



# December 2016 Climate Summary

Sunrise on Highway 50 near Texas Creek, Colorado. - Photo credit Colorado DOT. <http://hprcc.unl.edu>

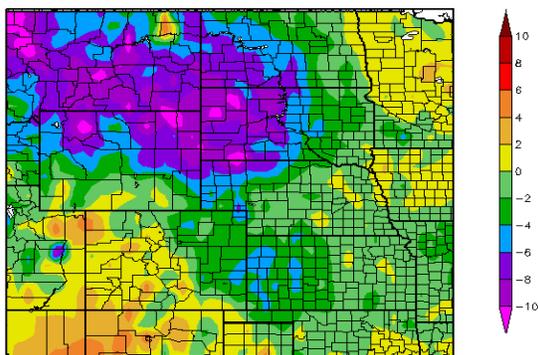
## A Switch to Cooler and Wetter Conditions

The warm pattern that had been present throughout much of the fall finally gave way to cooler conditions to begin the winter season. Arctic air masses pushed their way through the High Plains several times during December, contributing to monthly departures of up to 8.0 degrees F (4.4 degrees C) below normal in parts of the Dakotas and Wyoming. The greatest departures occurred mostly during the early and middle part of the month, punctuated by a bitterly cold outbreak of Arctic air on the 17th and 18th that brought the coldest temperatures of 2016 to some parts of the region. Temperatures in several locations dipped below -30.0 degrees F (-34.4 degrees C), which is in stark contrast to last year's mild winter season. Two locations had a top 5 coolest December on record: Rapid City, SD (3rd coolest) and Chadron, NE (4th coolest).

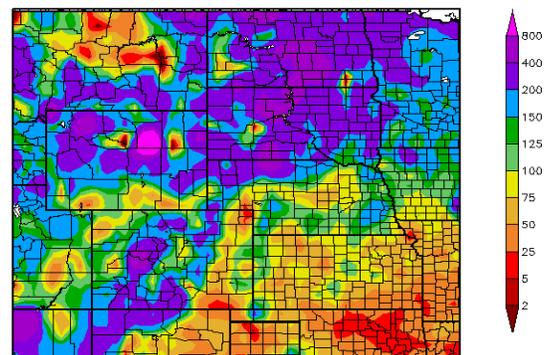
The cooler temperatures were accompanied by wetter conditions throughout a large part of the region. Several storm systems brought rain, freezing rain, and snow to the High Plains, and the region experienced a wide range of weather events, including blizzards, ice storms, thunderstorms, and even tornadoes. One of the largest systems moved through on Christmas Day, creating hazardous travel conditions where wintry precipitation occurred and causing damaging thunderstorms on the warmer side of the system. These systems did have some positive impacts. For example, the moisture was beneficial to parts of the Dakotas where drought has been persistent, and improvements were made in these areas on the U.S. Drought Monitor by the end of the month. Also, ample snowfall occurred in the Rockies in Colorado and Wyoming, which helped the mountain snowpack recover after an abysmal start to the snowpack season. However, not all parts of the region received excess precipitation in December. It was much drier in Kansas and eastern Colorado, and some areas of these states experienced below-normal precipitation in December as well. As a result, drought conditions persisted in western Kansas and eastern Colorado, and abnormal dryness was introduced to eastern Kansas during December by the U.S. Drought Monitor.

## Temperature and Precipitation Overview

Departure from Normal Temperature (F)  
12/1/2016 - 12/31/2016



Percent of Normal Precipitation (%)  
12/1/2016 - 12/31/2016



Above: Departure from 1981-2010 normal temperature (left) and percent of normal precipitation (right) for December 2016 in the High Plains region. Maps produced by the High Plains Regional Climate Center and are available at: <http://hprcc.unl.edu/maps/current>.

## Precipitation

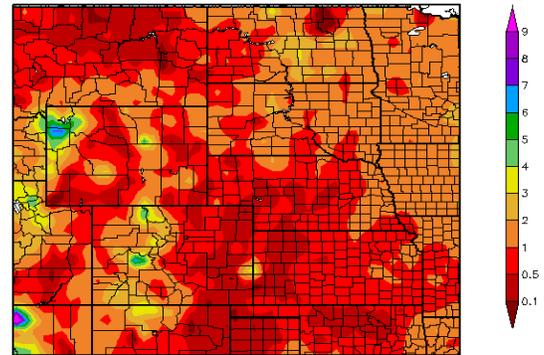
Wet and dry conditions both prevailed across the High Plains in December. The wettest areas included the Dakotas, Wyoming, and central Colorado, which received approximately 200-400 percent of normal precipitation for the month. Meanwhile, below-normal precipitation occurred throughout much of Kansas and central Nebraska, where December precipitation was only about 50 percent of normal, at best. Numerous locations experienced a top 10 wettest December on record, and a few places had a top 5 snowiest December as well. It was especially wet in North Dakota. Bismarck had its wettest and 2nd snowiest December on record, and it was the 4th wettest and 4th snowiest December for Grand Forks. Some notable storm systems impacted the region in December and were partially responsible for these impressive records.

