



# October 2019 Climate Summary

Fall squash and gourds grown in Lincoln, NE. Photo courtesy Natalie Umphlett.  
<http://hprcc.unl.edu>

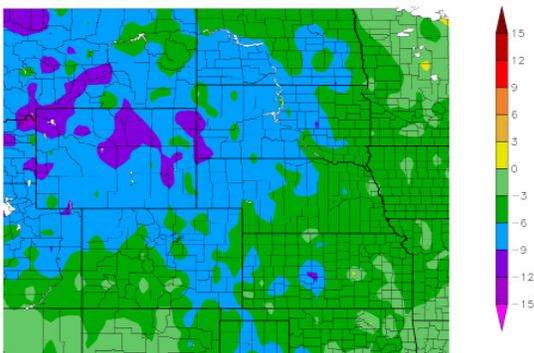
## Cold Temperatures Return to the High Plains

In a sharp contrast to the warm September that the region experienced, October brought much colder conditions to the High Plains. Below-normal temperatures were widespread throughout the region, with the largest departures of nearly 12.0 degrees F (6.7 degrees C) in areas of Wyoming and western South Dakota. Consequently, many locations experienced their coolest Octobers on record, such as Casper, Wyoming; Grand Junction, Colorado; and Rapid City, South Dakota. Similar to September, precipitation was not uniform across the region, with above-normal precipitation generally in the northern, southern, and eastern portions of the High Plains region. Meanwhile, below-normal precipitation was observed across the central and western parts of the region, with the exception of the higher elevations of the Front Range in central Colorado and across northeast Wyoming where heavier precipitation was recorded. Parts of the Dakotas were once again particularly wet, with widespread precipitation totals in excess of 200 percent of normal across northern South Dakota and much of North Dakota. As much colder air filtered into the region during October, many places observed their first measurable snowfall of the season. A large storm system moved across the Dakotas on the 10th through the 12th and brought historic, early season snowfall. This resulted in several locations observing their top 10 snowiest Octobers on record. This potent storm caused a variety of impacts in the Dakotas, including widespread tree damage, power outages, and stranded motorists. In the storm's wake, there was widespread basement flooding and increased river flooding due to snowmelt and rainfall that preceded the snow.

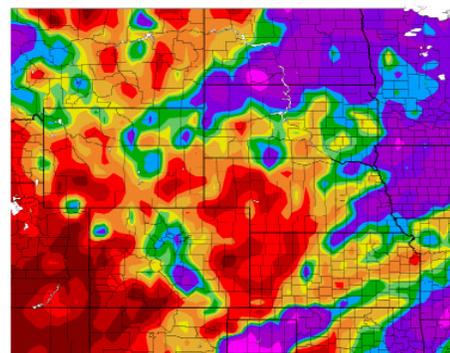
Not surprisingly, fall harvest activities were behind schedule this month, especially in the Dakotas. As of early November, nationally, it was the second slowest corn and soybean harvest since 1995 - only 2009 was slower. Wet soils across much of the region will continue to slow this year's harvest and some producers may have to wait until soils freeze to get out into the fields. It is also possible that some crops will go unharvested this fall.

