Weather Brew

VOLUME 5, ISSUE 1 SUMMER 2013

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2012-2013 Wisconsin Winter Season: A Roller Coaster Ride

By Rusty Kapela

- 15 winter storms (average 12) – total of snow storms/ice storms/blizzards
- Near normal to above normal snowfall
- Normal to above normal precipitation, 150-200% above normal southeast half
- Near normal temperatures – buts a lot of ups and downs
- January - periods of rain and 3 consecutive days with thunderstorms in S. WI
- Only 1 winter storm of consequence in January!
- Only 1 ice storm – April 10th - central and east-central counties
- Late season storms – 7 from mid-March to early May!

The 2012-2013 Wisconsin winter season was an on-off-on roller coaster ride, and a long one at that. A total of 14 systems generated at least 6" of snow in at least one county, but there were a lot of ups and downs. Only one storm of consequence occurred in the core winter month of January, while 4 storms hit Wisconsin from mid-April into early May. Overall, total snowfall was near normal to above normal.

The coldest Wisconsin temperature was -30 at Upson in Iron County on February 4th and the warmest temperature was 63 in Kenosha on Jan 29th.

The December 19-20th winter storm/blizzard had the largest footprint in Wisconsin for the 2012-13 winter season. It affected all but the northwestern counties. It dumped 12" to 21.5" in the south-central counties.

The April 17-19th winter storm generated the great-

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Month	Total	Storm 1	Storm 2	Storm 3	Storm 4
November 2012	1	22-23rd			
December 2012	3	9-10th	19-20th	28-29th	
January 2013	1	29-30th			
February 2013	3	7th	10-11th	26-27th	
March 2013	2	5th	18-19th		
April 2013	4	10th	11-12th	17-19th	22-23rd
May 2013	1	1-3rd			

The table above shows the number of winter storms per month and the associated dates.

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Winter Season (Continued)

est single-storm snow total of 22" in far northern Bayfield County.

The area from Madeline Island east of Bayfield to Upson and Hurly in the Gogebic Range in Iron County had the greatest winter season snow totals, with an estimate range of 145" to 165".

The May 1-3rd winter storm over northwestern Wisconsin was a record-setter for the month of May in Wisconsin. New all-time May snowfall records for 1-day, 2-day, and 3-day totals were established. A 3-day total of 18" was measured at Clam Lake 4W in extreme southeast Bayfield County!

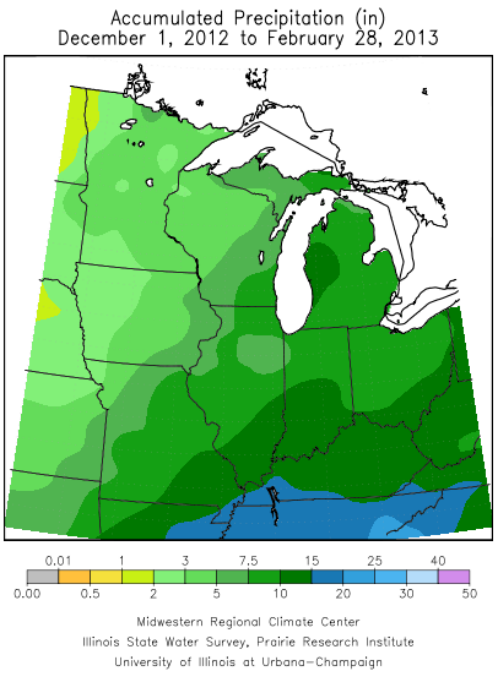
Winter season snowfall totals across Wisconsin

