North Dakota Climate Bulletin

Fall 2011

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North Dakota State Climate Office
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From the State Climatologist

The North Dakota Climate Bulletin is a digital quarterly publication of the North Dakota State Climate Office, the College of Agriculture, Food Systems and Natural Resources, North Dakota State University in Fargo, North Dakota.

Compared historically, North Dakota had a warmer and a drier fall following a warmer and a wetter summer. Temperature-wise, this fall was the 9th warmest since 1895. Precipitation-wise, it was the 40th driest fall since 1895. Even though the current ENSO suggests that ND would have a wetter and colder than normal winter, current conditions thus far already have proved that this is not an ordinary La Niña for North Dakota. More information is provided in the "Seasonal Outlook" and the "Hydro Talk" sections.

Unusually dry falls in the eastern North Dakota yielded none-major spring floods in the Red River Valley. We dedicated this quarter's Science Bits section to "Odds for a Major Spring Flood in the Red River".

The North Dakota total precipitation amounts as a percentage of the normal and average temperature departure from normal are shown on pages 6 through 8 (Season in-Graphics) followed by the time series of monthly total precipitation and average temperature of North Dakota for respective months of the season.

Photo by Akyüz

Adnan Akyüz, Ph.D.
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Weather Highlights

Seasonal Summary:

by B. A. Mullins

September 2011

The state average precipitation was 1.37 inches which is below the 1981-2010 normal of 1.71 inches. September 2011 state average precipitation ranked 52nd driest in the last 117 years with a maximum of 5.00 inches in 1900 and a minimum of 0.28 inches in 1897.

September was a quiet month with many dry days which aided harvest progress. The larger rainfall events that occurred in parts of North Dakota happened on the 1st, 18th, 19th, and 20th. The rainfall event on the 20th was widespread with the higher amounts falling in the northeast. For September, the northeastern part of the state had above normal precipitation ranging from approximately 125% to 250% of normal. For the most part, the rest of the state had below normal precipitation of less than 50%. The northwest corner had near normal September rainfall. September precipitation amounts ranged from a trace in the southeast to ~4 inches in the northeast. For many locations it was in the top 10 driest Septembers. For example, for Fargo it was the 4th driest September since 1881.

The National Weather Service (NWS) reported breaking several rainfall records on the 20th. The record rainfalls reported on the 20th include Grand Forks Airport with 1.13 inches, Jamestown with 0.62 inches, Minot with 1.17 inches, and Williston with 0.48 inches. Go to the Storms and Record Events section later in this bulletin to see these and other fall records.

The US Drought Monitor October 4, 2011 report abnormally had dry conditions in the southwest corner and the southeast corner. The remainder of the state had no drought conditions.

The USDA, National Agricultural Statistics Service, North Dakota Field Office reported a topsoil moisture of 2% very short, 19% short, 72% adequate, and 7% surplus with a subsoil moisture reported as 1% very short, 10% short, 75% adequate, and 14% surplus (Weekly Weather and Crop Bulletin Vol. 98, No. 40).

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

The top five September daily maximum wind speeds recorded from NDAWN were Greenbush MN on the 1st with 59.8 mph, McHenry on the 20th with 51.9 mph, St. Thomas on the 1st with 51.9 mph, Robinson on the 20th with 50.8 mph, and Crary on the 1st with 50.5 mph. NDAWN wind speeds are measured at a height of 10 feet (3 m).

The state average air temperature was 58.1 °F which is above the 1981-2010 normal of 56.77 °F. September 2011 state average air temperature ranked 33rd warmest in the past 117 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 55 °F to 61 °F. NDAWN departure from normal temperatures ranged from -1 °F to 7 °F. In the late hours of August 31st and the early hours of September 1st a severe thunderstorm that produced powerful winds swept through northeast North Dakota and hit especially hard in northwestern Minnesota in which a peak wind of 121 mph was measured. The 121 mph peak wind is under review and could possibly become the new MN state record, beating the previous record of 117 mph. The first few days of September had near normal average air temperatures for most parts of ND which was followed by a stretch from the 5th through the 11th of above normal average temperatures. The first killing frost hit on the 14th-15th. Daily minimum temperatures on the 14th fell to 28 °F in parts of the central west. Daily minimum temperatures fell to 28 °F and less primarily in the east on the 15th. Average temperatures rebounded after the 15th to near normal. The 21st - 22nd again had below normal average air temperatures for most. Beginning around the 25th was a long stretch of warm, sunny days that went into October.

The National Weather Service (NWS) recorded a record high temperature on the 28th at Fargo with 90 °F and Grand Forks airport with 88 °F. 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 93.0 °F at Sidney MT on the 25th. The lowest recorded daily air temperature was 22.8 °F at Bottineau on the 14th.

October 2011

The state average precipitation was 1.05 inches which is below the 1981-2010 normal state average of 1.48 inches. October 2011 state average precipitation ranked the 54th wettest in the past 117 years with a maximum of 4.71 inches in 1982 and a minimum of 0.10 inches in 1952.

The North Dakota Agricultural Weather Network (NDAWN) October percent of normal rainfall ranged from approximately 10% to 160%. Amounts of near-normal to above fell in the south central, central, and northwest regions. Most elsewhere had less than 50% of normal rainfall. NDAWN October totals ranged from 0.13 inches at Humboldt MN to 1.84 inches at Wishek. Most of the rain events happened from the 6th through the 12th and the 23rd through the 25th.

The National Weather Service (NWS) reported breaking three Minot precipitation records. Minot reported a record 0.06 inches on the 14th, 0.33 inches on the 23rd, and 0.40 inches on the 25th. A complete list of fall record events can be found in the "Storms and Record Events" section later in this bulletin.

The US Drought Monitor November 1, 2011 report had abnormally dry conditions in the southwest corner and the eastern edge of the state with no drought conditions reported elsewhere in the state.

The USDA, National Agricultural Statistics Service, North Dakota Field Office reported a topsoil moisture of 1% very short, 22% short, 71% adequate, and 6% surplus with a subsoil moisture reported as 0% very short, 11% short, 78% adequate, and 11% surplus (Weekly Weather and Crop Bulletin Vol. 98, No. 44).

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

The top five October daily maximum wind speeds recorded from NDAWN all happened on the 7th with 58.7 mph at McHenry, 54.4 mph at Jamestown, 54.4 mph at Wishek, 54.1 mph at Langdon and 53.7 mph at Pillsbury. NDAWN wind speeds are measured at a height of 10 feet (3 m).

The state average air temperature was 47.8 °F which is above the 1981-2010 normal of 43.24 °F. October 2011 state average air temperature ranked the 14th warmest in the past 117 years with a maximum of 54.8 °F in 1963 and a minimum of 32.5 °F in 1925.

NDAWN October average air temperatures ranged from 47 °F to 52 °F. NDAWN departure from normal temperatures were above normal across the state and ranged from 3 °F to 8 °F. The first half of the month had temperatures far above normal to near normal on most days. The second half of the month had average air temperatures hovering at near normal for most areas. The first more wide spread hard freeze happened on the 17th and 18th. The mild temperatures and dry days made this an excellent year for harvesting. Harvesting activities for many crops concluded by the end of October. Fargo and Grand Forks had the 6th warmest October on record.

The National Weather Service (NWS) reported breaking several high temperature records in the first six days of October. Dickinson had a record high temperature on the 2nd with 95 °F. Grand Forks airport had a record high on the 3rd with 83 °F. There were several high maximum temperature records set on the 5th. These included Minot with 87 °F, Williston with 86 °F, Grand Forks airport with 89 °F, and Grand Forks NWS with 88 °F. Record high minimum temperatures were set on the 5th with 64 °F at Fargo and 60 °F at Grand Forks airport. Record high minimum temperatures set on the 6th were 64 °F at Fargo, 61 °F at Grand Forks airport, and 62 °F at Grand Forks NWS.

