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Elk Mountain AWDN station in Wyoming - Photo by Glen Roebke  
<http://hprcc.unl.edu>

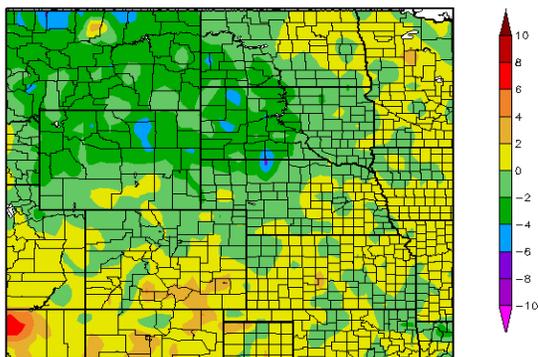
# June 2014 Climate Summary

## Region Breakdown

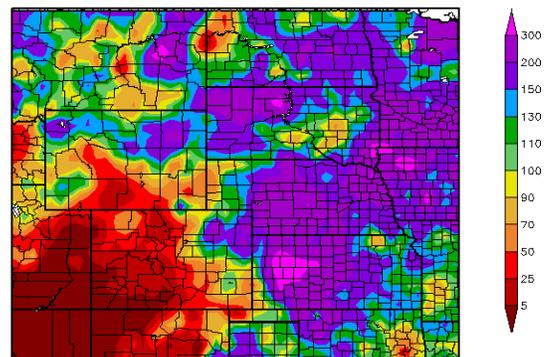
While most of the country had temperatures which were near normal, the upper Missouri River Basin was the cool spot in the nation with temperature departures generally up to 4.0 degrees F (2.2 degrees C) below normal. These lower temperatures were common across much of Montana, northern Wyoming, and the western sides of the Dakotas. Elsewhere in the High Plains Region, temperatures hovered around 2.0 degrees F (1.1 degrees C) above or below normal. Only a few locations in southern Colorado made it into the 2.0-4.0 degrees F (1.1-2.2 degrees C) above normal range.

Most areas did not experience record breaking temperatures, but a few isolated locations did break into the top 10. One of the cooler locations this month was Pierre, South Dakota. With an average temperature of only 64.4 degrees F (18.0 degrees C), Pierre had its 9th coolest June on record (period of record 1933-2014). The coolest June occurred in 1945 with 60.1 degrees F (15.6 degrees C). On the warm side was Trinidad, Colorado which had its 6th warmest June with 70.7 degrees F (21.5 degrees C). The record of 73.8 degrees F (23.2 degrees C) set in 2002 held (period of record 1899-2014).

Departure from Normal Temperature (F)  
6/1/2014 - 6/30/2014



Percent of Normal Precipitation (%)  
6/1/2014 - 6/30/2014



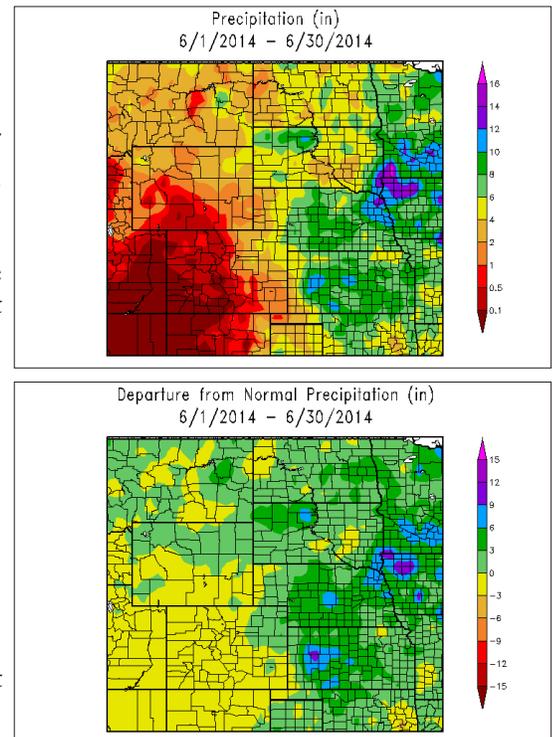
Departure from 1981-2010 Normal Average Temperature (left) and Percent of Normal Precipitation (right) for June 2014 in the High Plains Region. Maps produced by High Plains Regional Climate Center. Available at: <http://hprcc.unl.edu/maps/current>

