August 2020 Climate Summary

Smoky skies near Lincoln, NE. Photo courtesy Natalie Umphlett.

http://hprcc.unl.edu

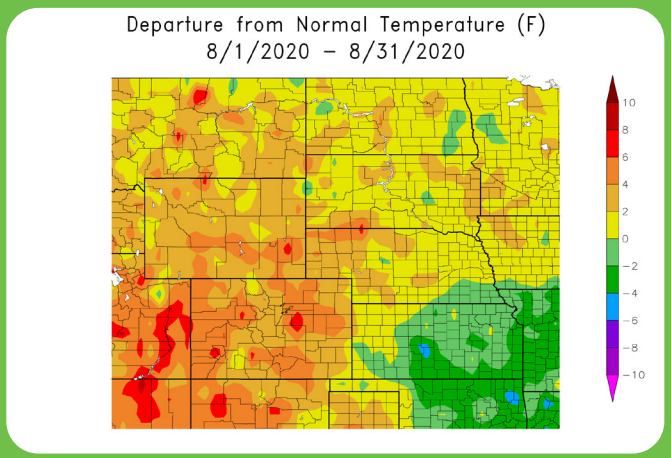
Dry Conditions Prevailed

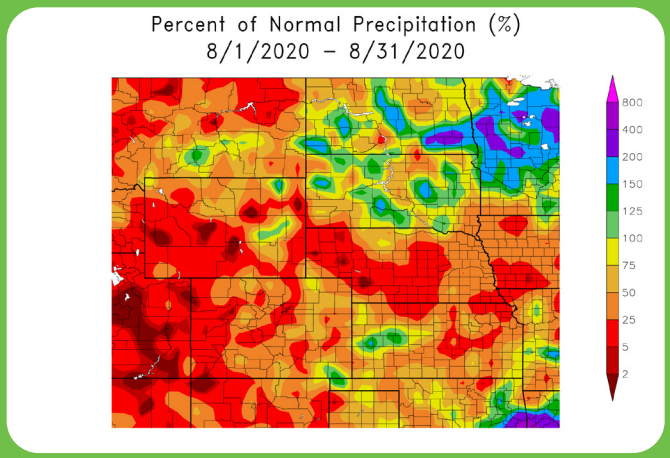
Hot, dry conditions caused drought to expand and intensify across much of the High Plains. By the end of August, almost 50 percent of the region was experiencing drought (D1-D4). These conditions helped fuel several wildfires, especially across Colorado, Wyoming, and western areas of South Dakota and Nebraska. Fires affected many areas of Colorado, forcing evacuations, closing roads, and impacting air quality. One such fire was the Pine Gulch Fire, located north of Grand Junction, in the western part of the state. Triggered by lightning at the end of July, this fire grew to be Colorado's largest fire in recorded history, surpassing the 2002 Hayman Fire, with over 139,000 acres burned. As of September 4th, according to InciWeb, the Pine Gulch Fire was 87 percent contained.

These conditions have also continued to impact agriculture. According to the August 31 USDA Weekly Weather and Crop Bulletin, the percent of pastureland rated poor to very poor was 73 percent in Wyoming and 57 percent in Colorado. Local reports indicated that some livestock producers were having to haul water and provide supplemental feed. Some producers were selling calves early as well. Crops were also impacted, particularly in Colorado, where 44 percent of corn was rated poor to very poor. However, corn and soybeans were faring well in the rest of the region. In fact, according to the USDA National Agricultural Statistics Service, soybean yields could hit record levels in Nebraska and South Dakota, while corn yields could set a new record in South Dakota.

In addition to drought impacting the region this month, severe storms that initiated in the High Plains tracked eastward and caused significant damage in the Midwest. On the morning of the 10th, a cluster of storms that formed along the southeastern South Dakota-Nebraska border evolved into a derecho, causing substantial damage to cities, towns, farmland, and other infrastructure, especially in central Iowa. According to the Storm Prediction Center, the storm tracked about 770 miles from South Dakota to Ohio in just 14 hours. Damages were still being determined at the time of this writing.

