



TEXAS CoCoRaHS OBSERVER

Spring 2018



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

Texas Spring Climate Summary

By: John Nielsen-Gammon, Texas A & M University, Texas State Climatologist, Bryan/College Station Regional CoCoRaHS Coordinator

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.

If you would like to have a presentation done for your group or organization about CoCoRaHS, please, send an e-mail to Texas@CoCoRaHS.org

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It was a mostly quiet season in Texas. Well, it wasn't so quiet that day in March when a severe thunderstorm pounded my roof with 3.5" hail. The photo is of hail in my front yard.

No, I didn't have a hail pad out. But I did take photos with a ruler as soon as it was safe to do so. I also still have a baggie filled with large hail in my freezer. Someday I might make iced tea with them, if I don't mind a little grass and dirt in my beverage.



I think I was personally unlucky, though. The number of severe hail reports so far this year is on the low side, and the number of tornadoes reported in

the Lone Star State as of the end of May is only 20, which is the lowest this century and far below the average number of 86.

A quiet year for severe weather often means a general lack of rainfall. This has been particularly so in Amarillo, which from November through May received the thrilling rainfall total of 1.03". Normal is 7.87", and the previous record over the past 127 years is 2.64". The winter wheat crop up there has been a disaster, and even irrigation systems can't keep up with the lack of moisture.

It hasn't helped recently that temperatures have also been running warm. May was the second-warmest May on record for the state as a whole, with the largest temperature increase from April to May ever. If you thought summer arrived quickly this year, you're right.

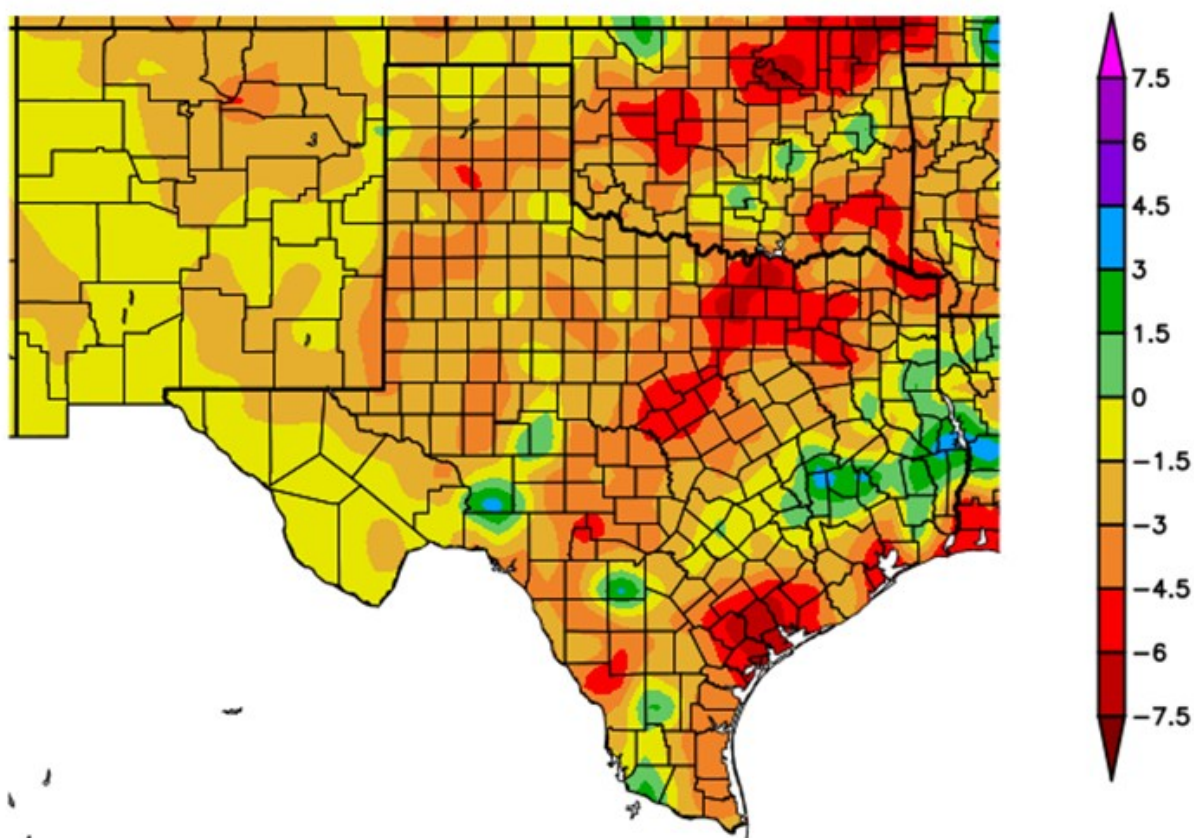
The rest of the summer depends on the rainfall. Some decent tropical rains would add moisture to the soil and produce a natural swamp cooler effect. If it stays dry, temperatures will just get hotter and hotter.

Summer Weather Outlook

By Bob Rose
Lower Colorado River Authority

The drier than normal weather pattern which developed last fall across much of Texas continued through the winter months and this spring. This drier than normal pattern can be traced in part to the second year of weak to moderate La Niña. Historically, La Niñas tend to bring a pattern of drier than normal weather to much of Texas, primarily in the fall, winter and spring months.

Departure from Normal Precipitation (in) 3/1/2018 – 5/31/2018



Generated 6/10/2018 at HPRCC using provisional data.

NOAA Regional Climate Centers

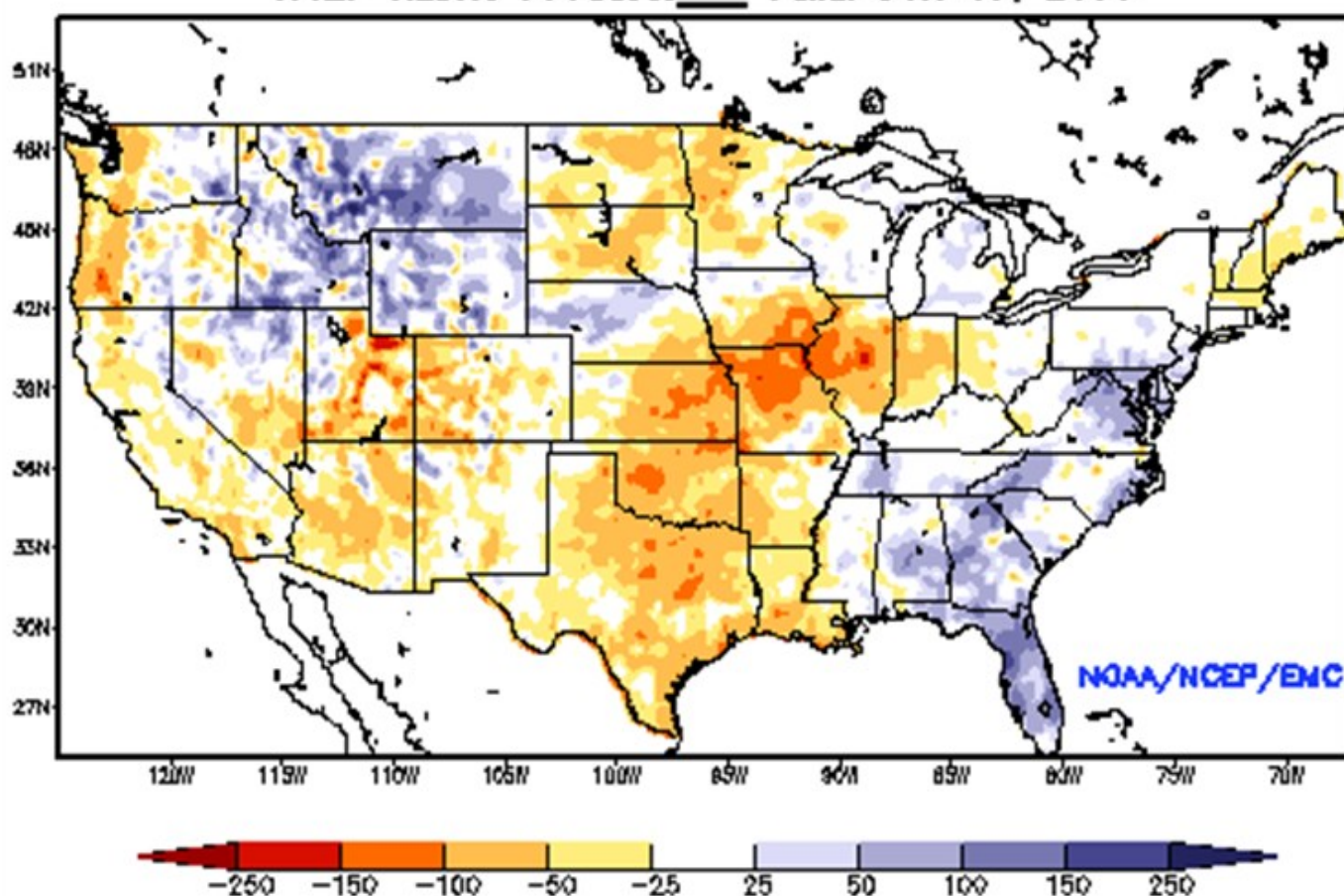
La Niña hung on through spring. However, in early May, the National Weather Service's Climate Prediction Center (CPC) announced the recent La Niña has come to an end. Sea surface temperatures in the tropical Pacific have been warming for the past couple of months and have recently warmed past the threshold for La Niña to a category which is often called "neutral". With a neutral tropical Pacific in place, we generally find little to no influence on temperature or rainfall patterns across Texas. Long-range forecast models call for Pacific waters to warm further over the summer, possibly reaching the threshold for El Niño by fall. El Niño often brings much of Texas a wetter than normal pattern during the fall and winter months. CONTINUED ON PAGE 3—————>

Summer Weather Outlook

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Spring is typically the wettest season of the year for Texas. Missing out on significant rain this spring has left much of the state with below normal soil moisture heading into summer. Soil moisture is an important factor contributing to the degree of warmth over the summer months. Dry soils tend to heat up quickly in summer, promoting a pattern of warmer than normal temperatures. This is in contrast to summers with adequate soil moisture, which often trend more toward near normal temperatures.

Ensemble-Mean - Current Total Column Soil Moisture Anomaly (mm)
NCEP NLDAS Products ___ Valid: JUN 07, 2018



The Sonoran heat ridge, (intense surface heating on the Mexican Plateau), built north across Texas out of Mexico several weeks earlier than normal this year. This feature, which normally shows up in July, arrived in May causing numerous days with above normal temperatures. In fact, May's average temperature across Texas was the second warmest on record dating back to 1895.

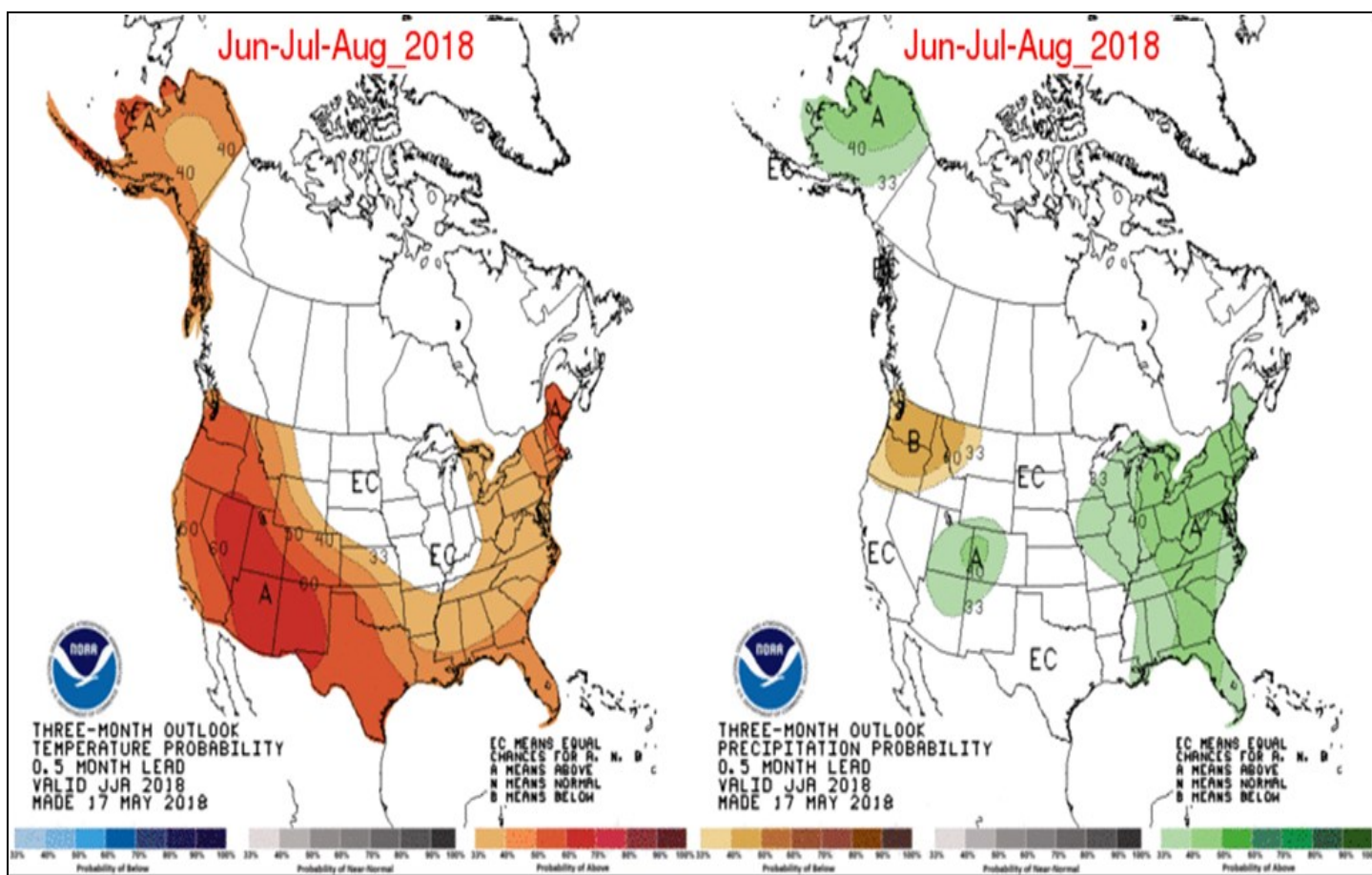
The early arrival of the Sonoran heat ridge is often a sign the upcoming summer is going to be a hot one! The ridge arrived similarly early in 1996, 2006 and 2011 and all three of those summers ended up with temperatures averaging well above normal. Rainfall during these same summers was generally near normal or slightly below normal. CONTINUED ON PAGE 4————>

