September 2018 Climate Summary

Flooding along Wildcat Creek near Manhattan, KS. Photo courtesy of Manhattan Police Department.

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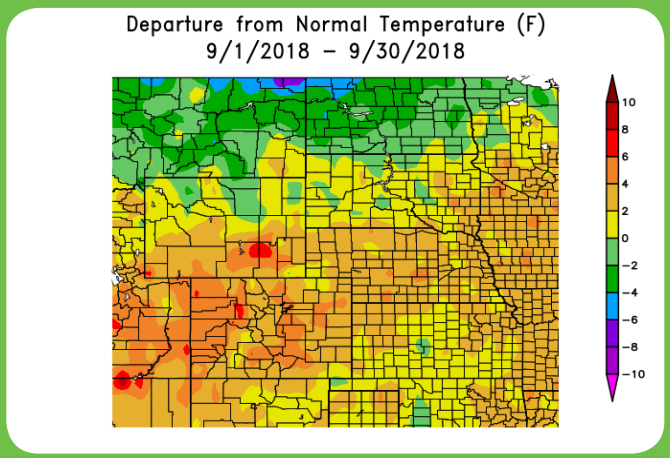
A Tale of Precipitation Extremes

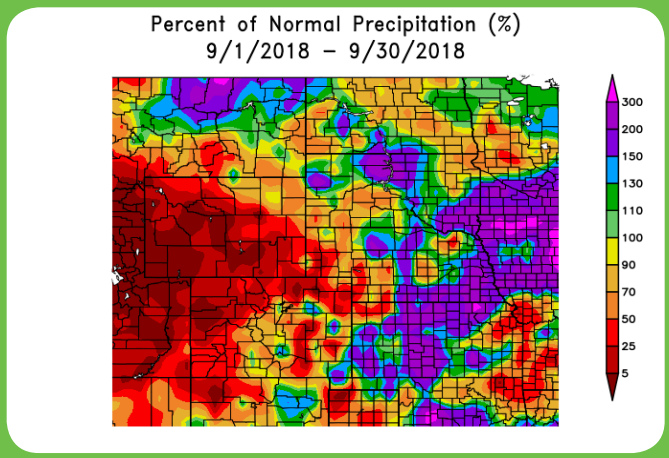
After a cool August, September was warm for most of the High Plains region, especially across Colorado and Wyoming where many locations ranked among the top 10 warmest Septembers on record. On the other hand, precipitation varied across the region, with areas in the eastern High Plains experiencing excessive rainfall and flooding, while western areas of the region continued to be impacted by drought conditions. Streamflows were reflective of conditions, as high flows could be found throughout southeastern South Dakota, eastern Nebraska, and central Kansas, while streamflows were abysmal in Colorado and southern Wyoming.

September 30th marked the end of the water year, which is defined as the period from October 1 - September 30. Looking at precipitation during the water year is not only helpful to examine in mountainous areas where snowpack and its runoff primarily determine water supply, but also in other areas where the growing season is coming to a close and soil moisture recharge has begun. Water-year precipitation was extremely low in portions of Colorado this year, with several locations ranking in the top 10 driest water years on record. The following locations in Colorado ranked in the top 10 driest water years: Pueblo (2nd driest), Grand Junction (3rd driest), Denver (5th driest), and Alamosa (7th driest). It is also worth noting that Alamosa and Denver had their warmest and 9th warmest water years on record, respectively. The lack of precipitation during the water year caused water supply issues in Colorado, as many reservoirs were very low.

The harvest season is underway as the growing season is coming to an end. Crops matured early in much of the region this year due to very warm temperatures in the early part of the summer. As of the end of September, the harvest of corn and soybeans was ahead of schedule for most states in the region. However, producers were having trouble getting into the fields to harvest in wetter areas, so drier conditions are needed in order to make progress.

Temperature and Precipitation Overview





Above: Departure from 1981-2010 normal temperature (left) and percent of normal precipitation (right) for September 2018 in the High Plains region.
Maps produced by the High Plains Regional Climate Center and are available at: http://hprcc.unl.edu/maps/current .

