoCoRaHS website. See page 56 for coverage of the May 16, 2024 Houston Derecho.

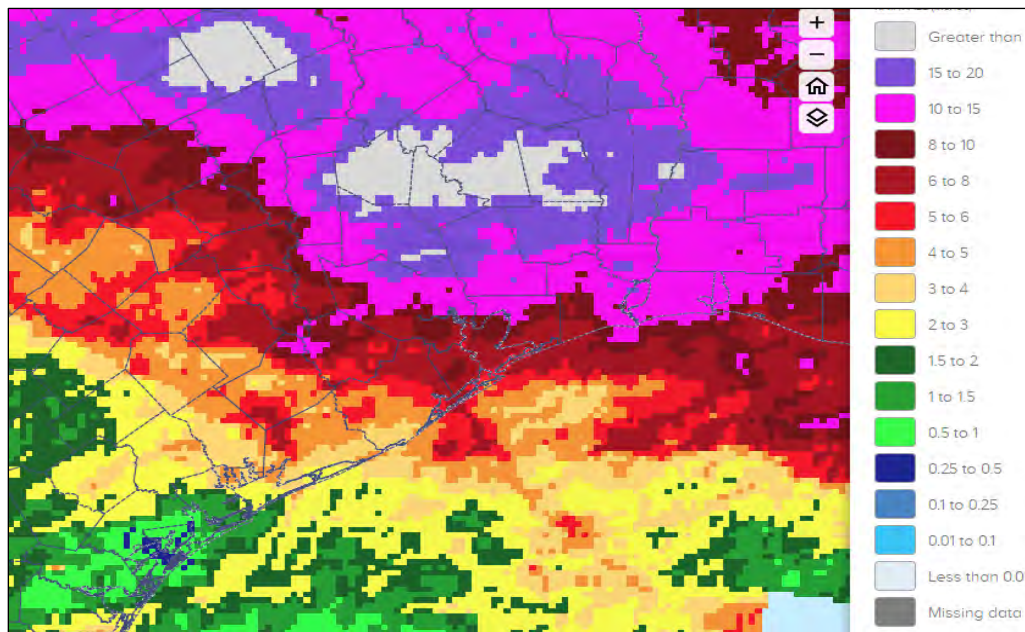


Figure 5: May Rainfall across Southeast Texas.



Figure 6: May Rainfall Departure from Normal across Southeast Texas

Southeast Texas Regional Summary (continued)

Spring 2024 CoCoRaHS SE Texas Houston/Galveston Section Rainfall
CoCoRaHS Station measured county rainfall averages in inches per month

County	March	April	May	Spring Total
	AVG.	AVG.	AVG.	Mar. - May.
Austin	4.49	3.68	5.29	13.46
Brazoria	5.19	2.25	5.59	13.03
Chambers	2.98	7.14	11.28	21.40
Colorado	3.71	2.14	5.58	11.43
Fort Bend	3.90	2.34	7.70	13.94
Galveston	4.49	3.53	6.52	14.54
Harris	3.50	4.05	9.17	16.72
Jackson	2.64	1.01	4.52	8.17
Liberty	4.34	8.31	18.55	31.20
Matagorda	2.01	1.25	6.31	9.57
Montgomery	3.27	6.46	16.26	25.99
Polk	2.73	15.43	11.43	29.59
San Jacinto	2.95	14.56	22.65	40.16
Wharton	3.48	1.95	2.86	8.29
Region Totals	3.55	5.29	9.55	18.39



 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 spring 2024.

Spring 2024 CoCoRaHS SE Texas Golden Triangle Section Rainfall
CoCoRaHS Station measured county rainfall averages in inches per month

County	March	April	May	Spring Total
	AVG.	AVG.	AVG.	Mar. - May
Hardin	4.73	12.49	16.05	33.27
Jasper	4.32	17.69	16.26	38.27
Jefferson	4.74	5.98	13.47	24.19
Newton	NA	NA	NA	NA
Orange	4.91	6.41	14.12	25.44
Tyler	3.34	19.61	20.48	43.43
Region Totals	4.41	12.44	16.08	32.92



 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 spring 2024.

