



December 2019 Climate Summary

Holmes Lake in Lincoln, NE. Photo courtesy Rezaul Mahmood.
<http://hprcc.unl.edu>

Winter Begins on a Mild Note

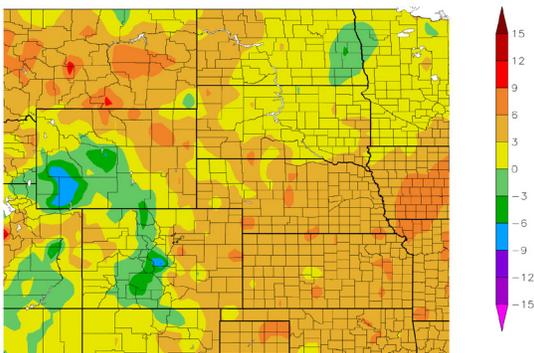
In contrast to the past couple of months, the start of winter was generally mild for the High Plains region. Temperature departures of 3.0-6.0 degrees F (1.7-3.3 degrees C) were widespread, especially across Kansas and Nebraska. Although there were some isolated areas where departures exceeded 6.0 degrees F (3.3 degrees C), very few locations ranked in the top 10 warmest Decembers on record. Exceptions to the overall warm conditions included portions of the Rocky Mountains and eastern North Dakota, where temperatures were below normal.

The month of December brought wet and snowy conditions to portions of the region, especially late in the month. A large storm system tracked across the High Plains region during the last week of December. This system brought widespread precipitation, including strong winds and heavy rain and snow. This created significant travel issues for many that were traveling between Christmas and New Year's Day. The excessive amount of precipitation that this system brought was largely responsible for the well-above-normal precipitation anomalies recorded for the month across parts of the region.

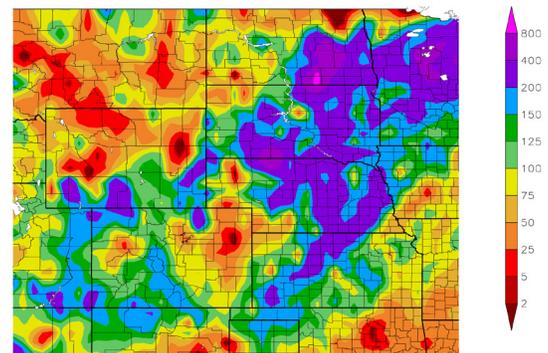
Crop harvest remained well behind schedule across the northern areas of the High Plains. Farmers across North Dakota continued to struggle getting their crops out of the ground. As of December 8th, less than half (43 percent) of North Dakota's corn crop had been harvested. Sunflower harvest was doing a little better, with 60 percent of North Dakota's crop having been harvested. In South Dakota the sunflower harvest was still not complete but was getting closer at 79 percent complete. Elsewhere across the region, crop harvest was largely complete for the season. The 2019 corn harvest will go down as the slowest harvest in the last 25 years, second only to 2009. It is likely that some crops will not get harvested until spring, or perhaps not harvested at all, due to poor field conditions in northern sections of the region.

Temperature and Precipitation Overview

Departure from Normal Temperature (F)
12/1/2019 - 12/31/2019



Percent of Normal Precipitation (%)
12/1/2019 - 12/31/2019



Above: Departure from 1981-2010 normal temperature (left) and percent of normal precipitation (right) for December 2019 in the High Plains region. Maps produced by the High Plains Regional Climate Center and are available at: <http://hprcc.unl.edu/maps/current>.

