Sun pillar in Aberdeen, SD. Photo courtesy NWS Aberdeen.
http://hprcc.unl.edu

Fall Ends with Continued Snowy Conditions

The month of November brought wet and snowy conditions to portions of the region, especially late in the month. Two large storm systems tracked across the High Plains region during the last week of November. These systems brought widespread precipitation, including heavy snow, and strong winds to a large portion of the region. This created significant travel issues for many that were traveling for the Thanksgiving holiday. However, the month started off very dry for much of the region as the High Plains continued its relatively dry streak that began in late October. Despite the dryness, the two large systems that came through in the latter part of the month brought enough precipitation to compensate for the dryness experienced early in the month in some places. Drought conditions continued to expand across portions of Kansas and Colorado during the month, where precipitation remained well below normal. In general, temperatures were near normal during the month of November.

Crop harvest remained well behind schedule across the northern areas of the High Plains region. Even with the help of drier conditions, especially during the first half of the month, farmers across North Dakota and South Dakota continued to struggle getting their crops out of the ground. Particularly hard hit were sugar beets, sunflowers, and corn. As of December 1st, only 36 percent of corn had been harvested in North Dakota, and 80 percent in South Dakota. Sunflower harvest was at 51 percent in North Dakota and 71 percent in South Dakota as of December 1st. The wet and snowy pattern that began in October led to incredibly wet soils that were too muddy or inundated to be able to harvest crops. Only as consistently colder temperatures began to freeze and harden the soil were some agriculture producers able to get back into the fields to harvest their crops. It is likely that some crops will not get harvested until spring, or perhaps not harvested at all, due to poor field conditions.

Temperature and Precipitation Overview

Departure from Normal Temperature (F)
11/1/2019 – 11/30/2019
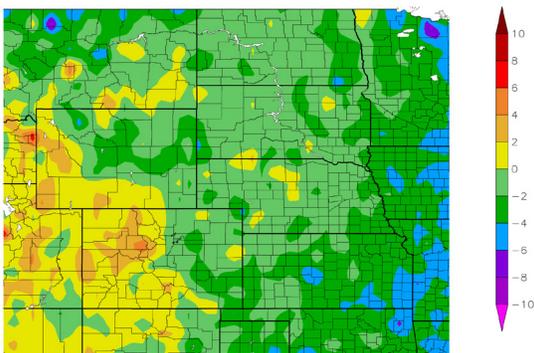
Percent of Normal Precipitation (%)
11/1/2019 – 11/30/2019
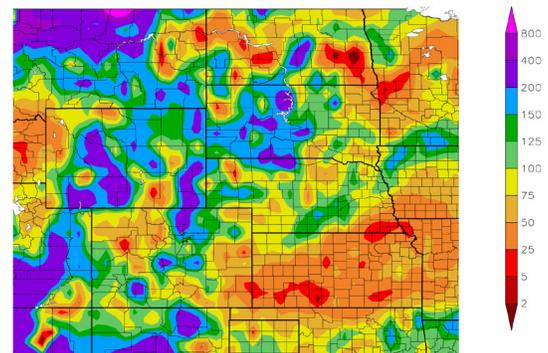
Above: Departure from 1981-2010 normal temperature (left) and percent of normal precipitation (right) for November 2019 in the High Plains region.
Maps produced by the High Plains Regional Climate Center and are available at: http://hprcc.unl.edu/maps/current .

Precipitation

Precipitation varied across the High Plains region during the month of November. Across western sections of the High Plains there were areas that observed widespread precipitation amounts of 150 percent of normal, with embedded pockets where amounts were up to 200 percent of normal. Meanwhile, in other parts of the region, precipitation amounts for the month were generally below normal with under 25 percent of normal precipitation being observed. Several locations in Wyoming and South Dakota ranked in the top 10 wettest Novembers on record, including Casper, WY (2nd wettest); Cheyenne, WY (5th wettest); Mobridge, SD (5th wettest); and Lander, WY (6th wettest). November was also a snowy month for some areas of the region. Several locations had monthly totals that ranked among the top 10 snowiest Novembers on record, such as Cheyenne, WY (6th snowiest); Hastings, NE (6th snowiest); Pierre, SD (6th snowiest); and Goodland, KS (10th snowiest).

