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

www.weather.gov/grb

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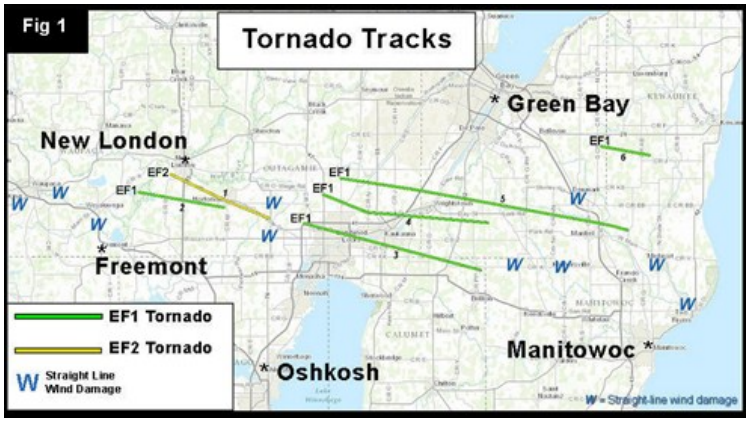
Packerland Weather News

Volume 11, Issue 2 Fall/Winter 2013

Rare Nighttime Tornado Outbreak Hits the Fox Valley

Gene Brusky,
Science and Operations Officer

Fig 1



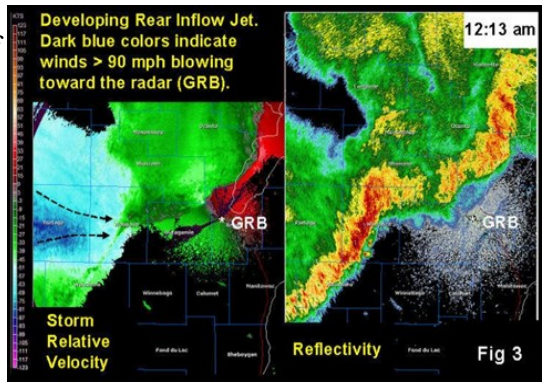
During the early morning hours of August 7, 2013, a fast moving quasi-linear convective system (QLCS) produced widespread damaging winds over the Fox Valley in northeast Wisconsin. In addition, storm surveys revealed **6 tornadoes occurred within 50 minutes** between 12:22 am and 1:10 am CDT **(Figure 1)**. Hundreds of homes, businesses, and farm buildings were damaged with two injuries reported. Thousands of trees and power lines were also downed, leaving tens of thousands of people without power. The strongest tornado of the event reached EF2 intensity (winds estimated at 115 to 120 mph). This tornado caused significant damage to a church in New London, Wisconsin **(Figure 2)**. The six tornadoes which occurred on August 7 were the most early morning (midnight - 6 am) tornadoes since 1950.

