The Newsletter of NOAA's National Weather Service in Green Bay, Wisconsin

www.weather.gov/grb

Packerland Weather News

Volume 6, Issue 2 Fall/Winter 2007

Inside this issue:

June 7 Tornado Outbreak in Wisconsin

By Jeff Last, Warning Coordination Meteorologist, NWS Green Bay

Fast moving severe thunderstorms with damaging winds, extremely large hail, and tornadoes ripped across Wisconsin on June 7, 2007. Five tornadoes touched down in the central and northeast part of the state, including a strong twister that tracked across the Northland for 40 miles.

The day started out mild but mainly cloudy across much of the area, ahead of a cold front and deep low pressure system that was moving across the western Great Lakes. Thunderstorms began to form during the early afternoon in western Wisconsin ahead of the approaching front. The storms quickly became severe as they moved over the central part of the state. The first tornado of the afternoon occurred between Mosinee and Bevent in Marathon County. The EF2 intensity twister damaged homes and barns as it traveled northeast toward Pike Lake. Shortly after this storm formed, a second severe storm quickly developed over Wood County and dropped hail in Wisconsin Rapids and Port Edwards that caused $45 million in damage. That storm also produced the second largest hailstone in Wisconsin weather history—5.5 inches in diameter!

The storm that produced the tornado in Marathon County produced another tornado 15 minutes later that first touched down in northeast Shawano County. This tornado strengthened to EF3 intensity and grew to 3/4 of a mile wide as it ripped across Menominee, southeast Langlade, and Oconto counties. Top winds were estimated at 160 mph as it tore through the Bear Paw Resort near White Lake. The tornado was on the

Continued on page 2

Large tornado in southwest Oconto County.
Credit: Ben Christianson.

5.5 inch diameter hailstone in Port Edwards.
Credit: Bart McCarthy.

Comments or Suggestions?

If you have suggestions for articles, have comments about the newsletter, or would like to be removed from the mailing list, please contact us at:

NOAA/NWS
2485 South Point Road
Green Bay, WI 54313

or by e-mail: jeff.last@noaa.gov

Are You Ready for Winter in Wisconsin?

The warm days of summer are long gone, and now is the time to prepare for the upcoming winter season. Begin by putting together a winter storm safety plan for you and your family:

• Check and winterize your vehicle before the winter season begins.

• Have a NOAA All-Hazards Weather Radio with a battery back-up to keep up-to-date on the latest weather forecast.

• Store extra food that requires no cooking, in the event electricity is cut off.

• Make sure your emergency heating source, such as a fireplace or space heater, has proper ventilation.

• Check the weather forecast before leaving for extended periods outdoors.

When traveling, carry a winter storm survival kit that includes blankets, a flashlight with extra batteries, a first-aid kit, high-calorie non-perishable food, a shovel and knife, a windshield scraper and brush, and booster cables. Keep your gas tank near full to avoid ice in the tank and fuel lines. If you must travel in a winter storm, avoid traveling alone.

A winter wonderland in Elcho, Wisconsin. Credit: Greg Geiger.

Tornado Outbreak…

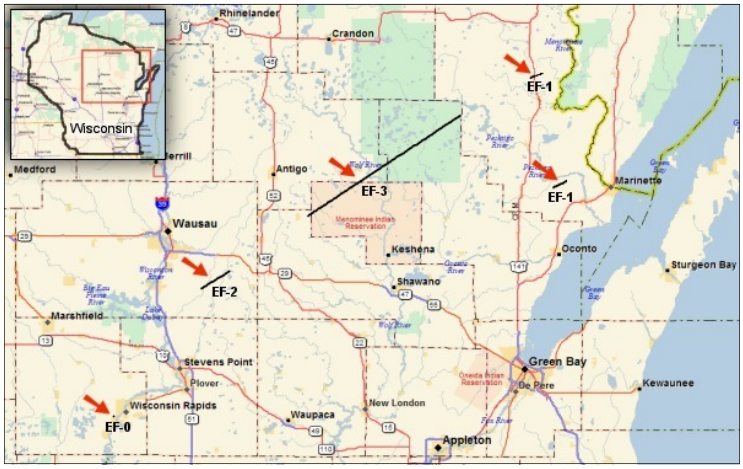
From page 1

ground for just over 45 minutes, covering 40.1 miles. Along its path, the twister destroyed 30 buildings, flattened over 14,000 acres of forest, and injured three people. The 40.1 mile long trail of destruction was the longest tornado track in the U.S. this year, and the strongest tornado in northeast Wisconsin since 1998.

