

## 2012 Growing Season Weather Summary for North Dakota

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### Introduction

The 2012 growing season (the period from April through September) for North Dakota can simply be characterized as “dry” and “warm” when compared to the 30-year average from 1981 to 2010. The state average precipitation during the 2012 growing season was 10.69” (down 6.25” from last year) which was the 13<sup>th</sup> driest growing season among the past 118 years since 1895. Historical records indicate that the state average precipitation values range between the lowest value of 5.62” and the highest value of 20.03” occurred in 1936 and 1941 respectively. On the average the state experienced 0.03” increase in precipitation per decade since 1895 (Figure 1). Even though the spring of 2012 appeared to be a wet season compared historically, it was only April that was wetter than normal (17<sup>th</sup> wettest April). However, summer months were consistently dryer than normal (19<sup>th</sup> driest summer).

Likewise, the state average temperature during the 2012 growing season was 60.7°F (up 2.4°F from last year) which was the 8<sup>th</sup> warmest growing season among the past 118 years since 1895. Historical state average growing season temperature values in North Dakota range between 62.5°F and 52.7°F in 1988 and 1907 respectively. The average growing season temperature in North Dakota increased linearly by 0.16°F per decade since 1895 (Figure 2).

Table 1 shows temperature and precipitation rankings for select locations in ND. Table 2 summarizes the length of growing season based on the number of consecutive days between the last and first day of frost and ranking for those select locations in ND. Figures 3 and 4 show statewide precipitation percent of normal, and temperature departure from normal conditions respectively averaged over the period from April 1 through September 30. In Figure 3, numbers above 100 indicates wetter than normal, while less than 100 indicates dryer than normal conditions. In Figure 4, negative numbers indicate cooler than normal, while positive numbers indicate warmer than normal conditions (zero is no different than the normal). The values in the map represent the magnitude of daily average departures from normal.

**Table 1. April-September 2012 average temperature and precipitation rankings for select North Dakota locations.**

City	Temperature Ranking	Precipitation Ranking
Bowman	The Warmest	21 <sup>st</sup> Driest
Bismarck	23 <sup>rd</sup> Warmest	52 <sup>nd</sup> Driest
Fargo	2 <sup>nd</sup> Warmest	10 <sup>th</sup> Driest
Minot	5 <sup>th</sup> Warmest	14 <sup>th</sup> Driest
Cavalier	6 <sup>th</sup> Warmest	28 <sup>th</sup> Driest
Williston Exp. Station	21 <sup>st</sup> Warmest	37 <sup>th</sup> Driest
North Dakota Average	<b>8<sup>th</sup> Warmest (118 years)</b>	<b>13<sup>th</sup> Driest (118 years)</b>

**Table 2. Length and the ranking of the 2012 growing season based on number of consecutive days between the last and the first day of frost.**

City	Length of the 2012 Growing Season	Ranking of the 2012 Growing Season
Bowman	131 Days (May 25- Oct 4)	44 <sup>th</sup> Longest (Since 1915)
Bismarck	105 Days (May 31-Sep 14)	10 <sup>th</sup> Shortest (Since 1875)
Fargo	144 Days (Apr 26-Sep 18)	35 <sup>th</sup> Longest (Since 1881)
Minot Exp. Station	147 Days (Apr 27-Sep 22)	14 <sup>th</sup> Longest (Since 1905)
Cavalier	139 Days (Apr 27-Sep 14)	24 <sup>th</sup> Longest (Since 1934)
Williston Exp. Station	105 Days (May 31- Sep 14)	13 <sup>th</sup> Shortest (Since 1894)

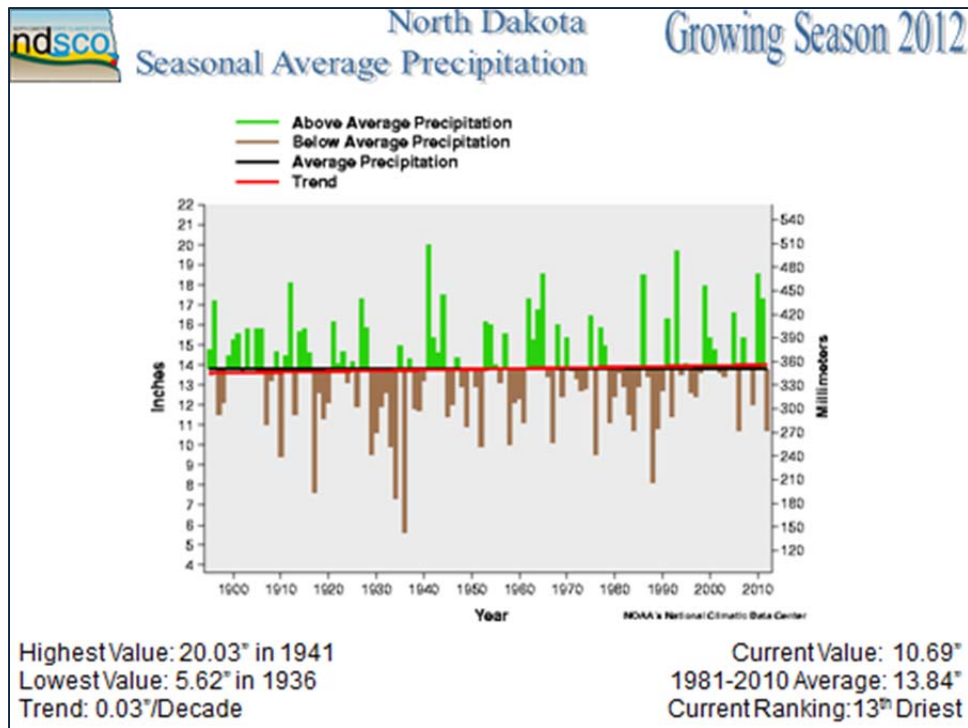


Figure 1. State Historical Growing Season Average Precipitation since 1890.

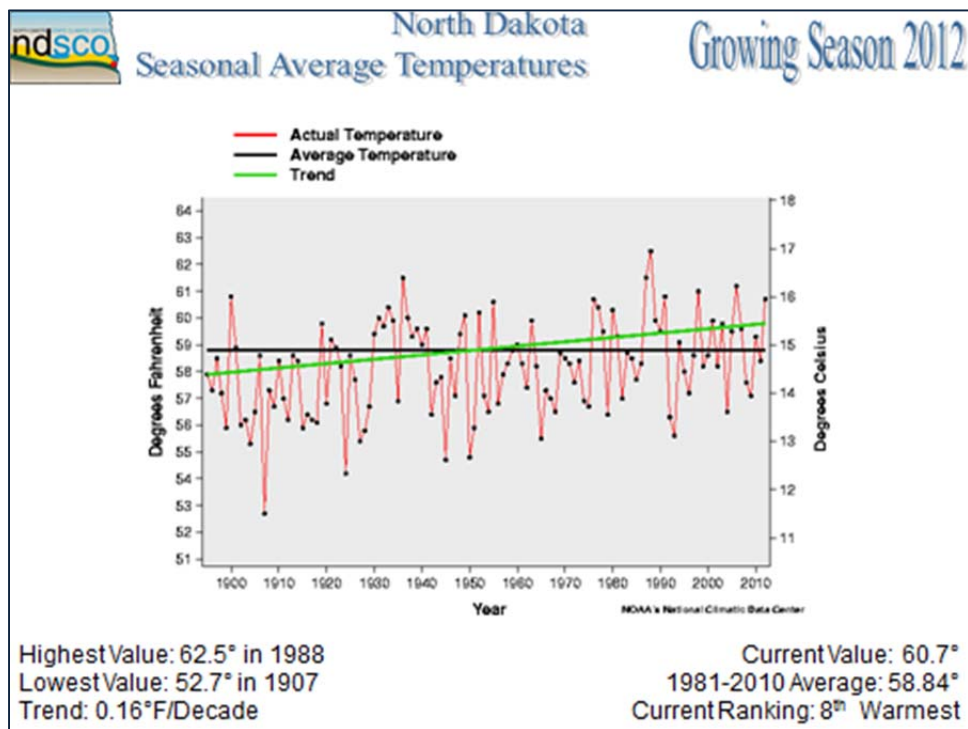


Figure 2 State Historical Growing Season Average Temperatures since 1890.

