



September 2023 Climate Summary

Flathead Lake near Polson, Montana, Photo Courtesy of Gannon Rush

Regional Breakdown

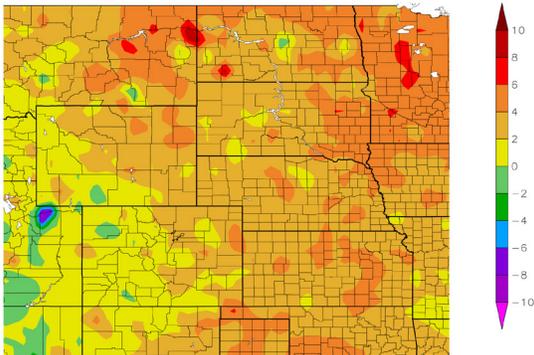
The region grappled with warmer temperatures and spotty precipitation this month, less than ideal conditions for agricultural producers. These conditions delayed harvesting in the region, while others are planting winter wheat on dry soils.

After another disappointing winter wheat crop this year, producers yet again started on the wrong foot. With very dry soil conditions, planting has been difficult. Farmers are planting deeper or planting at normal depth with hopes of precipitation.

Soybean and corn harvests have begun for many, with initial reports indicating a mixed bag of yields. Irrigated crops have reported slightly below-normal yields, while dryland yields varied widely in Kansas and Nebraska. The timing of planting this year also played a critical role in dryland corn yields, with much higher yields reported for those planted early.

Temperature and Precipitation Overview

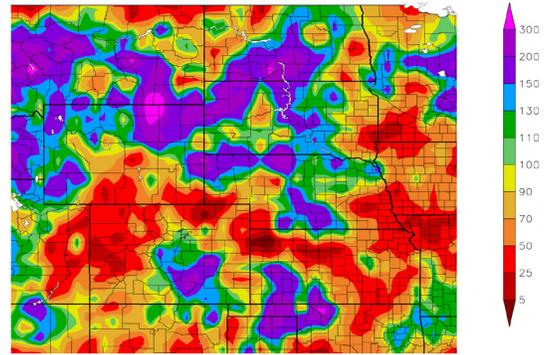
Departure from Normal Temperature (F)
9/1/2023 – 9/30/2023



Generated 10/10/2023 at HPRCC using provisional data.

NOAA Regional Climate Centers

Percent of Normal Precipitation (%)
9/1/2023 – 9/30/2023



Generated 10/10/2023 at HPRCC using provisional data.

NOAA Regional Climate Centers

Above: Departure from 1991-2020 normal temperature (left) and percent of normal precipitation (right) for September 2023 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 was spotty this month, with a sharp divide in distribution in some states. Southwestern Kansas greatly benefited from the moisture, while north of I-70 in northwestern Kansas received next to nothing. Wyoming continued to be wet, with some places up to 300 percent above their normal precipitation.

After a stretch of wet condition starting in April, northwestern Kansas had the faucet turned off. Goodland only had trace amount of precipitation, establishing their driest month on record. Nearby Colby only received 0.03 inches (0.76 mm) this month to rank 2nd driest, while just a mere 60 miles to the north and south both received well over 3 inches (7.62 cm) of precipitation.

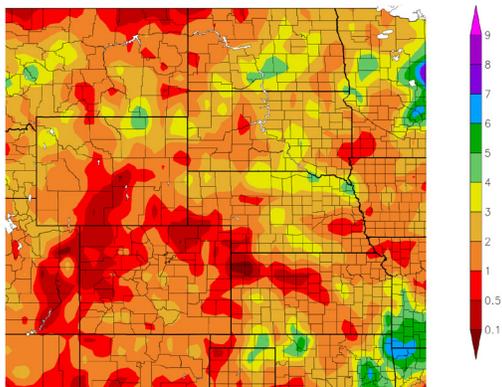
Parts of Wyoming continue to experience extreme wetness, with several locations on pace for their wettest year on record. In the western part of the state, Afton and Pinedale recorded their wettest January through September. In the central and eastern parts of the state, Shoshoni and Story also rank first respectively. Several other cities such as Casper, Cheyenne, and Rawlins are also in the top 10.

