TEXAS CoCoRaHS OBSERVER

Spring 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, training, and happenings related to the CoCoRaHS program here in Texas, as well as news about the latest weather patterns affecting each region of Texas seasonally.

Inside this issue

Texas Spring Weather Summary

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

Floods can develop suddenly. A single thunderstorm, if it produces rain efficiently and sits over the same place for a couple of hours, can produce a flood. We call them flash floods because they develop so quickly.

Drought doesn't develop suddenly. One day without rainfall does not make a drought. On the other hand, there's no hard-and-fast rule for how many days without rainfall make a drought. Maybe it's 30 days in the summer, or 60 days in the winter. It depends on how dry things are normally.

Over the past decade or so, meteorologists have coined the term "flash drought" to describe droughts that develop suddenly, perhaps even unexpectedly quickly. They are marked by high temperatures and by plants struggling to find the water they need.

Much of Texas is now experiencing a flash drought.

The most well-known flash drought was the 2012 drought in the upper Mississippi River basin. March 2012 was unusually warm, melting snow cover and exposing the soil to evaporation. May was downright hot, and plants and crops developed quickly. Then, when drier conditions set in during late May and June, foliage was unusually lush and the moisture in the soil was rapidly depleted. Suddenly plants that had looked great a month before were wilting. The hot, dry weather continued until late August.

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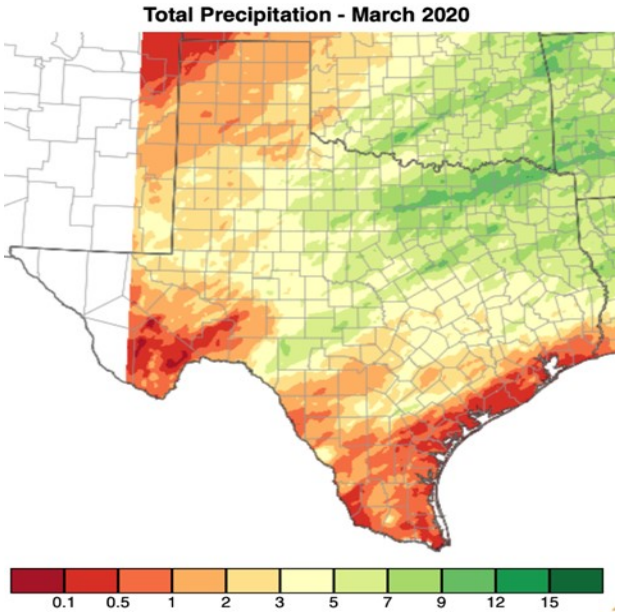
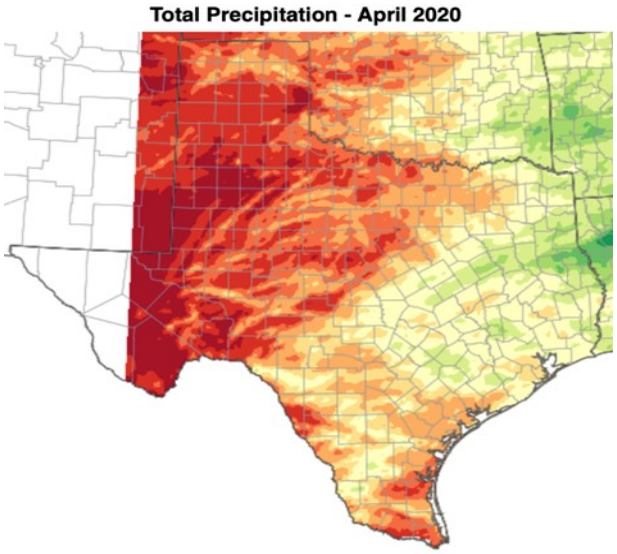
"Texas Spring Summary (continued)"



Most of us in Texas don't have to worry about melting snow cover. But we do have to worry about a warm spring, because soil moisture gets depleted earlier than usual. And since May and June are normally the wettest months of the year in many areas, a dry May and June means that moisture deficits can build up quickly and plants can quickly exhaust the moisture reserves that accumulated during the cool time of the year. By the time the astronomical start of summer rolls around, temperatures are already unusually warm, making it even harder for plants to recover.

That's the story in much of West Texas. This has already been a top ten year so far for high temperatures. Things were in decent shape over the winter, but during the past two or three months the spigot has been shut off from the northern Panhandle down to Abilene, San Angelo, and Midland.

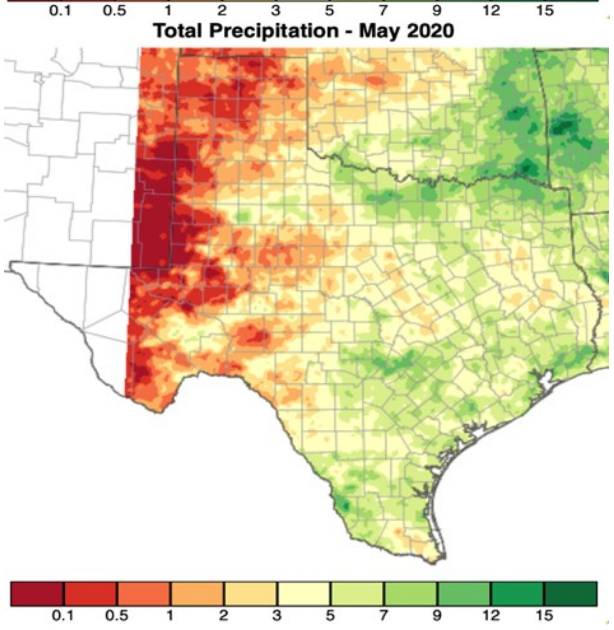
Figure 1: Texas total precipitation in March 2020



Just in time for the hot weather of June, the soil has started to dry out. The high temperatures will accelerate the drying process, as will the initial growth of plants drawing on water that remains in the soil for now. By the end of June, if the current forecasts of dry weather hold up, much of Texas will be looking like the middle of August by the end of June.

South Texas has experienced just the opposite. A nagging drought intensified during March and April along the coast, until May rainfall pretty much brought an end to it. Not only is that good news for South Texas, it's good news for Texas as a whole, because the moisture in South Texas will serve as a natural air conditioner, keeping air temperatures mild until the that air encounters the baked soils of the drier areas.

Figure 2: Texas total precipitation in April 2020



Then there are the areas in north and east Texas that were wet at the beginning of spring and are wet at the end of spring. Rainfall totals there are as high as two feet over the past three months, which obviously beats out those parts of west Texas that couldn't even manage two inches of rainfall over the same period.

The flash drought is already playing havoc with winter wheat in the Panhandle and cotton in west-central Texas. We'll see how long drought conditions last. While even a flash drought takes time to develop, droughts in Texas can end very quickly, often via a flash flood.

Note: Rainfall analyses are by the Northeast Regional Climate Center using National Weather Service data, including CoCoRaHS.

Figure 3: Texas total precipitation in May 2020

West Texas and Southeast New Mexico Regional Summary

Very wet March, but things dried up in April and May

By: James DeBerry – Meteorologist, National Weather Service Midland

March

March was another month of abundant rainfall for most of West Texas and Southeast New Mexico. A couple of events were even noted. On March 3rd, thunderstorms developed over the Permian Basin, closing some roads in Midland in Midland County, and near Tarzan in Martin County. Then on the 15th, thunderstorms flooded low-lying roads and water crossings in Fort Stockton in Pecos County.

Monthly radar precipitation estimates ranged from as little as 0.01" in Brewster County to up to 6" in the upper Colorado River Valley. However, the observed rainfall was 5.31" in Fluvanna in Scurry County. Average rainfall was a whopping 2.20".

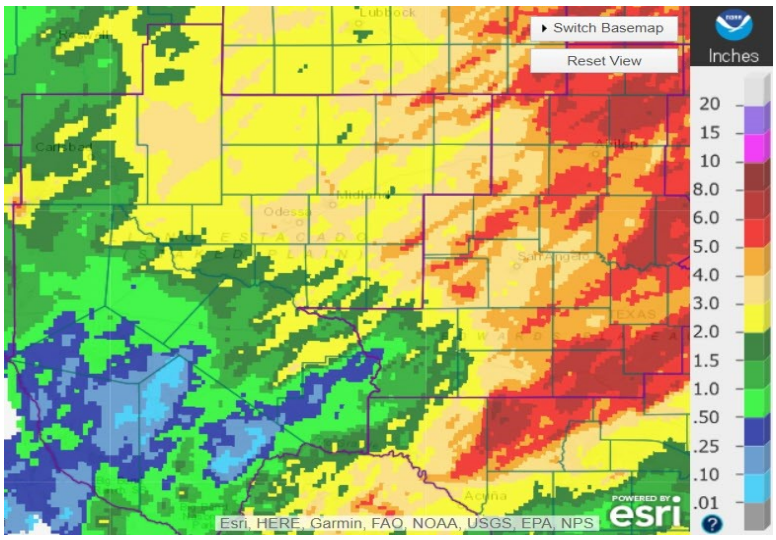


Fig. 1: March Precipitation

April

The spigot dried up in April as upper-level ridging began developing in the synoptic pattern, and cold fronts began dropping off. As a result, precipitation came in below-normal. Consequently, no hydrologic events were reported.

Monthly radar precipitation estimates ranged from nothing over much of the west to up to 3" in the southern Permian Basin and Upper Colorado River Valley. Highest observed rainfall was 0.91" in Snyder in Scurry County. Average rainfall was 0.16".

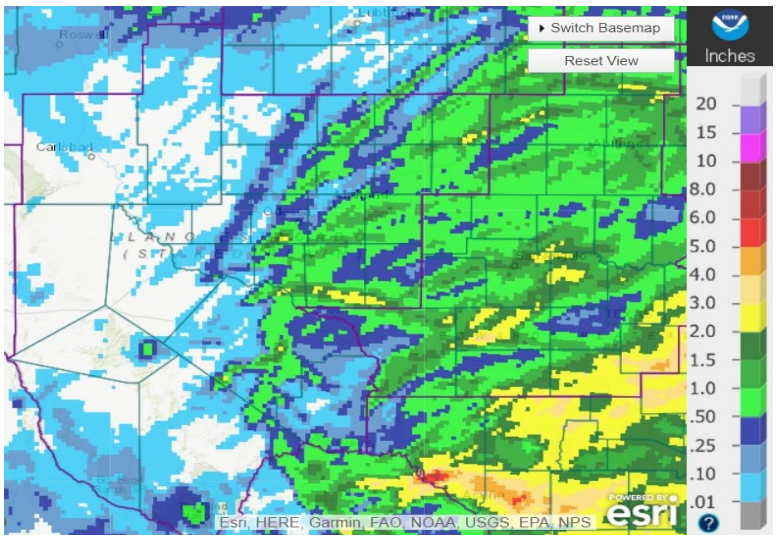


Fig. 2: April Precipitation

"West Texas Regional Summary (continued)"

May

May was another relatively dry month for West Texas and Southeast New Mexico, as the summertime ridge began asserting itself. The few hydrologic events worth mentioning were characterized by brief, intense downpours.

On May 10th, thunderstorms developed over the Big Bend, and dumped 2" of rain at Castolon in Brewster County in 40 minutes. This washed out roads from Castolon down through Santa Elena Canyon, bringing the Rio Grande briefly into minor flood.

On the 11th, the Pecos County supercell hit Fort Stockton, flooding several vehicles there.

Finally, on May 15th, thunderstorms inundated Stanton in Martin County, stalling several vehicles in and around town.

Monthly radar precipitation estimates ranged from no rain in much of Southeast New Mexico to up to 8" on the Stockton Plateau. Highest observed rainfall was 4.09" at a coop 38 miles southeast of Fort Stockton in Pecos County. Average rainfall was 0.70".

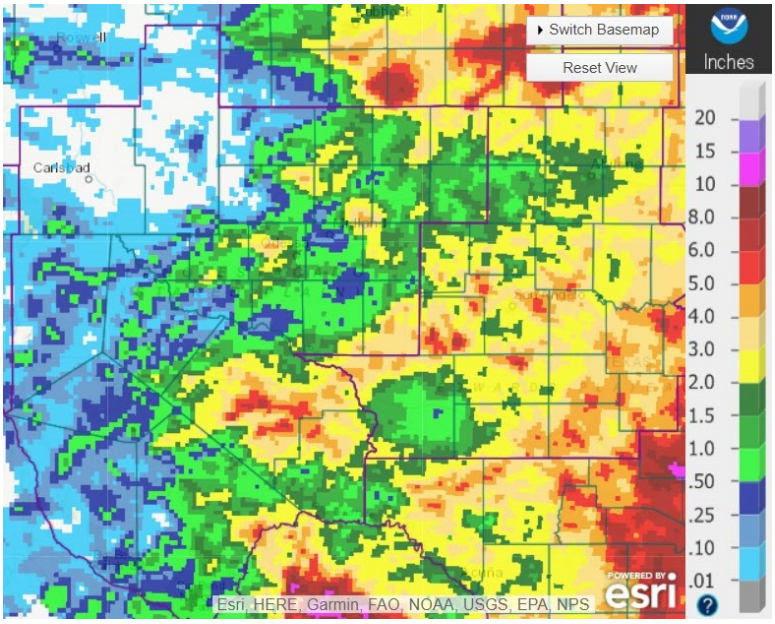


Fig.3: May Precipitation

Overall the spring of 2020 leaves West Texas and Southeast New Mexico in pretty good shape for the upcoming summer. Area reservoirs are at 48.4% conservation capacity as of June 1st.

North Texas Regional Summary

By: Greg Story - Retired - National Weather Service

Greetings from North Texas! It is incredible how busy we have been measuring rainfall so far this year. As I will highlight, it has been a near-record setting year. 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. Over the past several months, 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. In March, much of northern and western Texas had above normal rainfall, while southeast Texas was below normal. April actually turned drier, especially over the second half of the month. Below normal rainfall occurred over most of Texas, except for a few locations in eastern and southern parts of the state. Rainfall was much below normal in the far west. Then in May it was a mixed bag again, with northern and southern Texas receiving above normal rain, while central Texas was fairly dry.

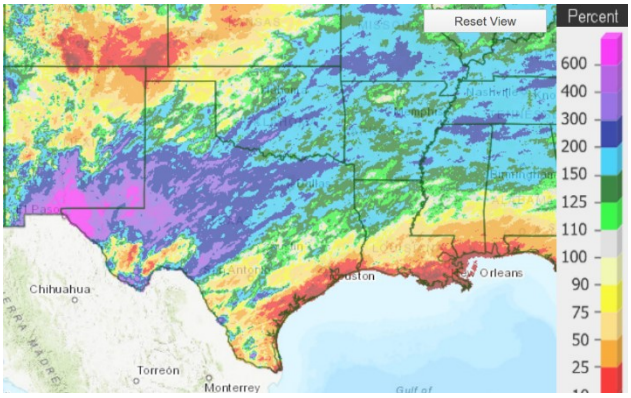


Fig. 1: Percent of normal rainfall for March 2020. The green and light yellow colors indicate near normal precipitation, the blue and purple colors indicate above normal, while the red indicates below normal precipitation. March was pretty dry over the middle and upper Texas Gulf coast, while most of northern and western Texas got above normal precipitation. Parts of southwestern Texas received much above normal rain in March, but most of south Texas had below normal precipitation.

For March at DFW they received 6.75". That was 3.26" above normal (March is the 4th wettest month of the year climatologically, with normal rainfall of 3.49"). March 2020 was the 2nd wettest March of record. And, March 2020 was the wettest month since May 2019 when DFW received 8.15" of rain.

Wettest March months

Rank	Year	Amount
1	2002	7.39"
2	**2020**	**6.75"**
3	1995	6.69"
4	1968	6.39"
5	1979	6.33"

Also, DFW had 11 consecutive days with rain from the 12th to the 22nd. The all-time DFW record had been 10 days set in April 1908 and in February 1932. The record was tied before midnight on the 21st (0.17") and was broken the morning of the 22nd (0.09"). The 19 rain days in March 2020 ties 1926 for the most on record. The 16 days with measurable rain in March 2020 broke the previous record of 14 days set in 1912, 1926 and 1945.

In the end, 2020 got off to the wettest start of a calendar year (January 1 through March 30) on record. Two years ago, we had what then was the 3rd wettest start to a year on record. Normal rainfall through March 30 was 8.17" so we were 7.46" above normal. Record keeping goes back to 1899.

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

March 3 – 5:

A major low pressure system moved slowly from the East Pacific region and northwest Mexico across Texas. The heaviest rain was over the northern two thirds of Texas. The heaviest was around 7" of rain near Alto, Texas. In north Texas, most rainfall observers had around an inch or less.

March 13 – 16:

A massive upper low was stationary over the California coast for a few days. The southwest flow aloft combined with short wave troughs and a frontal boundary to bring rain to mostly northern and western Texas. It rained for 11 straight days over parts of north Texas. During this period, widespread rainfall amounts of 3 to 4" were noted across our region.

"North Texas Regional Summary (continued)"

March 18 – 22:

The upper low near California finally moved northeast, bring additional rain initially to north Texas. A secondary upper air disturbance brought more rain primarily to central and east Texas. An additional 2 to 3" fell across north Texas during this time period.

March 28 – 29:

A cold front and dry line passed across Texas. The rain from these systems were most widespread across Central and East Texas. The rainfall over north Texas, on average, was less than 1".

March 30 – 31:

A short wave trough passed just north of Texas. It pushed a cold front across the state. Rain fell primarily along the Red River into much of northeast Texas. Rainfall across north Texas was generally less than 0.50".

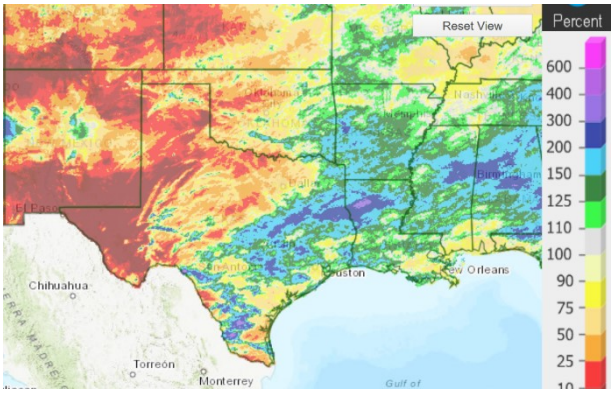


Fig. 2: April 2020 percent of normal rainfall map. The red and yellow colors indicate below normal precipitation, while the blue and purple indicate above normal rain. In April, there was quite a bit of variability, but most of the state had near normal precipitation. There were some locations which got above normal precipitation, but also some which were below so it pretty much balanced out. Much of far western Texas and parts of north Texas received below normal precipitation in April. But, most of eastern Texas, parts of central Texas, and Deep South Texas had above normal precipitation.

At the DFW airport in April they received 1.90". The normal April precipitation is 3.07", so they were 1.17" below normal. April has been the driest month of the year so far.

Since the weather turned dry from April 13-27, by the end of April Dallas-Fort Worth's 2020 rainfall had slipped into the 9th spot on the year-to-date rainfall list since records began in 1899. In Waco, they were 4th on the highest year-to-date rainfall list through April 30.

Waco through April 30

Rank	Year	Amount	Rank	Year	Amount
1	1905	26.93"	6	1997	19.64
2	1957	22.89"	7	1945	19.40
3	1922	20.78"	8	1912	17.70
4	**2020**	**20.10"**	9	1944	17.67
5	2004	20.05"	10	1908	17.49

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

April 3 – 4:

A long wave trough developed over the western U.S. during this period. A couple short wave troughs moved through the southwesterly flow aloft and produced showers and thunderstorms, especially across south Texas, where they got in excess of 4+". Most of the rainfall reports in north Texas were light.