Southeast Texas Regional Summary (continued)

Houston/Galveston Temperature & Rainfall Data for 2024 Spring Season

March Climate							
Site Location (record start)	Hi	Lo	Mean	Departure	Rain	Normal	Departure
Bush Airport (1888)	76.1	57.1	66.6	2.8	2.20	3.47	-1.27
Hobby Airport (1930)	76.5	59.2	67.9	3.2	2.63	3.28	-0.65
Galveston (1871)	72.2	61.4	66.8	1.6	4.40	3.02	1.38
Sugar Land (2000)	76.7	57.5	67.1	2.4	2.59	3.49	-0.90
April Climate							
Site Location (record start)	Hi	Lo	Mean	Departure	Rain	Normal	Departure
Bush Airport (1888)	81.6	63.9	72.8	2.8	4.23	3.95	0.28
Hobby Airport (1930)	82.0	65.6	73.8	3.3	3.38	4.08	-0.70
Galveston (1871)	77.9	67.2	72.6	1.1	2.03	2.06	-0.03
Sugar Land (2000)	82.1	63.9	73.0	2.7	2.21	4.26	-2.20
May Climate							
Site Location (record start)	Hi	Lo	Mean	Departure	Rain	Normal	Departure
Bush Airport (1888)	87.4	71.2	79.3	1.9	11.05	5.01	6.04
Hobby Airport (1930)	88.0	73.4	80.7	3.1	9.32	5.42	3.90
Galveston (1871)	84.7	75.3	80.0	1.8	3.04	1.35	3.22
Sugar Land (2000)	88.6	72.8	80.7	2.8	8.59	5.24	3.35

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

Golden Triangle Temperature & Rainfall Data for 2024 Spring Season

March Climate							
Site Location	Hi	Lo	Mean	Departure	Rain	Normal	Departure
Beaumont Port Arthur	75.2	55.8	65.5	2.2	3.87	4.11	-0.24
Beaumont Research Center	73.1	54.7	63.9	1.5	5.21	3.89	1.32
Orange 9N	73.2	52.7	63.0	2.7	3.91	3.52	0.39
April Climate							
Site Location	Hi	Lo	Mean	Departure	Rain	Normal	Departure
Beaumont Port Arthur	80.1	62.4	71.3	2.0	6.56	3.92	2.64
Beaumont Research Center	79.3	62.7	71.0	2.4	6.24	3.65	2.59
Orange 9N	78.7	60.7	69.7	3.7	5.96	4.18	1.78
May Climate							
Site Location	Hi	Lo	Mean	Departure	Rain	Normal	Departure
Beaumont Port Arthur	86.6	71.1	78.9	2.4	14.75	4.70	10.05
Beaumont Research Center	86.1	71.9	79.0	3.2	No data	5.06	No data
Orange 9N	85.0	70.4	77.7	4.2	13.13	5.14	7.99

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

Southeast Texas Regional Summary (continued)

Below are pictures from flooding in Liberty and Montgomery counties on May 3, 2024.



Pictures 1 and 2: Pictures taken at FM 2090 and County Road 360 about 0.30 miles west of the East Fork of San Jacinto River in Liberty County. The motorist had to climb on top of his vehicle to avoid being swept away (right side of picture 1 circled in red). The motorist was rescued shortly after these pictures were taken. See picture 2 on the right. The vehicle was not small but was swept off the road.



Picture 3: HCFC D gage #795 still working on FM 2090 @ San Jacinto River near County Road 360.



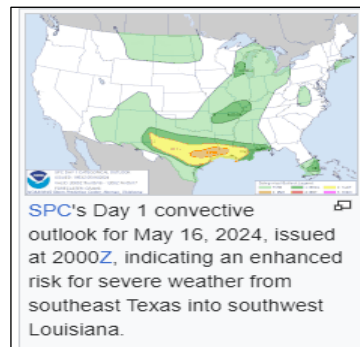
Picture 4: San Jacinto River (West Fork) near Conroe on SH 242. Large trees being swept downstream like small sticks.