Temperature and Precipitation Overview



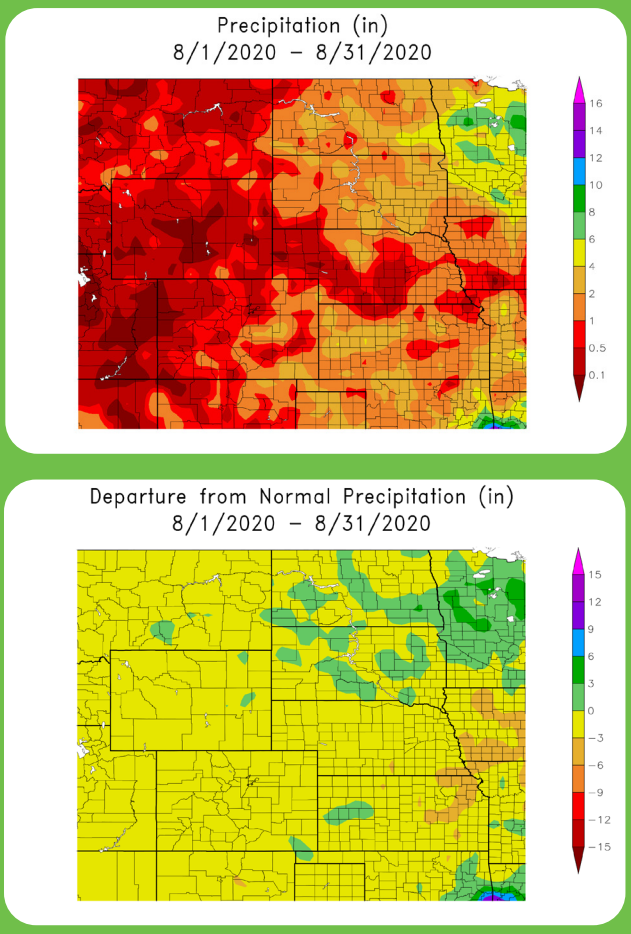


Above: Departure from 1981-2010 normal temperature (left) and percent of normal precipitation (right) for August 2020 in the High Plains region. Maps produced by the High Plains Regional Climate Center and are available at: http://hprcc.unl.edu/maps/current .

Precipitation

August was a dry month for much of the High Plains. The majority of the region had below-normal precipitation, with only a few isolated areas observing above-normal precipitation. The driest areas of the region, which were portions of Colorado, Wyoming, and Nebraska, received less than 25 percent of normal precipitation. A few isolated areas received less than 2 percent of normal precipitation. These conditions, combined with above-normal temperatures, led to further development and intensification of drought conditions in these areas. In fact, by the end of August, over 98 percent of Colorado, and nearly three-quarters of Wyoming, were experiencing drought. Additionally, many locations ranked in the top 10 driest Augusts on record. Some of those locations included: Scottsbluff, NE (2nd driest); Rawlins, WY (2nd driest); Grand Island, NE (3rd driest); Cheyenne, WY (4th driest); and Alamosa, CO (6th driest). There were also several locations that ranked in the top 10 driest summers on record, including Casper, WY (driest); Rawlins, WY (driest); Scottsbluff, NE (3rd driest); Omaha, NE (4th driest); and Lander, WY (7th driest). Casper, WY received only 0.37 inches (9 mm), which broke the previous record of 0.39 inches (10 mm) in the summer of 1971 (period of record 1939-2020). Meanwhile, Rawlins, WY only picked up 0.18 inches (5 mm), which broke the previous record of 0.33 inches (8 mm) in the summer of 2016 (period of record 1951-2020).

Regional Precipitation



Above: Total precipitation in inches (top) and departure from normal precipitation in inches (bottom) for August 2020. These maps are produced by HPRCC and can be found on the Current Climate Summary Maps page at: http://hprcc.unl.edu/maps/current.

Although many locations were dry, there were a few spots in the High Plains region that did receive above-normal precipitation in August. These areas were primarily confined to portions of North Dakota and South Dakota, with precipitation amounts of 125-150 percent of normal. However, precipitation was at least 200 percent of normal in southeastern North Dakota. An isolated area of west-central Kansas also had above-normal precipitation, with totals up to about 150 percent of normal. While it did not improve drought conditions, this precipitation did help prevent further degradations in this area. Although August was not particularly wet for most locations, it was a wet summer, overall, for Grand Forks, ND. This location had its 7th wettest summer on record, picking up 15.01 inches (381 mm) of precipitation, the majority of which fell during June and July. The wettest summer took place in 1944, when Grand Forks received 18.84 inches (479 mm) of precipitation (period of record 1893-2020).

