Northern Exposure

National Weather Service
Grand Forks, ND

Winter 2009/10

The Latest Flood Outlook and NWS Rivers and Lakes Tutorial

by Vanessa Pearce and Mark Ewens

Winter may have just started, but to us this means that the next spring flood season is getting closer. Although it is too early to know the exact extent of this year's spring-time flooding, certain generalizations about the past fall and winter thus far, as well as previous falls and winters, can be taken as a starting point to provide an outlook for this spring's flood.

IN THIS ISSUE

Several main factors influence the intensity and duration of spring flooding across the Red River Valley. Some of the factors will not be known until the flood is nearly upon us or already happening, but the latest flood outlook issued in late January indicates two of the biggest factors (wet fall conditions and plenty of moisture in the frozen snow pack) are already indicating an increased chance of significant flooding this spring.

The fall of 2009 across eastern North Dakota and northwestern and west central Minnesota was wet, but not as wet as the record breaking fall of 2008. The wet conditions and early winter freeze up led to the rivers freezing at very high levels. Stream flows for November and December on the Red River at both East Grand Forks and Fargo were greater than the 90th percentile of historical stream flows. River base flows remain well above normal into early February. This means there is already plenty of water in the river system just waiting to thaw.

Another significant factor playing into this upcoming spring flood is the amount of snow (and its equivalent to liquid water if melted) that has fallen across the area since the beginning of winter. Two major snowstorms have occurred within the region so far this winter. The Christmas weekend storm of 2009 produced record snowfalls across portions of the region. Almost a month later, another storm system dropped significant rainfall

"Therefore, the conditions are developing for significant spring flooding."

and snow across the region. As a result, snow depths range from 8 to 14 inches across the northern Red River Valley to 14 to 20 inches across the southern Red River Valley. Similar snow depths exist in the Devils Lake Basin. While snow depths are thick, what's really important is the amount of frozen water within that snow pack. Between 4 and 6 inches of liquid equivalent precipitation has fallen across southeastern North Dakota and western Minnesota. This represents 200 to 300 percent of normal precipitation. The Devils Lake Basin has also seen above normal precipitation over the past 4 months, where 3 to 4 inches of precipitation have occurred. This represents totals between 150 and 200 percent of normal. Frost depths are generally down to 18 to 24 inches, just slightly less than at the same time last year.

What has been most unusual about this winter is the relatively stormy pattern, despite the presence of a moderate El Niño in the Pacific. When looking at past years with similar weather and climate conditions, the spring months of March, April and may have been seasonally milder and wetter than normal. The majority of the anomalous precipitation has historically fallen across the southern Red River Valley.

Based on the recent behavior of the atmosphere and the expected overall climate conditions, the late winter into early spring 2010 is projected to remain milder than normal in terms of temperature, with continued above normal precipitation. Historical analysis and recent climate trends suggest that the southern Red River Valley will be more likely to experience above normal precipitation for the remainder of the period.

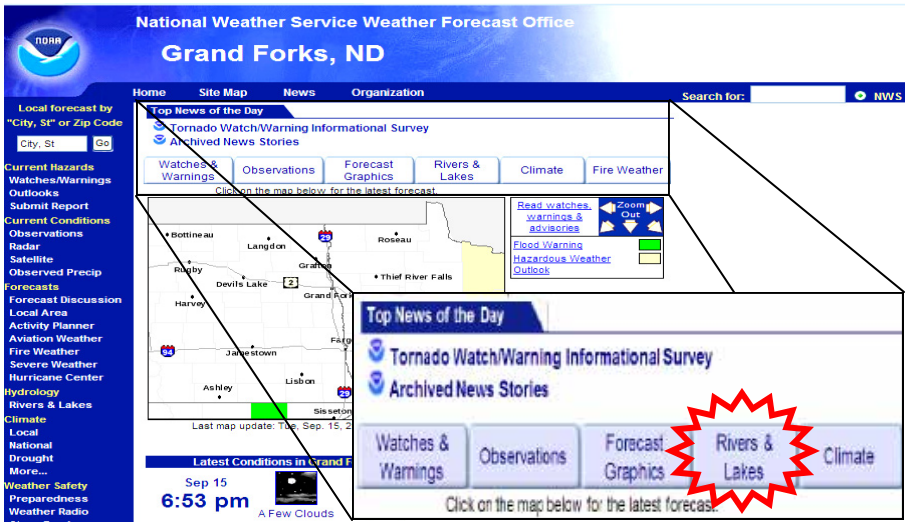
Therefore, the conditions are developing for significant spring flooding. The upcoming spring thaw cycle, as well as what precipitation falls before and during the melt, will be critical factors in the actual flood levels. The National Weather Service plans to issue another flood outlook later in February.

