Northern Exposure

National Weather Service
Grand Forks, ND

Summer 2009

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When Thunder Roars, Go Indoors

by David Kellenbenz

Summer is the peak season for one of the nation's deadliest weather phenomena — lightning. But don't be fooled, lightning strikes year round. An average of 62 people per year are killed in the United States by lightning, with an additional 340 survivors that suffer from devastating and permanent disabilities. The National Weather Service studies lightning fatalities in order to know where to best target its lightning education efforts. For example, men are struck far more often than women, sustaining about 85 percent of lightning deaths. And men under 40 account for 60 percent of all lightning fatalities.

The National Oceanic and Atmospheric Administration (NOAA) collects information on weather-related deaths to learn how to prevent these tragedies. Many lightning victims say they were "caught" outside in the storm and couldn't get to a safe place, but proper planning can prevent these tragedies. Other victims waited too long before seeking shelter. The mere difference of seeking shelter 5 to 10 minutes sooner could have helped those victims avoid those lightning strikes.

A nice lightning photo taken by Kevin Skow

Some people were struck because they went back outside too soon. Stay inside a safe building or vehicle for at least 30 minutes after you hear the last thunder clap. Finally, some victims were struck inside homes or buildings while they were using electrical equipment or corded phones. Others were in contact with plumbing, a metal door or a window frame. Avoid contact with these electrical conductors when a thunderstorm is nearby!

All thunderstorms produce lightning and are dangerous. In the United States, in an average year, lightning kills about the same number of people as tornadoes and more people than hurricanes. Lightning often strikes outside the area of heavy rain and may strike as far as 10 miles from any rainfall. Many lightning deaths occur ahead of storms or after storms have seemingly passed. If you can hear thunder, you are in danger. Don't be fooled by blue skies. If you hear thunder, lightning is close enough to pose an immediate threat.

Sources of additional lightning information:

http://www.lightningsafety.noaa.gov/

http://www.weather.gov/os/lightning/pdfs/lightning-safety.pdf

"If the thunder is not loud enough, the peasant forgets to cross himself." ~ Russian proverb

Volunteerism Alive and Well at WFO FGF

by "Wild" Bill Barrett

Lanae Preuss, our newest student volunteer at the Grand Forks National Weather Service Office, is a Moorhead native and is studying meteorology at Valparaiso University in Valparaiso, IN. Two Friday evenings ago, June 26th, as storm clouds swirled about portending a busy night ahead, Lanae requested to drive in from Moorhead to provide assistance during the impending storm situation. During the severe operations, it quickly became evident to this observer that Lanae possessed three qualities very much appreciated by our operation: unsolicited willingness to help, assertiveness, and competence.

Despite her limited experience working severe weather operations, Lanae was able to, with a minimum of intervention/supervision, clearly and confidently broadcast warning information and receive storm reports via NAWAS (National Warning System). In addition, she demonstrated the ability to manipulate text products and quickly disseminate storm reports using the Local Storm Data interface.

I think we need to recognize this kind of service as frequently as we can. Here, we've briefly pointed out the merits of a particular individual's performance on a specific evening, but this is just one example of the quality work done regularly by dedicated student SCEPs (hired interns) and volunteers. This includes those presently on board as well as the people that have worked these roles in the past and moved on to successful professional careers.

New Employee: Vanessa Pearce SCEP

Vanessa Pearce is a new SCEP (Student Career Experience Program) at the Grand Forks National Weather Service Office and is from Maple Grove, MN. According to a neighbor, Vanessa was able to name all the television meteorologists at the age of 18 months. Her love of weather continued on through her youth as she turned any school project into something weather related if at all possible. In 5th grade, she was required to take a small object and make it much larger, so she constructed a 4 foot tall raindrop. This love of weather has followed her through the years, and she will be in her last semester at the University of North Dakota this fall in Atmospheric Sciences and Spanish. She wants to use her two majors to help the communities of the United States understand the hazards of weather. Her goal is to discover the ways the public responds to the current watch/warning system and find a way to better alert them. "The reason the weather is put out everyday is for the public. Watches and warnings are important ways that the National Weather Service informs them of hazards thus it is vital that they understand the message," Vanessa stated.

