



October 2021 Climate Summary

Snow in Laramie WY, Photo courtesy Gavin Rush

First Snow for the High Plains

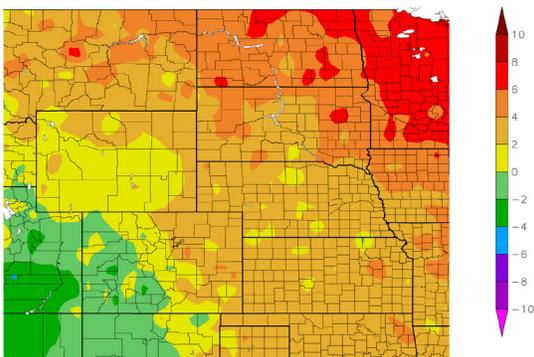
Snow made its first appearance for many portions of the region in October. Cooler fall temperatures and above-normal precipitation in Wyoming, The Dakotas, and the higher elevations in Colorado contributed to the appearance of the season's first significant snowfall.

Southeastern Wyoming had its first Winter Storm and High Wind event of the season. High winds of 40 to 50 mph (64 to 80 km/h) coupled with snowfall led to the first Blizzard warnings being issued this season for counties in southeastern Wyoming. Highway closures, due to the blizzard, resulted in major travel issues. Travel alerts did not appear on some phones, so motorists were not aware of the closures and were stranded in towns along the interstate. Some motorists had to sleep in their cars as limited hotels in small towns were full and they could not get to other areas with the road closures. While this storm created major travel headaches, it did bring much-needed relief to neighboring wildfires, as well as the hot temperatures from summer, while also helping to improve air quality in the region. The Colorado Rockies also received their first notable snowfall of the season. Multiple snowstorms impacted the region in October bringing over a foot of snow in different areas. Winter Storm Warnings were issued for the higher elevations and stretched north to south across the entire range in Colorado. After a storm that brought 14 inches (356 mm) of snow to the southwest part of the state, Wolf Creek ski area near Pagosa Springs became the first in Colorado to open for the season. This was quickly followed by multiple other resorts releasing their opening dates bringing an early start to the ski season.

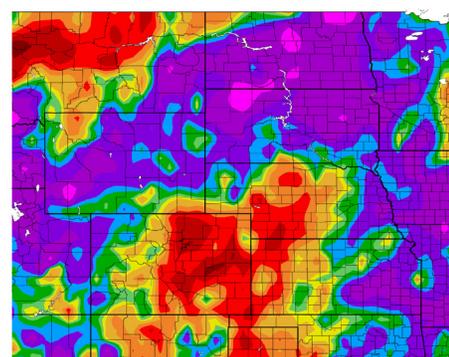
After a summer filled with extreme heat and drought, many areas welcomed the relief of colder temperatures and snow. While drought is still present in the High Plains, this above-normal precipitation and snow did help to provide minor improvement across Wyoming, The Dakotas, and areas in Colorado.