This is a picture of river ice on the Goose River near Hillsboro, ND from April 7, 2007. Courtesy of D. Bjorn

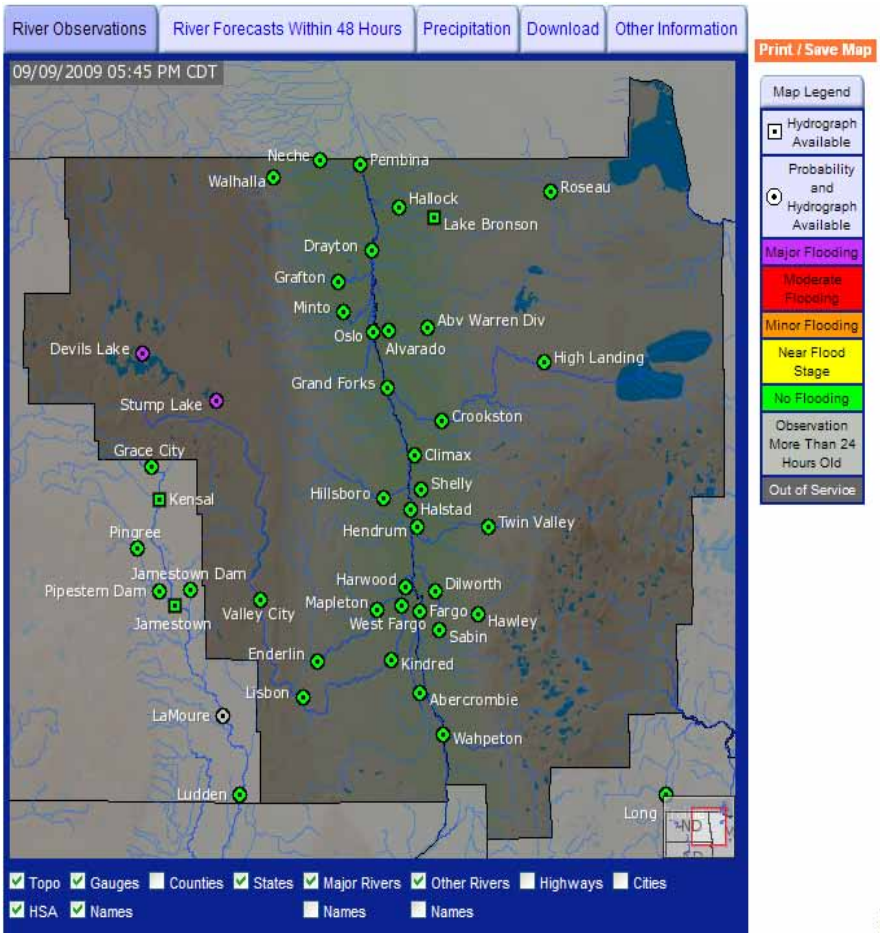
This past fall, two staff members attended the 2nd Annual Emergency Preparedness Expo at North Dakota State University. The National Weather Service Grand Forks Forecast Office was there to answer questions related to all aspects of weather but particularly for those related to flood information. A River & Lakes Webpage Tutorial was created by SCEP student, Vanessa Pearce, for this event. It is a user friendly how-to-guide on accessing river and flood information from the web, as well as a vehicle to get a better understanding of the NWS flood and river graphics and products that are on the NWS Advanced Hydrologic Prediction Services (AHPS) website.

Grand Forks NWS Rivers & Lakes Webpage Tutorial

Open Internet Application & Enter into address bar: www.nws.noaa.gov/fgf. This will lead to the Grand Forks National Weather Service homepage.



Click on the light blue Rivers & Lakes tab located above the map to lead you to a new page, located below.



This page shows the locations of river and lake gauges across Eastern North Dakota and Northwestern Minnesota and their current flood category which is indicated by the color of the point. The legend for the categories of the river is located to the right of the map.

Any of the gauges can be clicked on to view additional information about that specific point. The map is customizable using the checked boxes at the bottom of the map (i.e. topography, major rivers, cities, etc.).