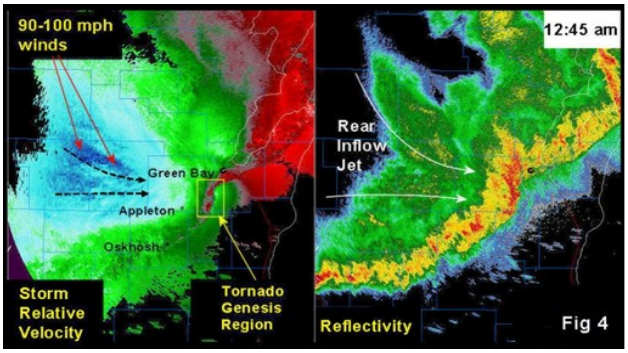
Fig 2

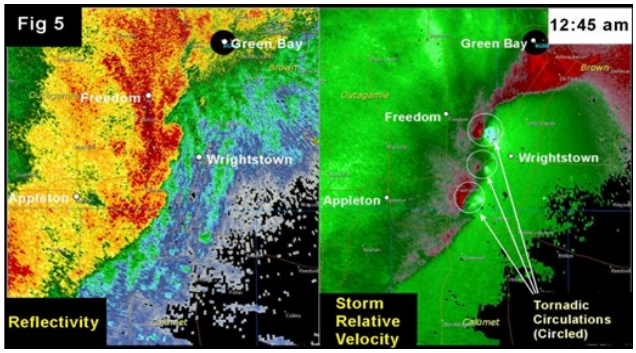
Unlike most discrete tornadic supercell storms, tornadoes associated with a QLCS are in a sense, more elusive and sinister, in that they typically evolve more quickly, the parent circulation is smaller in scale, are embedded in heavy precipitation, and can move eastward at speeds of 60-70 mph! In contrast, classic supercell tornadoes evolve from a somewhat larger mid-level circulation (referred to as a mesocyclone) which gradually descends toward the ground. Typically, this evolution can take several minutes or sometimes longer, thus increasing the likelihood of early detection and increased warning lead times. Because QLCS tornadoes spin-up very rapidly and in the lower levels of the storm closer to the ground, attaining adequate warning lead time can be difficult. In many cases, by the time the circulations are identified on radar, they are often already on the ground causing damage. In addition to the characteristics described above, the QLCS tornadoes on August 7 occurred in the middle of the night with little chance for visual sighting by storm spotters.

(continues on page 2)

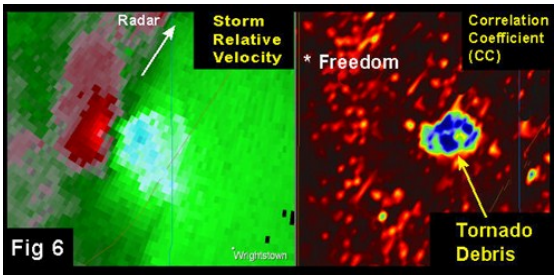
An important storm-scale characteristic of a QLCS is the development of the rear inflow jet (RIJ). The RIJ forms in the mid-levels of the storm behind the leading line of convection or squall-line **(Figure 3)**. As the QLCS matures, the RIJ strengthens, eventually impinging on the forward flank of the storm causing it to surge (or bow) eastward. It is during the bowing stage when QLCS tornadoes are most likely to develop along the leading edge of the storm. **Figure 4** shows the QLCS on August 7 during its mature stage as it transitioned to the bowing phase. Note that as RIJ strengthened, several small circulations (referred to as mesovortices) developed near the leading edge of the system. These circulations were tornadic, producing more concentrated damage at these locations **(Figure 5)**.



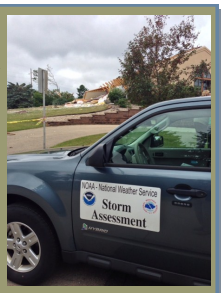




Back in May 2012, the NWS Green Bay Doppler radar was retrofitted with dual polarization (DP) capability. This upgrade allows the radar to scan atmospheric targets both in the vertical and horizontal plane, providing more information on the nature of the particles being detected. Dual polarization provided additional information in the August 7 tornado outbreak. One of the significant benefits of dual polarization is illustrated in **Figure 6**. The image on the left represents the classic tornado velocity signature (or velocity couplet). The green-blue colors are winds blowing toward the radar, while the red colors are winds blowing away from the radar. This strong circulation is being detected at about 600 feet above ground level and is located just 3 miles southeast of Freedom. The image on the right is the corresponding DP correlation coefficient (CC) product. The circular bluish-green area on the CC product represents the actual debris lofted by the tornado which was passing just south of the town of Freedom. This radar signature is also referred to as a tornadic debris signature (TDS). Keep in mind that this particular tornadic circulation is only 10 miles from the Green Bay Doppler radar, thus it was able to be detected fairly easily. Unfortunately, the majority of QLCS tornadoes occur considerably further from the radar, making their detection more challenging.



Storm Surveys 101



After a significant thunderstorm moves through an area and the final weather warnings have expired, the work of the National Weather Service (NWS) continues. Immediately following an event, the NWS communicates with each county affected and compiles damage reports from local officials. If thunderstorms or tornadoes cause severe damage or result in multiple casualties, the NWS may also travel to the affected area and conduct an on-site damage survey.

In many ways, conducting a damage survey is like a detective going to a scene after the fact, using all available clues and evidence to piece together what happened. Information gathered during a survey includes the location and time of the damage; the type and character of the damage; the width, length and path of the damage; the intensity of the damage; and observations by the public. From this information, a cause and estimate of peak winds can be discerned. Assessing storm damage can be challenging but is needed to accurately document what occurred. The documentation is used to improve forecast and warning services and to ensure the climate record is accurate.

