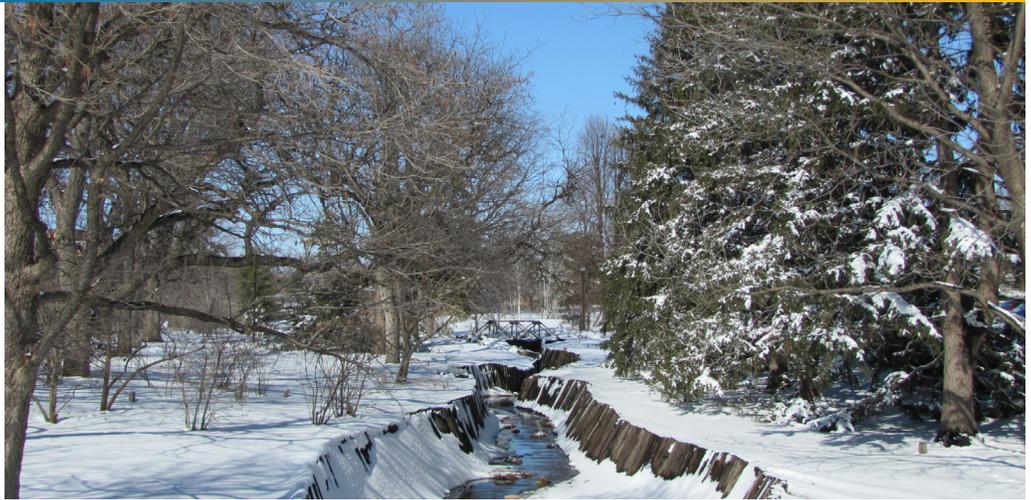




727 Hardin Hall
3310 Holdrege Street
Lincoln, NE 68583-0997
402 472-6706
Fax 402 472-2946
<http://hprcc.unl.edu>



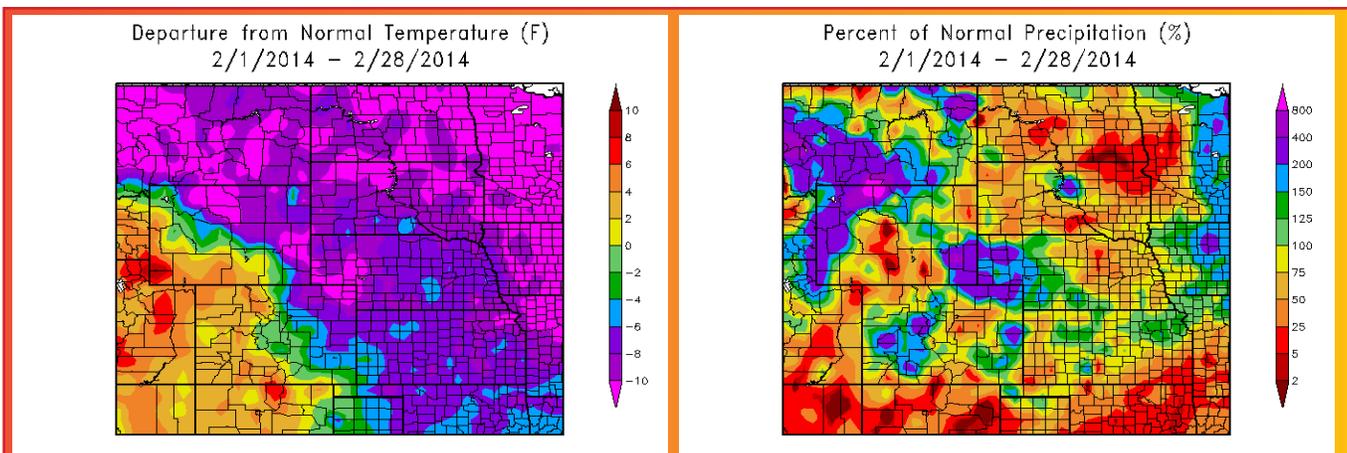
Snowy scene from Lincoln, NE - Photo by Natalie Umphlett
<http://hprcc.unl.edu>

