



August 2021 Climate Summary

Storm Clouds in Lincoln, NE. Photo courtesy Heleena Pettee
<http://hprcc.unl.edu>

Impacts Continue as Drought Conditions Persist

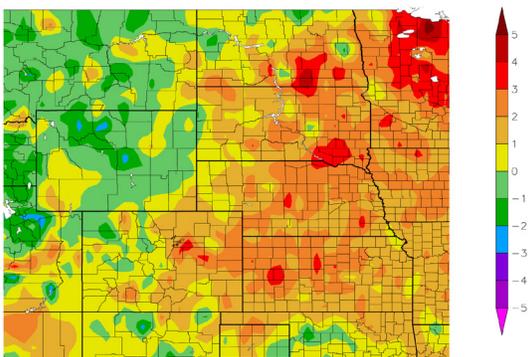
Drought conditions persisted across the region, as warm temperatures and minimal precipitation continued for August. This has led to several impacts across our region, most of which were observed in the Northern High Plains. Extreme heat and drought conditions have weakened beehives in North Dakota, a leader in U.S honey production. This has led to dwindling hive sizes and a decrease in honey production for the year. These effects have the potential to impact other areas in the U.S. Beehives from North Dakota are transported to California in winter months to help with almond tree pollination, and with reduced bee sizes there is the potential for less pollination.

Pastures and rangeland across Wyoming, North Dakota, and South Dakota continued to fare poorly. According to the USDA, 85 percent of pastures and rangeland in North Dakota, 83 percent in South Dakota, and 68 percent in Wyoming are in poor to very poor condition. Crops also continued to fare poorly in the region. In South Dakota, Spring Wheat ended the crop season with 75 percent in poor to very poor condition. Extreme heat has quickened the process of crop growth this season causing earlier than average maturation and harvest. Temperatures and lack of precipitation isn't the only thing impacting crop conditions: Grasshoppers, which have thrived in the warm, dry conditions, are causing major havoc on crops by eating them to the ground in some areas. This, along with low and poor quality stock ponds, has impacted cattle in the region causing many ranchers to sell their cattle.

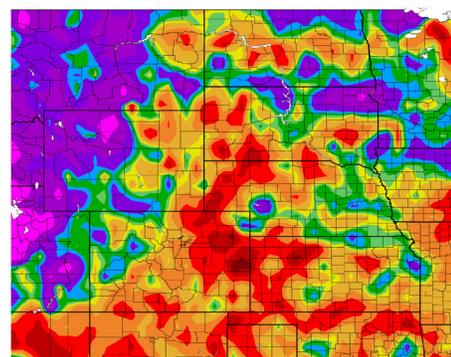
In the southern part of the High Plains, many areas entered drought conditions during the month. Portions of southwestern Nebraska, western Kansas and isolated pockets of eastern Colorado were in D0-D4 conditions at the end of August. It is also worth noting that some parts of the region did observe minor improvements in drought conditions throughout the month, however, not enough to create relief for those areas due to the extreme scope of the drought.

Temperature and Precipitation Overview

Departure from Normal Temperature (F)
8/1/2021 – 8/31/2021



Percent of Normal Precipitation (%)
8/1/2021 – 8/31/2021



Above: Departure from 1991-2020 normal temperature (left) and percent of normal precipitation (right) for August 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>.

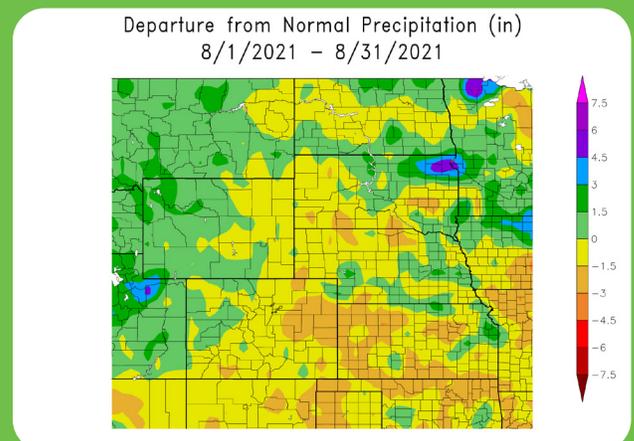
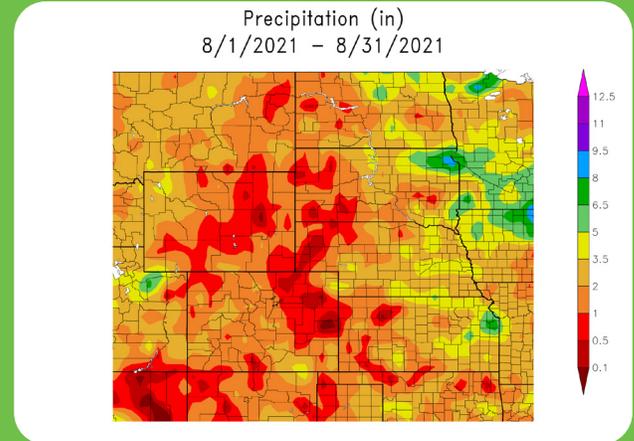
Precipitation