Southeast Texas Regional Summary (continued)

Houston Derecho on May 16, 2024

Meteorological synopsis

On May 14, the Storm Prediction Center (SPC) outlined a level 2/Slight risk for severe weather across portions of central and northern Texas. This risk area was zonally extended westward to the Texas–New Mexico border and eastward into southern Mississippi the following day.¹ By the morning of **May 16**, a level 3/Enhanced risk was delineated across central Texas, extending southward and eastward toward the Texas and Louisiana gulf coasts during the afternoon hours. Convective activity was already ongoing by the time of these outlooks, focused along and north of an outflow boundary from Midland into northeastern Texas. The environment south of these storms was characterized by rich low-level moisture and rapidly cooling temperatures with height, contributing to mixed-layer convective available potential energy values at or above 3,000 J/kg, indicative of a very unstable environment. Farther east across southeastern Texas and southwestern Louisiana, a greater surge of moisture began to advect with a northward-moving warm front bringing dew points as high as the upper-70s °F into the coastal counties.



By mid-afternoon, an expansive mesoscale convective system evolved across much of central and eastern Texas, exhibiting numerous updrafts and an increasing potential for extensive damaging winds. As this complex surged southeastward, it evolved into a derecho—a particularly long-lived and widespread damaging wind event—as it moved into the Greater Houston metropolitan area. While the highest wind gust recorded by an anemometer reached 78 mph (126 km/h), post-storm damage surveys conducted by the local National Weather Service office estimated that winds reaching 100 mph (160 km/h) moved through portions of the downtown area. Two EF1 tornadoes accompanied this activity. See radar images below showing the progression of the derecho across Houston from the northwest.

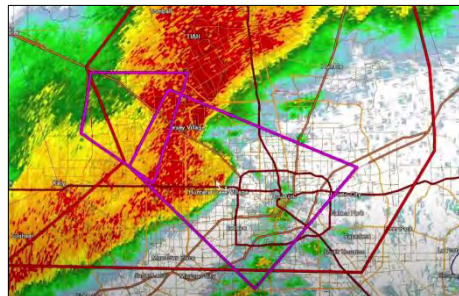


Fig 7: Radar image at 6:07pm 5/16/2024

Fig 8: Radar image at 6:17pm 5/16/2024

Fig 9: Radar image at 6:29pm 5/16/2024

Impact and Damage

As the derecho moved through the Greater Houston area, it produced wind gusts of up to 100 mph (161 km/h) in Downtown Houston. The derecho was considered the worst damaging wind event to affect Houston since Hurricane Ike in 2008. The strong winds in Downtown Houston blew out the windows of many high-rise buildings in the area, littering the streets below with broken glass. The derecho caused extensive damage to transmission lines along with widespread straight-line damage and more than a million customers lost power in the Greater Houston area and nearby counties as a result of the high winds. More than 24 hours later, almost 555,000 customers still remained without power, and by Wednesday of the following week, when repairs were initially expected to be finished, nearly 60,000 homes, businesses, and schools in the worst hit areas of the city were still without power. Seven people were confirmed to have died in Greater Houston as a result of the storm; the number of deaths was later revised to eight. The total cost of the storm along its entire path was \$1.2 billion dollars which moved well east of Texas.



Picture 5: Windows blown out of CenterPoint Energy Plaza

List of confirmed tornadoes – Thursday, May 16, 2024							
EF#	Location	County / Parish	State	Start Coord.	Time (UTC)	Path length	Max width
EF1	SSE of Pine Island	Waller	TX	29.989°N 95.9947°W	22:44–22:45	0.71 mi (1.14 km)	100 yd (91 m)
A large metal barn was destroyed, with debris tossed 1,000 yd (910 m). Trailers were rolled, and trees were downed.							
EF1	S of Cypress	Harris	TX	29.9232°N 95.7019°W	23:08–23:09	0.77 mi (1.24 km)	100 yd (91 m)
Numerous homes sustained roof damage and broken windows.							

Table 5: List of two confirmed tornadoes on May 16th, 2024.

Summer Weather Outlook

Tropical Weather to Play a Big Part in Summer Weather

By: Bob Rose, Meteorologist, Lower Colorado River Authority

Welcome to summer! The past few Texas summers have been brutal, with scorching hot temperatures and limited rain. 2023 was the second hottest summer in Texas history and 2022 was the 12th hottest. For anyone spending time outdoors in the heat, staying cool has become a whole new challenge. It's a given blazing hot temperatures will again be the rule this summer. Trying to figure out to what degree of hot is the real forecasting challenge. Besides the heat, how much rain we expect? Will Mother Nature will be as stingy with the rain as she's been in recent summers, or will she be a bit more generous this year?

