# Rosebud Sioux Tribe Climate and Drought Summary

## Fall Events & Winter Outlook 2017-18

### Warm Fall With Variable Precipitation

Warmer than normal temperatures occurred this fall across the Rosebud Sioux Tribe lands and surrounding area (see map below left). However, temperature departures were generally no more than 2°F above normal, so fall warmth was not record breaking. Precipitation varied across the region, with the southern half receiving up to 110 percent of normal precipitation and the northern half with less than 80 percent of normal (see map below right). Similar to temperatures, precipitation was not record breaking this fall. For more temperature and precipitation data from local stations, please see the data table on page 2.

Looking at each month of the fall season, September was wet with precipitation that was 110-200 percent of normal across the Rosebud Sioux Tribe lands and surrounding area. September temperatures across the area were within 1°F of normal. Southern South Dakota experienced its first frost of the season in early October, which was 1-2 weeks later than normal. October temperatures were slightly cooler than normal in the western half of the region but near normal in the eastern half. October was dry, with less than 50 percent of normal precipitation occurring in the northeastern portion of the Rosebud Sioux Tribe lands. November was even drier, with much of the region receiving less than 50 percent of normal precipitation. It was also quite warm in November, with widespread temperature departures of 3-5°F above normal. The late-fall warmth and dryness did not lead to degradations in drought conditions; however, it contributed to below-normal snowfall throughout the region.

Departure from Normal Temperature (°F)
September 1 - November 30, 2017
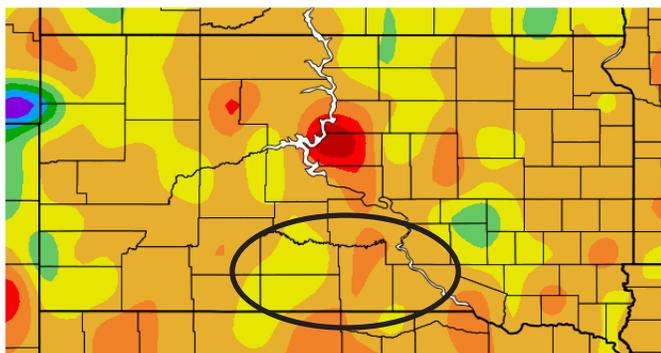
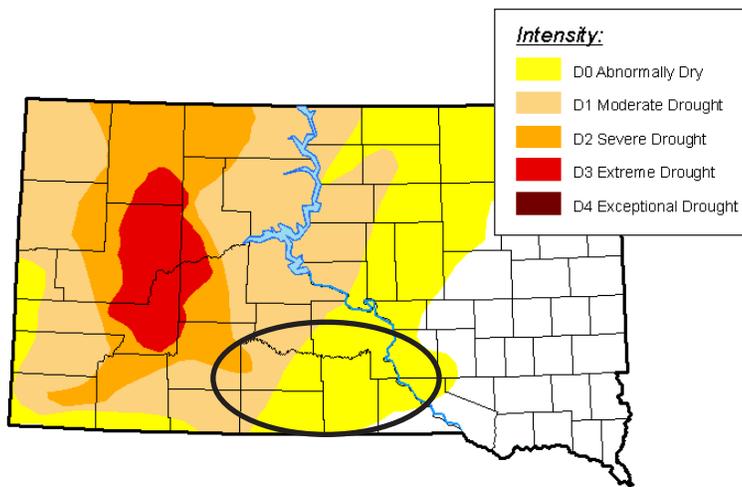Percent of Normal Precipitation (%)
September 1 - November 30, 2017
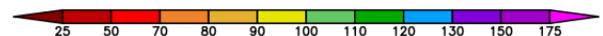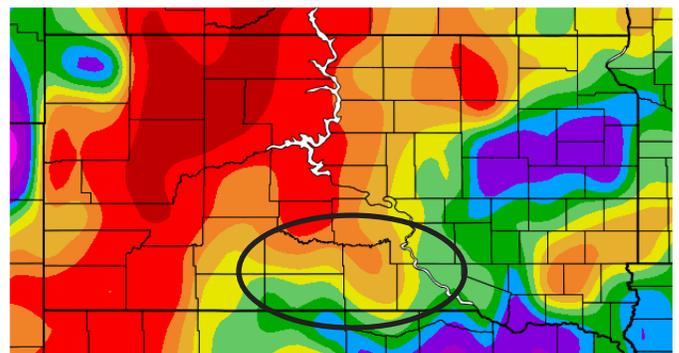
Maps produced by the High Plains Regional Climate Center and are available at: http://www.hprcc.unl.edu/maps/current