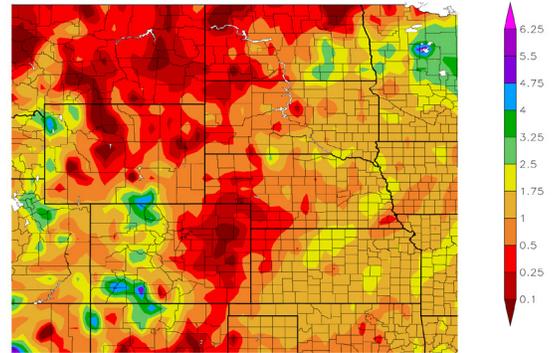
Precipitation

Precipitation varied quite significantly across the High Plains region during the month of December. Across central and northern sections of the High Plains there were areas that observed widespread precipitation amounts of 200 to 400 percent of normal, with embedded pockets where amounts were up to 800 percent of normal. Meanwhile, on the other end of the spectrum, precipitation was much below normal across some portions of eastern Colorado, northern Wyoming, the panhandle of Nebraska, and northern North Dakota. Although precipitation in these areas was less than half of normal, these deficits are not large this time of the year. Ultimately, several locations across the region ranked in the top 10 wettest Decembers on record, including Grand Forks, ND (6th wettest); Lincoln, NE (7th wettest); Fargo, ND (8th wettest); and Concordia, KS (10th wettest). Some of the same locations that had their top 10 wettest December also recorded their top 10 snowiest December. This includes Fargo, ND (6th snowiest); and Grand Forks, ND (7th snowiest).

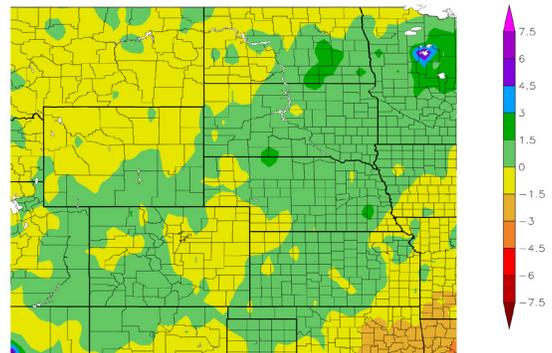
Similar to the month of November, December started off relatively quiet and dry for much of the region but ended wet and snowy. During the last week of the month, a large storm system tracked across the High Plains. This system arrived on the 27th and brought a swath of heavy snow and strong winds to central Nebraska, much of South Dakota, and eastern North Dakota. Snow totals from this system ranged from 4.0-18.0 inches (10-48 cm) in this area. The combination of heavy snow and strong winds disrupted travelers on I-80 in central Nebraska, forcing the interstate to close for a time. This storm system also produced significant rainfall for this time of year across portions of Kansas and eastern Nebraska. Over 2.00 inches (51 mm) of rain was observed in some areas. For instance, 2.12 inches (54 mm) of rain fell in Lincoln, Nebraska on the 27th. This was just 0.01 inch (0.3 mm) shy of breaking the one-day total precipitation record for the entire month of December (period of record 1887-present). Fortunately, the ground across this area was still not frozen, which allowed at least some of the rain to filter into the soil. If the soil had been frozen there would have been more runoff from this event, which could have been resulted in more abrupt rises of creeks, streams, and rivers.

Regional Precipitation

Precipitation (in)
12/1/2019 – 12/31/2019



Departure from Normal Precipitation (in)
12/1/2019 – 12/31/2019



Above: Total precipitation in inches (top) and departure from normal precipitation in inches (bottom) for December 2019. 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

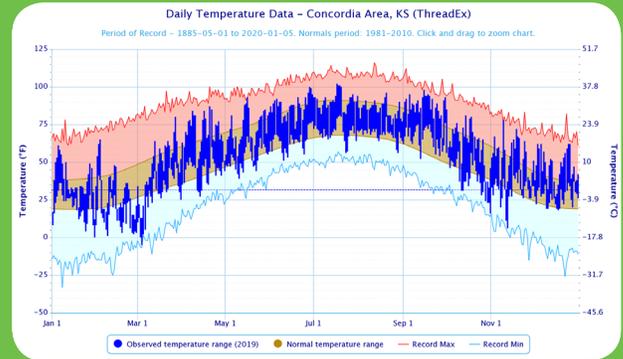
Mountain snowpack was generally in good shape this month across much of Colorado and Wyoming. By the end of December, snowpack was near to above normal in all basins in Colorado and most basins in Wyoming. However, a few basins in western Wyoming had below-normal snowpack. Across the Upper Missouri Basin, mountain Snow Water Equivalent (SWE) was near to slightly above normal. As of December 15th, mountain SWE was 96 percent of normal above Fort Peck and 108 percent of normal in the reach from Fort Peck to Garrison, according to the U.S. Army Corps of Engineers. The month of December also brought abundant snowfall to much of the Plains at the end of the month, with the highest snowpack found across central Nebraska and the Dakotas.

