

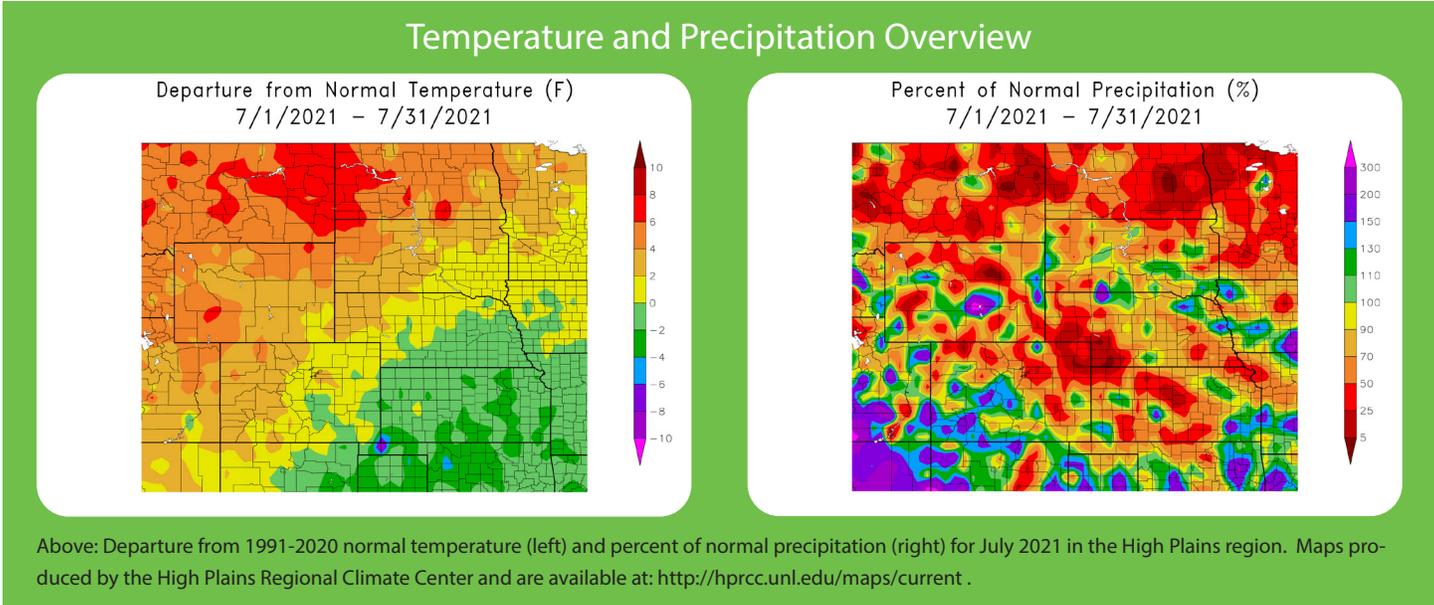


Drought Continues to Impact the Region

Drought continued to expand and intensify in western and northern parts of the region, with warm and dry conditions leading to numerous impacts. Several crops, along with pastures and rangeland were faring poorly, especially across North Dakota, South Dakota, and Wyoming. For example, according to the USDA National Agricultural Statistics Service, this year's spring wheat crop has been severely impacted by the drought, coming in as the worst-rated crop since 1988, nationally. In the High Plains, as of July 25th, 69 percent of South Dakota's spring wheat crop was rated poor to very poor, while 61 percent of North Dakota's spring wheat crop was rated poor to very poor. Meanwhile, pasture and range conditions were also in very rough shape, with 85 percent rated in poor to very poor condition in North Dakota and 72 percent rated poor to very poor in South Dakota.

Even drought outside of the High Plains region has had impacts here. Large wildfires burning in areas of California, Idaho, Nevada, Oregon, and Washington have brought smoky skies and poor air quality to parts of the region and beyond this month. Many who are sensitive to the impacts of poor air quality were advised to take precautions during this time.

One area of the region that has had recent improvements in drought is Colorado. But, the longer-term impacts of drought and last year's historic wildfire season are still being realized. Flooding in burn scar areas has become quite an issue this summer, especially with the increase in monsoonal moisture. For instance, according to Colorado Public Radio, I-70 in the Glenwood Canyon area has been closed nearly 10 times due to mudslides this summer. At the end of July, a mudslide closed the interstate yet again, trapping travelers until it was safe to leave. Many even stayed on the interstate overnight. The damage from these mudslides was so extensive that Governor Polis planned to issue a state disaster declaration, in addition to requesting a federal disaster declaration. Parts of the interstate could be closed for weeks or longer.

