



# TEXAS CoCoRaHS OBSERVER

Autumn 2016



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

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

If you have questions, comments or suggestions, feel free to contact us via the emails listed on the back page.

## Warm and Dry Autumn sets records across Texas

Texas had its warmest Autumn season on record with an average temperature of 6.1 degrees above normal across the state. Many cities across the state had their warmest October and November average temperature on record. North Texas had the warmest October in 53 years since 1963. Several Texas cities with the warmest average temperature on record in October include: Amarillo, Brownsville, Corpus Christie, Dalhart, Dallas/ Ft. Worth, Houston, Lubbock, and McAllen. In addition cities with the warmest November on record include: Austin, Dallas, Ft. Worth, McAllen, Midland, and San Antonio. See temperature departures from average for October and November to the right.

Rainfall totals in September were much above normal in parts of the NW portions of the state. October rainfall was much below normal over the entire state. The cities of Victoria and El Paso had record low rainfall for October with a total of 0.00". For El Paso it was the first time since 1953 that the city didn't record any

page 3—>

Texas cities average temp. departure from normal for October and November

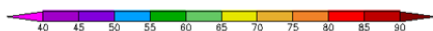
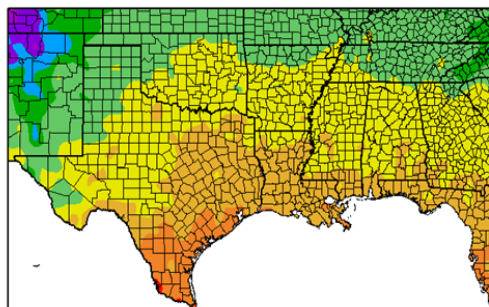
October		November	
City	Dep. from normal	City	Dep. from normal
Abilene	+5.4	Abilene	+5.5
Amarillo	+5.9 *	Amarillo	+7.4
Austin	+4.7	Austin	+4.4 *
Brownsville	+3.9 *	Brownsville	+3.9
Corpus Christie	+5.8 *	Corpus Christie	+4.3
Dallas / Ft. Worth	+6.9 *	Dallas / Ft. Worth	+6.6 *
El Paso	+4.6 *	El Paso	+6.2
Galveston	+6.1	Galveston	+4.2
Houston	+4.4 *	Houston	+3.5
Lubbock	+4.5 *	Lubbock	+6.0
Midland	+6.1 *	Midland	+7.8 *
Port Arthur	+4.6	Port Arthur	+3.7
San Angelo	+5.7	San Angelo	+5.4
San Antonio	+5.3	San Antonio	+3.2 *
Waco	+4.7	Waco	+5.1
Whichtia Falls	+5.5	Whichtia Falls	+4.9

Stations with an \* had their warmest month indicated on record

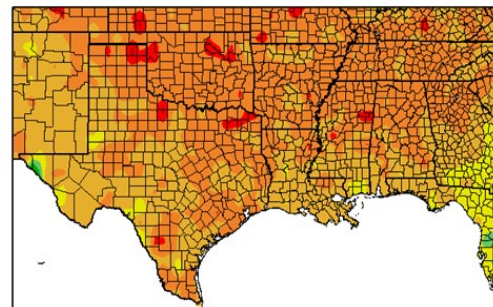
### Inside this issue:

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Temperature (F)  
9/1/2016 – 11/30/2016



Departure from Normal Temperature (F)  
9/1/2016 – 11/30/2016



## Fall 2016 South Central Texas Rainfall Summary

By Brett Williams and Larry Hopper  
NWS Austin/ San Antonio

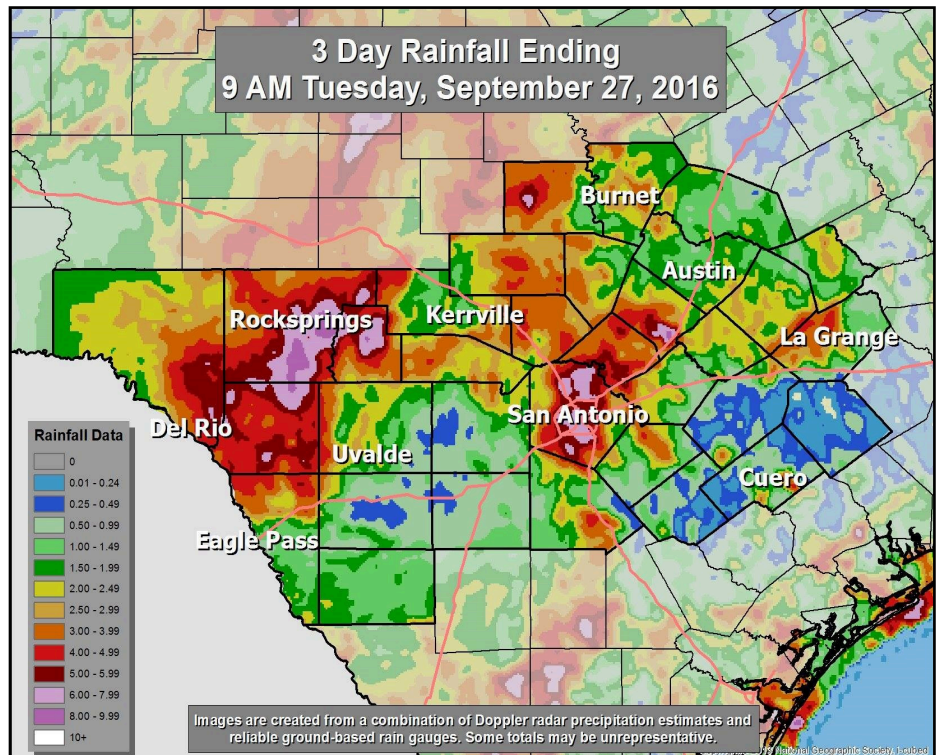
Fall was generally drier and warmer than normal across South Central Texas, with most spots (particularly along and east of Interstate 35) receiving 25-75% of their normal rainfall (Fig.1) with temperatures 3-5 degrees F above normal. However, parts of the Rio Grande, Hill Country, and Edwards Plateau ended up receiving above normal rainfall primarily due to one heavy rainfall event in late September. (Fig. 2)

High pressure dominated our weather pattern during most of September, but an upper level low in northwest Mexico interacted with a cold front and deep Gulf and Pacific moisture to end this dry streak. Widespread heavy rain occurred across the Edwards Plateau and western Hill County on September 25th, dropping over 5 inches of rain across portions of Val Verde, Kinney, Edwards, Real and Llano Counties. Eastern portions of Edwards County received up to 10 inches of rain and the city of Rocksprings had about 8 inches, making all roads leading to and from the town impassable.(Fig.2) Heavy rain then moved into the eastern Hill County and I-35 corridor during the morning and afternoon hours of September 26th, causing flooding on the San Marcos River which closed Texas State University for the rest of the day. (Fig.3 on page 3)