Summer Weather Outlook

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Putting together the elements of a neutral Pacific, lower than normal soil moisture and the early arrival of the Sonoran heat ridge, this summer's weather is shaping up to be a scorcher! Expect much warmer than normal temperatures along with near normal, to slightly below normal rainfall.

NOAA's Climate Prediction Center is showing a fairly similar outlook for this summer. CPC forecasters are calling for increased odds for above normal temperatures with no clear trend for precipitation.



Of course like in any year, this summer's pattern could be interrupted or changed by a potential tropical cyclone spreading into Texas out of the Gulf of Mexico or the eastern tropical Pacific. Clouds and rain from these systems will often cause an extended break from the heat and dry weather that can last for a few weeks.

Heading into summer, forecasts are indicating this is going to be a really hot one, with somewhat less than normal rainfall. Pay close attention to and respect these next hot few months. Always take the necessary precautions to keep you and your family cool and safe from the hot weather.

Wichita Falls Regional Summary

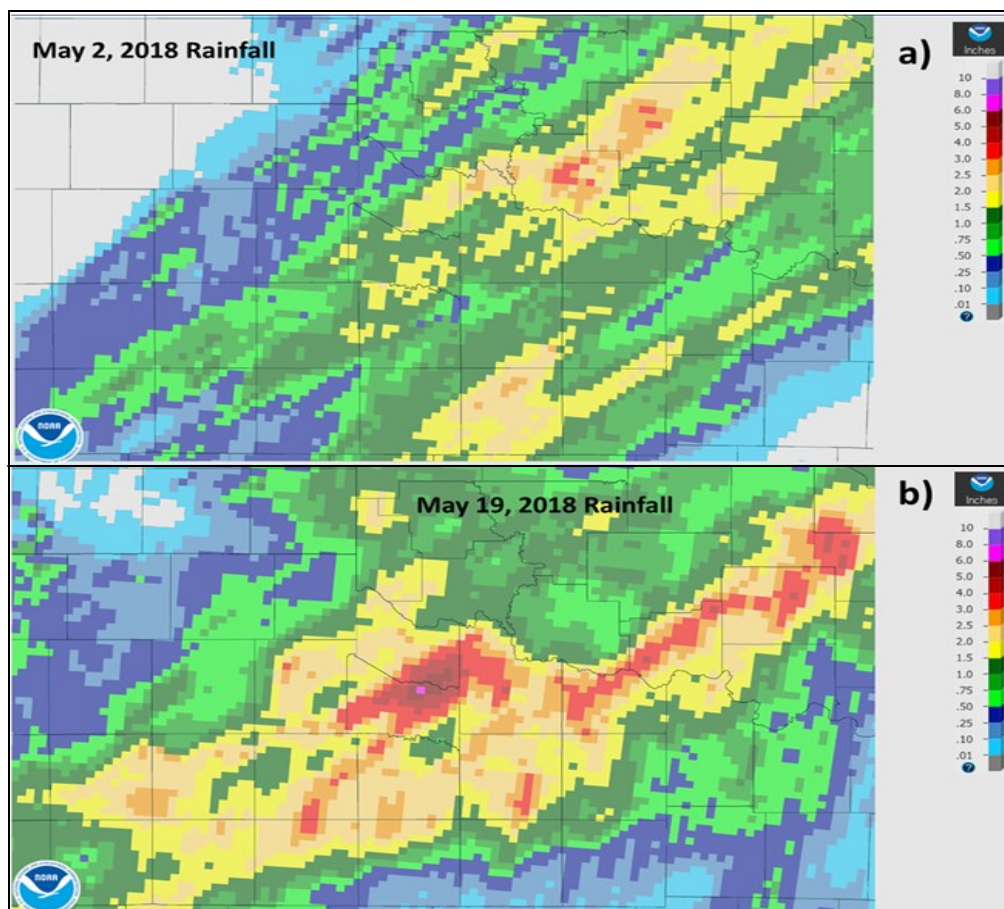
By Charles Kuster

CIMMS/NSSL

Spring started off quite dry in the Wichita Falls region. Through April 19, there were 45 dry days (all CoCoRaHS stations reported less than 0.05 inches) and only 6 wet days (at least one CoCoRaHS station reported 0.05 inches or more) and the region only experienced significant rainfall and severe weather on one day (March 26th). April 20th did mark the beginning of a pattern change that ushered in a wetter period extending through the end of May. Two significant rainfall and severe weather days highlighted this wet period (Fig 1). On May 2nd, severe wind and hail was reported across the region, including 2.0" hail in Quanah and an 87 mph wind gust in Knox City. All CoCoRaHS stations also reported 24-hour rainfall totals of at least 0.73" and many saw 24-hour rainfall totals over 1.10". The second event on May 19th brought more severe weather and especially heavy rainfall. All CoCoRaHS stations reported a 24-hour rainfall of at least 0.80" and many locations received at least 1.50" of rain. Some locations in Foard and Hardeman County received over 5" of rain (Fig 1b)!

The region did receive slightly below normal rainfall for the season despite May rainfall being well above normal (Fig. 2). In total the region had 71 dry days and 21 wet days (77% and 23% of days respectively). Thanks to the May rainfall, the area of severe and extreme drought decreased in the region. However, many locations especially in the western third of our region remain in severe or extreme drought (Fig. 3).

Figure 1: 24-hour rainfall estimates for a) May 2, 2018 and b) May 19, 2018.



Wichita Falls Regional Climate Summary

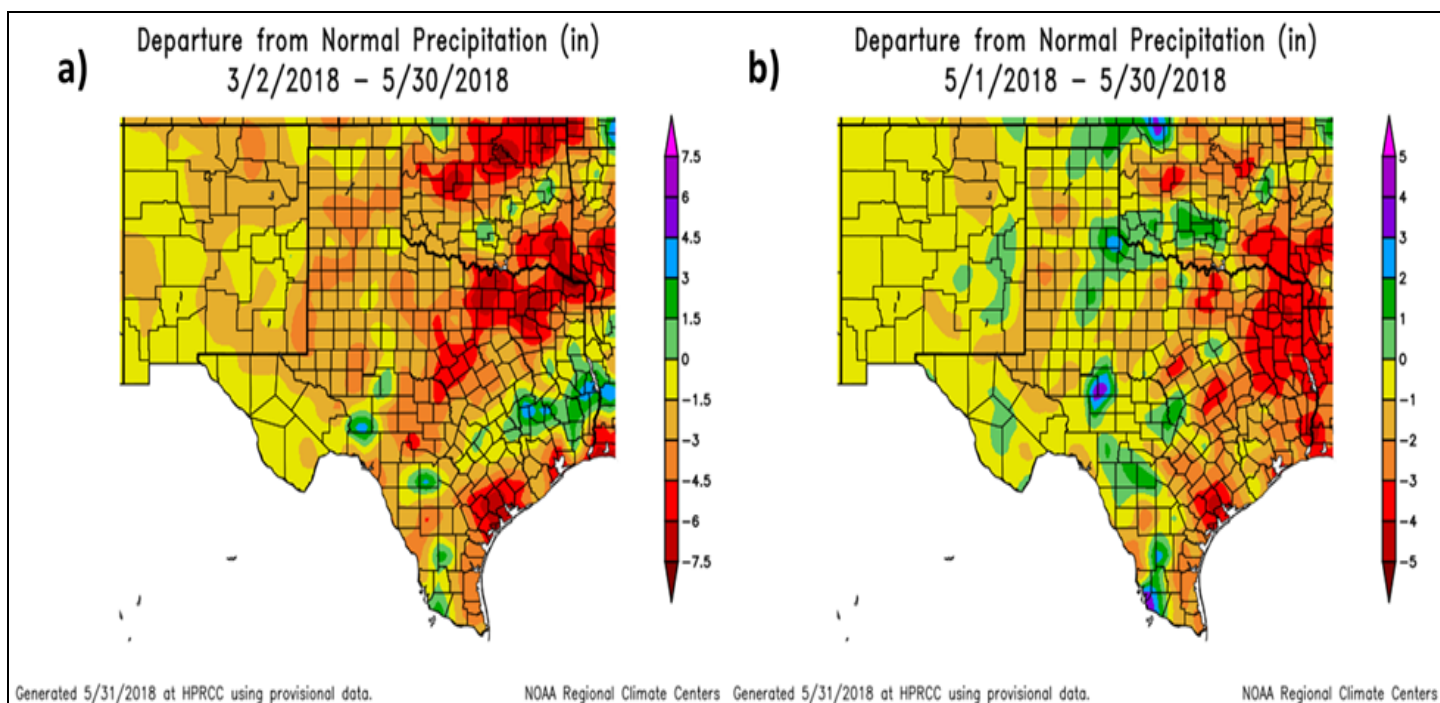


Figure 2: Departure from normal precipitation for a) March through May 2018 and b) May 2018. Warm colors indicate below normal precipitation and cool colors indicate above normal precipitation.

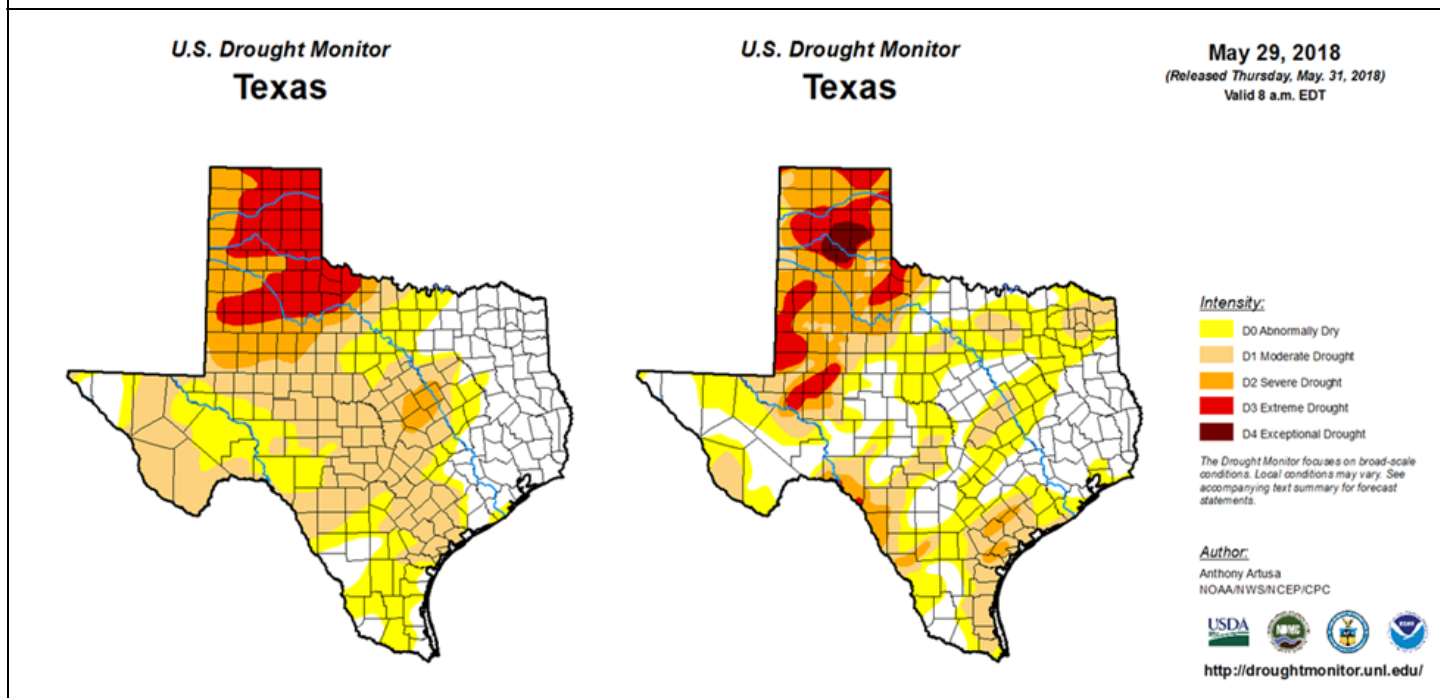


Figure 3: Change in the U.S. Drought Monitor for Texas from February 27, 2018 (left) to May 29, 2018 (right).

