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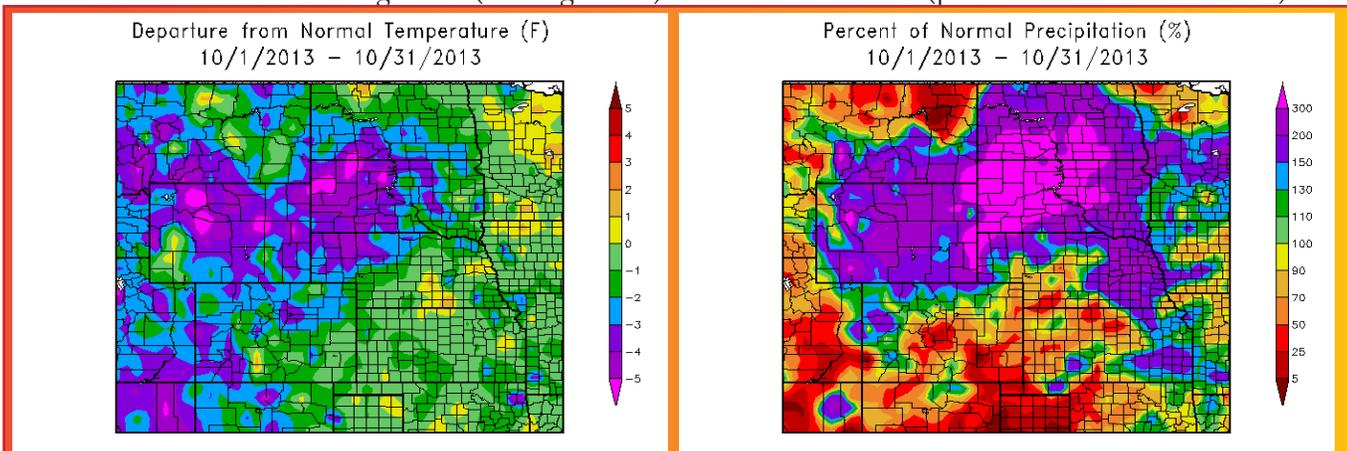
Black-eyed Susan, Valentine, Nebraska - Photo by BJ Baule
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October 2013 Climate Summary

Region Breakdown

Overall, October 2013 was a cool, wet month for most of the High Plains Region. Precipitation received over the first half of the month combined with cooler conditions slowed crop drydown and impacted harvest progress. Producers welcomed drier weather at the end of the month as many were able to resume harvest activities. But, even with drier weather, some producers were still battling muddy fields. According to the National Agricultural Statistics Service, harvest efforts in some areas of North Dakota will not resume until the ground is frozen solid.

By the end of the month, temperature departures indicated that all but a few locations were below normal. The areas with the largest departures included north-central Wyoming and western South Dakota where temperatures were 4.0-6.0 degrees F (2.2-3.3 degrees C) below normal. A few locations in these cooler areas managed to sneak into the top 10 coolest Octobers on record. Rapid City, South Dakota had an average temperature of 42.6 degrees F (5.9 degrees C). At 5.1 degrees F (2.8 degrees C) below normal, this was the 4th coolest October on record (period of record 1942-2013). The 2009 record firmly held at 38.7 degrees F (3.7 degrees C). Casper, Wyoming was also on the cool side this month with an average temperature of 41.5 degrees F (5.3 degrees C) which ranked as the 7th coolest. The record of 37.0 degrees F (2.8 degrees C) was also set in 2009 (period of record 1940-2013).