This summer's degree of heat and rainfall will likely be determined by three main factors: Spring rainfall and soil moisture, the position of the summer heat dome, and possible impacts from a potentially hyperactive tropical weather season.

Spring was extremely wet across North and East Texas this year. At the same time, the rains were considerably less across the western and southern parts of the state and northern Mexico. The very wet areas should see somewhat lower temperatures this summer thanks to the very wet soils and landscape. Meanwhile, the drier than normal conditions across the western and southern half of the state argue for warmer than normal temperatures since the dry ground heats up more efficiently.

The disparity in rain and soil moisture between East and West Texas is also expected to play a role in determining the position of the summer heat dome, or subtropical ridge of high pressure. Sinking air under the heat dome often causes long periods of very hot temperatures and dry weather. Areas on the periphery of the heat dome tend to have temperatures that aren't quite as hot. For this summer, the computer-forecast solutions indicate the center of the heat dome will become established across the drier areas of western Texas, northern Mexico, and the Desert Southwest, leaving a less intense heat dome for the eastern half of the state. With this configuration, the hottest summer temperatures can be expected across West Texas, with less hot readings across the eastern half. It also argues for periods of rain across eastern Texas, and less rain across the western half.

Finally, the combination of near-record warm waters in the Gulf of Mexico and tropical Atlantic and the development of La Nina by late summer is expected to result in an extremely active tropical weather season this summer. The National Hurricane Center is calling for 17-25 named storms. The Texas coast could be affected by potential storms. The more western position of the heat dome this summer argues for occasional periods of clouds and showers to spread inland across the southern half of the state.

Summer Weather Outlook (continued)

Considering all these factors, the National Weather Service’s Climate Forecast System version 2 forecast model solution for July, August, and September calls for near normal to slightly above normal temperatures across the eastern half of the state, and well above normal temperatures across West and Deep South Texas. Above normal rainfall is forecast across the coastal Plains, from Brownsville to Beaumont, extending inland about 100 miles. Below normal rain is forecast across far West Texas and the Panhandle region. Between these two areas, near normal rain is forecast.

