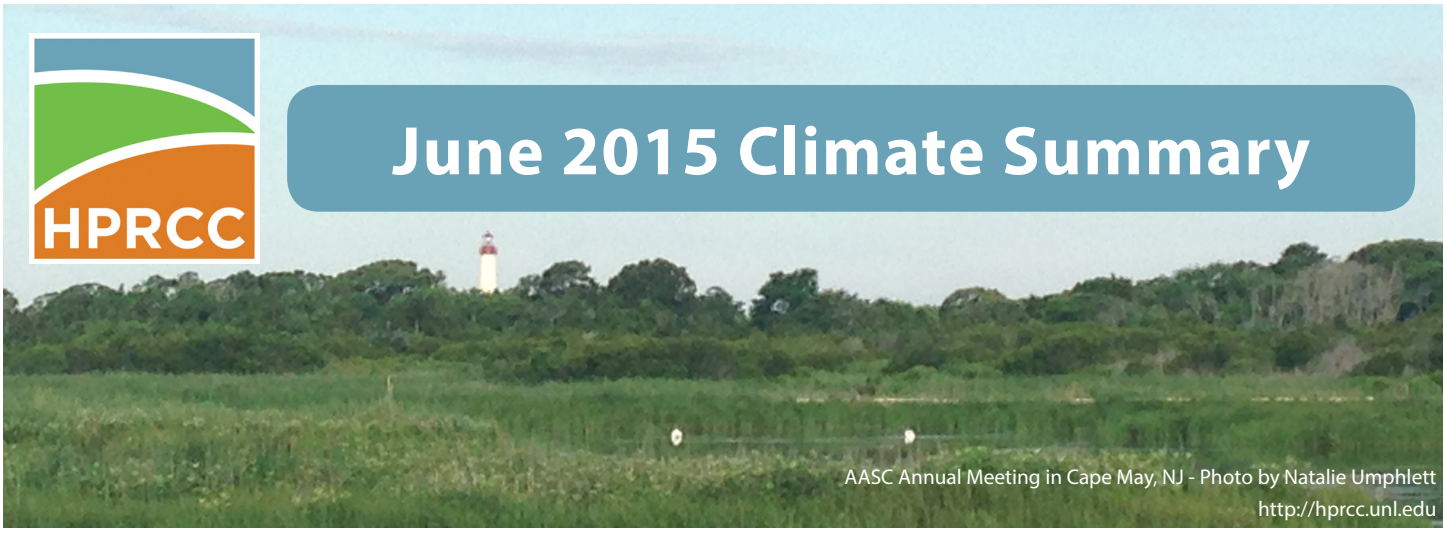
June 2015 Climate Summary



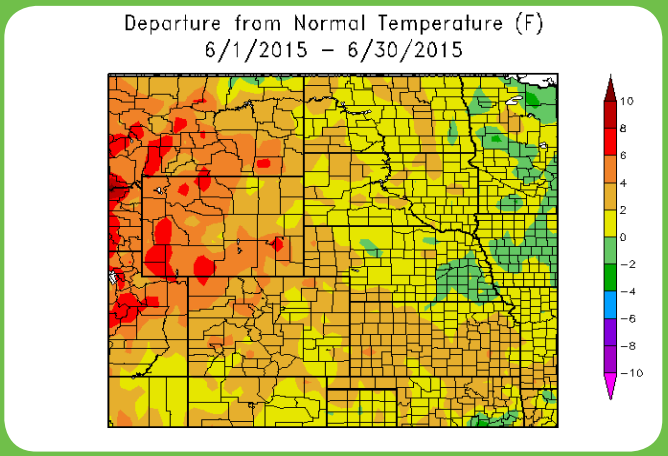
A Switch to Warmer Weather

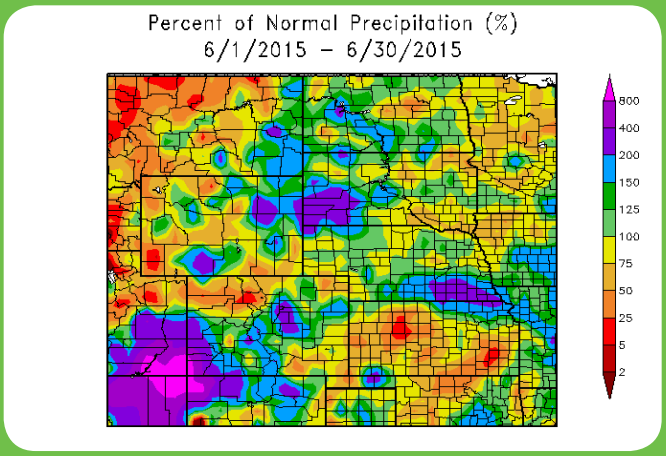
It was a month of extremes across the U.S. this June. After having their wettest month ever, Texas and Oklahoma were dealt another blow with flooding triggered by Tropical Storm Bill. Flooding also occurred in neighboring states as its remnants moved off to the north and east. On the other end of the spectrum, hot and dry weather continued in the West, while drought conditions started to emerge in portions of the Southeast. A strong ridge in the West brought record breaking warmth to the Pacific Northwest, with numerous shattered records. Preliminary data suggest that two locations in Washington set a new all-time record high for June of 113 degrees F (45.0 degrees C).

