



TEXAS CoCoRaHS OBSERVER

Autumn 2020



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.

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Texas Autumn Weather Summary

West Texas Is Dry, But What Do We Really Need to Know?

By: John Nielsen-Gammon, Texas State Climatologist

Total Precipitation September 1, 2020 – November 30, 2020

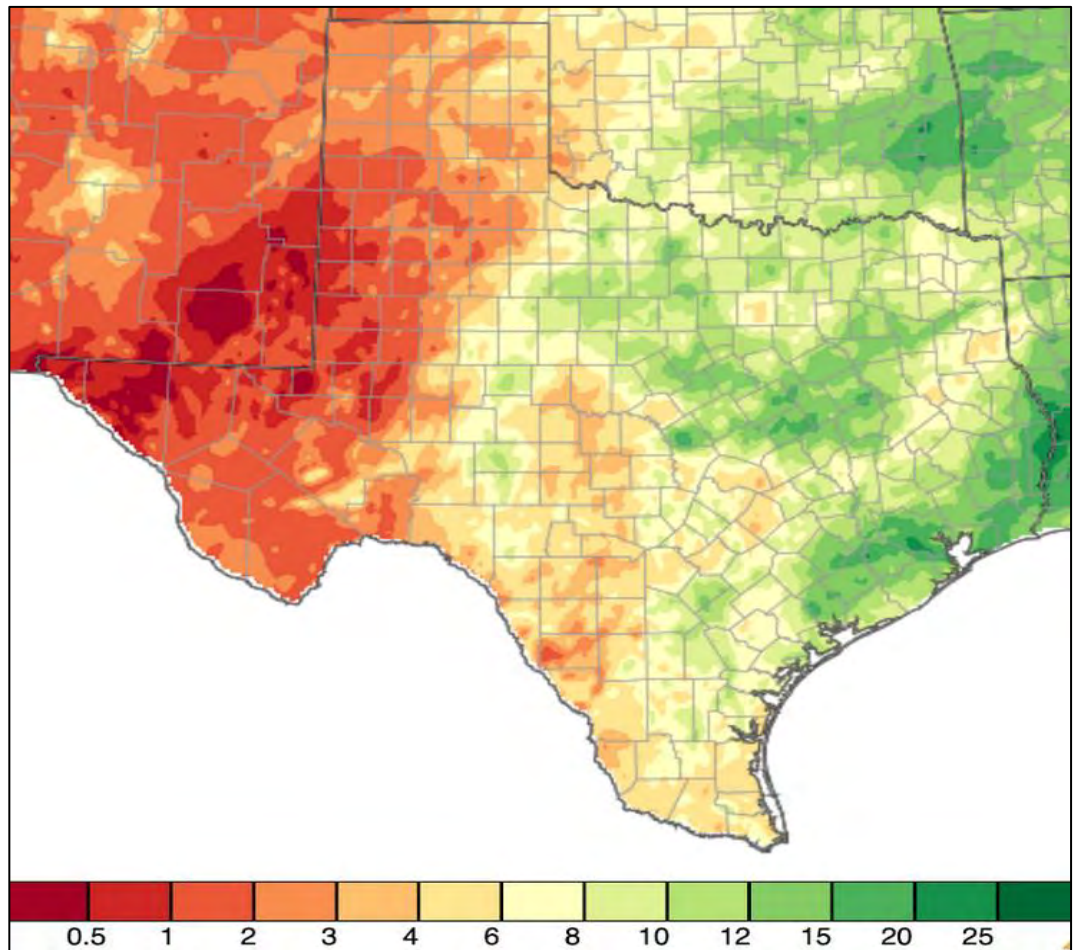


Figure 1: Texas autumn precipitation for 2020.

It's been dry in West Texas for a while now. Midland received just 2.08" of precipitation between April 1 and November 30. That's more than ten inches below normal, and more than an inch and a quarter below the previous record, set in 1998.

Continued page 2 >

"Because Every Drop Counts, As Do All Zeros"

“Texas Autumn Summary (continued)”

But what do people in Midland need to know?

They might need to know whether cool-season forage is likely to fail completely.

They might need to know whether the drought has substantially raised the risk of wildfire.

They might need to know whether the ongoing La Niña eliminates the chance of drought recovery for the next several months.

They might need to know if higher temperatures have already amplified the drought.

They might need to know when water supply issues will emerge.

A bunch of us from Texas A&M, UT Austin, and other places in and around Texas were concerned about whether the information that scientists normally provide about climate and climate change is actually useful to people who need to make climate-sensitive decisions. So we teamed up and wrote a paper, called "Unprecedented Drought Challenges for Texas Water Resources in a Changing Climate: What do Researchers and Stakeholders Need to Know"? The paper was published last summer in a scientific journal aptly called *Earth's Future*.

We noted that data from tree rings shows very severe, prolonged droughts over the past thousand years, sometimes called mega droughts. We showed that the most extreme climate model projections indicate that typical conditions could become as dry or drier in Texas than those mega droughts. We talked about the rising temperatures and changing precipitation patterns that have occurred so far.

Then we considered what this might mean for surface water and for groundwater. The implications are not the same. For example, if rainfall becomes more intense and erratic, less water will soak into the soil and filter into aquifers, but more water will run off and flow into reservoirs.

If you're running an agricultural operation, your main climate concern might be what will happen over the next several months. If you're a major water supplier, your main climate concern might be whether reservoirs need to be managed differently. If you're a small groundwater management district, your main concern might be how droughts will change the amount of water people need to pump from aquifers. And if you're a regional planning district, your main concern might be how all of this ties together, for example with higher temperatures in summer creating the need for more power generation and more water for the power plants.

These are very specific, local questions. The challenge for stakeholders is to know what questions they should be asking, and which ones are even answerable. The challenge for scientists like me is to generate the information needed to answer these questions.

West Texas and SE New Mexico Regional Summary

Warm and Dry Fall for West Texas

By: James DeBerry, National Weather Service Midland

West Texas and Southeast New Mexico saw a dry, warm fall, courtesy of a strong La Nina.

September

September was relatively dry and uneventful for West Texas and Southeast New Mexico, except for the eastern fringes of the HSA, which accumulated enough rainfall to offset the lack of it elsewhere. The only other notable hydrologic activity was minor flooding on the Rio Grande during the first half of the month, mainly due to increased inflows from the Rio Conchos. The Rio Conchos watershed saw abundant rainfall due to remnants of a tropical system that moved inland earlier in the month.

Monthly radar rainfall estimates ranged from nothing in parts of northern Eddy County to 6-8" in Mitchell County. However, the highest observed rainfall was 5.05" at a COOP southeast of Fort Stockton in Pecos County. The average of rainfall reported across West Texas and Southeast New Mexico was 1.47". Reservoir levels across the HSA averaged 39.0% of conservation capacity as of October 1st:

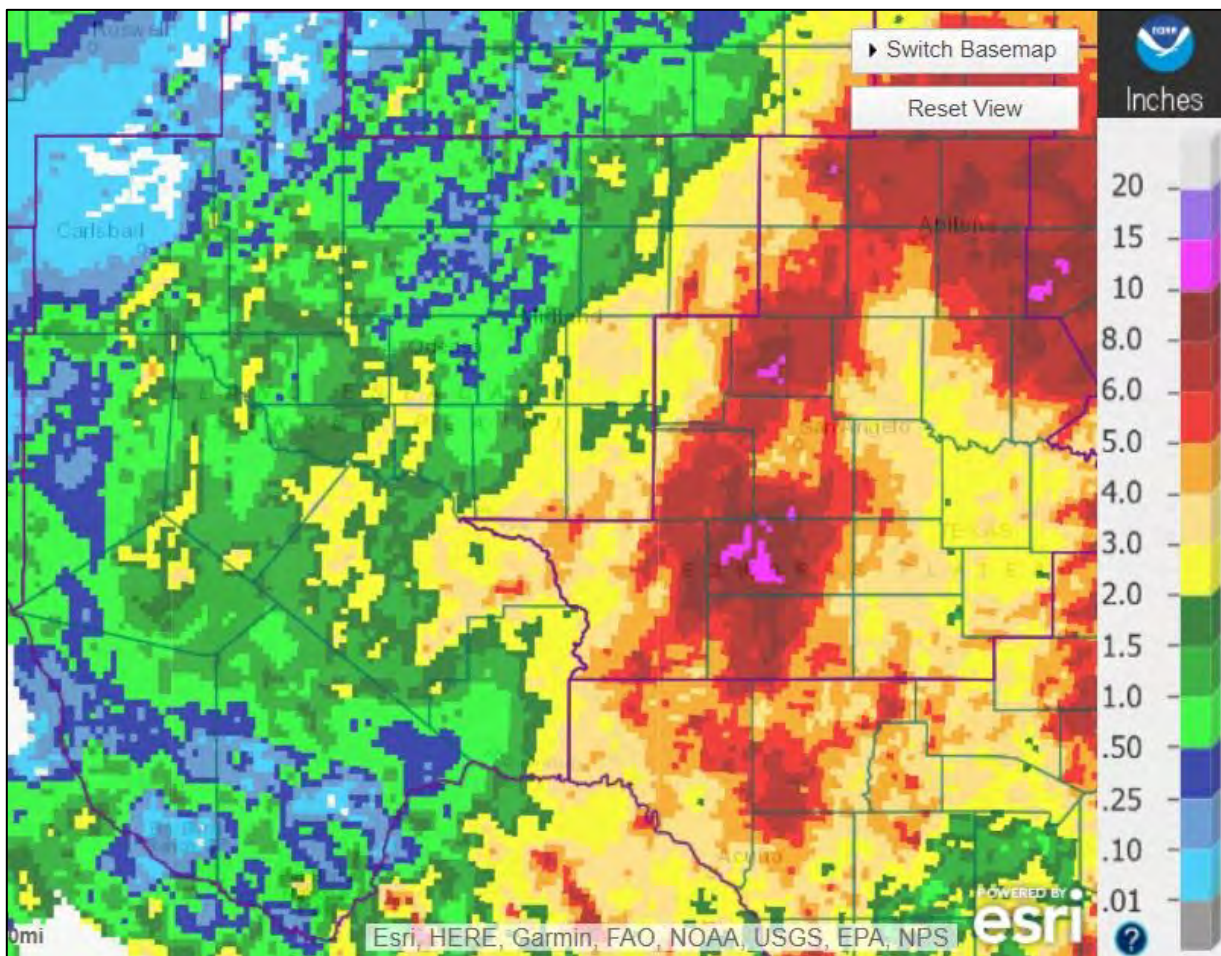


Fig. 1: September Precipitation for West Texas

“West Texas and SE New Mexico Regional Summary (continued)”

October

The drought continued in October under La Nina, as reflected in meager rainfall totals. A winter storm hit the region late in the month, but yielded little in the way of precipitation.

Monthly radar rainfall estimates ranged from nothing over West Texas west of the Pecos to up to 2” in the upper Colorado River valley. The highest observed rainfall was 1.53” in east Snyder in Scurry County. The average of precipitation reported across West Texas and Southeast New Mexico was just 0.17”.

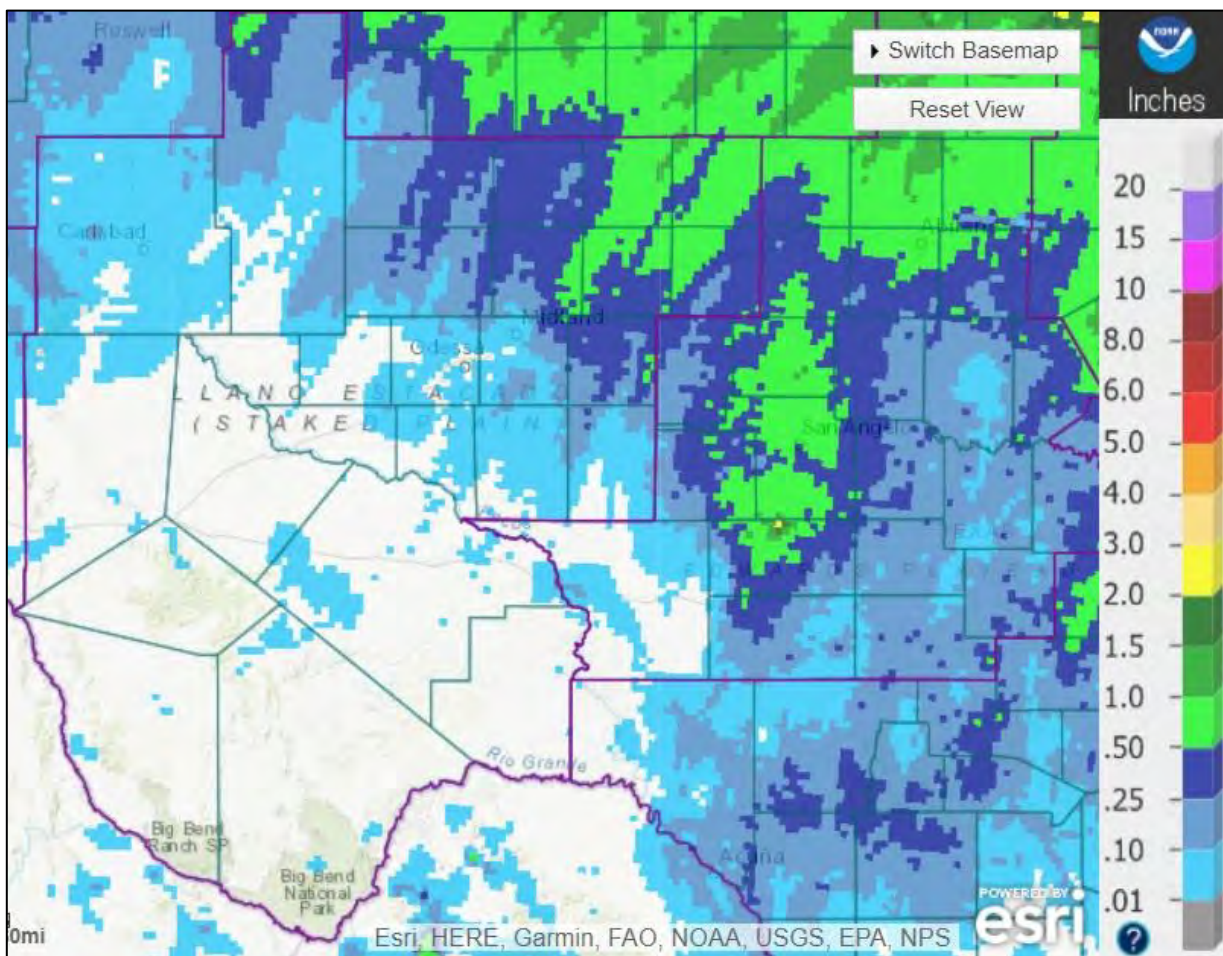


Fig. 2: October Precipitation for West Texas

November

The drought continued in November under La Nina, as reflected in meager rainfall totals. No significant hydrologic events were noted.

Monthly radar rainfall estimates looked very similar to October’s, and ranged from nothing over West Texas west of the Pecos to 1” in the upper Colorado River Valley. The highest observed rainfall was 0.95” in Snyder in Scurry County. The average of precipitation reported across West Texas and Southeast New Mexico was 0.19”.

