NATIONAL WEATHER SERVICE

Summer 2011

The Dakota Thunder

Inside this issue:

Welcome Message 1

Why are there three rainfall networks in North Dakota? 1

History of the COOP network in North Dakota 2

History of the ARBCON network in North Dakota 2

History of the CoCoRaHS network in North Dakota 3

Hail and Significant Weather Reporting Features 3

Record flooding in the Souris River Basin 4

Major flooding along the Missouri River Basin 5

Meet a McKenzie county observer 5

Meet a Cass county observer 6

Welcome Message

By: Tony Merriman

It is with great excitement to introduce the first ever North Dakota state CoCoRaHS newsletter! The purpose of this publication is to keep North Dakota residents informed about the latest weather events in the state and how observers like you assist the National Weather Service (NWS) create better river and weather forecasts.

This newsletter will be issued twice a year, one in the summer and one in the winter. The content is truly a team effort and is produced by a team of North Dakota CoCoRaHS coordinators.

If you have any requests for information you would like to see in the winter edition of this newsletter, please email me at

Tony.Merriman@noaa.gov.

Thanks again for being great weather observers!

The 4-inch rain gauge required to participate in the program

Why are there three rainfall networks in North Dakota?

By: Tony Merriman

(Source: CoCoRaHS)

Precipitation networks have been the foundation for a countless number of commercial and public safety decisions since the late 1800s.

The National Weather Service formalized the Cooperative Observer Program (COOP) in 1890 with the passage of the Organic Act. Its purpose is to define the U.S. climate and measure long-term temperature and precipitation trends. There are currently around 180 COOP observers in the state of North Dakota.

Since precipitation is highly variable (see left image), there was a need for a higher density rainfall network in North Dakota. The Atmospheric Resource Board's Cooperative Observing Network (ARBCON) was formally established in 1976 and began reporting in 1977, mainly to support agricultural interests during the growing season. There are currently around 800 ARBCON observers in North Dakota.

The Community Collaborative Rain, Hail, and Snow Network (CoCoRaHS) came to North Dakota in November 2008 to add to the national network of volunteer backyard precipitation observers. The CoCoRaHS network now encompasses the entire United States. Its purpose is to provide high quality and timely precipitation data to observers and decision makers. There are currently 142 active observers in North Dakota.

Even though all three networks have subtle differences in their purposes, they all work together to create high density, high quality precipitation data used for river forecast and water management decisions.

History of the COOP network in North Dakota

By: Mark Ewens

Some of the earliest records of weather in the State are actually hand written journals by explorer Pierre Bottineau. In the 1860s, Bottineau wrote of the waters that would later be named Spirit Lake, describing vast expanses of flooded lands. Around the same time, the U. S. Army was recording weather observations 3 times a day at Fort Abercrombie along the Red River south of Fargo. Typically, these observations were of temperature and precipitation, but written in a journal format.

It wasn't until the 1870s and 1880s that weather observing became more practiced. In 1875, regular observations began in the Bismarck area and a few years later in the Jamestown, Fargo, and Grand Forks areas. By the start of the 20th century, regular daily observations were being recorded in dozens of cities across the Peace Garden State. Cooperative Weather Observers operate at many locations in our State, helping us to predict the weather and monitor our changing climate. The successful 130-year-old program provides the nation with a cost-effective way to collect weather data for immediate forecasting needs and longer-term national, regional and local climate outlooks.

(Source: NOAA)

The 8-inch standard rain gauge (SRG) used in the COOP network

History of the ARBCON network in North Dakota

By: Darin Langerud

The Atmospheric Resource Board's Cooperative Observer Network (ARBCON) was formally established in 1976 and began reporting in 1977. Over the course of 35 years, between 600 and 1,000 people have volunteered annually, providing valuable information about North Dakota's growing season rainfall and hail patterns. Over 100 of our volunteers have actively reported for 30 years or more!