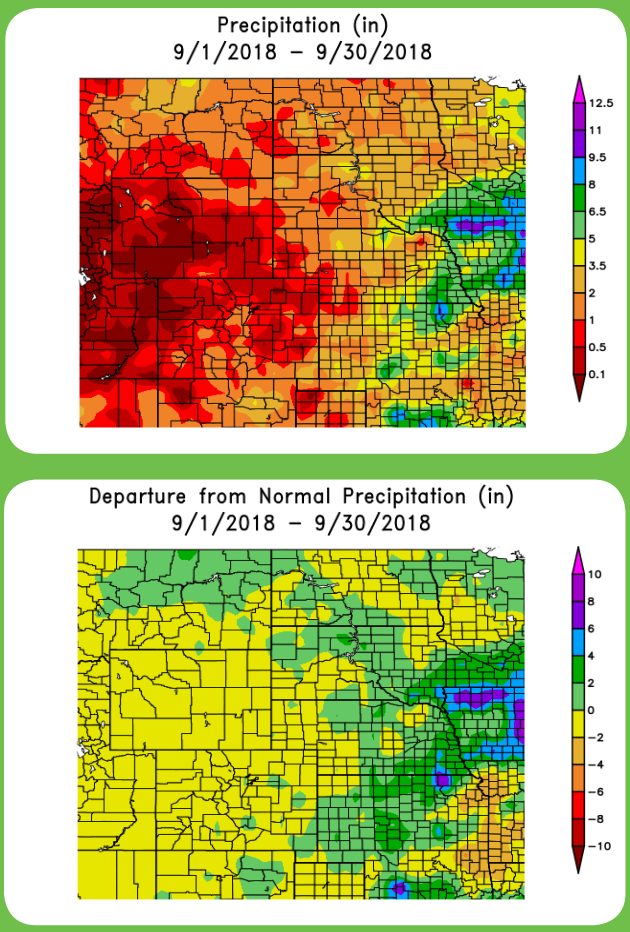
Precipitation

It was a tale of extremes regarding precipitation in September, as some areas were excessively wet while others were extremely dry. The wettest areas included southeastern South Dakota, eastern Nebraska, and central Kansas, where precipitation was 200 percent of normal in some locations. Sioux Falls, South Dakota, Lincoln, Nebraska, and Salina, Kansas broke into the top 10 wettest Septembers on record. Meanwhile, much of the rest of the region was dry, especially across Wyoming and western Colorado where precipitation was less than 25 percent of normal in some areas. This led to several impressive records for dryness. For instance, Grand Junction, Colorado and Rawlins, Wyoming had their driest Septembers on record, reporting only a trace and 0.02 inches (1 mm), respectively.

Wet areas across the High Plains experienced several impacts. For instance, heavy rainfall on the 2nd and 3rd caused flash flooding on Wildcat Creek in Manhattan, Kansas. Several CoCoRaHS observations from the area indicated that more than 7.00 inches (178 mm) of rain fell during the two days. Hundreds of people were evacuated and many were left without power. Also, wet fields slowed harvest and producers were concerned about compaction issues. Some crop diseases were reported in Nebraska, such as stalk rot in corn and stem rot in soybeans. Nebraska Extension reported that mosquito numbers were up in eastern Nebraska, and several West Nile Virus cases have been reported as well.

September was rather quiet in terms of severe weather occurrences in the region. However, it is worth noting that on the 1st, severe thunderstorms with damaging winds moved through Lincoln, Nebraska just after kickoff of the Nebraska Cornhuskers' first football game of the season. Ultimately, the inclement weather led to the game being cancelled, which was the first time in the school's history that a football game was cancelled due to weather.

Regional Precipitation



Above: Total precipitation in inches (top) and departure from normal precipitation in inches (bottom) for September 2018. These maps are produced by HPRCC and can be found on the Current Climate Summary Maps page at: http://hprcc.unl.edu/maps/current.

Unfortunately, some areas in drought across the region saw the continuation of dry conditions in September. For instance, western Colorado, southern Wyoming, portions of the Dakotas, and northeastern Kansas did not receive any drought relief. Although the primary growing season is coming to an end, winter wheat planting is underway. However, winter wheat producers in these areas were concerned about continued dryness, as moisture is needed going into winter for adequate growth of the crop.

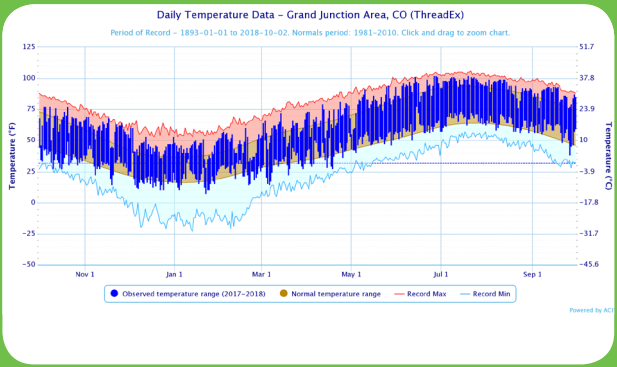
Streamflow Update

Both above-normal and below-normal streamflow were observed throughout the High Plains in September. Streamflows were running much above normal in portions of South Dakota, Nebraska, and Kansas. These areas received at least 150 percent of normal precipitation during September. The U.S. Army Corps of Engineers maintained higher-than-average releases from all Missouri River Mainstem projects in September to prepare for the 2019 Missouri River runoff season. The Corps reduced outflows from Gavins Point Dam as a result of heavy rains in southeastern South Dakota. In western Colorado, streamflows continued to be well below normal, as precipitation was less than 25 percent of normal in many locations. September was also dry for much of Wyoming, which caused streamflows to fall below normal throughout portions of the state.