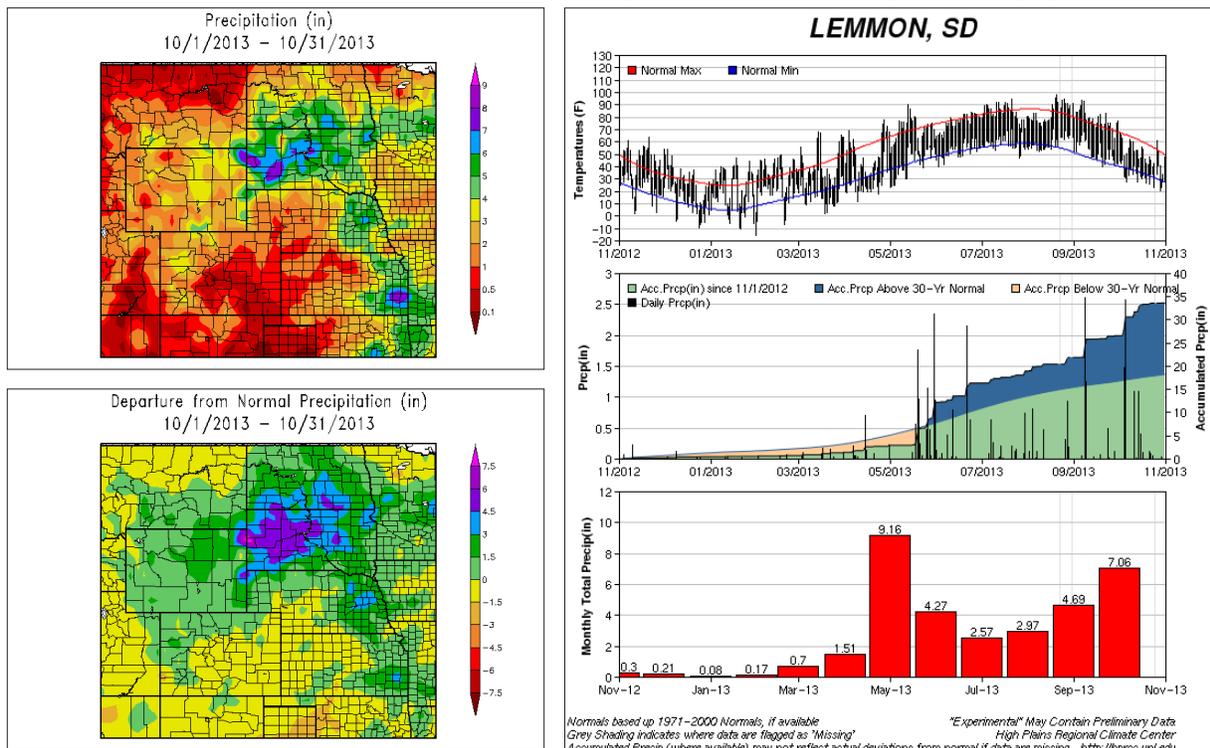


Departure from 1981-2010 Normal Average Temperature (left) and Percent of Normal Precipitation (right) for October 2013 in the High Plains Region. Maps produced by High Plains Regional Climate Center. Available at: <http://hprcc.unl.edu/maps/current>

Precipitation Summary

For a second month in a row, heavy precipitation was the big story for the High Plains Region. Precipitation totals over 200 percent of normal were common across Wyoming, North Dakota, South Dakota, and northern and eastern Nebraska. Some locations even topped 300 percent of normal, including eastern Wyoming, southern portions of North Dakota, western and central South Dakota, and northern portions of the panhandle of Nebraska. While much of the Region was drenched, some areas actually did miss out on the heavy rain and snow and received less than 50 percent of normal precipitation. Those areas included central and southeastern Colorado, southwestern Nebraska, and a few pockets of Kansas. Just like last month, numerous records were set this October including daily, monthly, and even some all-time records. The Dakotas had numerous locations rank in the top 10 wettest Octobers on record. One example of a new precipitation record comes from Bismarck, North Dakota which had an October total of 4.73 inches (120 mm). This total was 378 percent of normal and just beat out the old record of 4.30 inches (109 mm) set in 1982 (period of record 1874-2013). Just south, a station near the border of the Dakotas had its wettest and snowiest October on record. Those records were set by Lemmon, South Dakota which received 23.5 inches (60 cm) of snow and 7.06 inches (179 mm) of liquid precipitation. Even with a couple more months to go, 2013 is already the wettest year on record (period of record 1909-2013)! So far this year, Lemmon has received 33.18 inches (843 mm) of precipitation. Lemmon's old annual precipitation record was set recently, in 2010, with 25.56 inches (649 mm).

