



2022 Annual Climate Summary



Jackson Hole, Wyoming, Photo Courtesy of Gavin Rush

Regional Breakdown

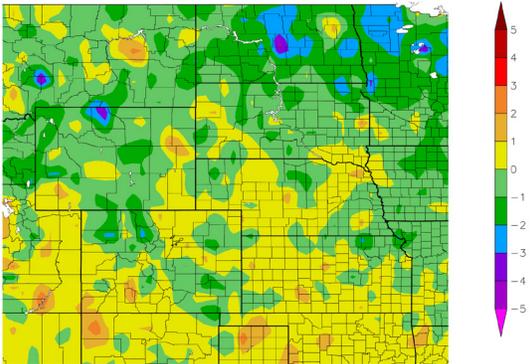
2022 was another year marked by dryness and extreme drought, with the worst conditions shifting from the northern to the southern part of the region. Drought conditions were improved in the Dakotas after near-record precipitation in April, finally offering relief from the conditions of 2021. While in Kansas and Nebraska, dryness dominated the entire year, and an extremely warm summer did no favors. Agriculture struggled in those states this year, with problems likely to linger into 2023. Streamflow was low throughout the region; however, mountain snowpack was slightly above normal at the end of the year, offering hope for some relief.

Notable precipitation and temperature records for the region in 2022 included:

- Cheyenne, Wyoming recorded their warmest summer on record. The average temperature was 70.6 degrees F (21.4 degrees C), breaking the previous record of 69.9 degrees F (21.1 degrees C) set in 2021 and 2020.
- Norfolk, Nebraska had its driest year on record with only 13.27 inches (337.06 mm) of precipitation and recorded its lowest calendar year snowfall with 7.1 inches (180.34 mm) of snow.

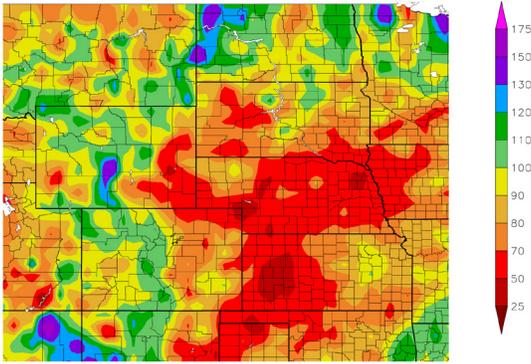
Temperature and Precipitation Overview

Departure from Normal Temperature (F)
1/1/2022 – 12/31/2022



Generated 1/20/2023 at HPRCC using provisional data. NOAA Regional Climate Centers

Percent of Normal Precipitation (%)
1/1/2022 – 12/31/2022



Generated 1/20/2023 at HPRCC using provisional data. NOAA Regional Climate Centers

Above: Departure from 1991-2020 normal temperature (left) and percent of normal precipitation (right) for 2022 in the High Plains region. Maps produced by the High Plains Regional Climate Center and are available at: <http://hprcc.unl.edu/maps/current>.

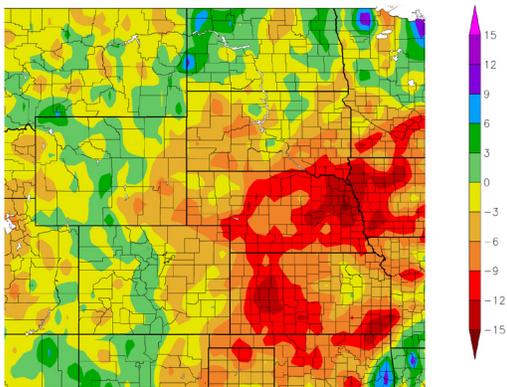
Precipitation and Water Resources

This was an extremely dry year for much of the region, with parts of Kansas and Nebraska observing their driest year on record. Late winter offered isolated pockets of above-normal precipitation, however, large-scale precipitation was not present until April. Several significant blizzards dumped up to 36 inches (914.4 mm) of snow in North Dakota and parts of South Dakota, leading to flooding along the Red River of the North. These wet conditions continued into May for the northern part of the region, while elsewhere conditions mostly remained dry. Precipitation throughout the region remained spotty at best through the end of the year. Numerous locations in the southern portions of the region ranked in the top 10 driest, with agricultural production significantly reduced this year. Wildfires and dust storms were also prevalent throughout the entire year in Kansas and Nebraska in response to the arid conditions.