A blizzard struck northeastern North Dakota from December 5-7. According to the National Weather Service (NWS) Weather Forecast Office in Grand Forks, snow fell at a rate of nearly 2.0 inches (5 cm) per hour at one point during the storm, and winds greater than 50 mph (80 km/hr) were reported around the region, causing hazardous travel conditions. The three-day snowfall total at Grand Forks was 16.5 inches (42 cm).

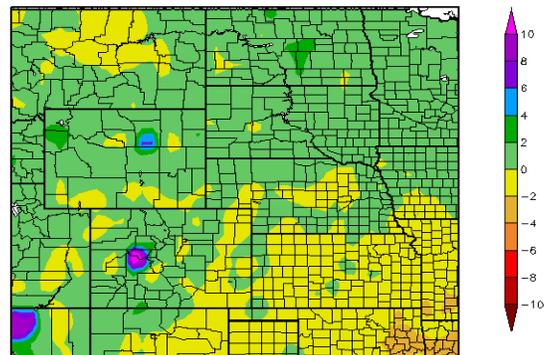
A large storm system tracked across the region on Christmas Day and the day after bringing a variety of weather conditions, including snow, freezing rain, high winds, and thunderstorms. For instance, a blizzard occurred in western and central North Dakota. The NWS Weather Forecast Office in Bismarck reported high winds and thundersnow at their office. The two-day snowfall total for the 25th and 26th in Bismarck was 12.5 inches (32 cm). To the south and east, freezing rain impacted southeastern North Dakota and northern South Dakota. Aberdeen, South Dakota crushed its daily precipitation record on the 25th, receiving 1.28 inches (33 mm) and beating the previous record of 0.36 inches (9 mm) set in 1950. According to the NWS Weather Forecast Office in Aberdeen, at one point Pierre was reporting a thunderstorm and freezing rain at the same time! The ice storm caused a power outage that affected thousands of people. In the southern part of the region, this same storm system brought thunderstorms, hurricane-force winds, and tornadoes to southern Nebraska and northern Kansas. Tornadoes are quite rare in December in this area. This storm system made it a Christmas to remember in the region!

### Regional Precipitation

Precipitation (in)  
12/1/2016 – 12/31/2016



Departure from Normal Precipitation (in)  
12/1/2016 – 12/31/2016



Above: Total precipitation in inches (top) and departure from normal precipitation in inches (bottom) for December 2016. These maps are produced by HPRCC and can be found on the Current Climate Summary Maps page at: <http://hprcc.unl.edu/maps/current>.

## Snowpack Update

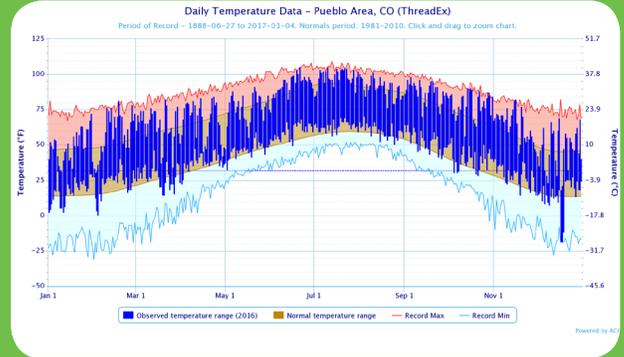
Despite the slow start to the snowpack season in the Rockies, ample snowfall in December allowed snowpack to recover across much of Colorado and Wyoming. These areas received approximately 150-400 percent of normal precipitation during the month, which resulted in above-normal statewide snowpack for both states. Below-normal temperatures aided in building the snowpack as well. According to the U.S. Army Corps of Engineers, Snow Water Equivalent (SWE) above Fort Peck Dam was 78 percent of average at the end of December, which was an increase from the previous month and similar to SWE levels of 2001, the lowest snowpack year of the last 20-year period. However, snowpack fared better between Fort Peck and Garrison Dams, as SWE increased to 105 percent of average. Normally by January 1, about 44 percent of the peak mountain SWE has occurred in both reaches.