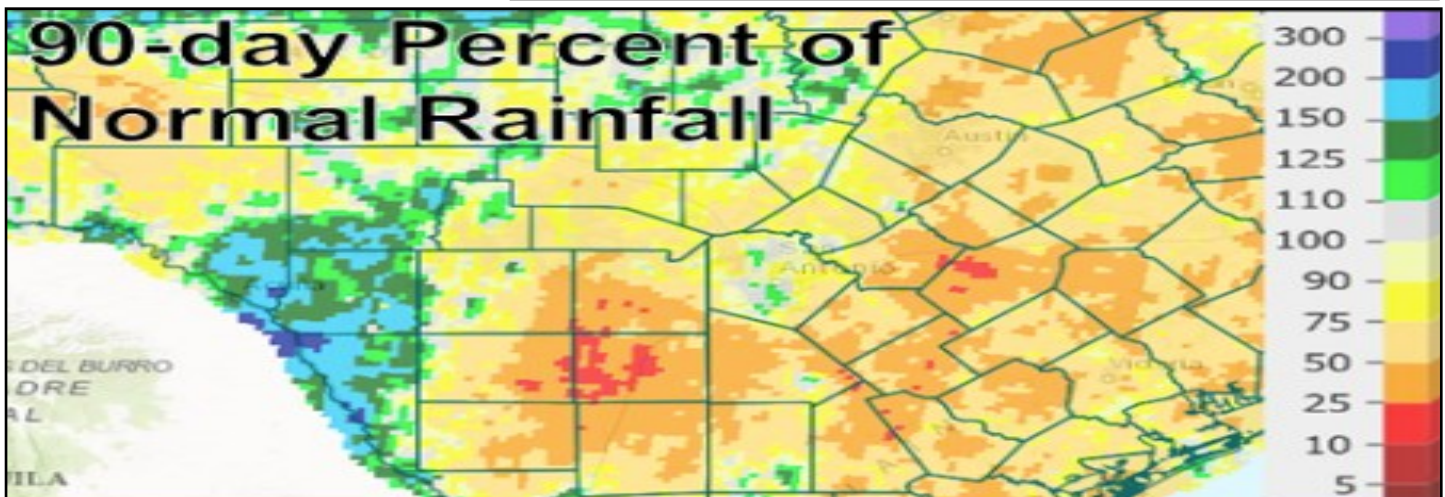
Although October is typically one of the wettest months for South Central Texas, it was uncharacteristically dry this year. High pressure dominated our weather pattern for most of October, leading to a hot and dry month that saw an average rainfall total of 0.32 inches across the South Central Texas

climate division (fifth driest since 1895). In addition, all four major climate sites received under 0.3 inches, ranking in their top 13 driest Octobers on record. This dry period ended at the beginning of November when 9-10 consecutive days of rain occurred across portions of South Central Texas. Initially, an upper

low dug into the southwest United States, entering northwest Mexico before becoming a cutoff low that remained stationary for a few days. Heavy rainfall occurred on November 3rd in the Rio Grande Plains across Maverick County as well as in Burnet, Travis, Hays, Llano, Gillespie and Blanco —>Page 3



**Figure 2 : 3 day rainfall totals ( in inches) across South Central Texas ending on September 27, 2016.**



**Figure 1: September—November % of normal rainfall across South Central Texas.**



## Fall 2016 South Central Texas Rainfall Summary continued

counties in the Hill Country. An approaching cold front from the northwest on November 7-8th brought heavy rain to the eastern Hill County and I-35 corridor, with portions of Bandera, Bexar, and Burnet Counties receiving more than 3 inches of rain. The rest of November was generally dry and warm, as high pressure returned to the region and only a few cold frontal passages occurred. Nevertheless, November still finished near normal for precipitation even though it was one of the five warmest Novembers on record across the region.

Figure 3 shows some of the flash flooding that occurred on September 26, 2016 along the San Marcos River near the Texas State University Campus. The University was closed for the rest of the day.



**Figure 3: September 26, 2016 flash flooding along the San Marcos River near the intersection of Aquarena Springs Drive and Sessom Road on the Texas State University campus.**

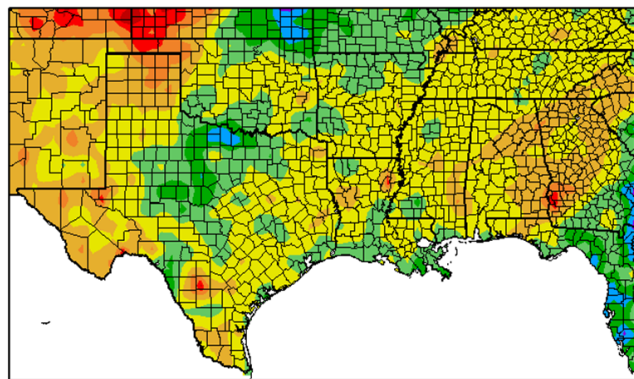
## Warm & Dry Autumn sets records across Texas—continued from page 1

rainfall. November was very dry as well across Texas. There was a few parts of the state that did receive rainfall towards the end of November. With warm temperatures this fall and low rainfall totals across the state drought conditions returned to several parts of the state during October and November. October and November were the 2nd warmest months in the last 122 years of record. The month of October was

6th driest in the last 122 years. Rainfall totals were the highest in North Central Texas down south to west of San Antonio for the Fall season. Rainfall departures from normal were the highest in the eastern quarter of the state. This portion of the state had the highest levels of drought indicated on Drought Monitor maps. Several counties across the state had to issue

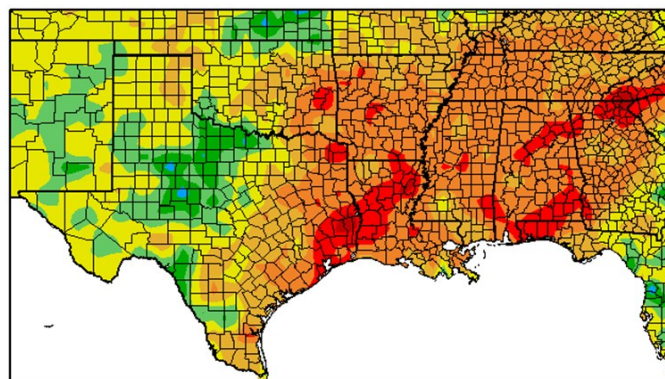
burn bans during October and November as dry conditions prevailed. Conditions improved across the state in November with a few days of beneficial rains in some of the driest areas allowing for many counties with burn bans to remove them. The maps below show total precipitation and departure from normal during Autumn season.

Precipitation (in)  
9/1/2016 – 11/30/2016



Generated 12/11/2016 at HPRCC using provisional data.

Departure from Normal Precipitation (in)  
9/1/2016 – 11/30/2016



Regional Climate Centers, Generated 12/11/2016 at HPRCC using provisional data.

Regional Climate Centers



## Fall Climate Summary for West Texas and Southeast New Mexico

By James DeBerry

### NWS Midland

West Texas and Southeast New Mexico saw a rather typical Fall, but rainfall was a bit above normal overall.