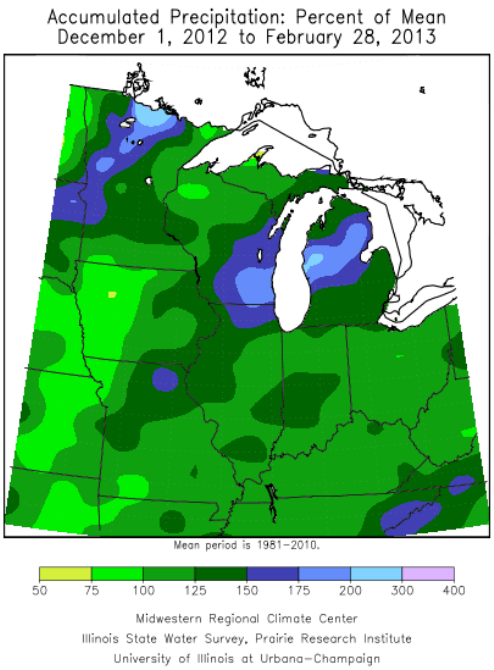
City	2012-2013 Winter Snow	Departure From Normal
Milwaukee	45.0 inches	-1.9 inches
Madison	70.6	+19.9
Green Bay	74.2	+23.0
Wausau	78.8	+19.3
Rhinelander	83.8	N/A
La Crosse	60.6	+17.3
Eau Claire	84.3	+37.4
Minneapolis	67.7	+13.3
Duluth	129.4	+43.6

Left: Liquid equivalent precipitation from December 1st 2012 – February 28th 2013

Right: Percent of mean precipitation from December 1st 2012 – February 28th 2013

Maps courtesy of the Midwestern Regional Climate Center





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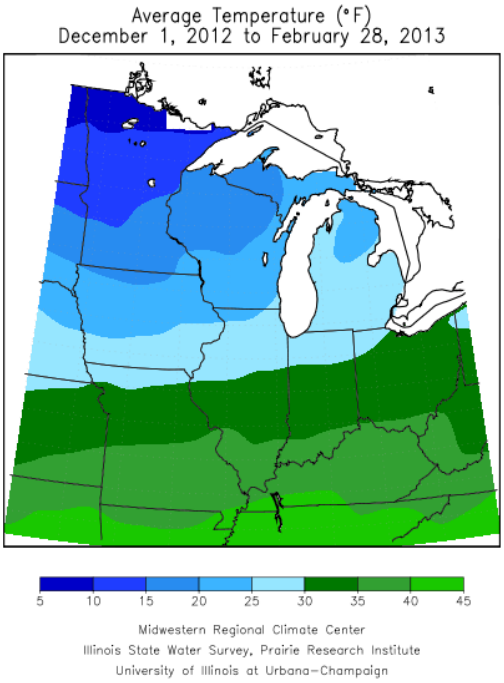
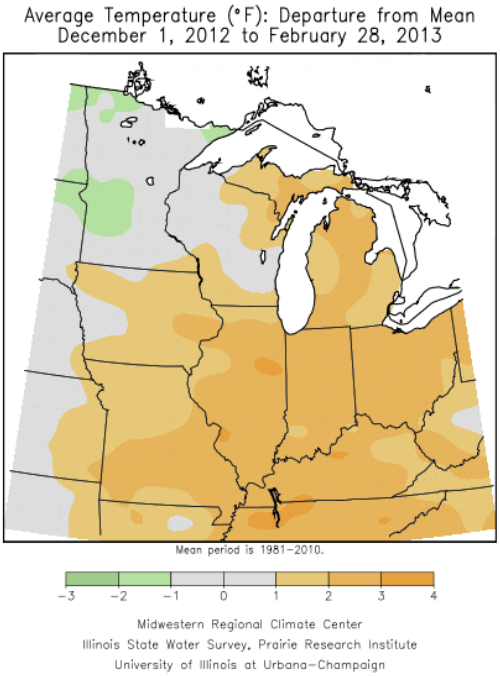
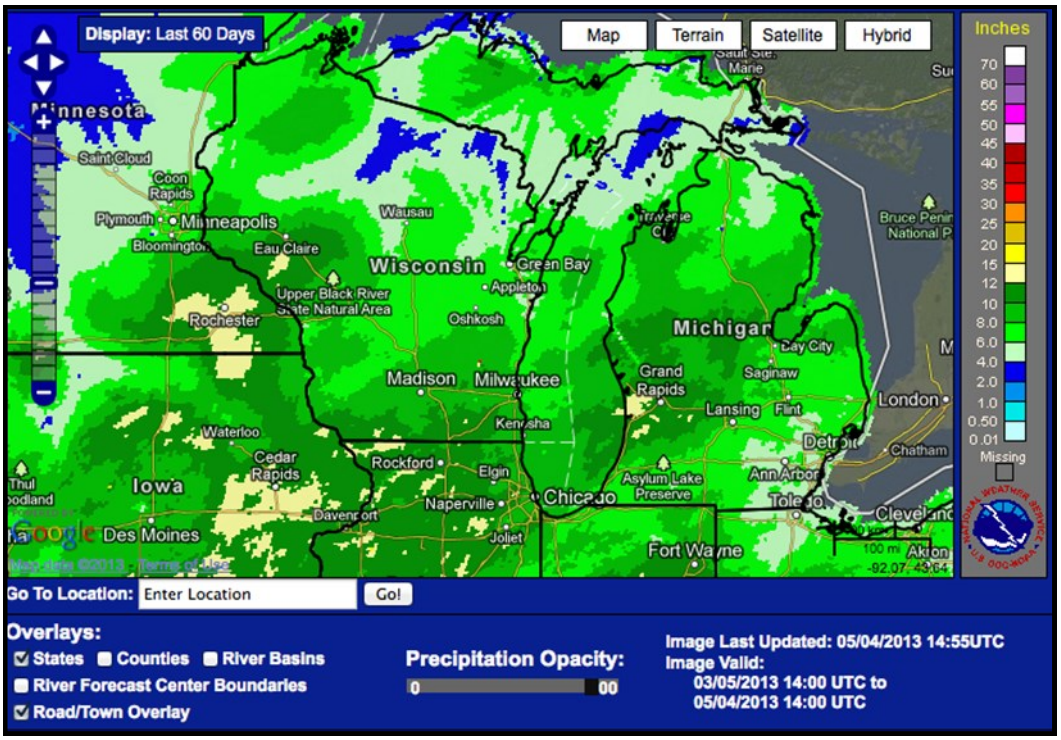
Winter Season (Continued)