Temperatures

Temperatures were below normal in the northern High Plains and above normal across the rest of the region in September. Generally, departures ranged from 2.0 degrees F (1.1 degrees C) below normal in portions of North Dakota to 6.0 degrees F (3.3 degrees C) above normal across much of Colorado. The warmth in the western High Plains resulted in several records breaking into the top 10 of warmest Septembers throughout Colorado and Wyoming.

Station Spotlight: Grand Junction, CO



Above: Daily temperatures along with extremes and normals values since October 1, 2017 in Grand Junction, CO.

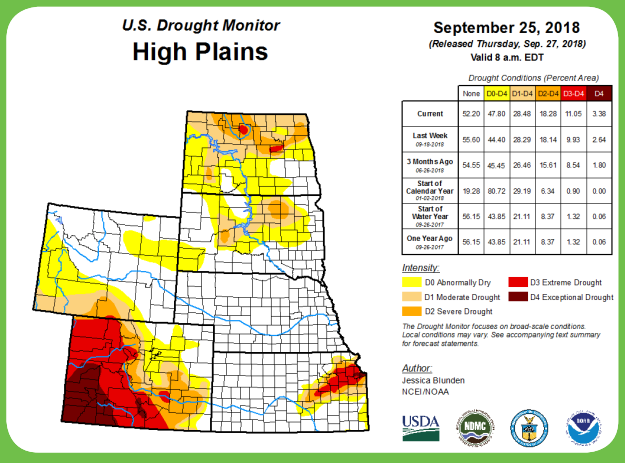
The first three weeks of the month were particularly warm throughout Colorado, Wyoming, South Dakota, and Nebraska, with several locations experiencing daily departures of 10.0 degrees F (5.6 degrees C) or more. Widespread maximum temperatures exceeding 90.0 degrees F (32.2 degrees C) occurred from approximately the 15th to the 20th. According to the Colorado Climate Center, Fort Collins had more days exceeding 90.0 degrees F (32.2 degrees C) in September than this location had in August. The excessive heat and dryness caused a resurgence of the fire season in western Colorado and western Wyoming.

Much of North Dakota and Wyoming experienced their first freeze of the fall season in September. For the most part, the first freeze occurred near the typical date a first fall freeze is expected in these areas. However, extreme northwestern North Dakota experienced an early freeze on the 5th and, according to the State Climatologist of North Dakota, there was some frost damage in lowland areas. For most of the region, however, the risk of frost damage is lower this year due to warm conditions in the early part of summer that ultimately led to the early maturation of crops.

Drought Conditions

Drought conditions improved in some areas but worsened in others in September, according to the U.S. Drought Monitor. Overall, the area in drought (D1-D4) in the High Plains increased by approximately three percent. For much of the region it was a dry month, causing drought to intensify.

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/.

Western and northern Colorado experienced warm and dry conditions during September, which exacerbated impacts. For instance, streamflows were low, with many streams experiencing flows that were less than the 10th percentile for this time of year. The drought has impacted water supplies, as reservoir levels continued to drop. Reservoir levels at Lake Powell and Lake Mead, which provide water to multiple states in the West, were less than the 10th percentile in September.

Drought also intensified in the Dakotas where it has been persistently dry. In North Dakota, producers reported stressed pastures, a shortage of hay, and disappointing soybean yields in dry areas. Producers in the Dakotas have voiced concerns about the dryness coinciding with winter wheat planting.

Areas that received drought relief in September included northeastern and southwestern portions of Kansas, as well as southeastern Colorado. Heavy rains early in the month brought about a one to two-category improvement in these areas, which helped improve soil moisture conditions.

Climate Outlooks

According to the Climate Prediction Center, ENSO-neutral conditions are present in the Pacific. Equatorial sea surface temperatures are near to above average across most of the Pacific Ocean. There is a 50-55 percent chance of El Niño developing during the fall, with chances increasing to 65-70 percent by winter. An El Niño Watch is in effect. If you are looking for more information about ENSO, check out the ENSO blog here: https://www.climate.gov/news-features/department/8443/all.

The National Weather Service long-range flood outlook indicates a greater than 50 percent chance of minor flooding along Little Osage River in eastern Kansas through December. Elsewhere in the High Plains, the chance for flooding is low.

According to the National Interagency Fire Center, wildland fire potential is expected to be below normal in southern portions of Kansas in October and November, while normal conditions are expected for the rest of the High Plains region through January.

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 October-December temperature outlook indicates an increased chance of above-normal temperatures for nearly the entire contiguous U.S., including the High Plains region. The only exception was in the Southeast U.S., where there are equal chances for above-, below-, and near-normal temperatures during the October-December period.