The strong ridge in the West impacted portions of the Missouri River Basin as areas of Wyoming, Montana, and northwestern Colorado had average temperatures in the 4.0-8.0 degrees F (2.2-4.4 degrees C) above normal range. Elsewhere across the High Plains region, temperatures were generally within 2.0 degrees F (1.1 degrees C) of normal, while larger departures on the warm side occurred in areas of Kansas, Colorado, and Wyoming. Meanwhile, precipitation varied across the region with heavy precipitation falling in areas of southeast Nebraska, the Black Hills of South Dakota, and parts Colorado including the Four Corners area and some locations along the Front Range. Most other areas of the region were near normal, however most of Kansas, northwestern Colorado, and southwestern Wyoming largely missed out on precipitation this month.

The severe weather season continued with 980 reports across the High Plains region. Of this total 68 were tornado reports, 574 were hail reports, and 338 were wind reports. A notable event occurred during the afternoon and evening of June 27th in eastern North Dakota. According to the National Weather Service in Grand Forks, North Dakota, a tornado outbreak occurred with at least 19 confirmed tornadoes (18 in North Dakota and 1 in Minnesota). Luckily, these tornadoes tracked through open lands and did minimal damage.

Temperature and Precipitation Overview





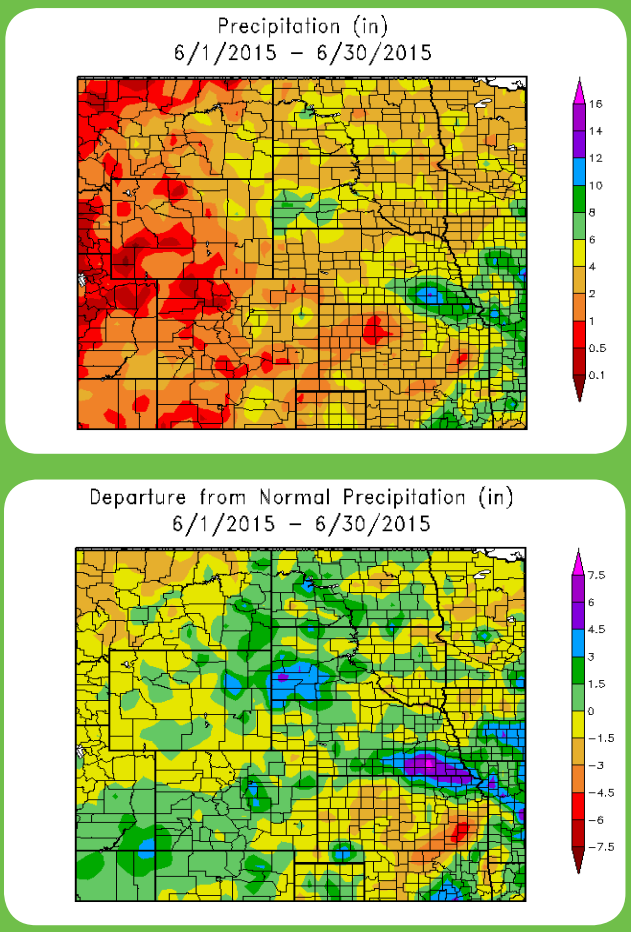
Above: Departure from 1981-2010 normal temperature (left) and percent of normal precipitation (right) for June 2015 in the High Plains region. Maps produced by the High Plains Regional Climate Center and are available at: http://hprcc.unl.edu/maps/current .

Precipitation

For many parts of the High Plains region, heavy rain continued to fall this month. Areas receiving greater than 200 percent of normal precipitation included parts of southeastern Nebraska, the Black Hills of South Dakota, the Four Corners region, and parts of the Front Range in Colorado. The only widespread dryness occurred in Kansas where much of the state had precipitation totals that were less than 75 percent of normal.

