



NATIONAL WEATHER SERVICE GREEN BAY

PACKERLAND WEATHER NEWS

Winter 2017
Volume 15, Issue 2

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RECORD MULTI-TORNADO QLCS RACES ACROSS WISCONSIN ON 14 JUNE 2017

GENE BRUSKY, SCIENCE AND OPERATIONS OFFICER

During the morning hours of June 14, 2017, clusters of thunderstorms developed over eastern Iowa, and then organized into a large quasi-linear convective system or QLCS (Figure 1). The QLCS continued to intensify as it raced northeast at nearly 50 mph across central and east-central Wisconsin, producing widespread straight-line wind damage and several brief tornadoes (Map 1). Ten tornadoes were associated with this QLCS, which tied the record for the most tornadoes for a single event in northeast



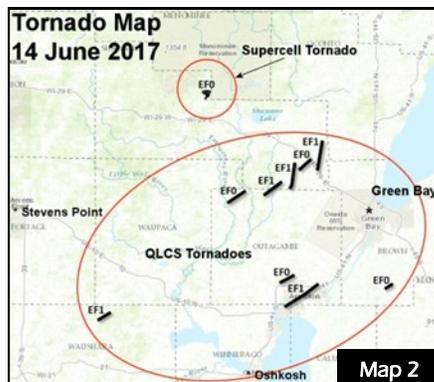
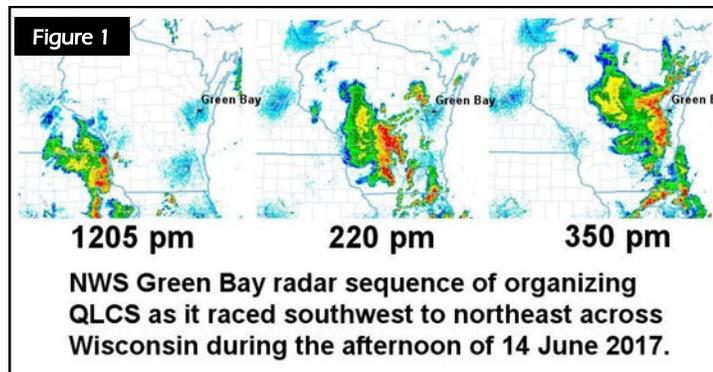
Wisconsin (Table 1). Nine of the ten tornadoes were associated with the primary QLCS, eight of which formed within about a 30 minute period (Map 2)! One brief tornado was also reported a couple hours earlier, associated with an

isolated supercell storm. The last multi-tornado QLCS event to strike northeast Wisconsin occurred during the early morning hours of August 7th, 2013, when six tornados formed within 45 minutes.

(continues on page 2)

LIVING THROUGH A HURRICANE

See page 11 for a first hand account of living through Hurricane Harvey, from a former NWS Green Bay employee and Ashwaubenon High School graduate, Sean Luchs.

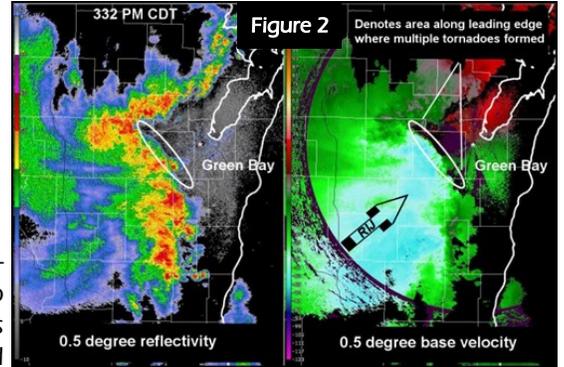


# Tors	Month	Day	Year	EF Scale	Comments
10	6	14	2017	1	Late afternoon QLCS
10	4	10	2011	3	Classic Supercells
7	6	4	2005	0	Mini (low-topped) Supercells
7	7	16	1997	2	Classic Supercells
6	8	6	2013	2	Very Early Morning QLCS

QLCS tornadoes present a difficult challenge for NWS warning decision makers. This is because they usually develop very rapidly and are short-lived, lasting only a minute or two. In addition, these tornadoes typically form at low levels, grow rapidly upward, and are quite small in diameter, making them difficult to detect especially at longer ranges. On June 14th, all but one of the QLCS tornadoes formed close to the radar (within 25 miles), thus allowing NWS meteorologists to detect them and issue warnings to alert the public.

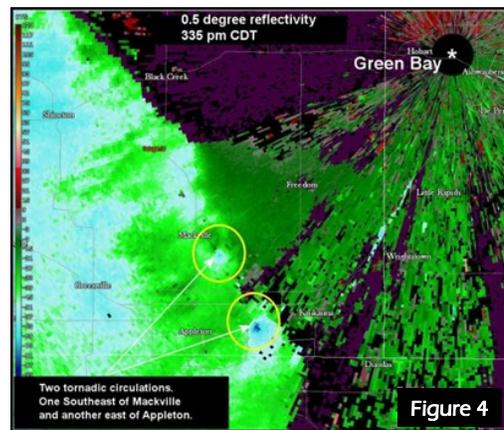
The right-half of **Figure 2** is the base velocity showing a large area of strong inbound winds blowing toward the radar (blue colors). This velocity feature is referred to as the rear inflow jet (RIJ). As a QLCS system organizes and grows larger,

it begins to draw air from mid-levels of the atmosphere into the back of the system. As this air stream descends and impinges on the leading edge of the system, a forward surge or bowing of the line will result. It is during this surging phase when QLCS tornadoes can develop. The tornadoes in this event formed along the leading edge of the bowing line segment, characterized by the leading edge of the rain-cooled air (gust front). As the gust front surged northeast, it lifted the moist and unstable air parcels ahead of it, stretching them vertically and getting them to spin-up quickly. This process is analogous to the ice skater that brings their out-stretched arms close to their body to increase their spin. **Figure 2** denotes the location where the QLCS tornadoes formed



along the leading edge of the squall line (circled area).