“West Texas and SE New Mexico Regional Summary (continued)”

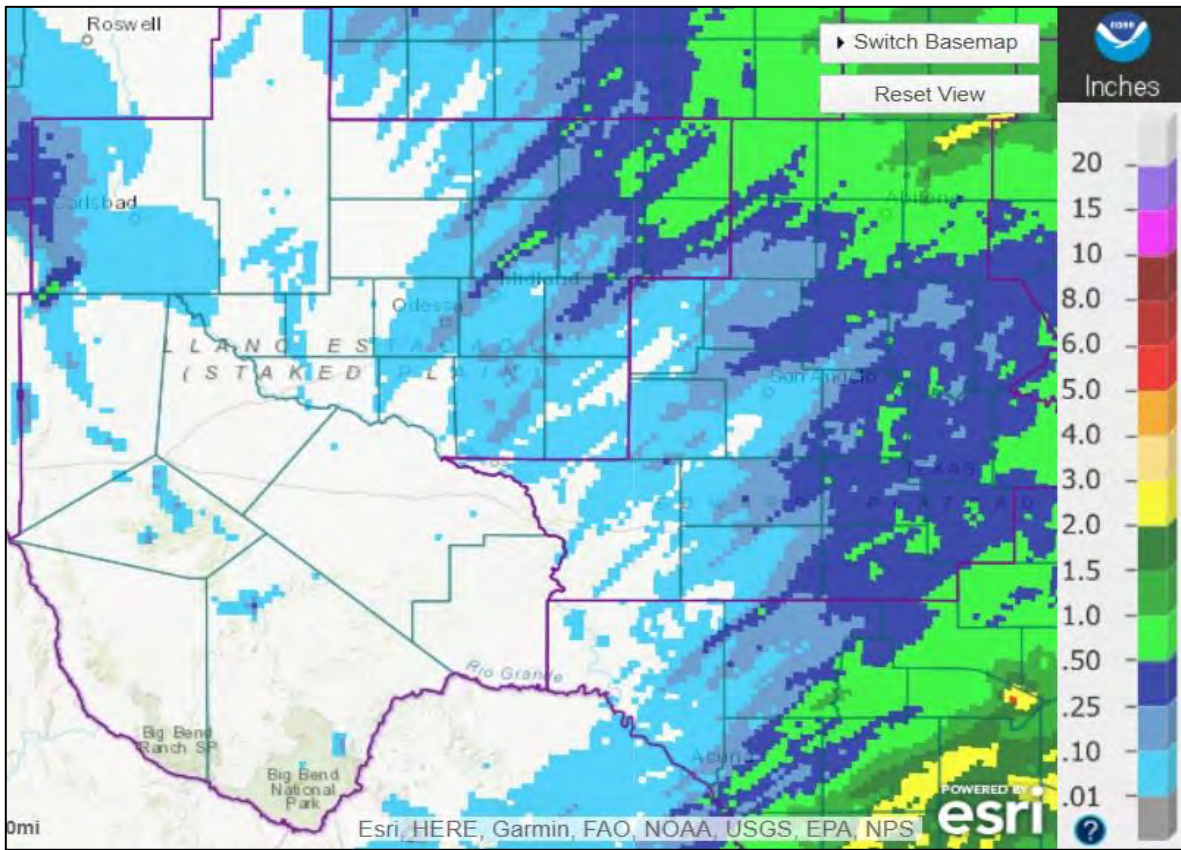


Figure 3: November Precipitation for West Texas

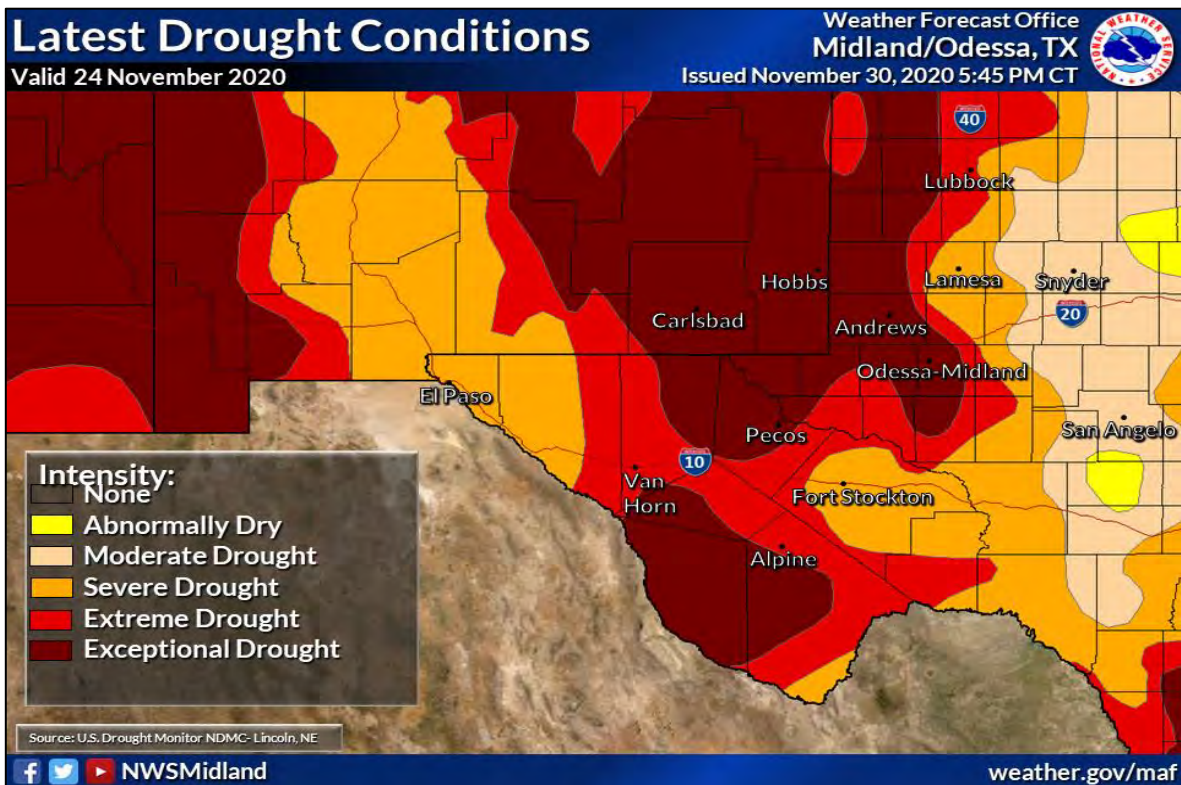


Figure 4: Drought conditions as of November 24th 2020

“Wichita Falls Regional Summary”

Long Dry Spells Highlight Importance of Reporting Zeros

By Charles Kuster

CIMMS/NSSL - Cooperative Institute for Mesoscale Meteorological Studies at National Severe Storms Laboratory

This autumn brought long periods of little to no precipitation split up by a few heavy rain events. The first 11 days of September saw several rainy days, with the heaviest rain falling on the 8th and 9th when two CoCoRaHS observers reported over 3” of rain. The final 19 days of September and first 22 days of October were dry (all CoCoRaHS observers’ reported less than 0.05”). Another heavy-rain event then occurred with several CoCoRaHS observers reporting at least 0.60” of rain and a couple reporting over 1.50” of rain. More rain fell in the final week of October before November started with a streak of 23 straight dry days. Thanks to all the observers who reported 0.00” during these dry streaks! These observations are important in monitoring drought development and maintaining complete weather records.

Overall, despite the dry spells, our region experienced relatively normal conditions and only slight expansion of the ongoing drought, likely due to the heavy rain events that occurred throughout the autumn (Fig. 1, 2). The southern portions of our region generally experienced slightly above normal precipitation while the northern portions of our region generally experienced slightly below normal precipitation (Fig. 2a). In total, there were 77 dry days and 14 wet days (at least one CoCoRaHS station reported 0.05” or more). For comparison, last autumn saw 70 dry days and 21 wet days. Nearly the entire region experienced below normal temperatures (Fig. 2b).

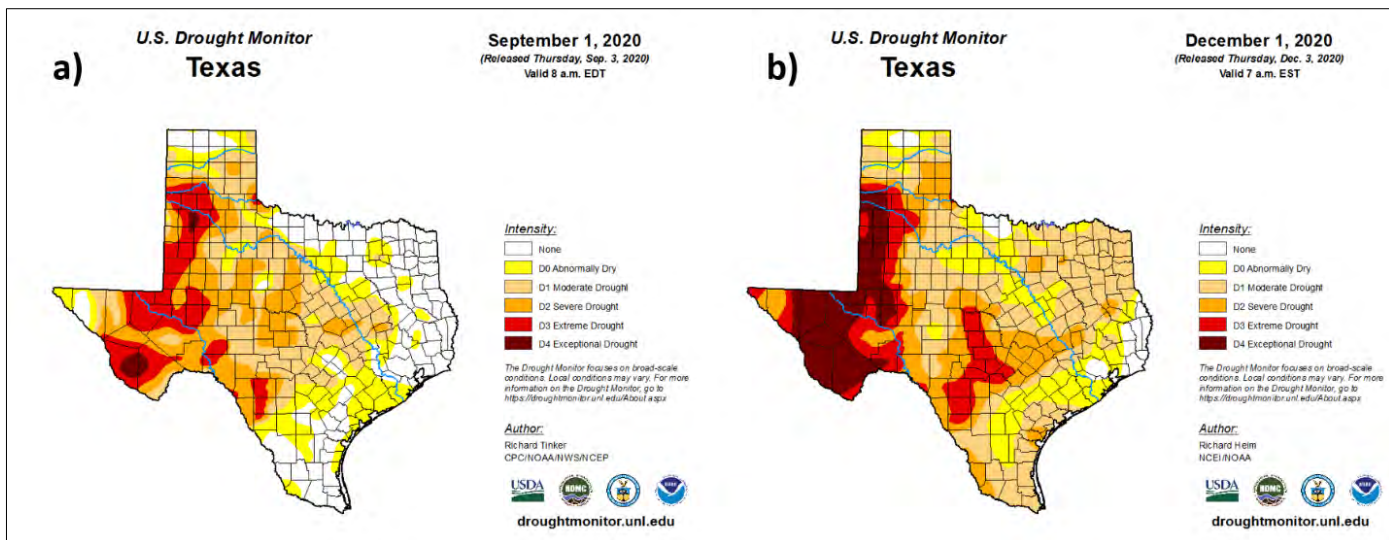


Figure 1. U.S. Drought Monitor comparison between a) September 1, 2020 and b) December 1, 2020. Warmer colors indicate more severe drought categories. Maps and data available at <https://droughtmonitor.unl.edu/>.

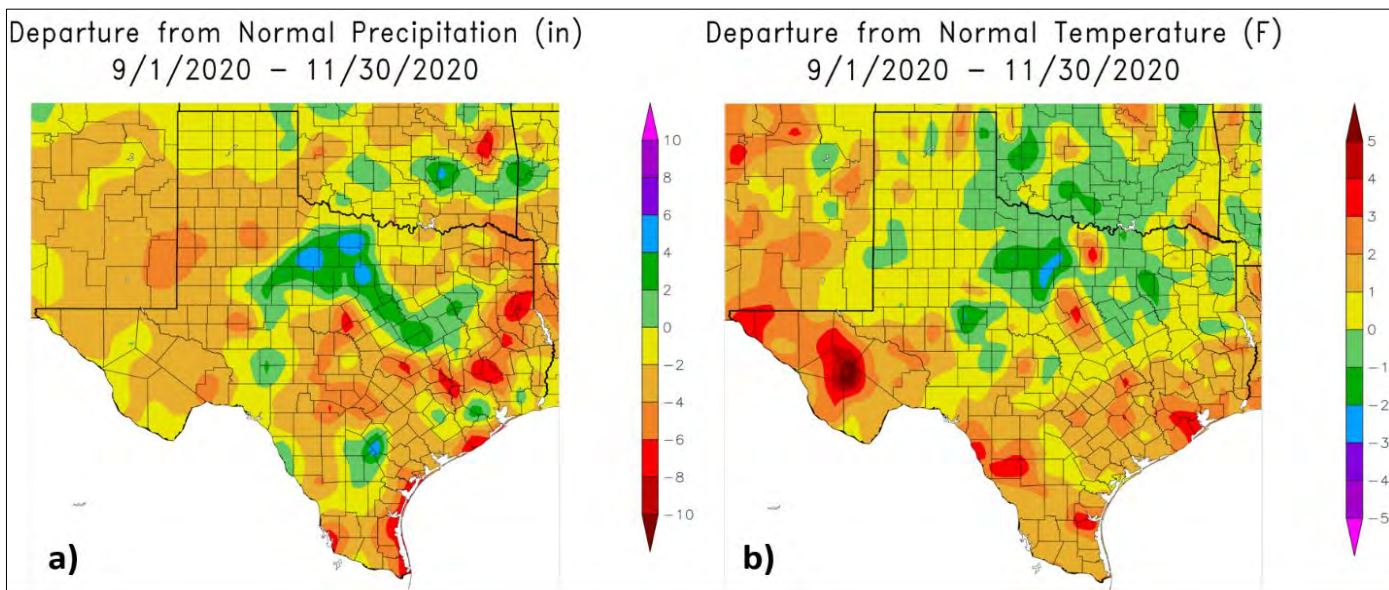


Figure 2. Statewide departure from a) normal precipitation and b) normal temperature. Cooler colors indicate above normal precipitation in a) and below normal temperature in b), while warmer colors indicate below normal precipitation in a) and above normal temperatures in b).

“Austin/San Antonio Regional Summary”

A Wet, Cool September, Then Returning Warmth and Dryness Led to Drought Expansion

By Keith White – WFO Austin/San Antonio

While it wasn't quite a “roller coaster” fall across south-central TX, the region did undergo a significant regime change from cool and wet in September (except west/southwest of San Antonio) to warm and dry for much of October and November. Notable exceptions include a few days of cooler weather towards the end of October and one decent rainfall event for some of the area on Nov. 27th-28th.

When taken as a whole, Fall 2020 was warmer than average across most of south-central TX, save a portion of Llano County and an area stretching from near Uvalde northwestward through Leakey to Rocksprings. In Del Rio, this fall tied for the 3rd warmest meteorological Fall on record. Precipitation was below to well below normal for most of the area as well, although a couple of spots were the benefactors of above-normal rain this fall (Fig. 1). Most prominently, there was a rainfall maxima southeast of San Antonio across portions of Atascosa, Wilson, and Karnes counties. Some smaller areas of above-normal seasonal rainfall are also depicted. These include a few spots across the Southern Edwards Plateau near NW Kinney and SW Edwards counties, portions of Maverick County, some locations in the Hill Country (i.e. near Llano), and a small area of NE Hays/SE Travis counties where one event in early September brought a 6.85” 6-hour total to one CoCoRaHS observer on the east side of Buda. This translates to about a 20-year recurrence interval per the NOAA Atlas 14 dataset. No flooding impacts were reported despite the high rainfall totals.

The wet, cool month of September was a welcome change after a predominantly warm, dry summer, and with the prospect of a La Niña Fall/Winter on our doorstep (which typically lead to warm/dry conditions here) we needed all the rain we could get. Several events impacted the region, notably on the 3rd-4th, the 8th-9th, and lastly Tropical Storm Beta on the 20th-22nd, which primarily affected areas along and east of I-35. Unfortunately, much of the Winter Garden region of Dimmit, Zavala, Frio and north into Medina and eastern Uvalde counties missed out on the party in September, generally receiving less than 2” to end the month. One CoCoRaHS station recorded only 0.73” in northwestern Frio County. Much of this area was already under a substantial deficit to end the Summer.

Beta's exit ushered in a warm, dry period that, with few exceptions, dominated the remainder of the season. A new record was set for number of days with high temperatures at or above 80°F in November at Austin (18) and Del Rio (17). By late November, many CoCoRaHS Condition Monitoring Reports describing the moderate dryness came in across several of our counties. The weekly Drought Monitor noted expansion and degradation of drought status through much of this time, with Exceptional Drought (D4) introduced for a short time in portions of Uvalde and Zavala Counties before some much-needed rain fell on Nov 27th-28th to round out the fall season and knocked it back to Extreme Drought (D3). However, the final Drought Monitor issuance with Fall 2020 data (Fig. 2) show that this event was not nearly enough to make up for the extended period of dryness elsewhere. About 77% of the WFO EWX coverage area was depicted as Severe Drought (D2) or worse, with only our southeastern counties in Abnormally Dry (D0) status.