Many interesting precipitation records have occurred over the past two months. For instance, after having its wettest month ever in May, Colorado Springs, Colorado had its 4th wettest June with 5.72 inches (145 mm). This precipitation pushed Colorado Springs' two month total to 13.85 inches (352 mm), marking the wettest May/June on record (period of record 1894-2015). Additionally, this has been the wettest first half of any year on record in Colorado Springs with 17.95 inches (456 mm). Southeast Nebraska continued to receive heavy rainfall this month as well, with many locations topping 10 inches (254 mm). Crete, Nebraska, located to the southwest of Lincoln, had an impressive June total of 12.22 inches (310 mm), which ranked 4th wettest in its 122 year record. Like Colorado Springs, Crete also had its wettest May/June with 25.68 inches (652 mm). For perspective, the annual normal precipitation for Crete is 29.46 inches (748 mm). Western South Dakota was also a wet area, with stations in and around the Black Hills ranking in the top 10 wettest Junes on record. With 7.12 inches (181 mm), Rapid City, South Dakota had its wettest June on record (period of record 1942-2015). The old record of 7.00 inches (178 mm) occurred back in 1968.

Regional Precipitation



Above: Total precipitation in inches (top) and departure from normal precipitation in inches (bottom) for June 2015. These maps are produced by HPRCC and can be found on the Current Climate Summary Maps page at: http://hprcc.unl.edu/maps/current.

The bulk of the precipitation occurred during the first half of the month, which, in addition to flooding, created issues for producers. Some low lying fields were inundated or muddy, making it difficult or impossible to work in those fields. Additionally, rains have proved to be a challenge for the application of agricultural chemicals as applications have either been delayed or even lost due to the rainy conditions. Winter wheat continued to be impacted, especially across Kansas, Nebraska, and South Dakota where diseases such as stripe rust, leaf rust, and head scab have been reported. Additionally, a rare wheat disease called flag smut has been found in some fields in central and western Kansas. This is the first time in 80 years that the disease has occurred in Kansas. According to the Kansas Department of Agriculture, infestation levels are low and the disease is controllable.

Streamflow Update

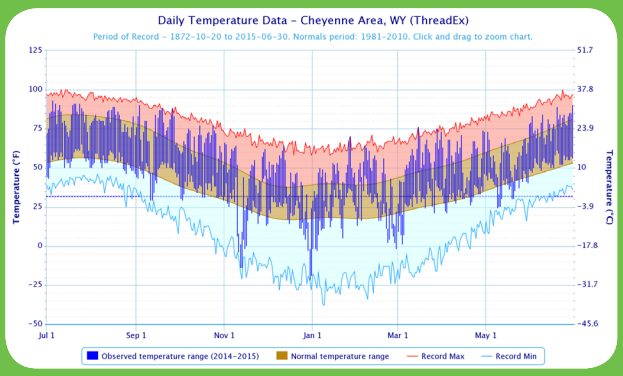
For the month of June, streamflow was largely normal to much above normal at gauges across the Missouri River Basin according to the United States Geological Survey (USGS). Record high streamflows occurred in parts of the Front Range in Colorado, the Black Hills in South Dakota, and areas of southeastern Nebraska and northeastern Kansas. Only parts of western Montana, north central Kansas, and southwestern Nebraska were below to much below normal.

High inflows have caused water levels to rise dramatically at Lake McConaughy, the largest reservoir in Nebraska. At the beginning of July, the lake was at 97 percent of capacity. According to the Central Nebraska Public Power and Irrigation District, if the lake rises to full capacity, this would be the first instance since 2011.

Temperatures

After a cool May, June was on the warmer side, especially for western portions of the High Plains region. Much of Nebraska, South Dakota, and North Dakota had monthly temperature departures within 2.0 degrees F (1.1 degrees C) above or below normal, while large areas of Kansas, Colorado, and Wyoming were at least 2.0 degrees F (1.1 degrees C) above normal. Western Wyoming was the warm spot this month, with departures in excess of 4.0 degrees F (2.2 degrees C) above normal. These warmer conditions caused many locations to be ranked in the top 10 warmest Junes on record, including Alamosa, Colorado (2nd), Lander, Wyoming (7th), Wichita, Kansas (9th), and Cheyenne, Wyoming (10th).

Station Spotlight: Cheyenne, WY



Above: Daily temperatures along with extremes and normals values over the past year in Cheyenne, WY.

