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Sunny summer afternoon in Greenwood, NE - Photo by Ken Dewey  
<http://www.nebraskaweatherphotos.org>

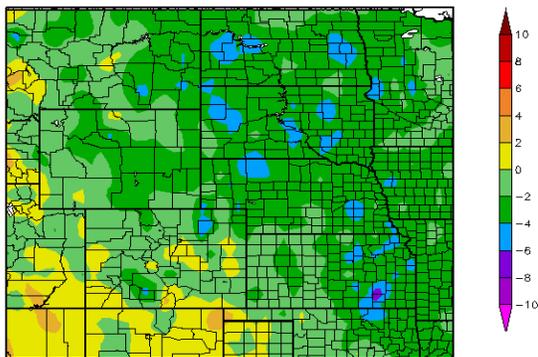
# August 2009 Climate Summary

## Region Breakdown

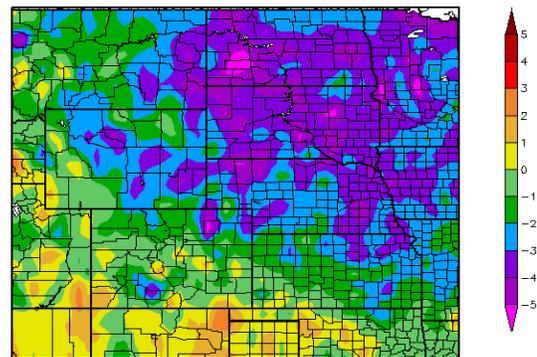
A persistent upper air pattern continued to keep the High Plains Region cool this August. Most locations had average monthly temperatures that were 2°F to 4°F (1.1°C to 2.2°C) below normal and isolated areas of the Region were 4°F to 8°F (2.2°C to 4.4°C) below normal. Monte Vista, CO recorded its coolest August with an average temperature of 57.8°F (14.3°C), which broke the old record of 58.2°F (14.6°C) recorded in 1956. Interestingly, many locations recorded average temperatures that were nearly identical to those recorded in July. For instance, Lincoln, NE had an average temperature of 72.6 (22.6°C) in July and 72.3 (22.4°C) in August. Lincoln's normals for July and August are 77.8 (25.4°C) and 75.4 (24.1°C), respectively.

For the summer, temperature departures of 2°F to 5°F (1.1°C to 2.8°C) below normal dominated the Region and many locations ranked in the top 15 coolest summers on record. The only exceptions to the mild weather were isolated pockets of Wyoming, Colorado, and Kansas. Casper, WY recorded its coolest summer with an average temperature of 63.9°F (17.7°C). The previous record of 64.3°F (17.9°C) occurred in 2004. More information about summer 2009 temperature rankings is located on page 5.

Departure from Normal Temperature (F)  
 8/1/2009 – 8/31/2009



Departure from Normal Temperature (F)  
 6/1/2009 – 8/31/2009



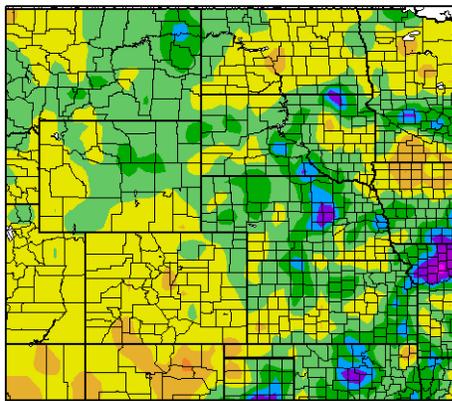
Departure from 1971-2000 Normal Mean Average Temperature for August 2009 (left) and Departure from 1971-2000 Normal Mean Average Temperature for Summer 2009 (right) in the High Plains Region. Map by High Plains Regional Climate Center. Available at: <http://hprcc.unl.edu/maps/current>

# Precipitation Summary

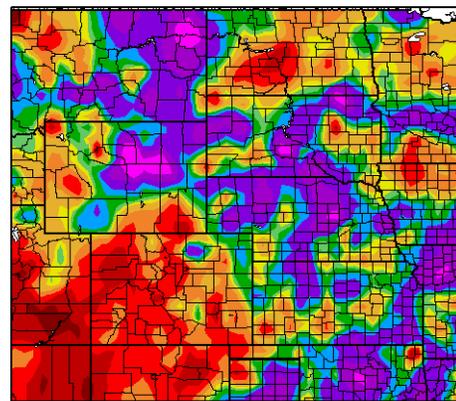
This August, some areas of the Region received ample precipitation, while other areas were dry and saw either the development of abnormally dry conditions or little relief to ongoing drought. Precipitation totals exceeding 200% of normal were confined to pockets of Wyoming, South Dakota, Nebraska, and Kansas. Within these regions of heavy precipitation, many locations recorded the wettest August on record (see table below). The driest areas in the region were Colorado and North Dakota where precipitation totals less than 50% of normal were common.

