March 2020 Climate Summary

Mild Start to Spring

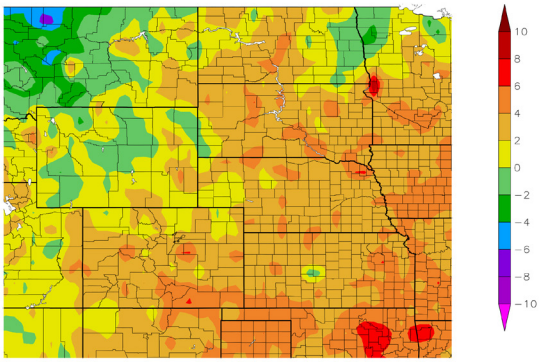
It was a warm and dry start to spring for the majority of the High Plains region. Above-normal temperatures were widespread, with departures generally ranging from 2.0-6.0 degrees F (1.1-3.3 degrees C) above normal. Only a few areas of Wyoming and North Dakota had slightly below-normal temperatures. The majority of the region was also dry this month, with large areas of Colorado, Kansas, North Dakota, South Dakota, and Wyoming receiving less than 50 percent of normal precipitation. High wildfire risk due to dry and windy conditions prompted Kansas Governor Laura Kelly to issue an emergency disaster declaration. One fire in Greenwood County, Kansas burned over 5,000 acres. Meanwhile, two main areas of above-normal precipitation occurred along a swath from northeastern Colorado through Wisconsin and in an area encompassing much of southeastern Kansas. These areas received at least 150 percent of normal precipitation.

By the middle of the month, snowmelt and rain contributed to ongoing or renewed flooding along the James and Big Sioux Rivers in eastern South Dakota. According to the Missouri River Basin River Forecast Center, at the beginning of April, two locations along the James River had been above flood stage for over a year - Columbia, SD and Stratford, SD. Towards the end of the month, flooding also began along the Red River of the North and its tributaries in North Dakota. Flooding was ongoing across eastern areas of the Dakotas at the time of this writing.

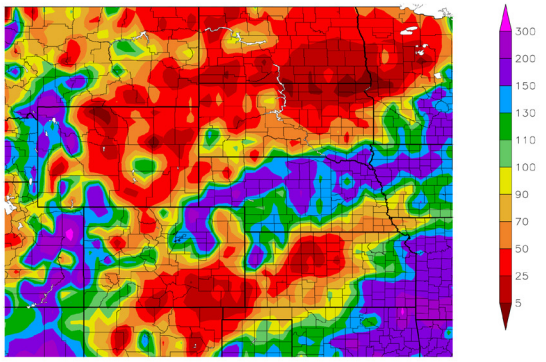
With the growing season quickly approaching, there continues to be concerns regarding long-term wetness and flooding, and how these conditions may impact spring planting activities. In some areas of the region, fall fieldwork was not completed. This has especially been an issue in North Dakota, where some crops remain in the fields waiting to be harvested. Despite the warm and dry conditions this month, soil moisture remained high across the Northern Plains, which may delay spring planting activities yet again this year. Ongoing flooding in eastern areas of the Dakotas is also a concern, as many fields have been inundated, yet again.

Temperature and Precipitation Overview

Departure from Normal Temperature (F)
3/1/2020 – 3/31/2020



Percent of Normal Precipitation (%)
3/1/2020 – 3/31/2020



Above: Departure from 1981-2010 normal temperature (left) and percent of normal precipitation (right) for March 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