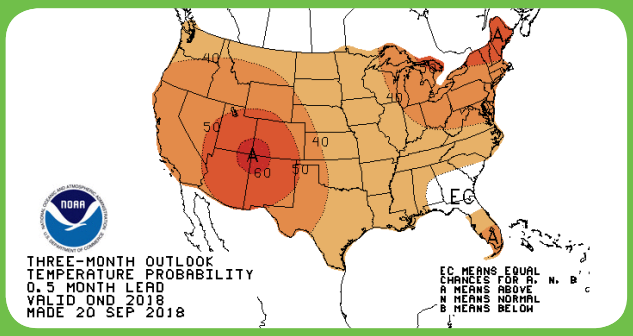
Precipitation

The precipitation outlook for the next three months calls for a higher probability of above-normal precipitation across portions of the Southwest, Southern Plains, Southeast, and East Coast. In the High Plains, this includes most of Colorado and western Kansas. Below-normal precipitation is expected in the Pacific Northwest, including extreme northwestern Wyoming. Elsewhere, there are equal chances for above-, below-, and near-normal precipitation in the contiguous U.S. during the October-December period.

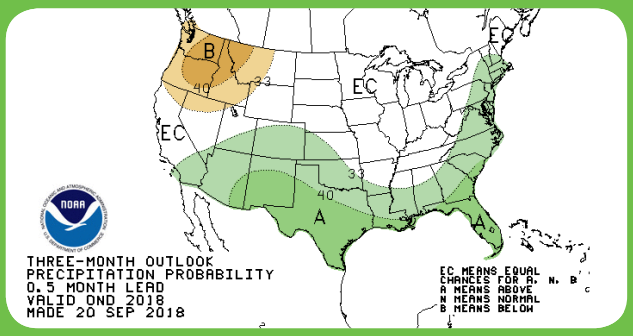
Drought

The September 20th U.S. Seasonal Drought Outlook shows that drought is expected to persist across parts of the West, Northern Plains, and Southeast regions. In the High Plains, this includes areas of drought in the Dakotas, Colorado, and Wyoming. Drought may improve or be removed in the West, the Southern Plains, the Midwest, and the Northeast, including the area of drought in eastern Kansas. Drought development is likely in northern Idaho, but additional drought development is not expected in the High Plains through December.

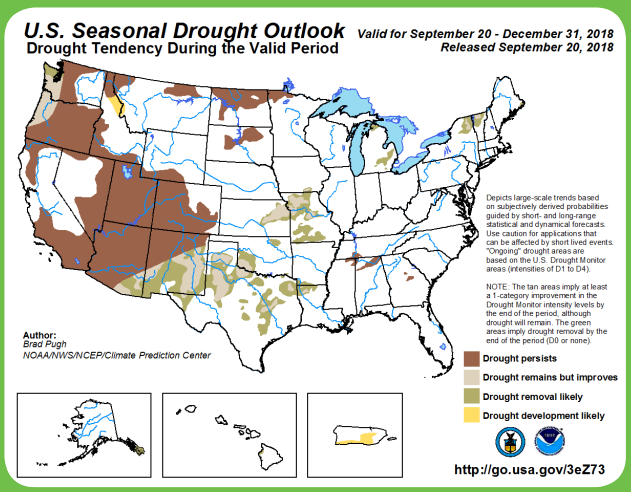
Temperature Outlook



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	81.6	51.2	66.4	3.4	96	09/13	38	09/28	0.28	-0.88	24
Alamosa San Luis Airport	77.4	37.8	57.6	2.6	84	09/18+	26	09/27	1.02	0.11	112
Colorado Springs Municipal Airport	81.0	52.1	66.5	5.6	93	09/18	40	09/29+	0.57	-0.62	48
Denver International Airport	82.7	52.8	67.8	4.4	96	09/13	36	09/29+	0.18	-0.78	19
Grand Junction Walker Field Airport	86.6	57.1	71.8	5.7	93	09/18+	38	09/26	T	-1.19	0
Pueblo Memorial Airport	86.6	52.7	69.7	5.0	99	09/13	40	09/27+	0.08	-0.69	10

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	77.6	59.3	68.5	0.5	93	09/20+	42	09/22	5.29	2.38	182
Dodge City Regional Airport	80.6	58.7	69.7	0.5	93	09/01	43	09/29+	1.87	0.20	112
Goodland Renner Field	80.4	53.8	67.1	2.5	96	09/18	35	09/26	1.00	-0.22	82
Topeka Municipal Airport	82.2	60.5	71.4	3.1	96	09/19+	40	09/26	1.12	-2.54	31
Wichita Mid-Continent Airport	82.4	62.9	72.7	1.7	98	09/01	43	09/27	2.77	-0.37	88

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	78.2	49.1	63.7	2.7	98	09/12	31	09/26	1.85	0.12	107
Grand Island Airport	77.4	57.4	67.4	2.3	94	09/19+	38	09/26	2.49	0.26	112
Lincoln Municipal Airport	78.7	58.1	68.4	2.4	96	09/20	41	09/26+	7.13	4.11	236
Norfolk Karl Stefan Airfield	76.0	56.1	66.1	2.3	95	09/17	37	09/28	3.38	0.69	126
North Platte Regional Airport	80.3	54.3	67.3	5.0	96	09/17	31	09/26	0.43	-0.98	30
Omaha Eppley Airport	78.7	60.2	69.4	3.7	95	09/20	45	09/26	3.46	0.78	129
Valentine Miller Field	77.8	54.3	66.0	3.7	99	09/11	37	09/26	2.14	0.50	130