This month's wet spot is Columbia, SD. Not only did this location record its wettest August, it also recorded its wettest summer. Columbia received 7.22 inches (183.4 mm) of precipitation, or 313% of normal, this month which smashed the old record of 5.84 inches (148.3 mm) recorded in 1957. For the summer, Columbia received 17.90 inches (454.7 mm) of precipitation which is 9.45 inches (240.0 mm) above normal and 212% above normal. The old record of 14.45 inches (367.0 mm) was recorded in 1993.

Departure from Normal Precipitation (in)  
8/1/2009 - 8/31/2009



Percent of Normal Precipitation (%)  
8/1/2009 - 8/31/2009



Above: Departure from 1971-2000 Normal Precipitation (inches) (left) and Percent of 1971-2000 Normal Total Precipitation (right) for August 2009 in the High Plains Region. These maps are produced by HPRCC and can be found on the Current Climate Summary Map page at: <http://hprcc.unl.edu/maps/current>.

## August 2009 Precipitation Records - Highlights

Monthly Records			
Precipitation in inches			
Wettest	New Record	Old Record/Year	Period of Record
Columbia 8 N, SD	7.22	5.84/1957	1949-2009
Big Stone City 2 NW, SD	6.89	5.85/1990	1983-2009
Murdo, SD	5.40	4.42/1930	1907-2009
Galesburg, KS	10.16	9.38/1985	1979-2009
Leavenworth, KS	11.31	10.93/2006	1891-2009
Ten Sleep 16 SSE, WY	3.05	2.75/1968	1955-2009

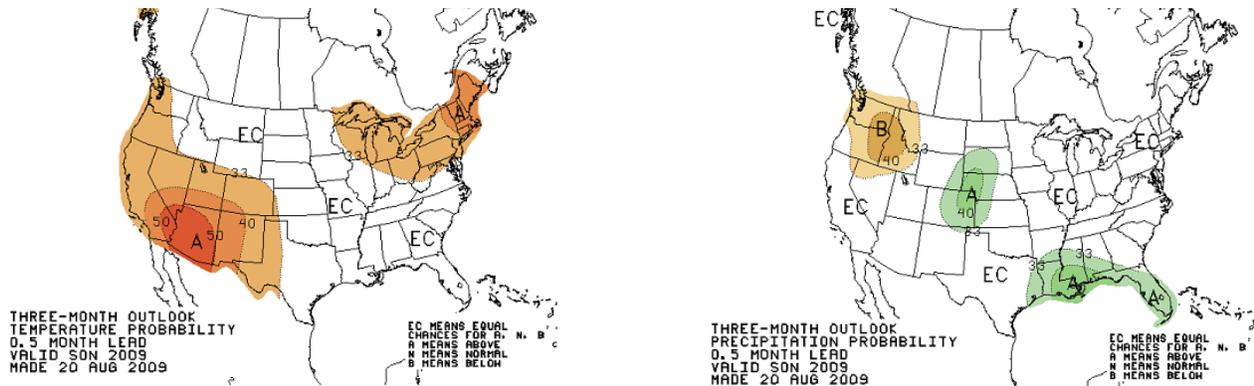
All Data are Preliminary and Subject to Change.  
Source: National Weather Service Cooperative Observation Network Data

The High Plains Regional Climate Center is one of the NOAA 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