## Temperatures

After a very warm fall, the pattern shifted in December to bring below-normal temperatures to most of the High Plains region. Departures of 6.0-8.0 degrees F (3.3-4.4 degrees C) below normal were common in the western Dakotas and northern Wyoming. While widespread record-breaking cold did not occur, a few top 10 records for coolest December were set: Rapid City, SD (3rd coolest); Chadron, NE (4th coolest); Casper, WY (7th coolest); and Sheridan, WY (9th coolest). Otherwise, temperatures across most of the High Plains were slightly below normal and not record-breaking. Only western Colorado experienced above-normal temperatures on the whole in December.

Several outbreaks of Arctic air during the first half of December were to blame for the below-normal temperatures that occurred in much of the region. The most impressive outbreak came through on the 17th and 18th. Nearly the entire region set minimum temperatures for the month on one of these two days. In fact, many locations experienced their lowest temperature of the year, as last winter was rather warm across most of the High Plains. Quite a few daily record minimum temperatures were set on the 17th and 18th. Windy conditions accompanied the cold, producing dangerous wind chills as low as -50.0 degrees F (-45.6 degrees C). Some locations were quite warm just before this Arctic outbreak, producing large temperature swings. For example, in Pueblo, Colorado the temperature went from 69.0 degrees F (20.6 degrees C) on the 16th to -19.0 degrees F (-28.3 degrees C) on the 17th! Temperatures did rebound somewhat during the latter half of the month; in fact, parts of Nebraska, Kansas, and Colorado had high temperatures in the 60s and even 70s on Christmas Day! In Kansas, daily record highs were set on the 25th in Wichita, Topeka, and Concordia.

### Station Spotlight: Pueblo, CO



Above: Daily temperatures along with extremes and normals values since January 1, 2016 in Pueblo, CO.

## Drought Conditions

December brought about both improvements and degradations in drought conditions throughout the High Plains region. Overall, drought conditions improved as the area in drought or abnormal dryness (D0-D4) on the U.S. Drought Monitor improved from nearly 60 percent to about 50 percent over the course of the month. However,

the area in severe drought (D2) increased. The drought that has been affecting the Black Hills region of South Dakota extending westward into Wyoming intensified due to a warm and dry November. However, a cooler and wetter December allowed for slight improvements in the area. One region that was drier in December was eastern Kansas, which received only about 50 percent of normal precipitation, at best. As a result, this region had been placed in the abnormal dryness category (D0) by the end of the month. The area in drought in western Kansas and eastern Colorado persisted, as it was not as wet as other locations in the High Plains in December. Several impacts were reported in eastern Colorado, such as grasses in poor condition and spotty winter wheat germination.

### U.S. Drought Monitor

**U.S. Drought Monitor High Plains**  
December 27, 2016  
(Released Thursday, Dec. 29, 2016)  
Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	50.65	49.35	21.54	4.05	0.00	0.00
Last Week (12/20/16)	44.85	55.15	22.68	4.68	0.00	0.00
3 Months Ago (9/27/16)	70.96	29.14	0.00	2.08	0.17	0.00
Start of Calendar Year (1/1/16)	79.82	21.18	1.58	0.00	0.00	0.00
Start of Water Year (9/1/15)	70.96	29.14	0.00	2.08	0.17	0.00
One Year Ago (12/27/15)	79.82	21.18	1.58	0.00	0.00	0.00

**Intensity**

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for more detail.

**Author:**  
Grant Pippen  
U.S. Department of Agriculture

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). For current Drought Monitor information, please see: <http://droughtmonitor.unl.edu/>.

The biggest improvements occurred across parts of the Dakotas and western Colorado. In the northern Plains, December precipitation was 200-400 percent of normal in many areas. A blizzard struck this region around Christmas, and despite its negative impact to travel, it provided beneficial moisture to drought-stricken areas. In western Colorado, mountain snowpack recovered quite well during December, which improved conditions there.

## Climate Outlooks

According to the Climate Prediction Center, La Niña conditions are present in the Pacific. Equatorial sea surface temperatures are below average in the central and eastern Pacific Ocean. A La Niña Advisory is in effect. However, a transition to ENSO-neutral conditions is favored during January-March 2017. If you are looking for more information about La Niña and its impacts, check out the ENSO blog here: <https://www.climate.gov/news-features/department/8443/all>. Or, take a look at this special update on La Niña in the Missouri River Basin states, which is available here: <http://hprcc.unl.edu/pdf/LaNina-MOBasin-2016-Final.pdf>.