NDAWN's highest recorded daily air temperature for October was 95.5 °F at Dunn on the 2nd. The lowest recorded daily air temperature was 14.9 °F at Bottineau on the 19th.

November 2011

The state average precipitation was 0.13 inches which is below the 1981-2010 normal of 0.72 inches. November 2011 state average precipitation ranked 12th driest in the past 117 years with a maximum of 2.51 inches in 2000 and a minimum of 0.02 inches in 1939.

The High Plains Regional Climate Center (HPRCC) November percent of normal rainfall ranged from approximately 1% to 50%. The northwest corner had the most precipitation ranging from 25% to 50% of normal. Williston ranked 54th driest November since 1895 with 0.39 inches. Minot ranked 17th driest November since 1948 with 0.23 inches. Bismarck ranked 13th driest November with 0.06 inches. Fargo ranked 31st driest November since 1881 with 0.26 inches. Grand Forks ranked 13th driest November since 1893 with 0.12 inches. HPRCC total November precipitation ranged from roughly a trace to 0.4 inches with the higher amounts falling in the northwest and northern regions and amounts of less than 0.2 inches falling most elsewhere. As of December 1st, moderate drought spread into eastern North Dakota after 115 consecutive weeks of no drought conditions any place in North Dakota. It was the longest stretch with no drought in North Dakota's recorded history since the inception of the Drought Monitor in 2000.

The National Weather Service (NWS) had no record rainfall events in November. A complete list of fall record events can be found in the "Storms and Record Events" section later in this bulletin.

The US Drought Monitor December 6, 2011 report had abnormally dry conditions in the southwest, south, and the eastern parts of the state. The far east, primarily Cass and Trail Counties, had moderately dry conditions. The remainder of the state had no drought conditions reported.

The USDA, National Agricultural Statistics Service, North Dakota Field Office reported a topsoil moisture of 1% very short, 28% short, 67% adequate, and 4% surplus with a subsoil moisture reported as 0% very short, 14% short, 77% adequate, and 9% surplus (Weekly Weather and Crop Bulletin Vol. 98, No. 48).

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

The top five November daily maximum wind speeds recorded from NDAWN all happened on the 15th with 50.8 mph at Dazey, 50.8 mph at Leonard, 50.5 mph at Carrington, 49.4 mph at Fargo and 49.0 mph at Pillsbury. NDAWN wind speeds are measured at a height of 10 feet (3 m).

The state average air temperature was 30.5 °F which is above the 1981-2010 normal of 27.44 °F. November 2011 state average air temperature ranked the 24th warmest in the past 117 years with a maximum of 37.4 °F in 2001 and a minimum of 7.30 °F in 1896.

NDAWN November average air temperatures ranged from 26 °F to 33 °F. NDAWN departure from normal temperatures were above normal across the state and ranged from 3 °F to 7 °F. The 1st through the 15th had near normal to above normal temperatures across the state. From the 16th through the 21st temperatures dropped significantly below normal. Temperatures again rebounded to near and above normal temperatures for the remainder of the month. Williston ranked 53rd warmest November since 1895 with 29.0 °F. Minot ranked 17th warmest November since 1948 with 31.2 °F. Bismarck ranked 38th warmest November with 31.4 °F. Fargo ranked 20th warmest November since 1881 with 33.8 °F. Grand Forks ranked 20th warmest November since 1893 with 31.5 °F. Lack of permanent snow pack for many areas contributed to the warm temperatures.

The National Weather Service (NWS) reported breaking several high temperature records on the 23rd and 24th. Bismarck, Minot, and Williston recorded record breaking or tying high temperatures on the 23rd with 62 °F, 55 °F, and 56 °F, respectively. Grand Forks airport, Grand Forks NWS and Fargo had record high temperatures on the 24th with 56 °F, 55 °F, and 57 °F, respectively. The Grand Forks airport also had a record high temperature on the 28th with 51 °F. A complete list of fall record events can be found in the "Storms and Record Events" section later in this bulletin.

NDAWN's highest recorded daily air temperature for November was 64.2 °F at Hazen on the 23rd. The lowest recorded daily air temperature was -11.6 °F at Bowman on the 20th.

Season in Graphics

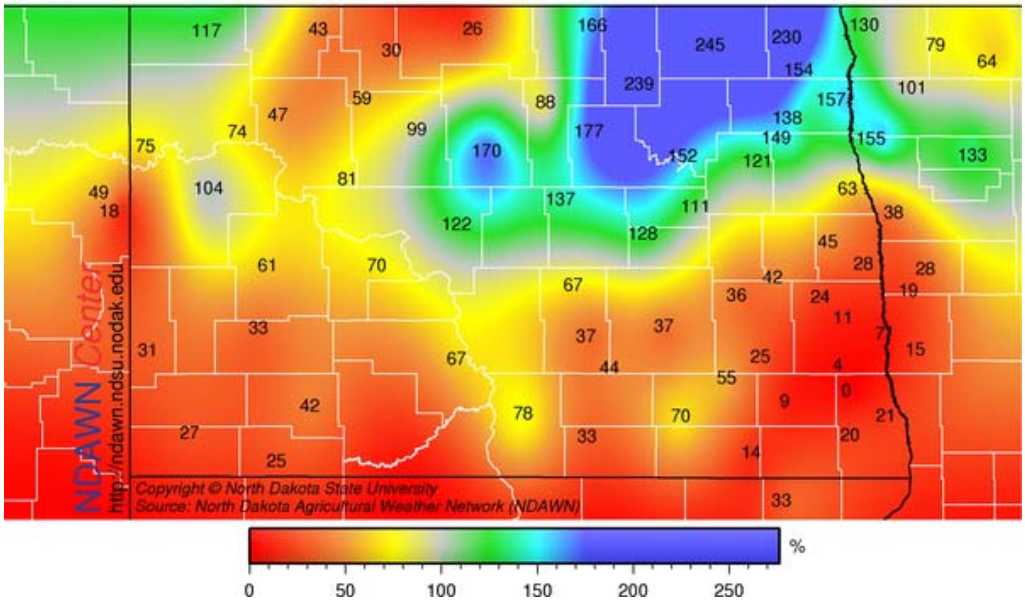
September 2011

Fall 2011 Weather in North Dakota:

Total Precipitation percent of mean (1971-2000)

Precipitation Percent of Normal

(Data from North Dakota Agricultural Weather Network (NDAWN))

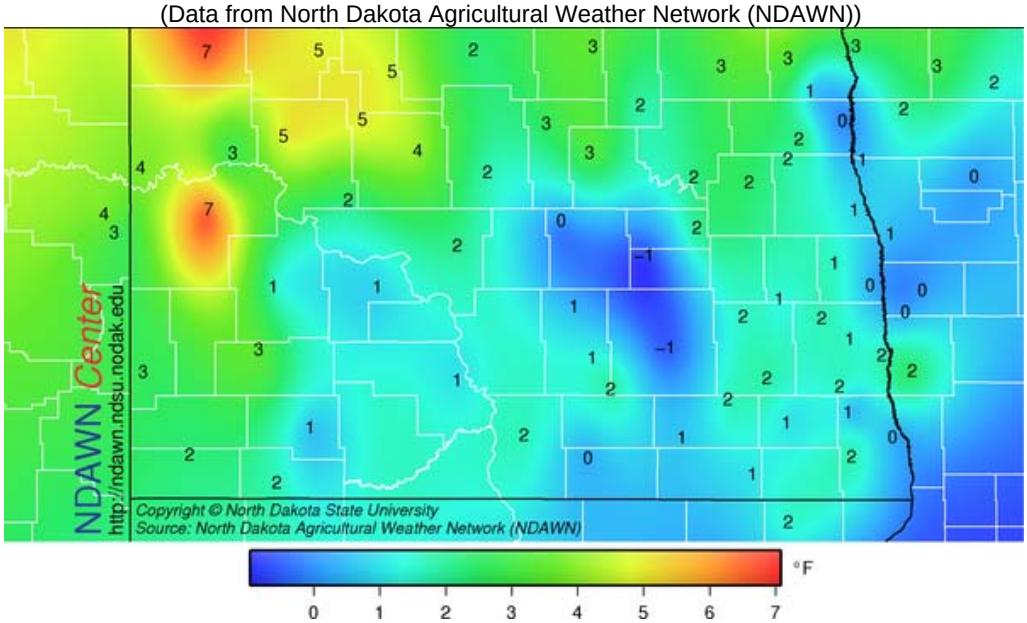


North Dakota State Climate Office

Average Temperature (°F) Deviation from Mean (1971-2000)

