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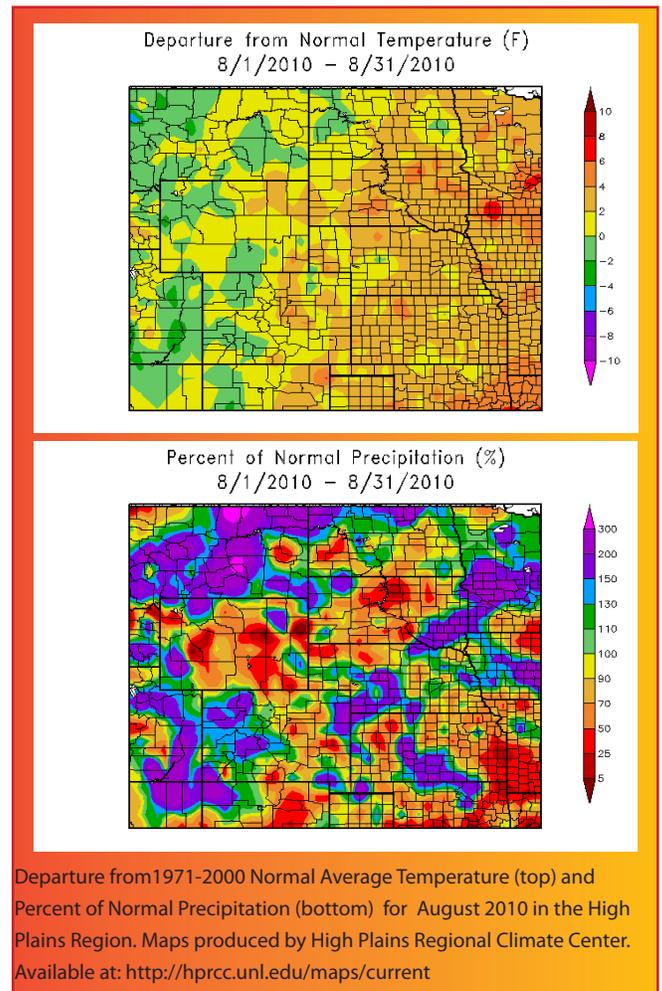
The Platte River, at Hwy 34 east of Grand Island, NE - Ken Dewey
<http://www.nebraskaweatherphotos.org>

August 2010 Climate Summary

Region Breakdown

August 2010 was warmer than normal for much of the High Plains Region. Meanwhile, precipitation varied across the Region. In the wet areas, the warm temperatures were welcome as this aided in crop development and the harvest of small grains. However, in areas which have been dry, the warm temperatures stressed some row crops and livestock. Temperature departures across the eastern half of the Region ranged from 2-4 degrees F (1.1-2.2 degrees C) above normal and isolated areas of Colorado, Kansas, Nebraska, and South Dakota were 4-6 degrees F (2.2-3.3 degrees C) above normal. The warmer than normal temperatures were not hot enough to break records, although a few locations in Colorado and Kansas were able to break into the top 10 warmest Augusts on record. This month's warm spot was Alamosa, Colorado which is located in the south central portion of the state. Alamosa had its 9th warmest August on record (period of record 1906-2010) with an average temperature of 64.4 degrees F (18.0 degrees C).

Overall, the summer (June, July, and August) was also warmer than normal for many locations in the Region, especially Colorado and Kansas where temperature departures were 2-4 degrees F (1.1-2.2 degrees C) above normal. Alamosa, Colorado recorded its warmest summer on record with an average temperature of 64.4 degrees F (18.0 degrees C). The previous warmest summer on record was set in 2007 with an average temperature of 64.1 degrees F (17.8 degrees C). Wichita, Kansas recorded its 5th warmest summer on record (period of record 1888-2010) with an average temperature of 82.3 degrees F (27.9 degrees C). The warmest summer on record in Wichita occurred in both 1936 and 1934 with an average temperature of 85.3 degrees F (29.6 degrees C).