April 9 – 12:

Big low pressure system moved inland over California. A lead short wave trough produced showers and thunderstorms over central Texas on the 9th. The storm system started moving east on the 11th and cleared Texas on the 12th. When all was said and done, 3" fell in the Mexia area. But most other north Texas rainfall observations were less than 1".

April 18 – 20:

A cold front produced some rain over east and southeast Texas. Then a short wave trough moved through the southern branch of the jet stream. This created showers and thunderstorms over especially east Texas. Southern Tarrant County got up to ½", but 4" fell over east Texas around Toledo Bend Dam.

April 22 – 23:

A short wave trough moved across Oklahoma which pushed a dryline across Texas. Thunderstorms developed which produced tornadoes in southern Oklahoma, northeast Texas and southeast Texas. The heaviest rain of 4" fell west and southwest of Shreveport, Louisiana.

"North Texas Regional Summary (continued)"

April 24:

Evening thunderstorms became severe over northeast Texas as a dryline and cold front moved through Texas. As with previous days, the heaviest rain of 1" occurred west of Shreveport, Louisiana.

April 28 – 29:

Isolated thunderstorms moved from west Texas into north Texas early on the 28th. Large hail fell from the thunderstorms in Fort Worth. Then a cold front generated a line of severe thunderstorms which moved from Oklahoma across Texas. And while most of north Texas received around 1.50" of rain, they got 7" in extreme southeast Texas.

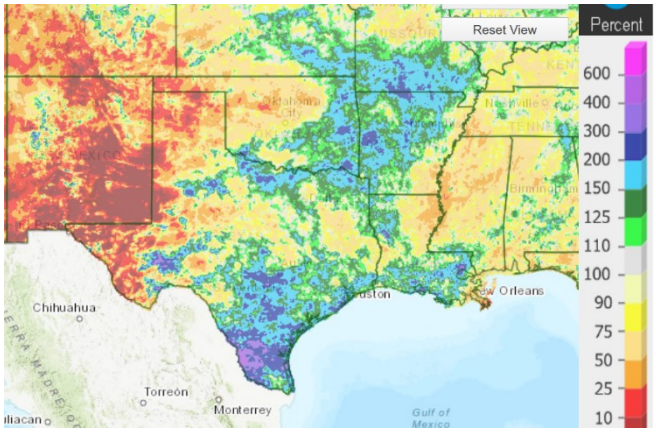


Fig 3: Percent of normal rainfall for May 2020.

The yellow and red colors indicate below normal precipitation, while the green, blue and purple colors indicate above normal rain. In May much of north and south Texas got above normal precipitation, and much of central Texas received below normal precipitation. Parts of far western Texas and the panhandle region received much below normal precipitation in May. But, parts of Deep South Texas had much above normal precipitation.

At DFW airport, the May rainfall was 7.54". The normal rain for May is 4.90" so they were + 2.64" above normal. It was the 21st wettest May of record.

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

May 4 – 5:

A strong cold front moved through Texas. A line of thunderstorms moved out of Oklahoma into North Texas late on the 4th. Close to 1" of rain fell over Dallas and Denton counties, with a maximum amount of 1.21" in Kaufman County.

May 8:

A strong cold front moved through north Texas. A supercell thunderstorm moved from near Childress to west and south of Fort Worth. Then a line of thunderstorms moved southward out of Oklahoma. The maximum rainfall total was 2" at Greenville Texas.

May 11 – 12:

The dryline was active over west Texas. Thunderstorms along and ahead of the dryline produced almost 2" of rain near Lubbock. Then strong storms and heavy rain developed over central Texas. They got isolated heavy rainfall over the Texas Hill Country with a maximum amount of 10" near Canyon Lake in central Texas. In north Texas most rainfall was 0.50" or less.

May 15 – 16:

An upper level low moved over Texas and produced widespread rainfall. Thunderstorms moved south from Oklahoma, while the dryline produced a line of thunderstorms which moved east. Then, under the upper low itself very heavy rain developed over north Texas. Almost 5" was noted over North Richland Hills, Arlington and Grand Prairie, and over 4" elsewhere in the metroplex. The May 16 rainfall at DFW Airport of 3.57" was the largest daily rainfall total since September 21, 2018 when 5.85" fell. At that point it was the 6th wettest start to a year on record at DFW.

May 22 – 25:

Thunderstorms formed along the dryline in northwest Texas, and a large mesoscale convective system (MCS) developed over north Texas and southern Oklahoma on the 22nd. There was a tornado at Bowie along with 7.70" of heavy rain. The next day there again were thunderstorms along the dryline in West Texas on the 23rd, and thundershowers developed with the sea breeze front over southeast Texas. They received 3.50" at Post in west Texas and 2" at Center in east Texas. On the 24th a large MCS formed over southwest Texas that moved across south Texas. They got over 5" of rain in the Austin/San Antonio area. This complex of storms from the 24th produced a mesoscale vorticity center (MCV) which moved across central into northeast Texas. This upper low brought widespread rainfall with a maximum amount of 2.30" from Hill to Ellis Counties. Dallas-Fort Worth established the mark for the most rainfall on the Memorial Day holiday since recordkeeping began in 1899 for Dallas-Fort Worth:

"North Texas Regional Summary (continued)"

Memorial Day – Wettest on record

Rank	Amount	Date
1	**1.65"**	**May 25, 2020**
2	1.42"	May 28, 2001
3	1.34"	May 30, 1967
4	1.08"	May 30, 1970
5	0.90"	May 30, 1963
6	0.67"	May 30, 2016

May 27:

The upper low from the 25th got "stuck" over Oklahoma and Arkansas. Short wave troughs on the back side of this low produced showers and thunderstorms west and south of DFW down to Houston and Beaumont.

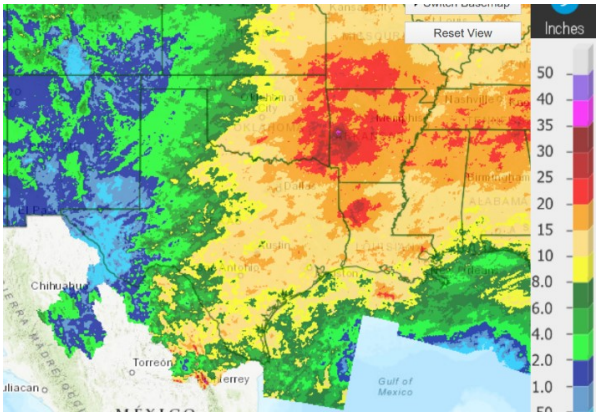


Fig. 4: Radar estimate of spring season precipitation 2020.

The bright red and orange colors indicate the largest rainfall totals while the light green and blue colors show light amounts.

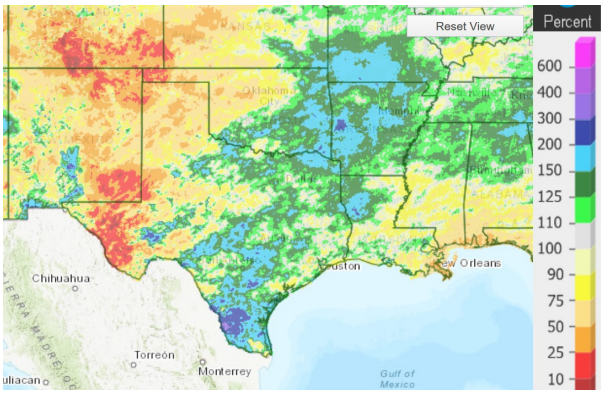


Fig.5: Percent of Normal Precipitation for spring season 2020.

The dark green, blue and purple colors indicate above normal rainfall. The brown, yellow and red colors indicate below normal amounts. Note the prolonged dryness over far west Texas into southeast New Mexico. The rainfall the past 3 months has been pretty high overall, with badly needed rainfall occurring from the Texas Hill Country into Deep South Texas.

At DFW Airport, the spring rainfall (March to May) was 16.19", the normal amount is 11.46" so they were +4.73" above normal. It was the 15th wettest spring. For DFW:

Spring rainfall at DFW airport – Wettest on Record

Rank	Amount	Year	Rank	Amount	Year	Rank	Amount	Year
1	29.01"	1957	8	19.59"	1914	**15**	**16.19"**	**2020**
2	25.05"	2015	9	18.47"	2002			
3	23.79"	1922	10	18.08"	1982			
4	23.34"	1908	11	17.38"	1946			
5	21.19"	1942	12	16.91"	2019			
6	21.02"	1995	13	16.80"	1949			
7	19.95"	1990	14	16.57"	1905			

"North Texas Regional Summary (continued)"

For Waco this spring season, they received 16.85" (just slightly more than Dallas/Fort Worth). The normal amount is 10.14" so they were 6.71" above normal for the season.

Since January 1 DFW had 25.07". The normal amount is 16.25" so they were + 8.82" above normal. It was the 7th wettest start to a year since records began in 1899.

DFW precipitation through May 31

Rank	Year	Amount
1	1957	32.50"
2	2015	31.63"
3	1990	29.21"
4	1922	27.42"
5	1949	27.00"
6	1908	26.75"
7	**2020**	**25.07"**
8	2002	24.31"
9	1932	24.08"
10	1995	23.57"

I wanted to remind you that, at times, all of us can make errors when we report our rainfall readings. Sometimes we place the decimal point in the wrong place, while other times we report a rainfall amount that lasted two or more days as a daily rainfall report. If the error is noticeable, we may contact you for clarification. If this occurs, please do not be offended. We are not doing this to criticize your reports. We are simply doing this to make sure we have the record straight. Having an accurate amount of the rainfall which fell is extremely important and valuable information to the National Weather Service's West Gulf River Forecast Center.

I want to thank ALL of you for submitting your rainfall readings to CoCoRaHS during this spring season. Your dedication helps us out a lot. Have a great summer season!

Houston/Galveston Regional Summary

Very Warm and Dry March to Storms and Good Rains in May

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

March

Temperature records fell in March with very warm conditions for the month. Most climate sites in the region experienced either their warmest month of March on record or had a month that was in the top 2-3 all time. Average monthly temperatures finished up 7.5°F to 8.3°F above normal.

Precipitation across the area during the month was near or slightly above normal in the northern part of the region resulting in drought improvements, while areas along the coast and central sections were two to three inches below normal leading to the drought expanding and degrading. See figures 1 and 2 displaying the rainfall pattern throughout the region with central and coastal areas below normal while northern parts of the region where above normal. Chart 1 shows the counties of Montgomery, Polk, and San Jacinto with similar rainfall totals. The average recorded rainfall for the region by CoCoRaHS observers was only 1.78" which is below normal.

April

Thunderstorms returned in April with the passage of 6 cold fronts which brought much needed rain to the region. Days with thunderstorms averaged about 10 for the month. Temperatures lowered with the showers and thunderstorms but the month still had its very warm to hot days with several days in the 90's. Temperatures averaged 1.3°F to 3.7°F above normal.

Rainfall for the month averaged above normal in areas that received the heavier thunderstorms. (See figures 3 and 4). Montgomery County had an average monthly CoCoRaHS observer total of 5.05". Some areas to the southern part of the region were below normal on rainfall such as Matagorda, Brazoria, Fort Bend, and Galveston counties. (See Chart 1).

On April 22, 2020 a large, long track tornado crossed Lake Livingston in San Jacinto County and continued on towards the city of Onalaska. Most of the track of the tornado damage was rated at EF-1 to EF-2 intensity. EF-3 damage was found in Paradise Acres subdivision in Onalaska. (See Map 1). This storm mesocyclone and long tracked supercell began in central Texas earlier that morning. *Please use the Significant Weather Report tab to report severe weather at your CoCoRaHS gauge location during times of severe weather such as flooding, hail, high winds, and tornadoes. Your report will go straight to your local National Weather Service Forecast office.*

May

A typical May pattern of storm systems producing thunderstorms and healthy rain amounts was present this May across the entire region. Some areas that experienced the heavier and more robust storms had above normal rainfall for the month while a few areas such as central Harris County, a small part of SW Fort Bend County, and Liberty County had below normal rainfall. The region wide CoCoRaHS observer rainfall average was 6.13". Thunderstorm days averaged about 10 to 11 days for the month.

Temperatures across the region continued to be above normal but areas that received plentiful rainfall were near normal. Most climate sites had 10 to 11 days with high temperatures 90°F or above. So this May was about as close to normal for the region as it could be if you average out the extremes of thunderstorm rainfall across the region.

The spring average CoCoRaHS observer rainfall total for the region for all counties came to 11.51". This is slightly below average for the season with March being the dry month with better rainfall as the spring moved along. Montgomery County had the most rainfall at 14.87" while Matagorda had the least rainfall for the spring with 8.45".

"Houston/Galveston Regional Summary (continued)"

Spring 2020 CoCoRaHS Stations Houston/Galveston Region Rainfall

Actual Station Measured County Rainfall Averages in inches per month

County	March	April	May	Spring Total
	AVG.	AVG.	AVG.	Mar.-May
Austin	2.56	3.76	6.44	12.76
Brazoria	0.53	2.60	6.27	9.40
Chambers	1.18	4.72	6.23	12.13
Colorado	2.08	4.58	4.80	11.46
Fort Bend	1.28	2.90	6.31	10.49
Galveston	0.34	2.89	7.67	10.90
Harris	1.55	3.51	6.33	11.39
Jackson	1.08	3.16	8.25	12.49
Liberty	1.49	3.39	4.33	9.21
Matargorda	0.40	1.77	6.28	8.45
Montgomery	3.89	5.05	5.93	14.87
Polk	3.83	3.71	5.87	13.41
San Jacinto	3.91	3.53	6.26	13.70
Wharton	0.80	4.85	4.89	10.54
Region Totals	1.78	3.60	6.13	11.51

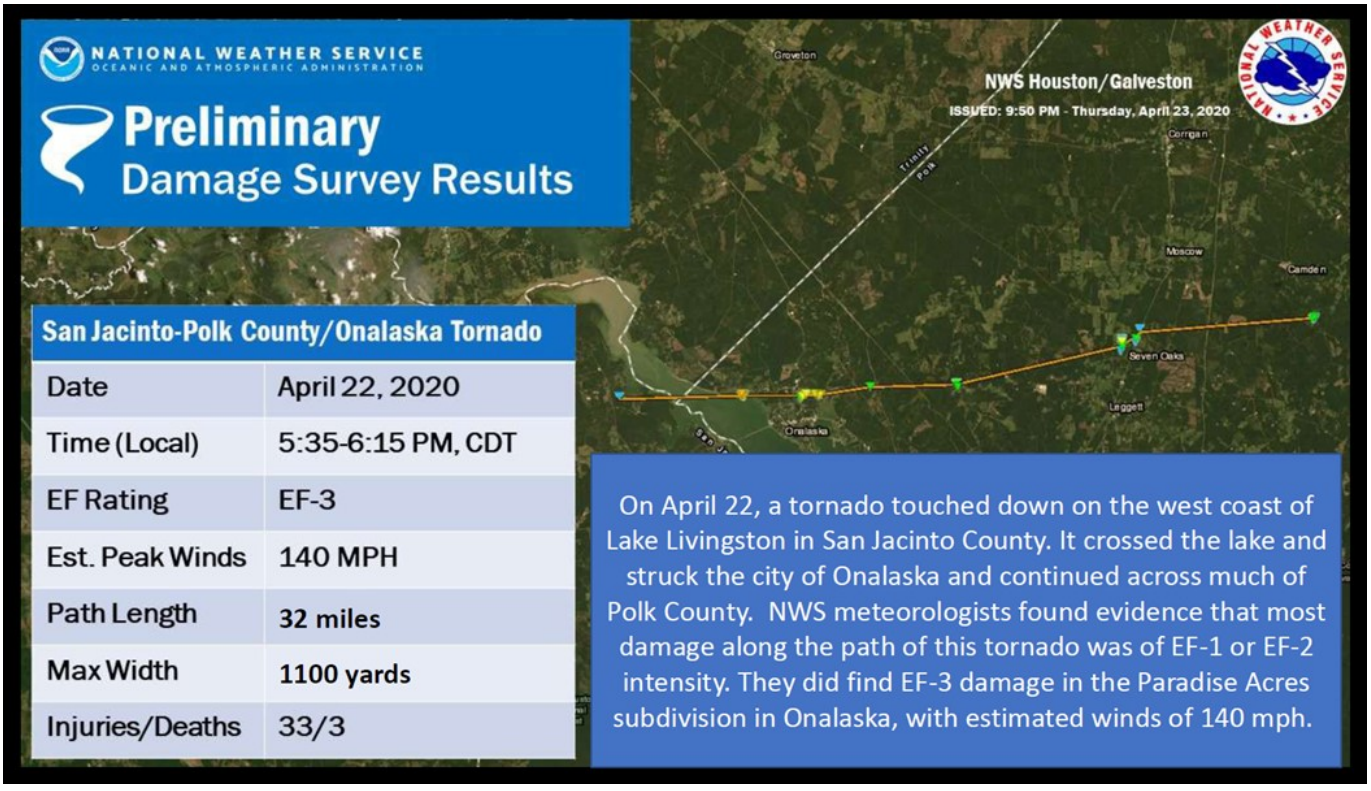
Highlights wettest month for a category

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 measured by CoCoRaHS observers in the Houston/Galveston region



Map 1: Tornado damage survey results of April 22, 2020 tornado in San Jacinto and Polk counties.

