TEXAS CoCoRaHS OBSERVER

Winter 2019-2020

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

Welcome to the Texas CoCoRaHS Observer newsletter

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

March is an excellent month to recruit a friend to join CoCoRaHS and sign up to become a precipitation and weather conditions observer.

Inside this issue

Winter Weather Summary-Today's Secret Word Is: Phenology

By: John Nielsen-Gammon
Texas State Climatologist

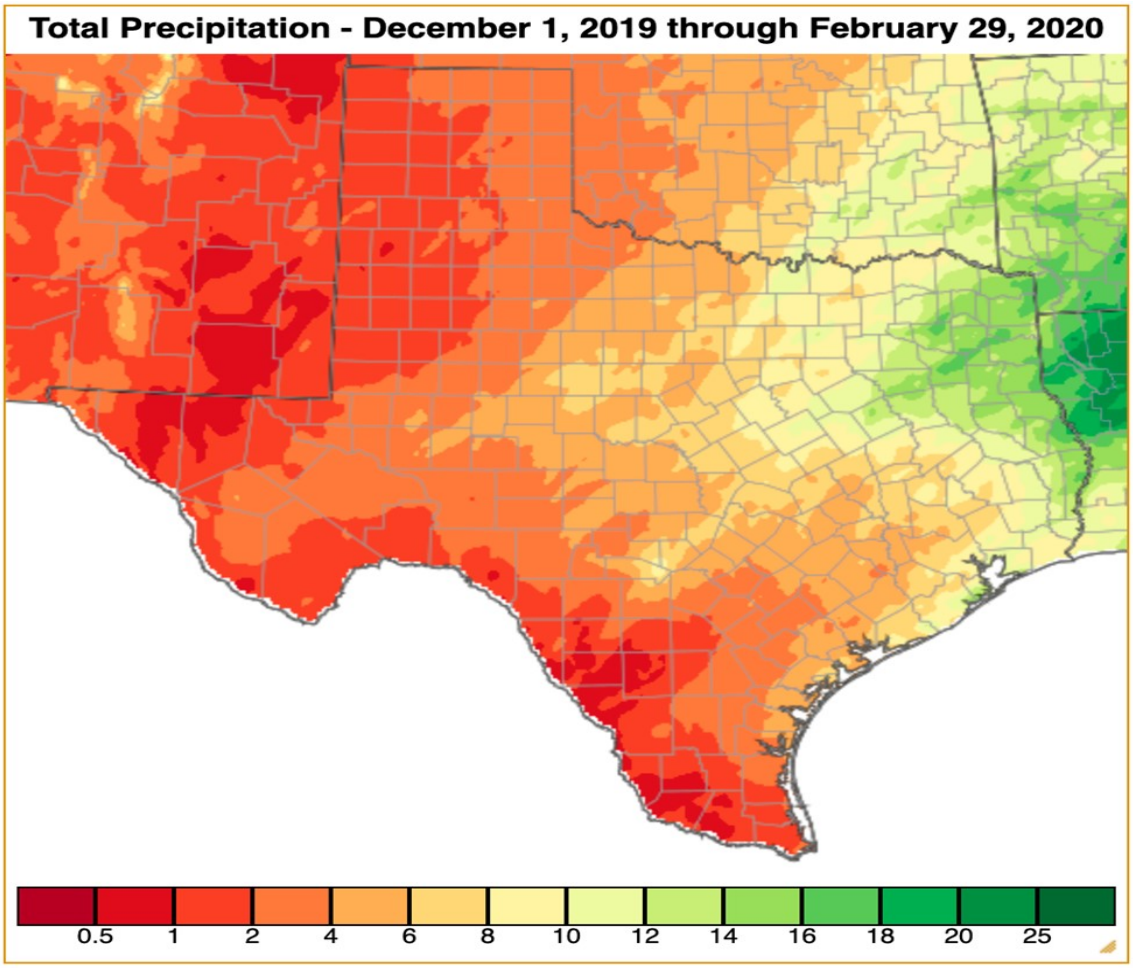


Image1: PRISM precipitation analysis by Oregon State University, graphical software by Northeast Regional Climate Center

CoCoRaHS is not the first volunteer observing network to inspire ordinary people to make high-quality scientific measurements. People have been recording the dates of important climate-related events for millennia. Examples include dates of first leaf or bloom appearance, dates of snowfall or flooding, and dates of first or last ice on rivers and ponds. ->

"Winter Weather Summary-Today's Secret Word Is: Phenology (continued)"

In many cases, these records have been compiled and used in climate studies. For example, scientists have found that, over the past 30 years, the timing of breakup of ice on 75 lakes mostly in North America and Europe has become earlier by about 1.5-2 days per decade, with similar trends for the delay of freeze up.

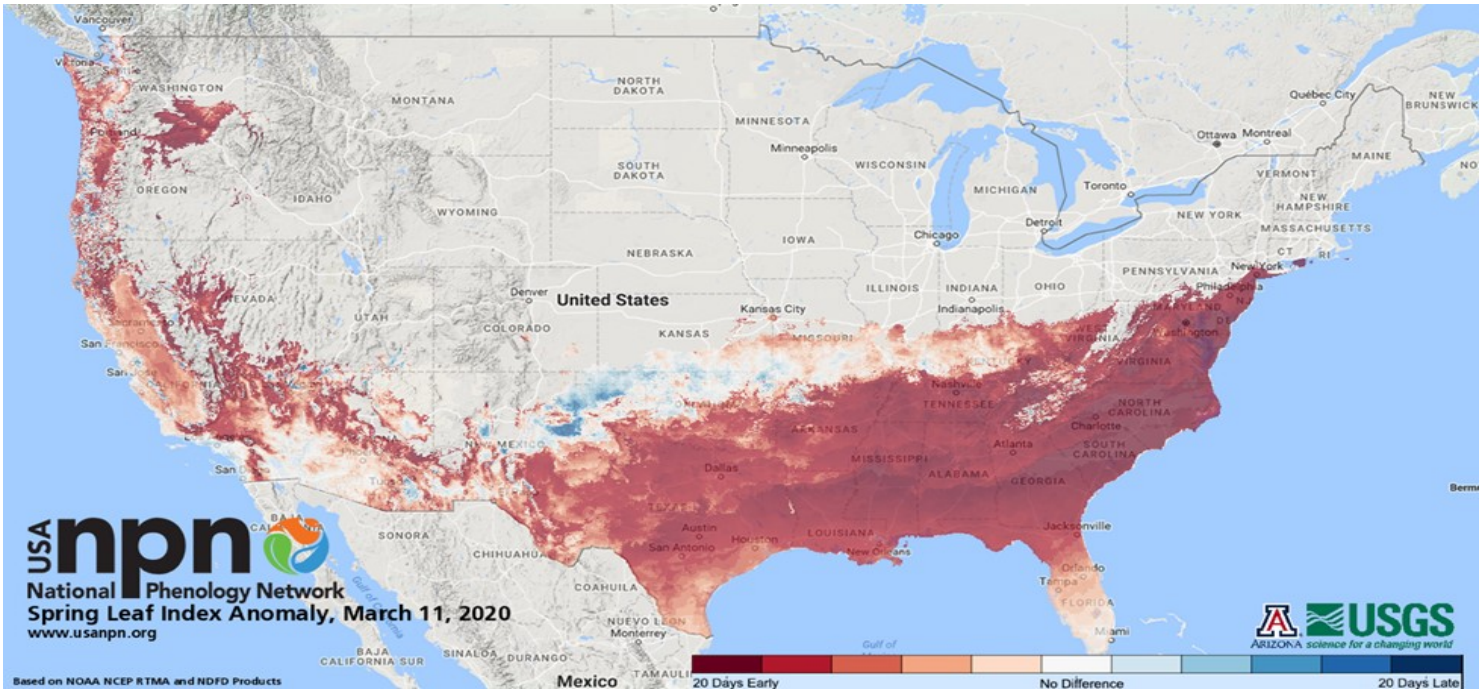
Our ponds don't tend to freeze over very often in most of Texas, but we do pay close attention to wildflower season. So do people in other parts of the country. Back in the 1950s and 1960s, some folks decided to take advantage of that fact and organize a set of volunteer observations for the blooming of lilacs and the leaf emergence of honeysuckle.

The original networks operated in full force over several decades and some versions are still operating today. Apart from the benefits of understanding the relationship between weather/climate and plant life, the records have proven to be a valuable way of tracking climate change without thermometers.

The name for the study of the timing of natural biological events, by the way, is "phenology", a seemingly ancient Greek word that actually was made up in 1849 because we needed one. In the US, it lives on in the National Phenology Network (https://www.usanpn.org), where if you want to you can enter your own phenological observations as part of an official data-base available for future research. They welcome formal observations that continue the lilac record as well as the timing of anything you've found important enough to observe and record.

One thing they've done with the lilac and honeysuckle data is to create a statistical model relating the blooming and leaf emergence ("leaf-out") to each year's weather conditions. They can do this to estimate the beginning of spring (first leaf and first flower are as good a measure of spring as any) throughout the United States in real time.

In Texas we've had a fairly mild winter. How has that affected the start of spring? According to the National Phenology Network models, spring started earlier, as you might expect. But the timing, compared to normal, varied quite a bit across Texas. As of March 11, spring has arrived everywhere, but it was quite early in most of the state and a bit late in the Panhandle.



Map1: National Phenology Network Map for Spring Leaf Index

The winner here seems to be central Texas, where spring sprung about 2-3 weeks early. In the Carolinas it was even earlier. Meanwhile, for about half of the country, spring is still just a gleam in a farmer's eye.

Next up on the phenological calendar: the start of summer, which I like to define as the first five consecutive days in which the forecasted chance of rainfall is exactly 20%.

Wichita Falls Regional Summary

Mild Winter in the Region While Globe Sees Warmest January on Record

By Charles Kuster
CIMMS/NSSL

The Wichita Falls region experienced above average temperatures this winter, while precipitation was generally near normal (Fig. 1). In total, the region experienced 75 dry days (all CoCoRaHS stations reported less than 0.05 inches) and 16 wet days (at least one CoCoRaHS station reported 0.05 inches or more). For comparison, the region experienced 73 dry days and 17 wet days last winter. The season started off dry with December seeing 28 dry days and the first significant rainfall of the season did not occur until January 17th. For this event, nearly every CoCoRaHS station reported 24-hour rainfall totals of at least 1.5" with a couple stations in Wichita County reporting over 2" of rain. Another significant precipitation event occurred on 2/5–2/6 when heavy snow fell across the region. Most locations saw 3–5" of snow with some locations seeing up to 7" of snow especially across the western portions of the region. These precipitation events, along with several other small events, were enough to eliminate nearly all of the region's drought as defined in the U.S. Drought Monitor (available at https://droughtmonitor.unl.edu/).

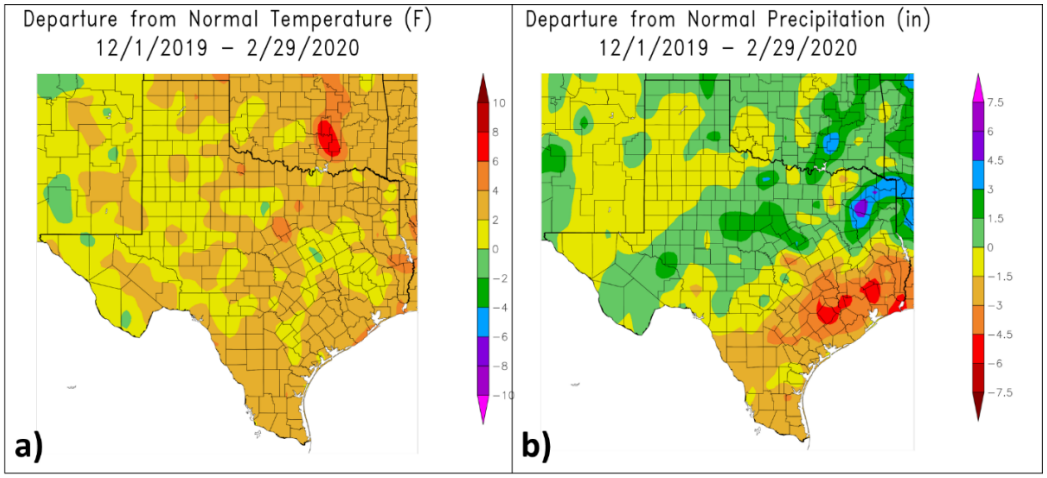


Figure 1a-1b: Departure from a) normal temperature and b) normal precipitation for December 2019 through February 2020. Warm colors indicate below normal precipitation and above normal temperature, while cool colors indicate above normal precipitation and below normal temperature.

Outside of the region, widespread warm temperatures also occurred and the globe experienced its warmest January on record (Fig. 2). In our region, temperatures may not have been as far above normal as other portions of the globe, but many areas still saw average temperatures at least 2-4° F above normal (Fig. 1a).

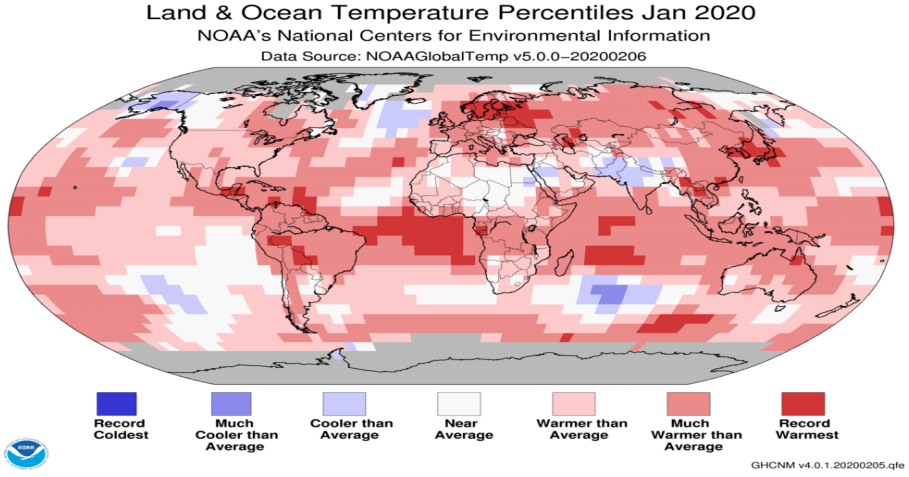


Figure 2: January 2020 global temperatures relative to average. Warmer colors indicate temperatures more above average while cooler colors indicate temperature more below average. Full story and additional figures available at https://www.ncei.noaa.gov/news/global-climate-202001.

North Texas Regional Summary

By: Greg Story
NWS Meteorologist, WGRFC Fort Worth Texas

Greetings from North Texas! I am thankful to each and every one of you for reporting your rainfall via CoCoRaHS, especially on days when it is raining at observation time! With rainfall as variable as it is, your reports help the National Weather Service (and other entities) to assess this variability. Over the past several months, after a dry July through September period across Texas, there was finally some rainfall in October and November, although it was a mixed bag. On average, rainfall was near to slightly below normal. December was pretty dry over most of Texas, then January saw near normal precipitation on average over most of the state. In February it was really a mixed bag, almost like the tail of two states. Much of north Texas got above normal precipitation, and much of south Texas received below normal precipitation. Overall it pretty much balanced out.

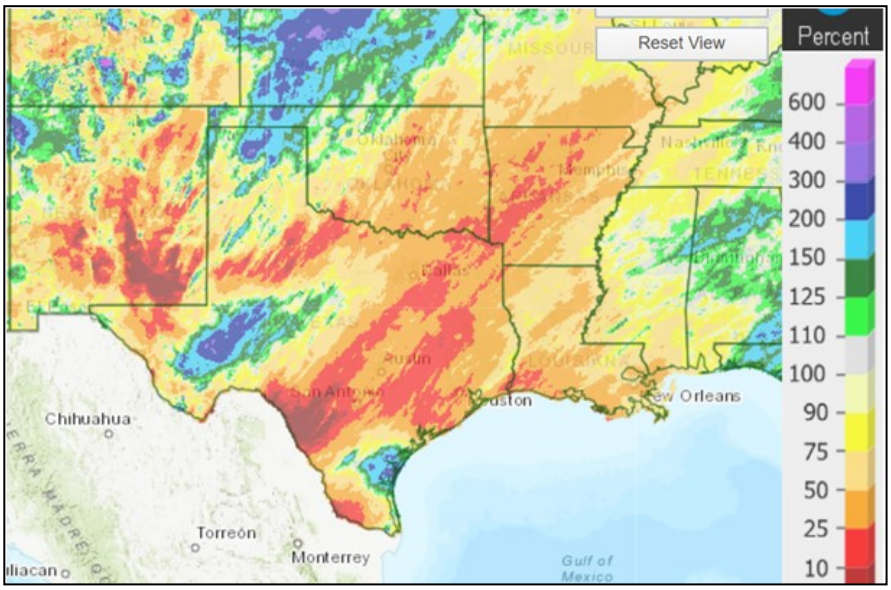


Fig.1: Percent of normal rainfall for December 2019: The green and light yellow colors indicate near normal precipitation, the blue and purple colors indicate above normal, while the red indicates below normal precipitation. December was pretty dry over most of Texas, although there were a few locations which got above normal precipitation. Much of southwestern Texas received above normal rain in December, as did the area surrounding Corpus Christi, but most of central into northeast Texas had below normal precipitation. Above normal precipitation was also observed over the northern Texas panhandle, but rainfall was much below normal near and southeast of Del Rio.

At the DFW airport they received 1.17" in December. The normal amount for December is 2.55" so they were below normal for the month by 1.38".