Below this map is a tab entitled "River Menus" that shows a list of each river with separate drop down menus (not shown). Any rivers that are in flood will be highlighted by its corresponding flood category color. In the drop down menu of a river, clicking on "(Name of the River) at a Glance" allows for users to customize the page to show desired features for multiple points along a river.

If an individual gauge point is clicked, a hydrograph similar to that shown below will appear:

In this example, the graphic shows the gage/stage flow readings for the Red River at Fargo for 10 days with the **blue line** and the **blue number** labels the latest observed value or most recent crest.

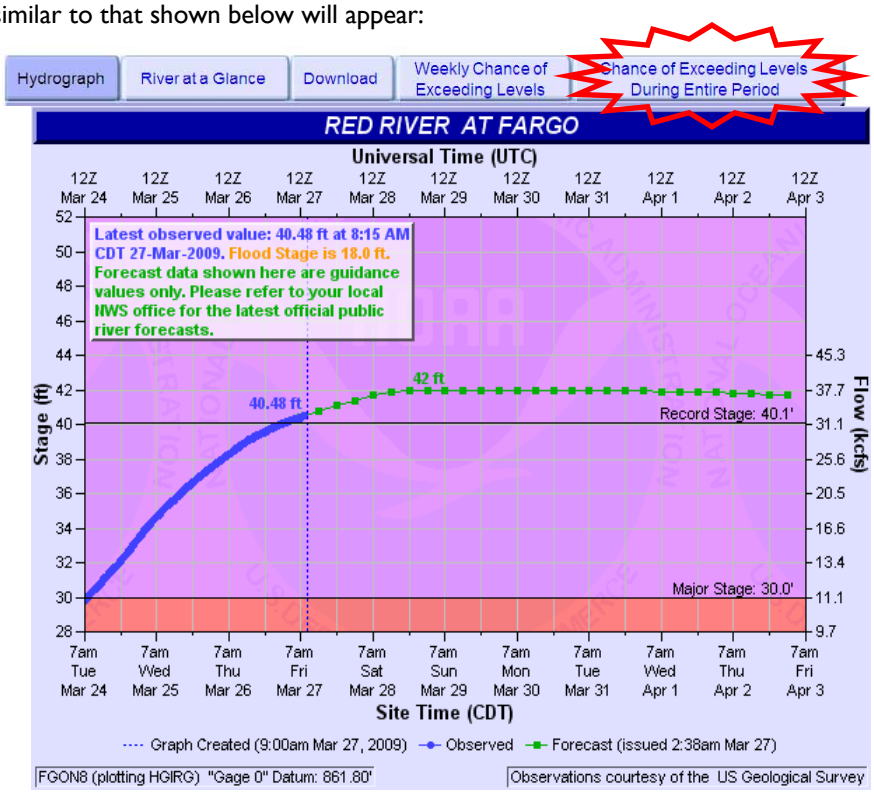
The hydrograph will only show a **green fore-cast line** if the point is at or exceeding action stage.

Left side of the graph: River stage or height of the river in feet.

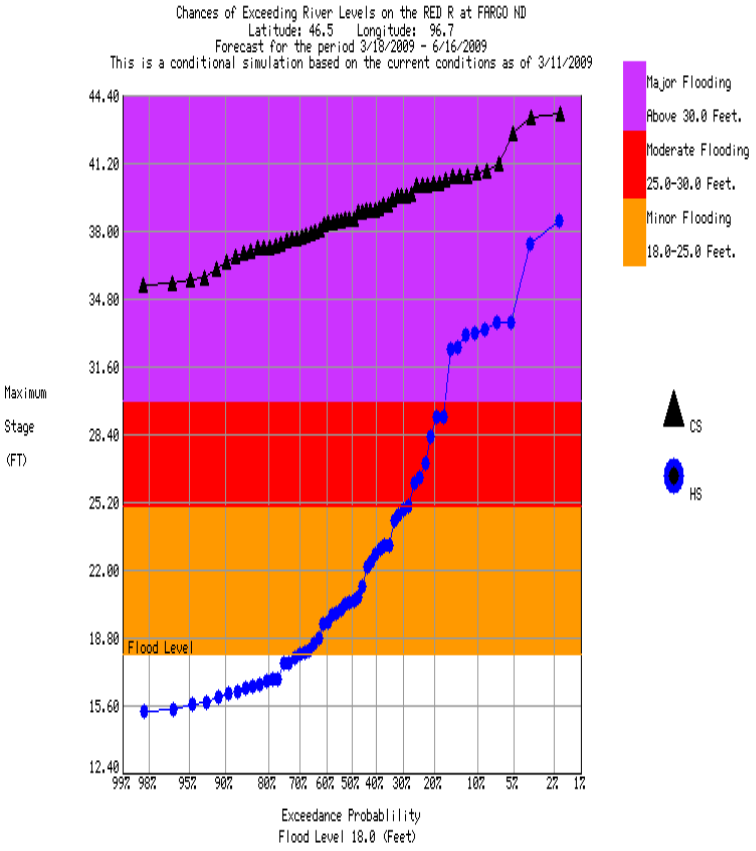
Below the graph: Date/Time of the observations/ forecasts for 10 days in Central Daylight Time.