December 2017

# Drought Conditions Improve But Persist

The Rosebud Sioux Tribe lands started the fall season with the presence of moderate (D1) and severe (D2) drought conditions. However, precipitation of 110-200% of normal occurred in September across the region, helping reduce the severity of the drought. Additionally, beneficial rainfall that occurred around mid-October resulted in a reduction of D1 and D2 conditions on the Rosebud Sioux Tribe lands. However, drought conditions persisted along with no indicated improvements or degradations during November. Statewide, 38% of winter wheat was in poor to very poor condition as of late November, and nationwide, the U.S. winter wheat condition index was at its 4th lowest in the last twenty years. Drought conditions are favored to continue this winter across western South Dakota, according to the U.S Seasonal Drought Outlook.

### U.S. Drought Monitor of South Dakota - November 28, 2017
Released November 30, 2017 Valid 7 a.m. EST

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

#### Drought Conditions (Percent Area)

|  | None | D0-D4 | D1-D4 | D2-D4 | D3-D4 | D4 |
|---|---|---|---|---|---|---|
| **Current** | 26.85 | 73.15 | 49.06 | 18.64 | 5.92 | 0.00 |
| **Last Week** 11-21-2017 | 26.85 | 73.15 | 49.06 | 18.64 | 5.92 | 0.00 |
| **3 Months Ago** 08-29-2017 | 15.55 | 84.45 | 68.85 | 42.60 | 6.27 | 0.00 |
| **Start of Calendar Year** 01-03-2017 | 61.22 | 38.78 | 26.01 | 6.00 | 0.00 | 0.00 |
| **Start of Water Year** 09-26-2017 | 19.56 | 80.44 | 59.35 | 32.30 | 5.62 | 0.00 |
| **One Year Ago** 11-29-2016 | 27.29 | 72.71 | 31.81 | 1.33 | 0.00 | 0.00 |

The U.S. Drought Monitor is jointly produced by the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration. Map courtesy of NDMC-UNL. For more information on the U.S. Drought Monitor, go to: http://droughtmonitor.unl.edu

# Summary Of Station Data (September - November 2017)

| Station | Average Temp. (°F) | Dep. from Normal Temp. (°F) | Temp. Rank | Total Precip. (in.) | Dep. from Normal Precip. (in.) | Percent of Normal Precip. | Precip. Rank | Period of Record |
|---|---|---|---|---|---|---|---|---|
| Cedar Butte | - | - | - | - | - | - | - | 1918-2017 |
| Kilgore 1 NE | 49.2 | 0.6 | - | 4.46 | 0.50 | 113 | - | 1998-2017 |
| Hamill (SD Mesonet) | 50.2 | - | - | 3.24* | - | - | - | 2008-2017 |
| Magpie Creek SD | 51.3* | - | - | - | - | - | - | 1987-2017 |
| Martin 19.6 ENE | - | - | - | 3.19* | - | - | - | 2007-2017 |
| Mission 14 S | 48.7 | 0.7 | - | 4.33 | 0.13 | 103 | near normal | 1951-2017 |
| Murdo | 50.2 | 1.0 | - | 2.79 | -1.33 | 68 | near normal | 1907-2017 |
| Norris 2.0 SSW | - | - | - | 3.52 | - | - | - | 2008-2017 |
| Olsonville 4.5 SE | - | - | - | 4.25* | - | - | - | 2013-2017 |
| Winner | 51.5 | 1.4 | near normal | 4.06 | -1.02 | 80 | near normal | 1910-2017 |
| Wood | 49.9 | 0.9 | near normal | 3.70 | -0.48 | 89 | near normal | 1913-2017 |

A dash (-) indicates insufficient data for calculation. An asterisk (*) indicates some missing data for this period.
All data are preliminary and subject to change.
Unless noted otherwise, data were retrieved from the Applied Climate Information System (ACIS): rcc-acis.org