Climate Corner — La Niña / El Niño Update & Winter 2013/14 Outlook

Roy Eckberg, Climate Program Leader

Water temperature anomalies across the Equatorial Pacific Ocean, known as the El Niño Southern Oscillation (ENSO), can have a significant impact on wintertime temperatures and precipitation types across North America. Climate forecasters usually look at the Niño 3.4 region **(Figure 1)** along the equator south/southeast of Hawaii as an indicator of El Niño or La Niña conditions. Most people are familiar with El Niño which occurs when water temperatures are warmer than normal. La Niña conditions occur when water temperatures in the Niño 3.4 region are cooler than normal.

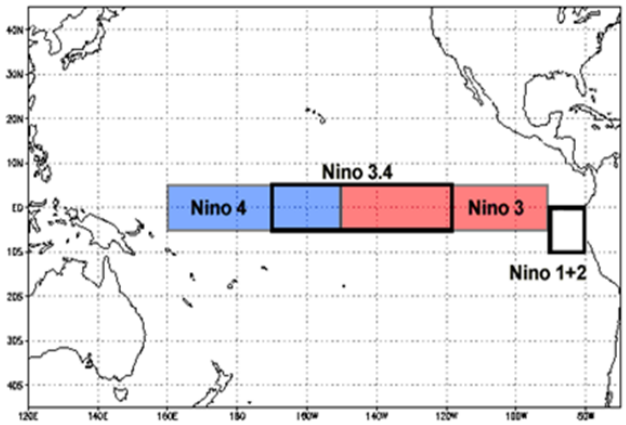


Figure 1: El Niño Regions

Changes in the ocean water temperature across the equatorial Pacific can impact the position and orientation of the jet stream. During El Niño winters, the sub-tropical jet is considerably stronger than during a typical winter **(Figure 2 - top)**. Also, the polar jet is shifted further north. This shift in the jet stream allows for fewer intrusions of arctic air that usually does not stay for a long period of time. El Niño winters usually bring wetter than normal conditions to southern California and Arizona, and cooler and wetter than normal conditions to Florida for those who escape the cold of a Wisconsin winter. During a La Niña winter, a large ridge of high pressure extends across the eastern Pacific into western North America **(Figure 2 - bottom)**. The polar jet stream stretches northward into Alaska and then turns southeast towards the middle-Atlantic states. This pattern usually leads to more frequent and longer duration intrusions of arctic air into Wisconsin.

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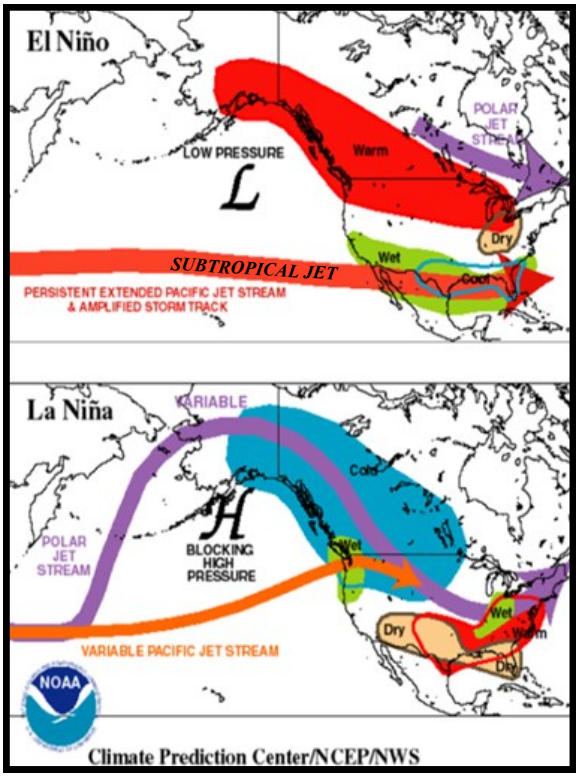


Figure 2: ENSO Jet Stream Patterns

DID YOU KNOW???

You can find the NWS Green Bay on Facebook, Twitter, and YouTube!