Departure From Normal Monthly
Average Air Temperature in degrees F

(Data from North Dakota Agricultural Weather Network (NDAWN))



North Dakota State Climate Office

Season in Graphics

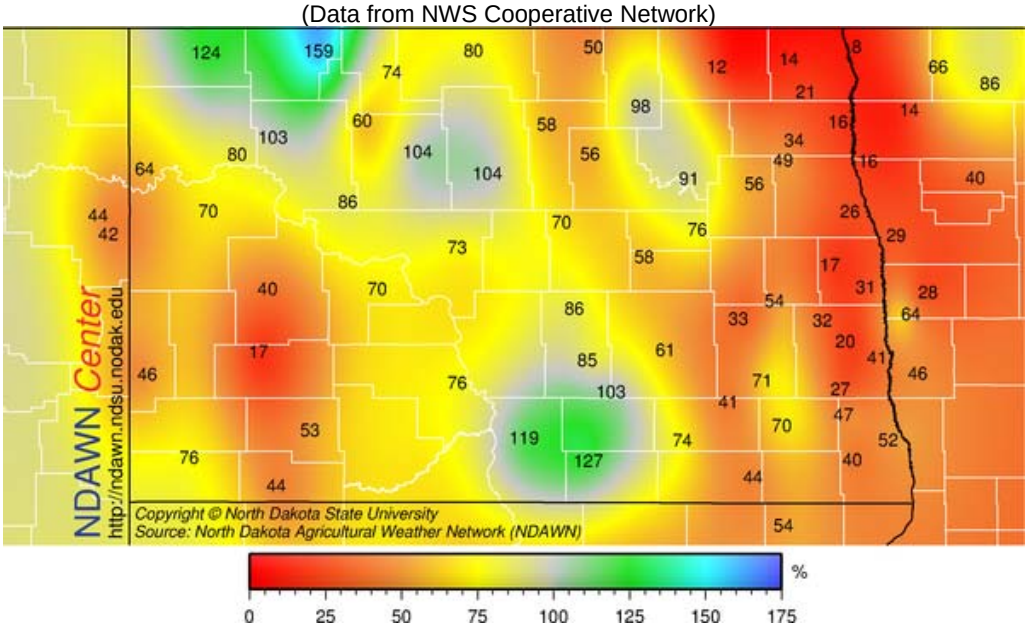
October 2011

Fall 2011 Weather in North Dakota:

Total Precipitation percent of mean (1971-2000)

Precipitation Percent of Normal

(Data from NWS Cooperative Network)

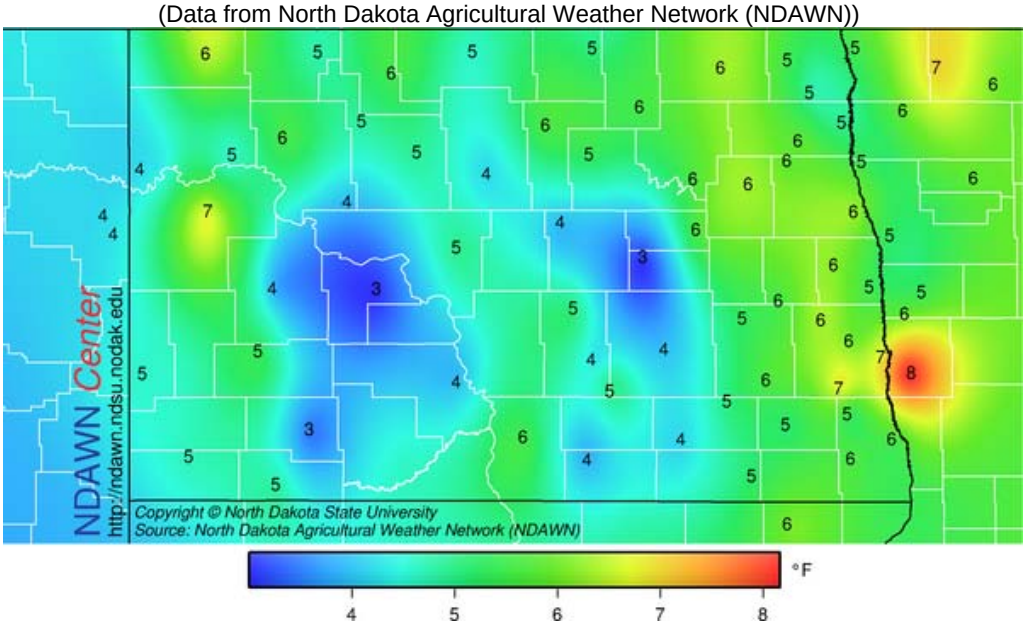


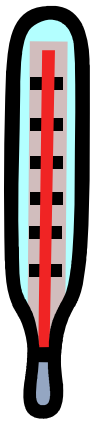
North Dakota State Climate Office

Average Temperature (°F) Deviation from Mean (1971-2000)

Departure From Normal Monthly
Average Air Temperature in degrees F

(Data from North Dakota Agricultural Weather Network (NDAWN))





North Dakota State Climate Office

Season in Graphics

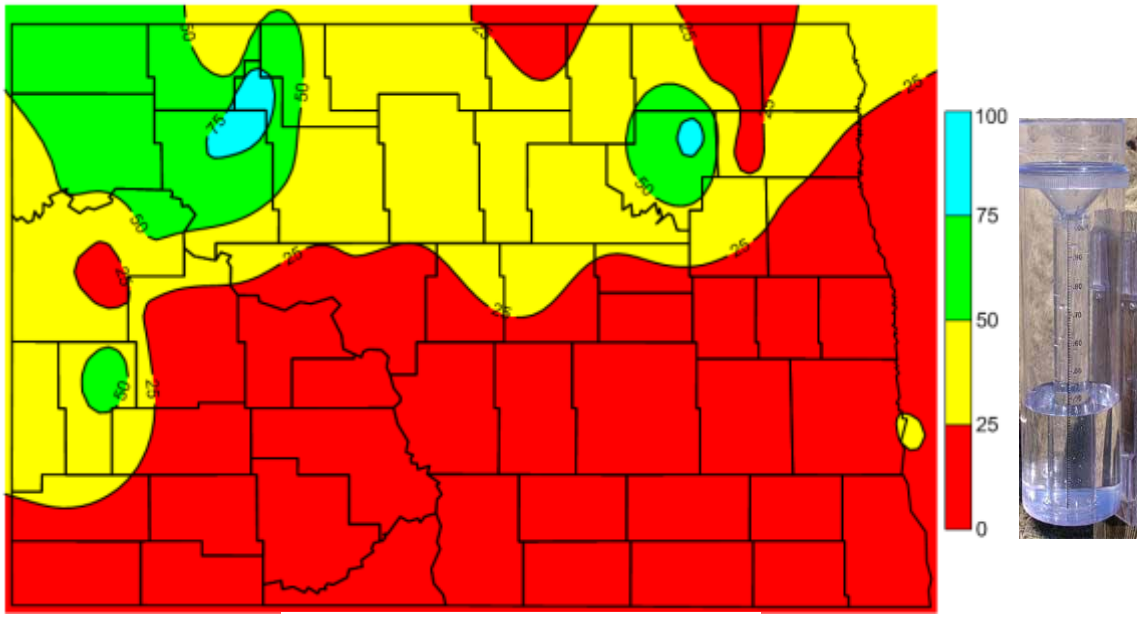
November 2011

Fall 2011 Weather in North Dakota:

Total Precipitation percent of mean (1981-2010)

Precipitation Percent of Normal

(Data from NWS Cooperative Network)

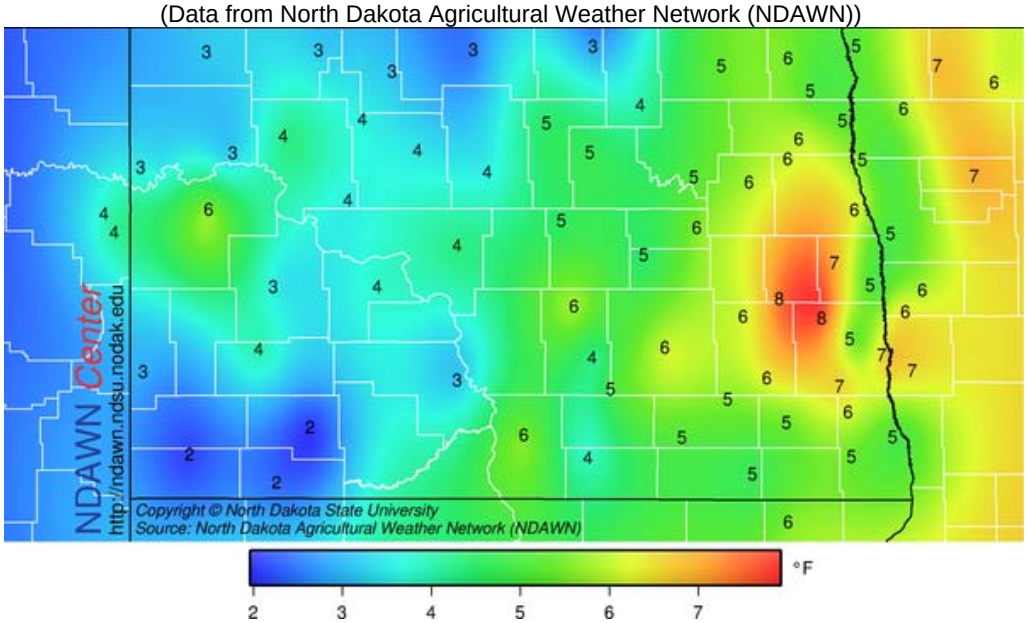


North Dakota State Climate Office

Average Temperature (°F) Deviation from Mean (1971-2000)

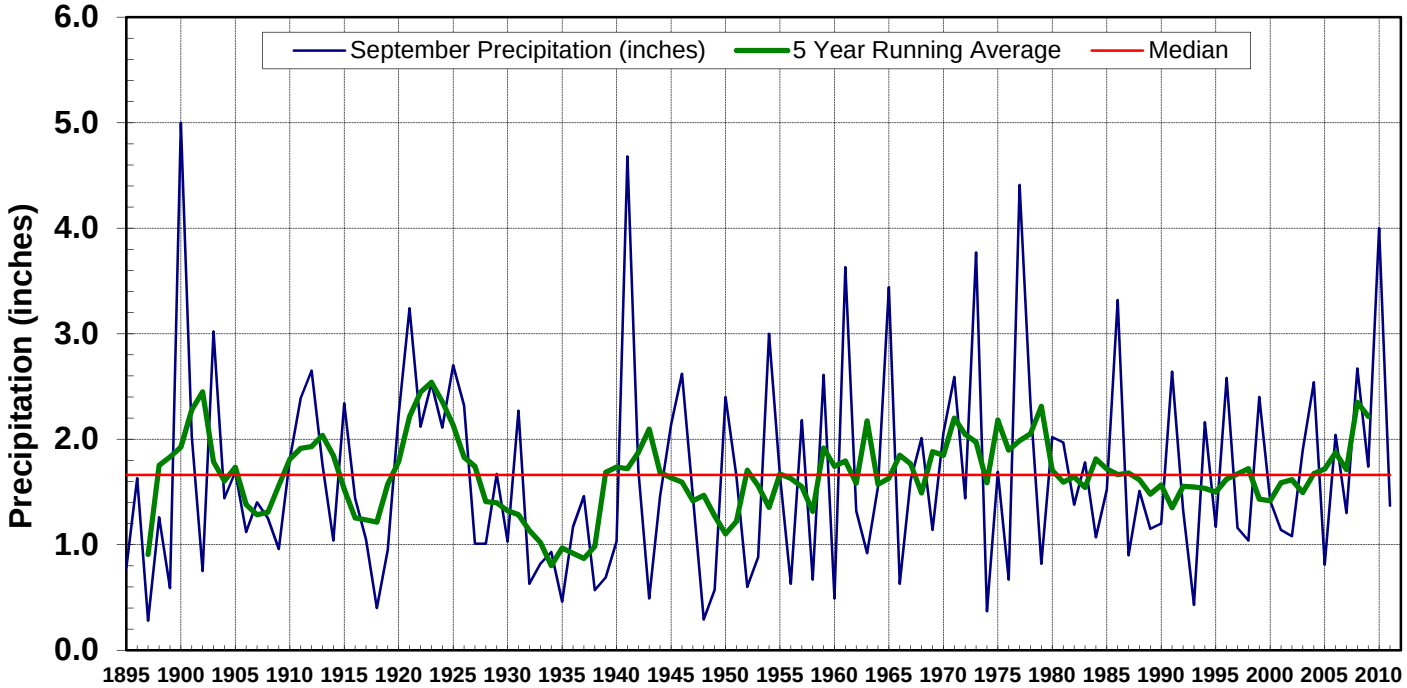
Departure From Normal Monthly
Average Air Temperature in degrees F

(Data from North Dakota Agricultural Weather Network (NDAWN))



