North Dakota Climate Bulletin

Spring 2007

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In This Issue

NDSCO

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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 very wet and very warm spring. Temperature-wise, the spring of 2007 was the 15th warmest since 1895. Unusual precipitation patterns in March and May yielded the 10th wettest spring since 1895 ending the extreme and severe drought statuses in the state. The spring temperature trend for the period of record (1895 to present) was 0.27° F per decade. The total precipitation as percentage of the normal and average temperature departure from normal are shown on pages 3 through 11 (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. We added a section, Hydro-Talk, and hope to continue this feature in future issues. The "Science Bits" features "Small-grain growth stages" by the guest writer, Dr. Joel Ransom, Extension Agronomist, explaining how weather impacts small grains at varying growth stages. 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. Mahoney

March 2007

The first few days of March had snowfall throughout most of the State. The heaviest snow fell in the eastern half of the state. Fargo had a record high snowfall on March 1st of 6.5". The snow pattern was followed by a dry spell that was briefly broken on March 15th and 16th when snowfall amounts of anywhere from a trace to 4 to 5 inches were dropped mostly in the central to eastern parts of the state. Grand Forks had 5.5" on March 15th. Another dry spell followed but was broken the last 2 to 3 days of March with snowfall turning to rain and freezing rain in the southern and eastern parts of the state. The average amount of precipitation across the state was 1.35", which is above the 1971-2000 normal of 0.80". March was the 12th wettest year out of 113 years. The precipitation percent of normal varied across the state. The largest areas with the greatest precipitation amounts were in the north eastern part of the state.

The average air temperature for the first one-third of the month was mid-teens in the upper northeast to lower 30's in the lower southwest. The middle of the month temperatures ranged from lower 20's to lower 40's. The last part of the month had average temperatures ranging from the upper 30's to mid 40's. The departure from normal air temperature ranged from 0 in the upper northeast to 8 in the west. The March 2007 state average temperature was 32.3 ° F, ranking March 2007 as the 11th warmest in the past 113 years. The 1971-2000 normal was 26.9 ° F.

April 2007

April started with the wet weather pattern that ended March. The April 1st showers quickly turned to freezing rain and snow. The southern two-thirds of the state had 6 to 9 inches of snow. The cold weather continued for the first ten days. Rain fell during the last half of the month but still the month ended dry. The north and central parts of the state had below normal rainfall. The south west and east corners of the state had above normal April precipitation. The state average April precipitation was 0.86", which is below the normal 1971-200 amount of 1.40". The month ended being the 28th driest April of the past 113 years.

The temperatures on April 1st hovered near normal across the state. However, temperatures quickly plummeted to extremes of 20 to near 30 degrees below normal from April 2nd to about the 10th. The cold spell broke around April 10th and the average temperatures for the rest of the month stayed around 55 ° F. The departures from normal air temperature ranged from a degree above normal in the north to 2.5 to 3.5 degrees below normal in the southern part of the state. The month summed up with a state average temperature of 41.2 ° F, which is near the normal temperature of 41.7 ° F. April 2007 ranked 54th warmest of the past 113 years.

May 2007

The wet cycle that ended April, started May. The scattered showers fell mostly in the eastern part of the state at the beginning of May. As May continued, more showers and thunderstorms were scattered across the state. Most of the high winds, hail and tornadoes fell on the 13th, 18th, and 21st of May. The month ended with nearly all areas receiving above average rainfall. The state average rainfall for May was 4.78", which was above the normal 1971-2000 amount of 2.31". May 2007 was ranked the 6th wettest month in the past 113 years.

Air temperatures for the first two-thirds of the month were above to slightly below average across the state. For the most part, the last one third of the month had below average air temperatures but rebounded to above or slightly below during the last four days of May. The average May air temperature for the state was 55.9 ° F, making it the 28th warmest month in the past 113 years. The 1971-2000 normal May air temperature was 54.8 ° F.

Season in Graphics

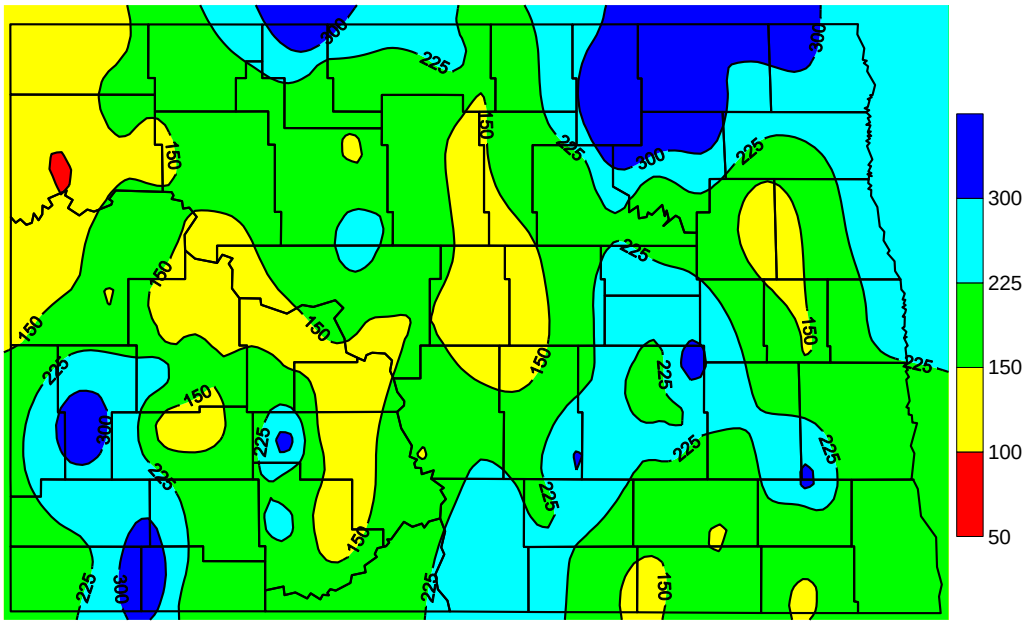
Spring 2007 Weather in North Dakota:

March 2007

Total Precipitation percent of mean (1971-2000)

Precipitation Percent of Normal

(Data from NWS Cooperative Network)



