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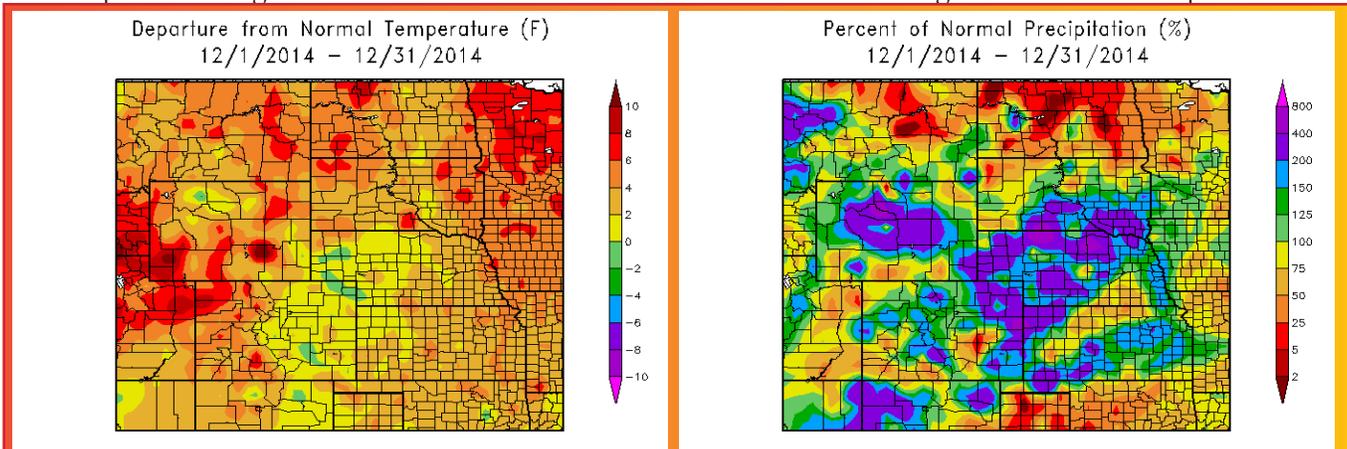
Fall meeting of the American Geophysical Union, San Francisco, CA - Photo by Natalie Umphlett
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December 2014 Climate Summary

Region Breakdown

December was generally mild across the High Plains Region. Much above normal temperatures for most of the month gave way to bitter cold at the end. This resulted in monthly temperatures which were above normal for the majority of the Region. Temperature departures of 2.0-6.0 degrees F (1.1-3.3 degrees C) above normal were common, however an area encompassing eastern Colorado, northwestern Kansas, and central Nebraska had temperatures which averaged out to near normal (2.0 degrees F (1.1 degrees C) above/below normal). Although not record breaking, there were some isolated areas which had departures over 6.0 degrees F (3.3 degrees C). The relative warmth placed many locations in the top 25 warmest Decembers on record. For instance, Fargo, North Dakota had an average temperature of 21.1 degrees F (-6.1 degrees C), which was an impressive 7.0 degrees F (3.9 degrees C) above normal. This ranked as the 12th warmest December on record (period of record 1881-2014). The warmest December occurred back in 1959 with an average temperature of 25.9 degrees F (-3.4 degrees C).

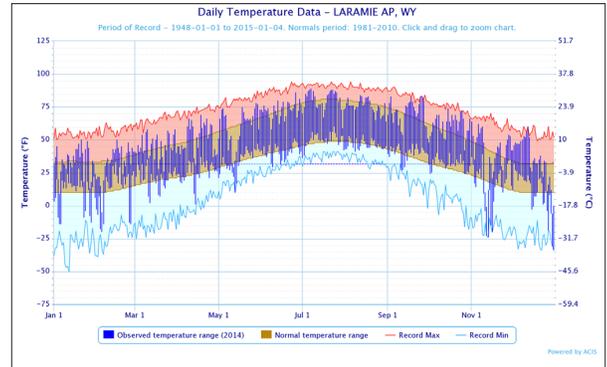
A look at daily temperatures shows that many interesting records occurred this month. For instance, relatively warm and humid conditions settled into the Region during the middle of the month which allowed for a smaller diurnal temperature range than usual and some locations set new records for highest minimum temperature ever



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

Temperature Summary cont.