Volunteers are issued a rain gauge and provided with detailed gauge siting and reporting instructions. Many continue to report monthly using postage-paid reporting cards, but nearly 200 observers now report online through ARB's Internet website.

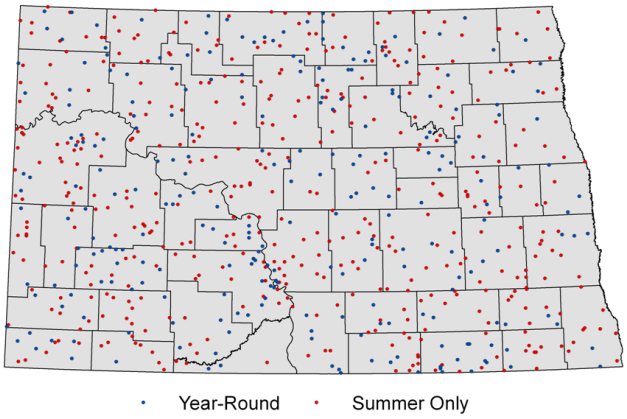
Last fall, in response to greater need for high-density snow data, ARBCON began year-round reporting, with more than 250 of its observers volunteering to make snowpack and snowfall measurements. Volunteers were issued 4-inch diameter gauges for snow reporting. The ARB will convert the entire network to the 4-inch gauges - the same used by CoCoRaHS - by 2012. The additional snow data helped improve forecasts for spring flooding across the state.

Data reported by ARBCON volunteers can be accessed directly through ARB's website at http://www.swc.nd.gov/arb. Those interested can find daily and monthly reports, monthly and seasonal gridded statewide precipitation maps, and tools that allow the user to view graphical displays of daily or multi-day precipitation values, hail observations, and snowfall and snowpack reports. Data for an individual location, county, or the entire state can also be downloaded directly from ARB's database for additional use.

ARBCON also has a long-standing relationship with the state's National Weather Service (NWS) offices in Bismarck and Grand Forks. Observers are asked to report daily rainfall amounts greater than one inch and other severe weather reports to the NWS to assist with forecasting and determining the extent of severe weather events. Many federal and state agencies, universities, private companies and the public at-large also benefit from ARBCON reporting.

Thanks to our thousands of volunteers, ARBCON has and will continue to be an effective partner in observing and reporting North Dakota's precipitation, one of its most valuable resources.

2011 ARBCON SITES



ARBCON observer locations.
"Summer only" sites report April through September.

History of the CoCoRaHS network in North Dakota

By: Adnan Akyüz

CoCoRaHS (Community Collaborative Rain, Hail and Snow Network) originated at the Colorado Climate Center at Colorado State University in 1998 after the Fort Collins flood in 1997. The flood created a compelling need to develop a network of precipitation recording stations at a much higher resolution. The founder of CoCoRaHS is the current Colorado State Climatologist, Nolan Doesken. When the network started, it was meant to only serve the state of Colorado. In fact, the first two letters of the network "Co" was the acronym for "Colorado" at that time. Soon, other states bordering Colorado realized the benefit and showed interest in joining the network. Soon, CoCoRaHS become a network of national volunteer observers who have one common interest; a passion for observing precipitation. The acronym for Colorado transitioned into "Community" with more and more states becoming a part of this community network. Today, all 50 states are a part of CoCoRaHS with nearly 15,000 active observers reporting local precipitation records daily.

North Dakota joined the network in November 2008 as the 37th member of the network. The state coordinators Adnan Akyüz (ND State Climatologist and the director of NDAWN network) and Darin Langerud (the director of the ARBCON network) discussed the logistics with the CoCoRaHS headquarters prior to admission to the network. Mark Ewens, NWS in Grand Forks, Len Peterson, NWS in Bismarck, and Richard Krolak, NWS in Williston took regional leadership to coordinate local administration. Then, Tony Merriman (also a CoCoRaHS coordinator from Texas) assumed the sole regional leadership in Bismarck after Len retired. Tony brings a great deal of coordination experience from his active involvement in Texas (5th state admitted to the network) since 2005. Contact information of the North Dakota local coordinators are listed at the following link: http://www.cocorahs.org/state.aspx?state=nd

North Dakota has 142 active volunteer observers representing 32 counties. CoCoRaHS Headquarters in Fort Collins coordinates various recruiting events nationally. The March Madness competition is designed to reward one state per year for recruiting the most observers in March. North Dakota was the winner of the National March Madness Competition in 2009 for recruiting the most observers (weighted for the population of the states) in March 2009. The cup is given to the state to keep for one full year, then is passed on to the next winner the following year.