Neither El Niño nor La Niña conditions are expected to develop this fall or winter, therefore ENSO "neutral" conditions are expected. The latest Climate Prediction Center (CPC) model forecast **(Figures 3 & 4)** indicated equal chances for above, below or normal temperatures and precipitation. As a "neutral" ENSO is expected this winter, it should not come as a surprise that there are no clear trends in the temperature and precipitation outlooks. ENSO events are one of the best indicators of what to expect for an upcoming winter. There are other factors that drive the weather that can mitigate the impacts of ENSO, thus nothing is 100 percent guaranteed in climate forecasting.

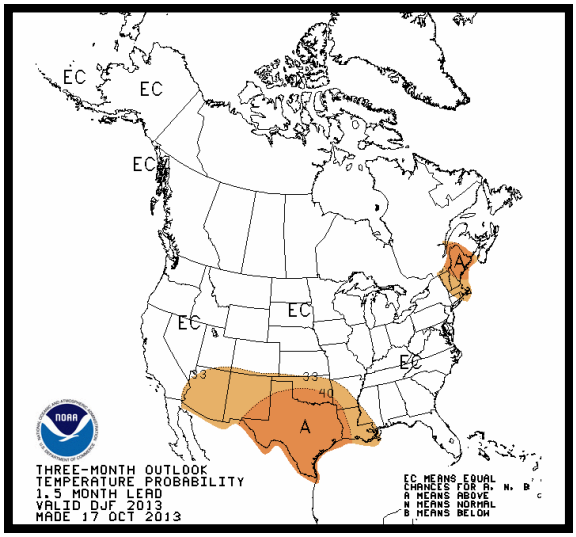


Figure 3: CPC 3-Month Temperature Outlook

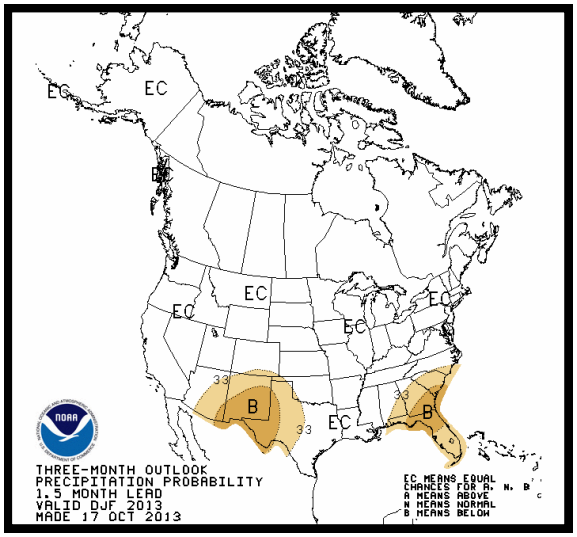
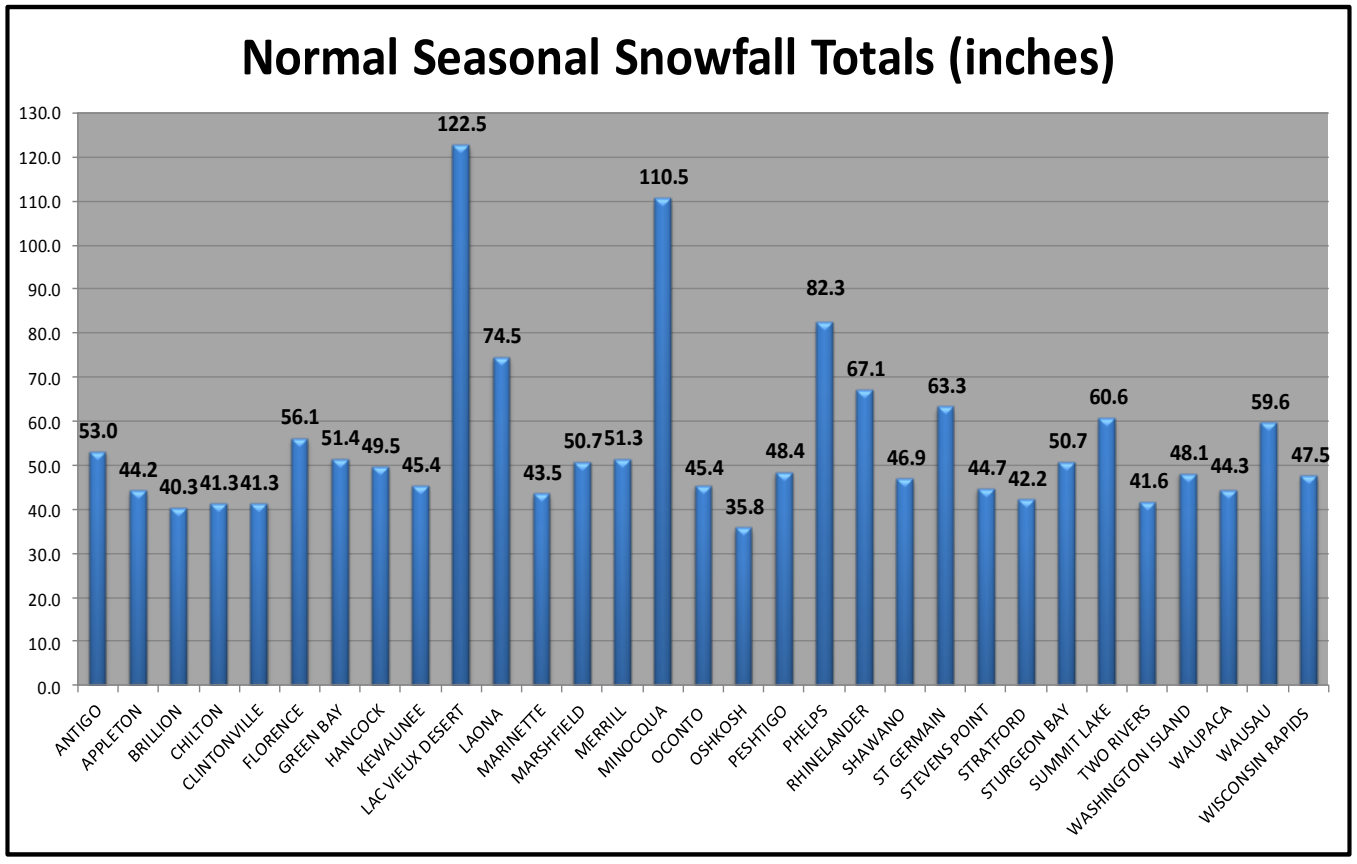