During the last week of the month, two large storm systems tracked across the High Plains. The first system arrived on the 26th and brought a swath of heavy snow and strong winds to portions of Colorado, much of Nebraska, and southeastern South Dakota. Snow totals from this system ranged from 4.0-12.0 inches (10-30 cm) in this area. Then, on the heels of the first system that week, on November 29-30, a particularly strong storm system brought heavy precipitation and strong winds to the northern High Plains. The combination of plentiful moisture and sub-freezing temperatures created significant snowfall over much of eastern Wyoming, northwestern Nebraska, South Dakota, and southern North Dakota. In these areas, snow totals were generally in the 6.0-18.0 inch (15-48 cm) range, with the exception of the Black Hills area of South Dakota where up to 30.0 inches (76 cm) of snowfall was observed. Very strong winds also occurred with this system, creating near whiteout conditions and prompting the issuance of blizzard warnings.

Regional Precipitation

Above: Total precipitation in inches (top) and departure from normal precipitation in inches (bottom) for November 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.
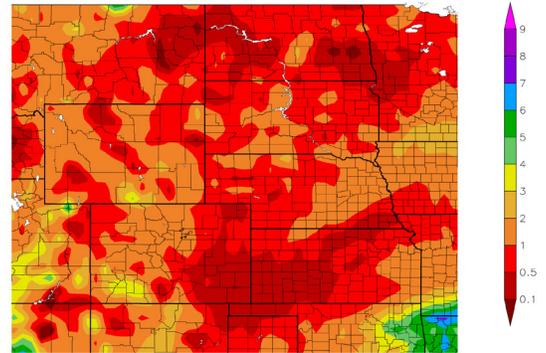
Both systems created major travel issues as they hit in the middle of the Thanksgiving holiday week. The first storm system was responsible for closing I-80 in both directions in Nebraska from Kearney to York for several hours on the evening of the 26th due to snow covered roads and poor visibility. A very similar scenario occurred with the second system on the 29th as additional snowfall and very strong winds created whiteout conditions and prompted additional road closures.
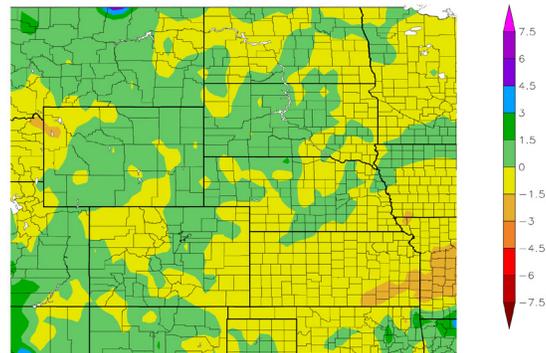
Snowpack Update

Mountain snowpack got off to a good start this month across all of Colorado and much of Wyoming. This has helped keep drought conditions from worsening and lowers concerns for low water levels. By the end of November snowpack was above normal across all of the basins in Colorado and almost all of the basins in Wyoming. Across the Upper Missouri Basin, mountain Snow Water Equivalent (SWE) was near to slightly above normal. As of December 1st, mountain SWE was 101 percent of normal above Fort Peck and 114 percent of normal in the reach from Fort Peck to Garrison, according to the U.S. Army Corps of Engineers. The month of November also brought plentiful snowfall to much of the Plains as well by the month's end, with the highest snowpack found across much of Nebraska, Colorado, and Wyoming.

Temperatures

Temperatures across much of the High Plains were generally near normal for the month of November, with departures within 2.0 degrees F (1.1 degrees C) of normal. There was, however, areas of the region that experienced greater departures. For instance, portions of central and southeastern Kansas had departures of 4.0-6.0 degrees F (2.2-3.3 degrees C) below normal. On the other hand, temperature departures of up to 6.0 degrees F (3.3 degrees C) above normal were observed further west across western areas of Colorado and Wyoming. With most areas experiencing a relatively mild month as a whole, there was not a significant number of monthly record high or record low temperatures.

Although the month of November did not feature a large number of record monthly temperatures, a noteworthy, cold air mass in the middle of the month brought temperatures near 0.0 degrees F (-17.8 degrees C) in many spots and caused several locations to set new daily record lows. Some locations even recorded temperatures that were well below 0.0 degrees F (-17.8 degrees C). One location that experienced this cold blast was Wichita, Kansas, where temperatures bottomed out at a record low of 8.0 degrees F (-13.3 degrees C) on the 12th. This broke the old record of 9.0 degrees F (-12.8 degrees C), which occurred in 1911 (period of record 1888-present). As for fall temperatures on the whole, there were only a few noteworthy records. The following locations ranked among the top 10 of coolest falls: Rapid City, SD (3rd coolest); Casper, WY (6th coolest); and Pierre, SD (tied for 8th coolest). However, while there were few fall temperature records, the extremes of the season were masked because September temperatures were above normal for much of the region, while October temperatures were well below normal.