February 2014 Climate Summary

Region Breakdown

February 2014 was a cold month for the High Plains Region. Many locations had average temperatures which were lower or similar to January which led to large departures. Even with a mid-month warm up, average temperatures for the majority of the Region were well below normal. Much of North Dakota, northern South Dakota, portions of the Nebraska panhandle, northeastern Colorado, and northern and eastern Wyoming had temperature departures of at least 10.0 degrees F (5.6 degrees C) below normal. Interestingly, these departures were not record breaking but, some locations ranked in the top 25 coldest on record. For instance, Aberdeen, South Dakota had its 7th coldest February on record with an average temperature of 6.6 degrees F (-14.1 degrees C). Although 11.0 degrees F (6.1 degrees C) below normal, this was a far cry from the record of -7.3 degrees F (-21.8 degrees C) which occurred in 1936 (period of record 1893-2014).

It should be noted that not all areas of the Region were dealing with the bitter cold this month. Parts of southern Wyoming and western Colorado were actually above normal, with departures up to 6.0 degrees F (3.3 degrees C) in some locations.



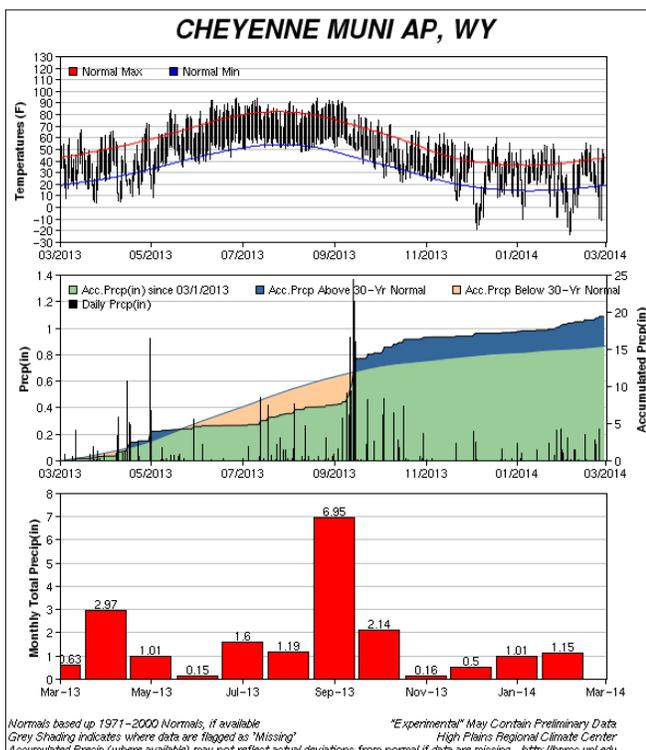
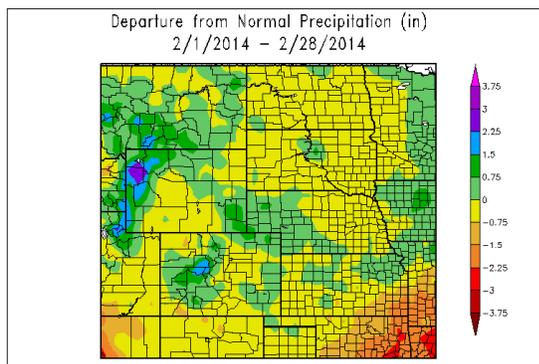
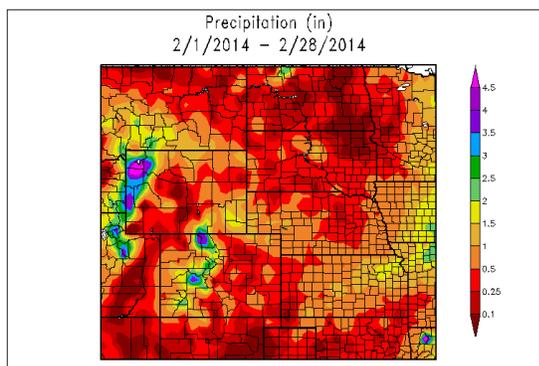
Departure from 1981-2010 Normal Average Temperature (left) and Percent of Normal Precipitation (right) for February 2014 in the High Plains Region. Maps produced by High Plains Regional Climate Center. Available at: <http://hprcc.unl.edu/maps/current>