"Houston/Galveston Regional Summary (continued)"

March Precipitation Maps

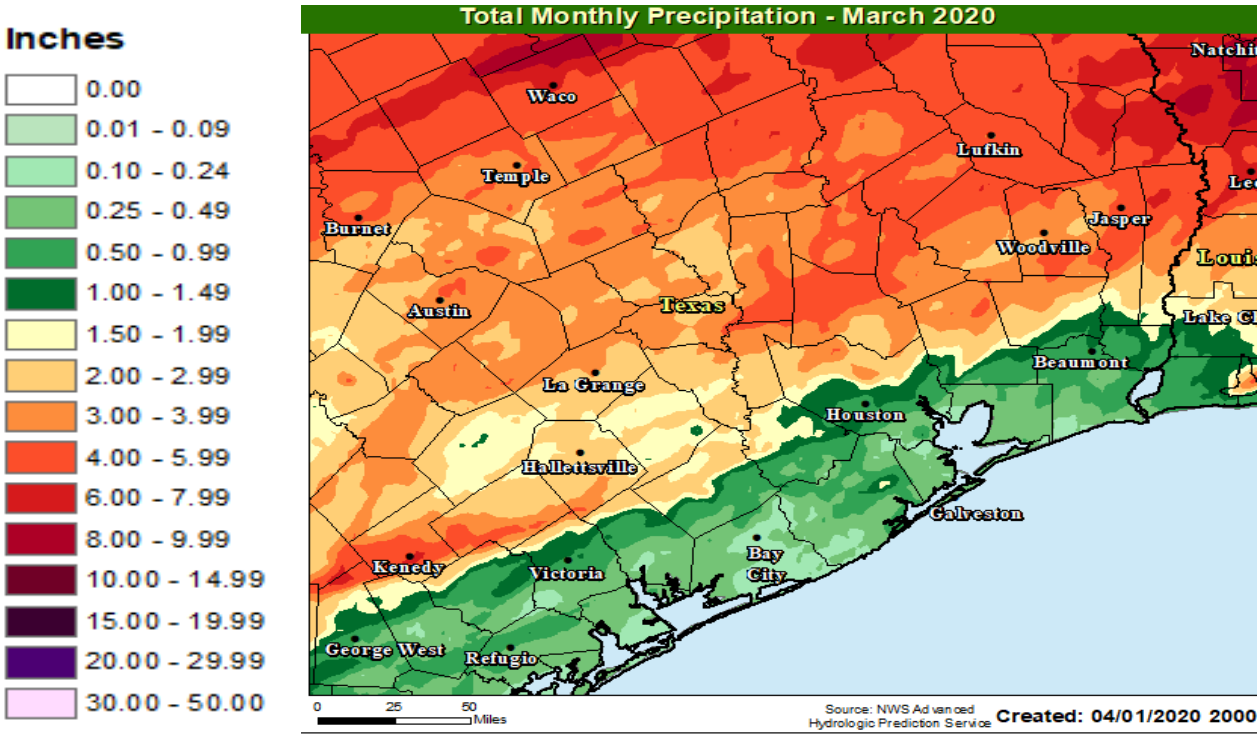


Fig. 1: Houston/Galveston Regional Rainfall for March 2020

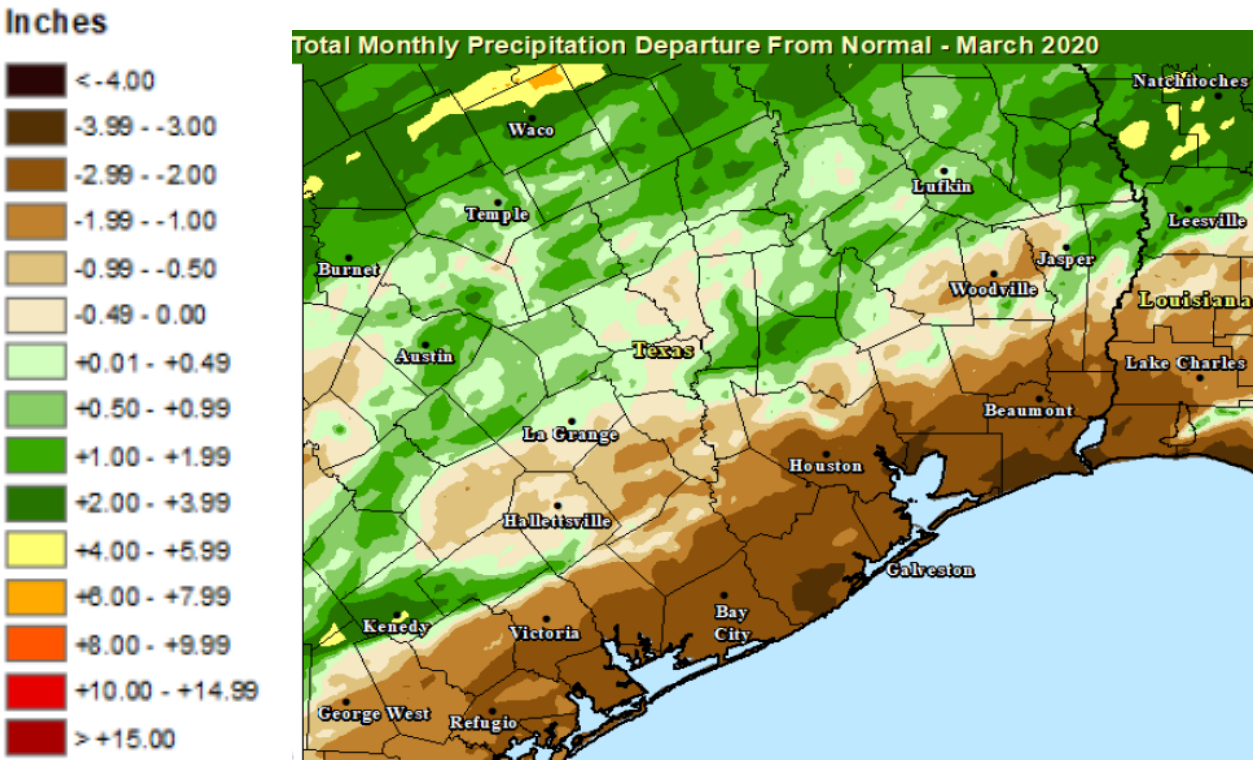


Fig. 2: Houston/Galveston Regional Rainfall Percent of Normal for March 2020

"Houston/Galveston Regional Summary (continued)"

April Precipitation Maps

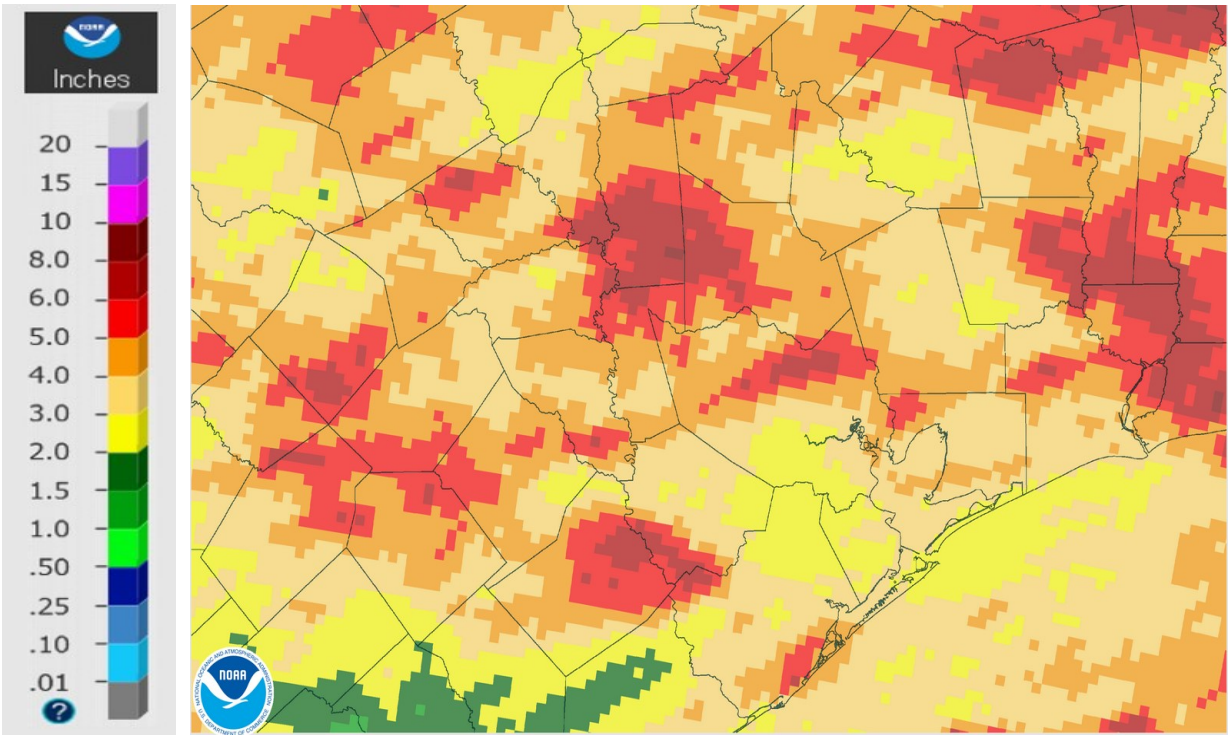


Fig.3: Houston/Galveston Regional Rainfall for April 2020

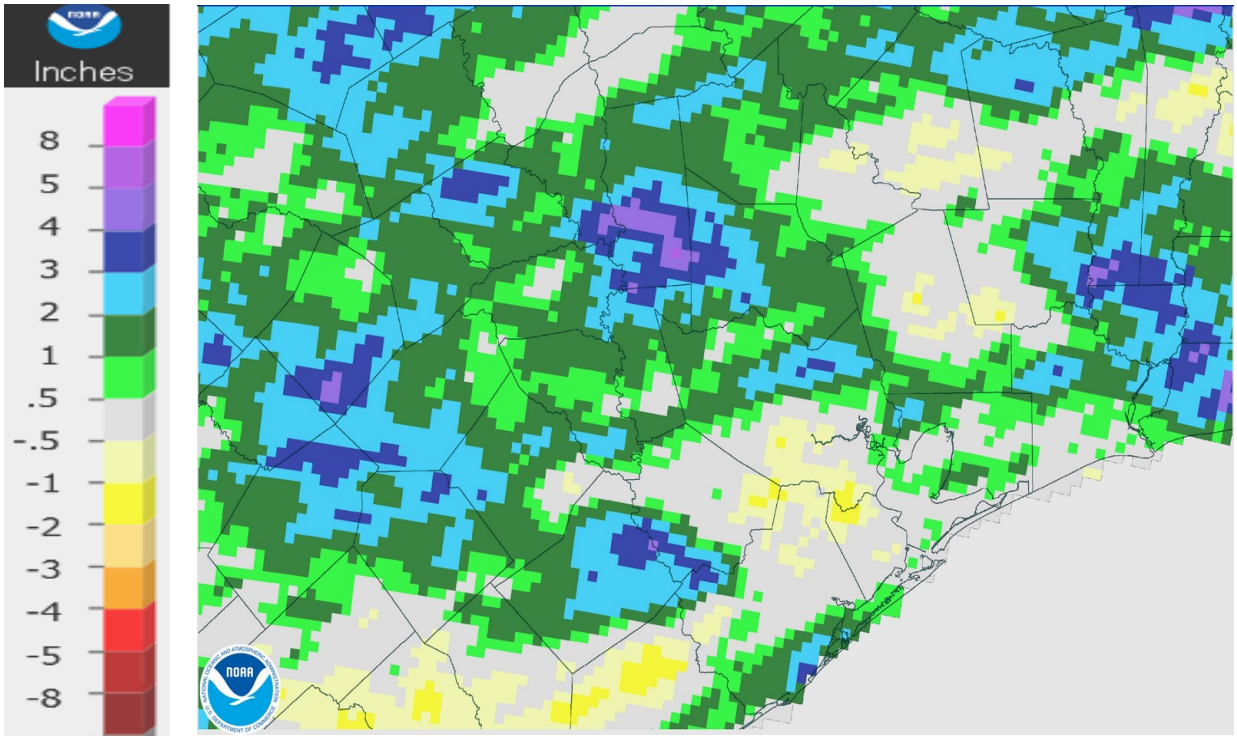


Fig. 4: Houston/Galveston Regional Rainfall Percent of Normal for April 2020

"Houston/Galveston Regional Summary (continued)"

May Precipitation Maps

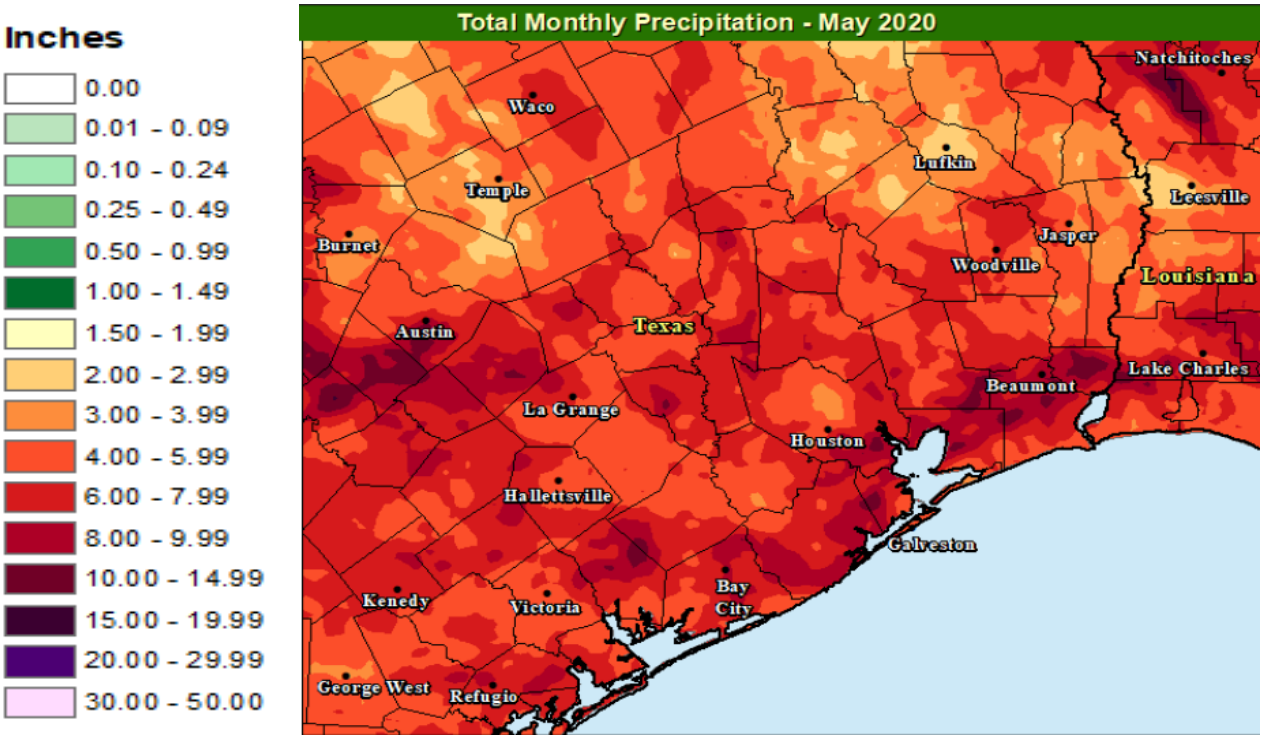


Fig.5: Houston/Galveston Regional Rainfall for May 2020

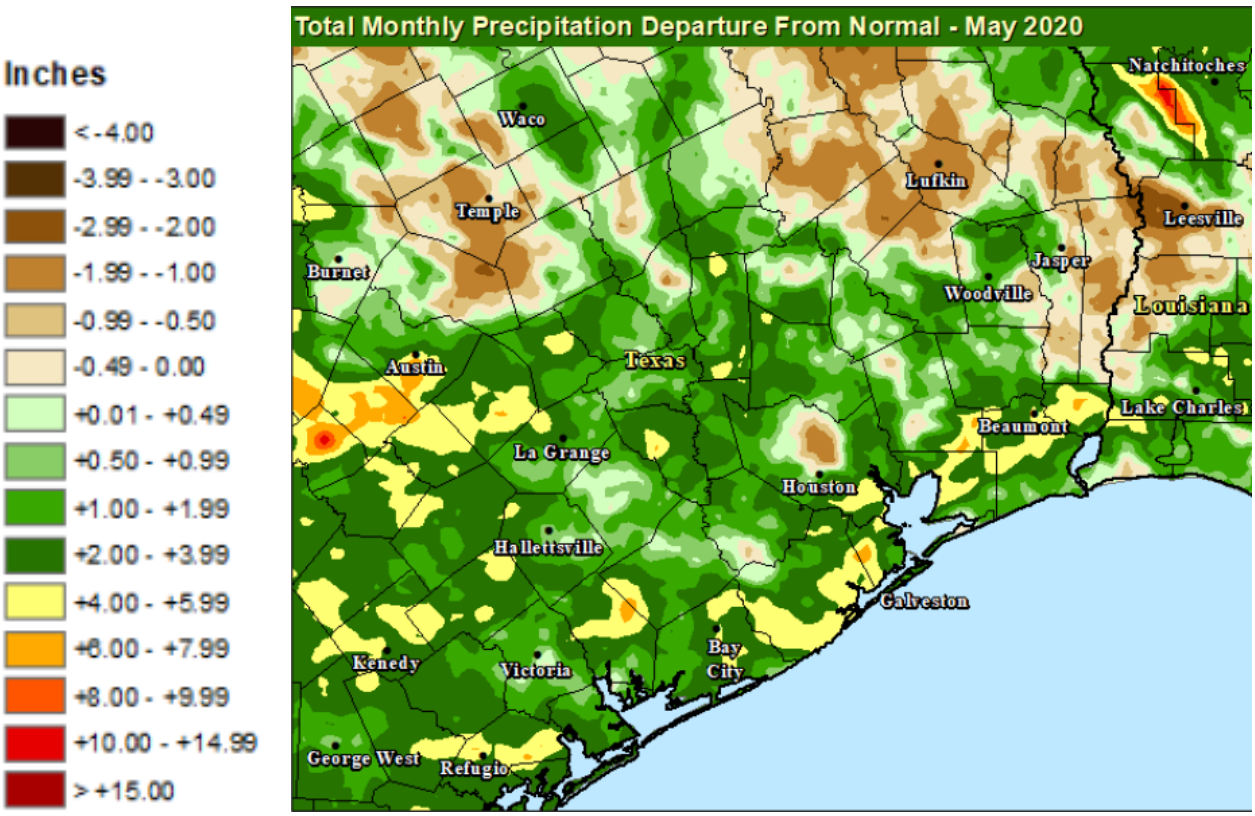


Fig.6: Houston/Galveston Regional Rainfall Percent of Normal for May 2020

East Texas Regional Summary

Wet Conditions across East Texas this Spring

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

Wet conditions continued across East Texas during the Spring months of 2020. As a result, drought free conditions remained across the region.

Dry conditions were observed during the first few days of March. But, by the 4th, heavy rain and large hail was observed across the region as an upper level low and cold front moved across East Texas. Many locations received over 1" of rain, with two stations in Rusk County receiving nearly 3". Wet conditions remained across East Texas during the remainder of the month. Normal March rainfall based on National Weather Service Climate sites is just above 4". However, nearly all of the East Texas CoCoRaHS sites reported over 5" for the month.

Fig. 1: Hail on US Highway 79 near Rusk/Panola County line, Wednesday March 04, 2020
Image Courtesy of KLTV viewer Randy Cook

Fig. 2: Hail near McLead, TX, Friday April 24, 2020.
Image Courtesy of Amberly Armstrong

By the month of April, wet conditions continued. A record rainfall of 2.58" was reported in Tyler, TX by the National Weather Service in Shreveport on April 12th. The previous record was 2.12" in 1917. Many locations across East Texas reported over 2" that day, including 3.84" at Hallsville in Harrison County. The highlight of the month occurred on the evening of April 24th in which several supercell thunderstorms formed, producing very large hail across the region. The cities of Hooks and Hallsville reported 2" and 1" diameter hail respectively. By the end of the month, most of the East Texas sites reported rainfall amounts above the climatic normal of 3" to 4" for the month of April, with the highest total of 10.27" at Center in Shelby County.

"East Texas Regional Summary (continued)"

The month of May, was not as wet as the previous months, but some areas, especially across extreme Northeast Texas, continued to see above average rainfall. Rainfall totals ranged from as high as 10.47" at Douglassville to as low as 2.28" at Lufkin. Despite the fact that rainfall was much lower in many locations, severe weather continued to occur across the region. Several tornadoes were spotted across Northeast Texas on May 16th, including a large tornado/ waterspout over Lake Wright Patman, just SW of Texarkana.

Fig. 3: Waterspout/Tornado on Lake Wright Patman. Saturday, May 16, 2020
Image Courtesy of TXK Today

On most years, the summer months are the dry months for the region. For those expecting much drier weather over the next 90 days may be disappointed. The Climate Prediction Center is forecasting above normal precipitation for the region. This scenario could have great impacts on the region as flooding along with rises on area waterways could become a concern.