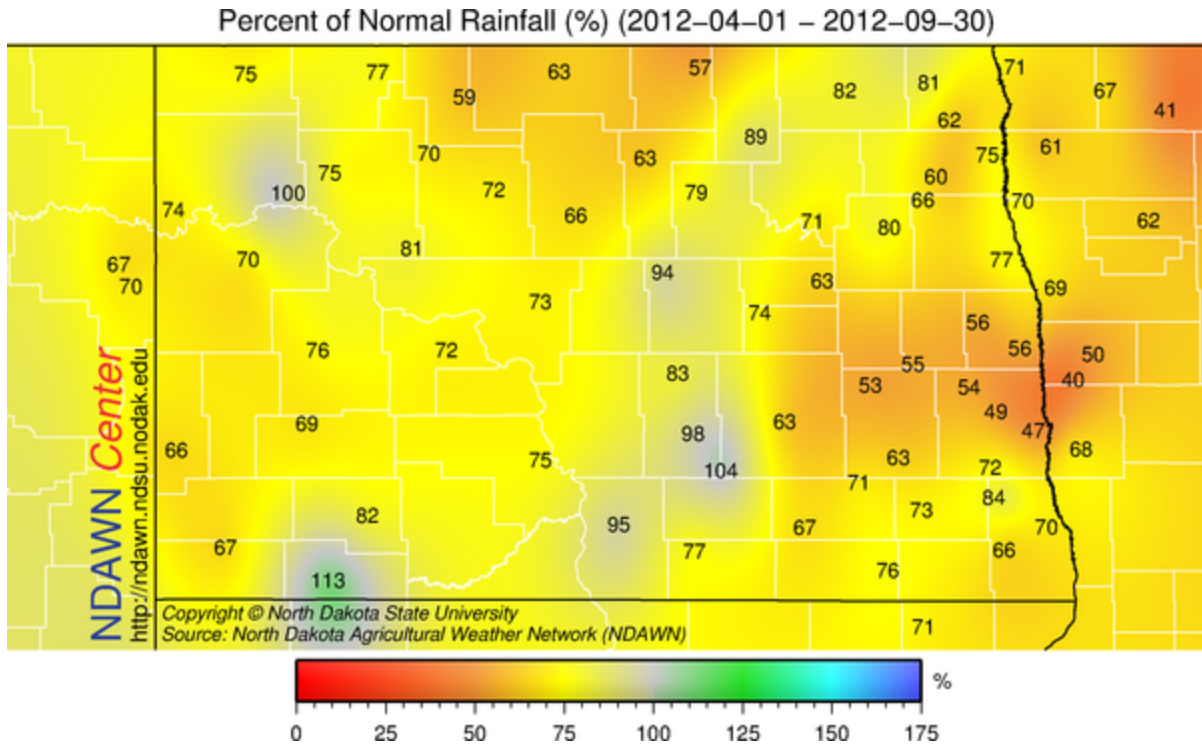


Figure 3. April through September 2012 Precipitation Percent of Normal (%) in North Dakota.

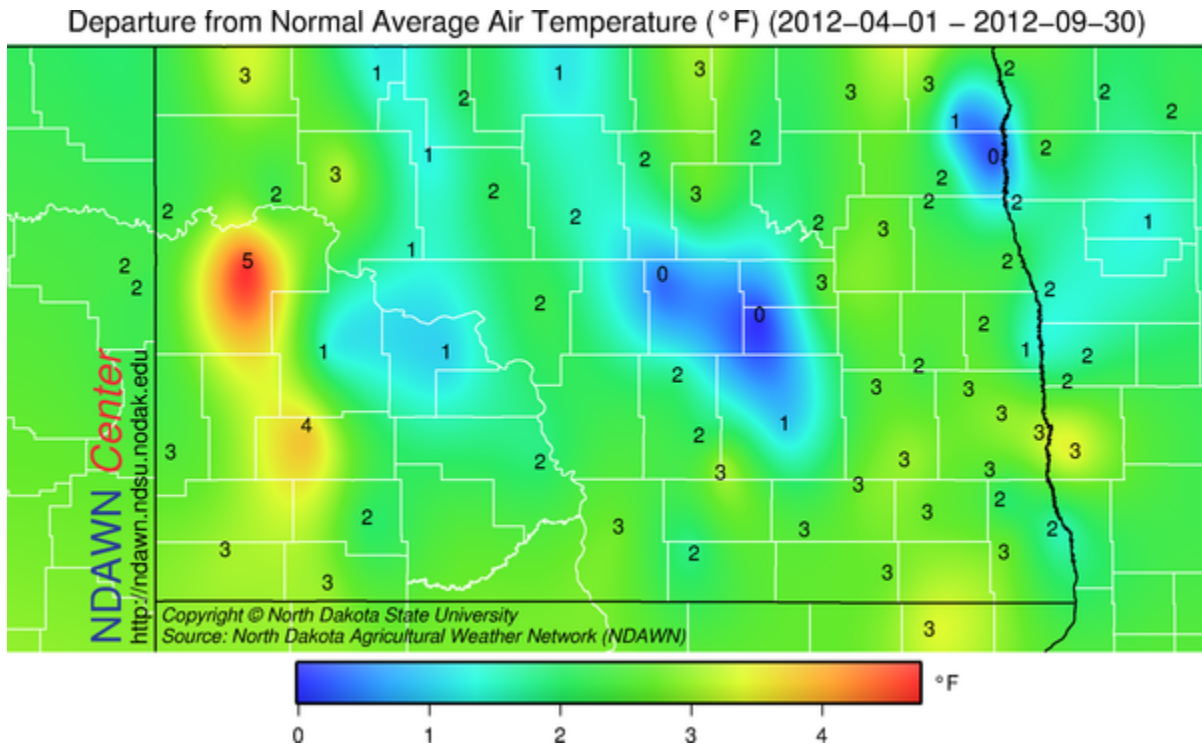


Figure 4. April through September 2012 Temperature Departure from Normal (°F) in North Dakota.

**2012 Growing Season Drought Conditions:**

Figure 5 shows the state’s drought coverage and severity for the period from April through September. The vertical axis is the accumulated coverage and the horizontal axis is the time. The intensity scale is labeled from D0 through D3. D0, D1, D2 and D3 represent “Abnormally Dry”, “Moderate Drought”, “Severe Drought” and Extreme Drought” conditions respectively. North Dakota experienced no severe drought in any parts of the state for 190 consecutive weeks from 11/18/2008 through 7/10/2012 (the longest stretch of severe drought free period in the state since 2000). At the beginning of the growing season, 18% of the state was experiencing at least a moderate drought. The drought conditions worsened throughout the season with the entire state experiencing at least a moderate drought (Figure 6).

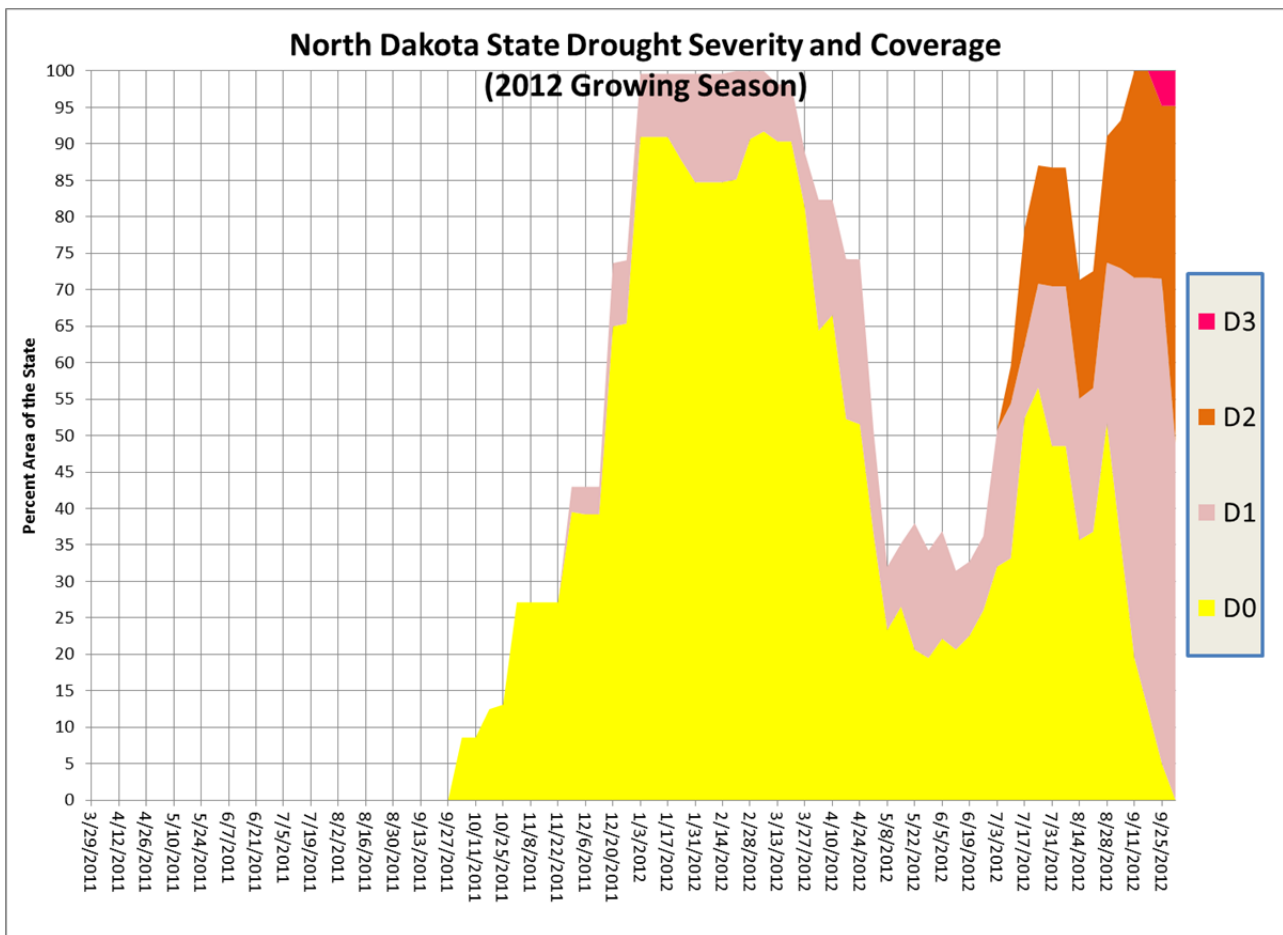


Figure 5. April through September 2012 North Dakota State Drought Severity and Coverage.