Climatologically our winter weather is drier in terms of precipitation. This certainly was the case in December. Most areas got significantly less precipitation than they did in October, and most got less than November. There were about four significant storm systems which affected our weather in December. Here are the highlights of the weather for the month.

December 1 – 9:

December started out with rain exiting the state following the cold front that moved through Texas at the end of November. Most locations received a third of an inch or less. Dry weather and seasonably cool conditions dominated the weather over Texas since the 1st, and dry weather continued through December 9 in spite of the fact that a cold front moved through on the 6th. The front passed through Texas with little or no rainfall.

December 10 – 11:

The next cold front passed through Texas from late on the 9th through the 11th which brought some rainfall. Most of the rain which occurred actually fell behind the front and was mostly light to moderate in intensity. The heaviest rain fell over southwest Texas. After this front cleared the state, the region experienced cold, dry weather for several days.

"North Texas Regional Summary (continued)"

December 16 - 17:

An arctic cold front moved rapidly across Texas. Showers and thunderstorms occurred along and ahead of the front, but were largely confined to east Texas and Louisiana. The heaviest rain fell where atmospheric moisture was most plentiful, mainly deep south Texas.

December 28 - 30:

A major low pressure system moved from California eastward and passed north of Texas across northwest Oklahoma and Kansas. This storm did push a cold front through Texas. This front produced some rain and a few thunderstorms particularly in east central and southeast Texas. Rainfall amounts of around 0.61" fell in the Grand Prairie area.

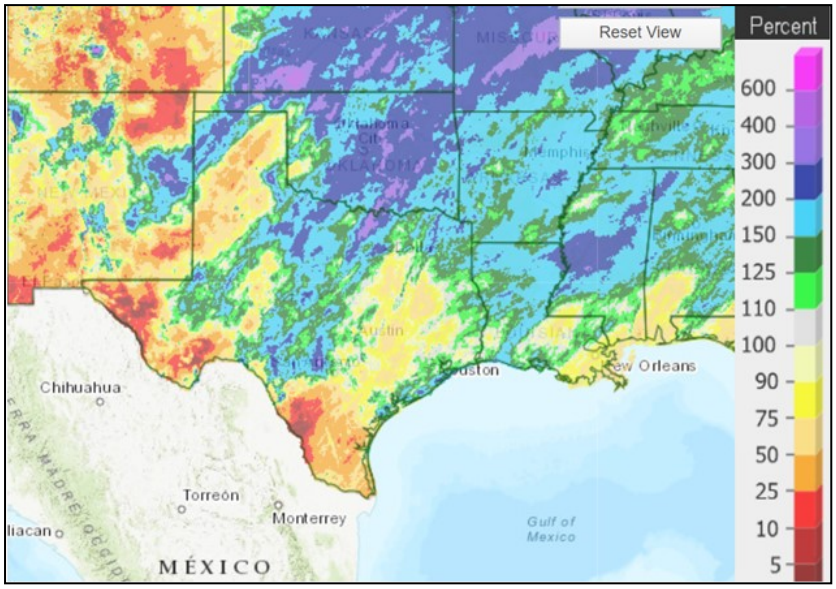


Fig. 2: January 2020 percent of normal rainfall map: The red and yellow colors indicate below normal precipitation, while the blue and purple indicate above normal rain. In January, most of the state had near normal precipitation. There were some locations which got above normal precipitation, but also some which were below so it pretty much balanced out. Much of southwestern Texas and Deep South Texas received below normal precipitation in January, as did the area from near Corsicana to Huntsville. But, most of northern Texas, parts of the Hill Country, and extreme east and southeast Texas had above normal precipitation. Above normal precipitation was also observed over the northwestern Texas panhandle, but rainfall was much below normal southeast of Del Rio to near Laredo.

At the DFW airport they received 5.00" in January. The normal amount for January is 2.13" so they were above normal for the month by 2.87". January 2020 finished in 7th place on the list of wettest January months in Dallas/Fort Worth. 16th warmest January on record with an average temperature of 50.2 degrees at DFW.

January – Wettest Years

1 - 9.07 1932
2 - 6.18 2012
3 - 5.58 2007
4 - 5.45 1949
5 - 5.07 1998
6 - 5.01 1950
7 - 5.00 2020*

With many locations receiving precipitation in January, and it being one of our "drier" months, many parts of north Texas had percent of normal precipitation values above 100%. There were about five significant storm systems which affected our weather in January. Here are the highlights of the weather for the month.

January 1 – 9:

January started out quiet on the 1st, but on the 2nd and 3rd a short wave trough rippled through the southern branch of the jet stream and brought rainfall to primarily deep south, eastern and southeastern Texas. Dry weather and rather mild conditions dominated the weather over Texas from the 4th through the 9th.

"North Texas Regional Summary (continued)"

January 10 – 12:

A powerful upper level low pressure system moved into Texas from the west and crossed the state. This was followed by a strong cold front. The combination of these systems brought showers and thunderstorms on the 10th to especially northern and eastern Texas. Following the strong cold front, there was some light mixed precipitation into the 11th. Record rainfall occurred at DFW Airport January 10 of 1.47" (the previous record was 0.76" in 1913). This was followed by snow and sleet showers over the northern parts of north Texas. Denton appeared to have picked up more an inch. Sleet was observed in the NE Dallas/Richardson area. The heaviest snowfall amounts occurred along a line from Breckenridge to Decatur to Denton, where 2-3" of accumulation were common. A few isolated spots in this corridor may have even received up to 4" of snow. Dallas and Tarrant counties picked up generally less than an inch, but enough to leave a small dusting. Dallas/Fort worth International Airport picked up 0.2" of snowfall, marking the first measurable snowfall at DFW since January 6, 2017 when 0.1" fell. This was the largest daily snowfall at DFW since March 5, 2015 when we got 1". It wasn't much to write home about, but it did end the 3-year drought of measurable snowfall nonetheless. A rainfall amount of 1.64" was noted over the Grand Prairie region. This cold front stalled over southeast parts of the state and aided in the development of more precipitation by the 14th.

January 14 - 19:

A stationary front across southeast Texas combined with upper air disturbances to produce rain across east Texas on the 14th and 15th. By the 16th, a strong storm system moved into Texas from Mexico. Ahead of this low, moisture streamed northward and began to interact with the next cold front. The result was widespread rain especially across north Texas. The highest amounts were in Terrell (2.51"), Dallas (2.26"), Arlington (2.10"), Fort Worth (1.71"), Garland (1.60") and Mesquite (1.45"). The CoCoRaHS observer in Richardson measured 0.54". A storm total amount of 3.48" fell over the Grand Prairie region during this time period.

January 28 - 29:

A low pressure system moved from New Mexico and the Texas panhandle eastward and passed north of Texas across southern Oklahoma. Most of the precipitation from this storm system was light. An amount of 0.36" was noted in the Grand Prairie region.

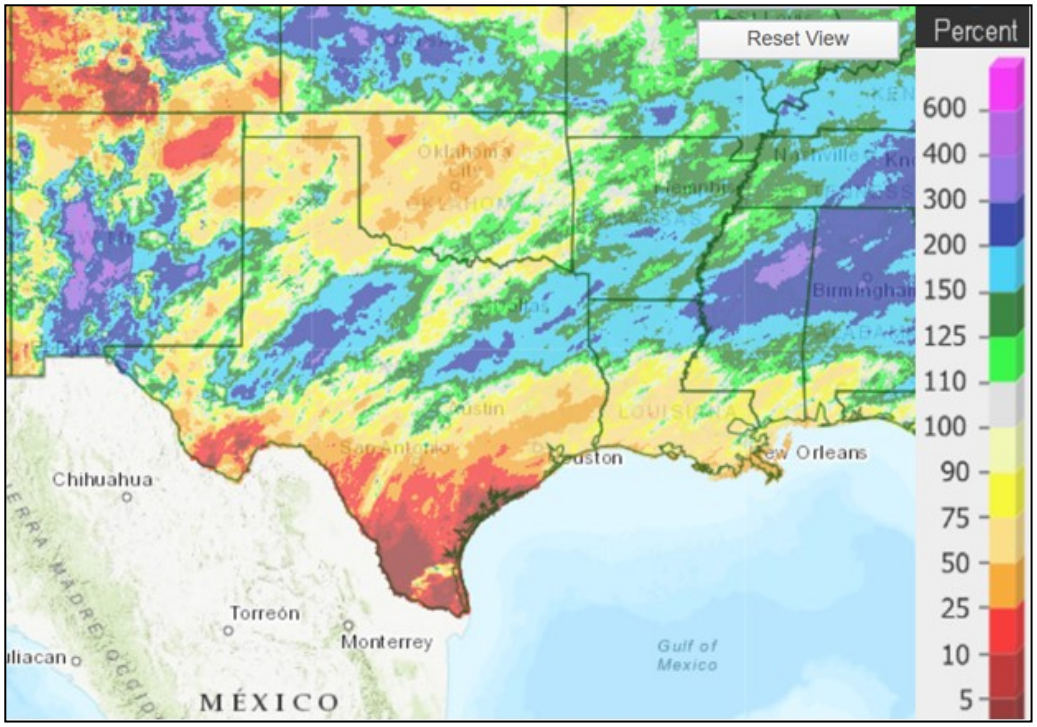


Fig. 3: Percent of normal rainfall for February 2020: The yellow and red colors indicate below normal precipitation, while the green, blue and purple colors indicate above normal rain. In February it was really a mixed bag, almost like the tail of two states. Much of north Texas got above normal precipitation, and much of south Texas received below normal precipitation. Overall it pretty much balanced out. Parts of southwestern Texas and most of Deep South Texas received much below normal precipitation in February. But, most of northern Texas and parts of west Texas had above normal precipitation.

At the DFW airport they received 3.88" in February. The normal amount for February is 2.66" so they were above normal for the month by 1.22". For Dallas-Fort Worth, February ended as the 15th wettest February.

"North Texas Regional Summary (continued)"

February – Wettest Years

1- 11.31 in 2018	5 -6.17 in 2001	9- 4.81 in 1944	13- 4.57 in 1938
2- 7.40 in 1997	6- 5.78 in 1993	10- 4.78 in 1970	14- 4.12 in 1948
3- 6.96 in 1945	7- 5.07 in 1903	11- 4.75 in 1949	15- 3.88 in 2020*
4- 6.20 in 1965	8- 4.92 in 1932	12- 4.72 in 1990	

And down in Waco, they had the 2nd wettest February on record, behind only the 7.91" in 1997. They received 6.92"! Waco's normal amount in February is 2.63" so they were 4.29" above normal.

Climatologically winter season weather is drier in terms of precipitation over Texas, but it is excessively dry over south Texas. Meanwhile, northern parts of the state have had abundant amounts of rain. There were about four significant storm systems which affected our weather in February. Here are the highlights of the weather for the month.

February 1 – 9:

February started out quiet from the 1st through the 3rd, but then a long wave trough moved through Texas. This ushered in a strong cold front which resulted in rain and areas of snow from the 4th through the 6th. Here are some snowfall totals from all around North Texas: Nocona (Montague County) - 3.5", Graham (Young) - 2.5", Breckenridge (Stephens) – 1", and Jacksboro - 0.5". The Dallas/Fort Worth Airport received a trace later in the evening of the 5th, but DFW remains in a snow drought with no snowfall totals of more than one-quarter inch registered officially since March 2015. Snow fell as far south as Waco (0.5") with some amounts above an inch near Waco close to Marlin. A trace of snow was also recorded as far south as Austin, as well as in Hays and Bexar counties.

February 9 – 12:

Dry and rather mild conditions dominated the weather over Texas on the 7th and 8th. But a major upper level low pressure system developed over the eastern Pacific Ocean and moved from the Gulf of California to New Mexico before it began to weaken the 9th through the 11th. The last of this low crossed Texas on the 12th. Several rounds of precipitation resulted in widespread rainfall amounts in excess of 4" fell from near Waco to Tyler, with isolated heavier amounts near Gladewater TX. The rain tapered off late on the 12th. Minor river flooding occurred on the upper Sabine, upper Neches and upper Trinity Rivers as a result of this rainfall, and this water slowly worked its way downstream the remainder of February. A rainfall amount of 2.07" fell over the Grand Prairie region over these four days.

February 18 - 20:

A cold front moved across Texas. Following the frontal passage, a couple of short wave troughs moved across the region. The end result was light to moderate rain, again mostly across north Texas. A rainfall amount of 0.92" fell over the Grand Prairie region during this time period. We had a couple dry days before the next storm system arrived on the 24th.

February 24 - 25:

A large upper level low pressure system passed north of Texas. The tail end of the trough brought rain to especially southeast Texas. It was dry for the remainder of February following this storm.

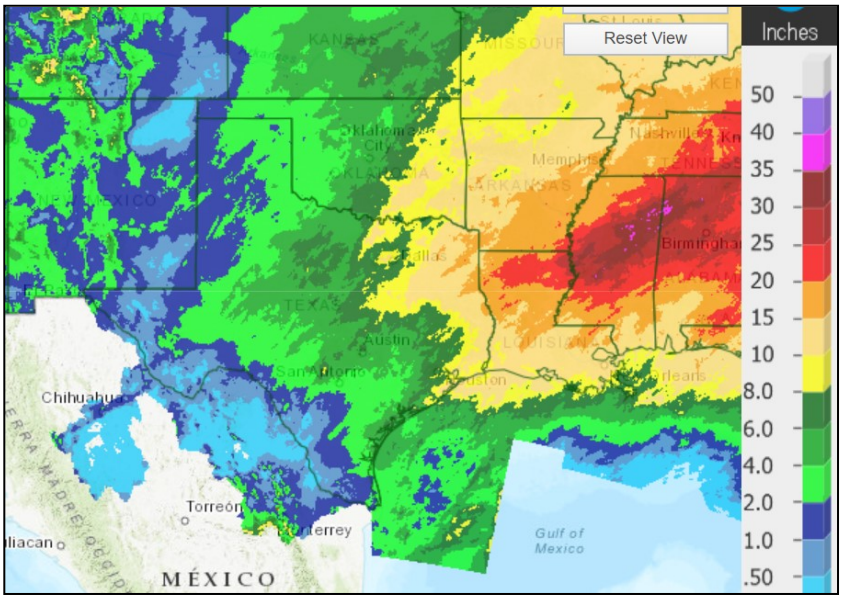


Fig. 4: Winter season precipitation 2019-2020: The bright red, purple and white colors indicate the largest rainfall totals while the light green and blue colors show light amounts.

"North Texas Regional Summary (continued)"

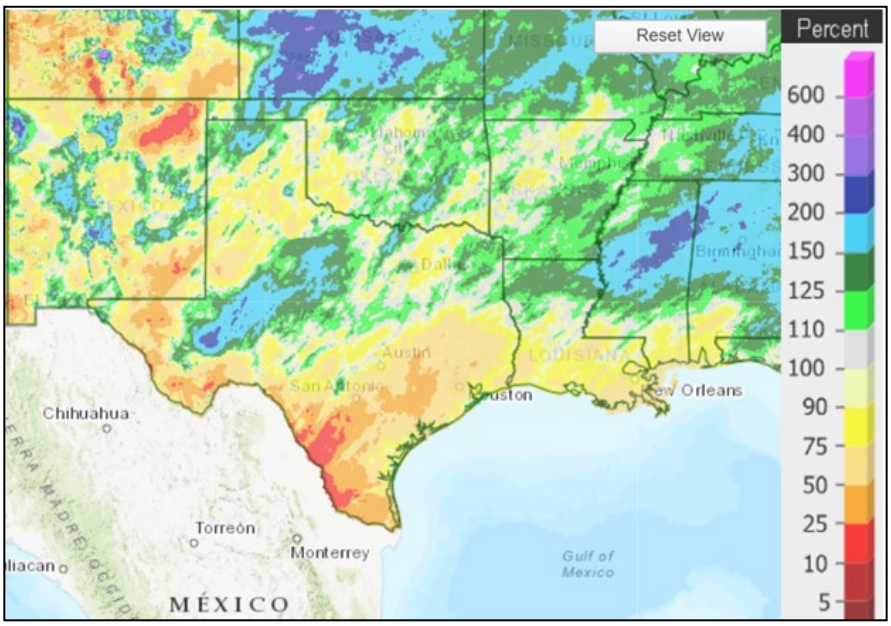


Fig.5: Percent of Normal Precipitation for Winter 2019-2020: The green, blue and purple colors indicate above normal rainfall. The brown, yellow and red colors indicate below normal amounts. Note the prolonged dryness from near Del Rio south through Laredo Texas to Falcon Lake. The rainfall the past 3 months has been pretty low overall. Below normal rains are showing up over parts of far southwest, south central and southeast Texas, as well as over northeastern New Mexico, with above normal rainfall noted over the lower Pecos River through the Permian basin to around Abilene, as well as a small area near and north of Fort Worth.

For the winter season, DFW received 10.05". The normal amount is 7.34" so they were above normal by 2.71". For Dallas-Fort Worth, the 2019-2020 winter season finished as the 14th wettest winter.

Winter – Wettest Years

1- 16.72 in 2017-2018	6- 12.48 in 1944-1945	11-10.64 in 1948-1949
2-.16.72 in 1931-1932	7- 12.41 in 2011-2012	12-10.36 in 1928-1929
3- 15.22 in 1997-1998	8- 12.18 in 2000-2001	13-10.22 in 1964-1965
4- 14.40 in 1991-1992	9 -11.78 in 1992-1993	14-10.05 in 2019-2020*
5- 12.62 in 1937-1938	10 -10.71 in 1943-1944	

For Waco this winter season, they received 9.86". The normal amount is 7.50" so they were 2.36" above normal for the season.