## Temperature and Precipitation Overview

Departure from Normal Temperature (F)  
10/1/2019 - 10/31/2019



Percent of Normal Precipitation (%)  
10/1/2019 - 10/31/2019



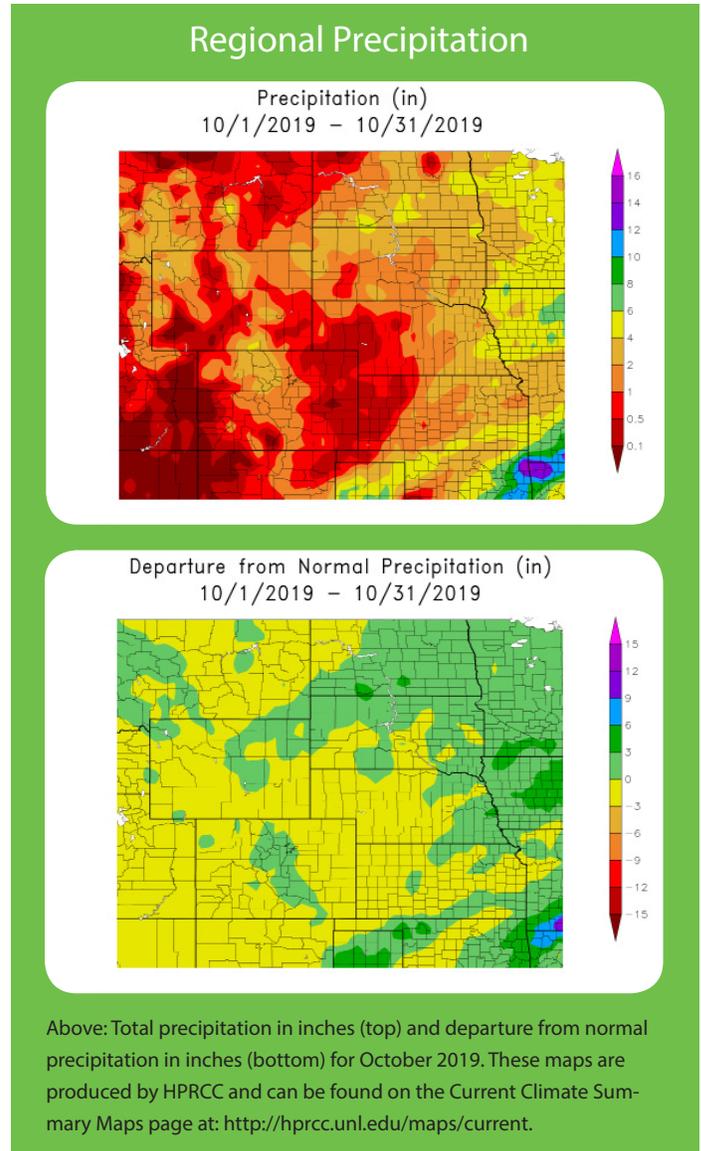
Above: Departure from 1981-2010 normal temperature (left) and percent of normal precipitation (right) for October 2019 in the High Plains region. Maps produced by the High Plains Regional Climate Center and are available at: <http://hprcc.unl.edu/maps/current>.

## Precipitation

Heavy precipitation continued to impact portions of the High Plains region this month, with areas of North Dakota, South Dakota, and eastern Nebraska receiving precipitation in excess of 200 percent of normal, with a small pocket along the North and South Dakota border receiving in excess of 300 percent of normal precipitation. This resulted in several locations in the Dakotas and eastern Nebraska ranking in the top 10 wettest Octobers on record, including Omaha, NE (4th wettest); Bismarck, ND (6th wettest); Grand Forks, ND (8th wettest); Mobridge, SD (8th wettest); and Lincoln, NE (9th wettest). October also turned out to be quite a snowy month for some areas of the High Plains region. Several locations had monthly totals that ranked among the top 10 snowiest Octobers on record, such as, Bismarck, ND (2nd snowiest); Pueblo, CO (3rd snowiest); Colorado Springs, CO (5th snowiest); Fargo, ND (5th snowiest); and Aberdeen, SD (7th snowiest).

Several storm systems impacted the region this month. On October 10-12, a particularly strong storm system brought heavy precipitation, strong winds, and much colder conditions to the northern High Plains. The combination of plentiful moisture, sub-freezing temperatures, and a slow moving low pressure system created historic snowfall over much of North Dakota and parts of South Dakota. In these areas, many locations reported 1 to 3 feet (30-91 cm) of snow. In addition to the heavy snow, strong winds created near whiteout conditions and prompted the issuance of blizzard warnings. The intense winds created drifts that were up to several feet high. According to the National Weather Service in Grand Forks, ND, drifts were as tall as some houses in the Devils Lake area. Impacts from the storm were exacerbated by its timing as widespread tree damage occurred because leaves had not fully dropped and many crops were unharvested when the storm struck. On October 21, Governor Doug Burgum declared a statewide flood emergency for North Dakota so that federal aid could assist those dealing with flooding caused by rain and snowmelt.