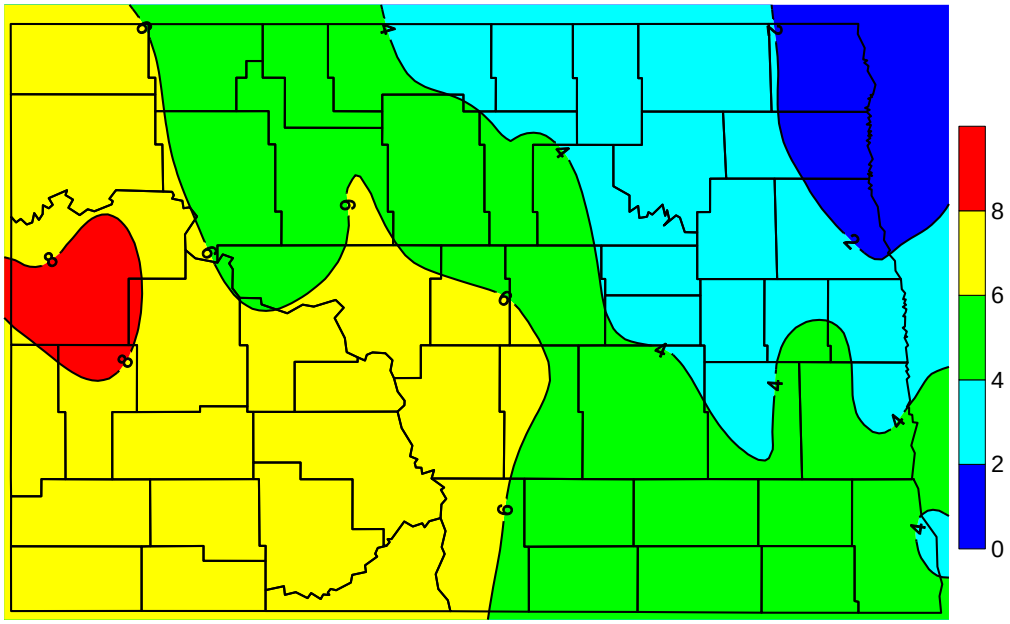
North Dakota State Climate Office

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

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April 2007

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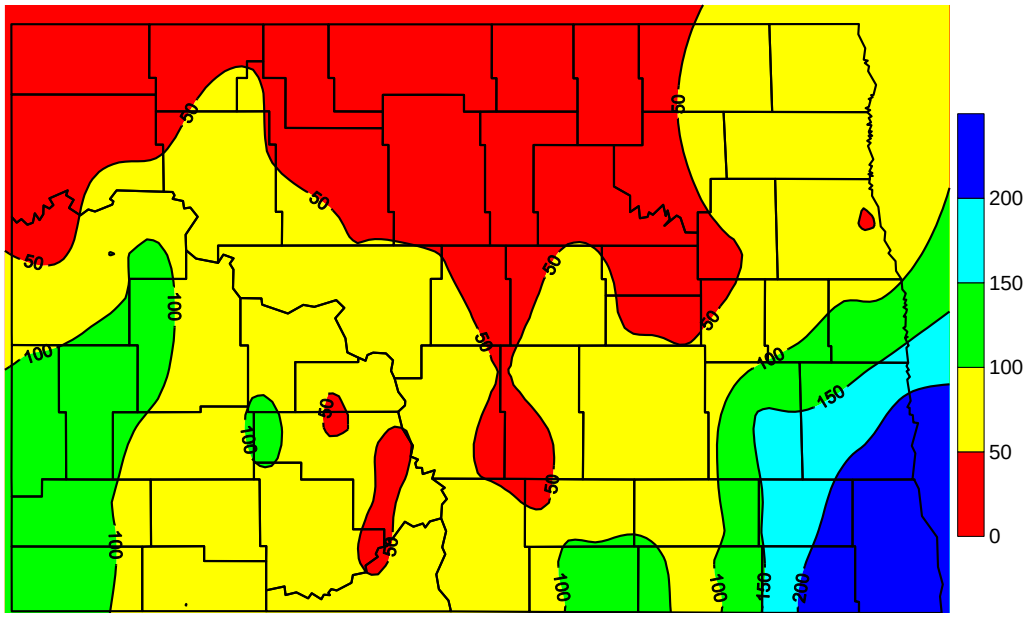

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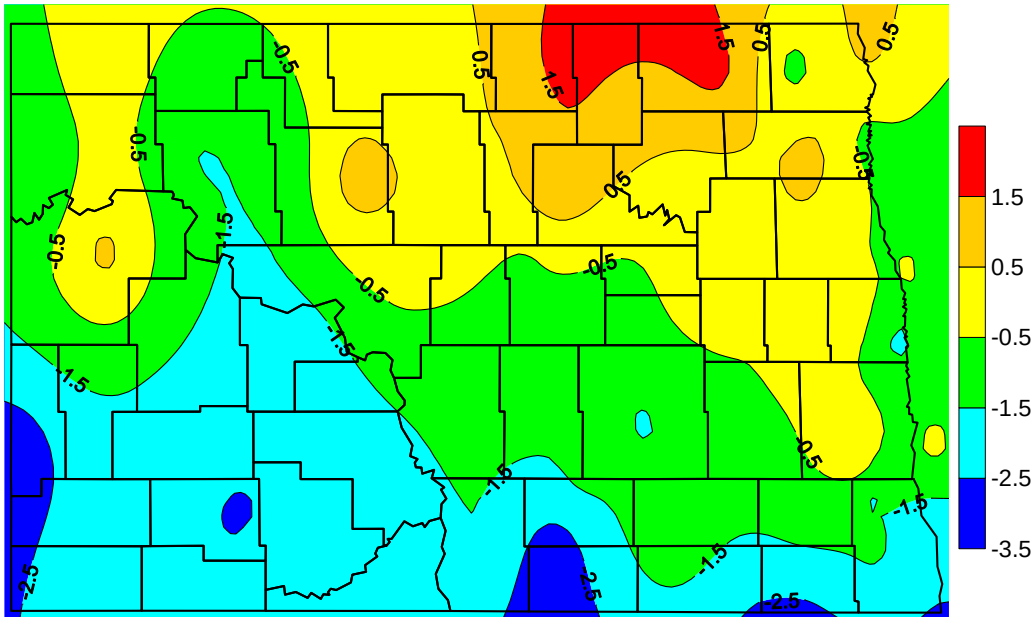