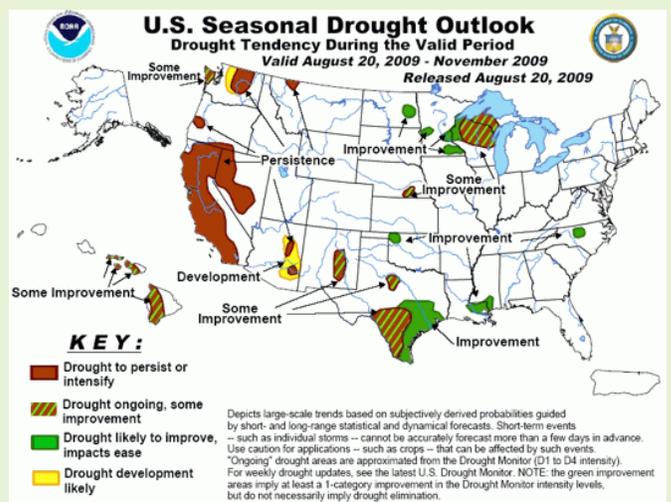
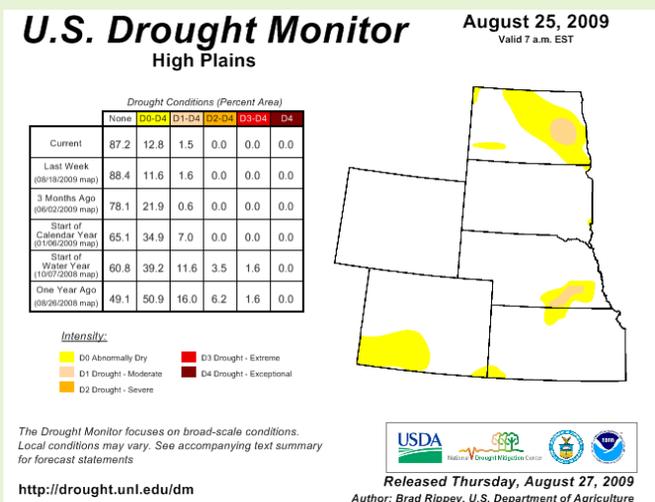
El Niño conditions continued this month and, based on observations and forecasts, will strengthen and continue through winter 2009-10. The temperature outlook indicates a higher probability of above normal temperatures for the majority of Colorado, a small portion of southern Wyoming, and far eastern Kansas. Elsewhere in the region, equal chances of above, near, or below normal temperatures are predicted. The precipitation outlook indicates a higher probability of above normal precipitation for a broad area that includes the western halves of South Dakota, Nebraska, and Kansas, eastern Wyoming, and the eastern half of Colorado. Elsewhere in the region, equal chances of above, near, or below normal precipitation is predicted. The seasonal outlooks combine the effects of long-term trends, soil moisture, and, when applicable the El Niño Southern Oscillation (ENSO) cycle. 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

The two areas of moderate drought (D1) remain largely unchanged this month as drought persists in eastern North Dakota and southeastern Nebraska. Both areas have seen crop stress however, impacts should be only short term as streamflows are above normal and the long term outlook is good. Due to a weak monsoon season, abnormally dry conditions (D0) have developed in southwest Colorado. Elsewhere in the Region, only minor changes were observed in the U.S. Drought Monitor. According to the U.S. Seasonal Drought Outlook, the drought conditions in south central Nebraska and east central North Dakota are expected to improve through November 2009.



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 NOAA 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	81.2	40.3	60.8	-1.3	88	8/05	31	8/09	0.71	-0.48	60
Akron Washington County Airport	83.9	55.8	69.9	-2.4	96	8/23	46	8/16	1.01	-0.99	50
Colorado Springs Municipal Airport	81.3	53.5	67.4	-0.2	91	8/23+	49	8/19	1.84	-1.64	53
Grand Junction Walker Field Airport	91.6	59.4	75.5	0.8	100	8/3+	48	8/16	0.30	-0.54	36
Pueblo Memorial Airport	89.2	55.7	72.4	-1.1	101	8/23	48	8/28	2.71	0.44	119

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	86.2	62.8	74.5	-2.5	103	8/08	44	8/31	2.80	-0.44	86
Dodge City Regional Airport	89.0	62.1	75.6	-2.6	101	8/08	52	8/30	2.57	-0.16	94
Goodland Renner Field	86.0	57.4	71.7	-1.5	100	8/07	48	8/21	1.83	-0.66	73
Topeka Municipal Airport	84.5	64.2	74.3	-2.4	97	8/08	48	8/31	4.54	0.73	119
Wichita Mid-Continent Airport	87.1	65.5	76.3	-3.5	99	8/08	53	8/31+	3.94	1.00	134