North Dakota State Climate Office

Historical September Precipitation for North Dakota

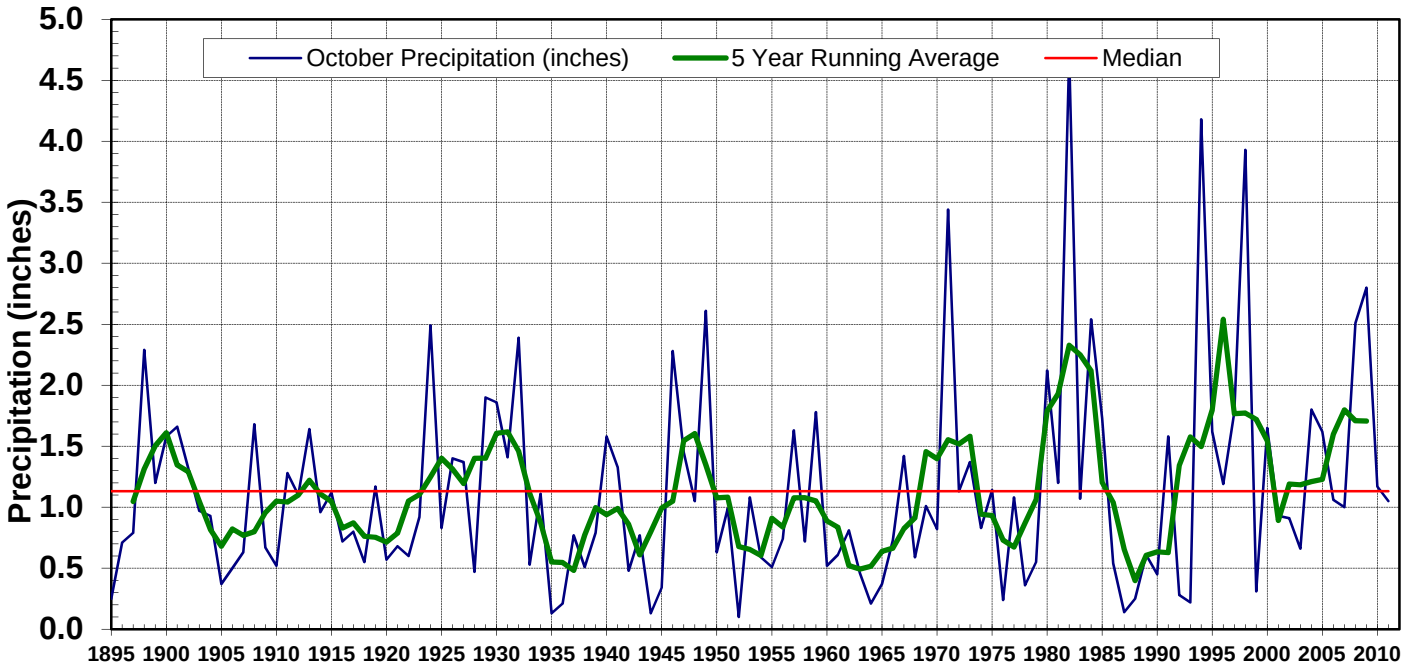


<u>September Precipitation Statistics</u>

2011 Amount: **1.37 inches**
Maximum: 5.00 inches in 1900
State Normal: 1.71" (1981-2010)

Monthly Ranking: 52nd Driest in 117 years
Minimum: 0.28 inches in 1897
Years in Record: 117

Historical October Precipitation for North Dakota

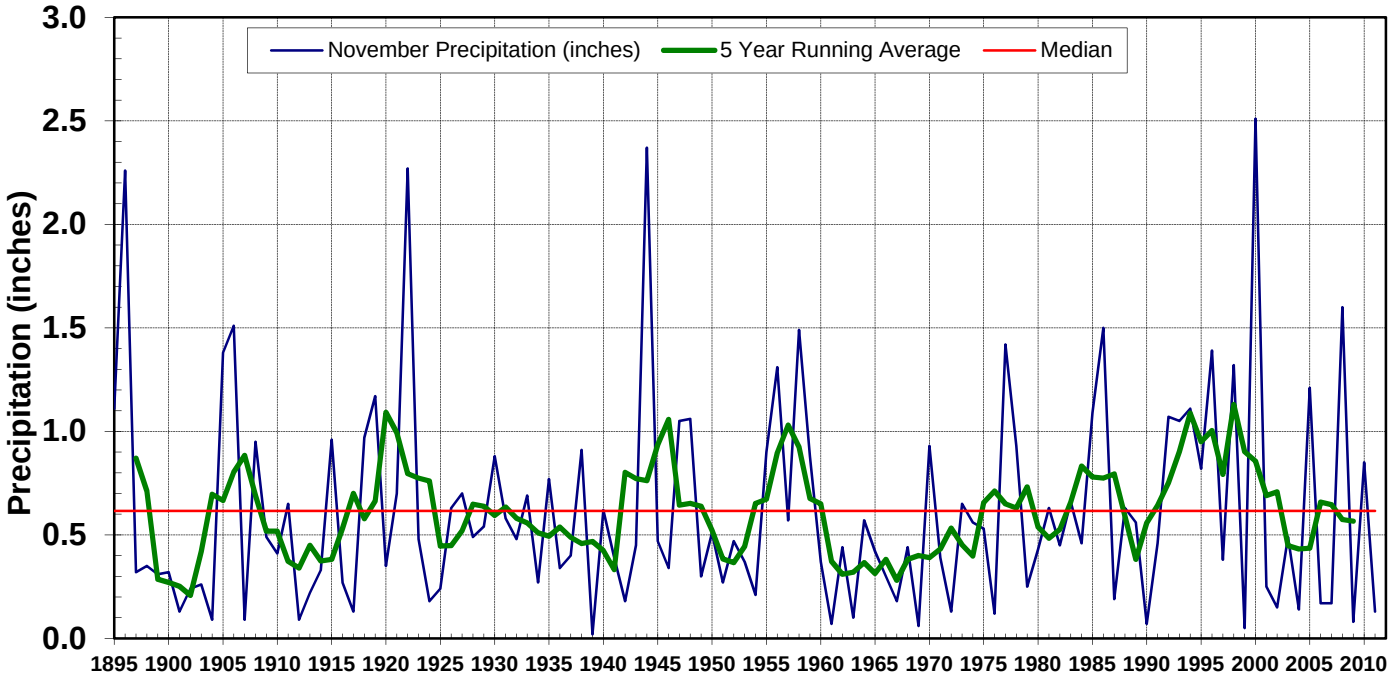


<u>October Precipitation Statistics</u>

2011 Amount: 1.05 inches
Maximum: 4.71 inches in 1982
State Normal: 1.48” (1981-2010)

Monthly Ranking: 54th wettest in 117 years
Minimum: 0.10 inches in 1952
Years in Record: 117