Temperatures

The winter season started off on a relatively mild note across the High Plains. Temperatures throughout the region were generally above normal for the month of December, with departures reaching over 6.0 degrees F (3.3 degrees C) above normal in some locations. This marked the first time since September that above-normal temperatures dominated the High Plains region as a whole. The largest departures occurred across Kansas, Nebraska, eastern Colorado, and eastern Wyoming. Further west, across portions of central Colorado and southwestern Wyoming, there was a small area of below-normal temperatures. Near-normal temperatures were observed over much of North Dakota and South Dakota. While most areas experienced relatively mild month as a whole, the warmest areas only ranked in the top 20 warmest Decembers on record.

The month of December brought generally above normal temperatures for much of the High Plains, but did not climb high enough to break records. However, an unseasonably warm air mass brought temperatures of over 60.0 degrees F (15.6 degrees C) to central and southern portions of the High Plains toward the end of the month, just in time for the Christmas holiday. One of these locations that experienced anomalous warmth was Concordia, Kansas, which recorded a high temperature of 62.0 degrees F (16.7 degrees C). This was the fourth warmest Christmas Day on record in Concordia. The warmest Christmas Day for Concordia, KS was 64.0 degrees F (17.8 degrees C), which occurred in 2016 (period of record 1885-present).

Station Spotlight: Concordia, KS

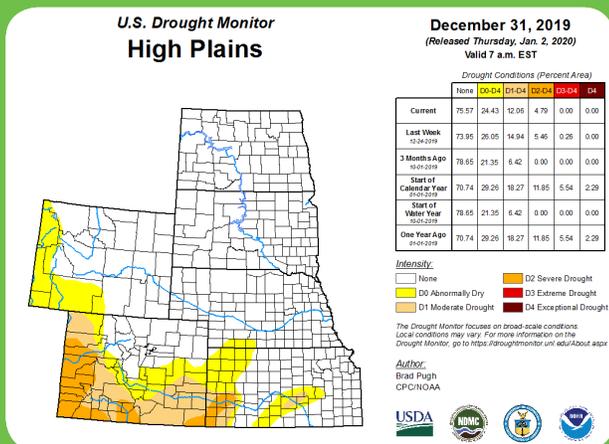


Above: Daily temperatures along with extremes and normals values since January 1, 2019 in Concordia, KS.

Drought Conditions

Drought conditions improved or were removed across southern and western portions of the High Plains region during the month of December. According to the U.S. Drought Monitor, the area experiencing drought (D1-D4) in the High Plains region decreased from approximately 15 percent at the end of November to just over 12 percent by the end of December. This improvement was the result of storm systems bringing wetter conditions to the western portion of the High Plains region in December.

U.S. Drought Monitor



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/>.

This month, abnormally dry conditions (D0) shrank across portions of western Kansas and central and eastern Colorado. There was some expansion of D0 conditions across western Wyoming, with a small area of D0 remaining in far southwestern Nebraska. Some improvement was observed over northern Colorado during the month, with a slight reduction of abnormally dry conditions in this area. Meanwhile, across southern Colorado and western Kansas, moderate drought (D1) and severe drought (D2) decreased in area through the month of December. A small pocket of extreme drought (D3) that had developed across southwestern Kansas during October and November was removed by the end of December.

The remainder of the region remained free of drought and abnormally dry conditions. As of the December 31st release of the U.S. Drought Monitor, both Nebraska and South Dakota were drought-free all of 2019.

Climate Outlooks

According to the Climate Prediction Center, ENSO-neutral conditions continued through December in the Pacific. These conditions are likely to continue through winter and spring 2020. For more information about ENSO, check out the ENSO blog here: <https://www.climate.gov/news-features/department/enso-blog>.

According to the National Weather Service's long-range flood outlook, minor to major flooding is forecast across parts of the Missouri River Basin and Souris-Red-Rainy Basin through March. In the High Plains, moderate to major flooding is forecast along the James River, Vermillion River, and Big Sioux River in South Dakota. Minor to moderate flooding is expected along the Souris, Maple, Red, and Sheyenne Rivers, in North Dakota, with minor flooding expected along the Missouri River in southeast Nebraska. Normal wildland fire potential is expected through April for the High Plains.

