



North Dakota Climate Bulletin

Winter 2007-2008

Volume: 2 No: 1

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NDSCO

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North Dakota State Climate Office
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From the State Climatologist



The 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 dry and cold winter following a dry and a warm fall. As a result, severe and moderate drought still persists in the western 2/3 of the state. Northwestern portion of the state is under extreme drought. Temperature-wise, the winter of 2007-08 was the 64th coldest since 1895. Precipitation-wise, it was the 33rd driest winter since 1895. The winter temperature trend for the period of record (1895 to present) was 0.51° F per decade indicating that the current winter seasons in ND is 5.1°F warmer today than 100 years ago on the average. The total precipitation as percentage of the normal and average temperature departure from normal are shown on pages 4 through 12 (Season in-Graphics). The Season in-Graphics also displays the time series of monthly total precipitation and average temperature of North Dakota for respective months of the season. You will also find the summer outlook in this issue. Hydro-Talk features fire danger in ND. The “Science Bits” features “Collecting Precipitation in ND” by the guest writer, Daniel Brothers, State Water Commission, ND. We hope you will enjoy this issue. This bulletin can be accessed at <http://www.ndsu.edu/ndsco/>. This web site hosts other great resources for climate and weather information.



Adnan Akyüz, Ph.D.
North Dakota
State Climatologist



Weather Highlights



Seasonal Summary:

by B. A. Mullins

December 2007

As December began, snow fell across the state. The snowfall was light in the western and central regions and heavy in the eastern part of the state. Record snowfall amounts of 7.4" and 6.4" fell on the 1st at Fargo and Grand Forks, respectively. This was followed by another record breaking 5.9" and 6.2" on the 4th for Fargo and Grand Forks, respectively. Most of the month was dry with some scattered snowfall with wider bands of snow falling around the 13th, 22nd, and 25th. Only the eastern part of the state had above normal monthly precipitation ranging from 130 to nearly 300 percent of normal. The western and central regions had below normal precipitation ranging from 5 to 70 percent of normal. The drought monitor as of January 1, 2008 displays the western and north central regions of the state having severe to moderate drought conditions. The remaining areas have abnormally dry conditions to no drought conditions (Table 1). The state average precipitation was 0.30 inches which is slightly below the 1971-2000 normal of 0.44 inches. December 2007 state average precipitation ranked 27th driest in the last 113 years with a maximum of 1.26" in 1909 and a minimum of 0.06" in 1944.

The first half of the month had reported daily air temperatures below normal for much of the state. Grand Forks had record low temperatures of -19 °F on the 5th and -26 °F on the 8th. The state was split with the eastern and north central regions being 1 to 5 degrees below normal. The western and south central regions had 1 to 5 °F above normal. The higher temperatures in the western regions allowed producers to continue grazing livestock. The state average air temperature was 12.9 °F which is nearly right on the 1971-2000 normal of 13.0 °F. December 2007 state average air temperature ranked 54th coolest (or 59th warmest) in the past 113 years with a maximum of 25.6 °F in 1939 and a minimum of -2.5 °F in 1983.

January 2008

The first 10 days of January were dry with very little snowfall, while the middle of the month had scattered snow. The last few days of January were relatively dry except for the 28th and 29th in which snow fell in some areas. A quarter inch of liquid precipitation or less was reported at most areas. The highest monthly total reported was nearly 0.4 inches in McLean and Sheridan counties. The state average precipitation was 0.08 inches which was well below the 1971-2000 normal state average of 0.50 inches. January 2008 state average precipitation ranked the 2nd driest in the past 114 years with a maximum of 1.35 inches in 1916 and a minimum of 0.07 inches in 1973.

January began with roughly six days of a warming trend where reported average temperatures rose into the 20's and 30's. After the 6th, the temperatures gradually trended cooler until around the 20th. A sharp warming took place on the 27th putting reported maximum air temperatures in the 30's and 40's across the state. On the 28th an arctic cold front past through North Dakota that dropped temperatures from the morning of the 28th to the morning of the 29th by 63 degrees in the southwest to 43 degrees in the northeast (see figure). Even with the cold air, the state average air temperature was 9.6 °F which is above the 1971-2000 normal of 7.9 °F. January 2008 state average air temperature ranked the 46th warmest in the past 114 years with a maximum of 25.9 °F in 2006 and a minimum of -10.7 °F in 1950.

February 2008

The western region was extremely dry with most areas reporting a tenth to a quarter of an inch of liquid precipitation. A couple of isolated western locations received around a half inch. Areas in the central and north central regions reported from 0.5 to 0.8 inches of precipitation. One isolated snow storm on the 14th produced up to 6 inches of snowfall in the north central region. The south central region had precipitation amounts around a quarter inch and less. The eastern central regions had reports of 0.5 to well over an inch of liquid precipitation. The far north eastern and south eastern regions had around a quarter inch. The U.S. drought monitor indicates that the western half of North Dakota is in severe drought with the northwest in extreme drought. The eastern region is abnormally dry with the southeast corner in moderate drought conditions (Figure 1). The state average precipitation was 0.29 inches

which is below the 1971-2000 normal of 0.45 inches. February 2008 state average precipitation ranked 33rd driest in the past 114 years with a maximum of 1.83 inches in 1998 and a minimum of 0.06 inches in 1934.

The reported average daily air temperatures from February 1st through the 8th were near normal. A cold streak ran from February 9th through the 22nd, minus a brief warm up on February 16th and 17th. Record low temperatures were set on the 20th at Grand Forks, Devils Lake, and Fargo of -33, -34, and -31°F, respectively. Record lows were also set on the 21st at Grand Forks and Fargo of -10 and -9 °F, respectively. Reported average daily air temperatures from the 23rd through the end of the month were near normal. Overall, average monthly air temperatures were below normal across the State. Departure from normal average air temperatures ranged from -1 in the Southwest to -9 in the Northeast. The state average air temperature was 9.9° F which is below the 1971-2000 normal of 15.4° F. February 2008 state average air temperature ranked the 49th coolest in the past 114 years with a maximum of 29.7 °F in 1954 and a minimum of -14.1 °F in 1936.