Dry conditions remained for much of the High Plains, barring several pockets of above-normal precipitation across the region. This precipitation disparity was observed in many states but most prominently in South Dakota. The northeast portion of South Dakota observed precipitation over 5 inches (127 mm) above normal ranking some areas in the top 10 wettest August on record. Sisseton, SD ranked the wettest August on record with 7.98 inches (202 mm), surpassing a previous record of 6.91 inches (176 mm) from 1964 by almost an inch (25 mm). Although Rapid City, SD did not set any new records for August, it is worth mentioning that it received well above normal precipitation for the month. Rapid City had 191 percent above normal precipitation totals, along with Aberdeen, SD (183 percent above normal), and Pierre, SD (136 percent above normal). This contrasted with the southwestern portion of the state which observed precipitation totals between 2 and 3 inches (51- 76 mm) below normal.

Above normal precipitation was also present in southeastern Nebraska, most of which came from an early August storm that brought torrential rains and high winds to the area. Omaha, NE experienced the greatest impacts from this thunderstorm. Winds at 60mph (96.5 km/h) and gusts up to 70mph (112.6 km/h) left thousands without power and businesses closed. Flash floods from heavy rains rushed through the streets, damaged roads, and stranded motorists. A group of people were stranded for a period in a parking garage elevator as water rushed in. They were all rescued, and no injuries were reported with the storm.

Outside of these isolated areas of above-normal precipitation, most of the region observed precipitation totals below normal for August. Most of Kansas, Colorado, Nebraska, and portions of North Dakota, South Dakota, and Wyoming had below-normal precipitation totals. These below normal conditions led to a new record in Alamosa, Colorado. Alamosa ranked as the driest August on record with 0.10 inches (2.5 mm) of precipitation for August. This lowered a previous record set in 1944 of 0.11 inches (2.7 mm). Colorado Springs observed its 4th driest August on record with 0.20 inches (5 mm) only reaching 7 percent of its normal precipitation for the month.

Regional Precipitation



Above: Total precipitation in inches (top) and departure from normal precipitation in inches (bottom) for August 2021. These maps are produced by HPRCC and can be found on the Current Climate Summary Maps page at: <http://hprcc.unl.edu/maps/current>.

Streamflow Update

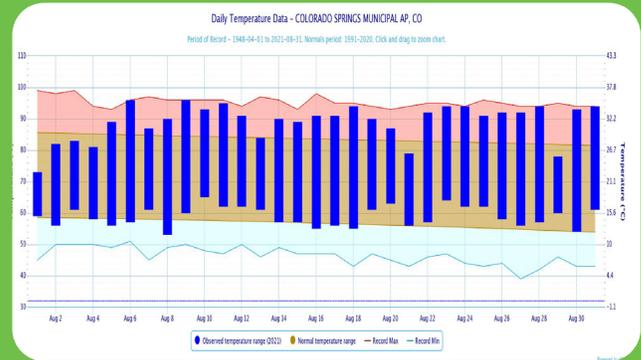
Streamflow across the region varied for the month. Localized precipitation in eastern and southwestern South Dakota has contributed to improvements in streamflow in those areas. Isolated areas of precipitation were also seen in North Dakota and Wyoming returning streamflow to normal for portions of the state. While some areas showed improvement, many areas in North Dakota, South Dakota, and Wyoming remained below normal to much below normal. In contrast to this, conditions remained the same for the southeast portion of the basin. The majority of the southeastern portion of the basin observed above normal to much above normal streamflow for the month.