When I go on speaking engagements where CoCoRaHS is discussed, those that are observers frequently ask me what one thing they can do to help the National Weather Service. Aside from the obvious answer, which is "report every day you can", my second response is to make sure the rainfall report you are entering is a 24 hour report ending at roughly 7 AM. Now of course there are going to be days where you miss reporting. We all go on vacations or go visit relatives, etc. But when you return to reporting, make sure your first report is a multi-day accumulation report. For example, Mondays are when we usually see a jump in multi-day accumulations reported as daily 24-hour amounts. Most observers use the multi-day accumulation report link infrequently enough that they forget to use it when they need to. There are a number of ways the NWS can identify these errors. The easiest is when the observer mentions in the comments that this is a multi-day total. Aside from these, often these erroneous reports are preceded by one or more days of missing reports since their last report. As an observer, please show some concern as to when the precipitation fell. If you get in the habit of reporting precipitation every day, even if no rain fell the previous 24 hours, it will help you to recognize when the rain occurred.

Often these multi-day totals stand out on our map at the NWS because they are much higher than surrounding amounts or are the only amount amidst a sea of zeroes. The end result is we discard your report for that day from our data base. We would prefer not to have to do that.

I want to thank ALL of you for submitting your rainfall readings to CoCoRaHS during this winter season. They continue to be extremely valuable to us at the National Weather Service. Your dedication helps us out a lot. Have a great spring season from Greg Story!

Houston/Galveston Regional Summary

Dry Winter across Southeast Texas

By Ron Havran
CoCoRaHS Houston/Galveston Regional Coordinator, Texas CoCoRaHS Assistant State Coordinator

December

A very dry December with temperatures averaging three to four degrees above normal was the prevailing pattern across this region for December. Total precipitation was much below normal for the month with most of the region receiving less than 1.50" of rainfall for the month. (Fig. 1) The CoCoRaHS reporting stations average rainfall for all counties was 1.23". A few counties averaged above 1.50" for the month with the maximum CoCoRaHS reporting station county rainfall average was Polk County with 2.17".

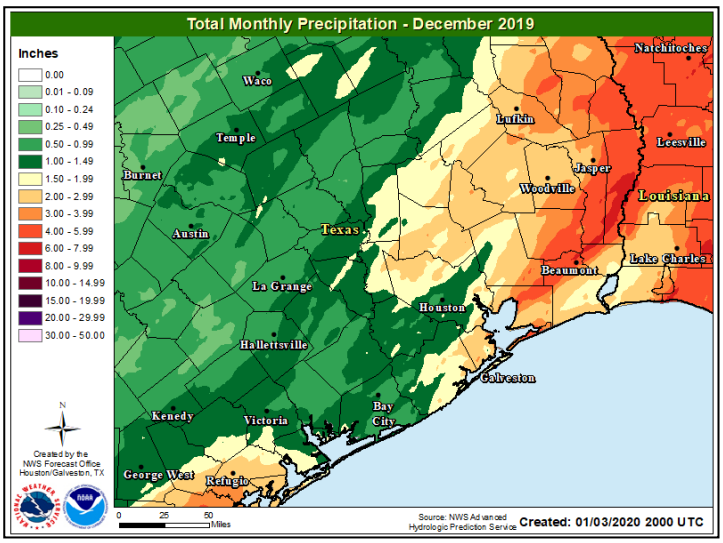


Figure 1: December 2019 SE Texas Regional Precipitation

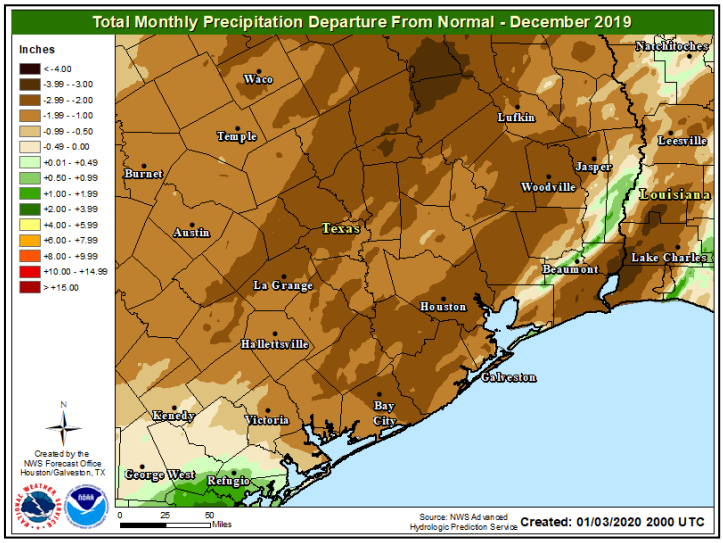


Figure 2: December 2019 SE Texas Precipitation Departure from Normal

January

January had much above normal temperatures that averaged five to six degrees above normal across the region. Very few areas in the region had temperatures below 32 degrees this month. Precipitation for the month across the region averaged near normal in most places except for the four coastal counties of Brazoria, Chambers, Galveston, and Matagorda counties which averaged slightly above normal with a four county CoCoRaHS reporting station average rainfall of 6.25". The remaining inland counties had a CoCoRaHS reporting station average rainfall of 3.58" which was just about normal. Most of the rainfall for the four coastal counties occurred on the 26th with a stalled band of storms along a frontal boundary. See figures 3 and 4 below showing where the heavy storms occurred on the 26th on the month.

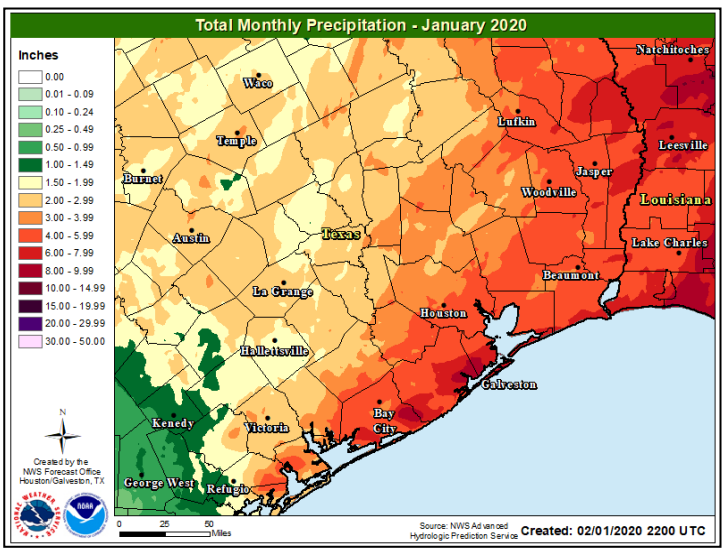


Figure 3: January 2020 SE Texas Regional Precipitation

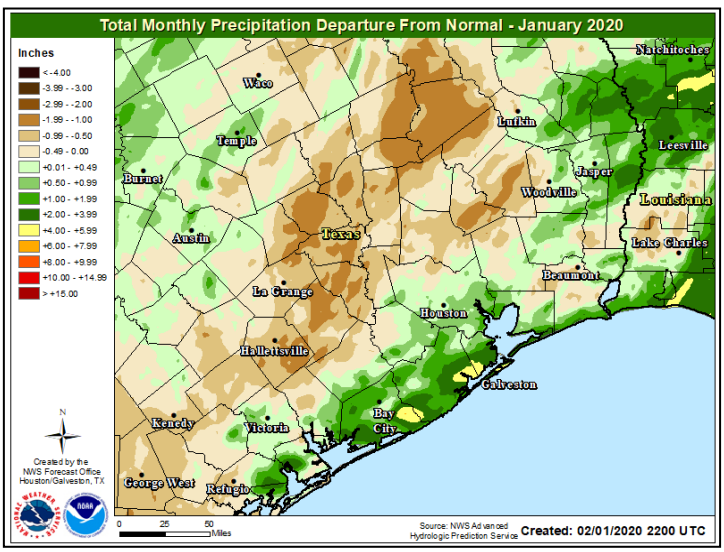


Figure 4: January 2020 SE Texas Precipitation Departure from Normal

"Houston/Galveston Regional Summary (continued)"

February

February continued the trend of a dry winter across southeast Texas with precipitation averaging much below normal across the entire region. Every county in the region had much below normal rainfall. The CoCoRaHS reporting station county rainfall average for all counties was 1.49". These dry conditions this winter have resulted in drought conditions to expand and worsen across most of the region except for the coastal counties. (Fig. 7) Temperatures across most of the region were near normal except for a few locations in the SE and southern portions that were slightly above normal.

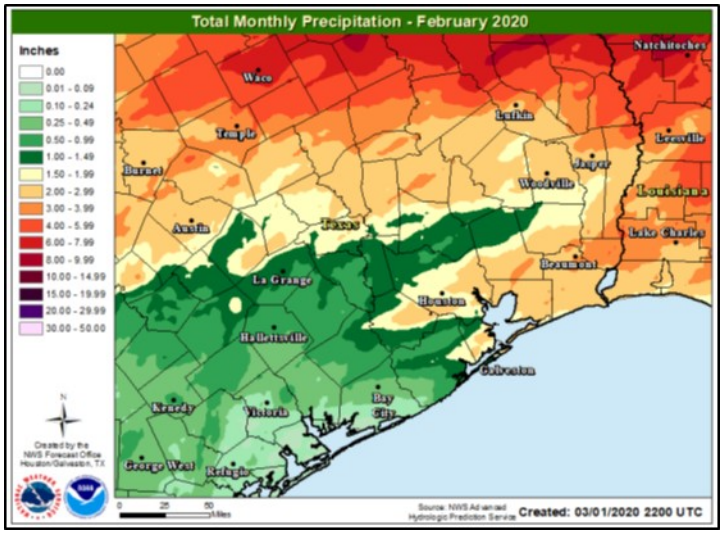


Figure 5: February 2020 SE Texas Regional Precipitation

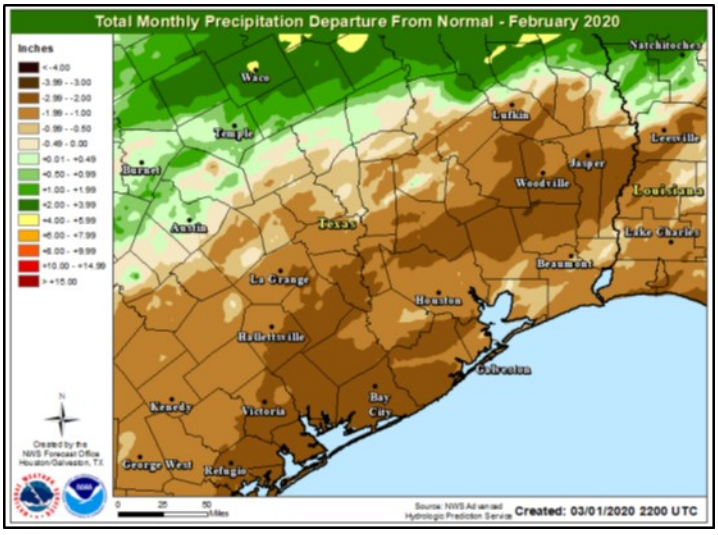


Figure 6: February 2020 SE Texas Precipitation Departure from Normal

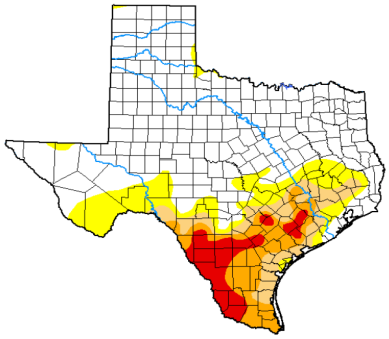
March 3, 2020
(Released Thursday, Mar. 5, 2020)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	65.58	34.42	21.16	13.93	5.87	0.00
Last Week 02-25-2020	67.75	32.25	19.79	10.95	2.66	0.00
3 Months Ago 12-03-2019	44.14	55.86	33.54	8.42	0.67	0.00
Start of Calendar Year 12-31-2019	44.69	55.31	36.12	9.19	0.74	0.00
Start of Water Year 10-01-2019	31.74	68.26	46.05	22.33	6.32	0.00
One Year Ago 03-05-2019	45.94	54.06	19.92	0.00	0.00	0.00

Intensity:
None
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx



Author:
Adam Hartman
NOAA/NWS/NCEP/CPC

Fig.7: Drought Monitor Map for Texas as of March 3, 2020 showing drought conditions in SE Texas getting worse.

Winter 2019-2020 CoCoRaHS Stations Houston/Galveston Region Rainfall

Actual Station Measured County Rainfall Averages in inches per month

County	December	January	February	Winter Total
	AVG.	AVG.	AVG.	Dec.-Feb.
Austin	0.84	2.74	1.31	4.89
Brazoria	1.15	6.27	0.95	8.37
Chambers	1.76	5.23	2.34	9.33
Colorado	0.87	2.64	1.59	5.10
Fort Bend	0.87	3.98	1.91	6.76
Galveston	1.72	7.26	1.50	10.48
Harris	1.18	4.13	1.62	6.93
Jackson	0.50	3.07	0.44	4.01
Liberty	1.55	4.53	2.19	8.27
Matagorda	1.13	6.25	0.39	7.77
Montgomery	1.52	3.61	1.41	6.54
Polk	2.17	4.23	2.33	8.73
San Jacinto	1.23	4.08	2.10	7.41
Wharton	0.70	2.78	0.78	4.26
Region Totals	1.23	4.34	1.49	7.06

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.

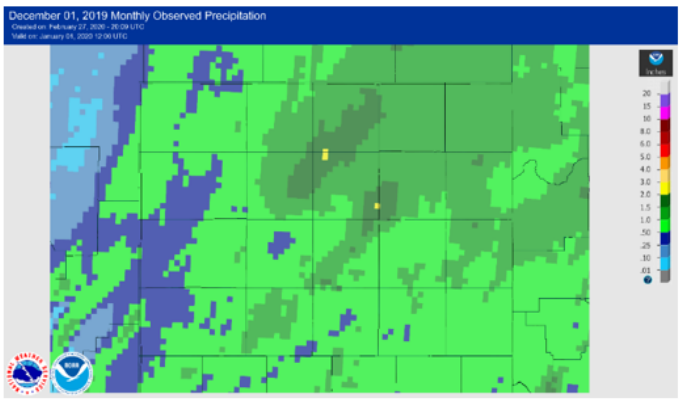
Texas Panhandle Regional Summary

Normal Precipitation for Winter in the Texas Panhandle and a Snow Event to Remember

By Kaitlin Rutt

Meteorologist - Amarillo National Weather Service

Precipitation this winter season for the months of December, January and February has been normal to slightly above normal. The monthly precipitation for December 2019 and January 2020 and February 2020 shows the entire Texas Panhandle having received some measurable precipitation over the month (Figures 1-3 on left). In December, the amount of precipitation was mostly normal except in the northcentral Texas Panhandle where there was a bullseye of about an 0.5" to 2" of above normal precipitation (Figure 1 on right). In January, there were similar findings with most of the Panhandle at or just 0.5" above normal precipitation and a small bullseye of 1" to 2" above normal precipitation in the southeast (Figure 2 on right). In February, the amount of precipitation was the closest to normal with just a small area of below normal in the east and a few pixels of above normal in the south central Texas Panhandle (Figure 3 on right).



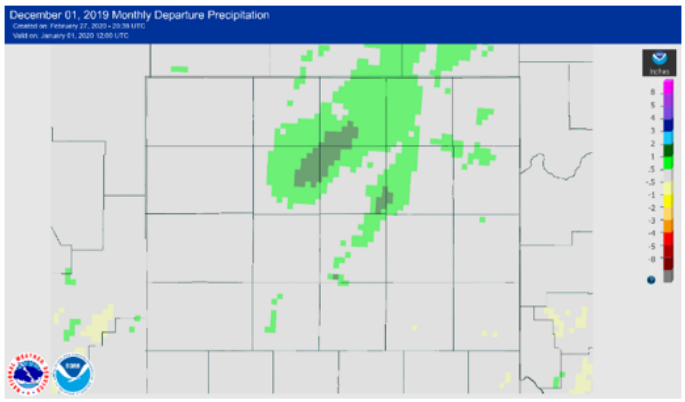
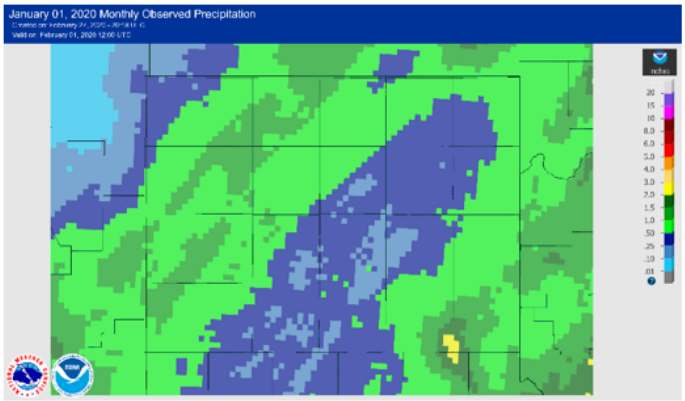


Figure 1: Observed Monthly Precipitation for Dec 2019 (left) and Monthly Departure Precipitation for Dec 2019 (right)



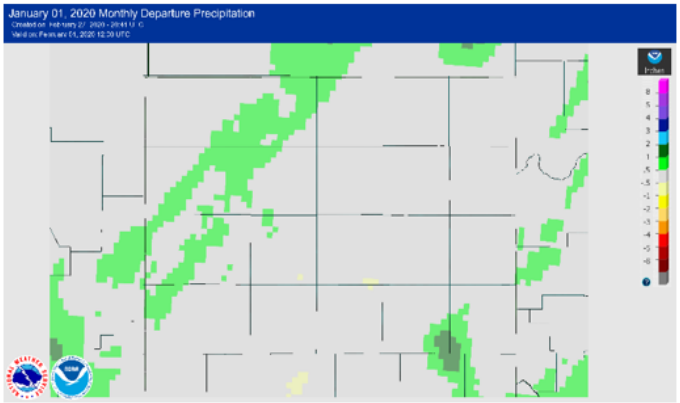


Figure 2: Observed Monthly Precipitation for Jan 2020 (left) and Monthly Departure Precipitation for Jan 2020 (right)

"Texas Panhandle Regional Summary (continued)"

At the start of the winter season, the Texas Panhandle was mostly drought free, except in the far northwest and southeast. The drought monitor for December 3, 2019 shows abnormally dry to moderate drought in both areas, with slightly more dry conditions in the northwest (Figure 4 on left). By the end of February, the drought monitor is much less in the Texas Panhandle with the ample amount of precipitation over the winter season (Figure 4 on right). In the far south and east remains a sliver of abnormally dry conditions, while the far northwest continues to have moderate drought and abnormally dry conditions for much less of the area.

