SCIPP
A NOAA RISA TEAM

Southern Climate Monitor

December 2015 | Volume 5, Issue 12

In This Issue:

The Southern Climate Monitor is available at
www.srcc.lsu.edu & www.southernclimate.org

Water Reservior Data Visualization Tool

Margret Boone, SCIPP Program Manager, University of Oklahoma

On October 26, 2015, the Water Reservoir Data Visualization Tool was publically released on the SCIPP website. This tool allows water resource managers and those interested in water resources to visualize both current water reservoir levels and historical reservoir levels along with daily precipitation data. This article will discuss the motivation for creating this tool and highlight how this tool might be used.

Over the past few years, SCIPP has focused on drought preparedness and management. This started in 2011 with the Managing Drought in the Southern Plains initiative. SCIPP, along with National Drought Mitigation Center, the National Integrated Drought Information System, and NOAA Regional Climate Services Director, began this initiative that included several in-person drought forums and workshops and online drought webinars. From these forums and webinars, feedback was received from stakeholders interested in water resources. One key item was how valuable water reservoir information was, and yet how hard it was to find. Through subsequent conversations, it became evident that having a centralized location to find reservoir information would be beneficial.

SCIPP, therefore, actively pursued funding and obtained it through the NOAA RISA program to continue to engage stakeholders in our SCIPP region to understand what information would be most valuable to them. Our SCIPP partners at LSU, specifically the Southern Regional Climate Center (SRCC), also obtained funding to develop and build the reservoir database.

From interactions with stakeholders, it became evident that not just current reservoir levels were important, but that there was a crucial need for historical data to be available as well. Because reservoir information is housed in different locations and managed by several agencies (US Geological Survey, US Army Corps of Engineers, Bureau of Reclamation, Texas Water Development Board), the information available for each reservoir can be different. Another important variable to water resource managers was being able to visualize the historical reservoir levels alongside the current levels. Many of the websites with reservoir information publically available either do not contain historical data, or lack a way to visualize and compare the data. Figure 1 is an example of how reservoir information is displayed (USACE Little Rock District).

Therefore, having both real-time information and historical information became a priority so that managers could compare previous droughts with current conditions and anticipate such things as lagging reservoir responses to rainfall. For instance, how much rain is needed before runoff can be sustained?

In order to create this database, SCIPP moved forward with 3 objectives.

Objective 1: Determine the stakeholder requirements for the database design;

Objective 2: Integrate those requirements into an operational system (at SRCC); and

Objective 3: Promote the use of the new system among those water resource sectors.

SCIPP started the project in October 2012, and began engagement by meeting with the Oklahoma Water Quantity forum to begin the

discussion of what elements would be most important for such a tool. During early 2013, SCIPP colleagues at LSU spent time talking to water managers about the elements that were most important to them. During the fall 2013 and into 2014, much of that time was spent compiling the information from the water resource managers into database development - determining what parameters and variables from the list of most requested variables were publically available, and how easy the metadata of those reservoirs was to obtain. Once the metadata was added and real-time dynamic data ingested into the database, the team went back in and added historical data to the reservoirs were it was available. Then, on October 26 of this year, this tool became publically available on the SCIPP website.

CORPS OF ENGINEERS
LITTLE ROCK DISTRICT
LAKE LEVELS @ 7 AM
(CURRENT AND FORECAST)

INDICATED FORECAST ELEVATIONS ARE SUBJECT TO CHANGE

****
* 21 MAY 2012 / 1031 *
****

	SEAS/ CONS POOL	7 AM POOL MON 21	7 AM POOL FORECASTS TUE 22	WED 23	THU 24	CREST or EMPTY ELEV DATE % FULL
BEAVER	1121.4	1118.79 92% CONS	1118.8 92%	1118.7 92%	1118.7 92%	FC EMPTY %
TABLE ROCK	916.7	913.77 90% CONS	913.7 90%	913.6 89%	913.5 89%	FC EMPTY %
BULL SHOALS	657.0	653.82 87% CONS	653.8 87%	653.8 87%	653.7 87%	FC EMPTY %
3-LAKE SYSTEM % FULL (BEA, TAB, BUL)		0%	0%	0%	0%	
NORFORK	555.0	552.06 92% CONS	552.1 92%	552.1 92%	552.0 91%	FC EMPTY %
4-LAKE SYSTEM % FULL (BEA, TAB, BUL, NOR)		0%	0%	0%	0%	
GREERS FERRY	462.1	460.21 92% CONS	460.1 92%	460.0 92%	460.0 92%	FC EMPTY %
CLEARWATER	498.0	498.47 0% F.C.	498.5 0%	498.5 0%	498.5 0%	FC EMPTY %
BLUE MOUNTAIN	387.0	387.09 0% F.C.	387.1 0%	387.1 0%	387.1 0%	FC EMPTY %
NIMROD	344.9	345.28 1% F.C.	345.3 1%	345.3 1%	345.2 1%	FC EMPTY %
DEQUEEN	437.0	437.21 0% F.C.	437.2 0%	437.2 0%	437.2 0%	FC EMPTY %
GILLHAM	502.0	502.31 0% F.C.	502.3 0%	502.4 0%	502.4 0%	FC EMPTY %
DIERKS	526.0	526.50 1% F.C.	526.5 1%	526.5 1%	526.5 1%	FC EMPTY %
MILLWOOD	259.2	259.61 1% F.C.	259.6 1%	259.5 1%	259.5 1%	FC EMPTY %