This tornado dissipated just before arriving in Marinette County, but the parent thunderstorm did produce downburst wind damage near Tommy Thompson State Park. The storm went on to produce a third tornado which moved across Highway 141 between Amberg and Wausaukee. The tornado damaged a couple of homes and uprooted or snapped numerous trees.

The final tornado of the evening occurred in southeast Marinette County near Porterfield. The twister damaged two homes, flattened a barn, and injured one person.

The small number of injuries can likely be attributed, in part, to the combined effect of advance warnings by the National Weather Service and the rapid dissemination of weather information to the public by local emergency management and the media. The storms were well forecast, even the day before, allowing officials to make decisions about the next day's activities. In fact, several school districts decided on the day before the storms to cancel outdoor activities planned for June 7, based on outlooks issued by the NWS. The information allowed those in harm's way to take appropriate actions.



Map of northeast Wisconsin showing location and tracks of June 7 tornadoes.

Great Lakes Workshop Comes to Wisconsin

By Phil Kurimski, Forecaster

NWS Green Bay

The 16th U.S.-Canada Great Lakes Operational Meteorology Workshop was held in Milwaukee on September 5-7, 2007, co-hosted by the National Weather Service offices in Green Bay and Milwaukee/Sullivan. The annual workshop is a collective effort between the NWS and the Meteorological Service of Canada, emphasizing the challenges of forecasting weather in the Great Lakes region. The workshop is held in a Great Lakes city and alternates locations between the United States and Canada. In addition to hosting the workshop, several staff members from the Green Bay and Sullivan offices presented research on the unique and challenging weather Wisconsin experiences each year.

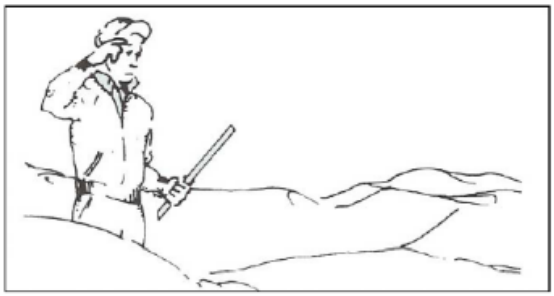
A presenter at the Great Lakes Workshop discusses weather research to a captive crowd.

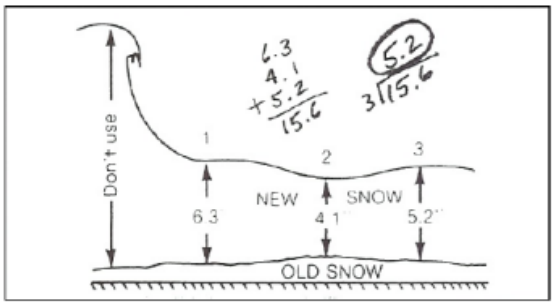
Over eighty meteorologists and atmospheric scientists attended this year's meeting, representing the U.S. and Canadian governments, academia, the media, and private sector.

Storm Spotters: It's Time to Get Out the Yardsticks

Before you know it, arctic cold and snow will return to the area. Your accurate snowfall measurements are essential to the National Weather Service forecast and warning program.

It is important to measure snowfall (and snow depth) in locations where the effects of blowing and drifting are minimized. Finding a good location where snow accumulates uniformly simplifies all other aspects of the observation and reduces the opportunities for error. In open areas where windblown snow cannot be avoided, several measurements will be necessary to obtain an average depth—these measurements should not include the largest drifts. In heavily forested locations, find an exposed clearing in the trees. Measurements beneath trees are inaccurate since large amounts of snow can accumulate on trees and never reach the ground. Avoid measuring directly on the grass; rather, use a snowboard or other hard surface away from the house. Make sure the snowboard is well cleared after your final measurement.