recorded in December. Lincoln, Nebraska had one of these records with a minimum temperature of 53 degrees F (11.7 degrees C) on the 14th. This was 37 degrees F (20.6 degrees C) above normal and high enough to beat the old record of 51 degrees F (10.6 degrees C) set on December 1, 1962. Laramie, Wyoming also had some interesting temperatures this month. With records going back to 1948, Laramie tied for its coldest December temperature with -34 degrees F (-36.7 degrees C) on the 31st and also tied for its 2nd warmest December temperature of 60 degrees F (15.6 degrees C) on the 12th. That's a 94 degree F (52.3 degree C) temperature range for the month! The figure to the right shows the temperatures over the past year in Laramie and how those temperatures compared to the averages and extremes. Note the large swing in temperatures with record cold in November, record warmth in mid-December, and then back to record cold at the very end of the year.

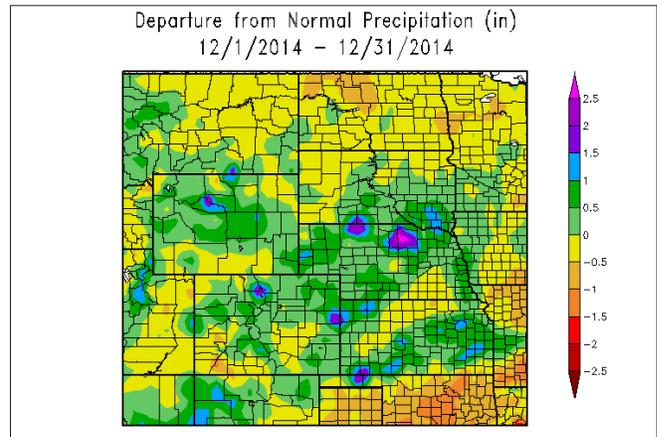
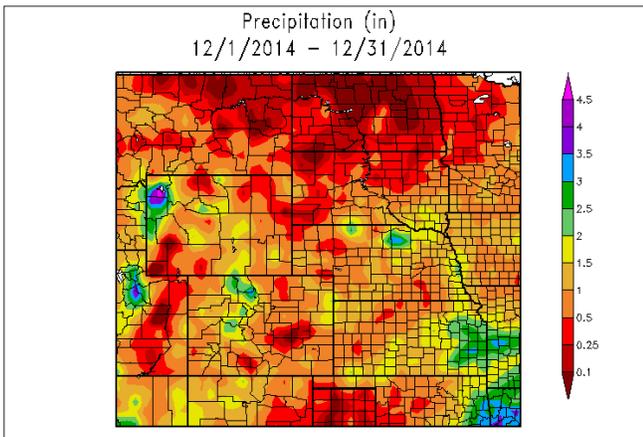


Above: 2014 daily temperatures along with extremes and normal values for Laramie, Wyoming.

Precipitation Summary

December was generally a wet month for the High Plains Region with the main exception being North Dakota. Although there was a slow start to the snow season, end of the month snowpack was near normal in the Rockies in Colorado and Wyoming, with statewide snowpacks of 103 percent and 107 percent, respectively. Additionally, a large area of the Region had precipitation totals which were greater than 200 percent of normal including central Wyoming, eastern Colorado, western Kansas, western and central Nebraska, and southern South Dakota. A few localized areas had greater than 400 percent of normal precipitation. Meanwhile in North Dakota, precipitation was lacking with widespread precipitation totals of less than 25 percent of normal. For this part of the country, liquid equivalent precipitation is typically light at this time of the year so although there were extremes, the actual amounts were quite low.