Figure 1. Daily reservoir levels from the US Army Corps of Engineers Little Rock District Office (21 May 2010). A user of this product would need to be familiar with the location of these lakes and cannot access historical context to determine if the levels are anomalous for the time of year.

Information available on the tool includes a reservoir cross-section plot that highlights current elevation, dead-pool and conservation pool elevations, a summary of physical reservoir information, reservoir levels over time, elevation-area-capacity curves for each reservoir, and precipitation data. Reservoir data sources include the Texas Water Development Board, US Geological Survey, and US Army Corps of Engineers.

Using NWS Cooperative Observer Data via the Applied Climate Information System (ACIS), the SRCC matches nearby precipitation-reporting stations to each reservoir (Figure 2). Users are able to select from nearby sites to examine precipitation in relationship to reservoir

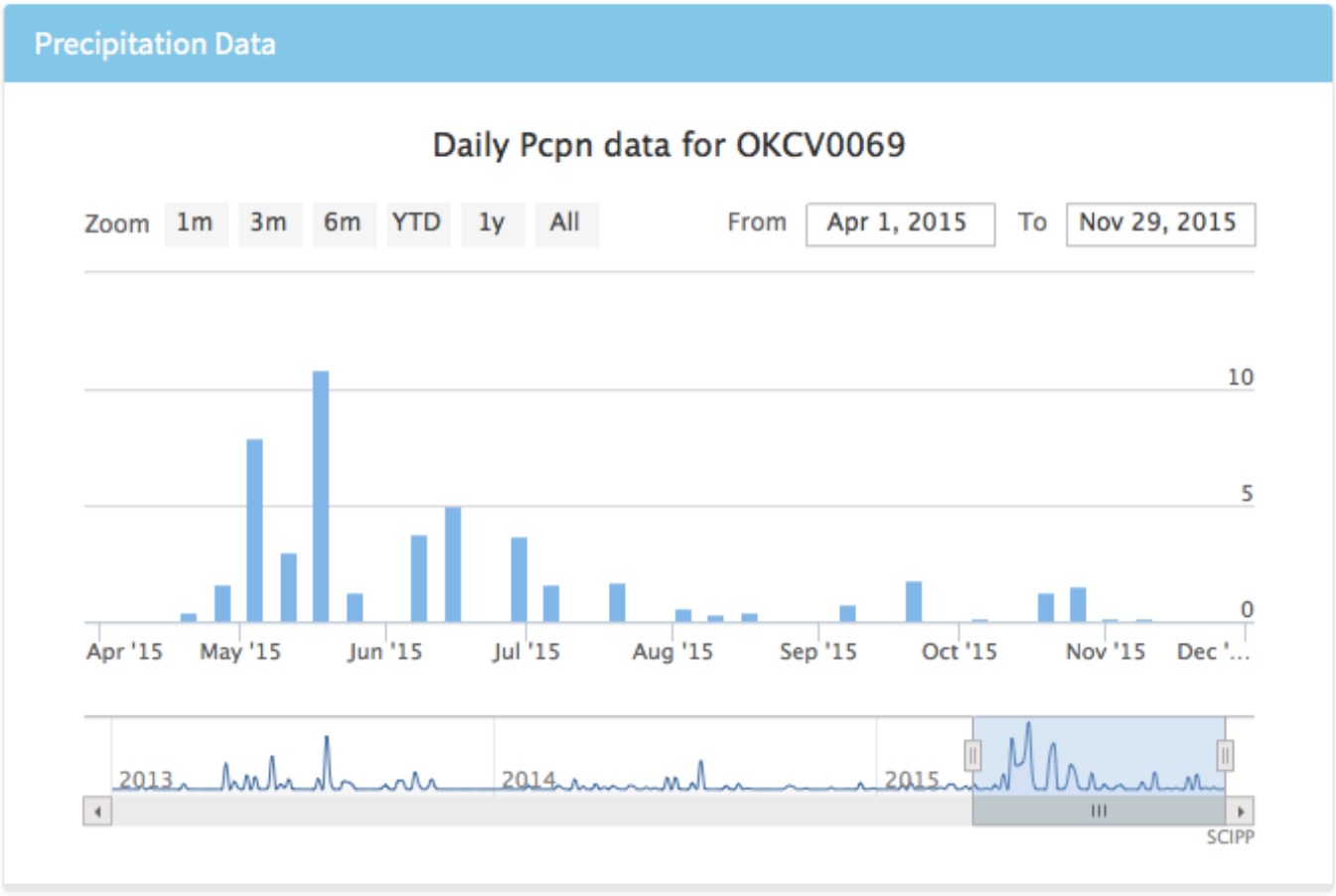


Figure 2. Daily precipitation data from April 1, 2015 to November 29, 2015 near Lake Thunderbird, OK.

response both at the site of the reservoir and also upstream sites important for generating runoff.