September was noted more for a few severe weather events. On the afternoon of September 17<sup>th</sup>, supercells developed across Southeast New Mexico, then across West Texas, resulting in probably the most active severe weather event there in at least a decade. Numerous supercells developed, spawning at least one tornado (Ector County), microbursts, and numerous reports of hail up to the size of baseballs. Supercells were long-lived. One developed just northwest of Artesia, NM, and diminished southeast of Odessa, TX some 7 hours later. Numerous damage reports from hail were noted across the region. Monthly radar rainfall estimates ranged from as little as 0.25" along the Rio Grande to 10-15" in northwest Eddy County. However, the highest observed rainfall was in the 6-7" range, and the average of observed rainfall was just under 2.5".

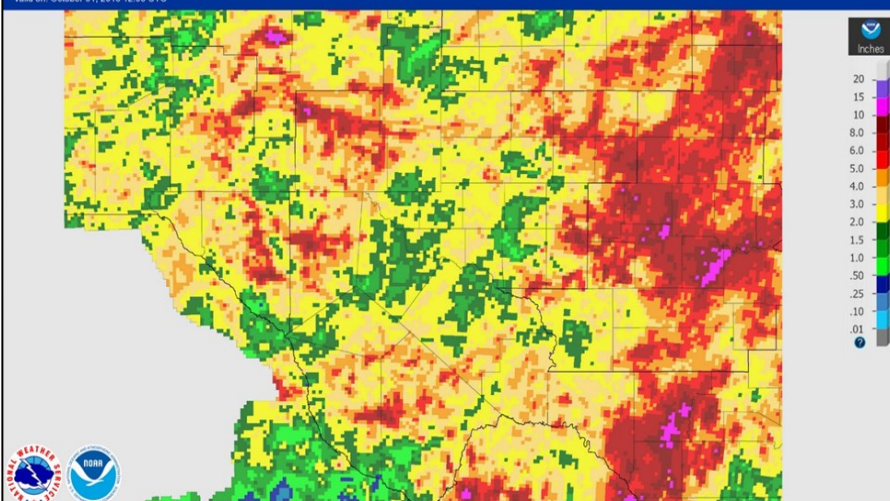
October was much drier than September, as West Texas and Southeast New Mexico were dominated by an upper-level ridge most of the month. Monthly radar rainfall estimates ranged from nothing along the Rio Grande to 4-5" in the upper Colorado River Valley. However, the highest observed rainfall was in the 1" range, and the average of observed rainfall was just under 0.5".

The upper ridge disappeared in November, as the synoptic pattern continued transitioning to fall, and more rainfall was observed than in October as the first few cold fronts began rolling in. Monthly radar rainfall estimates ranged from nothing in northwest Presidio County to 6-8" in the upper Colorado River Valley. However, the highest observed rainfall was in the 4-5" range, and the average of observed rainfall was just over 1.5".

Due to Fall rainfall, drought conditions were non-existent across West Texas and Southeast New Mexico. As of November 29<sup>th</sup>, in Southeast New Mexico, only a small portion of the Guadalupe Mountains in southwest Eddy County was abnormally dry. The rest of Southeast New Mexico was out of drought. In West Texas, extreme eastern Pecos and northeast Terrell Counties were abnormally dry. Otherwise, no drought conditions were noted. Reservoir levels across the region averaged 56.2% of conservation capacity as of December 1<sup>st</sup>:

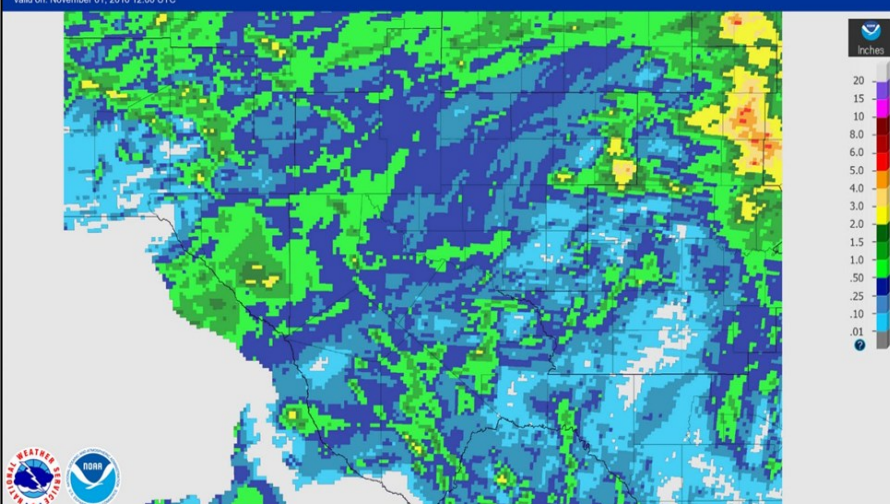
September 01, 2016 Monthly Observed Precipitation

Created on: December 11, 2016 - 00:39 UTC  
Valid on: October 01, 2016 12:00 UTC



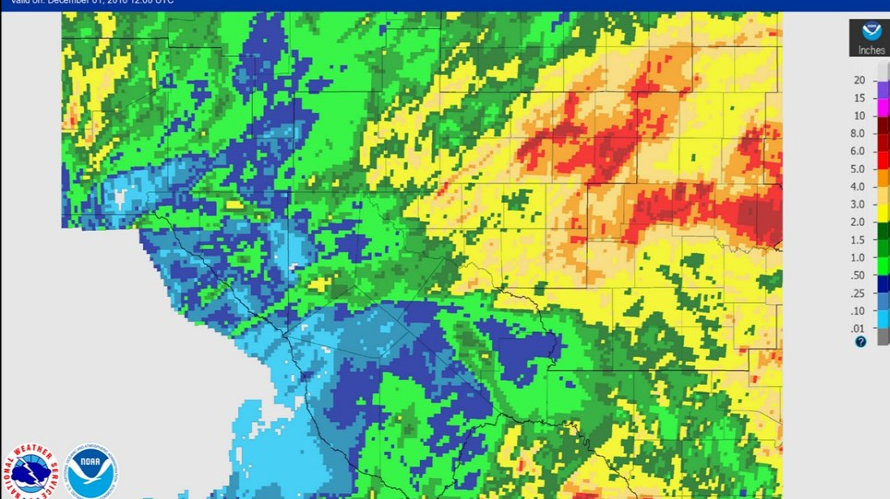
October 01, 2016 Monthly Observed Precipitation

Created on: December 11, 2016 - 00:52 UTC  
Valid on: November 01, 2016 12:00 UTC



November 01, 2016 Monthly Observed Precipitation

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Valid on: December 01, 2016 12:00 UTC