Right side of the graph: Flow of the river in thou-sands of cubic feet per second.

The colored background corresponds to the flood categories; a **black line** separates the flood cate-gories and is labeled by its respective height.



If a river point has a forecast made for it, a tab called Chance of Exceeding Levels During Entire Period can be found on the top right. When clicked, an outlook graphic will appear like that shown below :



This graph shows the probabilistic outlook for a 3 month time period with a historical and conditional outlook. The flood category of the river is indicated by the background color and corresponds to the leg-end on the right side of the graphic.

Left side of the graph: maximum stage of the river in feet.

Below the graph: probability that the height of the river will exceed the corresponding flood category for that location.

Blue circles (Historical Comparative Data): crests of model simulations from 50 years of snow cover, soil conditions, temperature, and precipitation for the period.

Black triangles (Probabilistic Outlook): crests of model simulations from current river, snow, and soil conditions applying the previous 50 years' temperature and precipitation for the time period.

When the two lines are spread far apart as shown in the graphic to the left, this implies atypical conditions.

For more information: Guide to Hydrologic Information on the Web

Winter Weather Safety

by Amanda Homann

Snow, ice, and extreme cold can make driving and simply walking during the winter season dangerous. Following these safety tips for driving and walking in winter conditions can help make winter travel safer:

- It is important to have a reliable vehicle during the winter. This includes tuning up your vehicle, filling up your antifreeze, making sure your battery is good, maintaining the recommended tire pressure, checking your tire tread, and/or replacing your tires with snow tires.

- Keep emergency gear in your vehicles at all times: cell phone, flashlight, jumper cables, sand or kitty litter, ice scraper, snow brush, shovel, blanket, first-aid kit, and tow rope.

- Avoid driving hazardous weather, such as snow, blowing snow, or freezing rain. If you must travel in bad weather, drive slowly and let someone know what route you're taking and when you plan to arrive at your destination.

- Make sure the exhaust pipe and the area around it are free of snow before you start the vehicle.

- Dress in layers and wear boots with nonskid soles. If you prefer to wear little while driving in your warmed up car, realize how quickly you can lose heat if the vehicle breaks down. It may be a good idea to have your coat and additional clothing (such as a hat and gloves) readily available within an arm's reach.

- Walk on sidewalks if possible. If sidewalks are covered in snow and ice and you must walk in the street, walk against the flow of traffic as close to the curb as you can.

- Don't wear a hat or scarf that blocks your vision or makes it hard for you to hear traffic.

Surviving a winter storm:

- Regularly tune into or monitor your favorite source of weather information. That could be a local television meteorologist and/or the website for your local National Weather Service in Grand Forks, ND (www.crh.noaa.gov/fgf).

- Be prepared. Before a winter storm hits, make sure you have a way to heat your home during a power failure.

- Keep extra blankets on hand along with flashlights with extra batteries, matches, and a first aid kit.

- Stock a few days' supply of water, required medications, and food that does not need to be refrigerated or cooked.

- Monitor the temperature of your home. If it is not possible to keep your home warm, stay with friends or family or in a shelter.

Dress in several layers of loose-fitting and lightweight clothing to maintain body heat and cover up with blankets.