Station Spotlight: Wichita, KS
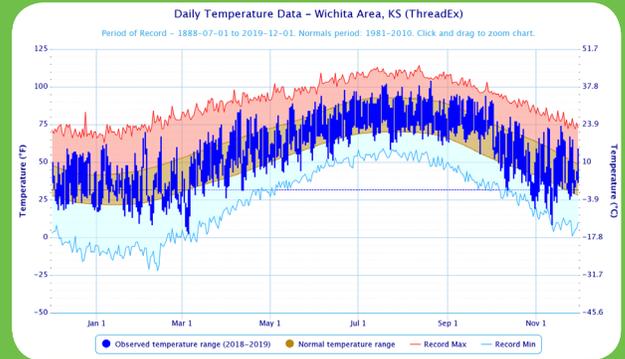
Above: Daily temperatures along with extremes and normals values since December 1, 2018 in Wichita, KS.
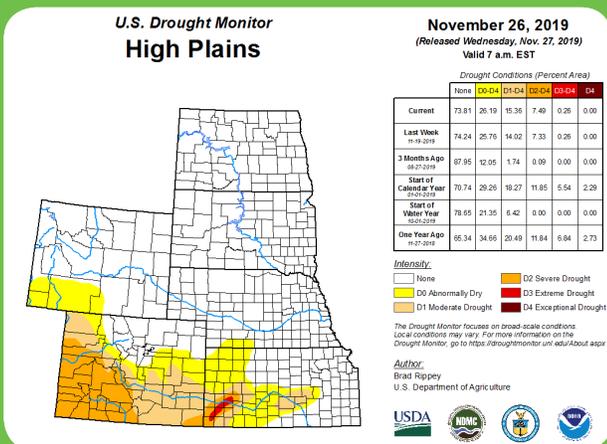
Drought Conditions

Drought conditions continued to expand and intensify across southern and western portions of the High Plains region during the month of November. According to the U.S. Drought Monitor, the area experiencing drought (D1-D4) in the High Plains region increased from approximately 13 percent at the end of October to just over 15 percent by the end of November. This increase included the expansion of drought in areas of southern and western Colorado and southwestern Kansas where precipitation deficits have continued to worsen over the past several months.

This month, abnormally dry conditions (D0) continued to expand across portions of western Kansas and into portions of southwestern Nebraska. D0 remained nearly unchanged in parts of southwestern Wyoming. Some improvement was observed over northern Colorado during the month, with a reduction of abnormally dry conditions in this area. Meanwhile, across southern Colorado and western Kansas, moderate drought (D1) expanded through the month of November, while severe drought (D2) also expanded across some portions of this same area. A small pocket of extreme drought (D3) also developed across southwestern Kansas during the month.

The remainder of the region was free of drought and abnormally dry conditions. As of the November 26th release of the U.S. Drought Monitor, both Nebraska and South Dakota continued their streak of being drought-free all of 2019.

U.S. Drought Monitor

U.S. Drought Monitor
High Plains

November 26, 2019
(Released Wednesday, Nov. 27, 2019)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	73.81	26.19	15.36	7.49	0.26	0.00
Last Week 11-19-2019	74.24	25.76	14.02	7.33	0.26	0.00
3 Months Ago 08-27-2019	87.95	12.05	1.74	0.09	0.00	0.00
Start of Calendar Year 01-01-2019	70.74	29.26	18.27	11.85	5.54	2.29
Start of Water Year 10-01-2019	78.65	21.35	6.42	0.00	0.00	0.00
One Year Ago 11-27-2018	65.34	34.66	20.49	11.84	6.84	2.73

Intensity:

None
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. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

Author:
Brad Rippey
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/.

Climate Outlooks

According to the Climate Prediction Center, ENSO-neutral conditions continued through November in the Pacific. These conditions are likely to continue through winter and possibly into 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 through February. In the High Plains, moderate to major flooding is forecast along the James River in South Dakota. Moderate flooding is also forecast along other parts of the Big Sioux River in South Dakota. Minor flooding is expected along the Vermillion River, parts of the Big Sioux River in South Dakota, and along the Missouri River in southeast Nebraska. Normal wildland fire potential is expected from December through March for the entire High Plains region.