New Employee: David Masterson Electronics Technician

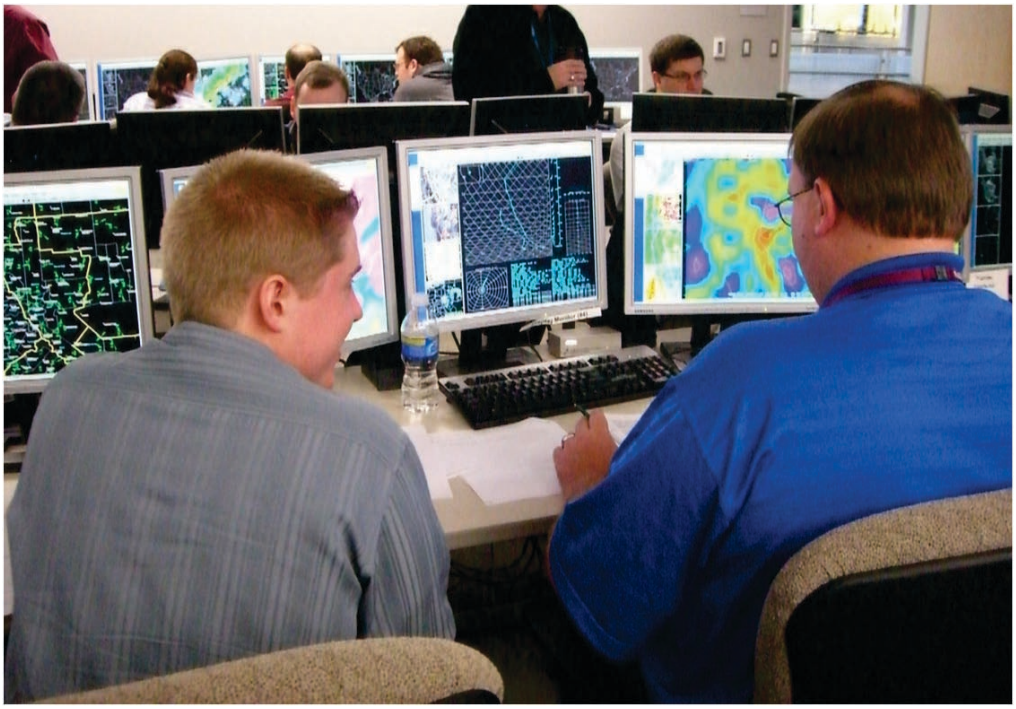
Dave Masterson is a new Electronics Technician at the Grand Forks National Weather Service Office. He is married, has two young sons, and has lived in the Grand Forks area for seven years. He is a Key West (conch) native, and also spent a number of years in Virginia where he went to High School. Dave is retired from the Air Force where he was an Integrated Avionics System Technician. He worked electronics systems on F-4, A-7, F-117, and F-16 fighter aircraft. He also served as a First Sergeant for six different organizations over his last years in the Air Force. He has an associate degree in Avionics System Technology and B.S. degree in Human Resources Management. Dave likes bike riding, fishing, doing anything with his family, and would like to get back into hunting. Before joining the office he spent the last year and a half working for a company that does inventories for retail stores. He looks forward to being part of the team.

Ready to Warn!

by Geoffrey Grochocinski

Meteorology is an infant science (and part art) that is ever evolving and can take many years of practice to develop useful skill. Most recent graduates of atmospheric science rarely have the full knowledge or skill to meet the public's high expectations of quality forecasts and warnings. Rather, a meteorology degree should be seen as a ticket to a lifetime of learning. An important mission of the National Weather Service (NWS) is to provide severe thunderstorm and tornado warnings, and the science and art of radar interpretation is too complex (in needed time, equipment, and data) to be adequately covered in most B.S. programs. Every new NWS meteorologist must complete radar interpretation and warning operations training before issuing convective warnings (severe thunderstorm and tornado warnings). The annual Distance Learning Operations Course (DLOC) is hosted by the Warning Decision Training Branch (WDTB) at the Weather Center in Norman, OK. It involves plenty of bookwork, computer modules, teletraining, and a one-week trip to Norman for final training. My November 2007 arrival to the Grand Forks NWS office was too late to allow me to participate in DLOC 2007/2008, and I was therefore unable to warn for thunderstorms or tornadoes last summer. However, I am now capable of issuing warnings this spring and summer after finishing DLOC 2008/2009 this past February.

The trip to Oklahoma was a great opportunity to befriend fellow NWS colleagues from across the nation. The 20 or so meteorologists in my group included men and women stationed as far as the remote reaches of Alaska to the paradise of Key West, as well as some former friends of mine from college and my previous private sector experience. The course provided me new tools and strategies to improve my forecasting and warning skills, and NSSL (National Severe Storms Laboratory) provided a sneak peak to upcoming technology 5 to 20 years down the road. However, the primary goals of my week were teamwork and performing simulated severe weather scenarios. And hey, it was great to get an early taste of spring-like weather after a cold North Dakota winter!



My DLOC friend and teammate Wes (right) and I (left) prepare for another severe thunderstorm scenario at the Weather Center in Norman, OK.

Tornado Safety on the Road

by Chauncy Schultz

Have you ever seen the dramatic video of a Kansas television crew riding out the fury of a tornado underneath an overpass bridge? Many of you probably have since the April 26th, 1991 tornado outbreak popularized the video. But, is it true – are highway overpasses a safe place to shelter from a tornado? The short answer is absolutely not. In fact, the truth is the exact opposite. In many instances, overpasses can actually be more dangerous as they could funnel and even strengthen the wind blowing through them. The Kansas story was very unique, for many reasons. One of the main ones is that the overpass the people in the video used to shelter under was actually designed much differently than most. Overpasses usually do not have small "crawl spaces" up underneath them like the Kansas one did. Perhaps just as important was the fact that the Kansas overpass didn't take a direct hit from the tornado, but only encountered its weaker fringe.

Deadly flying debris can be blasted between an overpass and the road. Many people have been killed in tornadoes by flying projectiles. When it comes right down to it, overpasses offer absolutely no protection. Unfortunately, cars are just as unsafe! Vehicles are tossed like toys in tornado winds. So, if you're driving, where do you go in the event of a tornado? Either leave your vehicle for a sturdy shelter, or drive out of the tornadoes path. In open country, where no buildings are nearby to serve as shelter, the only option may be to escape if the tornado is far away. Watch the tornado for a few seconds and compare its movement to a stationary object like a tree. If the tornado appears to move right or left of the object, it is moving away from you. In that case, drive away from the tornado, at right angles to its movement, putting as much space between you and it as possible. If you watch the tornado and it appears to stay in the same place while growing larger, it's probably moving right toward you. In that case, you need to get out of the way fast, or as a last resort, lie flat in a low spot like a ditch as far away from the road as possible.