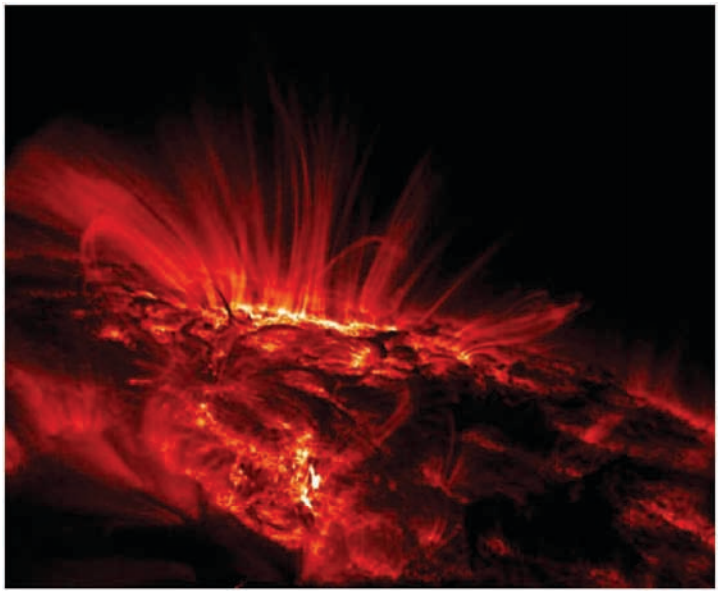
"Let every man shovel out his own snow and the whole city will be passable."

~Ralph Waldo Emerson (American poet)

Auroras and the Solar Cycle

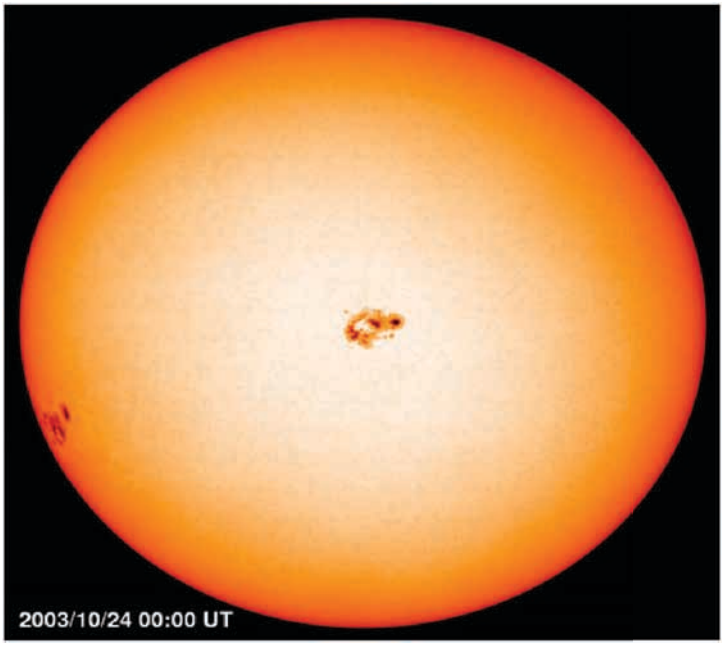
by Geoffrey Grochocinski

Have you noticed a lack of auroras the last several years? I moved up to Grand Forks a couple years ago and have been patiently waiting to see my first aurora, since I never had much of a chance back home in light-polluted Chicago. I can't help but be envious of my colleagues and their stories of more common auroras years ago. This seemed like a good time to review the current state of the solar cycle which is linked to the potential for auroras.



This is an ultraviolet image of a sunspot taken by NASA's TRACE space telescope.

Auroras are basically a result of high energy particles, called electrons, colliding with oxygen and nitrogen atoms in the highest reaches of the atmosphere. Those electrons are emitted from the Sun during geomagnetic storms and carried towards earth along the ever constant solar wind. Solar activity peaks during the Solar Maximum of the Solar Cycle, a cycle which is usually fairly close to 11 years but can occasionally vary by as much as ±2 years. The opposite is true during the Solar Minimum of the Solar Cycle when solar activity is at its minimum. Solar cycles are measured by the Sun's sunspot activity. Sunspots, relatively cool areas on the Sun's surface that appear dark to the naked eye, are caused by intense magnetic activity. Astronomers have been continually monitoring sunspot activity for over 250 years. The year 1755 was designated the beginning of Solar Cycle 1. The greater the solar activity, the greater the chance auroras will be visible at Earth's lower latitudes.



An image of sunspots on the Sun during October 2003.