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	85.4	53.2	69.3	-3.7	101	8/13	42	8/21+	3.13	1.46	187
Grand Island Airport	82.9	59.9	71.4	-2.2	95	8/07	45	8/30	2.40	-0.68	78
Lincoln Municipal Airport	84.5	60.2	72.3	-3.1	102	8/08	42	8/31	3.20	-0.15	96
Omaha Eppley Airfield	81.9	61.5	71.7	-2.8	98	8/08	46	8/31	6.24	3.03	194
Norfolk Karl Stefan Airport	81.4	58.5	70.0	-2.7	93	8/07	43	8/31	4.29	1.49	153
North Platte Regional Airport	82.3	55.6	68.9	-3.7	92	8/02	43	8/30	2.34	0.19	109
Valentine Miller Field	82.8	55.2	69.0	-3.1	99	8/02	39	8/30	3.47	1.27	158

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismark Municipal Airport	80.2	53.4	66.8	-2.2	98	8/12	42	8/30	0.58	-1.57	27
Fargo International Airport	77.5	54.4	65.9	-3.1	95	8/12	37	8/30	2.13	-0.39	85
Grand Forks International Airport	76.3	53.5	64.9	-2.9	96	8/12	38	8/30	3.17	0.45	117
Theodore Roosevelt Airport	78.8	50.6	64.7	-4.0	96	8/12	41	8/04+	0.75	-0.76	50
Williston International Airport	79.2	51.4	65.3	-3.0	98	8/12	40	8/04	2.30	0.82	155

All Data are Preliminary and Subject to Change.

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 2009 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	78.5	53.2	65.9	-4.7	92	8/12	40	8/30	2.82	0.40	117
Huron Regional Airport	80.1	55.7	67.9	-3.6	94	8/02	41	8/30	1.46	-0.61	71
Pierre Regional Airport	82.7	56.5	69.6	-4.5	97	8/12+	47	8/30	3.78	1.92	203
Rapid City Regional Airport	82.7	52.4	67.5	-3.5	97	8/13	42	8/01	1.48	-0.13	92
Sioux Falls Joe Foss Field Airport	78.7	57.2	68.0	-2.8	91	8/12	41	8/30	1.93	-1.08	64

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	84.2	46.6	65.4	-3.2	97	8/22	36	8/17	1.34	0.61	184
Cheyenne Municipal Airport	80.5	50.5	65.5	-0.4	94	8/23	40	8/16	0.37	-1.45	20
Lander Hunt Field Airport	82.5	52.1	67.3	-2.1	96	8/22	38	8/17	0.69	0.12	121
Laramie Regional Airport	77.6	43.5	60.6	-1.1	88	8/22	33	8/17	0.36	-0.87	29
Rawlins Municipal Airport	80.5	45.7	63.1	-3.4	92	8/22	32	8/17	0.59	-0.22	73
Sheridan County Airport	82.7	50.0	66.4	-1.8	96	8/12	42	8/29+	1.12	0.32	140

All Data are Preliminary and Subject to Change.

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 and Summer 2009 Temperature Rankings

Location	August 2009		Summer 2009 (Jun, Jul, Aug)		Period of Record
	Temp (F)	Rank	Temp (F)	Rank	
Denver, CO	70.3	19th coolest	68.4	7th coolest	1921-2009
Alamosa, CO	60.8	10th coolest	61.3	12th coolest	1906-2009
Goodland, KS	71.7	21st coolest	71.1	12th coolest	1895-2009
Topeka, KS	74.3	17th coolest	75.1	28th coolest	1887-2009
Wichita, KS	76.3	15th coolest	77.8	44th coolest	1888-2009
Lincoln, NE	72.3	23rd coolest	72.4	15th coolest	1887-2009
North Platte, NE	68.9	13th coolest	68.7	7th coolest	1874-2009
Omaha, NE	71.7	21st coolest	71.8	10th coolest	1871-2009
Bismark, ND	66.8	40th coolest	65.1	14th coolest	1874-2009
Grand Forks, ND	64.9	31st coolest	64.1	14th coolest	1893-2009
Fargo, ND	65.9	35th coolest	65.3	16th coolest	1881-2009
Aberdeen, SD	65.9	10th coolest	65.5	5th coolest	1893-2009
Sioux Falls, SD	68.0	12th coolest	67.5	8th coolest	1893-2009
Rapid City, SD	67.5	6th coolest	65.3	3rd coolest	1942-2009
Casper, WY	65.4	4th coolest	63.9	Coolest on record	1939-2009
Cheyenne, WY	65.5	48th coolest	63.7	23rd coolest	1872-2009
Sheridan, WY	66.4	18th coolest	64.0	4th coolest	1948-2009

Rankings are for the period of record for each station, which may vary in the number of years. Only periods with no missing data were used for each station. Period of record and the appropriate ranking are given.