## Precipitation Summary

The month of June brought a wide variety of weather to the High Plains Region. Much of southern Wyoming and western and central Colorado was dry with precipitation totals reaching 50 percent of normal at most. Alamosa, Colorado, located in the southern part of the state, had its 4th driest June on record with only 0.02 inches (1 mm) of precipitation. Only 3 other times had June been drier, with just a Trace, in 2011, 1980, and 1946 (period of record 1906–2014). Areas to the north and east, however dealt with multiple rounds of severe weather and heavy precipitation. In some areas, precipitation was quite welcome as this helped improve or eliminate drought and helped create excellent grazing and pasture conditions. However, areas with excessive rainfall dealt with flooding which washed out roads and bridges and inundated farmland. Some areas along the Missouri, Big Sioux, Souris, and Red Rivers experienced at least minor flooding. One example was the Big Sioux River which crested at 105.6 feet (32.2 m) at Sioux City. Luckily, this was lower than expected. A levee upstream failed and enough water flowed through the failure that flooding was not quite as bad as originally predicted. The record was 108.3 feet (33.0 m) set in 1969. Although not as bad as feared, buildings, houses, and farmland were inundated and a section of I-29 was closed several days.

The majority of Kansas, Nebraska, and the Dakotas were extremely wet this month with precipitation totals well over 150 percent of normal. The western half of Kansas, much of Nebraska, and northwestern and southeastern South Dakota had totals over 200 percent of normal with some locations even topping 300 percent of normal. Numerous locations ranked in the top 10 wettest Junes on record and flash flooding was common. Sioux Falls, South Dakota was one of these extremely wet locations with a June total of 13.70 inches (348 mm) which was 9.78 inches (248 mm) above normal, or 349 percent of normal precipitation. The old record of 8.43 inches (214 mm) set back in 1984 was absolutely crushed (period of record 1893–2014)! Sioux Falls experienced 19 days with measurable precipitation, of which there were 9 consecutive days of precipitation. This tied for the 2nd longest streak of measurable precipitation for any period. Only March of 1987 claims more, with 12. Preliminary data also suggest that Canton, South Dakota, located on the Big Sioux River just south of Sioux Falls received an incredible 19.65 inches (499 mm) of rain this month (period of record 1896–2014). According to the South Dakota State Climate Office, this is possibly the most rain ever received in one month in the whole state of South Dakota since records began. More details on the historic rainfall will be forthcoming, but more June precipitation rankings from around the Region are on page 5.