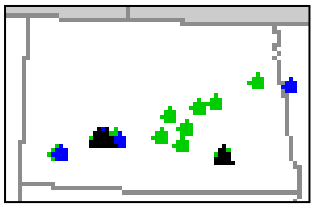
(Source: Colorado State University)

Nolan Doesken thoroughly enjoys taking rainfall observations for CoCoRaHS

"North Dakota was the winner of the National March Madness competition in 2009."

Hail and Significant Weather Reporting Features

By: Tony Merriman



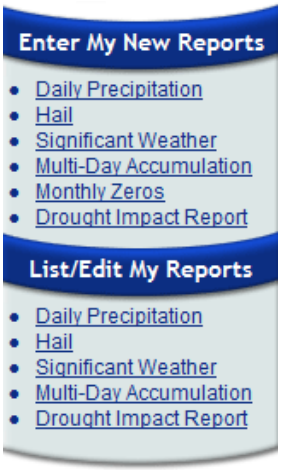
(Source: NOAA)

Storm reports from July 24, 2011. The green markers indicate severe hail reports

Many areas of North Dakota experienced hail on July 24, 2011. It was because of real-time reports from observers like you that provided National Weather Service (NWS) warning forecasters with accurate and timely information. An observer in Burleigh County in particular effectively utilized the "hail" reporting feature on July 24 to notify the NWS forecasters of the hail size falling at his house. This extremely valuable information was incorporated into subsequent severe thunderstorm warnings and statements, which alerted the affected residents of the size of hail they could expect.

The "significant weather" reporting feature can be used to report heavy rainfall or snowfall. Observers can also report the impacts from these events, such as water over the roadways due to flash flooding.

We really appreciate your daily reports. Your timely severe weather reports help us at the National Weather Service better accomplish our mission of protecting life and property.



After you log in, click on the "hail" or "significant weather" link on the left of the page. Your report goes directly to meteorologists at the National Weather Service

Record flooding in the Souris River Basin

By: Jimmy Taeger

(Source: USGS)
Looking east on Central Ave East from 2nd St. NE in Minot

The Souris River Basin, like the Missouri and Yellowstone Basins, received abundant precipitation this past winter and spring. In addition to the heavy snowpack, the basin received substantial rainfall in the spring and summer. Storms frequented the region approximately every four to seven days, with each dropping around two to five inches of rain across a large area. Although reservoir releases were increased in February to prepare for the snow melt, late spring heavy rainfall events in southeastern Saskatchewan overcame the capacity of the reservoirs.

Many locations along the Souris River had been in flood stage for weeks as releases from Lake Darling increased in late winter to accommodate spring snow melt. Flows from Lake Darling were increased to 4.3 kcfs (thousand cubic feet per second) on April 20th, which combined with high flow in the Des Lacs River, ended up increasing river levels at the Minot Broadway Bridge to 1549.49 feet mean sea level (MSL), minor flood stage. Additional high impact rain events increased releases and river levels over the next few weeks, but it was one substantial rainfall event that ended up exceeding the flood control ability of the dams and impacted thousands of people in mid-June.