North Dakota State Climate Office

Season in Graphics

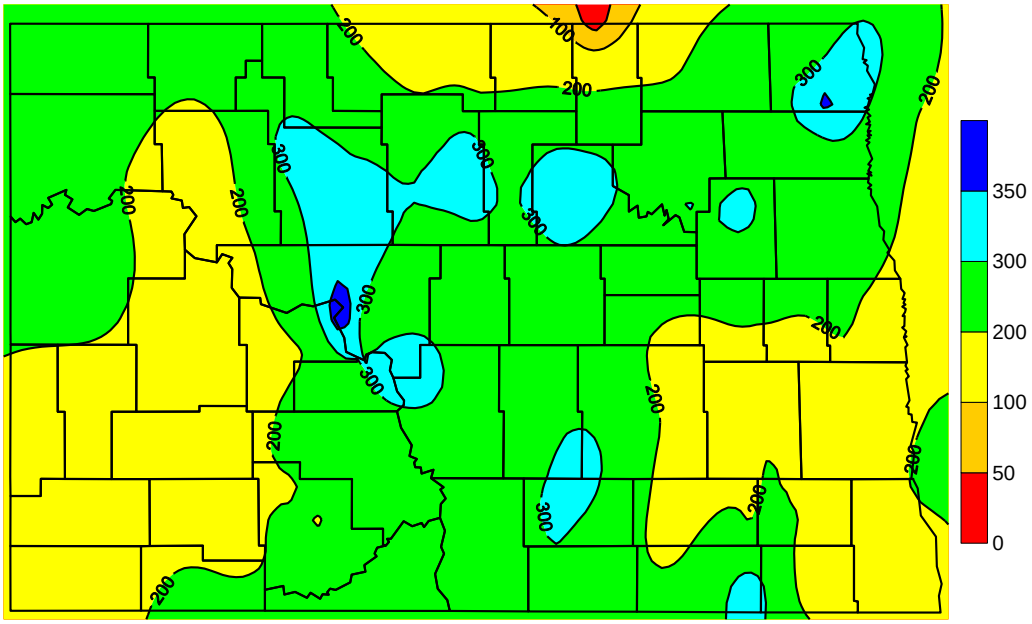
Spring 2007 Weather in North Dakota:

2007

Total Precipitation percent of mean (1971-2000)

Precipitation Percent of Normal

(Data from NWS Cooperative Network)