Temperature and Precipitation Overview

Departure from Normal Temperature (F)
10/1/2021 – 10/31/2021



Percent of Normal Precipitation (%)
10/1/2021 – 10/31/2021



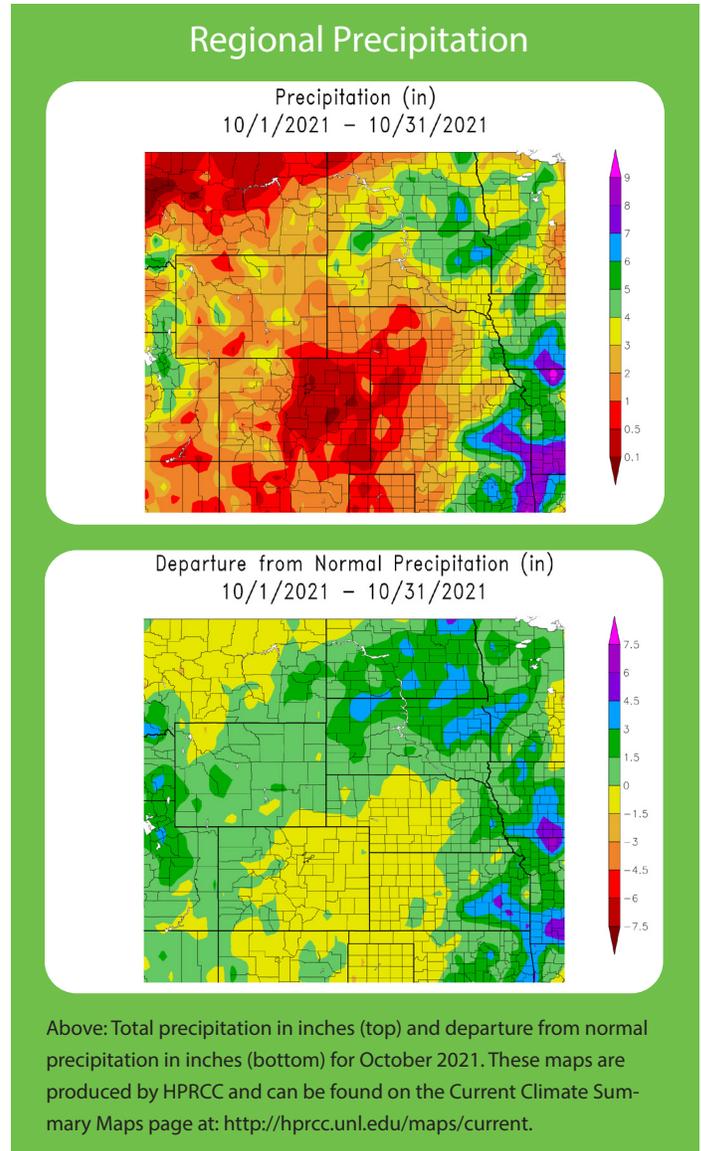
Above: Departure from 1991-2020 normal temperature (left) and percent of normal precipitation (right) for October 2021 in the High Plains region. Maps produced by the High Plains Regional Climate Center and are available at: <http://hprcc.unl.edu/maps/current>.

Precipitation

Precipitation for October varied across the region. Above-normal precipitation was observed across Wyoming and stretched into the Dakotas. The largest departures from normal occurred in the Dakotas, eastern Nebraska, and eastern Kansas with totals as much as 4.5 inches (114 mm) above normal. This large area of above-normal precipitation led to many locations ranking in the top 10 wettest on record for October, many were in the Dakotas (see page 6 for monthly rankings). Huron, SD observed 5.22 inches (133 mm) for the month which ranked as the 3rd wettest October on record, with the record of 6.44 inches (164 mm) being set in 1946. This was 268 percent above the normal precipitation for October. The wetness during the month of October brought both snowstorms and tornadoes to South Dakota. To the west, in Rapid City, blowing snow due to high winds created low visibility, which resulted in highway closures for the duration of the storm. As the storm progressed, several tornadoes were reported in the northeastern corner of the state.

Areas in Wyoming also observed above-normal precipitation for October. Casper, WY recorded 2.69 inches (68 mm) of precipitation which ranked as the 4th wettest October on record, the record being 4.62 inches (117 mm) set in 1998. This precipitation was 226 percent above normal for Casper. Lander, WY, which observed 255 percent of its normal precipitation for October, reported their 9th wettest October on record with 3.57 inches (91 mm) of precipitation.

Despite the wetness in the northern and eastern parts of the High Plains, dryness was present in a large portion of the region. Eastern Colorado and the western parts of Kansas and Nebraska experienced below-normal precipitation for the month, with large swathes of 50 percent or below-normal precipitation. Denver, CO recorded the 8th driest October, with only 0.08 inches (2 mm) of precipitation. The dryness within this area has impacted agriculture. According to the USDA's Weekly Weather and Crop Bulletin, pasture and rangelands that were rated as poor to very poor conditions were covering above 25 percent of the area for Colorado, Kansas, and Nebraska. Corn harvest was also ahead of the 5-year average for all states in the High Plains.



Streamflow Update

Above-normal precipitation during the month of October led to improvements in streamflow across parts of the region. Over large parts of North Dakota and Wyoming, streamflow returned to normal or above normal state. Colorado also observed improvements in conditions, however, pockets of much below normal streamflow are still present. The Southeastern portion of the Missouri River Basin continued to remain above normal for October with some streamflow observations much above normal. In contrast, streamflow in the tri-state corner of Colorado, Nebraska, and Kansas remained much below normal after another dry month for this region, with several gauges observing record low flows.