**Radar estimated rainfall totals for September, October, and November 2016 for West Texas and Southeast New Mexico.**

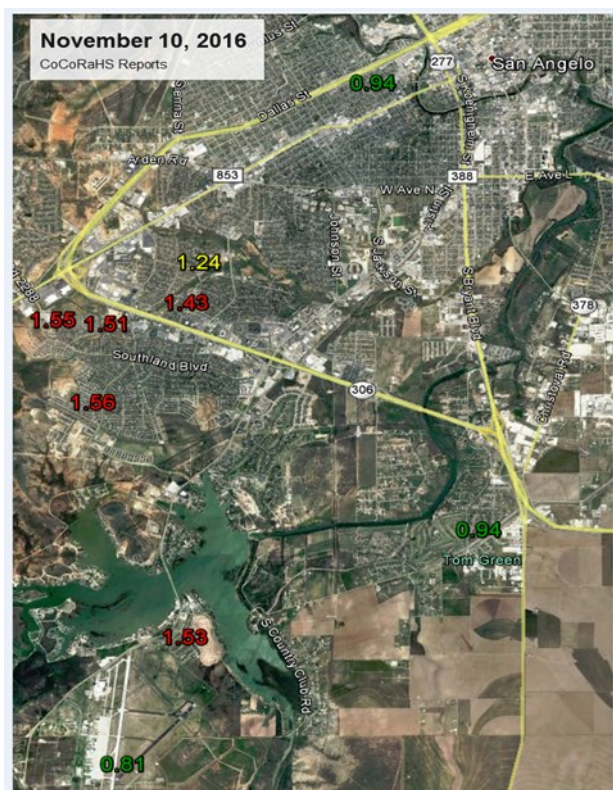
## 99 Year Precipitation Record Broken in San Angelo

**By Joel Dunn**  
**NWS San Angelo**

On November 10, an upper level low was positioned across the El Paso area. Over the next 24 hours this upper low was forecast to retrograde south into northern Mexico. Decent moisture was in place across West Central Texas, but for all intents and purposes, this was not a system to get excited about. However, November is a relatively dry month, with a normal rainfall amount of 1.16", making up only 6% of San Angelo's normal annual rainfall. Even a moderate system could bring above normal precipitation to the area.

The record at San Angelo Regional Airport, as it stood before being broken, was 0.34" set on November 10, 1907. By 2 AM on Thursday the 10th, 2016 0.48" had fallen. The record was broken. An additional 0.47" would fall that morning and early afternoon, securing the record at 0.94" and accounting for 70% of November's normal rainfall. Taking a look at the rainfall map for the city of San Angelo, one can see that the San Angelo airport (in the bottom left-hand corner) was on the low end of rainfall received for that day. Amounts of just under an inch to over 1.50" were reported to CoCoRaHS. Thankfully, due to the nature of the rainfall, a slow and steady rainfall rather than a heavy downpour, no flash flooding was observed.

The rainfall was diminished in the afternoon as the upper level support drifted farther south and west. Drizzle would continue and be observed off and on that day. Rainfall would not be observed again in San Angelo until the 25th of November.





## 2016 - 2017 Texas Winter Weather Outlook

**By Bob Rose**  
**Lower Colorado River Authority**

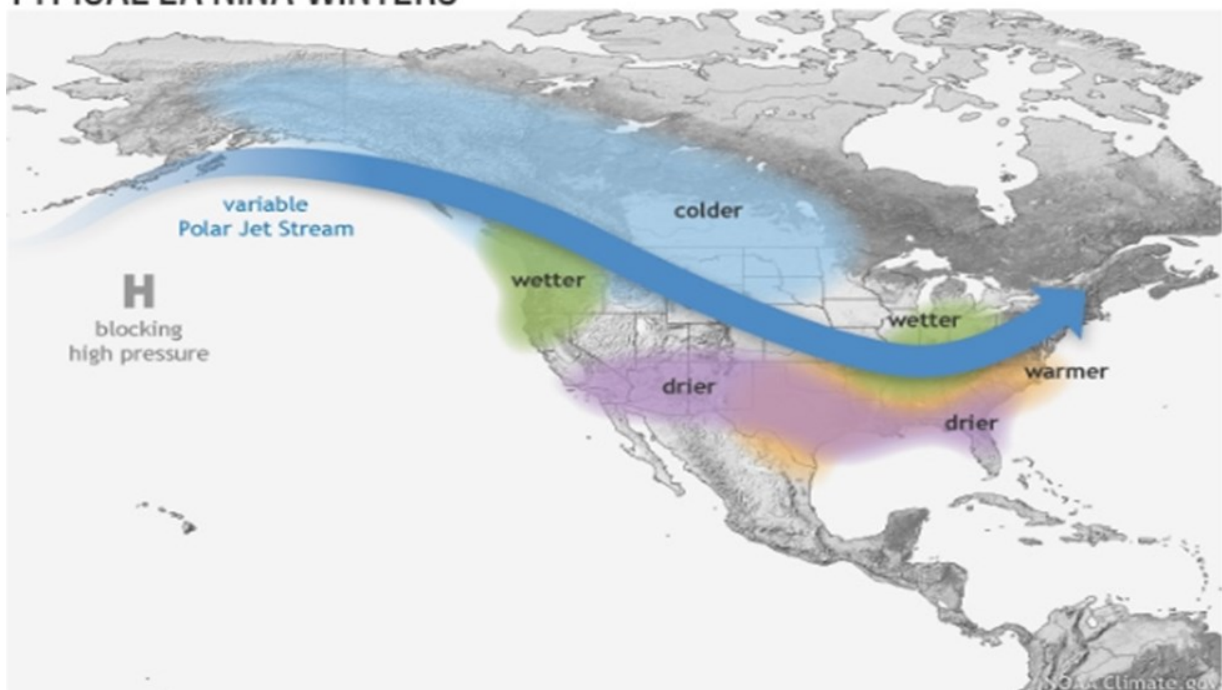
Fairly mild and somewhat drier than normal weather conditions are forecast across the Lone Star state this winter, thanks to the development of a weak La Niña and other noteworthy oscillations in the atmosphere and in the oceans. But despite this mild outlook, don't give up on expecting some occasional visits from Old Man Winter as the winter pattern will likely show some variability.

The most dominant feature to influence Texas weather this winter is expected to be a weak La Niña. In most cases, La Niñas alter the normal course of the Jet Stream across the Pacific and North America, leading to drier than normal and milder than normal weather conditions across Texas and the southern US during the fall and winter months.

In the wake of last year's strong El Niño, sea-surface temperatures in the tropical Pacific have been steadily cooling and actually fell below normal beginning in July. In November, the National Weather Service indicated these waters had cooled beyond the threshold for a weak La Niña. Forecasters were also noticing the cool waters were beginning to have an influence on the normal atmospheric circulation across the Pacific

In a La Niña, easterly trade winds increase, causing waters in the central and eastern Pacific to become cooler than normal. The warmest waters end up setting up across the western Pacific. This warm west/cool east water distribution causes air to rise over the western Pacific and sink over the eastern Pacific. A broad, stationary area of high pressure develops in the eastern Pacific due to the sinking air and it's this ridge of high pressure that diverts the Pacific jet stream north toward western Canada and the Pacific Northwest, instead of allowing it to flow toward the coast of California.