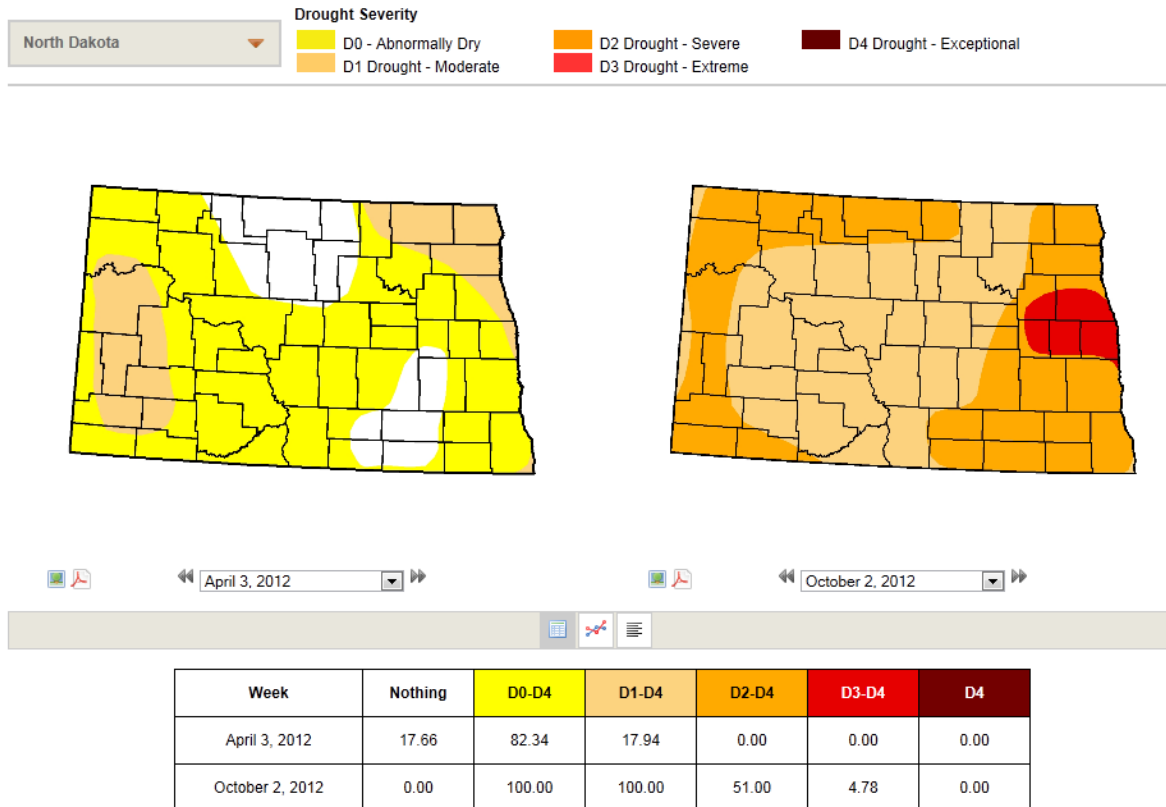


Figure 6. Drought Coverage and Intensity Comparison between the beginning and the end of the 2012 Growing Season.

### Monthly Weather Summary:

Weather conditions during the individual months of the growing season in 2012 are discussed in detail below. Graphics associated with each text are located at the end of the monthly summaries.

#### April 2012

The state average precipitation was 2.24 inches which is above the 1981-2010 normal state average of 1.23 inches. April 2012 state average precipitation ranked the 17<sup>th</sup> wettest in the past 118 years with a maximum of 3.86 inches in 1896 and a minimum of 0.11 inches in 1987. The North Dakota Agricultural Weather Network (NDAWN) April percent of normal precipitation (Figure 7) was less than 100% in the northeast and northwest. The remaining areas were above normal. The greatest amounts of around 200% of normal fell in the central and southern parts of the state. The first 12 days of April were relatively dry with only a few scattered

showers across the state. Rain events were more wide spread for the remainder of the month. NDAWN total monthly rainfall ranged from approximately 0.50 inches in the northwest to 3.60 inches in the southeast. The National Weather Service (NWS) reported breaking a few precipitation records in April on the 13<sup>th</sup>. See the “Storms and Record Events” section later in this publication for details on April event records.

The US Drought Monitor April 24, 2012 reported moderate (D1) drought listed for the northeast corner and the southwest, no drought conditions in the north central and

southeast, and abnormally dry (D0) conditions listed elsewhere.

The USDA, National Agricultural Statistics Service, North Dakota Field Office reported a topsoil moisture of 1% very short, 5% short, 81% adequate, and 13% surplus with a subsoil moisture reported as 0% very short, 8% short, 79% adequate, and 13% surplus (Weekly Weather and Crop Bulletin Vol. 99, No. 18).

According to the preliminary reports of the National Weather Service's Storm Prediction Center (SPC), there were no severe weather reports of wind, hail or tornadoes in April. The top five April daily maximum wind speeds recorded from NDAWN were 58.4 mph on the 2<sup>st</sup> at Sabin, MN; 53.0 mph on the 15<sup>th</sup> at Britton, SD; 53.0 mph on the 7<sup>th</sup> at Linton; 50.8 mph on the 7<sup>th</sup> at Turtle Lake; and 49.8 mph on the 1<sup>st</sup> at Crosby. NDAWN wind speeds are measured at a height of 10 feet (3 m).

The state average air temperature was 45.2 °F which is above the 1981-2010 normal of 42.37 °F. April 2012 state average air temperature ranked the 23<sup>rd</sup> warmest in the past 118 years with a maximum of 50.2°F in 1987 and a minimum of 31.1°F in 1907. NDAWN April monthly average air temperatures ranged from 43 °F to 49 °F. NDAWN departures from normal average temperature (Figure 8) were above normal across the state and ranged from 2 °F to 7 °F. Daily average air temperatures were primarily above normal the first few days of April with the remainder of the month having mostly near normal to above. The National Weather Service reported breaking several high temperature records on the 23<sup>rd</sup> and 24<sup>th</sup> in the central and western parts of the state. The National Weather Service (NWS) reported breaking several high temperature records in the in April. Maximum temperature records were broken

on the 1<sup>st</sup>, 23<sup>rd</sup>, and 24<sup>th</sup>. See the “Storms and Record Events” section later in this publication for a complete list on April event records. NDAWN's highest recorded daily air temperature for April was 91.3 °F at Mott on the 24<sup>th</sup>. The lowest recorded daily air temperature was 10.7 °F at Hofflund on the 10<sup>th</sup>.

### **May 2012**

The state average precipitation was 2.15 inches which is less than the 1981-2010 normal of 2.53 inches. May 2012 state average precipitation ranked 56<sup>th</sup> driest in the past 118 years with a maximum of 5.73 inches in 1927 and a minimum of 0.31 inches in 1901. The North Dakota Agricultural Weather Network (NDAWN) May percent of normal precipitation (Figure 9) was up to ~130% of normal in the northwest and a few scattered areas in the eastern half. The remaining areas were below normal with the driest areas of ~50% of normal precipitation in the southeast and north central regions. The first one third of the month had scattered showers with the heavier amounts falling in the northwest corner. The middle of the month was dry with roughly six days of no precipitation across the state. The last one-third of the month had the greatest total amount of rainfall. The National Weather Service (NWS) reported one precipitation record in May at Grand Forks Airport on the 27<sup>th</sup> with 0.61 inches, breaking the previous record of 0.60 inches set in 1954. See the “Storms and Record Events” section later in this publication for a complete list on May event records.

The US Drought Monitor May 29, 2012 report had moderate (D1) drought listed for the northeast corner, moderate (D1) to mostly Abnormally Dry (D0) for the southwest corner, and no drought conditions elsewhere.

The USDA, National Agricultural Statistics Service, North Dakota Field Office reported a topsoil moisture of 0% very short, 14% short, 77% adequate, and 9% surplus with a subsoil moisture reported as 0% very short, 10% short, 79% adequate, and 11% surplus (Weekly Weather and Crop Bulletin Vol. 99, No. 22).

According to the preliminary reports of the National Weather Service's Storm Prediction Center (SPC), severe weather reports for May had 13 reports of high wind, 15 hail reports, and 1 reported tornado.

The top five May daily maximum wind speeds recorded from NDAWN included Linton on the 2<sup>nd</sup> with 81.3 mph, Turtle Lake on the 27<sup>th</sup> with 56.9 mph, Mayville on the 22<sup>nd</sup> with 54.4 mph, Jamestown on the 22<sup>nd</sup> with 53.3 mph and McHenry on the 14<sup>th</sup> with 53.0 mph. NDAWN wind speeds are measured at a height of 10 feet (3 m).