North Texas Spring Weather Summary

By Greg Story
NWS Fort Worth

Greetings from North Texas! We really have been on a rainfall roller coaster in north Texas the past several months. Just to review, our region ended up with one of the wettest summers of record in 2017. Then we took a downturn last fall. September was the 13th driest September on record. October and November were dry as well, and the autumn season ended with the lowest total precipitation in five years with 3.40" at DFW airport, and that ranked 13th driest on record. Then it turned wet again in December. North Central Texas had the 12th wettest December of record. After that wet December, January was dry. And, after starting off dry in February, most of north Texas got drenched. We had the wettest February on record.

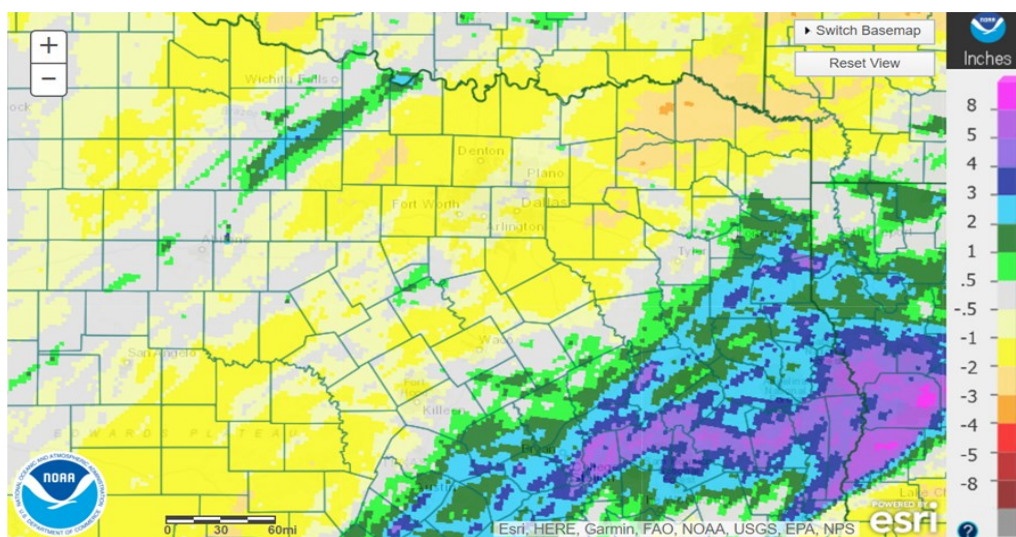


Figure 4: Departure from normal rainfall for March 2018. The brown and yellow colors indicate below normal precipitation, while the green and blue and purple colors indicate above normal.

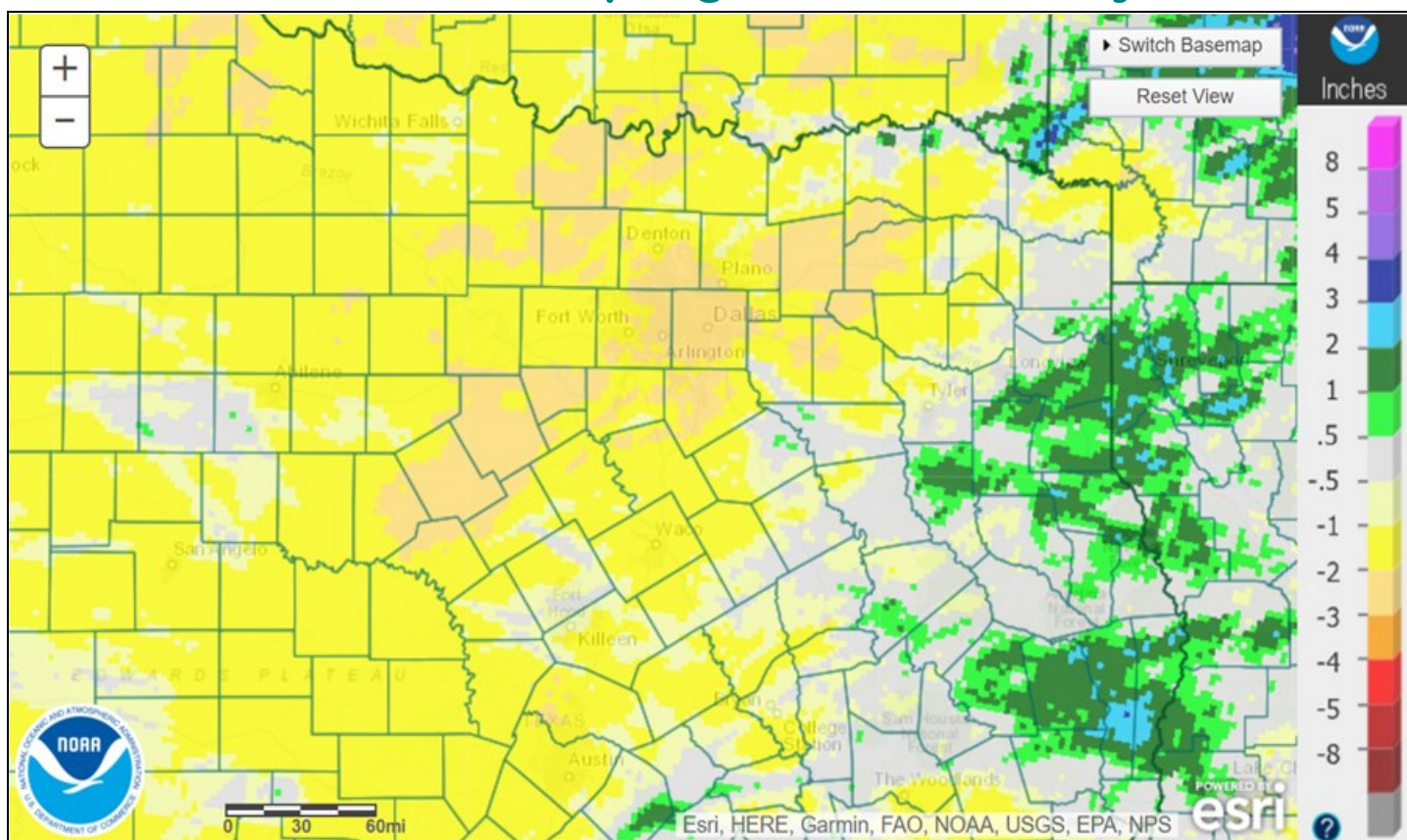
After we had the wettest February on record, the monthly March rain total was 2.90". The normal March rainfall is 3.49" so we were slightly below normal by 0.59". You can see how wet it was over the southeast portions of North Texas and over into the Toledo Bend Country.

As a side note, when you add up the totals for this past winter, DFW airport tied for 1st (with the winter of 2015-16) for the lowest snowfall total on record with only a trace of snow.

The largest storm of March came on the 27th and 28th. A long wave trough formed over the southwestern U.S., and this low moved slowly east. The upper-level trough over the Desert Southwest morphed into a cutoff low centered above Arizona, with a southwest upper air flow into Texas. This set up a very favorable pattern for heavy rain, and excessive rain did occur over east Texas. Some of the highest rainfall totals found in the Metroplex included Cedar Hill (4.92"), Arlington (4.72") and Frisco (4.32"). The DFW Airport measured 2.76", and Richardson received 2.28". Other north central Texas locations with high totals were Thorndale (Milam County) with 4.61", Glen Rose (Somervell County) with 4.32" and Palestine (Anderson County) with 4.20". Most of the rain was welcome, but some minor river flooding occurred in the Neches, Trinity and Sabine Rivers.

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North Texas Spring Climate Summary

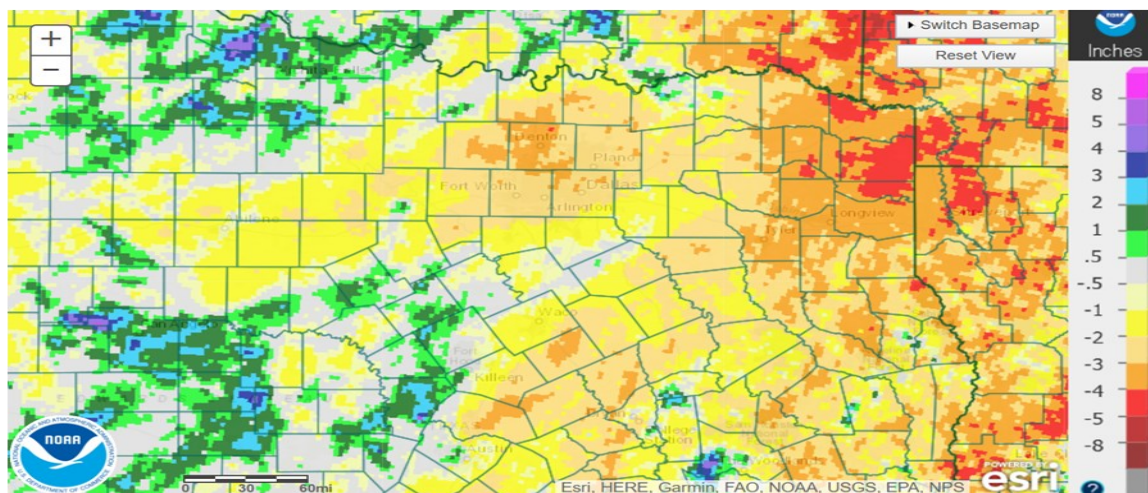


April 2018 departure from normal rainfall. The brown and yellow colors indicate below normal precipitation, while the green and blue indicate above normal.

In April a large majority of Texas had below normal rainfall. In north Texas, it was dry everywhere except for the extreme eastern portions. We had the 7th driest April of record. DFW airport received 0.77" in April. The normal amount is 3.07" so they were below normal by 2.30" for the month. A large storm affected Texas on April 7. This storm system brought showers and thunderstorms to primarily east and southeastern Texas. However, severe thunderstorms did produce large hail in Celina (Collin County) with 3" diameter stones, while 2" sized hail pelted Plano and McKinney. After the strong cold front moved through, areas around the Red River saw some very light wintry precipitation, the first time since 2007 that Texoma saw wintry precipitation in April. Also, Eastland Municipal Airport observed some light snow. It was so cold that steam was seen rising off Lake Granbury. Later in the month, an upper air low pressure system passed to the north of Texas, and this pushed another strong cold front through Texas April 21st and 22nd. The heaviest rainfall was again over east central and southeast Texas. Statewide, the severe storm reports were confined to north central Texas. Hail, with the largest size ranging from 1.25" to 2" in diameter, fell in Ellis, Parker, and Somervell counties. And, while it was just outside of the North Texas region, the Toledo Bend Lake area ended April with 4.39", giving them a 3-month total of 28.38"!