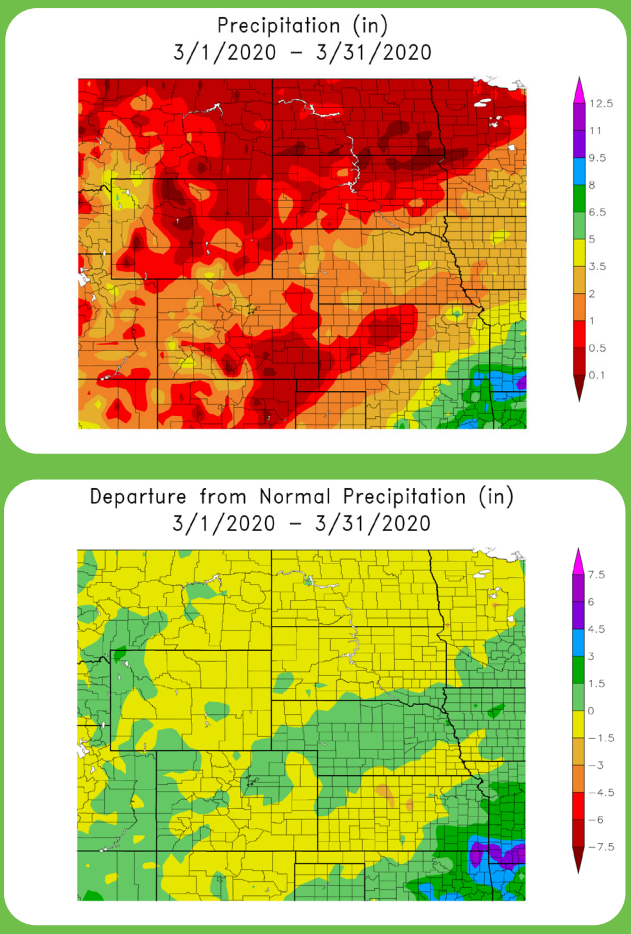
It was a fairly dry month for the High Plains, with the majority of the region receiving less than 50 percent of normal precipitation. This led to several locations having a top 10 driest and/or least snowiest March on record, including Aberdeen, South Dakota (6th driest and 7th least snowiest); Bismarck, North Dakota (7th least snowiest); Goodland, Kansas (9th least snowiest); and Fargo, North Dakota (10th least snowiest). Dry conditions resulted in a range of impacts, as drought was expanded in eastern Colorado and fires were reported in Kansas and Nebraska, yet saturated soils were able to dry out slightly.

On the other end of the spectrum, there were two main areas that received at least 150 percent of normal precipitation, including southeastern Kansas and an area extending from northeastern Colorado through northeastern Nebraska. Much of this precipitation fell during the second half of the month. This precipitation was not necessarily record-breaking; however, some locations ranked in the top 15 wettest Marches on record. One example was Norfolk, Nebraska, which had its 11th wettest March on record with 3.01 inches (76 mm) of liquid equivalent precipitation (period of record 1893-present). Although ranking as 11th wettest, this was quite far from the record amount of 7.27 inches (185 mm), which occurred in 1987.

While the month of March was fairly dry, there were some notable events that occurred. For instance, Wyoming has been impacted by a number of storm systems this snow season that have caused significant travel disruptions. According to KGAB Radio, I-80 in Wyoming had been closed at least 54 times by the end of February. A deadly pileup on I-80 in early March closed the interstate yet again, adding to the total. Adverse weather conditions contributed to the crash and the closure.

A notable storm system tracked across the higher elevations of central Colorado on the 19th and brought heavy snowfall to places such as Denver, which picked up 6.0 inches (15 cm) of snow. This was the highest 1-day snow total of the 2019-20 snow season for Denver. This system also produced the first severe thunderstorms of the spring season in Kansas and Nebraska. Another system brought abundant rainfall to portions of the region during the last week of the month, triggering flood watches over central and northern Nebraska and southern South Dakota.

Regional Precipitation



Above: Total precipitation in inches (top) and departure from normal precipitation in inches (bottom) for March 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.