The most notable storm of October occurred during the first weekend when an intense system brought a wide range of weather. While South Dakota got pummeled with snow, in some cases several feet worth, eastern portions of the Region dealt with large hail, high winds, and tornadoes. The most violent ripped through Wayne, Nebraska and was rated as an EF-4. Tornadoes are fairly rare for Nebraska during the month of October and tornadoes of that magnitude are exceedingly rare even on the national scale. According to the National Weather Service in Sioux Falls, South Dakota, the last time a tornado that strong occurred in October was October 3, 1979 in Connecticut. To learn more about the cold side of the storm and the impacts of the blizzard, please see page 3.



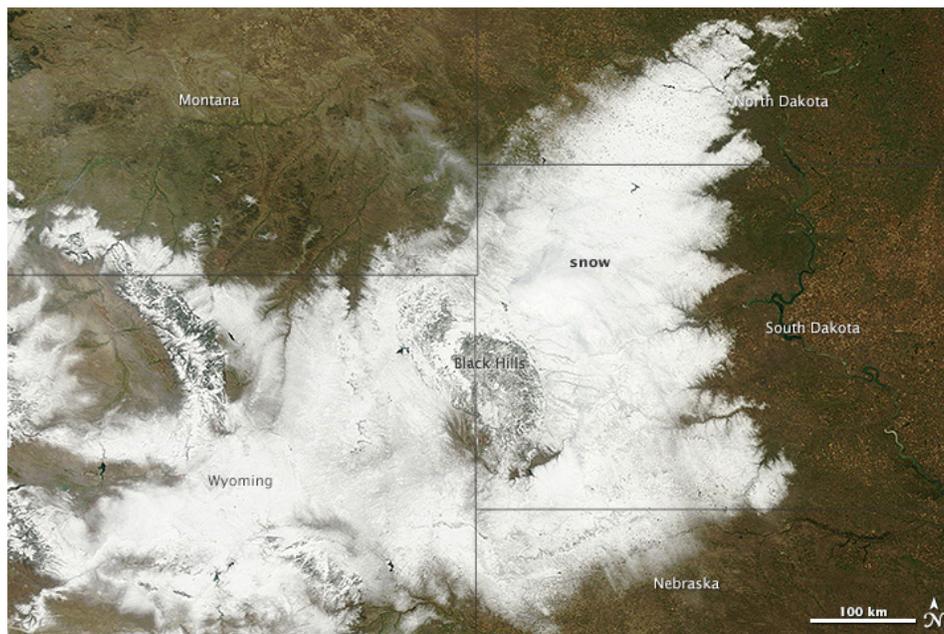
Above: Total precipitation (inches) (top left) and Departure from Normal Precipitation (inches) (bottom left) for October 2013 in the High Plains Region. Accumulated and monthly precipitation for Lemmon, SD (right) over the past year. These maps are produced by HPRCC and can be found on the Current Climate Summary Maps page at: <http://hprcc.unl.edu/maps/current>.

October 3-5 Blizzard Summary

The first big snowstorm of the season came with a vengeance. During the first weekend of October, a strong low pressure system brought an intense winter storm to portions of northeast Wyoming, western South Dakota, southwestern North Dakota, and northwestern Nebraska. This same storm brought severe weather to eastern portions of the Region. On the cold side of the storm, temperatures were warm and precipitation began as rain. As temperatures dropped, the rain turned to a heavy, wet snow. In addition, high winds developed which created blizzard conditions with very low visibility. By the time the storm exited the area, the snowpack was deep and a multitude of impacts were apparent ranging from catastrophic cattle losses to tree damage to travel issues.

Ultimately, there were widespread snowfall reports of more than 20.0 inches (51 cm), with the highest amounts in the Black Hills reaching 40.0-60.0 inches (102-152 cm). One of the highest official reports came from Lead, South Dakota with 55.0 inches (140 cm) over the 3-day period. 42.0 inches (107 cm) of that total fell in just one day – October 4th – setting a new 1-day snowfall record for October (period of record 1909-2013). The impressive snowfall reports were indeed record breaking and some stations even set new records for 1-day snowfall totals for not just October, but for any month. Belle Fourche, South Dakota was one such station. On October 5th, 24.0 inches (61 cm) fell which beat the old record of 20.0 inches (51 cm) set on April 18, 1970 (period of record 1908-2013).