### TYPICAL LA NIÑA WINTERS



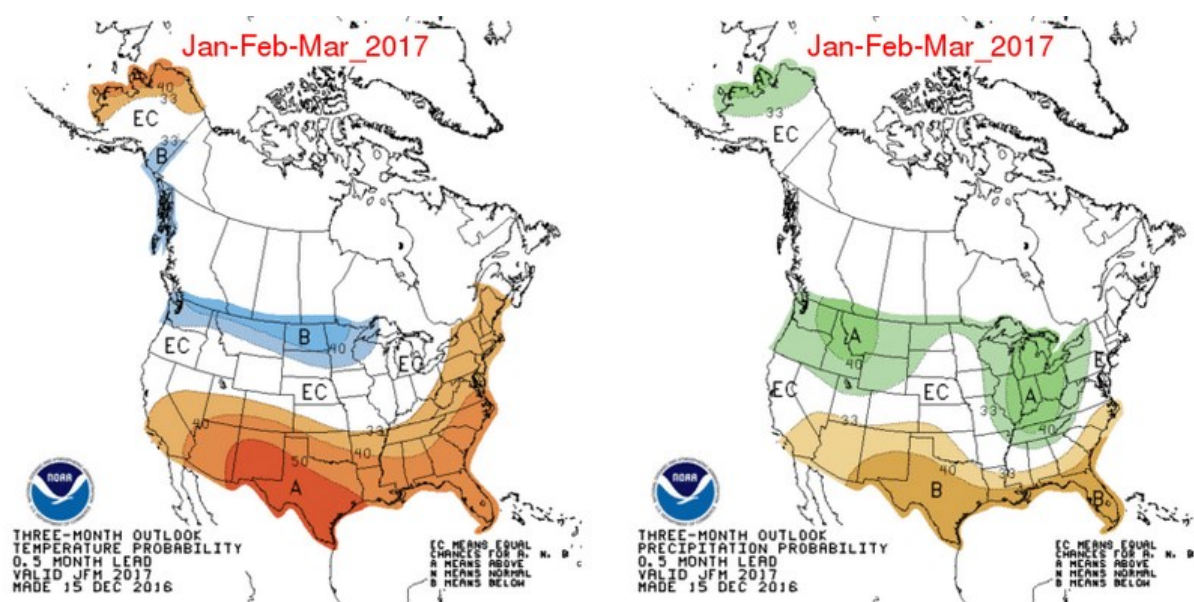
Typical January-March weather anomalies and atmospheric circulation associated with La Nina over North America.

## 2016 - 2017 Texas Winter Weather Outlook – continued

With the jet stream crashing inland across the Pacific Northwest, rainfall there trends wetter than normal. But as the storms flow southeast across the Rockies, they tend to lose their moisture and end up bringing only small amounts of rain to Texas and the southern US. As a result, rainfall typically averages less than normal.

With the jet stream generally flowing from the Pacific Northwest to the central Plains states due to the influence of La Nina, the coldest air often tends to stay confined to northern Plains states and the Great Lakes regions, allowing milder than normal temperatures to set up across Texas and the southeastern US.

This winter, the National Weather Service's Climate Prediction Center indicates the weak La Nina will likely have a strong influence on Texas weather. The outlook for January-February-March shows high probabilities for temperatures to average milder than normal. The outlook also shows a fairly strong trend for rainfall to average drier than normal



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January – March 2017 outlook for temperature and precipitation from the Climate Prediction Center, issued December 15, 2016.

But do keep in mind this outlook shows how weather conditions are forecast to average over the upcoming 3-month period. Within this time frame, there may be some occasional outbreaks of very cold air. But due to La Nina's influence on the jet stream, the cold outbreaks shouldn't last more than a few days. Overall, the temperature should average milder than normal. The same holds true for winter precipitation. While there will be some moderate rainfall from time to time, rainfall overall should average below normal at most locations.

As mentioned in the beginning, La Nina will likely have the strongest influence on Texas weather this winter. However, other atmospheric oscillations such as the Arctic Oscillation, the Madden-Julian Oscillation and the Eastern Pacific Oscillation may at times overwhelm the La Nina signal, allowing periods of unusual cold or unusual wetness to develop. Unfortunately, these oscillations can't be forecast with much skill more than about 2 weeks in advance, so they can't be figured into the seasonal outlooks. But they may at times allow for some unusual weather.

Climate Prediction Center forecasters call for the weak La Niña to dissipate sometime late winter, with the Pacific returning to a neutral state for the upcoming spring and summer months.

## Training Section: How to Report Snow/Sleet Precipitation

**My Data Entry : Daily Precipitation Report Form**

**Precipitation Report Form** Submit Data Reset

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

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

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

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

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

**Total Snow and Ice on Ground at Observation Time**  
**Depth of total snow and ice (new and old) in inches to the nearest half inch** 2.5 in.  
**Melted value from core to the nearest hundredth** NA in.

**Precipitation Information**  
**Precipitation Began** \_\_\_\_\_  
**Precipitation Ended** \_\_\_\_\_ ☐ AM ☐ PM  
**Heaviest Precipitation Began** \_\_\_\_\_ ☐ AM ☐ PM  
**Heaviest Precipitation Lasted** \_\_\_\_\_ minutes  
**These times are:** Select Time Accuracy

**Reporting Snow and Sleet**

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

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

Comments are always helpful.

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

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

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

### Instructions for Data Entry of Snowfall measurements

#### Total Rain and Melted Snow

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

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

#### New Snow:

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

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

#### Total Snow on Ground

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

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



## Training Section: Snow/Sleet Reporting continued

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

### Melted Value From Core

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

### Example:

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

What do you report for each entry?

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

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

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

*Note: Please read the training slide shows on the CoCoRaHS home page to learn the complete process of measuring snow at [www.cocorahs.org](http://www.cocorahs.org)*

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## Training Item Reminders

Here are several reminders on reporting CoCoRaHS data and maintaining your gauge during the winter months:

Condensation from foggy mornings, frost, and temperature changes during the winter may leave a small amount of water in your inner tube which may add up to as much as 0.03" reading. Please report the amount in the comments section as **condensation** and report zero precipitation in the rain entry box.

With the holiday season and bad weather conditions at times observers may be not be able to report daily observations. If you are away for the holidays or you are not able to read your gauge daily then please use the **"Multi-Day Report"** to enter the total amount of precipitation over a period of time greater than 24 hours.

If you are able to read and report daily please report days with zero rainfall as this data is very important for the Drought Monitor Reports.

The end of the year is a good time to clean your gauge of any mold or leaf debris that may have fallen during the fall months. Wash your inner tube out with a small amount of water and glass cleaner, then use a small cloth or paper towel to clean out the sides of the inner tube. The outside tube is very easy to clean. Please check your mounting bracket to the 4X4 wood post which it is mounted on to make sure it is secured.