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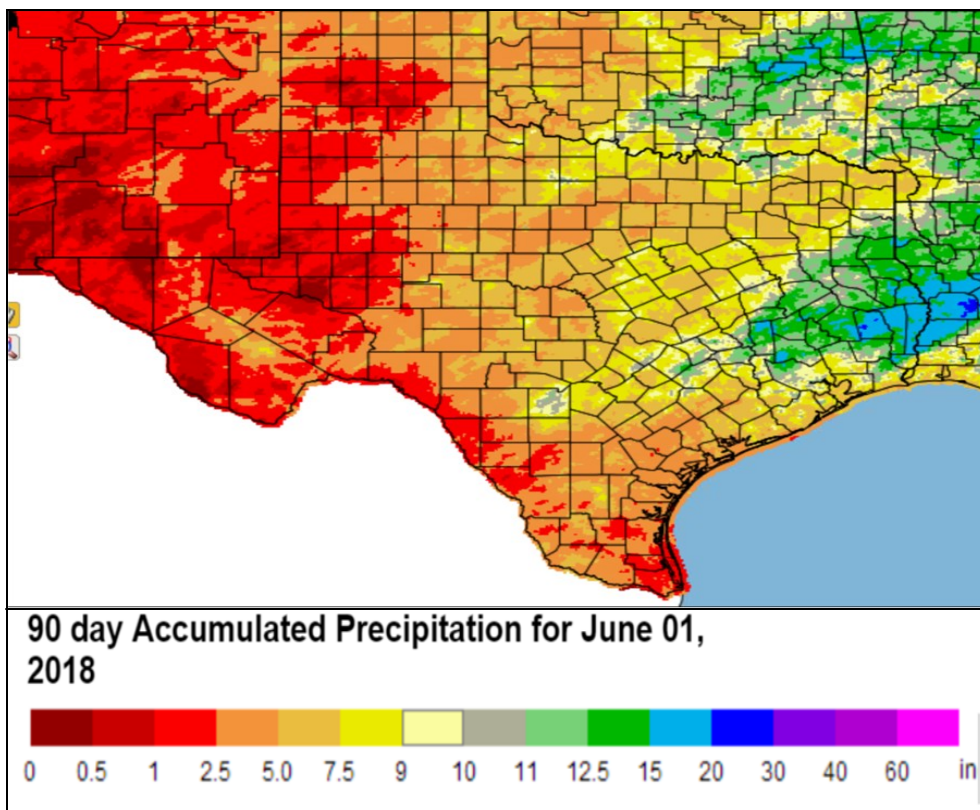
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Departure from normal rainfall for May 2018. The brown and red colors indicate below normal precipitation, while the green and blue indicate above normal.

In May, a few spots over central Texas saw above normal precipitation, as did the northwestern parts of north Texas. But below normal rainfall was noted elsewhere, especially over extreme northeast Texas. At DFW airport they received 1.87" in May. The normal amount is 4.90" so they were much below normal by 3.03" for the month. One of the largest storms came early in May. From the 2nd through the 5th, a major storm system affected Texas that came in from the west. A large closed low moved from the southwestern U.S. to northeast Colorado. This low opened up and passed to our north, but weaker short wave troughs of low pressure passed through the region which produced several rounds of thunderstorms over parts of Texas. Some of the highest two-day rainfall totals in the Dallas-Fort Worth Metroplex included: Frost in Navarro County with 6.68", Plano with 5.12", Cleburne (Johnson County) with 5.00", Corsicana (Navarro County) with 4.56", and Covington (Hill County) with 4.35". Later in the month the dryline became active from May 16 – 18, with thunderstorms occurring especially over west Texas. But further northeast a mesoscale convective system (MCS) delivered thunderstorms late on May 15 to parts of north Texas. The largest totals were seen in the Caddo Wildlife Management Area of Fannin County with 3.65", while Hamilton got 3.54" and Honey Grove (Fannin County) received 3.00".

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North Texas Spring Climate Summary

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Spring Precipitation 2018 Summary

Adding up the totals for this spring (March through May), most of North Texas ended up being dry. Only the far western and southern parts of North Texas had close to normal precipitation. The DFW airport received 5.54" for the season while the normal amount is 11.46". Thus they were 5.92" below normal. Interestingly, for the spring season last year DFW got a similar amount of 5.14".

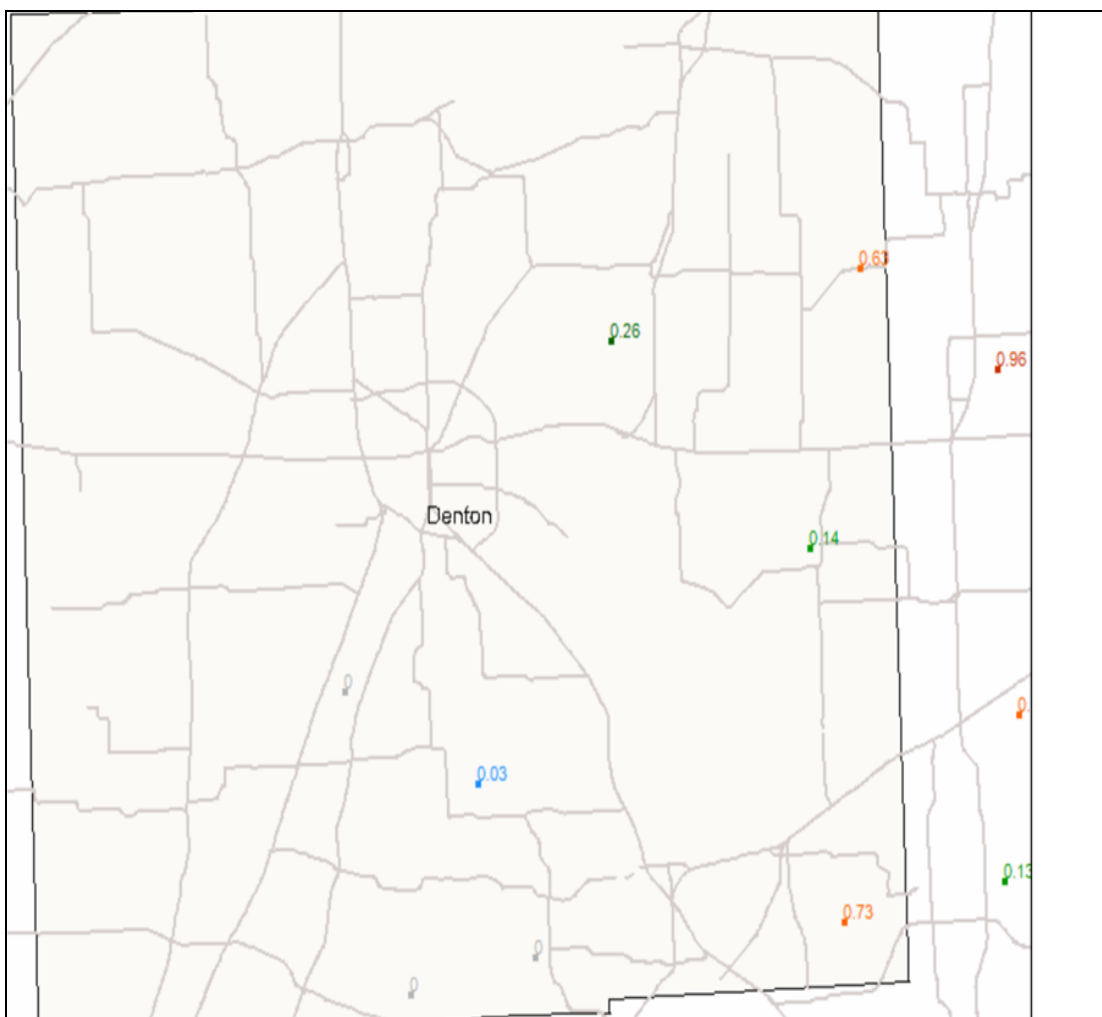
Adding up the totals for 2018 so far, DFW has received 17.70". The normal amount is 16.25" so we are still 1.45" above normal for the year (thanks in large part to the soggy February).

So in conclusion, I want to thank you for submitting your rainfall readings to CoCoRaHS. They continue to be extremely valuable to us at the National Weather Service. They have become increasingly important to our daily operations.

Additionally, I want to encourage all of you to continue making your daily weather observations even when the weather at your site is dry and hot and you only have zero rainfall to report. These "zero" reports are important to us, too. Why? Because we use the lack of rainfall from your reports as one of the tools in determining whether drought is occurring at your location or not. An example of what I am referring to is shown at right:

In this example (at right) from June 6, strong thunderstorms brought hail and moderate rain to eastern Denton County, while western Denton County got no rain at all. Both types of reports are important. Remember, every drop counts and so do zeros!

Thank YOU so much for your efforts. Have a great summer season!



Brazos Valley Spring Climate Summary

By: Jeramy Dedrick, Graduate Assistant for the Office of the State Climatologist

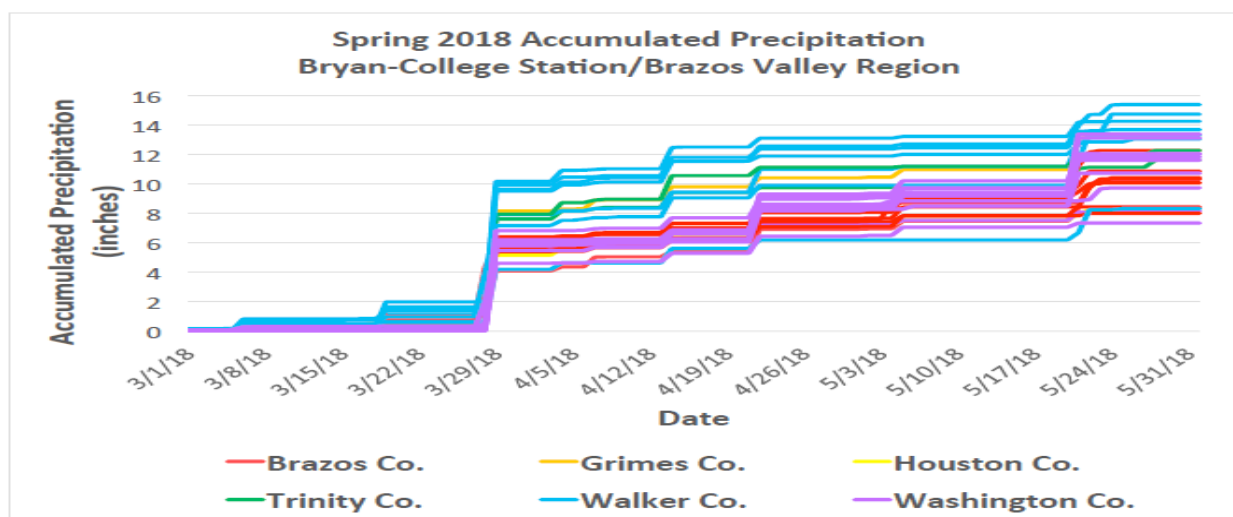
John Nielsen-Gammon, Texas A&M University, Texas State Climatologist, Regional CoCoRaHS Coordinator

Summary:

A dry first few weeks of March started the Spring season in the Brazos Valley. Most observing stations across the region remained under or just above an inch up to mid March. A large storm system moved through in the final week of March bringing torrential downpours and large-scale flooding. Rain totals from this system were the largest observed across all stations, with the most significant accumulation in Walker County. Frequent rains throughout April allowed for a steady increase in accumulation during the month. May saw a lack of precipitation for the majority of the first 3 weeks until a line of thunderstorms passed through the region in the fourth week bringing most of the measurable rain for that month.

Observer Statistics:

There were 47 active CoCoRaHS observers during the Spring season, down just one observer from the winter and three more than last fall. 6 observers reported for the full 92 days of the season. Not including these 6 stations that covered the entire period, 24 others reported for at least 75% of the period, providing a total of 30 active observers with reliable measurements across 6 (Brazos, Grimes, Houston, Trinity, Walker, and Washington) of the region's 8 counties.



Accumulated Precipitation:

The majority of March and a large part of May observed the lowest amount of precipitation this spring. In the final days of March, the notable rain event that occurred in the region is represented by the significant accumulation spike on March 28th and 29th. Rain totals were largest for Walker and Trinity counties following the March-April transition and continued to the end of the observing period. Similarly to last winter, a wide range of accumulations were observed this season with a range of 6 to 15+ inches.