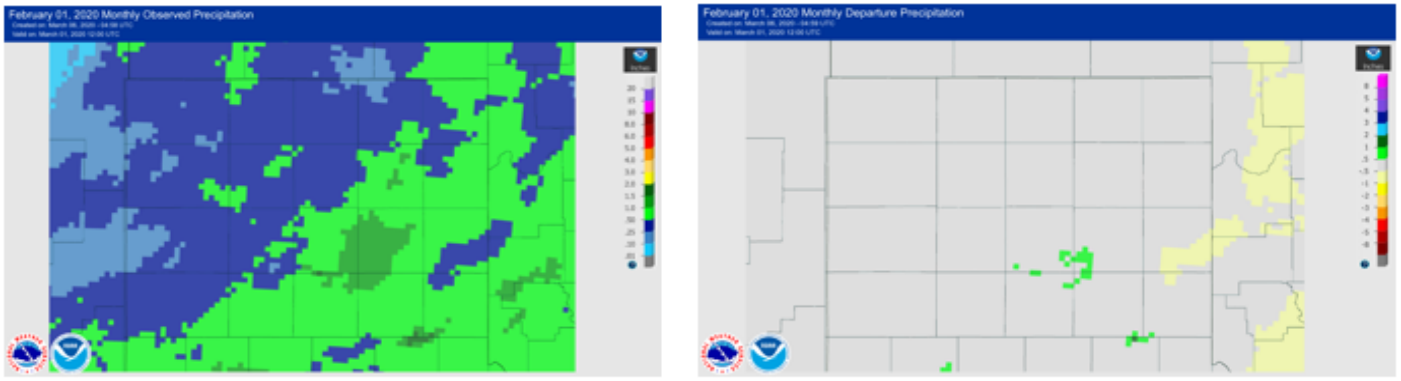


Figure 3: Observed Monthly Precipitation for Feb 2020 (left) and Monthly Departure Precipitation for Feb 2020 (right)

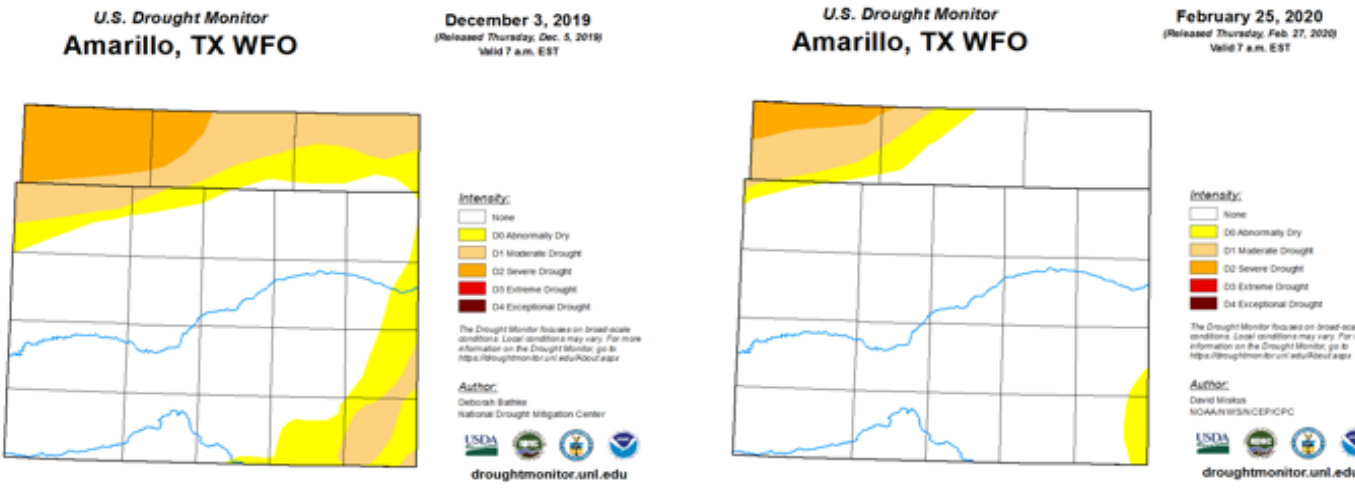


Figure 4: Dec 3, 2019 Drought Monitor (left) and Feb 25, 2020 Drought Monitor (right) for the Texas and Oklahoma Panhandles

This winter has included a variety of precipitation types including; rain, snow, freezing rain, sleet, etc. Never a dull day here in the Texas Panhandle with some days receiving three weather types as we approach the end of winter season and soon to be spring season. Sunday, February 23, 2020, the Texas Panhandle was forecasting fire weather in the southwest with severe weather in the east and northeast during the day and winter weather in the northwest later that night.

"Texas Panhandle Regional Summary (continued)"

Focusing closer on a recent snowfall event on February 4, 2020 in the Texas Panhandle where a band of heavy snow (about 60 miles wide) with snowfall rates of 2" per hour affected a line from Hereford to Canyon and on towards Groom and Lefors. Satellite analysis in Figure 5 shows the snow left behind on the ground post-event, along with the snow totals received across the Texas Panhandle. The snow band eventually began to let up and snowfall rates slowly diminished after crossing I-40 near Groom. While Canyon received up to 4" to 5" of snow, some portions of the Amarillo (mainly on the north side) only received 1" to 2" of snow being on the outer edge of the snow band. A majority of the snowfall fell within a two-hour window in the early afternoon hours of February 4. A few public photos (below) received from the event show how quickly the snow fell and impacted areas within the snow band. See the collected snowfall pictures below from the event.

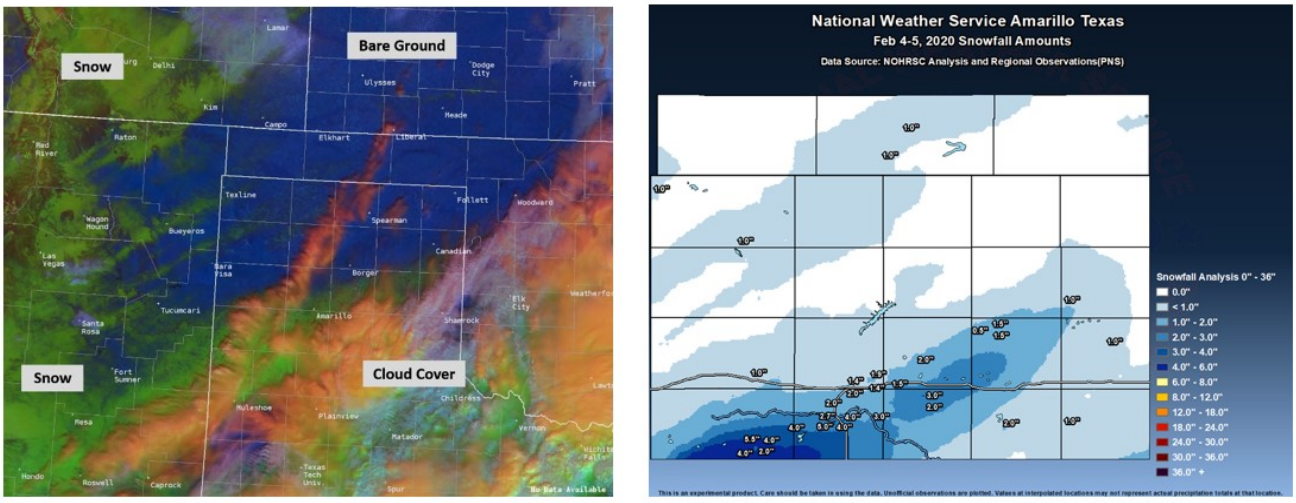


Figure 5: GOES-East satellite analysis of the snow left behind the snow band across the southern Texas Panhandle (left) and the post-event snow totals (right).

1:45PM Amarillo, TX
Photo Credit: Sean Callahan

3:45PM Amarillo, TX
Photo Credit: Sean Callahan

Canyon, Texas
Photo Credit: Dulce Flores

Canyon, Texas
Photo Credit: Carolyn Baum

"Texas Panhandle Regional Summary (continued)"

Palo Duro Canyon
Photo Credit: Luigi Meccariello

Claude
Photo Credit: Tessa Foster Waddell

Hereford
Photo Credit: Stefany Powell

With the rainy season upon us with the start of spring in March, it is an excellent time to recruit a friend to join CoCoRaHS and sign up to become a precipitation and weather conditions observer. Please join at https://www.cocorahs.org/application.aspx

West Texas Regional Summary

West Texas and Southeast New Mexico are off to a good start for 2020 and, hopefully, the new decade

By: Jim Deberry, CoCoRaHS Regional Coordinator, Meteorologist NWSFO Midland/Odessa

December

December closed out the decade abnormally dry. As such, no significant hydrologic events occurred. This brought an end to a year of near- to above-normal precipitation for most of West Texas and Southeast New Mexico.

Monthly radar rainfall estimates ranged no precipitation in the vicinity of Carlsbad in Eddy County to up to 3" near Alpine in Brewster County and a couple of places in Upton County. Indeed, the highest observed rainfall was 1.74" at McCamey in Upton County. The average of precipitation reported across West Texas and Southeast New Mexico was 0.56".

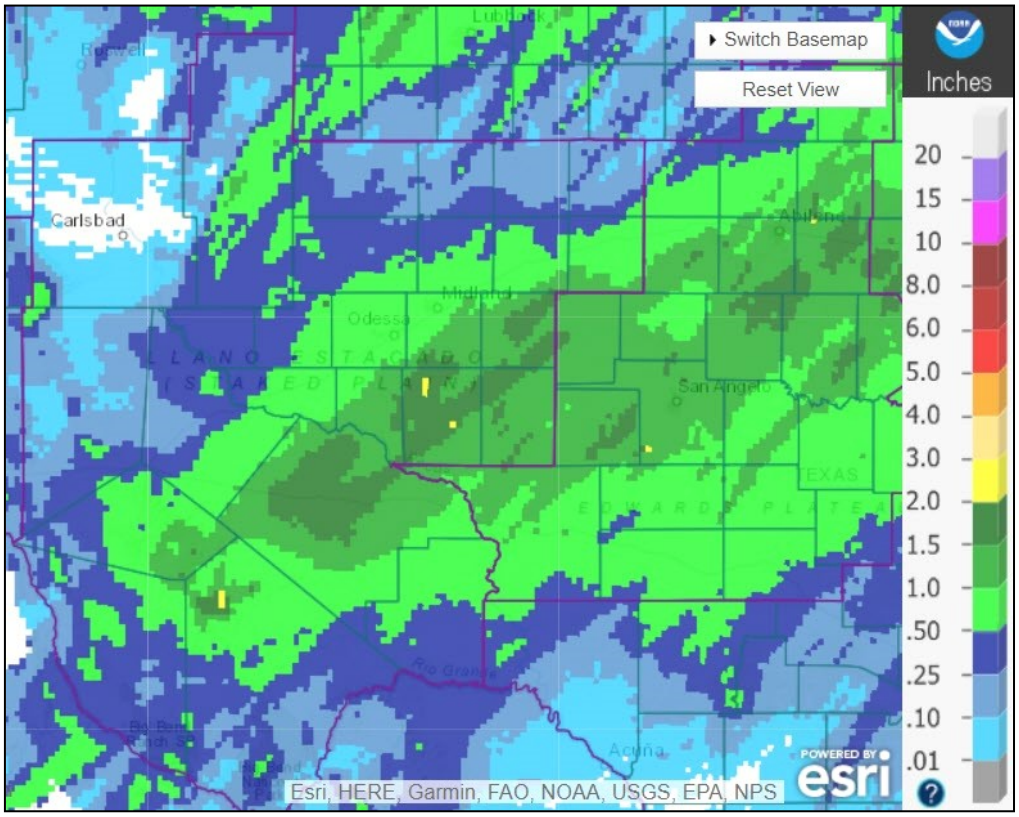


Figure 1: December Precipitation

January

Most of West Texas and Southeast New Mexico received near-normal precipitation in January, off to a good start for 2020. Most of the rain was stratiform, and no flooding occurred.

Monthly radar rainfall estimates ranged from nothing in the far west and south to up to 3" in the Permian Basin. However, the highest observed rainfall was 1.38" in Big Lake in Reagan County. The average of rainfall reported across West Texas and Southeast New Mexico was 0.60".

"West Texas Regional Summary (continued)"

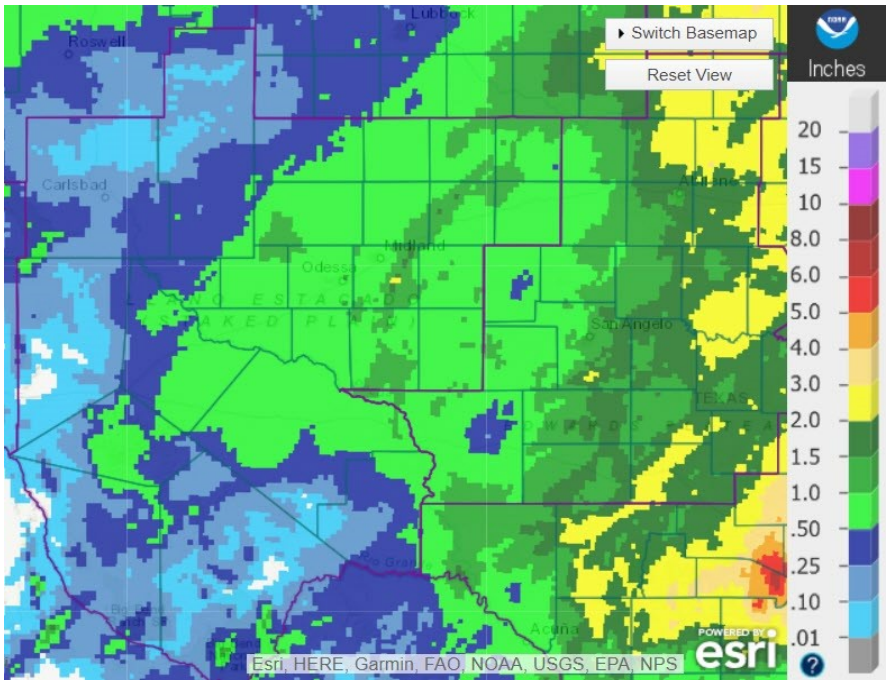


Figure 2: January Precipitation

February

February was a wet month for West Texas and Southeast New Mexico, although no flooding was reported. The most interesting event of note was a snow storm early in the month. Midland International Air and Space Port had 7.9" of snowfall, making this the 4th highest snowfall on record.

Monthly radar rainfall estimates ranged from nothing in the Big Bend Area to up to 5" in the upper Colorado River Valley. However, the highest observed rainfall was only 2.35" at Colorado City in Mitchell County. The average of rainfall reported across West Texas and Southeast New Mexico was 0.78"

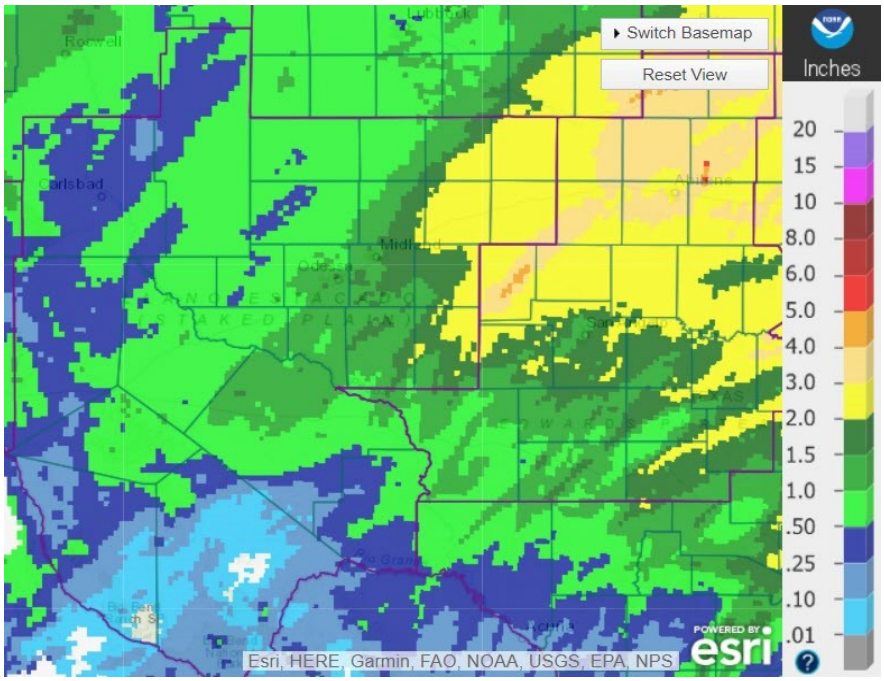


Figure 3: February Precipitation

Austin/San Antonio Regional Summary

Warm Winter across South-Central Texas

Brett Williams – NWS Austin/San Antonio

It was warm and near normal to drier than normal this winter across South-Central Texas. Del Rio registered their 6th warmest winter and Austin Bergstrom 24th winter on record, with Austin Camp Mabry coming in at their 9th warmest winter. Not too far behind was San Antonio at 22nd warmest International Airport at 25th warmest winter. While it wasn't quite as dry as it was warm, Austin Bergstrom came in at 26th driest winter on record, with Del Rio coming in at 32nd driest. San Antonio and Austin Camp Mabry came in at 45th driest and tied for 49th driest, respectively, with wintertime precipitation coming in much closer to climatological normals.