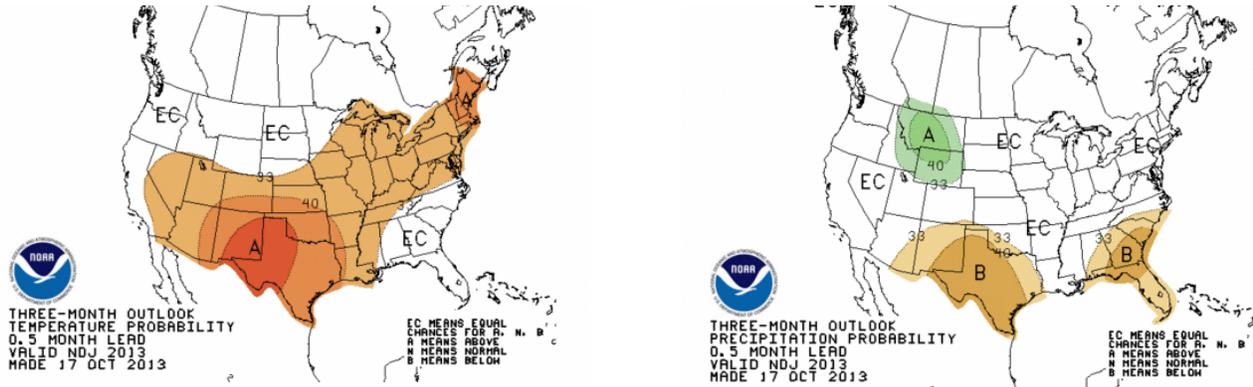
Many of the impacts from the storm were due to timing. For instance, the heavy, wet snow fell during a time when many trees still had their leaves – this resulted in major tree and limb damage as well as power outages. The catastrophic cattle losses were also due, in part, to the timing of the storm. According to the State Veterinarian of South Dakota, cattle losses in South Dakota alone were at 15,000-30,000, with more losses in Nebraska, North Dakota, and Wyoming as well. There were several other factors which contributed to the severity of the impacts. This early in the season, livestock were still out on open range with little shelter as they had not been moved to winter pasture yet. In addition, the cattle did not have their protective winter coats yet. Because the precipitation started out as rain, the animals were completely soaked before the snow and winds hit. In the end, the combination of falling temperatures, high winds, and snow was just too much for the animals who could not find shelter from the storm. Because the snow drifted over fence lines, there were even reports of displaced herds due to wandering cattle. To make matters worse, the storm coincided with the traditional marketing window for spring calves. According to iGrow, ranchers were being encouraged to delay marketing until the calves had time to recover from the added stress of the storm. In the end, the economic losses, both direct and indirect, could be up to \$1.7 billion.



Above: Early October snowstorm, courtesy NASA. Satellite image from October 6, 2013.

