NATIONAL WEATHER SERVICE
GREEN BAY

PACKERLAND WEATHER NEWS

Spring/Summer 2018

Volume 16, Issue 1

ARE YOU READY FOR SEVERE WEATHER?

This is the time of year when you should start thinking about the severe weather season. It's never too early to prepare for severe summer storms. Each year across the U.S., many people are killed or seriously injured by tornadoes and severe thunderstorms despite advance warning.

Some do not hear the warning, while others receive the warning but do not believe it will happen to them. Preparing before the storms strike could save your life. Here's what you can do before severe weather hits:

- Develop a plan for you and your family at home, work, school, and outdoors.
- Identify a safe place to take shelter.
- Have frequent drills.
- Know the county name in which you live or visit.
- Keep a highway map nearby to follow storm movement from weather bulletins.
- Use a mobile weather app to monitor severe weather.
- Have a NOAA Weather Radio with a warning alarm and battery back-up.
- Check the weather forecast before going outdoors for extended periods.
- When going outdoors, bring along a portable weather radio.
- Watch for signs of approaching storms: **"When thunder roars, go indoors!"**

When conditions are favorable for severe weather to develop, the National Weather Service issues a severe thunderstorm or tornado WATCH. A severe weather watch is usually issued two to six hours before storms develop. When a watch is in effect, keep an eye on the sky and stay tuned to a weather radio or local media for weather updates.

When severe weather begins to develop, WARNINGS are issued to alert the public and emergency officials. Warnings for severe weather are usually issued 10 to 60 minutes before the storms hit. When a warning is issued for your area, put your emergency weather plan into action.

See pages 2, 3 and 4 for more safety information. Our website is also a great source of weather safety tips and information:

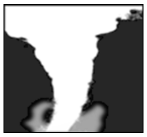
https://www.weather.gov/grb/prep

Inside this issue:

Read about the 130th Anniversary of Green Bay's Largest Snowstorm on page 8

SEVERE WEATHER FACTS AND SAFETY INFORMATION

TIMM UHLMANN, METEOROLOGIST



TORNADOES

A tornado is a violently rotating column of air extending from a thunderstorm to the ground. On average, 1,200 tornadoes cause 60-65 fatalities and 1,500 injuries nationwide. Wisconsin is on the far northern edge of Tornado Alley, and averages 23 tornadoes each year.

- The average tornado moves at approximately 30 mph, but can move up to 70 mph or remain stationary.
- Tornadoes can be transparent until they pick up enough dust and debris.
- Tornadoes typically move from southwest to northeast, but are capable of moving in any direction, as well as suddenly changing their direction of motion.
- Tornado intensity is determined by the Enhanced Fujita (EF) Scale, which uses storm damage to estimate wind speed (right).

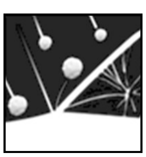
EF- SCALE	
EF RATING	3 Second Wind Gust (mph)
0	65-85
1	86-110
2	111-135
3	136-165
4	166-200
5	Over 200

Safety:

- **Stay inside.** An underground shelter, basement or safe room is best. Otherwise, move to a windowless interior room or hallway.
- Do **NOT** use an overpass for protection if caught outside or in a vehicle.
- Mobile homes are **NOT** safe during a tornado. Make sure you have a plan in place identifying nearby sturdy buildings!

Average Wisconsin Tornado Statistics:

- Strength: 1 on the EF scale
- Duration: 7.1 minutes
- Path Length: 3.7 miles
- Width: 118 yards
- Statistically, 4 out of every 5 tornadoes in Wisconsin occur from May to August.
- February is the only month that does not have a recorded tornado in Wisconsin.



HAIL

Strong rising currents in the storm, called updrafts, carry water droplets to heights where they freeze. Ice particles can then grow until they become too heavy for the updraft and fall to the ground as hail.

- Hail is larger than sleet and forms only in thunderstorms.
- Large hailstones can fall at speeds up to 100 mph.
- Hail often damages crops, and in larger sizes, can injure people, and damage cars and structures. **Find shelter when hail is falling!**
- Hail an inch or larger in diameter is considered severe.
- The largest hailstone ever measured fell in Vivian, South Dakota, in July 2010. It measured nearly 8" in diameter and weighed nearly 2 pounds!

Damaging Winds

Damaging winds are caused by outflow from a thunderstorm. These winds are known as "straight-line" winds, as they are not associated with any rotation within the storm; this differentiates them from damage associated with tornadoes. While gusts as little as 30-35 mph can bring down tree branches and impact power lines, severe damaging winds are classified as those near 60 mph or greater.