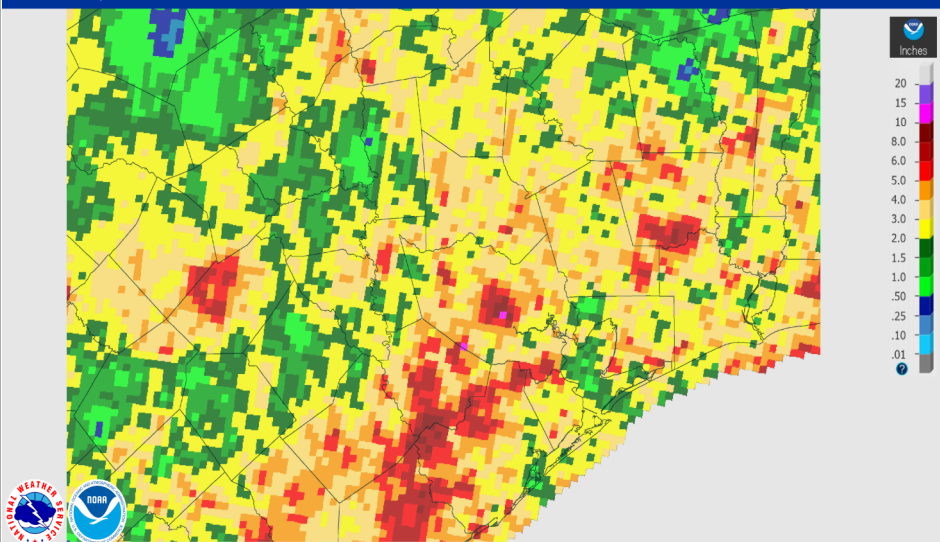
Please remember to remove the inner funnel of your CoCoRaHS Gauge if freezing temperatures are expected for several days and frozen precipitation or freezing rain is expected to occur. If you have freezing rain and your gauge is frozen to the bracket on the wood post use a bottle of warm water to gradually loosen the gauge from the bracket. Take the outer gauge inside and melt the ice in the tube and then measure the amount using the inner funnel.

## Houston-Galveston Regional Climate Summary

**September:** Weather conditions for the month across the region were mainly hot and dry. Temperatures averaged above normal ranging from 2.5 degrees to 5.0 degrees above normal. Daytime highs were mostly in the mid 90's and just slightly above normal while nighttime low temperatures were much above normal. The monthly average temperature across the region added up to the warmest September since 2005. Rainfall was below normal in most parts of the region except for the southern coastal counties, central Harris County, and a few locations which received isolated heavy afternoon thunderstorms. The regional average rainfall of CoCoRaHS observers across the region was 2.66". There were a few isolated totals of 6 – 8 inches of rain for the month recorded by CoCoRaHS observers.

September 01, 2016 Monthly Observed Precipitation

Created on: December 11, 2016 - 05:41 UTC  
Valid on: October 01, 2016 12:00 UTC

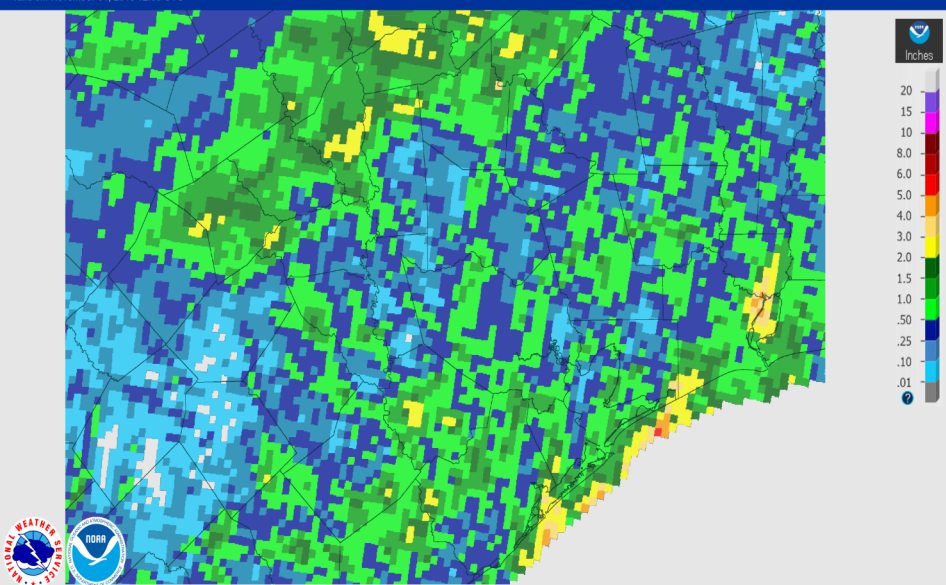


**Radar estimated rainfall for the month of September 2016 across Southeast Texas. CoCoRaHS observers recorded an average of 2.66" for the month.**

**October:** Very warm and dry conditions continued across the region for the month of October. Just about all CoCoRaHS observers recorded below 0.10-1.10 inches of rainfall for the month. Rainfall averaged 4" to 5.50" below normal. Temperatures averaged 4.0 degrees to over 5 degrees above normal. Most NWS first order stations recorded their 2<sup>nd</sup> warmest October on record topping the previous record warmest set in 2004. The daily zero reports of no rainfall by CoCoRaHS observers was very important in the calculation of the Drought Monitor maps which showed drought conditions across the region with six counties in moderate drought at the end of the month – Austin, Chambers, Colorado, Harris, Liberty, and Waller counties. CoCoRaHS observers recorded a monthly average rainfall of only 0.39" for the month.

October 01, 2016 Monthly Observed Precipitation

Created on: December 11, 2016 - 05:40 UTC  
Valid on: November 01, 2016 12:00 UTC



**Radar estimated rainfall for southeast Texas for the month of October 2016. Rainfall totals for CoCoRaHS observers across the region was 0.39".**



## Houston-Galveston Regional Climate Summary

Autumn 2016 CoCoRaHS Houston/Galveston Region Rainfall							
County Rainfall Average and County Station Rainfall Maximum Total in inches per month							
County	September		October		November		Autumn Total
	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	3-Month Rain Total
Austin	1.61	3.19	0.37	0.81	2.45	4.32	4.43
Brazoria	2.75	3.58	0.22	0.58	2.26	3.07	5.23
Chambers	N/A	N/A	N/A	0.09	N/A	1.73	N/A
Colorado	2.24	2.81	0.29	0.34	6.51	8.38	9.04
Fort Bend	3.96	6.33	0.34	1.31	4.54	6.47	8.84
Galveston	4.12	7.21	1.07	1.98	2.51	4.50	7.70
Harris	3.42	8.90	0.51	1.33	2.91	5.21	6.84
Jackson	N/A	3.87	N/A	0.37	N/A	1.99	N/A
Liberty	2.22	4.27	0.29	0.55	1.26	1.71	3.77
Matagorda	2.44	2.44	0.25	0.25	3.16	3.16	5.85
Montgomery	2.69	6.45	0.41	0.98	3.43	5.05	6.53
Polk	1.35	2.72	0.38	0.89	2.98	3.55	4.71
San Jacinto	1.79	1.79	0.10	0.19	3.39	3.62	5.28
Waller	N/A	0.73	N/A	0.95	N/A	2.60	N/A
Wharton	3.27	4.85	0.49	1.16	1.73	2.88	5.49
Region Totals	2.66	8.90	0.39	1.98	3.09	8.38	6.14