Temperatures

Temperatures varied across the region for the month but remained above normal for most of the region. Most of Wyoming and Montana observed temperatures below normal, with isolated areas above normal. On the other hand, temperatures were above normal for Colorado, Nebraska, Kansas, North Dakota, and South Dakota. Areas with the highest departures in the region occurred in southeastern North Dakota, southeastern South Dakota, and small areas of Kansas and Colorado where the monthly averages were 3.0 to 5.0 degrees F (1.7-2.8 degrees C) above normal.

As a result of these above-normal temperatures, many locations ranked in the top 10 warmest August on record (see page 6 for monthly rankings). Colorado Springs, CO tied a record set in 2020 as the 2nd warmest August on record with an average temperature of 74.0 degrees F (23.3 degrees C), which was 3.9 degrees F (2.2 degrees C) above normal. Denver, CO also tied a record, set in 2020 and 2017, with an average temperature of 75.4 degrees F (24.1 degrees C) making it the 4th warmest August on record. Bismarck, ND, ranking at 7th warmest August on record, broke a new record during August. Bismarck reached its 15th day this year equal to or above 100 degrees F (37.8 degrees C). This set a record for 2021 as the year with the highest number of days equal to or above 100 degrees F (37.8 degrees C) for Bismarck, beating a previous record of 14 days set in 1936. These high temperatures, combined with lack of precipitation, for August continued to offer little relief for drought conditions as the extreme heat continued to take a toll on crops and wildlife in the region.

Station Spotlight: Colorado Springs, CO



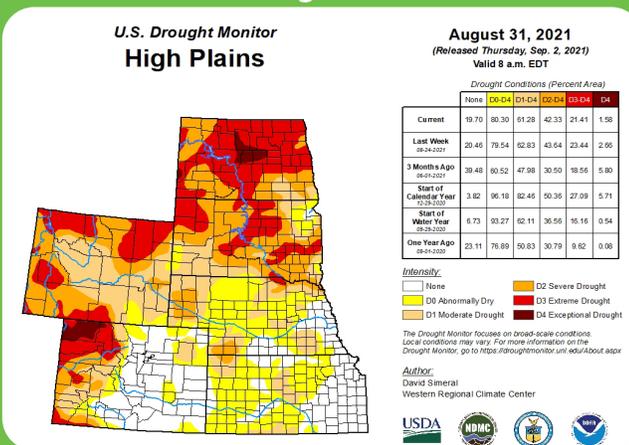
Above: Daily temperatures for August 2021 along with extremes and normals values in Colorado Springs, CO.

Denver, CO also tied a record, set in 2020 and 2017, with an average temperature of 75.4 degrees F (24.1 degrees C) making it the 4th warmest August on record. Bismarck, ND, ranking at 7th warmest August on record, broke a new record during August. Bismarck reached its 15th day this year equal to or above 100 degrees F (37.8 degrees C). This set a record for 2021 as the year with the highest number of days equal to or above 100 degrees F (37.8 degrees C) for Bismarck, beating a previous record of 14 days set in 1936. These high temperatures, combined with lack of precipitation, for August continued to offer little relief for drought conditions as the extreme heat continued to take a toll on crops and wildlife in the region.

Drought Conditions

Drought continued to expand across the High Plains this month, despite improvements. The areas experiencing drought (D1-D4) increased from 57 percent to just over 61 percent. Areas that are experiencing abnormally dry and drought conditions (D0-D4) increased from 74 percent to 80 percent.

U.S. Drought Monitor



The U.S. Drought Monitor is produced as a joint effort of the U.S. Department of Agriculture (USDA), National Drought Mitigation Center, U.S. Department of Commerce, and the National Oceanic and Atmospheric Administration (NOAA). For current Drought Monitor information, please see: <http://droughtmonitor.unl.edu/>.

The drought that has gripped the North Plains continued through the month of August. Although exceptional drought (D4) was reduced in North Dakota, extreme drought (D3) expanded 4 percent across the state. Numerous impacts to agriculture and water resources were reported in the state, during the month of August. To the south, D3 expanded over 7 percent in South Dakota. Meanwhile, the western parts of Nebraska experienced an expansion of moderate (D1) and severe (D2) drought.