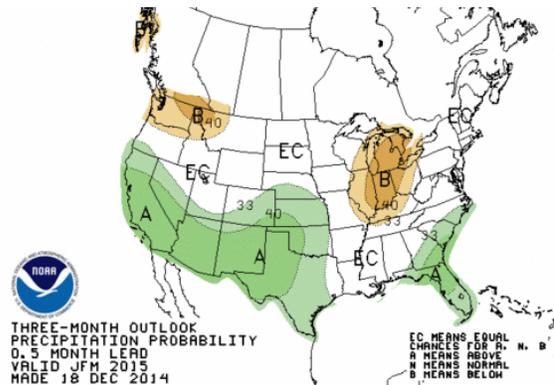
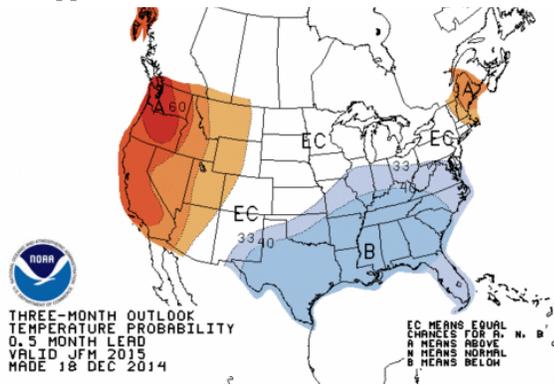
These precipitation extremes led to some top 10 rankings on both ends of the spectrum. On the wet side, Scottsbluff, Nebraska had its snowiest December on record with 25.3 inches (64 cm). This new record was easily set by exceeding the old record (18.2 inches (46 cm) in 2007) by over 6.0 inches (15 cm). 9.3 inches (24 cm) fell on the 25th and was Scottsbluff's snowiest Christmas on record (period of record 1893-2014). Some areas of North Dakota, however, had a lack of snowfall this December. For example, Fargo, North Dakota only had a Trace of snow on the ground on Christmas and has yet to receive its first 1-inch (3 cm) snowfall of the season (although smaller snowfall events under one inch have occurred). Only two other times has the first 1-inch snowfall happened so late in Fargo - January 22, 1914 and January 27, 1944. With only 0.9 inches (2 cm) of snow, Fargo tied for its 3rd least snowiest December on record (period of record 1885-2014). This was 10.3 inches (26 cm) below normal.



Above: Total Precipitation (inches) (left) and Departure from Normal Precipitation (inches) (right) for December 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>.

Climate Outlook

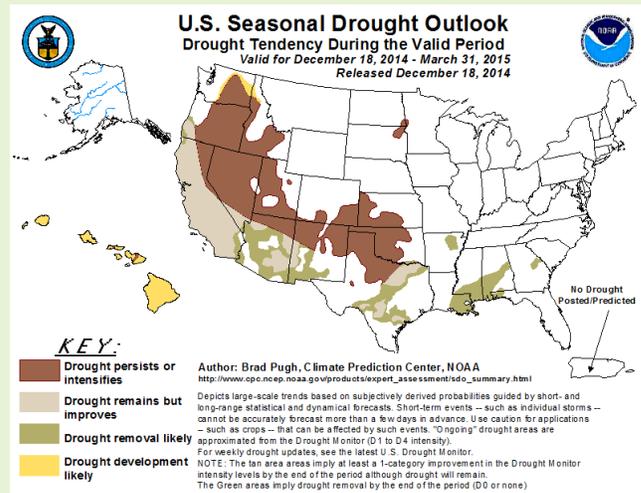
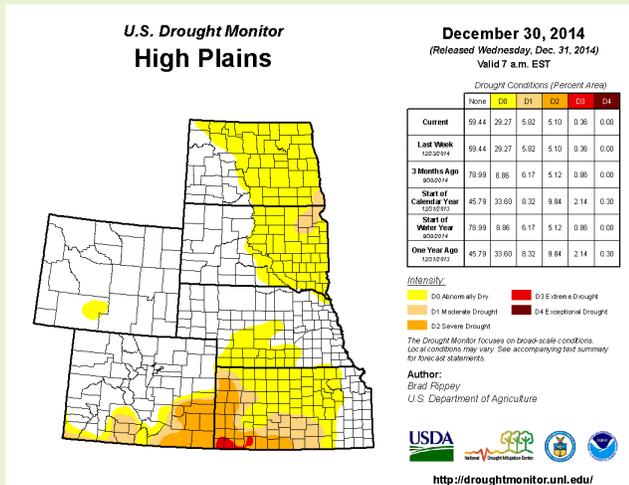
Although ENSO-neutral conditions continued through December, El Niño is still favored to begin sometime this winter. Similar to last month's outlook, the temperature outlook through March indicates a higher probability of above normal temperatures for the western United States including the western half of Wyoming and part of western Colorado. The southern U.S. has a higher probability for below normal temperatures and this includes part of southeastern Kansas. Meanwhile, the precipitation outlook shows equal chances for northern areas of the region, with a higher probability for above normal precipitation in Kansas, much of Colorado, and southern Nebraska. All other areas in the Region have equal chances of above, near, or below normal temperatures and precipitation. 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 of 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