Wind Facts:

- Over half of all severe reports in the continental U.S. are wind damage reports.
- Straight-line winds can exceed 125 mph (strength of an EF2 tornado!).
- A downburst is a small area of rapidly descending air beneath a thunderstorm. These can occur both with and without rain reaching the ground. Damage can be equivalent to a strong tornado (see image on the right).
- A gust front is the leading edge of rain-cooled air and wind created by thunderstorms, sometimes associated with a shelf or roll cloud.

Flooding

Over the last 30 years in the U.S., floods and flash floods have killed more people than any other thunderstorm event. It is easy to underestimate the power of moving water. Most flood-related fatalities occur in vehicles trying to cross flooded roads or when walking in or near flooded waters. Fast water can easily carry away people and vehicles. It can be nearly impossible to tell how deep the water is or if the road has been washed out. It is NEVER safe to drive or walk through flood waters.

Flooding Facts:

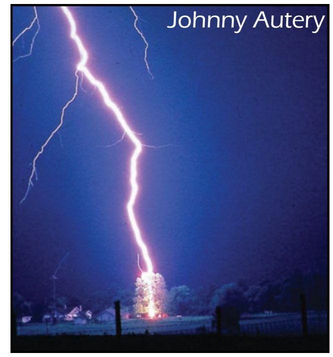
- **As little as 6 inches** of moving water can knock over a grown adult.
- **12 inches** of rushing water can carry away a small car.
- **2 feet** of water is enough to carry away most vehicles.
- More than half of all flood-related drownings occur when a vehicle is driven into hazardous flood waters.
- TURN AROUND, DON'T DROWN!

Common Types of Flooding:

<u>Flash flood</u> – A flood caused by heavy or excessive rainfall in a short period of time, generally less than 6 hours. Flash floods are usually characterized by raging torrents after heavy rains rip through river beds, urban streets, or mountain canyons, sweeping everything before them. They can occur within minutes or a few hours of excessive rainfall. They can also occur even if no rain has fallen. For instance, after a levee or dam has failed, or a sudden release of water occurs due to debris or an ice jam, hazardous flood conditions may develop.

<u>Areal Flood</u> – The inundation of a normally dry area caused by rising water in an existing waterway, such as a river, stream, or drainage ditch. Flooding is a longer term event than flash flooding: it can take days to occur and may last days or weeks.

LIGHTNING



Lightning is one of the most underrated weather hazards, but ranks as one of the top weather killers. All thunderstorms, whether severe or not, contain lightning. On average, 300-400 people each year are struck by lightning in the United States. While approximately 10% of lightning strike victims die, many survivors live the rest of their lives with intense pain, neurological disabilities, depression, and other health problems.

Lightning Quick Facts:

- Lightning is HOTTER than the surface of the sun and can reach temperatures around 50,000°F.
- Lightning can, and often does, strike the same place repeatedly. The Empire State Building gets struck numerous times each year.
- Most lightning victims are in open areas or under a tree.
- Cape Canaveral Air Force Station/Kennedy Space Center has documented lightning traveling almost 90 miles outward in a thunderstorm anvil.
- If you can hear thunder, you're close enough to be struck by lightning.
- Lightning strikes the United States about 25 million times a year.

Common Myths About Lightning

MYTH: If it is not raining, then there is no danger from lightning.

FACT: Lightning often strikes outside of heavy rain and may occur as far as 10 miles away from any rainfall.

MYTH: The rubber soles of shoes or rubber tires on a car will protect you from being struck by lightning.

FACT: Rubber-soled shoes and rubber tires provide NO protection from lightning. The steel frame of a hard-topped vehicle provides increased protection if you are inside AND not touching metal.

MYTH: People struck by lightning should not be touched because they carry an electrical charge.

FACT: Lightning-strike victims do NOT carry an electrical charge and should be helped immediately. Anyone who has been hit by lightning requires immediate professional medical care. Call 911 and monitor the victim. Start CPR or use an Automated External Defibrillator if needed.

MYTH: If stuck outside, crouch or lie prone to reduce the chance of being struck.

FACT: Crouching or lying on the ground does not reduce your chance of being struck. In fact, it may increase your chance of being susceptible to ground current from nearby strikes. Seek shelter in a vehicle or indoors!

MYTH: Staying underneath a tree to keep dry is safe.

FACT: Being underneath a tree is the second leading cause of lightning casualties.

TIPS TO KEEP YOU SAFE:

Plan. Know where to go and how to get there should thunderstorms form during outdoor activities.

Postpone. If thunderstorms are forecast, consider delaying your plans.

Monitor. Keep an eye on the sky. Look for developing storms in the forms of towering clouds, darkening skies, or flashes of lightning.

SEEK SAFE SHELTER. If you hear thunder, even in the distance, seek shelter and safety immediately. Fully enclosed buildings are safe. Most picnic shelters, sheds, tents, and covered porches do not provide lightning protection.