Climate Outlook

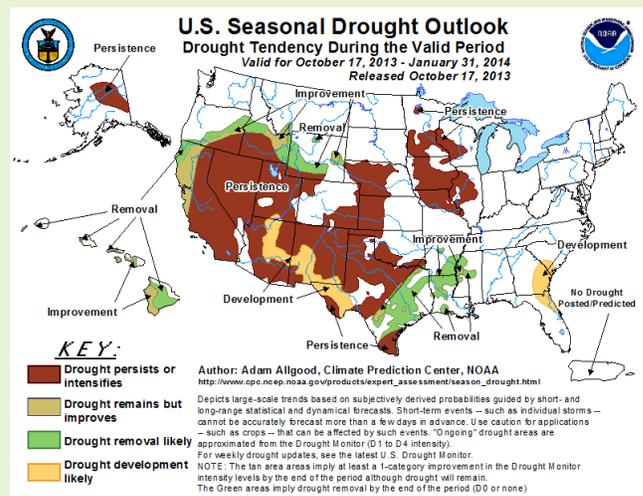
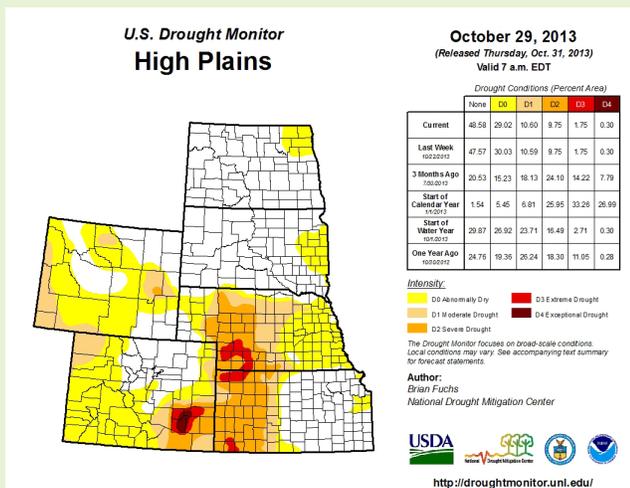
ENSO-neutral conditions were still present at the end of October and are likely to continue into the spring of 2014. For the next three months, the temperature outlook indicates a higher probability of above normal temperatures in Kansas, Colorado, southern Nebraska, and the far southwest corner of Wyoming. Equal chances of above, near, or below normal temperatures exist for the rest of the Region. Meanwhile, the precipitation outlook indicates a higher probability of above normal precipitation in only one area of the Region which includes Wyoming and a very small portion of western South Dakota. Equal chances of above, near, or below normal precipitation exist for the rest of the Region. The seasonal outlooks combine the effects of long-term trends, soil moisture, and when applicable, the El Niño Southern Oscillation cycle (ENSO).



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 U.S. Drought Monitor showed improvements in drought conditions over the past month for each state in the Region. At the end of September, approximately 49 percent of the Region was in moderate (D1) to exceptional (D4) drought, but by the end of the month this was down to about 22 percent. Heavy precipitation fell this month and a large area stretching from eastern Wyoming through central South Dakota and southern North Dakota received over 300 percent of normal precipitation. In terms of improvements, Wyoming was the big winner this month - eliminating all of its extreme drought (D3) and nearly all of its severe drought (D2). Significant improvements were also made in the Dakotas where drought conditions have been eliminated. Only some abnormally dry (D0) spots remained. Unfortunately, some areas in eastern Colorado, western Kansas, and southwestern Nebraska missed out on the heavy precipitation and had little to no change in drought conditions. According to the U.S. Seasonal Drought Outlook released October 17th, current drought conditions should persist across Nebraska, Kansas, and Colorado through January 2014. Improvements are expected in Wyoming.



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://droughtmonitor.unl.edu/>
 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
Akron Washington County Airport	59.3	35.4	47.4	-2.8	78	10/07	25	10/16+	1.09	-0.02	98
Alamosa San Luis Airport	59.6	24.4	42.0	-1.1	75	10/01	15	10/31	0.53	-0.15	78
Colorado Springs Municipal Airport	61.7	34.7	48.2	-1.2	78	10/02	25	10/19+	0.42	-0.40	51
Grand Junction Walker Field Airport	61.3	36.9	49.1	-3.9	76	10/01	29	10/19+	1.36	0.30	128
Pueblo Memorial Airport	66.5	35.6	51.0	-0.8	85	10/02	24	10/19	0.24	-0.48	33

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	67.7	43.0	55.4	0.0	89	10/04	31	10/21	0.80	-1.12	42
Dodge City Regional Airport	68.9	41.6	55.3	-1.3	91	10/03	31	10/19	2.84	1.10	163
Goodland Renner Field	63.1	36.9	50.0	-1.9	83	10/10	28	10/16	1.24	-0.13	91
Topeka Municipal Airport	68.7	43.6	56.1	-0.5	90	10/04	27	10/27	4.83	1.80	159
Wichita Mid-Continent Airport	70.9	45.8	58.4	0.1	90	10/04	29	10/27+	3.05	0.27	110