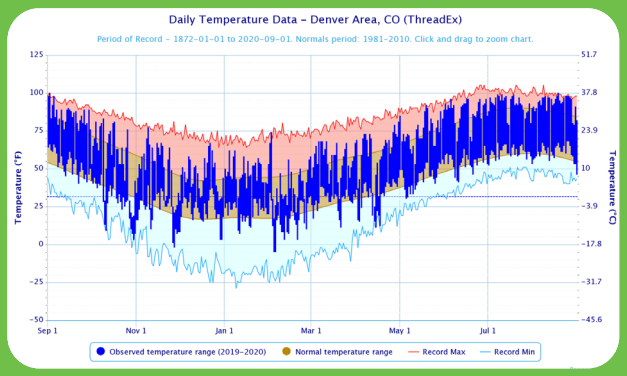
Streamflow Update

According to the USGS WaterWatch, streamflows continued to vary across the region. Not surprisingly, areas of Colorado, southwestern Nebraska, and southern and western Wyoming had many locations where streamflows were below normal to much below normal. As drought conditions developed and/or persisted in these areas this summer, reservoirs, lakes, and ponds were also beginning to be impacted. For example, on August 24th, an emergency fish salvage began at the Jumbo Reservoir near Julesburg, Colorado, as the combination of drought and increased irrigation were expected to lower reservoir levels to a point that would endanger the entire fish stock. Meanwhile, above-normal to much above-normal streamflows were prevalent across northeastern Kansas, northern Nebraska, and eastern portions of the Dakotas.

Temperatures

Temperatures varied across the High Plains in August. Across western portions of the region, in places such as Colorado, Wyoming, and the panhandle of Nebraska, temperature departures were generally 2.0-6.0 degrees F (1.1-3.3 degrees C) above normal, with some isolated pockets up to 8.0 degrees F (4.4 degrees C) above normal. On the other side of the spectrum, temperature departures ranged from 2.0-4.0 degrees F (1.1-2.2 degrees C) below normal in southern and eastern Kansas. Elsewhere across the region, temperatures were generally near normal.

Station Spotlight: Denver, CO



Above: Daily temperatures along with extremes and normals values since September 1, 2019 in Denver, CO.

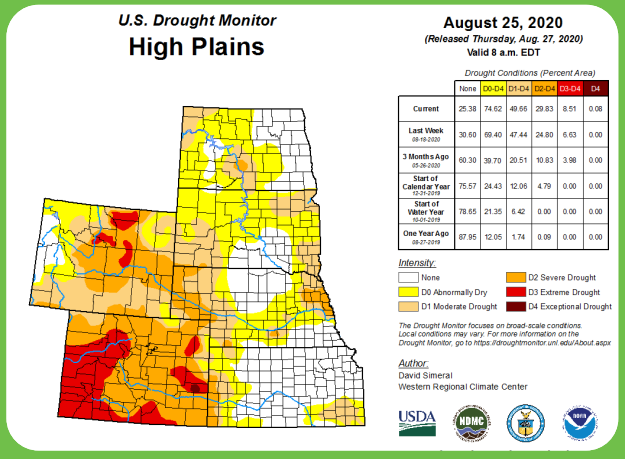
There were many locations that ranked in the top 10 warmest Augusts on record. Some of those locations included: Cheyenne, WY (warmest); Denver, CO (warmest); Rawlins, WY (2nd warmest); Colorado Springs, CO (2nd warmest); and Chadron, NE (3rd warmest). In addition to it being the warmest August on record, Denver, CO experienced other temperature records this month. According to the National Weather Service, Denver experienced 26 days at or above 90.0 degrees F (32.2 degrees C), and 17 days at or above 95.0 degrees F (35.0 degrees C), both of which were records for August. By the end of August, this brought the year-to-date number of days at or above 90.0 degrees F (32.2 degrees C) to 68 for Denver, which is just shy of the annual record of 73 days that occurred in 2012 (period of record 1872-2020).

For the summer season, Cheyenne, WY observed its warmest summer on record, with an average temperature of 69.9 degrees F (21.1 degrees C). This new record just slipped by the previous record, which occurred in 2012 with an average temperature of 69.8 degrees F (21.0 degrees C) (period of record 1872-2020).

Drought Conditions

This month, drought conditions expanded and intensified in portions of the High Plains, but there were other parts of the region that experienced improvements. According to the U.S. Drought Monitor, the area experiencing drought (D1-D4) in the region increased by approximately 7.5 percent between July 28th and August 25th.

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/.

