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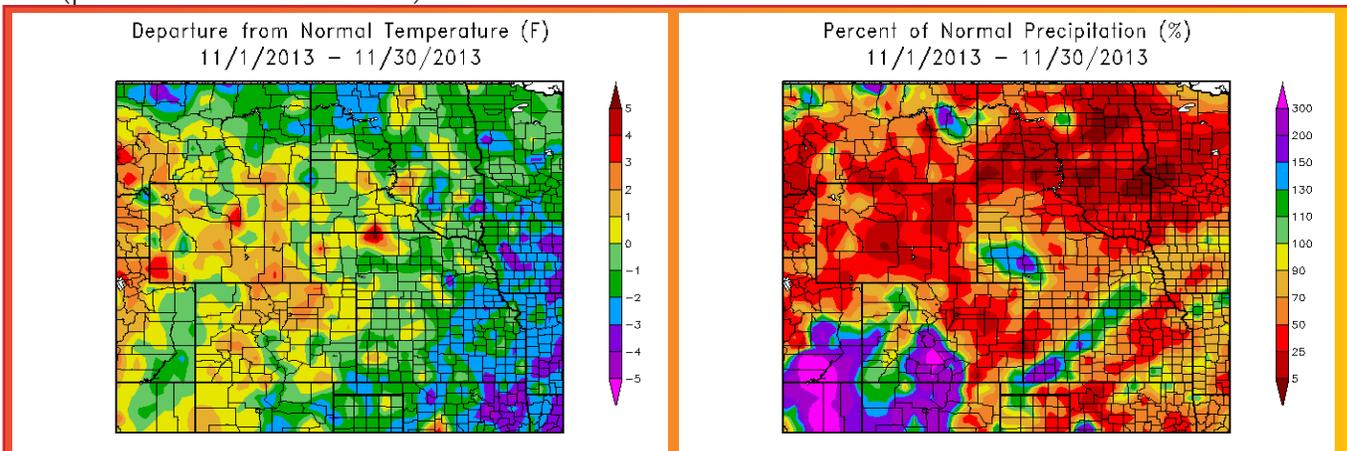
Automated Weather Data Network station in Merna, Nebraska - Photo by Glen Roebke
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November 2013 Climate Summary

Region Breakdown

After an eventful couple of months in the High Plains Region, November 2013 was fairly quiet. Temperatures were generally within 2.0 degrees F (1.1 degrees C) of normal and heavier precipitation was confined to just a few areas. This was good news for producers across the Region. Early in the month, grain moisture levels were a bit high, which slowed harvest activities. However, the drier conditions later on helped producers get back out into the fields to finish up their harvest and begin preparing for winter.

Overall, temperatures were near to below normal in the east and near to above normal in the west. The largest temperature departures occurred in areas of eastern Kansas and northwest North Dakota where temperatures were up to 3.0 degrees F (1.7 degrees C) below normal and a few pockets of Colorado and Wyoming where temperatures were up to 3.0 degrees F (1.7 degrees C) above normal. While some daily records were broken, especially during the cold snap around November 22-23, temperatures were not extreme enough to break monthly records. One example from the cold snap was Minot, North Dakota which set a new daily record on the 23rd with a minimum temperature of -17.0 degrees F (-27.2 degrees C). This beat the old record of -13.0 degrees F (-25.0 degrees C) set in 1950 (period of record 1948-2013).