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismarck Municipal Airport	69.1	46.6	57.9	-0.6	88	09/07	30	09/28	2.28	0.69	143
Fargo International Airport	70.1	47.8	59.0	-0.1	94	09/16	28	09/28	2.50	-0.07	97
Grand Forks International Airport	67.3	43.4	55.3	-1.6	92	09/16	23	09/28	2.22	0.17	108
Theodore Roosevelt Airport	67.9	41.4	54.7	-2.5	90	09/03	22	09/28	1.54	0.07	105
Williston International Airport	66.9	42.4	54.7	-2.0	90	09/08+	25	09/28	1.46	0.40	138

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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September 2018 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	72.9	48.4	60.7	1.8	95	09/16	30	09/29	2.38	0.19	109
Huron Regional Airport	75.5	53.1	64.3	2.6	95	09/15	35	09/28	3.37	0.91	137
Pierre Regional Airport	75.1	52.8	64.0	1.1	97	09/15	38	09/26	1.45	-0.42	78
Rapid City Regional Airport	72.1	48.2	60.2	-0.6	93	09/12	34	09/26	1.95	0.66	151
Sioux Falls Joe Foss Field Airport	73.1	55.9	64.5	3.2	93	09/15	36	09/29	7.32	4.55	264

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	78.8	41.0	59.9	2.0	91	09/15	25	09/26	0.28	-0.80	26
Cheyenne Municipal Airport	77.8	47.1	62.5	4.3	92	09/16	32	09/26	0.09	-1.39	6
Lander Hunt Field Airport	78.2	45.4	61.8	3.2	90	09/15	32	09/26	0.05	-1.00	5
Laramie Regional Airport	76.4	39.2	57.8	4.5	86	09/15	27	09/25	0.07	-1.04	6
Rawlins Municipal Airport	78.4	41.4	59.9	4.5	86	09/15	24	09/26+	0.02	-0.95	2
Sheridan County Airport	73.2	41.6	57.4	-0.5	91	09/10	29	09/26	1.21	-0.22	85

September 2018 Highlights

Monthly Rankings

Precipitation in inches, Temperature in degrees F

Warmest	**Temperature / Ranking**	**Record / Year**	**Period of Record**
Grand Junction, CO	71.8 / 2nd warmest	72.0 / 1979	1893-2018
Colorado Springs, CO	66.5 / 4th warmest	67.3 / 2015	1895-2018
Rawlins, WY	59.9 / 4th warmest	63.1 / 1998	1951-2018
Cheyenne, WY	62.5 / 5th warmest	64.7 / 2015	1873-2018
Laramie, WY	57.8 / 5th warmest	59.2 / 1998	1948-2018
Denver, CO	67.8 / 6th warmest	69.4 / 2015	1872-2018
Akron, CO	66.4 / 7th warmest (tie, 2013+)	68.9 / 1998	1937-2018
Pueblo, CO	69.7 / 9th warmest	72.0 / 2015	1888-2018
Wettest / Driest	**Precipitation / Ranking**	**Record / Year**	**Period of Record**
Sioux Falls, SD	7.32 / 4th wettest	9.26 / 1986	1893-2018
Lincoln, NE	7.13 / 6th wettest	8.32 / 1914	1887-2018
Salina, KS	5.39 / 7th wettest	12.05 / 1967	1948-2018
Grand Junction, CO	T / DRIEST (tie)	T / 1953+	1893-2018
Rawlins, WY	0.02 / DRIEST	0.10 / 1957+	1951-2018
Laramie, WY	0.07 / 4th driest	T / 1956	1948-2018
Cheyenne, WY	0.09 / 9th driest (tie, 1908)	0.00 / 1879	1871-2018
Scottsbluff, NE	0.13 / 9th driest (tie, 1983+)	T / 1953	1893-2018
Lander, WY	0.05 / 10th driest (tie, 1917)	T / 1932+	1892-2018

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North Dakota Climate Summary

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Precipitation:

Based on the National Centers for Environmental Information (NCEI), the statewide average September precipitation was 1.72 inches, which was 0.08 inch more than last month but 0.75 inch less than in September 2017, and only 0.01 inch more than the 1981-2010 average, making it the 51st driest September in the 124-year period of record. It was the driest September since 2015. The numbers less than 100 in Figure 1 below are are shaded in yellow and red to depict the region with below-average rainfall. In contrast, the numbers that are greater than 100 in the same figure are shaded in green and blue to depict the region with above-average rainfall in September. The greatest monthly precipitation accumulation was 3.87 inches, recorded in Bismarck, Burleigh County. The greatest 24-hour precipitation was 2.10 inches, recorded in Ashley, McIntosh County, on Sept. 21. Based on historical records, statewide September precipitation showed a positive long-term trend of 0.28 inch per century since 1895. The highest and lowest September precipitation for the state ranged from 4.68 inches in 1941 to 0.2 inch in 2012.

