

APPLICATION OF THE	§	BEFORE THE
LOWER COLORADO RIVER	§	
AUTHORITY FOR EMERGENCY	§	TEXAS COMMISSION ON
AUTHORIZATION RELATED TO	§	
WATER MANAGEMENT PLAN	§	ENVIRONMENTAL QUALITY

AFFIDAVIT OF BOB ROSE

THE STATE OF TEXAS	§
	§
COUNTY OF TRAVIS	§

Before me, the undersigned authority, personally appeared Robert H. Rosenzweig, also known as Bob Rose, a person known by me to be competent and qualified in all respects to make this affidavit, who being by me first duly sworn, deposed as follows:

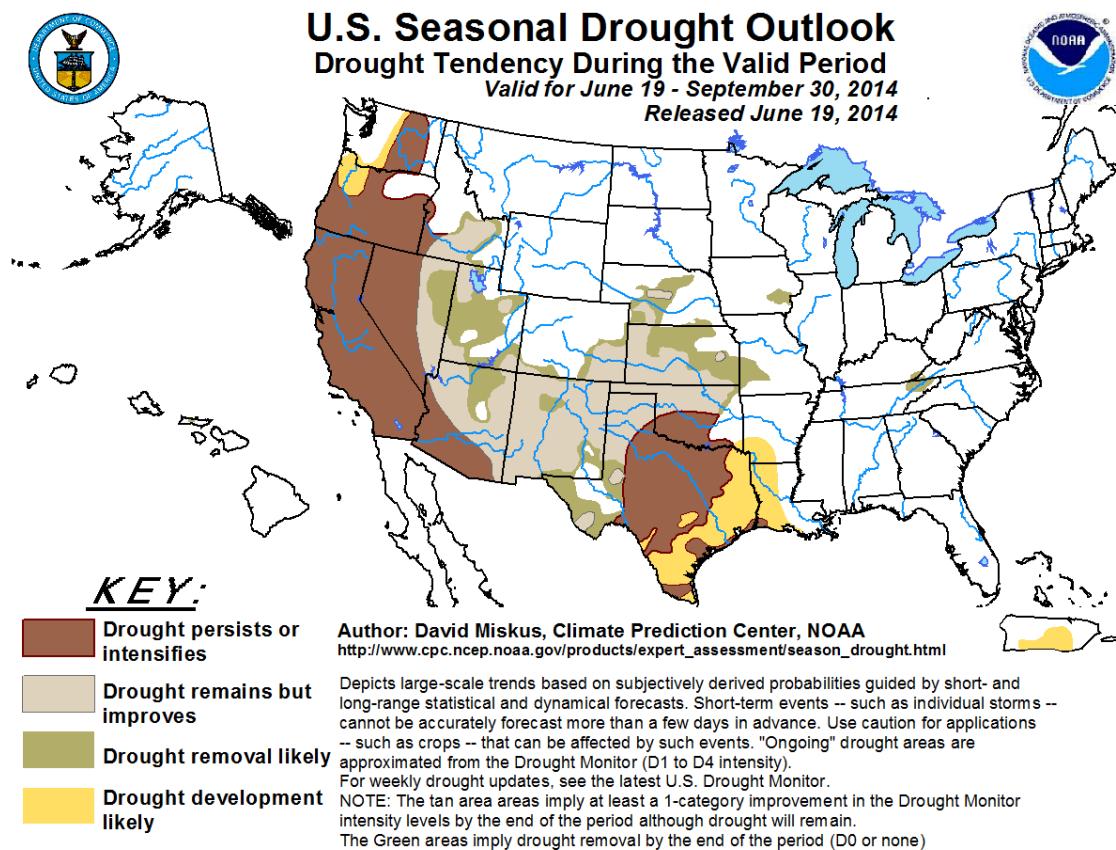
1. I am over 21 years of age, of sound mind, and have never been convicted of a felony or crime of moral turpitude. I am fully competent and qualified in all respects to make this affidavit.
2. The facts stated in this affidavit are within my personal knowledge and are true and correct.
3. I, Bob Rose, am an individual residing in Austin, Texas.
4. I am the Chief Meteorologist for the Lower Colorado River Authority (LCRA). I have held this position since 1995. I have worked as a meteorologist in Texas for 30 years. A true and correct copy of my resume, detailing my prior work history and education, is attached hereto under Tab 1.
5. As part of my duties at LCRA, I regularly review and summarize short-term and long-term weather predictions and drought indices for the Central Texas region. My opinion is based on my experience in the field and a review of data from the National Weather Service's Climate Prediction Center, National Oceanic and Atmospheric Administration's (NOAA's) Earth Science Research Laboratory, Texas State Climatologist Dr. John Nielsen-Gammon and Research Scientist Gregory J. McCabe.
6. Extraordinary drought conditions have gripped much of Texas, including the Colorado River basin for more than three (3) years, dating back to October of 2010. The drought conditions include both meteorological drought (taking into account rainfall and temperature) and hydrologic drought (taking into account streamflow and evaporation).
7. Rainfall. Rainfall during the ongoing drought has set record-lows. According to the Texas State Climatologist, Dr. John Nielsen-Gammon, on a statewide basis,