## Snow Season Off To A Slow Start

While streamflow was near average throughout the fall, the majority of stream gauges near the Rosebud Sioux Tribe lands are now shut down for the season. Due to this, the fall summary will turn its focus to Plains snowpack. Although there have been some rounds of snow this fall, Plains snowpack was largely non-existent at the start of winter, due to extremely warm temperatures at the end of November. For instance, as of November 30th, Mission 14S had only received 2.0 inches of snowfall for the season, which is 6.0 inches below normal. This abysmal season-to-date snowfall tied several years for the 7th least snowiest on record for Mission 14S. With the winter forecast showing increased chances for above-normal precipitation and below-normal temperatures, a Plains snowpack should return soon.
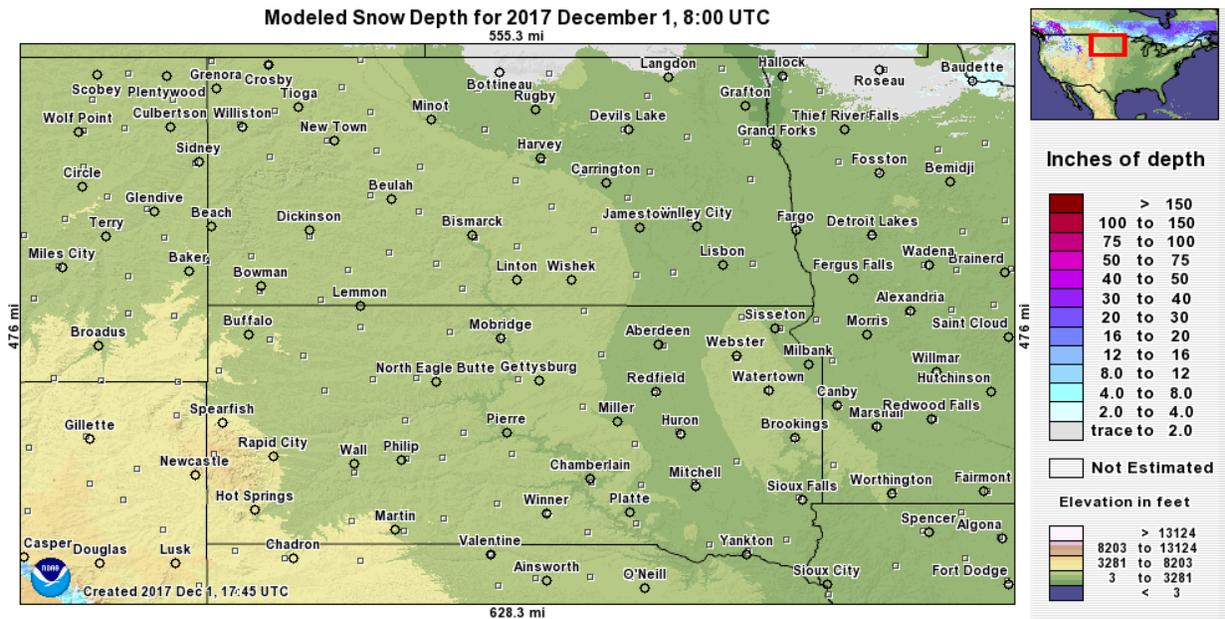


The modeled snow depth map above is produced by NOAA's National Operational Hydrologic Remote Sensing Center (NOHRSC). For the entire suite of maps, including snow water equivalent (SWE), please visit: https://www.nohrsc.noaa.gov/interactive/html/map.html. Please note that snow depth is simply the depth of the snow on the ground at a particular time, and is not indicative of the amount of water contained in the snow (SWE).

## Soil Moisture Conditions Near Average At End Of Fall

Persistent drought conditions this summer and fall impacted soil moisture across the northern Plains. Modeled soil moisture conditions at the end of fall indicated drier soils across portions of the Dakotas, with wetter soils across parts of Nebraska. For the Rosebud Sioux Tribe lands, soil moisture was near average. Soil moisture conditions at this time of the year can be an indicator of soil moisture availability at the start of the next growing season, given that soils have already frozen. The map to the right shows modeled percent of average soil moisture conditions. Areas shaded in yellows and reds indicate drier soils, while areas in greens and blues indicate wetter soils.
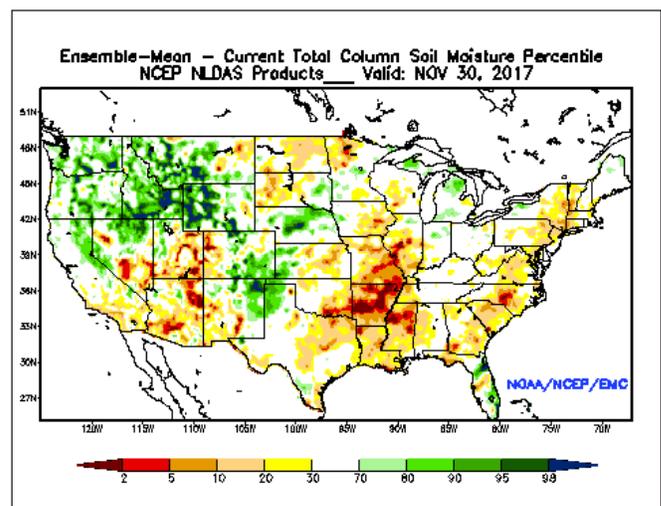