Left: Average temperature from December 1st 2012 – February 28th 2013

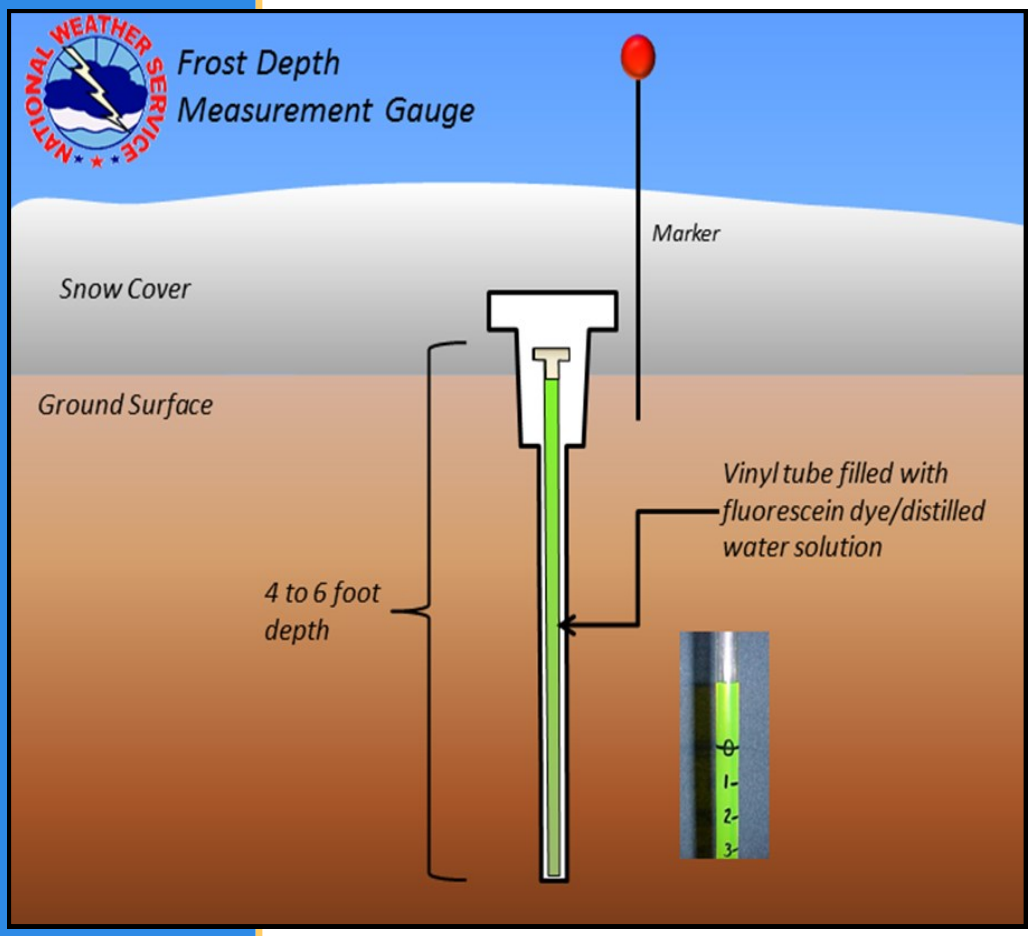
Right: Departure from mean average temperature from December 1st 2012 – February 28th 2013