Temperature:

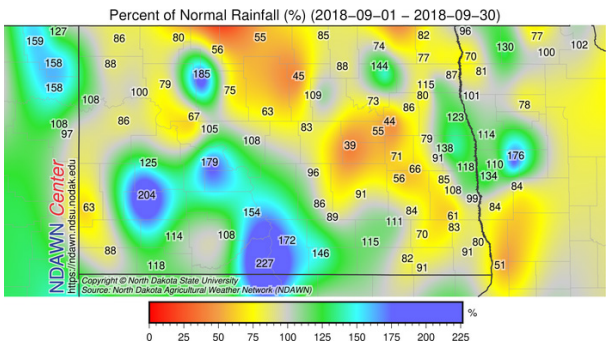
The official state average September temperature was 55.6.7 F, 12 F cooler than last month and 2.7 F cooler than in September 2017. The average September temperature was 1.3 F cooler than the 1981-2010 average, making it the 47th coolest September in the 124-year period of record. It was the coolest September since 2010. The positive numbers in Figure 2 below are shaded in yellow and red to depict the region with above-average temperature. In contrast, the negative numbers in the same figure are shaded in green and blue to depict the region with below-average temperature in September. The state's highest and lowest daily temperatures ranged from 95 F on Sept. 17 in Lisbon, Ransom County, to 20 F on Sept. 28, in Crosby, Divide County. Based on the historical records, the state average September temperature showed a positive long-term trend of 0.17 F per decade since 1895. The highest and lowest monthly state September average temperatures ranged from 63.5 F in 1897 to 45.5 F in 1965.

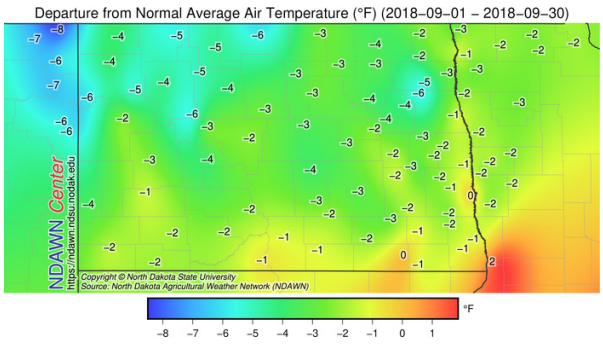
Drought and other notable impacts:

In general, overall drought conditions worsened throughout the month. By the end of September, D2 (severe drought) or worse covered nearly 17 percent of the state, 1.5 percent of which was under D3 (extreme drought). The Sept. 25 map shows more than 44 percent of the state experiencing drought (18 percent increase in coverage, compared with the previous month).

NDAWN's highest peak gust in September was 50 mph, recorded at the Streeter weather station in Stutsman County on Sept. 14, 2018. The NOAA Storm Report reported a total of 23 significant storm events in September. Across the observation network of weather stations with at least 30 years of history, a total of eight daily high and 14 daily low-temperature-related records were set or tied. A total of 18 highest daily precipitation-related records were set or tied.

Temperature and Precipitation Overview





Above: Percent of normal precipitation (left, figure 1) and departure from normal average temperature (right, figure 2) for September 2018 in North Dakota. Both figures produced by NDAWN.

Kansas Climate Summary

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Kansas Weather Data Library, Kansas State University
For more information: www.ksre.ksu.edu/wdl

KANSAS STATE UNIVERSITY

Variability was key

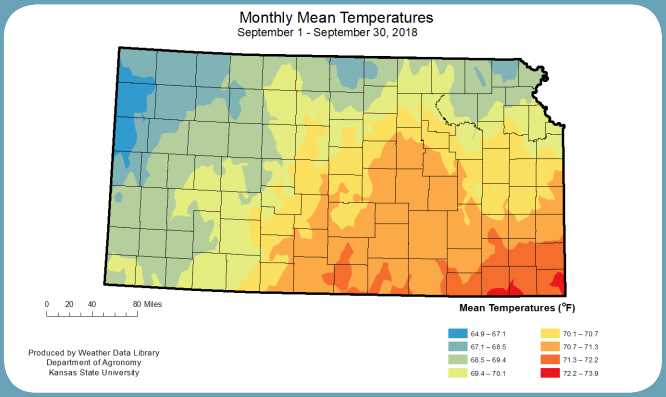
Average divisional precipitation ranged from 0.98 inches in the Northwest Division to 4.36 inches in the North Central. This resulted in a 0.56 inch deficit in the Northwest (61% of normal) and a 1.73 inch surplus in the North Central (164% of normal). State-wide average was 1.36 inches, which is a 0.66 inch surplus, or 133 percent of normal. The greatest monthly total for a National Weather Service Cooperative station was at Marysville, Marshall County, with 12.23 inches. The Community Collaborative Rain, Hail and Snow network station with the greatest monthly precipitation was Manhattan 3.7 N, Riley County, with 11.37 inches. Among the Kansas Mesonet stations, the Manhattan station on the North Farm, had the greatest monthly total with 8.00 inches. Most of the rainfall occurred during the first week of the month, particularly over the Labor Day weekend. The flooding produced by the intense rains resulted in a Governor's disaster declaration that covered 5 counties: Jewell, Kingman, Marshall, Pratt and Riley.