Figures 3 and **Figure 4** are close-up views of some of the tornadic circulations that formed right on the leading edge of the squall line. The circulation north of Nichols (**Figure 3**) and the circulation east of Appleton (**Figure 4**) both produced tornadoes with EF1 damage. The three photos shown below illustrate some of the tornadic damage that was surveyed near Nichols and Navarino, WI and a tornado captured east of Appleton, WI.



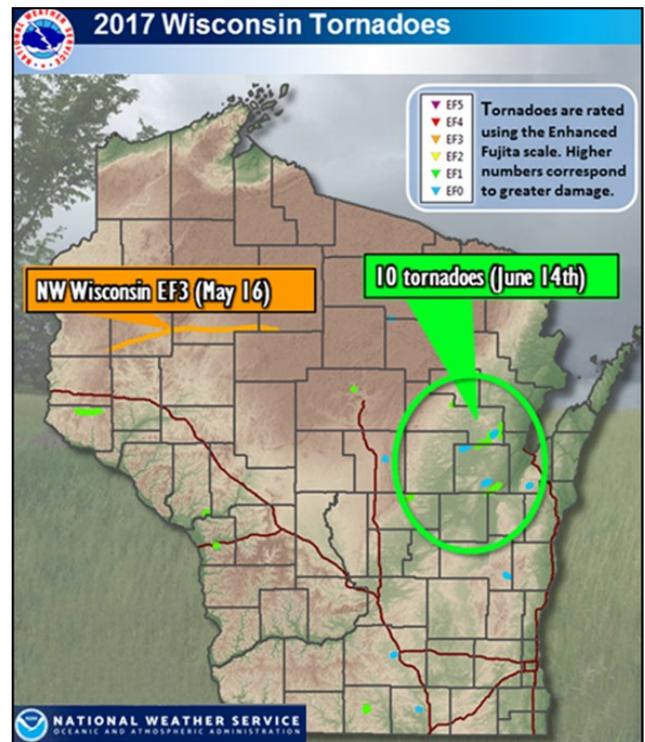
TWO BIG EVENTS HIGHLIGHT THE 2017 SEVERE WEATHER SEASON IN WISCONSIN

The severe weather season in northeast Wisconsin was typical of many springs and summers in this part of the state. The season started out quickly, with numerous bouts of severe weather in May, June, and the first half of July. Fewer severe storms occurred in August and September as drier weather prevailed.

The biggest outbreak of severe weather in northeast Wisconsin was on June 14, when severe thunderstorms produced ten tornadoes, hail, and straight-line wind gusts over 60 mph across the area. All ten tornadoes were "weak," but still resulted in over a half-million dollars in damage. The ten tornadoes

that occurred on that day was the largest single-day outbreak of tornadoes in the NWS Green Bay service area, tying the April 10, 2011 outbreak.

The state experienced 23 tornadoes in 2017, which is the long-term average. While northeast Wisconsin had the biggest outbreak of tornadoes in the state, the storm of the year was probably the May 16 EF3 tornado. That tornado, which occurred in the northwest part of the state, was on the ground for a record-setting 83 miles and moved across Polk, Barron, Rusk, and Price counties. One person was killed and 25 were injured in the storm.



Remember to visit www.weather.gov/grb for the latest watches, warnings, statements, and forecasts.

CENTRAL REGION DIRECTOR VISITS LAMBEAU FIELD

Central Region Director (and Pittsburgh Steelers fan) Chris Strager became a Green Bay



(Left-right) Jeff Last (GRB), Matt Lorentson (GRB), and Chris Strager (CRH), visiting the south end zone overlook atop Lambeau Field, the highest public-access point in the city of Green Bay.

Packers fan, if just for a day, during his July 25 visit to the Frozen Tundra. Chris, MIC Matt Lorentson, and WCM Jeff Last were given a VIP tour of Lambeau Field as part of promoting the WRN Ambassador program. Their visit included a look at the game day emergency operations center, as well as an overview of the many support needs required by an operation of this size.

In 2010, the Green Bay Packers became only the second NFL team to be recognized as a StormReady Supporter. The organization actively

works with the NWS Green Bay office to promote severe weather safety through awareness activities and weather safety training in an effort to better protect fans and spectators of events at Lambeau Field.

Packers emergency planning coordinator, Jeff Stauber, discussed game day weather operations with Chris and Matt, and how NWS Green Bay provides decision support service to local emergency management in support of Packers security officials.

2017-18 WINTER FORECAST: LA NIÑA CONDITIONS EXPECTED

ROY ECKBERG, METEOROLOGIST

Although thousands of miles away from Wisconsin, the temperature anomalies across the equatorial Pacific Ocean (Figure 1) can have a big impact on winter temperatures across the Upper Midwest. Scientists monitor the water temperature anomalies across the Niño 3.4 region. For an El Niño to occur, water temperatures anomalies of +0.5 C or greater must occur for five consecutive months. For a La Niña to occur, the water temperatures anomalies of -0.5 C or greater must also occur for five consecutive months.