Severe weather remained active this month, particularly in southwestern Nebraska. On the 21st, an 81 mph (130 km/h) gust occurred near McCook, and a 4-inch (10.16 cm) hailstone fell near Lexington. Hail continued to be an issue in eastern Wyoming yet again, meanwhile, Colorado had no reports of severe weather according to the Storm Prediction Center.

Streamflow is in good to great shape across the western and northern parts of the region. Gauges are much above normal to record highs in the Dakotas and Wyoming. Eastern Kansas continues to grapple with drought, and it has been reflected in below normal streamflow.

Regional Precipitation

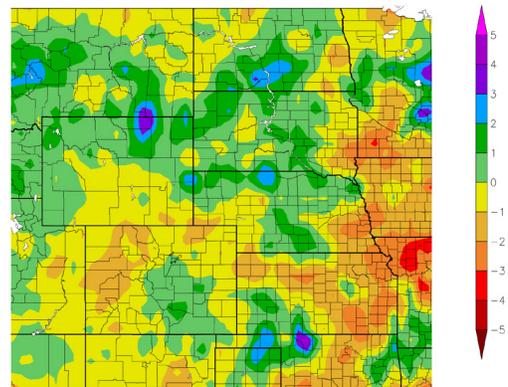
Precipitation (in)
9/1/2023 – 9/30/2023



Generated 10/10/2023 at HPRCC using provisional data.

NOAA Regional Climate Centers

Departure from Normal Precipitation (in)
9/1/2023 – 9/30/2023



Generated 10/10/2023 at HPRCC using provisional data.

NOAA Regional Climate Centers

Above: Total precipitation in inches (left) and departure from normal precipitation in inches (right) for September 2023. These maps are produced by HPRCC and can be found on the Current Climate Summary Maps page at: <http://hprcc.unl.edu/maps/current>.

Temperatures

Well-above-normal temperatures continued this month, with many locations in or just outside of their top 10 warmest September. Much of the region experienced 2 to 4 degrees F (1.1 to 2.2 degrees C) above normal and a very few locations reported below-normal temperatures.

Led by a scorching end to the month, numerous places ranked in the top 10 warmest category. The Dakotas were among the warmest, with Fargo, North Dakota observing their warmest month on record. The average temperature was 67 degrees F (19.4 degrees C), crushing the previous record of 65.6 degrees F (18.7 degrees C) set in 2015. Nearby Grand Forks, North Dakota as well as Sioux Falls, South Dakota ranked second, narrowly missing their respective records. Further ‘driving home the message’, every state in the region had locations reporting top 10 warmest temperatures during this month.

Drought Conditions

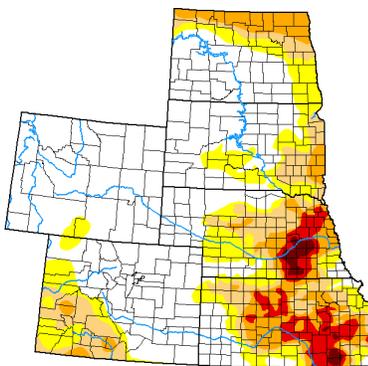
Drought conditions both improved and degraded across the region, with large changes in the eastern parts of Kansas and Nebraska. Overall, abnormally dry to exceptional drought (D0-D4) was reduced by nearly 1 percent in the High Plains.

After slow improvements in central Nebraska, D4 was rapidly expanded once again. Nearly 5 percent of the state is now under D4, and it includes the highest corn-producing county in the state. Conditions did finally improve in the central and western North Dakota, after above-normal precipitation. Elsewhere in the region, both localized improvements and degradations were observed.