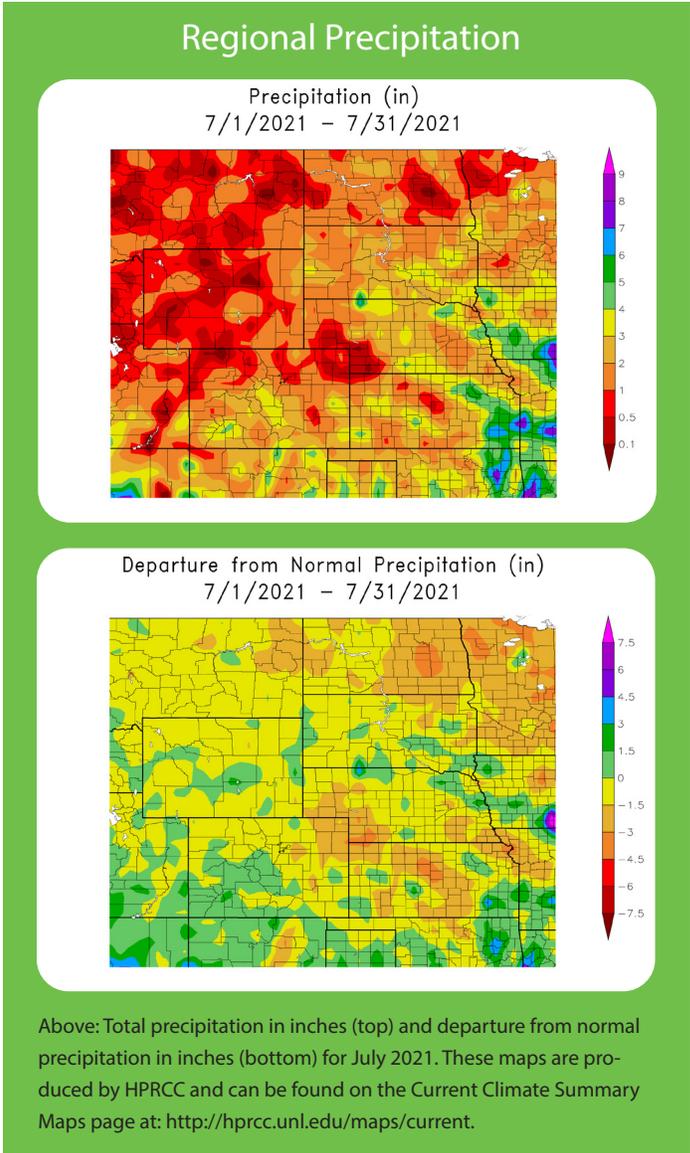


Precipitation

July was a dry month for much of the High Plains, except for several isolated pockets of above-normal precipitation. This contrast in precipitation was especially pronounced in Colorado. For instance, Pueblo, CO had its 3rd wettest July on record with 5.27 inches (134 mm), while Denver had its 9th driest July with only 0.34 inches (9 mm) (Pueblo period of record 1888–present; Denver period of record 1872–present).

Portions of the Northern Plains continued to be crippled by drought. North Dakota was especially dry with the majority of the state receiving less than 50 percent of normal precipitation. This led to many locations ranking in the top 10 driest Julys on record. For instance, Grand Forks had its driest July with a paltry 0.42 inches (11 mm) of precipitation (period of record 1893–present). This was 3.10 inches (79 mm) below normal. Just to the south, Fargo received only 22 percent of normal precipitation with 0.66 inches (17 mm). It is worth noting that, since January 1st, much of eastern North Dakota has received less than 50 percent of normal precipitation. Elsewhere in the High Plains, several areas received no more than 25 percent of normal precipitation. This included north-central Wyoming, eastern Colorado, and central Kansas. The tri-state area of Colorado, Nebraska, and Kansas was also very dry for the month of July, with no relief likely in the near future.