“Austin/San Antonio Regional Summary (continued)”

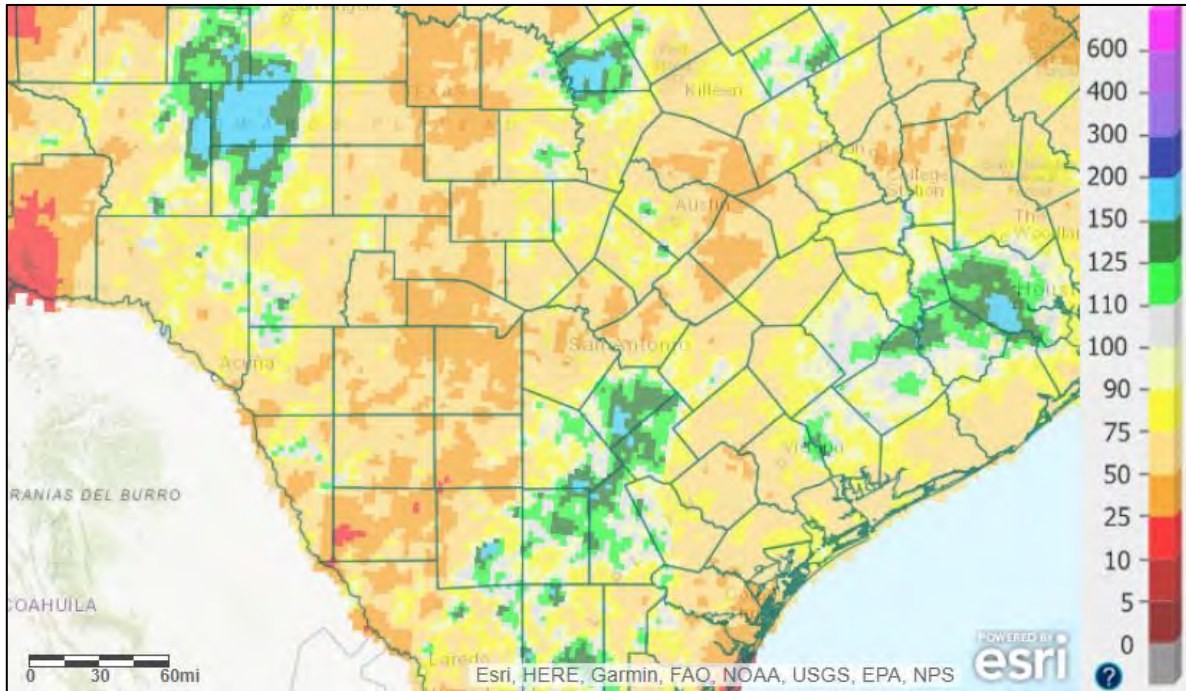


Figure 1: Percent of normal rainfall September 1st through November 30th 2020.

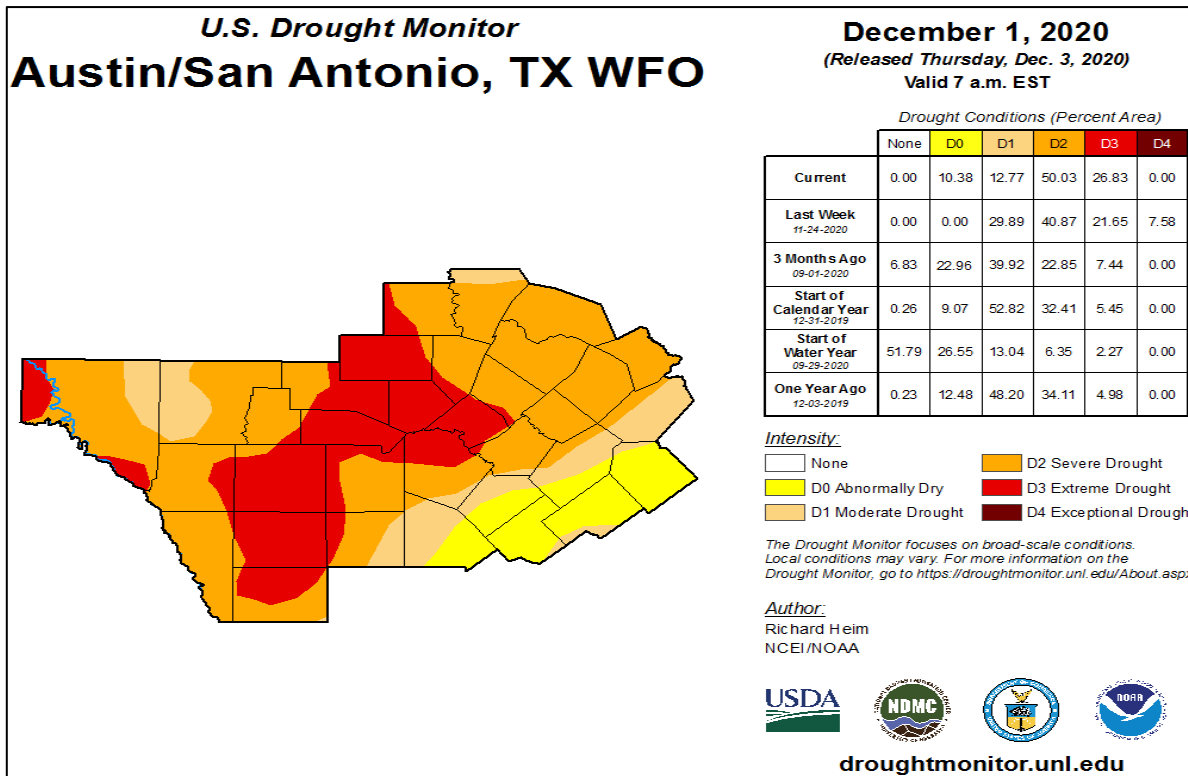


Figure 2: Drought Monitor released December 3rd, 2020

“Abilene/San Angelo Regional Summary”

An Autumn Weather Rollercoaster across West Central Texas Region

By: Joel Dunn, Observation Program Leader, San Angelo NWS WFO

September 2020

September started off with a triple digit day and a little bit of moisture, followed by several dry days with highs in the 90s. Over the next few days, however, the models would begin hinting at a significant change in the weather pattern. An upper level low was forecasted to bring an early season cold front and precipitation to West Central Texas. Hopes were high for some decent rainfall and cooler temperatures. On the 8th of September, the Weather Prediction Center (WPC) released a mesoscale precipitation discussion for the West Central Texas area. Here is a small portion of that discussion.

“The latest surface analysis shows a cold front with multiple waves of low pressure riding along it that is gradually settling down to the southeast across west-central and northwest TX. This is all in response to the anomalously strong upper trough pivoting slowly east across the Four Corners region. The frontal zone is already the focus for multiple clusters of heavy showers and thunderstorms as modest, but persistently moist and unstable low-level southeast flow advances from south-central TX up across the Edwards Plateau and into the boundary.”

The observed rainfall data from the month of September shows a minimum around the San Angelo area, although most of the reports totaled between 4”-5”, with a few stations around the city that were in excess of 5.00”. Areas east of San Angelo saw lower totals, between 2”-3”, while the Big Country fared the best overall with totals mostly above 5.00”.

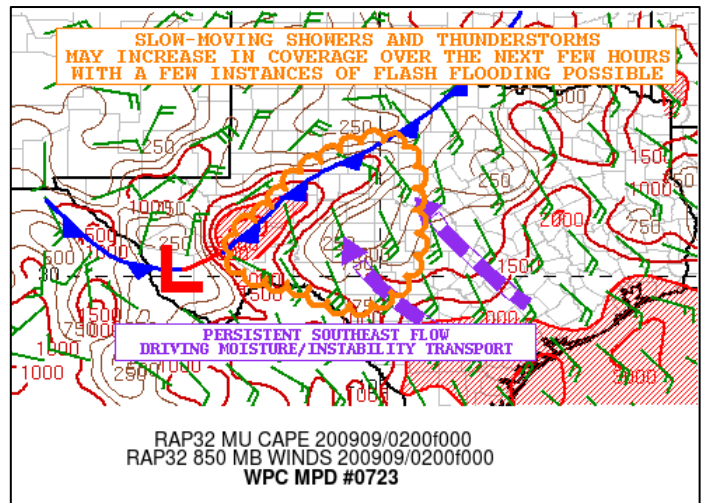


Image 1 - Surface analysis from September 8th 2020

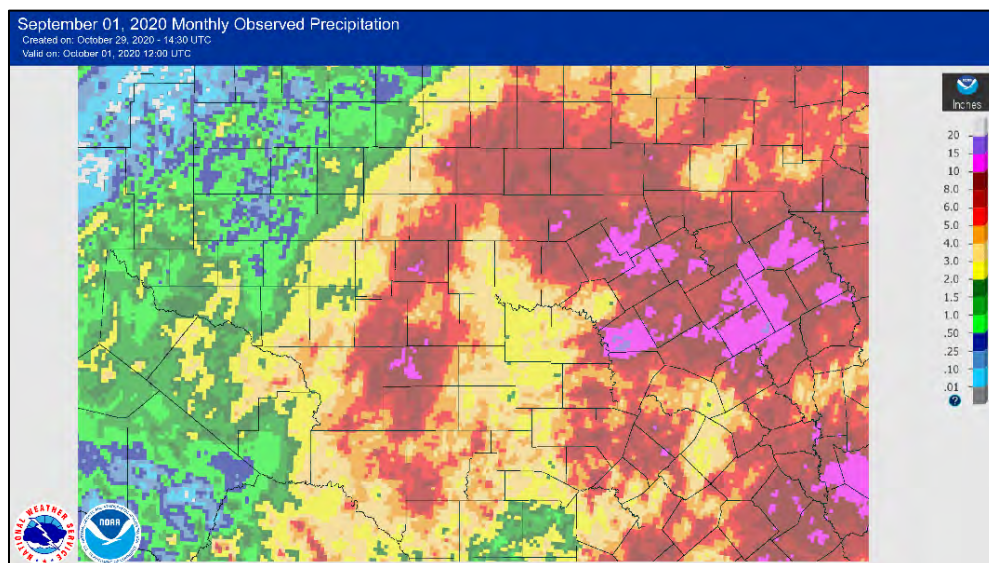


Image 2 - September Observed Precipitation

Once the cut off low migrated northeast toward the upper Midwest, high pressure once again settled over southwest US and hot and dry conditions returned to West Central Texas.

“Abilene/San Angelo Regional Summary (continued)”

October 2020

October could be described as a rollercoaster of weather with several records set, including a record high temperature, and a record for the coldest high temperature as well. On the 11th of October both Abilene and San Angelo recorded triple digit temperatures, 100°F, and 101°F respectively. This was a record high temperature for both stations. Abilene has only seen such heat during the Octobers of 1951, 1979, and now 2020. Likewise, San Angelo has only seen triple digit temperatures in October during the years 1926, 1951, and now 2020. Interesting fact to note, each year San Angelo experienced triple digit temperatures they always occurred on consecutive days.

October 100° Days in Abilene	
Year	# of 100° Days
1951	1
1979	2
2020	1

October 100° Days in San Angelo	
Year	# of 100° Days
1926	2
1951	2
2020	2

As the month progressed the models once again began hinting at an injection of cold air. This one would be quite strong, with possible frozen precipitation. An upper level trough was forecast to move south as far as northern Mexico bringing cold air advection from Canada. On Sunday October 25th at 5 PM, Sweetwater, TX was reporting a temperature of 56°F, while less than 80 miles south, San Angelo was reporting a temperature of 88°F. By Monday morning, West Central Texas was experiencing temperatures in the 30s and 40s. Freezing rain, sleet, and snow had been observed across the area. Once the system had moved out, Abilene reported 0.80” of frozen precipitation, while San Angelo came in at 0.30”. As of the writing of this article (December 1, 2020), 1802 days have elapsed since San Angelo received 0.50” or more of snowfall. This is a record number of days and as of December 1, 2020, is ongoing. The last record consecutive days without 0.50” or more of snowfall ended on January 28th, 1994 with 1094 days total.

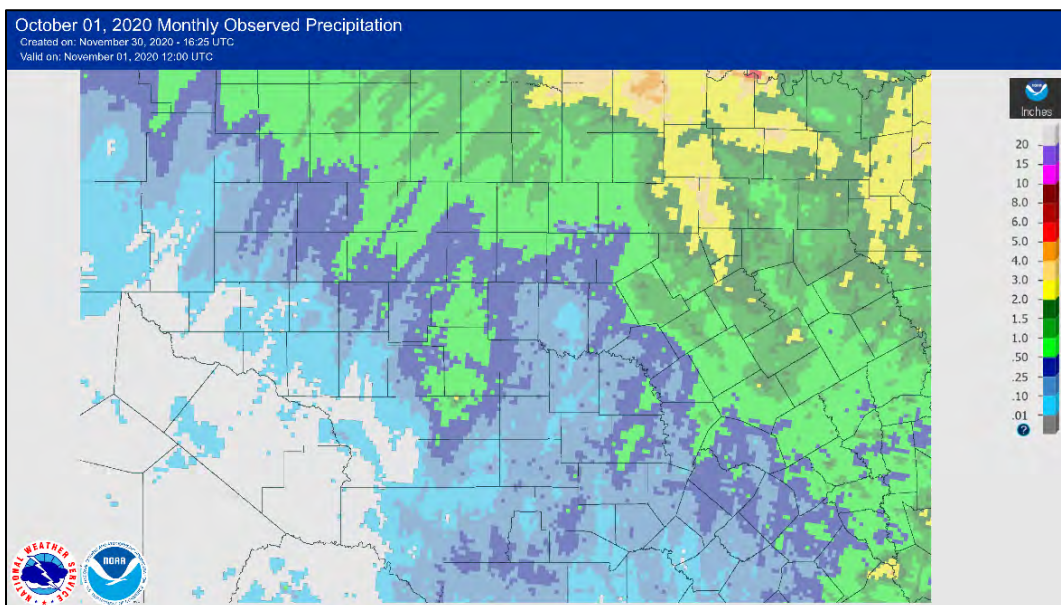


Image 3 - October Observed Precipitation

“Abilene/San Angelo Regional Summary (continued)”

November 2020

November continued the rollercoaster of temperatures with highs in the 70s and 80s at the beginning of the month and finishing off with highs in the 50s and 60s. Low temperatures remained mild until the last few days of the month where they regularly dipped below freezing. Precipitation, like October, was scarce across much of West Central Texas.

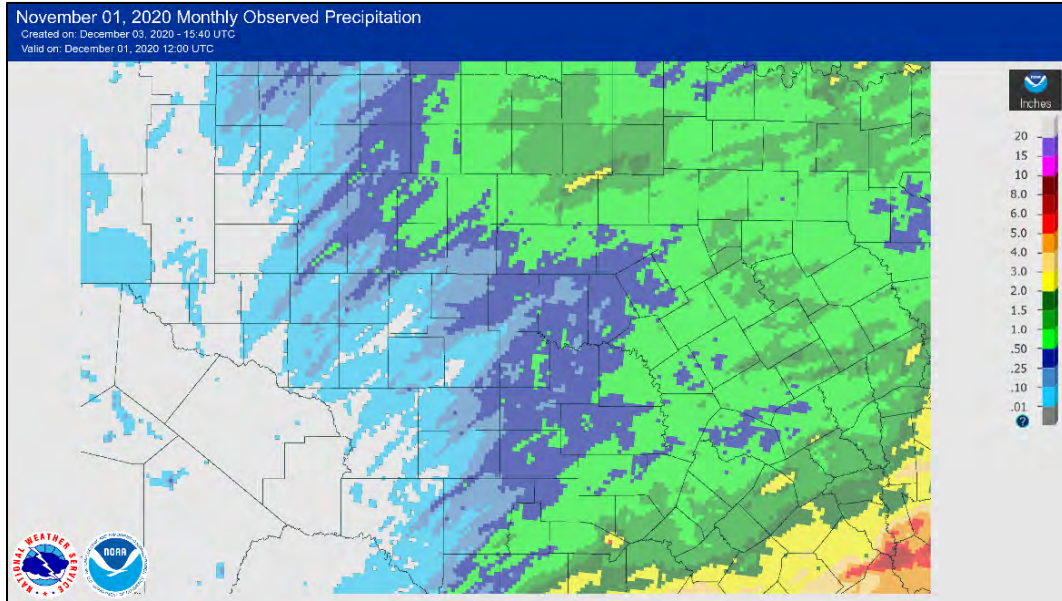


Image 4 – November Observed Precipitation

Though portions of the Big Country and northwest Hill Country saw some precipitation, however rainfall amounts were still mostly below normal, leading to a rather dry November.