The North American Land Data Assimilation System (NLDAS) was created to support both research and operational applications pertaining to land modeling and water resource management. NLDAS is supported by NOAA/NCEP and NASA/GSFC. A suite of soil moisture maps are produced on a daily basis with a 3.5 day lag time, in order to incorporate high quality surface data. For more information, please see: http://www.emc.ncep.noaa.gov/mmb/nldas/drought/.
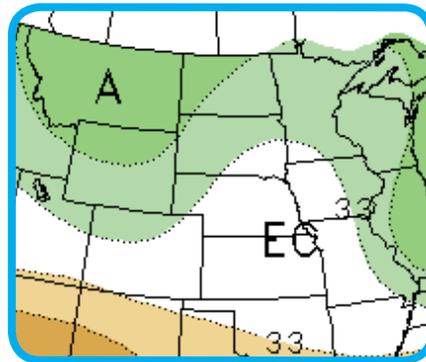
La Niña conditions are present and should continue through the winter months. The winter outlook from NOAA's Climate Prediction Center largely follows a wintertime La Niña pattern, with an increased chance for below-normal temperatures and above-normal precipitation across the upper Missouri Basin. Below-normal temperatures and equal chances for above-, below-, and near-normal precipitation are favored for the Rosebud Sioux Tribe lands (see maps below—left and center). The U.S Seasonal Drought Outlook favors the continuation of the drought in western South Dakota (see map below-right). The National Interagency Fire Center predicts wildfire potential to be normal through the end of winter; however, due to continued dryness across western areas of the Dakotas, drier than average fuels could ignite quickly during dry and windy conditions. CPC outlooks are available at: http://www.cpc.ncep.noaa.gov/.

### 3-Month Temperature Outlook
**Valid December 2017 - February 2018**



### 3-Month Precipitation Outlook
**Valid December 2017 - February 2018**
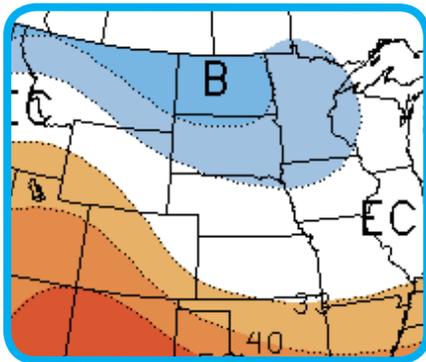


EC: Equal chances of above, near, or below normal
A: Above normal B: Below normal

### U.S. Seasonal Drought Outlook
**Valid Nov. 16, 2017 - Feb. 28, 2018**



Key:
- Drought persists
- Drought remains but improves
- Drought removal likely
- Drought development likely

**Three-Month Temperature and Precipitation Outlook explanation:**
Each month, the Climate Prediction Center issues a new three-month outlook for temperatures and precipitation for the lower 48 states and Alaska. These outlooks indicate the probability of temperatures and precipitation being above, near, or below normal. ("Normal" is what is expected based on average temperatures and precipitation during the period of 1981-2010.) In general, the colors on the map will indicate warmer/cooler or wetter/drier conditions. In the temperature outlook, the oranges signify above normal temperatures, while the blues signify below normal temperatures. In the precipitation outlook, the greens indicate above normal precipitation, while the browns indicate below normal precipitation. You will also see probabilities on the map (e.g. 33, 40, 50, 60, 70, and 80). For a location and season, forecasters divide the 30 observations from 1981-2010 into thirds: 1/3 is the coldest or driest, 1/3 is the warmest or wettest, and 1/3 is in between. When forecasters indicate that an area will have above normal precipitation, for example, they are saying that the probability is greater than 33 percent. The outlooks are for the 3-month period as a whole and do not indicate when certain conditions would occur or the duration and intensity of any particular event. Areas of white are marked by "EC," which means equal chances of above, near, or below normal temperatures/precipitation. EC does not mean near normal.

**Drought Outlook explanation:**
The Climate Prediction Center issues a seasonal drought outlook for the U.S. that is based on probabilities for drought development, persistence and intensification, improvement, and removal at a large scale. Local-scale changes in drought conditions may not be captured by this outlook. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4). The tan areas on the map imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none). The white areas imply no drought present.

**Collaborators and Partners:**



**Contact Information:** Please direct questions and feedback on this climate summary to Crystal Stiles, High Plains Regional Climate Center, 402-202-3320.