With peak severe weather season over for most of the High Plains, every state except for Colorado was below 50 percent of their yearly total for tornadoes, according to the Storm Prediction Center. To further emphasize how quiet of a severe weather season it has been for the region, several states have had their lowest year-to-date number of severe weather warnings since the 1990s (based on data going back to 1986). South Dakota and Nebraska both have the lowest number of severe weather warnings (thunderstorm and tornado warnings) since 1995. Kansas has been especially quiet, with the lowest number of warnings since 1990. Despite this overall slow month, a storm on the 9th of July did pack a punch across Nebraska. In the western part of the state, a 4.25-inch (11 cm) hailstone fell outside of Hemingford. Meanwhile, winds ravaged the eastern part of the state causing large swaths of damage. The Storm Prediction Center had multiple reports of 80 mile per hour (129 km/h) plus winds, with an impressive 96 mile per hour (155 km/h) wind gust recorded at Eppley Airfield in Omaha.



Streamflow Update

Generally, streamflows were below normal to much below normal within drought-stricken areas of the region, with record low flows reported in isolated areas of northwestern Colorado, northwestern and south-central Wyoming, western North Dakota, and southwestern Nebraska. In mid-July, the Bureau of Reclamation announced that, for the first time, emergency releases of water from reservoirs in the region will be required to help meet the needs for hydroelectric power at Glen Canyon Dam on Lake Powell in Arizona. These included the Flaming Gorge Reservoir on the Green River in Wyoming and Utah, the Blue Mesa Reservoir on the Gunnison River in Colorado, and Navajo Lake on the San Juan River in New Mexico and Colorado. Other areas of the region had near to above-normal streamflows, with some areas of eastern Kansas, central Nebraska, and central Colorado having much above normal streamflows.

Temperatures

Temperatures varied across the region this month, with the dividing line between warmer and cooler areas stretching from south-central Colorado through northeastern Nebraska. Areas to the north and west of this line were above normal, while areas to the south were generally near to below normal. The highest departures in the region occurred across North Dakota, northwestern South Dakota, and northern and western Wyoming, where monthly average temperatures were 4.0-8.0 degrees F (2.2-4.4 degrees C) above normal. These above-normal temperatures led to many locations ranking in the top 10 warmest Julys on record (see page 6 for more details). For instance, Bismarck, ND had an average temperature of 78.8 degrees F (26.0 degrees C), which was 7.5 degrees F (4.2 degrees C) above normal. Despite this large departure, this month's temperature was a distant second to the record of 83.3 degrees F (28.5 degrees C) that occurred during the Dust Bowl year of 1936 (period of record 1874-present). Extreme heat was a common occurrence this month in Bismarck with 7 days at or above 100.0 degrees F (37.8 degrees C). This tied for the second most 100.0 degrees F (37.8 degrees C) on record for any month. The record of 12 days occurred in July 1936 as well.

It is also worth noting that many daily records were set across the region this month. The most notable record occurred on July 9th, when Grand Junction, CO had its highest temperature ever at 107.0 degrees F (41.7 degrees C). This new record was just slightly higher than the previous record of 106.0 degrees F (41.1 degrees C) that was set on July 21, 2005 (period of record 1893-present).

Drought Conditions

Although there were some minor improvements, overall, drought continued to expand and intensify across the High Plains region this month. According to the U.S. Drought Monitor, the area experiencing drought (D1-D4) increased slightly from about 55 percent to just over 57 percent. The area experiencing abnormally dry and drought conditions (D0-D4) also increased from approximately 68 percent to 72 percent.

U.S. Drought Monitor

**U.S. Drought Monitor
High Plains**

July 27, 2021
(Released Thursday, Jul. 29, 2021)
Valid 8 a.m. EDT

	Drought Conditions (Percent Area)				
	None	D0-D4	D1-D4	D2-D4	D3-D4
Current	28.07	71.93	57.34	43.19	21.94
Last Week (7/20/2021)	27.76	72.22	56.04	42.66	21.60
3 Months Ago (04/27/2021)	18.35	81.65	63.52	40.57	22.13
Start of Calendar Year (1/1/2021)	3.82	96.18	82.46	50.36	27.09
Start of Water Year (06/01/2020)	6.73	93.27	62.11	36.56	16.16
One Year Ago (07/28/2020)	31.83	68.17	42.15	20.17	6.49