HELP BUILD A WEATHER-READY WISCONSIN!

The impacts of weather events like severe thunderstorms, tornadoes, widespread flooding, drought, and blizzards, can be reduced by taking action; this is what the Weather-Ready Nation (WRN) initiative is all about. Building a weather-ready U.S. takes well-informed communities, businesses, and individuals, that are ready, responsive, and resilient to extreme events. This requires the participation and commitment of a vast nationwide network of "Ambassadors"—entities who contribute by promoting weather safety, not only within their company or organization, but to the general public as well.

If your organization or business is committed to weather safety, willing to help spread the word, and inspire others to take action, the National Weather Service wants to recognize your work! Join the hundreds of Ambassadors in Wisconsin and help our state become weather-ready. For more information and to complete an application, visit:

http://www.weather.gov/grb/wrn

2018 SEVERE WEATHER SPOTTER TRAINING SCHEDULE

LOCATION	DATE	TIME
STEVENS POINT	APRIL 2	6:00 PM
RHINELANDER	APRIL 5	6:00 PM
MANITOWOC	APRIL 12	6:00 PM
CALUMET COUNTY	APRIL 17	6:30 PM
GREEN BAY	MAY 1	7:00 PM

For the full list of talks, locations and times, please visit: https://www.weather.gov/grb/spotterschedule

Can't attend a training course? Online training is available here: https://www.weather.gov/grb/skywarn

UWGB STUDENTS WORK WITH THE GREEN BAY FORECAST OFFICE FOR CLASS PROJECT

KIRA BENZ, METEOROLOGIST & GENE BRUSKY, SCIENCE AND OPERATIONS OFFICER

A group of students, from the University of Wisconsin-Green Bay (UWBG), recently completed an extensive class project focusing on the National Weather Service (NWS) forecast office in Green Bay. The purpose of the project was for the students to analyze the use of social media and graphical weather stories at the NWS Green Bay office, and then explore and present new ideas to enhance the office's social media presence and improve the quality of graphical messaging.

As part of their research, the team visited the Green Bay office to learn how forecasters create graphics, communicate to the public, and understand the challenges they face. Student Danielle Shea commented, "I learned that the National Weather Service has many restrictions on what they can and cannot do, such as social media platforms they can use, and whether they can have an app." Currently, the NWS in Green Bay is active on Facebook and Twitter, but they cannot have a mobile app.

After their initial research, the students began to assess the strengths and weaknesses in the office's social media use; and then they collaborated with staff to formulate a survey. This survey received more than 300 responses from the public. The results showed the group how the public interprets graphical weather information, based on audience, social media preference, and other information. This allowed the group to formulate a plan of action for the Green Bay NWS. "They had the creativity; we made what they had more streamlined for their needs and gave them a few rules and tweaks for further success," said student Kaylie Noll.

The student group with NWS staff after presenting their project and results to the class. From left to right: Danielle Shea, Kaylie Noll, Gene Brusky (NWS), Kira Benz (NWS), Travis Krueger, Caroline Rowe.

The students presented their project and results to the entire class, NWS Science and Operations Officer Gene Brusky, and NWS Meteorologist Kira Benz in late February (photo above). "I hoped to accomplish the idea to divide and connect…a way to connect each of the platforms along with the website so engagement can occur over all platforms," said student Travis Krueger. The Green Bay NWS staff is anxious to apply the recommendations and insight shared by the students that will undoubtedly improve the office's social media presence and quality of graphical weather information provided.

This assignment was part of an undergraduate upper-level communications course at UWGB. It is meant to be one of the most challenging courses in their college career. Noll shared her insight after the experience saying, "The fact that all types of organizations have the ability to use social media effectively is truly amazing. It re-opened my eyes to the notion that social media managers can be necessary for any business."

The NWS Green Bay wishes to thank Professor Phil Clampitt for enthusiastically allowing us to work with his dedicated and resourceful students. We are very excited to implement what we have learned!

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

"SHUTTLE" VISITS NWS GREEN BAY

REBECCA HYKIN, METEORLOGIST

The STEM (Science, Technology, Engineering, and Mathematics) Shuttle (and crew) made a trip to NWS Green Bay on November 22, 2017, to show their mobile classroom to staff and discuss future weather education collaborations.

The STEM Shuttle brings STEM-related, hands-on activities to 4th-8th grade students in Wisconsin and nearby states. Several workstations inside the bus teach students about space, robotics, and engineering.

STEM Shuttle instructors will work with the NWS, through the spring, to incorporate several weather activities to add to their workstations. With the addition of these weather activities, the mobile classroom will give students aboard a chance to learn about basic weather concepts they may have never known about.