As we have seen with the recovery from drought in parts of the region, reservoir response was lagging much longer than drought management experts anticipated. Having real-time information that can be compared spatially across a region and temporally in relationship to previous droughts can help resource managers better anticipate such lagging responses and consequently improve their management decisions related to water availability.

There are currently a few limitation of the tool. It's only available for Oklahoma, Texas, and Louisiana. Oklahoma reservoirs are still being added to the database, so not all Oklahoma reservoirs are available yet. Also, historical information is inconsistent across reservoirs and from state to state because it is based on what information is publically available. That being said, the tool has a lot of potential for water resource managers and SCIPP already has received some great positive feedback and suggestions from stakeholders.

To access the tool, please see: http://www.southernclimate.org/pages/data-tools.

Drought Update

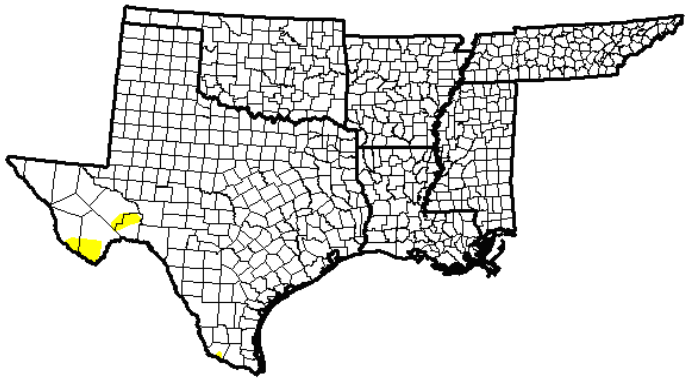
Luigi Romolo,
Southern Regional Climate Center

Near-to-above normal precipitation in the Southern Region has allowed for the continuation of drought-free conditions in all six states.

A tornado on December 21 resulted in one injury in Rapides Parish, Louisiana. The injury resulted from an overturned trailer

On December 23, several tornadoes were reported in an area ranging from northern Mississippi to western Tennessee. Two fatalities were reported in Benton County, Mississippi, and two more were reported in Perry County, Tennessee. Seven more citizens were injured in Wayne County Tennessee. There were numerous reports of damage to homes in various counties from northern Mississippi to western Tennessee. Four days later on the 27th of the month, several tornadoes were reported in southern Arkansas and northern Louisiana. There were no reports of injuries or fatalities but some events did result in structural damage to homes and businesses.

By the end of the year, 2015 was the wettest year on record for Texas. The major flooding and wet periods of 2015 were in May and October. These beat the previous record from 1895. This excess rain put an end to the five year drought. The Lone Star State was drought free for all of December, with just a slight increase in the areas with Abnormal Dryness (D0) throughout the month (Information provided by the Texas Office of State Climatology).



Released Thursday, January 7, 2016

Brian Fuchs, National Drought Mitigation Center

Above: Drought conditions in the Southern Region. Map is valid for January 5, 2016. Image is courtesy of National Drought Mitigation Center.

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	99.14	0.86	0.00	0.00	0.00	0.00
Last Week *12/29/2015*	97.72	2.28	0.00	0.00	0.00	0.00
3 Months Ago *10/6/2015*	34.37	65.63	45.42	27.03	9.14	0.32
Start of Calendar Year *12/29/2015*	97.72	2.28	0.00	0.00	0.00	0.00
Start of Water Year *9/29/2015*	36.88	63.12	37.43	18.31	5.72	0.00
One Year Ago *1/6/2015*	52.92	47.08	31.22	17.83	8.39	1.99

Intensity:

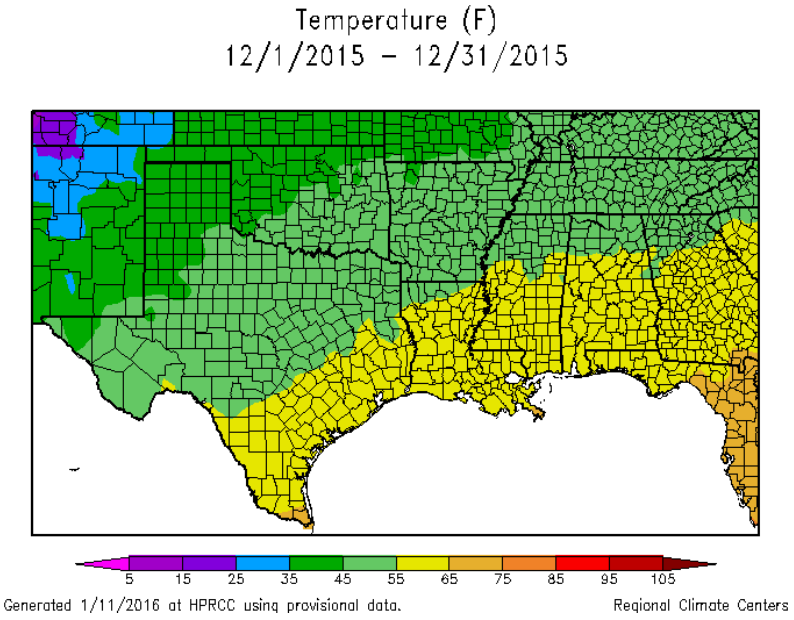
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

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

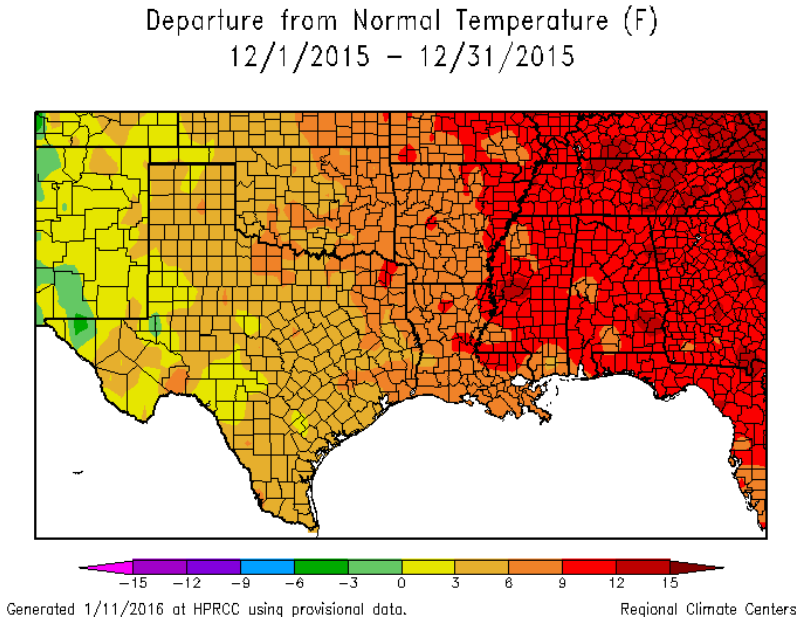
Temperature Summary

Luigi Romolo,
Southern Regional Climate Center

As was the case with November, December was a warm month for the entire Southern Region. All six states averaged above normal temperatures, with all states but Texas ranking in the top three warmest Decembers on record (1895-2015). For the region as a whole, it was the third warmest December. The region-wide average temperature was 51.63 degrees F (10.91 degrees C). Temperature anomalies were highest in Mississippi and Tennessee, where most stations averaged between 8-12 degrees F (4.44-6.67 degrees C) above the monthly normal. Elsewhere, stations generally averaged between 3-5 degrees F (1.67-2.78 degrees C) across most of Texas and Oklahoma, and between 5-9 degrees F (2.78-5.00 degrees C) across most of Arkansas and Louisiana. The state-wide average temperatures for the month are as follows: Arkansas averaged 49.80 degrees F (9.89 degrees C), Louisiana averaged 59.00 degrees F (15.00 degrees C), Mississippi averaged 56.60 degrees F (13.67 degrees C), Oklahoma averaged 44.90 degrees F (7.17 degrees C), Tennessee averaged 51.20 degrees F (10.67 degrees C), and Texas averaged 51.60 degrees F (10.89 degrees C). Both Mississippi and Tennessee experienced their warmest December on record. For Arkansas, it was the second warmest December on record, while Louisiana and Oklahoma recorded their third warmest December on record. Texas experienced its sixth warmest December. All ranking records are based on the period spanning 1895-2015.