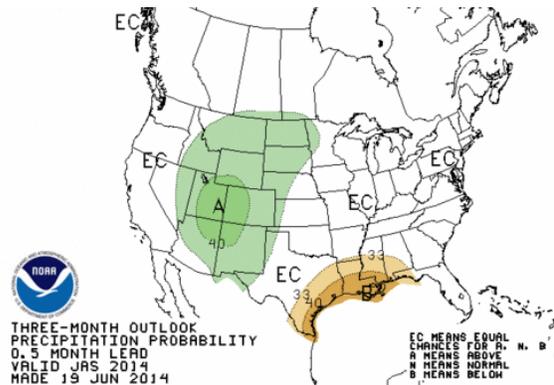
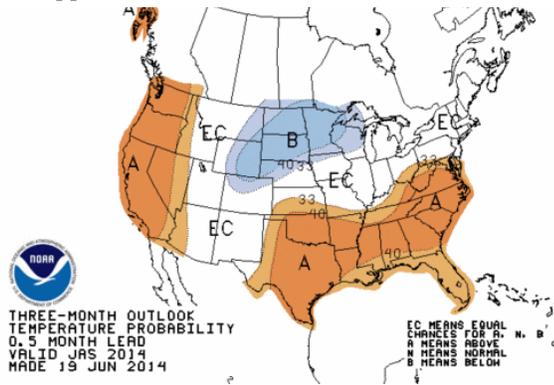
As mentioned earlier, June was an active month and has been the most active severe weather month this year in the U.S. - more than doubling the number of storm reports from May. Severe weather was a major issue in the High Plains Region with 1,681 total storm reports including 156 tornado reports, 794 hail reports, and 731 wind reports. Severe weather was reported somewhere in the Region every single day this month with the most reports occurring on the 3rd and 14th. The town of Pilger, Nebraska took a direct hit by an EF-4 tornado on the 16th. According to the National Weather Service Office in Valley, Nebraska 5 tornadoes were confirmed in the Pilger area, 4 of which were rated as EF-4 tornadoes and one as EF-0. Another EF-4 tornado occurred near Alpena, South Dakota on the 18th. In addition to the structural damage from the severe weather, agriculture also took a hit. Damage to crops, irrigation equipment, and grain storage occurred and livestock losses were reported as well. In regards to crops, some producers have been able to replant, however others were still making those decisions at the end of the month.



Above: Total precipitation (inches) (top) and Departure from Normal Precipitation (inches) (bottom) for June 2014 in the High Plains Region. These maps are produced by HPRCC and can be found on the Current Climate Summary Maps page at: <http://hprcc.unl.edu/maps/current>.

# Climate Outlook

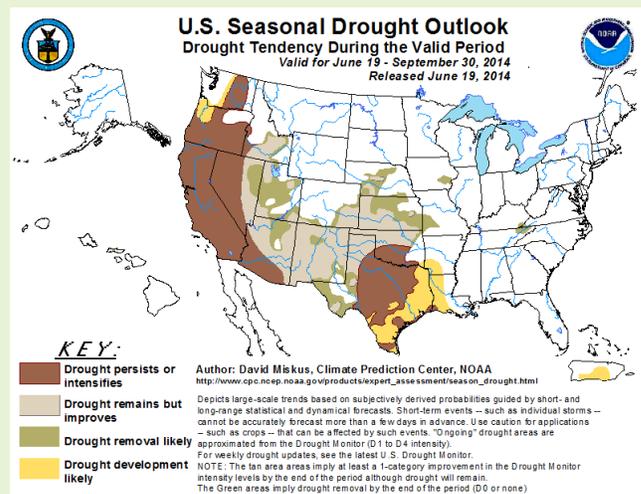
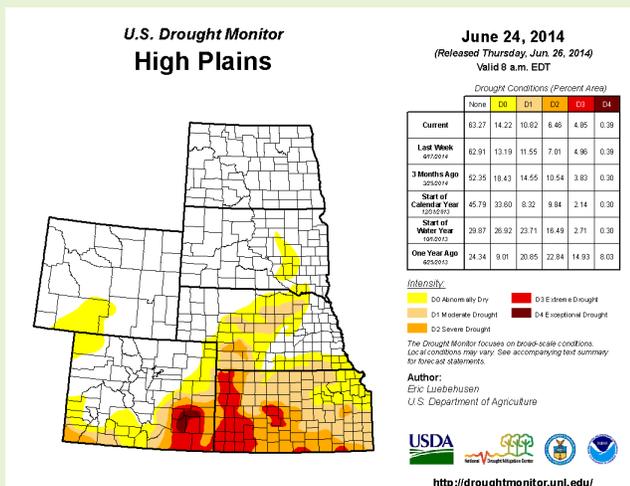
ENSO-neutral conditions held on this month; however it is likely that El Niño conditions will develop with increasing chances through the fall and winter. For the next three months, the temperature outlook indicates that a higher probability of below normal temperatures exists for the Dakotas and much of Wyoming, Nebraska, and northern Colorado. Only the southern half of Kansas has an increased probability of above normal temperatures. Meanwhile, the precipitation outlook shows a higher probability of above normal precipitation for a large area of the Region including Colorado, Wyoming, North Dakota, most of South Dakota, western Nebraska, and far western Kansas. All other areas in the Region have equal chances of above, near, or below normal temperatures and precipitation. The seasonal outlooks combine the effects of long-term trends, soil moisture, and when applicable, the El Niño Southern Oscillation cycle (ENSO).