Precipitation Summary

Precipitation was quite varied across the High Plains Region this month. Most areas of the Region had below normal precipitation with southeastern North Dakota, northeastern South Dakota, and southeastern Kansas being the driest. These areas only picked up liquid equivalent precipitation totals that were at most 25 percent of normal. Luckily, winter is a dry time of year for the plains, so these precipitation deficits were not too troublesome. Meanwhile, areas receiving above normal precipitation included western and northern Wyoming, western Colorado, and an area encompassing eastern Wyoming, northeastern Colorado, and the panhandle of Nebraska. These wetter areas all received liquid equivalent precipitation totals of at least 150 percent of normal.

February snowfall rankings indicate that some locations throughout the Region ranked in both the top 10 snowiest and least snowiest on record. Take Fargo, North Dakota and Cheyenne, Wyoming for example. Both sites receive about the same amount of snowfall in February, on average. Although several systems brought a Trace amount of snow, Fargo, North Dakota had its 8th least snowiest February on record with only 1.5 inches (4 cm). This amount was 5.5 inches (14 cm) below normal and not too far off from the record that occurred in February of 1954 with 0.3 inches (1 cm) (period of record 1885-2014). On the other end of the spectrum, Cheyenne, Wyoming had its 4th snowiest February with 19.4 inches (49 cm). This total was 11.5 inches (29 cm) above normal, but not enough to beat out the record of 23.3 inches (59 cm) which occurred back in 1995 (period of record 1883-2014). More February rankings are available on page 6.

Even though much of the Region had below normal precipitation, several systems brought snow to the Rockies and improved the snowpack in both Colorado and Wyoming. While southern basins in Colorado were running 15-23 percent below average, other basins were near to above normal which brought Colorado's statewide average at the end of February to 111 percent - up considerably from last month's 94 percent. Meanwhile in Wyoming, the statewide snowpack at the end of the month was 132 percent of average, also up from last month's 113 percent.



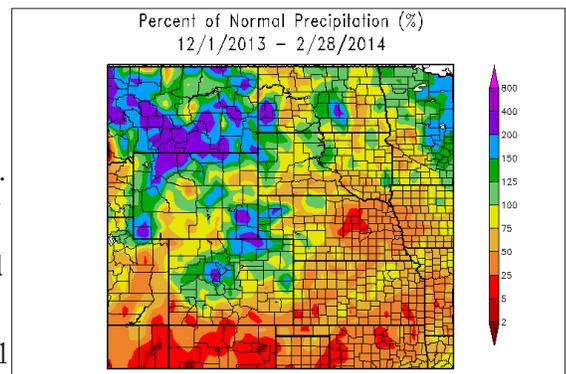
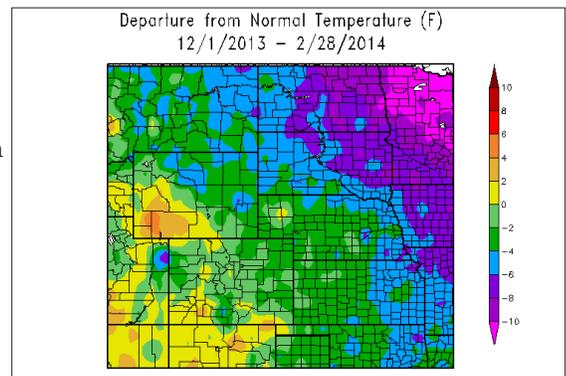
Above: Total precipitation (inches) (top left) and Departure from Normal Precipitation (inches) (bottom left) for February 2014 in the High Plains Region. Accumulated and monthly precipitation for Cheyenne, WY (right) over the past year. These maps are produced by HPRCC and can be found on the Current Climate Summary Maps page at: <http://hprcc.unl.edu/maps/current>.

Winter 2014 Highlights

There was strong ridging to the west and troughing to the east across the United States this winter. This pattern led a dichotomy where winter storms frequented the east and warm, dry conditions prevailed in the west. With the exception of portions of Colorado and Wyoming, the majority of the High Plains Region had temperatures which averaged well below normal. Although blasts of cold air were common, the coldest portion of these air masses slipped to the east and impacted places such as Minnesota, Iowa, Wisconsin, and Illinois. For instance, much of the northern and eastern sides of the Region had temperatures which were 4.0-10.0 degrees F (2.2-5.6 degrees C) below normal but, a large area of northern Minnesota and Wisconsin averaged greater than 10.0 degrees F (5.6 degrees C) below normal.