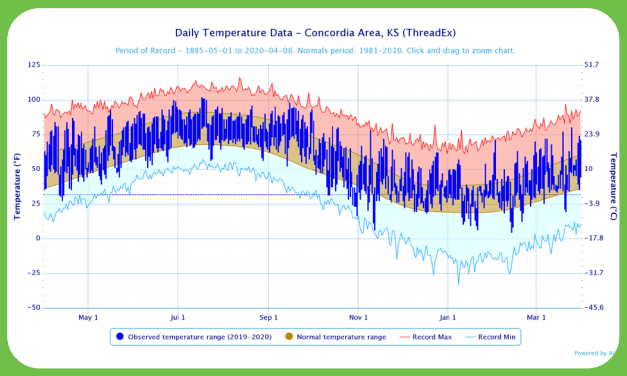
Snowpack Update

Mountain snowpack continued to be near to above median across Colorado and Wyoming this month. At the beginning of April, all basins were reporting Snow Water Equivalent (SWE) of at least 90 percent of median except for one - the Sweetwater Basin in central Wyoming. Across the Upper Missouri Basin, SWE continued to be slightly above average. According to the U.S. Army Corps of Engineers, as of March 29th, mountain SWE was 102 percent of average above Fort Peck and 101 percent of average in the reach from Fort Peck to Garrison. Significant flooding from mountain snow runoff alone is not anticipated this spring, according to the National Weather Service. Across the Plains, much of the snowpack had melted by the end of the month, with only a small amount remaining across portions of eastern North Dakota.

Temperatures

Overall, March temperatures were above normal across the High Plains region. The majority of the region had temperature departures of 2.0-4.0 degrees F (1.1-2.2 degrees C) above normal, including much of Colorado, Kansas, Nebraska, and the Dakotas. Some areas had departures up to 6.0 degrees F (3.3 degrees C) above normal; however, this warmth was not record-breaking. Meanwhile, much of Wyoming and eastern North Dakota had monthly average temperatures that were within 2.0 degrees F (1.1 degrees C) of normal.

Station Spotlight: Concordia, KS



Above: Daily temperatures along with extremes and normals values since April 1, 2019 in Concordia, KS.

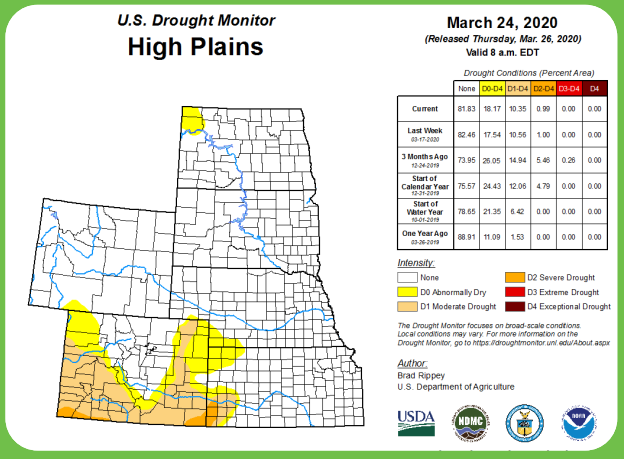
Although this month's warmth was not one for the record books, many locations did rank in the top 20 warmest Marches on record. For instance, Concordia, Kansas had its 13th warmest March on record with an average temperature of 47.8 degrees F (8.8 degrees C), which was 4.8 degrees F (2.7 degrees C) above normal. The warmest March on record occurred in 2012 when the average temperature was 56.6 degrees F (13.7 degrees C) (period of record 1885-present).

Now that spring is in full swing, many people may be wondering how this year's leaf out compares to previous years. Looking at data from the USA National Phenology Network, it is clear that much of the country is experiencing an early spring. In fact, spring leaf out is about three to four weeks ahead of normal for parts of the Southeast, Northeast, and West. So far for the High Plains region, spring leaf out is slightly late in some areas of Colorado, Kansas, and Nebraska. For portions of eastern Kansas and pockets of Nebraska, however, spring leaf out is slightly early. To track the spring leaf out and bloom in your area, please see: https://www.usanpn.org/news/spring.

Drought Conditions

Drought conditions expanded only slightly across the High Plains region over the past month. According to the U.S. Drought Monitor, the area experiencing drought (D1-D4) held at about 10 percent over the course of the month (9.72 percent on February 25th compared to 10.35 percent on March 24th).

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/.

Abnormally dry conditions (D0) remained largely unchanged from last month, with the exception of northwestern North Dakota where D0 developed towards the end of the month, and the panhandle of Nebraska where a small area of D0 improved. D0 remained unchanged in southern Wyoming and western Kansas. In mid-March, moderate drought conditions (D1) increased in coverage across portions of eastern Colorado. According to the U.S. Drought Monitor, warm and dry conditions in this area have begun to negatively impact winter wheat and rangelands, and streamflows were below the 10th percentile. Meanwhile, severe drought conditions (D2) remained nearly unchanged across portions of southern Colorado and western Kansas. The remainder of the region continued to remain free of drought and abnormally dry conditions, despite experiencing a relatively dry month.