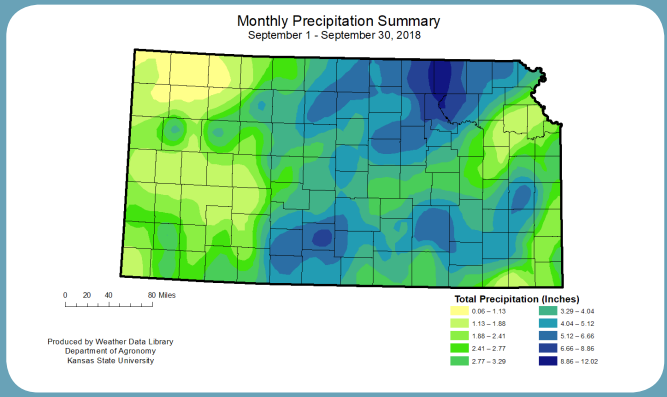
Temperatures also were highly variable. State-wide average temperature for the month was 69.9 oF, which is 1.8 degrees warmer than normal. All divisions were warmer than normal. The Northwest Division had the largest departure, with an average of 67.9 oF, or 2.6 degrees warmer than normal. The South Central Division came closest to normal with an average of 71.3 oF or 1.1 degrees warmer than normal. The variablility showed in the range of temperatures. The warmest maximum temperature was 105 oF at Johnson, Stanton County, on the 1st. The coldest minimum temperature was 30 oF, recorded at Brewster 4W, Sherman County, on the 27th. There were 10 record daily high maximum temperatures in the month, and 10 record daily low maximum temperatures. On the minimum temperature side, there were 27 record high minimums compared to only one record low minimum.

While hail and high winds were again major contributors to severe weather in Kansas during September, the big story was the Labor Day flood event. Damage in these counties featured washed out roads, bridges, culverts and flooding to some businesses and residential properties. Complete damage estimates are not yet available. There was one tornado report during the month consisting of land spout funnels in Hamilton County, on the 3rd. They were short lived.

The near normal temperatures in the West moderated the impacts of below normal precipitation. Drought was completely removed from the west, and greatly improved in the central divisions. Exceptional drought continues in eastern Kansas, and extreme drought has shifted into East Central Kansas. Currently, over 77 percent of the state is drought free, while under 1 percent is in exceptional drought conditions. The October outlook has increased chances for above normal precipitation across most of the state. However, a more even distribution across the month will be needed to continue improvement of drought conditions across the state. The temperature outlook is for warmer than normal temperatures statewide.

Temperature and Precipitation Overview





Above: September 2018 departure from normal monthly mean temperatures (left) and total precipitation (right) in Kansas. Maps produced by Weather Data Library, Department of Agronomy, Kansas State University.

Nebraska Climate Summary

Martha Shulski - State Climatologist
Nebraska State Climate Office, University of Nebraska-Lincoln
For more information: https://nsco.unl.edu/

NEBRASKA STATE CLIMATE OFFICE

This September saw nearly triple-digit heat, below-freezing temperatures and record-setting rainfall. The month overall averaged 3 degrees warmer than normal at 65.9°F for the statewide average. The strongest departures were in southcentral Nebraska where temperatures were more than 4°F above the September average. Several locations met or exceeded daily high temperature records during the third week of the month: Omaha saw 95°F on Sept. 20; Lincoln saw 96°F on Sept. 20; North Platte saw 94°F on Sept. 16; Valentine saw 99°F on Sept. 11 and 96°F on Sept. 16. The September statewide high of 99°F was observed at Valentine and McCook, but all observing stations reported monthly highs of 90°F or above. Below-freezing temperatures did occur in portions of western Nebraska – Alliance, Chadron, North Platte, Scottsbluff and Sidney, to name a few. The median date of first freeze in the fall ranges from early September in the Panhandle to mid-October in the southeast. Severe weather events included one landspout tornado on Sept. 19, 14 hail reports and 27 high wind reports.

Precipitation

The big story for September was the heavy rain received in the southeast portion of the state at the start of the month. For more than a dozen stations, rainfall totaled more than 3 inches early in the month. Lincoln reported 2.41 inches on Sept. 2 and Hastings reported 2.68 inches on Sept. 4, both of which were daily records. The highest daily total was observed near Weeping Water with 6.08 inches. Monthly totals ranged from 0.5 – 1 inch in the west to more than 6 inches in the southeast. Observing stations around Lincoln reported more than 8 inches, which is more than twice the average amount. Precipitation amounts were less than 75 percent of normal for portions of western, central, and northeast Nebraska; while rainfall was 150 percent of normal for a large portion of eastern Nebraska. The statewide average precipitation was 2.6 inches, which is 0.43 above normal for September.