Finally, what if you hear a tornado warning while traveling, but don't see one? It could be that the twister is hidden by curtains of rain or hail, or that it hasn't formed yet – the warning could be based on Doppler radar indications of its formation. The best course of action in that event is to stop and wait for the storm to pass in a sturdy building like a gas station. In all cases, the key to staying tornado safe while traveling in the summer is to keep aware of your surroundings by checking the forecasts before heading out, and tuning to local radio stations if the sky turns dark.

Vehicles are unsafe as shelter during a tornado. Take a good look at what happened to the vehicle above after the Northwood, ND EF4 tornado on August 26, 2007. Do you want to be inside your vehicle if it's about to become a missle.

2009: 90 Years Since the Fergus Falls F5 Tornado

by Geoffrey Grochocinski

"A giant menacing funnel moving northeast dipped out of the clouds to claw the earth." ~ Lance E. Johnson (author of The Great Fergus Falls, Minnesota Cyclone of June 22, 1919)

Fig. 1[1]: Destruction along the Otter Tail River in Fergus Falls, MN.

North Dakota and northern Minnesota are by no means within the heart of Tornado Alley, such as Oklahoma, but the north central United States has its fair share of tornadoes. However, only two known exceedingly destructive F5 tornadoes have struck the County Warning Area (CWA) covering eastern North Dakota, northwest and west central Minnesota, served by the Grand Forks National Weather Service (NWS) Office. The 1957 Fargo F5 tornado is the better known case, which was actually one of the tornadoes Dr. Fujita used to develop the F scale. Fargo commemorated its 50th anniversary of that infamous tornado just a couple years ago. A lesser known and even more deadly F5 tornado struck Fergus Falls, MN in 1919, and Fergus Falls recently commemorated its 90th anniversary this past June 22nd.

Most people during the summer of 1919 were likely thinking about the recent ending to World War I, the War to End All Wars. Many Minnesotans were probably striving for some sense of normalcy, and mentally and emotionally occupied by the recent global Influenza outbreak. Weather

data and forecasts at the time were nothing like the modern equivalents. The Weather Bureau, the predecessor to the NWS, mainly focused on the big picture; the location and strength of large low and high pressure systems. Some success had been made in providing a general heads up to approaching large scale storms (such as with blizzards and hurricanes), but means of communication were lacking in speed and efficiency. Morse Code, telegraphs, and newspapers still ruled the day, with telephones and radio being recent inventions. Weather Bureau personnel in 1919 did not have anywhere near the understanding that current NWS meteorologists' have today. And with no radar at the time, the Weather Bureau was basically powerless to monitor or warn for twisters, and Fergus Falls was about to get an unfortunate reminder.

June 22, 1919 was a hot and humid Sunday at Fergus Falls, a big for its time rural Minnesota town of about 12,000 people. In fact, there were a lot of complaints about the heat during the week of June 16th.[2] A low pressure system set up near Fargo, and by mid afternoon a warm front likely stretched from southeastern North Dakota to southern Minnesota based off the available information from a 6 p.m. weather map (Fig. 2). Thunderstorms developed during the afternoon along and/or ahead of the warm front, and a powerful supercell thunderstorm struck the Fergus Falls area around or shortly after 4:30 p.m. Lance E. Johnson provides a good description of the events that took place that late afternoon in his book <u>The Great Fergus Falls, Minnesota Cyclone of June 22, 1919</u>.

The Oriental Limited train northwest bound on the Great Northern Railway towards Fargo/Moorhead was about 2 miles northwest of Fergus Falls between 4:30 and 4:40 p.m. when passengers dashed to the sides to see a rope-shaped waterspout moving along the Pelican River.[4] The train

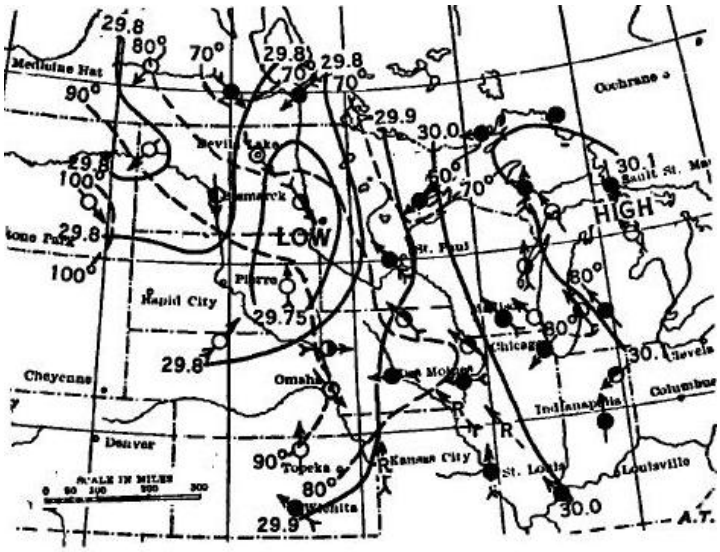


Fig. 2[1]: A surface weather map analysis of 6 p.m. on June 22, 1919 shows a low pressure system across the eastern Dakotas with a warm front just south of Fergus Falls, MN .

was shortly thereafter struck by another rope-shaped tornado which derailed some of the cars. Luckily, only a few people were injured.