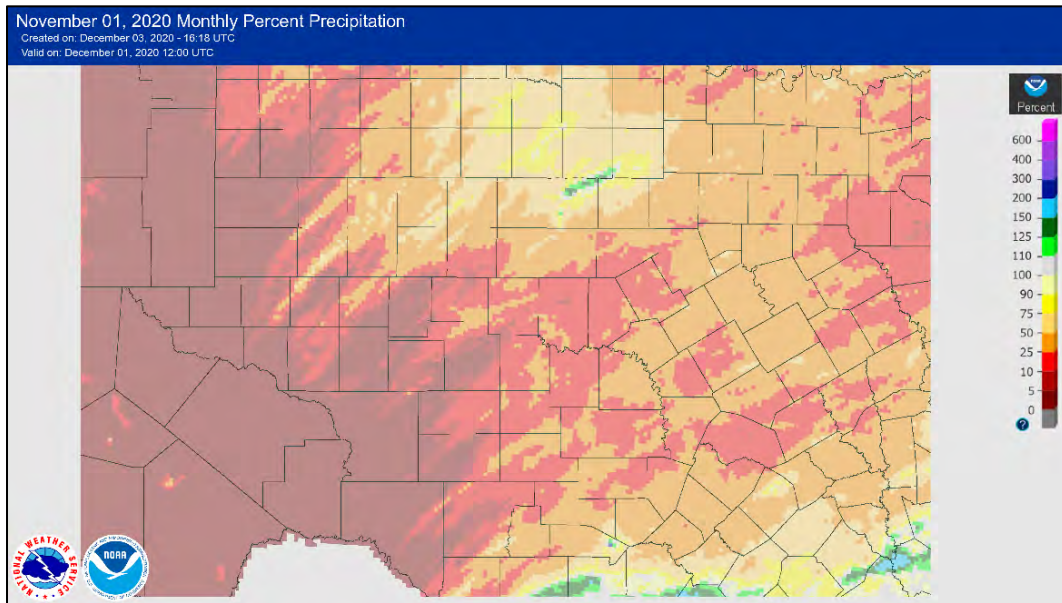


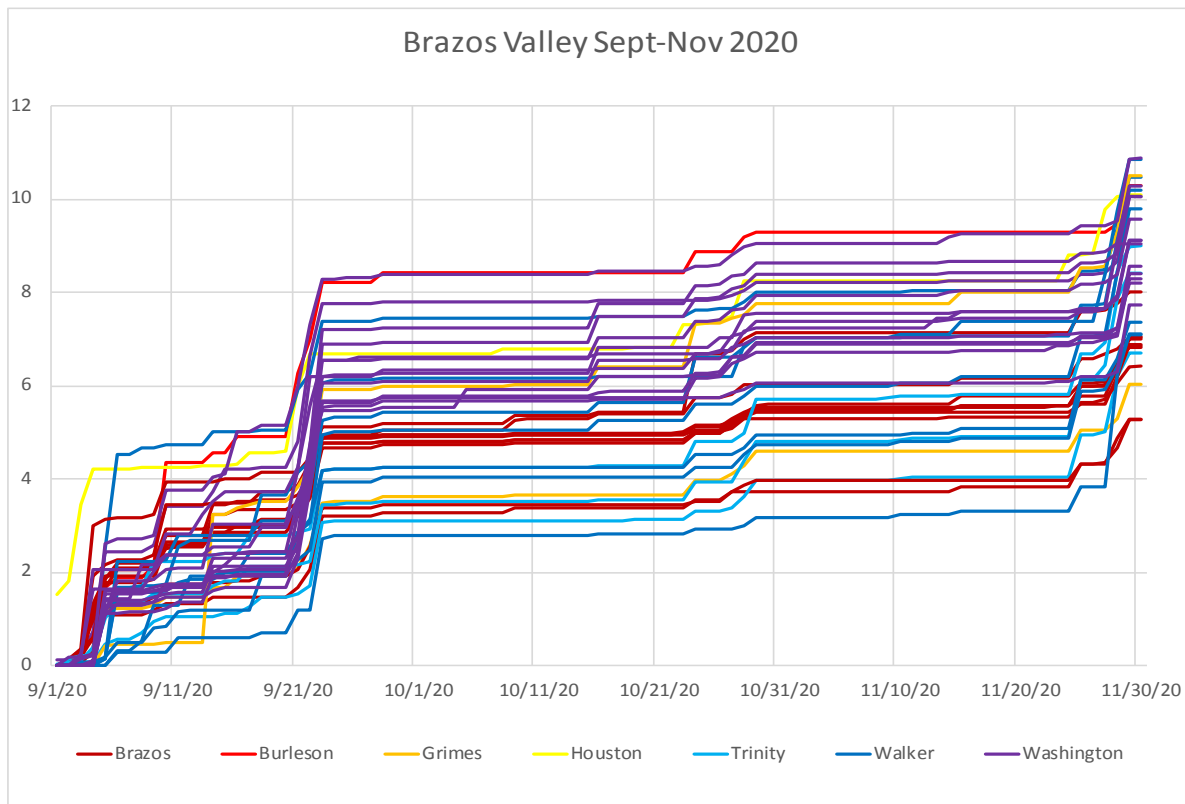
Image 5 - November Percent of Normal

“Brazos Valley Regional Summary”

Drought Conditions Prevail after Beta

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

The Bryan/College Station area has been flirting with drought all year, and unfortunately in many places, that relationship only deepened in the fall. Normal for the season at Easterwood Airport is 11.31", and all CoCoRaHS observers recorded less rain than that.



Haywood plot 1: Brazos Valley counties CoCoRaHS rainfall over time for the 2020 autumn season.

Summary:

The season got off to a decent start in September, with Tropical Storm Beta providing substantial precipitation to the area without causing too many problems. In and around Brenham, almost half of the fall's precipitation was produced by Beta.

After that, though, things turned dry. The sixty days after Beta produced rainfall totals from less than half an inch to slightly more than two inches, nowhere near even a third of normal amount for the period. The previous long-term historical record for dryness over that period was 1.20" in Brenham and 0.76" in College Station, and some broke those records.

We had 46 observers with at least one report and 37 with enough to estimate a reliable seasonal total. There were 26 of you that reported on at least 80 days, 12 with no missing days, and 9 with measurements on every single day. Thanks!

Season Statistics:

Wettest day: **2.77"**, Sept. 23, Washington County

Wettest season: **10.88"**, Washington County

Driest season: **5.27"**, Brazos County

Dusty Soles Award: **27 days without measurable rain**, Sep. 29 thru Oct. 25, Washington County

Soggy Socks Award: **6 days with measurable rain**, Sep. 1 thru Sep. 6, Trinity County

“Houston/Galveston Regional Summary”

T.S. Beta Brought Heavy Rains in September, then Dry Weather Prevailed

By: Ron Havran - CoCoRaHS Houston/Galveston Regional Coordinator

September

Very warm and dry conditions were in place to begin the month. Above normal temperatures prevailed for the first half of the month. The second half of the month saw temperatures near normal due to increased cloud cover and rains from tropical storm Beta. Most of the region had above normal temperatures for the month with a few areas having near normal temperatures for the month.

Dry conditions prevailed for the month until the 20th when Beta moved into the region. The bulk of rainfall across the region occurred with tropical storm Beta between the 20th and 23rd of the month (Fig.10). The wettest day of the month was on the 22nd. Jackson and Harris counties had the highest CoCoRaHS observer county average rainfall. San Jacinto and Polk counties ended up with the driest CoCoRaHS observer county average rainfall for September (Fig. 1 & Chart 1).

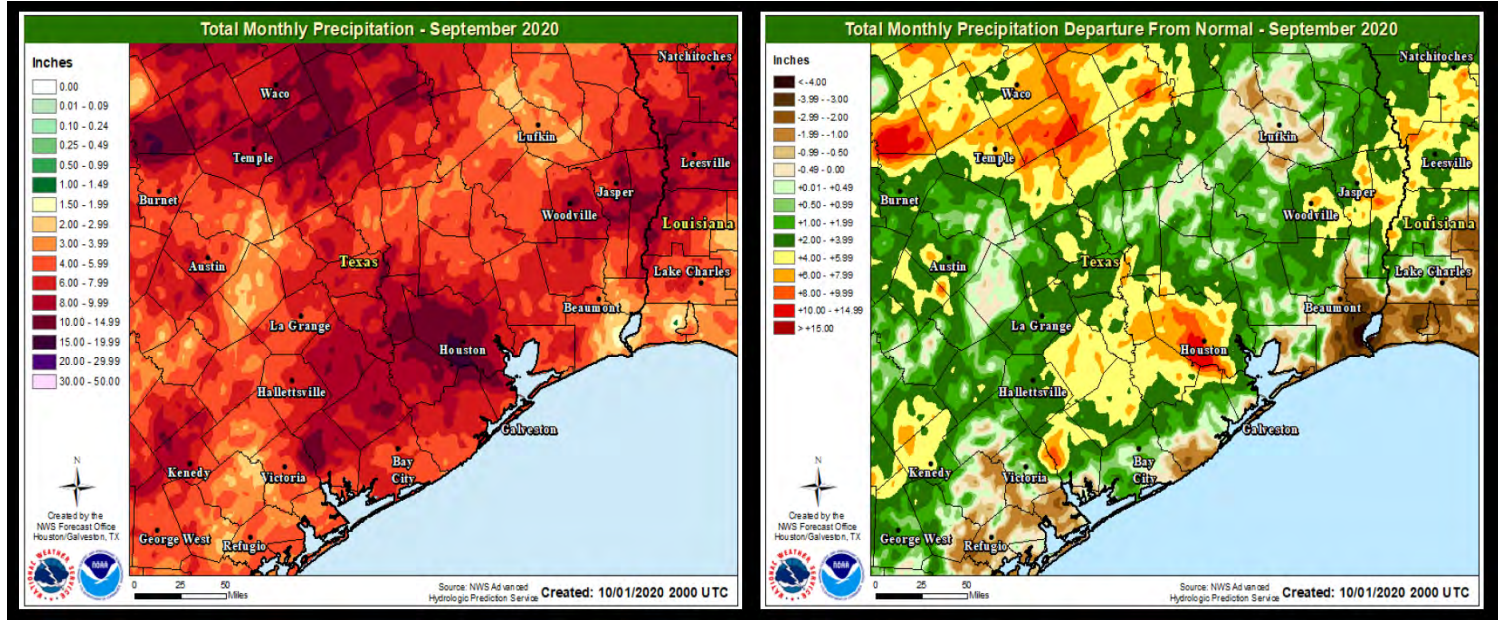


Figure 1: September 2020 Total Monthly Rainfall

Figure 2: September 2020 Precipitation Departure from Normal

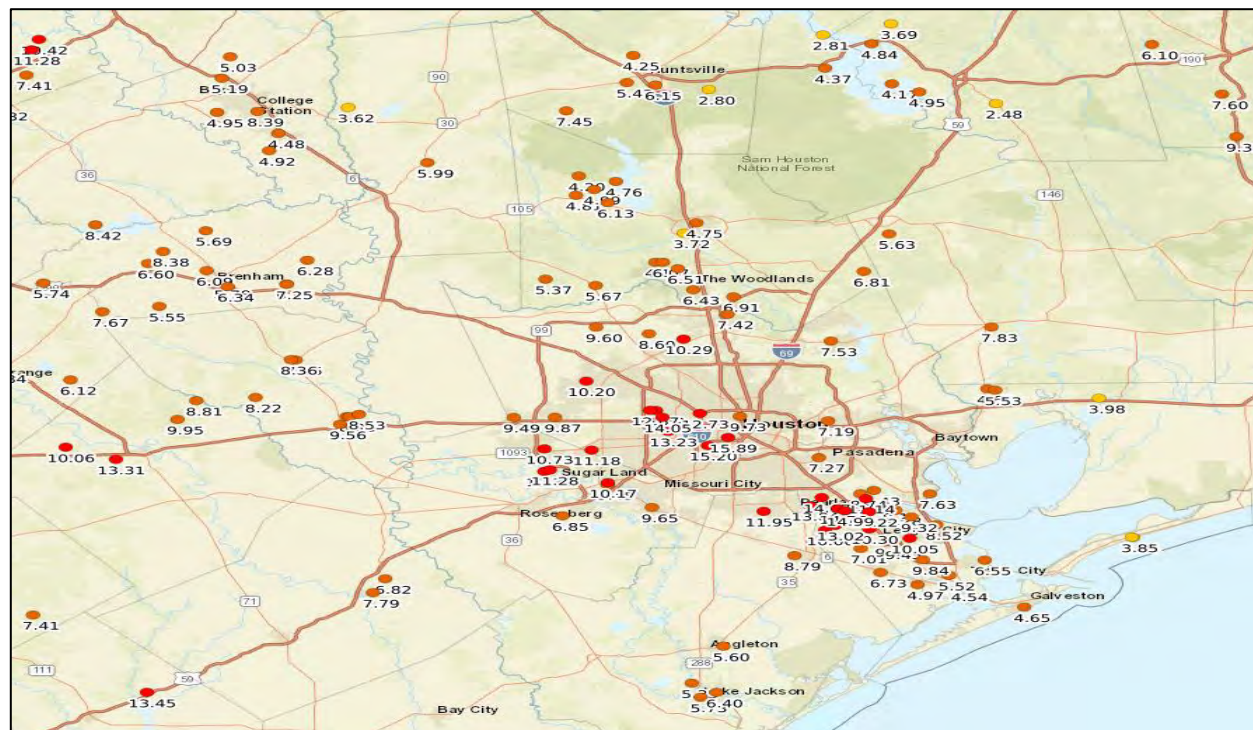


Figure 3: September 2020 Precipitation Recorded by CoCoRaHS Observers

“Houston/Galveston Regional Summary (continued)”

October

Abnormally dry conditions across the region this October. Drought conditions started to appear in some counties with very little rainfall. Sunny warm days were common most of the month until late in the month when a few strong cold fronts moved through the region. Most of the region had slightly above normal temperatures for the month from the very warm daytime highs consistently near the upper 80’s. Temperatures did cool down dramatically at the very end of the month.

Very little rainfall fell across the entire region for October. Chambers County had the highest CoCoRaHS observer county average rainfall with only 2.39”. The CoCoRaHS observer county rainfall average for the entire region was only 1.17”. Colorado, Austin, and Wharton counties were the driest counties in the region this month (Fig. 6). Large departures of rainfall values from normal across all of SE Texas are displayed in figure 5.