Temperatures

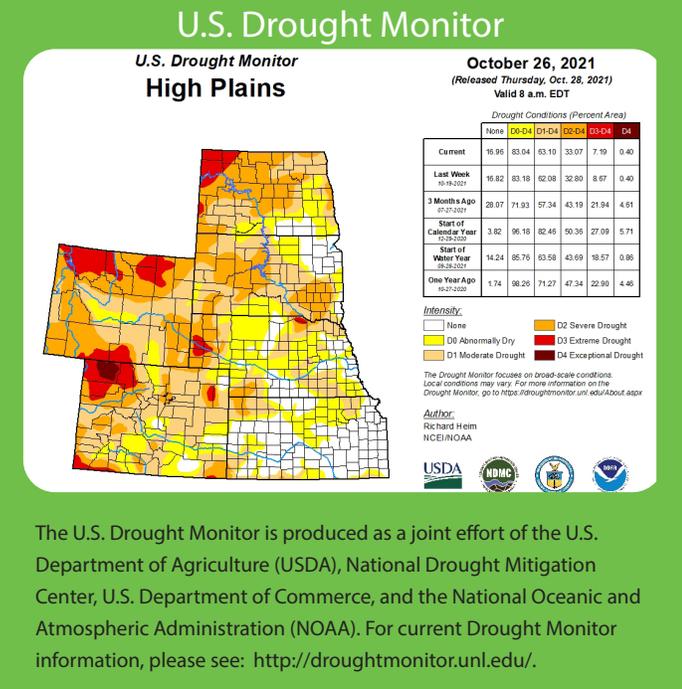
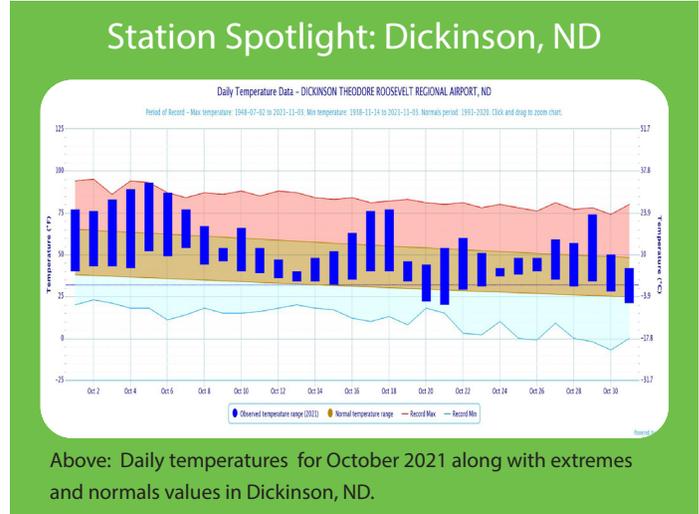
Temperatures for October remained above normal for most of the High Plains. The temperature departure gradient stretched northeast with the southwestern portion of the region observing temperatures below-normal and the northeastern portion observing the greatest departure of above-normal temperatures. The Rockies, in western Colorado, observed temperatures 2 to 4 degrees F (1.1 to 2.2 degrees C) below-normal, while the Dakotas observed the highest departure from normal with temperatures 4 to 8 degrees F (2.2 to 4.5 degrees C) above-normal.

As a result of these above-normal temperatures in the Dakotas, a few locations ranked in the top 10 warmest October on record (see page 6 for October rankings). Dickinson, ND observed its 5th warmest October on record with an average temperature of 49.1 degrees F (9.5 degrees C). Grand Forks, ND tied a record set in 1900 with its 10th warmest October on record with an average temperature of 49.4 degrees F (9.7 degrees C). While October 2021 only ranked as the 10th warmest for Grand Forks, this was a departure of 6.2 degrees F (3.5 degrees C) above normal. Above normal temperatures in North Dakota provided challenges to some deer hunters. Lower temperatures are ideal for deer hunting because it increases deer activity as they look for more food to store energy and keep their bodies warm. Without these cooler temperatures, the deer are remaining in the brush longer and are less likely to come out during the middle of the day making it harder for deer hunters in the region.

