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Tree damage near AWDN site - Goehner, NE - Photo by Glen Roebke
<http://hprcc.unl.edu>

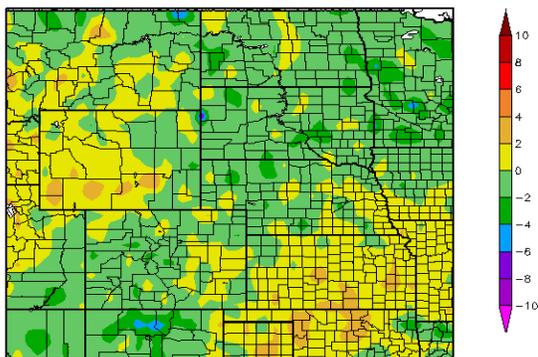
May 2014 Climate Summary

Region Breakdown

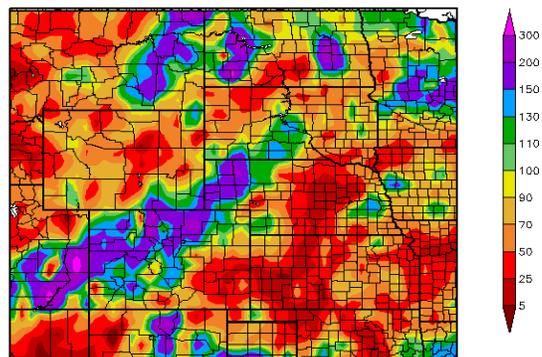
May 2014 average temperatures in the High Plains Region were near normal, within 2.0 degrees F (1.1 degrees C) above or below normal. These near normal average temperatures hid the extremes that occurred during the month. For instance, Wichita, Kansas went from near record cold of 35 degrees F (1.7 degrees C) on the 2nd to record warmth with 102 degrees F (38.9 degrees C) on the 4th. That turned out to be the earliest 100 degree F (37.8 degree C) day on record and completely smashed the old daily record of 94 degrees F (34.4 degrees C) set back in 1963 (period of record 1888-2014). Wichita was actually one of the few warmer locations in the Region and managed to have its 7th warmest May on record with an average temperature of 70.0 degrees F (21.1 degrees C).

These large swings in temperature put even more stress on the already struggling winter wheat crop in Kansas. Although the final assessment on the late freeze event is not yet available, by the end of the month 61 percent of the winter wheat crop in Kansas was in poor to very poor condition according to NASS. There have even been reports that crop insurance payments have already begun to be disbursed, which is quite early. Meanwhile, cooler air and soil temperatures have slowed planting in some northern areas of the Region. This delayed planting and development has some producers concerned for this year's harvest.

Departure from Normal Temperature (F)
5/1/2014 - 5/31/2014



Percent of Normal Precipitation (%)
5/1/2014 - 5/31/2014

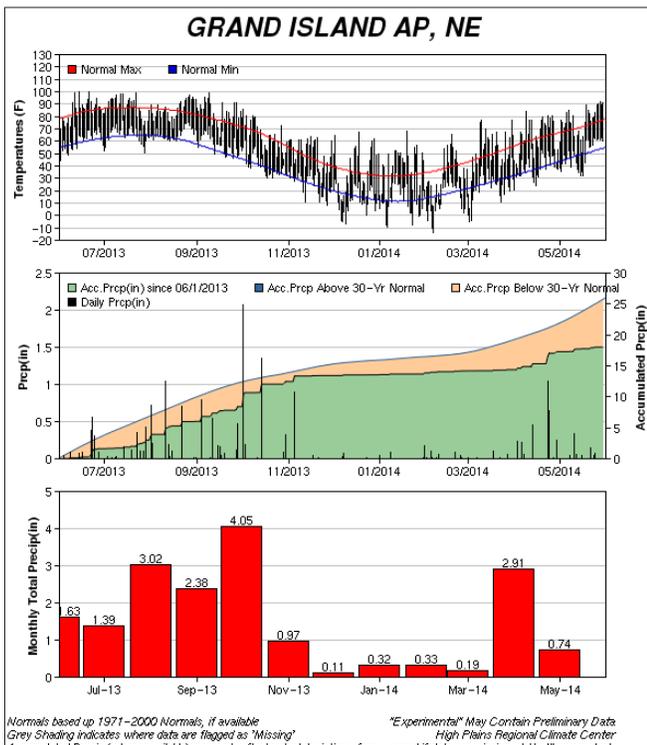
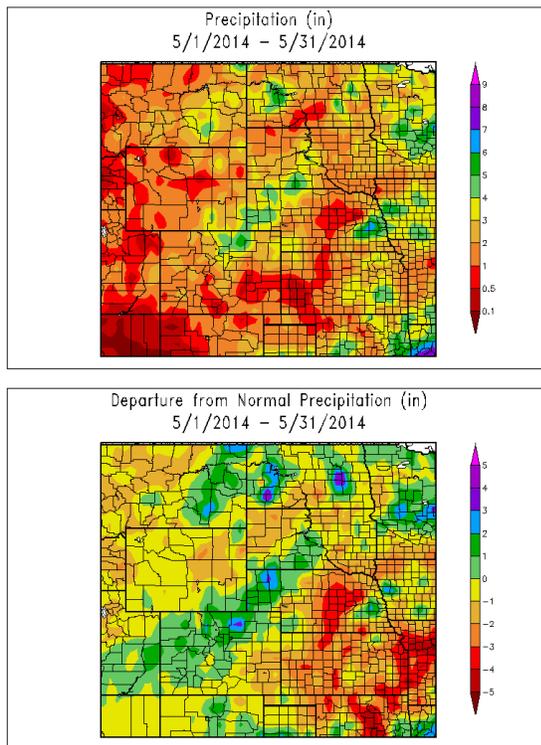


