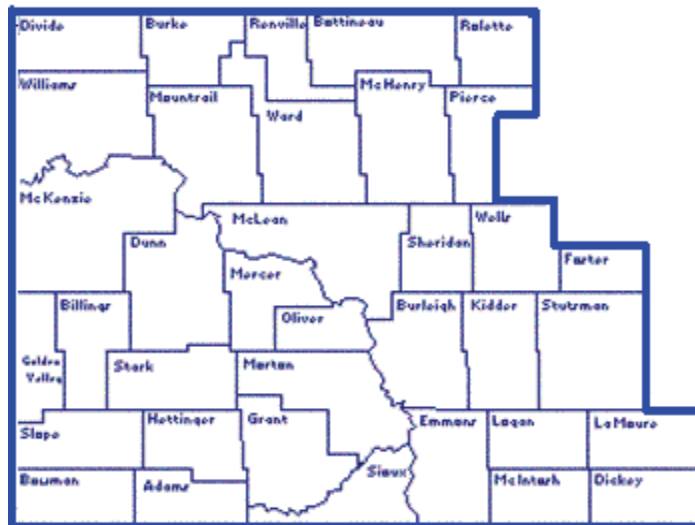


Fall
2006

Dakota Skies

Bismarck North Dakota National Weather Service

A map of the Bismarck CWA (County Warning Area) or area of responsibility. We issue weather products such as warnings and forecasts for 36 counties in western and central North Dakota. The office has 23 employees of which 13 are meteorologists. We are staffed 24 hours a day, seven days a week, year round.



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About this Publication

Dakota Skies is published twice each year, in the spring and in the fall, by the WCM (Warning Coordination Meteorologist) at your National Weather Service in Bismarck, North Dakota. Its purpose is to heighten awareness about safety for the coming severe weather season, whether it be summer or winter, and to relay information on any changes at the Bismarck NWS (National Weather Service). Additionally, other educational and useful information will be provided as space allows. If you have any comments or suggestions contact us.

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Winter Weather Awareness Week is October 30 through November 3

“Severe Winter Weather Awareness Week” in North Dakota is October 30 through November 3. You should...Get a Kit...Make a Plan...and Be Informed. Keep a high level of situational awareness by listening to the forecast every day. When snow, sleet, or freezing rain is in the forecast expect that it will impact your day to day routine.

Now is a good time to re-familiarize yourself with winter terms and safety rules. Prepare now for winter!

NWS Williston Contacts

NOAA-NWS
402 Airport Rd
Williston, ND 58801-9802
Inquires at 701-572-3198
Forecast at 701-572-2351

Winter Weather Terminology

Watch is issued when the risk of a hazardous winter weather event has increased, but its occurrence, location, and/or timing is still uncertain.

Warning or Advisory is issued when a hazardous winter weather event is occurring, is imminent, or has a high probability of occurrence. A warning is used when there is a threat to life or property. An advisory is for less serious conditions that cause inconvenience, and, if caution is not used, could lead to situations that may threaten life or property.

Snow criteria for a warning is 6 inches or more in 12 hours or less, OR, 8 inches or more in 24 hours or less. Snow criteria for an advisory is 3 to 5 inches.

Winter Storm Warnings and Winter Weather Advisories may be issued for a combination of elements like snow coupled with wind and blowing snow, or snow coupled with sleet and freezing rain.

Sleet is pellets of ice. Sleet bounces when it hits the ground.

Freezing Rain is rain that freezes when it hits the ground or objects on the ground. It forms a sheet or glaze of ice.

Ice Storm is used to describe occasions when the ice from freezing rain is significant enough (1/4 inch thick or more) to cause damage.

Blizzard is a storm with winds of 35 mph or higher AND visibility frequently below 1/4 mile in snow and/or blowing snow AND these conditions last three (3) hours or longer. There is no set temperature requirement for a blizzard.

Wind Chill is that part of the cooling of a human body caused by moving air. Moving air accelerates the rate of heat transfer away from a human body.

Wind Chill Advisory is issued for wind chills of 20 to 40 below zero with a wind speed of at least 10 mph.

Wind Chill Warning is issued for wind chills lower than 40 below zero with a wind speed of at least 10 mph.

wind chill table

wind speed down left side - temperature across top

	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Be Prepared

In the cold dress in layers of loose fitting clothes. Wear a hat, gloves or mittens, and a scarf. Have as little skin as possible exposed to the elements.