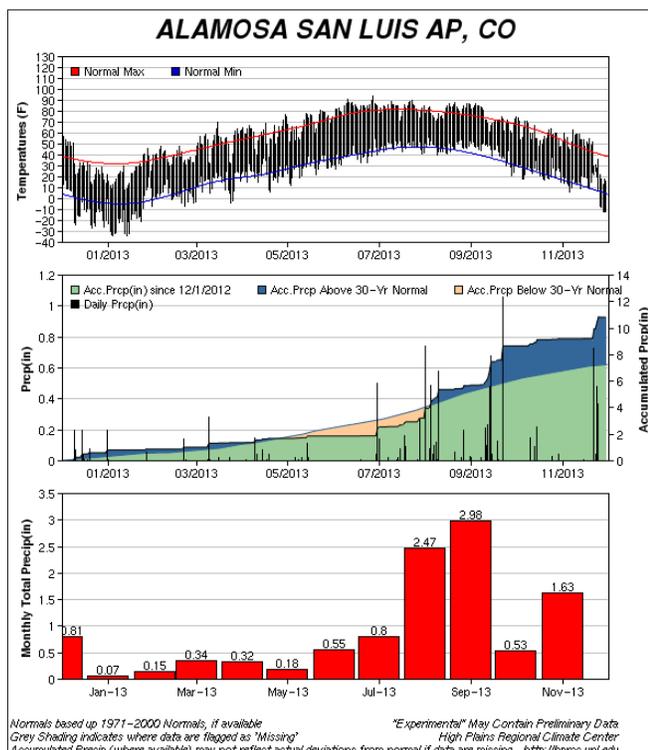
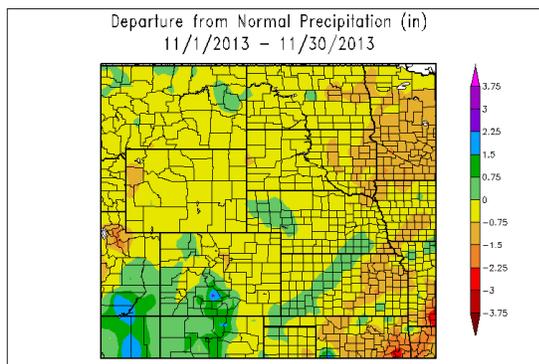
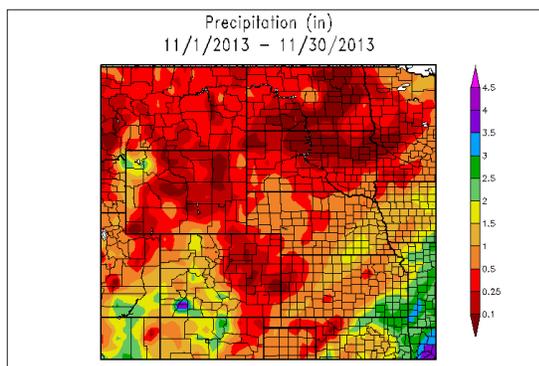
Departure from 1981-2010 Normal Average Temperature (left) and Percent of Normal Precipitation (right) for November 2013 in the High Plains Region. Maps produced by High Plains Regional Climate Center. Available at: <http://hprcc.unl.edu/maps/current>

Precipitation Summary

After two extreme precipitation months, the High Plains Region got a bit of a break. One of the impacts of the heavy precipitation in previous months was a recovery in soil moisture in many of the affected areas - especially in the Dakotas and Wyoming. At this time of the year it is highly unlikely that the soils will dry out and will consequently retain their moisture throughout the winter. With this in mind, some may be wondering about the potential for spring flooding. Luckily, it is very early in the season and there is a long way to go in terms of precipitation accumulations (both snow and rain). These conditions will continue to be monitored as the season progresses.

Taking a look at November, the High Plains Region was fairly dry with large areas receiving less than 50 percent of normal precipitation. Since precipitation during this time of the year is generally light, large deficits did not occur. Some locations within the dry areas ranked in the top 10 driest Novembers on record. Rock Springs, Wyoming only received 0.03 inches (1 mm) of precipitation which tied with 2007 as the 4th driest November on record (period of record 1948-2013). The driest November occurred in both 1974 and 1976 when only a Trace amount of precipitation was received.