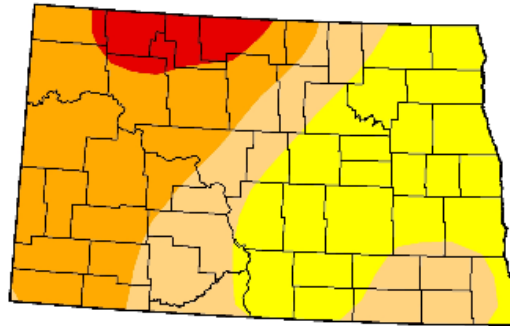
U.S. Drought Monitor

North Dakota

March 11, 2008
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.0	100.0	62.3	39.1	5.8	0.0
Last Week (03/04/2008 map)	0.0	100.0	62.3	39.1	5.8	0.0
3 Months Ago (12/18/2007 map)	19.8	80.2	55.4	16.4	0.0	0.0
Start of Calendar Year (01/01/2008 map)	19.8	80.2	55.5	16.4	0.0	0.0
Start of Water Year (10/02/2007 map)	25.6	74.4	38.1	4.4	0.0	0.0
One Year Ago (03/13/2007 map)	9.1	90.9	69.0	21.8	0.6	0.0



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements

<http://drought.unl.edu/dm>



Released Thursday, March 13, 2008

Author: Brian Fuchs, National Drought Mitigation Center

Figure 1. Drought Monitor for North Dakota (National Drought Mitigation Center)

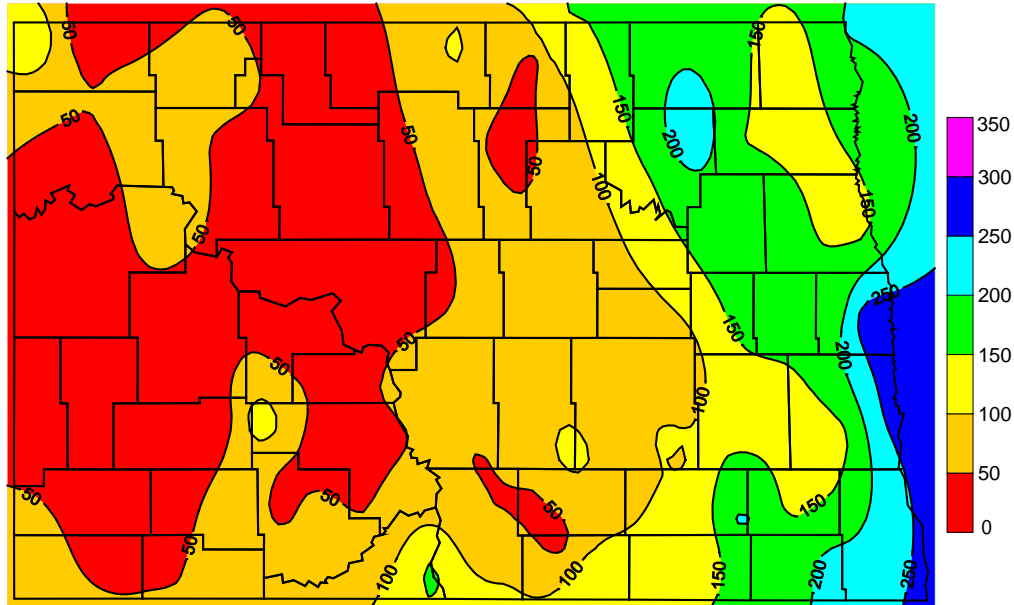
Season in Graphics

Winter 2007-2008 Weather in North Dakota:

Total Precipitation percent of mean (1971-2000)

Precipitation Percent of Normal

(Data from NWS Cooperative Network)



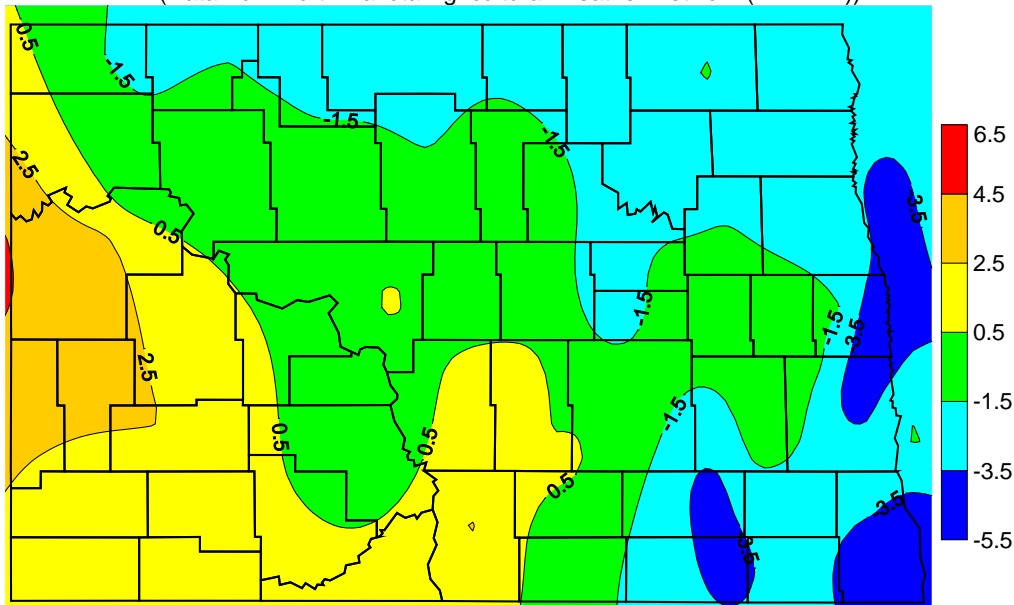
North Dakota State Climate Office

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

December 2007

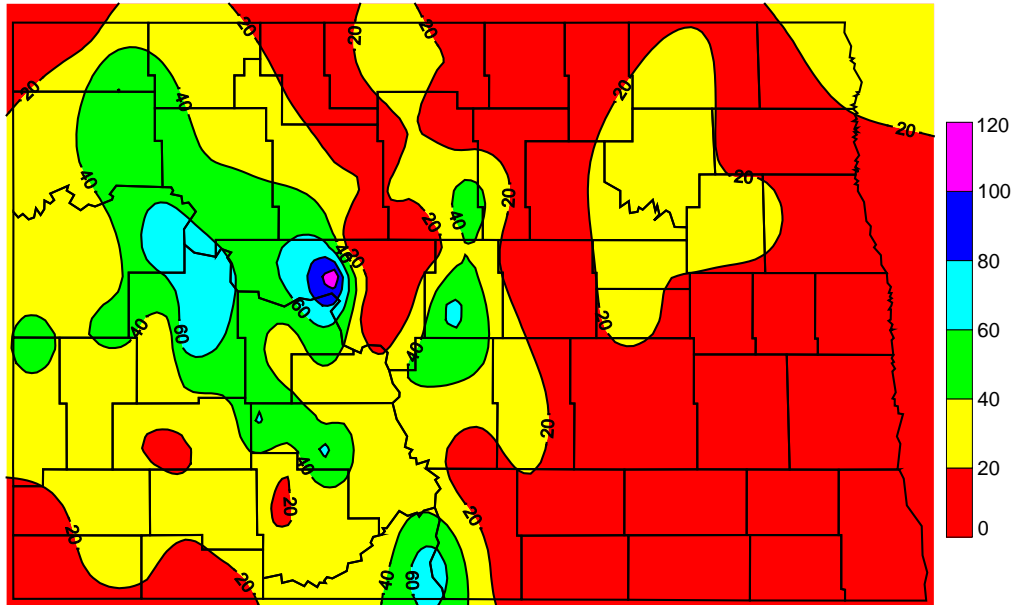
Season in Graphics

Winter 2007-2008 Weather in North Dakota:

Total Precipitation percent of mean (1971-2000)

Precipitation Percent of Normal

(Data from NWS Cooperative Network)

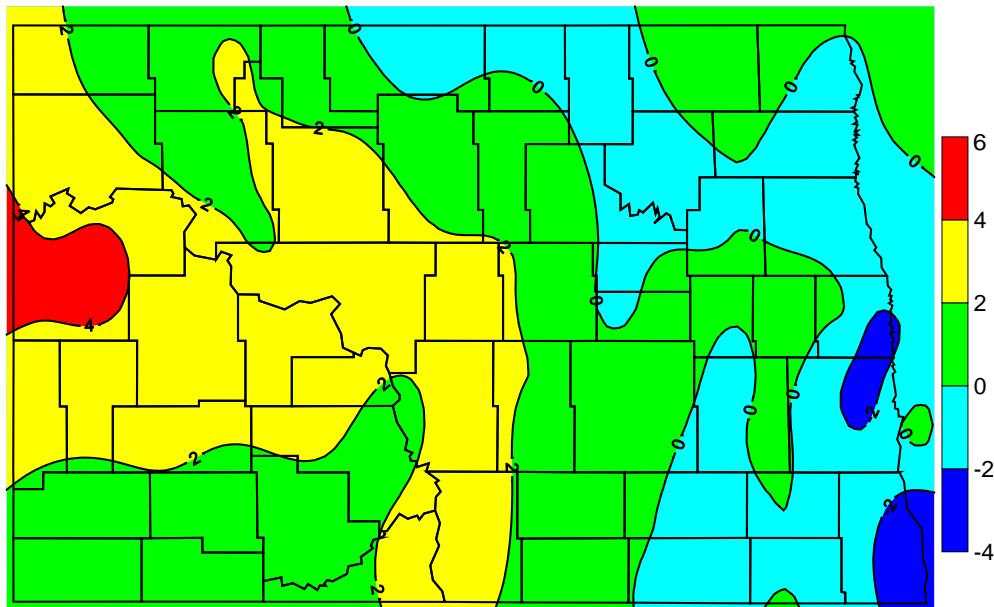


North Dakota State Climate Office

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

January 2008

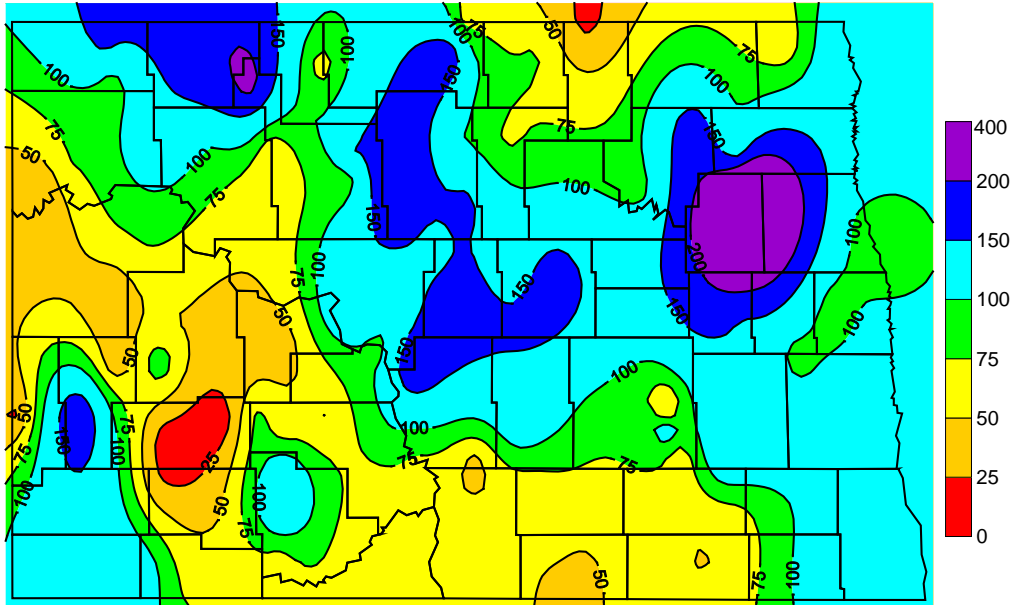
Season in Graphics

Winter 2007-2008 Weather in North Dakota:

Total Precipitation percent of mean (1971-2000)

Precipitation Percent of Normal

(Data from NWS Cooperative Network)