The severe weather season was mostly quiet for the region, however, there were several notable events. In late April, a costly and destructive EF3 tornado touched down in Andover, Kansas destroying over 300 buildings. This well-documented tornado injured three people and caused almost \$41.5 million dollars in damage. Several weeks later, a powerful derecho formed in Nebraska on May 12th. Straightline winds exceeded 100 mph (161 km/h) in places, wreaking havoc as it crossed into South Dakota. With the areas impacted having been dry, large amounts of dust were lofted which resulted in a haboob accompanying the derecho. Hailstorms were an issue for Nebraska in late May and into June. Several destructive storms impacted the state, with two towns in Buffalo County seeing 90 to 100 percent of homes significantly damaged. During this unsettled period, a 6-inch (152.4 mm) wide hailstone fell in the north-central part of the state. This was near the state record of 7 inches (177.8 mm) that fell in Aurora in 2003.

Regional Precipitation

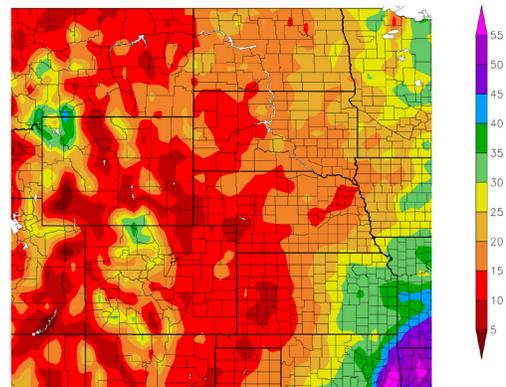
Departure from Normal Precipitation (in)
1/1/2022 – 12/31/2022



Generated 1/20/2023 at HPRCC using provisional data.

NOAA Regional Climate Centers

Precipitation (in)
1/1/2022 – 12/31/2022



Generated 1/20/2023 at HPRCC using provisional data.

NOAA Regional Climate Centers

Above: Total precipitation in inches (left) and departure from normal precipitation in inches (right) for 2022. 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

Temperatures across the region this year were slightly above or below normal. Most of the drought-stricken areas in the southern Plains were slightly above normal while cooler temperatures were present in the Dakotas and Wyoming. The year began cooler, before rapidly heating up during the summer. Multiple heat and cool outbreaks impacted the region, leading to numerous daily records being broken. One of these heatwaves occurred in May, leading to 720 records being broken. While an arctic cold air outbreak, combined with high winds, in late December led to wind chills plummeting to -40 degrees F (-40 degrees C) for much of the region.

Other Notable Temperature Records Included:

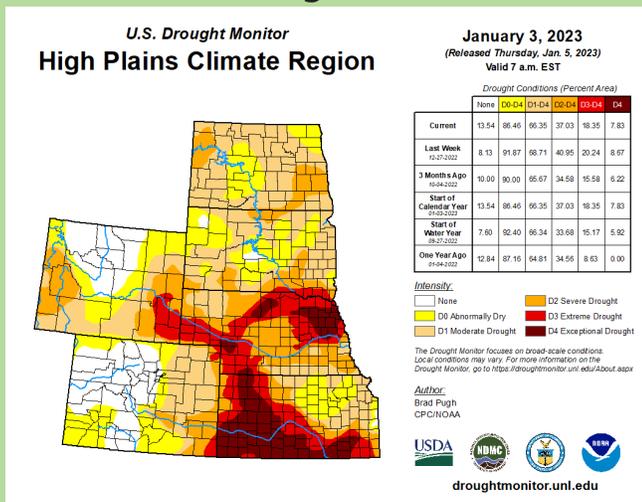
- Cheyenne, Wyoming observed its greatest 1-hour temperature drop on December 21. In 30 minutes, the temperature dropped 40 degrees F (22.2 degrees C), breaking the previous record of 37 degrees F (20.6 degrees C).
- Casper, Wyoming observed its lowest temperature on record of -42 degrees F (-41.1 degrees C) on December 22. The previous record of -41 degrees F (-40.6 degrees C) set on December 21, 1990.

Drought Conditions

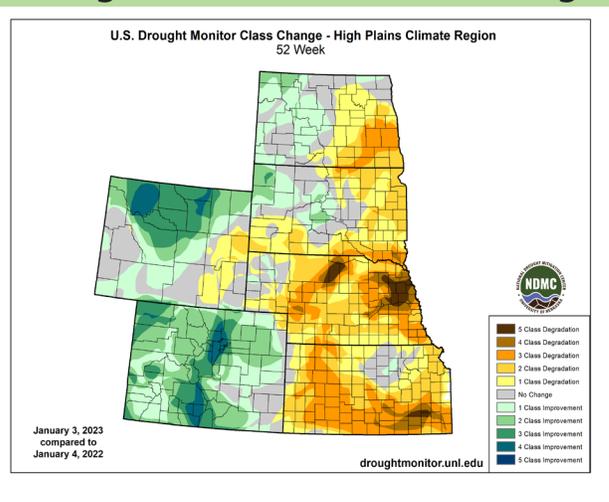
According to the U.S. Drought Monitor, overall drought coverage did not expand much but rather shifted and intensified. At the beginning of 2022, drought conditions were primarily in the western part of the region, compared to primarily in the eastern portions at the end of the year. Kansas and Nebraska were the two states that were most affected this year.