The temperature anomalies in the equatorial Pacific Ocean can

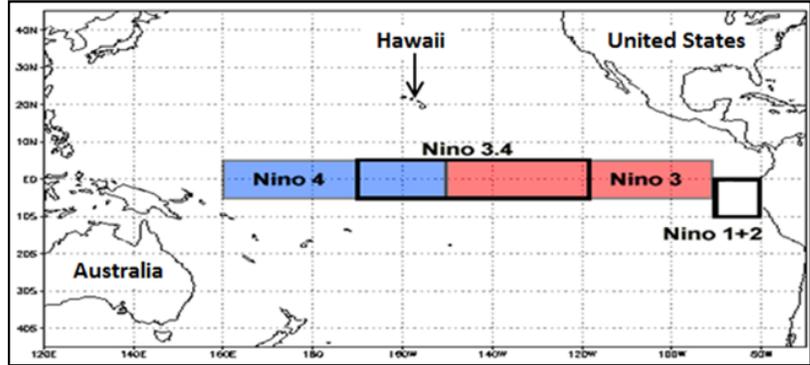


Figure 1: Niño regions for monitoring water temperature anomalies.

towards the Mid-Atlantic States. This pattern usually leads to more arctic intrusions into the western Great Lakes region, resulting in an increased chance for below normal winter temperatures.

Last fall (2016), moderate La Niña conditions prevailed. The cooler waters over the Niño 3.4 (Figure 3) gradually warmed this spring and continued through the summer. At times, water temperature anomalies were approaching weak El Niño conditions. However, by late July the warm waters began to cool and continued to cool even more during August and September. As of mid-October, water temperature anomalies were approaching weak La Niña (-0.5 C).

Based on the cooling waters and model forecasts, the Climate Prediction Center (CPC) issued a La Niña Advisory for the upcoming winter. The latest climate models are indicating a weak to moderate La Niña is likely.

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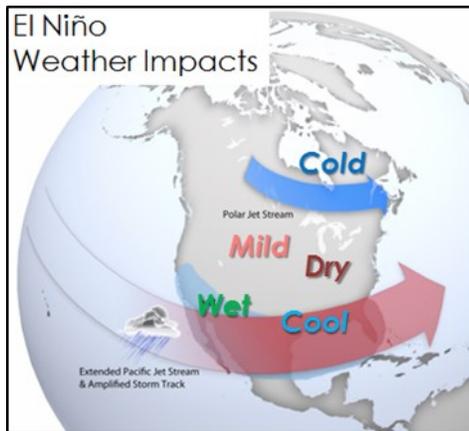
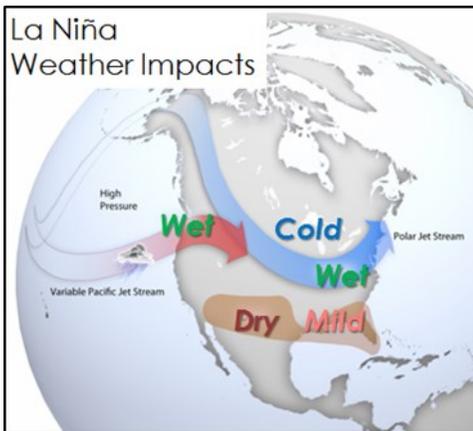


Figure 2: Typical jet stream patterns associated with El Niño/La Niña.

have a major impact on the location and magnitude (see Figure 2) of the jet stream. During an El Niño winter, the sub-tropical jet stream is stronger than normal while the polar jet is weaker. This pattern usually leads to fewer intrusions of arctic air into the western Great Lakes and a greater likelihood of milder than normal temperatures during the winter months. When La Niña conditions are occurring, a ridge of high pressure dominates the western United States. The jet stream moves northward towards Alaska, and then dives southeast

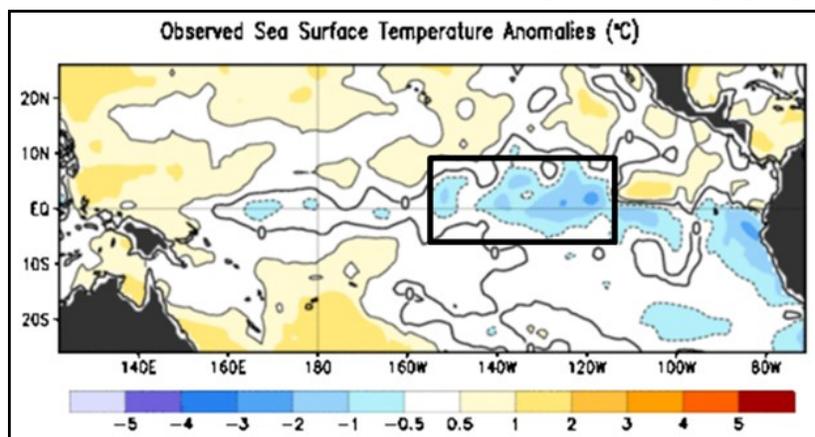


Figure 3: Temperature anomalies across the Equatorial Pacific.

(Black Box denotes the Niño 3.4 region.)

What does that mean for the upcoming winter across north-central and northeast Wisconsin? The current forecast (see **Figure 4**) from the Climate Prediction Center (CPC) indicates equal chances of above, below, or near normal temperatures for the upcoming winter (December-February). The climate models also indicate there is

a greater chance for above normal precipitation for the upcoming winter across the area. (**Figure 5**).

A closer inspection of previous La Niña winters at Green Bay indicates a greater chance for below normal temperatures. The strongest signal for below normal temperatures occurred when weak La Niña conditions were present in the

equatorial Pacific Ocean. Precipitation trends would suggest wetter and snowier conditions compared to normal. Although the odds would favor a colder and snowier winter, there is still a chance of above normal temperatures and less snow than normal. Only time will tell what mother-nature has in store for us!