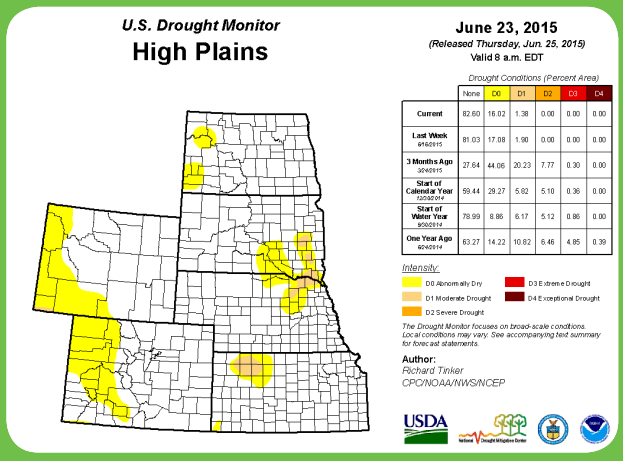
Much of the warmth experienced this month was not due to extreme maximum temperatures, but rather very warm minimum temperatures. This is illustrated well by the temperature graph of Cheyenne, Wyoming where not a single minimum temperature went below normal this month. Cheyenne's minimum temperatures for the month of June ranked as the second warmest on record (period of record 1872-2015).

An interesting impact to temperatures occurred at the end of the month when smoke from fires in Alaska and Canada made its way down through the Plains, extending as far south as northern Oklahoma. The smoke created hazy conditions which reduced incoming solar radiation (important for plant development), suppressed temperatures, and allowed for beautiful sunsets and moonrises. For some areas, the smoke also impacted air quality, making it unhealthful for sensitive groups to be outside.

Drought Conditions

After a record setting May, heavy rains continued into June, alleviating much of the remaining drought conditions in the High Plains region. Over the past month, the total area in drought (D1-D4) decreased from around 7 percent to a little over 1 percent. The last time the High Plains region had this little drought coverage was back in the summer of 2010 when, for several weeks, the region had an areal drought coverage of only 1-2 percent. Over the past month, all drought was eliminated in Colorado and abnormally dry conditions (D0) were all that remained at the end of June. Additionally, drought conditions improved or were eliminated in eastern South Dakota, northeastern Nebraska, and southwestern Kansas.

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/.

Only a few areas of moderate drought conditions (D1) remained at the end of the month, including a small area of northwestern Kansas, a sliver of southwestern Wyoming, and spotty areas extending from northeastern Nebraska into southeastern South Dakota. D0 decreased over the past month and is now confined to western portions of Wyoming and Colorado, in addition to some areas of western Kansas, northeastern Nebraska, southeastern South Dakota, and western North Dakota. The latest outlooks indicate that all drought conditions in the region should be eliminated over the summer or early fall, with the exception of extreme southwestern Wyoming. The small area of D1 is expected to persist through September, however further expansion into Wyoming is not anticipated.

Climate Outlooks

El Niño conditions continue and, according to the Climate Prediction Center, there is a 90 percent chance that these conditions will continue through the fall and an 85 percent chance that conditions will continue through the winter. El Niño impacts are most pronounced in the winter, so stay tuned for more details as the year progresses. 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.

The excessive moisture during May and the beginning of June could continue to have impacts throughout the remainder of the summer as this moisture will create muggy conditions, even with the chance of cooler conditions as described below. If proper precautions are not taken, warm and humid weather can lead to dangerous conditions for those spending time outdoors this summer.

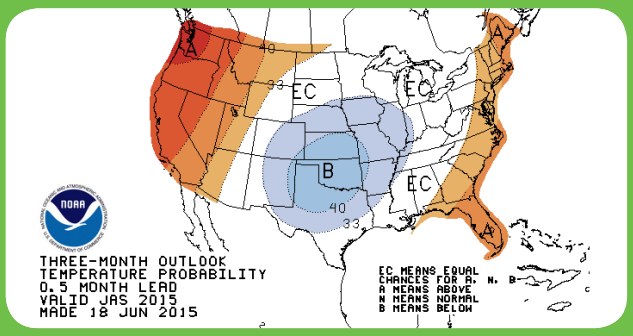
Temperature

The temperature outlook through September shows a higher probability of above normal temperatures for the western third of the U.S. and areas along the east coast, while much of the central part of the country could experience below normal temperatures. For the High Plains Region, an increased chance for above normal temperatures includes the western half of Wyoming and portions of northwest North Dakota. Increased chances for below normal temperatures exist for the entire state of Kansas, much of eastern and central Colorado, the majority of Nebraska, and southeastern South Dakota. Other areas of the region have equal chances for above, below, or near normal temperatures.