A continuation of below-normal precipitation and above-normal temperatures in portions of Colorado, Wyoming, Nebraska, and the Dakotas led to worsening conditions in these areas. Exceptional drought conditions (D4) developed in a small area of eastern Colorado. Extreme drought conditions (D3) persisted over parts of north-central Wyoming throughout the month, with D3 conditions expanding across western Colorado. Severe drought (D2) was also introduced across central North Dakota and portions of Nebraska. D2 conditions also expanded across much of Colorado and southern Wyoming. Areas of moderate drought (D1) conditions were introduced to northwestern North Dakota and increased in coverage in portions of South Dakota and Wyoming. Abnormally dry conditions (D0) increased in coverage across portions of the High Plains region, including areas of Wyoming, Nebraska, North Dakota, and South Dakota.

Across Kansas, D2 conditions remained the same, however there were some improvements as D0 and D1 conditions both decreased in coverage from late July to the end of August.

Climate Outlooks

According to the Climate Prediction Center, ENSO-neutral conditions continued through August in the Pacific. There is about a 60 percent chance that a La Niña could develop this fall and continue through the winter (~55 percent chance). A La Niña Watch is in effect. For more information about ENSO, check out the ENSO blog here: https://www.climate.gov/news-features/department/enso-blog.

According to the National Weather Service's long-range flood outlook, there is a greater than 50 percent chance of minor flooding in only two locations in the High Plains region - the James River near Stratford, SD and Stranger Creek near Easton, KS. This is quite the change from earlier in the year! Meanwhile, above-normal wildland fire potential is expected across portions of Colorado and Wyoming through September, and across southern Kansas and southeastern Colorado in October and 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 September-November temperature outlook indicates an increased probability of above-normal temperatures for all of the contiguous U.S. This also includes the entire High Plains region. The highest probability of above-normal temperatures is across Colorado, western and central Kansas, and southern Wyoming.

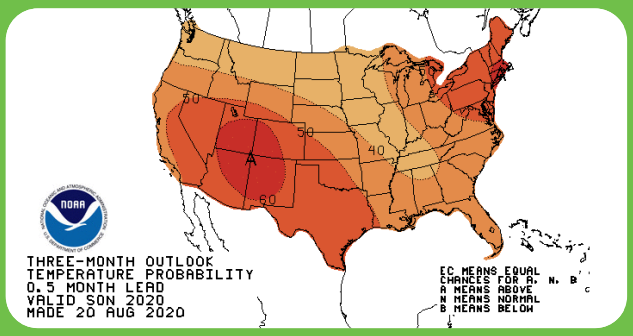
Precipitation

The September-November precipitation outlook indicates a higher chance of above-normal precipitation across northwestern and southeastern portions of the contiguous U.S. In the High Plains, this includes the northwestern fringes of North Dakota. Meanwhile, there is an increased chance of below-normal precipitation across portions of the western and southwestern U.S., and the central and southern Plains. In the High Plains, this includes Colorado, the majority of Kansas, southern Nebraska, and southwestern Wyoming. Elsewhere, there are equal chances for above-, below-, and near-normal precipitation through November.

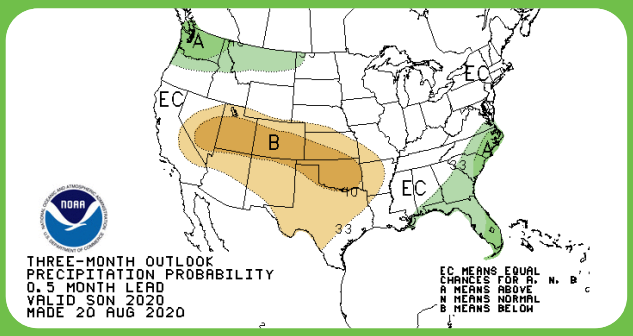
Drought

The August 20th Seasonal Drought Outlook indicates that, over the next three months, drought is expected to persist or develop in parts of the West, Southwest, and Plains. Drought may improve or be removed across portions of the Northeast, Midwest, Pacific Northwest, and the northern and central Plains. In the High Plains region, drought conditions are expected to develop or persist across Colorado, much of Wyoming, southwestern South Dakota, and portions of Nebraska and Kansas. Drought conditions are likely to improve or be removed across central and southern North Dakota, portions of South Dakota, and parts of eastern Nebraska over the next three months.