Above: 3-Month Outlook Maps Courtesy the NOAA Climate Prediction Center - <http://www.cpc.ncep.noaa.gov>  
 (left) The Three-Month Temperature Probability Outlook, (right) The Three-Month Precipitation Probability Outlook

## Drought Watch

According to the U.S. Drought Monitor, major improvements in drought conditions occurred in the High Plains Region this month as heavy precipitation helped eliminate or ease drought conditions. Approximately 23 percent of the Region was in moderate (D1) to exceptional (D4) drought at the end of June, down from 33 percent at the end of May. The extreme precipitation in South Dakota allowed for the elimination of all drought conditions there. Only a bit of abnormal dryness (D0) remained. In Nebraska, drought conditions were eliminated in the east and reduced in the central and southern parts of the state. Meanwhile in Kansas, all D4 was eliminated and a 25 percent reduction occurred in the extreme drought (D3) coverage. Parts of eastern Colorado also received ample precipitation and drought conditions were eased there as well. Other drought areas of Colorado persisted. According to the U.S. Seasonal Drought Outlook released June 19th, current drought conditions are expected to improve or be removed in Nebraska, Kansas, and Colorado.



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). Real-time data provided through ACIS from the Regional Climate Centers are often used by the agencies involved in the U.S. Drought Monitor when determining the area and intensity of drought conditions, although the product itself is not produced by HPRCC. For current Drought Monitor information, please see: <http://droughtmonitor.unl.edu/>  
 Portions of this Drought Watch are courtesy the Drought Monitor Text Discussion found on the Drought Monitor webpage.

## State Summaries

Colorado	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Akron Washington County Airport	80.6	51.9	66.2	-1.0	92	06/03	42	06/15	3.82	1.36	155
Alamosa San Luis Airport	81.8	39.3	60.6	1.0	90	06/29	29	06/15+	0.02	-0.47	4
Colorado Springs Municipal Airport	82.1	51.7	66.9	1.8	96	06/29	41	06/10	1.29	-1.21	52
Denver International Airport	83.4	51.2	67.3	-0.1	94	06/26	42	06/15	1.82	-0.16	92
Grand Junction Walker Field Airport	87.1	54.3	70.7	-1.3	96	06/30+	41	06/09	0.13	-0.33	28
Pueblo Memorial Airport	89.8	55.5	72.7	2.7	103	06/30	41	06/10	0.86	-0.50	63

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	84.6	63.9	74.2	0.8	94	06/30	52	06/13	6.70	2.65	165
Dodge City Regional Airport	86.2	61.9	74.1	0.2	98	06/17	52	06/13	9.09	5.85	281
Goodland Renner Field	82.4	54.5	68.5	-1.2	95	06/03	42	06/10	5.53	2.28	170
Topeka Municipal Airport	85.6	66.5	76.0	1.8	94	06/30+	54	06/13	6.23	0.83	115
Wichita Mid-Continent Airport	85.5	66.9	76.2	0.4	93	06/30+	55	06/13	10.46	5.26	201