According to the U.S. Drought Monitor, drought conditions remained largely unchanged over the past month. Winter is typically the driest time of year, so drought improvements or developments are not usually expected and impacts of drought, if any, are minor. The total area in drought (D1-D4) remained at about 11 percent with only a very slight expansion of moderate drought (D1) in South Dakota and a slight contraction in severe drought (D2) in northwestern Kansas. Drought conditions in the southern part of the region, across Colorado and Kansas, persisted. Abnormally dry conditions (D0) have expanded westward in the Dakotas and northward in Kansas where dryness has been occurring over the past three months. According to the U.S. Seasonal Drought Outlook released December 18th, drought conditions in the small area of the Dakotas and across Kansas through eastern Colorado are expected to persist through the end of March. Although no drought areas are expected to improve or be removed, new areas of development are not expected either.



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 of 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	39.6	17.0	28.3	0.0	69	12/12	-16	12/31	0.24	-0.16	60
Alamosa San Luis Airport	38.9	6.0	22.5	4.6	55	12/13	-11	12/29+	0.21	-0.14	60
Colorado Springs Municipal Airport	44.3	18.6	31.5	1.7	61	12/11	-11	12/31	0.16	-0.18	47
Denver International Airport	44.1	18.5	31.3	1.3	66	12/12	-19	12/30	0.59	0.24	169
Grand Junction Walker Field Airport	40.9	23.2	32.0	3.5	55	12/01	-2	12/31	1.06	0.47	180
Pueblo Memorial Airport	45.8	14.8	30.3	0.2	62	12/10	-17	12/31	0.24	-0.14	63

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	40.6	26.0	33.3	3.3	58	12/14+	1	12/31	0.74	-0.11	87
Dodge City Regional Airport	43.5	25.9	34.7	1.9	63	12/05	-3	12/31	1.00	0.16	119
Goodland Renner Field	43.4	17.8	30.6	0.7	69	12/02	-11	12/31	1.46	1.00	317
Topeka Municipal Airport	42.8	29.8	36.3	4.3	62	12/14	4	12/31	2.27	0.92	168
Wichita Mid-Continent Airport	45.2	31.1	38.2	4.4	60	12/08	7	12/31	1.29	0.09	108

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	41.1	11.8	26.5	2.1	72	12/12	-21	12/30	1.37	0.85	263
Grand Island Airport	37.1	21.1	29.1	2.4	58	12/14	-8	12/31	0.76	0.13	121
Lincoln Municipal Airport	38.6	24.3	31.4	4.6	59	12/14	-4	12/31	1.22	0.27	128
Norfolk Karl Stefan Airfield	35.0	21.3	28.2	3.9	58	12/14	-11	12/31	1.20	0.45	160
North Platte Regional Airport	39.0	15.1	27.0	1.6	60	12/07+	-17	12/31	1.04	0.63	254
Omaha Eppley Airport	37.6	25.4	31.5	5.5	59	12/14	-2	12/30	1.68	0.64	162
Valentine Miller Field	38.6	13.5	26.0	2.2	62	12/11	-18	12/30	0.90	0.53	243

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismark Municipal Airport	29.1	10.4	19.8	3.6	49	12/12	-18	12/01	0.11	-0.38	22
Fargo International Airport	28.1	14.1	21.1	7.0	47	12/14	-13	12/01	0.25	-0.58	30
Grand Forks International Airport	25.1	10.6	17.9	6.4	39	12/13	-17	12/01	0.22	-0.39	36
Theodore Roosevelt Airport	33.7	15.5	24.6	6.7	61	12/12	-16	12/29	0.07	-0.17	29
Williston International Airport	29.0	10.1	19.6	5.7	47	12/11	-20	12/01	0.03	-0.59	5

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>.