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	55.9	33.6	44.8	-2.8	74	10/01	26	10/18	2.27	0.96	173
Grand Island Airport	64.0	40.4	52.2	0.0	86	10/02	30	10/21+	4.05	2.19	218
Lincoln Municipal Airport	64.8	38.6	51.7	-1.5	86	10/04+	24	10/25	2.83	0.86	144
Norfolk Karl Stefan Airfield	61.5	37.9	49.7	-1.3	84	10/02	26	10/25	4.70	2.63	227
North Platte Regional Airport	61.1	34.1	47.6	-1.5	81	10/02	24	10/31	1.66	0.11	107
Omaha Eppley Airport	64.2	41.6	52.9	-0.3	86	10/02	28	10/25	3.78	1.63	176
Valentine Miller Field	57.2	34.4	45.8	-2.7	80	10/08	23	10/18	3.21	1.96	257

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismark Municipal Airport	52.5	31.5	42.0	-2.8	71	10/08+	20	10/28	4.73	3.48	378
Fargo International Airport	53.4	36.2	44.8	-0.7	75	10/08	22	10/28	4.18	2.03	194
Grand Forks International Airport	51.9	33.1	42.5	-0.6	72	10/08	16	10/29+	2.48	0.51	126
Theodore Roosevelt Airport	52.3	31.2	41.7	-2.1	75	10/07	21	10/24	4.45	3.22	362
Williston International Airport	53.3	29.5	41.4	-1.6	78	10/07	16	10/05	2.07	1.15	225

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>.

October 2013 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	52.9	31.8	42.3	-2.9	77	10/08	20	10/25+	4.72	2.73	237
Huron Regional Airport	56.4	36.8	46.6	-1.3	82	10/02	26	10/25+	5.41	3.62	302
Pierre Regional Airport	54.7	35.2	45.0	-3.7	75	10/07	25	10/24	4.76	3.11	288
Rapid City Regional Airport	52.6	32.6	42.6	-5.1	71	10/01	25	10/29	5.52	4.10	389
Sioux Falls Joe Foss Field Airport	57.9	37.4	47.6	-0.3	80	10/02	24	10/25	3.01	0.84	139

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	52.9	30.0	41.5	-3.7	73	10/01	19	10/05	3.03	1.92	273
Cheyenne Municipal Airport	53.5	32.3	42.9	-3.4	72	10/08	22	10/16	2.21	1.28	238
Lander Hunt Field Airport	51.1	30.2	40.6	-5.0	69	10/01	13	10/05	3.08	1.79	239
Laramie Regional Airport	50.8	26.0	38.4	-3.4	72	10/01	18	10/30	1.51	0.71	189
Rawlins Municipal Airport	51.1	28.5	39.8	-3.5	71	10/01	22	10/25	1.32	0.57	176
Sheridan County Airport	53.6	30.2	41.9	-3.6	70	10/26	20	10/16	2.47	1.06	175

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>.

October 2013 Records - Highlights

Monthly Rankings

Snowfall and Precipitation in inches

Snowiest

Location	Snowfall / Rank	Record or Previous Record / Year	Period of Record
Belle Fourche, SD	32.0 / SNOWIEST	11.5 / 1971	1908-2013
Dupree, SD	15.7 / SNOWIEST	11.7 / 1943	1922-2013
Lemmon, SD	23.5 / SNOWIEST	9.0 / 1932	1910-2013
Newell, SD	22.6 / SNOWIEST	13.7 / 1932	1920-2013
Oelrichs, SD	28.0 / SNOWIEST	18.5 / 1925	1893-2013
Pactola Dam, SD	47.2 / SNOWIEST	19.0 / 1996	1955-2013
Rapid City, SD	20.8 / SNOWIEST	10.2 / 1995*	1942-2013
Spearfish, SD	46.0 / SNOWIEST	41.0 / 1919	1893-2013

Wettest

Location	Precipitation / Rank	Record or Previous Record / Year	Period of Record
Ashley, ND	6.16 / WETTEST	5.04 / 1998	1893-2013
Bismarck, ND	4.73 / WETTEST	4.30 / 1982	1874-2013
Napoleon, ND	6.00 / WETTEST	5.97 / 1982	1893-2013
Lead, SD	12.56 / WETTEST	9.30 / 1994	1909-2013
Lemmon, SD	7.06 / WETTEST	4.66 / 1998	1909-2013
Murdo, SD	6.54 / WETTEST	5.31 / 1929	1908-2013
Spearfish, SD	7.53 / WETTEST	5.49 / 1994	1893-2013

All Data are Preliminary and Subject to Change.