Wichita Falls Regional Summary

Hail of a Spring in the Wichita Falls Area

By Charles Kuster

CIMMS/NSSL

It was an active spring in the Wichita Falls area especially with regards to severe hail. Six different days had reports of severe hail, while of those days, three had at least baseball size hail (4/28, 5/7, and 5/22). The most notable day for hail occurred on 5/22, when hail over 5" in diameter was reported in Burkburnett. The hail caused significant damage to vehicles and rooves and even punched holes in the roof of at least one home (Fig. 1). The largest hailstone measured 5.33", making it the fourth largest in Texas history. That day also saw heavy rainfall in Wilbarger and Wichita County where all CoCoRaHS observers reported at least 1" of rain and three CoCoRaHS observers reported over 2" of rain.

Figure. 1: Pictures of individual hail stones (a and b) and some of the damage they caused (c and d). The hail-stone in b) still has some insulation attached to it that it obtained while going through the roof of a home (d). Photos courtesy of Tim Marshall.

"Wichita Falls Regional Summary, (continued)"

In addition to rainfall, CoCoRaHS observers can also help meteorologists measure and map hail events such as the one on May 22nd. Under the "My Data" tab of the CoCoRaHS website, there is a hail report form under the "Enter My New Reports" section (Fig. 2). This form allows observers to report information about hail size, timing, color, and more and this information goes directly to National Weather Service forecasters. This optional form is just another way CoCoRaHS observers can collect and report information about Texas' weather.

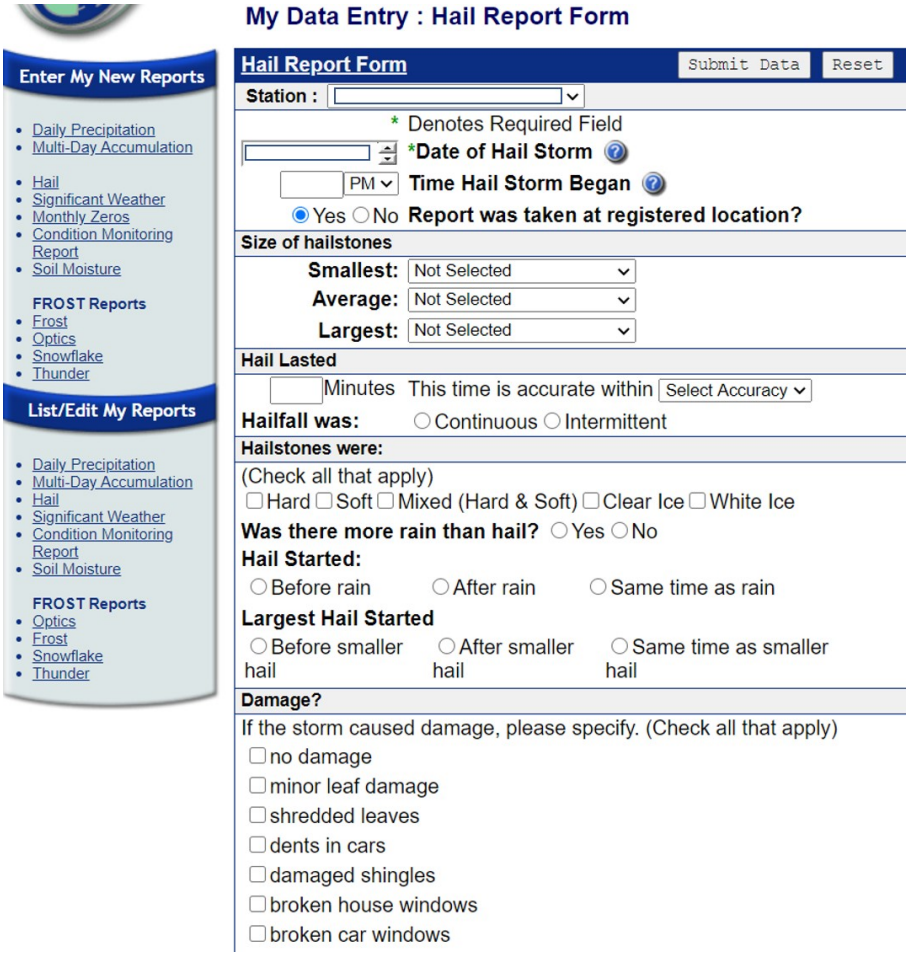


Figure 2: Hail report form on the CoCoRaHS website.

Overall, it was a relatively mild and wet spring with slightly above average temperature and precipitation (Fig. 3). In total, there were 64 dry days (all CoCoRaHS stations reported less than 0.05") and 28 wet days (at least one CoCoRaHS station reported 0.05" or more). Remarkably, last spring was nearly the same with 63 dry days and 29 wet days. The season ended with no area experiencing drought conditions according to the U.S. Drought Monitor (https://droughtmonitor.unl.edu).

"Wichita Falls Regional Summary, (continued)"

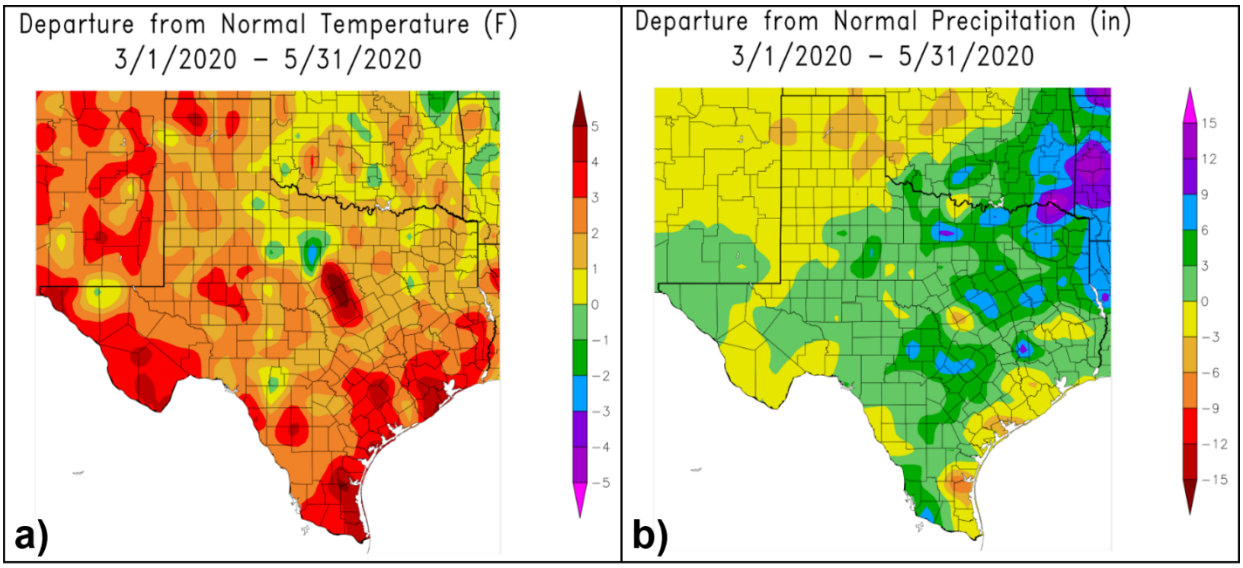


Figure 3: Departure from normal a) temperature and b) precipitation for the beginning of March through the end of May. Warm colors indicate above normal temperature (a) and below normal precipitation (b), while cool colors indicate below normal temperature (a) and above normal precipitation (b).

The Importance of Significant Weather Reports

Significant Weather Reports (SWR's) submitted by CoCoRaHS observers are a huge help to the National Weather Service. All SWRs are automatically routed to the local NWS office, and forecasters use these reports to monitor the progress of storms. Questions we get from time to time are "What is significant weather?" and "How often should I submit a Significant Weather report?" First, Significant Weather Reports are supplementary reports and DO NOT replace your Daily Report nor should it be submitted in lieu of a Daily Report. The SWR is great for updating rainfall after your regular observation time. You should not be updating your daily report once it is submitted, except to make a correction or add additional information.

What is "significant weather"? In general, it is heavy rain (falling at a rate of an inch an hour or more), snow accumulations, high winds, icing from freezing rain, or flooding. However, you are not limited to this list - use your best judgment. How often should you report? You should report as often as needed to convey what is happening. Comments included with your Significant Weather report are very useful.

Corpus Christi Regional Summary

How One Month Dented the Drought

By: Juan Peña, Meteorologist Corpus Christi NWS office

Spring began with most of the counties under Severe to Extreme Drought due to the lack of sufficient rainfall and above normal temperatures. Much of La Salle and Webb counties were experiencing Severe Drought with the northern portions of McMullen, Live Oak, Bee and Goliad counties experiencing Extreme Drought conditions. The majority of the coastal region did not participate in the drought except for a small area of Aransas County, eastern Refugio County and southwestern Calhoun County which was experiencing a Moderate Drought. March saw the presence of some beneficial rains, mainly across western Webb County and northern Brush Country. Some areas in Live Oak got more than 6.00" of precipitation while others along the Coastal Bend got less than 0.10" for the month of March. The majority of the area received below average rainfall with some areas as much as 2.60" below normal for the month of March.

The March rains made a slight dent in the drought across the Brush Country. Unfortunately, the same was not able to be said about the rest of the area as Severe to Extreme Drought conditions were still present across several counties. Severe Drought conditions were still being observed across portions of Webb County and the coastal plains. Other areas of the coastal plains were under an Extreme Drought. Those Extreme conditions encompassed eastern Goliad, most of Victoria, northern Calhoun, and a sliver of extreme northwestern Webb County. These conditions led some counties to issue burn bans, however, thankfully there were no water restrictions across the major cities. April saw some weather systems and cold fronts make their way to South Texas with the majority of Brush Country and the Rio Grande seeing above average rainfall as some areas received as much as 2.23" of precipitation above normal for the month of April. As much as that rain was needed, other areas such as the Coastal Bend and the Victoria Crossroads observed below average rainfall with some areas reporting only 50% of the normal rainfall values for April. Rain in the month of April led to improvements in the drought, especially across the Brush Country and Victoria Crossroads. Extreme Drought conditions lessened in coverage across the Victoria Crossroads with only a small portion of northern Bee County and far eastern portions of Calhoun and Victoria Counties still under Extreme Drought. With the limited rainfall, Severe Drought continued across the rest of the Coastal Bend, but was lifted across the Brush Country.

May was a very active month for much of South Texas. There were several days where South Texas was either under a Marginal, Slight or Enhanced Risk for severe weather. Although severe weather is never desirable, these systems led to much needed beneficial rains to the region. Areas of the Rio Grande Plains reported anywhere between 3 to 10" of rain, while the northern Brush Country reported 3 to 6" of rain, and the majority southern Brush Country reported more than 6". May was active enough that even the Coastal Bend decided to get in on the fun. Widespread areas of the Coastal Bend reported amounts greater than 6" for the month of May and the Victoria Crossroads received between 3 and 10". How significant was all this rain? Well, every county received more than their average May rainfall totals with several counties doubling their normal totals and some areas almost tripling their May rainfall totals.

The first half of May had resulted in much needed rainfall as a slow-moving and potent mid-level low pressure system dumped an average of 1-2" across South Texas. Later in the month, mesoscale convective systems (which is a system of complex thunderstorms that become better organized and is larger than an individual thunderstorm) and squall lines provided plenty of rain, hail and strong winds as severe weather affected much of South Texas. Roughly a full category of improvements was observed across the board. After the early May activity, the Coastal Bend was in a Moderate Drought with Severe Drought over the Victoria Crossroads region stretching from Calhoun County westward to Bee County. All Extreme Drought areas were removed. With the activity later in the month mostly all the areas of drought had disappeared. As of June 2nd, only a small portion of the Victoria Crossroads was observing Moderate Drought conditions and a small area extending from the Victoria Crossroads to Bee County Abnormally Dry.

Condition Monitoring Training

CONDITION MONITORING

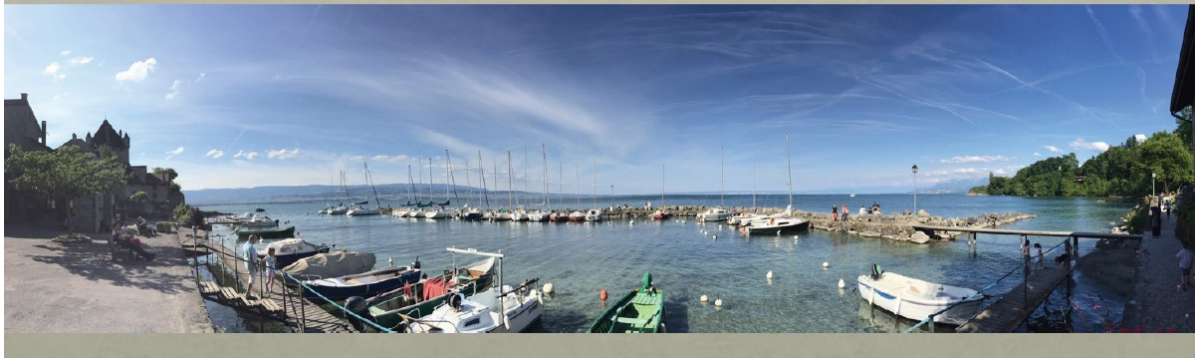
To understand the impacts of drought on plants, animals, and people, it is very helpful to monitor conditions regularly, whether the weather is wet or dry. This allows us to see how a drought year differs from a normal year, and we learn how different plants, animals and people respond to the onset,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

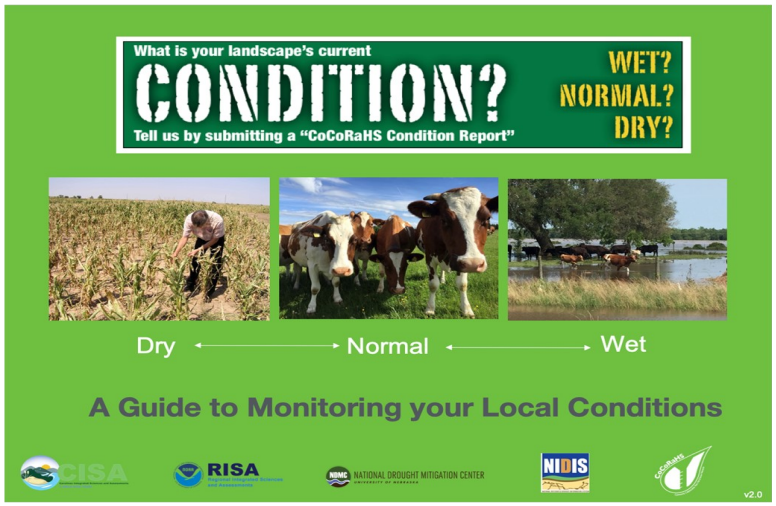
While you might not have time to write a full condition monitoring report every week, even short reports can provide valuable information. If conditions are stable, a report of "no notable change in overall conditions this week" is useful information, just as reporting "0" in your daily precipitation 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.
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

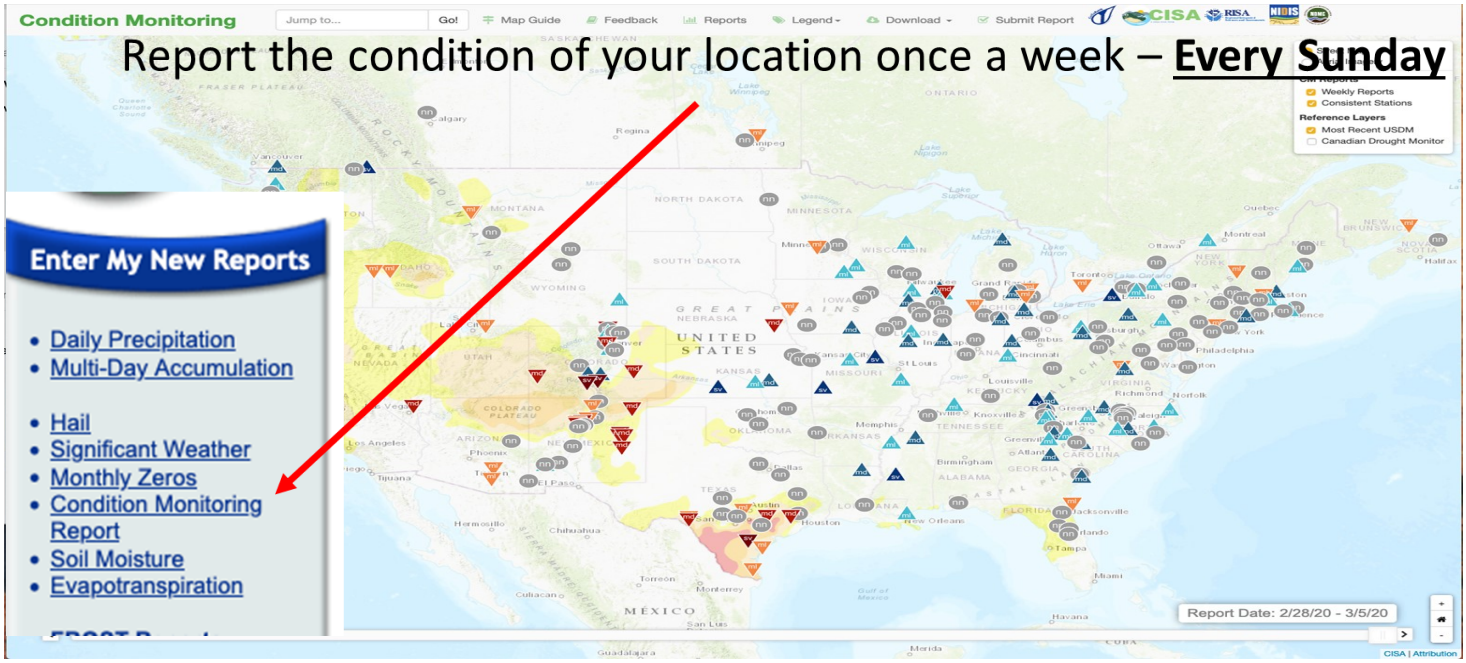
Please provide a description of how dry, normal or wet conditions are affecting you, your livelihood, your activities, etc. *