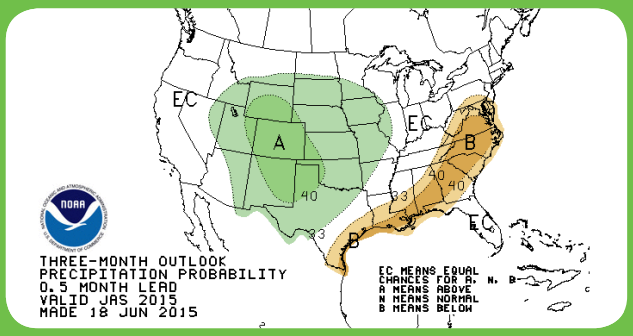
Precipitation

The precipitation outlook for the next three months shows a higher probability for above normal precipitation across much of the western and central U.S. For the High Plains region, this includes Wyoming, Colorado, Kansas, Nebraska, South Dakota, and southern North Dakota. Above normal precipitation should alleviate any remaining drought in the region, however flood chances could increase. Meanwhile, below normal precipitation could occur for a swath extending from southern Texas through the Deep South and as far north as Pennsylvania. The remainder of the contiguous U.S. has equal chances for above, below, or near normal precipitation.

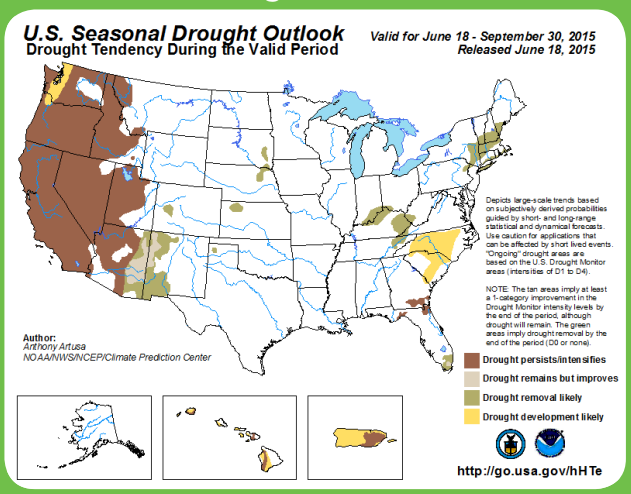
Temperature Outlook



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. For more information on these outlooks, produced by the Climate Prediction Center, see: http://www.cpc.ncep.noaa.gov.

Drought

The June 18th release of the U.S. Seasonal Drought Outlook shows that the remaining areas of drought in the High Plains region could be removed by the end of September. Much of the drought in the western U.S., however, is expected to persist or intensify. Meanwhile, drought development is likely in portions of the Carolinas.

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	81.5	57.7	69.6	2.4	93	06/30	52	06/17+	1.05	-1.41	43
Alamosa San Luis Airport	81.7	44.4	63.1	3.5	92	06/22+	34	06/03	1.19	0.70	243
Colorado Springs Municipal Airport	81.2	55.8	68.5	3.4	92	06/21	48	06/08	5.72	3.22	229
Denver International Airport	82.9	56.1	69.5	2.1	94	06/30	51	06/03	2.53	0.55	128
Grand Junction Walker Field Airport	89.4	58.7	74.0	2.0	101	06/30+	48	06/08+	1.19	0.73	259
Pueblo Memorial Airport	88.5	57.2	72.8	2.8	101	06/24	50	06/08+	1.22	-0.14	90

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	86.1	63.7	74.9	1.5	98	06/20	53	06/01	6.11	2.06	151
Dodge City Regional Airport	88.8	64.3	76.6	2.7	100	06/22	57	06/27+	2.08	-1.16	64
Goodland Renner Field	86.0	59.3	72.7	3.0	95	06/30+	54	06/27+	2.31	-0.94	71
Topeka Municipal Airport	86.8	67.1	77.0	2.8	98	06/20	56	06/02	6.22	0.82	115
Wichita Mid-Continent Airport	91.0	69.1	80.0	4.2	100	06/30	59	06/01	2.20	-3.00	42

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	81.3	56.5	68.9	3.0	96	06/30	50	06/03+	3.68	0.44	114
Grand Island Airport	82.6	60.4	71.5	0.2	96	06/09	54	06/23+	5.67	1.37	132
Lincoln Municipal Airport	84.8	62.1	73.4	0.8	99	06/10	54	06/16+	7.66	3.31	176
Norfolk Karl Stefan Airfield	81.7	60.1	70.9	0.7	97	06/09	51	06/01	4.60	0.34	108
North Platte Regional Airport	83.1	58.0	70.6	2.7	97	06/30	52	06/27	2.73	-0.69	80
Omaha Eppley Airport	83.4	63.4	73.4	1.3	97	06/09	54	06/01	4.61	0.43	110
Valentine Miller Field	81.1	57.0	69.1	1.6	95	06/09	50	06/12	3.42	-0.14	96

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismark Municipal Airport	78.3	54.4	66.4	1.7	92	06/29	45	06/04	4.98	1.81	157
Fargo International Airport	78.5	55.8	67.1	0.9	92	06/09	44	06/16	2.75	-1.15	71
Grand Forks International Airport	77.0	53.0	65.0	1.0	86	06/26	41	06/16	2.51	-0.97	72
Theodore Roosevelt Airport	76.6	52.1	64.4	2.2	92	06/29	43	06/15	2.93	-0.27	92
Williston International Airport	80.7	52.2	66.4	3.2	99	06/29	42	06/17	1.90	-0.62	75

All data are preliminary and subject to change. + indicates multiple dates, latest date listed.
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.