## State Spotlight - North Dakota

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



### Precipitation:

In general, August was a cool, dry and uneventful month. In North Dakota, the majority of the rain fell from the 6th through the 9th, the 14th through the 16th, the 19th to the 20th, and finally on the 24th. The North Dakota Agricultural Weather Network (NDAWN) total August rainfall ranged from 4.93 inches at Perley, MN to 0.26 inches at Hazen. The majority of the State had below normal precipitation with the central region receiving less than 50% of normal. The driest regions had less than 25% of normal precipitation and included McLean, Oliver, Morton, Burleigh, and Sheridan Counties (Figure 1. High Plains Regional Climate Center). The areas that had above normal precipitation included the northwest and southeast corners with primarily 130 to 200% of normal.

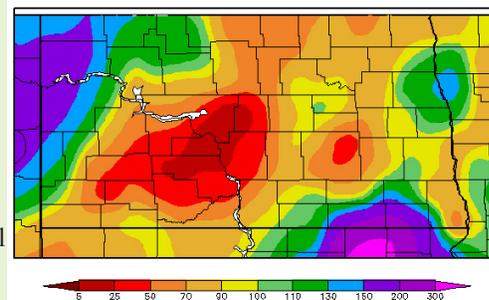


Figure 1. Precipitation Percent of Normal in August 2009 for North Dakota (High Plains Regional Climate Center)

### Temperature:

Throughout the month of August, most of the daily average air temperatures were below normal or near normal. The daily average air temperatures were above normal around the 11th through the 14th. Below normal average monthly air temperatures then continued across the State. Other than January 2009, when the southwest corner had above normal monthly average air temperatures, the last time there were statewide above normal air temperatures was November 2008. In 2009, February through August had below normal monthly air temperatures across the State. The August departures generally ranged from 1°F to 4°F below normal. The northeast corner of the state was between 1°F and 2°F below normal. The northwest, central, and southeast were 2°F to 3°F below normal. The southwest was 3°F to 4°F below normal (Figure 2. North Dakota State Climate Office). The average air temperatures ranged from 62°F in the north and 67°F in the southern part of the State.

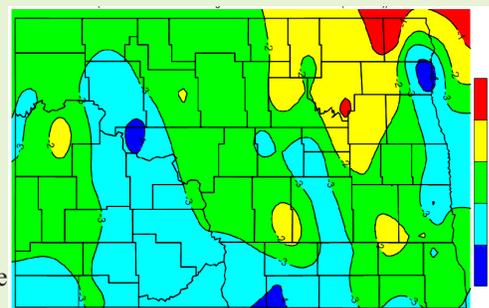


Figure 2. Temperature Departure from Normal in August 2009 for North Dakota (North Dakota State Climate Office)

## State Spotlight - Nebraska



**Al Dutcher - State Climatologist**  
**Nebraska State Climate Office, University of Nebraska - Lincoln**

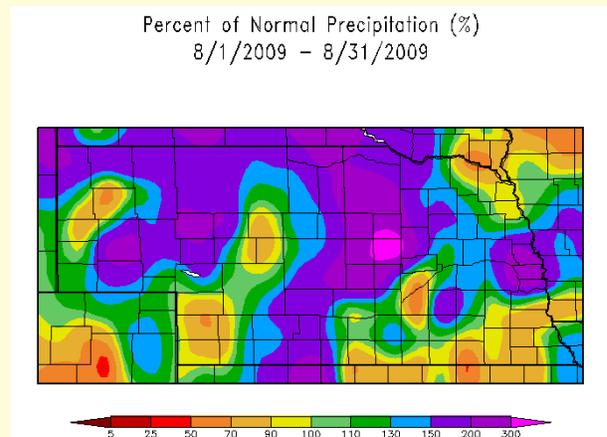
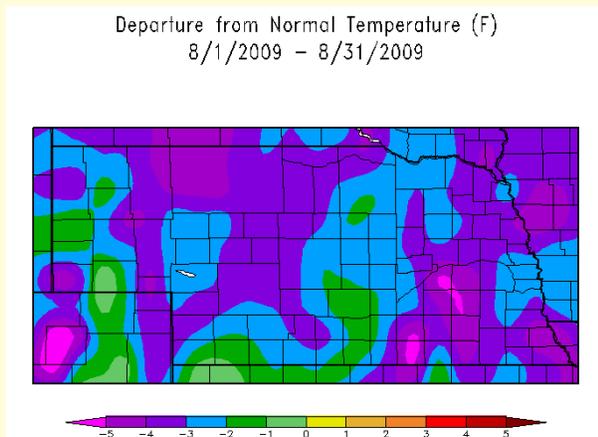
### Overview