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

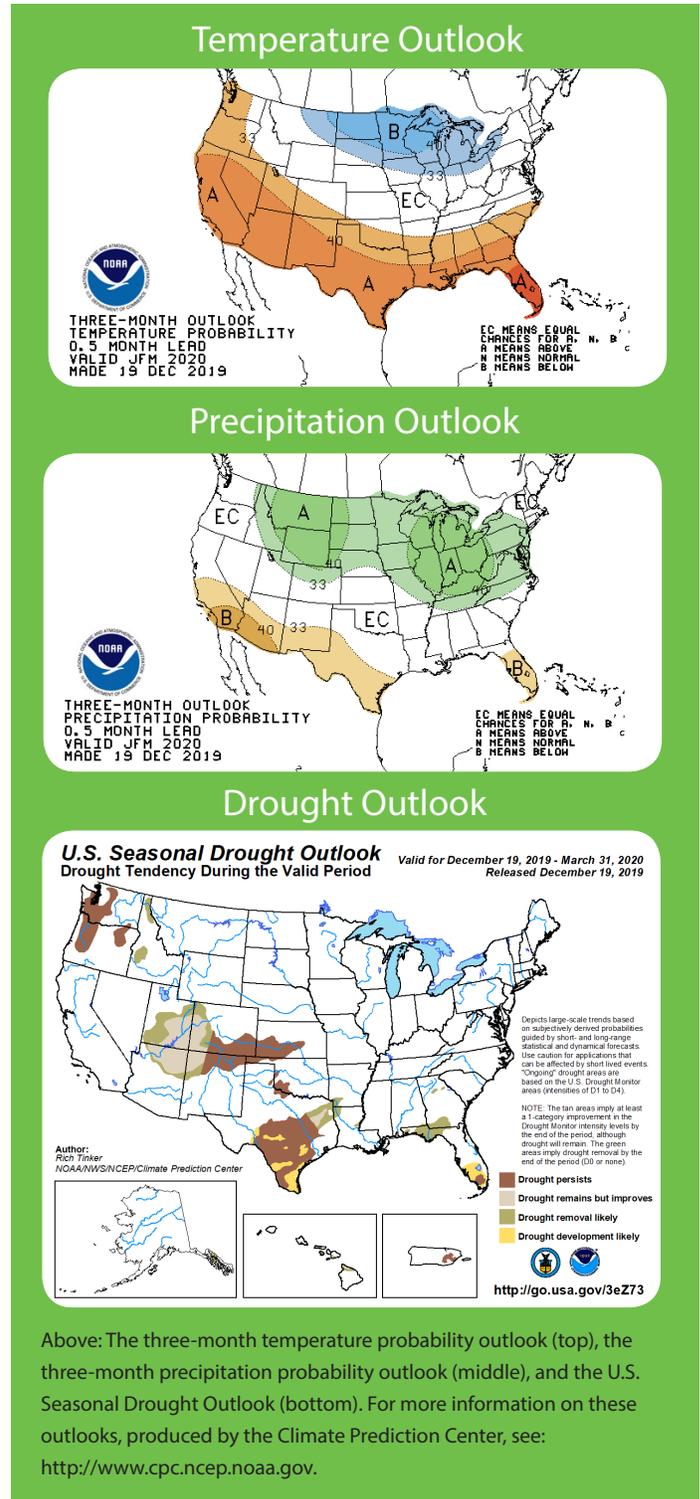
The January-March temperature outlook calls for a higher probability of above-normal temperatures for much of the western and southern U.S. This includes southwest Colorado and far southwestern Kansas in the High Plains region. There is an increased chance of below-normal temperatures through March for much of South Dakota and North Dakota. Elsewhere, across the High Plains, there are equal chances for above-, below-, or near-normal temperatures across northern Colorado, Nebraska, Wyoming, southwestern South Dakota, and the majority of Kansas.

Precipitation

The precipitation outlook through March calls for a higher probability of above-normal precipitation across much of the northern and central U.S. In the High Plains, this includes the Dakotas, Wyoming, much of Nebraska, and and northern Colorado. There is an increased chance for below-normal precipitation in parts of the Southwest and Florida. Elsewhere, there are equal chances for above-, below-, and near-normal precipitation through March.

Drought

The December 19th Seasonal Drought Outlook indicates that drought is expected to persist across parts of the central and southern Plains. Drought may improve or be removed across the Four Corners and in portions of the southern and northwestern U.S. Development of drought is likely for parts of Florida and Texas. In the High Plains, drought conditions are expected to persist across southeastern Colorado and southwestern Kansas. Drought conditions may improve or be removed across western Colorado. Drought development is not expected at this time in the High Plains through March.