It is worth noting that although this winter was not necessarily record breaking, there were many impacts. A deep frost line has been reported in many locations due to a lack of snow cover early in the season and extended cold. This could lead to enhanced runoff chances should these areas get early spring rains. Propane shortages have also impacted the Region, especially those that rely on the fuel for warmth. Unfortunately, at least one death in North Dakota was due to the propane shortage. Producers were also impacted by the shortage as some corn was not dry at the end of the growing season and propane is used to help finish drying the crop. In some places, there will be loss.

As for precipitation this winter, much of the Region was below normal however, parts of the Rockies have picked up quite a bit of snow. As such, snowpack has greatly improved in Colorado and Wyoming, especially when compared to last year. One local example was from the popular ski destination of Breckenridge, Colorado which had its 3rd snowiest winter on record with 131.6 inches (334 cm). The record of 182.6 inches (464 cm) from the winter of 1898-1899 held (period of record 1893-2014).



Above: Departure from Normal Temperature (F) (top) and Percent of Normal Precipitation (bottom) for Winter 2014 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>.

Winter 2014 Rankings - Highlights

Seasonal Records			
Temperature in degrees F / Precipitation in inches			
Coldest	Average Temperature	Old Record / Year	Period of Record
Grand Forks, ND	0.4 / 3rd coldest	-2.5 / 1978-1979	1893-2014
Aberdeen, SD	7.3 / 5th coldest	2.0 / 1935-1936	1893-2014
Casper, WY	21.1 / 6th coldest	16.0 / 1948-1949	1939-2014
Snowiest	Precipitation	Old Record / Year	Period of Record
Scottsbluff, NE	37.4 / 2nd snowiest	42.0 / 1977-1978	1893-2014
Casper, WY	41.4 / 7th snowiest	73.4 / 1982-1983	1939-2014
Cheyenne, WY	44.5 / 2nd snowiest	61.8 / 1979-1980	1883-2014

All Data are Preliminary and Subject to Change.

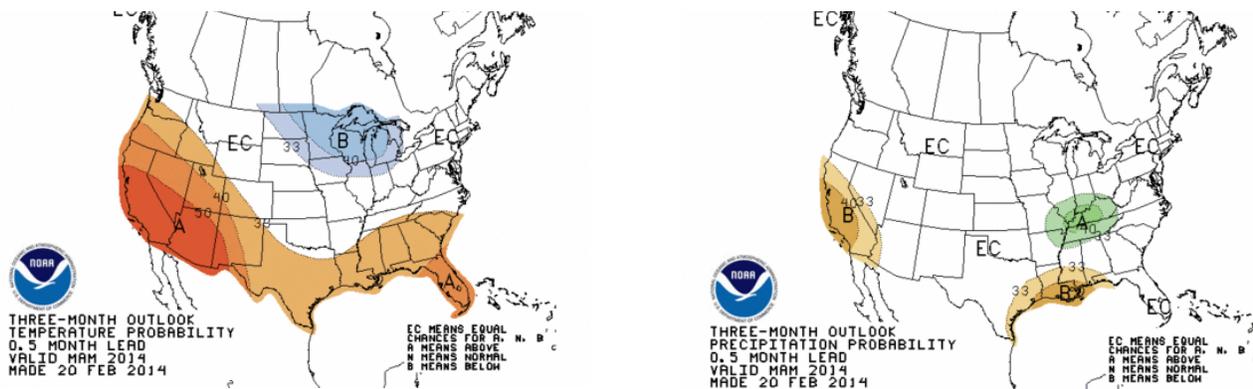
* indicates multiple records, latest date is listed