June 2015 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	81.6	56.4	69.0	3.4	98	06/09	48	06/12	2.10	-1.60	57
Huron Regional Airport	80.9	57.8	69.4	1.6	99	06/09	47	06/12	4.60	0.67	117
Pierre Regional Airport	80.7	57.5	69.1	1.4	96	06/09	49	06/12	6.16	2.59	173
Rapid City Regional Airport	78.0	56.2	67.1	2.6	91	06/09	49	06/01	7.12	4.59	281
Sioux Falls Joe Foss Field Airport	79.5	58.6	69.0	1.2	95	06/09	50	06/18	4.29	0.37	109

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	82.9	49.9	66.4	4.2	95	06/21	46	06/22+	1.50	-0.11	93
Cheyenne Municipal Airport	77.9	53.5	65.7	3.6	90	06/30	47	06/02	1.53	-0.81	65
Lander Hunt Field Airport	82.1	52.8	67.5	4.5	94	06/28	45	06/04	0.80	-0.47	63
Laramie Regional Airport	77.3	45.1	61.2	4.0	89	06/21	37	06/03	0.77	-0.77	50
Rawlins Municipal Airport	81.4	47.8	64.6	5.3	93	06/30	39	06/12	1.01	-0.02	98
Sheridan County Airport	79.9	52.0	65.9	4.3	95	06/29	45+	06/17	3.05	0.93	144

June 2015 Highlights

Monthly Rankings

Precipitation in inches / Temperature in degrees F

Wettest	**Precipitation / Ranking**	**Record / Year**	**Period of Record**
Colorado Springs, CO	5.72 / 4th wettest	8.00 / 1965	1894-2015
Mesa Verde NP, CO	2.01 / 7th wettest	3.89 / 1927	1922-2015
Crete, NE	12.22 / 4th wettest	13.39 / 1908	1893-2015
Falls City, NE	10.88 / 4th wettest	15.38 / 1949	1912-2015
Cottonwood 2 E, SD	6.79 / 2nd wettest	9.47 / 1967	1909-2015
Rapid City, SD	7.12 / WETTEST	7.00 / 1968	1942-2015
Warmest	**Temperature / Ranking**	**Record / Year**	**Period of Record**
Alamosa, CO	63.1 / 2nd warmest	64.5 / 2012	1906-2015
Salina, KS	79.4 / 6th warmest	81.9 / 1952	1948-2015
Wichita, KS	80.0 / 9th warmest	83.1 / 1953	1888-2015
Casper, WY	66.4 / 9th warmest	72.5 / 1988	1939-2015
Cheyenne, WY	65.7 / 10th warmest	68.0 / 2006	1872-2015
Lander, WY	67.5 / 7th warmest	72.5 / 1988	1891-2015
Worland, WY	71.7 / 4th warmest	75.0 / 1988	1907-2015

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Data are retrieved through the Applied Climate Information System (ACIS) and are available online through the CLIMOD system.
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North Dakota Monthly Climate Summary

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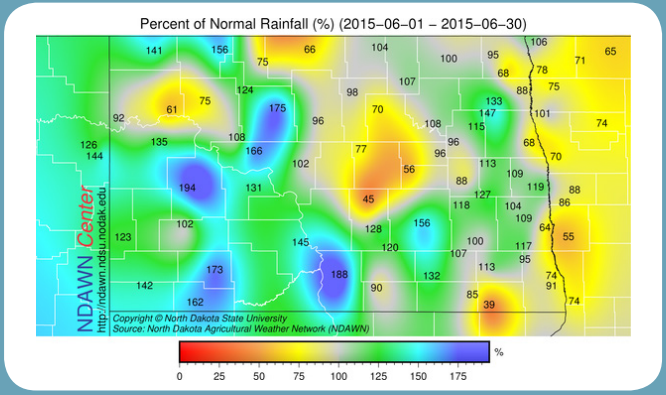
Precipitation:

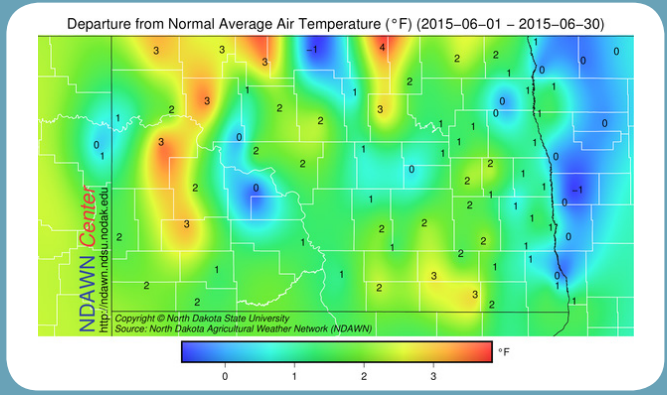
June is climatologically the wettest month of the year in North Dakota. A high percentage of that precipitation comes in the form of thunderstorms that drop highly variable rainfall amounts from one location to the next. Therefore, it is no surprise that rain totals varied greatly across the state during the month (Figure 1). The North Dakota Agricultural Weather Network (NDAWN) average rainfall was 3.76 inches which is above the average of 3.34 inches. That would rank the month as the 43rd wettest June statewide. The scattered above average rainfall during the month, plus the widespread excessive rain in May has eliminated all of the drought conditions in the state, although there are small portions of western North Dakota still listed in "Abnormally Dry" conditions on the Drought Monitor from June 30, 2015.

Temperature:

Much of North Dakota recorded temperatures between 1° and 3° above average during the month (Figure 2). The NDAWN statewide average temperature was 65.5 degrees which is 1.8 degrees above normal. That would rank the month as tied for the 47th warmest on record. Many of the thunderstorms that impacted the state occurred at night or left residual cloud cover during the overnight hours which attributed to warmer than average minimums on several occasions. That in turn played a dominant role in the above normal temperatures recorded. The warmest temperature recorded at any NDAWN station was 96° at Wyndmere on June 9 and at Watford City and Hofflund on June 29. The coldest temperature was 38° recorded at Bottineau on June 4.

Temperature and Precipitation Overview





Above: Percent of normal precipitation (left, figure 1, produced by NDAWN) and departure from normal average temperature (right, figure 2, produced by NDAWN) for June 2015 in North Dakota.

June 2015 Climate Summary

Kansas Climate Summary

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KANSAS STATE UNIVERSITY

Break in the Rains

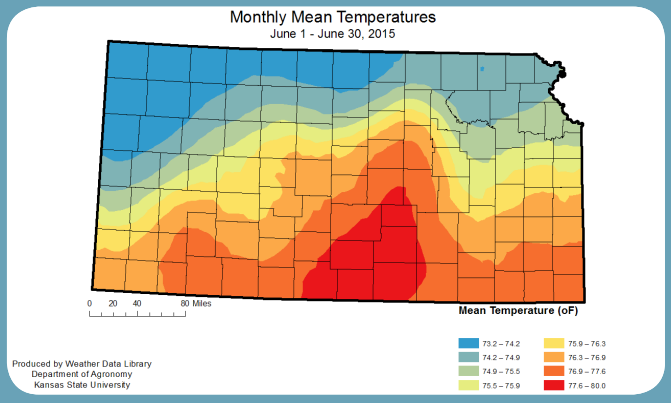
While June began on a wet note, most of the state saw lower than average precipitation for the month. State-wide average precipitation was 3.03 inches or 69 percent of normal. This ranks as the 33rd driest June on record. Only the Northeastern Division averaged above normal. The average precipitation for the Northeast was 6.94 inches or 134 percent of normal. Despite the overall lower than average precipitation, two locations in Southwest KS set daily precipitation records for June: Hugoton (Stevens County) with 3.90 inches on the 11th and Liberal (Stevens County) with 5.00 inches on the 12th. The greatest monthly total for the month was 10.46 inches at Bremen, Marshall County (NWS) and 9.54 inches at Blue Rapids 0.2 WSW, Marshall County (CoCoRaHS).