U.S. Drought Monitor

U.S. Drought Monitor
High Plains

September 26, 2023
(Released Thursday, Sep. 28, 2023)
Valid 8 a.m. EDT



Intensity:
 None
 D0 Abnormally Dry
 D1 Moderate Drought
 D2 Severe Drought
 D3 Extreme Drought
 D4 Exceptional Drought

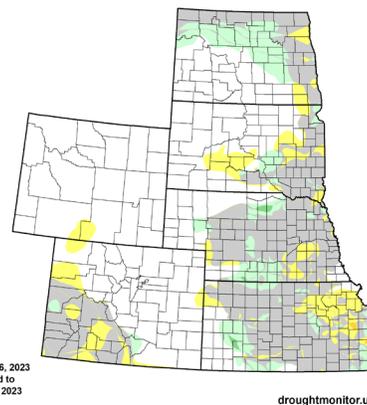
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <http://droughtmonitor.unl.edu/About.aspx>

Author:
Richard Heim
NCEI/NOAA



Drought Monitor 1-Month Change

U.S. Drought Monitor Class Change - High Plains Climate Region
4 Week



September 26, 2023
compared to
August 29, 2023



5 Class Degradation
 4 Class Degradation
 3 Class Degradation
 2 Class Degradation
 1 Class Degradation
 No Change
 1 Class Improvement
 2 Class Improvement
 3 Class Improvement
 4 Class Improvement
 5 Class Improvement

droughtmonitor.unl.edu

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/>.

September 2023 Climate Summary

Climate Outlooks

According to the Climate Prediction Center, an El Niño Advisory has been issued. For more information, visit https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/ens0-evolution-status-fcsts-web.pdf

The National Weather Service's long-range flood outlook indicates increased chances of Minor Flooding in central South Dakota. According to the National Interagency Fire Center (NIFC), fire potential will be limited across the region through January.

The seasonal temperature and precipitation outlooks presented 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

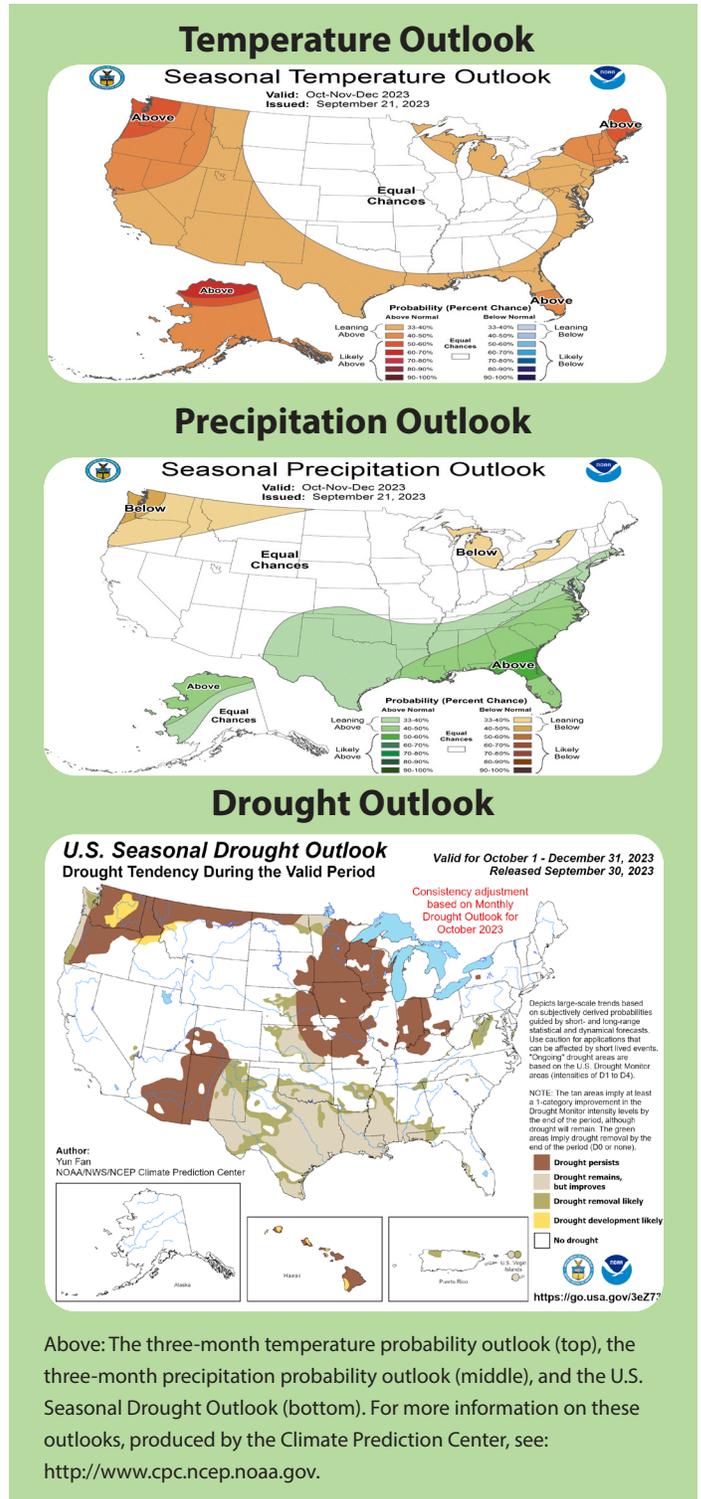
The three-month temperature outlook shows an increased chance of above-normal temperatures across the United States, except for the central states. Increased chances of above-normal temperatures are present in western Colorado and Wyoming.