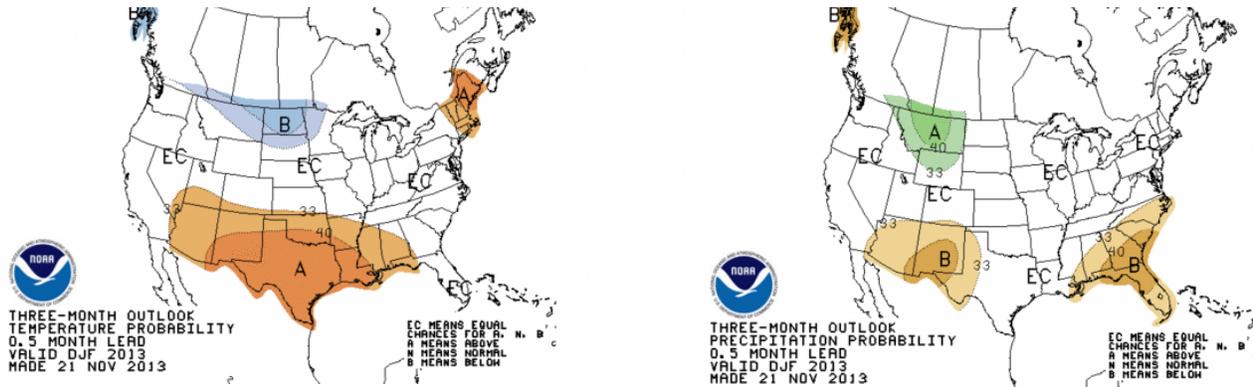
Areas receiving above normal precipitation included the panhandle of Nebraska, south-central Colorado, and a swath running from the southwest corner of Kansas into southeastern Nebraska. The precipitation totals in the wetter areas of Nebraska and Kansas varied from just above normal to 200 percent of normal, while south-central Colorado had precipitation totals which topped 300 percent of normal. One local example was Alamosa, Colorado which had its wettest and 3rd snowiest November on record (period of record 1932-2013). The monthly liquid equivalent precipitation total came to 1.63 inches (41 mm) which was 388 percent of normal! The old record of 1.23 inches (31 mm) occurred in 1991. The monthly snowfall total came to 18.1 inches (46 cm) which was just shy of the 1940 record of 20.0 inches (51 cm). Check out the graph below to see the precipitation over the past year in Alamosa.



Above: Total precipitation (inches) (top left) and Departure from Normal Precipitation (inches) (bottom left) for November 2013 in the High Plains Region. Accumulated and monthly precipitation for Alamosa, CO (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>.

Climate Outlook

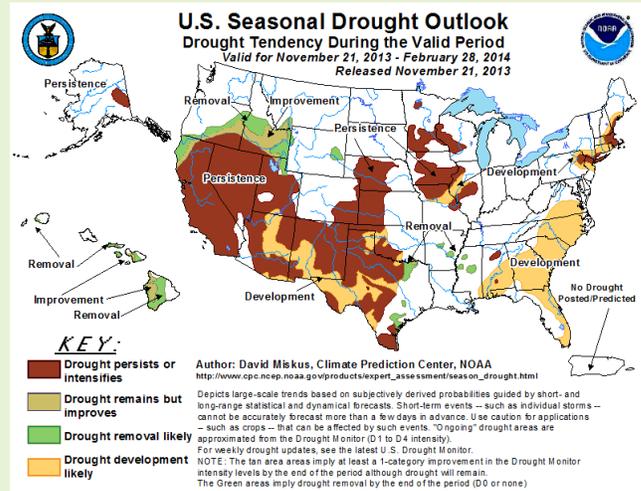
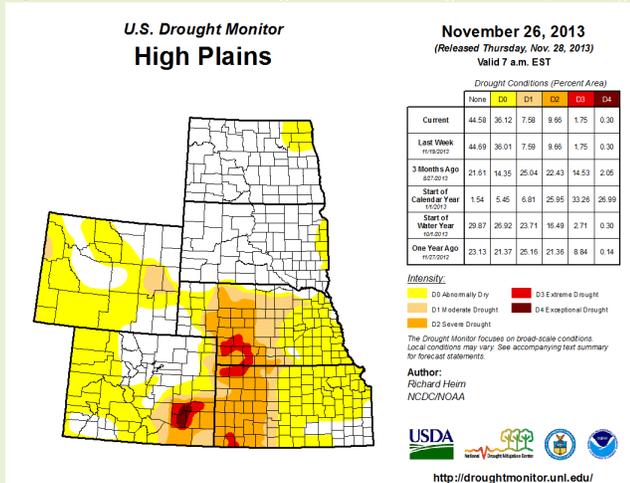
Just like last month, ENSO-neutral conditions were still present and likely to continue into the spring of 2014. For the next three months, the temperature outlook indicates a higher probability of above normal temperatures in extreme southern portions of Colorado and Kansas. Meanwhile, a higher probability of below normal temperatures exists for North Dakota and northern South Dakota. The precipitation outlook indicates a higher probability of above normal precipitation in only one area of the Region - northern Wyoming. A small sliver of southern Colorado has an increased probability of below normal precipitation. Equal chances of above, near, or below normal temperatures and 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