December 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	29.7	15.0	22.4	6.7	51	12/13	-16	12/01	0.25	-0.27	48
Huron Regional Airport	31.3	14.5	22.9	3.7	58	12/13	-16	12/30	0.70	0.18	135
Pierre Regional Airport	33.3	14.1	23.7	2.0	60	12/12	-12	12/31	0.82	0.27	149
Rapid City Regional Airport	40.8	15.7	28.3	3.4	71	12/12+	-15	12/30	0.42	0.00	100
Sioux Falls Joe Foss Field Airport	31.9	17.0	24.4	5.2	55	12/14	-13	12/30	1.33	0.64	193

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	38.2	18.7	28.5	4.7	60	12/12	-16	12/30	1.25	0.76	255
Cheyenne Municipal Airport	40.8	17.6	29.2	1.5	64	12/12	-22	12/30	0.67	0.18	137
Lander Hunt Field Airport	33.8	12.5	23.2	2.5	56	12/09	-27	12/31	1.82	1.24	314
Laramie Regional Airport	34.9	9.9	22.4	1.3	60	12/12	-34	12/31	0.14	-0.18	44
Rawlins Municipal Airport	33.9	15.5	24.7	3.2	54	12/12	-27	12/31	0.41	-0.02	95
Sheridan County Airport	36.2	13.9	25.0	2.1	60	12/09	-18	12/30	0.74	0.18	132

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Source: National Weather Service Cooperative Observation Network Data

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

December 2014 Top 10 Rankings - Highlights

Monthly Rankings			
Precipitation and Snowfall in inches			
Wettest / Driest	Precipitation / Ranking	Record / Year	Period of Record
Goodland, KS	1.46 / 7th wettest	2.90 / 1924	1895-2014
Scottsbluff, NE	1.47 / 5th wettest	2.22 / 1913	1893-2014
Williston, ND	0.03 / 4th driest	Trace / 1913	1894-2014
Casper, WY	1.25 / 3rd wettest	3.71 / 1982	1939-2014
Lander, WY	1.82 / 4th wettest	2.06 / 1909	1891-2014
Snowiest / Least Snowiest	Snowfall / Ranking	Record / Year	Period of Record
Scottsbluff, NE	25.3 / SNOWIEST	18.2 / 2007	1893-2014
Fargo, ND	0.9 / 3rd least snowiest	Trace / 1913	1885-2014
Grand Forks, ND	1.8 / 9th least snowiest	0.1 / 1959*	1893-2014
Pierre, SD	10.2 / 10th snowiest	31.3 / 1951	1893-2014
Rapid City, SD	9.1 / 7th snowiest	17.9 / 1975	1942-2014
Casper, WY	17.8 / 4th snowiest	62.8 / 1982	1939-2014
Lander, WY	21.1 / 7th snowiest	34.6 / 2007	1891-2014

All Data are Preliminary and Subject to Change.

* indicates multiple records, latest year is listed

State Spotlight - Kansas

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

Milder trend

December was much milder than November. With the mild weather came clouds. This December saw an average of just 57 percent of the possible sunshine. In comparison, last year that average was 79 percent. State-wide temperatures averaged 34.6F, which was 2.6F warmer than normal. This places it on the warm side of the middle range for December temperatures, as the 35th warmest since 1895. The Northwest Division came closest to average at 29.9F or 0.9F warmer than normal. The Southwest Division saw the greatest departure. The average temperature was 33.6F, or 3.7F warmer than normal. The warmer than average temperatures didn't mean that the month was without cold weather. All divisions reached lows in the single digits. The coldest reading occurred at the end of the month, as an Arctic front issued in the New Year. The coldest reading was -16F at Brewster 4W, in Thomas County, on the 31st. North Central KS also saw lows in the double digits below zero. Sub-zero readings were also recorded in the West Central, Central, and Northeastern divisions. The warmest reading for the month was 80F reported at Lakin in Kearny County, on the 3rd. Even with the warmer temperatures, there was only one daily high temperature record set. There were 176 record warm minimum temperatures set and of those daily records, 9 set monthly records for warmest minimums. On the cold side of things, 16 record low maximum temperatures were recorded.