Below normal temperatures in the Rockies, along with above normal precipitation, contributed to the season's first significant snowfall. Multiple storms provided a fresh layer of snow to the mountain range. Ski resorts in Colorado are opening, which is welcomed as it will help boost the local economy and provide jobs after a hard season in 2020.

Drought Conditions

Beneficial precipitation across drought-stricken areas of the High Plains led to improvements in drought and abnormally dry (D0-D4) conditions. The most notable improvements included a reduction of 12 percent in extreme and exceptional (D3-D4) conditions. Despite the improvements this month, 83 percent of the region is still experiencing D0-D4 conditions.



Conditions improved significantly in North Dakota after much of the state experienced above-normal precipitation during October. D3-D4 conditions were reduced 50 percent during the month, with only 9 percent of the state currently under the most severe drought conditions. In South Dakota, similar improvements occurred. D3-D4 categories were removed for the state while severe to exceptional (D2-D4) drought was reduced by 27 percent. Wyoming also experienced a 16 percent decrease to D3-D4 conditions. Despite the improvements this month, Colorado saw an increase of 21 percent to drought conditions (D1-D4). Throughout the rest of the region, other minor improvements were observed. According to the U.S. Monthly Drought Outlook for November, drought development is likely in southern Colorado and western Kansas.

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, La Niña conditions have developed during the month of October. A La Niña Advisory has been issued and La Niña conditions are expected to continue throughout the winter season. For more information, visit https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf

The National Weather Service’s long-range flood outlook through January indicates a continual decrease in the chance of minor flooding. There is a greater than 50 percent chance of minor flooding in the lower Missouri River Basin in November and that will continue to decrease through January where it becomes a less than 20 percent chance. According to the National Interagency Fire Center (NIFC), significant wildland fire potential has returned to normal for the High Plains and is expected to continue to remain normal 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 visit <http://www.cpc.ncep.noaa.gov>.

Temperature

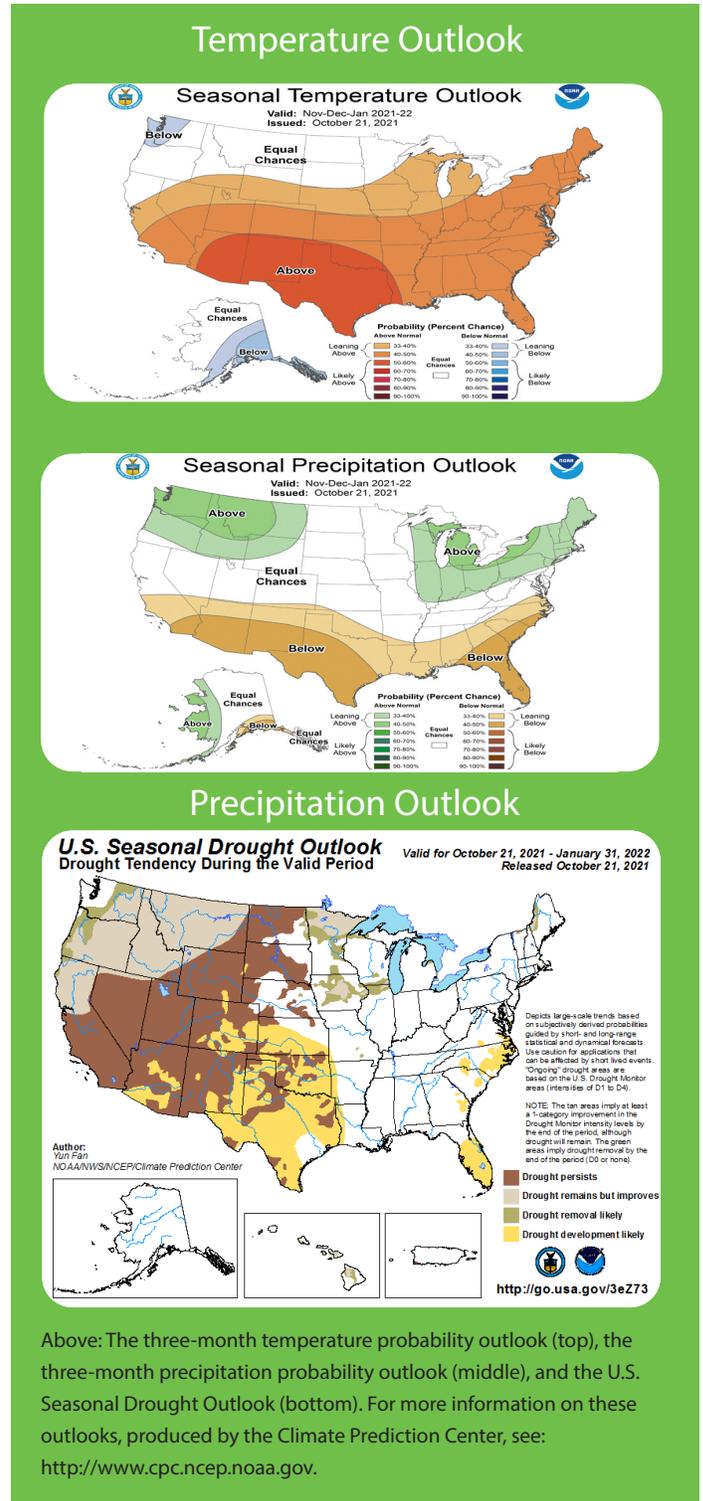
The three-month temperature outlook shows an increased chance for above-normal temperatures for most of the contiguous United States. The highest chances for above-normal temperatures can be observed in the Southwestern portion of the country. In the Southern High Plains, there is an increased chance of above-normal temperatures during the next three months, whereas in the majority of the Northern High Plains there are equal chances of above-, below-, and near-normal temperatures.