Drought conditions in the High Plains Region changed only slightly over the past month, according to the U.S. Drought Monitor. Approximately 19 percent of the Region was in moderate (D1) to exceptional (D4) drought at the end of the month, which was a slight decrease from 22 percent at the end of October. These improvements occurred in western Wyoming and northwestern Colorado where D1 was eliminated. Severe (D2), extreme (D3), and exceptional (D4) drought conditions persisted across southeastern Colorado, western Kansas, and west-central Nebraska. The only improvement in those categories occurred in eastern Wyoming where a small area of D2 was eliminated. Luckily, the only degradation was the increase in abnormally dry conditions from 51 percent to 55 percent coverage. This increase in dryness occurred in eastern Kansas where hydrologic and agricultural impacts were being realized. According to the U.S. Seasonal Drought Outlook released November 21st, current drought conditions should persist across Nebraska, Kansas, and Colorado through February 2014. Improvements are expected in the remaining areas of drought 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	51.4	26.0	38.7	1.1	66	11/08	7	11/21	0.16	-0.42	28
Alamosa San Luis Airport	44.8	11.4	28.1	-1.4	63	11/08	-12	11/30+	1.63	1.21	388
Colorado Springs Municipal Airport	53.1	25.3	39.2	1.1	70	11/08	13	11/21	0.27	-0.13	68
Grand Junction Walker Field Airport	49.3	28.7	39.0	0.0	62	11/12+	22	11/06	1.05	0.32	144
Pueblo Memorial Airport	56.0	24.8	40.4	1.1	75	11/08	12	11/06	0.34	-0.13	72

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	52.3	28.2	40.2	-1.4	69	11/08	10	11/27	1.15	0.04	104
Dodge City Regional Airport	54.8	28.9	41.8	-1.3	73	11/16	15	11/27	0.80	0.04	105
Goodland Renner Field	53.7	25.1	39.4	0.4	77	11/08	14	11/25+	0.17	-0.54	24
Topeka Municipal Airport	53.7	30.4	42.1	-1.7	75	11/16	14	11/24	0.88	-0.97	48
Wichita Mid-Continent Airport	54.8	32.9	43.9	-1.5	77	11/16	14	11/27	0.60	-0.83	42