Precipitation

The outlook for the next three months indicates below-normal precipitation in the Pacific Northwest and the Great Lakes, while above-normal precipitation is favored for the southeastern United States. Equal chances of above-, below-, or normal precipitation are present in the High Plains.

Drought

The U.S. Seasonal Drought Outlook released on September 30th indicates drought conditions will likely improve in Kansas, Nebraska, and northeast North Dakota.



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	82.0	51.5	66.9	2.8	100	09/01	41	09/23	1.80	0.56	145
Alamosa San Luis Airport	76.3	37.3	56.8	0.9	87	09/07	27	09/28	0.92	-0.06	94
Colorado Springs Municipal Airport	80.3	51.6	66.0	3.0	96	09/01	43	09/16	1.80	0.45	133
Denver International Airport	83.7	52.3	68.0	3.2	99	09/01	40	09/24	0.67	-0.68	50
Grand Junction Walker Field Airport	84.4	55.1	69.8	2.7	93	09/08	42	09/24	0.07	-1.12	6
Pueblo Memorial Airport	85.9	52.6	69.3	2.7	101	09/01	45	09/25	1.63	0.98	251

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	88.8	59.7	74.2	5.7	103	09/02	48	09/13	2.46	-0.34	88
Dodge City Regional Airport	88.0	59.0	73.5	3.5	105	09/04	49	09/24	2.74	1.43	209
Goodland Renner Field	85.3	51.7	68.5	3.2	100	09/02	40	09/24	T	-	-
Topeka Municipal Airport	88.8	58.8	73.8	4.6	101	09/04	49	09/13	1.20	-2.32	34
Wichita Mid-Continent Airport	88.9	63.0	76.0	4.3	99	09/04	54	09/26	1.18	-1.87	39

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	81.5	50.3	65.9	3.1	101	09/02	39	09/25	3.02	1.43	190
Grand Island Airport	84.9	57.0	70.9	4.3	101	09/02	46	09/17	1.55	-0.45	78
Lincoln Municipal Airport	85.9	56.6	71.3	4.1	98	09/03	45	09/17	0.60	-2.30	21
Norfolk Karl Stefan Airfield	83.2	55.6	69.4	5.0	101	09/02	43	09/12	2.20	-0.17	93
North Platte Regional Airport	83.8	50.0	66.9	2.7	102	09/02	40	09/25	1.67	0.06	104
Omaha Eppley Airport	84.0	57.7	70.9	3.3	97	09/03	46	09/17	1.35	-1.61	46
Valentine Miller Field	81.4	51.0	66.2	2.0	104	09/02	39	09/17	4.08	2.36	237

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismarck Municipal Airport	76.1	51.1	63.6	3.9	99	09/02	41	09/20	2.99	1.27	174
Fargo International Airport	79.1	55.0	67.0	7.0	97	09/03	40	09/17	2.21	-0.47	82
Grand Forks International Airport	76.9	50.4	63.7	5.8	97	09/02	36	09/12	2.60	0.34	115
Theodore Roosevelt Airport	74.5	47.7	61.1	2.6	95	09/02	37	09/16	2.28	0.66	141
Williston International Airport	75.1	51.1	63.1	5.1	95	09/02	43	09/15	1.13	-0.23	83

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>.