When shoveling snow go slow, take breaks, and don't get too tired. Keep fire hydrants near your home or business visible and free of snow.

Carry a winter survival kit in your vehicle. Include extra clothing, a blanket, and high energy food like candy bars, peanuts, and raisins. Have a flash light with fresh batteries, paper towels, sand, and a shovel. Keep the gas tank and windshield washer bottle full.

Before you set out on a trip let someone know the time you leave, the route you will take, and the time you plan to arrive. Check the latest forecast and road report. Take a cell phone and be sure the vehicle windows, headlights and taillights are clear of snow, ice, and frost.

If you get stuck, raise the vehicle antenna and tie a brightly colored cloth to it so that others passing by will see you. Keep the exhaust pipe clear of snow but do not overexert yourself by trying to push or shovel the vehicle out of deep snow. Keep a window open about a half inch. Clap your hands and rub your legs. Move your body around in the vehicle. Stay inside the vehicle. Do not try to walk away from the vehicle unless you can see a place of safety at a close distance. Do not fall asleep! Stay awake!

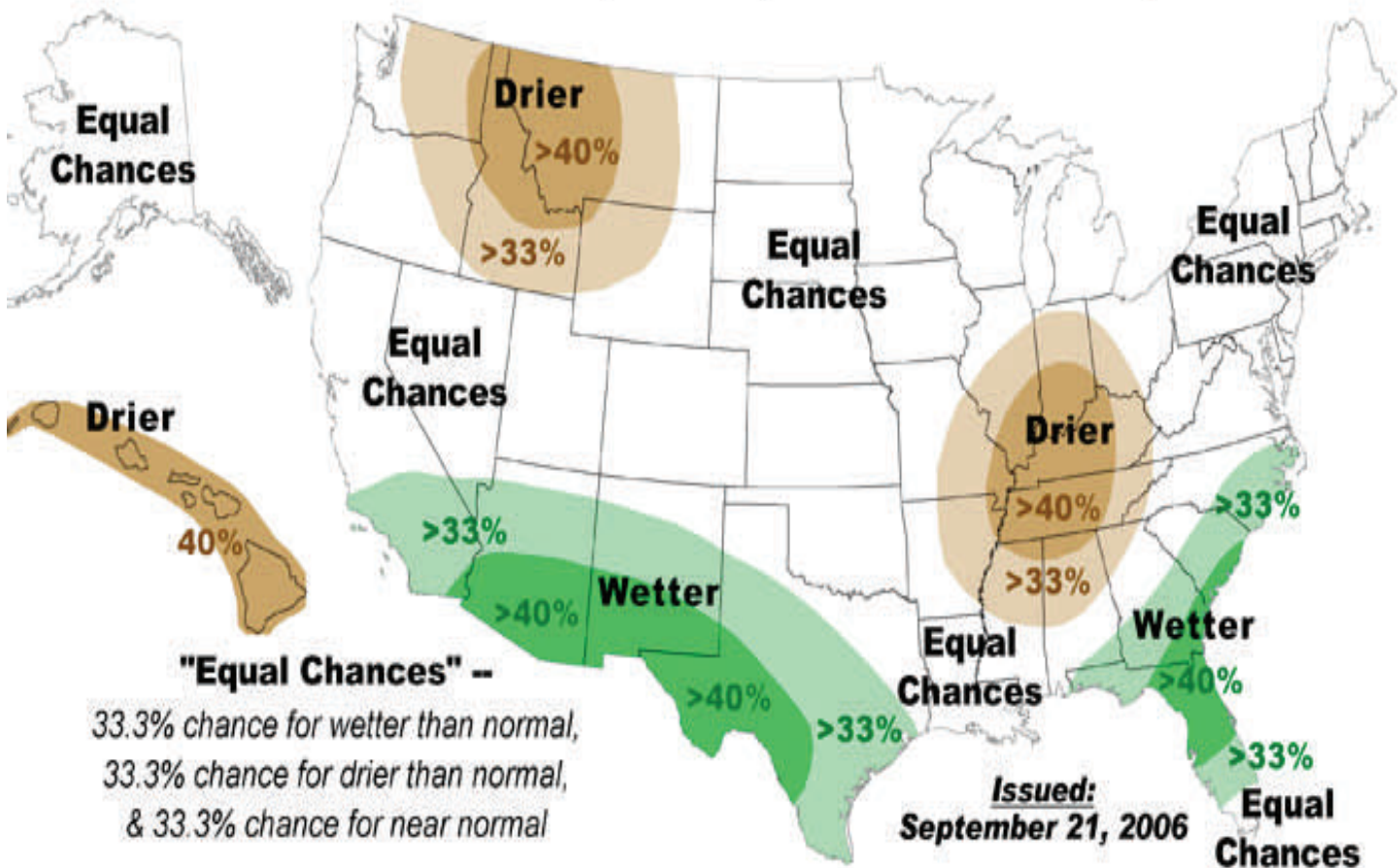


Precipitation Outlook

Winter (Dec. - Feb.) 2006/07



Chances for **Wetter Than Normal**, **Drier Than Normal**, or Near Normal Precipitation (based on 1971-2000)



Road Reports and other DOT information...dial **511**

*NOAA Weather Radio...
 isn't just for weather...*

*NOAA Weather Radio
 (All Hazards)*

**Winter Officially Begins at
 6:22 PM CST on December 21, 2006**