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	49.2	19.4	34.3	0.3	66	11/19	-9	11/22	0.31	-0.31	50
Grand Island Airport	50.6	25.5	38.1	0.0	64	11/16	8	11/27	0.97	-0.20	83
Lincoln Municipal Airport	50.0	23.5	36.7	-2.2	64	11/16	6	11/27	1.22	-0.21	85
Norfolk Karl Stefan Airfield	48.3	23.8	36.1	-0.3	64	11/16	5	11/22	0.83	-0.54	61
North Platte Regional Airport	50.2	21.3	35.7	0.1	68	11/08	7	11/22	0.51	-0.13	80
Omaha Eppley Airport	48.4	26.5	37.5	-1.4	65	11/16	10	11/12	1.06	-0.58	65
Valentine Miller Field	49.0	20.2	34.6	0.2	67	11/13	-8	11/22	0.52	-0.13	80

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismark Municipal Airport	39.5	15.6	27.6	-1.6	56	11/02	-11	11/23	0.09	-0.62	13
Fargo International Airport	38.2	18.2	28.2	-0.6	61	11/13	-6	11/23	0.40	-0.60	40
Grand Forks International Airport	34.8	14.0	24.4	-1.7	54	11/03	-13	11/23	0.15	-0.80	16
Theodore Roosevelt Airport	41.0	17.8	29.4	-0.1	57	11/02	5	11/21	0.06	-0.48	11
Williston International Airport	37.6	14.4	26.0	-1.1	57	11/02	-14	11/21	0.35	-0.30	54

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>.

November 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	40.9	13.3	27.1	-2.2	62	11/13	-7	11/23	0.10	-0.63	14
Huron Regional Airport	44.3	18.6	31.5	-1.1	60	11/19+	-1	11/23	0.17	-0.70	20
Pierre Regional Airport	45.4	21.4	33.4	-0.3	65	11/19	6	11/22+	0.24	-0.52	32
Rapid City Regional Airport	47.0	20.8	33.9	-0.6	64	11/13	-1	11/22	0.38	-0.15	72
Sioux Falls Joe Foss Field Airport	43.7	20.0	31.8	-0.8	60	11/13	-1	11/22	0.46	-0.90	34

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	46.5	19.2	32.9	-0.3	64	11/10	-9	11/23	0.24	-0.52	32
Cheyenne Municipal Airport	49.0	24.2	36.6	1.3	64	11/13	6	11/22	0.15	-0.44	25
Lander Hunt Field Airport	46.1	20.4	33.3	2.1	61	11/10	-5	11/22	0.13	-0.73	15
Laramie Regional Airport	44.6	19.4	32.0	2.7	59	11/02	-5	11/22	0.20	-0.34	37
Rawlins Municipal Airport	42.9	20.3	31.6	1.5	57	11/11	-13	11/22	0.13	-0.42	24
Sheridan County Airport	47.1	19.5	33.3	0.6	59	11/29+	-3	11/22+	0.17	-0.54	24

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>.

Fall 2013 Records - Highlights

Seasonal Rankings

Snowfall and Precipitation in inches

Snowiest

Location	Snowfall / Rank	Record or Previous Record / Year	Period of Record
Alamosa, CO	21.6 / 4th snowiest	34.1 / 1972	1932-2013
Agate 3 E, NE	24.0 / SNOWIEST	21.5 / 1985	1900-2013
Lemmon, SD	23.5 / 2nd snowiest	28.3 / 1986	1909-2013
Rapid City, SD	24.8 / 2nd snowiest	35.6 / 1985	1942-2013
Spearfish, SD	49.5 / 3rd snowiest	76.9 / 1919	1893-2013
Gillette 4 SE, WY	20.3 / 10th snowiest	33.9 / 1971	1904-2013
Sunshine 3 NE, WY	33.9 / 3rd snowiest	47.0 / 1989	1963-2013