Heavy rain followed by hail the size of baseballs fell upon a darkened Fergus Falls around 4:40 p.m. Farmers outside the city watched as boiling black clouds that looked like smoke from a hundred oil well fires continued a descent and journey towards Fergus Falls.

The sky then suddenly dropped upon Fergus Falls near Summit Avenue and Vine Street and as Johnson writes "A giant menacing funnel moving northeast dipped out of the clouds to claw the earth."[4] The tornado quickly moved northeast through the Lake Alice District, tearing apart homes and dumping debris into the lake before retreating back into the clouds.[4] Moments later at about 4:50 p.m. a second larger and more terrifying tornado with a width of over 840 feet dropped to the ground on the north side of town near Vine and Union just south of the State Hospital.[4] The tornado pushed south through the heavily residential area, eventually reaching a width of about

1200 feet, and according to Johnson seemed "as if guided by some remote control to do the greatest amount of damage imaginable."[4] The tornado thereafter veered to the south-southeast towards and through the business district and gradually narrowed its width. The twister exited the south-eastern part of town narrow and rope-shaped before dissipating.

The tornado ravaged Fergus Falls and killed about 56 people. The tornado still stands as Minnesota's second deadliest tornado on record. The Northern Pacific rail depot, county jail, four churches, Grand Hotel, and Otter Tail County Courthouse were destroyed. The town also lost 159 homes, with another 194 receiving 25 to 75 percent damage.[2] A graphic shows the wide path the tornado took through the town (Fig. 3).

Sources

1. Brooks, C. F., 1919: Tornado at Fergus Falls, Minn., June 22, 1919. *Mon. Wea. Rev.*, 47, 392-393.

2. Hintgen, Tom. "A Giant Menacing Funnel." Fergus Falls Daily Journal 21 Jun. 2009.

3. Huey, Pamela, 1999. "The Day that Shook Fergus Falls." Fargo Forum 22 Nov. 1999.

4. Johnson, Lance E. The Great Fergus Falls, Minnesota Cyclone of June 22, 1919. Fergus Falls, MN: Victor Lundeen Company, 1996.

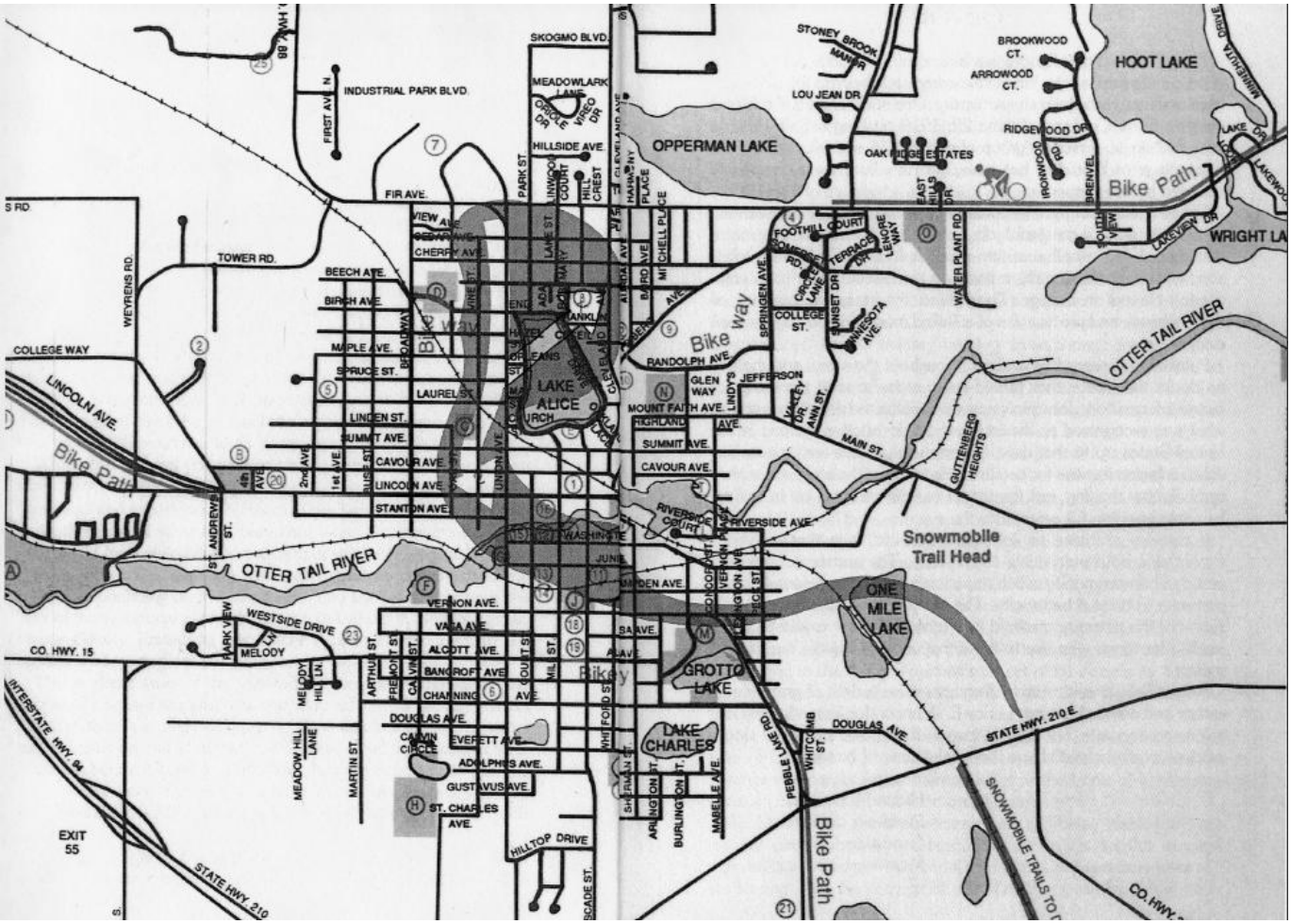


Fig. 3[4]: A graphic depicting the path of the tornado (in dark grey) through Fergus Falls, MN.