Precipitation

The precipitation outlook for the next three months indicates below-normal precipitation across the southern half of the United States, whereas above-normal precipitation can be observed throughout the Northwest and Northeast. In most of the High Plains region, there are equal chances of above-, below-, and near-normal precipitation. A portion of Northwestern Wyoming has a slightly increased chance of above-normal precipitation, while a small area of southern Kansas and Colorado has a slightly increased chance of below-normal precipitation.

Drought

The U.S. Seasonal Drought Outlook released on October 21st indicates drought conditions are expected to persist across the Western U.S and High Plains over the next three months. Drought conditions are expected to show minor improvements in the Northwest, with some areas likely to observe drought removal. It is also likely that in portions of Colorado, Florida, the Carolinas, and the Southern Plains, drought conditions will develop.



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	68.3	38.6	53.5	3.3	84	10/6	28	10/15	0.46	-0.53	46
Alamosa San Luis Airport	63.0	22.4	42.7	-1.1	74	10/25+	10	10/15	0.36	-0.29	55
Colorado Springs Municipal Airport	67.7	38.5	53.1	2.4	79	10/6+	28	10/16	0.26	-0.51	34
Denver International Airport	69.3	38.6	53.9	2.8	85	10/6	24	10/20	0.08	-0.91	8
Grand Junction Walker Field Airport	63.7	39.9	51.8	-1.4	80	10/5	31	10/27+	1.41	0.42	142
Pueblo Memorial Airport	73.0	37.1	55.0	2.2	85	10/8+	24	10/16	0.14	-0.62	18

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	71.3	45.8	58.2	2.6	88	10/9+	34	10/30	2.96	0.98	149
Dodge City Regional Airport	73.6	45.0	59.3	2.5	96	10/9	33	10/31	2.97	0.95	147
Goodland Renner Field	71..2	36.6	53.9	2.1	87	10/26	26	10/31	0.25	-1.16	18
Topeka Municipal Airport	72.2	48.4	60.3	3.3	91	10/9	32	10/30	5.09	2.24	179
Wichita Mid-Continent Airport	74.2	49.5	61.9	2.9	96	10/9	33	10/30	4.99	2.14	175

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	66.5	36.8	51.6	3.5	88	10/5	27	10/29+	1.91	0.63	149
Grand Island Airport	68.4	43.3	55.8	2.7	86	10/8	32	10/16	1.99	0.00	100
Lincoln Municipal Airport	69.3	44.0	56.6	2.8	86	10/8	28	10/22	4.04	1.90	189
Norfolk Karl Stefan Airfield	67.2	42.2	54.7	3.9	85	10/8	27	10/22	2.03	-0.12	94
North Platte Regional Airport	68.6	36.1	52.4	2.2	86	10/8	24	10/16	0.83	-0.82	50
Omaha Eppley Airport	68.5	47.4	57.9	3.5	86	10/8	33	10/30	4.75	2.43	205
Valentine Miller Field	67.4	39.4	53.4	4.1	86	10/8	25	10/21	0.99	-0.43	70