Departure from 1981-2010 Normal Average Temperature (left) and Percent of Normal Precipitation (right) for May 2014 in the High Plains Region. Maps produced by High Plains Regional Climate Center. Available at: <http://hprcc.unl.edu/maps/current>

Precipitation Summary

The majority of the High Plains Region was dry this month with the driest portions including central Wyoming, eastern Kansas, pockets of the Dakotas, and a swath stretching from eastern Colorado, through much of Kansas, and north into Nebraska. These areas received at most 50 percent of normal precipitation. This lack of precipitation caused some locations to be ranked in the top 10 driest Mays on record. Grand Island, Nebraska had its 5th driest May with 0.74 inches (19 mm) which was 3.67 inches (93 mm) below normal, or 17 percent of normal precipitation (period of record 1896-2014). The driest May on record occurred in 1934 with 0.34 inches (9 mm). Topeka, Kansas also ranked in the top 10 driest Mays on record. With only 1.63 inches (41 mm), or 33 percent of normal, this ranked as the 9th driest May for Topeka. The record of 0.41 inches (10 mm) was set in 1966 (period of record 1887-2014). The main exception to the dryness was a swath of above normal precipitation running from western to northern Colorado into the panhandle of Nebraska ending in central South Dakota. Parts of North Dakota also received above normal precipitation. One example was Dickinson, North Dakota which had its 2nd wettest May on record with 6.18 inches (157 mm). This amount bumped last year's 6.03 inches (153 mm) down to the number 3 spot, but was not enough to beat out the 6.52 inches (166 mm) received in 1962 (period of record 1949-2014).

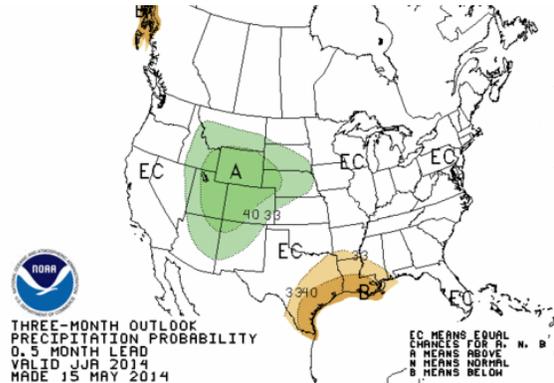
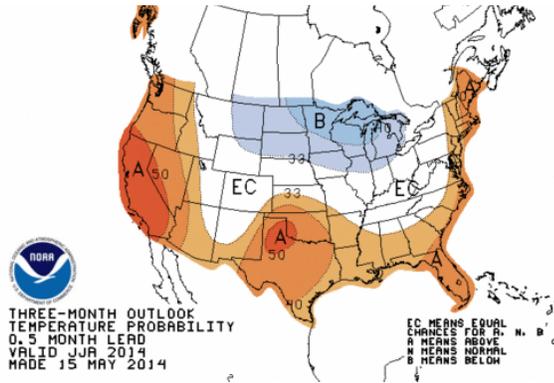
One of the notable storm systems of the month was the Mother's Day storm which brought accumulating snowfall to the west and severe weather to the east. The highest snowfall amounts ranged between 1 and 2 feet (30-61 cm) in the mountains of Colorado and Wyoming. Travel delays were numerous as portions of I-25 and I-70 in Colorado closed and portions of I-80 were closed in Wyoming and Nebraska. Numerous tornadoes, high winds, and large hail were reported in Nebraska, Kansas, South Dakota, and Iowa. According to the Omaha/Valley National Weather Service Office, one supercell produced 12 tornadoes along a 119 mile stretch in eastern Nebraska. Even one of the HPRCC's Automated Weather Data Network (AWDN) stations had a close call with the Beaver Crossing tornado. A 5-second wind gust of 119 mph (192 km/hr) was recorded at the station and damage to trees and center pivots occurred nearby.