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



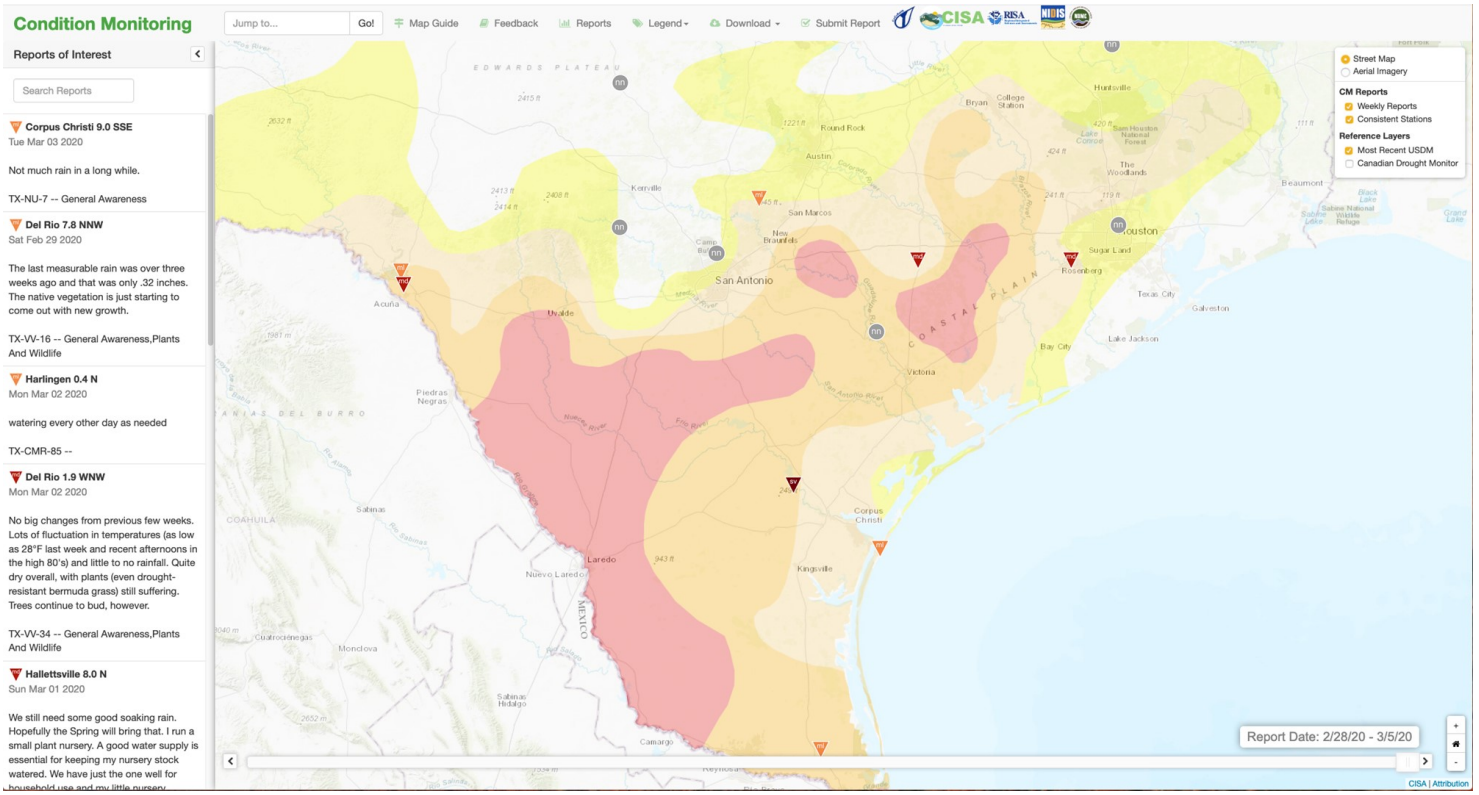
Del Rio 1.9 WNW

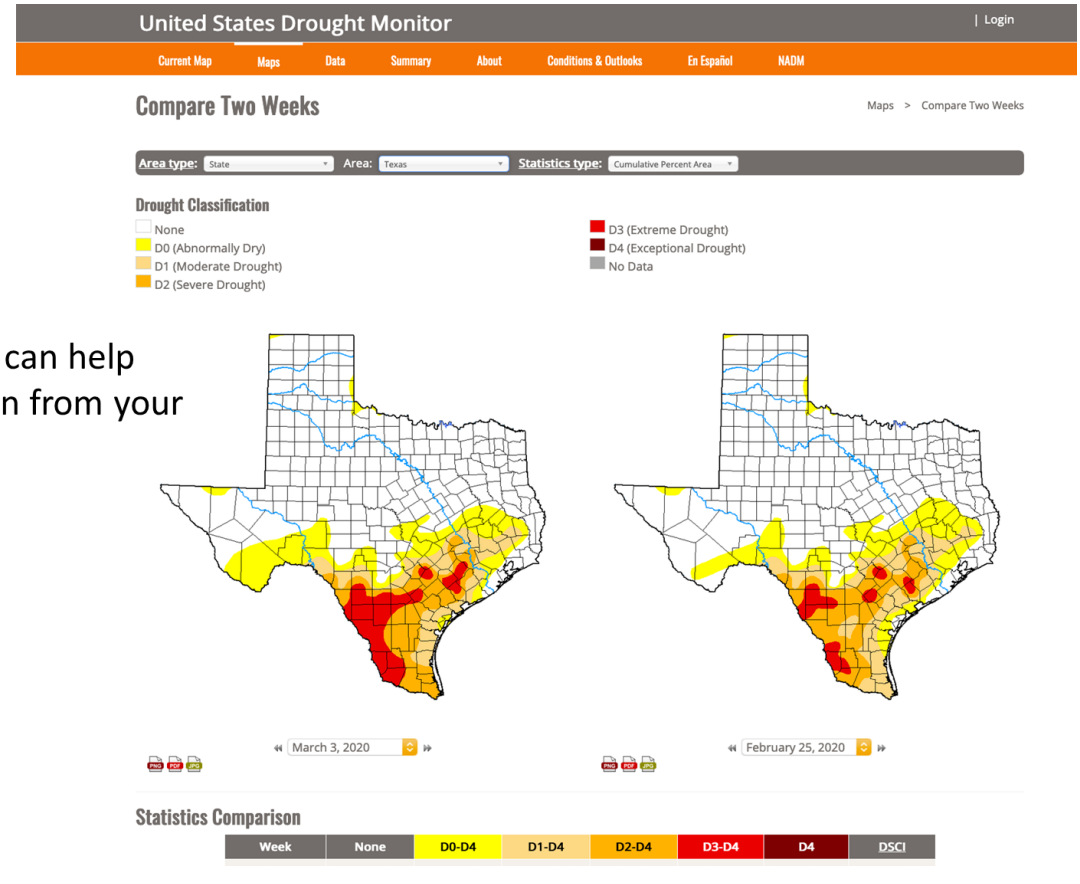
Station Number	TX-VV-34
Report	No big changes from previous few weeks. Lots of fluctuation in temperatures (as low as 28°F last week and recent afternoons in the high 80's) and little to no rainfall. Quite dry overall, with plants (even drought-resistant bermuda grass) still suffering. Trees continue 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

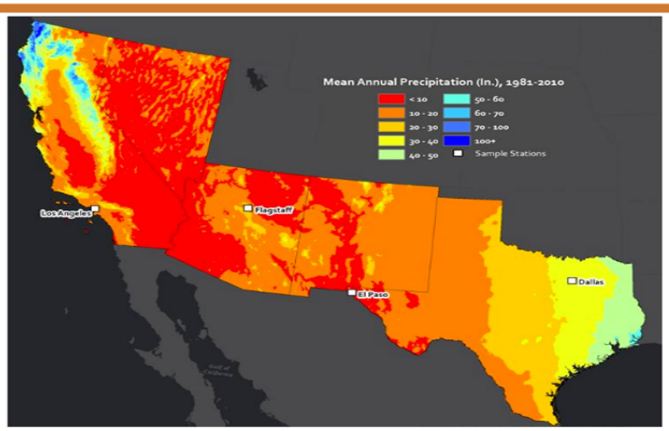
Condition Monitoring Reporting Guide: Southwest

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

Texas Summer 2020 Weather Outlook

By: Bob Rose, Lower Colorado River Authority Meteorologist

Summer is often the easiest season of the year to forecast for Texas. For most areas, you can call for very hot and generally dry and be accurate a good amount of the time. This hot and dry pattern often can be very persistent--especially during the months of July and August. The persistence comes about when a ridge of high pressure sets up over Texas usually around early July, then digs in and stalls for days and in some cases weeks. In some years, it takes a good cold front or a tropical system to finally get the ridge to back down.

After hours of research and digging through extensive computer model data, the outlook for summer 2020 is a real shocker: very hot and generally dry. Who wants to buck a good thing? But while the overall outlook calls for a fairly typical summertime pattern, there are some factors at play that may cause parts of the state to see extremes in both temperature and precipitation. These factors include a trend toward La Niña in the tropical Pacific Ocean, a strong potential for an active hurricane season a near normal Southwest Monsoon season for the far western part of the state.

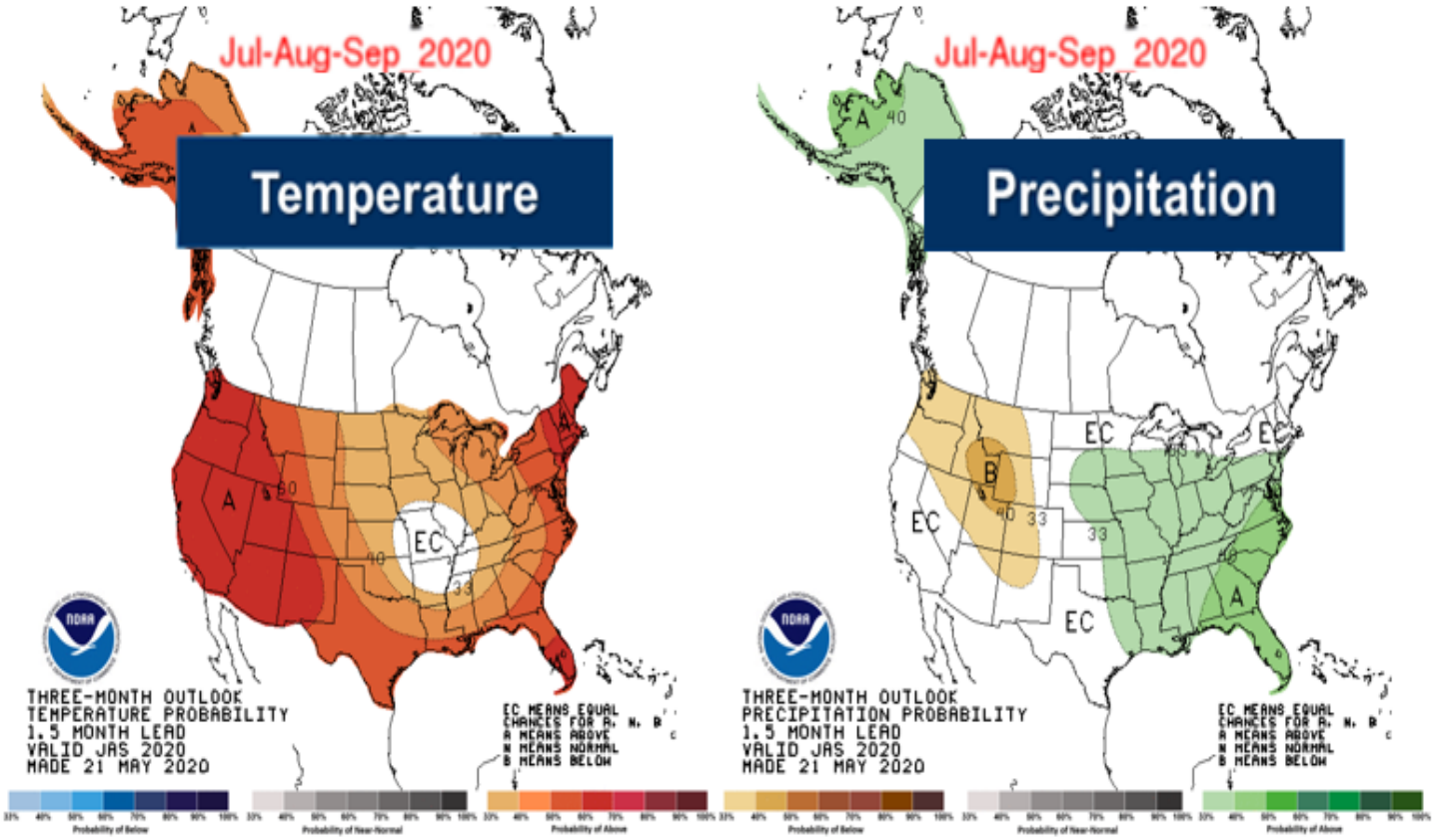
Since April, waters in the tropical Pacific have been steadily cooling. Most forecast solutions indicate this trend will continue through the summer, and a weak La Nina could develop by fall. While La Niñas typically don't have a strong influence on Texas weather during summer, they do often help promote the development of that familiar summertime high pressure ridge across Texas, northern Mexico and the Desert Southwest. The ridge is forecast to develop early and persist throughout a good part of the summer. With the ridge in place, a pattern of mostly dry and quite hot weather can be expected across a good part of the state.

Meanwhile, the developing La Niña is also expected to promote less wind shear across the tropical Atlantic, making conditions more favorable for tropical development. Sea surface temperatures in the Gulf of Mexico, the Caribbean Sea and the tropical Atlantic are all running much warmer than normal this year, another factor contributing to a favorable environment for tropical cyclone development. National Hurricane Center forecasters indicate there is a strong likelihood for this year's hurricane season will be very active hurricane season, with a well above normal number of storms. It's quite possible parts of Texas could be impacted by one or more land-falling tropical systems this summer that would producing large areas of heavy rain and possible flooding. In addition, occasional weak disturbances and incoming slugs of tropical moisture will have the potential to bring periods of showers and thunderstorms to coastal areas throughout the summer.

In most years, much of Far West Texas and the Panhandle region are influenced by the development of the Southwestern summer monsoon. Although the monsoon never really developed in 2019, it is forecast to develop this summer and may become the source for occasional scattered showers and thunderstorms for the western part of the state from July through September.

Putting all of these factors together, the summer weather outlook calls for this to be a fairly typical Texas summer: very hot and generally dry. Get ready for numerous days with temperatures at or above 100 degrees. Some parts of the state may turn quite dry, with drought conditions developing and persisting. Other areas, especially near the coast, could trend wetter than normal. NOAA's Climate Prediction Center outlook for July, August and September agrees. Their temperature outlook calls for increased odds readings will average above normal across Texas and most of the nation. NOAA's outlook for rainfall calls for roughly equal chances the rain will average above, below or near normal across the majority of the state. Much of East Texas, generally to the east of Interstate 45, is indicated to have increased odds for above normal precipitation; part of a wet pattern that is forecast for the eastern U.S.

"Texas Summer 2020 Weather Outlook (continued)"



As mentioned earlier, there is some potential this summer's pattern could be interrupted or changed by a potential tropical cyclone moving into Texas out of the Gulf of Mexico or the eastern tropical Pacific. Clouds and rain from these systems might bring a much needed break from the hot and dry pattern but they may also bring high winds and cause destruction.

So get ready for another typical Texas summer. The days will be long, the heat oppressive with a little rain from time to time if we're lucky. Be sure to take the all of the necessary precautions to keep you and your family cool and safe from the hot Texas sun.

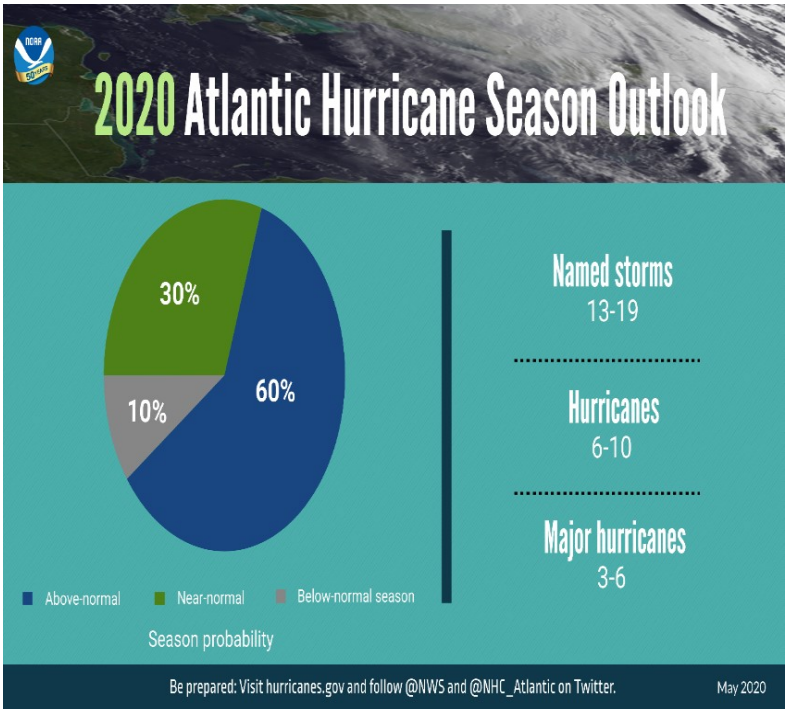
2020 Hurricane Season Outlook

2020 Atlantic Basin Hurricane Outlook

By: Ron Havran, CoCoRaHS Observer Newsletter Editor

An above-normal 2020 Atlantic hurricane season is expected, according to forecasters with NOAA's Climate Prediction Center, a division of the National Weather Service. The outlook predicts a 60% chance of an above-normal season, a 30% chance of a near-normal season and only a 10% chance of a below-normal season. The Atlantic hurricane season runs from June 1 through November 30.

NOAA's Climate Prediction Center is forecasting a likely range of 13 to 19 named storms (winds of 39 mph or higher), of which 6 to 10 could become hurricanes (winds of 74 mph or higher), including 3 to 6 major hurricanes (category 3, 4 or 5; with winds of 111 mph or higher). NOAA provides these ranges with a 70% confidence. An average hurricane season produces 12 named storms, of which 6 become hurricanes, including 3 major hurricanes.



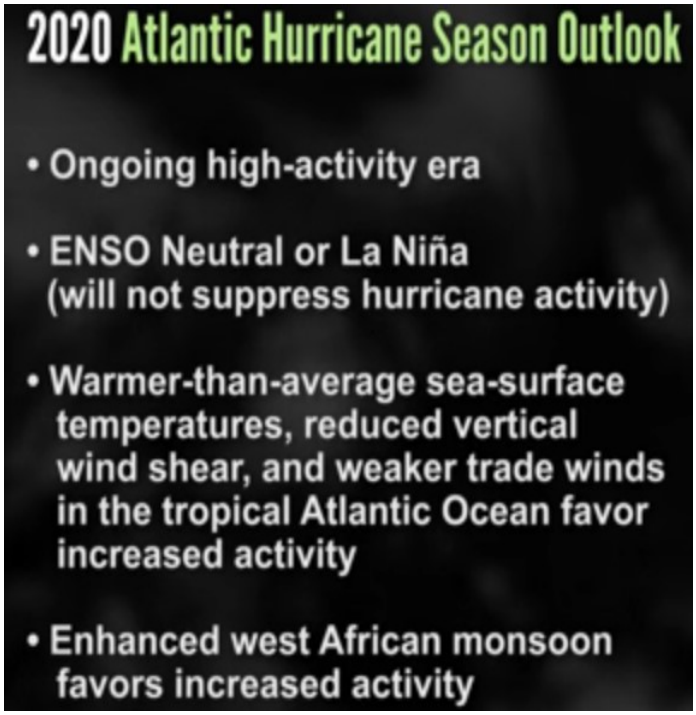


Figure 1: Official Outlook issued by NOAA for the Atlantic Basin for 2020. Courtesy of NOAA.

The combination of several climate factors is driving the strong likelihood for above-normal activity in the Atlantic this year. El Nino Southern Oscillation (ENSO) conditions are expected to either remain neutral or to trend toward La Nina, meaning there will not be an El Nino present to suppress hurricane activity. Also, warmer-than-average sea surface temperatures in the tropical Atlantic Ocean and Caribbean Sea, coupled with reduced vertical wind shear, weaker tropical Atlantic trade winds, and an enhanced west African monsoon all increase the likelihood for an above-normal Atlantic hurricane season. Similar conditions have been producing more active seasons since the current high-activity era began in 1995. See Figure 2 and chart number 1 and chart number 2.

Time era	Named Storms	Hurricanes	Major Hurricanes	
Average of 1995-2019	14.9	7.5	3.4	**Current high activity era since 1995**
Average of 1967-2019	12.0	6.3	2.5	**Satellite era began in 1967**
Average of 1943-2019	11.4	6.2	2.7	**Hurricane hunter aircraft era began in 1943**

Figure 2: Average number of Named storms, Hurricanes, and Major Hurricanes over different time periods. Compiled by author.