NATIONAL WEATHER SERVICE AT EAA AIRVENTURE

The National Weather Service will be one of several Federal Agencies at the Experimental Aircraft Association's Airventure (EAA) this 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. Staffing the booth will be meteorologists from the Aviation Weather Center in Kansas City, two Center Weather Service units, and local forecast offices.

The NWS information booth will feature computer workstations with real-time weather data, a hurricane simulator, a display of a new generation of weather satellites, and examples of different weather sensors installed on commercial aircraft.

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

We hope to see you there!

130TH ANNIVERSARY OF GREEN BAY'S LARGEST SNOWSTORM

ROY ECKBERG, METEOROLOGIST

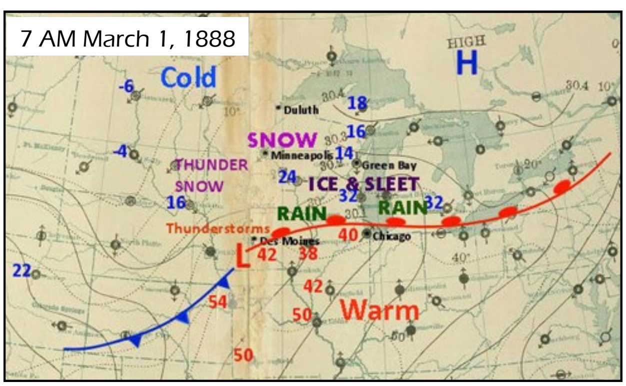
March 1st and 2nd of this year marked the 130th anniversary of Green Bay's largest snowstorm. On March 1, 1888, Green Bay recorded 24.0 inches of snow. This is the largest calendar day snowfall on record for the city. On the 2nd, an additional five inches of snow fell, bringing the two day storm total to 29.0 inches, making it the largest snowstorm on record. The second largest snowstorm on record at Green Bay is 23.1 inches, set on January 8-9, 1889, while the modern day record is 17.8 inches, set on March 22-23, 2011.

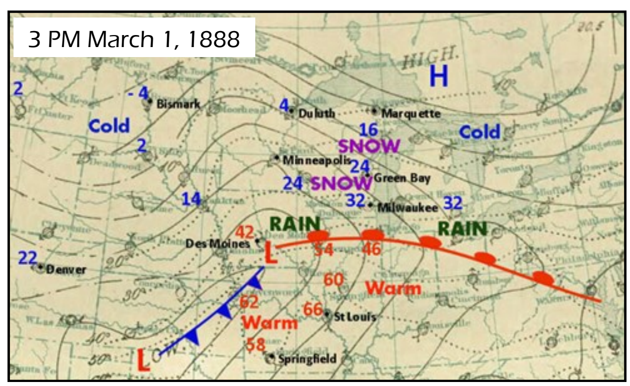
The Setup:

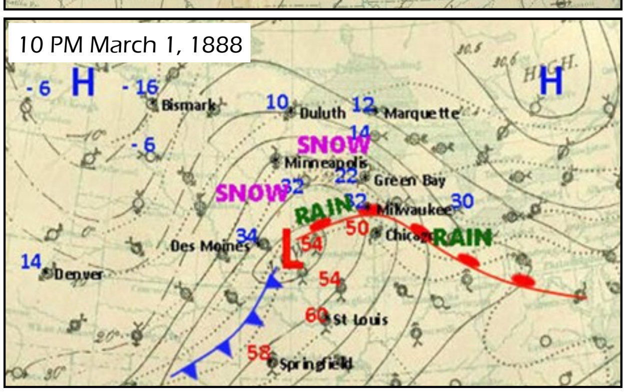
On February 26th, arctic air was firmly entrenched across the region, as high temperatures were only in the teens as far south as central and southern Illinois. On the 28th, low pressure was developing across the Rockies. On the 29th, a tightening temperature gradient across the central United States helped fuel the storm as the system intensified and moved over the Central Plains. Some high temperatures on the 29th were: 19° at Hancock, Michigan; 34° at Manitowoc, Wisconsin; 52° at Springfield, Illinois; and 60° at Greenville, Illinois. On the morning of March 1st, temperatures ranged from the single digits above and below zero across portions of Minnesota, the Dakotas and Nebraska, to the 40s and 50s across portions of Illinois, Missouri and Arkansas. As the day progressed, warmer air continued to push north as the low pressure system approached Wisconsin. Temperatures at 3 pm on March 1st ranged from -4° at Bismarck, North Dakota, to 66° at St. Louis, Missouri. A sharp temperature gradient was noted along the entire front. Some temperatures at that hour included: 14° at Yankton, South Dakota; 30° at Omaha, Nebraska; and 62° at Leavenworth, Kansas. The high temperature at Harrisburg, Illinois (just north of Paducah, Kentucky), was 68°.