Across the remainder of the region, drier conditions prevailed, with the driest conditions being located across eastern Colorado, western Nebraska, and western Kansas. In much of this area, less than half of the normal October precipitation fell during the month, with some places not even receiving a quarter of their normal October precipitation.



## Streamflow Update

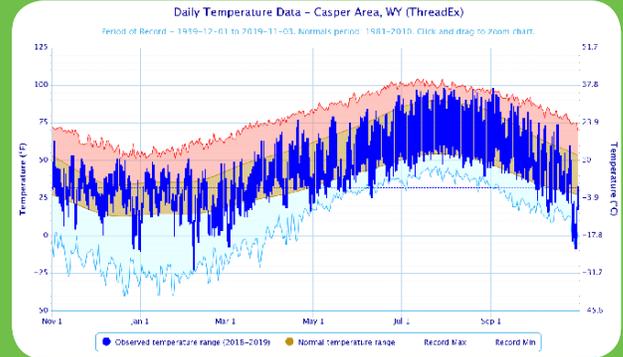
The 2019 runoff season is still on track to be among the highest on record for the upper Missouri River Basin (above Sioux City, Iowa). As of November 5, 2019, the U.S. Army Corps of Engineers' 2019 runoff forecast for the upper Missouri River Basin was 60.2 million acre-feet (MAF), which is 238% of average. The record occurred in 2011 with 61.0 MAF. Heavy precipitation caused streamflows to remain much above normal to high across much of the Missouri River Basin and the Souris-Red-Rainy Basin this month. Widespread record high streamflows for the month of October occurred across northern and eastern portions of North Dakota, eastern and southern South Dakota, and central Nebraska. For weekly updates on the status of the Missouri River Basin, please see: <http://www.nwd-mr.usace.army.mil/rcc/index.html>.

## Temperatures

In contrast to September, temperatures across the High Plains region were well below normal this month. The greatest temperature departures occurred across portions of Wyoming and western South Dakota where temperature departures of nearly 12.0 degrees F (6.7 degrees C) below normal were observed. More widespread departures of 6.0-8.0 degrees F (3.3-4.4 degrees C) below normal were found across nearly all of Wyoming, much of South Dakota, North Dakota, and western Nebraska. Consequently, some areas experienced their top 5 coolest Octobers on record, including Casper, Wyoming (coolest); Grand Junction, Colorado (coolest); Rapid City, South Dakota (coolest); Alamosa, Colorado (2nd coolest); and Pueblo, Colorado (2nd coolest). Across other parts of the region, temperature departures were not as large; however, average temperatures were still up to 6.0 degrees F (3.3 degrees C) below normal for the month of October.

An unusually cold air mass at the end of the month caused many locations to set new records. For instance, Casper, Wyoming set two new records for the month of October - one for lowest minimum temperature and one for lowest maximum temperature. Both of these records occurred on October 29th, when the maximum temperature was 8.0 degrees F (-13.3 degrees C) and the minimum temperature was -9 degrees F (-22.8 degrees C). Each of these new records beat out previous records by several degrees. The temperature dipped to -9 degrees F (-22.8 degrees C) again on the 30th, tying the record from the previous day. Interestingly, four of the top ten lowest October temperatures on record for Casper all occurred during October 2019 (period of record 1939-2019).

### Station Spotlight: Casper, WY

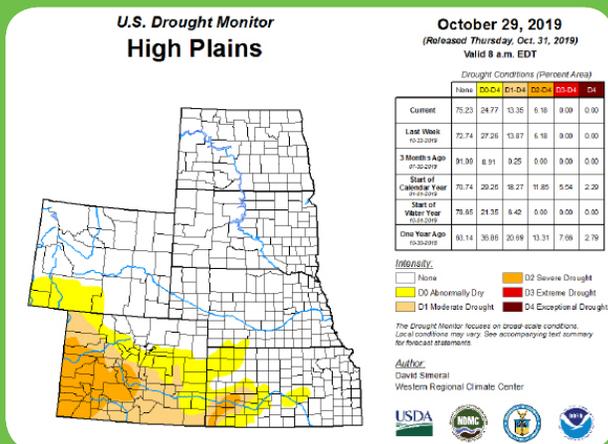


Above: Daily temperatures along with extremes and normals values since November 1, 2018 in Casper, WY.