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.
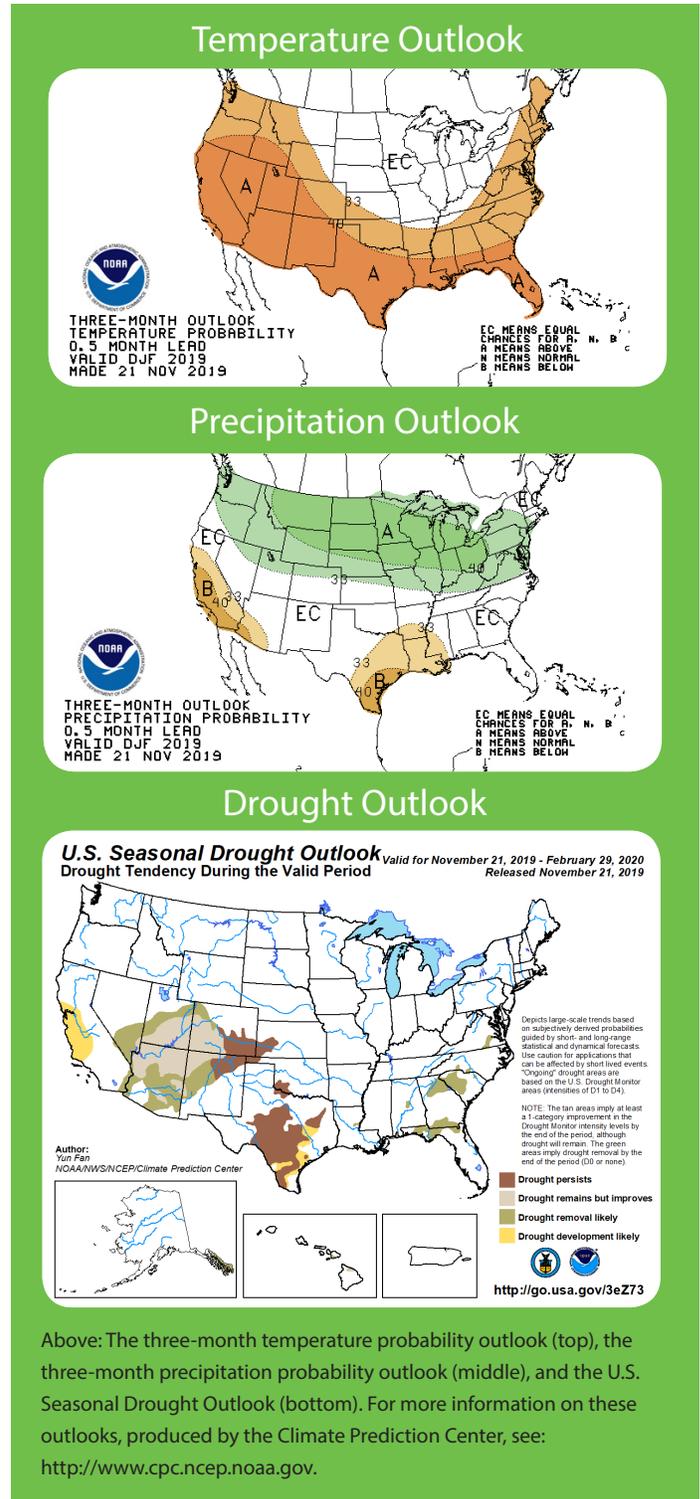
Temperature

The December-February temperature outlook calls for a higher probability of above-normal temperatures for much of the western, southern, and eastern contiguous U.S. This includes most of Colorado, Wyoming, and southwestern Kansas in the High Plains region. Elsewhere, across the High Plains, there are equal chances for above-, below-, or near-normal temperatures. There are no areas that have an increased chance of below-normal temperatures through February.

Precipitation

The precipitation outlook through February calls for a higher probability of above-normal precipitation across much of the northern half of the U.S. This includes most of the High Plains with central Kansas and Colorado being the exception. There is an increased chance for below-normal precipitation in parts of the West and the South. Elsewhere, there are equal chances for above-, below-, and near-normal precipitation during the December-February period.

Drought

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.

The November 21st Seasonal Drought Outlook indicates that drought is expected to persist across portions of the central and southern Plains. Drought may improve or be removed across the Four Corners, and in portions of the southern and eastern U.S. Development of drought is likely for portions of California and Texas over the next few months. In the High Plains, drought conditions are expected to persist in portions of 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 region through February.