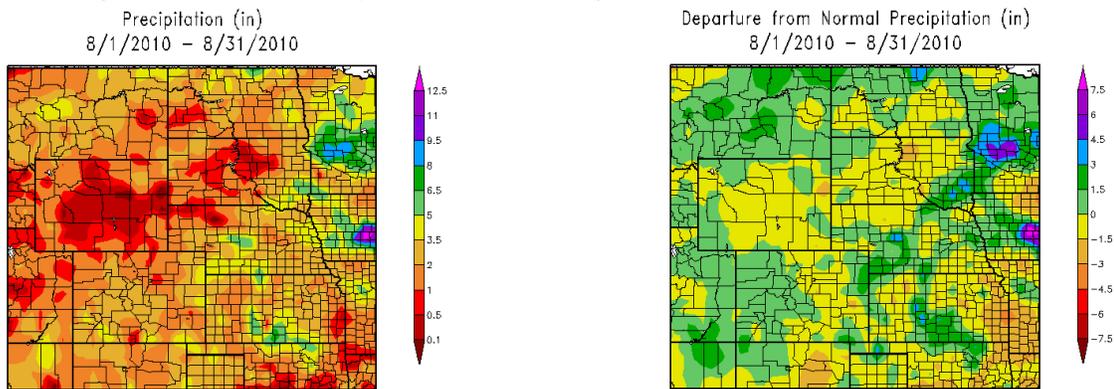


Precipitation Summary

Precipitation was spotty across the High Plains Region this month. Some areas of the Region, including central South Dakota, northern Nebraska, eastern and west central Kansas, and central and eastern Wyoming, received precipitation which was only 50 percent of normal or less. Meanwhile, other areas including southeastern South Dakota, eastern Colorado into southwestern Nebraska, and central Kansas received greater than 150 percent of normal precipitation. These precipitation totals were not enough to break records in August, however new precipitation records were set for the summer (see table below).

This month's wet spot was Wessington Springs, South Dakota. Wessington Springs received 3.95 inches (100.33 mm) of precipitation, or 178 percent of normal, which was the 9th wettest August on record (period of record 1893-2010). For the summer, Wessington Springs received a total of 25.16 inches (639.07 mm) of precipitation which smashed the old record of 15.52 inches (394.21 mm) received in 1962. Interestingly, the heavy precipitation this year now totals 35.43 inches (899.92 mm) which sets a new record for the entire year! The previous record was 34.13 inches (866.90 mm) of precipitation received in 1995.

The high precipitation led to flooding along rivers for much of the summer. According to the National Weather Service in Valley, NE, the Missouri River at Brownville was above flood stage for 78 consecutive days from June 11th to August 28th. The river crested at 42.89 feet, or 10.89 feet above flood stage, on June 22nd and this was the second highest crest ever reported at Brownville. The highest crest occurred July 24, 1993 with a stage of 44.30 feet.



Above: Total precipitation (inches) (left) and Departure from Normal Precipitation (inches) (right) for August 2010 in the High Plains Region. These maps are produced by HPRCC and can be found on the Current Climate Summary Maps page at: <http://hprcc.unl.edu/maps/current>.

Summer 2010 Precipitation Records - Highlights

Monthly Records			
Precipitation in inches			
Wettest	New Record	Old Record	Period of Record
Brookings 2 NE, SD	21.51	17.75/1963	1893-2010
Butte, NE	19.00	18.64/1993	1906-2010
De Smet, SD	20.96	19.32/1984	1893-2010
Ericson 6 WNW, NE	19.46	17.95/1994	1893-2010
Forestburg 3 NE, SD	18.87	18.18/1905	1893-2010
Marion, SD	26.32	21.98/1944	1901-2010
Sioux Falls, SD	22.64	17.39/1993	1893-2010
Taylor, NE	18.24	16.98/1981	1921-2010
Vermillion 2 SE, SD	21.94	19.47/1944	1893-2010
Wessington Springs, SD	25.16	15.52/1962	1893-2010
Yankton 2E, SD	20.30	20.27/1944	1932-2010