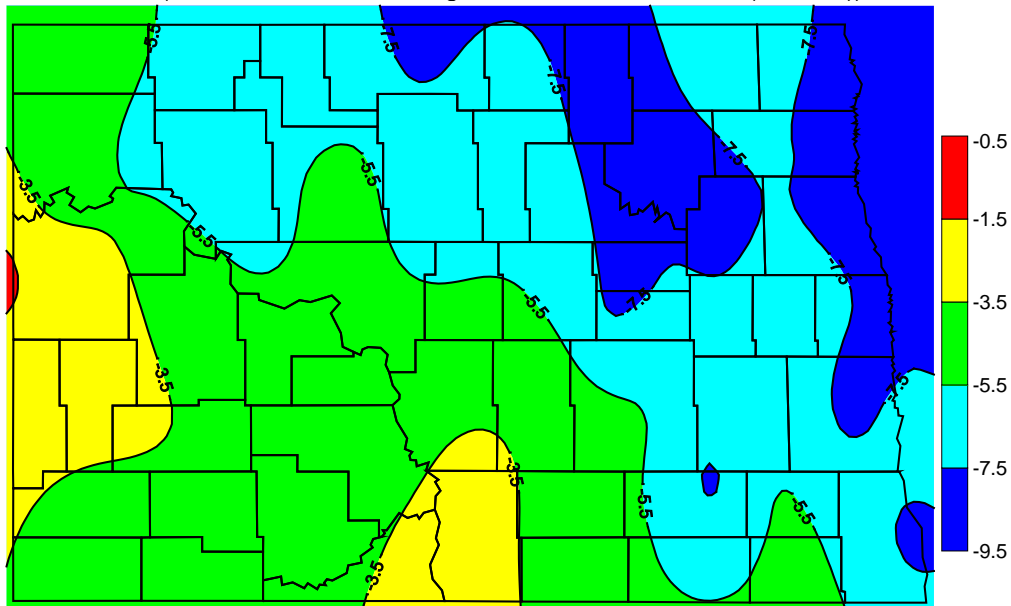


North Dakota State Climate Office

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

Departure From Normal Monthly Average Air Temperature in degrees F

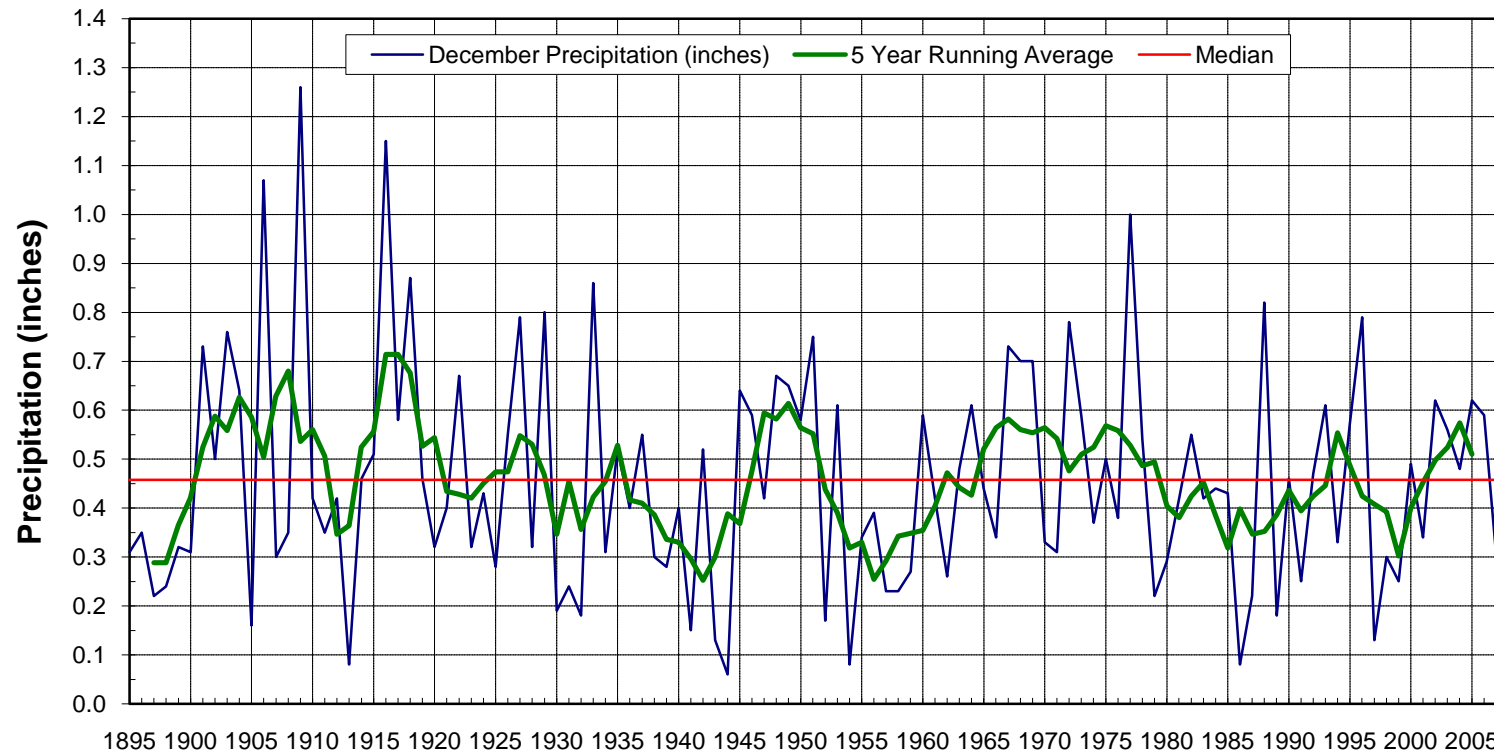
(Data from North Dakota Agricultural Weather Network (NDAWN))



North Dakota State Climate Office

February 2008

Historical December Precipitation for North Dakota

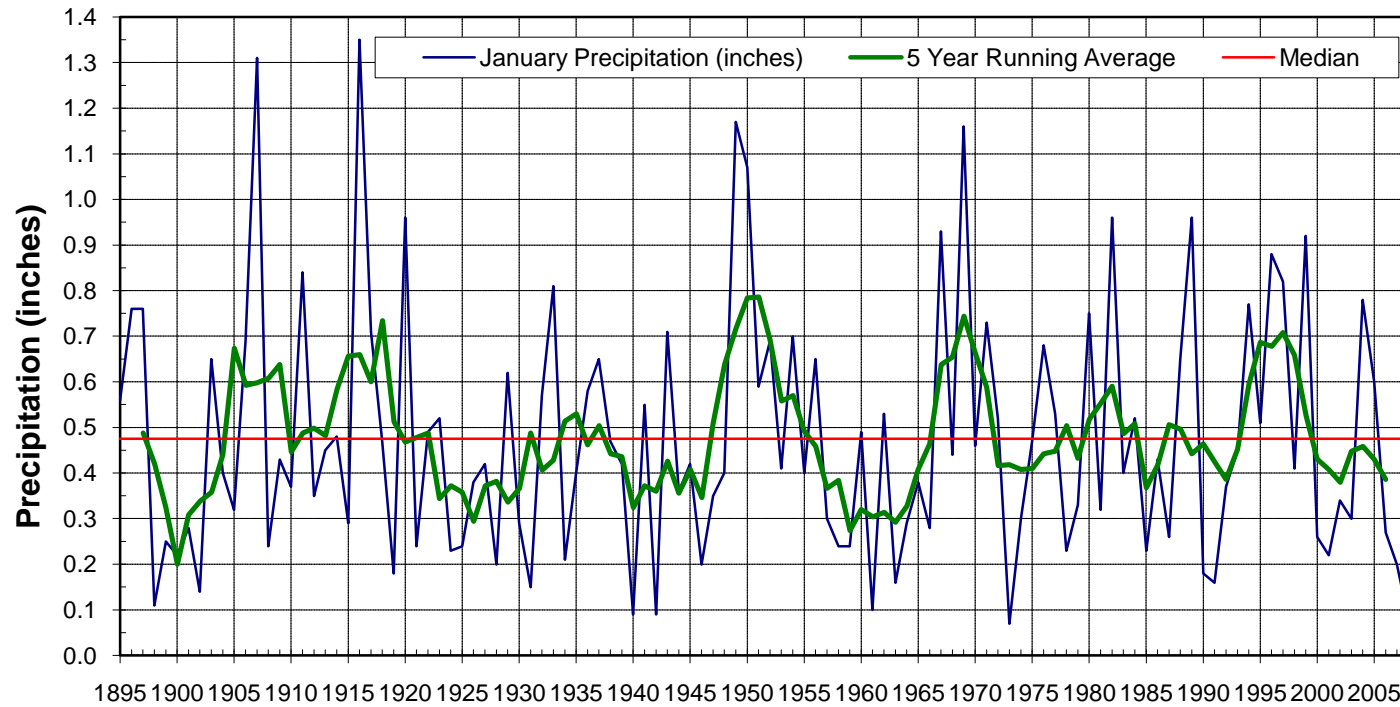


December Precipitation Statistics

2007 Amount: **0.30 inches**
 Maximum: 1.26 inches in 1909
 State Normal: 0.44" (1971-2000)

Monthly Ranking: 27th Driest in 113 years
 Minimum: 0.06 inches in 1944
 Years in Record: 113