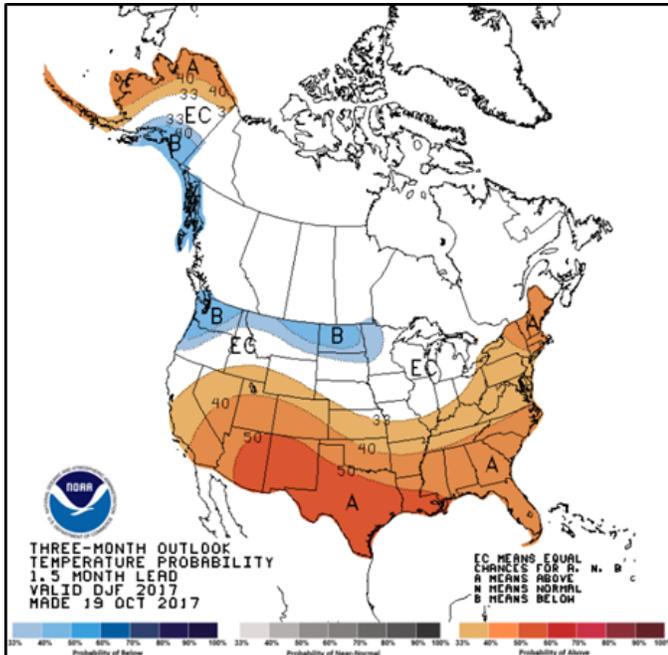


Figure 4: Winter (Dec-Feb) Temperature Forecast.

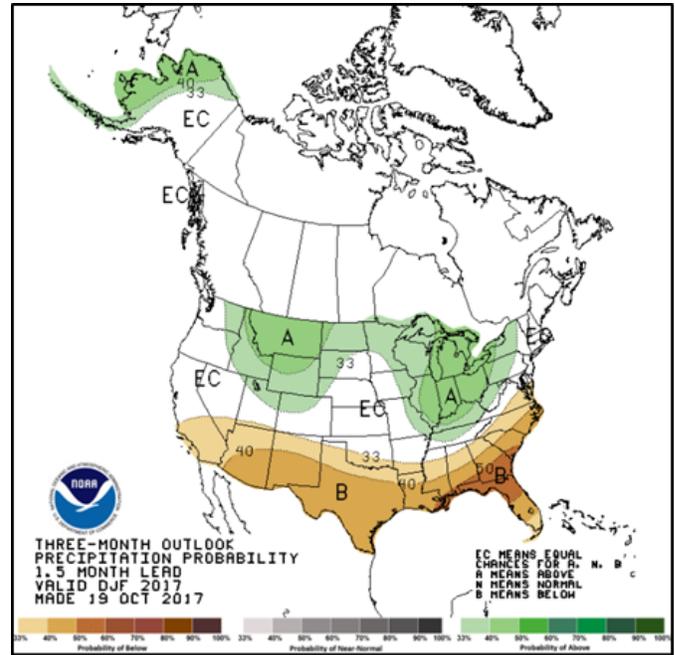


Figure 5: Winter (Dec-Feb) Precipitation Forecast.

EARLY AND LATE SEASON SNOWFALLS

RICH MAMROSH, LEAD METEOROLOGIST

Snow is a frequent visitor to northern and central Wisconsin from November to March, but sometimes falls as early as September or as late as May. Heavy snow in September or early October falls on the leaves of trees, resulting in fallen branches and power lines. Snowfalls in May often freeze new vegetation and buds on trees. The list on the right has an assortment of 24 hour early and late season snowfalls from across the area. Please note that record keeping varied at times through the years, so some of the records listed are not calendar day totals.

Place	Early Season Snow		Late Season Snow		Records Began
	Date	Amount	Date	Amount	
Appleton	October 12, 1909	2.8"	May 29, 1947	3.5"	1893
Antigo	September 28, 1899	2.5"	May 8, 1923	5.0"	1894
Brillion	October 7, 2000	1.0"	May 9, 1990	5.5"	1924
Green Bay	October 13, 1936	2.5"	May 28, 1947	3.0"	1886
Hancock	October 10, 1990	4.0"	May 2, 1940	5.0"	1902
Kewaunee	October 12, 1909	2.4"	May 29, 1947	2.0"	1908
Lac Vieux Desert	October 13, 2006	4.0"	May 6, 1979	6.0"	1908
Long Lake	October 9, 1932	1.9"	May 7, 1960	8.0"	1908
Manitowoc	October 12, 1909	2.5"	May 2, 1940	4.0"	1893
Marinette	October 19, 1976	2.0"	May 8, 1923	5.0"	1919
Oconto	October 19, 1976	4.0"	May 1, 1911	6.0"	1893
Oshkosh	October 25, 1898	2.0"	May 2, 1940	4.5"	1893
Phelps	September 27, 1942	6.0"	May 7, 1960	6.5"	1910
Rhineland	October 13, 2006	3.0"	May 7, 1960	7.0"	1893
Shawano	October 11, 1990	1.5"	May 11, 1990	4.5"	1893
Stevens Point	October 10, 1932	2.0"	May 10, 1902	5.0"	1893
Sturgeon Bay	October 12, 1909	4.0"	May 1, 1911	9.0"	1905
Waupaca	October 11, 1990	4.5"	May 10, 1902	4.0"	1895
Wausau	September 26, 1942	2.0"	May 2, 1935	5.5"	1893
Wausaukee	October 22, 1902	4.5"	May 10, 1990	5.0"	1897
Wisconsin Rapids	October 10, 1990	3.0"	May 8, 1906	2.0"	1903

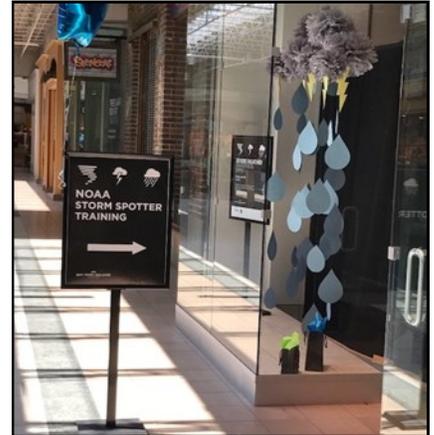
BAY PARK SQUARE RECOGNIZED BY NWS

Bay Park Square, the largest mall in Green Bay, was recently recognized as a 2017 Weather-Ready Nation (WRN) Ambassador of Excellence by the National Weather Service (NWS).