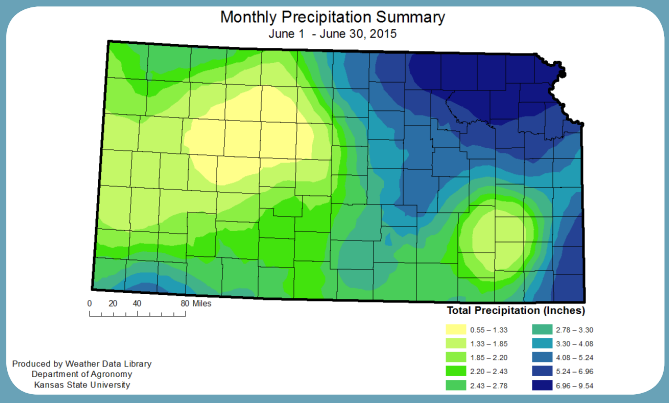
Temperatures averaged warmer than normal for the month. The statewide average temperature was 75.7F, which is 2.7 degrees warmer than normal. The Southwest Division had the greatest departure with an average of 76.8F, or 3.6 degrees warmer than normal. The North Central Division was closest to normal with an average of 74.6F or 1.3 degrees above normal. The warmest reading was 105F and occurred at two different locations and dates: Norton Dam (Norton County) on the 25th and Hill City (Graham County) on the 30th. This rapid switch from cool wet conditions to warm dry conditions have had mixed impacts. The dry weather allowed for rapid progress on wheat harvest and for field work such as haying. On the other hand, the warm temperatures stressed spring planted crops such as corn and soybeans that had limited root development. Despite the warmer than average conditions, there were only 8 new records set for high daily maximums. Most of the warmth was seen in new records on the low temperature side. There were 26 new daily records set for warm low temperatures and 21 records tied. There was one new record for a June daily warm low temperature: Garden City Experiment Station with a low of 75F on June 22nd. Previous record was 74F set on June 21, 1989.

The severe weather activity was less than last month. Preliminary data indicate there were 15 tornadoes reported during June, compared to 99 in May. Hail reports were also fewer with 83 in June versus 108 in May. There was an increase in damaging wind reports with 65 reports this month and only 52 reports last month.

Drought conditions continued to improve slightly as the wet end to May and wet start to June were included in the assessments. The only remaining moderate drought area is in Northwest and North Central KS, with a small area of abnormally dry conditions in the Southwest. Thirty seven counties in western Kansas remain in drought watch status according to the latest advisory from the Kansas Water Office. A return to normal or above normal precipitation is needed to sustain improvements. Some long-term hydrological deficits are in place affecting some water supplies and reservoirs. For example, Norton, Cedar Bluff, Kirwin, and Webster reservoirs are all less than 75 percent of conservation pool.

Temperature and Precipitation Overview





Above: June 2015 monthly mean temperatures (left) and total precipitation (right) in Kansas. Maps produced by Weather Data Library, Department of Agronomy, Kansas State University.

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.

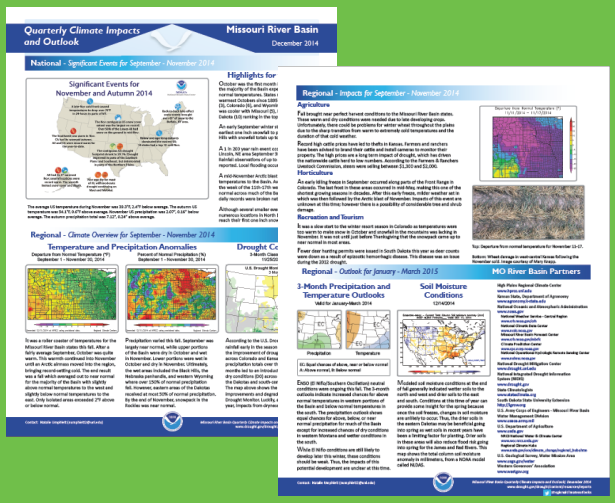
Much of the data and products found throughout this publication were built on the Applied Climate Information System (ACIS) framework. ACIS was designed to manage the complex flow of information from climate data collectors to the end users of climate data information. The main purpose of ACIS is to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

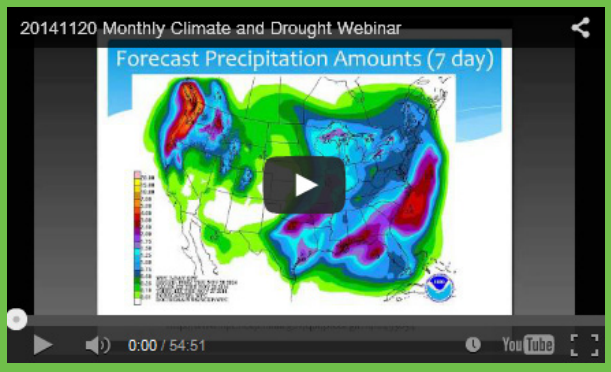
Additional Summary Information for the High Plains

Missouri River Basin Quarterly Climate Impacts and Outlook



For more information:
www.drought.gov/drought/content/resources/reports

Midwest and Great Plains Monthly Climate and Drought Webinar



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