rainfall during the 12 month period from Oct. 1, 2010 to Sep. 30, 2011 was the lowest ever recorded, dating back to 1895. (Available at http://climatexas.tamu.edu/files/2011_drought.pdf.) Statewide rainfall for the three-year period from January 2011 through December 2013 was well below normal, totaling 64.84 inches which is 16.57 inches below normal or 80 percent of normal. This is the 8th driest such period dating back to 1895. (Available at <http://www.ncdc.noaa.gov/temp-and-precip/climatological-rankings/index.php?periods%5B%5D=36¶meter=pcp&state=41&div=0&year=2013&month=12> last visited July 1, 2014.) Rainfall in the first four months of 2014 was extremely low across the Texas Hill Country, with many locations failing to record even one inch of rain. Rainfall in May and June was near to above normal, but the inflows to the Highland Lakes were still well below average. (See Affidavit of Ryan Rowney.) Dr. Nielsen-Gammon now characterizes the drought period starting in October 2010 as the second worst drought in recorded Texas history. (See Emily Schmall, “Dire Drought Forecast for Wichita Falls Region,” Associated Press/Austin American-Statesman, June 24, 2014, accessed July 1, 2014, <http://www.statesman.com/news/news/dire-drought-forecast-for-wichita-falls-region/ngRtZ/>.)

8. In the summer of 2012, forecasters predicted a 60 percent chance of El Niño for the fall of 2012. The sea temperature reached the threshold for El Niño in August, 2012. However, by October 2012, the temperature no longer met El Niño criteria.
9. According to the U.S. National Drought Monitor - a product of the National Weather Service, the U.S. Department of Agriculture, and the National Drought Mitigation Center - as of early July, much of the Texas Hill Country was designated as being in moderate or severe drought, the first and second of four drought classifications. Most of Gillespie County was designated as being in “extreme” drought, the third of four drought classifications. Note, the Drought Monitor does not specifically depict the state’s hydrologic drought, which is considerably worse than depicted.
10. Weather Forecast Sources. In developing my forecast, I have relied on various sources, including the National Weather Service’s Climate Prediction Center, NOAA’s Earth Science Research Laboratory, Texas State Climatologist John Nielsen-Gammon and Gregory McCabe, Research Scientist.
 - a) The latest National Weather Service’s Climate Prediction Center (CPC) Seasonal Drought Outlook, which includes the period through the end of September 2014, calls for drought persistence across the Texas Hill Country and all areas to the west of Interstate 35 (including the Highland Lakes watershed). See Figure 1. National Weather Service forecasters stated, “For the drought areas in the southern third of the Great Plains -- from southern Oklahoma southward to the Mexican border and the western Gulf Coast -- drought is expected to persist, with some expansion into south and eastern Texas and western Louisiana. The July and July-August-September odds tilt toward drier and warmer than normal conditions along the western Gulf Coast

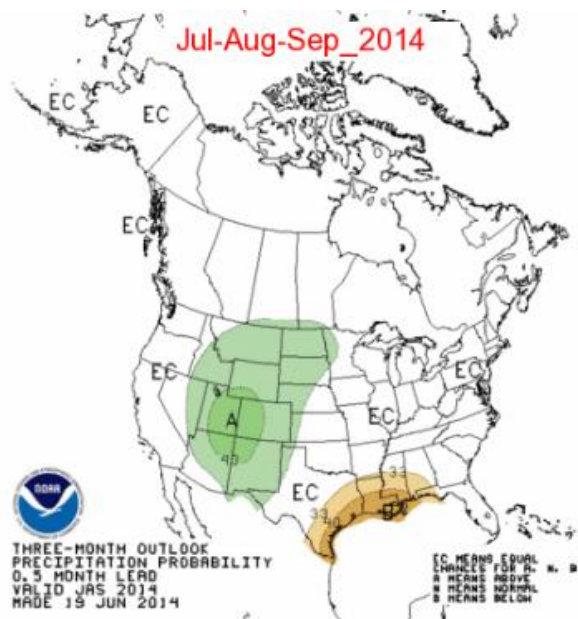
and in the southern Mississippi Valley, providing the main reasoning for keeping drought in this region with some southern and eastern expansion by the end of September. Forecast confidence for the southern Plains and the western Gulf Coast is moderate.” For areas to the east of Interstate 35 (which are not in the Highland Lakes watershed), following a wet May and June, drought development is forecast July through September. (See http://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_discussion.html last visited July 1, 2014.)