Average December 2015 Temperature across the South

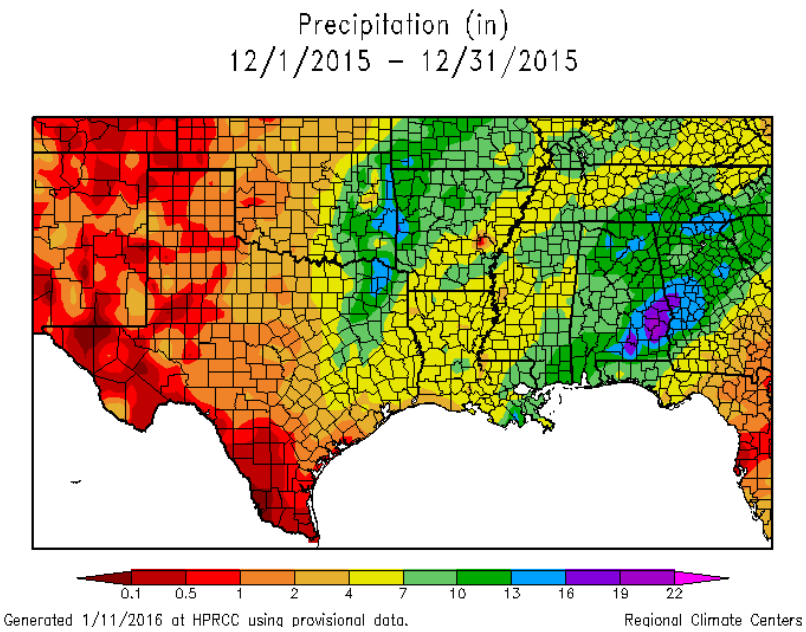


Average Temperature Departures from 1971-2000 for December 2015 across the South

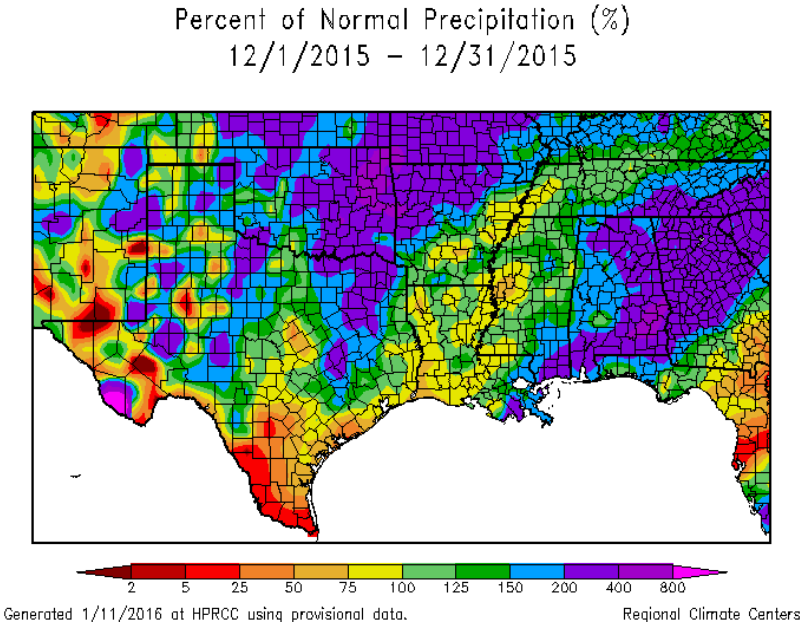
Precipitation Summary

Luigi Romolo,
Southern Regional Climate Center

December precipitation in the Southern Region varied spatially with some areas receiving above normal precipitation, and other areas experiencing precipitation deficits for the month. Throughout much of Louisiana and Mississippi, precipitation was near normal. This was also the case in western Tennessee and in central Texas. In southern Texas, conditions were quite dry, with many stations averaging less than half the normal precipitation.. Conversely, conditions were very wet in Oklahoma and northwestern Arkansas, where a bulk of the stations recorded between one and a half to two times the normal allotment. Similar wet conditions were also observed in eastern Tennessee. The state-wide precipitation totals for the month are as follows: Arkansas reporting 8.20 inches (208.28 mm), Louisiana reporting 5.59 inches (1414.99 mm), Mississippi reporting 7.08 inches (179.83 mm), Oklahoma reporting 4.80 inches (121.92 mm), Tennessee reporting 7.73 inches (196.34 mm), and Texas reporting 2.40 inches (60.96 mm). It was the third wettest December for Oklahoma, while Arkansas experienced their fifth wettest December. Tennessee and Mississippi recorded their fourteenth and twenty-eighth wettest Decembers on record, respectively. For Texas, it was the thirtieth wettest December and for Louisiana, the forty-fifth wettest December. All state ranking records are based on the period spanning 1895-2015.