Anatomy of the Flood

by David Kellenbenz

Record Fall precipitation in 2008 set the stage for record flooding in the Spring of 2009 in the Red River Valley. Grand Forks received 11.97 inches of rain from Sep-Nov, which broke the old record of 10.41 inches set in 1957, and Fargo similarly broke its 1977 Sep-Nov rainfall record after receiving 10.67 inches. Plenty of snow also fell during the 2008-2009 winter season, and a fairly deep snow pack developed, especially in the southern Red River valley, Devils Lake basin and Sheyenne River basins.

The first crest occurred in late March after several significant storms, including an early March blizzard and a mid March heavy rainstorm, added ample moisture to an already saturated river system. Fargo's first crest of 40.82 feet on 3/28/09 set an all-time record. A NASA satellite image (Fig. 1) shows just how swollen the Red River was at Fargo/Moorhead on March 28, 2009. Another crest occurred in early-mid April, with the Sheyenne River Basin seeing the largest response and record flooding at Lisbon and Valley City. An unusually dry pattern for most of April spared Fargo and produced a second crest much lower in comparison to the first crest. A hydrograph (Fig. 2) depicts the evolution of the Red River's level over the course of the spring.

The Grand Forks National Weather Service (NWS) is responsible for 32 total river forecast points. Out of these sites, 7 forecast points (Fargo, Oslo, High Landing, Valley City, Lisbon, Hillsboro and Abercrombie broke all time records,

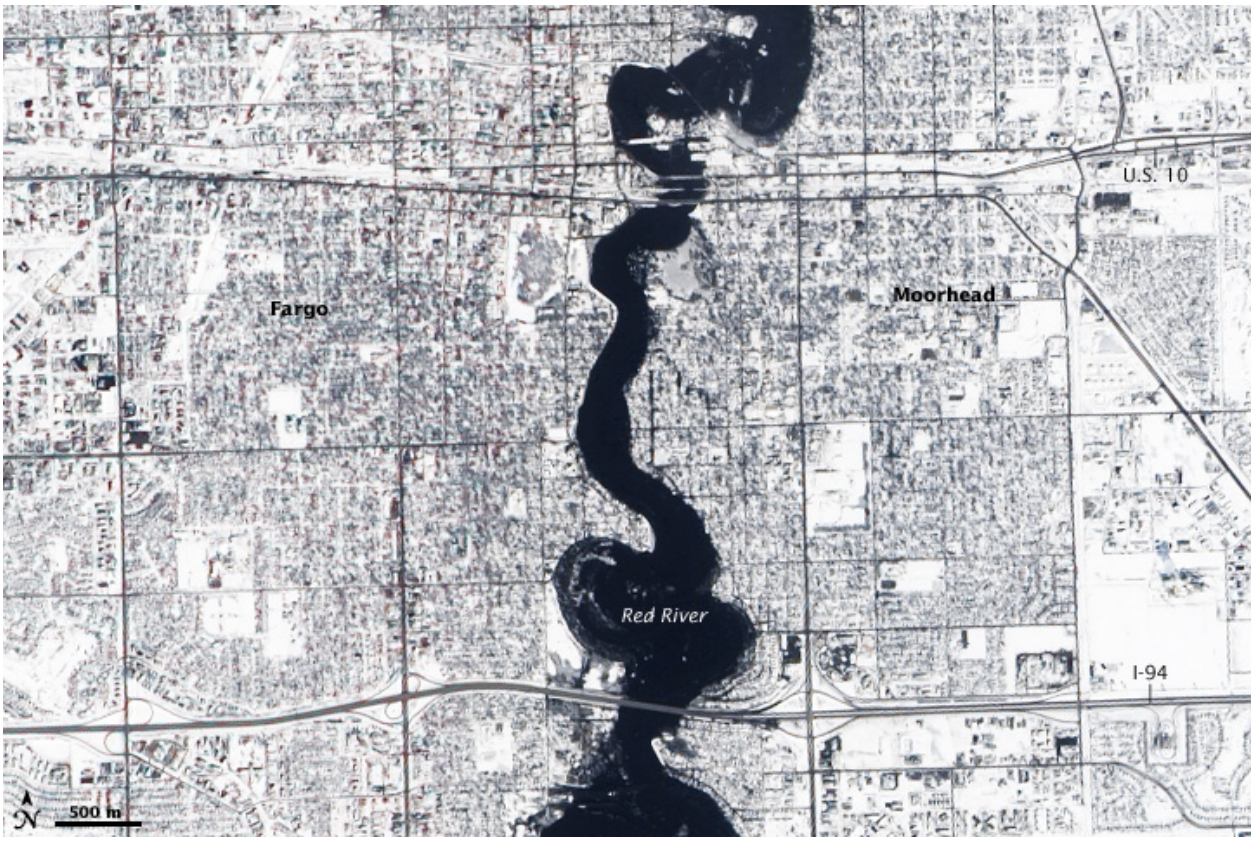


Fig. 1: A March 28, 2009 NASA satellite image shows the swollen Red River at Fargo/Moorhead.