## Drought Conditions

Drought conditions expanded and intensified across southern and western portions of the High Plains region this month. According to the U.S. Drought Monitor, the area experiencing drought (D1-D4) in the High Plains region increased from approximately 3 percent at the end of September to just over 13 percent at the end of October. This increase included the development and expansion of drought in areas of southern and western Colorado and southwestern Kansas where precipitation deficits have mounted over the past several months.

### U.S. Drought Monitor



This month, abnormally dry conditions (D0) expanded out across portions of eastern Colorado and into western Kansas and a small portion of southwestern Nebraska. D0 was removed in parts of southern and western Wyoming; however, an area in the southwestern part of the state remained. Meanwhile, moderate drought (D1) expanded across the southwestern half of Colorado and a small portion of southwestern Kansas, while severe drought (D2) developed and expanded across some portions of this same area. Colorado had the largest expansion in the region, as 60 percent of the state was in drought at the end of the month. Just over 27 percent of the state was in D2.

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/>.

Other areas of the region continued to be drought-free. As of the October 29th release of the U.S. Drought Monitor, both Nebraska and South Dakota have been drought-free all of 2019.

## Climate Outlooks

According to the Climate Prediction Center, ENSO-neutral conditions continued through October in the Pacific. These conditions are likely to continue through the remainder of fall and may continue 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 and the Souris-Red-Rainy Basin through January. In the High Plains, minor flooding is expected along the James River in North Dakota, and along the Missouri River in southeast Nebraska. Moderate to major flooding is forecast along the James River in South Dakota and along the Sheyenne River in North Dakota. Normal wildland fire potential is expected for the entire High Plains region in November, with normal conditions expected to continue through January.

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

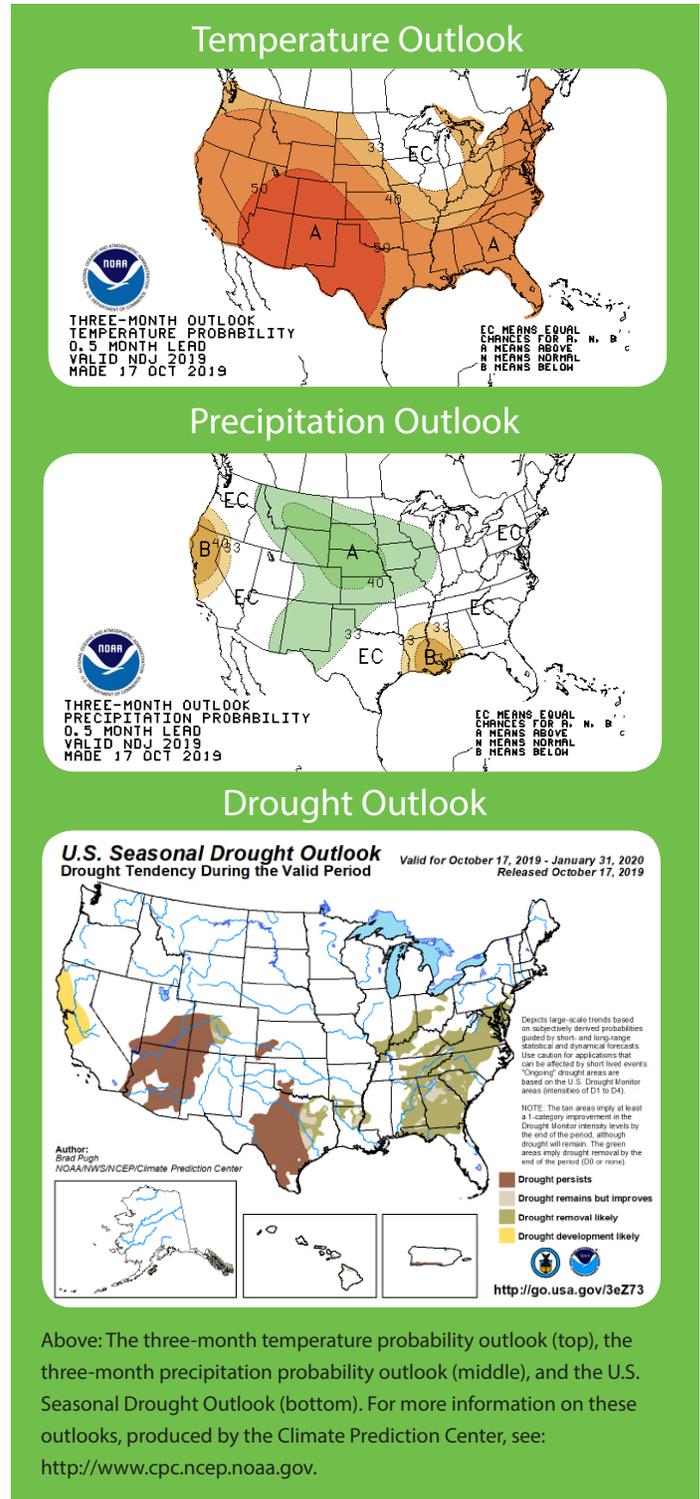
The November-January temperature outlook indicates an increased chance of above-normal temperatures for much of the contiguous U.S. This includes the majority of the High Plains region. In northeastern South Dakota and eastern North Dakota, there are equal chances for above-, below-, or near-normal temperatures. There are no areas that have an increased chance of below-normal temperatures over the next few months.