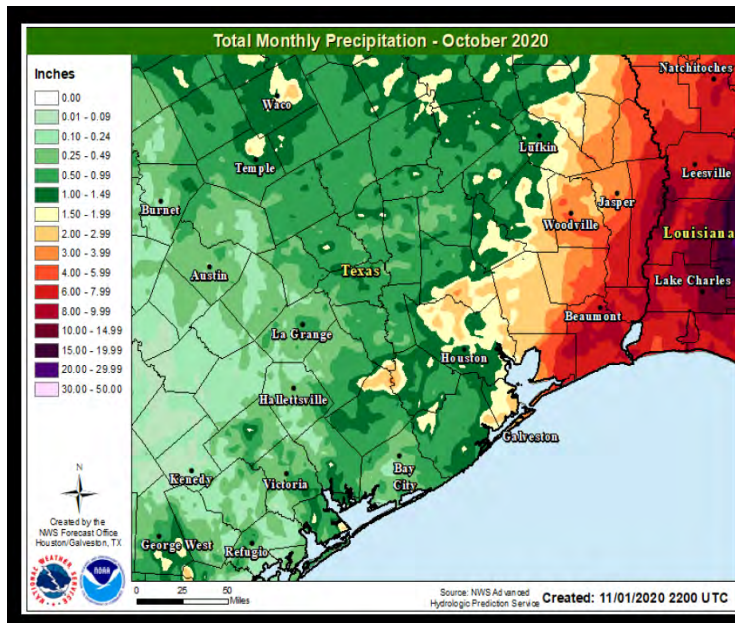


Figure 4: October 2020 Total Monthly Rainfall

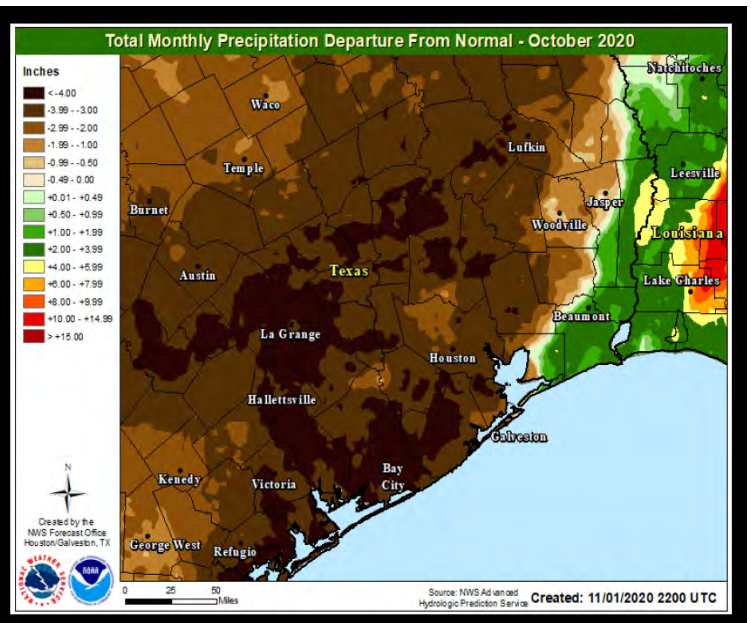


Figure 5: October 2020 Precipitation Departure from Normal

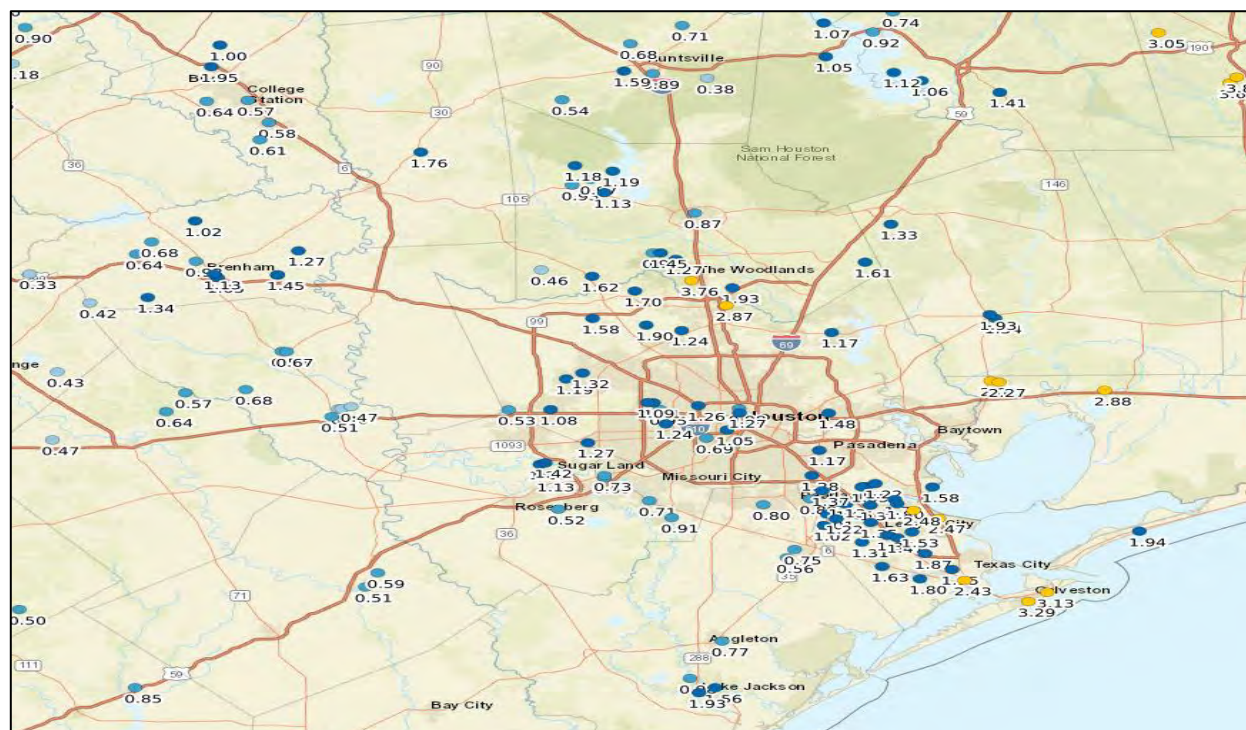


Figure 6: October 2020 Precipitation Recorded by CoCoRaHS Observers

“Houston/Galveston Regional Summary (continued)”

November

Very warm and dry month that ended with a big change when a complex storm system involving a stalled frontal boundary, a coastal low, and a second strong cold front moved through at the very end of the month. Sunny warm and dry conditions lasted for about three weeks in the month increasing the drought categories in the region. The region finished with above normal temperatures for the month.

Very little rainfall until the end of the month on the 27th and 28th which amounted to the bulk of the total rainfall across the region. Fort Bend, Brazoria, and Harris counties had the highest rain total for the month. Dry conditions for the month in San Jacinto, Colorado, Montgomery, Polk, and parts of Austin and Waller counties.

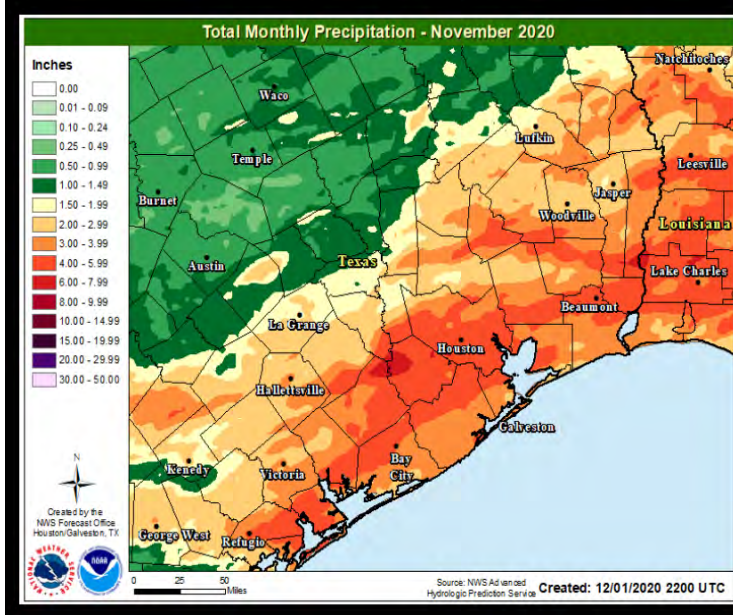


Figure 7: November 2020 Total Monthly Rainfall

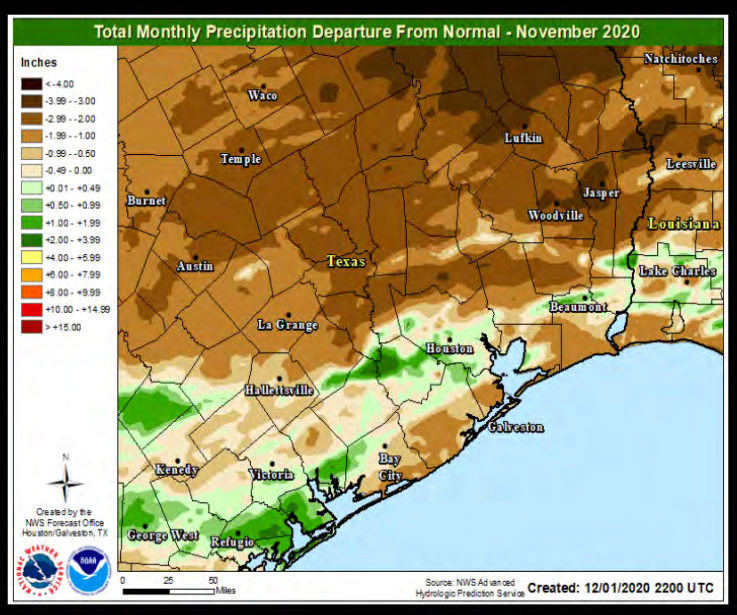


Figure 8: November 2020 Precipitation Departure from Normal

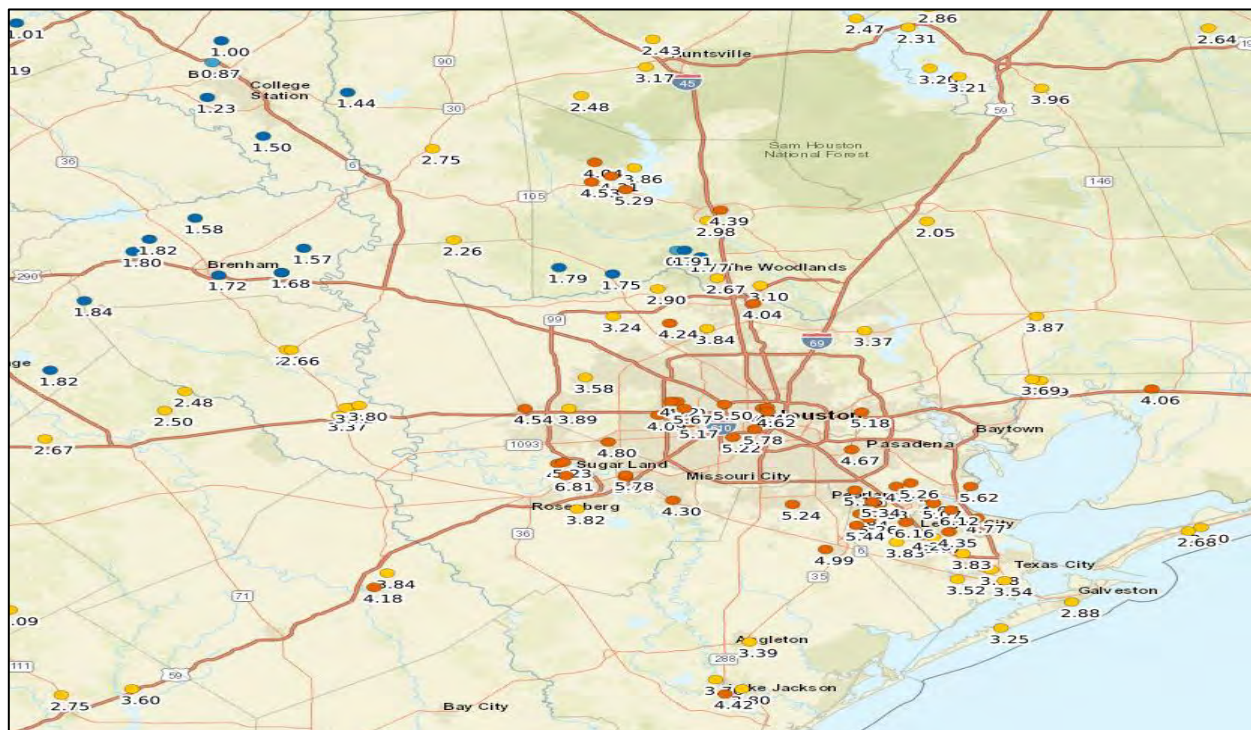


Figure 9: November 2020 Precipitation Recorded by CoCoRaHS Observers

“Houston/Galveston Regional Summary (continued)”

Autumn 2020 CoCoRaHS Stations Houston/Galveston Region Rainfall
 Actual Station Measured County Rainfall Averages in inches per month

County	September	October	November	Autumn Total
	AVG.	AVG.	AVG.	Sep.- Nov.
Austin	8.52	0.57	3.03	12.12
Brazoria	7.68	0.99	4.89	13.56
Chambers	4.72	2.39	3.78	10.89
Colorado	8.73	0.55	2.65	11.93
Fort Bend	9.33	0.95	5.04	15.32
Galveston	7.75	2.02	3.98	13.75
Harris	10.59	1.25	4.64	16.48
Jackson	11.53	0.64	3.17	15.34
Liberty	6.08	1.78	3.58	11.44
Montgomery	5.06	1.32	2.75	9.13
Polk	4.13	1.13	2.99	8.25
San Jacinto	3.87	1.06	2.62	7.55
Wharton	7.55	0.61	4.37	12.53
Region Totals	7.35	1.17	3.65	12.18

Highlights wettest month for a category
 Highlights driest month for a category

Note: All data taken from the CoCoRaHS website in Total Precipitation Summary Report
 Note: Only counties with 2 or more active observers reporting are displayed in this chart.

Chart 1: Total rainfall averages by county measured by CoCoRaHS observers in the Houston/Galveston Region.

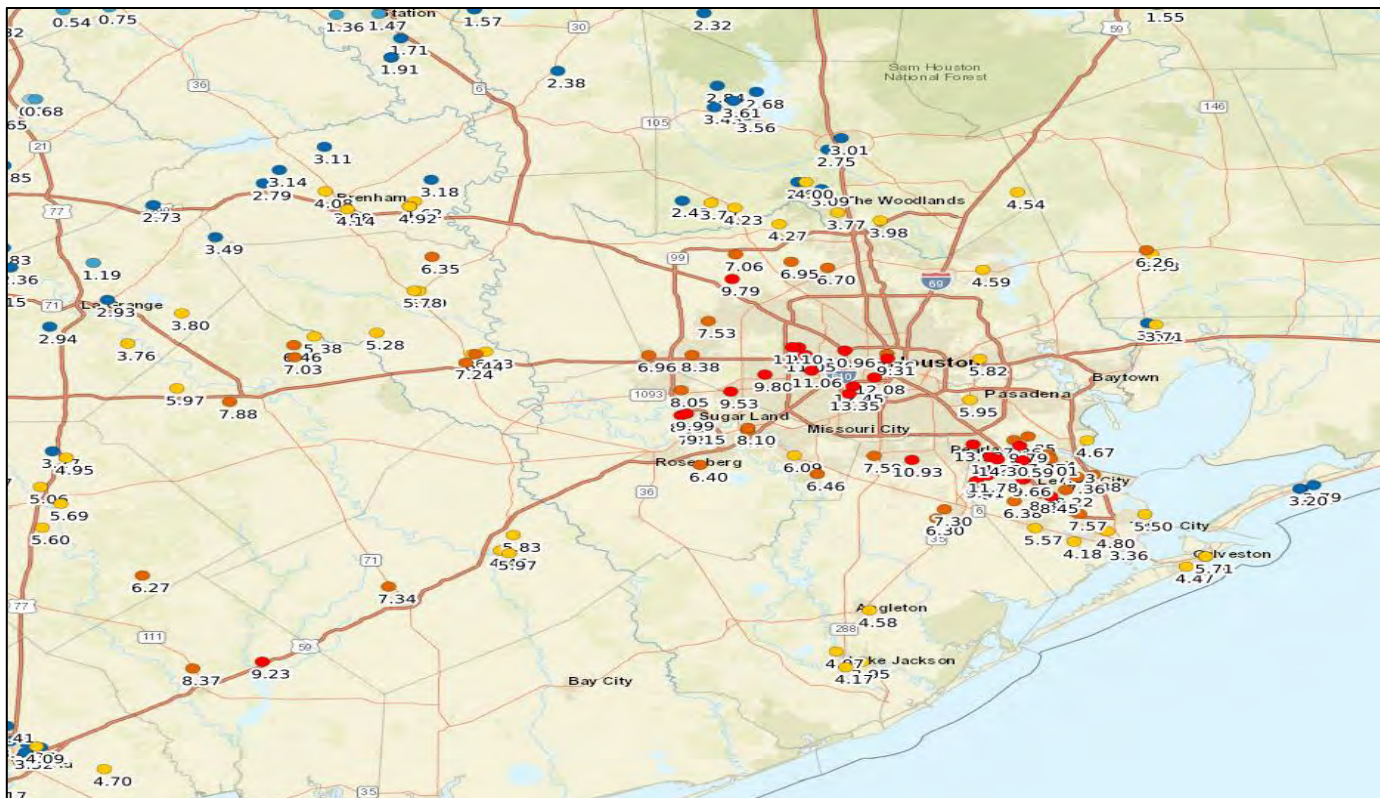


Figure 10: Tropical Storm Beta Rainfall September 20, 2020 – September 23, 2020

“East Texas Regional Summary”

Drought Intensifies over East Texas

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

Overall, below normal precipitation fell over most of East Texas this autumn, except for portions of Deep East Texas. This resulted in Moderate to Severe Drought developing across most of the region.