The state average air temperature was 54.7 °F which is above the 1981-2010 normal of 54.01 °F. May 2012 state average air temperature ranked the 39<sup>th</sup> warmest in the past 118 years with a maximum of 63.10°F in 1977 and a minimum of 43.30 °F in 1907. NDAWN May monthly average air temperatures ranged from 51 °F to 61 °F. NDAWN departure from normal average temperatures (Figure 10) ranged from -3 °F to 4 °F. Daily average air temperatures hovered near normal across the state for the first half of the month. From roughly the 12<sup>th</sup> through the 19<sup>th</sup> average air temperatures climbed to 10 and 20 °F above normal. From the 24<sup>th</sup> through the end of the month there was seasonably cooler weather as average daily air temperatures dropped to between 10 °F and 20 °F below normal. The National Weather Service (NWS) reported Fargo Airport breaking one temperature

record and tying two in May. No other records were recorded. See the "Storms and Record Events" section later in this publication for a complete list on May event records.

NDAWN's highest recorded daily air temperature for May was 97.1 °F at Sabin, MN on the 18<sup>th</sup>. The lowest recorded daily air temperature was 26.9 °F at Hazen on the 12<sup>th</sup>.

## **June 2012**

The state average precipitation was 2.61 inches which is below the 1981-2010 normal of 3.38 inches. June 2012 state average precipitation ranked 29<sup>th</sup> driest in the last 118 years with a maximum of 7.21 inches in 2005 and a minimum of 1.14 inches in 1974. The North Dakota Agricultural Weather Network (NDAWN) June percent of normal precipitation (Figure 11) ranged from ~40% in the northeast to ~180% of normal in the northwest and mostly below normal conditions in between. In the beginning of the month, the National Drought Monitor (DM) was depicting northeastern parts as moderate drought (D1, based on the DM categorization). Dry conditions in the northeast and southwest portions of the state exacerbated the drought conditions even further. By the end of the month, more than 10% of the state was under moderate drought including a newly added southwestern D1. A very localized storm on June 7 bringing 1.75", 1.1" and 0.92" of rainfall in Hofflund, Ross and Crosby respectively in the northwestern ND skewed the monthly total in favor of above normal precipitation in the region. Despite the magnitude of precipitation deficit in dry regions through the end of June, drought impact was minimal because of the charged soil moisture conditions from the previous seasons. However, dry dug outs, and some reports of drought stress on crops were seen in some isolated areas.



The National Weather Service (NWS) recorded breaking no precipitation records in June. A list of records can be viewed in the “Storms and Record Events” section later in this bulletin.

The US Drought Monitor July 3, 2012 report had drought conditions in eastern and the southwest regions. Drought conditions in those areas ranged from Abnormally Dry (D0) to Moderate (D1).

The USDA, National Agricultural Statistics Service, North Dakota Field Office reported a topsoil moisture of 7% very short, 38% short, 54% adequate, and 1% surplus with a subsoil moisture reported as 5% very short, 28% short, 65% adequate, and 2% surplus (Weekly Weather and Crop Bulletin Vol. 99, No. 27).

According to the preliminary reports of the National Weather Service’s Storm Prediction Center (SPC), there were 48 reported hail events, 28 reported high winds, and 6 reported tornadoes.

The top five June daily maximum wind speeds recorded from NDAWN were 58.7 mph at Berthold on the 26th, 52.6 mph at Crosby on the 9th, 49.0 mph at Hofflund on the 9th, 49.0 mph at Prosper on the 7th and 48.3 mph at Linton on the 11th. NDAWN wind speeds are measured at a height of 10 feet (3 m).

The state average air temperature was 65.5 °F which is above the 1981-2010 normal of 63.37 °F. June 2012 state average air temperature ranked 23<sup>rd</sup> warmest in the past 118 years with a maximum of 74.2 °F in 1988 and a minimum of 56.2 °F in 1915. June daily average air temperatures ranged from the low 60s in the northern ND, to the low 70s in the southeastern ND. On the average, the daily temperatures (Figure 12)

were between 1 to 4 °F greater than the normal daily temperatures in June. One exception is northwestern Ward County where the daily average temperatures were 1°F below normal. A strong cold front swept through the state on June 11 dropping the temperatures as severe as 18 °F below their seasonal averages at certain locations especially in Wells County.

The National Weather Service (NWS) reported breaking a couple temperature records in June. Fargo had a record high temperature on the 9th of 96 °F. Dickinson had a record high temperature on the 26th of 98 °F. A list of the records can be viewed in the “Storms and Record Events” section later in this bulletin. NDAWN’s highest recorded daily air temperature for June was 105.2 °F at Bowman on the 26th. The lowest recorded daily air temperature was 34.3 °F at Cando on the 12<sup>th</sup>.

## **July 2012**

The state average precipitation was 2.04 inches which is below the 1981-2010 normal state average of 2.88 inches. July 2012 state average precipitation ranked the 36<sup>th</sup> driest in the past 118 years with a maximum of 7.88 inches in 1993 and a minimum of 0.62 inches in 1936.

The North Dakota Agricultural Weather Network (NDAWN) July percent of normal precipitation (Figure 13) ranged from ~10% to an isolated ~180% of normal in Adams County. The greatest majority of the state had below normal precipitation with the driest areas of less than 50% of normal in the north central and east central regions. Throughout July there were hit and miss rain events across the state with very few that were wide spread. According to the U.S. Drought Monitor July 31st assessment, the eastern and south west corner of the state had a drought intensity of D2 (severe

drought) with nearby areas as D1 (moderate drought). The north central region had a drought intensity of D1 (moderate drought). The few areas assessed with no drought conditions included the far north west corner, parts of west central, and central regions with the remaining areas assessed as D0 (abnormally dry). Based on the coverage and the intensity of the current drought in North Dakota, it is the worst drought to impact North Dakota since July 29, 2008.

The National Weather Service (NWS) reported breaking a few precipitation records in July. The NWS recorded a record rainfall at Bismarck Airport of 1.4 inches on the 6<sup>th</sup>, Fargo Airport of 2.35 inches on the 24<sup>th</sup>, and Grand Forks Airport of 1.96 inches also on the 24<sup>th</sup>. See the “Storms and Record Events” section later in this publication for details on event records.

The US Drought Monitor July 31, 2012 reported the eastern and south west corner of the state had a drought intensity of D2 (severe drought) with nearby areas as D1 (moderate drought). The north central region had a drought intensity of D1 (moderate drought). The few areas assessed with no drought conditions included the far north west corner, parts of west central, and central regions with the remaining areas assessed as D0 (abnormally dry).

The USDA, National Agricultural Statistics Service, North Dakota Field Office reported a topsoil moisture of 23% very short, 44% short, 33% adequate, and 0% surplus with a subsoil moisture reported as 14% very short, 44% short, 41% adequate, and 1% surplus (Weekly Weather and Crop Bulletin Vol. 99, No. 31).

According to the preliminary reports of the National Weather Service’s Storm Prediction Center (SPC), there were 49 wind

reports, 53 hail reports and 2 reported tornadoes in July.

The top five July daily maximum wind speeds recorded from NDAWN were 57.6 mph on the 6<sup>th</sup> at Edgeley, 54.1 mph on the 28<sup>th</sup> at Bowbells, 52.6 mph on the 4<sup>th</sup> at Humboldt, 49.4 mph on the 6<sup>th</sup> at Marion, and 49.0 mph on the 4<sup>th</sup> at Cavalier. NDAWN wind speeds are measured at a height of 10 feet (3 m).

The state average air temperature was 73.8 °F which is above the 1981-2010 normal of 69.01 °F. July 2012 state average air temperature ranked the 2<sup>nd</sup> warmest in the past 118 years with a maximum of 79.7 °F in 1936 and a minimum of 61.8 °F in 1992. July daily average air temperatures ranged from ~70 °F in the north to ~75 °F in the south and western regions. The departure from normal average air temperatures (Figure 14) were above normal across the state with a range of ~2 °F to ~8 °F. Daily average air temperatures were above normal most of the month with only a few days with below normal temperatures. Many places had below normal average air temperatures on the 6<sup>th</sup>, 15<sup>th</sup>, 26<sup>th</sup>, and 27<sup>th</sup>. The National Weather Service recorded record high air temperatures at Bismarck, Minot, Jamestown, and Dickinson on the 19<sup>th</sup> with 104 °F, 101 °F, 101 °F, and 102 °F, respectively. The National Weather Service (NWS) reported breaking record high temperatures and record high minimum temperatures on the 19<sup>th</sup> and 20<sup>th</sup>. See the “Storms and Record Events” section later in this publication for a complete list on event records.

NDAWN’s highest recorded daily air temperature for July was 104.1 °F at Hazen on the 19<sup>th</sup>. The lowest recorded daily air temperature was 40.5 °F at Bottineau on the 27<sup>th</sup>.

## August 2012

The state average precipitation was 1.74 inches which is less than the 1981-2010 normal of 2.10 inches. August 2012 state average precipitation ranked 44th driest in the past 118 years with a maximum of 5.02 inches in 1900 and a minimum of 0.72 inches in 1961.