Historical November Precipitation for North Dakota

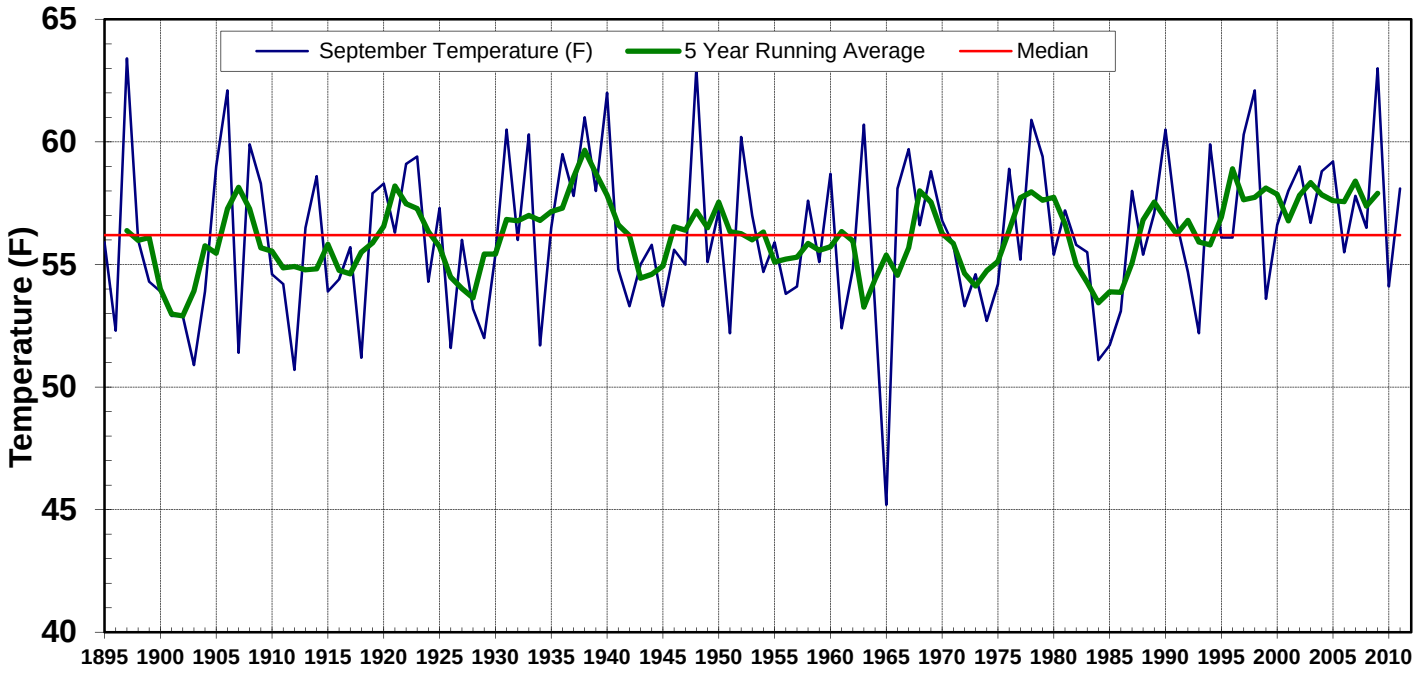


<u>November Precipitation Statistics</u>

2011 Amount: 0.13 **inches**
Maximum: 2.51 inches in 2000
State Normal: 0.72" (1981-2010)

Monthly Ranking: 12th driest in 117 years
Minimum: 0.02 inches in 1939
Years in Record: 117

Historical September Temperature for North Dakota

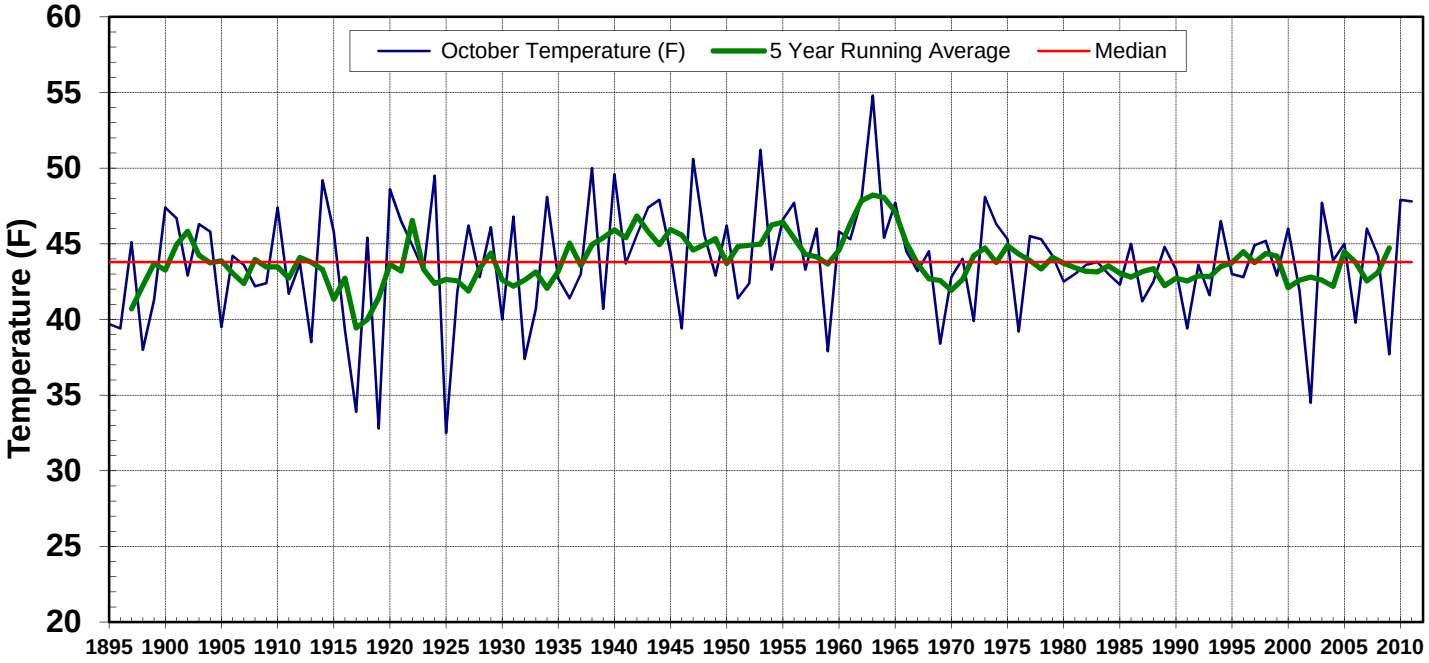


September Temperature Statistics

2011 Average: **58.1** °F
Maximum: 63.4 °F in 1897
State Normal: 56.77 °F (1981-2010)

Monthly Ranking: 33rd Warmest in 117 years
Minimum: 45.2 ° F in 1965
Years in Record: 117

Historical October Temperature for North Dakota

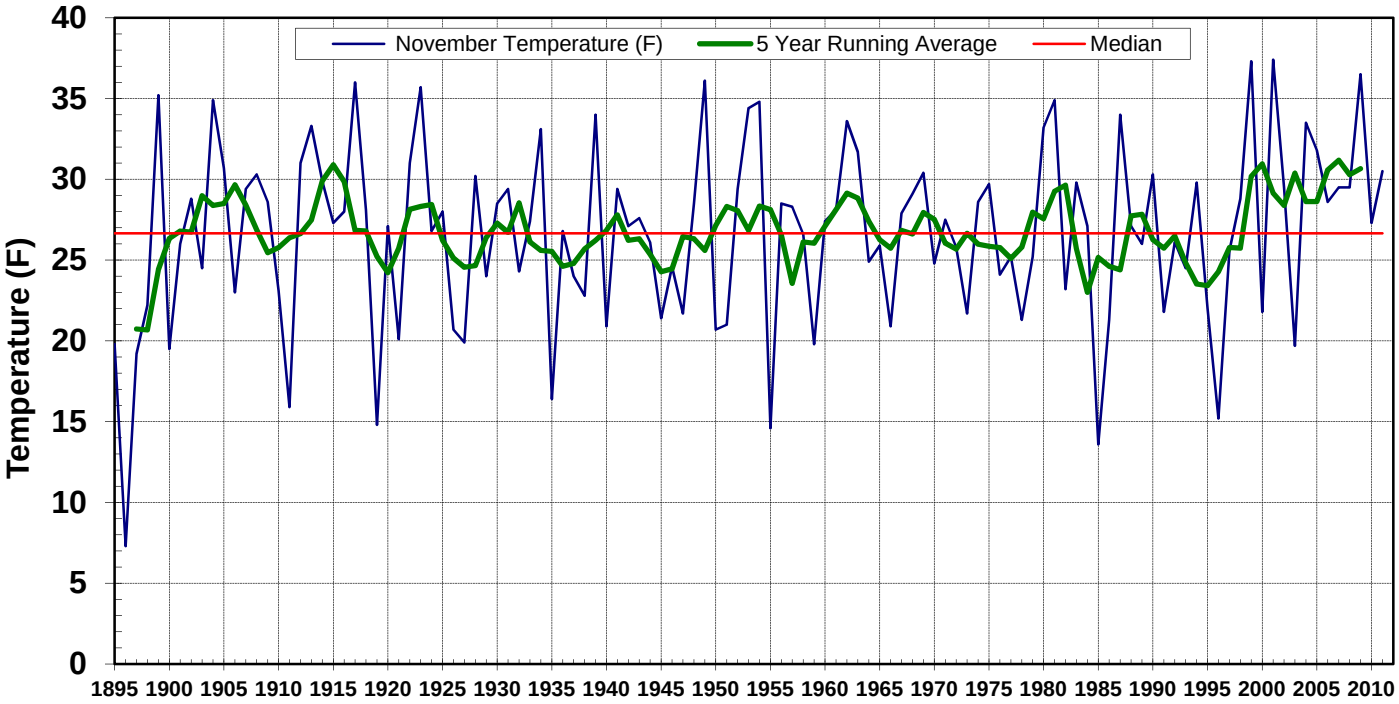


October Temperature Statistics

2011 Average: 47.8 °F
Maximum: 54.8 °F in 1963
State Normal: 43.24 °F (1981-2010)

Monthly Ranking: 14th Warmest in 117 years
Minimum: 32.5 °F in 1925
Years in Record: 117