Historical January Precipitation for North Dakota

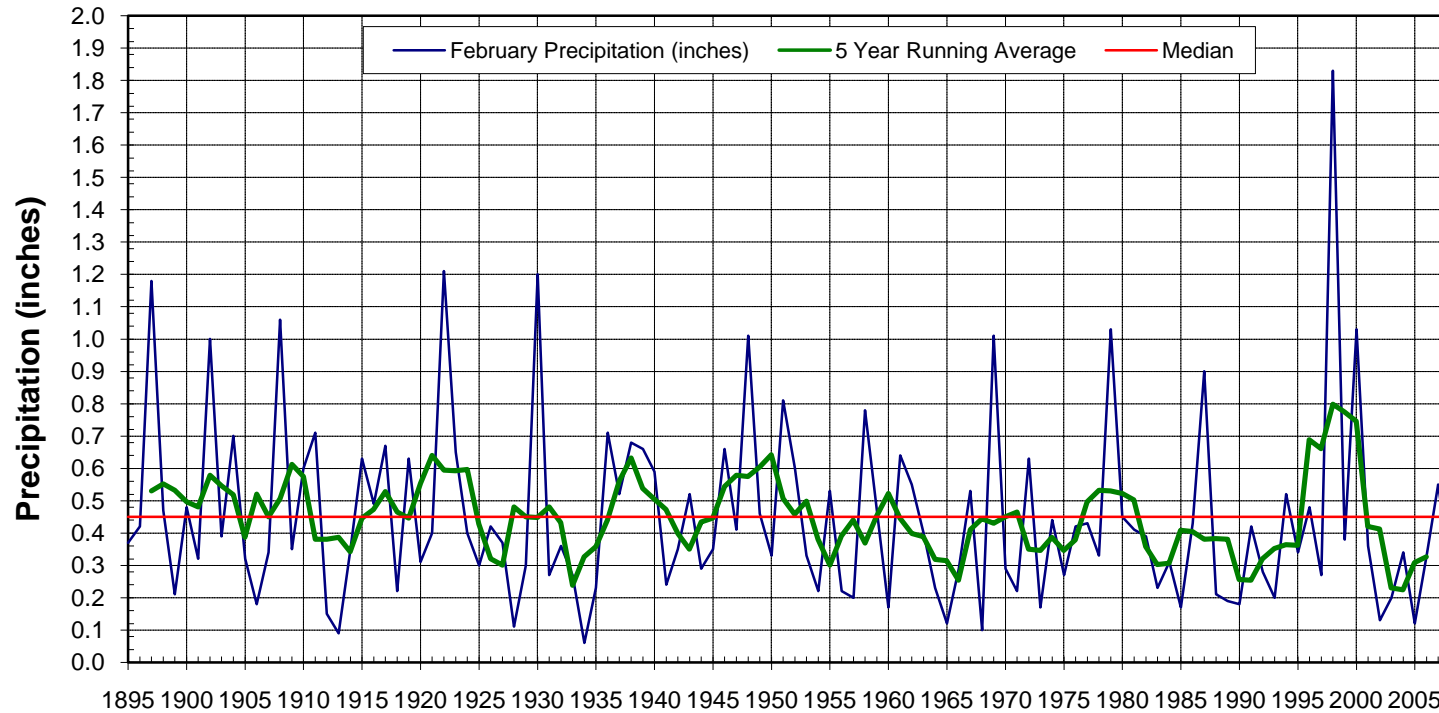


January Precipitation Statistics

2008 Amount: 0.08 inches
Maximum: 1.35 inches in 1916
State Normal: 0.50" (1971-2000)

Monthly Ranking: 2nd Driest in 114 years
Minimum: 0.07 inches in 1973
Years in Record: 114

Historical February Precipitation for North Dakota

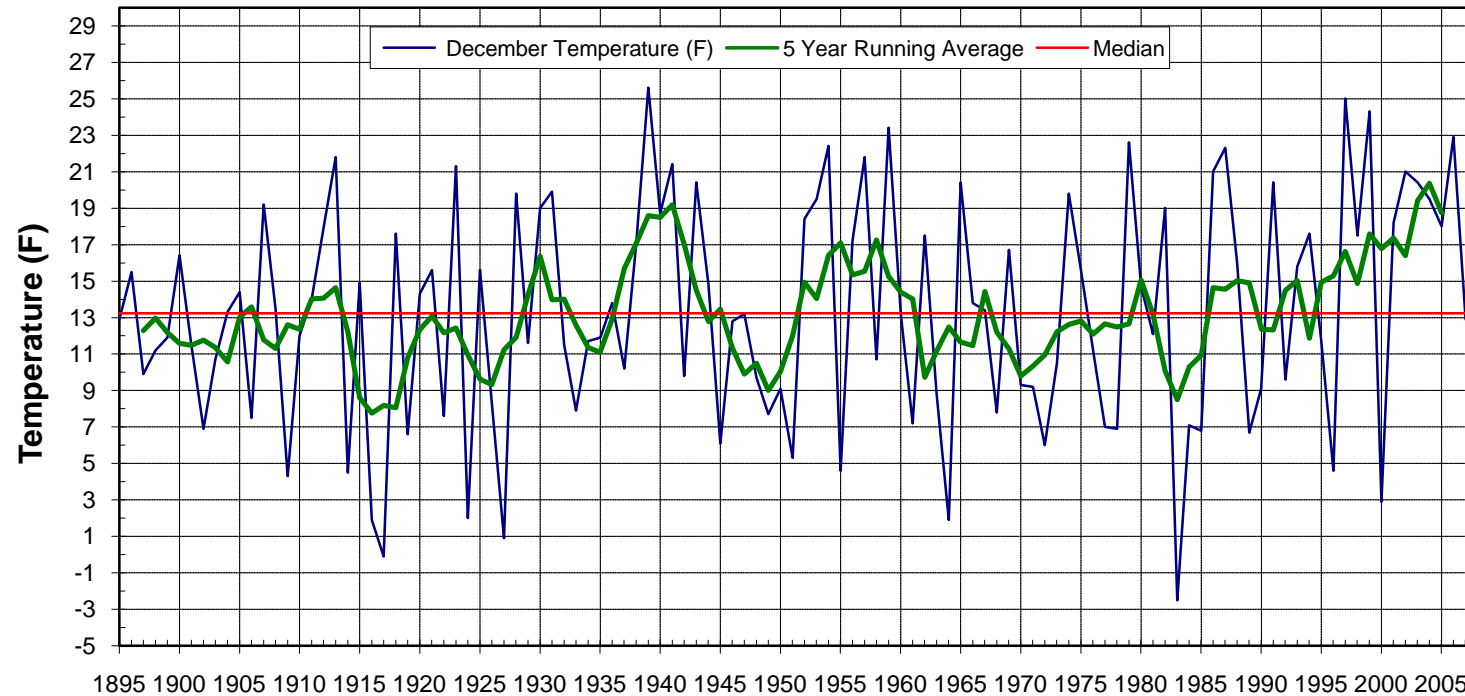


February Precipitation Statistics

2008 Amount: 0.29 **inches**
Maximum: 1.83 inches in 1998
State Normal: 0.45" (1971-2000)

Monthly Ranking: 33rd Driest in 114 years
Minimum: 0.06 inches in 1934
Years in Record: 114