Based on the North Dakota Agricultural Weather Network (NDAWN), August precipitation in North Dakota ranged from mostly well below normal conditions to well above normal conditions. The greatest majority of the state had below normal precipitation with the driest areas of less than 50% of normal in the north western and east central regions (Figure 15). Throughout August the drought conditions did not differ significantly from July. According to the

U.S. Drought Monitor August 28<sup>st</sup> assessment, 17.5% of the state was experiencing severe drought (D2), and 22% of the state was experiencing moderate drought (D1). The severe drought areas were in the east central and southwest corner (<http://droughtmonitor.unl.edu/>).

According to the NASS ND Field Office, 23% of the corn is in mature stage, and 26% and 90% of dry edible beans, and canola respectively are harvested.

The National Weather Service (NWS) did not report breaking any precipitation records for August. See the “Storms and Record Events” section later in this publication for a complete list on event records.

The USDA, National Agricultural Statistics Service, North Dakota Field Office reported a topsoil moisture of 19% very short, 53% short, 28% adequate, and 0% surplus with a subsoil moisture reported as 14% very short, 54% short, 32% adequate, and 0% surplus

(Weekly Weather and Crop Bulletin Vol. 99, No. 36).

According to the preliminary reports of the National Weather Service’s Storm Prediction Center (SPC), severe weather reports for August had 18 reports of high wind, 13 hail reports, and 0 reports of tornadoes.

The top five August daily maximum wind speeds recorded from NDAWN included Ekre on the 3<sup>rd</sup> with 69.5 mph, McHenry on the 24<sup>th</sup> with 58.7 mph, Mavie, MN on the 24<sup>th</sup> with 56.9 mph, McHenry on the 3<sup>rd</sup> with 56.9 mph and Carrington on the 24<sup>th</sup> with 53.0 mph. NDAWN wind speeds are measured at a height of 10 feet (3 m).

The state average air temperature was 66.8 °F which is below the 1981-2010 normal of 67.52 °F. August 2012 state average air temperature ranked the 57<sup>th</sup> warmest (61<sup>st</sup> coolest) in the past 118 years with a maximum of 73.6 °F in 1983 and a minimum of 60.9 °F in 1977. August daily average air temperatures ranged from ~65 °F in the northeast to ~70 °F in the western regions. The departure from normal average air temperatures (Figure 16) were below normal across the state with a range of ~2 °F to ~3 °F with the exception of pockets of above normal areas. Below normal temperature conditions slowed down the impacts of below normal precipitation in drought stricken areas.

The National Weather Service (NWS) reported breaking four temperature records on the 29<sup>th</sup>. The four records were Grand Forks airport with 97 °F, Minot with 104 °F, Dickinson with 105 °F, and Williston with 99 °F. See the “Storms and Record Events” section later in this publication for a complete list on August event records. NDAWN’s highest recorded daily air temperature for August was 105.6 °F at

Hazen on the 29th. The lowest recorded daily air temperature was 36 °F at Greenbush, MN on the 17th.

### **September 2012**

The state average precipitation was 0.24 inches which is ranked the driest in the last 118 years with a maximum of 5.00 inches in 1900 and a minimum of 0.24 inches in 2012. The North Dakota Agricultural Weather Network (NDAWN), September precipitation in North Dakota was well below normal (Figure 17) with the lowest amounts of ~0.01 inches in the west and the far northeast corner. The greatest amounts of precipitation measured by NDAWN were 0.66 inches at Cando, 0.65 inches at Pillsbury, and 0.58 inches at Prosper. According to the U.S. Drought Monitor September 25<sup>th</sup> assessment, 28.49% of the state was experiencing severe to extreme drought (D2-D3) and 66.41% of the state was experiencing moderate drought (D1). The driest area with extreme drought (D3) was in parts of Grand Forks, Nelson, Griggs, Steele and Trail Counties. The National Weather Service (NWS) reported no record precipitation in September. Go to the Storms and Record Events section later in this bulletin to see these and other fall records.

The US Drought Monitor October 2, 2012 report had Severe (D2) to Extreme (D3) drought conditions for 51% of the state. The remaining 49% of the state was listed as Moderate (D1) drought.

The USDA, National Agricultural Statistics Service, North Dakota Field Office reported a topsoil moisture of 43% very short, 46% short, 11% adequate, and 0% surplus with a subsoil moisture reported as 34% very short, 50% short, 16% adequate, and 0% surplus (Weekly Weather and Crop Bulletin Vol. 98, No. 40).

According to the preliminary reports of the Storm Prediction Center (SPC), no severe weather was recorded in September.

The top five September daily maximum wind speeds recorded from NDAWN were Williston on the 13<sup>th</sup> with 51.5 mph, Prosper on the 21<sup>st</sup> with 47.2 mph, Baker on the 12<sup>th</sup> with 44.7 mph, Dazey on the 19<sup>th</sup> with 44 mph and McHenry also on the 19<sup>th</sup> with 44 mph. NDAWN wind speeds are measured at a height of 10 feet (3 m).

The state average air temperature was 57.2 °F which is above the 1981-2010 normal of 56.77 °F. September 2012 state average air temperature ranked 42<sup>nd</sup> warmest in the past 118 years with a maximum of 63.4 °F in 1897 and a minimum of 45.2 °F in 1965. NDAWN September average air temperatures ranged from ~53 °F in the northeast to ~61 °F in the west. Departure from normal average air temperatures (Figure 18) ranged from below normal of approximately -2 °F in the Red River Valley to above normal of approximately 7 °F in the west. The first wide spread frost occurred on the 17<sup>th</sup>. Producers were concerned about the lack of precipitation in September. However, conditions were suitable most days for harvest to progress at a swift rate.

The National Weather Service (NWS) recorded a record low temperature of 32 °F on the 18<sup>th</sup> at Grand Forks Airport, a record high temperature of 85 °F on the 28<sup>th</sup> at Williston, and a record high temperature of 85 °F on the 29<sup>th</sup> at the Grand Forks Airport. The Storms and Record Events section later in this bulletin lists all NWS fall records. NDAWN's highest recorded daily air temperature for September was 101.3.0 °F at Mott on the 1<sup>st</sup>. The lowest recorded daily air temperature was 16.6 °F at Hazen on the 22<sup>nd</sup>.

**Conclusion of the season:**

The state dodged what could have been the worst drought since 1988. It is mainly because of the soil moisture recharge from the previous wet period started in 2009 continued into 2011. The growing seasons of 2010 and 2011 were 5<sup>th</sup> and 12<sup>th</sup> wettest growing seasons respectively in the recorded history. Even though last fall in 2011 was slightly drier than normal (40<sup>th</sup> driest fall) that was followed by the 25<sup>th</sup> driest winter in recorded history, soil moisture at 5-foot profile was adequate. Much warmer than normal (2<sup>nd</sup> warmest spring in the recorded history) conditions in the spring of 2012 (2<sup>nd</sup> warmest spring in the recorded history) helped get field work started early in the season. Crops took advantage of much above normal heat accumulation to develop with good deep root systems tapping into deep soil moisture.

At the end of the growing season, drought progressed. As of October 16, 5% of the

state was under extreme drought, 46% of the state was under severe drought, and 49% of the state was under moderate drought. If the state did not take advantage of the soil moisture recharged from the previous years, the drought agricultural impact would have been similar to those in the other Midwestern states suffering from exceptional drought conditions.

However, if drought continues, the areas in already-drought stricken areas will suffer from lack of moisture at the beginning of the next growing season in 2013.

Outlook into winter and spring is not very promising. The Climate Prediction Center (CPC) calls for greater probability of warmer than normal conditions during the period from December through April. However, CPC's precipitation forecast during this period put equal probability of having a wetter, drier or near normal conditions during the same period.

Percent of Normal Rainfall (%) (2012-04-01 – 2012-04-30)

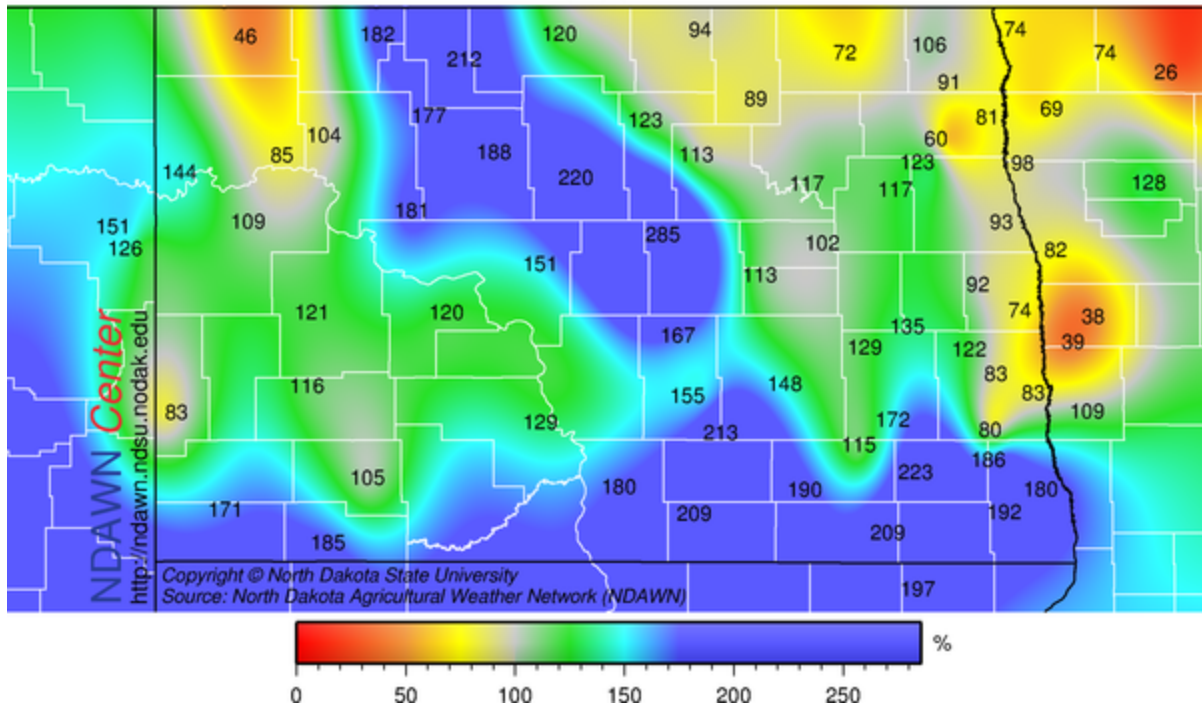


Figure 7. April 2012 Precipitation Percent of Normal (%).