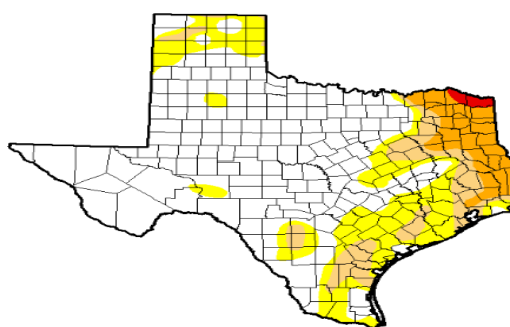
### November:

The entire region experienced above normal temperatures running from 4.5 to 6.5 degrees above normal. It was the 1<sup>st</sup> and 2<sup>nd</sup> warmest Novembers at many NWS first order climate stations. Galveston recorded the warmest autumn on record and Houston recorded the 2<sup>nd</sup> warmest autumn on record. Just about the entire region recorded between 1 to 4 inches of rainfall. Colorado County CoCoRaHS observers recorded an average rainfall of 6.51" which was the only county with above normal rainfall. All other counties in the region had rainfall that was slightly below normal to as much as 3.00" below normal. Liberty, Wharton, Brazoria, and Matagorda counties where the driest in the region. Drought conditions worsened over the region with the low rainfall totals. The region CoCoRaHS observer average rainfall was 3.09".

### Autumn Summary:

The 3 month autumn CoCoRaHS observer average rainfall for the region was only 6.14". This amount is under 50% of normal for the autumn period for the region. Colorado County had the highest rainfall amount during the autumn with 9.04" followed by Fort Bend County with 8.84".

### U.S. Drought Monitor Texas



**November 15, 2016**  
(Released Thursday, Nov. 17, 2016)  
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D1	D1-D2	D2-D3	D3-D4	D4
Current	64.98	35.02	16.32	7.69	0.63	0.00
Last Week 11/08/16	64.99	35.01	14.03	5.55	0.00	0.00
3 Months Ago 08/15/16	71.24	28.76	5.31	0.63	0.00	0.00
Start of Calendar Year 1/01/16	95.48	4.52	0.00	0.00	0.00	0.00
Start of Water Year 10/01/15	94.83	5.17	0.62	0.00	0.00	0.00
One Year Ago 11/15/15	90.41	9.59	0.61	0.00	0.00	0.00

#### Intensity

D0 Abnormally Dry  
D1 Moderate Drought  
D2 Severe Drought  
D3 Extreme Drought  
D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:  
Richard Heim  
NCEI/NOAA

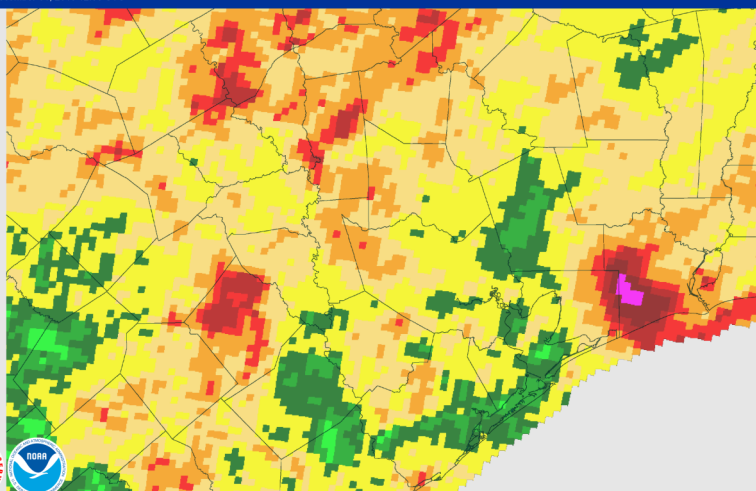


<http://droughtmonitor.unl.edu/>

### Above: Drought Monitor map for Texas mid month on November 15th.

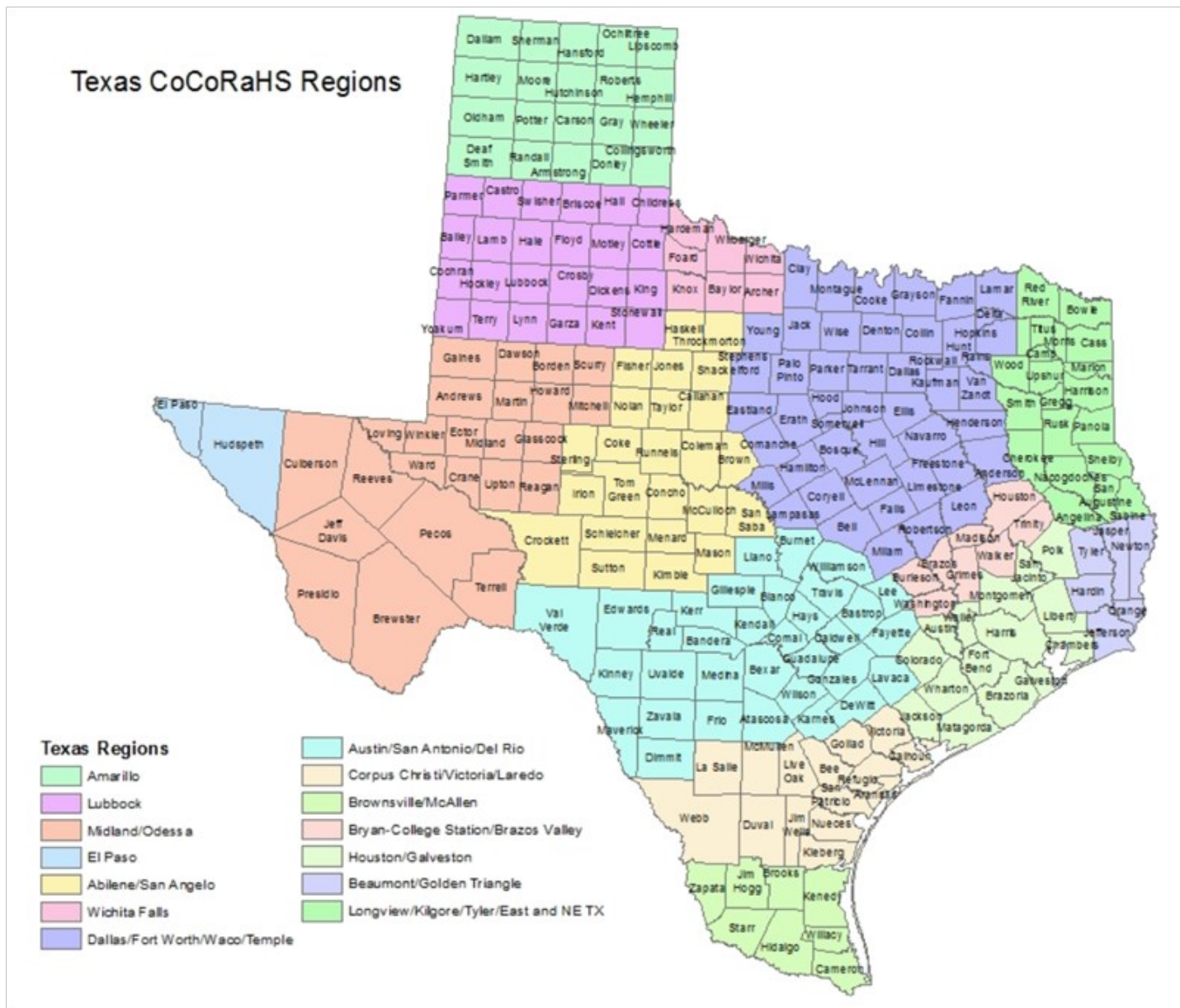
November 01, 2016 Monthly Observed Precipitation