Above: Total precipitation (inches) (top left) and Departure from Normal Precipitation (inches) (bottom left) for May 2014 in the High Plains Region. Accumulated and monthly precipitation for Grand Island, NE (right) over the past year. 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

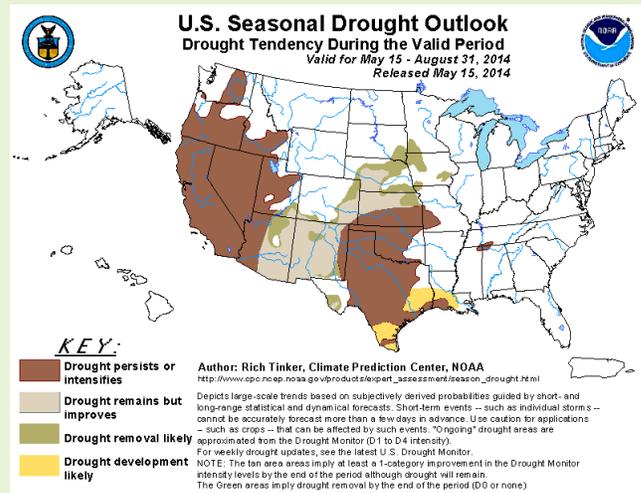
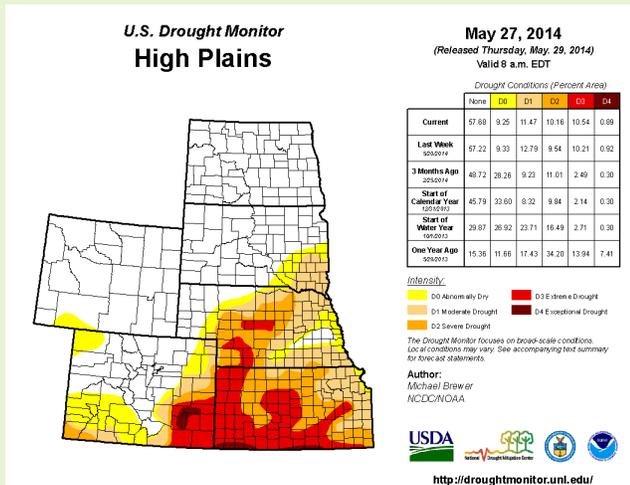
ENSO-neutral conditions continued this month, however the chances for the development of El Niño conditions is increasing and will exceed 65% by the end of summer. For the next three months, the temperature outlook indicates a higher probability of above normal temperatures across southeastern Colorado and southern Kansas. A higher probability of below normal temperatures exists for North Dakota, the majority of South Dakota, and northeastern Wyoming. Meanwhile, the precipitation outlook shows a higher probability of above normal precipitation for a large area of the Region including Wyoming, most of Colorado, northwestern Kansas, and the majority of Nebraska and South Dakota. 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

Overall, there were only slight changes to the U.S. Drought Monitor in the High Plains Region this month. Although some areas had improvements and others had degradations, the areas experiencing moderate (D1) to exceptional (D4) drought remained at about 33 percent. The most significant changes occurred in Kansas where there was a 20 percent increase in extreme drought conditions (D3). Exceptional drought conditions (D4) were also introduced across the southern border of the state. In Nebraska, D1 and D2 were trimmed in areas receiving ample precipitation, but a new area of D3 emerged in the central part of the state. D1 also expanded northward into southeastern South Dakota. A small area of D3 also expanded to include all of southeastern Colorado. According to the U.S. Seasonal Drought Outlook released May 15th, current drought conditions are expected to persist or intensify across far southeastern Colorado and southern Kansas through August. Meanwhile, drought conditions may improve or be eliminated in other parts of Colorado, Kansas, Nebraska, and South Dakota.