Figure 4: CPC 3-Month Precipitation Outlook



Are You Ready for Another Wisconsin Winter?

Summer is long gone, and now is the time to prepare for the upcoming winter season. Get ready for winter 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 Weather Radio with a battery back-up to keep up-to-date on the latest weather situation.
- 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.

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 a cell phone. 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.

It's also important to know the difference between a watch and a warning. A winter storm **watch** is issued when there is a potential for a winter storm during the next one to three days. It doesn't always mean the area will be directly hit because of uncertainty in the path or timing, but it does mean that it's time to start planning just in case. A **warning** means a dangerous event is expected or occurring. Avoid unnecessary travel when winter warnings are in effect. Winter weather advisories are issued for events that are expected to be an inconvenience, and not life-threatening if common sense is used.

Wisconsin is Looking for Volunteer Rain and Snowfall Observers!

Rain and snowfall amounts can vary widely from location to location. We've all seen times where your house is dry, but your neighbor across the street has an afternoon downpour. While the National Weather Service has specialized equipment in the field to report rain and snow totals, they usually are too far apart to find these localized situations. That is why we need you to fill in these gaps. Precipitation observers are needed across Wisconsin. We are looking for volunteer Community Collaborative Rain, Hail, and Snow Network reporters, also known as CoCoRaHS. Your observations will be used by the National Weather Service as well as by media, researchers, farmers, and even members of your own community. You don't need to be a scientist to join; anyone with an interest in weather, from young to old, can become a CoCoRaHS observer. If you would like to volunteer, please follow the links below for more information on the program, training, necessary equipment, and how to join. Participation would be greatly appreciated and remember: **every drop counts!**

www.cocorahs.org

In addition to CoCoRaHS reporters, we are also looking for precipitation-type observers. No training or equipment is necessary! All you need to do is simply look out the window and report what kind of precipitation is falling in your backyard. Then, simply submit the report on your computer, or download the app for your mobile phone so you can report while on the road. While radars can detect what type of precipitation is occurring IN the clouds, we need you to let us know what is happening ON the ground. By submitting a precipitation-type report, you will alert local meteorologists to what is going on so we can give you the most up to date and accurate forecast as possible. For more information on the Precipitation Identification Near the Ground project (or PING), please go to: **http://www.nssl.noaa.gov/projects/ping/**

The National Weather Service and your local community thank you for all your input and please know that every report is a valuable one!