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	77.7	49.9	63.8	-2.1	94	06/21	40	06/12	2.75	-0.49	85
Grand Island Airport	83.6	61.8	72.7	1.4	96	06/18	49	06/13	9.65	5.35	224
Lincoln Municipal Airport	85.3	62.6	74.0	1.4	95	06/20+	46	06/13	5.90	1.55	136
Norfolk Karl Stefan Airfield	81.8	59.0	70.4	0.2	93	06/18	40	06/13	11.39	7.13	267
North Platte Regional Airport	81.0	54.6	67.8	-0.1	93	06/17+	43	06/10	8.75	5.33	256
Omaha Eppley Airport	83.4	63.7	73.5	1.4	93	06/20+	46	06/13	10.52	6.34	252
Valentine Miller Field	78.8	54.4	66.6	-0.9	92	06/21	42	06/12	8.63	5.07	242

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismark Municipal Airport	74.4	52.4	63.4	-1.3	90	06/21	41	06/13	3.02	-0.15	95
Fargo International Airport	77.5	56.9	67.2	1.0	89	06/21	44	06/08	5.69	1.79	146
Grand Forks International Airport	75.0	55.7	65.4	1.4	88	06/21	44	06/08	6.60	3.12	190
Theodore Roosevelt Airport	70.6	48.6	59.6	-2.6	81	06/26	37	06/12+	3.83	0.63	120
Williston International Airport	74.4	49.8	62.1	-1.1	85	06/21	33	06/12	1.44	-1.08	57

All Data are Preliminary and Subject to Change. + indicates multiple dates, latest date listed.

Source: National Weather Service Cooperative Observation Network Data

Data are retrieved through the Applied Climate Information System (ACIS).

These data are available for the entire period of record through the CLIMOD system. For more information please see <http://hprcc.unl.edu/services>.

## June 2014 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	76.0	51.1	63.5	-2.1	87	06/21	37	06/13	3.31	-0.39	89
Huron Regional Airport	79.2	54.7	66.9	-0.9	88	06/26+	42	06/08	2.37	-1.56	60
Pierre Regional Airport	75.5	53.3	64.4	-3.3	88	06/21	42	06/13	4.39	0.82	123
Rapid City Regional Airport	72.9	49.4	61.2	-3.3	84	06/26	41	06/12+	5.25	2.72	208
Sioux Falls Joe Foss Field Airport	78.4	58.2	68.3	0.5	90	06/20	44	06/13	13.70	9.78	349

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	77.2	42.9	60.1	-2.1	92	06/26	36	06/15+	1.35	-0.26	84
Cheyenne Municipal Airport	75.3	46.8	61.1	-1.0	87	06/13	36	06/15	1.98	-0.36	85
Lander Hunt Field Airport	76.8	45.3	61.1	-1.9	87	06/10	32	06/19	0.60	-0.67	47
Laramie Regional Airport	72.6	40.7	56.7	-0.5	86	06/26	29	06/09	0.76	-0.78	49
Rawlins Municipal Airport	76.1	42.5	59.3	0.0	87	06/26+	29	06/09	0.30	-0.73	29
Sheridan County Airport	72.8	45.0	58.9	-2.7	84	06/20	36	06/09	2.20	0.08	104

All Data are Preliminary and Subject to Change. + indicates multiple dates, latest date listed.

Source: National Weather Service Cooperative Observation Network Data

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These data are available for the entire period of record through the CLIMOD system. For more information please see <http://hprcc.unl.edu/services>.

## June 2014 Top 10 Precipitation Rankings - Highlights

Precipitation Rankings			
Precipitation in inches			
Location	Total Precipitation / Ranking	Record or Old Record / Year	Period of Record
Alamosa, CO	0.02 / 4th driest	Trace / 2011*	1906-2012
Dodge City, KS	9.09 / 2nd wettest	11.17 / 1899	1874-2014
Goodland, KS	5.53 / 9th wettest	9.46 / 1982	1895-2014
Salina, KS	8.19 / 4th wettest	12.49 / 1951	1948-2014
Wichita, KS	10.46 / 3rd wettest	14.43 / 1923	1888-2014
Grand Island, NE	9.65 / 3rd wettest	13.96 / 1967	1895-2014
Norfolk, NE	11.39 / 3rd wettest	12.28 / 1924	1893-2014
North Platte, NE	8.75 / 2nd wettest	10.47 / 1951	1874-2014
Omaha, NE	10.52 / 5th wettest	12.70 / 1883	1871-2014
Valentine, NE	8.63 / WETTEST	8.18 / 1905	1889-2014
Grand Forks, ND	6.60 / 10th wettest	9.52 / 1925	1893-2014
Sioux Falls, SD	13.70 / WETTEST	8.43 / 1984	1893-2014
Rapid City, SD	5.25 / 8th wettest	7.00 / 1968	1942-2014

All Data are Preliminary and Subject to Change.