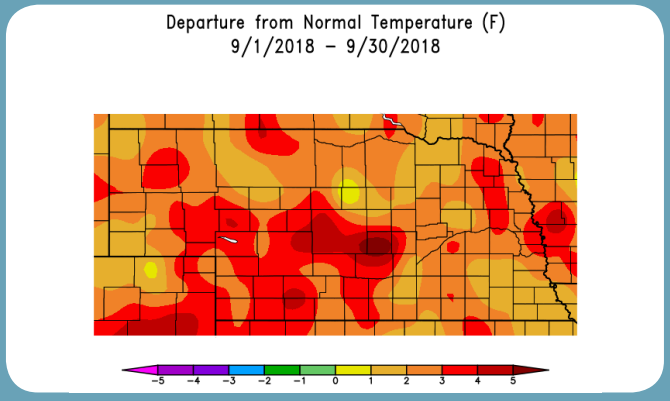
Drought

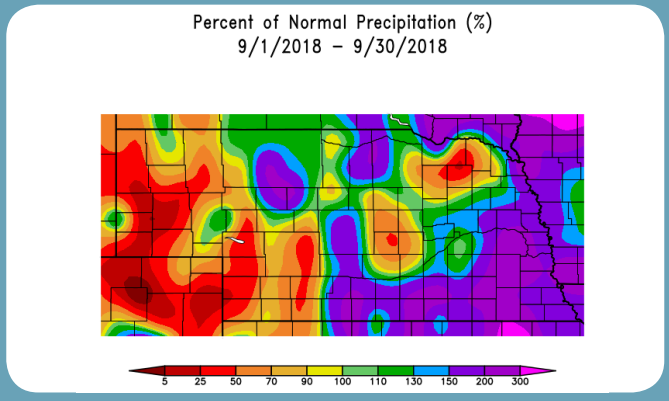
Nebraska began September with a small portion of southern Pawnee and Richardson counties classified as abnormally dry (D0), according to the U.S. Drought Monitor. This swath was eliminated due to rainfall received in this area. In the Panhandle and west central Sandhills, Nebraska Extension is reporting concerns of surface dryness as wheat establishment is getting underway. However, the recent storm system crossing Nebraska should help.

Agriculture

Some areas of Nebraska are ahead on corn and soybean harvest when compared to the last five years. This is due to early maturation with warmth early in the growing season. However, portions of the state are experiencing harvest delays due to the recent rains, which are expected to continue into the short term. The major concerns for soybean harvest is worst in northeast, east central and southeast Nebraska. These areas of the state have not had enough time to dry between rain events and cloud cover has kept bean moisture above 15 percent, making combining difficult. Other major concerns for unharvested corn are decreased stalk integrity, which affect the corn's ability to withstand winds and periodic heavy rain events.

Temperature and Precipitation Overview





Above: September 2018 departure from normal temperature (left) and percent of normal precipitation (right) in Nebraska. Maps produced by the Applied Climate Information System.

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.

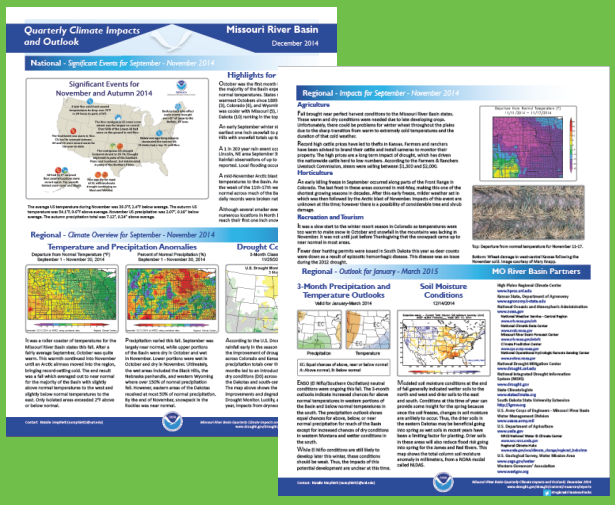
Much of the data and products found throughout this publication were built on the Applied Climate Information System (ACIS) framework. ACIS was designed to manage the complex flow of information from climate data collectors to the end users of climate data information. The main purpose of ACIS is to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

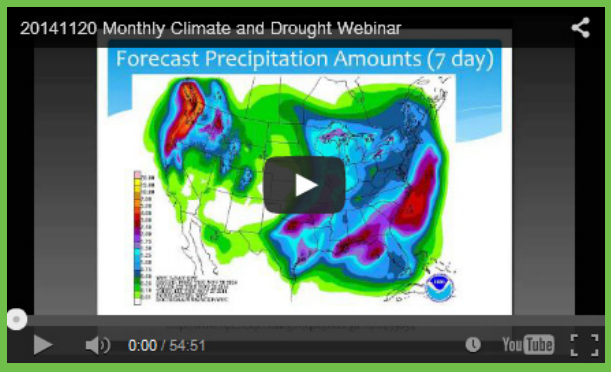
Additional Summary Information for the High Plains

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



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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