North Dakota State Climate Office

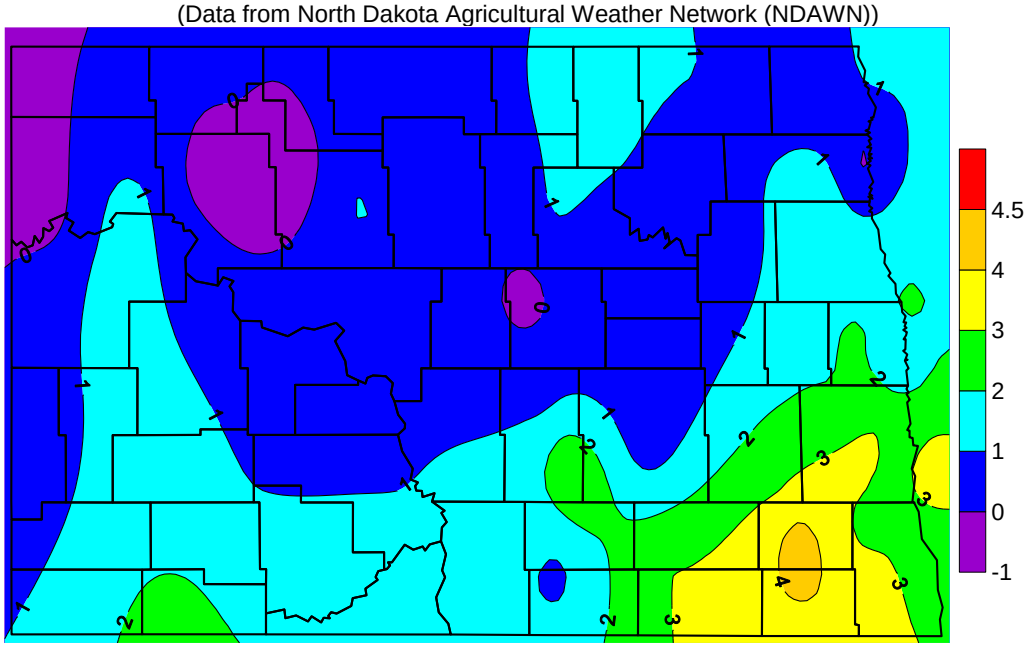
May

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

Departure From Normal Monthly

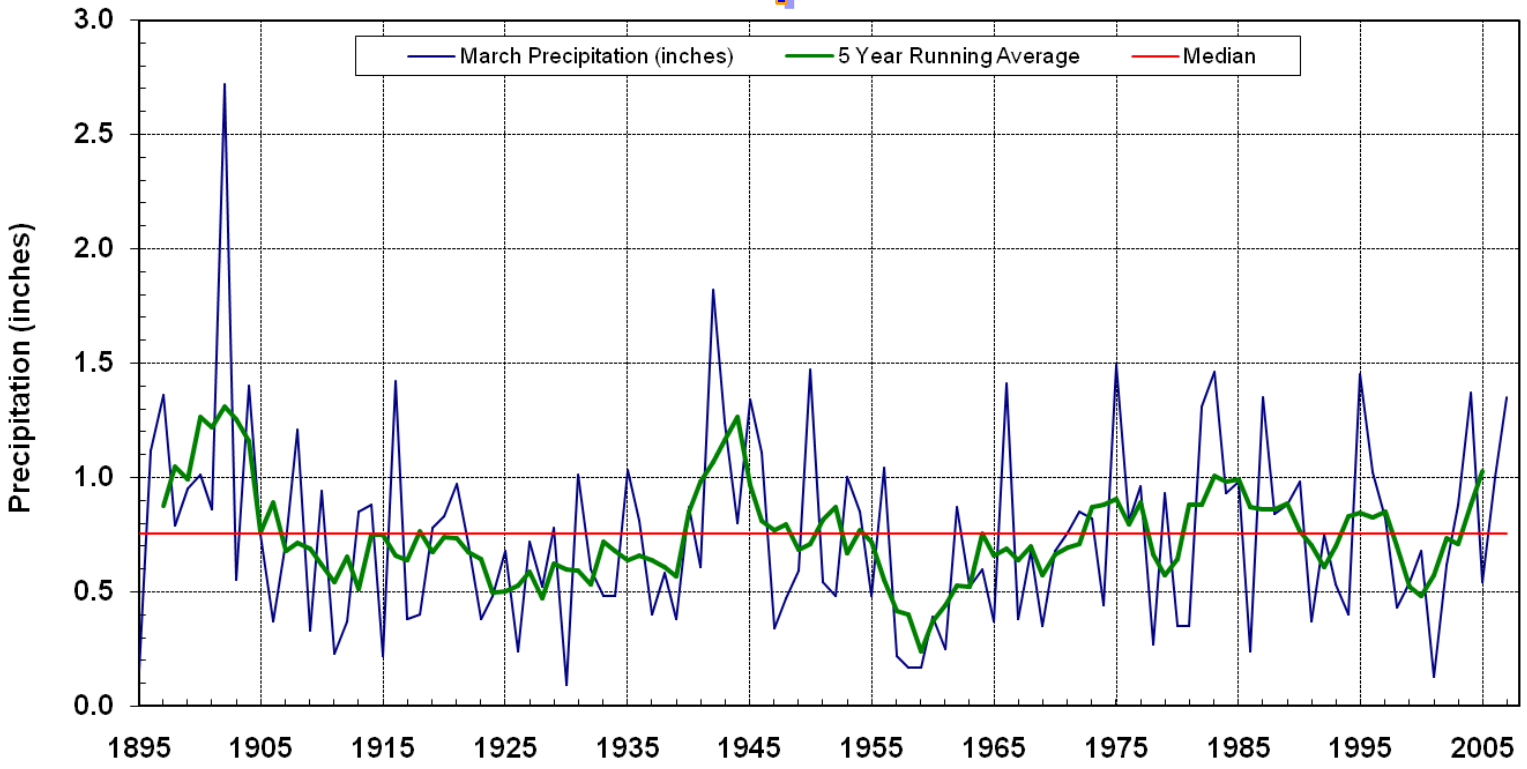
Average Air Temperature in degrees F

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



North Dakota State Climate Office

Historical March Precipitation for North Dakota

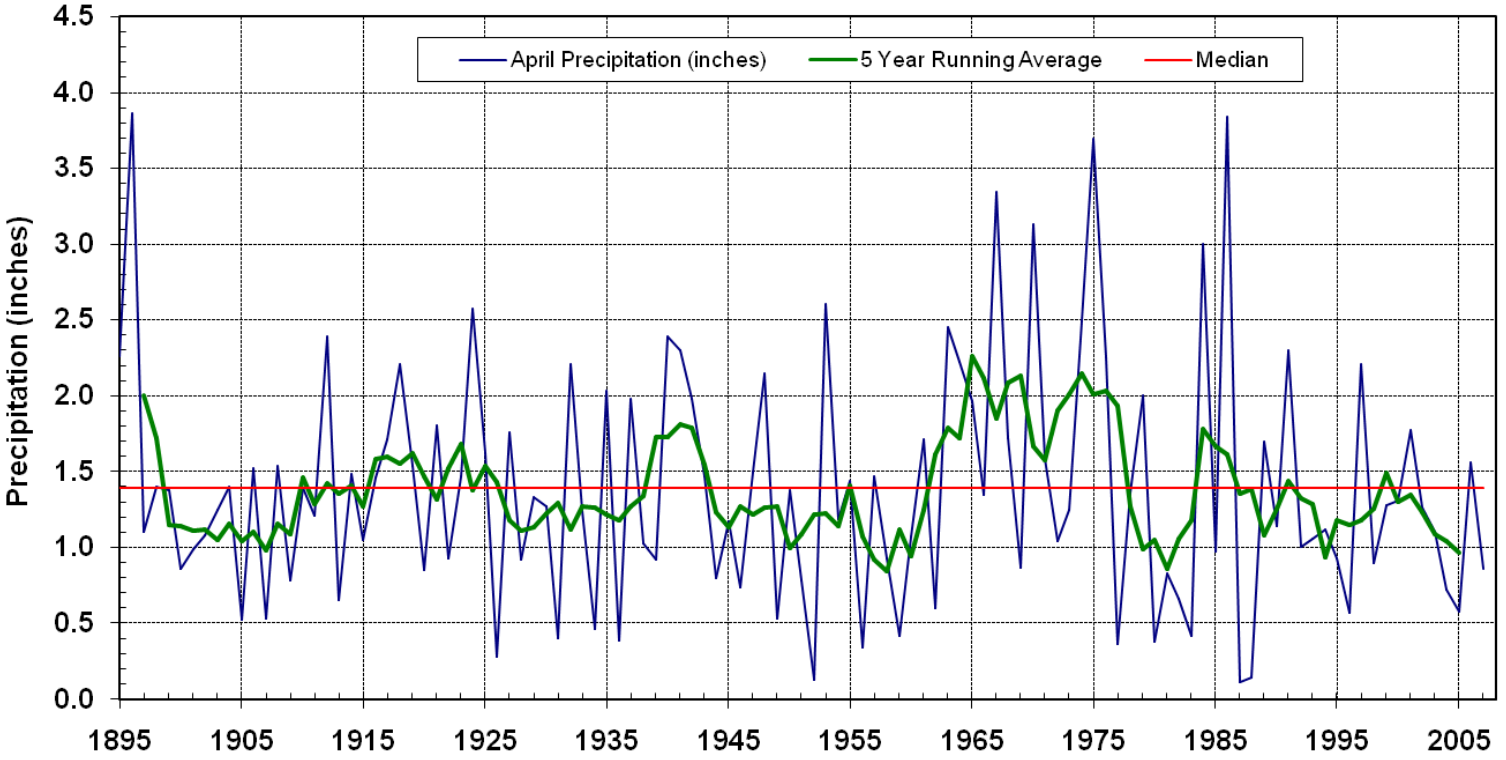


March Precipitation Statistics

2007 Amount: **1.35 inches**
Maximum: 2.72 inches in 1902
State Normal: 0.80" (1971-2000)

Monthly Ranking: 12th Wettest in 113 years
Minimum: 0.09 inches in 1930
Years in Record: 113