Temperature

Precipitation

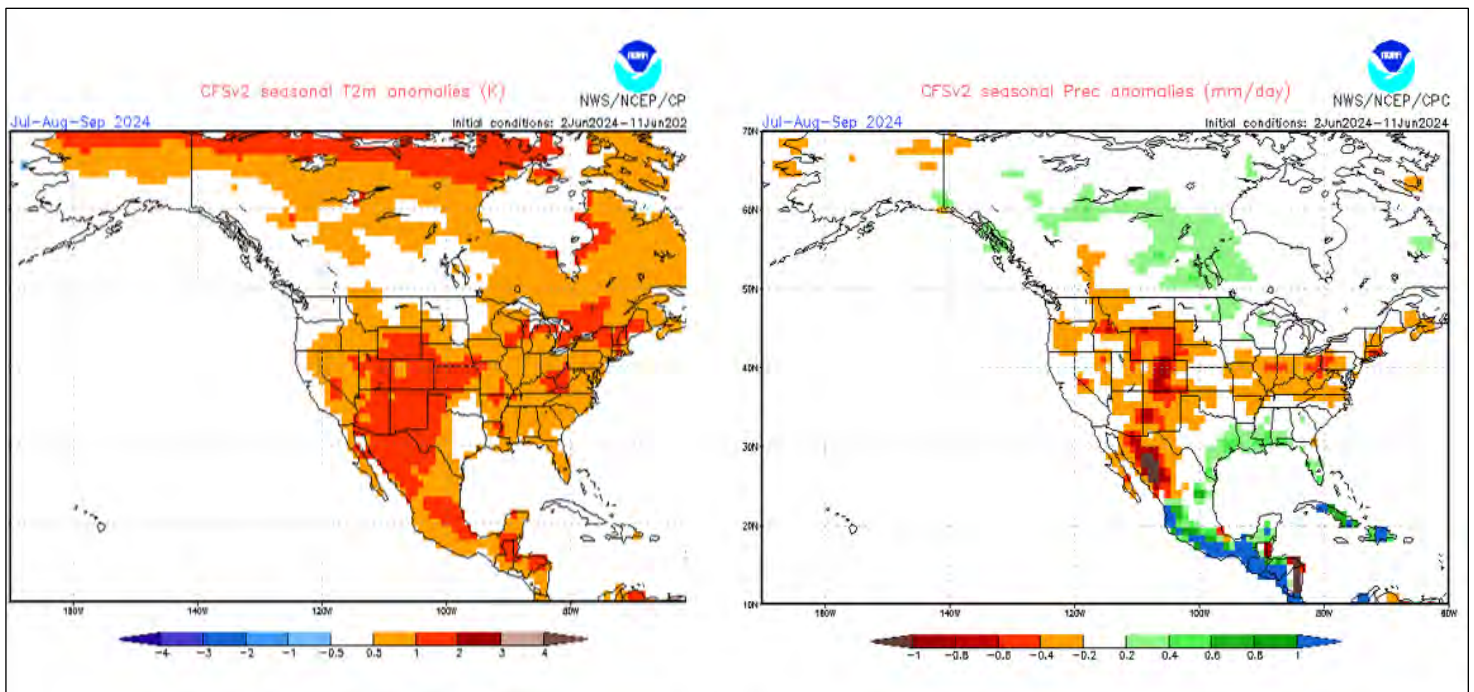


Figure 1: Climate Forecast System Version 2 Temperature and Rainfall Forecast for July/August/September