**Spring Officially Begins at
 7:07 PM CDT on March 20, 2007**

El Nino and the Jet Stream

NOAA's CPC 2006-2007 Winter Outlook issued September 21 calls for above average temperatures and near normal precipitation for North Dakota (see pages 4 and 5). Why? The answer is El Nino!

The CPC has stated that "weak" El Nino conditions have developed in the tropical Pacific and are expected to persist through the winter months, possibly strengthening into the "moderate" category.

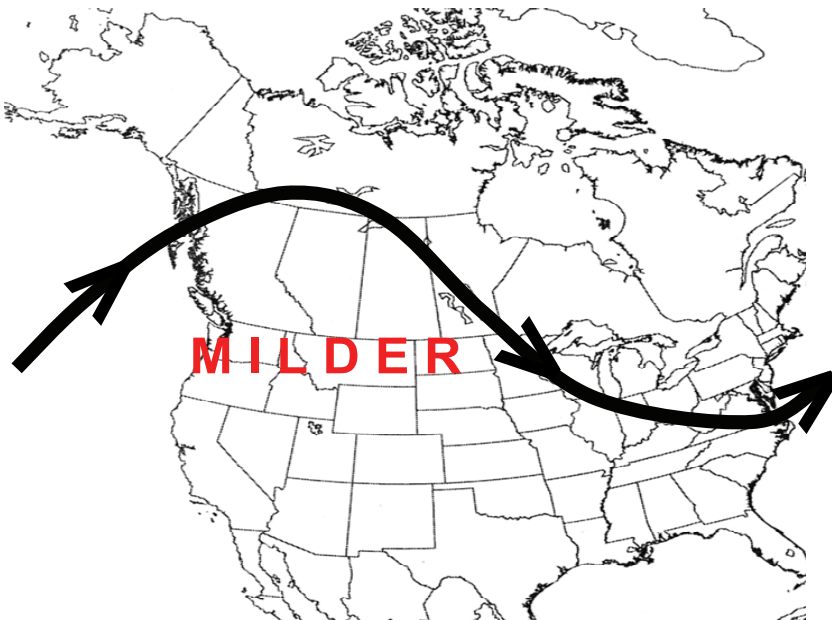
El Nino is a warming of the tropical Pacific Ocean that occurs irregularly at about 3 to 5 year intervals and lasts on the order of 3 to 5 months. This occurs in response to large scale weakening of the trade winds that normally blow westward from South America toward Asia.

Our first knowledge of the term El Nino came from Peruvian geographers at the end of the 19th century. They became interested in the unusual climate that occurred along the Peru coast and took note of what a knowledgeable ship captain said about the fishermen

in the area who typically saw a switch from cold to tropical ocean conditions around Christmas. They attributed this to a southward setting warm "El Nino current". The term was a reference to the Christ child. We don't know how mythical the story might be, but it is the tale that has been passed on. The geographers noted that in some years the onset of the warm conditions was stronger than usual and was accompanied by unusual oceanic and climatic phenomena. Today, when the onset of the warm conditions is stronger than usual we call it El Nino.