The seasonal temperature and precipitation outlooks below combine the effects of long-term trends, soil moisture, and when applicable, the El Niño Southern Oscillation cycle (ENSO). To learn more about these outlooks, please see: <http://www.cpc.ncep.noaa.gov>.

### Temperature

The January-March temperature outlook indicates an increased chance of above-normal temperatures for the southern half of the U.S., as well as the East Coast. This includes central and southern Colorado and southwestern Kansas in the High Plains region. Below-normal temperatures are favored across the northern Plains and northern Rockies, including North Dakota and the northern half of South Dakota. Elsewhere, there is an equal chance for above-, below-, or near-normal temperatures in the contiguous U.S. during the January-March period.

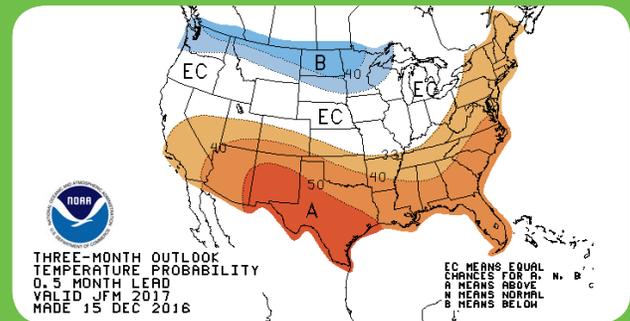
### Precipitation

The precipitation outlook for the next three months calls for a higher probability of above-normal precipitation across the Pacific Northwest, northern Rockies, parts of the northern Plains, the Great Lakes, and the Ohio Valley. In the High Plains region, this includes most of Wyoming, northern and western North Dakota, and western South Dakota. Below-normal precipitation is favored across southern parts of the U.S., including southern Colorado and southwestern Kansas. The remainder of the contiguous U.S. has equal chances for above-, below-, or near-normal precipitation.

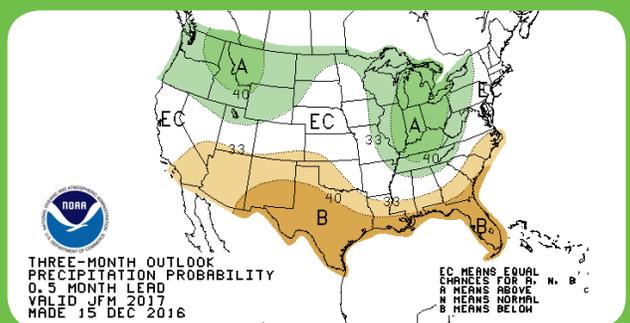
### Drought

The December 15th U.S. Seasonal Drought Outlook shows that drought is expected to persist across portions of the Southwest, the Plains, the Southeast, and the Northeast. In the High Plains region, this includes a large area in drought in eastern Colorado and western Kansas, as well as parts of Nebraska. Drought may improve or be removed in portions of the West, the Plains, the Northeast, and the Southeast. This includes the area in drought in the Black Hills region of South Dakota extending west into Wyoming, as well as parts of central Colorado and southern Wyoming. Further development of drought is likely along parts of the Gulf Coast and in Florida, but drought development is not likely in the High Plains region through March.

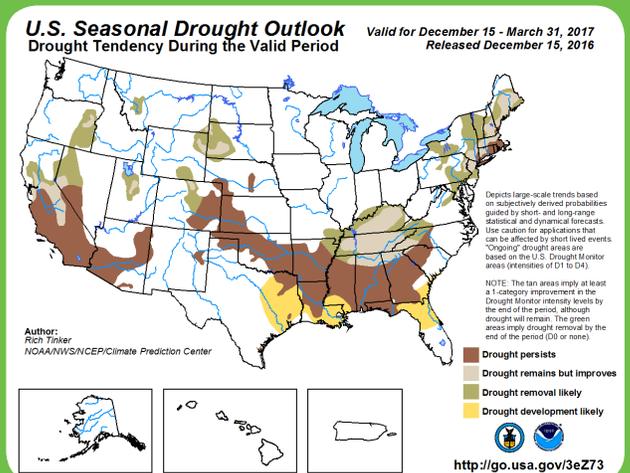
### Temperature Outlook



### Precipitation Outlook



### Drought Outlook



Above: The three-month temperature probability outlook (top), the three-month precipitation probability outlook (middle), and the U.S. Seasonal Drought Outlook (bottom). For more information on these outlooks, produced by the Climate Prediction Center, see: <http://www.cpc.ncep.noaa.gov>.