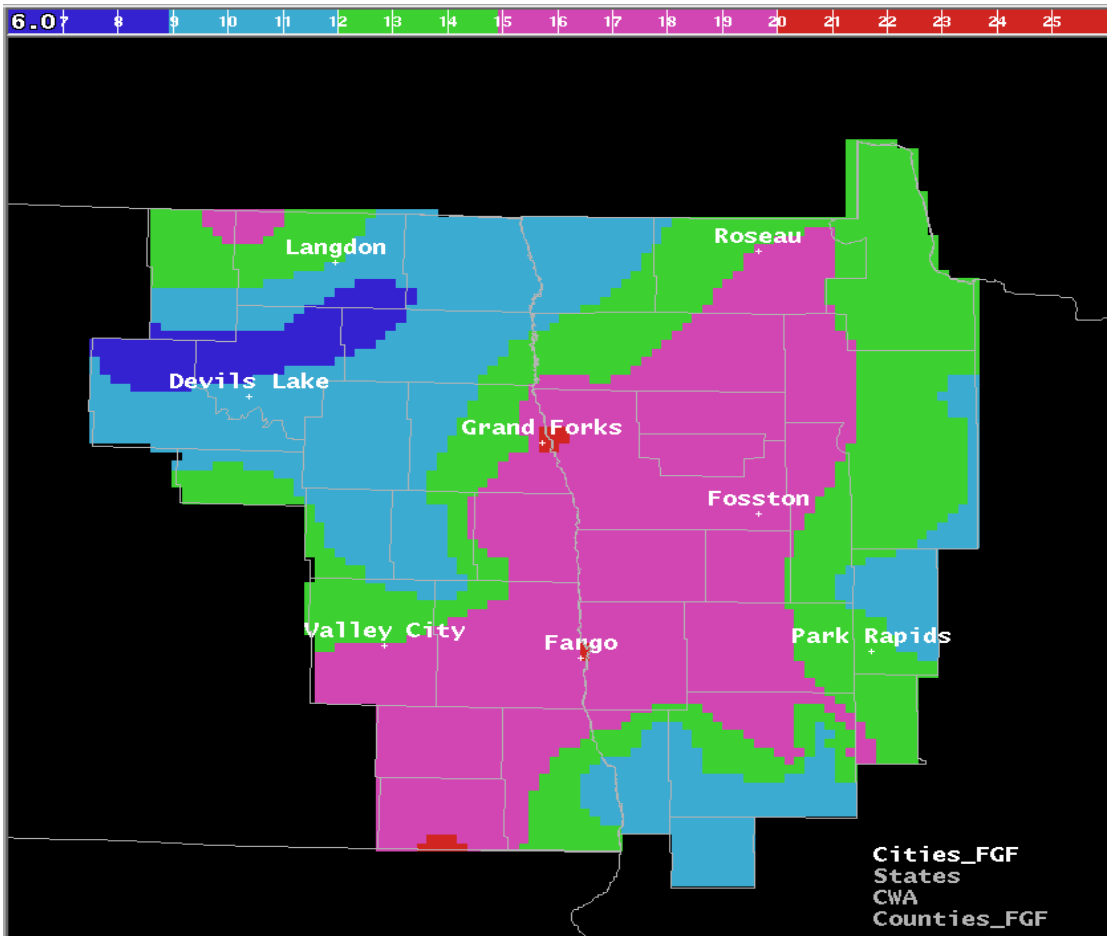
So where are we now in terms of the Solar Cycle? The Sun is coming out of a prolonged Solar Minimum. A typical Solar Minimum lasts just over a year; this recent one was nearly two years long. The last Solar Maximum was in 2001. December 2008 was identified as the Solar Minimum and the beginning of Solar Cycle 24. We can expect solar activity, such as sunspots, to increase over the coming 2-3 years. As of last year, NASA was predicting the next Solar Maximum for the year 2013. This in turn means we can also expect increasing chances that North Dakotas and northern Minnesotans will be able to see an aurora.

The Christmas Blizzard of 2009

by Dave Kellenbenz

The Christmas Blizzard of 2009 affected the entire region during the Christmas holiday. Several waves of snow occurred from December 23 through December 25, with the heaviest snow occurring on Christmas day for the entire region. Most areas received at least a foot of snow, with some areas near Grand Forks topping out near 2 feet for the entire event. This storm was well forecast by the National Weather Service in Grand Forks days in advance of the system, and the public heeded these warnings. Interstate 29 and 94 was closed throughout Christmas day, and travel was brought to a standstill even in towns at times. Drifting snow was also a significant problem, and plows were pulled at times due to the prolonged nature of the heavy snow. The heaviest snow occurred during the evening on Christmas day, when snow rates from 1 inch to nearly 2 inches per hour were occurring. This snow combined with winds gusting to around 35 mph at times in the Red River Valley to produce blizzard conditions and impassable roads this past Christmas.