The strengthening El Nino will influence the position of the jet stream over the Pacific Ocean and North America. Basically the mean position of the jet stream will be farther north. This in turn will affect winter temperature and precipitation patterns across the United States.

For North Dakota a jet stream displaced farther north from its "normal" position will allow milder air to work into the state. For details on the affect on North Dakota weather, see pages 4 and 5.



Expected mean position of the Jet Stream this winter. As a result of El Nino the jet is expected to be displaced north of its normal position. This will allow milder air to work into North Dakota more frequently.

Time Changes - They are a Changing

Sunday, October 29...2 AM CDT becomes 1 AM CST. Fall BACK one hour.

On August 8, 2005, President George W. Bush signed the *Energy Policy Act of 2005*. This Act changes the time change dates for DST (Daylight Saving Time) in the United States. Beginning in 2007, DST will begin on the second Sunday of March (rather than the first Sunday of April) and end on the first Sunday of November (rather than the last Sunday of October).

Severe Summer Weather 2006

By definition a *severe thunderstorm* is one that produces a 58 mph (50 knot) wind gust and/or 0.75 inch diameter hail. A penny is 0.75 inch diameter.

A *tornado* is a violently rotating column of air in contact with the ground (visible funnel not necessary).

A *Flash Flood* results from too much water in a short period of time where flooding occurs very quickly, or in a “flash”.

The Fujita tornado damage scale:

<u>F-rating</u>	<u>tornado intensity</u>	<u>wind speed</u>
F0	weak	40 to 72 (mph)
F1	weak	73 to 112
F2	strong	113 to 157
F3	strong	158 to 206
F4	violent	207 to 260
F5	violent	261 to 318

During the 2006 severe weather season the National Weather Service in Bismarck officially logged the following reports for the Bismarck CWA (County Warning Area) (see map page 1):

191 large hail (0.75 inch diameter or larger)
65 high wind (58 mph or higher)
11 tornadoes
6 flash floods

Dates and locations of the 11 tornadoes:

F0 April 28 LaMoure County 9SE Marion
F0 April 28 LaMoure County 11NE LaMoure
F0 June 23 LaMoure County 2N Edgeley
F0 June 23 LaMoure County 5NE Edgeley
F0 June 23 Rolette County 1S Rolla
F0 August 4 McIntosh County 6S Ashley
F0 August 10 Sioux County 6S Selfridge
F0 August 20 Dickey County 1N Monango
F0 August 24 Morton County Hebron
F2 August 24 McLean County 9SW Underwood
F0 August 24 Kidder County 2S Steele

The first report of severe summer weather in 2006 was 0.88 inch diameter hail (nickel size) on the southeast end of Mandan, Morton County, on April 10.

The highest thunderstorm wind gust was estimated at 125 mph (109 knots) that tore through Coleharbor,

McLean County, on July 12. (See COLEHARBOR story page 7.)

The largest hailstone was 3.25 inch diameter. It fell at the Great River Energy Plant, about 3 miles southeast of Stanton, Mercer County, on August 24. (See STORMY DAY story page 8.)

The last report of severe summer weather in 2006 was 0.88 inch diameter hail (nickel size) that fell 6 miles northwest of Ellendale, Dickey County, on August 24.

Coleharbor

Between 7:27 PM and 7:38 PM CDT on Wednesday, July 12, 2006, a weather disaster struck the town of Coleharbor, McLean County. Damage was extensive and severe and included nearly every building and tree in the town of about 80 people. The degree of damage varied with heavier damage to structures and trees on the west side of town, including to a brick school built in 1916. Just across highway 83, on the west side of town, an empty railroad coal car was off the tracks and on its side. Damage in the vicinity of Coleharbor was confined to an area around 2 1/2 miles on a side (north to south and west to east).

The structure and tree damage pattern, coupled with comments from eye witnesses, and Doppler RADAR Data, led to the determination that the event was a wet microburst with wind speeds of around 125 mph. A cluster of multicellular structured storms (storms in different stages of their lifecycles) was moving through the area. Witnesses described a shelf cloud approaching, followed by the high wind, and then very heavy rain. They described the highest wind as lasting only a short time. An investigation of RADAR data indicated that one of the storms just west of Coleharbor suddenly collapsed, resulting in a downward and outward rush of water and wind into Coleharbor.