Wettest

Location	Precipitation / Rank	Record or Previous Record / Year	Period of Record
Boulder, CO	20.69 / WETTEST	8.19 / 1902	1893-2013
Denver, CO	6.60 / WETTEST	6.46 / 1969	1872-2013
Bismarck, ND	9.18 / 3rd wettest	9.92 / 1994	1874-2013
Dickinson, ND	7.82 / 3rd wettest	8.67 / 1977	1948-2013
Lead, SD	16.91 / WETTEST	12.83 / 1998	1909-2013
Lemmon, SD	11.91 / WETTEST	7.99 / 1977	1909-2013
Cheyenne, WY	9.24 / WETTEST	7.18 / 1942	1871-2013
Lander, WY	6.99 / 6th wettest	10.39 / 1923	1891-2013

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

Chilly End to Autumn

Despite the warm days at the end of the month, November was cooler than average state-wide. With an average temperature of 43.2F, the Southeastern Division had the greatest departure from average at -2.6F. The Northwest Division came closest to normal. The average temperature for the division was 38.5F, or -0.5 degrees below normal. The state-wide average temperature was 40.9F, which was -1.6 degrees below normal. This ranks as the 39th coldest of 119 years, which places it in the bottom third of the range. There were two record high daily maximum temperatures, but 20 record low maximum temperatures. On the cold side, there were three record low minimum temperatures, and 14 record high minimum temperatures. The warmest temperature record in the state was 82F at Tribune 14N (Greeley County) on the 9th. The coldest temperature recorded was 1F at Leoti 1W (Wichita County) on the 14th.

State-wide moisture averaged only 0.94 inches, which was 70 percent of normal. Only the Southwestern Division had above average precipitation. The divisional average was 0.81 inches which was 130 percent of normal. Much of that came as part of a winter storm on the 22nd of November. The Northwest Division had the lowest average precipitation at 0.42 inches, which was 50 percent of normal. The East Central Division had the lowest percent of normal at 39 percent, which is equal to 0.90 inches. The greatest monthly total precipitation for a National Weather Service Cooperative (NWS) station was 3.32 inches at Grenola 1N in Elk County. For the Community Collaborative Rain Hail and Snow Network (CoCoRaHS), the greatest monthly total was 3.28 inches at Garland 2.7SW in Bourbon County. For daily totals, the greatest reported at a NWS station was 2.08 inches on the 8th at Colony in Anderson County. In the CoCoRaHS network, the greatest daily total was 2.00 inches, reported at Arkansas City 2.0 SSE in Cowley County and at Eureka 0.9 NW in Greenwood County. Both daily highs were reported on the 6th.

The dry conditions resulted in deterioration in the state drought conditions. Abnormally dry (D0) conditions expanded in the eastern third of the state, which had been drought free at the end of October. In the western third of the state, where moderate to extreme drought conditions persisted, there was little change. The cooler than average temperatures somewhat reduced the negative impacts of the low precipitation. Both the Seasonal Drought Outlook and the Monthly Drought Outlook suggest continued improvement on the eastern edges of the drought region. The Seasonal Drought Outlook and the monthly outlook for December call for 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. For December, the temperature outlook is neutral. That means conditions are equally likely to be above or below normal. The precipitation outlook is for below normal precipitation in the Southeastern half of the state with equal chances in the rest of the state for December. The mid-term outlook for the next 8-14 days calls for a greater chance of below average temperatures through the 19th of December. Precipitation outlook calls for greater chance for below normal for the entire state, with equal chances for the remainder of the state.

Unlike states to our east, including Missouri, severe weather was limited this month. No tornadoes were reported during November. There were 3 reports of hail and no reports of wind damage. Rainfall was limited, with the greatest daily amount on the 6th of November so flooding wasn't a problem. Snowfall was a bigger factor, with between 8 and 10 inches reported in Southwestern Kansas, most coming in a storm from November 22-24th.

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.