The streak of drought-free conditions (D1-D4) continued this month for Nebraska and South Dakota. Nebraska has remained free of drought since early September 2018 and South Dakota has remained free of drought since early December 2018.

Climate Outlooks

According to the Climate Prediction Center, ENSO-neutral conditions continued through March in the Pacific. These conditions will likely continue through the spring and summer. For more information about ENSO, check out the ENSO blog here: 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 to major flooding across eastern areas of the region. This includes portions of the Missouri River mainstem in Nebraska, along with several tributaries of the Missouri River in South Dakota, such as the Big Sioux, James, and Vermillion Rivers. This also includes portions of the Red, Sheyenne, and Souris Rivers in North Dakota and several creeks and rivers in eastern Kansas. Normal wildland fire potential is expected through July for the High Plains region.

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.

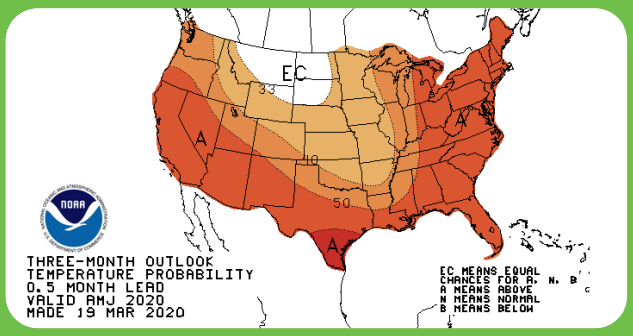
Temperature

The April-June temperature outlook calls for a higher probability of above-normal temperatures for the majority of the contiguous U.S. In the High Plains, this includes Colorado, Kansas, Nebraska, much of Wyoming, eastern South Dakota, and eastern North Dakota. Elsewhere, there are equal chances for above-, below-, and near-normal temperatures. This includes northeastern Wyoming and much of the Dakotas in the High Plains region.

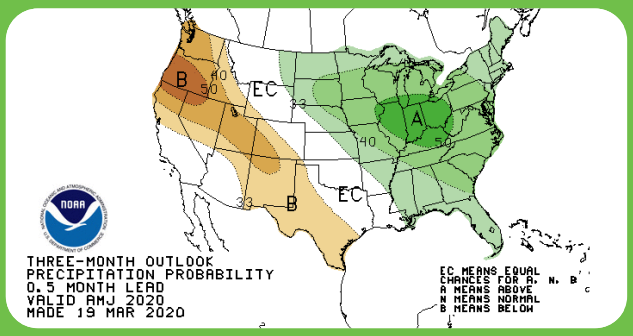
Precipitation

The April-June precipitation outlook indicates a higher probability of above-normal precipitation across much of the eastern and central U.S. In the High Plains, this includes North Dakota, South Dakota, much of Nebraska, eastern Kansas, and far northeastern Wyoming. Across the western and southwestern U.S., there is an increased chance for below-normal precipitation through June. This includes much of Colorado and the southwestern corner of Wyoming in the High Plains region. Elsewhere, there are equal chances for above-, below-, and near-normal precipitation through June.

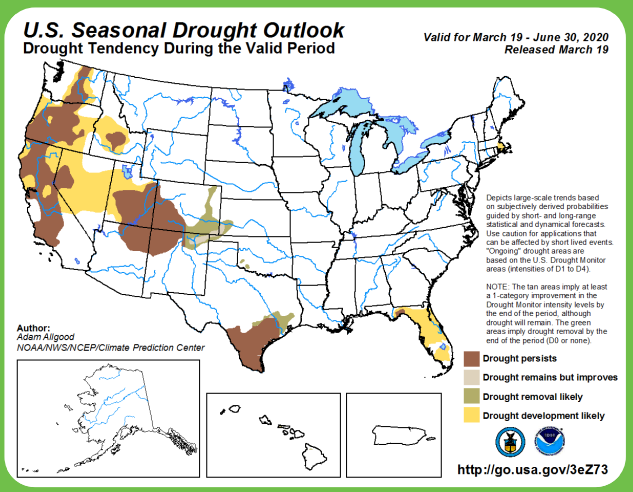
Temperature Outlook



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.