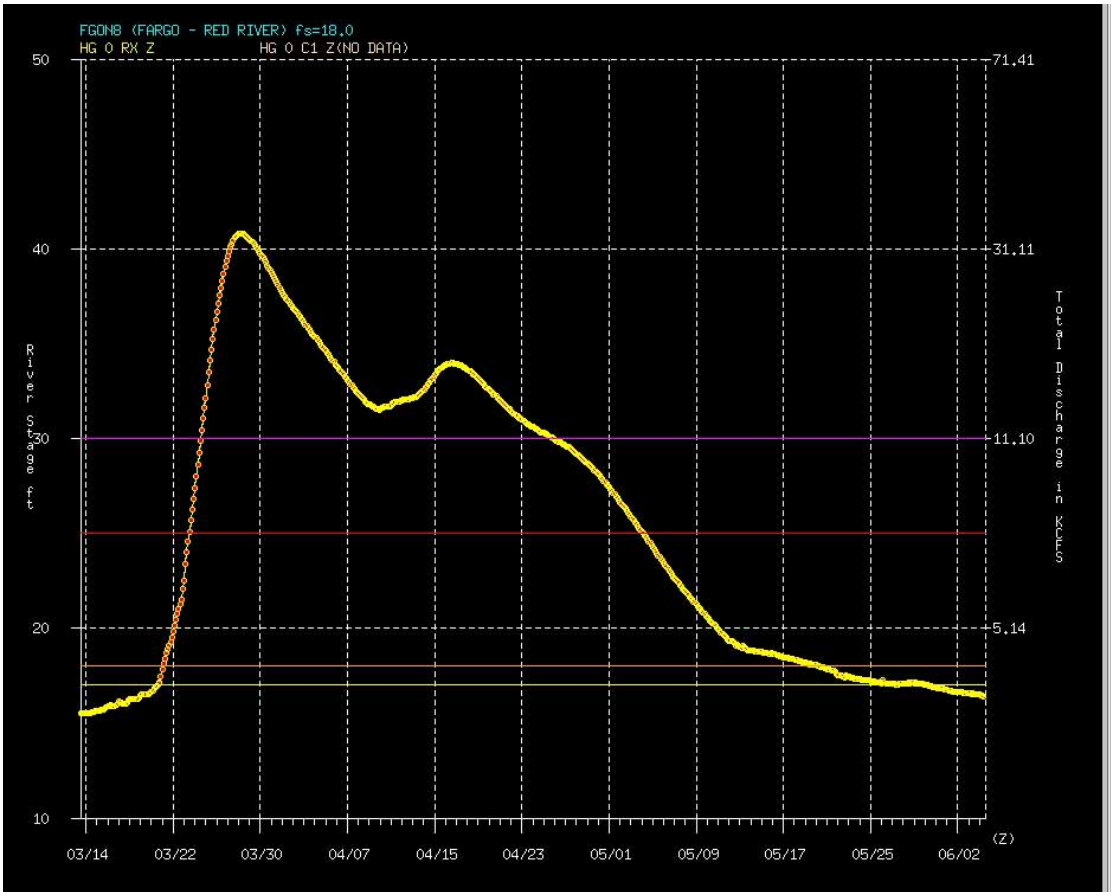


Fig. 2: A hydrograph depicts the two crests of the Red River level at Fargo/ Moorhead during this past spring's record flooding.

Record or 22% of the forecast points. Major flooding was recorded at 16 forecast points, or 50% of all points, moderate flooding occurred at 8 points or 25% of all points. Therefore, 97% of all river forecast points reached moderate flood stage or higher during the Spring 2009 flood event, and 72% of forecast points reached major to record flood stage. There were at least 3,000 Flood Statements (FLS) issued for the flood event based on best estimates.

A tremendous volume of water flowed through the Red River Valley during the 2009 spring flood. An estimated 267.12 billion cubic feet (2 trillion gallons) of water went through the Red River at Pembina. The total volume was derived from the average daily stage, converted to discharge, accumulated over the 52 days the river was in flood. Pembina was used in this simulation since it is the last point in the United States before the Red River goes into Canada and it carries the largest volume of water for any river forecast point in the area.

The Spring flood of 2009 in the Red River Valley was unique since it contained 2 spring snowmelt crests within a month. The first crest occurred in late March, then a major winter storm produced significant snow and temperatures well below normal. This caused the river system to freeze back up and return to a winter like state. This presented many challenges to forecasters both at the NWS office in Grand Forks, and the River Forecast Center (RFC) at Chanhassen, MN. Reviews of this record flood event are ongoing, and will enable the NWS to perform even better during our next flood season.

The Historic 1887 Grand Forks Tornado

by Vince and Nancy Godon and Kelly Kramlich

Have you ever heard the comment "The city of Grand Forks has never been hit by a tornado?" Have you heard the saying that "A tornado will never hit an area that has a fork in a river?" If you answered "yes" to either of these two questions, you would be wrong. In the modern history of Grand Forks, which dates back to the 1880s, tornadoes have hit the Grand Forks area. As recently as May 20, 2005, an F1 tornado brushed the King's Walk area of south Grand Forks, and blew around some lawn furniture. Going back over 100 years ago, to June 16, 1887, a much stronger tornado tracked through the frontier towns of Grand Forks and East Grand Forks.