The monsoonal rains brought relief for the drought-stricken parts of western Colorado and southwestern Wyoming. D3-D4 was reduced by six and eight percent in Colorado and Wyoming, respectively. Despite relief in southwestern Wyoming, most of the state is experiencing D0-D4 conditions. Throughout the rest of the region, other minor adjustments were made. According to the U.S. Monthly Drought Outlook for September, drought development is likely in southern Kansas and parts of eastern Colorado.

Climate Outlooks

According to the Climate Prediction Center, ENSO-neutral conditions continued for the month of August. However, La Niña development is possible this fall, lasting throughout the winter, and a La Niña watch has been issued. 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 November indicates a less than 50 percent chance of river flooding for much of the region. According to the National Interagency Fire Center (NIFC), above-normal wildland fire potential is expected for most of Montana, North Dakota, South Dakota, and Wyoming, and a small portion of Nebraska and Colorado through October. The wildland fire potential is expected to return to normal 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 visit <http://www.cpc.ncep.noaa.gov>.

Temperature

The temperature outlook for the next three months shows an increased chance of above-normal temperatures for much of the contiguous United States. The highest chances for above-normal temperatures in the Northeastern and Southwestern portions of the United States. Most of the High Plains region has increased chances of above-normal temperatures, with a small portion of northcentral and northwestern North Dakota seeing equal chances of above-, below- and near-normal temperatures.

Precipitation

The precipitation outlook for the next three months indicates below-normal precipitation stretching northeast from portions of the Southwest into the High Plains. The highest chances of below-normal precipitation can be seen stretching from Arizona and western New Mexico, northeast into Utah, western Colorado, southern Wyoming, and even reaching western Nebraska and southwestern South Dakota. The remainder of the United States indicates equal chances of above-, below-, and near-normal precipitation with a small part of the Northwest showing below-normal precipitation.

Drought

The U.S Seasonal Drought Outlook released on August 19th indicates drought conditions are expected to persist in the Western U.S and Northern Plains over the next three months. While the Northern High Plains will see persistent drought conditions, areas of drought will likely develop in western Nebraska, northwestern Kansas, northeastern Colorado, and a small portion of southwest South Dakota.

Temperature Outlook

Precipitation Outlook

Drought Outlook

Valid for August 19 - November 30, 2021
Released August 19

Author: Adam Hartman
NOAA/NWS/NCEP/Climate Prediction Center

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).
NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

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	90.5	59.9	75.2	2.7	98	8/09+	52	8/20	0.38	-1.98	16
Alamosa San Luis Airport	84.2	45.1	64.7	1.5	88	8/06+	33	8/25	0.10	-1.19	8
Colorado Springs Municipal Airport	89.2	58.8	74.0	3.9	96	8/09+	53	8/08	0.20	-2.76	7
Denver International Airport	90.6	60.2	75.4	2.5	98	8/09	53	8/20	0.27	-1.31	17
Grand Junction Walker Field Airport	91.7	61.3	76.5	0.2	100	8/06	49	8/20	1.55	0.63	168
Pueblo Memorial Airport	93.4	59.4	76.4	1.6	100	8/28	54	8/31	1.23	-0.88	58

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	91.7	67.9	79.8	3.4	100	8/26+	56	8/02+	3.40	-0.09	97
Dodge City Regional Airport	94.3	65.6	80.0	1.9	105	8/24	54	8/02	1.22	-1.77	41
Goodland Renner Field	93.0	61.0	77.0	3.4	101	8/26+	56	8/21+	0.82	-2.24	27
Topeka Municipal Airport	89.5	68.8	79.2	1.3	97	8/11+	57	8/03	4.03	-0.52	89
Wichita Mid-Continent Airport	93.8	69.5	81.6	1.7	103	8/12	59	8/03	1.72	-2.58	40