Historical April Precipitation for North Dakota

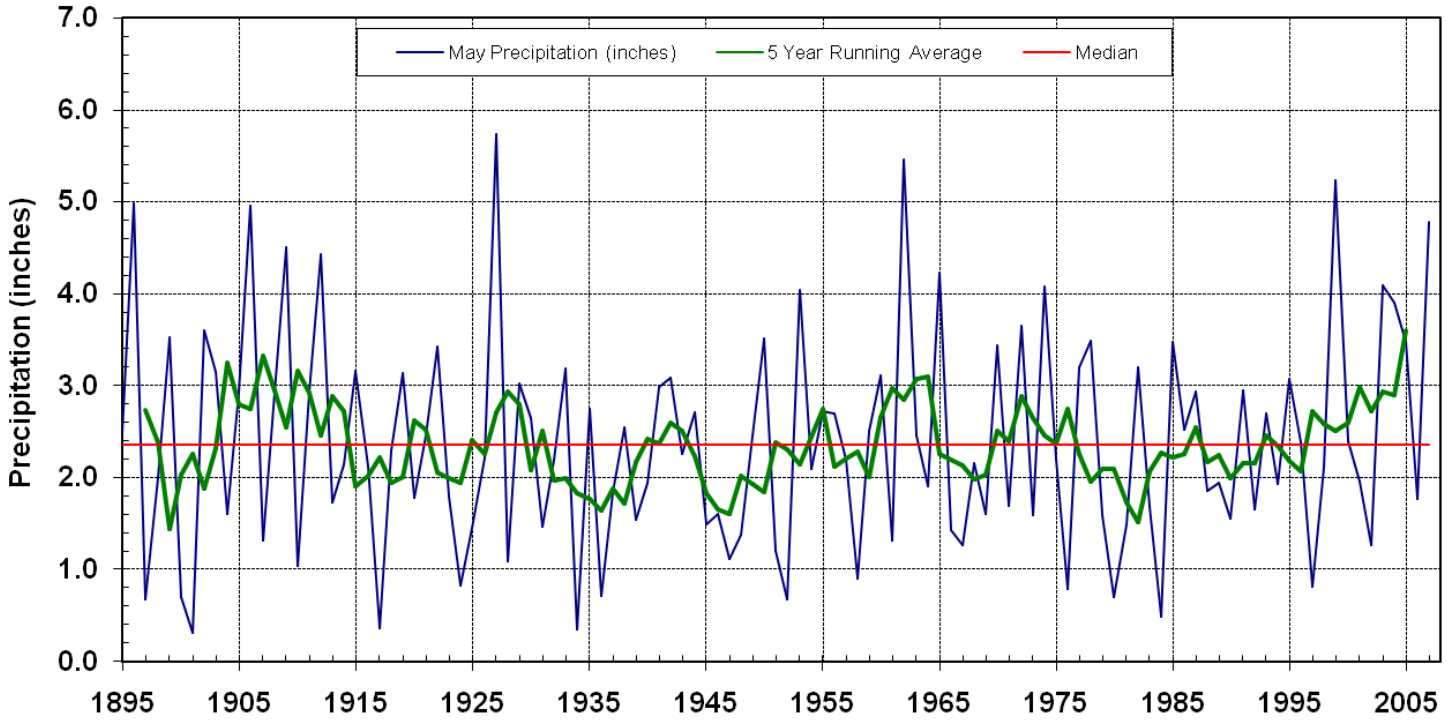


April Precipitation Statistics

2007 Amount: **0.86 inches**
Maximum: 13.86 inches in 1896
State Normal: 1.40" (1971-2000)

Monthly Ranking: 28th Driest in 113 years
Minimum: 0.11 inches in 1987
Years in Record: 113

Historical May Precipitation for North Dakota

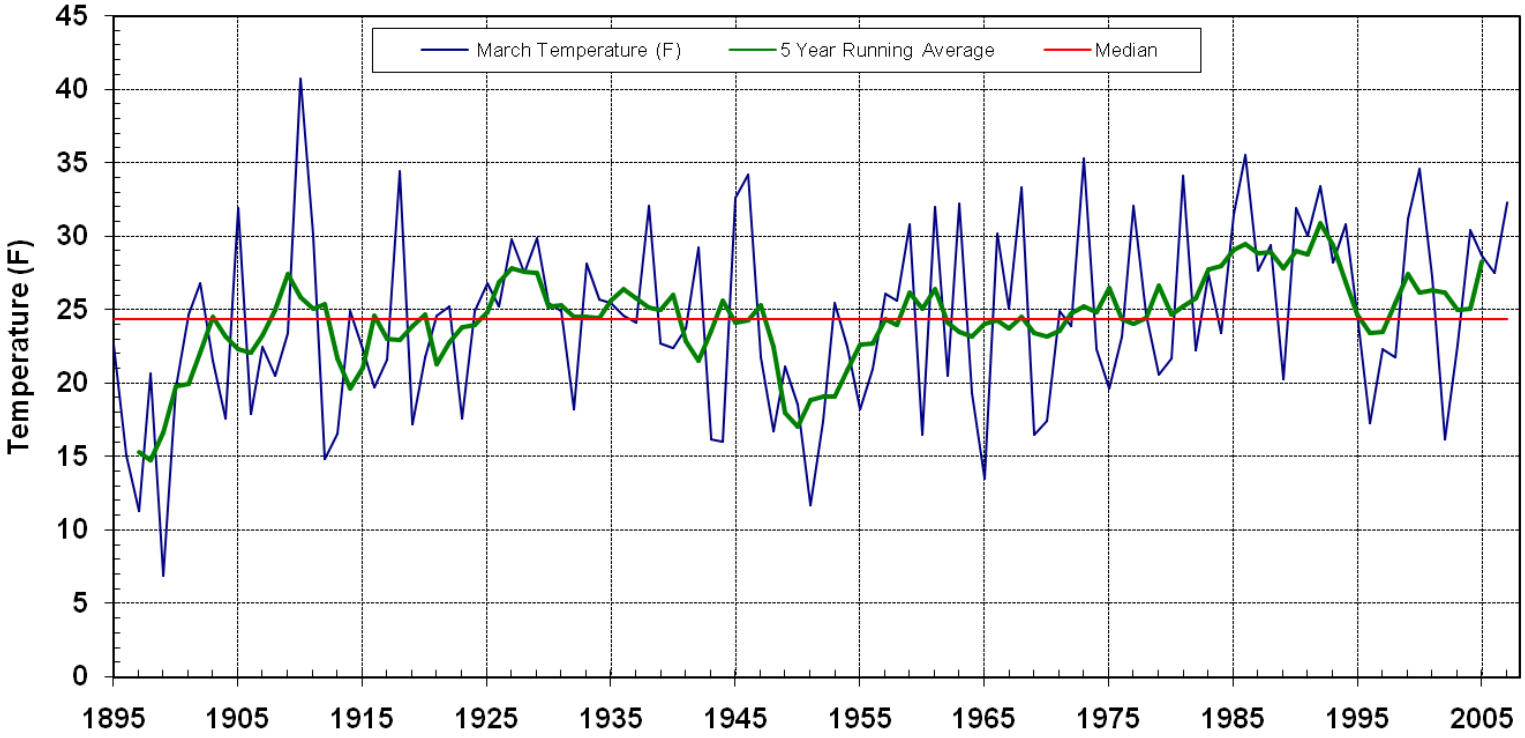


May Precipitation Statistics

2007 Amount: **4.78 inches**
Maximum: 5.73 inches in 1927
State Normal: 2.31" (1971-2000)

Monthly Ranking: 6th Wettest in 113 years
Minimum: 0.31 inches in 1901
Years in Record: 113