\* indicates multiple records, latest year is listed

Source: National Weather Service Cooperative Observation Network Data

# State Spotlight - Kansas

Mary Knapp - Service Climatologist  
 Kansas State Climate Office, Kansas State University

## Rain Returns

Much of Kansas was wetter than normal in June. State-wide, the average precipitation was 7.25 inches which places it as the fifth wettest June since 1890. All divisions averaged wetter than normal, but distribution wasn't evenly spread even within the divisions. The West Central Division had the biggest departure from normal. The divisional average precipitation was 7.99 inches, which is 280 percent of normal, or 5.18 inches above normal. The Northeast Division was closest to normal with an average of 6.44 inches or 130 percent of normal. In the Southwest, extreme western counties continue to miss out on the major precipitation events. In Hamilton County, totals ranged from just over an inch near Kendall to almost 6 inches north of Syracuse. The greatest daily precipitation reported was 7.20 inches at Mullinville 12.5 S, Kiowa County on the 2nd from the Community Collaborative Rain Hail and Snow Network (CoCoRaHS). For the National Weather Service Cooperative Observer Network (NWS), the greatest daily precipitation report was 5.50 inches at Sylvan Grove 1NE, in Lincoln County on the 11th. There were 116 new daily rainfall records reported in June, although none of those reached monthly or all-time records.

The state-wide average temperature for the month was very close to normal, at 75.4F, or just 0.2 degrees warmer than normal. Again, the range of temperatures was quite wide. The warmest reading reported was 104F on the 18th at Lakin (Kearny County). The coolest reading was 41F, which was reported at several locations on the 10th: Brewster 4W (Thomas County) and Tribune 1W, Tribune 14N (Greeley County). Only two new daily maximum temperature records were set, both in western KS. There were 15 record low maximum temperatures recorded. On the cold side of temperatures, there were 23 new daily high minimum temperature records set, and three record low minimum readings set. There were no monthly or all-time records set in any of the temperature categories.

Severe weather was also a feature for the month. There were 33 tornadoes reported, but fortunately no fatalities. Hail and damaging winds were even more prevalent. There were also 394 reports of hail damage and 385 reports of wind damage. Given the heavy rains, it isn't surprising that flooding was also an issue in many locations. Garden City was particularly hard hit on the 28th after an early morning storm dumped over 4 inches on already saturated ground.

Drought conditions persist across the state. Only a tiny sliver of extreme Northeastern KS is in near normal conditions. However, the area of extreme drought has been reduced, particularly in Central and South Central KS. There was a small increase in extreme drought in extreme Southwestern KS, where rainfall was more limited. Nearly 45 percent of the state is now in extreme drought conditions and an additional 29 percent of the state is in severe drought. The wet June, and the neutral outlook for July, gives some hope that conditions will continue to improve. The El Niño/Southern Oscillation (ENSO) is expected to switch to an El Niño event by late summer, but remains to be seen what impact will be felt. The July temperature outlook is neutral state-wide, with an increased chance of cooler than normal temperatures in the desert Southwest through Colorado. The precipitation outlook is also neutral, with equal chances of above or below normal precipitation for July. This does not indicate how that moisture might be distributed, and means heavy rains or extended dry periods are both possible.

For more information about the Kansas State Climate Office: <http://www.ksre.ksu.edu/wdl/>  
 The KSU's AWDN is a part of the High Plains Automated Weather Data Network (AWDN). Data are available through KSU or HPRCC.