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	92.0	55.3	73.6	0.8	105	8/17	43	8/29	0.78	-0.49	61
Grand Island Airport	87.6	65.0	76.3	1.7	96	8/09	55	8/02	4.53	1.33	142
Lincoln Municipal Airport	90.3	66.2	78.3	2.7	100	8/27+	54	8/03	3.41	0.09	101
Norfolk Karl Stefan Airfield	87.4	63.8	75.6	3.2	95	8/23+	52	8/02	3.75	0.25	107
North Platte Regional Airport	91.2	60.9	76.0	3.0	101	8/06	52	8/21	3.31	0.75	129
Omaha Eppley Airport	88.5	67.5	78.0	2.3	97	8/27+	57	8/14+	5.31	0.71	115
Valentine Miller Field	92.4	61.1	76.7	3.1	102	8/16	50	8/21	2.48	0.44	122

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismarck Municipal Airport	87.8	58.5	73.1	3.5	104	8/17	49	8/25+	1.07	-1.43	43
Fargo International Airport	84.1	59.8	72.0	3.2	96	8/18	46	8/13	2.85	0.25	109
Grand Forks International Airport	82.6	56.7	69.7	2.7	96	8/18	45	8/13	5.06	2.25	180
Theodore Roosevelt Airport	84.5	54.2	69.3	0.8	103	8/16	43	8/25	1.57	0.04	103
Williston International Airport	81.9	56.0	68.9	-0.01	100	8/15+	45	8/25	1.33	-0.24	85

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>.

August 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	87.0	58.9	73.0	3.3	97	8/18+	44	8/13	4.10	1.86	183
Huron Regional Airport	87.7	60.6	74.1	2.8	97	8/17	46	8/13	2.11	-0.48	81
Pierre Regional Airport	90.2	61.0	75.6	2.6	106	8/17	53	8/23	2.65	0.70	136
Rapid City Regional Airport	88.1	55.0	71.5	0.7	105	8/17	43	8/21	2.14	0.55	135
Sioux Falls Joe Foss Field Airport	83.9	63.7	73.8	2.3	90	8/17	56	8/21	6.37	3.03	191

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	86.4	50.0	68.2	-0.8	96	8/14	39	8/29+	0.94	0.15	119
Cheyenne Municipal Airport	85.4	54.5	69.9	1.8	93	8/09	31	8/31	0.48	-1.04	32
Lander Hunt Field Airport	84.9	53.0	68.9	-0.9	95	8/16+	44	8/29+	0.62	0.10	119
Laramie Regional Airport	80.4	46.4	63.4	0.6	87	8/17+	40	8/21	0.70	-0.44	61
Rawlins Municipal Airport	82.8	49.1	65.9	0.1	92	8/14	39	8/21	0.56	-0.17	77
Sheridan County Airport	86.4	50.9	68.6	-0.5	101	8/17	41	8/29+	0.90	0.19	127

August 2021 Highlights

Monthly Rankings

Temperature in degrees Fahrenheit, Precipitation in inches

Warmest	Temperature / Ranking	Record / Year	Period of Record
Colorado Springs, CO	74.0 / 2nd warmest (tie, 2020)	74.1 / 2011	1894-2021
Denver, CO	75.4 / 4th warmest (tie, 2019+)	77.0 / 2007+	1872-2021
Alamosa, CO	64.7 / 6th warmest (tie, 1995)	66.0 / 2011	1906-2021
Bismarck, ND	73.1 / 7th warmest (tie, 2020)	75.6 / 2003	1874-2021
Akron, CO	75.2 / 8th warmest (tie, 1970)	77.6 / 1937	1937-2021
Valentine, NE	76.7 / 8th warmest	78.7 / 1937	1889-2021
Wettest	Precipitation / Rankings	Record / Year	Period of Record
Sisseton, SD	7.98 / WETTEST	6.91 / 1964	1931-2021
Mobridge, SD	4.29 / 9th wettest	6.21 / 2007	1911-2021
Sioux Falls, SD	6.29 / 10th wettest	9.33 / 1932	1893-2021
Driest	Precipitation / Rankings	Record / Year	Period of Record
Alamosa, CO	0.10 / DRIEST	0.11 / 1944	1906-2021
Colorado Springs, CO	0.20 / 4th driest	0.12 / 2012	1894-2021

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>.

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

Author Information

For questions, comments, or suggestions, please contact:
Heleena Pettee or Gannon Rush
702 Hardin Hall, 3310 Holdrege Street
Lincoln, NE 68583-0997
402-472-8968
<https://hprcc.unl.edu/contact.php>