December was warm across the region, with all locations coming in above normal for temperatures. This was especially the case at Del Rio (7th warmest December) and Austin Camp Mabry (13th warmest December). It was also a dry December across South-Central Texas, with all locations coming it below normal for rainfall. January continued the theme of warm conditions. All of South-Central Texas was well above normal for temperatures in January, with all four official climate sites registering a top ten warmest January on record. Rainfall in January was very close to climatological normals. While January was overall a quiet month, on the evening of January 10th, an upper level disturbance brought severe thunderstorms to the region with widespread damaging winds and some large hail. After well above normal temperatures in December and January, temperatures in February came in near climatological normals. Precipitation was mixed, with most of the region receiving below normal precipitation in February while portions of the Hill Country and the Austin metro received above normal precipitation. The only notable weather event in February occurred on the evening of February 5th when portions of the Austin metro area received a dusting of snow. While both official climate sites of Austin Camp Mabry and Austin Bergstrom only received a trace of snow, a few CoCoRaHS sites in northeastern Travis and eastern Williamson Counties reported up to 0.5" of snow!

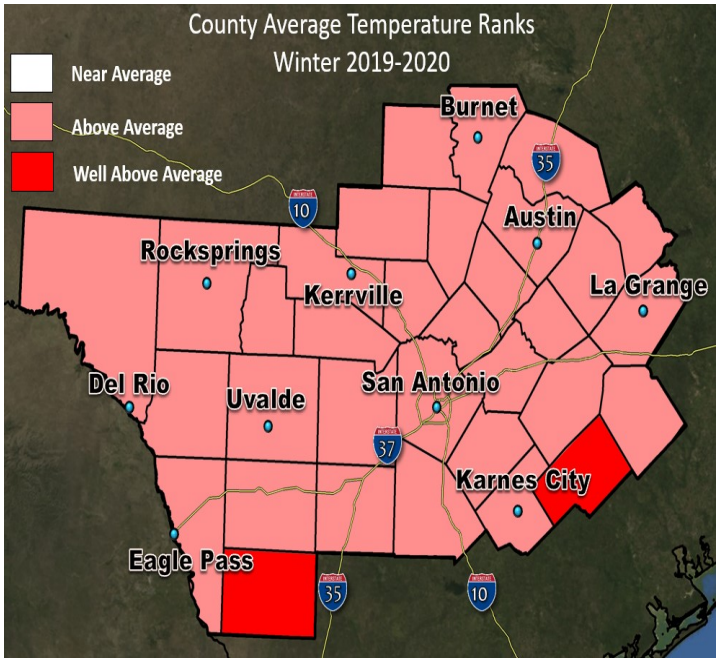


Fig. 1: County Avg. Temperature Ranks across South-Central Texas

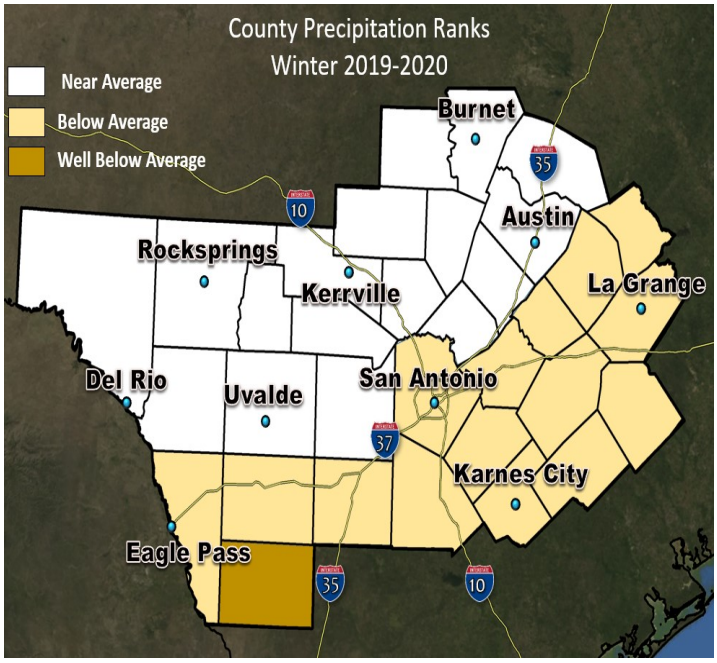


Fig. 2: County Precipitation Ranks across South-Central Texas

East Texas Regional Summary

East Texas Had Plentiful Rains This Season

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

An unusually dry autumn turned into a very wet winter for 2019-2020 across East Texas. This resulted in nearly all of the region being drought free by the start of spring,

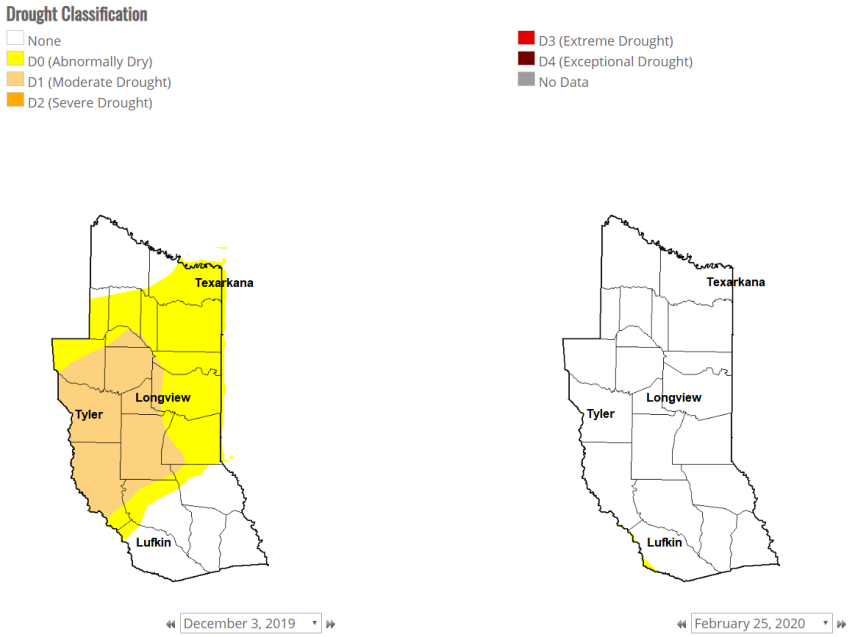


Fig. 1: Drought Comparison Map for East Texas on December 3, 2019 and February 25, 2020
Courtesy of National Drought Mitigation Center

Although rainfall was plentiful this winter, December was a carbon copy of the autumn months. Below average rainfall was observed across most of the region during the month. Many locations received less than two inches of precipitation, which is nearly three inches below normal for the month. The heaviest rain occurred on the 10th as a strong cold front moved through the region, bringing one-half to three-fourth of an inch of rain. What stands out most about this system is that the atmosphere cooled enough to support light snow across portions of extreme Northeast Texas, as a weak disturbance moved across the region in wake of the frontal boundary. No accumulations were reported as temps remained above freezing, but it was the first winter precipitation of the season.

Precipitation frequency started to increase for the month of January and through February, as the weather pattern became more active. Flow aloft was predominantly from the southwest and several disturbances moved across the region along the flow in addition to the several cold fronts that moved through East Texas during this time frame. The combination of the two provided moderate to heavy precipitation on several days during both months. January monthly precipitation totals generally ranged from 4.00” to 6.00”, which is one to two inches above normal. January 11th was a memorable day, as severe storms produced flash flooding, damaging winds, and several tornadoes, which resulted in a couple injuries and one fatality.

February was even wetter, as precipitation totals range from 6.00” to 9.00” in most areas, except across portions of Deep East Texas where 2.00” to 4.00” was observed. At least half of the precipitation for the month fell between the 10th and 12th as a cold front stalled over the region. Flash flooding by the morning of the 12th resulted in numerous road closures in Smith, Gregg, Upshur, and Cass Counties.

"East Texas Regional Summary (continued)"

Fig. 2: Flooding on US Highway 69 near Tyler, TX on February 12, 2020
Image Courtesy of Doc Deason

Although the overwhelming precipitation was rain during the months of January and February, there were a couple of days in which the air temperature was cold enough to support some wintry precipitation in some locations. The first occurred on the 22nd of January as strong upper level disturbance moved over the area. Temperatures were generally at or slightly above freezing as the system approached the region. The initial precipitation fell in the form of sleet along and north of Interstate 20 with mostly rain to the south before transitioning over to all rain. However, in areas along and north of Interstate 30, temperatures were cold enough to yield minor accumulations of sleet/snow mix. A trace to near a quarter of an inch was observed which is on par with the 0.1 inches measured by CoCoRaHS observers. On the 6th of February, another disturbance moved into the area in wake of a cold front. Wintry precipitation was confined to the most northern and western sections of East Texas, north of Interstate 20. Snow was the primary precipitation type, with the heaviest observed across Wood and Franklin counties. One CoCoRaHS station recorded 0.50", but pictures from various social media platforms suggest that totals up to an inch may have occurred.

Fig. 3: Sleet/Snow in Texarkana on January 22, 2020
Image Courtesy of KLTV viewer Sherry Price Hicks

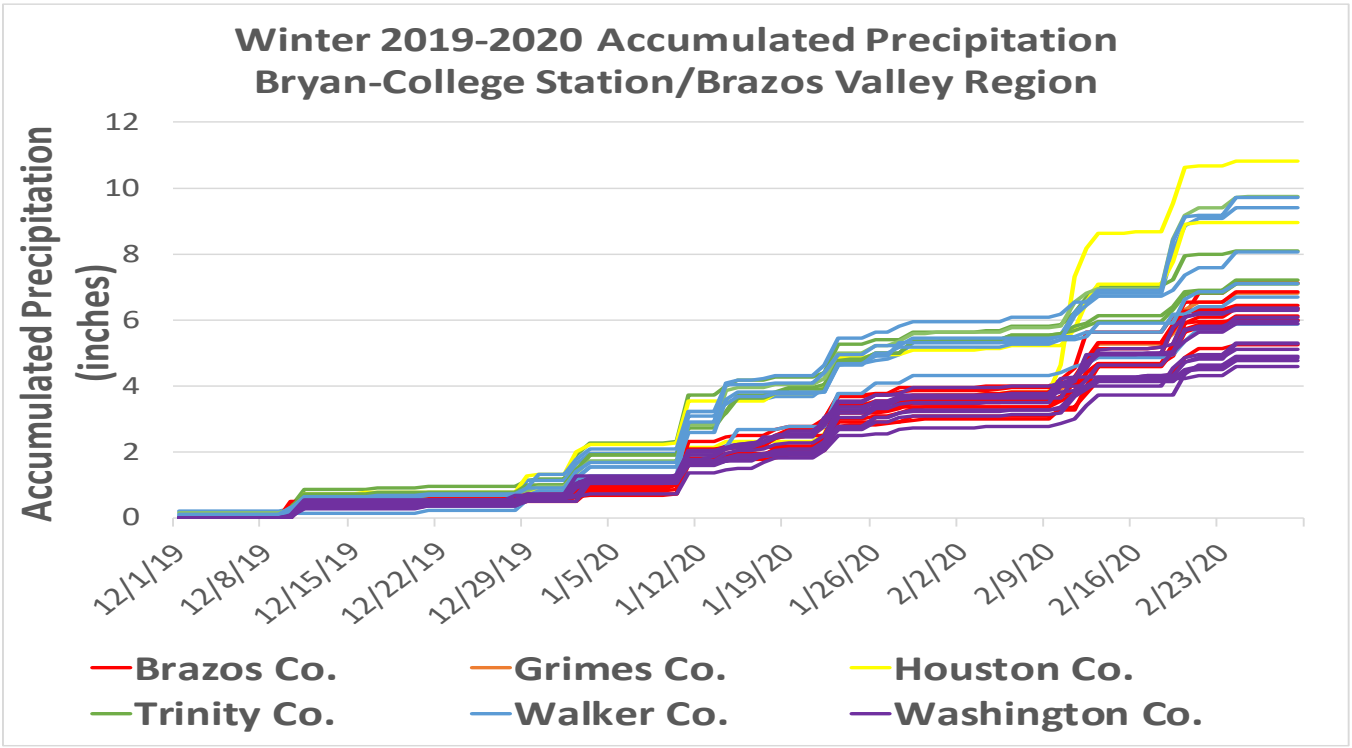
Fig. 4: Snow in Alba, TX (Wood County) on February 6, 2020
Image Courtesy of KSLA viewer Antwion Collins

Brazos Valley Regional Summary

Winter 2019-2020 Precipitation Summary

Bryan-College Station/Brazos Valley Region, Texas

By: John Nielsen-Gammon, Texas A&M University, Texas State Climatologist, and Regional CoCoRaHS Coordinator



Summary:

This winter was mild and dry…anything but harsh. Temperatures overall were among the ten warmest winters on record and the warmest since the year-almost-without-a-winter of 2016-2017. Only a few days managed to get below freezing, and not very far below at that. The warm temperatures and lack of rainfall made drought a concern, though. CoCoRaHS observers in the region who captured all the rain events reported between 4.59" and 10.81", while normal ranges from 9" toward the west to 12" toward the east. It was especially dry in December, with most stations reporting less than 1". Substantial relief came in January for Houston, Walker, and Trinity Counties, and Brazos, Grimes, and Washington Counties still benefited from the near-normal rainfall they received in January and February.

Observer Statistics:

There were no CoCoRaHS observer reports in Burleson and Madison Counties. Ten stations within the Brazos Valley region reported precipitation values all 91 days within the winter period and another 9 stations missed fewer than 12 days of recorded values (80 or more). In total, there were 34 CoCoRaHS observers with a sufficient number of single and multi-day observations to provide a seasonal total precipitation amount.

Season Statistics:

Wettest day: 2.69", February 11th, Houston County

Wettest seasonal total: 10.81", Houston County

Driest seasonal total: 4.59", Washington County

Soggy Socks Award (longest spell of daily reports with measurable rain): 7, January 13th-19th, Brazos County

Dusty Soles Award (longest spell of daily reports without measurable rain): 16, December 12th-27th, Washington County

Condition Monitoring Training

CONDITION MONITORING

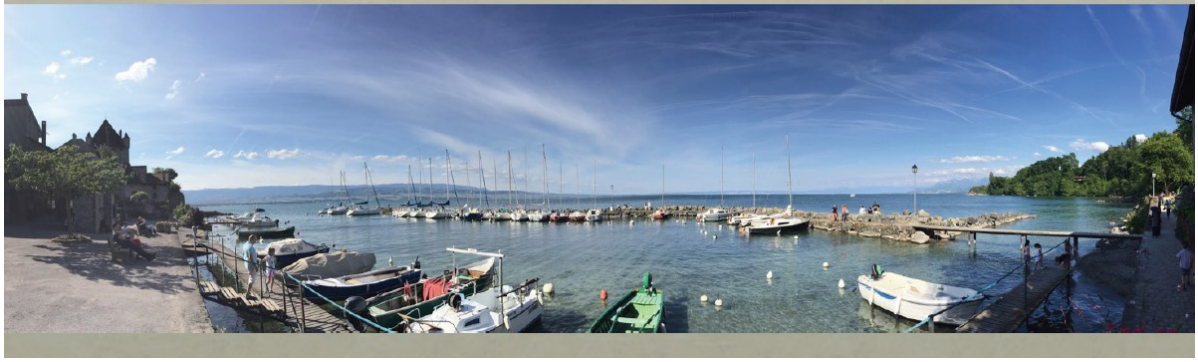
To understand the impacts of drought on plants, animals, and people, it is very helpful to monitor conditions regularly, whether the weather is wet or dry. This allows us to see how a drought year differs from a normal year, and we learn how different plants, animals and people respond to the onset, intensification, and recovery of drought.

Regular condition monitoring can also help identify expected seasonal changes versus changes caused by unseasonably wet or dry conditions.

This type of monitoring can also help to identify long-term or cumulative effects of drought.

CONNECTING WEATHER AND CLIMATE WITH THE ENVIRONMENT

Your knowledge about the local environment and how weather influences it can reveal much more than can be learned from recording daily rainfall alone.