Created on: December 11, 2016 - 05:37 UTC  
Valid on: December 01, 2016 12:00 UTC



**Radar estimated rainfall for November 2016. Heaviest rainfall occurred in Colorado county.**

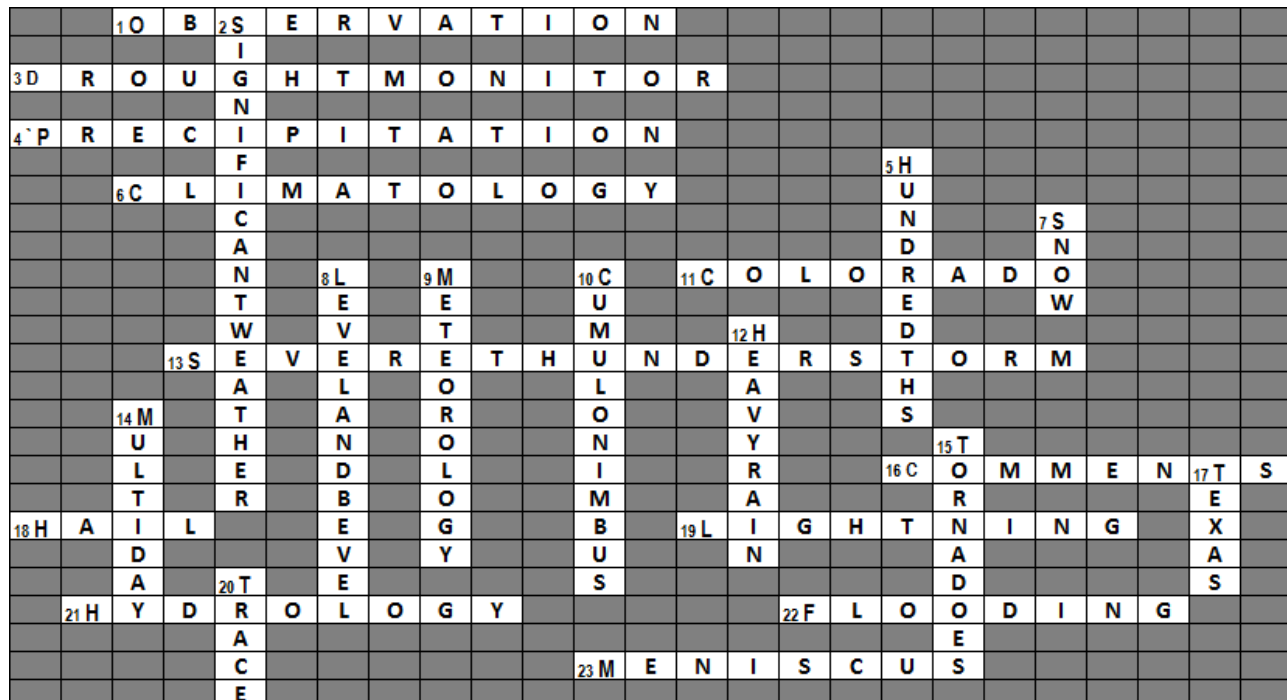
# Texas CoCoRaHS Regions Map





## Answers to Summer Edition CoCoRaHS Crossword Puzzle

Here are the answers to the Summer edition crossword puzzle. All the answers are found in previous editions of the Texas CoCoRaHS Observer, the CoCoRaHS website which includes training material, videos and webinars.



### Down

2. This report allows an observer to send information directly to the NWS when heavy rain or hail falls. **SIGNIFICANT WEATHER**
5. What increment are the lines on the inner tube of the 4 inch diameter gauge read at? **HUNDREDTHS**
7. This occurs in parts of Texas at times in the winter months. **SNOW**
8. An observer must do this when installing their post and mounting their gauge to measure accurate readings. **LEVEL AND BEVEL**
9. The study of weather is called this. **METEOROLOGY**
10. The name of the cloud on the front of the newsletter is called what? **CUMULONIMBUS**
12. This will make the inner tube overflow in a short period of time. **HEAVY RAIN**
14. If you go more than 24 hours without a daily report you should enter what report for an observation. **MULTI-DAY**
15. A supercell thunderstorm can produce many of these during its track. **TORNADOES**
17. Which state was the fifth state to join CoCoRaHS? **TEXAS**
20. An amount of rainfall less than 0.01" is called what? **TRACE**

### Across

- 1 This is taken daily at 7am by CoCoRaHS observers. **OBSERVATION**
3. Daily reports of zero rain are very important for this to be mapped across the U.S. **DROUGHT MONITOR**
4. Any water in a liquid or solid form that falls from the sky is called? **PRECIPITATION**
6. The study of climate is called this. **CLIMATOLOGY**
11. In what state did CoCoRaHS begin? **COLORADO**
13. A type of warning issued for large hail falling or winds greater than 58 mph. **SEVERE THUNDERSTORM**
16. These are very important to users looking at reports of CoCoRaHS data. **COMMENTS**
18. Thunderstorms can have this object fall from them which can cause serious damage. **HAIL**
19. Thunderstorms produce this across the sky or to the ground? **LIGHTNING**
21. The study of water in the atmosphere, earth's surface, and in the soils and rocks is called this? **HYDROLOGY**
22. What happens in low lying areas when high rainfall rates occur? **FLOODING**
23. An observer always reads the inner tube of the gauge at the bottom of this? **MENISCUS**

## Meet a Regional Coordinator

Angie Margrave is now the Regional CoCoRaHS Coordinator for the Amarillo Region.

She has been at the forecast office in Amarillo, TX since October 1991. She was born in Southern California, moved to Texas in the mid 70's. She has worked in Washington D.C. and Lubbock, but always seem to find her way home to Amarillo!

She is very happy to help in this very important program and will be working hard to get to know observers in the region. If you have any questions about CoCoRaHS and live in the Amarillo region please don't hesitate to contact her at the following email address [Angela.Margrave@NOAA.GOV](mailto:Angela.Margrave@NOAA.GOV)



Palo Duro Canyon – July 2016 Courtesy NWS Amarillo, TX



### ***Texas CoCoRaHS Observer***

The official newsletter of Texas CoCoRaHS

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 CoCoRaHS of South Texas



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