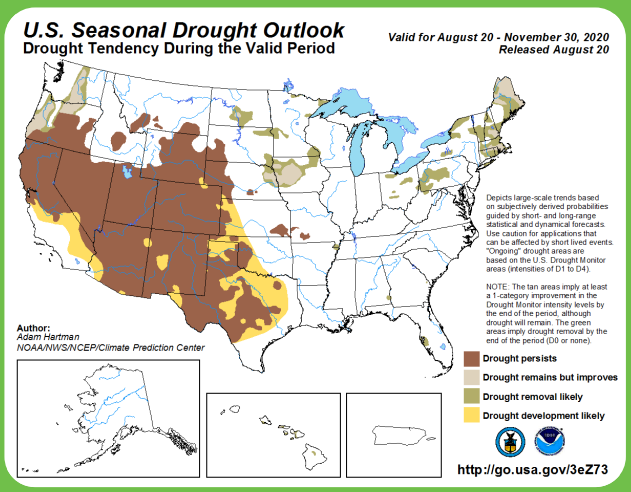
Temperature Outlook



Precipitation Outlook



Drought Outlook



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	91.8	60.0	75.9	3.8	100	08/24	44	08/31	1.63	-0.67	71
Alamosa San Luis Airport	86.5	44.3	65.4	2.7	92	08/19	38	08/31+	0.33	-0.94	26
Colorado Springs Municipal Airport	89.6	58.3	74.0	5.3	96	08/14+	46	08/31	2.74	-0.60	82
Denver International Airport	93.5	60.6	77.0	4.5	100	08/18	46	08/31	0.35	-1.34	21
Grand Junction Walker Field Airport	97.0	65.1	81.0	5.5	103	08/02	57	08/31+	0.07	-0.88	7
Pueblo Memorial Airport	95.9	60.5	78.2	4.8	103	08/22	53	08/31	0.31	-2.01	13

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	90.7	67.4	79.0	1.9	100	08/08	57	08/04	0.53	-2.61	17
Dodge City Regional Airport	91.0	64.2	77.6	-0.5	103	08/28	58	08/03	0.88	-1.87	32
Goodland Renner Field	89.3	60.6	75.0	1.3	97	08/30+	48	08/31	2.81	0.11	104
Topeka Municipal Airport	87.8	65.1	76.4	-1.0	97	08/28	53	08/04	0.79	-3.45	19
Wichita Mid-Continent Airport	90.4	66.9	78.6	-1.4	100	08/09	60	08/18	1.05	-2.66	28

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	94.5	58.5	76.5	4.3	105	08/25+	42	08/31	0.19	-1.39	12
Grand Island Airport	88.1	64.0	76.1	2.1	97	08/25	54	08/03	0.54	-2.58	17
Lincoln Municipal Airport	87.2	62.9	75.0	-0.3	95	08/28+	49	08/04	1.27	-2.22	36
Norfolk Karl Stefan Airfield	87.3	61.7	74.5	1.7	98	08/23	49	08/04	1.94	-1.31	60
North Platte Regional Airport	90.9	59.9	75.4	3.3	99	08/27+	51	08/29	0.44	-1.85	19
Omaha Eppley Airport	88.6	65.7	77.2	2.6	100	08/24	53	08/04	0.46	-3.36	12
Valentine Miller Field	92.3	60.0	76.1	3.3	105	08/25	43	08/31+	0.98	-1.20	45

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismarck Municipal Airport	87.9	58.4	73.1	3.6	100	08/19	47	08/31+	0.59	-1.69	26
Fargo International Airport	80.5	57.9	69.2	-0.1	90	08/13	47	08/29	4.16	1.60	163
Grand Forks International Airport	80.6	56.1	68.3	1.2	88	08/19	46	08/31	2.41	-0.47	84
Theodore Roosevelt Airport	87.4	54.0	70.7	2.3	99	08/19	42	08/31	0.53	-1.01	34
Williston International Airport	88.1	57.4	72.7	3.8	102	08/18	41	08/31	0.42	-1.03	29

All data are preliminary and subject to change. + indicates multiple dates, latest date listed. * indicates some missing data for the period.
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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	86.3	59.6	73.0	4.0	96	08/22	50	08/04	1.19	-1.24	49
Huron Regional Airport	84.5	60.9	72.7	1.1	94	08/23+	49	08/29	2.61	0.18	107
Pierre Regional Airport	90.0	59.6	74.8	1.1	106	08/25	45	08/31	1.12	-0.68	62
Rapid City Regional Airport	89.2	55.3	72.2	0.7	101	08/23+	37	08/31	0.94	-0.62	60
Sioux Falls Joe Foss Field Airport	86.7	63.1	74.9	4.3	96	08/25+	50	08/04	1.23	-1.82	40