Drought

The March 19th Seasonal Drought Outlook indicates that drought is likely to persist across parts of the West, the Four Corners region, and southern Texas. Drought may improve or be removed in only a few areas, including a small portion of southern Texas and the central and southern Plains. Development of drought is likely for parts of the West and Florida. In the High Plains region, drought conditions are expected to persist across western Colorado, with an improvement in drought conditions expected across eastern Colorado and southwestern Kansas. Further drought development is not expected in the High Plains region through June.

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	53.7	28.5	41.1	1.9	72	03/08	13	03/20	0.49	-0.38	56
Alamosa San Luis Airport	58.6	20.6	39.6	6.1	68	03/31	10	03/29+	0.22	-0.31	42
Colorado Springs Municipal Airport	56.7	29.5	43.1	4.0	70	03/11+	18	03/21	0.99	-0.01	99
Denver International Airport	56.0	29.0	42.5	2.1	68	03/11+	11	03/21	1.26	0.34	137
Grand Junction Walker Field Airport	57.9	34.9	46.4	2.5	70	03/07	25	03/03	1.45	0.53	63
Pueblo Memorial Airport	63.9	28.2	46.1	3.8	77	03/26	18	03/21+	0.19	-0.74	20

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	58.4	37.3	47.8	4.8	80	03/25	19	03/21	1.15	-0.86	57
Dodge City Regional Airport	60.3	35.5	47.9	3.5	81	03/25	22	03/21	0.93	-0.66	58
Goodland Renner Field	57.6	30.1	43.9	3.4	76	03/25+	16	03/20	1.01	-0.06	94
Topeka Municipal Airport	59.4	39.3	49.4	4.6	77	03/19	22	03/21	2.68	0.19	108
Wichita Mid-Continent Airport	61.3	39.9	50.6	4.1	78	03/25	26	03/21	2.75	0.06	102

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	53.1	25.7	39.4	3.6	73	03/07	11	03/20	0.87	-0.36	71
Grand Island Airport	53.5	32.5	43.0	3.6	74	03/08	15	03/20	2.86	1.06	159
Lincoln Municipal Airport	55.6	33.0	44.3	4.2	75	03/25	18	03/20+	1.67	-0.26	87
Norfolk Karl Stefan Airfield	51.3	30.5	40.9	3.5	73	03/08+	13	03/20	3.01	1.24	170
North Platte Regional Airport	56.8	28.4	42.6	4.6	79	03/08	14	03/20	1.42	0.37	135
Omaha Eppley Airport	54.3	34.0	44.1	4.6	74	03/08	19	03/21	1.98	-0.01	99
Valentine Miller Field	54.1	27.3	40.7	4.5	80	03/07	2	03/20	1.61	0.54	150

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismarck Municipal Airport	44.6	23.8	34.2	4.3	66	03/30	8	03/20	0.26	-0.61	30
Fargo International Airport	36.4	19.2	27.8	0	56	03/30	0	03/21	0.14	-1.16	11
Grand Forks International Airport	33.0	13.8	23.4	-1.8	49	03/31+	-10	03/21	0.26	-0.70	27
Theodore Roosevelt Airport	45.0	21.1	33.0	3.0	69	03/07	-2	03/20	0.13	-0.56	19
Williston International Airport	41.4	20.9	31.1	1.8	65	03/30	4	03/20+	0.54	-0.17	76

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	43.8	24.1	33.9	4.0	66	03/30	9	03/20	0.16	-1.00	14
Huron Regional Airport	46.0	27.2	36.6	3.5	64	03/24	13	03/20	0.88	-0.88	60
Pierre Regional Airport	50.3	25.4	37.9	3.5	79	03/07	8	03/20	0.72	-0.51	59
Rapid City Regional Airport	50.6	24.7	37.6	2.2	74	03/07	6	03/20	0.58	-0.35	62
Sioux Falls Joe Foss Field Airport	48.6	28.2	38.4	5.5	69	03/08	14	03/20	2.06	0.30	117