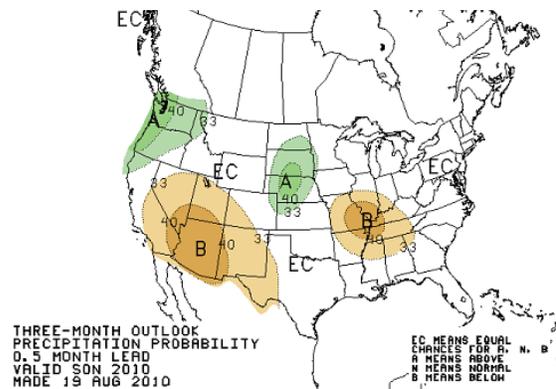
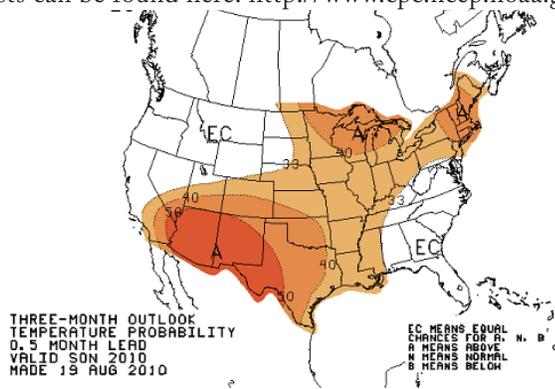
All Data are Preliminary and Subject to Change.
 Source: National Weather Service Cooperative Observation Network Data

The High Plains Regional Climate Center is one of the Regional Climate Centers, and is involved in the Applied Climate Information System (ACIS) development and management effort. Data found throughout this publication were derived using products built on the ACIS framework.



Climate Outlook

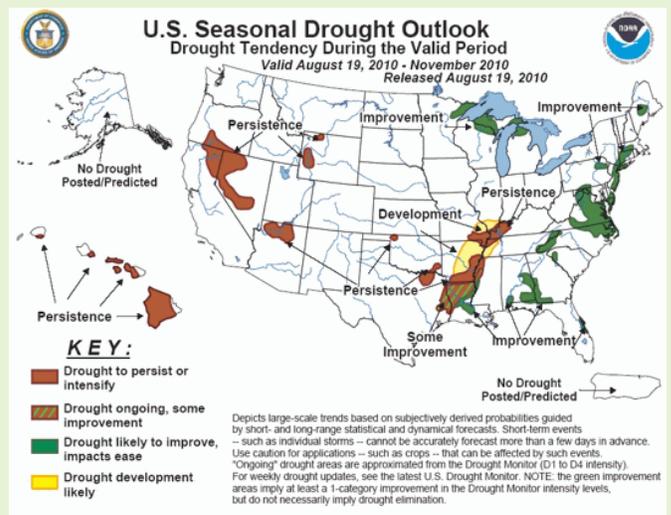
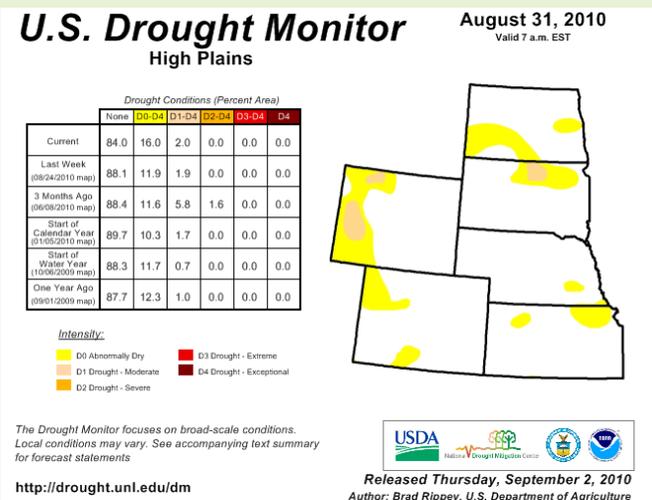
La Niña conditions were present across the equatorial Pacific this month and are likely to continue through early 2011. The temperature outlook indicates a higher probability of above normal temperatures for Colorado, Kansas, the majority of Nebraska, the eastern halves of the Dakotas, and the far southeastern corner of Wyoming. Equal chances of above, near, or below normal temperatures are predicted elsewhere. The precipitation outlook indicates a higher probability of above normal precipitation for the majority of Nebraska and South Dakota, southern North Dakota, northwestern Kansas, and extreme north-eastern Colorado. Western Colorado has a higher probability of below normal precipitation. Equal chances of above, near, or below normal precipitation are predicted elsewhere in the Region. The seasonal outlooks combine the effects of long-term trends, soil moisture, and when applicable, the El Niño Southern Oscillation cycle (ENSO). More information about these forecasts can be found here: <http://www.cpc.ncep.noaa.gov/>.