Snowfall should be reported in tenths of an inch (for example, 3.9 inches). Official spotters can call in their reports to the NWS at any time using the toll-free hotline or send them via eSpotter, linked on the NWS Green Bay website:

www.weather.gov/grb

NWS Green Bay Forecaster Receives Cline Award

By Linda S. Skowronski,

Administrative Support Assistant, NWS Green Bay

Forecaster Phillip Kurimski received the 2007 Isaac M. Cline Award this past August. As a winner in the category of leadership, Kurimski became eligible for the regional Cline Award presented by the Central Region of the National Weather Service as well as the national Cline Award.

Kurimski was nominated by his co-workers for demonstrating leadership in support of the NWS mission by recognizing office needs and providing creative and innovative ways to personally solve problems. He has been a forecaster at the Green Bay office since 2001.

The prestigious award is named in honor of Isaac M. Cline, one of the most recognized employees in weather service history. Cline made numerous contributions to the mission of what was then called the Weather Bureau. His most noteworthy accomplishment was the actions he took during the Galveston hurricane of 1900, the deadliest weather event in U.S. history. The Cline Award is presented annually to NWS staff in nine categories of accomplishment.

Congratulations on a job well done!

Phil Kurimski (L) receives congratulations from NWS Green Bay Meteorologist-in-Charge Gary Austin.

New River Monitoring Site in Wood County

By Tom Helman, Senior Forecaster

NWS Green Bay

A wire weight gauge was installed on the Yellow River in Pittsville in June 2007 by NWS Milwaukee/Sullivan Service Hydrologist Brian Hahn, NWS Milwaukee/Sullivan Data Acquisition Manager Rudy Schaar, and NWS Green Bay Hydrology Program Leader Tom Helman. After the gauge was installed, a site survey was done to determine bankfull and flood stage levels. In addition to monitoring local flooding effects, the gauge will serve to provide valuable information downstream for the forecast point at Babcock.

The readings will be taken by an employee of the Pittsville Waste Water Treatment Plant. Data will be collected once a day during the warm season and once a week during the cold season. More frequent reports will be sent during high water. The new gauge information can be seen on the NWS Green Bay Advanced Hydrologic Prediction Service (AHPS) website.

This location is unique. About 50 feet north (upstream) of the bridge is the official "middle" of the state, as declared by the State of Wisconsin.

Paul Veldman, Pittsville Waste Water Treatment Plant, stands next to the new gauge on the Yellow River.

On the Web

www.crh.noaa.gov/ahps2/index.php?wfo=grb

Winter 2007-08 Outlook

U.S. Winter Affected by Pacific Ocean

By Roy Eckberg, Forecaster,
NWS Green Bay

Although thousands of miles away from Wisconsin, the equatorial Pacific Ocean water can affect our weather. The temperature of the water goes through warm and cold periods known as the El Niño/ Southern Oscillation (ENSO) cycle. The ENSO cycle can play a significant role in what type of winter we experience in the U.S. and here in Wisconsin.

El Niño refers to the large-scale ocean-atmosphere climate phenomenon linked to a periodic warming in sea-surface temperatures across the central and east-central equatorial Pacific. La Niña refers to the periodic cooling of ocean surface temperatures in the central and east-central equatorial Pacific every three to five years.

Over the last several months, La Niña conditions have developed across the equatorial Pacific. Figure 1 shows the sea surface temperature anomalies across the equatorial Pacific from October 7 to November 3, 2007. Sea surface temperatures were generally 1 C to 2 C below normal off the west coast of South America (far right in Figure 1).

La Niña conditions are expected to continue for the upcoming winter across North America. Over half of the computer models indicated at least a moderate-strength La Niña through December, followed by gradual weakening thereafter. Current atmospheric and oceanic conditions and recent trends are consistent with the model forecasts.

Potential impacts for the contiguous U.S. include above average precipitation in the northern Rockies, northern California, and in southern and eastern regions of the Pacific Northwest. Below-average precipitation is expected across the southern tier of states, particularly in the southwest and southeast. Mild temperatures are expected across most of the nation.

For Wisconsin, the forecast from the NWS Climate Prediction Center is for above normal temperatures. The climate models indicate a slight tendency for above normal precipitation across the southeast half of Wisconsin, with no trend noted over the northwest part of the state.

Despite recent mild winters and a high probability for above normal readings for this winter, periods of cold weather are still expected. For snow enthusiasts, there is some slight hope for above normal snowfall across the area. Although there is a limited number of cases, past La Niña events have shown some trends for above normal snowfall across the region compared to years when there was no La Niña or El Niño present.