Historical December Temperature for North Dakota



December Temperature Statistics

2007 Average: **12.9 °F**

Maximum: 25.6° F in 1939

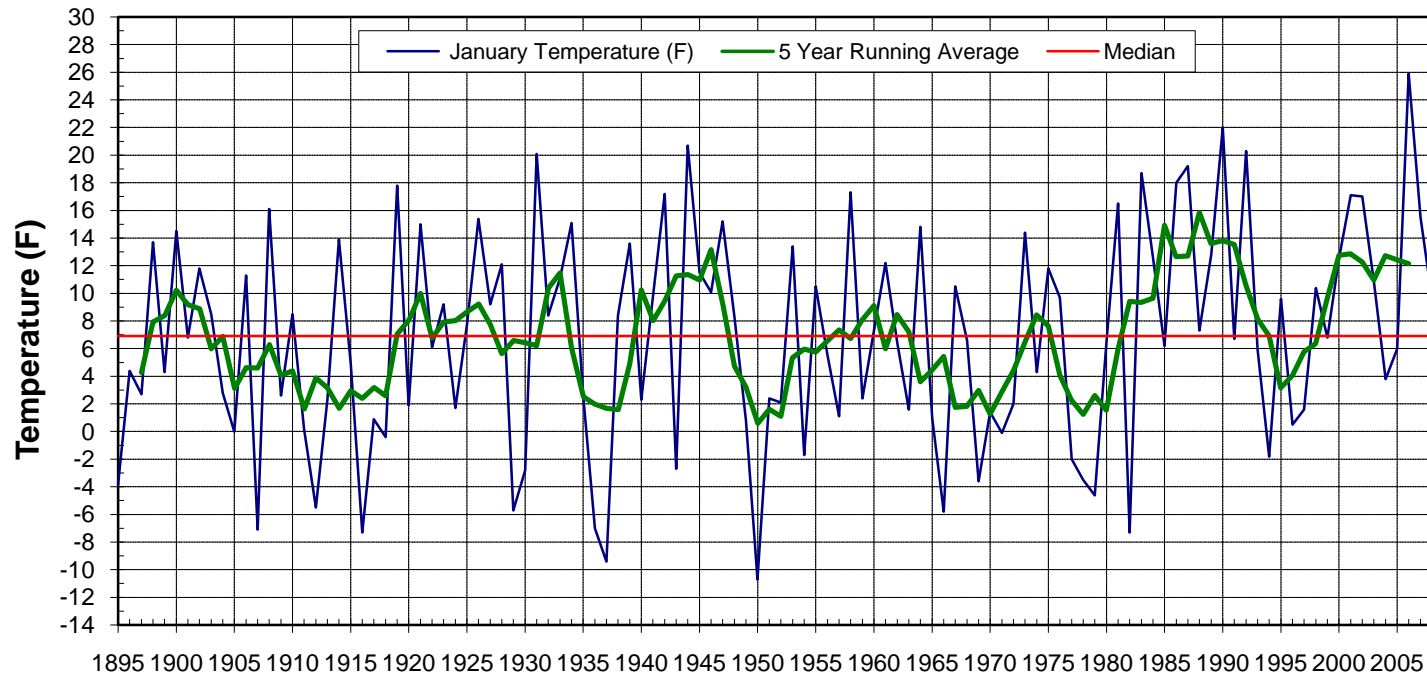
State Normal: 13.0° F (1971-2000)

Monthly Ranking: 54th Coolest in 113 years

Minimum: -2.5° F in 1983

Years in Record: 113

Historical January Temperature for North Dakota



January Temperature Statistics

2008 Average: 9.6 °F

Maximum: 25.9 °F in 2006

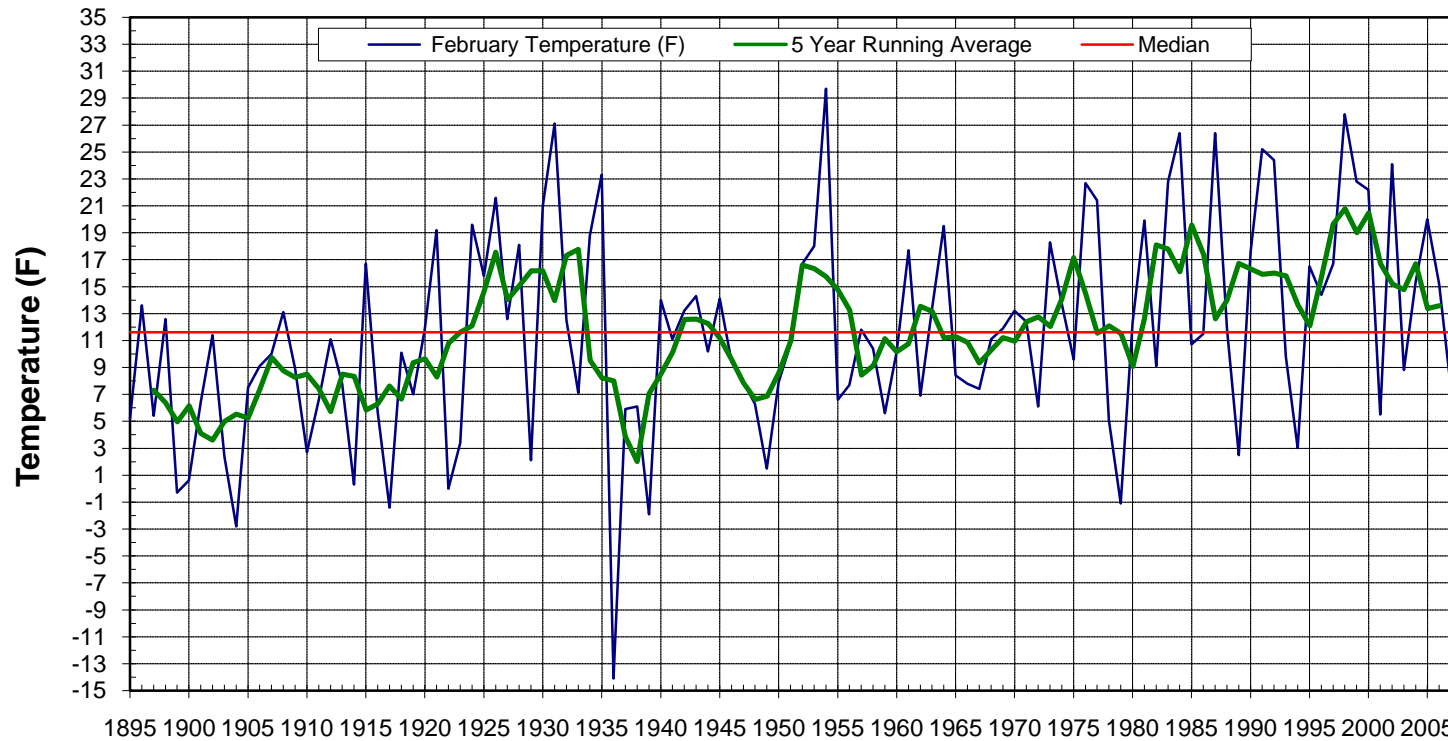
State Normal: 7.9 °F (1971-2000)