## Station Summaries: By the Numbers

Colorado	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Akron Washington County Airport	38.8	12.6	25.7	-2.6	58	12/24	-12	12/17	0.14	-0.26	35
Alamosa San Luis Airport	34.9	1.5	18.2	0.3	60	12/15	-18	12/27	1.08	0.73	309
Colorado Springs Municipal Airport	43.9	14.6	29.3	-0.5	65	12/16	-14	12/17	0.68	0.34	200
Denver International Airport	42.7	12.9	27.8	-2.2	65	12/30	-15	12/17	0.78	0.43	223
Grand Junction Walker Field Airport	39.4	20.5	29.9	1.4	57	12/16	9	12/07	0.73	0.14	124
Pueblo Memorial Airport	46.6	13.7	30.1	0.0	69	12/16	-19	12/18+	0.76	0.38	200

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	39.3	18.8	29.1	-0.9	64	12/25	-12	12/18	0.93	0.08	109
Dodge City Regional Airport	42.7	17.3	30.0	-2.8	61	12/25	-16	12/18	0.62	-0.22	74
Goodland Renner Field	40.4	11.4	25.9	-4.0	67	12/30	-15	12/17	0.60	0.14	130
Topeka Municipal Airport	41.5	19.7	30.6	-1.4	68	12/25	-9	12/18	1.05	-0.30	78
Wichita Mid-Continent Airport	44.3	21.5	32.9	-0.9	67	12/25	-10	12/18	0.66	-0.54	55

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	30.4	4.2	17.3	-7.1	50	12/04	-26	12/18	0.94	0.42	181
Grand Island Airport	37.3	14.5	25.9	-0.8	53	12/30+	-15	12/18	0.81	0.18	129
Lincoln Municipal Airport	37.2	16.0	26.6	-0.2	60	12/25	-12	12/18	1.62	0.67	171
Norfolk Karl Stefan Airfield	33.9	12.7	23.3	-1.0	52	12/30	-24	12/18	0.84	0.09	112
North Platte Regional Airport	40.5	9.9	25.2	-0.2	63	12/30	-17	12/17	0.62	0.21	151
Omaha Eppley Airport	36.0	17.8	26.9	0.9	54	12/25	-11	12/18	1.47	0.43	141
Valentine Miller Field	32.7	5.5	19.1	-4.7	51	12/30	-31	12/18	0.94	0.57	254

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismarck Municipal Airport	19.9	1.2	10.5	-5.7	37	12/21	-31	12/17	2.06	1.57	420
Fargo International Airport	23.5	8.5	16.0	1.9	39	12/23	-20	12/18	1.27	0.44	153
Grand Forks International Airport	21.1	5.0	13.1	1.6	36	12/20	-24	12/18	1.61	1.00	264
Theodore Roosevelt Airport	18.4*	2.6*	10.5*	-7.4*	46	12/30	-25	12/17	0.16	-0.08	67
Williston International Airport	18.9*	2.9*	10.8*	-3.1*	39	12/20	-24	12/17	0.96	0.34	155

All data are preliminary and subject to change. + indicates multiple dates, latest date listed. \* indicates some missing data for the period. Data are retrieved through the Applied Climate Information System (ACIS) and are available online through the CLIMOD system. For more information please contact us: <http://www.hprcc.unl.edu/contact.php>.

## December 2016 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	23.4	3.1	13.3	-2.4	41	12/04	-37	12/18	1.78	1.26	342
Huron Regional Airport	26.2	6.6	16.4	-2.8	44	12/05	-31	12/18	1.39	0.87	267
Pierre Regional Airport	24.5	7.1	15.8	-5.9	40	12/04	-21	12/18	1.70*	1.15	309
Rapid City Regional Airport	27.8	5.3	16.6	-8.3	49	12/04	-23	12/17	0.77	0.35	183
Sioux Falls Joe Foss Field Airport	28.7	11.1	19.9	0.7	45	12/05	-27	12/18	1.92	1.23	278