Above: 3-Month Outlook Maps Courtesy the NOAA Climate Prediction Center - <http://www.cpc.ncep.noaa.gov>
 (left) The Three-Month Temperature Probability Outlook, (right) The Three-Month Precipitation Probability Outlook

Drought Watch

While overall, summer 2010 was wet for many locations across the High Plains Region, some locations were drier than normal which led to significant changes in the U.S. Drought Monitor this month. Early in the month, pockets of abnormally dry conditions (D0) were introduced to north central South Dakota, southeastern Nebraska, and northern Kansas. Later in the month, moderate drought conditions (D2) developed in north central South Dakota as little rain fell and D0 conditions were also expanded into North Dakota. Meanwhile, drought conditions remain unchanged in Wyoming and the D0 area in Colorado was trimmed slightly. According to the U.S. Seasonal Drought Outlook released August 19th, the drought conditions in western Wyoming were expected to persist through November 2010.



The U.S. Drought Monitor is produced as a joint effort of the U.S. Department of Agriculture (USDA), National Drought Mitigation Center, U.S. Department of Commerce and the National Oceanic and Atmospheric Administration (NOAA). Real-time data provided through ACIS from the Regional Climate Centers are often used by the agencies involved in the U.S. Drought Monitor when determining the area and intensity of drought conditions, although the product itself is not produced by HPRCC. For current Drought Monitor information, please see: <http://www.ndmc.unl.edu/dm/monitor.html>
 Portions of this Drought Watch are courtesy the Drought Monitor Text Discussion found on the Drought Monitor webpage.

State Summaries

Colorado	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Alamosa San Luis Airport	82.6	46.2	64.4	2.3	88	8/15	37	8/14	0.47	-0.72	39
Akron Washington County Airport	89.3	60.0	74.6	2.3	98	8/27	50	8/31	1.29	-0.71	64
Colorado Springs Municipal Airport	84.4	57.4	70.9	3.3	92	8/27+	49	8/25	2.47	-1.01	71
Grand Junction Walker Field Airport	88.7	60.5	74.6	-0.1	97	8/15	53	8/13	1.22	0.38	145
Pueblo Memorial Airport	80.7	58.2	74.5	0.9	97	8/28+	51	8/28+	1.76	-0.51	78

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	93.4	67.5	80.4	3.4	107	8/02	54	8/25	3.16	-0.08	98
Dodge City Regional Airport	94.4	65.6	80.0	1.8	105	8/08	50	8/25	1.92	-0.81	70
Goodland Renner Field	90.1	61.2	75.7	2.5	97	8/18+	50	8/27	2.66	0.17	107
Topeka Municipal Airport	94.6	69.1	81.9	5.2	106	8/13+	53	8/25	1.68	-2.13	44
Wichita Mid-Continent Airport	95.7	71.3	83.5	3.7	109	8/13+	57	8/25	4.26	1.32	145

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	92.2	57.9	75.0	2.0	106	8/27	43	8/24	0.00	-1.67	0
Grand Island Airport	89.1	64.4	76.7	3.1	101	8/12	52	8/25	3.87	0.79	126
Lincoln Municipal Airport	90.7	65.5	78.1	2.7	100	8/12	52	8/25	2.81	-0.54	84
Omaha Eppley Airfield	89.2	68.8	79.0	4.5	99	8/11	58	8/25	4.83	1.62	150
Norfolk Karl Stefan Airport	86.9	63.8	75.4	2.7	96	8/12+	51	8/25	4.48	1.68	160
North Platte Regional Airport	87.9	60.5	74.2	1.6	96	8/11	48	8/25	2.35	0.20	109
Valentine Miller Field	91.0	60.8	75.9	3.8	103	8/21	41	8/24	2.01	-0.19	91

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismark Municipal Airport	84.6	57.6	71.1	2.1	104	8/22	42	8/25	2.74	0.59	127
Fargo International Airport	82.0	60.5	71.2	2.2	92	8/27+	46	8/25+	2.76	0.24	110
Grand Forks International Airport	82.6	58.7	70.6	2.8	95	8/09	43	8/17	4.12	1.40	151
Theodore Roosevelt Airport	83.7	53.8	68.7	0.0	98	8/22	42	8/25	0.93	-0.58	62
Williston International Airport	81.9	55.8	68.8	0.5	97	8/26+	42	8/25	2.20	0.72	149

All Data are Preliminary and Subject to Change. + indicates multiple dates, latest date listed.

Source: National Weather Service Cooperative Observation Network Data

Data are retrieved through the Applied Climate Information System (ACIS).