After starting 2022 as already dry, western Kansas was offered little relief. Conditions remained arid in that part of the state throughout the entire year, while the southern part of the state rapidly dried up during the summer. The situation in southern Kansas worsened so quickly that towns were unprepared, which led to water shortages. At the end of the year, 56 percent of Kansas was under extreme drought to exceptional drought (D3-D4) conditions, and 37 percent of the state was in D4. Agriculture was significantly affected, with all crops well below their average yields. The effects will linger in

U.S. Drought Monitor



Drought Monitor 12-Month Change



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/>.

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Notable Events

Winds Across the Region: The wind seemed to be constantly blowing during the winter and into the spring. Combined with the lack of moisture, numerous impacts were reported. Wildfires were a serious problem in the spring, due to low snowfall in places and still dry from the year before. While dust storms were prevalent throughout the entire year, with several deaths attributed to them. Cattle were also severely impacted, with respiratory issues reported due to dust inhalation.

December Arctic Outbreak: A vigorous and deadly cold front pushed through the region on December 21, bringing significant temperature drops. Combined with the ever-relentless winds, wind chills were -40 degrees F (-40 degrees C) for much of the region. Places dipped into wind chills within the -60 and -70 degrees F (-51.1 to 56.7 degrees C) range. While records would be hard to verify, many places likely reached their lowest wind chills ever observed.

May 12 Derecho: A large and record-setting derecho formed in central Nebraska and moved into South Dakota. Due to the dry soils in Nebraska, large amounts of dust were lofted, creating a haboob on the edge of the derecho. A total of 32 tornadoes occurred with this event and nearly 1.3 billion dollars in damage. It is also notable for the number of significant wind gusts (75 mph or 120 km/h) reported from one continuous storm. There was a total of 68 reports, which surpassed the previous record of 64 during the December 15, 2021, derecho in the central Plains.

Drought in Kansas and Nebraska: Drought conditions rapidly deteriorated in both states after an arid winter and spring. Well-below-normal snowfall led to dry soils in the spring, which impacted planting. All crops were tremendously impacted, with drought-tolerant sorghum unable to form heads for harvest. Pasture conditions reached such poor levels that cattle herds were heavily culled. A heatwave in June reportedly led to the death of thousands of cattle in southwestern Kansas. Water resources became an issue over the summer, with irrigation use reduced by 25 percent in places and towns declaring water rationing.

Wildfires: Numerous fires occurred across Kansas and Nebraska this year resulting from the drought. Several towns were evacuated due to the large and uncontrolled fires in the spring and fall. The dangerous fires led to several deaths in Nebraska.



Top: Struggling corn in western Kansas (credit Kevin Rush)

Middle: Aftermath of the Holiday fire in central South Dakota in the fall of 2022 (credit David Martin)

Bottom: Decimated corn in central Nebraska after a wind-driven hail-storm (credit Grant Bonifas)

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	64.6	35.6	50.1	-0.1	104	07/18	-19	12/23	10.9	-4.49	71
Alamosa San Luis Airport	62.0	24.0	43.0	0.7	92	06/11	-27	02/04	9.97	2.58	135
Colorado Springs Municipal Airport	65.6	37.1	51.3	0.8	100	07/23	-10	12/22	13.49	-2.42	85
Denver International Airport	66.0	36.7	51.4	0.2	101	08/05	-24	12/22	11.92	-2.56	82
Grand Junction Walker Field Airport	66.6	40.6	53.6	0.4	103	07/22	-2	01/03	9.33	0.27	103
Pueblo Memorial Airport	70.6	35.7	53.2	-0.1	108	07/23	-15	12/22	9.39	-2.63	78

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	68.4	43.0	55.7	1.6	105	8/13	-9	12/22	21.66	-6.72	76
Dodge City Regional Airport	71.3	41.4	56.4	0.4	109	7/19	-8	12/22	11.80	-10.20	54
Goodland Renner Field	67.8	36.4	52.1	0.4	107	7/23	-17	12/22	11.11	-7.98	58
Topeka Municipal Airport	68.7	44.0	56.3	0.5	103	7/23	-4	12/22	32.23	-4.30	88
Wichita Mid-Continent Airport	70.7	45.3	58.0	0.3	107	7/19	-5	12/22	30.53	-3.78	89