"2020 Hurricane Season Outlook (continued)"

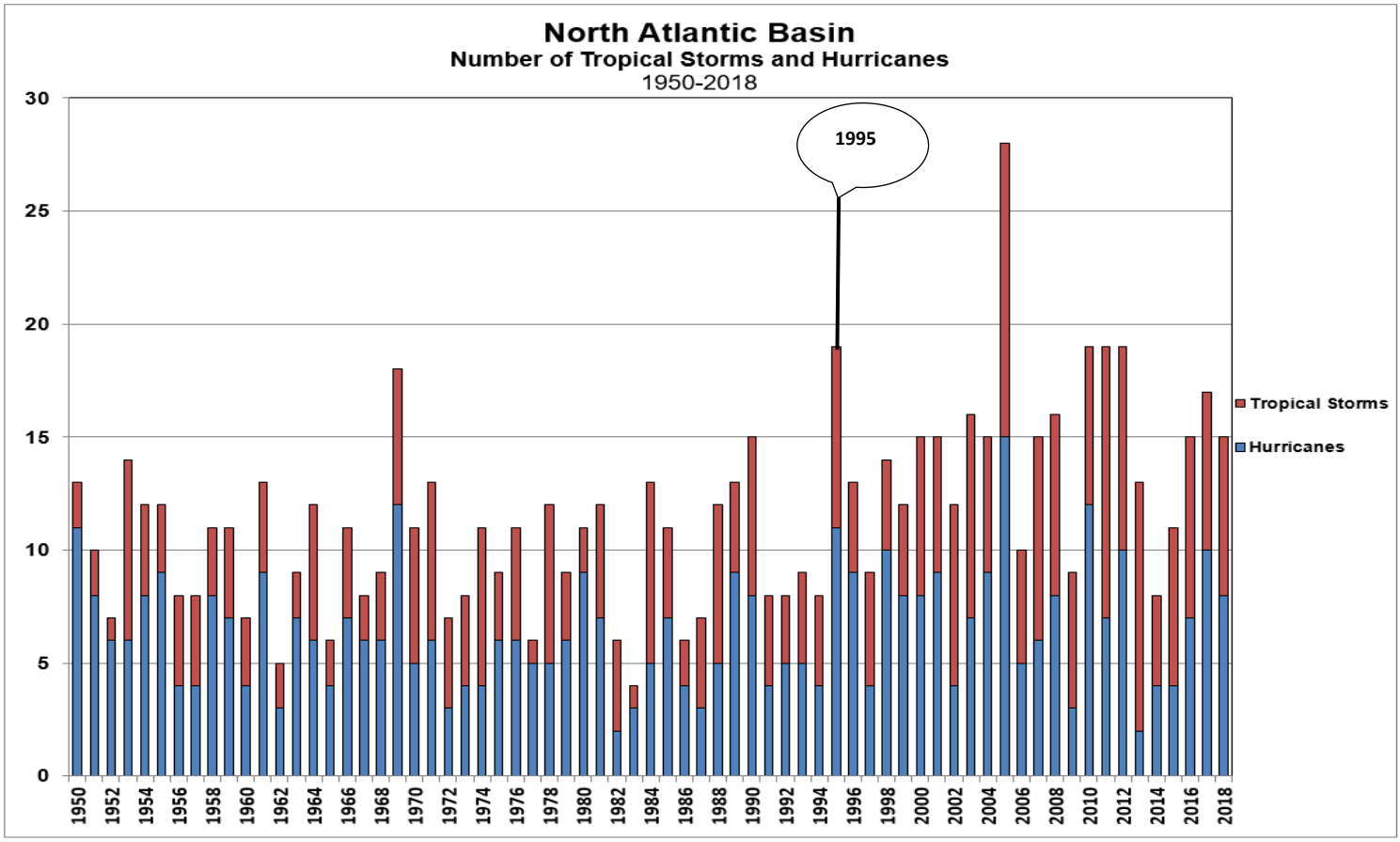


Chart 1: # of Tropical Storms and Hurricanes from 1950 – 2018. Notice increased activity after 1995. Courtesy of NOAA.

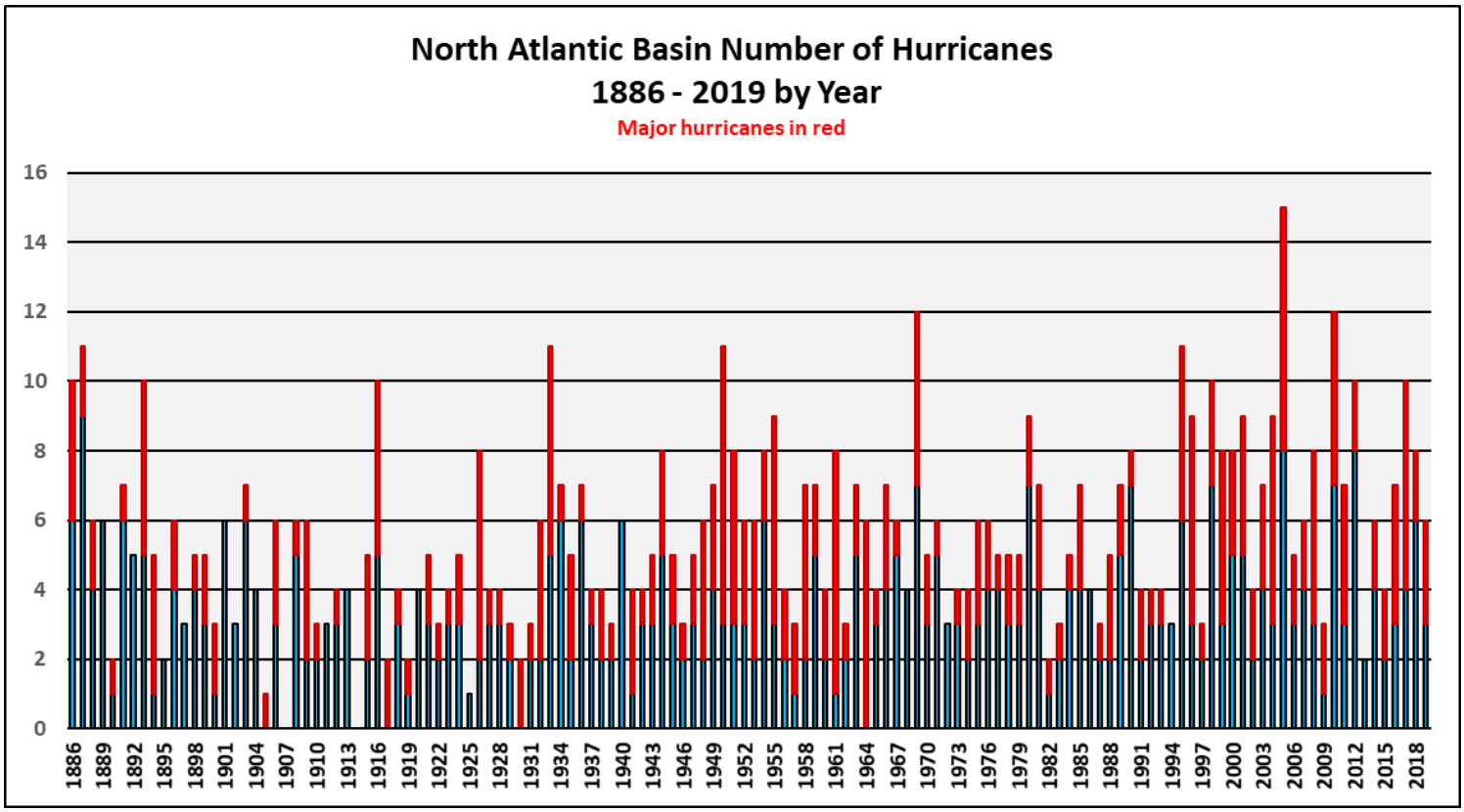


Chart 2: Total # of hurricanes from 1886 – 2019 with # of major hurricanes in a season highlighted in red. Complied by author

San Angelo Regional Summary

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

March 2020

Spring across West Central Texas started out rather wet, with March looking more like May, with several rounds of upper level systems bringing generous amounts of precipitation to the area. In fact, the forecast area was generally above normal (see image 1). While higher rainfall amounts are always welcome, these systems were often accompanied by elevated severe weather risk. The first Severe Thunderstorm Warning of the spring season would be issued on March 4th, and would begin a trend for the rest of the month. Several more rounds of severe weather would pass through the forecast area bringing straight line wind damage, large hail and even a tornado. By the end of March, most areas had seen at least 2.00" – 4.00" of rainfall, with a few isolated areas receiving closer to 5.00". The city of Abilene recorded the 2nd wettest March on record with 4.69", while San Angelo recorded its 6th wettest March with 3.12".

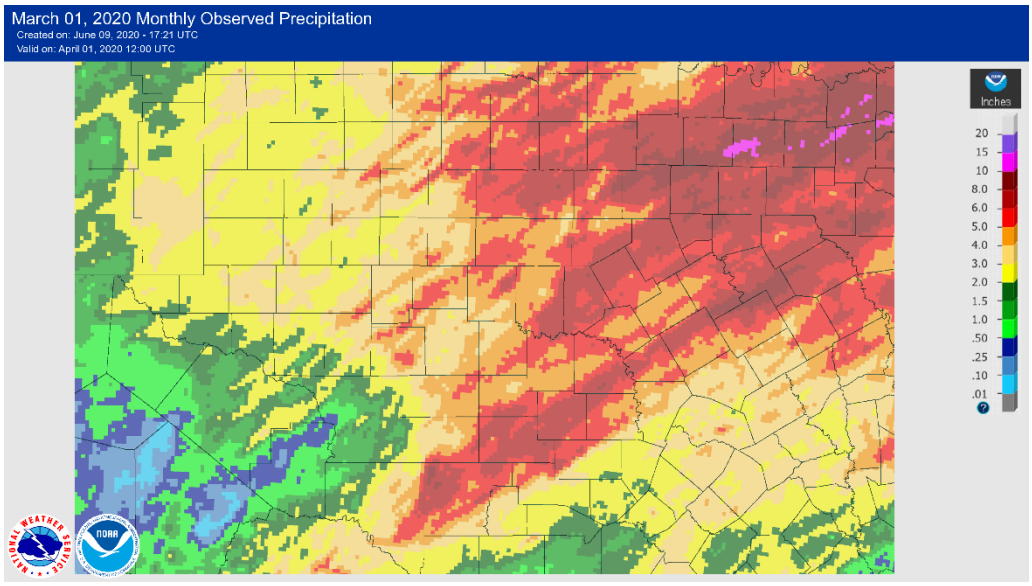


Image 1 – March Observed Precipitation

April 2020

The overall pattern would shift for the month of April as if shutting off the preverbal tap, leaving the area drier than normal (see image 2 and 3). Despite the shift in rainfall off to central and eastern Texas, the severe threat would remain, though storms would be more isolated than those in March. By the end of the month the Abilene's rainfall totals were slightly below normal at 0.77", while San Angelo was one of the lucky ones with a slightly above normal monthly total of 1.71".

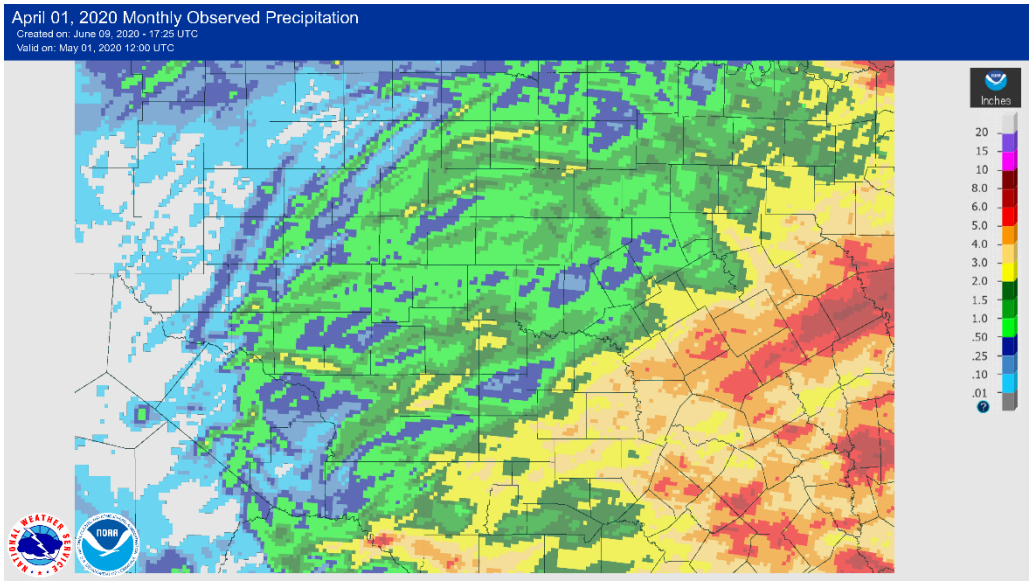


Image 2 - April Observed Precipitation

"San Angelo Regional Summary (continued)"

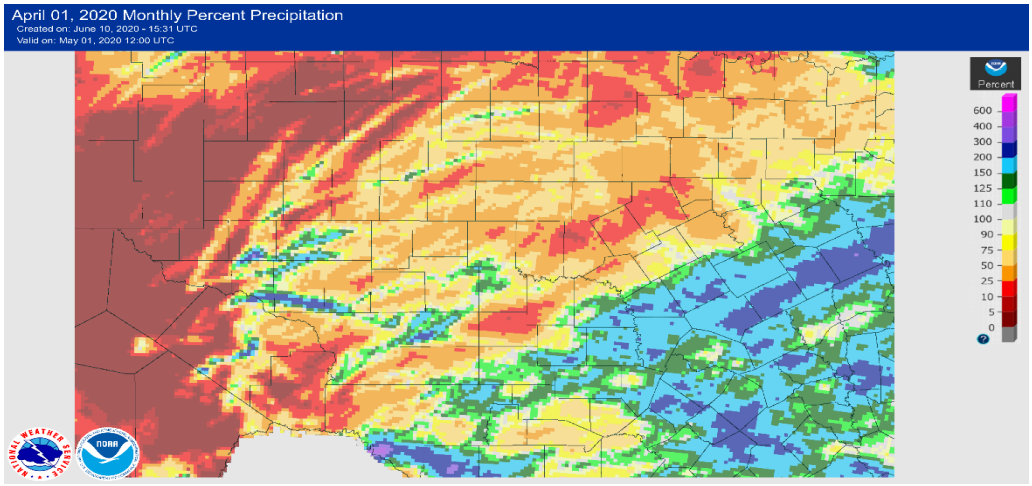


Image 3 - April Percent of Normal

May 2020

Climatologically, May is the wettest month of the year. Sadly, most areas experienced drier than normal conditions. A few lucky areas, such as the Heartland and parts of the Concho Valley, would receive normal to slightly above normal precipitation. The city of Abilene recorded only 1.40" of rainfall, this is nearly 2.00" below normal. Meanwhile, San Angelo fared slightly better with 2.22", just over 0.50" below normal. Though rainfall was low, the severe weather threat remained elevated. One such event occurred in the San Angelo area where hail up to 3.00" was observed. This size of hail has not been recorded in San Angelo since the mid-90s.

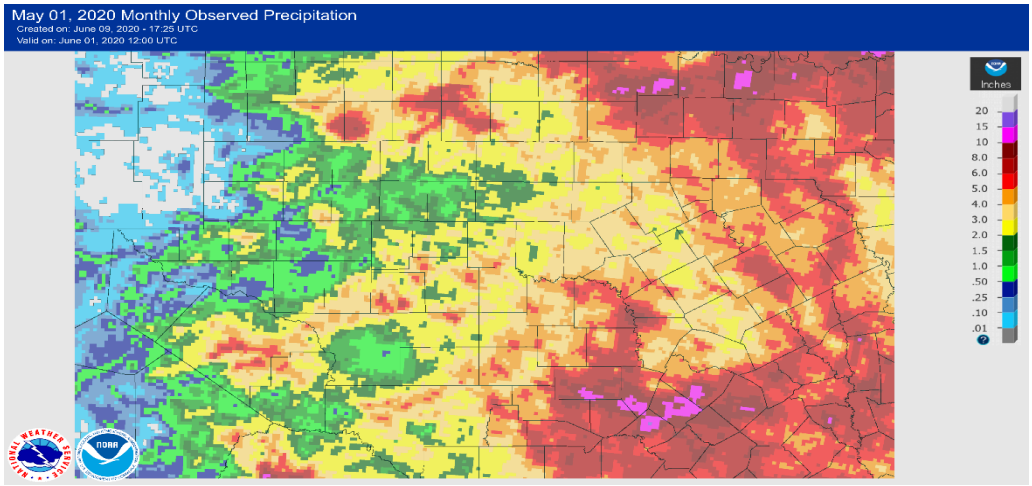


Image 4 - May Observed Precipitation

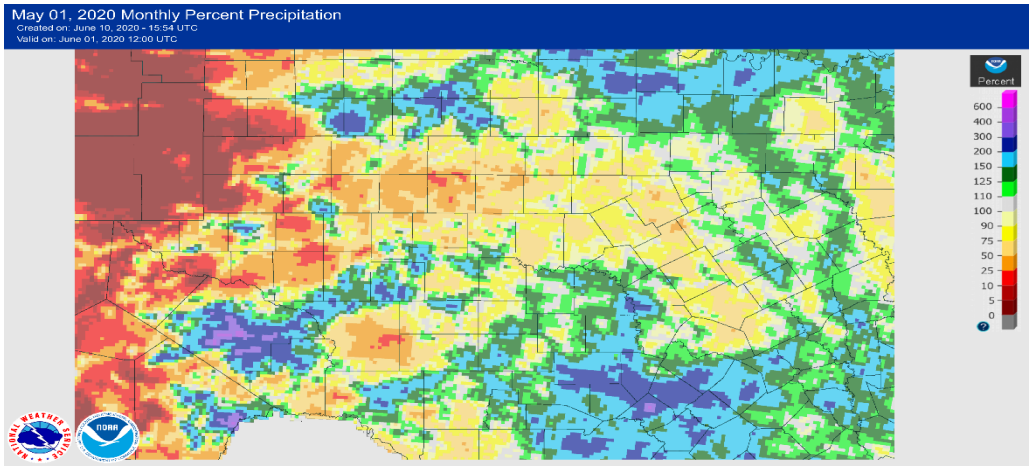


Image 5 - May Percent of Normal

Amarillo Spring Wildfire Incident

March 7, 2020 Significant Wildfire in Beaver County

By: Angela Margrave – Amarillo National Weather Service Forecast Office

On March 7th, 2020 a significant wildfire occurred in Beaver County, Oklahoma. The fire started about 4 miles east of Balko during the late morning and quickly spread northeast towards the city of Beaver. The fire spread at a rate of 103 feet per minute. The towns of Beaver and Forgan eventually had to be evacuated as the fire continued to jump containment lines. Several homes were destroyed or damaged in and around Beaver. The weather conditions that day were favorable for the spread of wildfires, however it was not a pattern favorable for a Southern Great Plains Wildfire Outbreak. The upper level pattern was characterized by zonal flow aloft ahead of a trough to the west and ridging over the Mississippi Valley. There were no jet streaks in the area, but the cross-barrier flow over the southern Rocky Mountains did promote strong lee surface troughing. In turn, the pressure gradient promoted southwest winds of 25 to 35 mph with occasional gusts around 40 mph. The winds started around 9 AM Saturday morning (March 7th), and did not decrease until late Saturday night. A thermal ridge was present which aided temperature rising into the mid-60s to low 70s. This resulted in relative humidity values falling into the 20 to 25 percent range. Moreover, the Red Flag Threat Index (RFTI) was mostly wind driven and maxed out around 4 in Beaver County. Probably the biggest factor that supported the extreme fire behavior was the fuels. Fuel loading was high and the energy release component (ERC) percentiles were above the 70th percentile. The means the grass was overgrown and very receptive to fire spread. Some terrain may have also enhanced the fire spread as well.