A wet microburst is defined as a globular mass of heavy rain (wet) accompanying an area of strong and damaging wind (downburst) produced by the convective downdraft (downward rushing air) of a thunderstorm. By definition it is 2 1/2 miles or less on a side and lasts 5 minutes or less.

There were two injuries and thankfully no fatalities.

Stormy Day August 24

Thursday, August 24, 2006, will be long remembered by a lot of folks in western and central North Dakota, including the meteorologists at your National Weather Service and our partner broadcast meteorologists at local radio and television stations. By every standard it was a heck of a busy day in the weather department.

The first severe weather warning was issued at 3:52 AM CDT for Williams County and the last that day was issued at 6:55 PM CDT for Dickey County. In that 15 hour period on August 24, 87 warnings were issued by NWS Bismarck and relayed to you through various means including NWS partners in the broadcast industry. There were 64 severe thunderstorm warnings issued, 17 tornado warnings, and 6 flash flood warnings. In the end 58 reports of severe weather were logged including 3 tornadoes and 4 flash floods.

Low pressure in South Dakota with a warm front extending into Minnesota, and a training cold front through eastern Montana, triggered the storms. Storms formed early in the day ahead of the warm front. This was followed by a line of storms that developed along the Montana-Dakotas border in the late morning and moved across western North Dakota with the cold front.

The largest hailstones fell at the Great River Energy Plant near Stanton, Mercer County. Hail as large as 3.25 inches in diameter (a baseball is 2.75 inches diameter) caused extensive damage to about 40 vehicles at the plant. The highest wind gusts occurred at Falkirk and Turtle Lake (McLean County) and was estimated at 90 mph. There was significant damage to the elevator and a home at Falkirk, and barns around Turtle Lake. Tornadoes were spawned near Hebron, Steele, and about 9 miles southwest of Underwood. A farm house and outbuildings 9 miles southwest of Underwood were severely damaged.

The National Weather Service received no reports of deaths or injuries.

A New Face at Bismarck

Kevin Birk became a National Weather Service meteorologist intern at the Bismarck office in mid October.

Kevin was born and raised in the St. Louis, Missouri area where he experienced many weather extremes from severe summer storms to dynamic winter ones. This peaked his curiosity into the driving forces of such extreme weather, which in turn led to a passion for meteorology.

Kevin earned his Bachelor of Science Degree in Atmospheric Science at the University of Missouri-Columbia, and went on to earn his Masters there as well.

While at the University of Missouri he performed research on how variability associated with the ENSO (El Nino Southern Oscillation) affected Mid-western climates. Additionally, he studied how long term changes in ENSO caused responses in climatic signals.

Welcome to Bismarck, Kevin!



NOAA's NWS Bismarck web site at...

www.weather.gov/bis

What a Volunteer We Have in Chris

Chris Hammer, a student at Century High School in Bismarck, has volunteered at Bismarck's National Weather Service Office for the past two summers, and even a little while on break during the school year. During the summer of 2006 Chris logged 422 hours of volunteer time for the NWS.

Chris was born in 1989 in Minot. He showed a strong interest in science from an early age and by age 5 was fascinated with weather. Chris moved to Bismarck when he was in the 6th grade and in middle school his interest in weather matured to an interest in meteorology. While in high school he has become a "self-study" in the science and his knowledge of meteorology (not just weather) continues to grow.

During the summer of 2005 Chris volunteered at NWS Bismarck, putting in about 200 hours of volunteer work. During the 2005-2006 school year he occasionally stopped by the office while on school break. The summer of 2006 brought Chris back to the NWS as a volunteer.

Chris's volunteer work exposes him to the expertise of 13 degreed meteorologists and a hydrologist. He is learning not only what goes into the Warning-Decision-Making process when dealing with severe and sometimes life threatening weather, but also how important the day to day routine forecast is for many people in west and central North Dakota. Chris too is learning the importance of service to the people of the United States, and how critical the mission of the NWS (protecting life and property, and supporting the national economy) is.

Chris has set high goals for himself which include earning a Masters of Science Degree in Meteorology and becoming a forecaster at the NWS Storm Prediction Center in Norman, Oklahoma.

Chris is a very bright young man. He has matured significantly since his first days at the NWS. Chris is an asset to NWS Bismarck and the staff thanks him for his service and wish him well. Chris's future is bright!

NWS Bismarck Spotlights...