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	70.4	43.7	57.0	-0.1	88	5/29	28	5/13	3.08	0.16	105
Alamosa San Luis Airport	69.2	32.0	50.6	-0.6	82	5/28	17	5/14	0.23	-0.35	40
Colorado Springs Municipal Airport	70.5	43.0	56.7	0.8	84	5/28+	29	5/02	2.56	0.53	126
Denver International Airport	70.6	44.5	57.5	0.4	87	5/29+	30	5/12	3.51	1.39	166
Grand Junction Walker Field Airport	73.6	46.7	60.2	-1.4	92	5/28	25	5/01	1.49	0.61	169
Pueblo Memorial Airport	77.0	45.7	61.3	0.9	91	5/29+	29	5/14	0.65	-0.86	43

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	79.0	51.6	65.3	2.2	99	5/07	33	5/17+	3.12	-1.04	75
Dodge City Regional Airport	81.6	50.0	65.8	1.6	98	5/19+	30	5/02	1.67	-1.18	59
Goodland Renner Field	74.9	43.9	59.4	0.0	90	5/29	29	5/02	1.75	-1.20	59
Topeka Municipal Airport	80.3	55.6	67.9	2.9	92	5/28	35	5/16	1.63	-3.28	33
Wichita Mid-Continent Airport	83.2	56.9	70.0	4.0	102	5/04	35	5/02	4.06	-0.51	89

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	68.5	44.1	56.3	0.6	90	5/29	27	5/09	4.08	1.32	148
Grand Island Airport	76.3	49.6	62.9	1.7	92	5/28	32	5/17+	0.74	-3.67	17
Lincoln Municipal Airport	78.2	52.2	65.2	2.9	98	5/07	30	5/16	5.26	0.97	123
Norfolk Karl Stefan Airfield	74.5	48.1	61.3	0.8	87	5/31+	28	5/16	1.25	-2.68	32
North Platte Regional Airport	72.5	43.0	57.8	-0.1	90	5/29	25	5/02	1.81	-1.47	55
Omaha Eppley Airport	76.6	52.0	64.3	2.0	96	5/07	33	5/16	3.13	-1.63	66
Valentine Miller Field	71.2	44.9	58.0	0.4	92	5/30+	28	5/15	3.01	-0.12	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	68.6	43.1	55.8	0.3	92	5/29	24	5/15	0.85	-1.55	35
Fargo International Airport	68.2	45.8	57.0	-0.1	93	5/30	30	5/04	1.99	-0.82	71
Grand Forks International Airport	65.8	43.5	54.6	-0.2	90	5/24	25	5/04	2.56	-0.12	96
Theodore Roosevelt Airport	65.9	40.6	53.2	0.1	88	5/29	25	5/15+	6.18	3.86	266
Williston International Airport	68.2	40.2	54.2	0.1	87	5/24+	21	5/14	1.62	-0.30	84

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>.

May 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	68.2	42.2	55.2	-1.2	89	5/30	23	5/16+	2.18	-0.93	70
Huron Regional Airport	70.4	45.4	57.9	-0.2	91	5/30	24	5/15	2.05	-1.06	66
Pierre Regional Airport	68.5	45.1	56.8	-1.1	87	5/29	25	5/15	4.40	1.25	140
Rapid City Regional Airport	66.4	42.5	54.4	-0.6	91	5/29	27	5/09	1.54	-1.68	48
Sioux Falls Joe Foss Field Airport	70.2	45.3	57.7	-0.3	88	5/30	23	5/16	2.11	-1.29	62

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	68.4	37.3	52.8	0.6	92	5/28	22	5/01	0.49	-1.53	24
Cheyenne Municipal Airport	63.5	40.3	51.9	-0.5	83	5/29	27	5/13+	2.99	0.65	128
Lander Hunt Field Airport	67.7	41.5	54.6	1.3	87	5/28	29	5/13+	1.51	-0.69	69
Laramie Regional Airport	60.2	33.5	46.9	-0.7	78	5/28	10	5/13	2.55	0.86	151
Rawlins Municipal Airport	66.3	36.5	51.4	2.0	85	5/28	17	5/13+	0.87	-0.54	62
Sheridan County Airport	66.9	40.3	53.6	1.1	93	5/28	27	5/01	1.73	-0.62	74