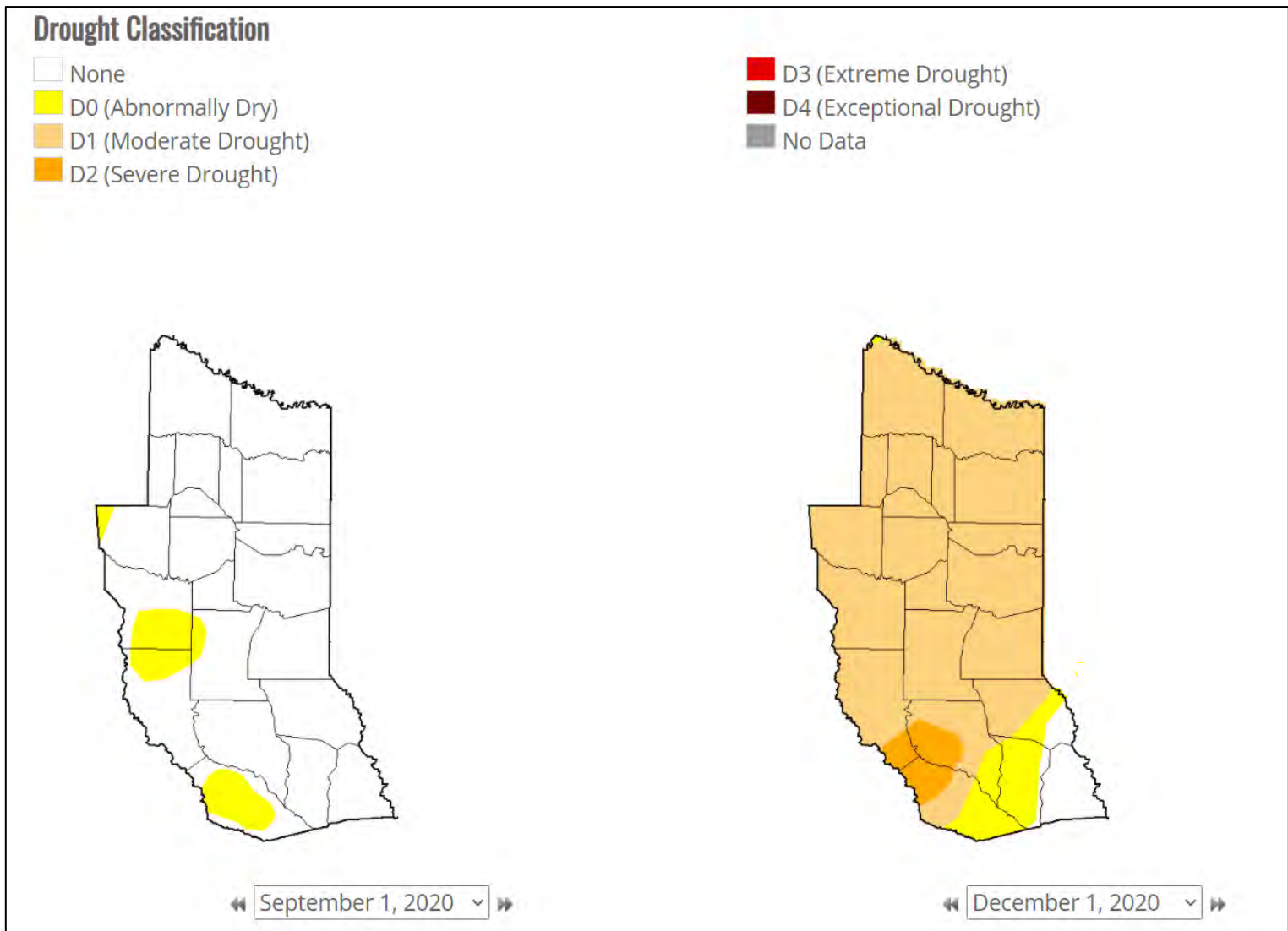


Figure 1: Drought Monitor for September 1st and December 1st 2020 - Image Courtesy of NDMC/USDA/NOAA

Despite the overall dry conditions this autumn, the month of September produced above average precipitation across most of East Texas. At the beginning of the month, the weather pattern became more active, as a series of frontal boundaries and troughs moved through the region. In fact, record daily rainfall was reported on the 3rd by the National Weather Service-Shreveport at both Tyler and Longview airports as 2.84” and 2.56” fell respectively. Additional moderate to heavy rainfall occurred on the 21st through 23rd of the month, as a surface trough moved into the region from the northwest along with Tropical Storm Beta across Southeast Texas. The heaviest precipitation occurred across Bowie and Cass Counties, where most CoCoRaHS sites reported around 3” to 5” of rainfall. There were also storm total amounts over 3” from sites across Deep East Texas, particularly in San Augustine County. Overall, most sites saw over 4” of rainfall for the entire month, with many sites in the Tyler/Longview areas reporting between 9” to upwards of nearly 16”.

“East Texas Regional Summary (continued)”

Rainfall amounts took a nosedive for the month of October, as a much drier weather pattern settled over the region. Based on National Weather Service climatology, the average rainfall for East Texas in October is around 4” to 5”. However, the overwhelming majority of CoCoRaHS sites across the region reported less than 2” of rainfall for the month. The highlight of the month occurred on the 9th-10th, when Hurricane Delta moved across Southwest Louisiana. This brought some well needed rainfall to portions of Deep East Texas, with sites across Angelina and San Augustine counties reporting nearly 2”. Most of the additional monthly rainfall across the sites occurred on the 23rd and 28th, as slow-moving cold fronts move through the region.

Drought conditions began to worsen during the month of November, as dry conditions remained over the region. The highlight of the month occurred during the late evening hours of the 24th and overnight hours of the 25th, when a cold front moved through the region bringing much needed rainfall along with severe weather. An EF-1 tornado was reported in Panola County just south of the Deadwood community near Farm-to-Market Road 31, about 13 miles southeast of Carthage. There were also many other locations across East Texas that reported high winds and trees down. By the 27th-28th, a cold front stalled across Deep East Texas bringing moderate to heavy rainfall to that area. Portions of Angelina and San Augustine counties reported 2” to 3” during this timeframe. Despite the two aforementioned events, rainfall amounts were very meager. Many of the CoCoRaHS sites, outside of Deep East Texas, reported less than 1” of precipitation for the entire month.



Figure 2: Panola County EF-1 Tornado Damage – November 25, 2020

With La Nina conditions currently in place across the equatorial Pacific Ocean, the Climate Prediction Center is forecasting below normal rainfall for the winter months. If this is to hold, expect drought conditions to worsen this winter, which could result in fire concerns and Burn Bans across the region.

“Winter Weather Outlook”

Mild Temperatures and Drier Than Normal Conditions Expected this Winter

By: Bob Rose, Meteorologist, Lower Colorado River Authority

There’s an old saying in Texas that if you don’t like the weather, just wait a bit and it will change. That may be true most of the time, but this winter, we may not see a whole lot of change. The reason for the stagnant outlook is the recent development of a moderate to strong La Niña earlier this fall. The La Niña is already having a strong influence on the weather pattern across the U.S and around the world and it is not expected to diminish anytime soon. Moderate to strong La Niñas have historically caused drier and milder-than normal winters across Texas and this year will likely not be an exception.

La Niñas develop when waters in the tropical Pacific between the west coast of South America and the International Date Line become colder than normal. As all of this sets up, the warmest Pacific waters shift to the western side of the Pacific. Thunderstorms develop over the warm waters of the western Pacific cause air to rise and spread east. This air sinks over the cool waters of the eastern Pacific, creating an area of high pressure in the upper atmosphere that often builds north to Alaska and western Canada. The Jet stream coming east from Asia is forced to bend north around the ridge and move into Canada instead of coming east into Texas. With the jet on this northerly track, it not only limits the number of storm systems that would otherwise move across Texas, but this northerly position also limits the number of cold fronts and cold air outbreaks that would typically spread south from time to time. La Niña winters will most often have lots of mild, Pacific air and just occasional periods of light rain. In short, milder than-normal and drier than-normal conditions.

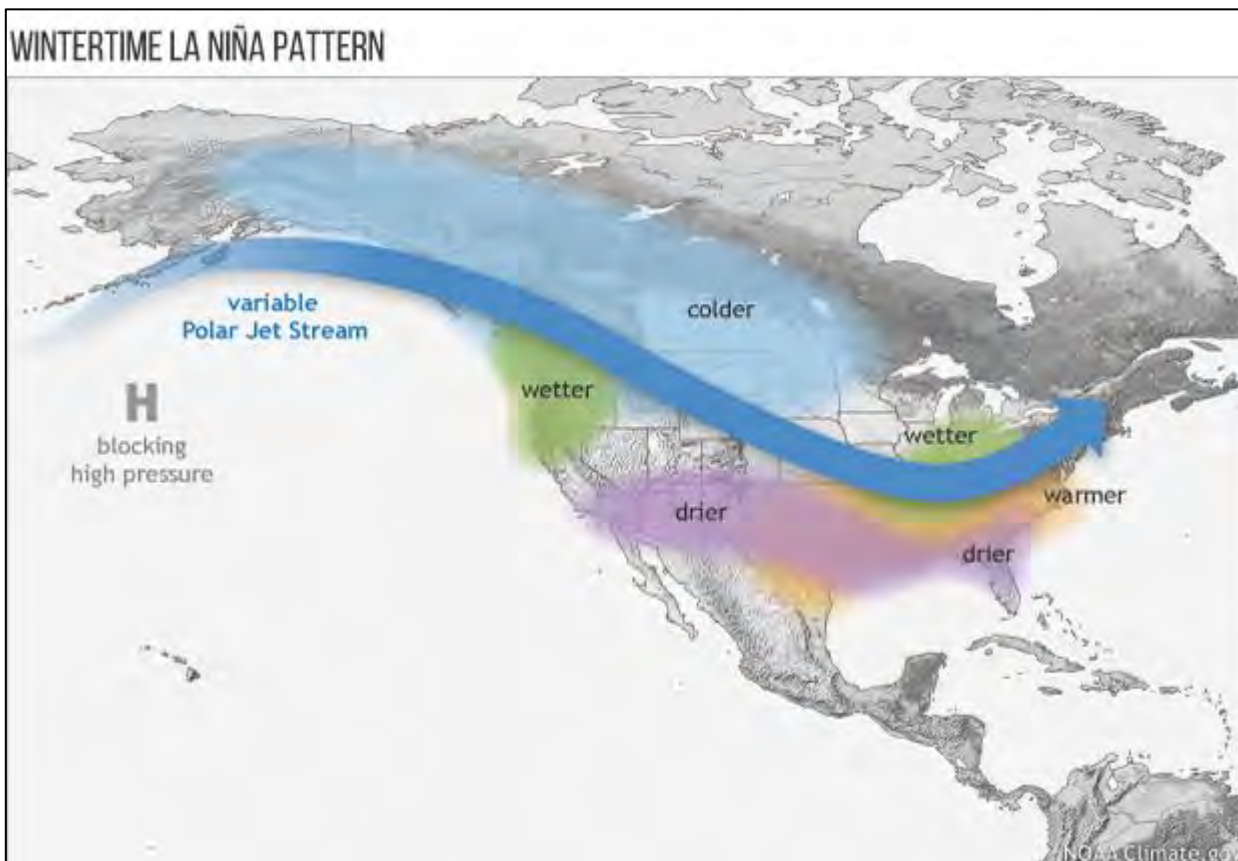


Figure 1: Typical wintertime La Niña pattern across North America.

“Winter Weather Outlook (continued)”

This winter, waters across the tropical Pacific are quite cool. In fact, they are the coldest since the winter of 2010-2011—the last time a moderate to strong La Niña was in place. Looking back at the weather conditions for that winter, the weather was quite mild and much drier than-normal across Texas. Recent observations show the circulation of rising air across the western Pacific and sinking air along the eastern side is quite strong. This circulation along with the very cool eastern Pacific waters give forecasters high confidence La Niña will have a strong influence on Texas weather this winter.

With that high confidence in mind, the Climate Prediction Center’s outlook for January/February/March shows strong odds for temperatures to average warmer than-normal and precipitation to average drier than-normal across all of the state. In short, a mild and dry winter:

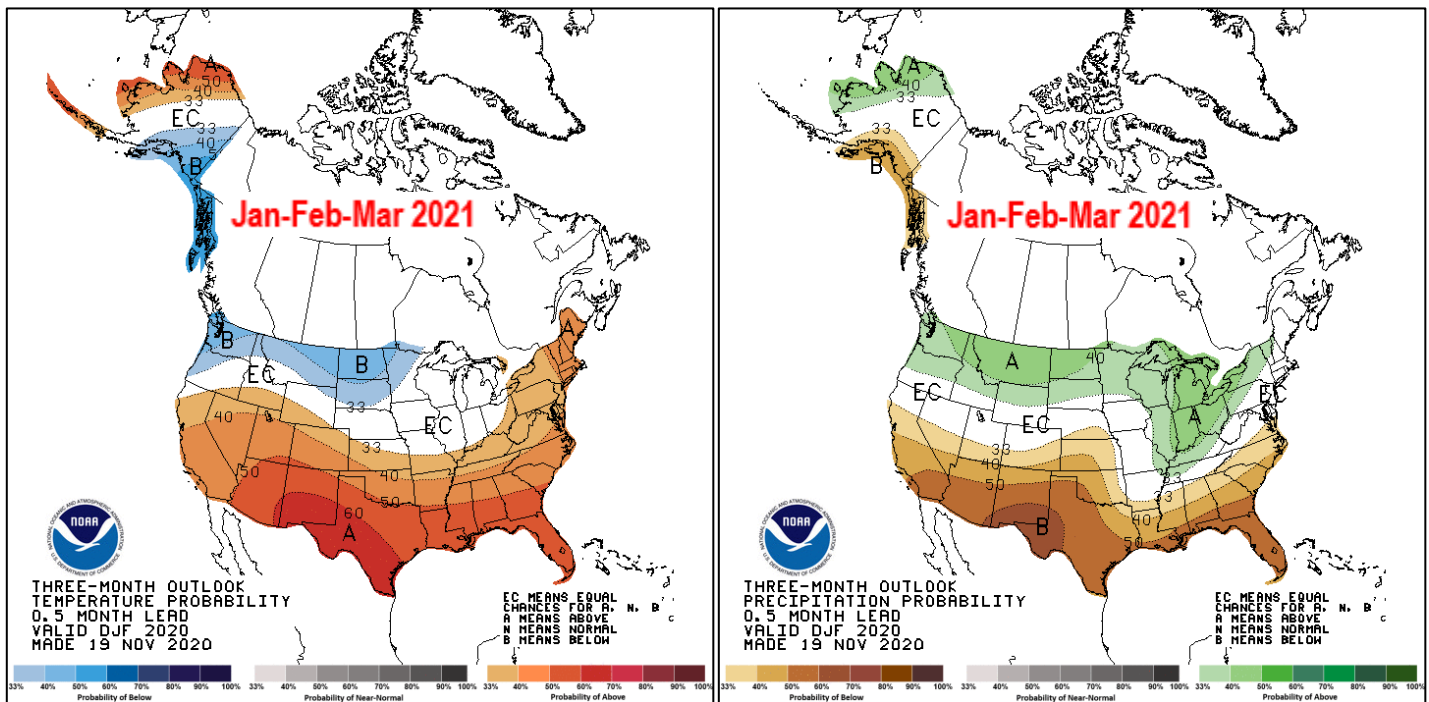


Figure 2: Temperature and Precipitation Outlook for winter 2020-2021

This outlook shows average winter conditions across Texas. But do keep in mind other atmospheric oscillations such as the Madden-Julian Oscillation, may at times briefly overwhelm the La Niña signal, allowing for some outbreaks of cold air. But these outbreaks will be short-lived. The same holds true for precipitation. While parts of the state may see moderate rainfall and even a little wintery precipitation every now and then, totals overall should average below normal.