Hein Retires from National Weather Service

Linda S. Skowronski, Administrative Support Assistant

Observing Program Leader Patrick Hein retired from the National Weather Service (NWS) on June 1, 2013, after nearly 43 years of service with the federal government.

Hein began his federal service career as a Communication Center Specialist in the U.S. Air Force from 1970 to 1974. He is a veteran of the Vietnam War, having served in 1972.

Hein joined the NWS in 1974 as a Forecaster Aid stationed at the Milwaukee County Airport. In January 1979, he transferred to the Green Bay office as a Meteorological Technician, and was promoted to Hydrometeorological Technician in October 1994. In July 2005, Hein accepted a promotion to Observing Program Leader, the position he held until his retirement.

During his career with the NWS, Hein experienced many improvements to a wide range of NWS systems. He was very proud of the cooperative observer program that he managed for many years.

Gary Austin (L) presenting Pat Hein (R) with a commemorative plaque.

Pat and his wife, Patricia, have two adult children. In addition to Pat continuing his love of fishing and hunting, he and his wife also plan to do more traveling. We wish them all the best in retirement.

Senior Forecaster Honored for Aviation Training Contributions

The Cooperative Program for Operational Meteorology Education (COMET®) formally acknowledged Senior Forecaster Richard Mamrosh for his long-standing service of many years to the program, contributing his aviation weather expertise to the creation of COMET's extensive library of aviation-related lessons, which have been used nationally and internationally. COMET was established in 1989 by the University Corporation for Atmospheric Research (UCAR), located in Boulder, Colorado and NOAA's NWS to promote a better understanding of mesoscale meteorology among weather forecasters and to maximize the benefits of new weather technologies during the NWS's modernization program. The COMET mission has expanded, and today COMET uses innovative methods to disseminate and enhance scientific knowledge in the environmental sciences, particularly meteorology, but also including diverse areas such as oceanography, hydrology, space weather, and emergency management. COMET is sponsored not only by the NWS, but also receives additional funding from foreign meteorological services and the U.S. Navy.

Mamrosh was acknowledged on October 3 via video-teleconference with Dr. Greg Byrd of COMET reading a certificate signed by COMET Program Director Rich Jeffries. Mamrosh was also presented a COMET clock. This was the first time anyone has been acknowledged in such a manner by COMET. In his contributions to COMET, Mamrosh served as their primary expert for answering a wide variety of forecasting questions, working with several different COMET team members over the years, oftentimes from home following a midnight shift.

NWS Green Bay Participates in National Week of Service

My name is El Nino. My connection with the National Weather Service (NWS) started about one year ago when I decided to help one of the forecasters with the upper air balloon release. I was lost anyway and had nothing better to do. It turned out to be good for me. The nice people at the NWS brought me in and gave me food and shelter for the night. The next day, I was taken to the local animal shelter where I was seen by a doctor and fed more. One week later, I was adopted to my forever home. A National Weather Service home! Though I was only at the shelter for a week, many other dogs and cats are not as lucky. They needed my help. So, I decided to enlist the help of all my NWS friends. For their "Week of Service" to the community they serve, the NWS staff held a food drive for "Happily Ever After" a local no kill animal shelter. I am sure all that they collected will feed my fellow dogs and cats for quite a while.