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	64.1	32.4	48.2	0.1	111	7/18	-17	12/21	12.59	-2.63	83
Grand Island Airport	65.9	39.1	52.5	0.7	103	7/23	-15	12/22	15.20	-11.41	57
Lincoln Municipal Airport	66.1	38.8	52.5	0.0	103	9/20	-13	12/22	19.92	-9.42	68
Norfolk Karl Stefan Airfield	63.9	37.0	50.5	1.3	102	8/2	-18	12/22	13.27	-13.74	49
North Platte Regional Airport	67.3	34.4	50.9	1.0	108	6/13	-20	01/02	14.23	-6.85	68
Omaha Eppley Airport	63.8	39.8	51.8	-0.6	101	8/2	-14	12/22	22.54	-9.32	71
Valentine Miller Field	64.1	33.7	48.9	-0.2	109	08/02	-19	12/22	13.15	-7.75	63

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismarck Municipal Airport	54.8	30.2	42.5	-0.6	103	08/04	-23	02/23	17.33	-1.72	91
Fargo International Airport	50.2	29.3	39.7	-2.5	101	06/19	-28	01/07	21.42	-2.54	89
Grand Forks International Airport	49.1	27.3	38.2	-1.6	100	06/19	-37	01/01	23.32	1.58	107
Theodore Roosevelt Airport	53.8	29.4	41.6	-1.2	102	08/04	-25	12/21	11.37	-4.26	73
Williston International Airport	51.5	29.6	40.6	-1.1	101	08/04	-30	01/06	15.34	0.23	102

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	56.1	31.1	43.6	0.4	101	06/19	-22	02/23	21.13	-0.69	97
Huron Regional Airport	58.3	32.9	45.6	-0.3	105	06/29	-19	12/22	20.88	-2.44	90
Pierre Regional Airport	60.1	33.4	46.8	-0.2	109	08/05	-18	02/23	20.55	0.35	102
Rapid City Regional Airport	60.9	31.8	46.3	-0.4	105	07/18	-18	12/22	16.10	-1.34	92
Sioux Falls Joe Foss Field Airport	59.1	35.8	47.5	0.1	105	08/02	-18	12/22	24.81	-3.04	89

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	59.2	29.6	44.4	-1.2	101	08/10	-42	12/22	13.36	1.14	109
Cheyenne Municipal Airport	60.7	34.1	47.4	0.5	99	07/18	-25	12/22	9.47	-5.94	61
Lander Hunt Field Airport	59.0	31.5	45.2	0.1	100	07/17	-32	12/22	13.92	0.69	105
Laramie Regional Airport	55.5	27.5	41.5	0.1	91	07/18	-24	12/22	6.38	-4.14	61
Rawlins Municipal Airport	57.0	29.7	43.4	0.3	96	08/10	-25	12/22	6.61	-2.43	73
Sheridan County Airport	60.3	30.7	45.5	0.1	104	09/07	-23	12/23	15.48	0.55	104

Annual 2022 Highlights

Monthly Rankings

Temperature in degrees Fahrenheit, Precipitation in inches

Temperature	Temperature / Ranking	Record / Year	Period of Record
Colorado Springs, Colorado	51.3 / 9th Warmest (tied with 1981)	52.9 / 2012	1894-2022
Precipitation			
Precipitation	Precipitation/ Ranking	Record / Year	Period of Record
Norfolk, Nebraska	13.27 / Driest	13.8 / 1894	1893-2022
Hastings, Nebraska	16.08 / 2nd Driest	15.39 / 1934	1894-2022
McCook, Nebraska	10.39 / 4th Driest	9.34 / 1910	1894-2022
Laramie, Wyoming	6.38 / 4th Driest	5.4 / 2002	1948-2022
Akron, Colorado	10.9 / 9th Driest	7.81 / 2002	1937-2022
Cheyenne, Wyoming	9.47 / 9th Driest	5.04 / 1876	1871-2022
Dodge City, Kansas	11.80 / 9th Driest	9.97 / 1956	1874-2022
Grand Island, Nebraska	15.20 / 9th Driest	11.55 / 2012	1895-2022
Goodland, Kansas	11.09 / 9th Driest	9.19 / 1956	1895-2022
Snowfall			
Snowfall	Snowfall/ Ranking	Record / Year	Period of Record
Norfolk, Nebraska	7.1 / Lowest Snowfall	12.7 / 1967	1893-2022
Lincoln, Nebraska	5.9 / 2nd Lowest Snowfall	4.7 / 1954	1897-2022
Hastings, Nebraska	10.8 / 5th Lowest Snowfall	8.9 / 1929	1894-2022
Bismarck, North Dakota	86.7 / 3rd Snowiest	103.1 / 1996	1886-2022

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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

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. Key sections include "National - Significant Events for September - November 2014", "Regional - Impacts for September - November 2014", "Regional - Climate Overview for September - November 2014", "Drought Co-Occurrence", "3 Month Precipitation and Temperature Outlooks", and "Soil Moisture Conditions".

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 main content is a map titled "Forecast Precipitation Amounts (7 day)" showing precipitation forecasts for the Midwest and Great Plains regions. The map uses a color scale from blue (low) to red (high). A play button is visible in the center of the map.

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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