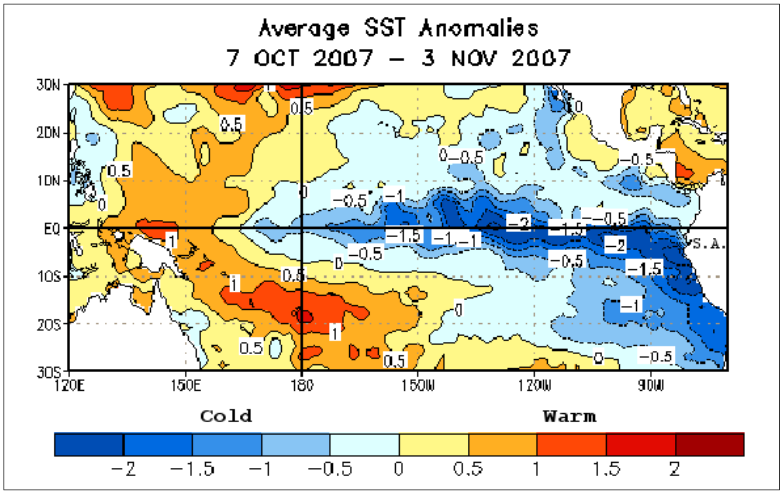


Fig. 1. Average sea-surface temperature anomalies across Equatorial Pacific Ocean. South America is labeled "S.A." on the far right.

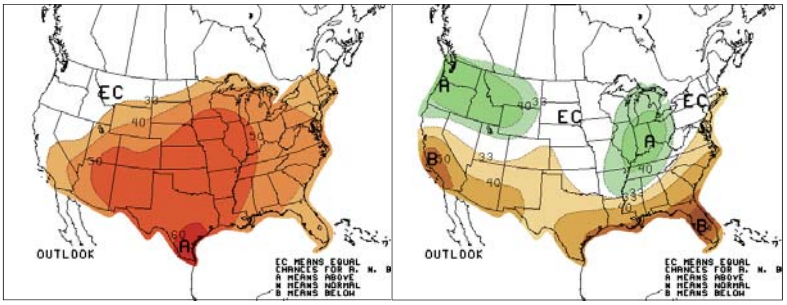


Fig. 2. Winter outlook for temperature (left) and precipitation. "A" marks areas with best chance of above normal conditions, and "B" is for below normal.

On the Web

www.cpc.ncep.noaa.gov

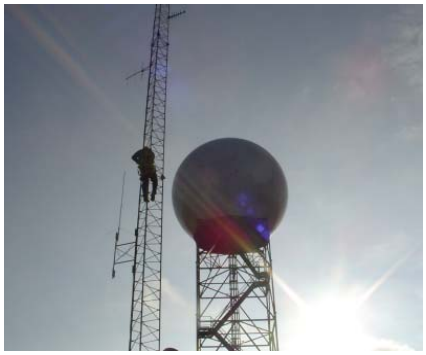
It's Not Just a Job, It's an Adventure

By Glenn Wareham, Electronics Technician, NWS Green Bay

Many of you may remember that Navy recruiting slogan of the 1980's, but for the Electronics Technicians at the National Weather Service Green Bay office it still holds true. On a daily basis you might find the Electronics Technician involved in such routine tasks as completing paperwork, cleaning equipment, and performing simple preventative maintenance tasks on the radar and weather observing equipment. But every once in a while, an opportunity arises that takes them above and beyond that daily routine.

Recently, our technicians had the opportunity to hang from an 80 foot antenna tower while securing communication cables critical to the northeast Wisconsin amateur radio storm spotter program. Storm spotters are an important part of the NWS warning program, and a large segment of our spotters use amateur radio to communicate with the weather office.

Another adventure involved a ten mile cruise with the Green Bay Coast Guard ATON (Aids To Navigation) Unit to repair a wind sensor located atop the Green Bay Harbor Entrance Lighthouse. The wind sensor is part of the NWS Green Bay marine weather program. The data collected is extensively used by the forecast staff in preparation of warnings and forecasts for the waters of Green Bay. The NWS Green Bay marine forecast area encompasses the southern two thirds of the bay as well as the near shore waters of Lake Michigan from Rock Island Passage to Sheboygan.



Electronics Technician Ed Kindred on the communications tower at NWS Green Bay. The Doppler radar tower is in the background.