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	48.6	25.1	36.8	-0.8	74	11/09	7	11/11	0.24	-0.34	41
Alamosa San Luis Airport	50.8	9.2	30.0	0.5	62	11/09	-3	11/27	0.45	0.03	107
Colorado Springs Municipal Airport	50.5	24.5	37.5	-0.6	71	11/09	10	11/27	0.90	0.50	225
Denver International Airport	49.7	22.7	36.2	-2.1	77	11/09	-2	11/27	1.31	0.70	215
Grand Junction Walker Field Airport	54.6	26.1	40.4	1.4	64	11/09+	11	11/01	0.87	0.14	119
Pueblo Memorial Airport	54.2	22.7	38.4	-0.9	75	11/09	9	11/23	0.52	0.05	111

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	53.2	31.1	42.2	0.6	78	11/09	6	11/12	0.56	-0.55	50
Dodge City Regional Airport	56.7	28.2	42.4	-0.7	79	11/09	4	11/12	0.20	-0.56	26
Goodland Renner Field	52.5	23.5	38.0	-1.0	77	11/09	3	11/11	0.75	0.04	106
Topeka Municipal Airport	54.0	29.3	41.6	-2.2	73	11/09	8	11/12	1.22	-0.63	66
Wichita Mid-Continent Airport	57.3	30.1	43.7	-1.7	74	11/18	8	11/12	0.64	-0.79	45

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	46.6	20.4	33.5	-0.5	70	11/09	-5	11/11	0.27	-0.35	44
Grand Island Airport	49.5	26.5	38.0	-0.1	77	11/09	3	11/12	1.91	0.74	163
Lincoln Municipal Airport	49.4	25.3	37.4	-1.5	74	11/09	2	11/12	0.79	-0.64	55
Norfolk Karl Stefan Airfield	46.7	23.1	34.9	-1.5	69	11/09	-7	11/12	2.02	0.65	147
North Platte Regional Airport	50.9	20.3	35.6	0.0	77	11/09	-1	11/12+	0.73	0.09	114
Omaha Eppley Airport	47.0	27.7	37.4	-1.5	65	11/20+	6	11/12	0.93	-0.71	57
Valentine Miller Field	48.4	20.7	34.6	0.2	75	11/09	-6	11/12+	1.39	0.74	214

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismarck Municipal Airport	37.6	20.6	29.1	-0.1	56	11/24	-7	11/11	1.03	0.32	145
Fargo International Airport	34.3	20.8	27.6	-1.2	46	11/24	-3	11/11	1.02	0.02	102
Grand Forks International Airport	31.9	18.2	25.0	-1.1	45	11/14	0	11/11	0.95	0.00	100
Theodore Roosevelt Airport	37.0	19.1	28.1	-1.4	56	11/24	-9	11/11	0.09	-0.45	17
Williston International Airport	34.8	18.8	26.8	-0.3	52	11/18	-9	11/11	0.22	-0.43	34

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.

South Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Aberdeen Regional Airport	39.7	20.1	29.9	0.6	60	11/24	-3	11/11	1.66	0.93	227
Huron Regional Airport	41.3	22.9	32.1	-0.5	59	11/24	5	11/12+	1.12	0.25	129
Pierre Regional Airport	43.1	21.9	32.5	-1.2	66	11/09	-3	11/11	1.07	0.31	141
Rapid City Regional Airport	45.4*	19.9*	32.6*	-1.9*	69	11/09	-5	11/11	0.60*	0.07*	113*
Sioux Falls Joe Foss Field Airport	41.8	22.6	32.2	-0.4	57	11/15	2	11/07	1.34	-0.02	99

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	42.5	19.5	31.0	-2.2	64	11/09	-9	11/27	1.86	1.10	245
Cheyenne Municipal Airport	46.4	21.4	33.9	-1.4	70	11/09	-5	11/27	1.84	1.25	312
Lander Hunt Field Airport	42.2	18.7	30.5	-0.7	66	11/09	2	11/27	2.23	1.37	259
Laramie Regional Airport	43.0	16.4	29.7	0.4	63	11/09	-16	11/27	0.25	-0.29	46
Rawlins Municipal Airport	42.7	19.3	31.0	0.9	61	11/19	-13	11/26	0.79	0.24	144
Sheridan County Airport	44.1	18.3	31.2	-1.5	70	11/09	-13	11/11	1.37	0.66	193