These data are available for the entire period of record through the CLIMOD system. For more information please see <http://hprcc.unl.edu/services>.

August 2010 Climate Summary

South Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Aberdeen Regional Airport	85.7	61.1	73.4	2.9	96	8/22	47	8/25	1.01	-1.41	42
Huron Regional Airport	86.6	64.2	75.4	3.9	94	8/11	48	8/25	1.60	-0.47	77
Pierre Regional Airport	90.6	62.4	76.5	2.4	108	8/27	48	8/25	0.83	-1.03	45
Rapid City Regional Airport	87.9	57.1	72.5	1.4	102	8/27+	46	8/24	1.33	-0.28	83
Sioux Falls Joe Foss Field Airport	84.1	64.5	74.3	3.5	92	8/11	51	8/25	6.26	3.25	208

Wyoming	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Casper Natrona County International AP	86.5	54.0	70.3	1.7	97	8/22+	39	8/24	0.40	-0.33	55
Cheyenne Municipal Airport	83.8	54.2	69.0	3.1	93	8/26+	46	8/24	0.34	-1.48	19
Lander Hunt Field Airport	85.5	54.0	69.8	0.4	95	8/26+	38	8/31	0.23	-0.34	40
Laramie Regional Airport	79.4	46.4	62.9	1.2	88	8/22	35	8/31	1.16	-0.07	94
Rawlins Municipal Airport	80.8	48.9	64.8	-1.7	91	8/22	33	8/24	0.54	-0.27	67
Sheridan County Airport	85.9	52.2	69.0	0.9	101	8/21	39	8/31	0.79	-0.01	99

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Summer 2010 Temperature and Precipitation Rankings

Location	Summer 2010 Temperature Rankings		Summer 2010 Precipitation Rankings		Period of Record
	Temp (F)	Rank	Precip (inches)	Rank	
Alamosa, CO	64.4	Warmest on record	1.61	11th driest	1906-2010
Denver, CO	72.4	19th warmest	6.35	32nd wettest	1872-2010
Grand Junction, CO	76.4	31st warmest	1.95	54th wettest	1893-2010
Dodge City, KS	79.3	16th warmest	14.76	10th wettest	1874-2010
Topeka, KS	80.7	8th warmest	15.82	32nd wettest	1887-2010
Wichita, KS	82.3	5th warmest	12.36	45th wettest	1888-2010
Grand Island, NE	75.3	39th warmest	16.74	8th wettest	1895-2010
Lincoln, NE	76.7	30th warmest	18.54	6th wettest	1887-2010
North Platte, NE	72.9	47th warmest	11.32	23rd wettest	1874-2010
Omaha, NE	77.2	18th warmest	20.40	5th wettest	1871-2010
Bismark, ND	69.0	41st warmest	8.23	52nd wettest	1874-2010
Grand Forks, ND	68.8	15th warmest	10.31	31st wettest	1893-2010
Fargo, ND	70.0	18th warmest	11.25	34th wettest	1881-2010
Aberdeen, SD	71.1	20th warmest	9.65	47th wettest	1893-2010
Huron, SD	72.9	25th warmest	15.55	5th wettest	1881-2010
Sioux Falls, SD	71.8	43rd warmest	22.64	Wettest on record	1893-2010
Rapid City, SD	68.8	25th coolest	7.56	25th wettest	1942-2010
Casper, WY	66.9	21st coolest	3.79	24th wettest	1939-2010
Cheyenne, WY	66.6	29th warmest	4.87	58th driest	1872-2010
Sheridan, WY	66.2	21st coolest	5.01	21st wettest	1948-2010

All Data are Preliminary and Subject to Change.

State Spotlight - North Dakota



F. Adnan Akyüz - State Climatologist, Barb Mullins
North Dakota State Climate Office, North Dakota State University

Precipitation:

The North Dakota Agricultural Weather Network (NDAWN) August precipitation totals ranged from approximately 0.5 to 6.5 inches with the higher amounts of greater than 3 inches falling in the northwestern, north central, and southeast regions. NDAWN's percent of normal precipitation ranged from about 30% to 250%. Areas in the northwest, north central, southeast, and southwest edge had greater than 100% of normal with less than 100% falling elsewhere (Figure 1. North Dakota State Climate Office). Most of the daily rainfall events happened on the 1st and 2nd, 7th through the 13th, and the 30th. The National Weather Service (NWS) Storm Prediction Center reported 14 tornadoes in August. According to the NWS, on the 7th an EF3 (Enhanced Fujita Scale) tornado touched down about 10 miles south of Wahpeton, ND and tracked northwestward for approximately 5 miles, increasing in intensity to a low end EF4, and ended 7 miles south southeast of Breckenridge, MN. On the 12th the NWS reported an EF3 tornado near Bowbells that destroyed one home and damaged a second. The tornado also threw a car 200 yards resulting in one injury and one fatality.