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	90.9	51.9	71.4	2.4	98	08/23	33	08/31	0.05	-0.80	6
Cheyenne Municipal Airport	88.0	56.5	72.3	4.7	95	08/18+	43	08/31	0.20	-1.75	10
Lander Hunt Field Airport	89.8	56.9	73.3	3.7	97	08/18	40	08/31	0.05	-0.56	8
Laramie Regional Airport	86.2	47.8	67.0	4.7	90	08/18	41	08/10	0.21	-1.02	17
Rawlins Municipal Airport	88.8	49.4	69.1	3.9	94	08/23	34	08/31	0.02	-0.74	3
Sheridan County Airport	91.1	53.1	72.1	3.1	101	08/17	37	08/31	0.53	-0.19	74

August 2020 Highlights

Monthly Rankings

Precipitation in inches / Temperature in degrees F

Driest	**Precipitation / Ranking**	**Record / Year**	**Period of Record**
Rawlins, WY	0.02 / 2nd driest	T / 1954	1951-2020
Grand Junction, CO	0.07 / 2nd driest	0.04 / 1956	1893-2020
Omaha, NE	0.46 / 3rd driest	0.18 / 1913	1871-2020
Grand Island, NE	0.54 / 3rd driest	0.33 / 1919	1895-2020
Casper, WY	0.05 / 4th driest	T / 1944	1939-2020
Cheyenne, WY	0.20 / 4th driest	0.03 / 1944	1871-2020
Alamosa, CO	0.33 / 6th driest	0.11 / 1944	1906-2020
Concordia, KS	0.53 / 7th driest	0.30 / 1947+	1885-2020
Chadron, NE	0.19 / 8th driest	T / 2011+	1941-2020
Pueblo, CO	0.31 / 8th driest	T/ 1900	1888-2020
Lander, WY	0.05 / 8th driest	T / 1970+	1891-2020
North Platte, NE	0.44 / 9th driest	0.06 / 1967	1874-2020
Topeka, KS	0.79 / 9th driest	0.26 / 1971	1887-2020
Warmest	**Temperature / Ranking**	**Record / Year**	**Period of Record**
Denver, CO	77.0 / WARMEST (tie)	77.0 / 2011	1872-2020
Cheyenne, WY	72.3 / WARMEST	71.6 / 1995	1871-2020
Colorado Springs, CO	74.0 / 2nd warmest	74.1 / 2011	1894-2020
Rawlins, WY	69.1 / 2nd warmest	71.0 / 2000	1951-2020

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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.

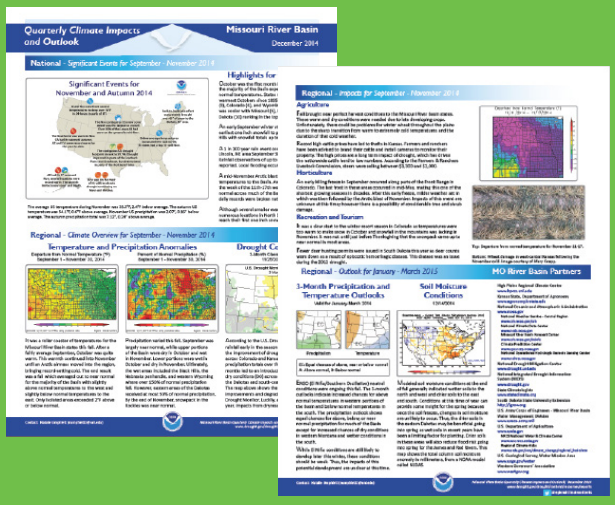
Much of the data and products found throughout this publication were built on the Applied Climate Information System (ACIS) framework. ACIS was designed to manage the complex flow of information from climate data collectors to the end users of climate data information. The main purpose of ACIS is to 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.

ACIS Applied Climate Information System

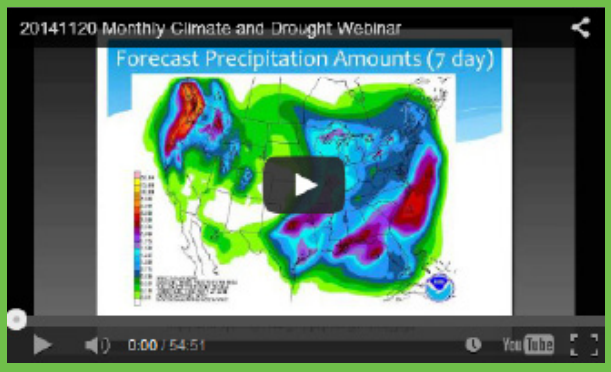
Additional Summary Information for the High Plains

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



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