### Precipitation

The precipitation outlook through January calls for a higher probability of above-normal precipitation across portions of the Interior West, Midwest, the Southwest, and much of the Great Plains. This includes most of the High Plains with southeast Kansas, western Colorado, southwestern Wyoming, and northeast North Dakota being the exception. There is an increased chance for below-normal precipitation in portions of the West, Pacific Northwest, and the South. Elsewhere, there are equal chances for above-, below-, and near-normal precipitation during the November-January period.

### Drought

The October 17th Seasonal Drought Outlook indicates that drought is expected to persist across much of the Four Corners region and Southern Plains. Drought may improve or be removed across the southern and eastern U.S., and portions of the Midwest and central Colorado. Development of drought is likely for portions of California. In the High Plains, drought conditions are expected to persist in portions of western Colorado and southwestern Kansas. Drought development is not expected at this time in the High Plains region through January.



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	57.7	28.0	42.9	-7.3	85	10/17	2	10/30	0.18	-0.93	16
Alamosa San Luis Airport	60.2	16.9	38.6	-4.5	75	10/01	-4	10/31	0.07	-0.61	10
Colorado Springs Municipal Airport	58.1	28.1	43.1	-6.3	81	10/17	4	10/30	0.82	0.00	100
Denver International Airport	58.5	28.9	43.7	-7.2	83	10/09	3	10/30	0.91	-0.11	89
Grand Junction Walker Field Airport	62.4	30.3	46.4	-6.6	82	10/09	6	10/31	0.02	-1.04	2
Pueblo Memorial Airport	63.3	29.1	46.2	-5.6	87	10/08	-6	10/30	1.15	0.43	160

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	63.0	40.1	51.5	-3.9	85	10/01	16	10/31	1.24	-0.68	65
Dodge City Regional Airport	64.5	37.2	50.9	-5.7	87	10/18+	10	10/31	1.43	-0.31	82
Goodland Renner Field	61.4	30.7	46.0	-5.9	87	10/17	8	10/31+	0.26	-1.11	19
Topeka Municipal Airport	63.6	40.6	52.1	-4.5	90	10/01	22	10/31	1.91	-1.12	63
Wichita Mid-Continent Airport	66.4	42.5	54.4	-3.9	91	10/01	19	10/31	3.22	0.44	116