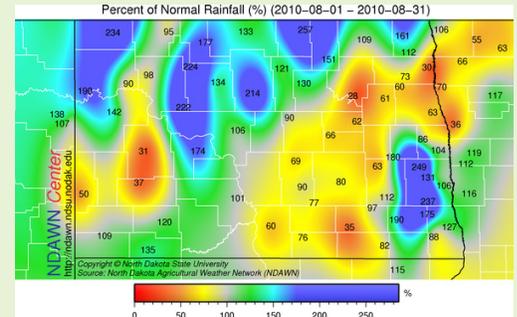


Figure 1. Precipitation Percent of Normal in August 2010 for North Dakota (North Dakota State Climate Office)

Temperature:

NDAWN's August average air temperatures ranged from 65 °F to 73 °F. The eastern part of the state had above normal temperatures and the western part had near normal to below normal average air temperatures. NDAWN departure from normal air temperatures ranged from -1 °F to 4 °F (Figure 2. North Dakota State Climate Office). According to the USDA, National Agricultural Statistics Service, North Dakota Field Office much of August had warm, dry weather which allowed good progress for small grain harvest. High winds, especially around the middle of the month, caused damage to some crops. NDAWN on the 12th recorded a maximum wind speed of 68 mph at Hettinger, 66 mph at Mott, 64 mph at Linton and 50 mph at Bowbells. NDAWN wind speeds are measured at a height of 10 feet (3 m).

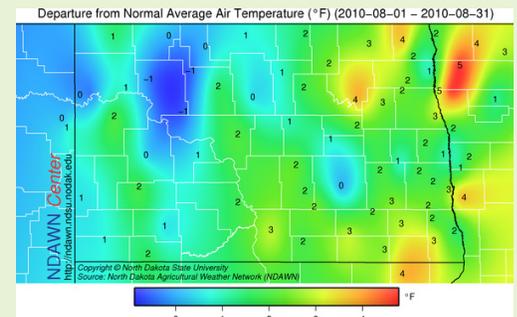


Figure 2. Temperature Departure from Normal in August 2010 for North Dakota (North Dakota State Climate Office)

State Spotlight - South Dakota

Dennis Todey - State Climatologist
South Dakota State Climate Office, South Dakota State University



Synopsis

Variability was again the watchword of August and the summer as a whole across South Dakota. The state encompassed several stations with wettest Augusts on record as well as several stations at driest or near driest. The wet and dry both have had an impact on agriculture drowning out crops in wet areas while stressing crops to yield loss in the dry areas.

Temperatures

Average temperatures in August were in the 70s except for a few counties in the far northwest. These temperatures were above average statewide (Fig. 1) ranging from 1-2 F above average in the far northwest to 3-5 F in most of the row crop areas of the east and portions of the south central. Several days had high temperatures well above 100 F, particularly in the west throughout the month.

What drove the above average temperatures most in the east were overnight lows. Many stations in the northeast to east central parts of the state had top 10 warmest overnight lows with at least ten locations having top five warmest August low temperatures.

The warm temperatures also drove growing degree day (GDD) accumulation pushing crop maturity ahead of average and well ahead of last year. Accumulations were 7-10 days ahead of average since April 1. The GDD accumulation is a good indicator of crop maturity.

Precipitation and Drought

Precipitation for the month was extremely variable ranging from 5”+ totals across the southeast part of the state to less than half an inch from north central to southwest South Dakota. The wetter areas were from 150-200% of average precipitation, including the southeast, a few stations around Milbank, the far northwest and in the far southwest. On the other extreme less than 25% of average precipitation fell in north central South Dakota, just east of the river and a few stations in the Black Hills.

The warmer temperatures helped increase evapotranspiration and evaporation of water from open areas during the month. Thus, the impact of wetter conditions was shorter lived with brief flood episodes. Overall flooding decreased during the month as flood warnings were gradually removed from the Big Sioux and James Rivers.