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

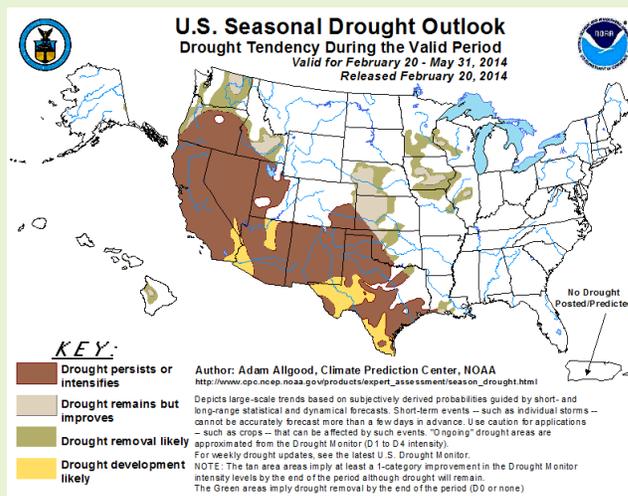
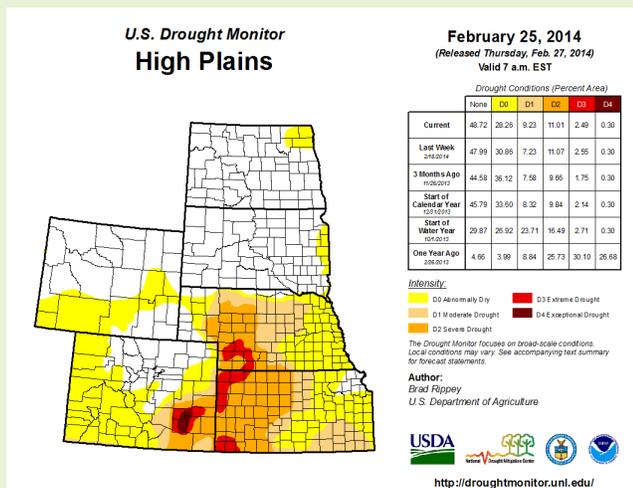
ENSO-neutral conditions continued this month and are likely to continue through the summer of 2014. For the next three months, the temperature outlook indicates a higher probability of above normal temperatures in portions of southern and western Colorado and the southwest corner of Wyoming. Meanwhile, a higher probability of below normal temperatures exists for most of North Dakota and northeastern South Dakota. The precipitation outlook shows there are equal chances of above, near, or below normal precipitation for the Region through May. Equal chances of above, near, or below normal temperatures also exist for the rest of the Region not mentioned above. 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

Typical for this time of year, there were only small changes to the U.S. Drought Monitor in the High Plains Region this month. Approximately 23 percent of the Region was in moderate (D1) to exceptional (D4) drought at the end of February, which was unchanged from January. While the percentage of area in drought remained about equal, some small areas had improvements and others had degradations. For instance, Wyoming's last remaining D1 areas were eliminated, but D1 in eastern Kansas expanded. The extreme (D3) and exceptional (D4) drought conditions across western Nebraska, western Kansas, and eastern Colorado remained unchanged. According to the U.S. Seasonal Drought Outlook released February 20th, current drought conditions are expected to persist across Colorado and southwestern Kansas through May 2014. Meanwhile, drought conditions may improve or be eliminated in other parts of Kansas and Nebraska. Further drought development is not expected at this time.



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	35.1	12.1	23.6	-7.8	62	02/16	-19	02/05	0.19	-0.25	43
Alamosa San Luis Airport	43.7	12.7	28.2	5.4	62	02/15	-10	02/06	0.05	-0.21	19
Colorado Springs Municipal Airport	44.4	17.2	30.8	-1.3	66	02/16	-15	02/06	0.22	-0.12	65
Grand Junction Walker Field Airport	46.0	24.1	35.1	0.6	63	02/16	1	02/02	0.71	0.17	131
Pueblo Memorial Airport	46.2	17.8	32.0	-1.9	71	02/18+	-16	02/06	0.28	-0.02	93

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	36.0	16.5	26.3	-6.4	72	02/18	-7	02/06	0.76	-0.03	96
Dodge City Regional Airport	39.3	17.1	28.2	-7.7	73	02/18	-3	02/05	0.60	-0.08	88
Goodland Renner Field	37.0	13.9	25.4	-6.9	63	02/18	-14	02/05	0.37	-0.12	76
Topeka Municipal Airport	36.9	16.9	26.9	-7.5	70	02/18	-6	02/06	1.29	-0.03	98
Wichita Mid-Continent Airport	41.9	20.2	31.0	-6.2	71	02/18	3	02/05	0.86	-0.32	73