Monthly Ranking: 46th Warmest in 114 years

Minimum: -10.7 °F in 1950

Years in Record: 114

Historical February Temperature for North Dakota



February Temperature Statistics

2008 Average: **9.9 °F**

Maximum: 29.7 °F in 1954

State Normal: 15.4 °F (1971-2000)

Monthly Ranking: 49th Coolest in 114 years

Minimum: -14.1 °F in 1936

Years in Record: 114



Storms & Record Events



State Tornado, Hail, and Wind Reports for Winter 2007-2008 by B. A. Mullins

North Dakota Counties	Tornado	Hail	Wind
	0	0	0
Reports by Month			
Month	Wind	Hail	Tornado
Total December	0	0	0
Total January	0	0	0
Total February	0	0	0

North Dakota Record Event Reports for Winter 2007-2008

- 02/21/08 Grand Forks Airport set a record low temperature of -10 ° F. This breaks the previous record of -6 set in 1986.
- 02/21/08 Fargo Hector Airport set a record low temperature of -9 ° F. This breaks the previous record of -8 set in 1939.
- 02/20/08 Grand Forks Airport set a record low temperature of -33 ° F. This breaks the previous record of -29 set in 1956.
- 02/20/08 Devils Lake set a record low temperature of -34 ° F. This breaks the previous record of -30 set in 1939.
- 02/20/08 Fargo Hector Airport set a record low temperature of -31 ° F. This breaks the previous record of -30 set in 1889.
- 02/04/08 Bismarck had a record snowfall of 3.9". This breaks the previous record of 2.4" set in 1967.
- 02/04/08 Bismarck had a record precipitation accumulation (liquid) of 0.26". This breaks the previous record of 0.18" set in 1967 and 1876.
- 01/27/08 Dickinson had a record high temperature of 51 ° F. This breaks the previous record of 50 ° F set in 1942.
- 01/27/08 Bismarck had a record high temperature of 48 ° F. This breaks the previous record of 46 ° F set in 1931.
- 01/08/08 Williston had a record high temperature of 44 ° F. This breaks the previous record of 43 ° F set in 1914 and 1984.
- 01/05/08 Dickinson had a record high temperature of 53 ° F. This breaks the previous record of 48 ° F set in 1958.
- 01/04/08 Dickinson had a record high temperature of 56 ° F. This breaks the previous record of 50 ° F set in 1956.
- 01/04/08 Minot had a record high temperature of 49 ° F. This breaks the previous record of 44 ° F set in 2001.
- 12/08/07 Grand Forks had a record low temperature of -26 ° F. This breaks the previous record of -21 set in 1960 and tied in 1972.
- 12/05/07 Grand Forks International Airport had a record low temperature of -19 ° F breaking the previous record of -16 ° F set in 1972.
- 12/04/07 Fargo Hector International Airport had a record of 0.53" of precipitation and 5.9" of snow.
- 12/04/07 Grand Forks International Airport had a record of 0.33" of precipitation and 6.2" of snow.
- 12/04/07 Grand Forks Univ. (NWS) had a record of 0.34" of precipitation and 8.1" of snow.
- 12/01/07 Fargo Hector International Airport had a record of 0.67" of precipitation and 7.4" of snow.
- 12/01/07 Grand Forks International Airport had a record of 0.18" of precipitation and 6.4" of snow.



Seasonal Outlook



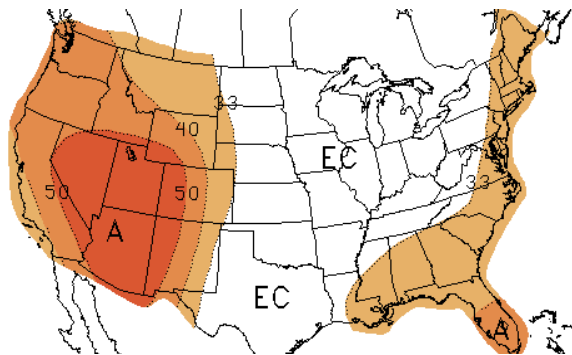
Spring & Summer Climate Outlooks by M. Ewens

The Climate Prediction Center (CPC) indicates that a moderate to strong La Nina continues in the equatorial Pacific, affecting the global weather patterns. The presence of this La Nina has, in part, resulted in a colder than average winter across the northern plains. As La Nina conditions are forecast to continue through the 2008 spring, the climate across the northern plains will likely reflect La Nina type response patterns of temperature and precipitation. La Nina conditions are forecast to weaken during the boreal 2008 summer.

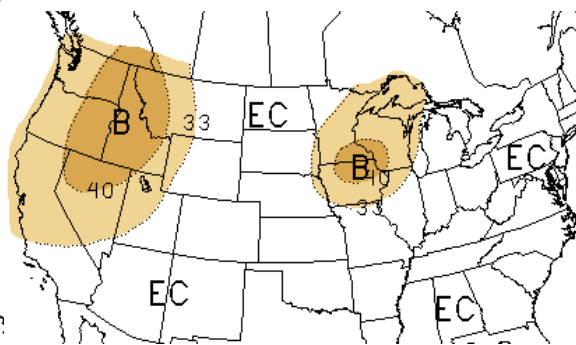
While several intra-seasonal forcing mechanisms can and do cause wide variations in day to day weather, the overall patterns of colder and wetter than average exist in La Nina springs. Something of a reversal occurs during the boreal summer months of June, July and August. Although the overall affect on climate wanes during the summer, La Nina summers tend toward warmer and drier than average.

Local research agrees with these scenarios, further suggesting that unusually cold weather lingers well into May, with a fairly rapid reversal in mid June. Even though that the Climate Prediction Center's graphics below do not show, with below normal precipitation and warmer than average temperatures, drought conditions are likely to continue, and even intensify, during the 2008 summer. While it is impossible to make specific predictions about a given season, large scale forcings associated with La Nina and other climate scale events further suggest dry conditions across much of the Red River Valley region this summer. As is always the case, local variations and timely rainfall will affect crop development and actual yields.