Several current and former staff members of the National Weather Service Office in Grand Forks, ND, are investigating this 1887 tornado. There are many challenges to this undertaking. It is almost like an episode of CSI (Crime Scene Investigations), in that there are still many clues available, but they are not easy to find. There has never been a thorough investigation of the facts of June 16, 1887, and for the most part, this has been a forgotten event in the history of this region. The investigators hope to piece together a good account of the events on and around June 16th to provide an accurate historical record for the future.

Where do you even start looking for information from over a hundred years ago? The authors looked for personal diaries, census records, city maps, city directories, and newspaper accounts. The most logical sources for this type of information are historical societies and libraries. Multiple trips were made to the Minnesota and North Dakota Historical Societies, the Chester Fritz Library at UND, and the Grand Forks Public Library, to glean over the information at each location. Newspapers were the primary source of information, and about 20 individual newspapers were located, including the *Grand Forks Daily Herald*, the *Jamestown Alert*, and the *Larimore Pioneer*. All these newspapers can still be found on microfilm, even from 1887.

It was also important to get a picture of what the Grand Forks area looked like back in June 1887. The population was estimated to be around 6,000 people at the time, and they all lived near to what we now consider the downtown area. There was virtually nothing west of Washington Street, other than the University of North Dakota's Main Building. The local economy at the time was driven by agriculture, much like it is now. The local newspapers even defined river flooding and street conditions as two of the more persistent problems which plagued the city. Has this changed in the 100+ years since? Construction methods in 1887 were definitely not as good as they are today. Some of the homes built back in 1887 were thrown up in a matter of days, which made a tornado event much more devastating back then.

June 16, 1887 was a hot, muggy day. The tornado touched down around 3 p.m. about 7.5 miles west-southwest of downtown Grand Forks (Fig. 1), first destroying some farm houses and farm buildings (Damage Point 1). The tornado then hit the University of North Dakota's Main Building (Damage Point 3), knocking down several brick walls. From this point, the tornado struck the city of Grand Forks, destroying multiple homes and buildings, and killing two people. As the tornado hit East Grand Forks, it also destroyed several buildings and killed another person. The tornado continued

on to the east-northeast, wiping out several farms along the way, and killing two more people. Overall, five people were killed and about 75 people were injured.

What were some of the interesting facts about this tornado? First, people in 1887 thought tornadoes could not occur this far north. It was thought that the northward boundary for tornadoes stopped at southern Minnesota and southern South Dakota. Another interesting fact is that a typical wedge shaped "tornado" was never seen. It was likely that the tornado was masked by other clouds, rain, or dirt and debris. Therefore, the tornado was considered a straight line wind event. Finally, people bound together, just like they did during the devastating 1996-97 Red River spring flood, and found a way to recover.

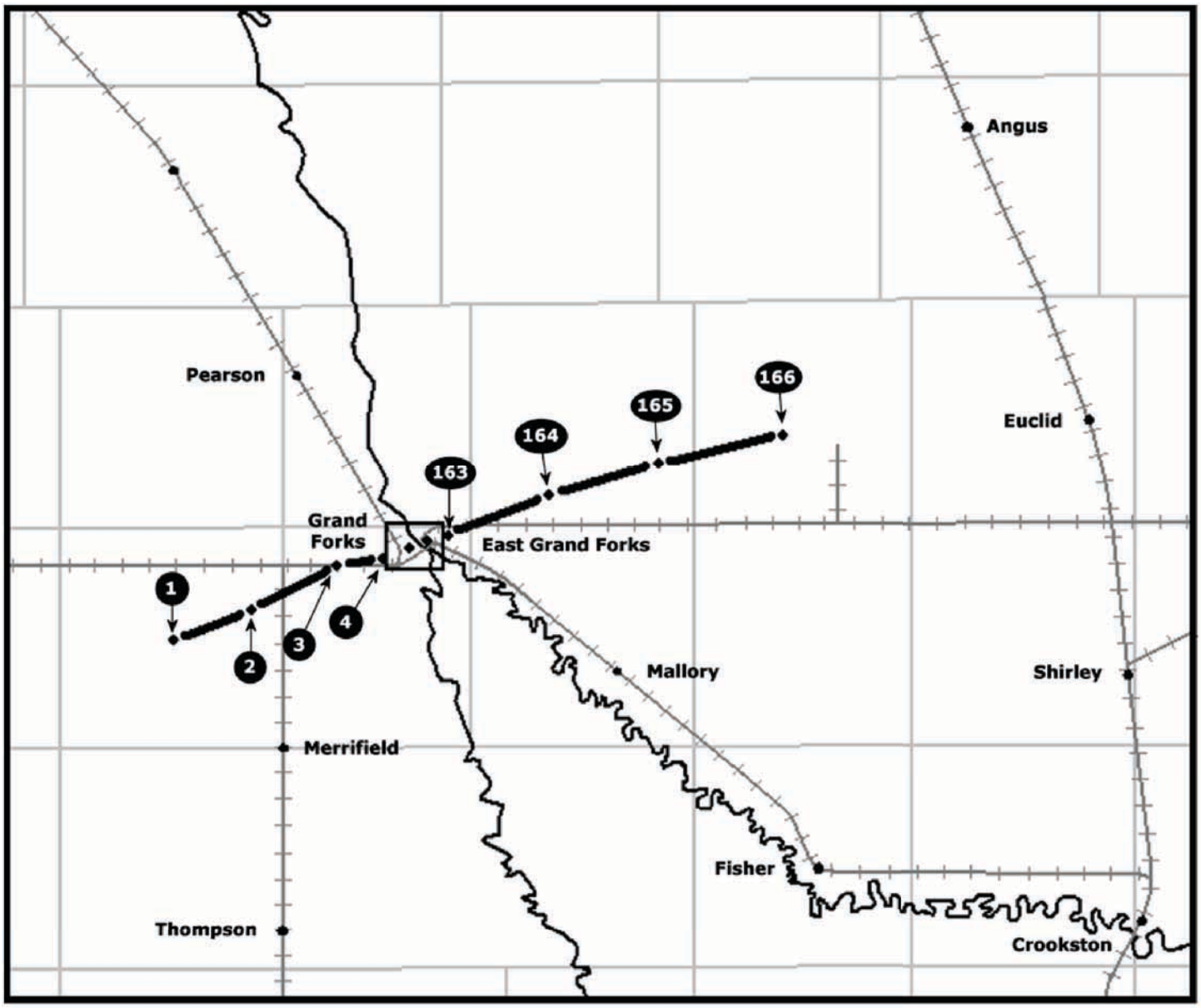
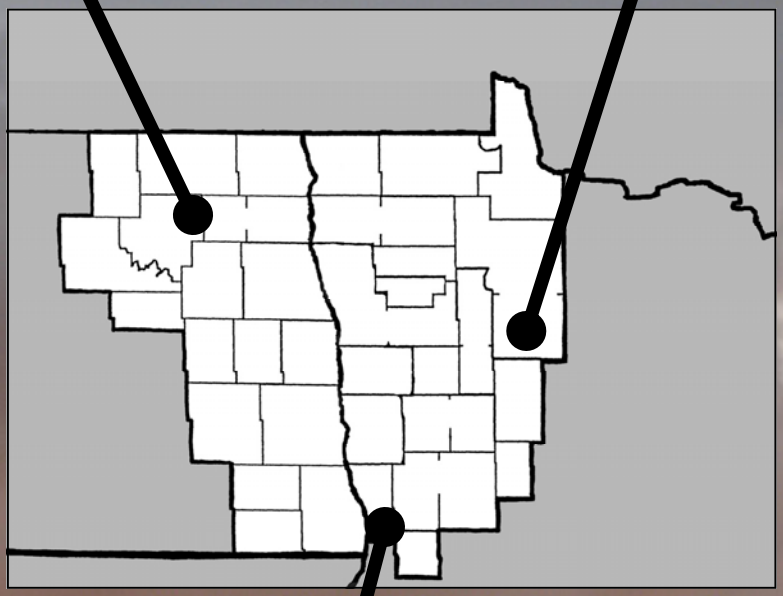