* indicates multiple records, latest year is listed, T stands for Trace amount of precipitation.

Source: National Weather Service Cooperative Observation Network Data

State Spotlight - Kansas

Mary Knapp - Service Climatologist
 Kansas State Climate Office, Kansas State University

Early Snow

While Kansas missed the worst of the first major snow storm of the season on October 4th and 5th, the Northwestern Division saw snowfall amounts of up to 6 inches for the month. Even the eastern portions of the state saw the snowflakes, but accumulations in this area were generally less than an inch. Despite the snow, the average precipitation in the western third of the state was less than normal for October. This pattern extended into North Central and Central KS, which also averaged below normal for the month. The eastern divisions and South Central KS averaged above normal precipitation for the month. The Southeastern Division had the greatest rainfall, with an average of 5.31 inches or 145 percent of normal. In contrast, the West Central Division saw the least precipitation with an average of 0.96 inches, or 66 percent of normal. State-wide, the average precipitation was 2.36 inches which was 102 percent of normal. The greatest monthly precipitation total for National Weather Service (NWS) stations was 9.91 inches at Uniontown in Bourbon County. The greatest monthly total for Community Collaborative Rain Hail and Snow (CoCoRaHS) stations was 8.55 inches at Humboldt 4.6 ESE in Allen County. The maximum daily rainfall amount for NWS stations was 3.50 inches on the 29th at Uniontown in Bourbon County. The maximum daily rainfall amount for CoCoRaHS stations was 4.41 inches at Uniontown 0.7 NW, also in Bourbon County, on the 29th.

State-wide, the average temperature was 54.8F, which was just slightly cooler than average. The Central Division averaged 56.2F, which was closest to normal at just -0.1F below normal. In contrast, the Northwestern and Southeastern divisions had close to the same departure from normal: -1.2F for the Northwest and -1.1F for the Southeast. The average temperature for the Northwest Division was 51.0F and the average temperature for the Southeastern Division was 56.7F. The highest temperature reported was 93F at Larned No.2 (Pawnee County) on the 4th. The coldest temperature reported was 23F at multiple locations, the latest at Holton (Jackson County) on the 27th. All divisions reported lows in the low to mid 20s, marking the end of the growing season for Spring planted crops. Winter wheat planting and emergence is close to last year at 94 percent planted and 74 percent emerged. Condition of the wheat crop was reported at 59 percent good to excellent this year, in contrast to last year where only 37 percent of the crop was in good to excellent condition at the end of October.

The continued moisture allowed for normal conditions to remain on the Drought Monitor in the Central division, with some improvements in the eastern divisions where abnormally dry conditions persist. There has been little change in the western divisions. Change was limited, as rainfall for the year continues to be well below average. Cooler than average temperatures have somewhat reduced the negative impact of the below average rainfall, but severe to extreme drought conditions remain throughout the western region. Both the Seasonal Drought Outlook and the Monthly Drought Outlook suggest continued improvement on the eastern edges of the drought region and continuing drought in the western third of the state. Given the fact that we are moving into the drier part of the year, even normal precipitation will have minimal impact on the long term deficits in the region. The El Niño/Southern Oscillation (ENSO) is expected to remain neutral through the winter.

Severe weather was limited this month. No tornadoes were reported during October. There were 17 reports of hail and 29 reports of wind damage. In addition, with the heavier rain events there was some localized flooding, particularly at the end of the month in southeastern KS.

For more information about the Kansas State Climate Office: <http://www.ksre.ksu.edu/wdl/>
 The KSU's AWDN is a part of the High Plains Automated Weather Data Network (AWDN). Data are available through KSU or HPRCC.