Electronics Technician Glenn Wareham is dressed in cold water survival gear before heading out to the Green Bay lighthouse.

Conditions at the time of repair were less than favorable. Freezing temperatures and three to five foot seas made for a rather interesting ride. Once there, working outdoors on a two foot ledge, over 50 feet above the water didn't make the task any easier. However, repairs were made and the information critical to the program was flowing again.

Oftentimes it is just a job, but it can also be a real adventure.

Did You Know?

The coldest air temperature ever measured in Wisconsin was –55 F, recorded in the town of Couderay in Sawyer County on February 2 and 4, 1996 (and that's without the wind chill!).

The heaviest 24-hr snowfall in the state was 26.0 inches, measured in Neillsville (Clark County) on December 27, 1904. The greatest single-storm snowfall was 31.0 inches in Superior, which fell October 31-November 3, 1991.

The most snow for a season was 301.8 inches in Hurley (Iron County), during the winter of 1996-97. But they're used to heavy snow—the average snowfall for a typical winter in Hurley is 165 inches!

The June 7 Tornado Outbreak

The Science Behind the Storms

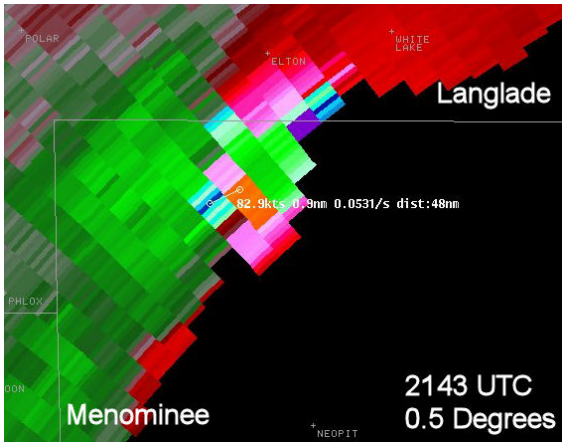
By Phil Kurimski, Forecaster, and
Gene Brusky, Science and Training Meteorologist
NWS Green Bay

An unseasonably strong low pressure system moved across the western Great Lakes on June 7, 2007, setting the stage for a rare, significant tornado outbreak across central and northeast Wisconsin. The environment in which the storms developed was characterized by very strong vertical wind shear and modest instability. Winds in the middle levels of the atmosphere were unseasonably strong, around 100 mph, which contributed to very strong vertical wind shear allowing the storms to rotate. Despite morning cloud cover, surface temperatures warmed into the lower 80s with dew points in the 65 to 70 degree range during the afternoon hours. The overall "convective available potential energy" (or CAPE), a measure of instability, was modest and reached about 1500 Joules/kilogram.

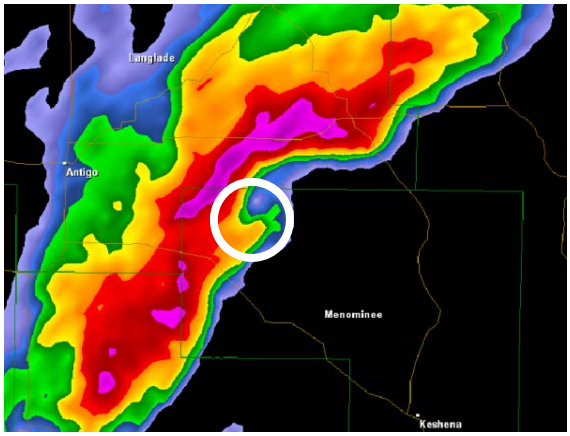
Three supercell thunderstorms raced northeast at nearly 50 mph across the National Weather Service-Green Bay forecast area during the afternoon. The first two storms quickly moved from central to northeast Wisconsin and produced several damaging tornadoes. A third supercell, which moved across the Fox Valley area south of the northern storms, did not produce a tornado.

The northernmost supercell was the strongest and produced a 40.1 mile long, 3/4 mile wide, EF3 intensity tornado that tracked through Shawano, Menominee, Langlade and Oconto counties. The Doppler radar-detected rotation associated with this storm was intense, with velocities approaching 200 mph (measured several thousand feet above the ground) as the storm moved through southeast Langlade county!