Chris Hammer

Ten Years Ago This Winter

The winter of 1996-97 was one for the record books. Bismarck had its snowiest winter on record that season with 101.6 inches.

Seasonal snow totals from around the area (96-97)...

Bowman	84.2 inches
Carson	129.8
Drake 9NE	91.0
Jamestown	100.3
Napoleon	108.4
Oakes 2S	126.5
Streeter	88.0
Underwood	116.0
Velva 3NE	85.4
Wishek	88.0
Woodworth	109.2

NOAA Weather Radio Distribution

NOAA Weather Radios (All Hazards) are being distributed to all public schools in the nation. They are being sent directly to the schools and have already begun arriving at schools in west and central North Dakota. If schools in your area haven't received one yet it should be arriving in the next few weeks.

This is a joint effort between the United States Department of Homeland Security, Education, and Commerce. NOAA's NWS is an agency within the Department of Commerce.

**MARK TRAIL CHAMPIONS
NOAA WEATHER RADIO-
THE VOICE OF THE NATIONAL WEATHER
SERVICE**



A New Face at Williston

David Jankowski became a National Weather Service meteorologist intern at the Williston office at the end of August.

David was born and raised in the St. Louis, Missouri area. He moved to Columbia to attend the University of Missouri-Columbia. David earned his Bachelor of Science Degree in Atmospheric Science and went on to earn his Masters in the same field. His graduate work focused on the duration of storm systems in determining a more accurate account of precipitation totals.

In his spare time David enjoys fishing, bowling, and watching the St. Louis Cardinals. David said that he has fished tournaments for bass in Missouri, and is getting accustomed to the walleye and pike in the waters around Williston.

Welcome to North Dakota, David!



What a Year for SKYWARN

During the 2006 SKYWARN training season 1,243 people attended 38 SKYWARN-safety training sessions conducted by NWS Bismarck staff. This was a record number of attendees and record number of talks.

Today, there are 1,483 official weather spotters in the 36 counties of west and central North Dakota served by the Bismarck office of the NWS.

Valuable Web Sites

Check out these sites for weather and various safety information.

NWS Bismarck at

www.weather.gov/bis

NWS Grand Forks at

www.weather.gov/fgf

North Dakota Department of Emergency Services at

www.nd.gov/des

North Dakota Department of Transportation at

www.dot.nd.gov

North Dakota Highway Patrol at

www.nd.gov/ndhp

North Dakota Parks & Recreation Department at

www.parkrec.nd.gov

North Dakota Game and Fish at

www.gf.nd.gov

North Dakota State Fire Marshal at

www.ag.state.nd.us/FM/FM.htm

Citizen Corps at

www.citizencorps.gov

Last Year's Historic Snowstorm

The winter season of 2005-2006 arrived early for a lot of folks in western and northern North Dakota. October 4-5, 2005, brought an early and very significant winter storm to an extensive area of the state. Heavy wet snow disrupted the lives of thousands and transportation came to a standstill as the storm forced the closure of major highways.

Here are the more significant snow reports from the storm, in inches, rounded to the nearest inch.