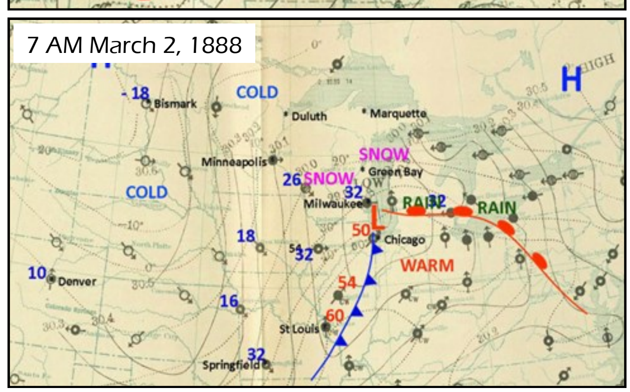
Ahead of the system, thunder snow was reported across South Dakota, with temperatures in the teens and 20s, while eight locations in Iowa, reported thunderstorms. It is surmised that thunderstorms moved into Wisconsin, later on March 1st. During the evening of March 1st, the surface low was approaching Chicago, Illinois. This is a prime storm track for heavy snow across northeast Wisconsin. A large temperature gradient was noted at 10 pm across the upper Midwest, as temperatures warmed to 54° at Davenport, Iowa, and 50° at Chicago. At the same time, it was only 32° at La Crosse, Wisconsin, 22° at Green Bay, and 12° at Marquette, Michigan.

(continues on page 9)









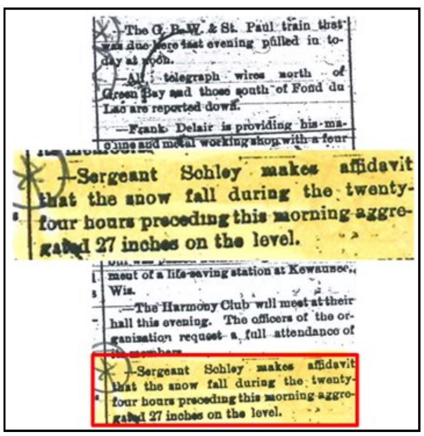
Snowfall Amounts and Impacts:

During this period, there were very few weather observation stations that reported daily storm total snowfall. Therefore, there was some doubt whether the 29 inch snowfall was accurate at Green Bay. However, a newspaper clipping from the Green Bay Advocate (below) quoted a Green Bay weather observer who stated "27 inches" of snow had fallen during the past 24 hours (referring to the 24 hour period prior to the newspaper interview). This confirmed the record setting snowstorm! Besides the 29 inch amount at Green Bay, Sault Ste. Marie, Michigan, reported two feet of snow, while around 18 inches of snow was reported in northern Lower Michigan. The Sturgeon Bay newspaper reported over a foot of snow fell at Sturgeon Bay. Just to the west of Green Bay in Embarrass (Waupaca County), an observer reported 1.15 inches of liquid equivalent (melted snow) with highs in the lower to middle 20s. Surmising a snow to water liquid equivalent ratio of 15:1 to 25:1, that would put an estimated snowfall between 17 to 28 inches in the city. Newspaper accounts indicated heavy snow fell across Wisconsin, including Waupaca County. An Oshkosh Northwestern headline stated the storm was a "paralyzer." The newspaper went on to state:

"Last night's storm had done more to paralyze business throughout the northwest than any one of the blizzards experienced during the entire winter. Telegraphic communications with outside cities almost entirely cut off".

The storm exhibited a sharp gradient in the snowfall amounts with a wintry mix across the southern third of Wisconsin into central portions of Lower Michigan. The Green Bay Advocate indicated wires were down south of Green Bay due to icing, while the Oshkosh Northwestern also stated the southern portion of the state experienced "a super abundance of sleet." In Michigan, only three inches of snow fell at Mio, while 150 miles to the north, around two feet of snow was observed.

Source: Green Bay Advocate


—The G. B. W. & St. Paul train that was due here last evening pulled in to-day at noon.
—All telegraph wires north of Green Bay and those south of Fond du Lac are reported down.
—Frank Delair is providing his machine and metal working shop with a four
—Sergeant Schley makes affidavit that the snow fall during the twenty-four hours preceding this morning aggregated 27 inches on the level.
ment of a life-saving station at Kewaunee, Wis.
—The Harmony Club will meet at their hall this evening. The officers of the organization request a full attendance of members.
—Sergeant Schley makes affidavit that the snow fall during the twenty-four hours preceding this morning aggregated 27 inches on the level.