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	47.4	24.5	36.0	0.8	60	03/31	6	03/01	0.96	0.14	117
Cheyenne Municipal Airport	48.7	26.4	37.6	1.7	64	03/06	12	03/21	1.22	0.17	116
Lander Hunt Field Airport	47.2	23.4	35.3	-0.2	57	03/31	4	03/02	0.58	-0.58	50
Laramie Regional Airport	46.2	20.6	33.4	2.5	59	03/17	0	03/02	0.26	-0.32	45
Rawlins Municipal Airport	43.7	23.9	33.8	1.5	56	03/17	3	03/02	0.20	-0.48	29
Sheridan County Airport	48.5	24.3	36.4	1.2	72	03/07	12	03/02	0.55	-0.43	56

March 2020 Highlights

Monthly Rankings

Precipitation and Snowfall in inches

Least Snowiest	**Snowfall / Ranking**	**Record / Year**	**Period of Record**
Mobridge, SD	T / 2nd least snowiest	0.0 / 1981	1911-present
Sisseton, SD	T / 2nd least snowiest	0.0 / 2010	1931-present
Huron, SD	0.6 / 6th least snowiest	0.1 / 2012+	1888-present
Aberdeen, SD	0.4 / 7th least snowiest	T / 2010+	1893-present
Bismarck, ND	0.7 / 7th least snowiest	T / 1981+	1886-present
Goodland, KS	0.7 / 9th least snowiest	T / 2017+	1895-present
Fargo, ND	0.6 / 10th least snowiest	T / 2010+	1885-present

Driest	**Precipitation / Ranking**	**Record / Year**	**Period of Record**
Mobridge, SD	0.08 / 4th driest	T / 1927	1911-present
SIsseton, SD	0.11 / 5th driest	0.03 / 1959	1931-present
Aberdeen, SD	0.16 / 6th driest	0.04 / 1971	1893-present
Fargo, ND	0.14 / 7th driest	0.03 / 1958	1881-present

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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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.

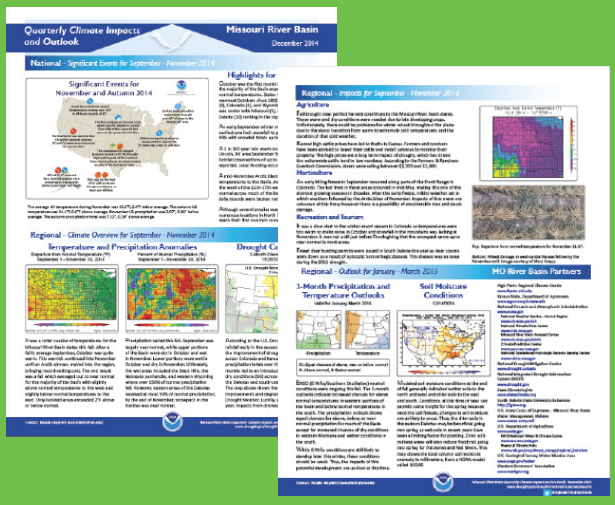
Much of the data and products found throughout this publication were built on the Applied Climate Information System (ACIS) framework. ACIS was designed to manage the complex flow of information from climate data collectors to the end users of climate data information. The main purpose of ACIS is to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

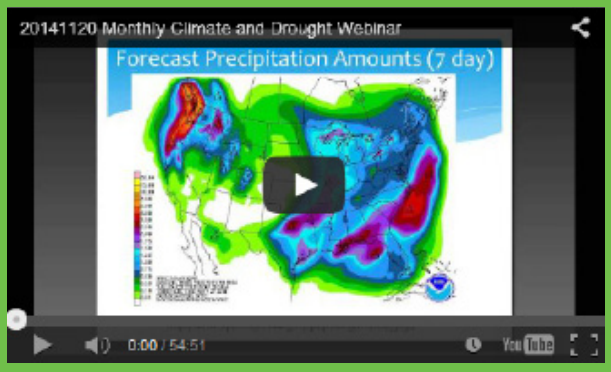
Additional Summary Information for the High Plains

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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For an archive:
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