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismarck Municipal Airport	62.5	39.0	50.7	5.9	91	10/5	21	10/21	3.35	1.92	234
Fargo International Airport	61.2	40.8	51.0	5.5	82	10/4	23	10/23	2.96	0.79	136
Grand Forks International Airport	60.3	38.6	49.4	6.2	84	10/5	21	10/23+	3.48	1.60	185
Theodore Roosevelt Airport	61.3	36.9	49.1	5.3	93	10/5	20	10/21	2.91	1.74	249
Williston International Airport	59.2	37.3	48.2	5.0	92	10/6	21	10/31	0.62	-0.32	66

All data are preliminary and subject to change. + indicates multiple dates, latest date listed. * indicates some missing data for the period. ** indicates value is under evaluation. 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>.

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South Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Aberdeen Regional Airport	63.6	39.9	51.8	5.5	88	10/4	25	10/29	4.39	2.25	205
Huron Regional Airport	64.4	40.9	52.7	4.8	83	10/4	25	10/31	5.22	3.27	268
Pierre Regional Airport	63.8	40.7	52.2	3.7	86	10/5+	25	10/31	2.09	0.04	124
Rapid City Regional Airport	64.6	37.3	51.0	3.9	90	10/5	25	10/21	2.76	1.35	196
Sioux Falls Joe Foss Field Airport	64.9	42.9	53.9	4.3	83	10/8+	27	10/31	2.33	-0.03	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	59.0	35.6	47.3	2.0	80	10/5	25	10/14	2.69	1.50	226
Cheyenne Municipal Airport	61.5	36.8	49.2	2.7	79	10/5	26	10/15	0.74	-0.26	74
Lander Hunt Field Airport	59.0	33.9	46.4	1.0	79	10/4	16	10/13	3.57	2.17	255
Laramie Regional Airport	56.7	30.4	43.5	1.6	75	10/5	19	10/12	0.56	-0.27	67
Rawlins Municipal Airport	57.3	33.3	45.3	1.7	75	10/5	24	10/15+	0.99	0.31	146
Sheridan County Airport	62.9	35.4	49.2	3.8	89	10/5	28	10/14	2.56	0.99	163

October 2021 Highlights

Monthly Rankings

Temperature in degrees Fahrenheit, Precipitation in inches

Warmest	Temperature / Ranking	Record / Year	Period of Record
Dickinson, ND	49.1 / 5th warmest	56.7 / 1963	1938-2021
Bismarck, ND	50.7 / 9th warmest	54.9 / 1963	1886-2021
Grand Forks, ND	49.4 / 10th warmest (tied with 1900)	57.1 / 1963	1893-2021
Precipitation	Precipitation / Rankings	Record / Year	Period of Record
Huron, SD	5.22 / 3rd wettest	6.44 / 1946	1881-2021
Casper, WY	2.69 / 4th wettest	4.62 / 1998	1939-2021
Rapid City, SD	2.76 / 5th wettest	5.60 / 1998	1942-2021
Chadron, NE	1.91 / 6th wettest	3.57 / 2013	1941-2021
Sisseton, SD	4.97 / 6th wettest	7.01 / 2009	1931-2021
Aberdeen, SD	4.39 / 6th wettest	7.29 / 1998	1893-2021
Dickinson, ND	2.91 / 6th wettest	5.77 / 1982	1938-2021
Bismarck, ND	3.35 / 7th wettest	4.73 / 2013	1886-2021
Mobridge, SD	3.43 / 8th wettest	5.69 / 2013	1911-2021
Grand Forks, ND	3.48 / 8th wettest (tied with 2019)	5.79 / 1998	1893-2021
Lander, WY	3.57 / 9th wettest	4.90 / 1994	1891-2021
Denver, CO	0.08 / 8th driest (tied with 2003+)	Trace / 1934	1872-2021

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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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