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	31.6	6.3	19.0	-8.4	65	02/16	-17	02/06+	0.35	-0.26	57
Grand Island Airport	33.5	13.4	23.4	-5.7	66	02/18	-14	02/06	0.33	-0.35	49
Lincoln Municipal Airport	33.8	11.3	22.5	-6.5	69	02/18	-13	02/06	0.62	-0.15	81
Norfolk Karl Stefan Airfield	31.1	8.9	20.0	-6.8	62	02/18	-13	02/10	0.42	-0.34	55
North Platte Regional Airport	32.4	8.2	20.3	-8.7	60	02/18	-21	02/06	0.73	0.23	146
Omaha Eppley Airport	31.9	11.6	21.7	-6.4	64	02/18	-9	02/10+	0.72	-0.13	85
Valentine Miller Field	32.1	6.2	19.2	-8.0	59	02/19	-21	02/07	0.62	0.14	129

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismark Municipal Airport	20.9	-1.6	9.6	-8.5	46	02/19	-18	02/10	0.19	-0.32	37
Fargo International Airport	14.4	-5.3	4.6	-10.0	41	02/19	-20	02/27+	0.11	-0.50	18
Grand Forks International Airport	11.0	-10.1	0.4	-11.6	34	02/18+	-29	02/27	0.57	0.05	110
Theodore Roosevelt Airport	22.4	-0.5	10.9	-9.6	44	02/17	-15	02/10+	0.13	-0.20	39
Williston International Airport	20.9	-2.1	9.4	-7.5	46	02/17	-17	02/10	0.26	-0.13	67

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>.

February 2014 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	18.7	-5.4	6.6	-11.0	43	02/19	-20	02/10	0.16	-0.39	29
Huron Regional Airport	24.8	1.9	13.3	-8.3	57	02/19	-14	02/25+	0.42	-0.18	70
Pierre Regional Airport	26.4	3.4	14.9	-9.4	56	02/19	-19	02/07	0.43	-0.16	73
Rapid City Regional Airport	31.1	6.5	18.8	-8.6	64	02/16	-19	02/07+	0.26	-0.18	59
Sioux Falls Joe Foss Field Airport	22.2	1.4	11.8	-9.7	50	02/19	-18	02/10	0.68	0.08	113

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	31.6	6.3	19.0	-7.7	56	02/16	-26	02/06	0.74	0.17	130
Cheyenne Municipal Airport	35.0	10.1	22.6	-7.0	56	02/16	-23	02/05	1.15	0.68	245
Lander Hunt Field Airport	32.3	10.0	21.1	-4.1	53	02/13	-17	02/06	0.19	-0.39	33
Laramie Regional Airport	33.2	11.6	22.4	-1.1	50	02/16	-20	02/05	0.16	-0.18	47
Rawlins Municipal Airport	35.3	16.3	25.8	2.1	50	02/16	-20	02/06	0.18	-0.24	43
Sheridan County Airport	28.6	4.4	16.5	-10.1	58	02/16	-28	02/06	1.21	0.67	224

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Source: National Weather Service Cooperative Observation Network Data

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

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February 2014 Top 10 Rankings - Highlights

Temperature and Precipitation Rankings			
Temperature in degrees F / Precipitation and Snowfall in inches			
Coldest February			
Location	Temperature / Rank	Record or Previous Record / Year	Period of Record
Scottsbluff, NE	20.6 / 9th coldest	6.9 / 1899	1893-2014
Grand Forks, ND	0.4 / 9th coldest	-13.1 / 1936	1893-2014
Aberdeen, SD	6.6 / 7th coldest	-7.3 / 1936	1893-2014
Rapid City, SD	18.8 / 8th coldest	14.4 / 1989	1942-2014
Casper, WY	19.0 / 3rd coldest	11.9 / 1989	1939-2014
Least snowiest February			
Location	Snowfall / Rank	Record or Previous Record / Year	Period of Record
Fargo, ND	1.5 / 8th least snowiest	0.3 / 1954	1885-2014
Snowiest February			
Location	Snowfall / Rank	Record or Previous Record / Year	Period of Record
Topeka, KS	15.0 / 7th snowiest	27.1 / 1900	1887-2014
Wichita, KS	13.1 / 6th snowiest	21.2 / 2013	1888-2014
Scottsbluff, NE	20.1 / 2nd snowiest	23.4 / 1987	1893-2014
Cheyenne, WY	19.4 / 4th snowiest	23.3 / 1995	1883-2014

All Data are Preliminary and Subject to Change.