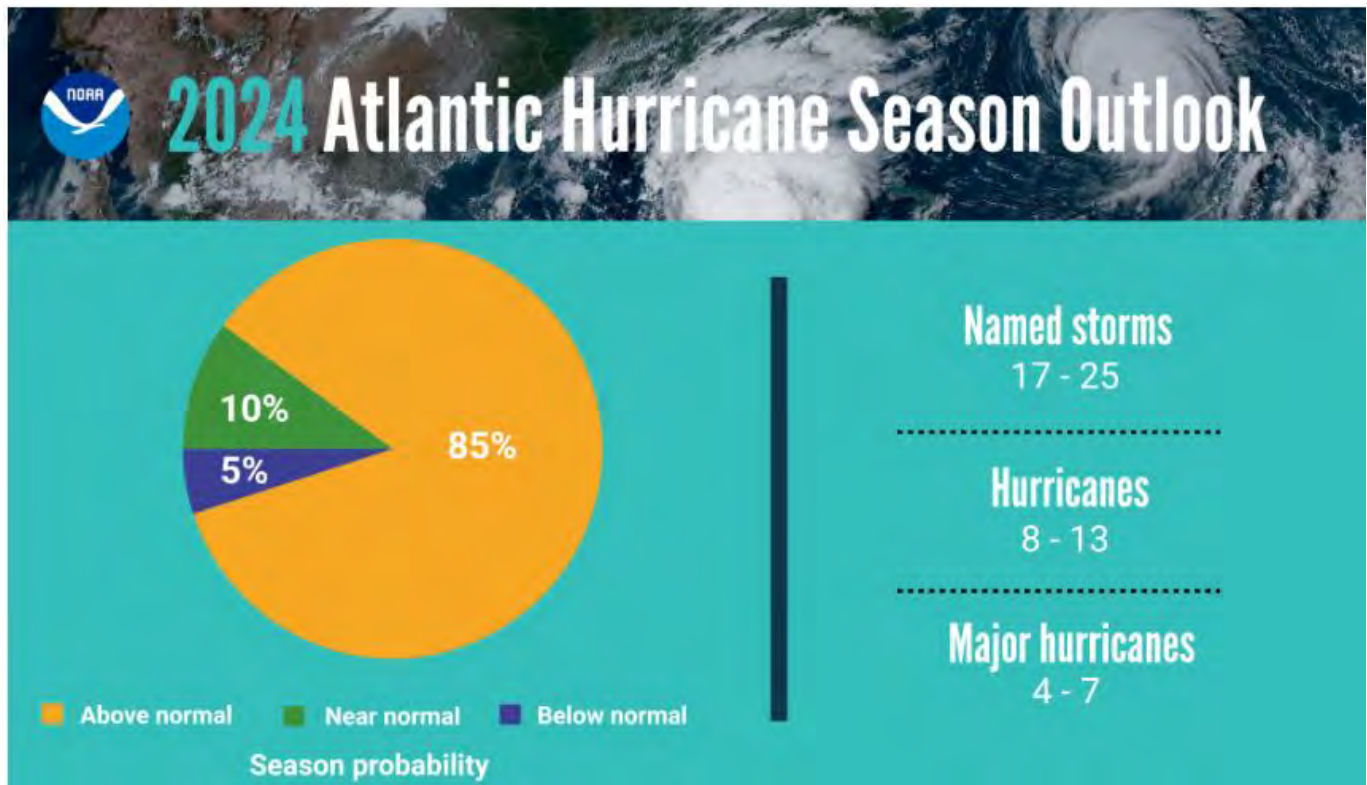
2024 Atlantic Hurricane Season Outlook

By: Ron Havran, Texas CoCoRaHS Observer Newsletter Editor

NOAA National Weather Service forecasters at the Climate Prediction Center predict above-normal hurricane activity in the Atlantic basin this year. NOAA's outlook for the 2024 Atlantic hurricane season, which spans from June 1 to November 30, predicts an 85% chance of an above-normal season, a 10% chance of a near-normal season and a 5% chance of a below-normal season.

NOAA is forecasting a range of 17 to 25 total named storms (winds of 39 mph or higher). Of those, 8 to 13 are forecast to become hurricanes (winds of 74 mph or higher), including 4 to 7 major hurricanes (category 3, 4 or 5; with winds of 111 mph or higher). Forecasters have a 70% confidence in these ranges.

The upcoming Atlantic hurricane season is expected to have above-normal activity due to a confluence of factors, including near-record warm ocean temperatures in the Atlantic Ocean, development of La Nina conditions in the Pacific, reduced Atlantic trade winds and less wind shear, all of which tend to favor tropical storm formation.



NOAA's outlook is for overall seasonal activity and is not a landfall forecast. In addition to the Atlantic seasonal outlook, NOAA also issues seasonal hurricane outlooks for the eastern Pacific, central Pacific and western north Pacific hurricane basins.

NOAA's Climate Prediction Center will update the 2024 Atlantic seasonal outlook in early August, prior to the historical peak of the season. Remember it takes only one major hurricane for it to be a bad season anywhere. Be prepared!!!

Scheduled CoCoRaHS Webinars & Information

Webinar #91 - Thursday, September 2024

Measuring beyond precipitation. How is your forest responding to drought?

Peter Goble

Colorado Climate Center
Colorado State Univ.
Fort Collins, CO



[Biography](#)

The US Drought Monitor (USDM) is a critical tool used to assess drought conditions and plan drought responses. However, data collection and monitoring can be challenging, especially in remote locations. Reports in forested areas, both empirical and anecdotal, are often sparse. Consequentially, forest conditions are underrepresented in the US Drought Monitor process, and quality of drought appraisal suffers. Resource managers and professionals working in forested landscapes are often acutely aware of current conditions and are frequently the first to observe drought-related changes in forest/vegetation health, soil moisture, streamflow's, and patterns of human use.

Peter has worked with the US Forest Service to increase CoCoRaHS Condition Monitoring in forested areas across Colorado. Targeted outreach raised the number of Colorado CoCoRaHS Condition Monitoring reports collected in the months of May-September from 346 in 2021 to 610 in 2022. These additional reports were used in the US Drought Monitor Process to observe progress in forestland health as drought conditions ameliorated during the 2022 monsoon season. Additional Condition Monitoring reports were particularly helpful on the San Juan National Forest. May-September participation increased from 3 to 39 reports in Archuleta County and from 16 to 52 reports in La Plata County.

In this webinar Peter talks about what we have learned from these additional Condition Monitoring Reports in forested areas so far, and plans to continue to fill the drought impact data gap in forested areas.

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

	<p style="text-align: center;"><i>Texas CoCoRaHS Observer</i> The official newsletter of Texas CoCoRaHS</p>	
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