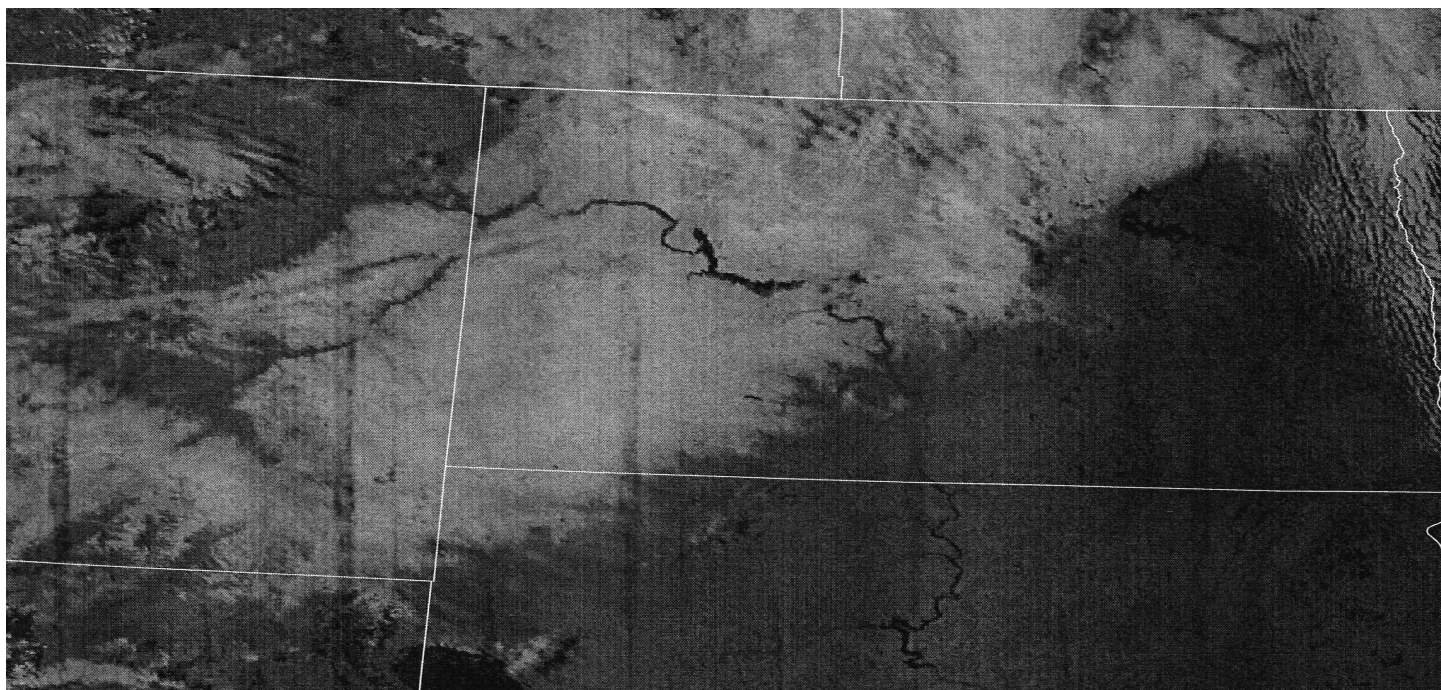
Beach...15 inches
Bowman...15
Dickinson...15
Dunn Center...19
Dunn Center 4 miles south...22
Fairfield...17
Grassy Butte...14
Halliday...15
Hebron...18
Lake Metigoshe...11
Minot...15
Powers Lake...13
Richardton...15
Stanley 13
Tioga...16
Trotters...14

An estimated 14,000 people in North Dakota were without power because of the storm.

To have this much snow, so early in the season, over such a large part of North Dakota, was indeed historic and record breaking.

The storm was preceded on October 1st by temperatures in the 90s. It was followed by record cold as temperatures over snow covered areas plummeted. On the 6th Powers Lake had a low of 4 degrees.

A check of records back to 1874 showed that North Dakota has had snow even in September. For example Bismarck had 5 inches of snow on September 23-24, 1984, 4 inches on September 25, 1942, and 2 inches on September 12, 1903. Until the October 2005 storm, though, the earliest most significant storm to affect such a large part of North Dakota had been 6 to 13 inches on October 7-8, 1985. The 2005 storm came a few days earlier in the season and dumped more snow than the 1985 one, with 15 inches being common. Indeed the storm of October 2005 was record breaking and of historic proportions.



Visible satellite picture taken October 7, 2005 showing the snow cover on the ground (large white area) from Montana, across North Dakota, and into Canada. Note Lake Sakakawea and the Missouri River standing out.



SKYWARN Recognition Day 2006

SRD (SKYWARN Recognition Day) for 2006 has been set for December 2. It will run from 0000 UTC (Universal Coordinated Time) to 2400 UTC. That corresponds to 6 PM CST on December 1st to 6 PM CST on the 2nd. This will be the 8th annual SRD.

SKYWARN is a national network of severe weather spotters. It is basically volunteers, who are trained in severe weather observing, and report information to the National Weather Service. In this way the spotters become a critical component of the Warning and Decision making process that goes on at the NWS. SKYWARN really is one neighbor helping another in the protection of life and property.

SKYWARN Recognition Day celebrates the contributions that amateur radio operators make to the National Weather Service severe weather operations, and consequently to the public welfare.

U.S. Department of Commerce National Oceanic and Atmospheric Administration

NOAA-National Weather Service
2301 University Dr Building 27
Bismarck ND 58504

**Official Business
Penalty for private use, \$300**