Maps courtesy of the Midwestern Regional Climate Center

Above normal precipitation from March 5th through May 5th. Note the large amounts of precipitation in west central Wisconsin and southern Wisconsin.

The Hows and Whys of Frost Depth

By Marc Kavinsky



Schematic of a NWS frost depth gauge.

The National Weather Service serving south central and southeast Wisconsin keeps track of frost depth each year from November 1st through the following spring thaw. Frost depth is the depth into the soil that frost has penetrated, or the depth that the ground temperature has fallen below freezing.

Frost depth is typically deepest during the mid to late winter and early spring, when surface temperatures are coldest. The duration of cold, subfreezing temperatures and depth of snow cover have the most influence on frost depth. Deeper snow cover acts as an insulator, which typically prevents deeper frost depths.

Knowledge of the frost depth is useful in determining the potential for flooding during the spring snow melt. Frozen ground will not allow the water to penetrate into the ground, resulting in additional water runoff. This was the case this spring when heavy rainfall affected southern Wisconsin between April 8th and 18th. Many locations received between 4 and 8 inches of rain. Temperatures had remained well below normal prior to the rainfall, while snow cover persisted through most of March. This combination of prolonged cold and snow cover resulted in frost depths around 20 inches, from late January into early April. The frozen

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The Hows and Whys of Frost Depth (Continued)

soil and periods of heavy rainfall in mid-April resulted in many flooded fields, localized street flooding, and many rivers and streams experiencing significant flooding.

Approximately seventy National Weather Service frost depth gauges are installed in Wisconsin. The frost gauge program began in the early 2000's. Prior to the installation of the frost depth gauge network, frost depth information was retrieved from grave diggers and utility companies. These observations tended to be inconsistent and less reliable.

The National Weather Service frost depth gauge consists of a vinyl tube inserted 4 to 6 feet into the ground. The vinyl tube is protected by an outer 1 inch PVC tube. An additional larger PVC tube inserted into the ground at the surface protects the inner PVC and vinyl tubes from damage during the winter.

The inner vinyl tube is marked with a one inch scale, and is filled with a combination of fluorescein dye and distilled water. The fluorescein dye causes the water to take on a green color, however when the water and dye mixture freeze, the mixture turns clear. This allows for a more straightforward interpretation of the depth of the freezing temperatures, or frost depth.

Yearly maintenance of the frost depth gauge is required. Moisture may have collected in the outer tube, which needs to be removed. Also, the fluorescein dye/distilled water solution may need to be replaced.

The latest frost depth readings from the National Weather Service office near Sullivan, as well as across Wisconsin, are available from November through the following spring thaw here or at the following link: **http://go.usa.gov/bhM3**

The NWS frost depth gauge consisting of vinyl tubing, a mixture of fluorescein dye and distilled water, and a PVC pipe to protect the vinyl tubing.