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	29.4	6.2	17.8	-6.0	50	12/24	-33	12/08	1.31	0.82	267
Cheyenne Municipal Airport	38.3	14.4	26.3	-1.4	55	12/30	-16	12/08	0.43	-0.06	88
Lander Hunt Field Airport	28.6	4.8	16.7	-4.0	50	12/20	-21	12/17	0.90	0.32	155
Laramie Regional Airport	33.4	10.6	22.0	0.9	51	12/24+	-23	12/08	0.13	-0.19	41
Rawlins Municipal Airport	31.3	11.3	21.3	-0.2	49	12/24	-18	12/08	0.29	-0.14	67
Sheridan County Airport	28.1	2.7	15.4	-7.5	53	12/30	-25	12/17	1.00	0.44	179

## December 2016 Highlights

### Monthly Rankings

Temperature in degrees F / Precipitation and Snowfall in inches

Warmest / Coolest	Temperature / Ranking	Record / Year	Period of Record
Rapid City, SD	16.6 / 3rd coolest	8.1 / 1983	1942-2017
Chadron, NE	17.3 / 4th coolest	7.4 / 1983	1941-2017
Casper, WY	17.8 / 7th coolest	10.9 / 1983	1939-2017
Wettest / Driest	Precipitation / Ranking	Record / Year	Period of Record
Bismarck, ND	2.06 / WETTEST	1.71 / 1884	1874-2017
Casper, WY	1.31 / 3rd wettest	3.71 / 1982	1939-2017
Chadron, NE	0.94 / 4th wettest	1.37 / 2014	1941-2017
Alamosa, CO	1.08 / 5th wettest	1.52 / 1964	1932-2017
Snowiest / Least Snowiest	Snowfall / Ranking	Record / Year	Period of Record
Bismarck, ND	24.5 / 2nd snowiest	33.3 / 2008	1886-2017
Grand Forks, ND	25.1 / 4th snowiest	30.2 / 1996	1893-2017
Casper, WY	22.2 / 4th snowiest	62.8 / 1982	1939-2017
Rapid City, SD	11.3 / 5th snowiest	17.9 / 1975	1942-2017

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# North Dakota Monthly Climate Summary

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For more information: [www.ndsu.edu/ndsco](http://www.ndsu.edu/ndsco) or [www.ndawn.ndsu.nodak.edu](http://www.ndawn.ndsu.nodak.edu)



## Precipitation:

Based on the National Centers for Environmental Information (NCEI), statewide total December precipitation was 1.23", 0.66" greater than the last year, and 0.75" greater than the 1981-2010 average, making it the 3rd wettest December in the 122-year period of record. It was the wettest December since 2010. Above-average precipitation was observed in most areas of North Dakota, particularly in central and south central parts of the state where 500% of normal was common (Figure 1). The greatest monthly accumulation was 3.85" recorded in Tolley, Renville County. The least amount of monthly precipitation accumulation was 0.19" recorded in Bowman, Bowman County. However, the greatest monthly snow accumulation was 43" recorded in Bottineau, Bottineau County. The greatest 24-hr precipitation was 3" that was recorded in Center, Oliver County on December 5. The highest 24-hr snowfall of 18" was recorded in both Underwood and Turtle Lake locations in McLean County on December 26. Based on historical records, statewide December precipitation showed a slight positive long-term trend of 0.06" per century since 1895. The highest and the lowest December precipitation for the state ranged from 1.27" in 2008 to 0.05" in 1944.

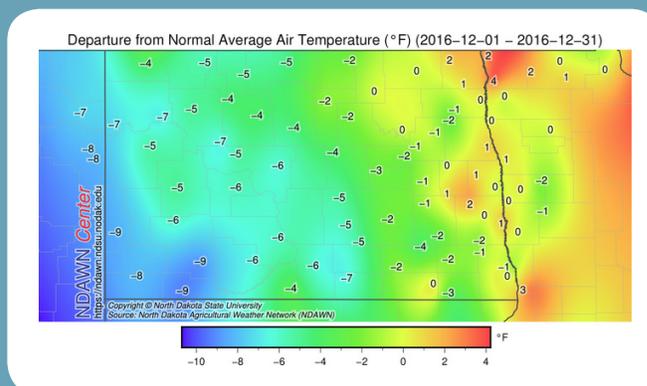
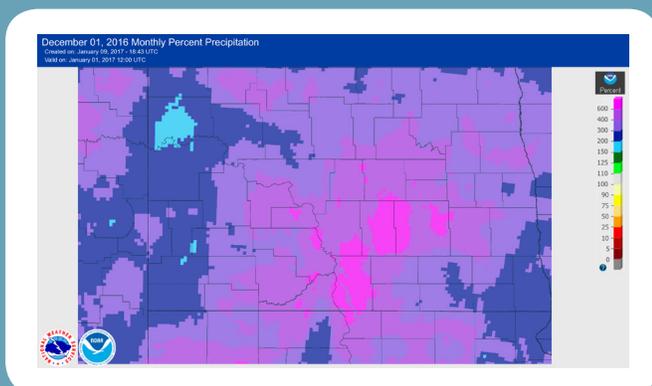
## Temperature:

The official state average December temperature was 10.3°F, 10.8° colder than the last year, and 3.7° colder than the 1981-2010 average, making it the 43rd coldest December in the 122-year period of record. Below-average temperatures were observed almost all across North Dakota except for the eastern parts of the state along the Red River Valley of the North. The coldest anomalies were observed in the southwestern regions (Fig. 2). The state's highest and lowest daily temperatures ranged from 46° on December 30 at Theodore Roosevelt Airport in Stark County to -17° on December 18 in Esmond, Benson County. Based on historical records, the state average December temperature showed an increasing trend of 0.23°F per decade since 1895. The highest and the lowest monthly state December average temperatures ranged from 39.2° in 2016 (this year) to 6.1° in 1896.

## Drought and other notable impacts:

Based on the Drought Monitor (DM) the drought conditions diminished in central ND, especially along the Missouri River corridor south of Bismarck. By the end of the month, less than 10% of the state was designated as "Abnormally Dry" based on the DM for December 27, 2016. As for storm reports, NDAWN's highest peak gust in December was 57 mph recorded at the Watford City weather station on December 21, 2016. Linton also reported similar wind speeds on the same day. Bottineau in Bottineau County received a total of 43" of snow in December (an all-time monthly record). Turtle Lake in McLean County, Esmond in Benson County, Lansford in Bottineau County, Streeter in Stutsman County, and Lake Metigoshe in Bottineau County received in excess of 30" in December which is also the all-time highest December snowfall on record for all of the locations. Three blizzard warnings were issued by the National Weather Service (NWS) in Bismarck; on December 5, 7 and 25. Also, three blizzard warnings were issued by the NWS in Eastern North Dakota; on December 6, 7 and 25.

## Temperature and Precipitation Overview



Above: Percent of normal precipitation (left, figure 1) and departure from normal average temperature (right, figure 2) for December 2016 in North Dakota. Figure 1 produced by NOAA, Figure 2 produced by NDAWN.

# Kansas Climate Summary

Mary Knapp - Service Climatologist  
 Kansas Weather Data Library, Kansas State University  
 For more information: [www.ksre.ksu.edu/wdl](http://www.ksre.ksu.edu/wdl)



## A cold end to the year

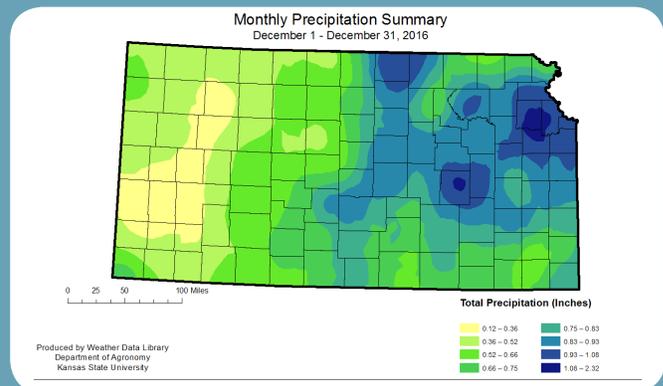
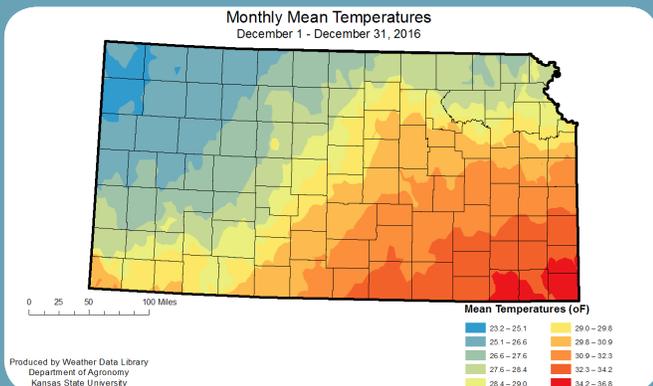
December marked a shift in the warm pattern that dominated much of the Fall. The state-wide average temperature was 29.0 oF, or -2.3 degrees colder than normal. This was the 25th coldest since 1896. The Southeast Division was closest to normal for the month. Their average temperature was 33.4 oF, or -0.4 degrees colder than normal. The division with the greatest departure was the West Central Division where the average temperature was 26.7 oF or -3.7 degrees colder than normal. Even with the cold, there were 28 new daily record high temperatures set in the month, although none of those set monthly records. There were also twelve new daily record high minimum temperatures set. On the cold side, there were 17 new record daily low maximum temperatures and 93 new record daily low minimum temperatures reported. Of those record low minimum temperatures, 11 set new record lows for December. The coldest minimum temperature reported was -24 oF reported at Oakley 19 SSW, Logan County, on the 20th. The highest temperature reported was 74 oF reported at Elkhart, Morton County, on the 17th.