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	54.4	24.5	39.5	-8.1	83	10/17+	0	10/30	0.76	-0.55	58
Grand Island Airport	59.0	34.9	46.9	-5.3	79	10/18	13	10/31	1.35	-0.51	73
Lincoln Municipal Airport	60.4	37.0	48.7	-4.5	79	10/18	18	10/31	4.69	2.72	238
Norfolk Karl Stefan Airfield	57.4	33.8	45.6	-5.4	77	10/18	14	10/31	1.93	-0.14	93
North Platte Regional Airport	59.3	27.0	43.1	-6.0	84	10/17	4	10/31	0.42	-1.13	27
Omaha Eppley Airport	58.3	39.6	49.0	-4.2	74	10/18	20	10/31	5.63	3.48	262
Valentine Miller Field	56.6	27.5	42.0	-6.5	86	10/08	6	10/31	1.17	-0.08	94

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismarck Municipal Airport	48.0	30.4	39.2	-5.6	78	10/08	16	10/31	3.36	2.11	269
Fargo International Airport	48.6	34.5	41.6	-3.9	70	10/08	16	10/31	3.78	1.63	176
Grand Forks International Airport	46.4	33.1	39.8	-3.3	70	10/08	17	10/31+	3.48	1.51	177
Theodore Roosevelt Airport	47.8	27.2	37.5	-6.3	75	10/08	11	10/30	1.27	0.04	103
Williston International Airport	47.7*	28.2*	37.6*	-5.4*	73	10/08	8	10/30	0.55*	-0.37*	60*

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>.

# October 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	50.4	30.9	40.7	-4.5	70	10/08+	11	10/31	2.66	0.67	134
Huron Regional Airport	51.1	33.4	42.2	-5.7	73	10/08	15	10/31	2.28	0.49	127
Pierre Regional Airport	52.1	31.5	41.8	-6.9	76	10/08	14	10/31	1.45	-0.20	88
Rapid City Regional Airport	51.5	24.7	38.1	-9.6	79	10/08	-2	10/30	1.33	-0.09	94
Sioux Falls Joe Foss Field Airport	53.7	35.8	44.8	-3.1	74	10/08	16	10/31	2.61	0.44	120

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	50.9	22.8	36.8	-8.4	75	10/04	-9	10/30+	1.30	0.19	117
Cheyenne Municipal Airport	54.2	25.7	40.0	-6.3	77	10/08	2	10/31+	0.77	-0.16	83
Lander Hunt Field Airport	51.4	23.0	37.2	-8.4	73	10/17+	-10	10/29	0.87	-0.42	67
Laramie Regional Airport	49.3	19.1	34.2	-7.6	74	10/04	-16	10/30	0.27	-0.53	34
Rawlins Municipal Airport	49.0	21.6	35.3	-8.0	69	10/08+	-20	10/30	0.47	-0.28	63
Sheridan County Airport	51.5	22.5	37.0	-8.5	77	10/16	-7	10/30	1.37	-0.04	97

## October 2019 Highlights

### Monthly Rankings

Temperature in degrees F, Precipitation and Snowfall in inches

Coldest	Temperature / Ranking	Record / Year	Period of Record
Casper, WY	36.8 / COOLEST	Old record: 37.0 / 2009	1940-present
Grand Junction, CO	46.4 / COOLEST	Old record: 47.3 / 1969	1893-present
Rapid City, SD	38.1 / COOLEST	Old record: 38.7 / 2009	1942-present
Alamosa, CO	38.6 / 2nd coolest	38.5 / 1969	1932-present
Pueblo, CO	46.2 / 2nd coolest	46.1 / 2009	1888-present
Wettest	Precipitation / Ranking	Record / Year	Period of Record
Omaha, NE	5.63 / 4th wettest	6.23 / 2007	1871-present
Bismarck, ND	3.36 / 6th wettest	4.73 / 2013	1874-present
Grand Forks, ND	3.48 / 8th wettest	5.79 / 1998	1893-present
Mobridge, SD	3.36 / 8th wettest	5.69 / 2013	1911-present
Lincoln, NE	4.69 / 9th wettest	5.40 / 1986	1887-present
Snowiest	Snowfall / Ranking	Record / Year	Period of Record
Bismarck, ND	17.1 / 2nd snowiest	23.7 / 1991	1886-present
Pueblo, CO	12.0 / 3rd snowiest	16.3 / 1991	1888-present
Colorado Springs, CO	12.6 / 5th snowiest	25.9 / 1984	1895-present
Fargo, ND	4.5 / 5th snowiest	8.1 / 1951	1885-present
Aberdeen, SD	5.0 / 7th snowiest	16.0 / 1906	1896-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