On June 19th and 20th, over five inches of rain fell in the Estevan area of Saskatchewan, along with over three inches of rainfall in the Long Creek watershed. With reservoirs already nearly filled to capacity, many were forced into an "inflow must equal outflow" condition. Increased releases on already above average releases had substantial impacts on cities downstream. Releases from Lake Darling were increased to 25 kcfs on June 25th, and later that same day, the Minot Broadway Bridge crested at 1561.72 feet MSL, which surpassed the old record of 1558 feet MSL set in 1881. Although dikes had been built along the Souris in Minot to prepare for potential flooding in the spring, crests of this magnitude meant the flood fight would unfortunately be lost.

Fortunately, precipitation in the basin throughout July has not been extreme like previous months. Releases, along with river levels, have lowered. The river level for the Souris at the Minot Broadway Bridge fell below minor flood stage on July 16th, and has continued to fall throughout mid-July. Even though above normal precipitation is forecast by the Climate Prediction Center (CPC) through at least the fall, the return of high water is not expected.

(Source: USGS)
Souris River flooding in Minot

Flood Categories for the Souris River at the Minot Broadway Bridge

Major: 1555 feet
Moderate: 1551 feet
Minor: 1549 feet
Action: 1555 feet

Flood Categories for the Souris River at Minot 4NW

Major: 22 feet
Moderate: 17 feet
Minor: 14 feet
Action: 13 feet

For more information about river levels in your area, visit:

http://water.weather.gov/ahps

"(The Souris River at) the Minot Broadway Bridge crested at 1561.72 feet MSL, which surpassed the old record of 1558 feet MSL set in 1881."

Major flooding in the Missouri River Basin

By: Jimmy Taeger

The Missouri and Yellowstone River basins received 150-300% of normal snowpack during the past winter and spring. Over 800% of the normal precipitation fell across portions of the upper basin during the second half of May with above normal precipitation continuing into early June. This abnormal, heavy rain came as a series of storms moved over the basins. The subsequent flooding impacted many people along the Missouri River in Montana and North Dakota.

The old record of 28 feet from 1912 for the Missouri River at Williston was exceeded on June 9, 2011, and eventually shattered by a crest of 30.53 feet on June 21, 2011. However, these two historical crests are a little different from each other than just the obvious. The new record of 30.53 feet is provisional until certified by the USGS, and was enhanced by backwater effects of the elevated level of Lake Sakakawea. The record set in Williston in 1912 was prior to the creation of Garrison Dam on Lake Sakakawea.

The elevated level of Lake Sakakawea forced new record releases from the Garrison Dam this past spring. The highest release from Garrison Dam was 150 kcfs (thousand cubic feet per second) this summer, which topped the previous record of 65.2 kcfs in 1975. Releases from the dam directly affected cities downstream.

(Source: USGS)

The Garrison Dam Spillway with all 28 gates open, releasing 150 kcfs

The Missouri River at Bismarck rose to its highest level this spring since the Garrison Dam was completed in 1953. On July 1, 2011, the Missouri River at Bismarck reached a level of 19.25 feet. Major flood stage is 19 feet. Some residences in the lower areas of Bismarck and Mandan prepared for the higher water by building dikes around their homes, and moving furniture to higher levels.

The flooding that occurred along the Missouri in North Dakota will certainly be an event that will not be forgotten any time soon. Lake Sakakawea had been lowered to an elevation of 1837 feet mean sea level to prepare for a large spring snowmelt, but the record rainfall in late May and early June combined with snowmelt on the plains and foothills of the Rockies quickly filled system capacity, leaving little room for much of the mountain runoff. River levels have been slowly receding throughout mid-July, and are forecast to continue to slowly fall for the rest of the summer.

Flood Categories for the Missouri River at Bismarck

Major: 19 feet
Moderate: 18 feet
Minor: 16 feet
Action: 14 feet

"The highest release from Garrison Dam was 150 kcfs this summer, which topped the previous record of 65.2 kcfs in 1975."

Meet a McKenzie County Observer

By: Rick Krolak

Carrie Carson is one of our dedicated CoCoRaHS observers. She lives on a ranch with her family 15 miles west of Grassy Butte in southern McKenzie county. She is married to Monty Carson and has 2 sons, Chase (25) and Layne (22). The Carson's own a fencing company and when they are not watching the weather, they produce team roping throughout the year.