Season Statistics:

Wettest Day: 8.27", March 29 (Walker County)

Wettest seasonal total: 15.39" (Walker County)

Longest spell of days without measurable rain: 15; May 6 - 19 (Brazos, Grimes, Houston, Trinity, Walker, and Washington Counties)

Longest spell of days with measurable rain: 5 (Walker County)

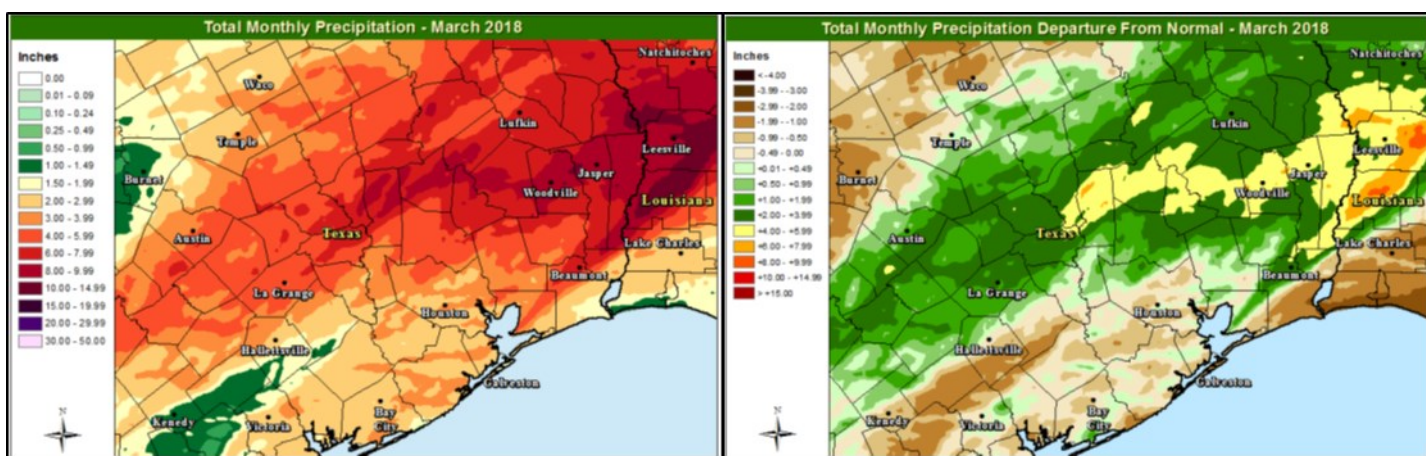
Houston-Galveston Spring Regional Climate Summary

By: Ron Havran

Houston-Galveston Regional CoCoRaHS Coordinator

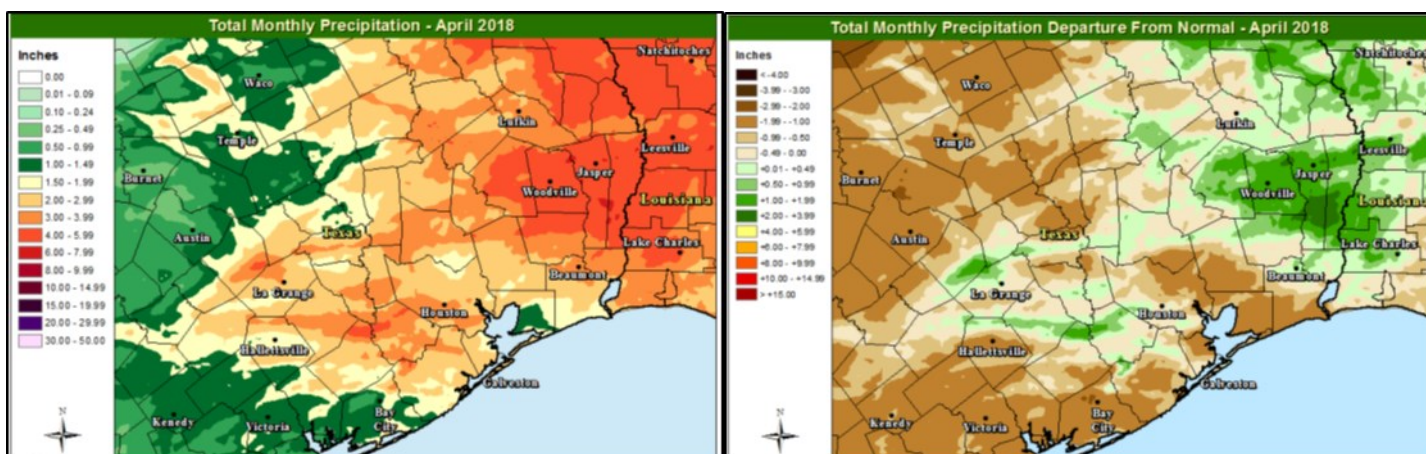
March Summary

Northern portions of the region had much above normal rainfall in San Jacinto and Polk counties. San Jacinto County had an average CoCoRaHS station monthly rainfall of 7.83" with a CoCoRaHS station maximum rainfall amount of 9.64". Polk County had an average CoCoRaHS station rainfall of 7.69". Central parts of the region had normal to slightly below rainfall. Southern counties had much lower rain amounts and ended up with much below normal rainfall. Wharton County had the lowest CoCoRaHS station average rainfall at 2.01". Galveston, Fort Bend, and Brazoria counties had very dry conditions as well. The 28th and the 29th were the two days that most of the rain occurred on. The mean temperature for the region averaged from 4 to 6 degrees above normal. There were a few cool nights from the 12th to the 16th after a cold front on the 11th. Most daytime highs were warm for the month with abundant sunshine. Thunderstorm days averaged from 3 days in the southern sections to 5 days elsewhere.



April Summary

The month was rather cool and dry across most of SE Texas. The average CoCoRaHS station rainfall per county ranged from a low total of 1.98" in Wharton County to a maximum total of 2.90" in Montgomery County. Morning average low temperatures for the month were lower than in March at most locations. Temperatures averaged from 2 to 4 degrees below normal for the monthly mean. Rainfall was below normal over most parts of the region except in a few areas that received isolated heavy rainfall. Late evening on April 3rd a cluster of thunderstorms moved through the central sections with some heavy rain and lightning. The 14th and the 21st-22nd both had cold frontal boundaries bring storms to parts of the region. The storms with these systems were clustered and not widespread. Displayed on both maps below are two storm track paths which amounted to the heaviest rain totals over the month. Thunderstorm days averaged 5-6.

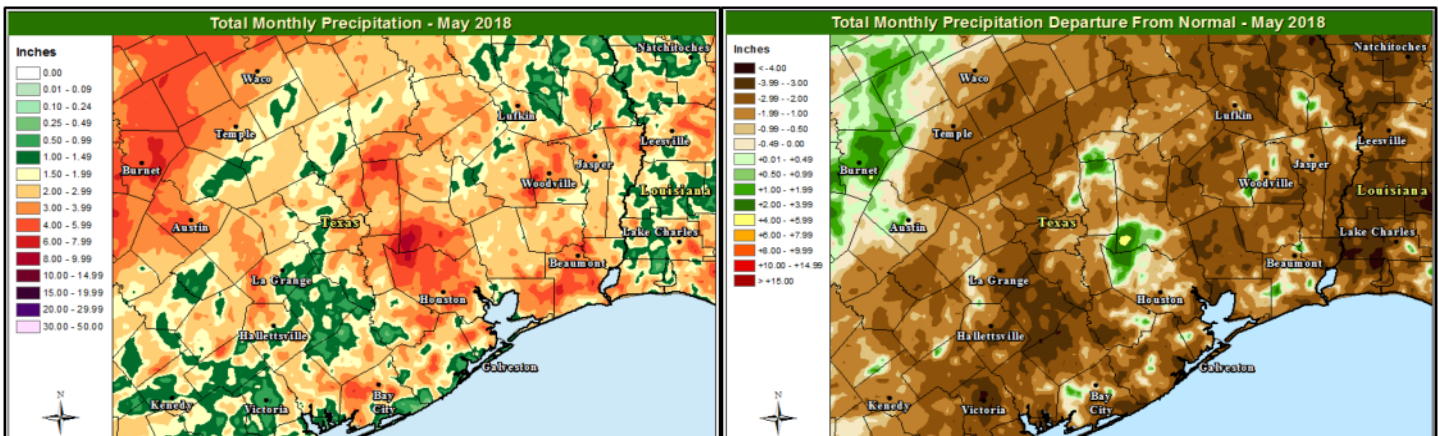


Houston-Galveston Spring Regional Climate Summary

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May Summary

Average temperatures ended up the month of May 3-5 degrees above normal. Rainfall totals were low for the month due to an upper level ridge of high pressure which maintained a NW flow aloft and sinking air that made storm formation difficult. Most of region saw below normal rainfall in May, except for an area in NW Harris, SW and southern Montgomery, and NE Waller counties on May 21st, attributed to a very slow moving cluster of storms on a stalled frontal boundary. This one storm event lead to Montgomery County having the highest CoCoRaHS station average rainfall for the month with 4.80". The maximum rainfall for a CoCoRaHS station in Montgomery County was 9.72" of rain this month, again the highest in the region. Polk County only had a CoCoRaHS station average of 0.85" followed closely by Colorado County with 0.88". Drought conditions continue to worsen in the region and are the worst in Jackson, Matagorda, Colorado, Wharton, and Brazoria counties. Moderate drought conditions are in just about all of Jackson County with moderate drought conditions in some parts of the other four mentioned counties. Thunderstorm days averaged 4-5 days, normal is about 10-11 for May.



Spring 2018 CoCoRaHS Houston/Galveston Region Rainfall

County Rainfall Average and County Station Rainfall Maximum Total in inches per month

County	March		April		May		Spring Total
	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	
Austin	3.64	4.05	2.44	3.22	2.26	3.37	8.34
Brazoria	2.46	3.02	2.02	3.04	2.80	5.08	7.28
Chambers	N/A	4.35	N/A	1.35	N/A	1.44	N/A
Colorado	4.46	5.83	2.07	2.29	0.88	1.69	7.41
Fort Bend	2.83	3.54	2.77	3.66	3.54	7.14	9.14
Galveston	2.17	3.08	2.69	4.17	2.34	4.77	7.20
Harris	3.14	4.88	2.81	4.57	2.88	6.25	8.83
Jackson	N/A	1.11	N/A	2.03	N/A	2.67	N/A
Liberty	4.63	4.89	2.81	3.77	3.04	3.70	10.48
Matagorda	N/A	1.97	N/A	1.32	N/A	3.58	N/A
Montgomery	4.67	6.47	2.90	3.66	4.80	9.72	12.37
Polk	7.69	8.27	2.80	3.79	0.85	1.08	11.34
San Jacinto	7.83	9.64	2.52	2.96	1.27	1.56	11.62
Waller	N/A	4.80	N/A	2.75	N/A	2.27	N/A
Wharton	2.01	2.46	1.98	2.62	1.59	2.73	5.58
Region Totals	4.14	9.64	2.53	4.57	2.39	9.72	9.05

Denotes wettest month for a category

Denotes driest month for a category

Note: Months with a N/A for avg. county rainfall had only one station reporting in that county.

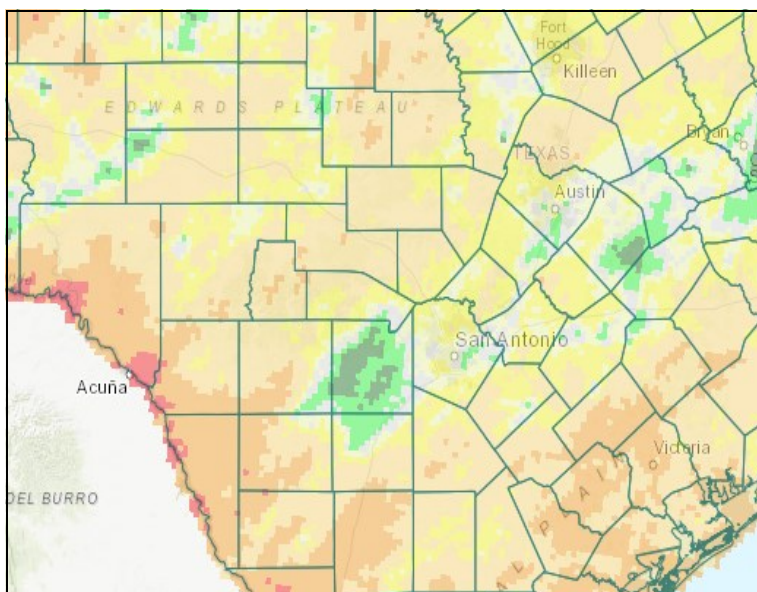
Warm/Dry with a Quiet Severe Weather Season for Austin/San Antonio/ Del Rio Region

By: Brett Williams

National Weather Service Austin/San Antonio

Warm and dry with drought conditions persisting was the primary story of spring 2018 across south central Texas. The severe weather season was also below normal, with only a few severe weather days this spring. Austin Camp Mabry, the official climate site for the city of Austin, registered its 7th warmest spring on record. San Antonio came in at 12th warmest spring and Del Rio at 5th warmest spring on record.