Climate Prediction Center forecasters call for La Niña to dissipate sometime this spring, with the Pacific returning to a neutral state—neither La Niña nor El Niño by summer.

“North Texas Regional Summary/State Highlights”

Trending to Drier Weather as Autumn Progressed

By: Greg Story, NWS Retired

Greetings from North Texas! Needless to say, 2020 has been a strange year on many fronts. It was incredible how busy we had been in measuring rainfall through the middle of June, then, starting in July and August and continuing through autumn it turned more “normal”. As I will highlight, the near-record setting year for the first six months turned into most months seeing below normal rainfall. I am thankful to each and every one of you for reporting your rainfall via CoCoRaHS! With rainfall as variable as it is, your reports continue to help the National Weather Service (and other entities) to assess how widespread the rainfall events are and where droughts may be developing.

In September the center part of Texas got above normal rainfall. Only the western and far southwest sections had below or much below normal precipitation. Then in October, which is usually a wet month, it was very dry state-wide. Only northwest Texas and the Sabine River basin from Toledo Bend Lake southward (and western Louisiana) saw above normal rainfall. In November the dry weather regime continued, with only parts of south central and southeast Texas observing above normal rainfall. All other parts of Texas were below normal. This was quite a shift from earlier this year!

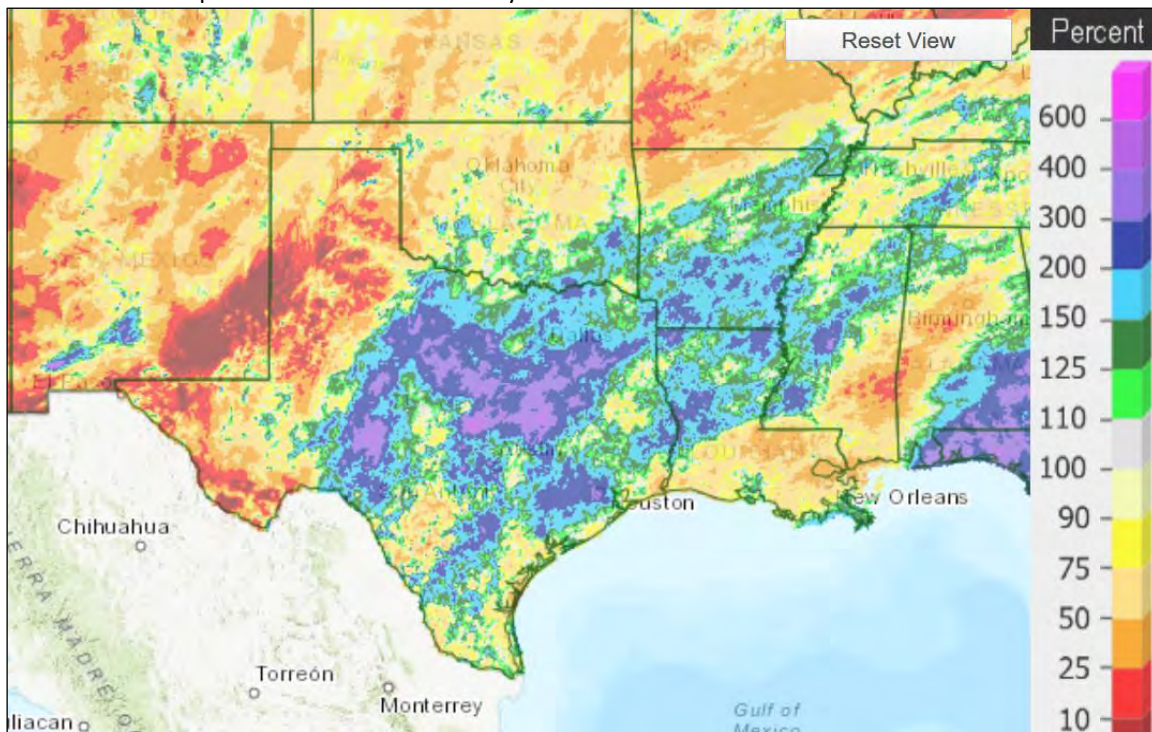


Figure 1: Percent of Normal Rainfall for September 2020. The green and light yellow colors indicate near normal precipitation; the blue and purple colors indicate above normal, while the brown and red indicates below normal precipitation.

At DFW Airport, the September 2020 monthly rainfall amount was 3.87". The normal amount is 2.55" so they were +1.32" above normal for the month. For Waco, they received quite a bit more than the Dallas/Fort Worth area with 7.45" for September. The normal amount is 3.06" so they were +4.39" above normal. There were about five significant storm systems which affected our weather in September. Here are the highlights of the weather for the month.

September 1 - 2:

Showers and thunderstorms formed over southern Oklahoma which moved into north Texas. These thunderstorms also put out additional outflow boundaries which generated more thunderstorms over north and central Texas. This created a stationary front in north Texas which producing even more rain. When all was said and done 6" – 8" of rain fell near Denton and other isolated locations. Further south in north Fort Worth around 3.40" was measured.

September 9 – 10:

A huge closed low pressure system over four corners region produced widespread rain, especially over the far western portions of north Texas. There was 5" – 7" of rain over the far western parts of north Texas. Further east, 3" - 4.50" was measured from Grand Prairie to Richardson.

September 16:

Hurricane Sally moved onshore at Gulf Shores, Alabama. There was no impact from Sally on our weather in north Texas, but a weak front did bring scattered showers.

“North Texas Regional Summary/State Highlights (continued)”

September 21 – 23:

Tropical storm Beta made landfall over the middle TX Gulf coast. The maximum 24-hour rainfall was 10.80" near Friendswood. The storm total amount was 14" – 15". The heaviest rain in north Texas was 2+” around Lott and Salado on 21st. Further north the heaviest rain was slightly over 1" from Rockwall to Paris on the 22nd.

September 27 – 28:

During the late evening of the 27th to early on the 28th a strong cold front moved rapidly through north Texas. The heaviest rain created by the frontal passage was over northeast Texas where 1.33" to 1.75" fell from Longview to Cumby.

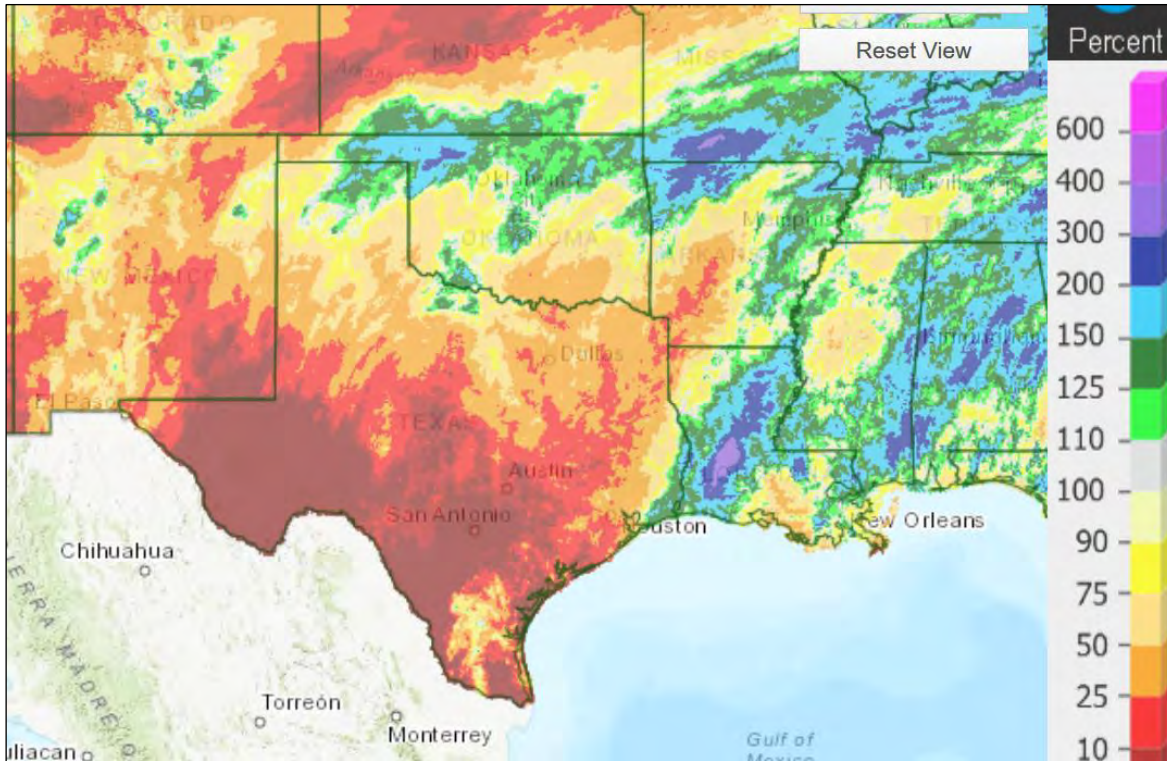


Figure 2: Percent of Normal Rainfall for October 2020. The red and yellow colors indicate below normal precipitation, while the blue and purple indicate above normal rain. In October, most of the state had near to below normal precipitation. There were very few locations which got above normal precipitation. Much of southwestern and central Texas and parts of northeast Texas received below normal precipitation in October. But, the area near Wichita Falls and parts of extreme southeastern Texas had above normal precipitation.

At DFW Airport, the October 2020 monthly rainfall amount was 1.74". The normal amount for October, which is our second wettest month of the year climatologically behind May, was 4.22" so they were -2.48" below normal for the month. For Waco, the October 2020 monthly rainfall was 1.73". The normal amount for October is 3.90" so they were -2.17" below normal for the month. There were about three significant storm systems which affected our weather in October. Here are the highlights of the weather for the month.

October 9 - 10:

Hurricane Delta moved onshore in southwest Louisiana, and this storm moved northeastward. The impact from Delta on north Texas' weather was minimal, with the heaviest rain falling near and northeast of Lake Charles LA. Some heavy rain did occur over extreme east Texas with 7.54" occurring at Bon Wier.

October 23:

A strong cold front passed through Texas. As this occurred thunderstorms developed along and ahead of the front. These thunderstorms brought 1.50" to nearly 3" from the area near Dennis to Glen Rose.

October 26 – 29:

A major low pressure system developed over Arizona and moved slowly northeast. Initially with this storm there was only light rain, with freezing rain, snow and sleet over northwest Texas. Initial precipitation amounts were all under 1", with the heaviest near and just west of Wichita Falls TX. Then on the 27th they had 1" to 1.50" over northeast Texas. Finally, on the 28th there was around 1" over west Texas. Plus, hurricane Zeta struck southeast Louisiana including New Orleans, with only light rain falling over north Texas. Storm total rainfall amounts during this period over north Texas were generally 0.75" to 1".

“North Texas Regional Summary/State Highlights (continued)”

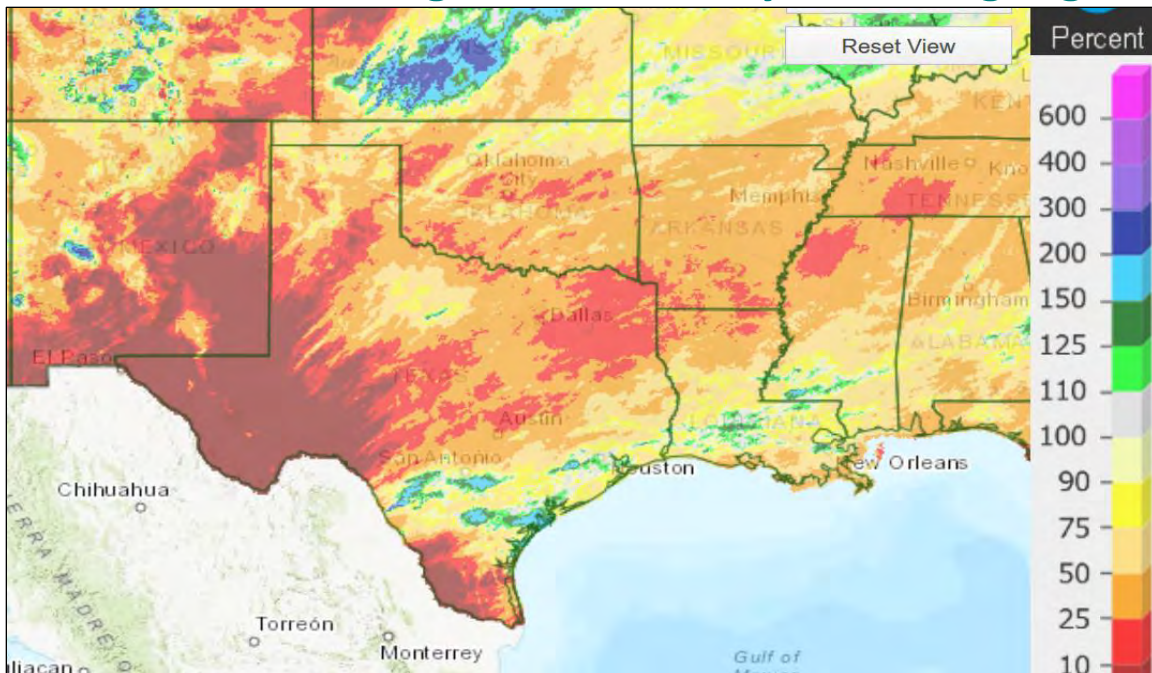


Figure 3: Percent of Normal Rainfall for November 2020. The yellow and red colors indicate below normal precipitation, while the green and blue colors indicate above normal rain.

At DFW Airport, the November 2020 monthly rainfall was 1.08". The normal amount for November is 2.71" so they were -1.63" below normal for the month. For Waco, in November 2020 they received 1.25". The normal November rainfall in Waco is 2.82" so they were -1.57" below normal for the month. There were about three significant storm systems which affected our weather in November. Here are the highlights of the weather for the month.

November 10 – 12:

November began with a very dry weather pattern. On the 10th through the 12th tropical storm Eta moved in and through Florida. However, there were no impacts to Texas' weather.

November 14 - 15:

Late in the day on the 14th into the 15th a strong cold front moved through Texas, but while south Texas received some rain from this frontal passage no rainfall over north Texas.

November 24 - 25:

Late in the evening of the 24th, a strong cold front produced a line of showers and thunderstorms across north Texas that lasted into the early morning hours of the 25th. A brief EF2 tornado occurred in Arlington. Rainfall of slightly over 1" occurred in Denton and Collin counties, with most other cities receiving around 0.25".

November 27 – 29:

A storm began forming west of Texas on the 27th. Late that day a stalled front produced 4" of rain in the Houston area, but initially there was no rain over north Texas. Then on the 28th into very early on the 29th a strong upper low passed north of Texas which produced widespread rainfall. The heaviest rain of 3" occurred across south Texas. In north Texas the average amount of rain was around 0.67".

For the fall season (September through November), DFW airport received 6.69". The normal amount is 9.48" so DFW was -2.79" below normal for autumn. For the fall season in Waco, they got 10.43". The normal rainfall is 9.78" so they were +0.65" above normal for autumn. In 2020 through November 30, DFW airport has received 40.70". The normal amount is 33.59" so they are +7.11" above normal for the year. And for Waco for 2020 through November 30, they have received 41.08". The normal amount is 31.94" so Waco is +9.14" above normal for the year.