Figure 1.



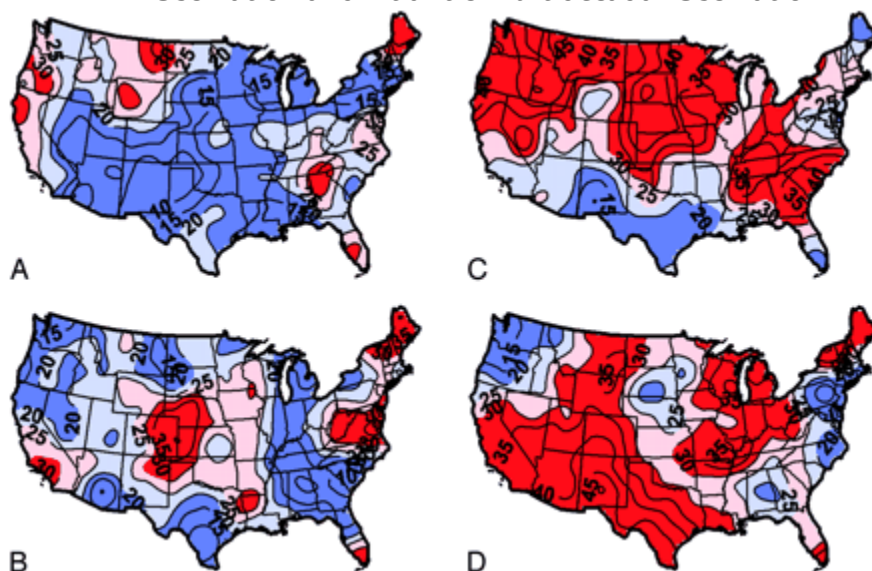
- b) The latest National Weather Service precipitation outlook calls for below normal precipitation across roughly the eastern half of Texas during the July-August-September period. See Figure 2. Climate signals this summer are forecast to be weak, so a forecast of near to below normal rainfall is forecast. However, a trend toward above normal rainfall is forecast beginning in the September-October-November period, continuing through January-February-March of 2015. National Weather Service forecasters believe the wet influence from El Niño will begin across Texas sometime this fall. (See <http://www.cpc.ncep.noaa.gov/products/predictions/90day/fxus05.html>, last visited July 1, 2014.)

Figure 2. Precipitation Outlook



- c) El Niño. In the tropical Pacific, sea surface temperatures are warmer than normal across the region between the coast of South America and the Date Line. The trade winds have reversed and are now blowing from the west, which should help push additional warm water east over the next couple of months. With the continued warming forecast, confidence is increasing that the Pacific waters will reach the threshold for El Niño sometime in the late summer or early fall. The National Weather Service has issued an El Niño Watch, and indicates there is at least a 70 percent chance an El Niño will develop within the next six months. El Niños often cause a pattern of above-normal rainfall across Texas, but this is mainly during the fall and winter months. Should an El Niño develop this summer as currently forecast, its effects likely won't be felt across Texas until sometime in the fall.
- d) In 2004, McCabe et. al. published a statistical study of drought frequency in the lower 48 states versus the PDO and Atlantic Multidecadal Oscillation (AMO). (See Figure 3, available at <http://www.pnas.org/content/101/12/4136.long>.) Currently, the Pacific Ocean is in the midst of a negative phase of the PDO where waters on the eastern side of the Pacific are unusually cool. At the same time, waters in the North Atlantic Ocean are unusually warm, a result of the positive phase of the AMO. Oceanic conditions in both the Atlantic and Pacific Oceans seem to influence long-term drought conditions within the U.S. Scientists monitoring both oceans have been able to match the changing phases of multi-decadal oscillations within each ocean to the presence or absence of drought across the U.S. McCabe pointed out the difference between the dust bowl drought in the 1930s when the PDO and AMO were both positive and the multi-year drought of the 1950s over the south central and southwestern U.S. when the PDO was cold and the AMO was warm.