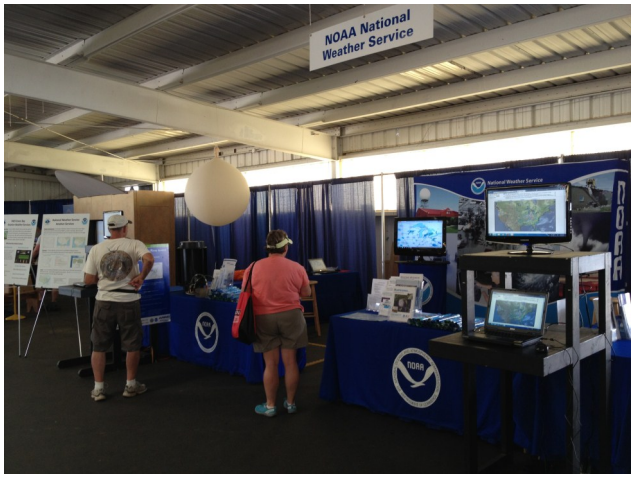
Thanks NWS,

P.S. Now can anyone help me with another matter? I am a dog from Wisconsin and I do not understand why I have to wear a Patriots jersey every Sunday in fall!

NWS Participates at EAA Oshkosh and the Oconto Fly-In

Rich Mamrosh, Aviation Program Leader

The National Weather Service staffed a booth at EAA AirVenture last summer. NWS staff members from Green Bay, La Crosse, Kansas City, and Washington, D.C. worked the weeklong event, which featured displays of weather instruments, live weather displays, and informative brochures. Staff members also conducted presentations about how pilots can effectively use automated weather information from airports.



NWS Setup at EAA AirVenture 2013

The Green Bay National Weather Service also participated in the 5th annual EAA Warbirds Fly-In at the Oconto Airport on September 14th. Attendees asked a variety of questions, including the Colorado floods that were in the national news, and local issues such as low water levels on the bay and Oconto River. Many people were interested in the winter weather outlook, and where they could find resources for expanding their weather knowledge. Display items included aviation weather posters, a weather radio, brochures, and weather instruments.

New Forecast for Lake Winnebago

Teri Egger, Marine Program Leader

This past June, the NWS office in Green Bay began a forecast for Lake Winnebago. The forecast will be available only during the boating season, May 1 through October 31. The forecast, both graphical and text is produced twice per day at approximately 4 am and 4 pm, with updates made when weather conditions become unrepresentative. A wave model is run by NWS in Green Bay which produces the wave height forecast for Lake Winnebago. Forecasters at NWS Green Bay develop the wind forecast that is used in the wave model. The wave model has been used on the Great Lakes and has been shown to do reasonably well. Forecasts are valid for either 36 or 48 hours dependent on issuance time. Forecast elements include winds, significant wave heights, sensible weather, and associated restrictions to visibility if applicable over the open lake waters.

This forecast is only available on our website **http://www.crh.noaa.gov/grb/?n=lk_winnebago**. Throughout this past boating season, we collected feedback from boaters to see how well the forecast did. Though only a few reports came in, those that did said it did well. Whenever any of you are out on Lake Winnebago, please remember us and contact **w-grb.webmaster@noaa.gov** with any suggestions, comments or questions.

Thanks to our Volunteers!

In striving to achieve a Weather-Ready Nation, NOAA's National Weather Service (NWS) in Green Bay could not perform its forecast and warning mission effectively without volunteers. Volunteer observer contributions are selfless and require personal commitment. Cooperative observers take and report daily weather observations, while weather spotters observe and report hazardous weather. Amateur radio operators ("hams") relay hazardous weather observations and serve as a backup communications source during unexpected communications outages. Further, several hams actually volunteer their personal time directly at our station, to establish and maintain communications equipment in support of our hazardous weather operations – this could be at any time of day – serving as a valuable "channel of information" for other hams in the field!

Cooperative observers record temperatures and precipitation every single day of the year. Some have done so for many years in succession, nearly a lifetime in some cases – that's incredible dedication! Their observations, carefully measured in accordance with NWS guidelines, provide us with important weather information which permits us to know what has truly happened "on the ground," and assists 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 by a wide variety of organizations, both in government and the private sector.

Weather spotters, after gaining new knowledge and/or refreshing their previous knowledge of hazardous weather spotting at our annual training talks, assist us during hazardous weather events, in real-time in any season of the year, providing us with reports of their observations. Although we have high-technology equipment, like radars and satellites, we still rely on observers' eyes to let us know what is truly happening "on the ground" so we can make appropriate warning decisions. Some spotters relay their reports via ham radio, where radio links are sometimes the only way we receive reports of hazardous weather.