The entire state of Nebraska experienced below normal average temperatures for the second consecutive month. Although not as great as July, average temperature departures across the state were in the 2-4 F range, with a few pockets approaching 6 F below normal. The impact of these cool temperatures has been significant on warm season crops. Planting progress in May mirrored the 5-year average, but at the end of August crops were running 7-14 days behind normal.

Much of the state did receive above normal moisture during August, which boosted prospects that record yields are likely barring a killing freeze prior to maturity. A small pocket of dryness developed from south central into east central Nebraska during late July into mid-August. Moderate drought conditions were depicted by the U.S. Drought Monitor until 2-4 inches of moisture were received during the 15-16th time frame.

The unseasonable cool temperatures helped minimize crop damage by lowering water demands and heat stress. However, some yield losses are expected, with the largest losses confined to Webster, Nuckolls, and Thayer counties. Light to moderate crop damage was reported in Clay, Fillmore, York, Saline, Seward, and Lancaster counties.

Even though August was a cool month, the warmest temperatures of the summer developed during the August 7-8 time frame when highs reached the upper 90's to low 100's. In an ironic twist, the coolest temperatures of the summer occurred at the end of the month when lows dropped into the upper 30's to upper 40's and highs cooled into the upper 60's to lower 70's.



Above: Departure from 1971-2000 Normal Mean Average Temperature (left) and Percent of Normal Precipitation (right) for August 2009 for Nebraska (HPRCC).

# State Spotlight - Nebraska, cont.



**Al Dutcher - State Climatologist**

**Nebraska State Climate Office, University of Nebraska - Lincoln**

### Precipitation

The majority of Nebraska received above normal moisture during August. Pockets of below normal moisture were limited to the central Panhandle, the south central Sandhills, the extreme northeast corner, the southwest corner, and the southeastern corner of the state. Precipitation in excess of 150% of normal fell across the eastern and western 1/3 of the Sandhills, the northern and southeastern Panhandle, as well as portions of south-central and southwest Nebraska.

Information provided by the National Weather Service cooperative weather network and the Nebraska Rain Assessment and Impacts Network (NeRAIN) indicates that precipitation was recorded somewhere in the state on 26 of the 31 days in August. The heaviest event occurred on August 26th, when up to 6 inches of moisture fell across south-central Nebraska, and 2-4 inches across much of the remainder of eastern Nebraska. One to two inches were common across the remainder of the state.

The highest monthly precipitation total recorded by the NWS cooperative network was 9.34 inches at Greeley, with the greatest 24-hour total being 3.98 inches at Hastings 4 N on August 26th. Only 44 of the 163 cooperative network stations failed to receive normal rainfall during August. Of the 818 NeRAIN observers reporting August totals, 152 received at least 5 inches, 38 received at least 6 inches, 16 received at least 7 inches, and 4 exceeded 8 inches. The greatest monthly total reported was 9.08 inches at Elba 2.5 W.

### Temperature

Temperature departures for the month of August were 2-4 F below normal for much of the state. A small section of south-central, southwest, and southern Panhandle were 1-2 F below normal. An area extending from Hebron to Central City had departures running 4-6 F below normal, as well as the northwestern 1/4 of the Nebraska Sandhills.

The general temperature trend during the month was for below normal temperatures during the August 1-6, 9-11, 16-23, and 26-31 time frames. Average temperature departures during the August 21-22 and 30-31 periods were 10-15 F below normal. Above normal temperatures were recorded during the August 7-8, 12-15, and 24-25 periods, with the greatest average temperature departures running 10-15 F above normal on August 8th.

The highest recorded temperature was 102 F on August 8th at the Lincoln Municipal Airport, while the lowest temperature recorded was 32 F at Agate Fossil beds on August 21st. It should be noted that surface cover at Agate is primarily rock which leads to lower minimum temperatures than over standard grass surfaces. The next lowest recorded minimum temperature was 34 F at Harrisburg 12 WNW on the 21st.