State-wide average precipitation was 1.20 inches which was 118 percent of normal. Unfortunately, that excess only equals 0.17 inches. The West Central and North Central divisions averaged below normal for the month, while the Northwest and Southwest divisions tied for the greatest percent of normal at 157 percent in both divisions. Again, the departure from normal was slight in actual amounts at 0.38 inches in the Southwest and 0.24 inches in the Northwest. The wettest day of the month was on the 5th, when the average precipitation was 0.48 inches. However, the highest daily total reported for the CoCoRaHS network was 1.75 inches at Lawrence 7.8 SW (Douglas County) on the 18th. The highest 24hr total reported for the month at a National Weather Service Coop site was 2.00 inches on the 5th at Liberal, (Seward County) in southwestern KS. Highest monthly totals were 3.27 inches at Wakeeney, Trego County (NWS). This was an isolated value as surrounding stations saw much lower monthly totals. The greatest monthly total for the CoCoRaHS network was 3.74 inches at Lawrence 7.8 SW (Douglas County). As typical, December was quiet on the severe weather side. There was only one report of severe weather in December: a rare winter tornado. This was an EF0 tornado reported in Harper County on the 14th. This is only the sixth December since 1950 to record a tornado. There was one snow event, but amounts were generally not troublesome. Highest daily total reported was 6.9 inches at Goff 3WSW, Nemaha County on the 18th (NWS) and 7.1 inches at Ellsworth 3.3 NW, Ellsworth County (CoCoRaHS).

Drought conditions persist across the state, particularly in the west. There was some degradation in the east. By the end of November, the drought-free area had shrunk to 29 percent. This dropped another 10 percent in December. The fact that December is generally one of our drier months means that even above normal precipitation has only limited benefits. However, a continued dry pattern is likely to result in further expansion of drought in the North Central Division. The likelihood of an El Niño/Southern Oscillation (ENSO) continues to diminish. It is still expected to switch to an El Niño, but it also remains to be seen what impact will be felt. Other global circulation patterns can have significant impacts on the winter season. The January temperature outlook is neutral for most of the state, with cooler than normal temperatures for the northwestern areas. The precipitation outlook is also neutral, with precipitation equally likely to be above normal, normal, or below normal. This does not indicate how that moisture might be distributed, and means snow events or extended dry periods are both possible.

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.

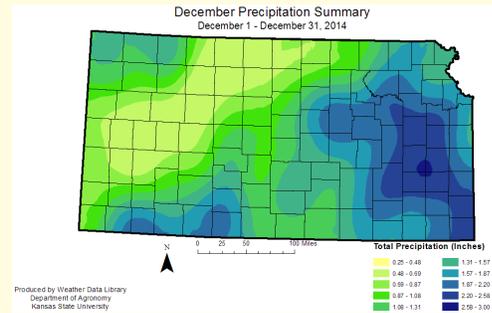


Figure 1. December 2014 total precipitation for Kansas (Kansas State Climate Office)

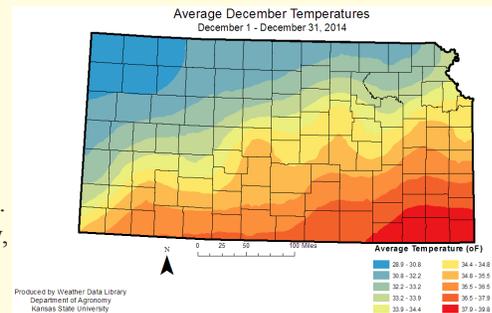


Figure 2. December 2014 average temperatures for Kansas (Kansas State Climate Office)

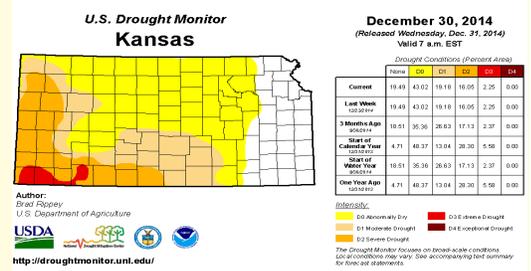


Figure 3. December 30, 2014 U.S. Drought Monitor map and statistics for Kansas (U.S. Drought Monitor)

State Spotlight - North Dakota

F. Adnan Akyüz - State Climatologist, Daryl Ritchison - Research Specialist
 North Dakota State Climate Office, North Dakota State University



Precipitation:

December 2014 was dry with many locations in North Dakota recording less than 0.2 inches of precipitation (Figure 1). Using data from the Cooperative Network and CoCoRaHS, the statewide average precipitation for the month was 0.21 inches. That is below the 30 year average of 0.52 inches. December was the fourth consecutive month with below average precipitation in many parts of North Dakota. Because of that recent dryness, the U.S. Drought Monitor now lists 68% of North Dakota in either Abnormally Dry or Moderate Drought conditions.