A second tornadic supercell tracked from Wood County to Marinette County. This storm produced near-record size hail of 5.5 inches in diameter and a brief EF0 tornado near Wisconsin Rapids around 4:26 pm. This storm also produced an EF1 intensity tornado near Porterfield in Marinette County about 90 minutes later.



Close-up of Doppler storm-relative velocity of the storm that produced the long-track tornado, as seen by the NWS Green Bay radar. Blue hues next to orange (center of image) indicates very strong rotation in the thunderstorm.



Reflectivity image of the thunderstorm that produced the long-track tornado. Area circled indicates "hook echo" that is indicative of a rotating thunderstorm.

Finally, a third non-tornadic supercell moved across Waushara and Winnebago counties. Although Doppler radar detected strong rotation at times, this storm only produced one inch hail and 60 mph winds. Multiple storm spotters in the vicinity of the storm only reported a weakly rotating wall cloud. These spotter reports were invaluable, as they allowed the NWS Green Bay office to hold off issuing a tornado warning and prevented a false alarm for a highly populated area.

Drought Slowly Diminishing Across Wisconsin

By Roy Eckberg, Forecaster, and
Tom Helman, Senior Forecaster
NWS Green Bay

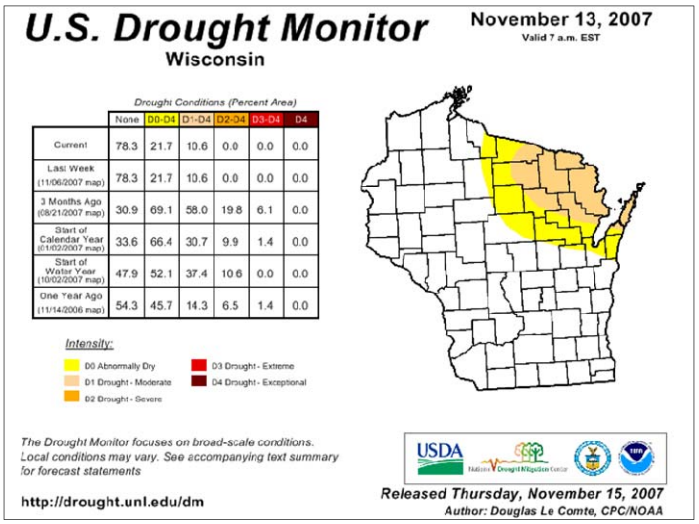
After several years of below normal precipitation, very warm and dry weather at the end of July through mid-August led to moderate to severe drought conditions across the area by the end of the summer. At one point, most of north-central and northeast Wisconsin was classified in moderate to severe drought conditions. With the drought occurring during the significant portion of the growing season, many crops experienced stress or damage due to the dry conditions. Forty-two counties in Wisconsin, including most in the north-central and northeast part of the state, were declared drought disaster areas by the U.S. Department of Agriculture.

Precipitation returned closer to average during September. A very humid and warm airmass for early October brought very heavy rainfall to north-central Wisconsin between the 4th and 8th. Overall, October rainfall amounts were generally near normal over the southern part of the state and an inch or two above normal over the north. Short term drought conditions improved significantly in October as vegetation turned green and topsoil moisture improved. Fire weather danger dropped to the low category after being high or very high during the summer.

Long term affects of the drought are still being felt across the region. Many area lakes, reservoirs, wells, and rivers are running well below normal as of mid-November. Depending on location, it may take six months to as much as several years of above average precipitation to replenish local water resources.

The below normal precipitation from 2005 to 2007 affected recreational use of some area rivers. Some rivers were no longer navigable due to low water or submerged hazards to boaters. Numerous counties reported poor fishing, and some piers on a few lakes over Northern Wisconsin were completely out of the water.

For historical purposes, several rivers across northeast Wisconsin reached or established new record low stages. Most notable was a 50 year record low stage that was broken in August in Peshtigo on the Peshtigo River. A new low stage was also established on the Little Wolf River in Royalton, breaking last year's record. The Royalton site was established by U.S. Geological Survey in 1929, and the recent records of 2006 and 2007 were even lower than the dry years of the 1930's. For more information on river crest and low stage data, visit the NWS Green Bay Advanced Hydrologic Prediction Service (AHPS) website.



Drought status for Wisconsin as of November 13, 2007.

Low water in Crescent Lake, three miles west of Minocqua.