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	43.0	21.8	32.4	4.1	55	12/08	9	12/30+	0.02	-0.38	5
Alamosa San Luis Airport	33.1	0.2	16.6	-1.3	49	12/14	-26	12/31+	0.51	0.16	146
Colorado Springs Municipal Airport	46.8	21.9	34.4	4.6	65	12/07+	5	12/17	0.32	-0.02	94
Denver International Airport	45.3	22.1	33.7	3.7	67	12/22	3	12/30+	0.30	-0.05	86
Grand Junction Walker Field Airport	40.0	21.6	30.8	2.3	50	12/06	9	12/18	0.55	-0.04	93
Pueblo Memorial Airport	50.5	19.0	34.8	4.7	70	12/07+	0	12/17	0.30	-0.08	79

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	46.6	26.7	36.7	6.7	62	12/25+	18	12/17	1.98	1.13	233
Dodge City Regional Airport	50.8	24.6	37.7	4.9	67	12/25	18	12/18+	1.32	0.48	157
Goodland Renner Field	47.9	22.5	35.2	5.3	71	12/22	11	12/17	0.30	-0.16	65
Topeka Municipal Airport	48.3	27.2	37.7	5.7	67	12/25	10	12/18	2.23	0.88	165
Wichita Mid-Continent Airport	50.3	27.4	38.9	5.1	68	12/25	10	12/17	1.77	0.57	148

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	38.0	14.0	26.0	1.6	53	12/08	-2	12/17	0.13	-0.39	25
Grand Island Airport	41.6	22.9	32.3	5.6	65	12/22	8	12/16	1.50	0.87	238
Lincoln Municipal Airport	43.8	21.1	32.5	5.7	60	12/05	9	12/17	2.57	1.62	271
Norfolk Karl Stefan Airfield	38.3	19.4	28.9	4.6	54	12/22	-2	12/16	1.10	0.35	147
North Platte Regional Airport	43.3	17.5	30.4	5.0	62	12/08	2	12/17	0.94	0.53	229
Omaha Eppley Airport	41.2	23.4	32.3	6.3	56	12/05	13	12/09	2.10	1.06	202
Valentine Miller Field	40.0	17.4	28.7	4.9	61	12/22	2	12/16	0.88	0.51	238

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismarck Municipal Airport	26.0	9.0	17.5	1.3	41	12/21+	-18	12/11	0.61	0.12	124
Fargo International Airport	22.6	5.1	13.8	-0.3	36	12/22	-18	12/11	1.72	0.89	207
Grand Forks International Airport	19.7	-1.1	9.3	-2.2	35	12/03	-27	12/15+	1.50	0.89	246
Theodore Roosevelt Airport	30.9	12.7	21.8	3.9	44	12/22+	-13	12/10	T*	-0.24*	0*
Williston International Airport	26.2*	9.0*	17.6*	3.7*	46*	12/07+*	-16*	12/10*	0.03*	-0.59*	5*

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 2019 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	26.2	9.3	17.7	2.0	40	12/03	-17	12/11	0.87	0.35	167
Huron Regional Airport	29.4	13.8	21.6	2.4	42	12/22+	-7	12/11	1.01	0.49	194
Pierre Regional Airport	31.7	14.9	23.3	1.6	47	12/07	2	12/10	1.02	0.47	185
Rapid City Regional Airport	39.5	17.9	28.7	3.8	58	12/07	3	12/10	0.25	-0.17	60
Sioux Falls Joe Foss Field Airport	31.8	16.4	24.1	4.9	45	12/21	-2	12/11	1.24	0.55	180

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	33.8	19.6	26.7	2.9	49	12/23	4	12/27+	0.60	0.11	122
Cheyenne Municipal Airport	40.7	22.0	31.3	3.6	57	12/22	6	12/16	0.59	0.10	120
Lander Hunt Field Airport	28.5	8.7	18.6	-2.1	45	12/07	-7	12/31	0.09	-0.49	16
Laramie Regional Airport	32.6	11.5	22.0	0.9	50	12/22	-15	12/16	0.33	0.01	103
Rawlins Municipal Airport	28.6*	12.8*	20.5*	-1.0*	43*	12/23*	-12*	12/16*	0.55	0.12	128
Sheridan County Airport	41.2	17.0	29.1	6.2	61	12/21	2	12/01	0.21	-0.35	38