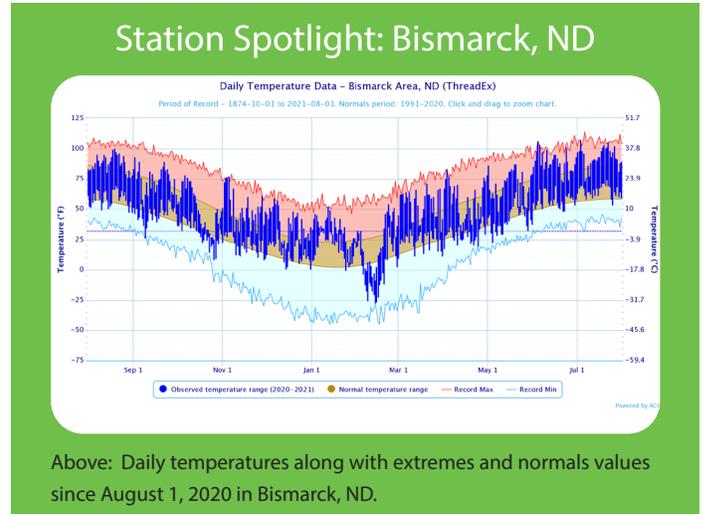
Intensity:

- 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>

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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/>.



Drought persisted across the Northern Plains this month with many impacts to agriculture and water resources. In North Dakota, despite some improvements in extreme (D3) and exceptional drought (D4), the entire state remained in drought from mid-June through the end of July. Meanwhile, South Dakota had a 5 percent increase in D3 and Wyoming had an expansion of severe drought (D2) along with D3 across southwestern and northern parts of the state. By the end of the month, about 93 percent of Wyoming was experiencing drought conditions, which was a 9 percent increase from the end of June.

Elsewhere, monsoonal rains helped to improve conditions in parts of southwestern Colorado, while recent dry conditions led to the development of drought in northwestern Kansas, as well as southwestern and south-central Nebraska. Throughout the rest of the region, other minor adjustments to drought conditions were made. According to the U.S. Monthly Drought Outlook for August, drought development is likely across much of Nebraska and pockets of South Dakota.

Climate Outlooks

According to the Climate Prediction Center, ENSO-neutral conditions continued this month. However, a transition to La Niña conditions could occur this fall and a La Niña Watch is in effect. For more information, see: <https://www.climate.gov/news-features/department/enso-blog>.

The National Weather Service’s long-range flood outlook through October indicates that the vast majority of locations in the region have a less than 50 percent chance of flooding. According to the National Interagency Fire Center (NIFC), above-normal wildland fire potential is expected across much of North Dakota, South Dakota, Wyoming, and northwestern portions of Colorado and Nebraska through October. The wildland fire potential is expected to return to normal across the region in November.

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

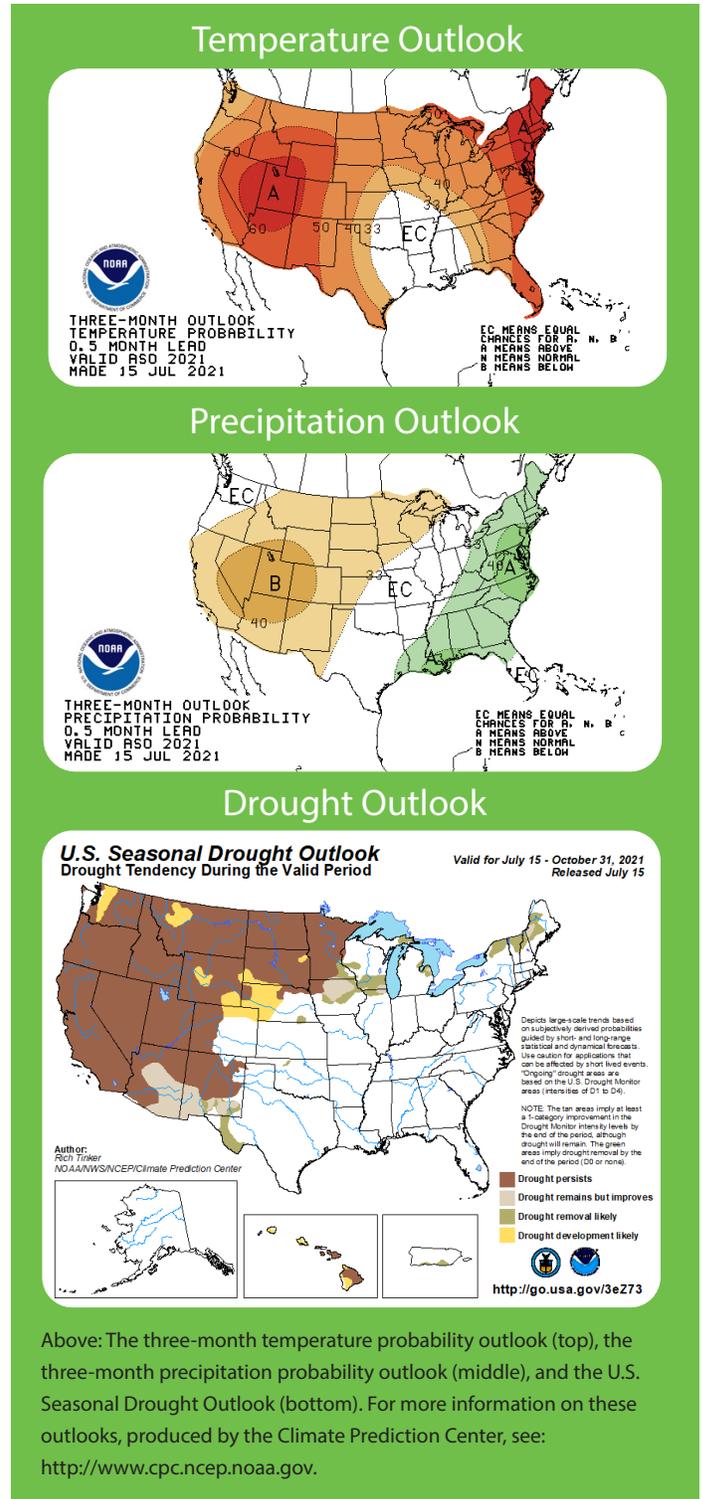
The temperature outlook for the next three months indicates increased chances of above-normal temperatures for the majority of the contiguous U.S. This includes most of the High Plains region, with the highest chances for above-normal temperatures across western portions of Colorado and Wyoming. There is an area in the south-central U.S. that has equal chances of above-, below-, and near-normal temperatures, which includes portions of southeastern Kansas. No areas have an increased chance for below-normal temperatures.