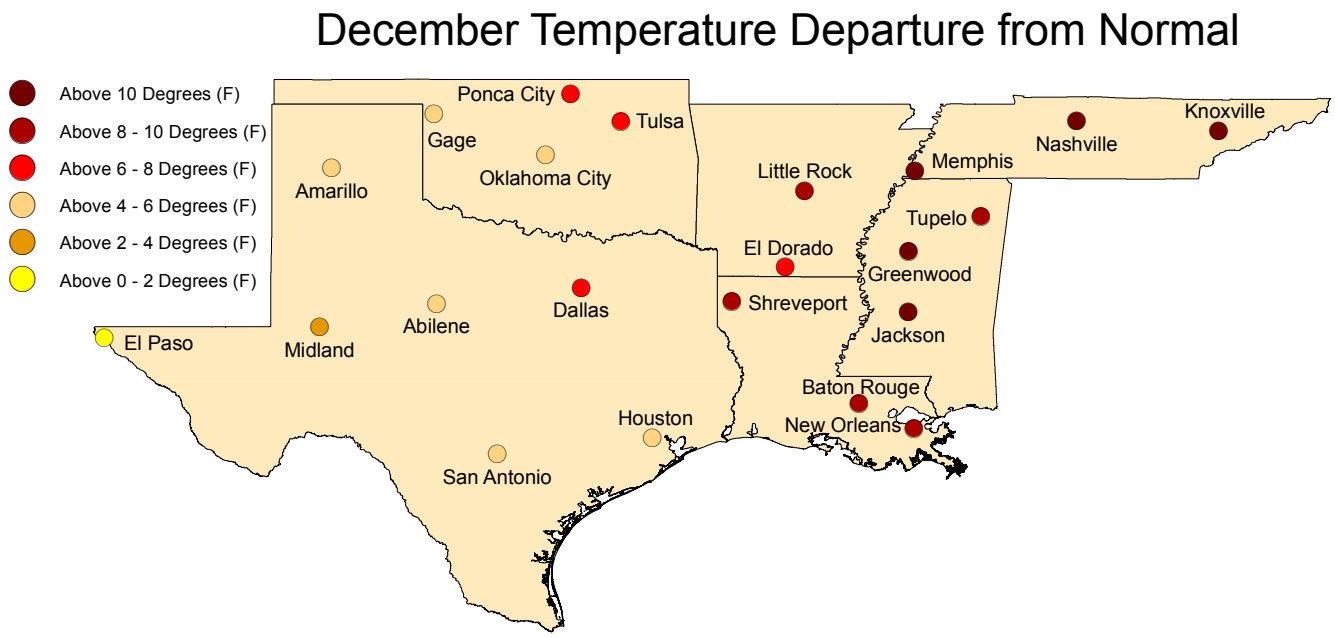


December 2015 Total Precipitation across the South

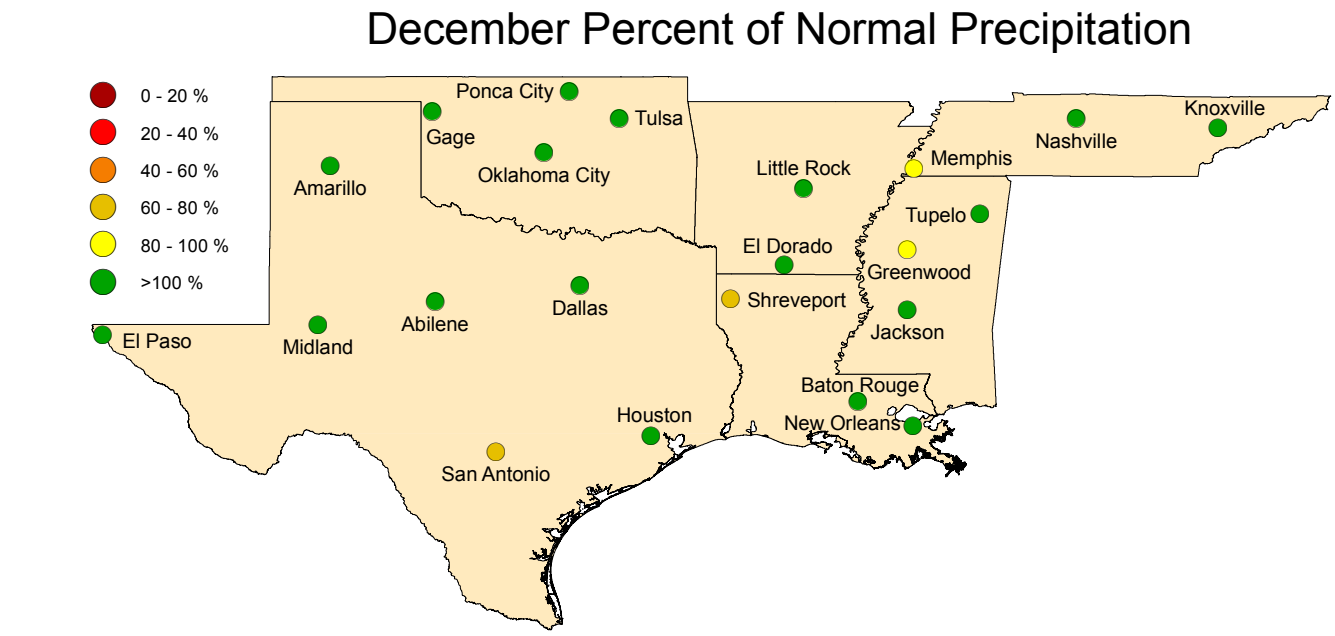


Percent of 1971-2000 normal precipitation totals for December 2015 across the South