December 2019 Highlights

Monthly Rankings

Precipitation and Snowfall in inches

Wettest	Precipitation / Ranking	Record / Year	Period of Record
Grand Forks, ND	1.50 / 6th wettest	2.29 / 1918	1893-present
Lincoln, NE	2.57 / 7th wettest	4.42 / 2015	1887-present
Fargo, ND	1.72 / 8th wettest	2.28 / 1927	1881-present
Concordia, KS	1.98 / 10th wettest	3.91 / 1913	1885-present
Snowiest	Snowfall / Ranking	Record / Year	Period of Record
Fargo, ND	20.4 / 6th snowiest	33.5 / 2008	1885-present
Grand Forks, ND	21.7 / 7th snowiest	30.2 / 1996	1893-present

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North Dakota Climate Summary

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For more information: www.ndsu.edu/ndsco or www.ndawn.ndsu.nodak.edu



Precipitation:

Based on the National Centers for Environmental Information (NCEI), the statewide average December precipitation was 0.8 inch, which was 0.21 inch more than last month and 0.15 inch more than in December 2018. It also was 0.28 inch more than the 1981-2010 average, making it the 17th wettest December in the 125-year period of record. The values less than 100 in Figure 1 below are shaded in yellow, orange and red to depict the region with below-average rainfall. In contrast, the values that are greater than 100 in the same figure are shaded in green, blue and purple to depict the region with above-average rainfall in December. The greatest monthly precipitation accumulation was 3.95 inches, recorded in Grand Forks, Grand Forks County. The greatest monthly snowfall accumulation was 38.2 inches, recorded in Grand Forks, Grand Forks County. Based on historical records, statewide December precipitation showed a slight positive long-term trend of 0.07 inch per century since 1895. The highest and lowest December precipitation for the state ranged from 1.3 inches in 2016 to 0.05 inch in 1944.

Temperature:

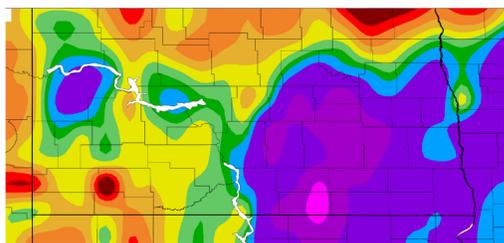
The official state average December temperature was 16.2 F, which is 9.9 degrees cooler than last month and 4.6 degrees cooler than in December 2018. However, the average December temperature was 2.2 degrees warmer than the 1981-2010 average, which made it the 45th warmest December in the 125 years of record. It was the warmest December since 2017. The negative numbers in Figure 3 are shaded in green and blue to depict the region with cooler-than-average temperatures in December. In contrast, the positive numbers in the same figure are shaded in red and orange to depict the region with warmer-than-average temperatures in December. The state's highest and lowest daily temperatures ranged from 52 F on Dec. 8 in Kildeer, Dunn County, to minus 28 F on Dec. 10, in Bottineau, Bottineau County. Based on the historical records, the state average December temperature showed a slight positive long-term trend of 0.3 degree per decade since 1895. The highest and lowest monthly state December average temperatures ranged from 25.4 F in 1939 to minus 3.2 F in 1927.

Drought and other notable impacts:

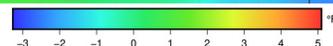
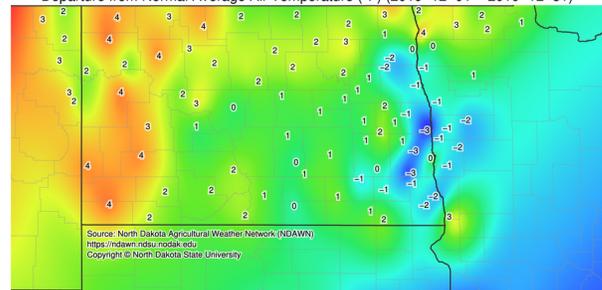
Across the observation network of weather stations with at least 30 years of history, seven daily high- and three daily low-temperature records were set or tied. A total of 83 highest daily precipitation-related records were set or tied.

Temperature and Precipitation Overview

Percent of Normal Precipitation (%)
12/1/2019 - 12/31/2019



Departure from Normal Average Air Temperature (°F) (2019-12-01 - 2019-12-31)



Source: North Dakota Agricultural Weather Network (NDAWN)
<https://ndawn.ndsu.nodak.edu/>
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Above: Percent of normal precipitation (left, figure 1) and departure from normal average temperature (right, figure 2) for December 2019 in North Dakota. Figure 1 produced by the High Plains Regional Climate Center, figure 2 produced by NDAWN.

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

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