March was well above normal across the entire region in regards to temperatures. Austin Bergstrom and Camp Mabry had their 12th and 5th warmest March on record, while San Antonio checked in at tied for 15th warmest March and Del Rio experienced its 12th warmest. March was also wetter than normal for much of the region, with the exception of the Rio Grande plains. Austin Bergstrom had its 2nd wettest March on record while San Antonio came in at their 9th wettest March. There were a few notable severe weather and heavy rain events in March. On March 17th, baseball sized hail fell across northern Burnet County. The following day, a left-splitting supercell dropped hail up to the size of softballs across eastern Bastrop County near the town of Smithville. Heavy rain overspread much of the region on March 28th, with much of the region along and east of Interstate 35 receiving over 2 inches of rain. Austin Bergstrom Airport received 5.99" of rain on this day, obliterating the daily rainfall record for the 28th. The heavy rainfall created a temporary lake out in front of the forecast office in New Braunfels!



Spring percent of normal rainfall across south central Texas



Photo of almost 5" hail in Smithville, TX from hailstorm on March 18th (photo credit: Rose Land)

April was a different story, as temperatures were a bit below normal for much of south central Texas and precipitation was well below normal. Austin was about 2 degrees below normal for April while San Antonio was slightly more than 1 degree below normal. Del Rio was right at seasonal normal. For rainfall, Austin Bergstrom and Camp Mabry saw their 17th and 10th driest Aprils on record. San Antonio experienced its 15th driest April. Del Rio only received 0.01" of rain in April, making it the 2nd driest on record. Much of the Rio Grande and southern Edwards Plateau region received very little rainfall, and drought conditions expanded and intensified during April. By the end of the month, severe drought conditions were in place. Severe weather was almost non-existent in April across south central Texas. The only event of note occurred on April 6th when a supercell thunderstorm brought hail and a brief weak tornado across northern Burnet County near the community of Watson.

Above normal temperatures returned with vengeance in May as mid-summer type temperatures overspread south central Texas. Austin Bergstrom and Camp Mabry recorded their 2nd warmest and warmest Mays on record, respectively. San Antonio came in at 3rd warmest May and Del Rio at 4th warmest. Rainfall was a bit more than normal across the Austin area, with both San Antonio and Del Rio receiving below normal rainfall. Much of the area received some much-needed rain on May 3rd through 5th, when widespread 2+ inches of rain fell.

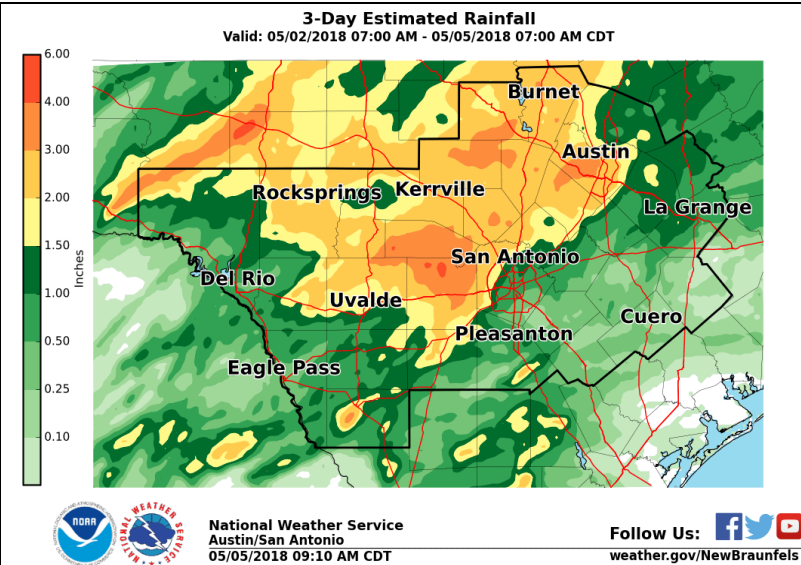
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Warm/Dry with a Quiet Severe Weather Season for Austin/San Antonio/Del Rio Region

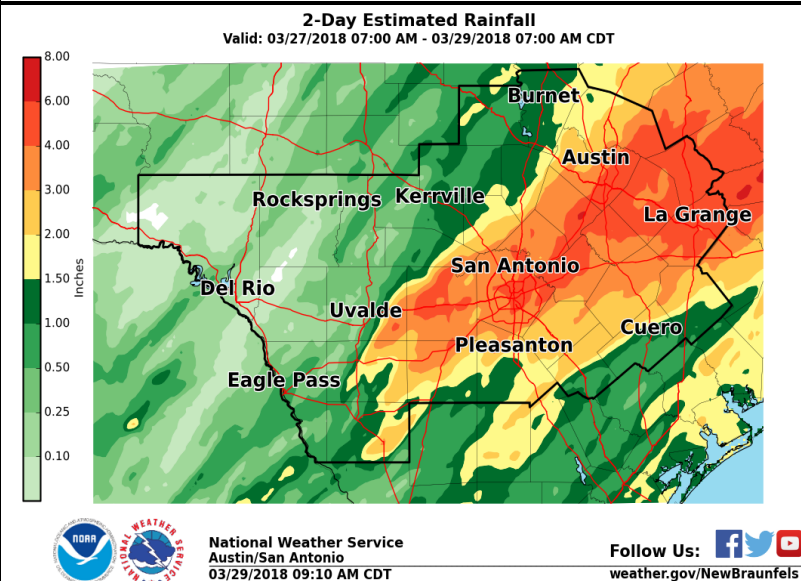
CONTINUED FROM PAGE 14—>inches of rain fell across the Austin area and much of the Hill Country. This improved drought conditions across these regions, but severe drought continued to persist along the Rio Grande. Severe weather was hard to come by again in May, with the only notable events occurring on May 15th with hail and strong winds across Burnet and Blanco Counties and May 20th, when an EF-1 tornado impacted the Austin suburb of Leander.



Temporary lake in front of the WFO and radar in New Braunfels from heavy rain on March 28th (photo credit: Brett Williams)

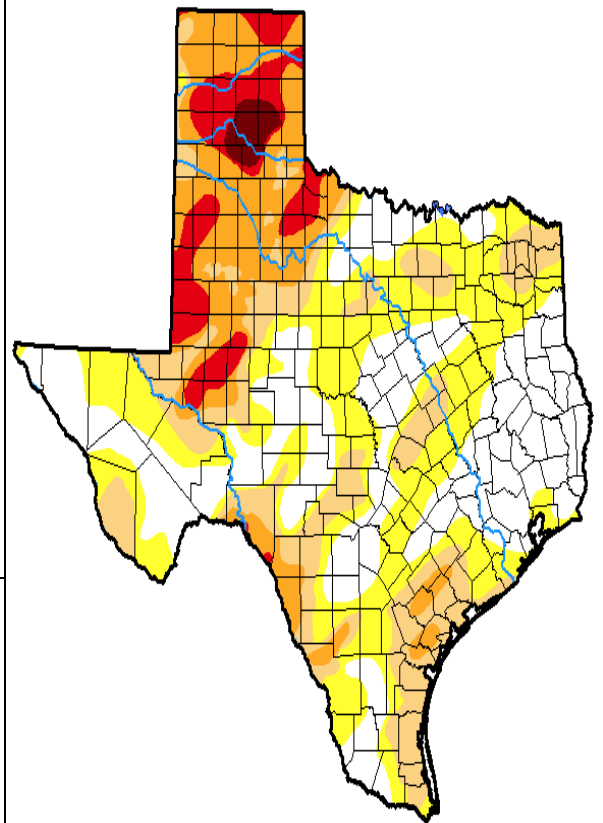


Above: Total rainfall from the May 4th rain event



Above: Total rainfall from the March 28th rain event

Right: May 29th Texas Drought Monitor. The driest areas of the state are in the Texas Panhandle and Permian Basin regions.



Amarillo Spring Regional Climate Summary

By: Kaitlin Rutt
Intern Amarillo National Weather Service

Dry Spring for the West Texas Panhandle

West Texas Panhandle is experiencing a dry spring this year with a lack of precipitation. The table below shows the monthly precipitation totals (in inches) for three different climate stations located in the Texas Panhandle. Note the values are very low for the first three months of the year, but certain areas of the Panhandle began to receive an inch or two of rain in the later springtime months. But where do these values stand in terms of the normal precipitation seen in the first six months of the year? The table below also denotes the departure from the normal in parenthesis next to the monthly total. Red denotes how much drier (in inches) the monthly totals are from the normal amount of precipitation, while green represents how much the monthly totals have exceeded the normal amount of precipitation.

Monthly Precipitation Totals (inches) and Departure from the Normal (inches)						
Station	January	February	March	April	May	June
Amarillo, TX	T (-0.72)	0.01 (-0.55)	0.24 (-1.15)	0.60 (-0.80)	0.18 (-2.11)	0.63 (-0.76)
Borger, TX	0.01 (-0.58)	T (-0.62)	0.04 (-1.37)	1.03 (-0.51)	2.32 (-0.57)	0.18 (-1.16)
Dalhart, TX	0.01 (-0.51)	T (-0.40)	T (-1.17)	0.73 (-0.35)	1.07 (-1.17)	1.16 (+0.21)

Table 1: Monthly precipitation totals (in inches) and departure from the normal (in inches) for three Texas climate sites. Current months shown are for the 2018 year and the month of June only accounts for the dates of June 1, 2018 thru June 12, 2018. Departure from the normal amounts are in the parenthesis where red denotes the monthly total is less than the normal by that amount and green is the monthly total is greater than the normal by that amount.

In just the first two months of the year the total amount of precipitation is lacking in the Texas Panhandle. This table reveals the end of the 2017-2018 winter season was relatively dry compared to the normal, with the US Drought Monitor on March 6, 2018 showing the Texas Panhandle in extreme drought (bright red color on plot and D3 in the legend).

March 6, 2018

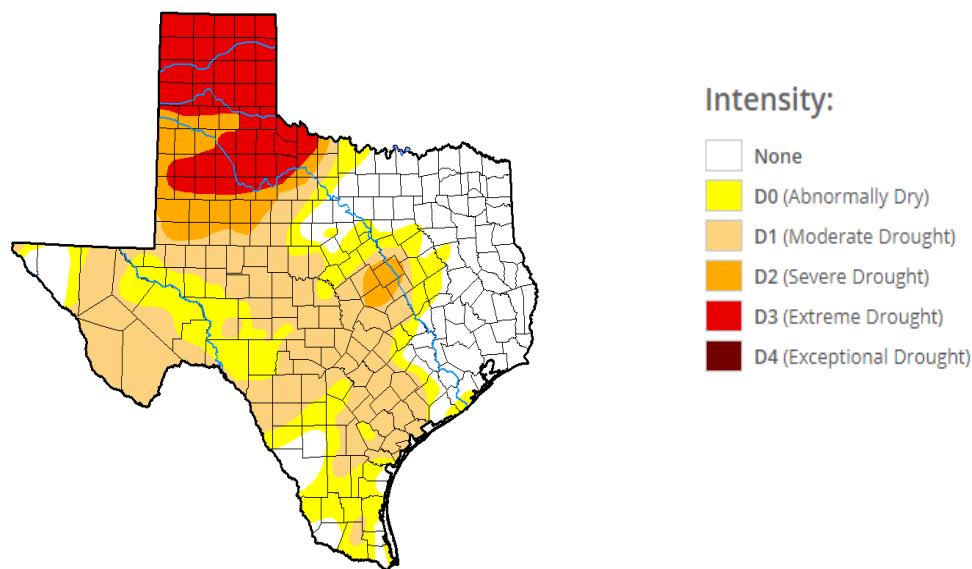


Figure 1.1: Texas drought map for January 1, 2018 thru March 6, 2018.

Amarillo Spring Regional Climate Summary

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As noted in Table 1, the precipitation totals began to increase slightly during the springtime months. To get a better look at the northern Texas Panhandle for precipitation departures, Figure 1.2 is the 90-day precipitation departure from normal starting March 14, 2018 thru June 12, 2018. Focusing on the Texas Panhandle, most of the area is in negative values meaning those counties are experiencing a drier 90-day period than normal. However, in the northwest and southeast corners of the Panhandle, the values are around normal or exceeding the normal by a couple inches. This ultimately shows where the rain patterns have been so far this spring.