"Condition Monitoring Training (continued)"

What is condition monitoring?

Condition monitoring is the regular recording of weather and its impacts on people, plants, and animals. In addition to daily precipitation measurements, observers submit short descriptions of how the amount of precipitation they have, or have not, received has affected their local environment and community.

Why have we changed from drought impacts reporting to condition monitoring?

It is helpful to monitor conditions regularly whether it is wet or dry. Condition monitoring includes all impacts not just impacts from droughts. This can help us identify indicators of and recovery from drought.

How do I submit a 'condition monitoring' report?

The CoCoRaHS website provides a step-by-step guide for submitting your report. The instructions are on pages 21-46 in the guide. **New!** Read details related to your specific region in our regional guidance document.

How has the reporting form changed from the previous drought impact report?

- Report date: Previously the report form included a start date and end date. In order to simplify reporting and improve consistency we have replaced the start/end date fields with a "Report Date" field. Enter the date you submit your report here.

Condition scale bar: The condition scale bar has been added to provide a standardized form of condition reporting. You can select from one of the 7 levels representing a range of dry, wet, or normal conditions. Here is a link to the condition monitoring guide that has more information on what each condition looks like.

- General awareness category: The "General Awareness" option provides a box to check when conditions may not have changed or if the other report levels are not appropriate for the content of your report. Reporting no change is equally as important as reporting zeros on days when you do not receive any precipitation. Please report "No change" in the description, as well as check the "General Awareness" box, if you do not have any updates to report on the conditions in your area.

- Deleted: The condition monitoring checkbox will no longer be necessary and has been removed from the data entry from. Everyone using the CoCoRaHS data entry form will be entering condition monitoring reports.

Deleted: Due to a lack of reporting and some confusion about what values to enter, the economic value boxes were removed from the data entry form.

How do I know what to check on the condition scale bar?

- Guidance is available through a link on the report form.

How often should I submit reports?

Once a week is ideal. Reporting on Saturday or Sunday will allow report users such as US Drought Monitor (USDM) authors to view updated information before they update the USDM map each week. Some observers report once/2 weeks to once/month which is also fine.

It is most important to try to report consistently over time.

What if I don't have time to submit a full condition monitoring report? Can I just mark conditions on the scale bar?

While you might not have time to write a full condition monitoring report every week, even short reports can provide valuable information. If conditions are stable, a report of "no notable change in overall conditions this week" is useful information, just as reporting "0" in your daily precipitation is an important data point. If you would like your report to appear on the national Drought Impact Reporter, be sure to select one or more of the report categories.

How do I know what to write in a condition monitoring report?

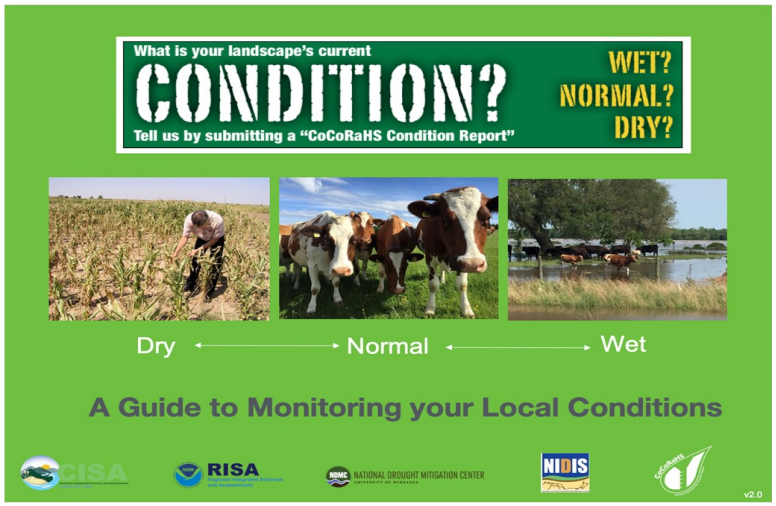
- Try to report on **current** conditions in the local area(s) near your station. This could include conditions at your home, neighborhood, or the community or county in which you live.
- Try to report on **how conditions may have changed** based on the amount of precipitation you have, or have not, received. You might also include information about how conditions are compared to past years or months.
- There is no right or wrong answer for what you are reporting, so give it your best try.
- Guidance is available through a link on the report.

Here is a link to the condition monitoring guide with specific guidance on what to write in a condition monitoring report.

Regional guidance documents provide additional information about the types of information you might include, specific to your part of the country.

"Condition Monitoring Training (continued)"

CONDITION REPORTS



https://www.cocorahs.org/Content.aspx?page=condition

My Data Entry : Condition Monitoring Report Form

Condition Monitoring Report Form Submit Data Reset

Station Number : CO-LR-610

Station Name : Fort Collins 3.5 SW

Condition monitoring reports are submitted on a regular (weekly, biweekly, monthly) basis to share information about the effects of local precipitation on the environment and society. By submitting reports on a regular basis, you create a baseline to see change through time, such as seasonal differences or changes caused by more or less precipitation. Please refer to the Condition Monitoring training slide show for more information.

* *indicates required field*

Report Date *

3/5/2020

Condition Scale Bar More information on the scale bar Clear Scale Bar

Severely Dry	Moderately Dry	Mildly Dry	Near Normal	Mildly Wet	Moderately Wet	Severely Wet
○	○	○	○	○	○	○

Description

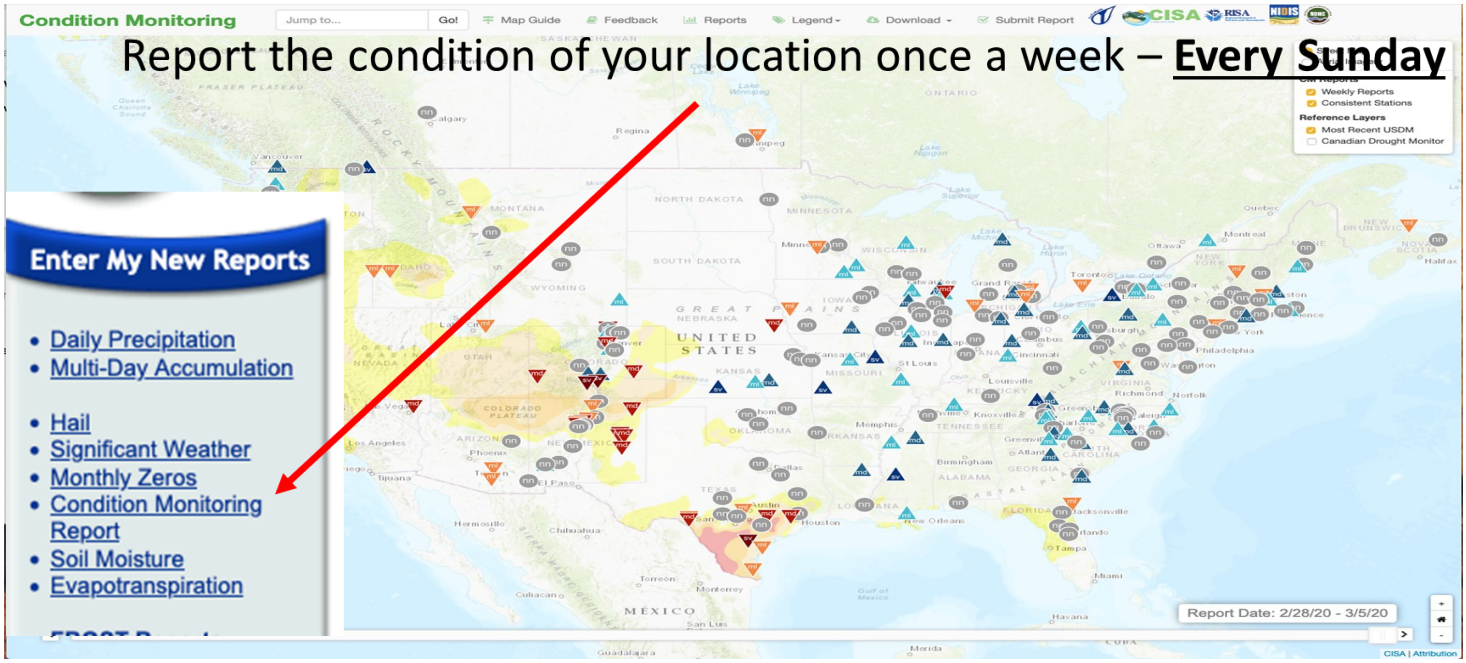
Please provide a description of how dry, normal or wet conditions are affecting you, your livelihood, your activities, etc. *

Report Categories

Please check at least one report category. If you check a category, please provide supporting information in the description. More information on condition monitoring categories.

- ☐ General Awareness
- ☐ Agriculture
- ☐ Business & Industry
- ☐ Energy
- ☐ Fire
- ☐ Plants & Wildlife
- ☐ Relief, Response & Restrictions
- ☐ Society & Public Health
- ☐ Tourism & Recreation
- ☐ Water Supply & Quality

Submit Data Reset



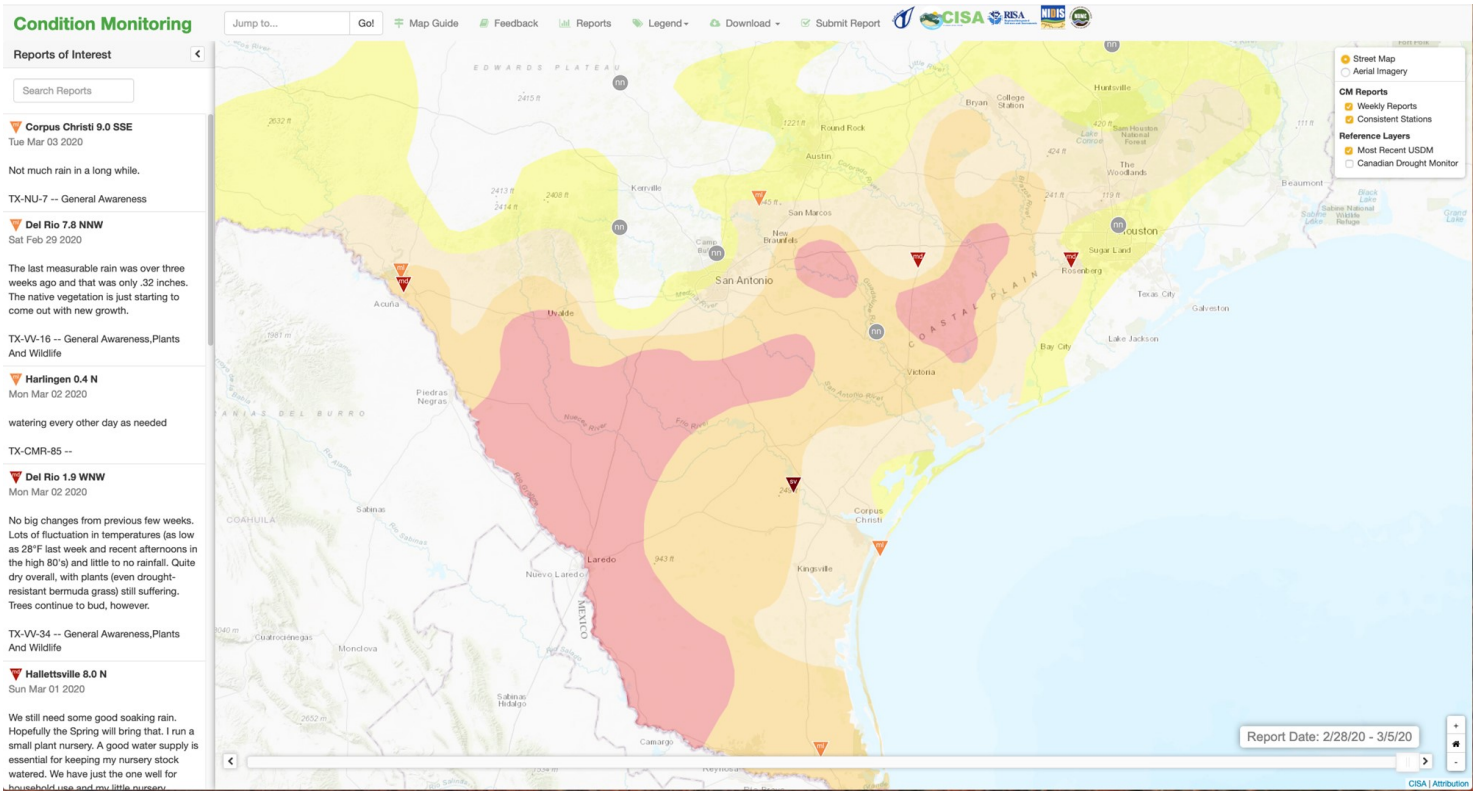
Del Rio 1.9 WNW

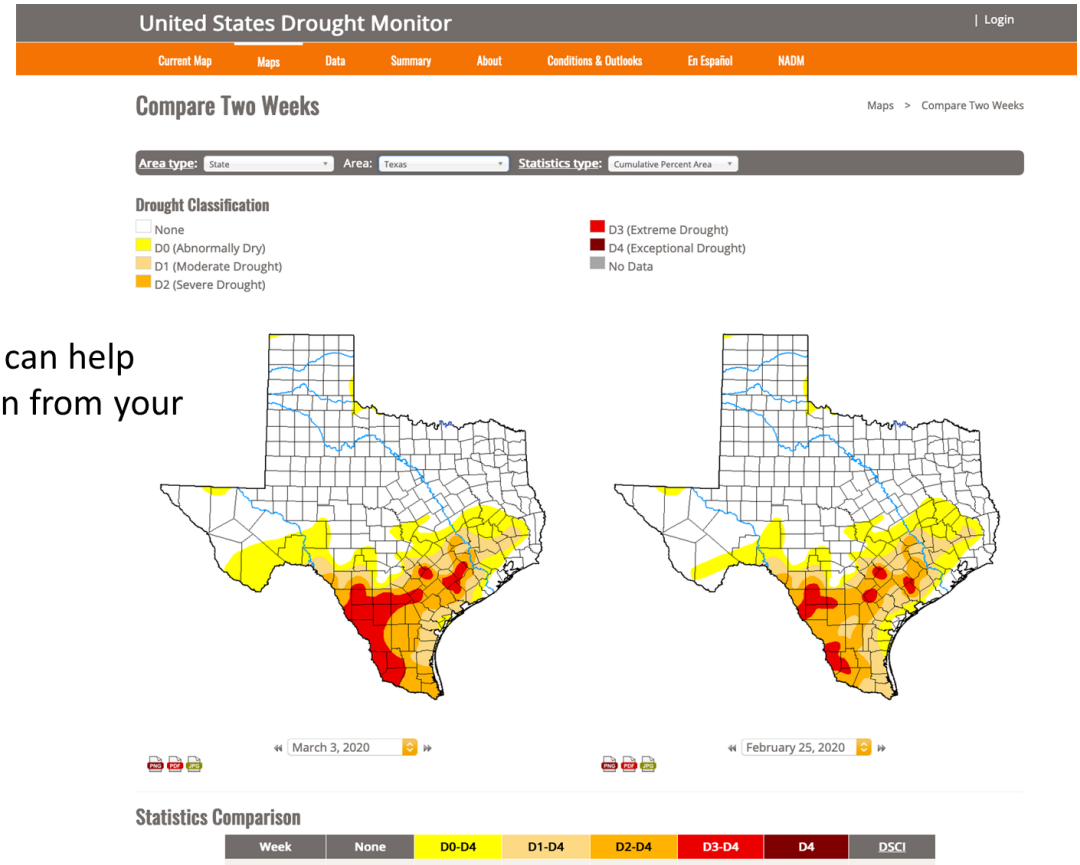
Station Number	TX-VV-34
Report	No big changes from previous few weeks. Lots of fluctuation in temperatures (as low as 28°F last week and recent afternoons in the high 80's) and little to no rainfall. Quite dry overall, with plants (even drought-resistant bermuda grass) still suffering. Trees continue to bud, however.
Condition	Moderately Dry
Date	Mon Mar 02 2020
Summary Data	CoCoRaHS summary data by week for this station.

Sandia 0.9 WNW

Station Number	TX-JW-14
Report	Pond,wetland, pastures, and brush habitats are all severely dry. Pond has been reduced to a 10' x 40' oval mud puddle less than 1 ' deep. Most wetland plants have dried up in creekbed, possibly exacerbated by two very light and short duration frosts over the last week. Pastures are dry with minimal forage. Purchased 36 round bales of hay in February and using 1 bale every 4 days for 12 head. Brush is starting to show signs of Spring with buds on Mesquite and Huisache.
Condition	Severely Dry
Date	Sun Mar 01 2020
Summary Data	CoCoRaHS summary data by week for this station.

"Condition Monitoring Training (continued)"





Your **Condition Reports** can help provide local information from your county!

"Condition Monitoring Training (continued)"

What to Look For

The following tables provide examples of the types of conditions you might observe during different wet or dry periods. **These lists are designed as an aid.** The first table shows the condition monitoring scale bar categories and the types of conditions that correspond to those categories. The second table organizes different types of conditions and impacts by sectors and areas of interest. Be sure to note any other observations that you think may relate to dry or wet conditions.