Fig. 1: The path the June 16, 1887 tornado took through the Grand Forks and East Grand Forks area.

"Destination Spring"
Lawton, ND Spring 2008
taken by Edy Lorenz

"Downtown Bemidji"
Bemidji, MN June 9, 2007
taken by D. Bjorn



"Campbell Funnel Cloud"
South of Campbell, MN June 17, 2009
taken by Eric Whitehill

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:

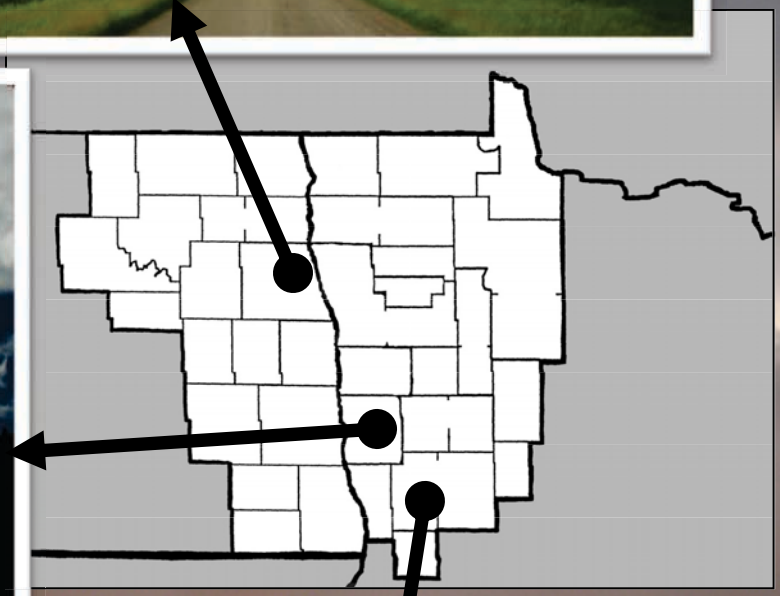
Geoffrey.Grochocinski@noaa.gov

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.**

"Larimore Tornado"
Larimore, ND
June 25, 2009
taken by Justin Turcotte



"Summer Clouds"
Cass County, MN June 19, 2008
taken by D. Bjorn

"Fergus Shelf Cloud"
Near Fergus Falls, MN June 18, 2009
taken by Makayla Revering

The Grand Forks NWS Staff

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Lead Forecaster	Dan Riddle
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Lead Forecaster	David Kellenbenz
Lead Forecaster	Tommy Grafenauer
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Intern Meteorologist	Bradley Hopkins
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Hydrometeorological Technician	William Barrett
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Feel free to make suggestions to Editor Geoffrey Grochocinski
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Theme Picture: Nice Color Gradient
Fargo, ND August 22, 2008
taken by S. Nazari

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