On the Web

www.crh.noaa.gov/ahps2/index.php?wfo=grb

The Cooperative Observer Corner

By Pat Hein, Observations Program Leader, NWS Green Bay

First off, I hope this newsletter finds you all in good health. I would like to thank everyone for the time and effort you have put forth in your observations.

One of the most difficult and challenging elements for observers to measure is snowfall. In an effort to aid your observations for this and future winter seasons, I obtained a new "snowfall to estimated water" conversion table. I have distributed these charts to you this year during my inspections throughout our 22 county forecast area. If you have misplaced it, please go to the web address listed at right, or let me know and I will send you another copy. Use this chart only as an aid to help you estimate the water equivalent of the snow. Please continue to melt your snowfall from the standard rain gauge, then compare it with the chart. I like to think of the conversion table as the "physics" of snowfall. It is fairly accurate as long as you consider the range of temperatures during the time the snow fell.

Each snowfall is different in Wisconsin. Consider the heavy wet snow early and late in the year which will give you a higher water equivalent and usually falls straight down without much wind. Your catch in the gauge should be fairly accurate. Wind is definitely an enemy for snowfall measurement. Wind can affect both light snowfall and snowstorms. You might measure only a few hundredths of an inch of water equivalent in your gauge because the snow blew over the top of it. During these blowing snow conditions, your gauge will not make a good catch of the snow and hence your water equivalent will not be accurate. In this case you should use the chart, making sure you accurately measured the snowfall and temperatures during the period of falling snow. If you use the chart, please add the remark "Estimated due to blowing snow" in your observation, both on the B-91 form and in your computer or phoned-in report. If your water equivalent is close to the reading on the chart, let it stand, write it down, and send it in.

Finally, if you didn't have any precipitation in the last 24 hours, put a zero (0) in your precipitation column. This verifies that you actually had no precipitation during the period. I forward these forms to the National Climatic Data Center in Asheville, North Carolina. When they enter the data into their database, a blank entry will be entered as missing data. I'm sure, in many cases, you do not intend for that to be the case. That is why it is critical you enter a zero when no precipitation is recorded.

As always, if you have any questions, please give me a call or drop me an e-mail. My e-mail address is pat.hein@noaa.gov Have a safe and happy holiday season and keep your snow board area marked. Nothing is more frustrating than losing your snowboard in deep snow after a heavy snowstorm.

On the Web

www.crh.noaa.gov/images/grb/misc/Snow_water.pdf

Special Thanks…

From page 10

and the private sector.

Weather spotters, after learning and/or refreshing their knowledge of hazardous weather spotting at our spring training talks, assist us during severe weather events, in real-time in any season of the year, providing us with information about hazardous weather. Although we have high-tech equipment like radars and satellites, we still rely on observers' eyes to let us know what is happening in their community so we can make appropriate warning decisions. Many spotters relay their reports via amateur radio, where radio links are sometimes the only way we receive reports of hazardous weather. Others use phones or the Internet.

Without the volunteer service of our observers, spotters, and hams, we could not provide the valuable services expected by our tax-paying community. Thank you very much and have a happy holiday season!

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Linda Skowronski
Roy Eckberg
Phil Kurimski

Special Thanks to Our Volunteers

By Gary R. Austin, Meteorologist-in-Charge, NWS Green Bay

The National Weather Service in Green Bay thanks our volunteer weather observers and spotters for their personal dedication in taking observations and reporting them to us. Our volunteers include cooperative observers, hazardous weather spotters and amateur radio operators ("hams"). Ham radio operators not only serve as spotters but also relay important information about on-going hazardous weather to our office as an integral part of our hazardous weather warning operations. Last but not least, three hams actually volunteer their personal time directly at our station during summer severe weather operations, including at any time of day or night, serving as our "receivers of information" relayed from spotters in the field.

Cooperative weather observers assist us every single day of the year in recording temperatures and precipitation. Some have done so for many years in succession—that's remarkable dedication! Their observations, taken by meticulously following NWS guidelines, provide us with information that is invaluable on a daily basis. The observations permit us to know what has truly happened "on the ground," and assist us in making forecast decisions and providing information to the public. The observations also serve as the foundation upon which a national climate database is maintained, permitting the study and identification of long-term trends of weather patterns. The database is used by a wide variety of organizations, both in government

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