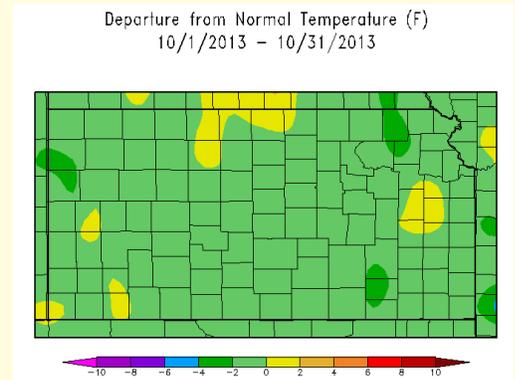


Figure 1. October 2013 departure from average temperatures across Kansas (High Plains Regional Climate Center)

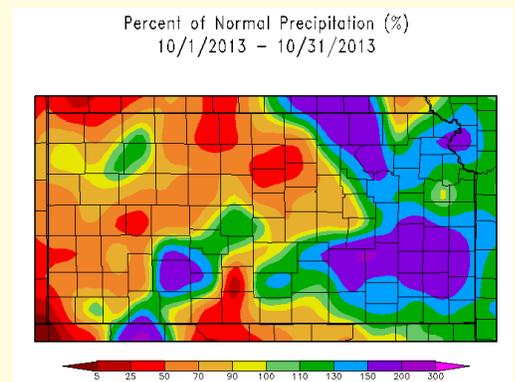


Figure 2. October 2013 percent of normal precipitation across Kansas (High Plains Regional Climate Center)

State Spotlight - North Dakota



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

Precipitation:

October 2013 was wet with Bismarck ranking the wettest, Williston the 6th, Jamestown the 4th, Dickinson the 4th, Williston the 6th, Minot the 5th, and Fargo the 8th wettest. The North Dakota Agricultural Weather Network recorded precipitation totals of above normal for all but the far northeast corner which had below normal precipitation (Figure 1). A major storm system happened on the 4th and 5th dropping heavy snowfall in the southwest and rainfall in the south central region. Official snowfall totals for the 24 hour snowfall ending on the 5th in the southwest ranged from 6 inches to 18 inches which fell at Hettinger. The heavy snow drifts laid sunflowers to the ground. The sunflower fields hit the worst suffered losses of 20 to 80%. Some areas around Hettinger lost cattle in the heavy snow storm. A second storm on the 11th produced record rainfall in the western part of the state and a third storm on the 14th produced record rainfall across the state. The U.S. Drought Monitor October 29th report listed the northeast corner as abnormally dry with no drought conditions for the remainder of the state.

Temperature:

NDAWN October average air temperatures ranged from ~39 °F in the north to ~45 °F in the southeast. Departure from normal average air temperatures were from 0 °F to 5 °F below normal (Figure 2). Daily average air temperatures for October started slightly above normal but dropped quickly from the 3rd through the 6th. Average daily air temperatures rebounded to above normal for most areas from the 7th through the 11th. The remainder of October was cool with many days having below normal average air temperatures with the 28th and 29th being at least 10 °F below normal for most areas.

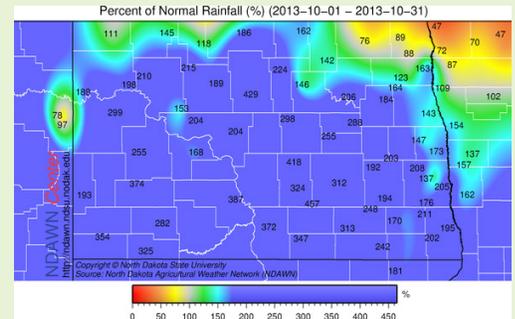


Figure 1. Percent of Normal Precipitation in October 2013 for North Dakota (North Dakota State Climate Office)

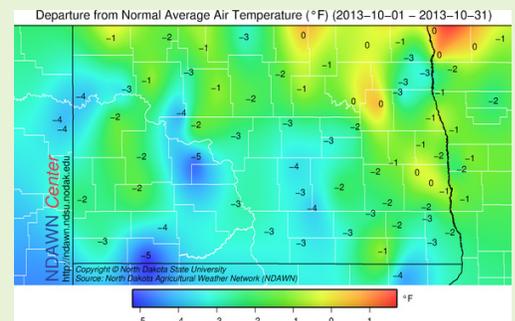


Figure 2. Temperature Departure from Normal in October 2013 for North Dakota (North Dakota State Climate Office)

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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