Newspaper Account — Snowfall

The Discrepancies:

What made this storm even more interesting were the discrepancies found in the old Weather Bureau records from the 1890s to as late as the 1920s, regarding the March 1888 snowfall total and the seasonal snowfall total for the winter of 1887-88. In some years, the snowfall for March 1, 1888, was (mistakenly) entered as 2.4 inches (instead of 24 inches), while the seasonal total was around 125 inches. The numbers changed back and forth over the years. In 2005, a local study was performed by the NWS Green Bay office to verify the high seasonal totals from 1886 to 1891. Daily snowfall for all five winter seasons in question was analyzed. In over 90 percent of the daily snowfall events, there was corresponding snowfall data to support each event. After the analysis was completed, the NWS Green Bay office established Green Bay's snowiest winter at 147.7 inches during the winter of 1887-88. It should be noted that Embarrass, in northeast Waupaca County, reported 126.9 inches of snow during that winter, but this does not include the snow event from March 1-2, 1888. At the time of the 2005 study, the top three snowiest winters in Green Bay were noted in the late 1880s (1887-88, 1889-90, 1886-87). It wasn't until the winter of 2007-08 (and subsequently, the winters of 2008-09 and 2010-11) the snowfall of 1886-87 was surpassed (see table below).

Source: Green Bay Entertainer

Rank	Year	Snowfall
1	1887-1888	147.7"
2	1889-1890	103.6"
3	2010-2011	92.6"
4	2008-2009	87.7"
5	2007-2008	87.4"
6	1886-1887	82.7"

Greatest Snowstorms in Green Bay

THE JANUARY 14-15 LAKE-ENHANCED WINTER STORM OVER EASTERN WISCONSIN

GENE BRUSKY, SCIENCE AND OPERATIONS OFFICER

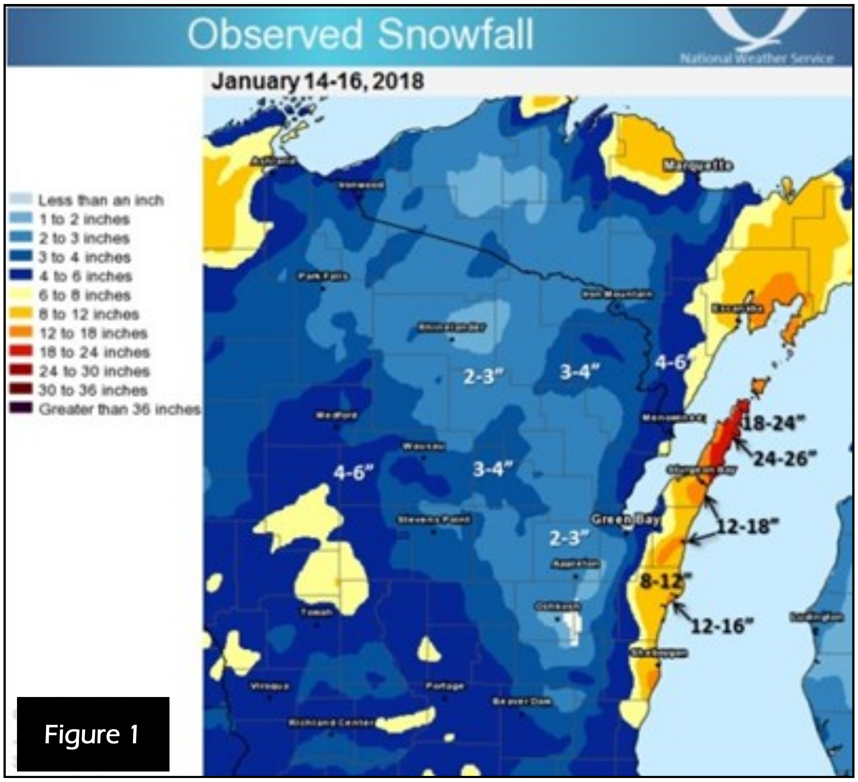


Figure 1

A slow-moving low pressure system, in concert with the relatively warm waters of Lake Michigan, combined forces to dump over two feet of snow over parts of Door County over about a 24 hour period. Up to 26 inches of snow was measured near the town of Ephraim in northern Door County (**Figure 1**). This was the greatest amount of snowfall at any location from a single winter storm of the 2017-18 winter season in the Green Bay Forecast area. Widespread amounts of 8-12 inches were also measured all along the eastern Wisconsin shoreline from Washington Island to Sheboygan. Away from Lake Michigan, a widespread 3-5 inches of snow was reported across much of the rest of Wisconsin.