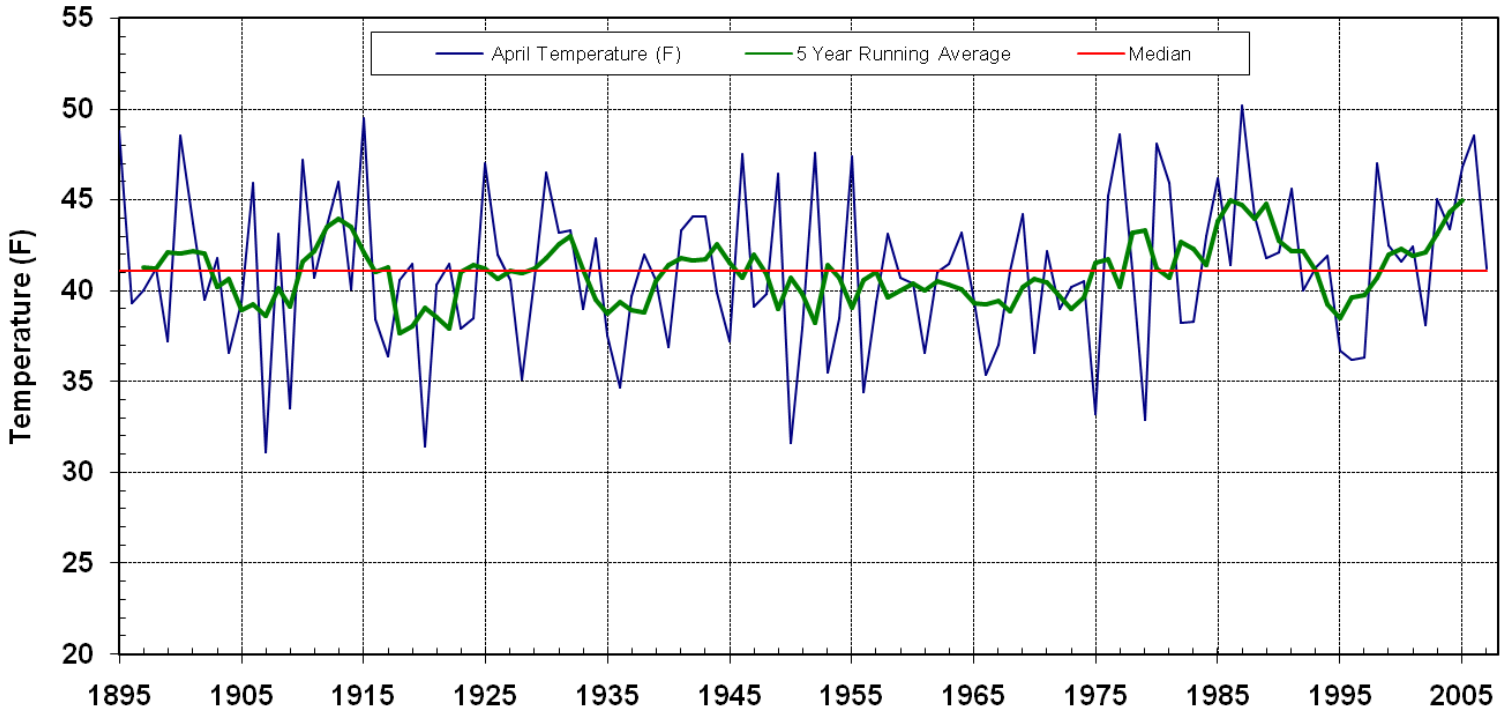
Historical March Temperature for North Dakota



March Temperature Statistics

2007 Average:	**32.3 °F**	Monthly Ranking:	11th Warmest in 113 years
Maximum:	40.7 °F in 1910	Minimum:	6.9 °F in 1899
State Normal:	26.9 °F (1971-2000)	Years in Record:	113

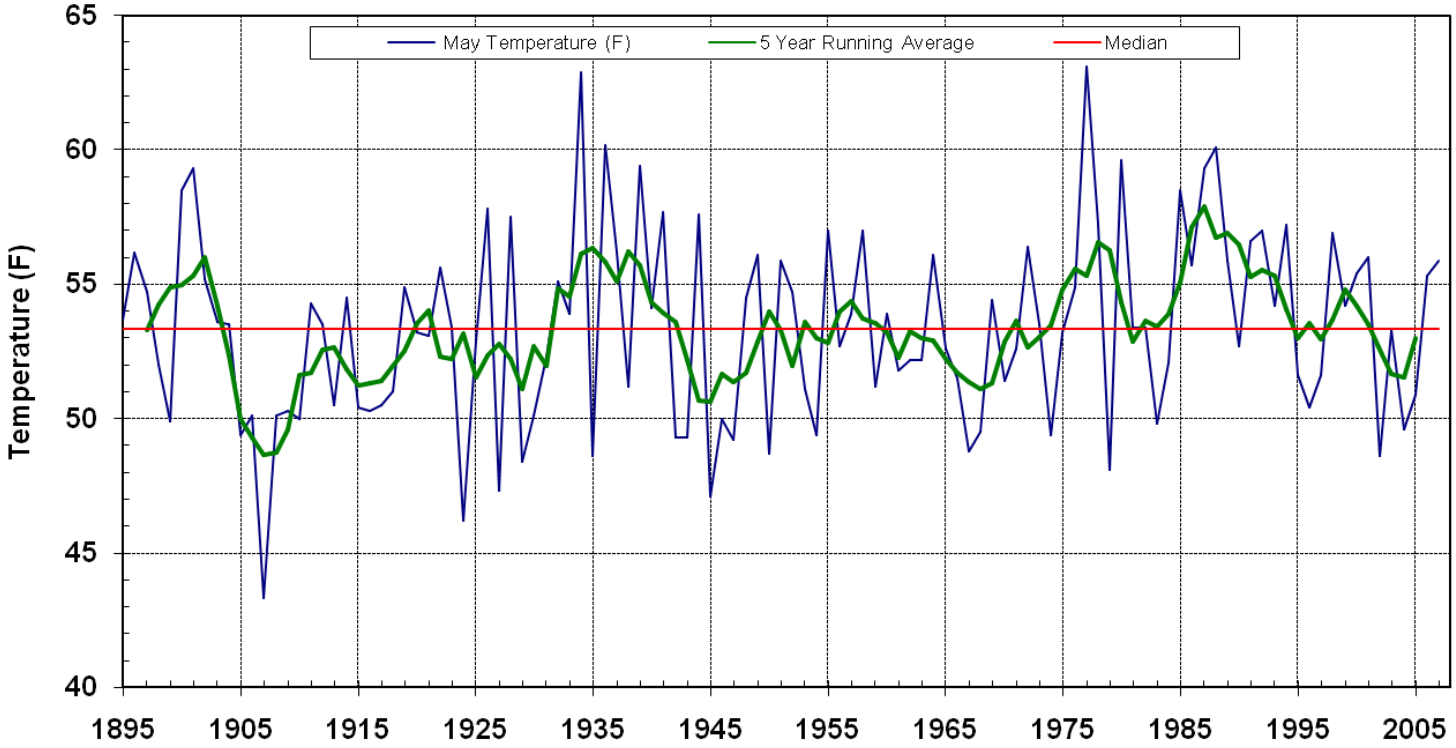
Historical April Temperature for North Dakota