The CPC generates a series of monthly and seasonal climate outlooks designed to indicate the overall, general trends in regional climate. These outlooks are issued on the last Thursday of each month and are updated at the end of each month. These outlooks are available at http://www.cpc.ncep.noaa.gov/products/OUTLOOKS_index.shtml



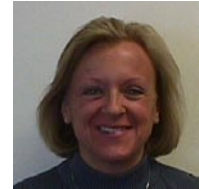
Summer 2008 Temperature Outlook (CPC, NOAA)



Summer 2008 Precipitation Outlook (CPC, NOAA)



Hydro-Talk



Fire Danger in North Dakota

by Charlene Prindiville



As the drought continues to intensify over west and central North Dakota due to the lack of fall moisture and winter snowfall, so too does the chance for rural fire activity.

The National Weather Service is charged with the responsibility of issuing a daily Rangeland Fire Danger Statement or, (RFD). The RFD reflects daily weather conditions such as high temperatures, cloud cover, afternoon dew points (relative humidity) and wind speed, as well as percent green of open rangeland. Open rangeland includes grasslands and pastures, but does not include cultivated farmland. Should the RFD index rise into the “very high” or “extreme” category, certain county burning restrictions and prohibitions will be in effect. These restrictions are located in the [North Dakota Rural Fire Danger Guide](#). This guide can be viewed on the North Dakota State Division of Emergency Services website: <http://www.nd.gov/des/info/docs/fire-danger-guide.pdf>

The following lists the index ratings and fire danger descriptions:

Index Rating	Fire Danger Description
LOW	Weather and fuel indicators show the probability of fire occurrence is low.
MEDIUM	Weather and fuel conditions indicate some potential for fire occurrence. Expect predictable fire behavior with moderate rates of spread.
HIGH	Fires are active. Expect moderate and occasional high rates of spread.
VERY HIGH	Fires spread rapidly and show erratic behavior. Dangerous burning conditions exist.
EXTREME	Potential for large fires exists. Fires spread rapidly. Extreme fire behavior is probable. Critical burning conditions exist.

A Red Flag Warning or Fire Weather Watch is issued for weather conditions that could sustain extensive fire activity. These two National Weather Service products are issued to alert federal, state, and local agencies, as well as the general public of the potential for explosive fire growth, should a fire ignite. They are generally in effect for a day or two, depending on daily weather conditions.

Burn Bans

Under North Dakota state law, either the Governor or individual counties (Emergency Managers and/or county commissions) decide whether to impose a burn ban. They may request weather information from the National Weather Service, but the Weather Service does not recommend whether a ban should be put into effect. County officials may also request rangeland conditions from the U.S. Forest Service, or other state/federal/local agencies in their decision making.

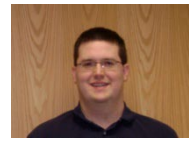
Burn bans may be declared by the County Emergency Manager or the county commission. Burn bans declared by Emergency Managers are in effect for seven days, after which the county commission must decide whether to continue the ban another 7 days or, “until further notice”.

Restrictions and prohibitions in effect for a burn ban vary from county to county. The public should contact the County Division of Emergency Services or the local county sheriff for detailed restrictions and prohibitions. For updated daily fire weather information, visit our National Weather Service websites and click on the fire weather links:

The Bismarck National Weather Service Forecast Office: www.weather.gov/bis
The Grand Forks National Weather Service Forecast Office: www.weather.gov/faf



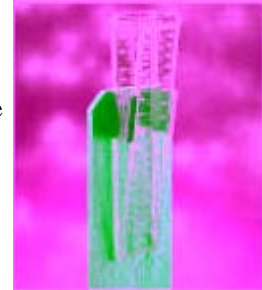
Science Bits



Collecting Precipitation Data in North Dakota

by Daniel Brothers

The Atmospheric Resource Board Cooperative Observer Network (ARBCON) is a collection of over 750 volunteer rain gauge observers in North Dakota. ARBCON has collected precipitation data during the growing season (April – September) of every year since 1977. Observers are provided a wedge-type rain gauge (just like the one shown on the right) and prepaid postcards to report rainfall and hail.

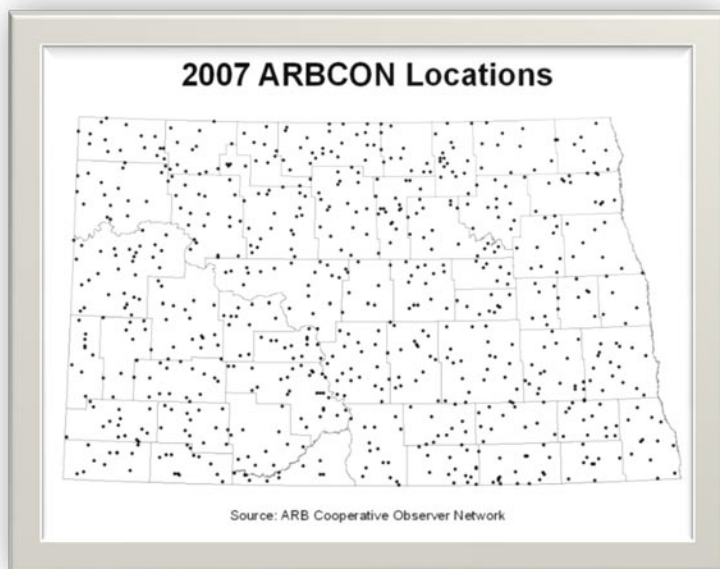


The information collected by ARBCON is used by many local, state, and federal government offices, as well as private companies, for a variety of purposes. Universities have used the data for a number of research applications and students at all levels from elementary school through college have used this rainfall data for assorted projects and reports.

The Atmospheric Resource Board (ARB) uses the data collected through ARBCON to produce monthly and seasonal rainfall maps for North Dakota, which are posted on the ARB website. ARBCON turned 30 years old in 2006, providing the ARB with a data set suitable for producing climate maps. Average monthly and seasonal rainfall maps were produced, and starting in 2007 these were used to create a Percent of Normal rainfall map for each month and the seasonal total.

The ARB recently developed a method for observers to report their rainfall and hail data via the Internet, eliminating the need for monthly postcards. While reporting through the mail is still an option used by many observers, internet reporting provides data significantly faster and is a more cost effective method of collecting the information from observers.

Starting after the 2006 season the ARB also started a service recognition program to acknowledge long time ARBCON observers for their many years of service. A certificate is sent to an observer after 10, 20, and 30 years of reporting precipitation data. In addition to the certificates, observers are recognized on the ARB website when they achieve these thresholds. Those observers who have reported for at least 30 years become members of the ARBCON Hall of Fame.



Information from the ARBCON database is available on the internet at www.swc.nd.gov/arb. Monthly and seasonal rainfall maps from 1977 through 2007 are available, as well as daily rain and hail data. You can also contact the ARB office at 1-800-654-5981 for information or questions about ARBCON. If you would like to become a volunteer observer you can call the above number or e-mail us at dabrothers@nd.gov.

CONTACTING THE NORTH DAKOTA STATE CLIMATE OFFICE

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

North Dakota State Climate Office

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