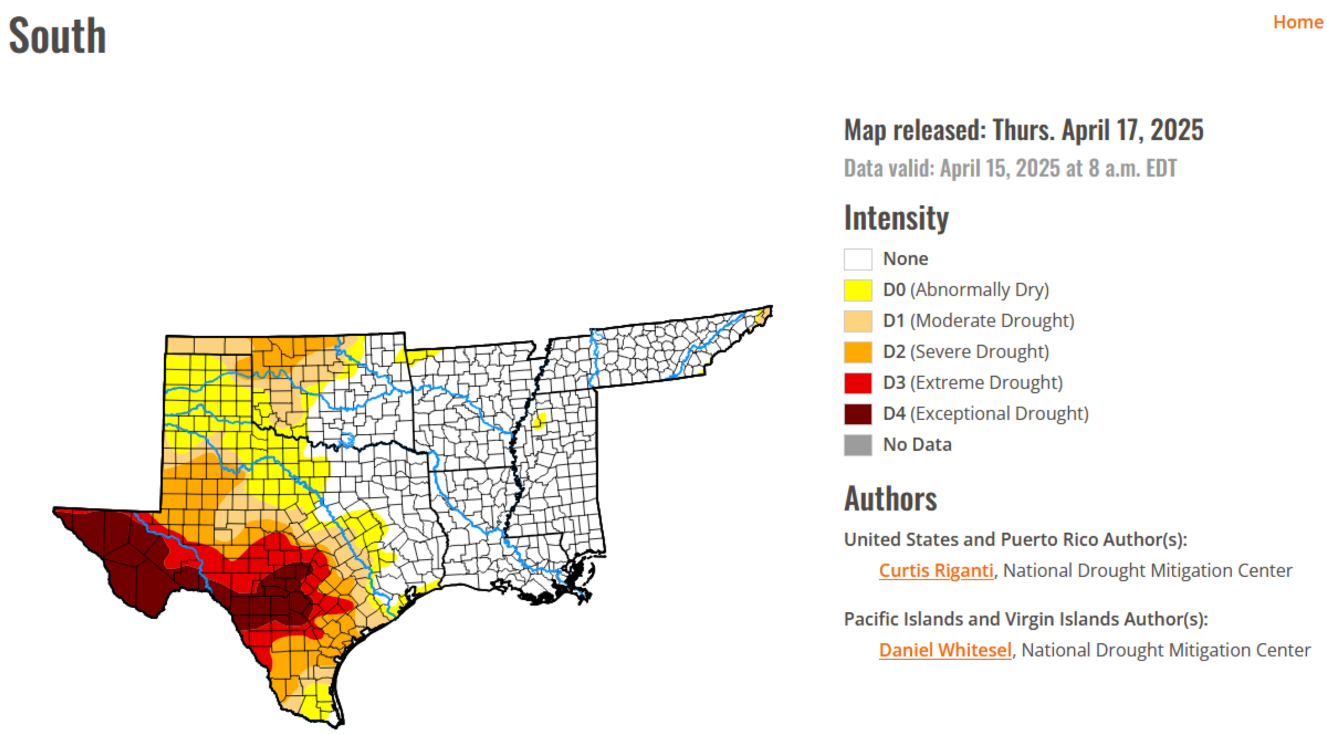
Bi-monthly Educational Topic #8 for CCGCD
by Texas Hill Country Weather Services, LLC
April 17, 2025

Current conditions:

As of April 17, 2025, Kendall County remains within the D4 exceptional drought category (per the latest available US Drought Monitor map provided below) as the area associated with this drought continues to expand and intensify, despite La Niña absence. ENSO-neutral conditions are in place, but the overall dry weather pattern continues. CCGCD remains at a Stage 4 drought restriction within this on-going Drought Emergency.



There are three main types of drought: agricultural, hydrological and meteorological.

When there is a shortage of soil moisture and a shortage of water resources needed for crop growth and irrigation, these farming operations are experiencing an agricultural drought.

When there is a decrease in water availability in rivers, lakes, reservoirs, and groundwater supplies, these water systems are experiencing a hydrological drought.

And then the drought that drives the previous two is the meteorological drought which is defined as the prolonged period of time of abnormally dry weather, characterized by below average rainfall for a region.

Within this topic, the concentration of the material being written is focused on the ***meteorological drought*** emphasized by CCGCD's call to also manage our on-going hydrological drought.

You may have heard of the Lincoln Declaration of Drought Indices workshop (Hayes *et al*., 2011)? In 2009, at the University of Nebraska-Lincoln, fifty-four drought experts from across the world gathered to recommend to the World Meteorological Organization (WMO) a universal meteorological drought index. After four days of several technical sessions, they finished and recommended the Standardized Precipitation Index (SPI).

For more details on this recommendation among several other recommendations can be found within this document: https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1013&context=droughtfacpub. Subsequently, a great resource of available research documentation related to drought can be found at https://digitalcommons.unl.edu/droughtfacpub/ with research dating back to 1978, free of charge to the public in which this documentation can be downloaded in pdf files for consumption.

This link, https://spi-support.blogspot.com/p/references.html, provides a list of references between 1993 through 2013 that support SPI.

SPI is simple, flexible index to calculate. Precipitation is the only required input parameter. The equation for SPI is $(P – P^*) / \sigma_p$ where P is the observed precipitation, P* is the mean precipitation and σ_p is the standard deviation of precipitation.

Thirty years of monthly precipitation is required with sixty years of monthly precipitation being optimal. Missing data is allowed, but data missing influences the confidence of the results, depending on the distribution of the missing data in relation to the length of the record. Climatologists would prefer no missing data, but the dataset must be 75% or higher complete.

SPI can be calculated for multiple timescales. These timescales can then be applied to the impact of drought on the availability of water resources, short-term soil moisture conditions and long-term groundwater, streamflow and reservoir storage. Thus, typical timescales calculated for SPI are 1-, 3-, 6-, 12-, 24-, 36-, 48-, 60- and 72-month.

Stay tuned into CCGCD’s website page, as TXHCWS will soon be providing more educational materials.