Departure from Normal Average Air Temperature (°F) (2012-04-01 – 2012-04-30)

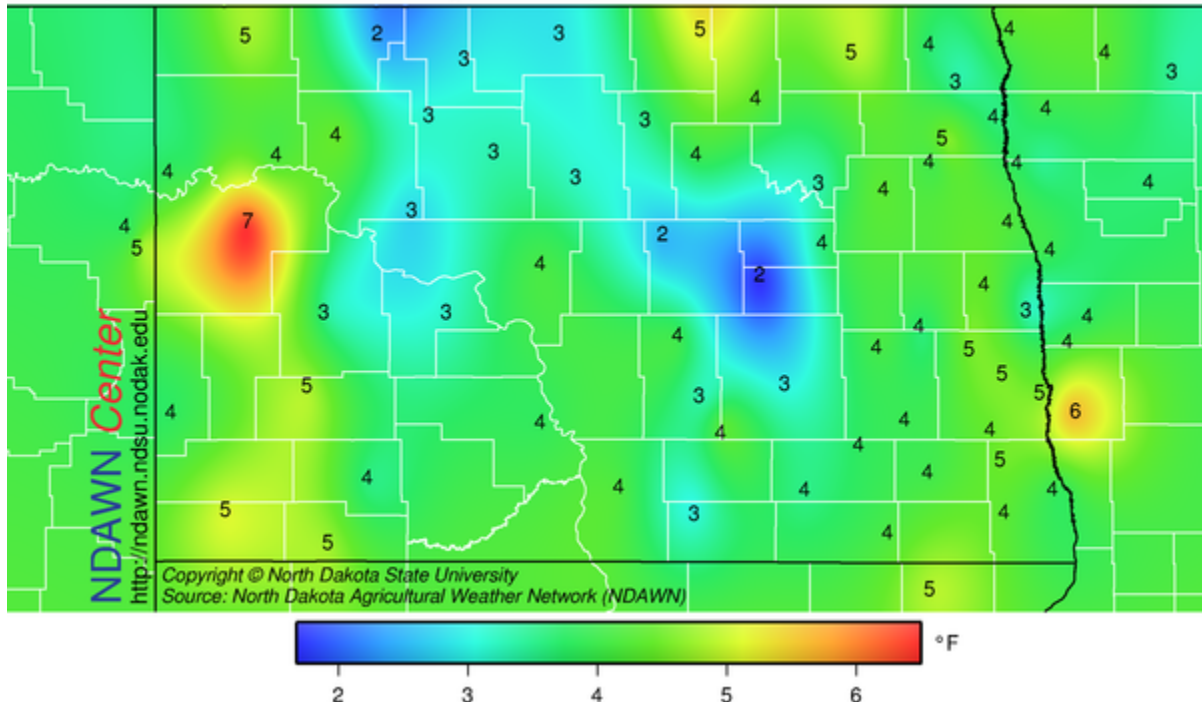


Figure 8. April 2012 Temperature Departure from Normal (°F).

Percent of Normal Rainfall (%) (2012-05-01 – 2012-05-31)

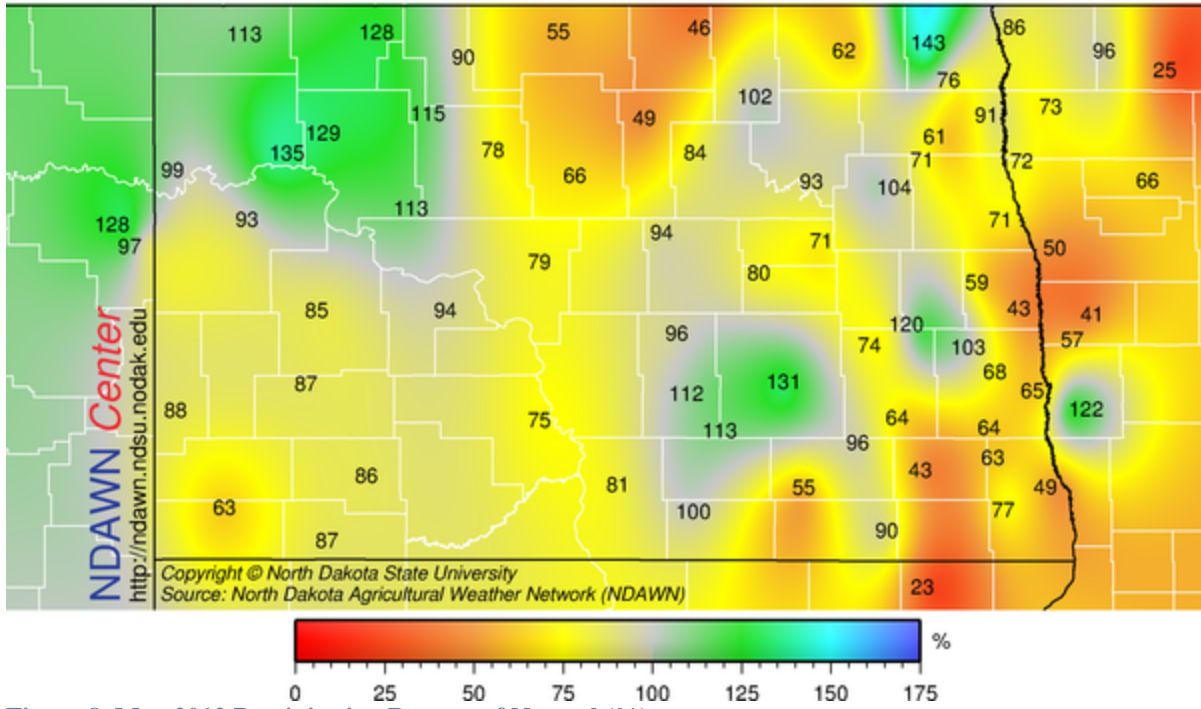


Figure 9. May 2012 Precipitation Percent of Normal (%).

Departure from Normal Average Air Temperature (°F) (2012-05-01 – 2012-05-31)

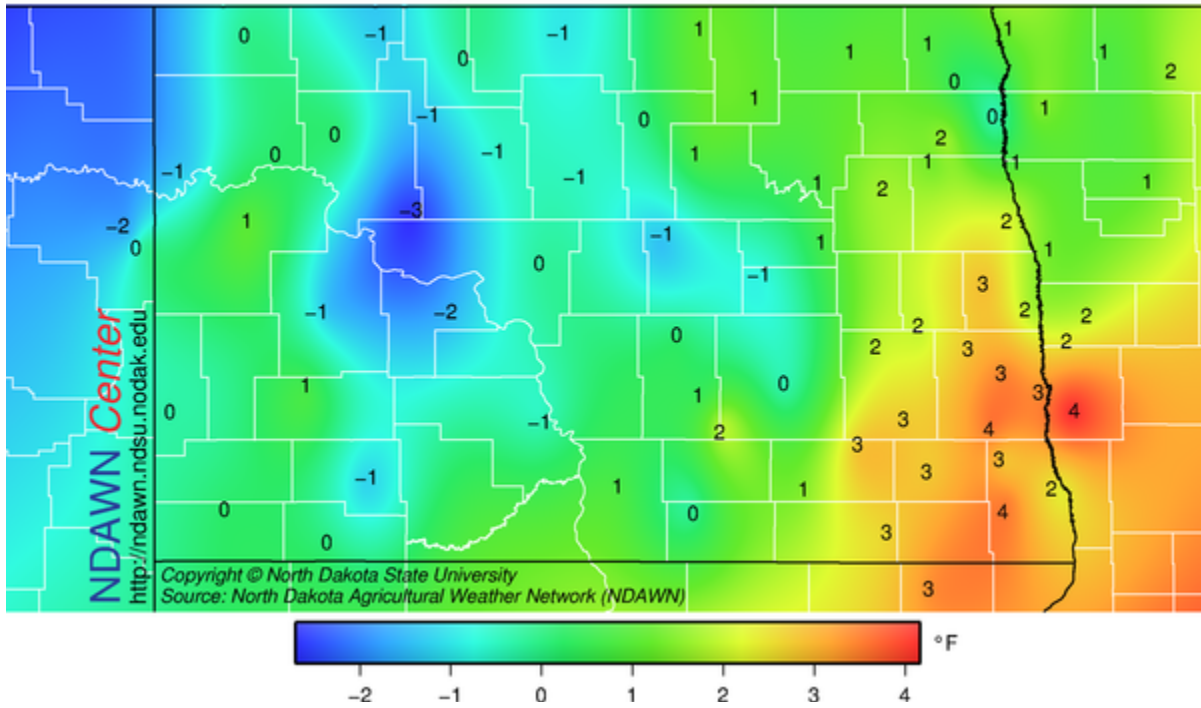


Figure 10. May 2012 Temperature Departure from Normal (°F).