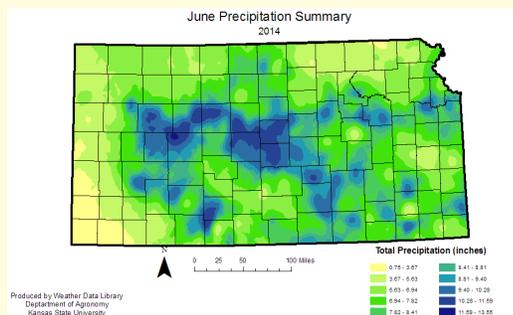


Figure 1. June 2014 total precipitation for Kansas (Kansas State Climate Office)

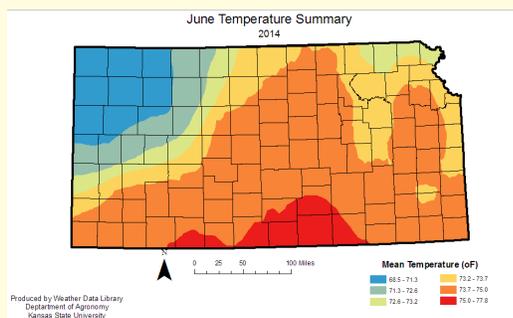


Figure 2. June 2014 average temperatures for Kansas (Kansas State Climate Office)

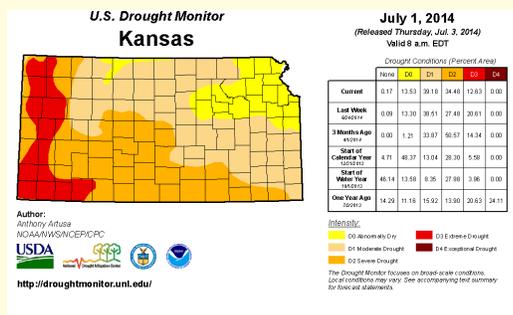


Figure 3. July 1, 2014 U.S. Drought Monitor map and statistics for Kansas (U.S. Drought Monitor)

# State Spotlight - North Dakota

**F. Adnan Akyüz - State Climatologist, Daryl Ritchison - Research Specialist**  
**North Dakota State Climate Office, North Dakota State University**



## Precipitation:

June 2014 in a word was wet. A high percentage of North Dakota recorded well above average rainfall during the month (Figure 1). The only exception was in west central North Dakota and a small area of near normal monthly rainfall around Wells County in the central part of the state. Using data from the North Dakota Agricultural Weather Network (NDAWN), the statewide average precipitation for the month of June was 4.69 inches. That is well above the June average of 3.34 inches. That would rank June 2014 as the 20th wettest on record. The U.S. Drought Monitor did not include any part of North Dakota in drought conditions.

## Temperature:

The average temperature during the month of June finished very near the 30 year average across all of North Dakota. The slightly below normal temperatures in western North Dakota were offset by the slightly warmer than normal temperatures across much of eastern North Dakota (Figure 2). The NDAWN stations recorded an overall average temperature of 63.2 degrees, right at the average of 63.3 degrees for the month of June. That would rank the month as tied for the 68th coldest June since such records began in 1895.

## Notable Weather:

The excessive rain was the most notable weather feature during the month of June in not only North Dakota but also for much of the upper Midwest and the northern plains. After a very difficult planting season attributed to the cool and moist conditions throughout much of May, the wet June did not allow for late season planting in many locations and for some, the heavy June rains flooded crops that were emerging.

The abundant moisture over the past several weeks has pushed the Palmer Drought Severity Index into the Extremely Moist or Very Moist values as the month of June ended (Figure 3). These moist conditions were also present in parts of South Dakota and Minnesota that were in drought conditions earlier in the year. That is a testament to how exceptionally wet the region has been in the past several weeks.