April Temperature Statistics

2007 Average:	**41.2 °F**	Monthly Ranking:	54th Warmest in 113 years
Maximum:	50.2 °F in 1987	Minimum:	31.1 °F in 1907
State Normal:	41.7 °F (1971-2000)	Years in Record:	113

Historical May Temperature for North Dakota



May Temperature Statistics

2007 Average: **55.9 °F**
Maximum: 63.1 °F in 1977
State Normal: 54.8 °F (1971-2000)

Monthly Ranking: 28th Warmest in 113 years
Minimum: 43.3 °F in 1907
Years in Record: 113

Storm Center

State Tornado, Hail, and Wind Reports for Spring 2007

by B. A. Mahoney

North Dakota Counties	Tornado	Hail	Wind
	8	51	26

Reports by Month			
Month	**Wind**	**Hail**	**Tornado**
Total March	0	1	0
Total April	1	2	0
Total May	25	48	8

Maximum by County	
County with Most Tornado Reports	Barnes, Cass, Morton
County with Most Hail Reports	Ward
County with Most Wind Reports	Stark
County with Most Total Reports	Ransom, Ward

Maximum by Date	
Date with Most Tornado Reports	5/18/07
Date with Most Hail Reports	5/18/07
Date with Most Wind Reports	5/13/07
Date with Most Total Reports	5/18/07

Summer Outlook

Spring 2007: Seasonal Climate Outlooks

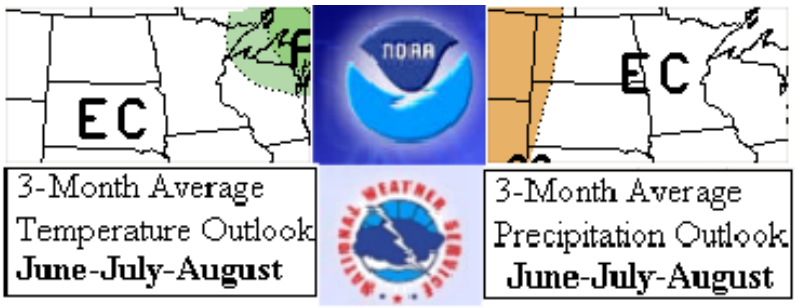
by M. Ewens

Producing climatological outlooks is a bourgeoning part in the field of meteorology. As was discussed in the previous newsletter, the science has benefited from the many technological advances of the past several decades. Another tool is the long term trends in the climate. Remember that *climate* is the anticipated state of the weather over a long period of time. For example, it is normal to expect 30 to 50 inches of snow during any given winter across the northern plains. That is based on the long term observed weather patterns. The climate outlooks are also based, in part, on long term trends in the climate. It is an accepted fact that the overall climate for our region has gotten warmer – and wetter – over the past 2 decades.

The seasonal statewide outlooks for June, July and August indicate that there are equal chances for most of North Dakota and most of Minnesota to have below normal, normal or above normal temperatures. The precipitation outlook for the next 3-month period also generally calls for equal chances of wetter than normal, dryer than normal and near normal conditions.

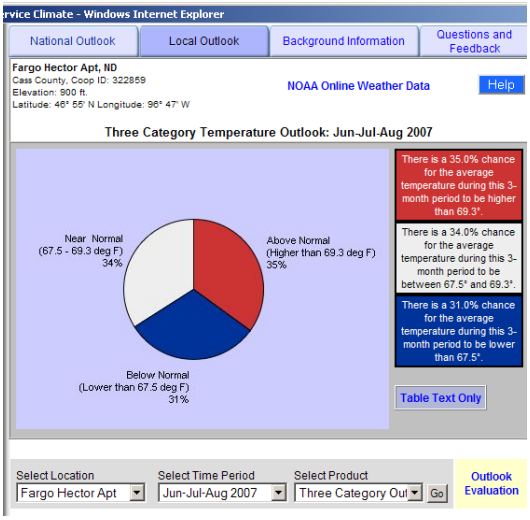
These outlooks are updated on the third Thursday of each month, with a final monthly outlook issued at the end of each month and posted at the following link:

http://www.cpc.ncep.noaa.gov/products/predictions/long_range/lead01/off_index.html



In addition to the national outlook, NOAA's National Weather Service is producing local 3 month outlooks. These products attempt to further define the temperature patterns expected at a more local scale. These outlooks are based on the national climate outlook (see above), with the local effects accounted for. For example, the climate station near Cavalier, North Dakota has been historically cooler than the surrounding area.

The local outlooks are available from the CPC at the following website:
http://www.weather.gov/climate/l3mto.php
Users then may click on the area of interest as well as the period of interest to see the local outlook requested. An outlook similar to the graph above can be acquired for select locations in North Dakota.