The dry conditions did cause an introduction of D0 conditions in the north central that has gradually covered a larger area and also led to an introduction of D1 conditions just east of the river in north central South Dakota. The dry conditions are still considered shorter term issues leading to agricultural drought. These occurred in the midst of longer term heavier precipitation. Very few state streams/rivers are showing effects of dryness. All longer term precipitation indexes show overall wetness in the state.

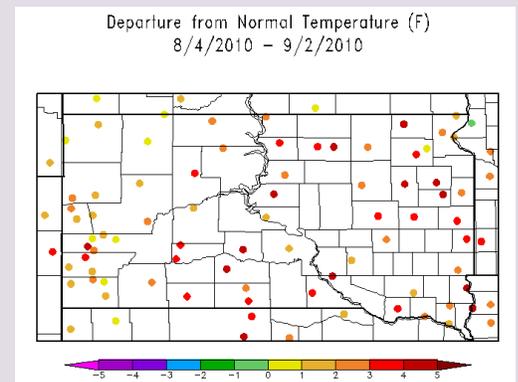


Figure 1. Departure from Normal in August 2010 for South Dakota (High Plains Regional Climate Center)

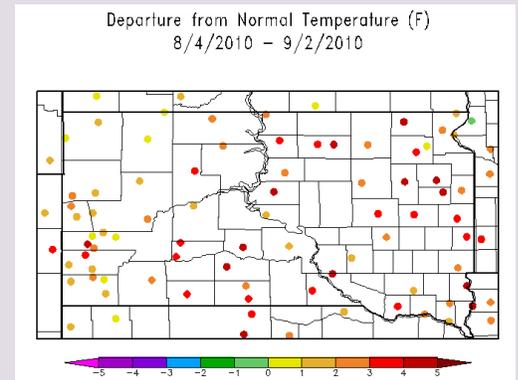


Figure 2. Precipitation Percent of Normal in August 2010 for South Dakota (High Plains Regional Climate Center)

State Spotlight - South Dakota cont.

Dennis Todey - State Climatologist
South Dakota State Climate Office, South Dakota State University



Agricultural Impacts

The warm conditions continued to stress crops in the dry areas of north central and northeast South Dakota and other dry pockets. The pocket of D1 encompassed an area that has been extremely dry for the whole summer. Crops held on until this month and then began to show stresses.

The last state agricultural statistics report showed statewide concern about near-surface soils as 30% short and 12% very short up from 27% and 6% the previous week.

Local reports from extension and personal interaction talked about corn firing and beans turning leaves as signs of stress and likely crop loss. Smaller areas have dead corn on lighter ground due to the combination of heat and lack of rainfall. Pastures that were green early in the month had become brown. Satellite greenness indexes also showed stressed vegetation across the D1 and D0 areas of the US Drought Monitor. One farmer in Campbell County reported no ears being formed on corn due to dryness.

In contrast on the wet side, large numbers of acres went unplanted this spring because of the wet conditions. Total numbers are difficult to determine. But easily several hundred thousand acres likely did not get planted.

Severe Weather

The state reported 125 severe weather events for the month (106 wind, 17 hail and 2 tornado).

About the High Plains Regional Climate Center

The High Plains Regional Climate Center (HPRCC) operates out of the University of Nebraska - Lincoln (UNL) in Lincoln, Nebraska. As one of 6 regional climate centers throughout the nation, HPRCC works closely with other organizations such as the National Climatic Data Center (NCDC), Local and Regional National Weather Service (NWS) Offices, and other climate services organizations such as the National Drought Mitigation Center (also located at UNL) to provide climate data services and specialized climate products.

For More Information Online

High Plains Regional Climate Center: <http://hprcc.unl.edu>

High Plains Regional Climate Services: <http://hprcc.unl.edu/services>

CLIMOD: <http://climod.unl.edu>

Regional Climate Centers and ACIS: <http://www.rcc-acis.org>

National Weather Service: <http://www.weather.gov>

National Climatic Data Center: <http://ncdc.noaa.gov>

University of Nebraska - Lincoln: <http://www.unl.edu>

National Drought Mitigation Center: <http://drought.unl.edu>

Climate Prediction Center: <http://www.cpc.noaa.gov>

NOAA Storm Prediction Center: <http://www.spc.noaa.gov>



Photo of the Nebraska Sandhills by Bill Sorensen - Senior Programmer - HPRCC

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