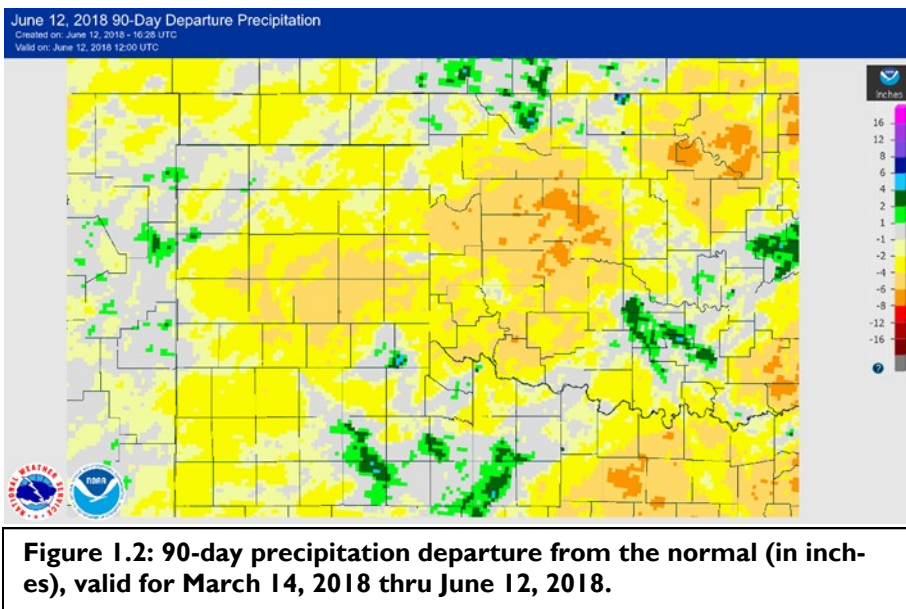


Figure 1.2: 90-day precipitation departure from the normal (in inches), valid for March 14, 2018 thru June 12, 2018.

Figure 1.3 is the Texas drought map valid June 5, 2018 and can be compared to the previous drought map in Figure 1.1 valid for March 6, 2018. Notice there is about a 90-day difference between the maps, thus Figure 1.2 should disclose major differences between the two drought maps. In the drought map for March, the entire Panhandle was in an extreme drought, but by June the intensity has changed in various locations. Notice the northwest and southeast portion of the Texas Panhandle are now in moderate/severe drought due to the increases amount of precipitation in those areas over the last 90 days. However, the south central part of the Panhandle remained dry and some areas became part of the exceptional drought. Hopefully in the upcoming summer months, more rain will fall in the Texas Panhandle and decrease the intensity of this drought.

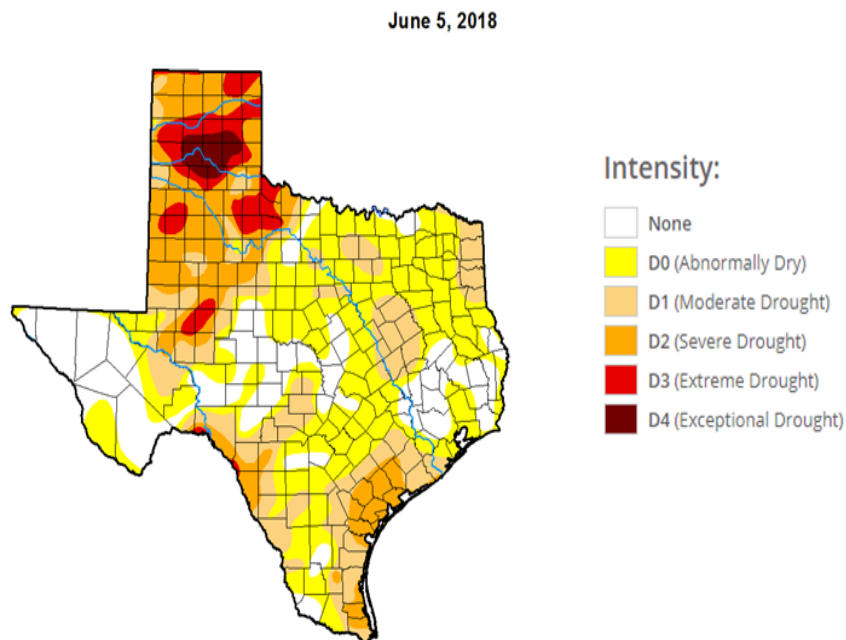


Figure 1.3: Texas drought map for January 1, 2018 thru June 5, 2018.

WANTED: CoCoRaHS Local County Coordinators

By: Billy Forney
Harris County Coordinator

Overview

CoCoRaHS is a unique, non-profit, community-based network of volunteers of all ages and backgrounds working together to measure and map precipitation (rain, hail, and snow). By using low-cost measurement tools, stressing training and education, and utilizing an interactive website, our aim is to provide the highest quality data for natural resource, education, and research applications.

Our network consists of over 20,000 individual volunteer observers across all fifty United States, all providing accurate, high-quality precipitation data for our numerous end-users on a timely basis. Our data is used by a wide variety of organizations and individuals, including the National Weather Service, other meteorologists, hydrologists, and many more. We have excellent quality control systems and processes in place to make sure our data is reliable and error-free. Our state and regional coordinators, as well as teams of quality control members, volunteer hours of their time to find potential errors in data across the state. But, in order to have the data to check, we need coordinators at the local level to help fill in the numerous gaps in data points.

That's why we are looking for local coordinators at the county level. Local county coordinators help support the CoCoRaHS network in many ways, primarily to spread the word about the network. Because of the high variability of rainfall over short distances, local county coordinators can help increase the density of precipitation data available throughout the country by encouraging volunteer weather observing. Becoming a citizen scientist in our network is both fun and rewarding, and becoming a local county coordinator is, too.

Coordinator Responsibilities

Local County Coordinators help support CoCoRaHS in the following ways:

- Help recruit new volunteers through local press, contacts with local service organizations, social media, or through other creative means
- Help organize and attend local training sessions as needed
- Provide support for volunteers in their county
- Become familiar with the CoCoRaHS website (<https://www.cocorahs.org>)

Other opportunities, if willing:

- Help volunteers with the installation of their equipment
- Help volunteers who do not have internet access by entering their data
- Quality control check the list of observers in your area and check for any stations no longer reporting

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Get in touch

We provide a list of additional ideas (https://www.cocorahs.org/Media/docs/CoCoRaHS_LocalCoordinatorDescription2006.pdf) that a local county coordinator can do beyond those mentioned above. Because of Texas's size, we are still recruiting volunteers to step into the role of local county coordinator. For a list of existing county coordinators in Texas, go to the web address https://www.cocorahs.org/Content.aspx?page=coord_tx and search for your county. You never know when your county might need you!

If you would like to be considered as a local county coordinator, please feel free to contact Bill Runyon, retired Observation Program Leader at the National Weather Service and current Texas state coordinator for CoCoRaHS, at Texas.CoCoRaHS@austin.rr.com.

Remember: you are one of our most valuable resources, and we truly appreciate your time and efforts!

Texas CoCoRaHS Counties by Region Without a County Coordinator

CoCoRaHS is recruiting observer/ volunteers to be county coordinators. See if you your county needs a coordinator . If you would like to be a county coordinator please contact the Texas state coordinator at Texas.CoCoRaHS@austin.rr.com

Amarillo	Lubbock	Midland/Odessa	El Paso	Abilene/San Angelo	Wichita Falls
Armstrong Carson Collingsworth Deaf Smith Donley Gray Hansford Hartley Hemphill Hutchinson Lipscomb Moore Ochiltree Oldham Potter Randall Roberts Sherman Wheeler	Bailey Briscoe Castro Childress Cochran Crosby Cottle Floyd Garza Hale Hall Hockley Kent King Lamb Lubbock Lynn Motley Parmer Stonewall Swisher Terry Yoakum	Andrews Borden Brewster Crane Culberson Dawson Ector Gaines Glasscock Howard Jeff Davis Loving Martin Mitchell Pecos Presidio Reagan Reeves Scurry Terrell Upton Ward Winkler	El Paso Hudspeth	Brown Coleman Coke Concho Crockett Fisher Haskell Irion Jones Menard Nolan Schleicher Shackelford Sterling Sutton Taylor Throckmorton	Baylor Clay Foard Hardeman Knox Wilbarger
Corpus Christi/ Victoria/ Laredo	Austin/San Antonio / Del Rio		Dallas/ Ft. Worth Waco/Temple		Brownsville/ McAllen
Bee Duval Jim Wells Live Oak McMullen Refugio San Patricio	Bastrop Bexar Caldwell Dimmit Edwards Frio Uvalde Val Verde Zavala		Anderson Cooke Eastland Falls Fannin Freestone Hamilton Henderson Hill Jack Leon Limestone Mills Palo Pinto Parker Robertson Somervell Stephens Wise Young		Brooks Cameron Jim Hogg Kenedy Starr Willacy Zapata
Beaumont/ Golden Triangle	Bryan/ College Station/ Brazos Valley		Longview/Kilgore/ Tyler/East/ NE Texas		Houston/ Galveston
Jasper Newton	Brazos Burleson Grimes Houston Madison Trinity Walker		Marion Panola Sabine San Augustine Shelby		Brazoria Chambers Jackson Matagorda San Jacinto

Important Training and Observing Tip Reminders

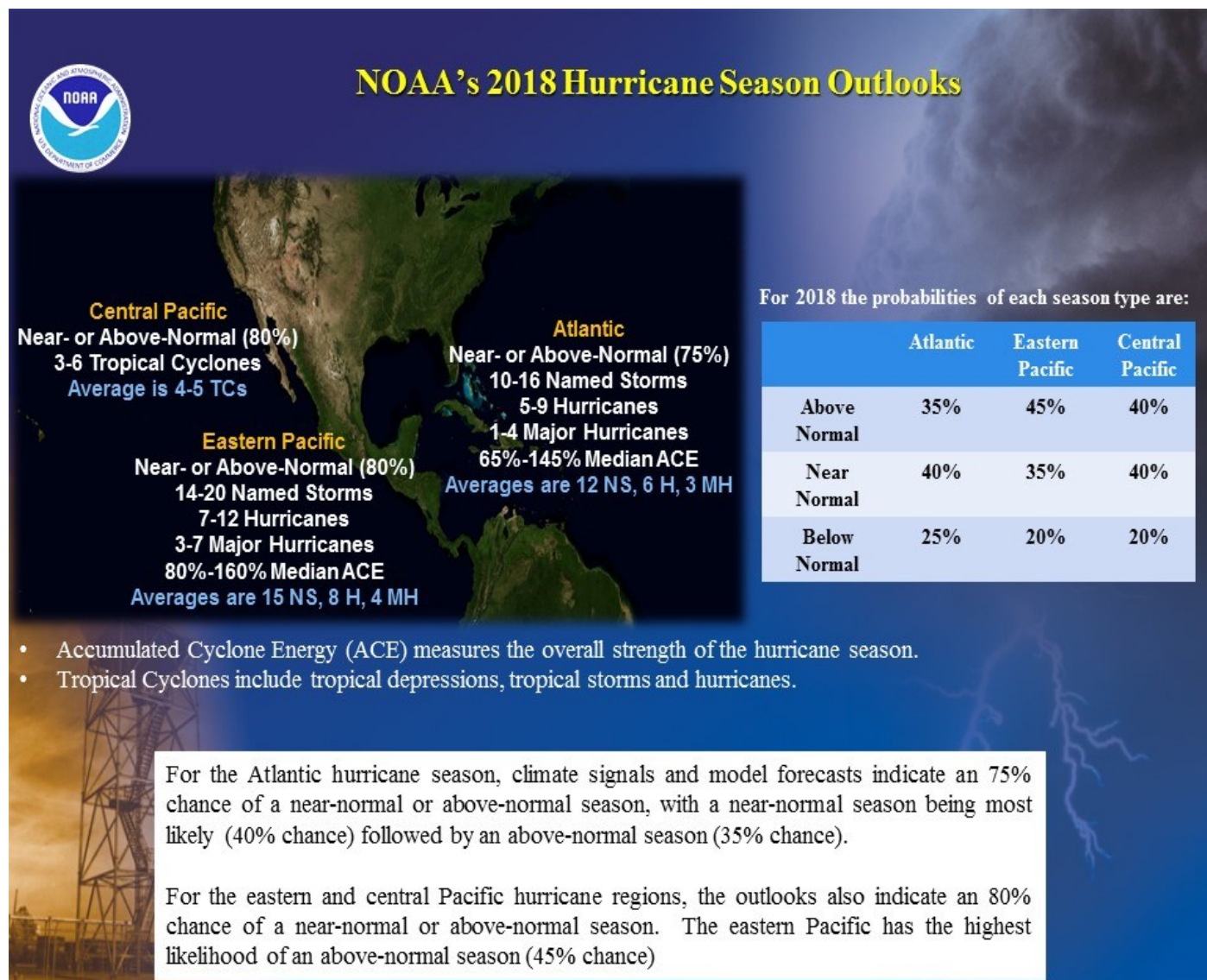
The purpose of these training reminders is to remind observers of the proper observing techniques, maintenance, and proper reporting types for the kinds of precipitation they observe. By making correct observations each day and reporting correctly each day the CoCoRaHS precipitation database will be a highly accurate source of reliable precipitation data for the many users of this important weather phenomenon. One of the most important things an observer can do once he or she signs up is to get the official 4-inch diameter rain gauge recommended by CoCoRaHS. By all observers using this gauge we have a scientific benchmark of recording equipment that makes precipitation data comparable across the country. No automatic recording gauge rainfall amounts should ever be entered into the CoCoRaHS data base.