SEVERELY WET	MODERATELY WET	MILDLY WET	NEAR NORMAL	MILDLY DRY	MODERATELY DRY	SEVERELY DRY
• **Use this category sparingly** • Wet conditions have persisted for several weeks • Major flooding	• Wet conditions have persisted for a few weeks, or there has been a major rainfall event • Standing water and minor flooding	• Frequent precipitation for several days • Standing water is common	• Observed conditions normal for this time of year • **This should be your default entry**	• Dry conditions have persisted for a few weeks	• Dry conditions have persisted for several weeks • Lakes and rivers are low • Water use restrictions start	• **Use this category sparingly** • Dy conditions have persisted for months • Water is scarce • State of Emergency

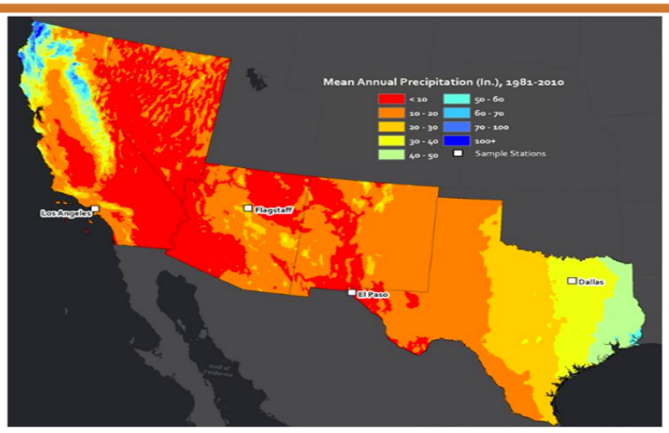
Condition Monitoring Reporting Guide: Southwest

Regional Background

Though most of the region is known for its desert heat throughout much of the year, elevation and dry air means cooler summer nights and cold winters in many areas. Despite being extremely arid, what little rainfall the region does receive often comes in short, intense bursts. Higher elevations have slightly more moderate summer temperatures and will often accumulate snow in the winter. The coast of Southern California is kept dry and relatively warm year-round because of the moderating effect of the ocean. East Texas has a humid subtropical climate more like that of the Southeast, whereas northern California's climate is quite rainy. CoCoRaHS observers in those areas should consider consulting the Reporting Guides for the Southeast and Pacific Northwest, respectively.

Reporting Reminders

- Use "Severe" categories sparingly: overuse of these labels can make it hard for researchers to identify the hardest hit areas.
- Sometimes, minor events may still have major human impacts, or vice versa. Don't worry if your precipitation measurements seem to conflict with the severity reflected in your reports: differentiating between magnitude and human impact is valuable to researchers and decision makers!
- While heat and drought often go together, be careful to note that impacts of heat (e.g., wilting plants) are not necessarily indicative of drought conditions.
- Droughts don't end instantly. Rain after long droughts may mean *less dry* conditions, but not necessarily a reset to "Near Normal" conditions. Think *long term*.
- In addition to rain measurements, notes on a storm's duration, power outages, road closures, and other such impacts are helpful to include.



Average Monthly Climate Data, 1981-2010

These sample climate charts represent normal monthly precipitation and temperature in your region. Pick a city near you and use the data below as a baseline for your "near normal" conditions. Explore these resources for climate data in other locations:

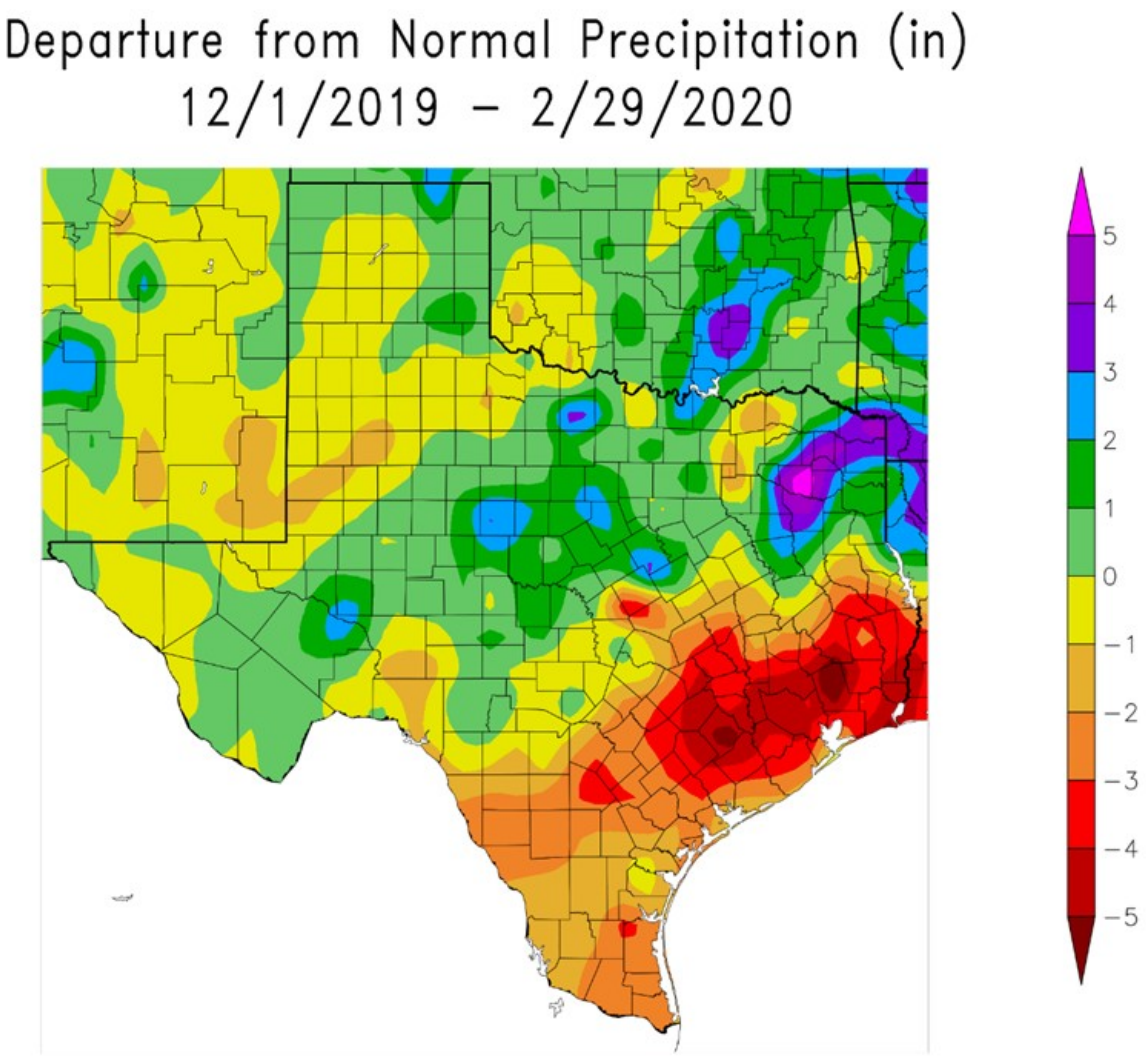
- National Drought Mitigation Center
- NOAA National Centers for Environmental Information
- NOAA Regional Climate Centers
- American Association of State Climatologists

Spring 2020 Weather Outlook

By: Bob Rose, Lower Colorado River Authority Meteorologist

Springtime weather across Texas typically means warming temperatures, periods of rain and severe weather and of course, lots of wildflowers. This year's spring pattern is expected to live up to these expectations and more as frequent storm systems bring periods of rain along mixed in with warm temperatures.

Winter was for the most part a now-show across Texas this year. While there were some occasional outbreaks of cold air, the cold quickly faded, allowing mild air to return. Forecasters noted the development of massively strong and persistent low pressure area across all of Earth's polar region throughout most of this winter. This broad area of low pressure area helped keep most of the bitterly cold air up locked up around the North Pole, severely limiting the number of arctic air outbreaks. This same feature also helped focus the primary winter storm track along a path from the Pacific Northwest, to the southern Plains states to the Deep South. The northern half of Texas was close enough to the storm track to see frequent periods of rain and above normal rainfall. But most of this winter's storms tracked too far north to affect South Texas, where rainfall averaged several inches below normal.



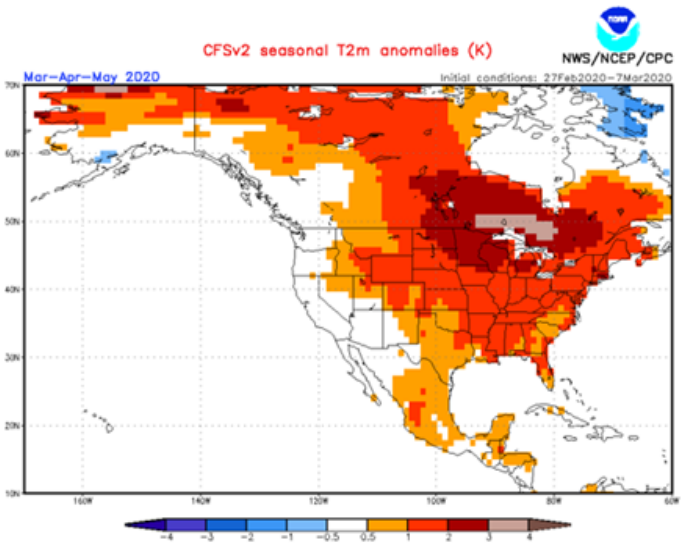
"Spring 2020 Weather Outlook (continued)"

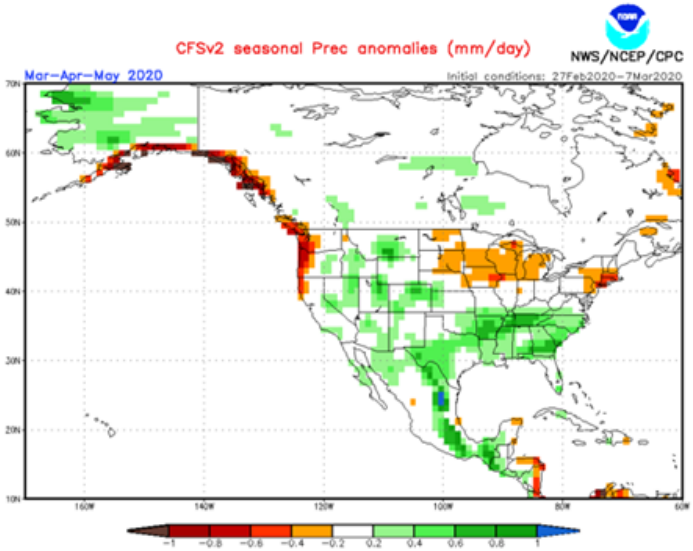
Over the winter months, neither El Niño nor La Niña had an influence on our region's temperature or rainfall as the Pacific remained ENSO neutral. ENSO neutral means neither an El Niño nor a La Niña are in place and sea surface temperatures are near normal in the tropical Pacific Ocean. Weather forecasters continue to keep a close eye on these sea surface temperatures where conditions have been ENSO neutral going back to last summer. Computer-forecast model solutions call for no significant changes in the sea surface temperatures this spring and summer, meaning the ENSO neutral pattern will likely continue.

Interestingly, sea surface temperatures in the Gulf of Mexico and the Caribbean Sea may actually play a sizeable role in our springtime pattern. Waters in the Gulf and the Caribbean are running much warmer than normal. A southerly flow off the warm Gulf waters is expected to bring warmer than normal and quite humid air inland to much of the state. The humid air will provide considerable fuel for potential rain showers and thunderstorms.

The unusually strong polar low pressure area mentioned earlier is forecast to weaken this spring. However, the cold air bottled up across the polar region is forecast to remain well up to our north and this should allow springtime temperatures to warm up quickly. Do note that as the low pressure area weakens, it is expected to cause the current storm track to relax and take on a more typical springtime configuration, running roughly from the Desert Southwest and the southern Rockies, across Texas and into the mid-Atlantic. This more typical springtime storm track in combination with a warm and moist flow off the Gulf of Mexico is expected to produce a pattern of warmer than normal temperatures and near normal, to slightly above normal rainfall across most of the state.

The following is the temperature and precipitation outlook for March-April-May from the National Weather Service's CFSV2 forecast model:





Stay weather aware as we move through the spring severe weather season. Severe storms and heavy, possible flooding rains can be expected at times with some of the stronger storms. But also remember to take time to enjoy the wildflowers and everything else that makes the spring months some of the best of the entire year.

Rio Grande Valley Regional Summary

Winter in the Rio Grande Valley: "Dry" Fronts Dominate; Drought Worsens Steadily

By: Barry Goldsmith, NWS Brownsville

A fast-moving west-to-east atmospheric steering pattern, with little "tap" to the tropics of the eastern Pacific Ocean or the southwest Gulf of Mexico, brought more than a dozen fronts with limited rainfall, followed by dry to very dry and sunny conditions, through Deep South Texas and the Rio Grande Valley between December 2019 and February 2020.

Temperatures varied ahead of and behind each front. Canadian connections pushed temperatures near or just below freezing across much of Deep South Texas and parts of the Rio Grande Valley on December 18th, 19th, and on February 27th. A somewhat warmer atmosphere and slightly more southwesterly steering flow in January pushed average temperatures into the top ten warmest all-time, a fitting start to a new year after 2019 saw top ten warmest levels for the fourth year in a row across the highly populated Rio Grande Valley urban areas. December 2019 wasn't that far behind, finishing in the top 25 warmest, and featured two days in the lower 90s (mid Valley) mid-month. Despite February 2020's near "normal" temperatures, the boreal winter finished eighth warmest in McAllen, and eleventh-warmest in Brownsville and Harlingen.

Rainfall was non-descript for the period, and as expected in a worsening drought situation, well below average. Total rainfall averaged a little over 1 inch for the season, ranking the populated Rio Grande Valley between twelfth and sixteenth driest on record. Most of the notable rain fell on Saturday, December 21st – one of the heaviest shopping days of the year. The remainder of the rain fell as light showers or drizzle, with no effect on the drought. Despite a somewhat more favorable southwesterly steering pattern, rainfall ranked among the top third driest, as the better atmospheric forcing favored central through north Texas for welcome rains. Percent of average rainfall for the winter was around 25 to 33 percent.

Several days in February were critical to rapid wildfire growth and spread due to a combination of afternoon humidity in the teens and twenties, and northwest winds 20 to 25 mph with gusts to 35 mph. While there were several wildfires across the ranchlands, none were known to become large or uncontained.

The worsening drought exacerbated conditions for new dryland crops, which could not be planted in some cases due to the lack of rainfall. In mid-February, Hidalgo, Jim Hogg, and Brooks County was designated as "contiguous disaster counties" by the USDA, allowing them access to federal resources to help alleviate dry conditions. The designation was primarily for crop farmers and livestock ranchers, many who had to resort to "water hauling" to ensure cattle had sufficient hydration.

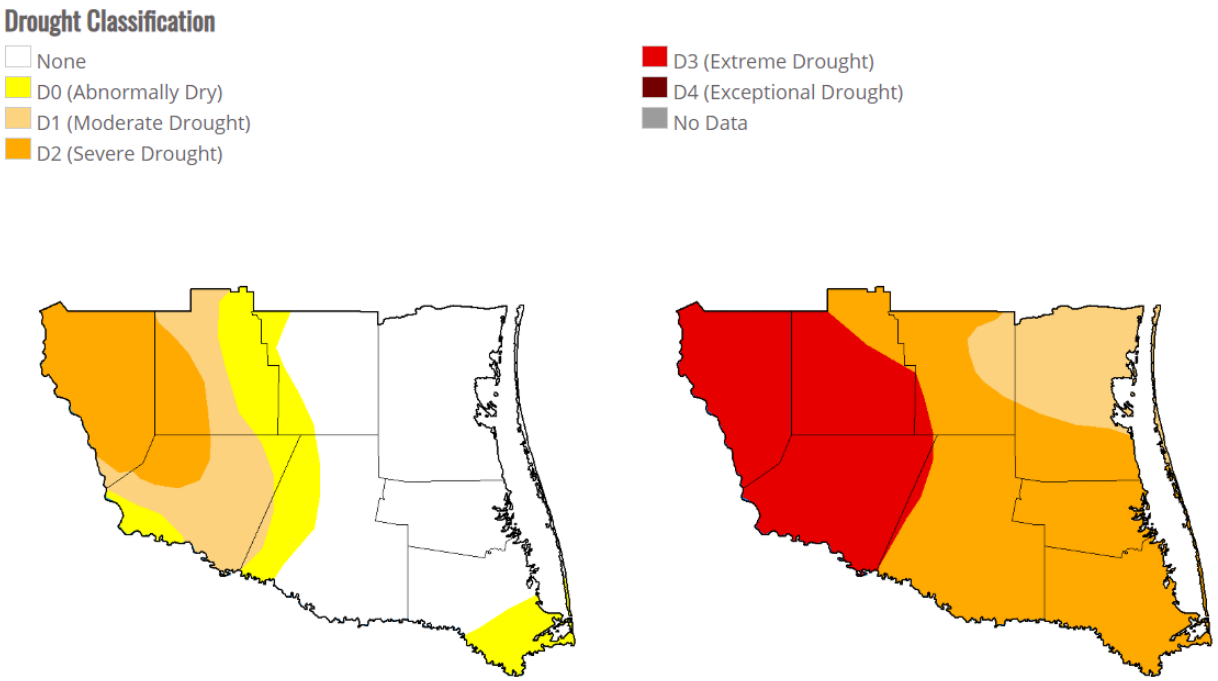


Fig. 1: Drought Monitor Comparison from Dec.3 on the left to Mar.3 on the right

"Rio Grande Valley Regional Summary (continued)"