Precipitation

The precipitation outlook through October shows a higher probability of above-normal precipitation across portions of the Northeast, Midwest, and Southeast. Meanwhile, there are increased chances for below-normal precipitation across portions of the West, the Plains, and the Midwest. In the High Plains, this includes Colorado, Wyoming, North Dakota, South Dakota, the majority of Nebraska, and western Kansas. The highest chances for below-normal precipitation are in western parts of Colorado and Wyoming. Elsewhere, there are equal chances for above-, below-, and near-normal precipitation.

Drought

The July 15th U.S. Seasonal Drought Outlook indicates that drought is expected to persist or develop across much of the West and the Northern Plains over the next three months. In the High Plains, current drought conditions are largely expected to persist, with development likely across portions of western Nebraska, northeastern Colorado, and pockets of South Dakota and Wyoming. Drought may improve or be removed in portions of the Midwest, Northeast, Southwest, and the southern Plains. This includes a small area of drought in south-central Nebraska and extreme north-central Kansas.



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	90.7	60.7	75.7	1.2	101	7/08	55	7/11	0.42	-2.36	15
Alamosa San Luis Airport	85.5	50.0	67.7	2.4	94	7/10	43	7/27	1.14	0.10	110
Colorado Springs Municipal Airport	85.8	59.3	72.5	0.1	96	7/09	53	7/12	3.26	0.14	105
Denver International Airport	91.4	62.0	76.7	1.6	102	7/08	52	7/15	0.34	-1.80	16
Grand Junction Walker Field Airport	96.8	67.2	82.0	2.8	107	7/09	58	7/15	0.50	-0.09	85
Pueblo Memorial Airport	93.4	61.8	77.6	0.4	103	7/09	57	7/15+	5.27	3.38	279

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	90.2	67.5	78.9	0.0	102	7/09	59	7/13	3.66	-0.49	88
Dodge City Regional Airport	92.7	66.4	79.6	-0.5	101	7/09	54	7/12	2.51	-0.57	82
Goodland Renner Field	90.3	60.7	75.5	-0.6	101	7/09	50	7/12	1.62	-1.46	53
Topeka Municipal Airport	88.9	68.2	78.5	-1.3	100	7/29	61	7/13+	2.96	-1.03	74
Wichita Mid-Continent Airport	90.1	68.4	79.3	-2.2	100	7/31	60	7/12	1.15	-2.83	29