Below are listed some of the most common mistakes observers make without even realizing that they may have observed or reported incorrectly. Some reporting issues are easily caught by double checking your report online and some observing issues are easily corrected by good maintenance and observing practices.

- The number one error that observers make in their observations is failing to enter a multi-day report when they have not submitted a daily report for one day or longer. If an observer skips reporting for more than one day then they need to submit a multi-day report covering the time since their last report. Now an addition to the log-in page has a direct link at the top of the page that will take an observer to a multi-day report form for their station so that they correctly report the amount rain in their gauge since the last time they read their gauge. Please follow directions on entering the number of days the report covers and the time and day that you read your gauge. Please enter comments as this helps users of your data determine the time when the rain may have fallen in your back yard.
- The decimal being in the wrong place on a rainfall amount is a common mistyped mistake that can be quickly caught by double checking your submitted report on the CoCoRaHS view data section on-line and entering your county to look at the reports of that county for the day. If an amount was entered in error then the observer can correct the amount and then re-submit the report. Please make sure before you hit submit on your reports to check that the amount you typed into the precipitation box matches the reading you took off of your gauge. An example would be a correct reading of 0.87" of rain entered incorrectly. Make sure that you did not enter 8.70" or 87.00" of rain. By checking local data sets an observer can see how their precipitation amount compares to nearby CoCoRaHS stations in their county. When using the CoCoRaHS App on your cell phone be extra careful of the values you enter. Try to check on-line the value you just entered to verify it is correct.
- Please report days that you did not receive any precipitation, an entry of 0.00". These reports are just as valuable as a report of a day of rainfall. This data is used in many ways to produce an accurate picture of mapping of total monthly rainfall across your county. These zero reports of precipitation data are used to produce the Drought Monitor maps across the US each week. CoCoRaHS observer reports are the largest source of data for these maps. Please get in the routine of checking that gauge every day and reporting every day.

- It is so important to check your gauge every day, as mentioned previous about the importance of reporting zero rainfall. It is not uncommon to find a collection of water in your gauge on clear nights from the formation of dew on the gauge and then draining inside the inner funnel and giving the appearance of rainfall. Please do not report condensation from dew, frost, or fog as precipitation. Please make a note that you received water from dew, frost, or fog in your gauge in the comments section but don't enter a number value in the precipitation box and leave as 0.00". It is so important to check your gauge every day to make sure your gauge is at zero for the next 24 hour period.
- Another mistake that some observers make after a significant amount of rain has fallen the previous day is not completely emptying the CoCoRaHS gauge tubes when measuring the rainfall in the inner tube. Please remember that the inner funnel magnifies a small amount rain to be read down to hundredths of an inch. Please shake or sling the inner tube several times after finishing measuring rainfall in the tube to get all moisture out of the tube. A small amount of water on the sides of the tube will settle down at the bottom of the tube as several hundredths of an inch in the tube giving a false reading of more rain for the next day.
- Please keep your CoCoRaHS gauge free of any kind of vegetation debris such as small pieces of leaves and grass clippings which can be blown by the wind and make their way down into the inner funnel. Also regularly wash out all parts of the gauge with a mixture of mild dishwashing soap and water to remove any debris, mold, dirt, pollen, or small particles washed out of the atmosphere by rain. The cleaner your gauge is the easier it is to read an accurate value that is not affected by debris in the tube. Birds sometimes are a problem and are easily scared away by using holographic scare tape that reflects light in bright flashes and keeps them away. It can be found in the garden section in some home and garden stores.
- Sometimes observers get excited about a big gully washer from a summer afternoon thunderstorm that produces a large amount of rainfall. Please do not submit this amount as a Daily Report until the next morning at 7am as the standard time for the Daily Report. The report that the observer needs to submit at this moment in the afternoon is the **Significant Weather Report**. This report goes straight to the local National Weather Service office so forecasters can see the 2.10" of rainfall you just had the last hour in your back yard. This report is a real time report and does not replace the daily report. The next morning at 7am please submit your daily report including the 2.10" of rain from yesterday afternoon and any other rainfall that occurred up to 7am that following morning. These reports are critical for forecasters in issuing severe thunderstorm and flash flood warning. Please use this report for significant weather.
- If you have questions about how to make a report or something in the training material isn't easily understandable than please send an e-mail to texas.cocorahs@austin.rr.com. Your e-mail will be answered in a timely fashion to get you up to speed on being a complete CoCoRaHS observer. Also another method would be to contact your Regional Coordinator for your particular region in the state. They will be more than happy to answer a question about any observing or reporting questions you may have.

2018 Hurricane Season Outlook



NOAA's outlook for the 2018 Atlantic Hurricane Season indicates that a near-normal season is most likely (40% chance), followed by a 35% chance of an above-normal season and a 25% chance of a below-normal season. The Atlantic hurricane region includes the North Atlantic Ocean, Caribbean Sea, and Gulf of Mexico.

The 2018 outlook calls for a 70% probability for each of the following ranges of activity:

- 10-16 Named Storms
- 5-9 Hurricanes
- 1-4 Major Hurricanes

Accumulated Cyclone Energy (ACE) (*explanation on page 23*) range of 65%-145% of the median

The seasonal activity is expected to fall within these ranges in 70% of seasons with similar climate conditions and uncertainties to those expected this year. These ranges do not represent the total possible ranges of activity seen in past similar years. These expected ranges are centered near or above the 1981-2010 seasonal averages of 12 named storms, 6 hurricanes, and 3 major hurricanes. Most of the predicted activity is likely to occur during the peak months (August-October, ASO) of the hurricane season.

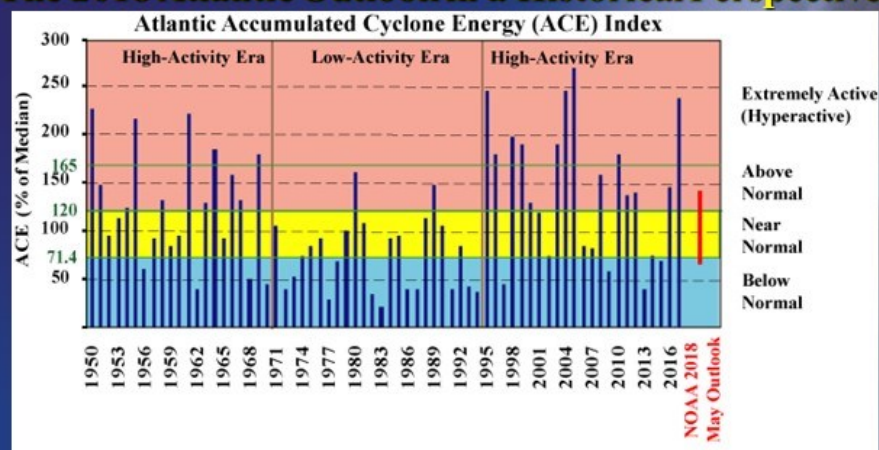
2018 Hurricane Season Outlook

2018 FORECAST AS OF 31 MAY 2018

Forecast Parameter	Statistical Forecast	Analog Forecast	Final Forecast (Including Alberto)	1981-2010 Median
Named Storms (NS)	9.2	12.0	14	12.0
Named Storm Days (NSD)	41.3	57.3	55	60.1
Hurricanes (H)	4.9	7.3	6	6.5
Hurricane Days (HD)	16.9	20.6	20	21.3
Major Hurricanes (MH)	1.7	2.0	2	2.0
Major Hurricane Days (MHD)	3.3	2.1	4	3.9
Accumulated Cyclone Energy (ACE)	69	86	90	92
Net Tropical Cyclone Activity (NTC)	78	96	100	103



The 2018 Atlantic Outlook in a Historical Perspective

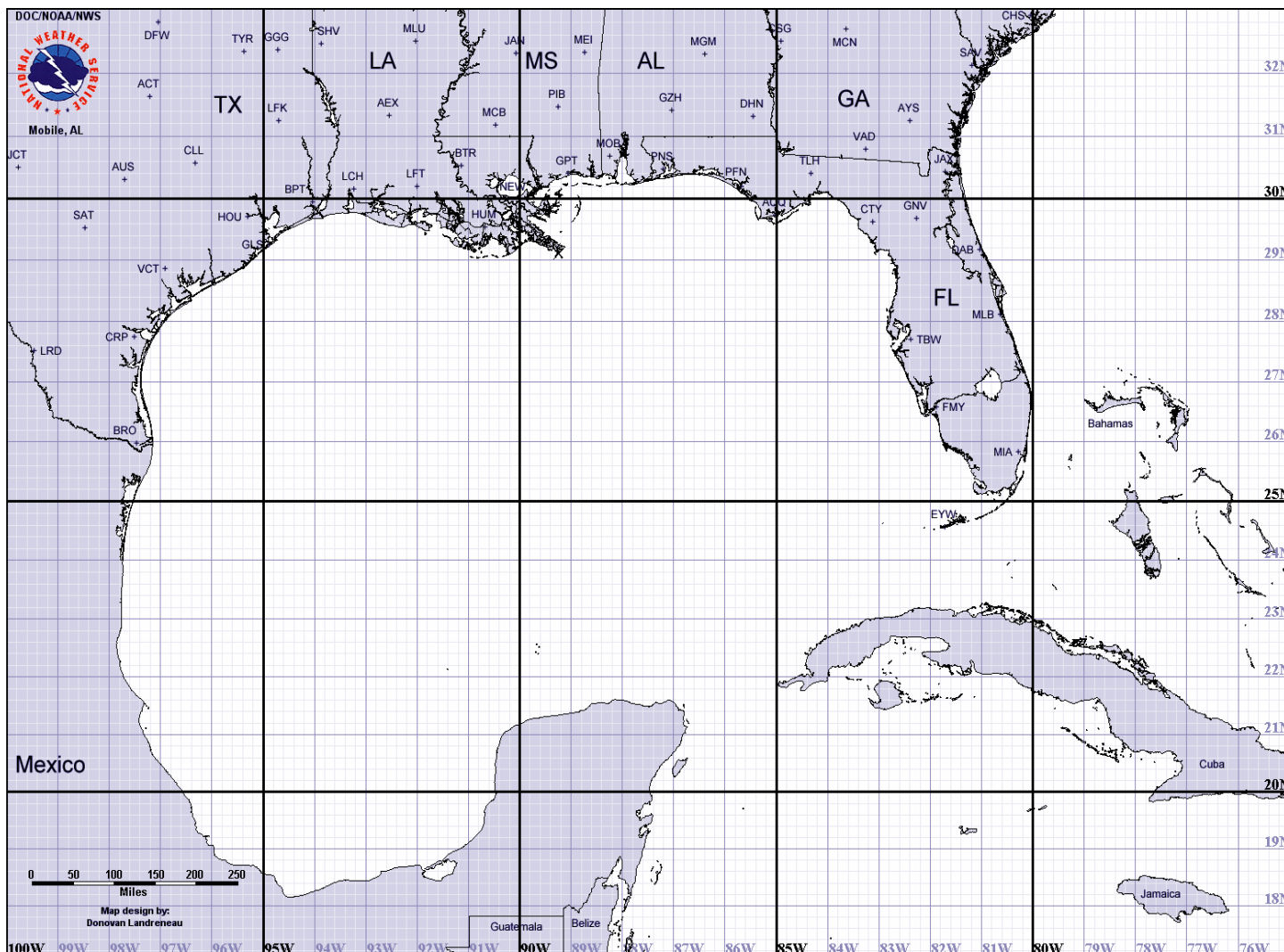


Caption: Seasonal Accumulated Cyclone Energy (ACE) index during 1950-2017 (Blue bars) and NOAA's 2018 outlook range with a 70% probability of occurrence (Red bars). Shading indicates NOAA's ACE thresholds for classifying hurricane season strength. The 165% threshold denotes a extremely active season (also called hyper-active).

- ACE=Sum of squares of maximum sustained surface wind speed (measured 6-hourly) for all named storms while at least tropical storm strength.
- ACE index measures the overall season strength by accounting for the combined intensity and duration of tropical storms and hurricanes.

NOAA's outlook for the 2018 Atlantic hurricane season predicts a 70% probability for an ACE range of 65%-145% of the median.

Gulf of Mexico Hurricane Tracking Chart



Texas CoCoRaHS Observer

The official newsletter of Texas CoCoRaHS

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