Weather has been a big part of Carrie's life and she has been keeping track of rainfall and fog for over 30 years. She attributes this in honor of her grandmother, Annie, who also had weather interests. Annie also kept records of moisture and fog. Carrie enjoys collecting rainfall, especially this year as she has recorded over 19 inches so far.

NATIONAL WEATHER SERVICE - BISMARCK, ND

2301 University Drive
Building 27
Bismarck, ND 58504
(701) 223-4582
http://www.weather.gov/bis

COCORAHS NATIONAL HEADQUARTERS

1371 Campus Delivery
Fort Collins, CO 80523-1371
(970) 491-1196
http://www.cocorahs.org

National Weather Service Mission Statement:

The National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community.

CoCoRaHS Mission Statement:

CoCoRaHS is a unique, non-profit, community-based network of volunteers of all ages and backgrounds working together to measure and map precipitation (rain, hail and snow). By using low-cost measurement tools, stressing training and education, and utilizing an interactive Web-site, our aim is to provide the highest quality data for natural resource, education and research applications.

Summer 2011 Dakota Thunder Team:

Tony Merriman (editor) - Lead Forecaster (NWS Bismarck) / Western North Dakota Regional CoCoRaHS Coordinator
Adnan Akyüz - North Dakota State Climatologist (NDSU) / North Dakota State CoCoRaHS Coordinator
Darin Langerud - Division Director for the Atmospheric Resource Board (NDSWC) / North Dakota State CoCoRaHS Coordinator
Mark Ewens - Data Acquisition Program Manager (NWS Grand Forks) / Eastern North Dakota Regional CoCoRaHS Coordinator
Rick Krolak - Official in Charge (NWS Williston) / North-Western North Dakota Regional CoCoRaHS Coordinator
Jimmy Taeger - Meteorologist Intern (NWS Bismarck)

Meet a Cass County observer

By: Adnan Akyüz

Louise Tegtmeier has been a CoCoRaHS observer since November 2008. She and her husband, Tim, have 7 children. The Tegtmeier family lived in Fargo from 1982 until July 1998, when they bought a farmstead outside of Hunter, ND. In order to converse with the farmers of ND, one has to know the weather. Farmers often asked, "How much rain did you get last night?" She loved talking about her CoCoRaHS rain gauge and her small electronic weather station.

On December 15, 2008, a house fire changed the lives of the Tegtmeier family. Thankfully, the family escaped into 10-degrees-below-zero weather with snow drifts on the ground. This is what she entered in the comments section when she reported her observation for CoCoRaHS the next day:

"We had a house fire at 'my location' around noon on December 15th. I will endeavor to continue readings, but they won't be at the precise same time every day. Thank you for your forbearance during these difficult days ahead. - Everybody got out safe and unharmed except our caged birds - thanks for asking)"

Later she stated "If anyone is wondering whether the comments are read by anybody, I can attest that they do".

Within two weeks, the family was able to find a similar farmstead in the same school district, and closer to Fargo. "…and it even came with chickens!" Louise said emphatically. Louise is now ND-CS-9, and loves to spend a few minutes a day to be able to tell her farmer friends "yes, I know exactly how much rain fell last night."

Source: Chris Franz/The Forum. July 5, 2010 story titled "Precipitation Participation-ND Tops in weather-tracker rate by Patrick Springer.

Louise works part-time as Enrichment Programs Advisor at Northern Cass School in rural Hunter, ND. She also keeps busy with a wide range of volunteer activities, from 4H leader to VBS Director at her church, to Poultry Building Supervisor at the Red River Valley Fair each summer. Many animals live on the Tegtmeier farmstead, too.

Louise added: "CoCoRaHS is a fun activity that doesn't take much time, but it connects me to people in my community. I love that the network is so varied, yet cooperates to give a more accurate picture of our weather than could be accomplished through any computer modeling. I enjoy being a small part of something larger."