It took the area several days to dig out from the Christmas Blizzard of 2009, and will be a Christmas that none of us will soon forget, as Santa had plenty of snow for the sled this past year!



A rough depiction of snow totals from the Christmas Blizzard.

We need your weather stories and pictures!

Want a chance at sharing your weather story or picture in future newsletters?

If you are interested, then please send your weather story/picture(s) to Geoffrey Grochocinski at the Grand Forks, ND National Weather Service by email or mail:

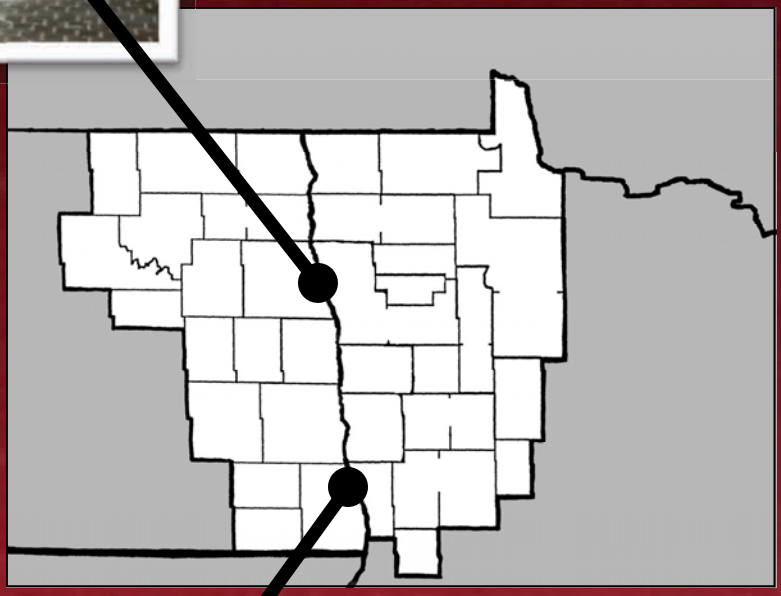
Geoffrey.Grochocinski@noaa.gov

or

National Weather Service
4797 Technology Circle
Grand Forks, ND 58203

- **Greater preference will be given to story/photo(s) originating within our county warning area of eastern ND and the northwestern quarter of MN.**
- **Please be as detailed as possible (provide a title, the name of the author/ photographer, where, when, and so forth).**
- **If your story or photo does not fit the theme of the next newsletter (Spring, for instance), do not despair! It will be saved for the next appropriately themed Northern Exposure.**

"Blizzard Ali"
Grand Forks, ND
Dec 14, 2008
taken by Crystal Ann



"Sun Coming Up"
Near Abercrombie, ND
Dec 27, 2009
taken by Faylin Myhre

The Grand Forks NWS Staff

MIC (Meteorologist in Charge)	Mark Frazier
SOO (Science Operations Officer)	Bradley Bramer
WCM (Warning Coordinator Meteorologist)	Greg Gust
ESA (Electronic Systems Analyst)	Michael Lukasz
DAPM (Data Acquisition Program Manager)	Mark Ewens
SH (Service Hydrologist)	Michael Lukes
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Lead Forecaster	Nancy Godon
Lead Forecaster	Dan Riddle
Lead Forecaster	Al Voelker
Lead Forecaster	David Kellenbenz
Lead Forecaster	Tommy Grafenauer
Forecaster	Vince Godon
Forecaster	John Hoppes
Forecaster	Peter Rogers
Forecaster	Peter Speicher
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Intern Meteorologist	Bradley Hopkins
Intern Meteorologist	Jim Kaiser
Hydrometeorological Technician	William Barrett
Electronic Technician	Ed Schulz
Electronic Technician	David Masterson
SCEP	Amanda Homann
SCEP	Vanessa Pearce

Feel free to make suggestions to Editor Geoffrey Grochocinski

Geoffrey.Grochocinski@noaa.gov

"Orion over Trees"
Baudette, MN February 4, 2006
taken by Dan Reust

National Weather Service
4797 Technology Circle
Grand Forks, ND 58203
(701) 772-0720
http://www.crh.noaa.gov/fgf/