Regional Climate Perspective in Pictures



December 2015 Temperature Departure from Normal from 1971-2000 for SCIPP Regional Cities



December 2015 Percent of 1971-2000 Normal Precipitation Totals for SCIPP Regional Cities

Climate Perspective

State	Temperature	Rank (1895-2011)	Precipitation	Rank (1895-2011)
Arkansas	49.80	2nd Warmest	8.20	5th Wettest
Louisiana	59.00	3rd Warmest	5.59	45th Wettest
Mississippi	56.60	1st Warmest	7.08	28th Wettest
Oklahoma	44.90	3rd Warmest	4.80	3rd Wettest
Tennessee	51.20	1st Warmest	7.73	14th Wettest
Texas	51.60	6th Warmest	2.40	30th Wettest

State temperature and precipitation values and rankings for December 2015. Ranks are based on the National Climatic Data Center's Statewide, Regional, and National Dataset over the period 1 895-201 1.

Station Summaries Across the South

Station Summaries Across the South

Station Name	Temperatures								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	%Norm
El Dorado, AR	64.1	40.9	52.5	7.0	80	12/26	27	12/19	8.06	2.88	156
Little Rock, AR	62.3	41.6	52.0	9.0	81	12/26	29	12/19	8.38	3.41	169
Baton Rouge, LA	71.5	52.0	61.7	8.3	84	12/26	33	12/19	6.33	0.73	113
New Orleans, LA	72.1	57.1	64.6	9.0	83	12/26	41	12/20	6.46	1.22	123
Shreveport, LA	67.3	45.0	56.2	8.1	82	12/27+	31	12/19	2.89	-1.88	61
Greenwood, MS	67.3	46.5	56.9	11.0	84	12/11	26	12/19	5.10	-0.55	90
Jackson, MS	68.5	48.0	58.3	10.5	84	12/26	28	12/19	5.87	0.72	114
Tupelo, MS	63.6	44.3	54.0	9.8	78	12/24+	27	12/20+	7.36	1.08	117
Gage, OK	53.0	27.6	40.3	5.2	77	12/11	9	12/29	1.54	0.65	173
Oklahoma City, OK	56.8	33.7	45.3	4.7	74	12/09	22	12/29+	3.07	1.19	163
Ponca City, OK	56.1	31.2	43.7	7.1	71	12/12+	18	12/29+	2.43	1.01	171
Tulsa, OK	58.0	35.5	46.7	7.2	73	12/12+	25	12/18+	8.60	6.11	345
Knoxville, TN	61.5	43.5	52.5	11.7	77	12/27	25	12/19	7.84	3.34	174
Memphis, TN	63.1	45.1	54.1	10.5	80	12/26	32	12/18	4.77	-0.97	83
Nashville, TN	62.6	43.6	53.1	12.7	76	12/27+	28	12/20+	4.92	0.68	116
Abilene, TX	62.0	36.9	49.5	4.2	83	12/11	22	12/18	2.20	0.97	179
Amarillo, TX	53.8	28.3	41.0	4.2	73	12/11	18	12/29+	0.78	0.07	110
El Paso, TX	59.0	34.7	46.8	2.0	74	12/11+	23	12/28	1.08	0.30	138
Dallas, TX	64.9	42.4	53.6	6.5	82	12/26	31	12/29+	3.83	1.25	148
Houston, TX	69.1	49.6	59.4	5.0	83	12/25	37	12/05	5.21	1.47	139
Midland, TX	61.5	34.1	47.8	3.4	81	12/11	19	12/29	1.24	0.64	207
San Antonio, TX	70.0	46.4	58.2	5.3	83	12/23	34	12/19	1.48	-0.43	77

Summary of temperature and precipitation information from around the region for December 2015. Data provided by the Applied Climate Information System. On this chart, "depart" is the average's departure from the normal average, and "% norm" is the percentage of rainfall received compared with normal amounts of rainfall. Plus signs in the dates column denote that the extremes were reached on multiple wdays. Blueshaded boxes represent cooler than normal temperatures; redshaded boxes denote warmer than normal temperatures; tan shades represent drier than normal conditions; and green shades denote wetter than normal conditions.

A Little History of the Bonnet Carré Spillway

Barry Keim, Louisiana State Climatologist, Louisiana State University

This may come as a surprise to some, but flooding on the Mississippi River is not a new thing. It's just what the River does.....not all of the time, but on occasion. This occassional flooding has been a thorn in the side of the city of New Orleans since its inception. Note that there were serious considerations of abandoning the city shortly after it was founded in 1718 due to all of the flooding problems.