* indicates multiple records, latest date is listed

Source: National Weather Service Cooperative Observation Network Data

State Spotlight - Kansas

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

Winter Continues

As with January, February saw snowy weather both to begin and end the month. Overall, temperatures were much colder than average. The preliminary state-wide average temperature was 26.5F, which was 7.4 degrees cooler than average, and 2 degrees cooler than the January average temperature. That places it as the 13th coolest February of 120 years. Coupled with the cooler than average temperatures in December and January, it makes this winter season the 14th coldest on record. The coldest reading in February was -16F at Atwood 2S (Rawlins County) and St. Francis (Cheyenne County) on the 6th. The warmest reading was 80F at Richfield 1NE (Morton County) on the 16th. All divisions saw lows below zero. The coldest February on record occurred in 1899, when the average temperature was 18.5F.

While February was wetter than January, preliminary statewide average precipitation was only 0.69 inches, which was 72% of normal. This makes it the 42nd driest February since 1895, or in the lower part of the distribution. The long-term average precipitation in February is 0.95 inches. All divisions averaged below normal (1981-2010), with the exception of the Northeastern Division. The Northeast averaged 1.24 inches, which was 0.12 inches above normal or 111% of normal. The Southeastern Division fared the worst, when compared to normals. The Southeastern Division averaged 0.51 inches, which was 30 percent of normal. There has been some improvement in drought conditions, particularly in the Northeastern Division, where precipitation amounts were heaviest. Ten days in February averaged greater than a trace of precipitation. Only three of those days saw a state-wide average precipitation of greater than a tenth of an inch. Greatest daily precipitation for both the NWS and CoCoRaHS networks occurred at the beginning of the month, with 1.58 inches on the 5th at Osage City, Osage County (NWS) and 1.38 inches on the 5th at Brookville 5.9 NNW, Saline County (CoCoRaHS). Greatest monthly totals for February were 3.19 inches at Rossville, Shawnee County (NWS), and 2.90 inches at Mayetta 5.5 WSW, Jackson County (CoCoRaHS). Snow was a large component of the moisture in February. Greatest daily snowfall was 15.5 inches reported on the 5th at both Eskridge, Wabaunsee County (NWS) and at Eskridge 0.1 SW, Wabaunsee County (CoCoRaHS).

Drought conditions persist across the state. There was some slight improvement in the Northeastern Division, but moderate drought expanded in the South Central and Southeastern divisions. Almost 8% of the state was in extreme drought at the end of February, similar to the ending value in January. The latest Drought Monitor shows that extreme drought now covers 7.74% of the state. Normal precipitation in February is still low, so even above normal precipitation has little impact. The latest Drought Outlook indicates drought conditions are expected to continue through May, although there might be some improvement in the Northwest and West Central areas of the state. The El Niño/Southern Oscillation (ENSO) is expected to remain neutral through the spring. That means the signal for increased spring precipitation will also be weaker. For March chances are equally likely for precipitation to be above or below normal state-wide. The temperature outlook calls for below normal temperatures across the Northeast, with equal chances for above or below normal temperatures across the remainder of the state. This does not indicate how much cooler conditions might be, and does not exclude the possibility of warm weather in the period.

Severe weather came in the form of winter storms at the beginning and end of the month. The February 5th storm was particularly active with hail, sleet, and thunder in advance of heavy snow and strong winds. There were also several red flag warnings for extreme fire danger in the Southeastern Division, an area where such conditions are uncommon.

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.