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	94.1	62.8	78.5	3.2	107	7/28	55	7/11	1.94	-0.05	98
Grand Island Airport	87.6	65.9	76.8	-0.2	98	7/28	57	7/12	2.85	-0.65	81
Lincoln Municipal Airport	88.4	65.3	76.8	-1.3	98	7/28	56	7/12	1.73	-1.52	53
Norfolk Karl Stefan Airfield	86.5	63.9	75.2	0.4	99	7/28	55	7/12	3.10	0.12	104
North Platte Regional Airport	89.4	63.5	76.4	0.8	102	7/28	52	7/12	2.60	-0.58	82
Omaha Eppley Airport	87.9	67.5	77.7	-0.4	99	7/28	57	7/12	4.44	0.89	125
Valentine Miller Field	92.4	65.1	78.7	3.0	105	7/28	53	7/11	3.03	0.21	107

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismarck Municipal Airport	93.0	64.6	78.8	7.5	107	7/03	53	7/25	1.56	-1.51	51
Fargo International Airport	86.6	62.9	74.8	4.1	96	7/23	55	7/29	0.66	-2.41	22
Grand Forks International Airport	86.6	59.3	73.0	4.1	96	7/23	52	7/10+	0.42	-3.10	12
Theodore Roosevelt Airport	89.5	59.8	74.6	5.2	103	7/03	52	7/13	1.91	-0.64	75
Williston International Airport	90.1	63.2	76.6	6.5	104	7/19	53	7/07	1.70	-0.84	67

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>.

July 2021 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	88.3	62.4	75.3	3.0	101	7/28	54	7/15	1.43	-1.66	46
Huron Regional Airport	87.4	63.2	75.3	1.6	106	7/28	54	7/11	2.57	-0.26	91
Pierre Regional Airport	92.1	64.0	78.0	3.1	108	7/27	56	7/15+	2.39	0.00	100
Rapid City Regional Airport	90.8	60.9	75.9	3.5	107	7/27	53	7/11	2.49	0.21	109
Sioux Falls Joe Foss Field Airport	86.8	64.4	75.6	1.2	101	7/28	56	7/12	4.90	1.65	151

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	91.0	55.4	73.2	2.2	100	7/27	49	7/11+	1.83	0.64	154
Cheyenne Municipal Airport	87.1	57.6	72.3	2.2	96	7/28	51	7/11	0.51	-1.60	24
Lander Hunt Field Airport	91.0	58.7	74.8	3.3	100	7/19	49	7/10	1.09	0.50	185
Laramie Regional Airport	83.2	51.3	67.2	2.4	93	7/09	45	7/11	1.83	0.49	137
Rawlins Municipal Airport	89.6	55.6	72.6	4.7	96	7/19	47	7/11+	0.84	0.12	117
Sheridan County Airport	94.1	57.1	75.6	4.9	107	7/27	50	7/15+	0.57	-0.50	53

July 2021 Highlights

Monthly Rankings

Temperature in degrees Fahrenheit, Precipitation in inches

Warmest	Temperature / Ranking	Record / Year	Period of Record
Bismarck, ND	78.8 / 2nd warmest	83.3 / 1936	1874-2021
Alamosa, CO	67.7 / 3rd warmest	68.4 / 2011	1906-2021
Williston, ND	76.6 / 3rd warmest	80.7 / 1936	1894-2021
Grand Junction, CO	82.0 / 4th warmest	84.1 / 2003	1893-2021
Mobridge, SD	78.5 / 5th warmest	86.9 / 1936	1911-2021
Sheridan, WY	75.6 / 5th warmest	77.9 / 1936	1907-2021
Cheyenne, WY	72.4 / 6th warmest	75.1 / 2003	1872-2021
Scottsbluff, NE	78.0 / 6th warmest	79.7 / 2012	1893-2021
Grand Forks, ND	73.0 / 7th warmest	79.3 / 1936	1893-2021
Lander, WY	74.8 / 7th warmest	75.9 / 2006+	1891-2021
Denver, CO	76.7 / 9th warmest	78.9 / 2012	1872-2021
Fargo, ND	74.8 / 9th warmest	80.2 / 1936	1881-2021
Wettest / Driest	Precipitation / Rankings	Record / Year	Period of Record
Pueblo, CO	5.27 / 3rd wettest	6.72 / 1895	1888-2021
Grand Forks, ND	0.42 / DRIEST	0.49 / 1989	1893-2021
Cheyenne, WY	0.50 / 5th driest	0.43 / 2008+	1871-2021
Denver, CO	0.34 / 9th driest	0.01 / 1901	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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