Figure 1: Wall of Smoke - Photo by Daisy Farr

Figure 2: Burn Scar - Photo by Daisy Farr

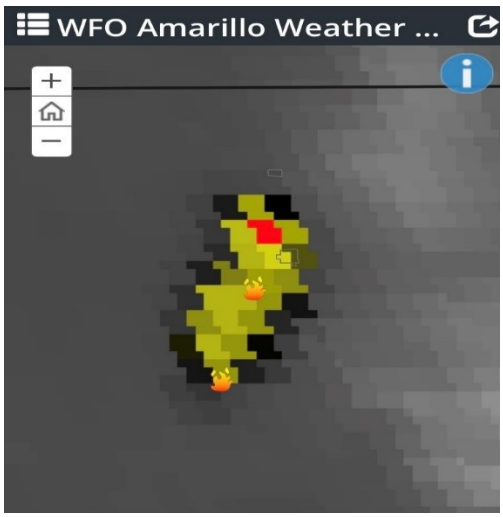


Figure 3: Burn Scar on satellite

Austin/San Antonio Regional Summary

Warm, Wet, Stormy Spring across South Central Texas

Brett Williams – NWS Austin/San Antonio

It was a warm, wet, and stormy spring across South-Central Texas. For temperatures, topping the list was Del Rio, which recorded its 3rd warmest spring on record. Not far behind was Austin Camp Mabry with its 7th warmest spring followed closely by San Antonio with its 8th warmest spring on record. Breaking it down by counties, all 33 counties of South-Central Texas had above average temperatures this spring with the vast majority coming in well above average (Fig. 1). In regards to precipitation, the Austin area came in much wetter than normal. Austin Bergstrom International Airport recorded its 6th wettest spring while Austin Camp Mabry recorded its 18th wettest spring on record. Del Rio and San Antonio were also a bit wetter than normal with their 38th wettest spring and 39th wettest spring on record, respectively. On the county level, almost all counties received above average rainfall this spring, with a few counties across the Hill Country – Kerr, Gillespie, Blanco, and Hays – receiving well above average rainfall (Fig. 2). Drought conditions that were in place across much of the region at the end of winter were almost completely eradicated by the end of spring thanks to this above normal rainfall (Fig. 3).

It was an active spring severe weather season across the region, with numerous days in which severe weather occurred. In total, the NWS Austin/San Antonio office issued 29 tornado warnings, 192 severe thunderstorm warnings, and 17 flash flood warnings during the spring season. There was 47 reports of thunderstorm wind damage and 15 measured severe wind gusts, with 3 of these measured wind gusts being 75 mph or greater (Fig. 4). There was a total of 127 severe hail reports, with 64 severe hail reports on the evening of May 27th alone. The largest hail stones recorded this spring were the size of softballs across Del Rio on the evening of April 11th. A total of 5 tornadoes were officially confirmed via NWS storm surveys this spring, including a brief EF-1 tornado across northwestern Bexar County near Helotes on the evening of May 24th.

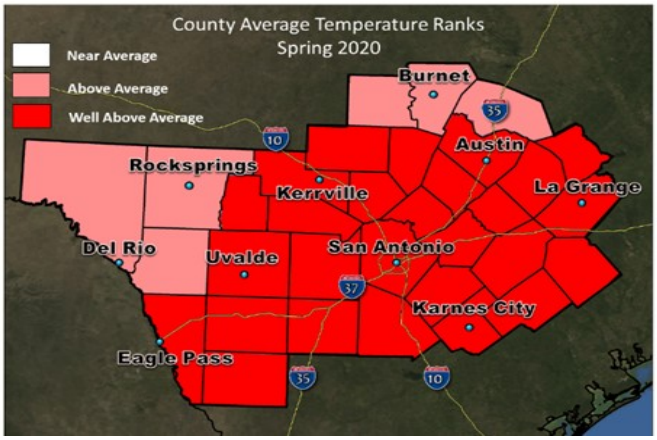


Fig. 1: NCDC County Average Temperature Ranks - spring 2020

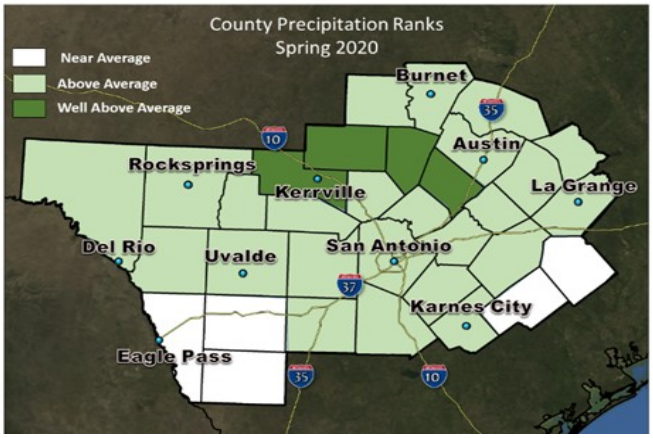


Fig. 2: NCDC County Precipitation Ranks - spring 2020

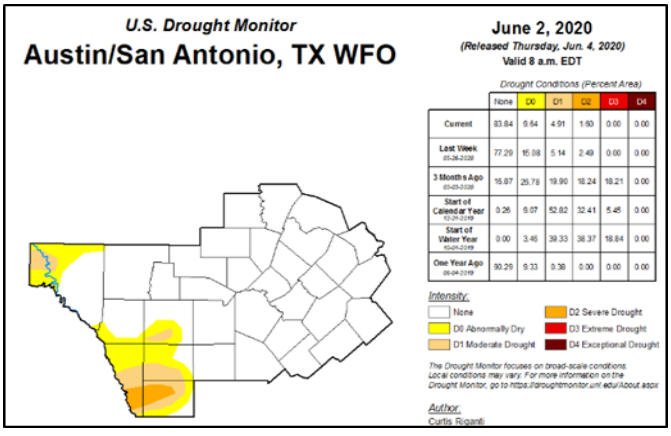


Fig. 3: Drought monitor from June 2nd 2020

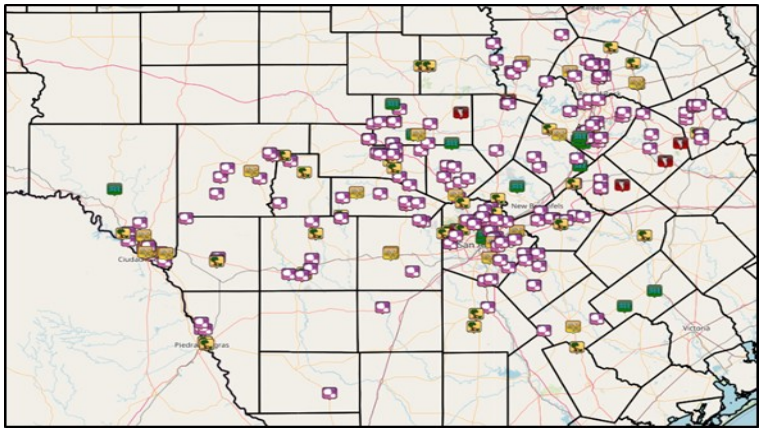


Fig. 4: Storm Reports (LSRs) across South-Central Texas in spring 2020

CoCoRaHS Observer Training

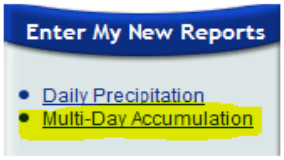
Is Your Rainfall Report for One Day, or is it for Multiple Days? Is Your Observation More than Four Hours Late?

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.

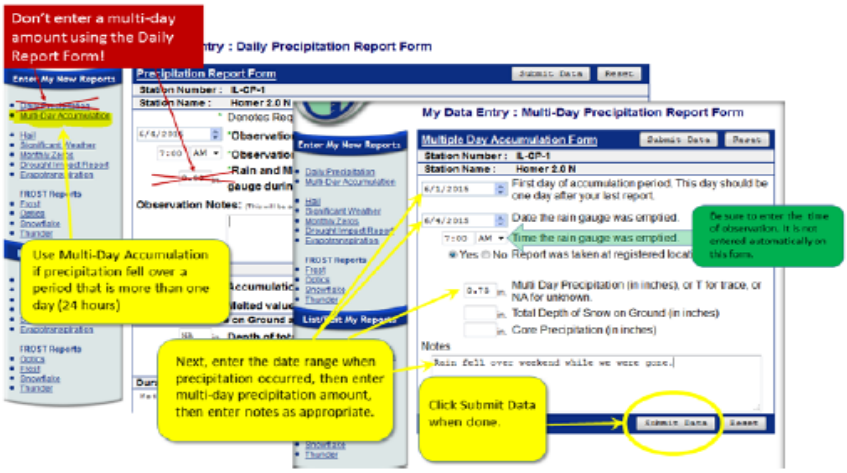
Example 1

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.

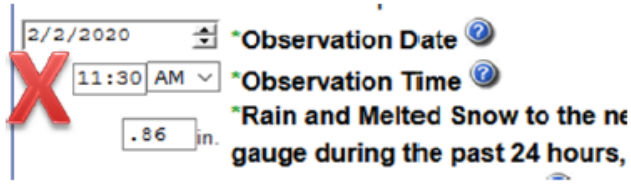
DO use the Daily Precipitation report form. When the form appears on the screen, change the date to 6/1, enter the observation, and click the Submit Data button. Then, click on Daily Precipitation under Enter My New Reports, change the date to 6/2 and enter that observation and click the Submit Data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

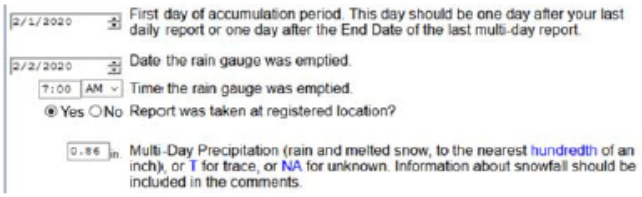
"CoCoRaHS Observer Training (continued)"

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.

Brownsville/Rio Grande Valley Regional Summary

Summer-Like Heat Dominated Spring 2020 for the Rio Grande Valley

Record Temperatures Was the Big Story; Drought Relieved by May Rains

By: Barry Goldsmith, Warning Coordination Meteorologist, NWS Brownsville, TX

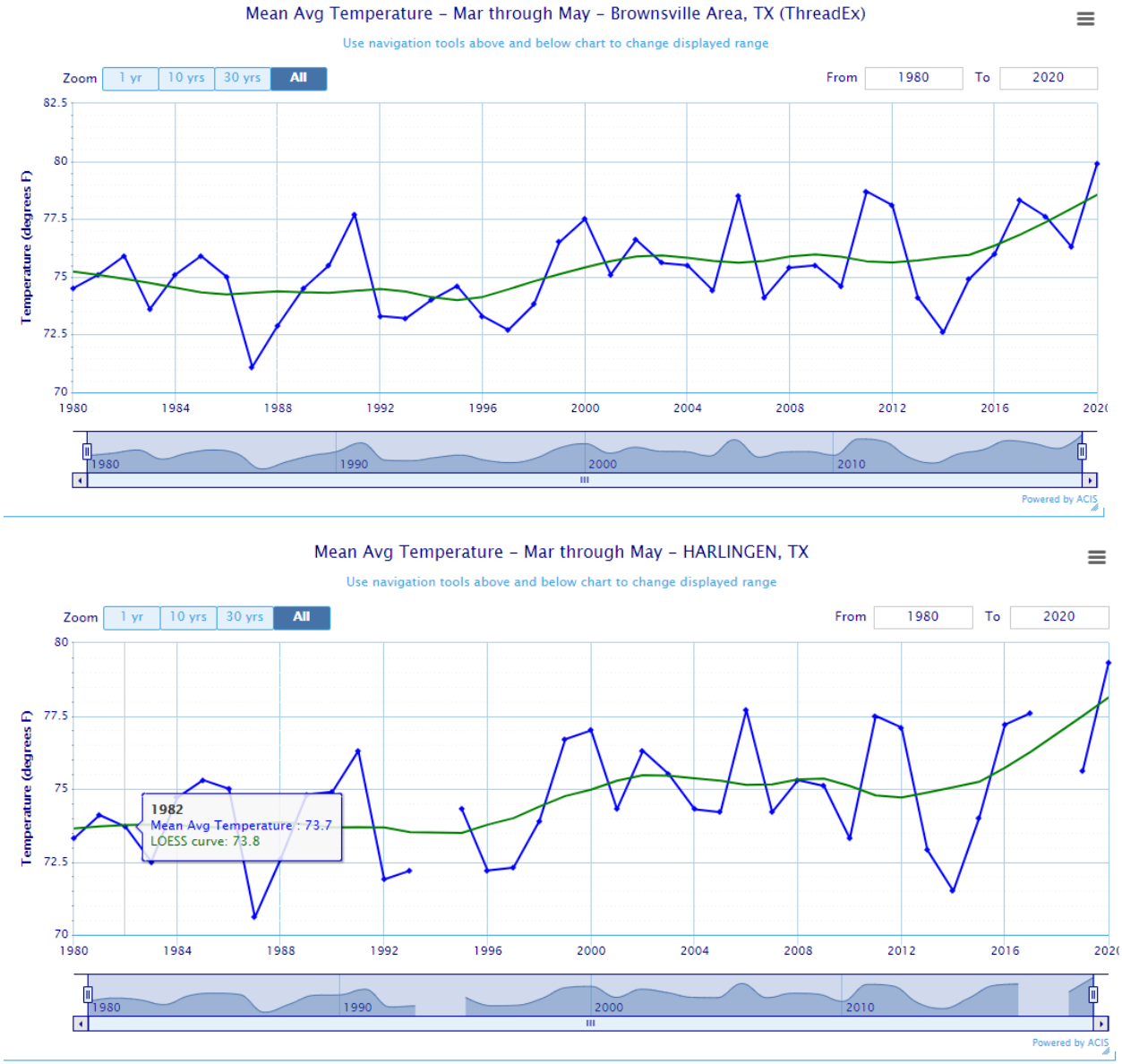


Fig. 1: Spring (March-May) average temperatures at Brownsville (top) and Harlingen (bottom) since 1980. New records were set at each site in 2020. Note the LOESS curve (green smoothed line) showing an exponential rise during the past decade (2011-2020).

For yet another year, spring (March-May) featured above-to-much above average temperatures across the Lower Rio Grande Valley, with 2020 topping the list and breaking prior records set within the past ten years. Brownsville (since 1878) shattered its prior record by more than a *full degree* (F), with 2020 reaching 79.9 degrees, besting 2011's 78.7. Harlingen (since 1912) finished at 79.5 degrees, breaking the record of 78.9 degrees set in 1953. McAllen (since 1941) finished just behind 2017 by 0.1 degree (80.5 vs. 80.6). The heat was dominated by a combination of unusually hot days as well as a sizable number of sultry nights. For example, Brownsville had twenty-five days with morning lows at or above 75, and McAllen had six afternoons hitting 100 degrees or higher.

"Brownsville/Rio Grande Valley Regional Summary (continued)"

The heat came with little rainfall, which, combined with the warm and dry winter that led into spring, increased evaporation rates to near summer levels and allowed severe to extreme drought conditions to hold forth through the first week of May. At times in March and April, the combination of heat and drought created difficulty for cattle ranchers and crop producers alike; water "hauling" was required for a number of ranches to ensure hydration for cattle and other livestock, and planting of dryland crops was delayed due to the persistently high evaporation rates.

The rains *finally* came in May, as the atmospheric flow pattern "flattened" after an early arrival of the dreaded summer "La Canícula" pattern that closed April and began May (Figure 5, lower left image). This flatter pattern, with embedded upper-level disturbances, helped lift the unusually warm and humid airmass into lines and clusters of thunderstorms. These thunderstorm lines and clusters were most efficient across the ranchlands of Starr, Zapata, and Jim Hogg County, where extreme to exceptional drought at the start of April would shift to moderate *wetness* by the end of May. Notable rain events occurred on May 8th, May 16th, and May 26th. The multi-phased event on May 16th produced sufficient rainfall across the Cameron/Willacy County region to begin improving drought conditions there after earlier events ran out of steam, running into stable environments and leaving little more than sprinkles.

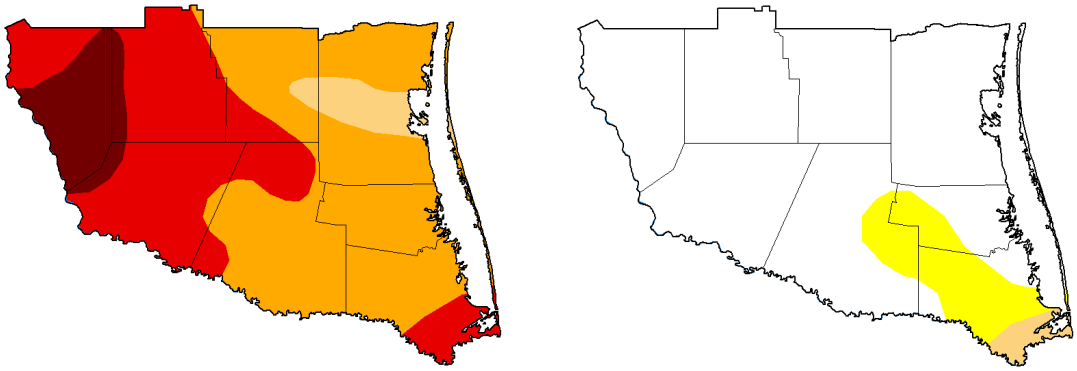


Fig. 2: Change in Drought Monitor for Deep S. Texas/Lower Rio Grande Valley region between March 31, 2020 (left) and June 2, 2020 (right).

The active flow pattern, which maintained an unstable atmosphere (much cooler above the surface than at the surface), produced severe weather in the form of damaging winds and large hail for each of the event dates listed above, with widespread damage to poorly built structures in Zapata County just after midnight on May 26th.

For nearly all of the region, May rainfall ranged from average to well above average, ranging from 1 to 3 inches in pockets of eastern Hidalgo County and around Brownsville, to 7 to 15 inches across the ranchlands of Zapata and Jim Hogg County. This equated to a percentage of average ranging from 75 to 100 percent near Brownsville and portions of eastern Hidalgo County to as high as 400 to 600 percent of average in Zapata and Jim Hogg County.