The WRN Ambassador initiative is the NWS's effort to recognize partners who are improving the nation's readiness against severe weather events. The Excellence recognition honors Ambassadors for their outstanding work and contributions to building a Weather-Ready Nation. Bay Park Square held its first ever Severe Weather Awareness Expo in April 2017, where dozens of vendors, two television stations, and the NWS, staffed information booths and conducted seminars. The event drew hundreds of people to the mall where they learned how to prepare before, be safe during, and recover after a storm.

Your organization can become a Weather-Ready Nation Ambassador, too! For more information, visit: www.weather.gov/grb/wrn



NWS GREEN BAY RADAR RECEIVES UPGRADE

TASOS KALLAS, METEOROLOGIST



The Doppler weather radar (WSR-88D) at the National Weather Service in Green Bay was down for much of the week of October 23-27 as technicians installed an important technological upgrade. The work on the WSR-88D was scheduled to minimize any potential impacts to office operations.

During the outage, radar data from the NWS Green Bay WSR-88D was unavailable. Surrounding radars (Milwaukee/La Crosse/Duluth/Marquette) were utilized by

NWS Green Bay staff to continue to issue warnings and statements to keep the public safe.

The radar technician crew:

- Deployed a new, state of the art digital signal processor capable of supporting algorithm upgrades for the foreseeable future.
- Incorporated the antenna positioning control functions in software
- Interfaced the computer to system sensors such as backup generator fuel level, temperature sensors, etc.

Did you know: the WSR-88D is considered by many to be the most powerful radar network in the world, each transmitting at 750,000 watts! (An average light bulb is only 75 watts.)

This is the first of four major upgrades, known as Service Life Extension Program (SLEP), planned over the next five years to update major components



of the 20+ year old WSR-88D's and to keep the radars operational into the 2030's. The \$150 million investment, which covers all NWS radars across the country, is being made by three organizations that use these radars: the NOAA National Weather Service, United States Air Force, and Federal Aviation Administration. Other future projects scheduled for the NWS Green Bay radar include refurbishing the transmitter and pedestal.

For more information, please visit: <https://www.roc.noaa.gov/WSR88D/SLEP/SLEP.aspx>

METEOROLOGIST INTERN JOINS NWS GREEN BAY

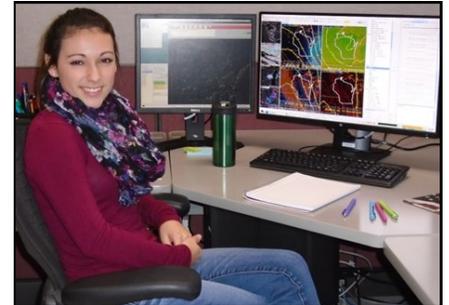
LINDA S. SKOWRONSKI, ADMINISTRATIVE SUPPORT ASSISTANT

Rebecca Hykin joined the staff at the National Weather Service office in Green Bay, Wisconsin on September 5 as a Meteorologist Intern.

Hykin received a Bachelor of Science Degree in Earth Sciences with an emphasis in Meteorology from the University of Northern Colorado in Greeley, Colorado. Following graduation, she accepted a position as a Weekend Meteorologist/Multi-Media

Journalist for Nexstar Media Group working at KREX-TV in Grand Junction, Colorado. While with KREX-TV, Hykin provided live on-air weather broadcasts as well as researched, filmed, edited and presented stories for daily newscasts. Her work in broadcasting will be helpful in communicating important weather information to the emergency management community and the public.

We wish her a rewarding career with the National Weather Service.



NATIONAL WEATHER SERVICE AT EAA AIRVENTURE

The National Weather Service was just one of several Federal Agencies that took part at the Experimental Aircraft Association's Airventure in July. As part of the mission to protect life and property, the NWS produces aviation forecasts and advisories to help foster safe and efficient flight.

Nearly 600,000 people from around the world attended Airventure last summer.

Staffing the booth were meteorologists from the Aviation Weather Center in Kansas City, two Center Weather Service units, and local forecast offices in Green Bay and Milwaukee. Owlie Skywarn (pictured on the right) also made an appearance.

The NWS information booth featured computer workstations with real

time weather data that meteorologists could discuss with pilots, a hurricane simulator, a display of a new generation of weather satellites, and examples of different weather sensors that are installed on commercial aircraft.



NATIONAL WEATHER SERVICE AT CAREER FAIR



Two meteorologists from the National Weather Service in Green Bay attended the 8th grade Career Exploration Fair in Oshkosh this October. This one-day event hosted more than 800 eighth grade students in both public and private schools where they learned about different careers options. The NWS booth featured information on

working for the NWS, different careers within NOAA, weather safety, and included a "teaching tornado" where the students learned how/why tornados form. The students asked many questions about what it is like to work at the National Weather Service and how we predict the weather.