State-wide average rainfall for December continued the trend of the dry Fall and was well below normal. The state-wide average was 0.56 inches or 57 percent of normal. The Northwest Division fared the worst with an average of 0.18 inches or 34 percent of normal. The North Central Division came closest to normal with an average of 0.70 inches or 82 percent of normal. This December ranks as the 50th driest in the 122 years of record. The wettest December on record occurred in 1913, when the statewide average total was 3.15 inches. The driest December occurred in 1976 when the state-wide average was 0.05 inches. Despite the dry pattern there were 43 new record daily precipitation totals. The greatest 24-hour total recorded at a CoCoRaHS station was 0.94 inches at St. Francis 8.6 NNE, Cheyenne County, on the 26th. The greatest 24-hour report for a National Weather Service station was 1.15 inches at Eskridge, Wabaunsee County, on the 25th. The greatest monthly totals: 1.88 inches at Lawrence, Douglas County (NWS) and 1.58 inches at Olathe 3.3 ENE, Johnson County (CoCoRaHS).

The cold air mass of the 18th through the 20th was displaced by a warm front. The clashing systems triggered a rare Christmas tornado outbreak in Southwest KS. Brief touchdowns were reported in Ford, Kiowa and Rush counties. There were reports of damage to a cattle building and a horse shed in Kiowa County, but no reports of deaths or injuries. In addition to the tornadoes, there were 11 reports of wind damage during the month.

The lack of precipitation has taken its toll, and abnormal dry conditions expanded during the month. As we move into the drier part of the year, even above normal precipitation is not likely to result in significant improvement. By the same token, the rate of deterioration is likely to slow, especially in the western half of the state.

## Temperature and Precipitation Overview



Above: December 2016 monthly mean temperatures (left) and total precipitation (right) in Kansas. Maps produced by Weather Data Library, Department of Agronomy, Kansas State University.

# About the High Plains Regional Climate Center

The High Plains Regional Climate Center (HPRCC) is one of six NOAA Regional Climate Centers (RCCs) that has been providing timely climate data and information to the public for cost effective decision-making since 1987. The HPRCC primarily serves the six-state region of Colorado, Kansas, Nebraska, North Dakota, South Dakota, and Wyoming, but has also served people from all across the country and even throughout the world. HPRCC operates under a three-tiered structure of climate services and works closely with other organizations on the local, regional, and national levels. HPRCC staff engage with a wide range of stakeholders including K-20 education, the public, media, private industry, research, and state/tribal/federal entities, among others.

Much of the data and products found throughout this publication were built on the Applied Climate Information System (ACIS) framework. ACIS was designed to manage the complex flow of information from climate data collectors to the end users of climate data information. The main purpose of ACIS is to alleviate the burden of climate information management for people who use climate information to make management decisions.

HPRCC is involved in the ongoing development and management of ACIS. In the spring of 2014, the RCCs released a new website for ACIS. This new and improved website not only contains descriptions of ACIS and the sources of data found within, but also features real-world examples of how RCCs and external groups are using ACIS for their particular climate data needs. In addition to these examples, there is extensive documentation and tutorials on how ACIS can be used and accessed by external clients using Web Services. For more information see: <http://rcc-acis.org>.



## Additional Summary Information for the High Plains

### Missouri River Basin Quarterly Climate Impacts and Outlook

For more information:  
<https://www.drought.gov/drought/dews/missouri-river-basin/reports-assessments-and-outlooks>

### Midwest and Great Plains Monthly Climate and Drought Webinar

To sign up for future webinars:  
<https://www.drought.gov/drought/calendar/webinars>

For an archive:  
[www.hprcc.unl.edu/webinars.php](http://www.hprcc.unl.edu/webinars.php)

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