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## Precipitation:

Based on the National Centers for Environmental Information (NCEI), the statewide average October precipitation was 2.32 inches, which was 3.36 inches less than last month, but 0.93 inch more than in October 2018 and 0.86 inch more than the 1981-2010 average, making it the 13th wettest October in the 125-year period of record (Table 1). 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 October. The greatest monthly precipitation accumulation was 6.51 inches, recorded at Pretty Rock, Grant County. The greatest monthly snowfall accumulation was 24.7 inches, recorded at Lake Metigoshe State Park, Bottineau County. The greatest 24-hour snowfall was 18 inches, recorded also at Lake Metigoshe State Park, on Oct. 12. Based on historical records, statewide October precipitation showed a positive long-term trend of 0.53 inch per century since 1895. The highest and lowest October precipitation for the state ranged from 4.61 inches in 1982 to 0.09 inch in 1952 (Figure 2).

## Temperature:

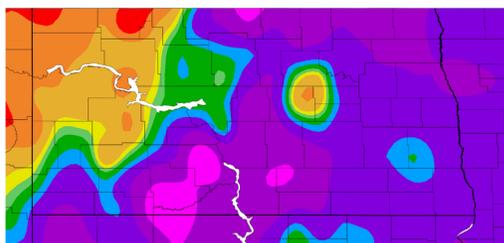
The official state average October temperature was 38 F, which is 20.8 degrees cooler than last month and 1 degree cooler than in October 2018. The average October temperature was 5.4 degrees cooler than the 1981-2010 average, which made it the eighth coolest October in the 125-year period of record. It was the coolest October since 2009 (Table 2). The negative numbers in Figure 3 are shaded in green and blue to depict the region with cooler-than-average temperatures in October. The state's highest and lowest daily temperatures ranged from 80 F on Oct. 9 in Hettinger, Adams County, to 5 F on Oct. 30, again in Hettinger, making the monthly temperature range 75 degrees for Hettinger in October. Based on the historical records, the state average October temperature showed a slight positive long-term trend of 0.1 degree per decade since 1895. The highest and lowest monthly state October average temperatures ranged from 54.8 F in 1963 to 32.6 F in 1925 (Figure 4).

## Drought and other notable impacts:

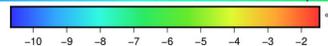
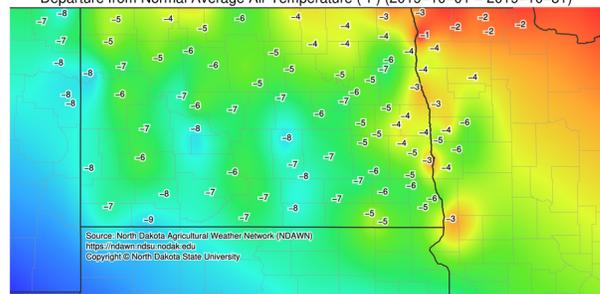
Across the observation network of weather stations with at least 30 years of history, zero daily high- and 71 daily low-temperature records were set or tied. A total of 87 highest daily precipitation-related records were set or tied.

## Temperature and Precipitation Overview

Percent of Normal Precipitation (%)  
 10/1/2019 – 10/31/2019



Departure from Normal Average Air Temperature (°F) (2019-10-01 – 2019-10-31)



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 October 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](http://www.hprcc.unl.edu/webinars.php)

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