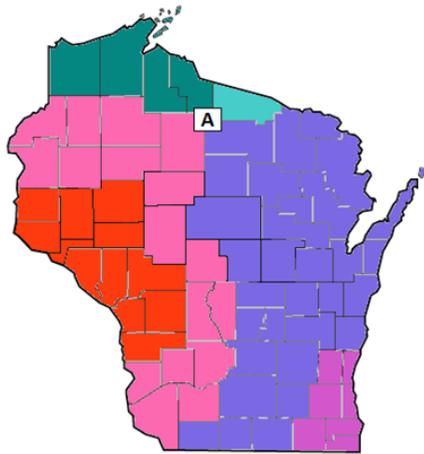
SIMPLIFIED WINTER WATCH, WARNING, AND ADVISORY HEADLINES START THIS SEASON

KIRA BENZ, METEOROLOGIST

Winter weather impacts everyone. Whether there are snow flurries on a Friday night, blizzard conditions on a Tuesday morning, or any condition in between, each event poses different impacts.

When weather conditions are expected to deteriorate, the National Weather Service (NWS) will issue the appropriate weather Watch, Warning, or Advisory (WWA) headline to alert the public of the forecast conditions. In the past, the name of the headline often reflected the expected weather. For example, “Freezing Rain Advisory” or “Lake Effect Snow Warning.” This year, these headlines will change, but it’s important to note that our service will not change.

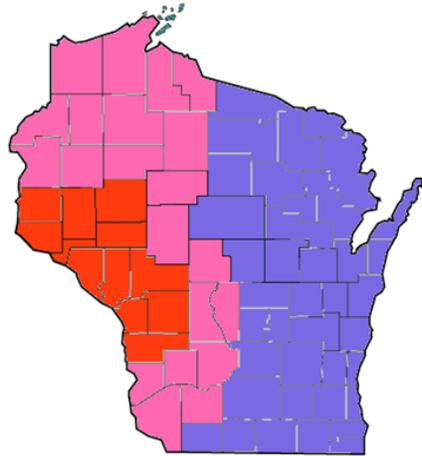
To put the change in perspective, headlines during a winter storm may have looked like **MAP 1**.



MAP 1

- Blizzard Warning
- Winter Storm Warning
- Lake Effect Snow Warning
- Lake Effect Snow Advisory
- Winter Weather Advisory
- Freezing Rain Advisory

Now, the same event would look like **MAP 2**.



MAP 2

- Blizzard Warning
- Winter Storm Warning
- Winter Weather Advisory

This is not the first time WWA headlines have gone through a change. (Anyone remember the “Travelers Advisory” of the 80s?) The current WWA structure was implemented in the 1990’s, and over the years the number of headlines grew. So much so that there were as many as 127 possible headlines you could come across! It can be overwhelming to know and understand the specific

requirements for each. It can also be challenging to communicate multiple weather headlines when they intersect the same area. (see **point A on MAP 1**).

The NWS began considering consolidation of these headlines in 2011. After collecting data and feedback from users and social scientists during the past few years, some changes were implemented for the 2017-2018 winter season. One of the main goals is to focus less on the actual WWA headline, and more on how each event will affect people.

For Wisconsin, WWA headlines will be consolidated into five main categories you should know. They are:

- ◆ **Winter Storm Watch**
- ◆ **Winter Weather Advisory**
- ◆ **Winter Storm Warning**
- ◆ **Blizzard Warning**
- ◆ **Ice Storm Warning**

Graphic 1 (below) explains the meaning of each headline.

(continues on page 9)

SAME SERVICE...SIMPLER PACKAGE

WINTER WEATHER

Winter Storm Watch

... for **potentially significant** weather, including heavy snow, ice, sleet, blowing snow

Winter Weather Advisory

...when snow, blowing snow, ice or sleet is expected, but is expected to cause relatively **minor inconveniences**

Winter Storm Warning
Blizzard Warning
Ice Storm Warning

... when snow or sleet, blowing snow or ice accumulation is expected to cause **significant impact to life or property**

National Weather Service Hazard Simplification

Although the number of headlines has been reduced, specific information about what type of weather is expected and how it will impact you will be more clearly and concisely provided in the weather message.

The main points to take away from this change are (1) winter weather headlines are now consolidated into five options in Wisconsin, (2) the details for each event are more clearly presented in the messaging, and (3) the weather message will focus on impacts for the specific event.

Changes to the winter weather messages are just the beginning.

Next up, flood headline consolidation will gradually begin in spring 2018. Many of the flood weather messages will also follow the same WHAT, WHERE, WHEN, etc., formatting. Information about the entire Hazard Simplification plan can be found at

www.weather.gov/hazardsimplification



Winter Weather Safety Talks

11-27

Wausau @ 6:30pm

UW-Marathon County, Lecture Hall 180

11-28

Chilton @ 6:30pm

Chilton Public Library, 221 Park Street

(No registration required for talks)

WANTED: WINTER WEATHER OBSERVERS!

The National Weather Service in Green Bay is looking for volunteer winter weather observers across north-central and northeast Wisconsin.

Rain, sleet, freezing rain, and snowfall amounts can vary widely from location to location, and we need your help to try and fill in these gaps.

The National Weather Service has a weather observation network that reports snow totals, but they are sometimes too far apart to detect localized situations. That is why winter weather observers are needed across Wisconsin. During winter weather events, you can measure snowfall or ice accumulation in your area and

report that to the National Weather Service Green Bay office on Facebook, Twitter, or our website.

The National Weather Service and your local community thank you for all your input. Every weather report is valuable and essential to the forecast process and to keep people safe.

Six Basic Steps for Properly MEASURING SNOW

Accurate and timely snowfall measurements are extremely important to your National Weather Service office, your community, local media, and many others. Here are the six steps you need to know for measuring snow:

- 1 Supplies**
Ruler or yard stick
24" X 24" white board, flag
- 2 Planning**
Find an open area away from tall objects, but sheltered from wind
- 3 Set-up**
Set up before snow begins
Put your board out and mark it with the flag
- 4 Measuring Snow**
Record your total to the nearest tenth of an inch
Wipe the board off after measuring
Measure once daily at the same time, after measuring place the board on top of snow
- 5 When Snow Stops**
Measure as soon as the snow stops to avoid lower totals due to melting, settling and drifting
- 6 Reporting**
weather.gov
social media
SEND us your report!