Figure 3. Drought probability for the four classes of Pacific Decadal Oscillation and Atlantic Multidecadal Oscillation



A is Cold (-) AMO and Warm (+) PDO. B is Cold (-) AMO and Cold (-) PDO. C is Warm (+) AMO and Warm (+) PDO. D is Warm (+) AMO and Cold (-) PDO.

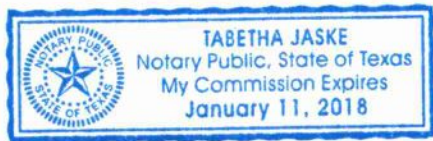
The current conditions are indicative of classification D, which indicates persistent drought for Texas and the southwestern United States. McCabe in 2004 wrote, “Should the current positive AMO (warm North Atlantic) conditions persist into the upcoming decade, we suggest two possible drought scenarios that resemble the continental-scale patterns of the 1930s (positive PDO) and 1950s (negative PDO) drought.”

11. Heat. For Texas, the summer of 2011 was the hottest summer ever recorded in Texas. Summer 2011 was also by far, the hottest summer on record for Austin. Statewide, calendar year 2011 was the second hottest year ever recorded and the hottest year on record for Austin. The summer of 2012 was the 10th hottest summer on record statewide and the 11th hottest summer on record for Austin. Statewide, 2012 tied with 1921 as the hottest year on record. Summer temperatures for Austin in 2013 were the 5th hottest on record.
12. Weather Forecast. Based on a review of data and forecasts from the sources listed above, it is my opinion that a pattern of somewhat drier than normal weather will be in place across Central and South Texas during July and August. A significant long-term drought pattern remains entrenched across Texas and, despite some generous rains during May and June; this long-term pattern will be hard to break during the hot summer. Barring the effects from a tropical cyclone, I expect a pattern of hotter than normal temperatures and below normal rainfall during the months of July and August. As a result, current drought conditions will likely persist and possibly intensify. Oceanic observations and computer-model forecasts do suggest a high probability for the development of an El Niño later this summer or fall. But if it does develop, El Niño would not be expected to have a significant impact on Central Texas weather until September or October.

Further affiant sayeth not.

Bob Rose
BOB ROSE, AFFIANT

SWORN TO AND SUBSCRIBED before me on the 2nd day of
July, 2014.



Tabetha Jaske
Notary Public in and for the State of Texas
My Commission Expires: 1-11-2018

BOB ROSE

P.O. Box 220
 Austin, TX 78767-0220
 bob.rose@lcra.org

EDUCATION

Texas A&M University, College Station, Texas
 Bachelor of Science in Meteorology 1979.

PROFESSIONAL EMPLOYMENT

- | | |
|----------------------|---|
| Jan 1995 to Present | <p><i>Chief Meteorologist, Lower Colorado River Authority, Austin, Texas</i></p> <ul style="list-style-type: none"> • Responsible for the daily forecast of weather conditions and temperatures affecting the Lower Colorado River Authority's power generation, electrical transmission, flood control and water supply operations. • Produce a daily weather blog about Central Texas weather:
 http://www.lcra.org/water/conditions/weather/weather_column.html • Write daily operational weather briefs to keep all departments of LCRA apprised of expected weather conditions. • Provide advance notice significant weather event e mails to emergency management officials, county judges along with city and state agencies. • Present a bi-weekly video weather blog about Central Texas weather. Give numerous talks to various civic groups and organizations about the weather. • Provide weather information to a number of newspapers and media outlets across Central Texas about regional weather. |
| Feb 1988 to Jan 1995 | <p><i>Meteorologist, KVUE-TV (ABC), Austin, Texas</i></p> <ul style="list-style-type: none"> • Responsible for the morning and midday newscasts for 4 years, weekend newscasts for 3 years. • Prepared a weekly astronomical report called Skywatch, and did occasional science and environmental reporting. |
| Sep 1978 to Jan 1988 | <p><i>Weekend Meteorologist, KBTX-TV, Bryan, Texas (ABC/CBS).</i></p> <ul style="list-style-type: none"> • Responsible for the forecasting, preparation and presentation of the 10 PM weekend weathercasts. |

PROFESSIONAL MEMBERSHIPS

Member, American Meteorological Society. TV Seal #501, AMS Certified Broadcast Meteorologist.
 Member, Austin-San Antonio chapter, American Meteorological Society
 Currently serving on the Board for Private Sector Meteorology with the American Meteorological Society

RELATED ACTIVITIES:

A regular contributor to the National Drought Monitor.
 Member of the Southern Climate Impacts Planning Program (SCIPP)
 Travis and Williamson County Coordinator for CoCoRaHS