The overall weather situation leading up to the snowfall was characterized by a relatively moisture-deficient low pressure system which interacted with a very cold and dry arctic airmass situated over the western Great Lakes region (**Figure 2**). Hypothetically, if one were to ignore the effects of the Great Lakes, the low pressure system on its own would most likely only be capable of producing up to 4 to 6 inches of light, fluffy snow as it passed south of the forecast area. In reality, as the low pressure system slowly moved eastward along the Wisconsin-Illinois border, cold low-level winds circulating around the low pressure system were able to blow across the relatively warm waters of Lake Michigan over a prolonged duration. As the low pressure system approached, south to southeast winds, ahead of the system, experienced a long fetch across the long-axis of the lake. This allowed considerable time for the low-level air to pick up a lot of extra moisture from the lake surface. The increased warmth and moisture caused the atmosphere to become very unstable. In addition, southerly winds generated enhanced low-level convergence over the lake due to frictional effects. The enhanced low-level convergence, coupled with the over-water instability, allowed for the lake-induced convection to develop very quickly. The process was also likely enhanced further by broader large-scale upward motion associated with the approaching low pressure system. Low to mid-level clouds, combined with light precipitation associated with the approaching low, also moved over the lake, helping to "seed" the developing lake-induced clouds below with lots of ice crystals (referred to as "seeder-feeder" mechanism); therefore, creating a very efficient snow-producing machine! Evidence of the broader and more widespread, lighter precipitation can

(continues on page 11)

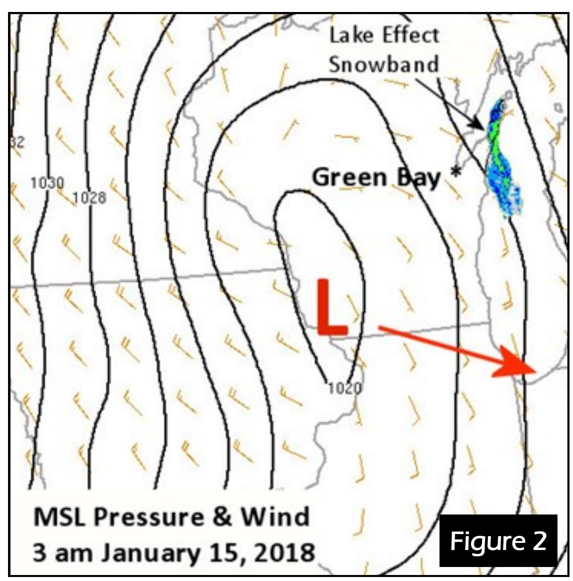
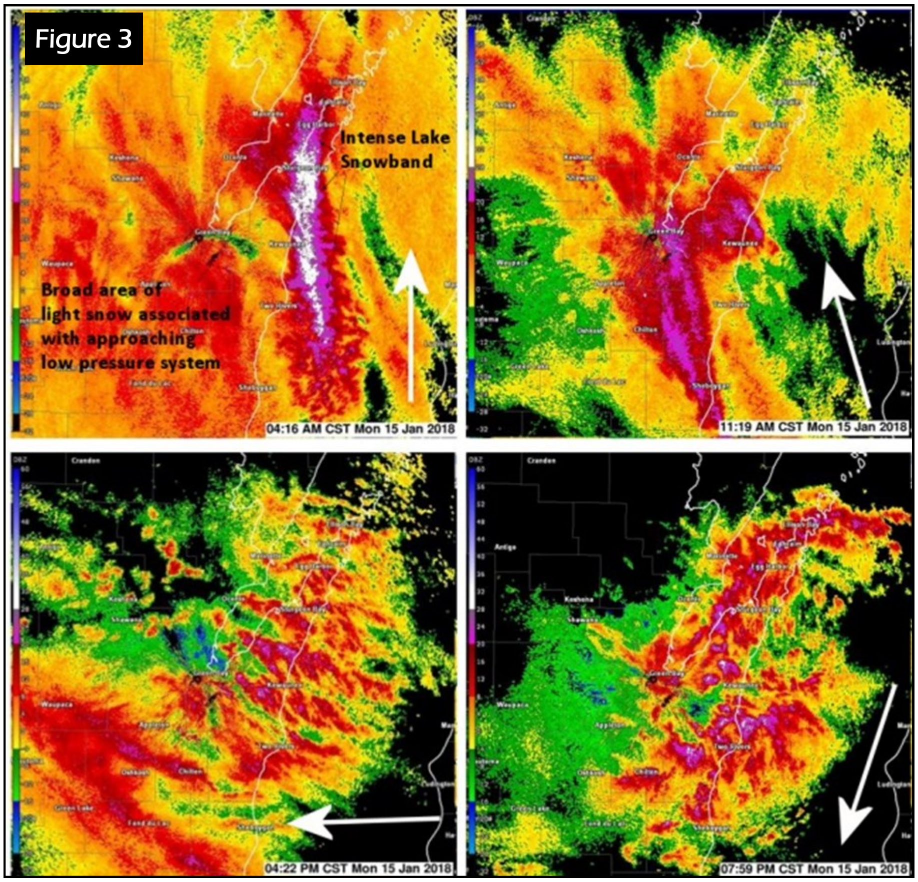


Figure 2



be seen in the upper-left hand radar image in **Figure 3**.