Percent of Normal Rainfall (%) (2012-06-01 – 2012-06-30)

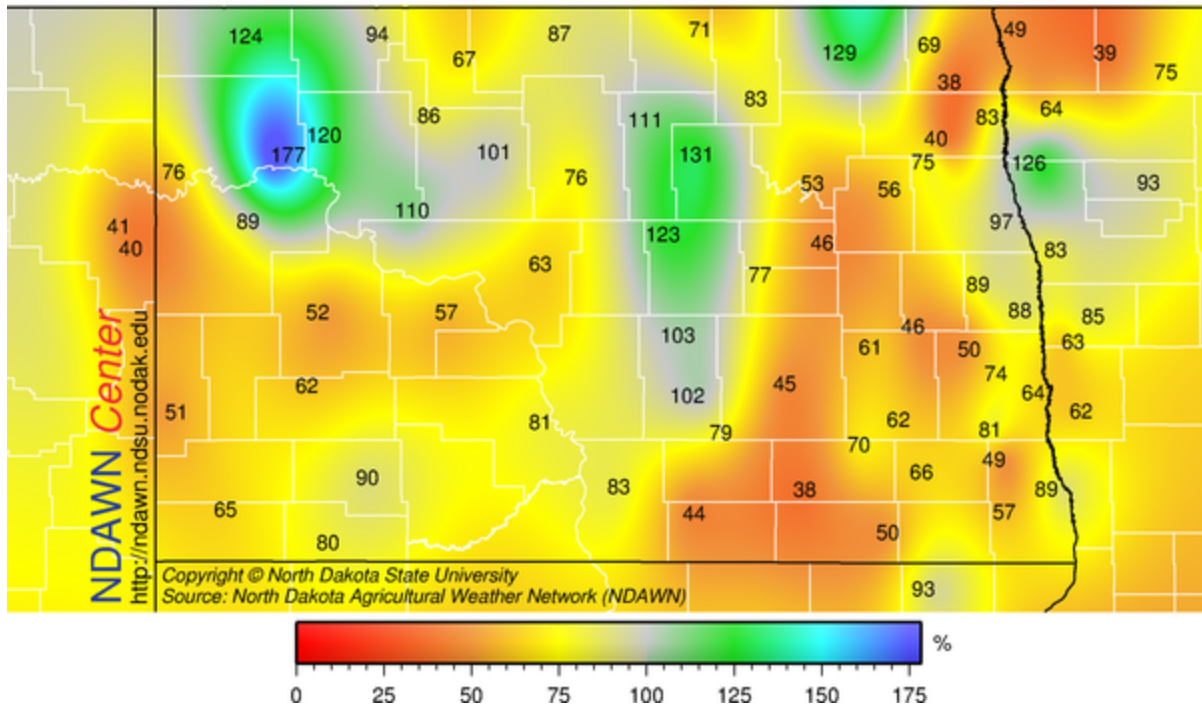


Figure 11. June 2012 Precipitation Percent of Normal (%).

Departure from Normal Average Air Temperature (°F) (2012-06-01 – 2012-06-30)

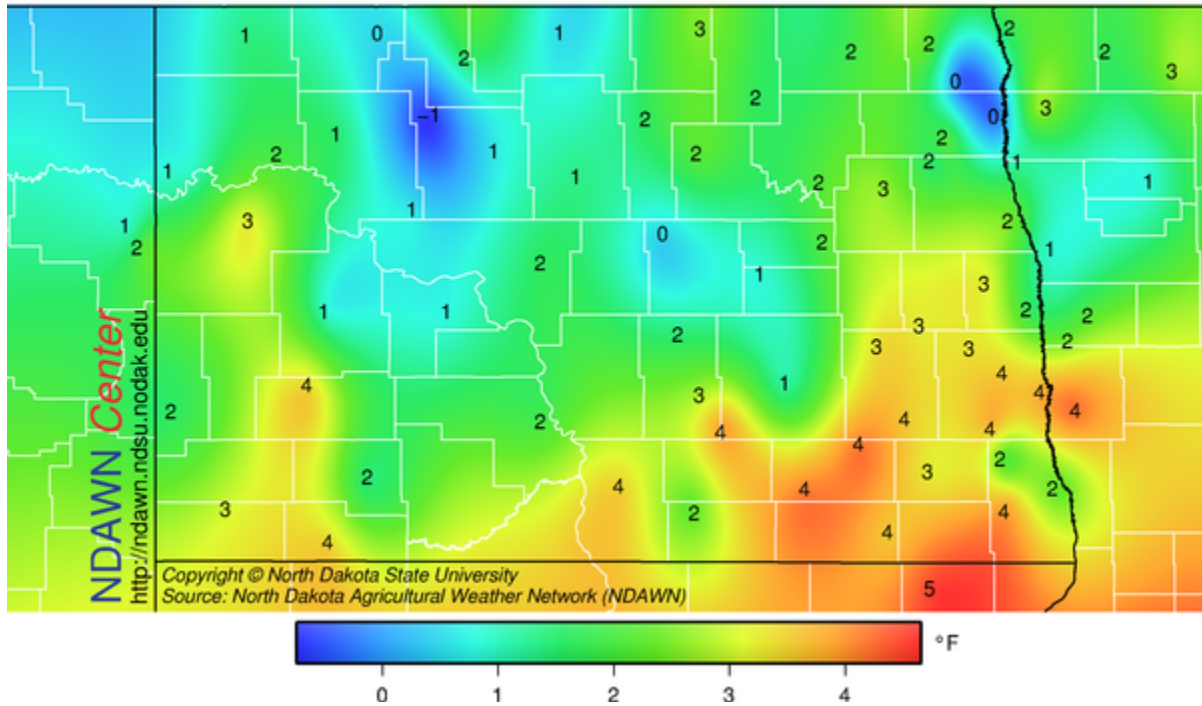


Figure 12. June 2012 Temperature Departure from Normal (°F).





Percent of Normal Rainfall (%) (2012-08-01 – 2012-08-31)

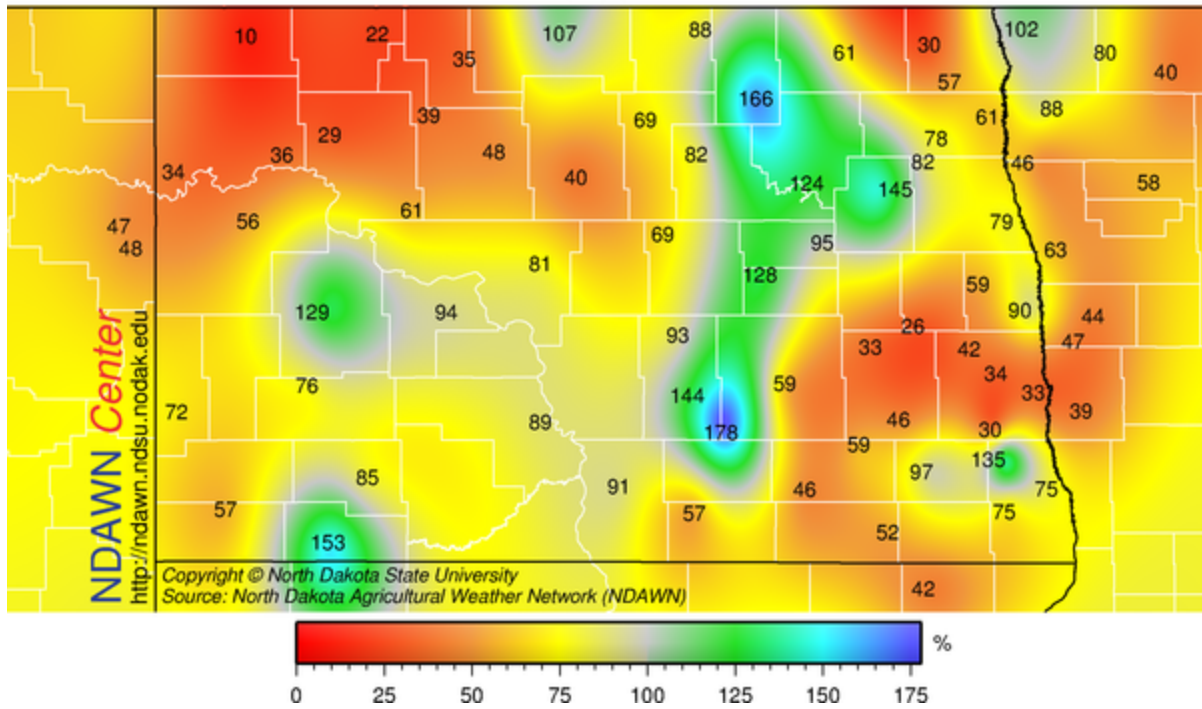


Figure 15. August 2012 Precipitation Percent of Normal (%).