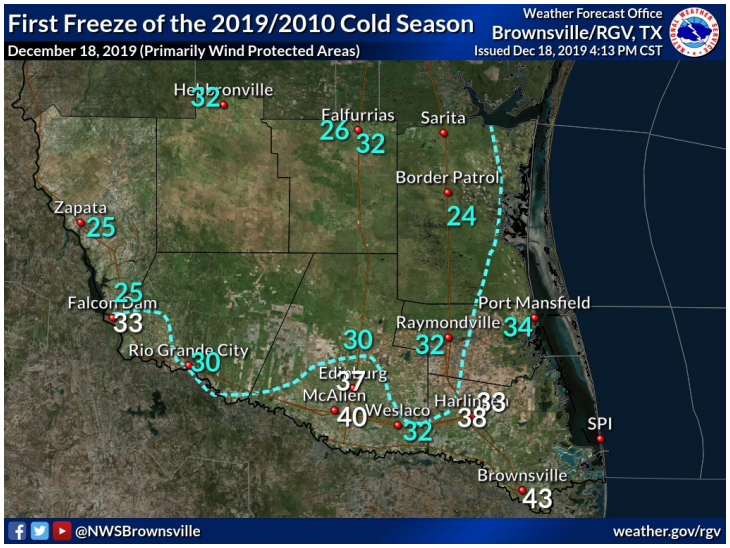


Fig. 2 December 18th freezing line in South TX

Fig.3 Freezing temperature on Dec. 18th change landscape

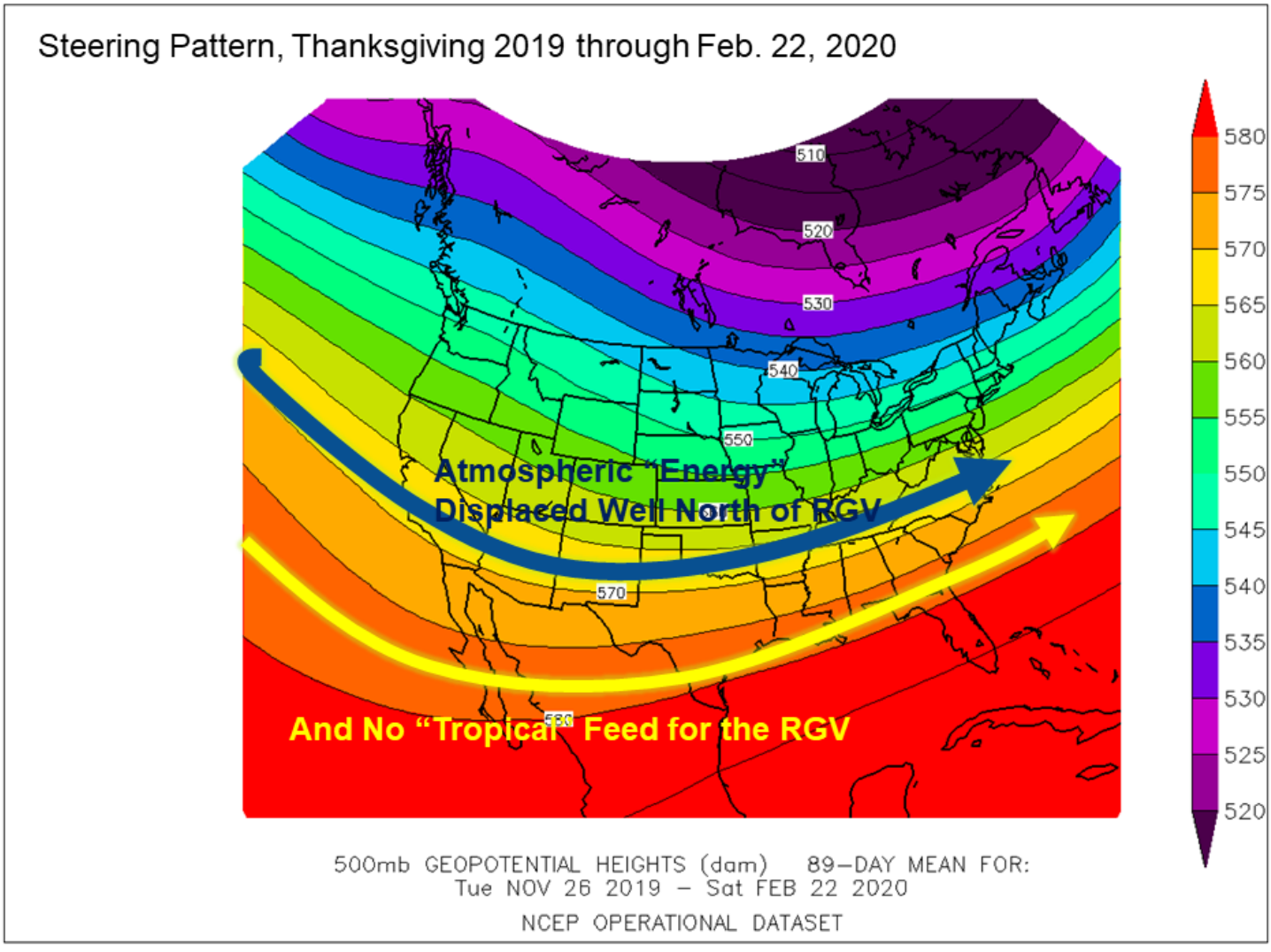


Fig. 4 Upper level wind flow pattern for the winter

"CoCoRaHS Observer Training (continued)"

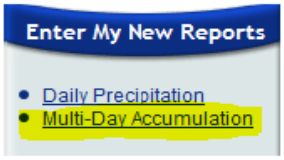
Is Your Rainfall Report for One Day, or is it for Multiple Days? Is Your Observation More than Four Hours Late?

It is important not only to read your rain gauge correctly, but to report correctly as well. If you have an amount that has accumulated in the gauge over a period more than one day (like over a weekend), you must report this using the Multi-Day Accumulation report, NOT the Daily report. Or, if your observation is more than 4 hours past your normal observation time (for example, your observation is made at 11:30 a.m. and your normal time is 7:00 a.m.), then do not submit a daily report for that day. Instead, wait until the next day and submit a 2-day total using a Multi-day Report. See page 2 for instructions on this.

For many observers reporting precipitation for multiple days is an infrequent occurrence, and we forget that these amounts are entered differently than the daily report. The Daily Report form (the one that appears after you log in) is ONLY for an amount collected for a one-day period. If you are reporting an amount collected for a period of two or more days, then use the Multi-Day Precipitation form on the web site. This form is for reporting an accumulation of precipitation over two or more days where you did not take daily observations. In other words, for any given date, you should report precipitation using either the Daily Precipitation Report or the Multi-Day Precipitation Report form.

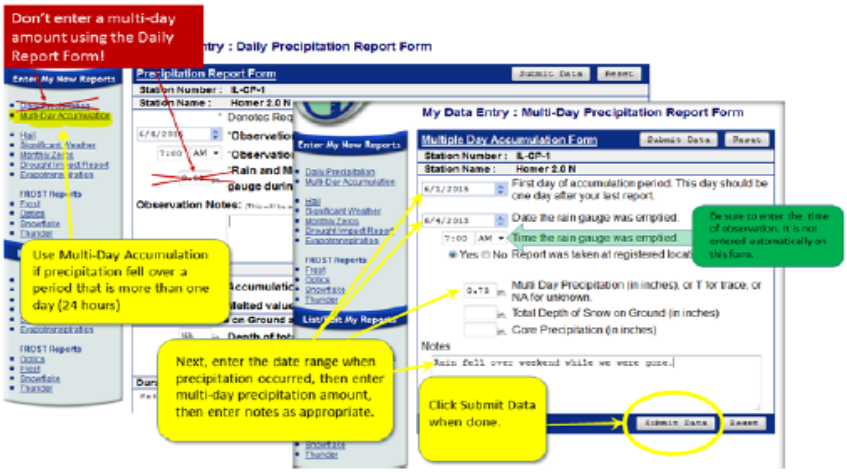
Example 1

After your observation on May 31, you head out for a long weekend. You return late on June 3. On the morning of June 4 you check your rain gauge and find 0.75 inches of rain in the tube. How do you report this?



Log on to the CoCoRaHS web site as usual. IGNORE the Daily Report screen that pops up. Instead select Multi-Day Accumulation in the menu

On the form, enter the first day of accumulation. In this case it is 6/1, the day after your last report (May 31). You emptied the rain gauge on 6/4. Enter the time you emptied the rain gauge, then enter the amount that you measured in the field labeled "Multi Day Precipitation (in inches)". In this case, you would enter 0.75. Click on Submit Data and you are done.



Example 2

One weekend you take your daily observations but for a variety of reasons are not able to get access to the computer to enter your observations into the CoCoRaHS web site. You have the following observations:

6/1 0.01"
6/2 0.00"
6/3 0.50"
6/4 0.25"

You are able to enter your data on June 4. How do you report this?

DO NOT use the Multi-Day Precipitation form. That is only used for entering one measurement that represents an accumulation over a period of two or more days, not for multiple daily reports.

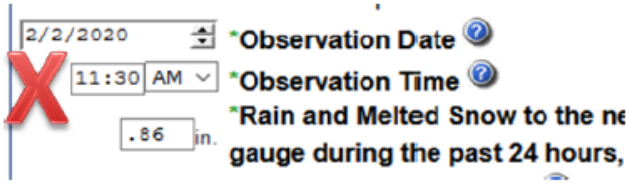
DO use the Daily Precipitation report form. When the form appears on the screen, change the date to 6/1, enter the observation, and click the Submit Data button. Then, click on Daily Precipitation under Enter My New Reports, change the date to 6/2 and enter that observation and click the Submit Data button. Repeat for the last two observations.

Be careful entering a sequence of reports like this. A common error we see is observers transposing observations, for example, entering the amount for 6/1 for 6/2 and 6/2 for 6/1.

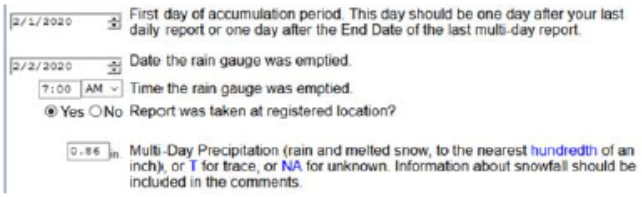
"CoCoRaHS Observer Training (continued)"

A Late Observation—When Should You Submit a Multi-Day Report ?

If your observation is more than 4 hours past your normal observation time (for example, your observation is made at 11:30 a.m. and your normal time is 7:00 a.m.), then do not submit a daily report for that day. Instead, wait until the next day and submit a 2-day total using a Multi-day Report.



At times we see observers wait until rain has stopped to make an observation, thinking that it will be more helpful to capture the entire "event" than make an observation during it. That is not the case. Remember, we are trying to compare rainfall data that was collected in observations 24 hours apart. If an observer waits until the afternoon to make a measurement and report it, then it cannot be compared to observations made that morning (too much precip), nor to observations made the next morning (too little precip). The one time you should wait is if it is not safe to make your observation (lightning or other severe weather). Consistency in observation times is important to interpretation of the precipitation data. You can, however, submit a Significant Weather Report to report the rainfall you received.

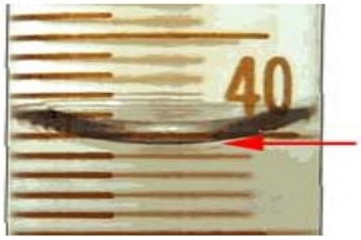


Wednesday's observation of 0.52" was at 1:00 p.m., 6 hours past the normal ob time for this observer. Instead of a daily report for Wednesday, the observer waits until Thursday morning and submits a Multi-Day Report with a total of 0.66" (0.52" plus the 0.14" that fell between 1:00 p.m. Wednesday and 7:00 a.m. Thursday.

"CoCoRaHS Observer Training (continued)"

1. The surface of the water in the gauge looks curved. How do I know where to read?

As water fills up the measuring tube, a curved surface is formed called a **meniscus**. This meniscus is formed by the surface tension of a liquid in contact with the sides of the tube. Always read the base of the meniscus when taking measurements. Here is an illustration to help you understand this process.



2. What do I do if the inside measuring tube is full?

We can determine that more than one inch of rain has fallen by simply observing that the inside measuring tube is full and the additional water has spilled out into the larger container. Remember that the measuring tube will only hold one inch of water. Follow these steps when measuring rainfall more than one inch.

Step 1. You will first need to read the precipitation in the measuring tube, record it, and empty the water in the measuring tube. **Do not empty out the water that has collected in the Overflow Tube.**

Step 2. You will need to carefully pour the remaining water, from the overflow tube, into the measuring tube, record it, and add up the totals. The easiest way of doing this is by pouring the water into the measuring tube a little bit at a time. You do not have to fill up the tube to the one inch mark every time, rather fill up the tube half or three quarters of the way, record it, and add up the totals. **Be careful not to spill any precipitation.** When in doubt, place a bucket or other large container under the gauge as you pour, so that you can collect the water if you do happen to spill. If more than 2.00 inches of rain fell, you will have to repeat the process several times. Make sure you write down each rainfall quantity and add up the total. If you don't write it down immediately, you could forget.

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

On damp, dewy spring and summer mornings a few drops of moisture may collect in your rain gauge. **Do not to report this as rain**. If the only moisture in your gauge came from dew (rarely will dew collect to more than 0.02 inch), report "0.00".

4. Should I keep a written record of my precipitation data?

Yes, it is important to maintain a written record of your data. This gives you a permanent record and gives us a backup in case we have computer or phone problems. This is also important if we find that your data have been entered erroneously into the CoCoRaHS computer system. It might happen that a CoCoRaHS student intern spots an suspicious or erroneous report for your station. If so, they may contact you and discuss it with you. Keep your written records handy. Please **do not** be offended, we are simply trying to collect the best data as possible. You can print out our "CoCoRaHS Precipitation and Snow Measurement Form" to record your data on.

5. What If I leave for a weekend or for a vacation and find precipitation in the gauge when I get back?

You need to enter your data as a multi-day report. Click on the "Multiple Day Accumulation Form" button. Enter the precipitation amount and the dates, the first date is generally the day after you left and the second date is the day you returned and emptied the rain gauge. Make sure that you don't accidentally write over good data by entering a date that is too early. Please also let us know in the comments if you think you know on which day the precipitation fell.

6. I have an automated weather station with a rain gauge. Can I use that instead of the CoCoRaHS gauge ?

Answer: ***In order to accurately compare CoCoRaHS reports, all observers must use the 4-inch CoCoRaHS gauge. Automated rain gauges tend to underestimate a heavy rainfall and do not accurately measure water content of snow. You are welcome to place the automated gauge beside the 4-inch gauge to compare measurements, but report what falls in the 4-inch gauge.***

"CoCoRaHS Observer Training (continued)"

Understanding the Difference between Precipitation and Condensation

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

Answer: ***Dew, fog, fog mist, and frost are a process of condensation of water vapor changing from a vapor phrase to a liquid phase which is deposited on surfaces such as a rain gauge. Do not report condensation values in any box on the daily, multi-day, and significant weather reports.***

Precipitation is a process of a liquid or solid phrase aqueous particles that originate in the atmosphere such as a cloud and fall to the earth's surface as rain, hail, sleet, and snow. CoCoRaHS measures rain, hail, sleet, and snow and these values are reported in the precipitation boxes on the daily, multi-day, and significant weather reporting forms.

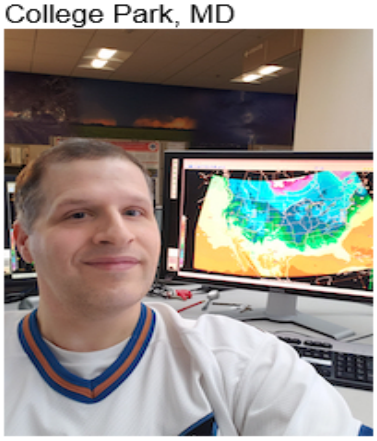
With the rainy season upon us with the start of spring in March, it is an excellent time to recruit a friend to join CoCoRaHS and sign up to become a precipitation and weather conditions observer. Please join at https://www.cocorahs.org/application.aspx

CoCoRaHS Webinars

Webinar #69 - Thursday, April 30, 2020, 1PM EDT

NOAA's Weather Prediction Center -- Part 1: A Quick Overview with a Deeper Dive into QPF/Heavy Rainfall Products

Greg Gallina
NOAA/Weather Prediction Center
College Park, MD



CoCoRaHS WeatherTalk Webinar Series

NOAA's Weather Prediction Center (WPC) is one of nine National Centers of Environmental Prediction that include Centers like the more familiar National Hurricane Center or Storm Prediction Center. However, much like the name implies, the mission of WPC is quite broad and covers many of the aspects of weather for the entire nation including but not limited to: Analysis and forecast weather maps/charts (ie fronts, high/low pressure area, isobars), heavy rainfall and flash flooding concerns, and winter weather in the short-term (up to 3 days) and medium range (up to 7-10) forecast periods, as well as, serving as backup to the National Hurricane Center.

Given the breadth of WPC's roles, this talk (part 1) will quickly overview WPC's position and role within the national weather enterprise, but then take a deeper look into the center's expertise in precipitation forecasting focusing on products and uses coming into convective (thunderstorm season): Quantitative Precipitation Forecast (QPF), Excessive Rainfall Outlook (ERO), and Mesoscale Precipitation Discussions (MPDs). In late summer, early fall, a second talk (part 2) will shift focus to WPC's role in winter weather forecasting with new products and services being tested and available to more users into the 2020-21 winter weather season.

Texas CoCoRaHS Observer

The official newsletter of Texas CoCoRaHS

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