November 2019 Highlights

Monthly Rankings
Precipitation and Snowfall in inches

Wettest	Precipitation / Ranking	Record / Year	Period of Record
Casper, WY	1.86 / 2nd wettest	2.72 / 1983	1939-present
Cheyenne, WY	1.84 / 5th wettest	2.48 / 1979	1871-present
Lander, WY	2.23 / 6th wettest	3.37 / 1983	1891-present
Mobridge, SD	1.34 / 5th wettest	2.72 / 1977	1911-present

Snowiest	Snowfall / Ranking	Record / Year	Period of Record
Aberdeen, SD	17.7 / 8th snowiest	32.8 / 1896	1893-present
Cheyenne, WY	22.0 / 6th snowiest	31.1 / 1979	1883-present
Goodland, KS	9.2 / 10th snowiest	23.3 / 1983	1895-present
Grand Island, NE	10.0 / 7th snowiest	17.1 / 1983	1895-present
Hastings, NE	8.1 / 6th snowiest	15.5 / 1928	1894-present
Mobridge, SD	12.2 / 6th snowiest	25.0 / 1985	1911-present
Norfolk, NE	10.3 / 7th snowiest	22.6 / 1983	1893-present
Pierre, SD	11.6 / 6th snowiest	27.4 / 1985	1893-present
Scottsbluff, NE	13.5 / 6th snowiest	18.5 / 1983	1893-present

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.

North Dakota Climate Summary

Adnan Akyuz - State Climatologist
North Dakota State Climate Office, North Dakota State University
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 November precipitation was 0.54 inch, which was 1.78 inches less than last month and 0.22 inch less than in November 2018. It was 0.14 inch less than the 1981-2010 average, making it the 71st driest November 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 November. The greatest monthly precipitation accumulation was 2.08 inches, recorded in Steele, Adams County. The greatest monthly snow-fall accumulation was 18.5 inches, recorded at Pretty Rock, Grant County. Based on historical records, statewide November precipitation showed a slight negative long-term trend of 0.03 inch per century since 1895. The highest and lowest November precipitation for the state ranged from 2.33 inches in 2000 to 0.03 inch in 1939.
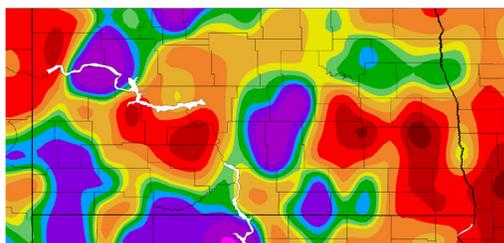
Temperature:

The official state average November temperature was 26.2 F, which is 11.8 degrees cooler than last month but 3.3 degrees warmer than in November 2018. The average November temperature was 1.1 degrees cooler than the 1981-2010 average, which made it the 54th coolest November in the 125 years of record. It was the coolest November since 2018. The negative numbers in Figure 2 are shaded in green and blue to depict the region with cooler-than-average temperatures in November. The state's highest and lowest daily temperatures ranged from 61 F on Nov. 10 in Hettinger, Adams County, to minus 12 F on Nov. 11, in Medora, Billings County. Based on the historical records, the state average November temperature showed a slight positive long-term trend of 0.3 degree per decade since 1895. The highest and lowest monthly state November average temperatures ranged from 39.3 F in 2016 to 6.1 F in 1896.

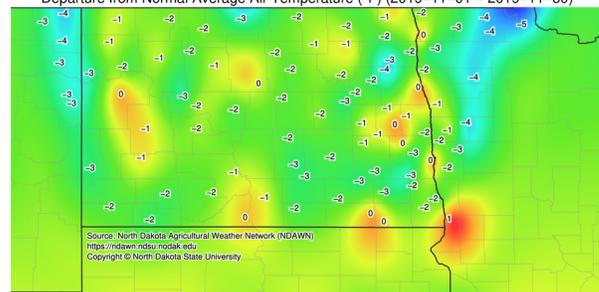**Drought and other notable impacts:**

Across the observation network of weather stations with at least 30 years of history, six daily high- and 17 daily low-temperature records were set or tied. A total of 24 highest daily precipitation-related records were set or tied.

Temperature and Precipitation Overview

Above: Percent of normal precipitation (left, figure 1) and departure from normal average temperature (right, figure 2) for November 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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