Departure from Normal Average Air Temperature (°F) (2012-08-01 – 2012-08-31)

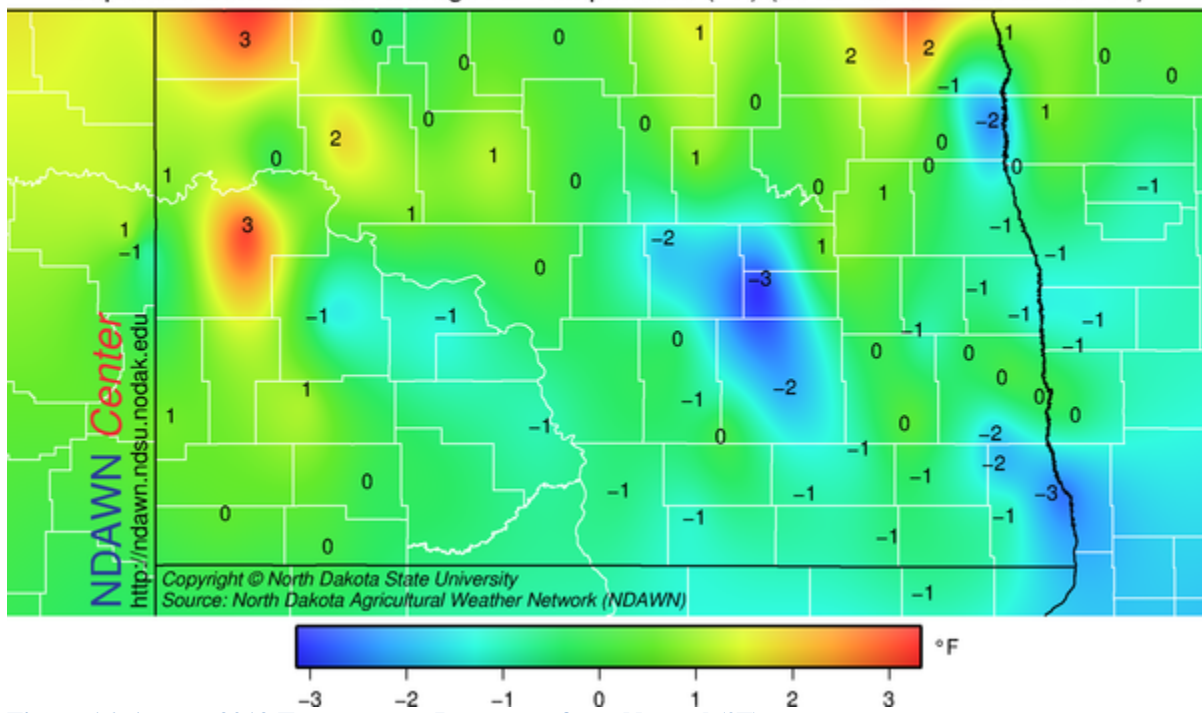


Figure 16. August 2012 Temperature Departure from Normal (°F).

Percent of Normal Rainfall (%) (2012-09-01 – 2012-09-30)

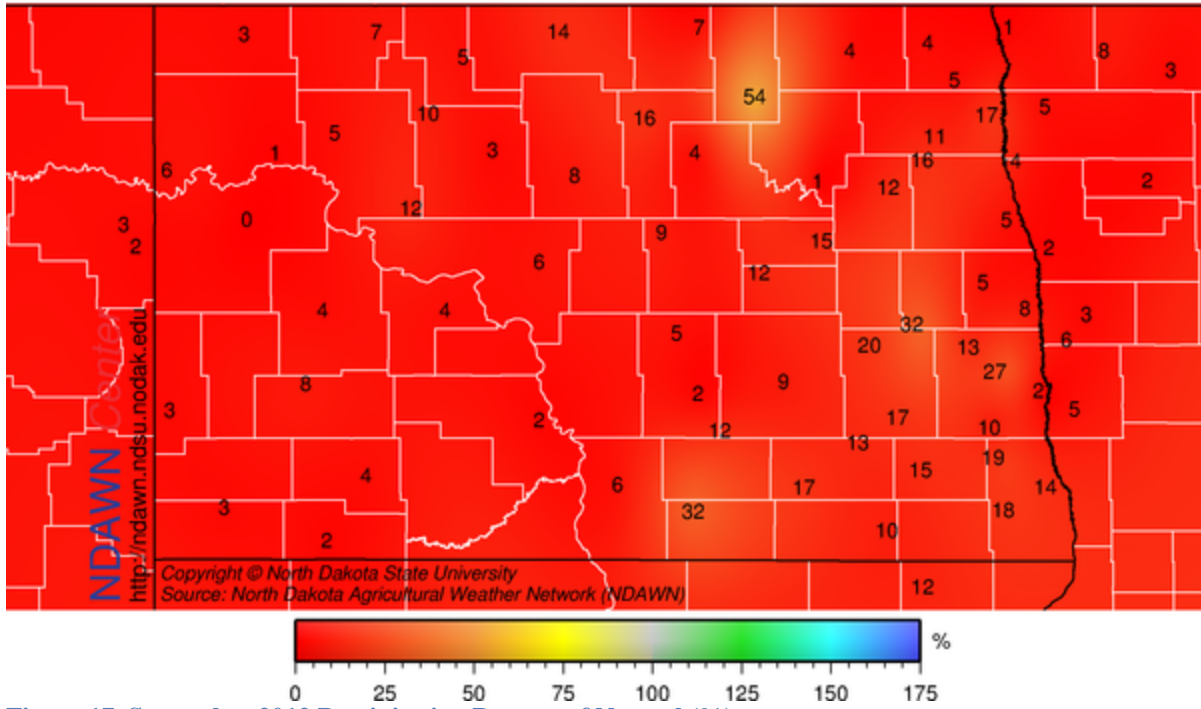


Figure 17. September 2012 Precipitation Percent of Normal (%).

Departure from Normal Average Air Temperature (°F) (2012-09-01 – 2012-09-30)

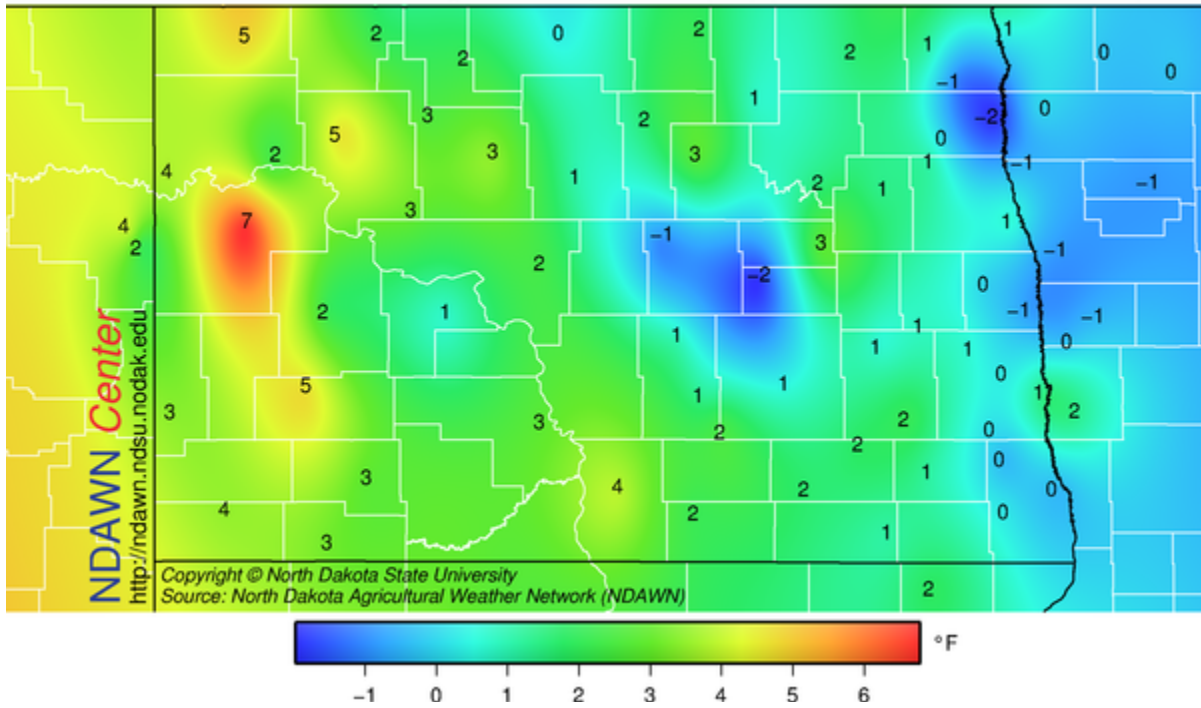


Figure 18 September 2012 Temperature Departure from Normal (°F).