Temperature:

The year 2014 as a whole was persistently cold with a high percentage of the months finishing with temperatures below average. There were two exceptions to that rule, the first was the month of October that finished above average and the other was December that finished well above average (Figure 2). The NDAWN (North Dakota Agricultural Weather Network) average temperature was 18.5 degrees which is 4.5 degrees above average. That would rank December 2014 as having the highest positive temperature anomaly of any month during the year and only the second December with above average temperatures in the past eight years.

Notable Weather:

The warmer than average temperatures in December were directly related to a persistent stratus cloud deck that remained trapped under a strong temperature inversion that plagued the region off and on from December 7 through December 25. That tenacity of low clouds and fog made for small diurnal changes from low to high temperatures. Because the overnight temperatures were only in many cases a few degrees cooler than the previous day maximums, several records were broken during the month for high minimums. Examples of some of these record high minimums are presented in Figure 3. Fargo Hector International Airport recorded five straight record high minimums from December 20 through December 24. Grand Forks managed four straight record high minimums from December 11 through December 14. Other parts of the region also recorded such records making the numerous warm minimums the most notable weather feature of the month.

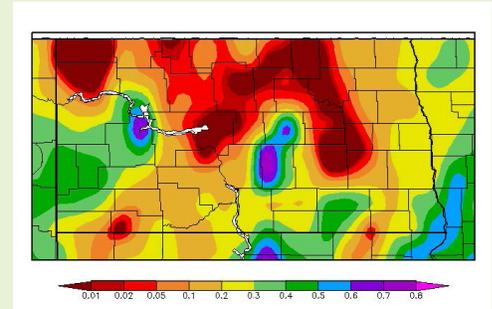


Figure 1. Total Precipitation in December 2014 for North Dakota (HPRCC)

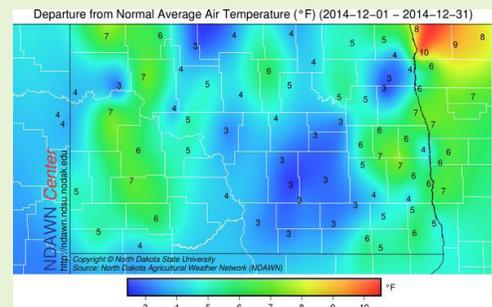


Figure 2. Temperature Departure from Normal in December 2014 for North Dakota (NDAWN)

Highest Min Temperature - December 22 for North Dakota
 Click column heading to sort ascending, click again to sort descending.

Name	Station Type	Record	Year	Valid Date Range
FARGO HECTOR INTL AP	WBAN	34	2014	1891-05-27 to 2014-12-22
MC LEOD 3 E	COOP	29	2014	1912-04-01 to 2014-12-22
GRAND FORKS UNIV	COOP	33	2014	1893-01-01 to 2014-12-22
DEVILS LAKE MUNI AP	WBAN	30	2014	1963-07-01 to 2014-12-22
GRAND FORKS INTL AP	WBAN	33	2014	1965-03-31 to 2014-12-22
PEMBINA	WBAN	28	2014	1898-05-01 to 2014-12-22

Highest Min Temperature - December 23 for North Dakota
 Click column heading to sort ascending, click again to sort descending.

Name	Station Type	Record	Year	Valid Date Range
FARGO HECTOR INTL AP	WBAN	31	2014	1891-05-27 to 2014-12-23
OAKES 2 S	COOP	32	2014	1922-09-19 to 2014-12-23
MC LEOD 3 E	COOP	31	2014	1912-04-01 to 2014-12-23
JAMESTOWN STATE HOSP	COOP	31	2014	1881-06-21 to 2014-12-23
MAYVILLE	COOP	32	2014	1893-01-01 to 2014-12-23
GRAND FORKS UNIV	COOP	30	2014	1893-01-01 to 2014-12-23
DEVILS LAKE MUNI AP	WBAN	25	2014	1963-07-01 to 2014-12-23
WILLOW CITY	COOP	28	2014	1893-01-01 to 2014-12-23
CAVALIER 7NW	COOP	29	2014	1934-08-01 to 2014-12-23
BOTTINEAU	COOP	27	2014	1893-01-01 to 2014-12-23
STREETER 7 NW	COOP	28	2014	1987-08-01 to 2014-12-23
GRAND FORKS INTL AP	WBAN	30	2014	1965-03-31 to 2014-12-23
PEMBINA	WBAN	32	2014	1898-05-01 to 2014-12-23

Figure 3. Record High Minimum Temperatures on December 22 and 23, 2014

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

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