Well.....the Mississippi River is getting restless again, while it copes with heavy rains and runoff from the Ohio River Valley, as well as the Upper Mississippi and Missouri River Basins. All of this water will come roaring past the Big Easy for the next few weeks. As a result, the U.S. Army Corps of Engineers has opened the Bonnet Carré Spillway, which is located upriver from New Orleans, and is designed to reduce water levels in the Mississippi River before the flood waters reach the city of New Orleans.....and downtown Chalmette. BUT, in January, you ask?! YUP, this is unusual and it is the earliest the Spillway has been opened, as the Mississippi tends to normally flood in May and June, from late spring and early summer rains, combined with snowmelt rolling in from everywhere east of the Continental Divide.

Figure 1. Historical Mississippi River flood breach at Bonnet Carré in 1871 . Image is in the public domain and can be found at https://upload.wikimedia.org/wikipedia/commons/3/3d/Onthemississippibonnetcarre.jpg.

The Spillway is situated between the towns of Montz, on the upriver side, and Norco, on the downriver side, in St. Charles Parish. It is located approximately 30 "river miles" upriver from downtown New Orleans, and about 22 miles as the crow flies. The bend on the river near this site was called Bonnet Carré, which tranlates to "square hat"??? Throughout the settlement of the region - which was largely controlled by Germans, as part of the "German Coast" - flooding was prevelent. The river levees here frequently would breach creating the Bonnet Carré Cravesse. One such flooding event at Bonnet Carré is captured in Figure 1, representing the Crevasse of 1871, but there were numerous other flooding episodes in the immediate area, including the "flood of all floods" on the Mississippi River in 1927. After 1927, the U.S. Army Corps of Engineers significantly changed their approach to

managing flooding across the region, which included the construction of the current Spillway. The design was completed in 1931, and consists of 350 bays spanning about a 1.5 miles that seal off the River from the Spillway with 7000 wooden pins, which need to be removed individually to allow the water to pass through. Once through the bay, the water from the river runs to Lake Pontchartrain via the 5.3 mile long Spillway. The diverted water then bypasses New Orleans by taking this alternate route to the Gulf of Mexico through Lake Pontchartrain and Lake Borgne. In all, this opening in 2016 marks the 11th time that the Bonnet Carré Spillway has been opened since it was completed. It was opened in 1937, 1945, 1950, 1973, 1975, 1979, 1983, 1997, 2008, 2011, and now 2016. It's far, far, far from a perfect fit, but I note that this string of Spillway openings has a faint smell of El Nino, and yes, we're in another El Nino episode this year! Did I mention that the Mississippi River floods on occasion? If you have any questions, feel free to contact me at keim@lsu.edu.

Southern Climate Monitor Team

Luigi Romolo, Regional Climatologist
Southern Regional Climate Center (LSU)

Gina Fujan, Student Assistant SCIPP (OU)

Margret Boone, Program Manager SCIPP (OU)

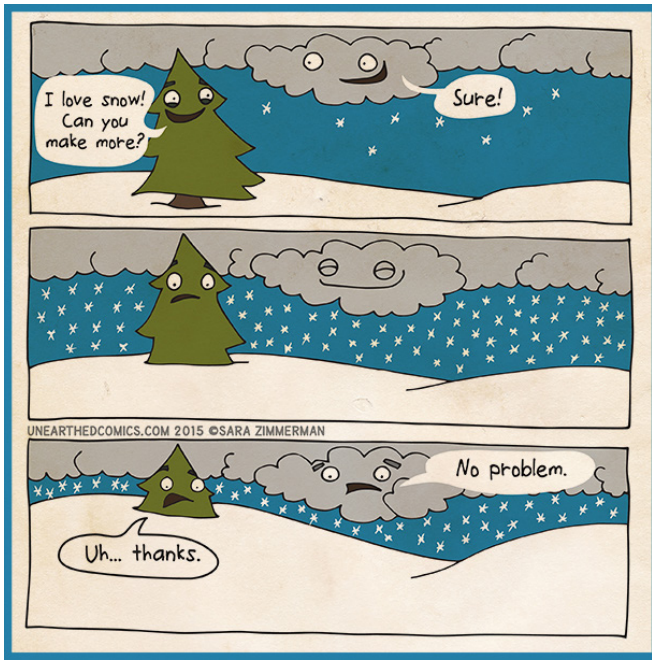
Contact Us

To provide feedback or suggestions to improve the content provided in the Monitor, please contact us at monitor@southernclimate.org. We look forward to hearing from you and tailoring the Monitor to better serve you. You can also find us online at www.srcc.lsu.edu & southernclimate.org.

For any questions pertaining to historical climate data across the states of Oklahoma, Texas, Arkansas, Louisiana, Mississippi, or Tennessee, please contact the Southern Regional Climate Center at 225-578-5021.

For questions or inquiries regarding research, experimental tool development, and engagement activities at the Southern Climate Impacts Planning Program, please contact us at 405-325-7809 or 225-578-8374.

Monthly Comic Relief



SCIPP
A NOAA RISA TEAM