Without the volunteer service of our observers, spotters and hams, we could not provide the weather services which are expected of us by our tax-paying community – the service of our volunteers directly supports our nation becoming Weather-Ready. We and the citizens of northeast Wisconsin are truly indebted to you!

Gary Austin
Meteorologist-in-Charge

Cooperative Observer Program Awards!

Name	City	Years
Marshfield Agriculture Station	Marshfield	100
Wisconsin Rapids Water Purification Plant	Wisconsin Rapids	75
Gary Zimmer	Laona	30
Mark Riegelman	Rest Lake	25
Keith Koster	New London	20
Marge Heinemann	Rhinelander	20
Gary Motowski	Peshtigo	15
Jerry Wagner	Summit Lake	10

From left, Arlington Agricultural Station Superintendent MikeBertram, Marshfield Ag Station Superintendent Nancy Esser, retired Superintendent Tom Drendel, Research Specialist Lisa Bauman, NWS Green Bay retired OPL Pat Hein and Research Specialist Tina Seeger

Dale Scheunemann (L), Superintendent and Operator Mike Zarn (R) from the Wisconsin Rapids Water Purification Plant

Gary Zimmer

Mark Riegelman

Keith Koster

Marge Heinemann & NWS Green Bay ESA Rob Hoag

Gary Motowski

Jerry Wagner

Long-Time National Weather Service Cooperative Observer Passes Away

The National Weather Service lost a dear friend and a dedicated weather observer last month. On September 10th, John Caskey passed away at the age of 98. Caskey started taking observations in 1945 for Wisconsin Valley Improvement Company as part of his duties as a dam tender of the Phelps Dam. Since that time, he measured over 2,000 inches of precipitation and more than 7,000 inches of snowfall, a miraculous feat in the Lake Superior Snow Belt region. In his NWS career, Caskey received many awards. The last award he received was the Helmet E. Landsberg award in 2007, recognizing over six decades of dedication in taking weather observations for the National Weather service.

In his spare time, Caskey loved the outdoors, as he was an avid hunter and fisherman. Caskey was also very active in his local community. He drove a school bus for many years, did caretaker work, and helped build homes. He also served on the City of Phelps Town Board for more than 44 years. While a board member, he helped to lay out and build many of the town roads. Caskey retired from the National Weather Service cooperative observer program in October 2009. We are very grateful for all of his years of service.

NWS Green Bay Using New Radiosonde

The National Weather Service in Green Bay is now using a new Lockheed Martin Sippican LMS-6 radiosonde for the upper air program. This new instrument replaced the Lockheed Martin Sippican Mark IIA radiosonde that had been in use since 2008. The radiosonde is an instrument that measures temperature, moisture, and wind. It is attached to a weather balloon and released twice daily at about 70 NWS offices across the continental U.S.

The LMS-6 radiosonde is lighter than the Mark IIA instrument and uses dry-cell batteries. It also provides improved accuracy of the relative humidity data. The NWS will continue to implement the LMS-6 radiosonde across the rest of the upper air network. Users of the upper air data will notice no changes in how the data is received.

For more info about weather balloons, please visit: **http://www.crh.noaa.gov/grb/?n=ua**

Old Mark IIA Radiosonde

New LMS-6 Radiosonde

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

Timely reports during and after snow, ice, and wind events provided important information to National Weather Service forecast staff, which resulted in more accurate warnings and advisories. Before you know it, arctic cold and snow will return to the area. Your accurate snowfall measurements will again be needed this season. 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**

Winter Weather Word Search

L C Q Q F V W B R W G S G T W I R P G C
L Z Y D R C I O H I E N U S W C A W O S
I K G R E U N Z K A V O V E U E G L L S
H V U S E T D A F W E R M C I S D Y N S
C M H B Z U Y I U T O I R B T T L O R B
D Z G C I M S N I Q C H J D A O W R Z I
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ACCUMULATION
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COLD
DRIFT
FREEZINGRAIN
GLOOMY
ICESTORM
ICING
SLEET
SNOW
SNOWSTORM
WHITEOUT
WINDCHILL
WINDY
WINTERSTORM

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