Thanks to you all for your weather observations. I want to give a special shout out to those of you who have yet to miss a day to report in 2020! Remember, even on days you are not home (vacation) or unable to report for any reason, you can make a multi-day accumulation report upon your return. This type of report fills in the gaps when your daily reporting was not possible. The amount of the rainfall which fell at your station is extremely important and valuable information to the National Weather Service's West Gulf River Forecast Center.

“North Texas Regional Summary/State Highlights (continued)”

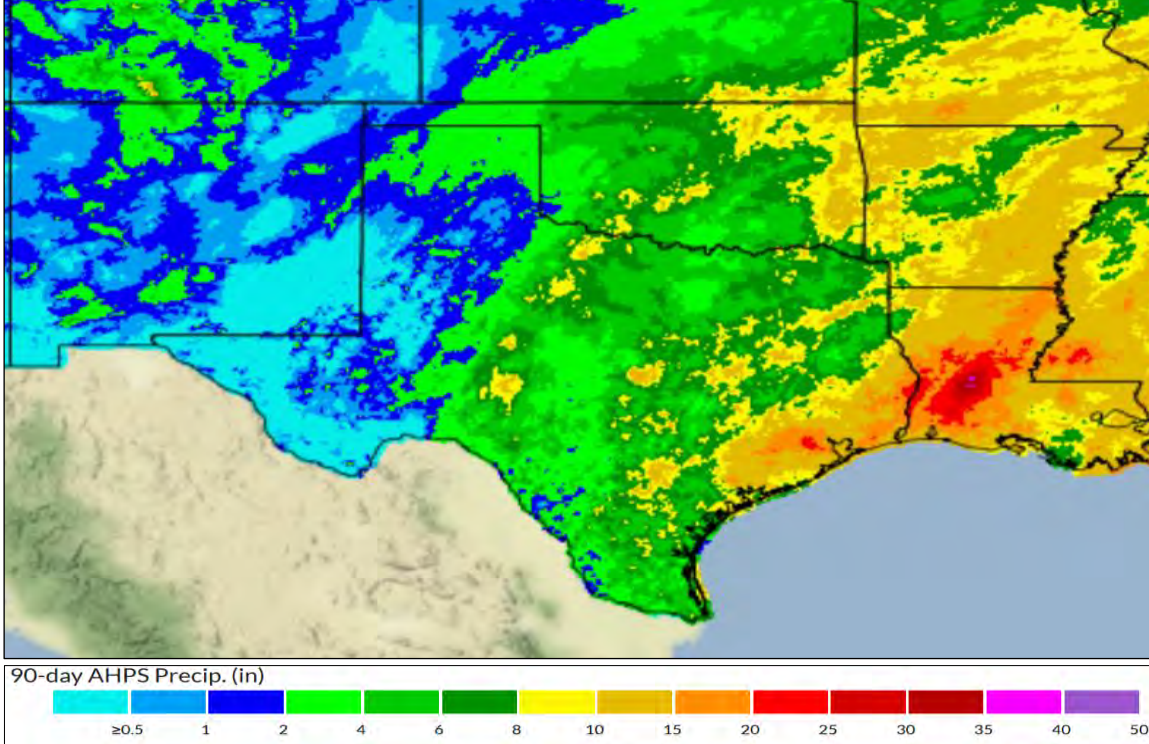


Figure 4: Fall season precipitation 2020. The bright red and brown colors indicate the largest rainfall totals while the light green and blue colors show light amounts.

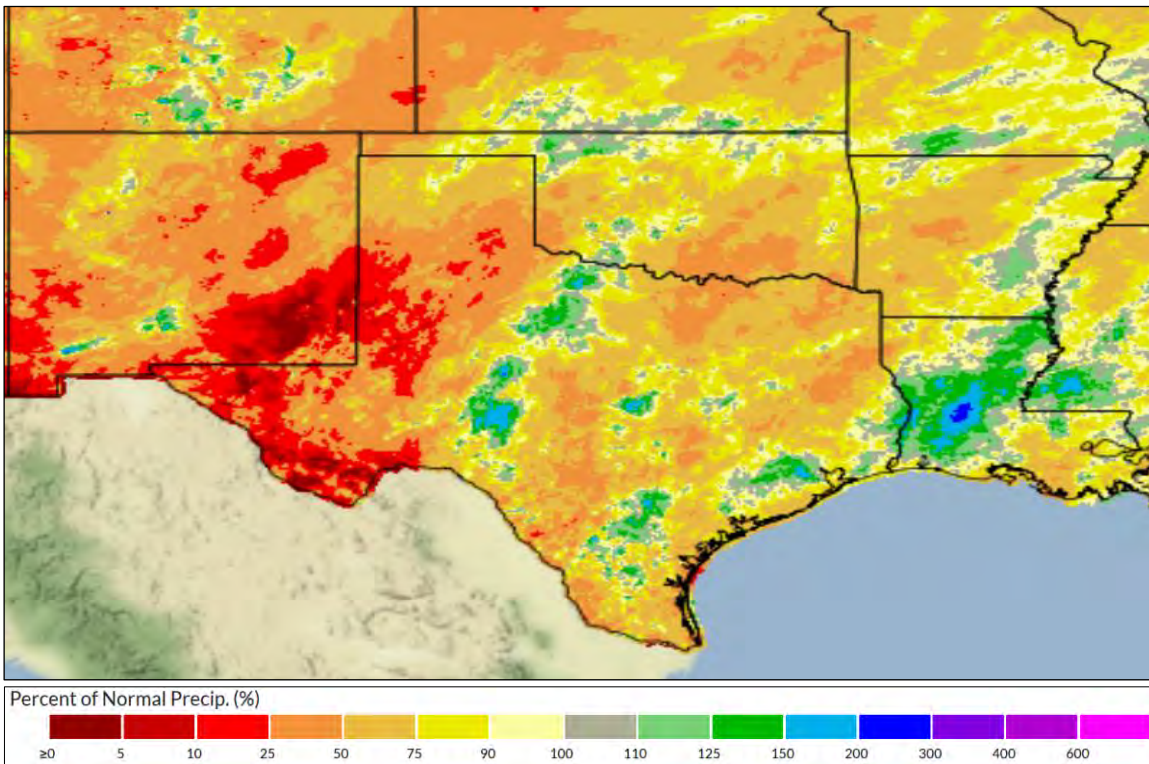


Figure 5: Percent of Normal Precipitation for Fall 2020. The dark blue and green colors indicate above normal rainfall. The brown, yellow and red colors indicate below normal amounts. Note the prolonged dryness over southwest and far west Texas into southeast New Mexico.

Please consider inviting your neighbors, relatives and friends to join CoCoRaHS! You might even consider giving an official rain gauge as a Christmas present! I realize that this has been a difficult time for many of you due to COVID-19. But your faithfulness in submitting your rainfall readings to CoCoRaHS during this fall season has not gone unnoticed. Your dedication helps the users of CoCoRaHS data out a lot. Have a very merry Christmas and a Happy New Year! Sincerely Greg Story.

“Observer Tips & Training Material”

Understanding the Difference between Precipitation and Condensation

Question: *Which one does CoCoRaHS measure and what is the difference?*

Answer: CoCoRaHS measures rain, hail, sleet, and snow. These are all forms of precipitation.

Precipitation is a process of a liquid or solid aqueous particles in the atmosphere such as a cloud and falling to the earth's surface as rain, hail, sleet, and snow. Only precipitation values *should* be reported on a daily report form.

Condensation is the process of water vapor changing from a vapor phase to a liquid phase which is deposited on surfaces such as a rain gauge. Dew, fog, fog mist, and frost are the result of condensation. CoCoRaHS does not measure or report any values of condensation. CoCoRaHS observers *shouldn't* report condensation collection in the 4-inch diameter gauge as precipitation on the daily report form. Only make a note in comments of condensation from dew.

Do I report morning dew that has collected in my rain gauge?



Answer: *No. Dew is not precipitation, but you may note the dew in the comments*

The first thing every observer should do when reading their gauge and finding water in it is to ask themselves how did it get in the gauge. Did other CoCoRaHS stations in your county and surrounding counties report precipitation? Was the sky clear all night? Condensation on a vehicle windshield will make it difficult to see clearly through while rain will wash a windshield clean. These are some things an observer can do to answer the question of how did the water get in the gauge. Sometimes an observer will not completely empty the CoCoRaHS gauge of all water by slinging it dry. It only takes a very small amount of water left in the gauge to settle to the bottom of it and collect as 0.01". There have been many occasions of reports of 0.01" of rain from stations just after previous days had rainfall and the gauge was read the previous morning. Not all water was completely emptied from the gauge that morning before the current observation resulting in the left over water being reported again as 0.01" of rain on a clear 24 hour period. Hopefully these tips and understanding of condensation will help you answer the question of where the water came from. There is a huge difference between condensation and precipitation! Dew, melted frost, fog, and fog mist on your gauge may trick you into reporting a trace amount or 0.01"-0.02" of precipitation, but you won't be fooled now, will you?

“Observer Tips & Training Material (continued)”

My Data Entry : Daily Precipitation Report Form

Precipitation Report Form Submit Data Reset

Station Number : IL-CP-1
 Station Name : Homer 2.0 N

* Denotes Required Field

12/1/2015 * **Observation Date**
 7:00 AM * **Observation Time**

0.23 in. **Rain and Melted Snow to the gauge during the past 24 hours, or T for trace, or NA for unknown.**

Observation Notes: (This will be available to the public)
 Very little wind - good gauge catch.

New Snowfall

2.6 in. **Accumulation of new snow in inches to the nearest tenth**
 0.25 in. **Melted value from core to the nearest hundredth**

Total Snow and Ice on Ground at Observation Time

2.5 in. **Depth of total snow and ice (new and old) in inches to the nearest half inch**
 NA in. **Melted value from core to the nearest hundredth**

Precipitation Information

Precipitation Began _____
Precipitation Ended _____ AM PM
Heaviest Precipitation Began _____ AM PM
Heaviest Precipitation Lasted _____ minutes
These times are: Select Time Accuracy

Reporting Snow and Sleet

The depth of snow and/or sleet measured on your snow board or flat, level surface is entered here.

Melt the frozen precip in the gauge and report it here. If you cannot melt or do not have a measurement, change to NA. Do not leave it as zero.

Comments are always helpful.

This is the water measured from a core of snow taken from your snow board. If you do not take a separate core leave this NA. Do not copy your precip into this field.

This the depth of snow and ice on the ground each day, whether or not any snow has fallen.

This is for the SWE of total on the ground, old plus new snow and ice.

Instructions for Data Entry of Snowfall measurements

Total Rain and Melted Snow

Enter only the amount of rain or melted snow that fell into the rain gauge for the past 24 hours ending at 7:00 A.M. the day of entry. If warm water was added to help melt snow, be sure to subtract that amount.

If there was no precipitation, report 0.00. If some precipitation fell, but the total was less than 0.01 inches, enter T in this blank "field".

New Snow:

This is the depth of the new snow (not its water content) that fell in the last 24 hours. This is measured with a ruler and reported to the nearest one-tenth (0.1") inch. The **New Snow** is the maximum accumulation of fresh snow during the past day prior to melting or settling. Since snow melts and settles, you may have to measure during or soon after the snowfall ends since by 7:00 A.M. the depth may be reduced.

If snow fell in the past 24 hours, but you did not measure it, please do not leave it as 0.0". Instead, please enter NA ("not available").

Total Snow on Ground

This is the total amount of snow (new and old snow combined) on the ground, measured to the nearest 0.5 (1/2) inch. The **Total Snow on Ground** is reported even on days when no new snow has fallen. If there is snow on the ground but you did not measure the depth, then leave "NA" on the form ("Not Available"). If there is no snow at all on the ground, replace the "NA" on your form with 0.0

Uneven Snow: If the wind has blown and the snow is uneven, or if melting has occurred in some areas but not in others, then please take several measurements. Average your measurements into one value, and enter that value

“Observer Tips & Training Material (continued)”

Details about variations in snow may be added in the "Notes" section.

Melted Value From Core

If you believe your gauge has not caught all of the precipitation that has fallen (or if you're just curious), then you can take a core sample of the new snow that has fallen using your 4 inch diameter rain gauge, on your snowboard. If the amount is less than 0.01 inches, enter T in the field.

Example:

The snow begins to fall in mid-morning. At 3 P.M. the snow stops falling and you measure the depth at 4.2". The sun then comes out and the snow quickly begins to melt and settle. At 7 A.M. the next morning you measure 2.6" of snow on your snowboard. There was little wind with this snow, and your rain gauge has likely caught most of the snow that fell. You melt the contents of the gauge and find 0.41".

What do you report for each entry?

Total Rain and Melted: 0.41" (the melted snow and/or rain)

New Snow: 4.2" (the amount of snow received in the previous 24 hours, prior to melting and settling)

Total Snow on Ground (in inches) 2.5" (assuming bare ground prior to this snow)

Note: Please read the training slide shows on the CoCoRaHS home page to learn the complete process of measuring snow at www.cocorahs.org

How Does Your Rain Gauge Work?

When it rains, your gauge measures the amount of precipitation that falls through the area at the top of the gauge. When you read the gauge, you measure the depth of water that has fallen through the area and accumulated at the bottom of the tube, which is the depth of water.

How, you may ask, can this gauge work properly if the inner tube is 10 inches long but only records 1 inch depth of water? The reason has to do with accuracy. The National Weather Service (NWS) has adopted the criteria that the gauge should be able to measure to an accuracy of 0.01". The problem with a gauge that's 4" (CoCoRaHS) or 8" (NWS standard) in diameter, is that it's nearly impossible to read the depth to an accuracy of 0.01". That's where the funnel and inner tube come in.

The funnel of the CoCoRaHS gauge squeezes the water into the area of the inner tube, which is 1/10th of the area of outer cylinder (The NWS gauge has a similar funnel and inner tube). By reducing the area that the water falls into, the depth can be stretched by the same factor of 10. In this way, the total volume of water (area X depth) that fell through the top of the gauge and the total volume in the inner tube are the same. This stretching allows us to read the depth of water an accuracy of 0.01".

Incidentally, the Fort Collins, Colorado weather station has a CoCoRaHS and NWS gauge side-by-side and has been keeping track of their measurements for a number of years. The results show that both gauges record very similar amounts of precipitation. View the abstract from the AMS 15th Conference on Applied Climatology/13th Symposium on Meteorological Observations and Instrumentation (2005).

Sunset over CoCoRaHS gauge



Photo courtesy of B.R. Koehler taken on December 13, 2019 near San Felipe

"Scheduled CoCoRaHS Webinars"

SPECIAL WEBINAR - Thursday, January 28, 2021 -1PM EST

"A Review of Significant Weather Events Occurring in 2020"

Greg Carbin
NOAA/Weather Prediction Center
College Park, MD



"Greg will present an overview of hazardous weather episodes impacting life and property within the United States during 2020 (and the top 10 events in the past decade ending in 2019). Selected events will be presented in quasi-chronological order and described with photos, maps, and loops of satellite and radar data. While many of the events selected for this talk captured the attention of the media and public, some of these "meteorological memories" may have been forgotten as more substantial weather events occurred throughout the year. This review will highlight some of the "big stories", as well as smaller short-term events. The presentation will include descriptions of significant and deadly weather events of the past year including winter storms, tornadoes and floods. Along with the meteorological set-up for each event, an impact summary will also be provided.

Webinar #75 - Thursday, March 11, 2021 -1PM EDT
"COOP - NOAA's long established citizen observation program"

Amy Fritz
NOAA/National Weather Service
Silver Spring, MD

	<p><i>Texas CoCoRaHS Observer</i> The official newsletter of Texas CoCoRaHS</p>
	<p>Newsletter Editor: Ron Havran, Regional Coordinator - Houston/Galveston Region Assistant State Coordinator cocorahs.hou.galv@gmail.com</p> <p>Texas CoCoRaHS: Bill Runyon, Texas State Coordinator texas@cocorahs.org</p>
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