COOP AWARDS

20 YEARS



Bob Friberg (left) from Florence Co. WWTP receives a 20 year award from OPL Scott Cultice

15 YEARS



Scott Cultice of Appleton receives a 15 year award with his dog Sophie



Current and former staff of the NWS Green Bay receive a 15 year award (accepted by their weather equipment)



Lew Miller, Erika Sisel, and Steve Zellner (left to right) from Denmark receive a 15 year award



10 YEARS



Richard Olson (left) from Forestville receives a 10 year award from OPL Scott Cultice



Andrew Vitek, Brian Hewlett, Tom Unti, Gabe Aschbacher, and Aaron Benson from the Marinette WWTP receive a 15 year award



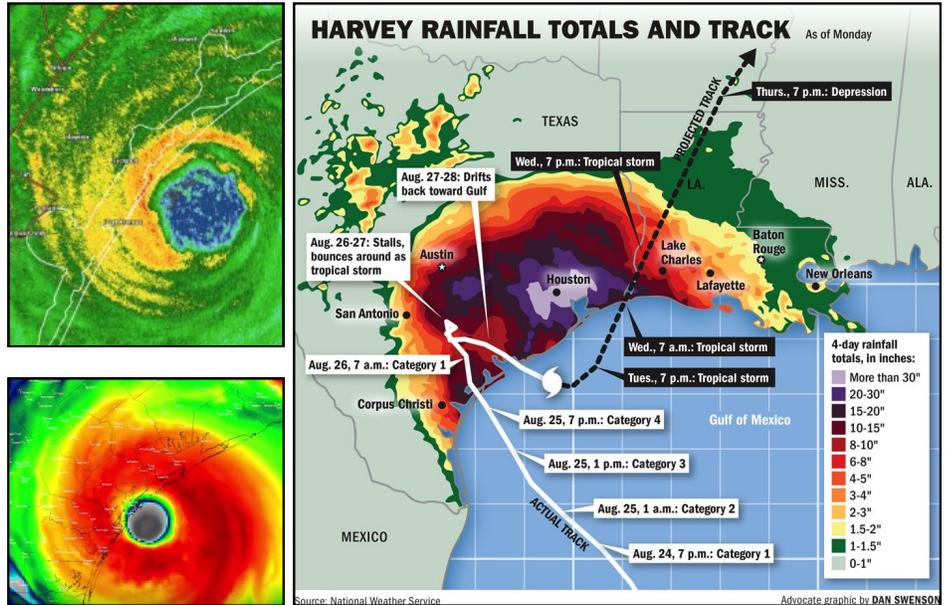
Paul Meyers (left) from Lakewood receives a 10 year award from OPL Scott Cultice

LIVING THROUGH HURRICANE HARVEY

Hurricane Harvey brought catastrophic flooding to southeast Texas in late August. Harvey made landfall as a Category 4 hurricane with winds of 130 mph near Rockport, TX. Harvey then meandered around southern Texas for days as it weakened to a tropical storm.

Sean Luchs, an Ashwaubenon High School graduate and former meteorologist at the NWS Green Bay, lived through this devastating hurricane.

For Sean's story, including first hand accounts of living through this hurricane from both at home and at work, please visit: www.weather.gov/grb/Harvey



LONG-LIVED HURRICANE IRMA SETS SEVERAL RECORDS

PHIL KURIMSKI, LEAD METEOROLOGIST

On August 30, 2017, Tropical Storm Irma formed near the Cape Verde Islands, and within 24 hours, rapidly intensified to a Category 2 hurricane on the Saffir-Simpson scale. The hurricane would remain a Category 2 or 3 hurricane for the next few days, until strengthening to a Category 5 hurricane on September 4.

The hurricane would reach its maximum intensity on September 6 when winds increased to 185 mph (highest this hurricane season) and

its central pressure dropped to 914mb (2nd lowest this hurricane season behind Hurricane Maria). This hurricane maintained 185 mph winds for a record setting 37 hours, beating the previous record of 24 hours by Typhoon Haiyan in 2013 and stayed a Category 5 storm for 3.25 days of its life, tying a record set by the Cuba Hurricane of 1932.

The hurricane would be responsible for 134 deaths and over \$62 billion damage as it tracked through the Caribbean Islands and southeastern U.S., making it the 4th costliest hurricane on record. The hurricane swept through the island of Barbuda at full strength, making the island uninhabitable and empty of inhabitants for the first time in 300 years. The hurricane would become a tropical depression over the southeastern United States on September 11th. As the hurricane moved toward the U.S., the NWS Green Bay office had a small role to



play in the forecasting of the hurricane. The local office, along with dozens of others in the central and eastern U.S., launched extra weather balloons as the storm approached Florida. The increase in weather balloon launches from two to four better sampled the upper atmosphere and provided additional data to computer forecast models. Those models were critical to accurately forecasting the northward turn as the hurricane approached southern Florida.



Hurricane Irma approaching Anguilla on September 6th

5 Things to Know about Winter Weather Forecasts

- ### 1 Snow or ice totals can vary greatly over short distances

A heavy snow band may form, dropping more snow in one location while significantly less snow falls just a few miles away.
- ### 2 Winter forecasts can change frequently

Forecasts may change as new model data becomes available. Always check weather.gov for the latest information.
- ### 3 Focus more on the winter storm's impacts

Don't focus too much on exact numbers, and consider the full range of possibilities.
- ### 4 Know your winter weather terminology

If a Watch is issued, get prepared for hazardous weather. If a Warning or Advisory is issued, take action – hazardous weather is occurring or will occur soon.
- ### 5 Rely on a dependable source for weather info

Choose your information sources wisely, and follow a name or organization you know and trust.