Historical November Temperature for North Dakota



<u>November Temperature Statistics</u>

2011 Average: **30.5 °F**
Maximum: 37.4 °F in 2001
State Normal: 27.44 °F (1981-2010)

Monthly Ranking: 24th warmest in 117 years
Minimum: 7.3 °F in 1896
Years in Record: 117

Storms & Record Events

State Tornado, Hail, and Wind Reports for Fall 2011

by B. A. Mullins

North Dakota 3 Month Total	Wind	Hail	Tornado
	0	0	0

Reports by Month			
Month	**Wind**	**Hail**	**Tornado**
Total September	0	0	0
Total October	0	0	0
Total November	0	0	0

North Dakota Record Event Reports for Fall 2011

Date	Location	Type of Record	Previous Record
09/20/11	Grand Forks airport	Rainfall of 1.13 inches	0.79 inches in 2004
09/20/11	Jamestown	Rainfall of 0.62 inches	0.58 inches in 1996
09/20/11	Minot	Rainfall of 1.17 inches	1.10 inches in 1955
09/20/11	Williston	Rainfall of 0.48 inches	0.30 inches in 1902
09/25/11	Williston	High temperature of 89 °F	Ties previous record in 1990
09/28/11	Grand Forks airport	High temperature of 88 °F	85 °F in 1995
09/28/11	Fargo	High temperature of 90 °F	89 °F in 1905
10/02/11	Dickinson	High temperature of 95 °F	91 °F in 1997
10/03/11	Grand Forks airport	High temperature of 83 °F	Ties previous record in 1997
10/05/11	Minot	High temperature of 87 °F	85 °F in 1920
10/05/11	Williston	High temperature of 86 °F	Ties previous record in 1920
10/05/11	Fargo	High minimum temperature of 64 °F	58 °F in 1963
10/05/11	Grand Forks airport	High minimum temperature of 60 °F	53 °F in 1963
10/05/11	Grand Forks NWS	High minimum temperature of 61 °F	57 °F in 1955
10/05/11	Grand Forks airport	High temperature of 89 °F	86 °F in 1970, 1961, and 1947
10/05/11	Grand Forks NWS	High temperature of 88 °F	86 °F in 1947
10/06/11	Fargo	High minimum temperature of 64 °F	58 °F in 1984
10/06/11	Grand Forks airport	High minimum temperature of 61 °F	57 °F in 1994
10/06/11	Grand Forks NWS	High minimum temperature of 62 °F	59 °F in 1984
10/14/11	Minot	Rainfall of 0.06 inches	0.05 inches in 1951
10/23/11	Minot	Rainfall of 0.33 inches	0.25 inches in 1957
10/25/11	Minot	Rainfall of 0.40 inches	0.30 inches in 1973
11/23/11	Bismarck	High temperature of 62 °F	61 °F in 1890
11/23/11	Minot	High temperature of 55 °F	Ties previous record in 1942
11/23/11	Williston	High temperature of 56 °F	Ties previous record in 1942
11/23/11	Grand Forks NWS	High temperature of 56 °F	51 °F in 1984
11/23/11	Grand Forks airport	High temperature of 58 °F	52 °F in 1972
11/24/11	Grand Forks NWS	High temperature of 55 °F	54 °F in 1984
11/24/11	Fargo	High temperature of 57 °F	56 °F in 1984
11/24/11	Grand Forks airport	High temperature of 56 °F	53 °F in 1984
11/28/11	Grand Forks airport	High temperature of 51 °F	50 °F in 2002

Seasonal Outlook

Winter Climate Outlooks

by D. Ritchison[1]

Before General Motors discontinued their Oldsmobile division, they had a marketing campaign with the slogan "this is not your father's Oldsmobile" to entice younger people to consider the brand. I use this as a reference to the current state of the equatorial Pacific Ocean. Although there are currently La Niña conditions present, just like last winter, to steal that phrase from Oldsmobile, this is not last year's La Nina. In fact, conditions are barely within the realm of what is considered to be a La Nina, so in other words, it is a borderline event.

During the past few months a persistent ridge of high pressure has resided over the northeastern part of the Pacific Ocean. This has brought generally mild and dry conditions to North Dakota. The flow around that upper-level high pressure system creates a dominant flow from the northwest aloft where little moisture is available to be drawn into the state. Plus, a persistent subtropical jet stream has been locked into place well to our south and that is where most of the moisture-laden storms have been tracking. This pattern has been so persistent that parts of the region have transitioned from very wet into mild drought conditions during the autumn season.

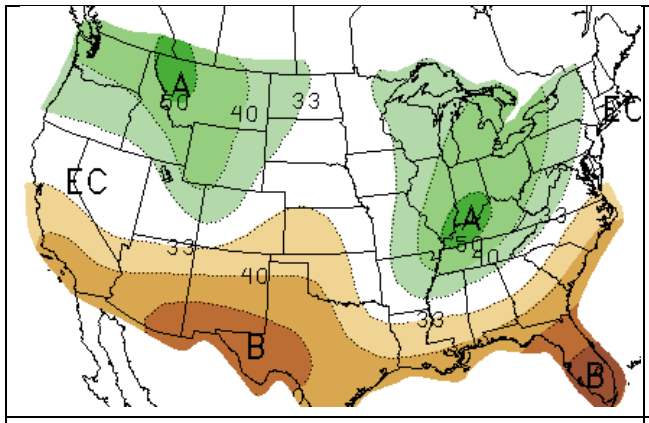
During the next three months, this dominant Pacific ridge should weaken. This in turn will help increase the amount of available moisture, yet still keep us in a normal to below normal precipitation pattern. Also, a transition into more frequent colder than average temperature periods is expected as we head into January and February. For sensible weather this means the odds favor less snowfall then last year, plus, temperatures not as cold as the 2010-2011 winter. Being North Dakota, it is going to snow and of course be cold, but it appears it will not be as harsh as the past couple of winters.

The latest winter outlook from the Climate Prediction Center for the winter currently has a classic La Niña signature to them (See the figures below). These may be adjusted slightly when the newer forecasts come out. You can find the current and future outlooks, when new ones become available, at http://www.cpc.ncep.noaa.gov/products/predictions/90day .

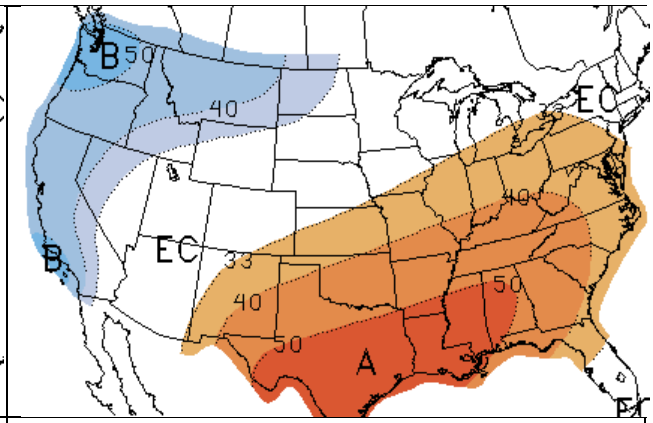
As a reminder, the North Dakota State Climate Office has links to the National Weather Service's local 3-month temperature outlooks for the upcoming year. Those outlooks can be found here: http://www.ndsu.edu/ndsco/outlook/L3MTO.html .