The 4-panel radar image (**Figure 3**) also reveals an interesting evolution of radar characteristics of the lake-enhanced snowfall, over a 16-18 hour period, when the majority of the snow fell during this winter storm. These changes in radar structure are partly a reflection of the changes in the low-layer wind direction (length of the wind fetch over the water), wind speed, vertical wind shear in the cloud layer, instability and overall forcing as the surface low pressure system passed to the south of the area. The upper-left hand radar image (4:19 am CST) shows a very well-organized and intense single snowband. This was near the time when the lake-enhanced winter storm was reaching its peak intensity over eastern Wisconsin. The low-level winds at this time were from the south (white arrow).

Recall that southerly low-level winds tend to be convergent over the lake and have a long over-water fetch, which typically supports an intense single snowband. In fact, snowfall rates of 2-3 inches per hour were occurring over parts of central Door County at this time, with over a foot of snow already on the ground near Ephraim! During the next 12 hours, as the surface low continued to move east, the low-level winds began to turn more easterly. As a result, the initial intense snowband began to move rapidly inland and weaken (upper-right panel). Meanwhile, multiple weaker snowbands formed over Door County, but were now orientated in an east-west fashion and nearly parallel to the low-level easterly winds (lower-left panel). With easterly winds, over-water fetch is much shorter, thus less time for the air to become unstable. Even though bands were more disorganized and somewhat weaker, they persisted over Door County for several hours while still producing up to one inch per hour snowfall rates at times. Finally, by the late evening of January 15, the surface winds backed to the north-northeast. Although the over-water boundary layer wind fetch actually increased with a northerly wind, the air blowing over northern Lake Michigan became very dry through a deep layer. In addition, there was no longer any upper-level forcing to help support the snow bands. The bands became less organized but were still capable of producing measurable snowfall (lower right panel).

In summary, one could say eastern Wisconsin, in particular Door County, had endured a relentless blitzkrieg of lake-enhanced snowbands attacking from the south, then from the east, and finally from the north. The snow barrage finally ended during the early morning hours of January 16.

Jacksonport, WI. Picture by Steve, courtesy WLUK FOX 11

SEVERE WEATHER WORD SEARCH

X	L	N	H	G	M	B	N	P	K	S	L	O	K	C	W	T	N	D	X
I	I	A	I	C	R	R	J	X	U	P	Z	I	C	Z	V	H	S	W	C
X	G	S	M	U	T	R	O	P	G	P	L	P	A	W	X	I	W	N	X
V	H	E	Q	O	F	A	E	T	G	S	R	B	N	H	W	Y	A	D	F
G	T	E	I	H	R	R	W	E	S	S	G	R	Y	A	J	N	K	L	P
K	N	O	W	I	C	D	Y	W	P	R	V	R	R	R	D	L	O	N	G
G	I	Y	D	E	Y	D	N	I	W	K	E	N	L	O	N	O	F	Z	A
Z	N	J	L	A	R	A	I	N	G	K	I	D	W	P	D	H	S	C	C
Y	G	L	I	D	N	R	R	H	H	N	O	N	N	I	X	T	E	K	Q
I	D	J	F	S	Y	R	L	E	G	U	P	W	N	U	A	O	V	Q	E
A	H	G	L	H	I	N	O	N	T	O	O	G	B	X	H	H	E	Y	X
N	H	T	R	A	R	X	O	T	U	T	S	X	R	E	A	T	R	S	O
U	N	E	D	E	J	H	L	R	T	H	O	P	L	H	O	N	E	T	I
R	N	T	J	Q	U	V	W	F	Y	V	W	P	T	G	U	O	U	U	F
J	O	G	Y	B	R	O	T	A	T	I	O	N	S	A	N	B	D	V	Z
H	U	Z	R	J	O	Z	X	A	S	K	E	R	Q	K	E	B	O	O	C
J	O	D	H	U	M	I	D	H	M	O	J	Z	K	B	F	L	D	S	E
I	P	E	J	E	Z	M	C	G	G	L	I	S	V	G	Q	U	R	O	J

DOWNPOUR	**HUMID**	**SEVERE**	**TORNADO**
FLOODING	**LIGHTNING**	**SPOTTER**	**WARNING**
HAIL	**RAIN**	**SUPERCELL**	**WATCH**
HOT	**ROTATION**	**THUNDERSTORM**	**WINDY**

NATIONAL WEATHER SERVICE
GREEN BAY

2485 South Point Road
Green Bay, WI 54313
Phone: 920-494-2363

www.weather.gov/grb

NWSGreenBay

@NWSGreenBay

Special thanks to our editors:
Scott Berschback, Gene Brusky, Rebecca Hykin, Phil Kurimski and Jeff Last