September 2023 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	78.3	52.6	65.5	4.6	98	09/04	39	09/17	3.17	1.18	159
Huron Regional Airport	81.3	53.4	67.3	4.7	103	09/03	38	09/17	2.02	-0.41	83
Pierre Regional Airport	79.9	52.4	66.2	2.6	103	09/03	41	09/16	3.72	1.98	214
Rapid City Regional Airport	79.8	49.1	64.5	3.2	103	09/02	42	09/25	0.99	-0.23	81
Sioux Falls Joe Foss Field Airport	82.6	56.4	69.5	5.7	101	09/02	44	09/17	0.51	-2.22	19

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	78.9	43.5	61.2	2.3	91	09/01	33	09/26	0.59	-0.36	62
Cheyenne Municipal Airport	77.9	48.8	63.4	3.8	92	09/01	40	09/24	0.42	-1.05	29
Lander Hunt Field Airport	77.4	47.6	62.5	2.9	88	09/01	36	09/23	0.56	-0.42	57
Laramie Regional Airport	73.9	40.0	57.0	2.7	87	09/01	31	09/26	0.31	-0.80	28
Rawlins Municipal Airport	75.3	41.2	58.3	1.8	86	09/01	29	09/26	0.51	-0.38	57
Sheridan County Airport	77.9	46.9	62.4	3.3	96	09/02	38	09/29	2.78	1.31	189

September 2023 Highlights

Monthly Rankings

Temperature in degrees Fahrenheit, Precipitation in inches

Precipitation	Precipitation/ Ranking	Record / Year	Period of Record
Valentine, Nebraska	4.08 / 4th Wettest	5.91 / 1973	1889-2023
Pierre, South Dakota	3.72 / 6th Wettest	6.95 / 1996	1893-2023
Chadron, Nebraska	3.02 / 10th Wettest	5.82 / 1986	1941-2023
Goodland, Kansas	Trace / Driest	0.01 / 1992 and 1922	1895-2023
Sioux Falls, South Dakota	0.51 / 8th Driest	0.20 / 2011	1893-2023
Grand Junction, Colorado	0.07 / 9th Driest (tied with 1968)	Trace / 2018+	1893-2023
Temperature	Temperature/ Ranking	Record / Year	Period of Record
Fargo, North Dakota	67.0 / Warmest	65.6 / 2015	1881-2023
Sioux Falls, South Dakota	69.5 / 2nd Warmest	69.9 / 1908	1893-2023
Grand Forks, North Dakota	63.7 / 2nd Warmest	64.2 / 2009	1893-2023
Concordia, Kansas	74.2 / 5th Warmest	77.6 / 1931	1885-2023
Aberdeen, South Dakota	65.6 / 6th Warmest	68.3 / 1931	1893-2023
Cheyenne, Wyoming	63.4 / 6th Warmest	64.7 / 2015	1871-2023
Norfolk, Nebraska	69.4 / 7th Warmest	70.5 / 1931	1893-2023

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

The screenshot shows the cover page of a report titled "Missouri River Basin Quarterly Climate Impacts and Outlook" for September-October 2014. It features a map of the basin, a table of contents, and several sections of text and graphics, including "Highlights for November and October 2014", "Regional - Impacts for September - November 2014", "Regional - Outlook for January - March 2015", and "MO River Basin Partners".

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

The screenshot shows a video player for a webinar titled "20141120 Monthly Climate and Drought Webinar". The video content displays a "Forecast Precipitation Amounts (7 day)" map of the Midwest and Great Plains regions, with a play button in the center.

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:
Gannon Rush
711 Hardin Hall, 3310 Holdrege Street
Lincoln, NE 68583-0997
402-472-8968
<https://hprcc.unl.edu/contact.php>