These outlooks are updated on the third Thursday of each month, with a final monthly outlook issued at the end of each month. These outlooks are available at http://www.cpc.ncep.noaa.gov/products/predictions/90day/

[1] The corresponding author: Daryl Ritchison is a broadcast meteorologist working at WDAY-TV Fargo, ND.
E-Mail: daryl@ritchison.com



January through March Precipitation Outlook



January through March Temperature Outlook

Also the readers will find the following National Weather Service office web sites very useful for shorter term weather forecasts:

Eastern North Dakota: http://www.crh.noaa.gov/fgf/
Western North Dakota: http://www.crh.noaa.gov/bis/

Hydro-Talk

Impact of Dry Soil but Full Wetlands on Local Hydrology

by A. Schlag[2]

Given the past three years of statewide flood problems, it is probably best to discuss what we do, and do not, know about the spring of 2012. First and foremost, the El Niño Southern Oscillation (ENSO) is one of the more dominant factors in climate patterns for North Dakota. As shown in Fig. 1, the current model runs expect this winter and early spring to be in a La Niña pattern.

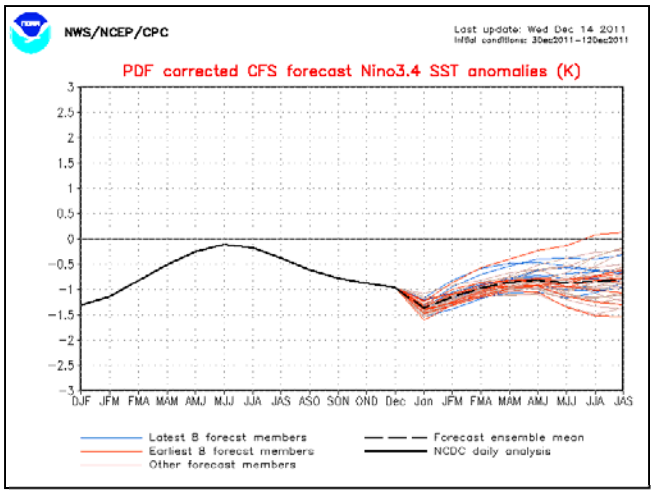


Figure 1. Model runs for ENSO forecast.

Compounding the problem during some La Niña winters are a similar ocean temperature anomaly called the Pacific Decadal Oscillation (PDO), local research suggests that when ENSO and PDO are synchronized in their cool phases, not only are the winters in North Dakota colder, but wetter as well. The combination of these two factors led the Climate Prediction Center (CPC) to highlight North Dakota's increased chances for cold and wet through spring. December has thus far been slightly below average in temperature and well below normal with respect to precipitation. There is a very real possibility of this winter turning out to be unremarkable, but we still have a long time to go before the jury comes in on this winter.

The lack of natural surface water storage across the prairie pothole region of North Dakota is worth noting. The past three years have filled many seasonal wetlands to their natural overflows, and going into this winter many remain at or very near their natural overflow points. The problem with this is that the region does NOT necessarily need record to near record snowpack to create flood problems in these areas because natural wetlands are more full than normal and will more readily contribute to runoff. This suggests that lesser amounts of rain storm next year may create runoff that was historically observed from greater amounts of rainfall events. The exact increase in contributing area is very difficult to quantify, but qualitatively we do know that it can play a factor. This is troubling to forecasters because the climate outlooks for the March – May period continue to reflect an above normal risk of being wetter than normal.

Soil moisture content for most of last summer was very high across North Dakota. This would have been a serious concern going into winter if it weren't for the pleasant surprise of a meteorological drought befalling part of the state. A meteorological drought is simply a period of abnormally dry conditions that do not impact river flow or vegetative growth. Rarely do people welcome droughts, but because of the timing and lack of impacts, this one actually has produced a benefit by drying out the upper soils. The region has now entered winter and below freezing soil temperatures, which helps preserve the storage in the soils for at least some of next spring's snowmelt.

Those watersheds with significant amounts of natural wetlands, including the Souris, James, and Sheyenne, are at above normal risk of at least seeing minor flooding next spring. The current climate outlooks for the winter do not necessarily paint a rosy picture but after a few years in a row of meeting or exceeding expectations, statistically speaking it would not be unusual to find one of those more "normal" winters that have historically been observed in years with similar climate drivers. North Dakota is known for its wide variability from year to year and we still have much to learn about how other significant climate drivers affect the region in a La Niña winter. That being said, while no indicators suggest that we are in store for another year with a nine-month long flood season, it is reasonable to infer that at least minor flooding will be seen in North Dakota in 2012.

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Science Bits

Odds for a Major Spring Flood in the Red River :

by F. A. Akyüz[3]

Last winter, I discussed the Red River of the North's flood sensitivity to fall precipitation. Last spring, the Red River reached its peak stage of 38.75' (8.75' above the major flood threshold), following the 10th wettest spring, and the 3rd snowiest winter. The Climate Prediction Center forecasted that La Niña would continue well into the upcoming spring, creating anxiety among the residents that another major flood would occur in the Red River.

So far, the weather pattern is uncharacteristic of a La Niña pattern in North Dakota. It has been very warm since July 2011 and very dry since August 2011. In fact, the fall of 2011 was the 4th driest fall in the recorded history for Fargo since 1881. Historically, dry falls are normally followed by none-major flood producing spring weather in Fargo. In fact, off all dry falls (55) in the recorded history since 1881, only one was followed by spring weather that led to a major flooding in Fargo. It was 1965 when the 30.5-foot river stage (0.5' above the major flood threshold) was reached on April 15. The table below shows the 10 driest falls (as observed in Fargo) and the Red River stage in Fargo.

Ranking	Year	Date of Peak Stage in Following year	Annual Peak Stage in Following Year (feet)	Fall Precipitation (in)
1	1976	4-Jul	14.99	0.97
2	1936	12-Apr	10.17	1.2
3	1967	30-Apr	14.71	1.41
4	**2011**	**?**	**?**	**1.43**
5	1963	18-Apr	16.22	1.54
6	1953	4-Jul	10.53	1.84
7	1952	1-Jun	18.05	1.9
8	1917	31-Mar	6.87	2.11
9	1939	8-Apr	9.63	2.11
10	1937	2-May	10.02	2.11

Incidentally, 1936-1937 winter was the 4th snowiest season with 82.3" of total snowfall (32.2" above the 1981-2010 normal for Fargo). The Red River gauge in Fargo never exceeded 10.17 feet (nearly 7 feet below the action stage). It can partially be attributed to the dry fall in 1936. In fact, fall of 1936 was the third driest fall in the recorded history for Fargo.

Fargo still has not observed a 1-inch snow event this season. With a total of 1.2" of snowfall (as of December 20) in Fargo, this winter ranks the driest winter. Based on 120 years of snow recording history in Fargo, seasonal snowfall totals were never greater than 37.1" when the first measurable snowfall event was delayed as late as December 20. Each day that passes without snowfall will make a near normal seasonal total less probable. Even achieving a seasonal snowfall total in the near normal range will require a record-breaking cach-up in Fargo.

Given the strong relationship of fall precipitation and major flood events in the Red River in Fargo and the probability of receiving less than normal snowfall this winter should comfort residents living near the banks of the Red River. However, it is just a rough analogy, as exact conditions during the upcoming spring may vary. Citizens living in this region should always expect the unexpected-extreme conditions in the weather.

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Please contact us if you have any inquiries, comments, or would like to know how to contribute to this quarterly bulletin.

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