"Brownsville/Rio Grande Valley Regional Summary (continued)"

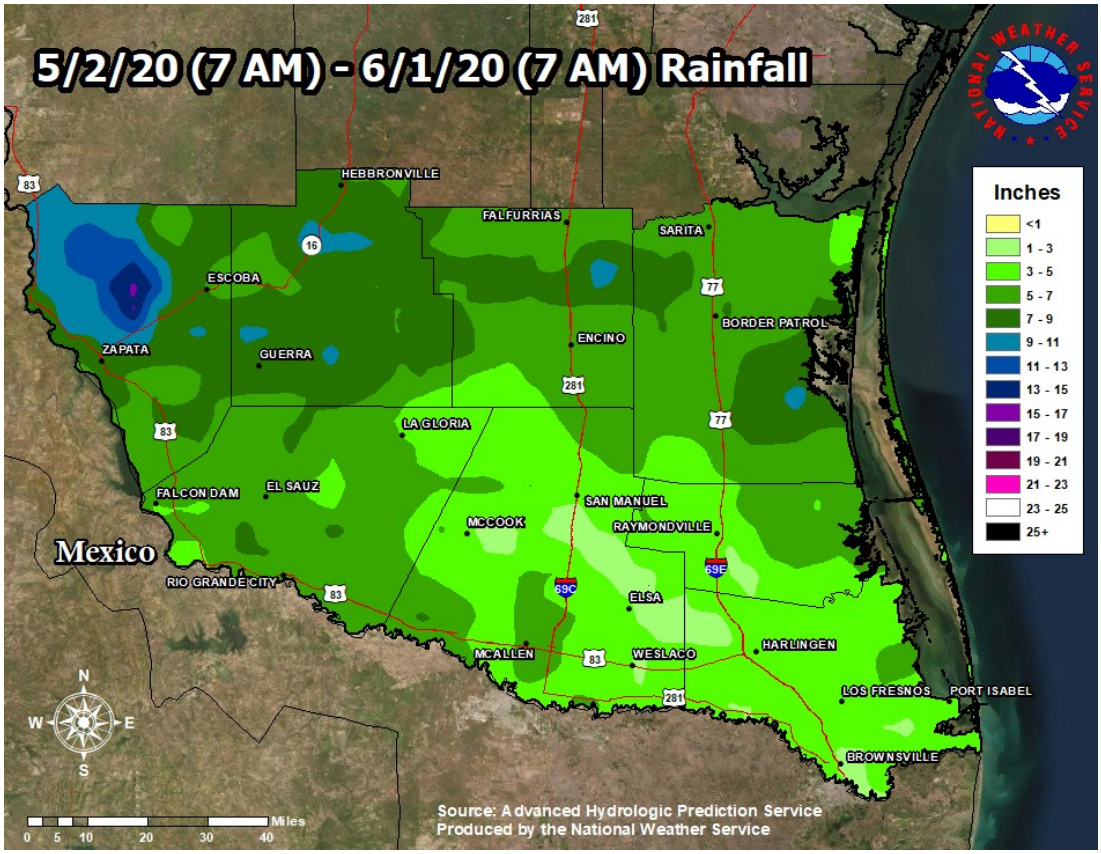


Fig. 3. Estimated and measured rainfall map for Deep South Texas and the Lower Rio Grande Valley region for May 2020.

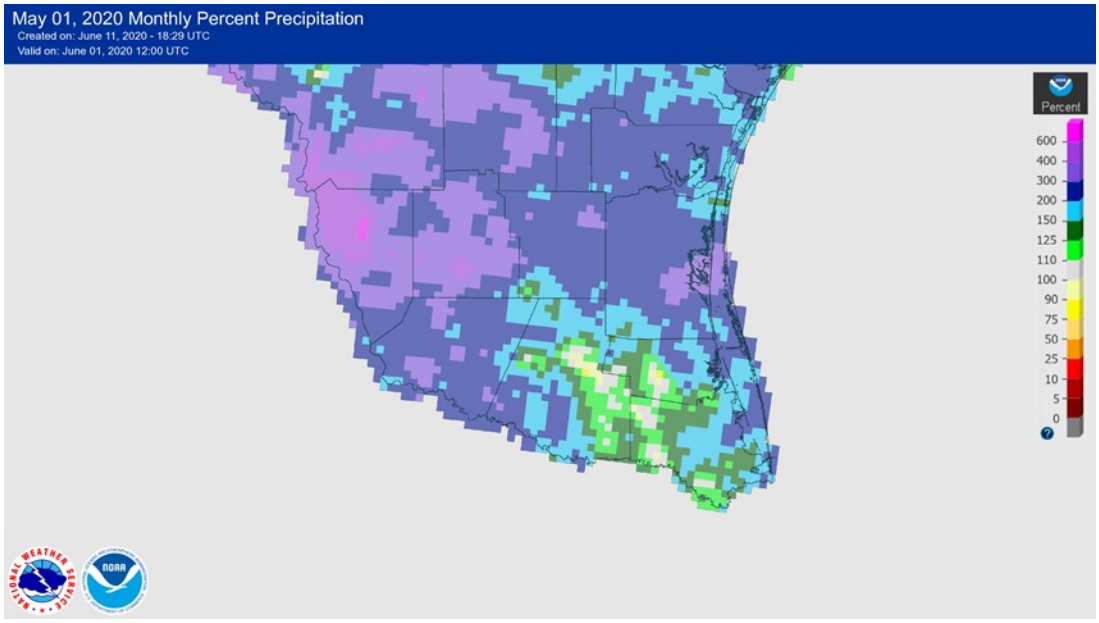


Fig. 4. Percentage of average (1981-2010) rainfall for Deep S. Texas and the Rio Grande Valley, May, 2020.

"Brownsville/Rio Grande Valley Regional Summary (continued)"

Pattern Matters

The atmospheric pattern ('steering pattern") that began spring was a continuation of where winter 2019/2020 left off: a robust mid-latitude flow with frequent, fast-moving disturbances. With the lower levels of the atmosphere more "stable" early in the season, the necessary "lift" needed to generate welcome rains remained well north of the southern tip of Texas. The region "waved" to these disturbances, and west to southwest flow above the surface into the mid-levels of the atmosphere provided dry air from the northern and northwest Mexican plains and mountains, keeping rainfall to a minimum. A single rain "bomb" affected a small area near McCook on March 20th, with a single strong to severe thunderstorm rolling off the ranches and moving off the coast in Willacy County on April 4th, but aside from those events, March and April were mostly rain-free. For the latter half of April into early May, a dry west to northwest steering pattern dominated south Texas and northern Mexico, similar to an early-onset of La Canícula. The northwest flow slipped eastward and intensified a bit for the final two-thirds of May, bringing stronger upper level disturbances farther south, which were able to lift the well-heated surface air into the aforementioned periodic lines and clusters of thunderstorms. Despite the additional rainfall, no true cold fronts crossed the region in May which ensured the record spring heat.

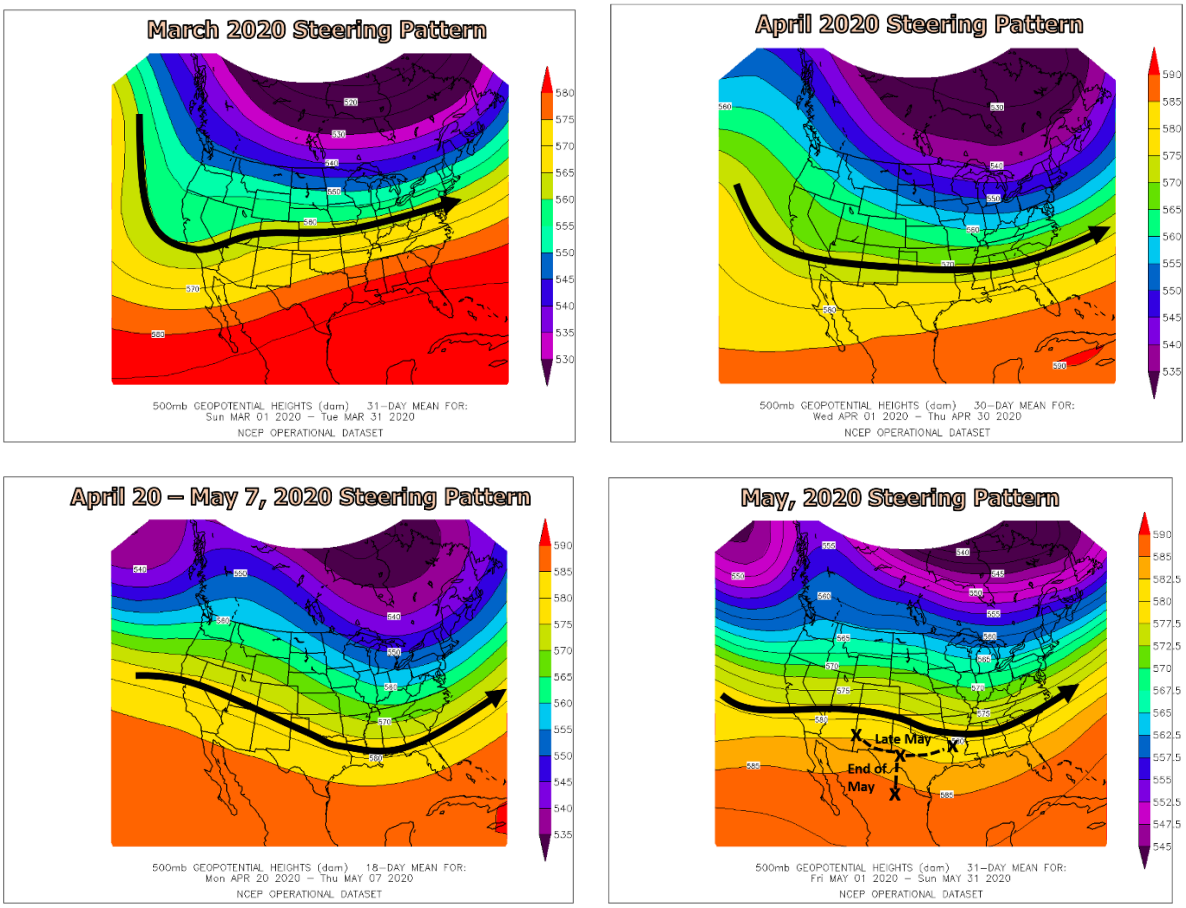


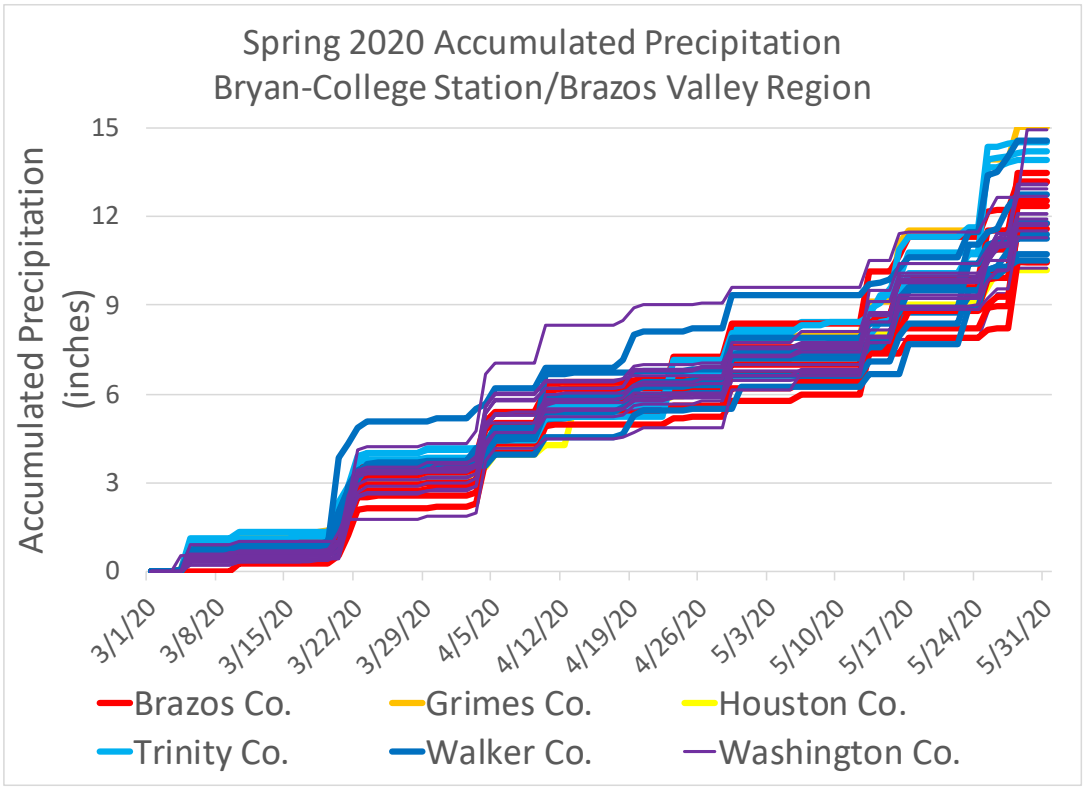
Figure 5: Flow pattern at 500 mb during spring 2020. Clockwise from upper left: March, April, April 20-May 7; May. Note that May overall *looks* relatively similar to April, but individual waves in early and especially late May provided lift to create lines/clusters of thunderstorms. At the end of May, a final wave dropped south and brought deeper tropical moisture from the south to begin June and keep another few days of locally heavy rainfall going; residual south flow was able to steer Tropical Storm Cristobal between June 2 and June 8.

Brazos Valley Regional Summary

Spring 2020 Precipitation Summary

Bryan-College Station/Brazos Valley Region, Texas

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



Summary:

The recovery from drought conditions continued during the spring. Rainfall was rather uniform across the area, with less than 5" separating the wettest and driest stations. Unfortunately, severe weather was also rather uniform. Within the eight-county area, there were ten days with severe weather, including 3.5" hail in Walker County on April 18. Technically, there were no tornadoes, but the Onalaska tornado on April 22 did nip the southern corner of Trinity County as a waterspout over Lake Livingston. One fatality was attributed to severe weather in Walker County when a tree fell on a house on April 28.

Observer Statistics:

There were no CoCoRaHS observer reports in Madison County, but a Burleson County observer did join during the spring (yay!). Eleven stations within the Brazos Valley region reported precipitation values on all 92 days, including multi-day reports, and another 13 stations missed fewer than 12 days of recorded values. In total, there were 34 CoCoRaHS observers with a sufficient number of single and multi-day observations to provide a seasonal total precipitation amount.

Seasonal Statistics:

Wettest day: 3.13", May 25, Trinity County

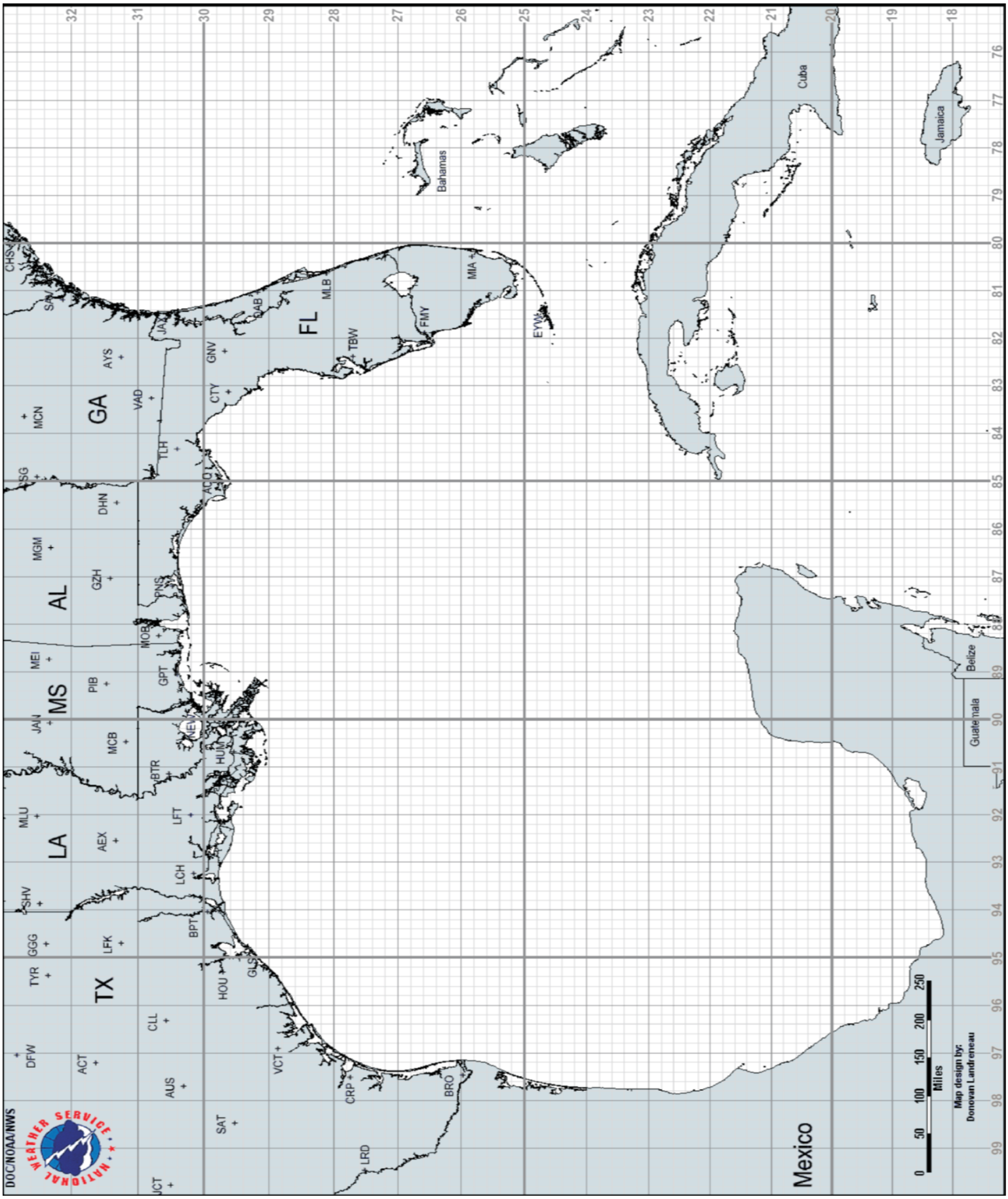
Wettest seasonal total: 15.04", Grimes County

Driest seasonal total: 10.19", Houston County

Soggy Socks Award (longest spell of daily reports with measurable rain): Numerous stations had six consecutive days of rain, but only Walker County managed to do it twice, on May 13-18 and again on May 23-28.

Dusty Soles Award (longest spell of daily reports without measurable rain): Several stations in Brazos, Walker, and Washington Counties couldn't find anything to measure from April 30 through May 12.

Gulf of Mexico Hurricane Tracking Chart



CoCoRaHS Webinars

Upcoming WxTalk Webinars:

Webinar #71 - Thursday, September, 2020, 1PM EDT

NOAA Weather Radio
Bruce Thomas
Chief Marketing Officer
Weather2020
Kansas City, MO

CoCoRaHS WeatherTalk Webinar Series

Webinar #72 - Thursday, October 15, 2020, 1PM EDT

Awesome or Awful? Ranking Winter Severity with the Accumulated Winter Season Severity Index (AWSSI)
Barb Boustead
NOAA/NWS's Warning Decision Training Division
Norman, OK

(biography)

This webinar will look at the Accumulated Winter Season Severity Index (AWSSI). AWSSI provides a scientific way to quantify the severity of a winter at any given location compared to its weather history. Using daily temperature, snowfall, and snow depth measurements, the AWSSI assigns a point total to each day of winter. Daily points add up through the winter season, giving a whole-season total at the end of winter. Besides the curiosity factor of having the numbers to support perceptions of whether a winter was severe or mild, AWSSI can be used to compare severity among sites or to compare the severity of one winter to others at a given site. The index can provide insight into wildlife and vegetation patterns, transportation and education impacts, and relationships between winter severity and other weather and climate patterns.

Texas CoCoRaHS Observer

The official newsletter of Texas CoCoRaHS

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