Hydro-Talk

Is the drought over?

by Charlene Prindiville

West and central North Dakota have been in a drought since the spring of 2006. By definition, drought is popularly known as a spell of dry weather. Spells of weather last for an indefinite period, which usually are many weeks to months. Drought is unique in that it creeps up gradually. Man is helpless to combat it as there is no way to produce enough rain from the free atmosphere by artificial means, in spite of current technology. "The first rainless day in a spell of fine weather contributes as much to the drought as the last day, but no one knows precisely how serious it will be until the last dry day has gone and the rains have come again". (USDA, 1947). Drought produces moisture deficits that have social, environmental, and economic impacts. Its primary physical effects are agricultural and water supply.

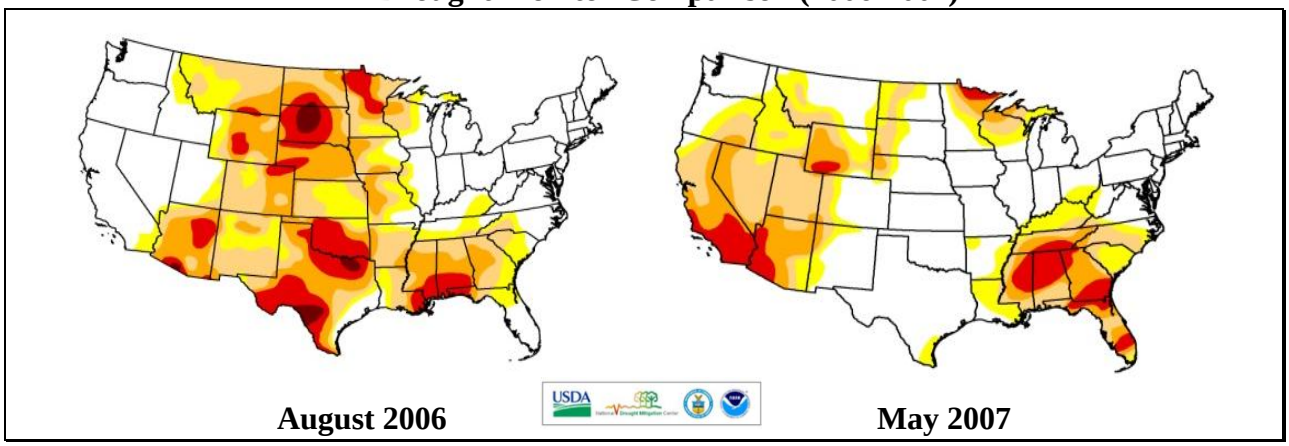
The US Drought Monitor, a collaborative effort between the USDA, National Drought Mitigation Center, and NOAA, maps the entire United States summarizing current drought conditions. Drought categories are represented by categories of intensity with D0 being the least intense and D4 the most intense.

By August 1st, 2006 the southwest half of North Dakota was suffering from Extreme (D3) and Exceptional (D4) drought conditions, a result of minimal seasonal snowfall and below normal spring and summer rainfall. Reservoirs and rivers dried up, as did most of the farm and ranch land. Comparisons could be made to the late 1980's and even the early 1930's.

A La Niña pattern began affecting the upper Midwest early spring 2007. As a result, May rainfall has liberated much of North Dakota's grasslands and farm fields from the moisture deficit. Monthly precipitation totals of 4-8 inches were common, (200% - 400% of normal). Rivers have begun to flow and reservoirs and stock ponds are recovering. Garrison Reservoir has risen 7 feet from its low point in February of 2007. Current elevation is 1813.6 feet. The most current monitor classifies only the western third of the state in an Abnormally Dry (D0) drought status. If current weather patterns hold, North Dakota may be on its way to becoming drought-free statewide.

The Drought Monitor can be viewed at: http://www.drought.unl.edu/dm/monitor.html
The National Weather Service in Bismarck: www.weather.gov/bis
The National Weather Service in Grand Forks: www.weather.gov/fgf

Drought Monitor Comparison (2006-2007)



Science Bits

Small-Grain Growth Stages

by Joel Ransom

NDAWN is an incredibly powerful tool for accessing and analyzing weather data from North Dakota. I have reviewed agricultural weather systems such as NDAWN in other states and believe that NDAWN may be the premier system in the U.S. when it comes to features and user friendliness. One lesser-known feature of NDAWN is the growth-stage prediction model that is associated its growing degree-day (GDD) application. It is available for several, but not all crops for which GDDs are calculated. In this article I will focus on its application in research for wheat.

The growth-staging models in NDAWN allow farmers and farm managers to predict the current growth stage of their crop by simply indicating the planting date when accessing wheat GDDs from NDAWN. Knowing the growth stage of a crop is important to farmers/managers as many management practices are growth stage dependant (i.e. herbicide applications). However, we in the Extension Service strongly encourage farmers to visit their fields often as this allows them to observe any major biotic and abiotic stresses and to evaluate how the crop is responding to the various management practices that have been applied. I think the real value of the growth-staging feature of NDAWN for farmers/farm managers is that it allows them to compare crop development in a given year with development in previous years. This is particularly useful as varieties and management practices can interact significantly with the environment, and the better a manager understands how a particular variety/management practice is affected by the environment, the better they will be able to adapt practices that will be stable and profitable over the long-term.

Perhaps as important, the growth-staging function has immense potential for use in research. For example, one could determine the effect of planting dates on the number of days it takes for the plant to reach the 6-leaf stage after emergence without actually planting an experiment. Since cool weather during early vegetative growth of wheat favors the development of high yield potential in the absence of other stresses, this information might help us understand the importance of early planting and how early season development changes from year to year. Table 1 summarizes the effect of planting date on the number of days from emergence to the 6-leaf stage for recent years in Fargo. These data demonstrate the value of early planting in "prolonging" the early vegetative development of wheat. They also illustrate the potential for year-to-year differences in early season wheat development. For example, there was little difference in the number of days between emergence and the 6-leaf stage between the 15 April and 1 May planting dates in 2003, but relatively large differences between those planting dates in 2002 and 2005. These data do not directly predict yield differences as affected by years and planting dates, but give a rough feel for how yield might have been impacted. Interestingly, by using growth-stage prediction data and published yield and planting date data from irrigated experiments like those conducted at Carrington, one could run correlations between numbers like those presented in Table 1 or other growth stages and yield data to determine the importance of the length of various growth stages to the ultimate yield of the crop.

Table 1. Effect of planting date on the number of days from emergence to the 6-leaf stage of wheat in Fargo. Data generated using the growth-staging application within NDAWN.

	Planting Date		
Year	15 April	1 May	15 May
		Days	
2002	35	27	24
2003	34	30	24
2004	38	32	27
2005	38	30	25
Mean	36	30	25

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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