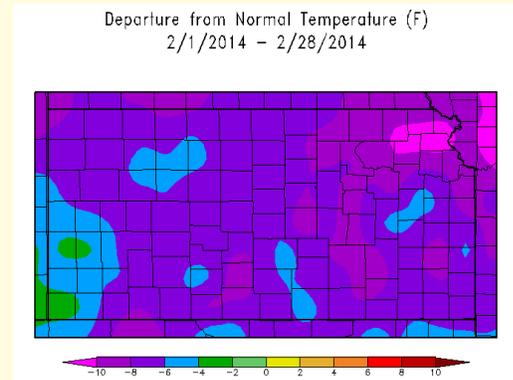


Figure 1. February 2014 departure from average temperatures across Kansas (High Plains Regional Climate Center)

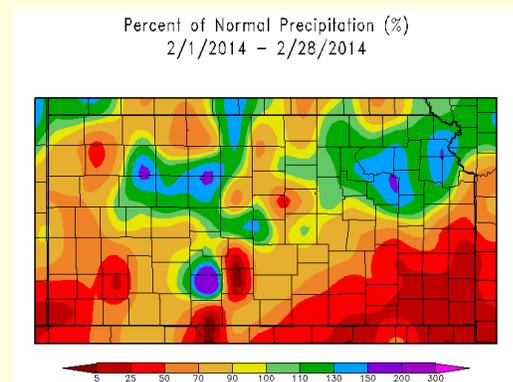


Figure 2. February 2014 percent of normal precipitation across Kansas (High Plains Regional Climate Center)

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:

February 2014 precipitation totals were below average for most of the state (Figure 1). Preliminary statewide average February 2014 precipitation total was 0.18 inches which was 40% lower than the 1981-2010 average of 0.45 inches. A precipitation total of 0.18" puts February 2014 as the 12th driest in the past 120 years. Recent years of February 2005 (0.12") and 2002 (0.13") ranked 5th and 7th driest, respectively. The top three February 2014 snowfall totals were Elgin (COOP) with 9.5", Grand Forks 0.6 WS (CoCoRaHS) with 7.7" and Pembina (WBAN) with 7.5". The U.S. Drought Monitor February 25th report listed the northeast corner as abnormally dry with no drought conditions for the remainder of the state.

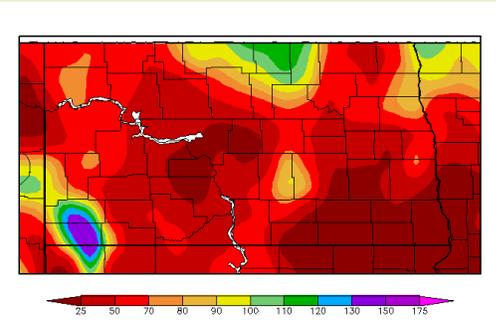


Figure 1. Percent of Normal Precipitation in February 2014 for North Dakota (High Plains Regional Climate Center)

Temperature:

NDAWN February average air temperatures ranged from a minimum of -2 °F in northeast to 11 °F in the southwest. Departure from normal average air temperatures were between 7 °F and 14 °F below normal (Figure 2). The preliminary state average temperature was 5.5 °F which is 10.1 °F below the 1981-2010 average of 15.6 °F. This puts February's rank as 20th coldest in the past 120 years. This ties 2001 which is the most recent year to rank 20th or less. February daily average temperatures were consistently below normal for most places with only a few days from the 17th through the 20th with above normal temperatures.

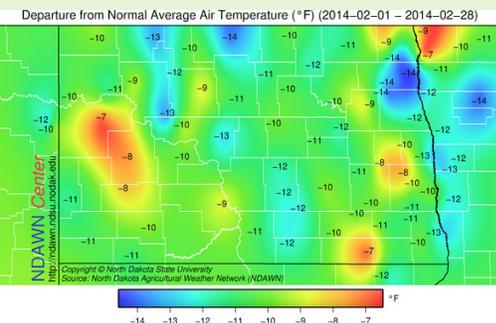


Figure 2. Temperature Departure from Normal in February 2014 for North Dakota (North Dakota State Climate Office)

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

Author Information

For questions, comments, or suggestions, please contact:

Natalie Umphlett - Regional Climatologist - High Plains Regional Climate Center

(402) 472-6764 - numphlett2@unl.edu

712 Hardin Hall

3310 Holdrege Street

Lincoln, NE 68583-0997