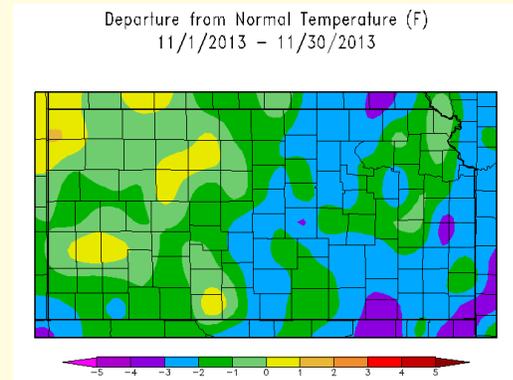


Figure 1. November 2013 departure from average temperatures across Kansas (High Plains Regional Climate Center)

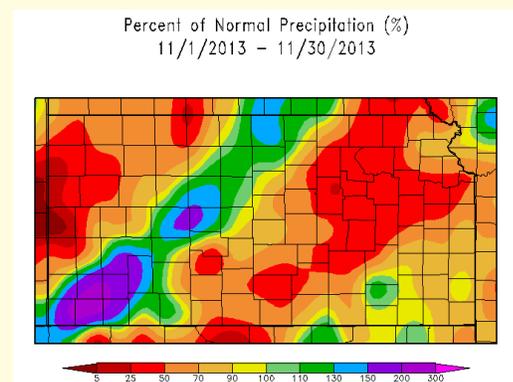


Figure 2. November 2013 percent of normal precipitation across Kansas (High Plains Regional Climate Center)

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:

November 2013 was below normal for nearly all of North Dakota (Figure 1). Only Sheridan County had above to near normal precipitation. The first significant storm system passed through on the 8th and 9th producing less than a tenth of an inch in the north and under a half inch in the south. On the 10th the first snowfall totals of less than an inch fell in the southwest. Spotty showers fell from the 16th through the 19th producing some measurable snowfall. A wide spread system on the 20th had up to a half inch of precipitation for some areas in the west and central regions also producing anywhere from a trace to 6 inches of snow. The north and northeast had scattered precipitation from the 25th through the 30th. The U.S. Drought Monitor November 26th report listed the northeast corner as abnormally dry with no drought conditions for the remainder of the state.

Temperature:

NDAWN November average air temperatures ranged from ~22 °F in the north to ~30 °F in the southwest. Departure from normal average air temperatures were from 0 °F to 5 °F below normal (Figure 2). Daily average air temperatures for November were between near normal and ~10 °F below normal for the first 10 days. Daily average air temperatures dropped to ~20 °F below normal on the 11th. Temperatures rebounded on the 14th to above normal followed by several days of primarily above normal average air temperatures for most. The daily average air temperatures dropped to ~20 °F to ~30 °F below normal from the 21st through the 23rd. The remainder of the month was primarily near normal to ~10 °F below normal for many areas.

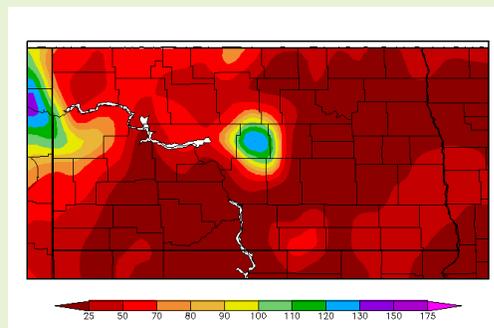


Figure 1. Percent of Normal Precipitation in November 2013 for North Dakota (High Plains Regional Climate Center)

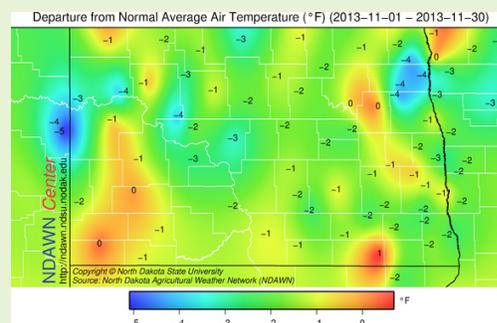


Figure 2. Temperature Departure from Normal in November 2013 for North Dakota (North Dakota State Climate Office)

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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