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State Spotlight - Kansas

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

A Month of Extremes

May was a month of extremes. Temperatures ranged from a high of 103F at Ashland (Clark County) on the 20th to a low of 25F at Wilmore (Comanche County) on the 2nd. Many stations reported the highest temperature and the lowest temperature within two days. Windy weather continued to aggravate the dry conditions in western and central KS. The month ended with a wide-spread precipitation event. Some stations saw as much in the last three days of the month as they had in the previous three months combined.

Despite the rain to end the month, precipitation averaged below normal for the state. The state-wide average precipitation was 1.88 inches or 42 percent of normal. The wettest division was the Southeast with an average of 3.13 inches, or 55 percent of normal. The remaining divisions are all less than half of normal for May. For the year-to-date, all divisions are significantly below normal. State-wide, at 4.80 inches, this is the second driest start to the year on record. The driest was in 1966, when the Jan-May total was 4.16 inches. The greatest monthly precipitation total for a National Weather Service station was 9.22 inches at Thrall 4W in Greenwood County. The greatest monthly total for a CoCoRaHS station was 6.54 inches at Eureka 0.9 NW also in Greenwood County. The greatest 24 hour precipitation totals were 3.89 inches on the 26th at Blue Rapids, Marshall County (NWS) and 4.60 inches on the 12th at Jetmore 6.9 ESE, Hodgeman County (CoCoRaHS). Snow was not much of a factor, although there were reports of a trace to half an inch in Sherman County on the 12th.

The state-wide average temperature for the month was very close to normal, at 64.3F, or just 0.8 degrees warmer than normal. The range of temperatures, however, was quite wide. The highest temperature reported for the month was 104F on the 20th at Ashland (Clark County). The lowest temperature for the month was 25F on the 2nd at Wilmore (Comanche County). There were 105 new daily record highs established, and 2 new record highs for May. Wichita recorded a high of 102F on the 4th and Toronto Lake recorded a high of 95F on the 5th. On the other extreme, there were 75 new daily record low temperature readings set, and sub-freezing values as late as the 15th of May.

Severe weather was also a feature for the month. There were 10 tornadoes reported, but fortunately no fatalities. There were also 125 reports of hail damage and 50 reports of wind damage. Despite the lower than normal rainfall for the month, there were a few reports of isolated flooding. This was particularly true with the isolated heavy rains on May 11th and 12th, and again with the storm complex that moved through the state May 21st through the 25th.

Drought conditions persist across the state. No portion of the state was in near normal conditions, and the portion of the state in abnormally dry conditions continues to shrink. Nearly 45 percent of the state is now in extreme drought conditions and an additional 29 percent of the state is in severe drought. A wet start to June gives some hope that conditions will 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 June temperature outlook is neutral for much of the state, with warmer than normal temperatures expected in the southwest. The precipitation outlook calls for wetter than normal conditions for all but the extreme southwestern portion of the state. This does not indicate how much wetter conditions might be, and does not exclude the possibility of drier than normal weather in the period.

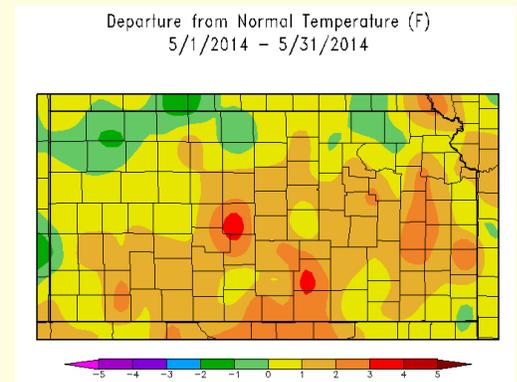


Figure 1. May 2014 departure from average temperatures across Kansas (High Plains Regional Climate Center)