The above average rainfall during the month of June once again pushed area rivers above flood stage. The Red River Valley recorded high flows in the moderate flood stage in the southern part of the valley and minor flood stage levels were reached in the northern end of the valley. A heavy rain event during the last weekend in June in north central North Dakota also pushed the Souris (Mouse) River and tributaries well above flood stage.

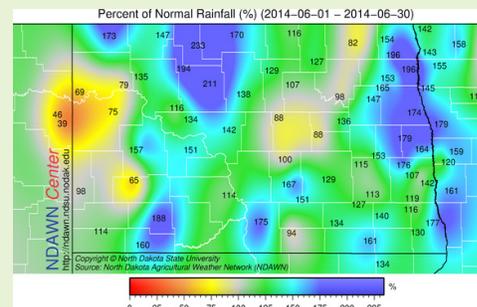


Figure 1. Percent of Normal Precipitation in June 2014 for North Dakota (NDSCO)

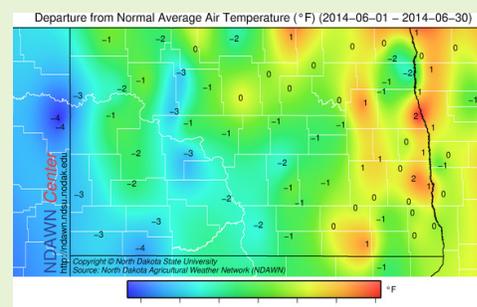


Figure 2. Temperature Departure from Normal in June 2014 for North Dakota (NDSCO)

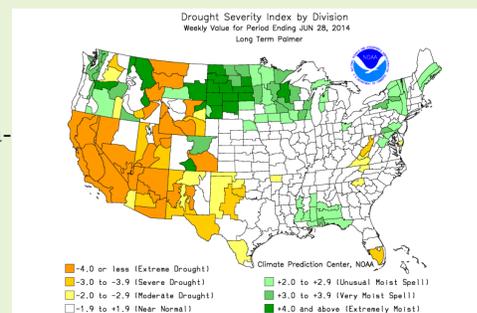


Figure 3. Palmer Drought Severity Index, June 28, 2014 (NOAA)

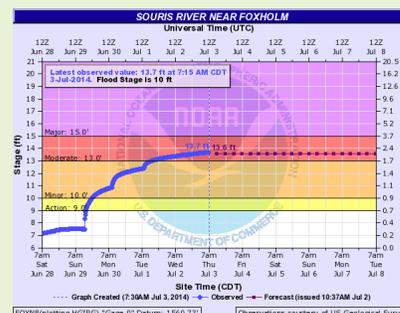


Figure 4. The Souris River level and projection at Foxholm, ND on July 3, 2014 (NWS)

# About the High Plains Regional Climate Center

The High Plains Regional Climate Center (HPRCC) operates out of the University of Nebraska - Lincoln (UNL) in Lincoln, Nebraska. As one of 6 regional climate centers throughout the nation, HPRCC works closely with other organizations such as the National Climatic Data Center (NCDC), Local and Regional National Weather Service (NWS) Offices, and other climate services organizations such as the National Drought Mitigation Center (also located at UNL) to provide climate data services and specialized climate products.

## For More Information Online

High Plains Regional Climate Center: <http://hprcc.unl.edu>

High Plains Regional Climate Services: <http://hprcc.unl.edu/services>

CLIMOD: <http://climod.unl.edu>

Regional Climate Centers and ACIS: <http://www.rcc-acis.org>

National Weather Service: <http://www.weather.gov>

National Climatic Data Center: <http://ncdc.noaa.gov>

University of Nebraska - Lincoln: <http://www.unl.edu>

National Drought Mitigation Center: <http://drought.unl.edu>

Climate Prediction Center: <http://www.cpc.noaa.gov>

NOAA Storm Prediction Center: <http://www.spc.noaa.gov>



Photo of the Nebraska Sandhills by Bill Sorensen - Senior Programmer - HPRCC

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