Of the 144 stations having at least 90% of their data available for analysis, only 10 stations recorded at least one day of 100 F or greater readings. In addition, Concord failed to reach 90 F during the month of August. There were 9 locations that recorded at least one minimum temperature reading in the 30's, while only two locations failed to record at least one minimum temperature reading below 50 F.

## State Spotlight - South Dakota

**Dennis Todey - State Climatologist**  
**Chirag Shukla**  
**South Dakota State Climate Office, South Dakota State University**



### Overview

Continuing from the rest of the summer, August was much cooler than average over the state. Statewide temperatures were generally 2-5 F below average. These conditions continued to cause delayed development of many agricultural crops. Precipitation was much more variable ranging from 1-2 inches below average to as much as 4 inches above average in the northeast and south central parts of the state.

### Temperatures and Impacts

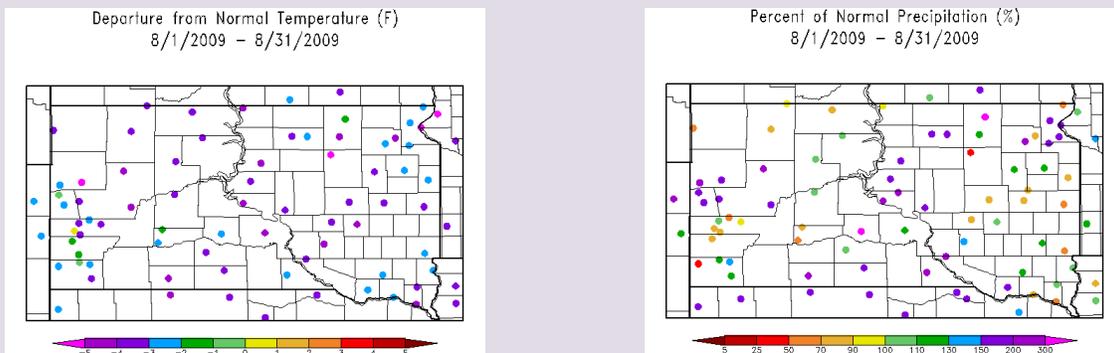
Overall the state was again colder than average like June and July. Temperatures for the month ranked in the top 20-25 coolest Augusts on record and several stations did come in as top 10 coldest for the month. Four stations set low temperature records during the month with some readings in the 30s for the first time transitioning into fall.

The cold August was a continuation of a generally cold summer. Brookings for example had its warmest temperature occur in April with only a few days making it above 90 and actually few days in the 80s. Similar average temperature years in recent history would be 2004, 1993, and 1992. A total of 32 stations (based on preliminary data) were in the top five coldest summers with another large set in the top 10 coldest. The coolness of the summer overall has delayed development of corn, mylo, and other warm season crops. Growing degree day accumulation is much below average ranging from 1-3 weeks behind for this time of year. Concern exists over much of the state for frost/freeze conditions. Because of the delayed development many crops are susceptible to an early freeze. Potential freeze conditions are being watched closely.

### Precipitation and Drought

Precipitation variability was large across the state from somewhat dry to very wet. Northeastern and south central parts of the state received the heaviest precipitation in August. Murdo set a record for most August precipitation at 5.40". Gregory (2), Webster (2), Summit 1W (3), Belle Fourche (3), and Martin (5) all were in top five precipitation totals for August. In contrast, roughly one-third of the state was drier than average with Edgemont being the 6th driest August on record.

Despite the dry areas, little drought issues were reported as any location that was somewhat dry had impacts mitigated by cooler temperature conditions. Thus, the US Drought Monitor map contained only small areas of D0 in Roberts, Minnehaha and Lincoln Counties.



Above: Departure from 1971-2000 Normal Temperature (left) and Percent of 1971-2000 Normal Precipitation (right) for August 2009 for South Dakota (HPRCC).

For more information about the South Dakota State Climate Office: <http://climate.sdstate.edu>

The SDSU's AWDN is a part of the High Plains Automated Weather Data Network (AWDN). Data are available through SDSU or the High Plains Regional Climate Center.

# 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 operated under the National Oceanic and Atmospheric Administration (NOAA), 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>

NOAA 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

## Author Information

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