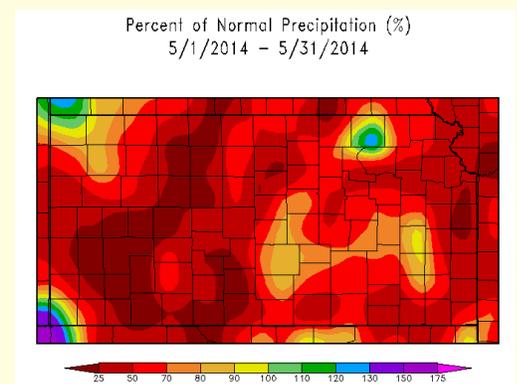


Figure 2. May 2014 percent of normal precipitation across Kansas (High Plains Regional Climate Center)

State Spotlight - North Dakota

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



Precipitation:

May 2014 recorded highly variable rain totals across the state of North Dakota. Most of the rainfall during the month occurred in the form of thunderstorms that attributed to this variability. About as many locations recorded above normal as recorded below normal rainfall during the month (Figure 1). Using data from the North Dakota Agricultural Weather Network (NDAWN), the statewide average precipitation for the month of May was 2.27 inches. That is very close to the May average of 2.32 inches. That would rank May 2014 as the 63rd driest on record. The U.S. Drought Monitor did not include any part of North Dakota in drought conditions.

Temperature:

If you examine the final average temperatures for May 2014, most of North Dakota finished very close to the current 30 year average. Yet, a very high percentage of the month recorded noticeable positive or negative temperature anomalies. From May 1 to 15 most NDAWN stations recorded temperatures 5 to 7 degrees below normal. From May 16-31 most locations recorded temperatures from 5 to 7 degrees above averages. The final result was a near average month for the state (Figure 2) with an overall average temperature of 53.8°F. That would rank May 2014 as the 54th warmest on record.

Notable Weather:

The cool air during the first part of May was a continuation of a prolong period of colder than average temperatures that began in October 2013. The combination of a cool astronomical autumn and the lack of truly warm conditions not being observed until the second half of May meant that there was an extended period from the last 80°F high temperature of 2013 and the first 80°F reading in 2014.

Fargo recorded 238 straight days with a high temperature below 80°F which ranked as the 12th longest such period since 1891. Bismarck recorded 242 days in a row without an 80°F temperature which ranked as the 11th longest such streak since 1874 and the residents of Williston had to wait even longer with 247 days without an 80°F temperature being observed. That was the 4th longest such period since 1894.

Other cities include Grand Forks that recorded 240 consecutive below 80°F days which was the 9th longest such period on record and the Minot Experiment Station with 247 days between 80°F days which ranked 6th on record.

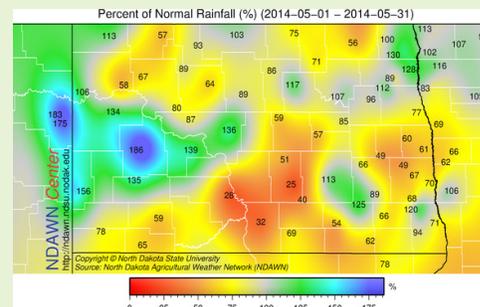


Figure 1. Percent of Normal Precipitation in May 2014 for North Dakota (HPRCC)

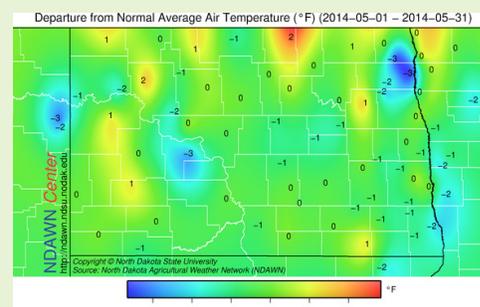


Figure 2. Temperature Departure from Normal in May 2014 for North Dakota (NDSCO)

Number of Consecutive Days Max Temperature < 80 for WILLISTON SLOULIN INTL AP, ND
 Click column heading to sort ascending, click again to sort descending.

Rank	Run Length	Ending Date
1	258	1945-05-23
2	256	1927-05-15
3	252	1999-05-27
4	247	2014-05-22
5	245	1972-05-13
6	244	1966-05-03
7	243	1995-05-29
-	243	1907-06-11
9	242	1983-05-25
-	242	1978-05-14
-	242	1920-05-16
12	241	1960-05-11
13	240	1969-05-12
-	240	1919-05-19
15	239	1922-05-23

Period of record: 1894-01-01 to 2014-06-01

Figure 3. Top 15 consecutive days with a high temperature below 80°F in Williston, ND

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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