For more information on winter weather safety, visit:
weather.gov/winter

Winter Storm Watch Checklist

IF A WATCH IS ISSUED:

- Prepare to **change or cancel** plans for if a **warning** is issued
- Fill** cars with gas
- Prep** generators if available
- Gather your **emergency kit**, which should include at least:
 - Bottles of water
 - Blankets
 - Hats and gloves
 - Shoes and thick socks
 - Flashlights and extra batteries
 - First aid kit
 - Emergency contact information
 - Any prescriptions
 - IDs
- Check back** to local news or weather websites for any updates on potential winter weather impacts and warnings
- Charge your phone** so it has a full battery
- Have your **NOAA weather radio** available with new batteries

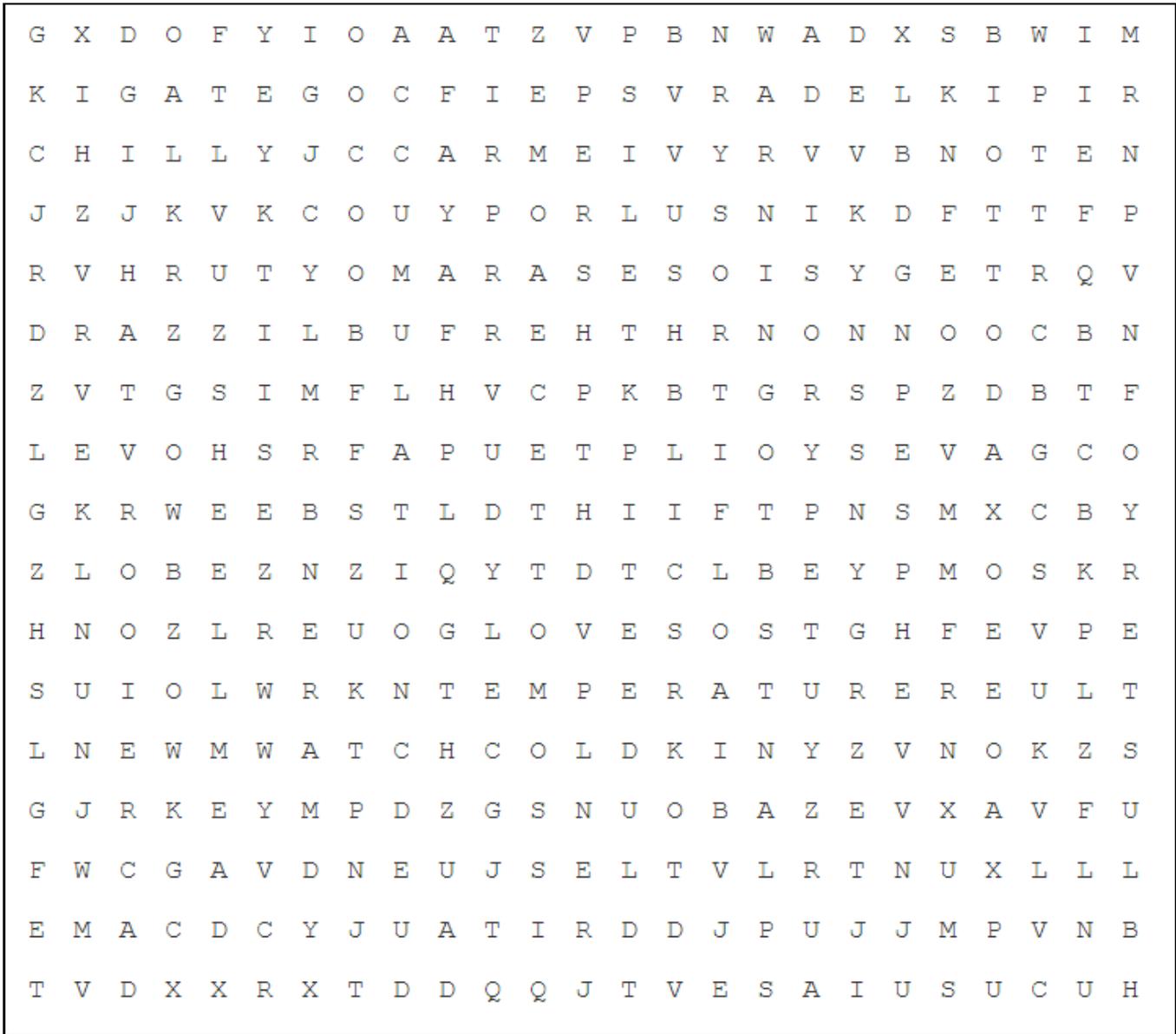
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WITHOUT A PLAN, YOU MAY BE AT RISK!

- Communicate!**
 - Discuss with your family what to do in a weather emergency
 - Have multiple way to receive weather alerts
- Plan!**
 - Learn about possible weather hazards
 - Check the weather everyday for possible upcoming hazardous conditions
- Prepare!**
 - Build an emergency preparedness kit
 - Have a NOAA Weather Radio
 - Run through school or office weather drills

BE A FORCE OF NATURE

WINTER WEATHER WORD SEARCH



ACCUMULATION

ADVISORY

ARCTIC

BLIZZARD

BLUSTERY

CHILLY

COLD

FREEZING



FROSTBITE

FROZEN

GLOOMY

GLOVES

HYPOTHERMIA

MITTENS

OBSERVER

SHOVEL



SLEET

SLIPPERY

SNOW

SPOTTER

TEMPERATURE

WARNING

WATCH

WINDY



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