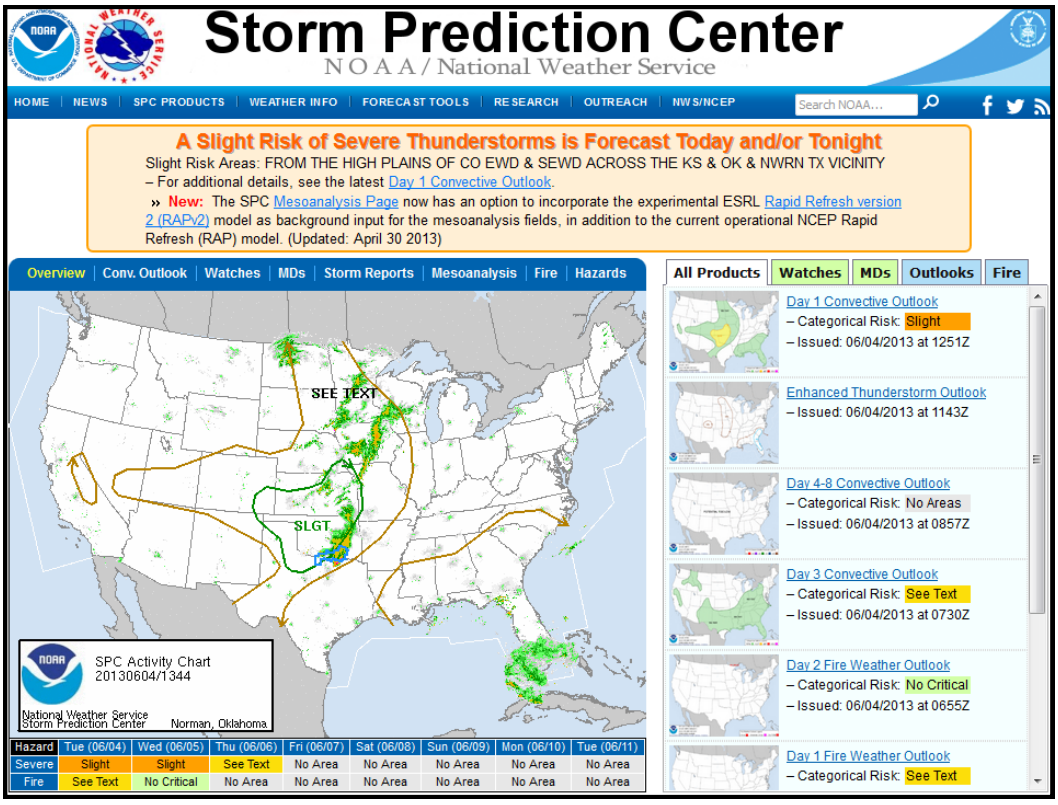
Storm Prediction Center: Convective Outlooks and Watches

By Ed Townsend

The Storm Prediction Center, or SPC, is part of the NWS and the National Centers for Environmental Predication (NCEP). Unlike a local NWS office that forecasts and issues products for a specific sized geographic area, the SPC is responsible for performing a weather watch across the entire nation. Also, the SPC products focus on forecasts and watches for severe thunderstorms and tornadoes over the entire contiguous U.S. and they also monitor/issue products related to fire weather, heavy snow, and heavy rain.

Like the NWS Milwaukee/Sullivan's website, the SPC website has a vast amount of information and they have their own unique products that they issue. Two of their notable products are their convective outlooks and their severe weather watches.

A screen shot of the SPC's main page is shown below. On the front page is a radar mosaic with the Day 1 Convective Outlook overlaid on top (under the "Overview" tab). Hovering over each tab (from left-to-right —



Hazard	Tue (06/04)	Wed (06/05)	Thu (06/06)	Fri (06/07)	Sat (06/08)	Sun (06/09)	Mon (06/10)	Tue (06/11)
Severe	Slight	Slight	See Text	No Area	No Area	No Area	No Area	No Area
Fire	See Text	No Critical	No Area	No Area	No Area	No Area	No Area	No Area

The Storm Predication Center's website, available at: www.spc.noaa.gov

From the webpage, you can access: convective outlooks, tornado and severe thunderstorm watches in effect, storm reports (that have been issued by a local forecast office), and more!

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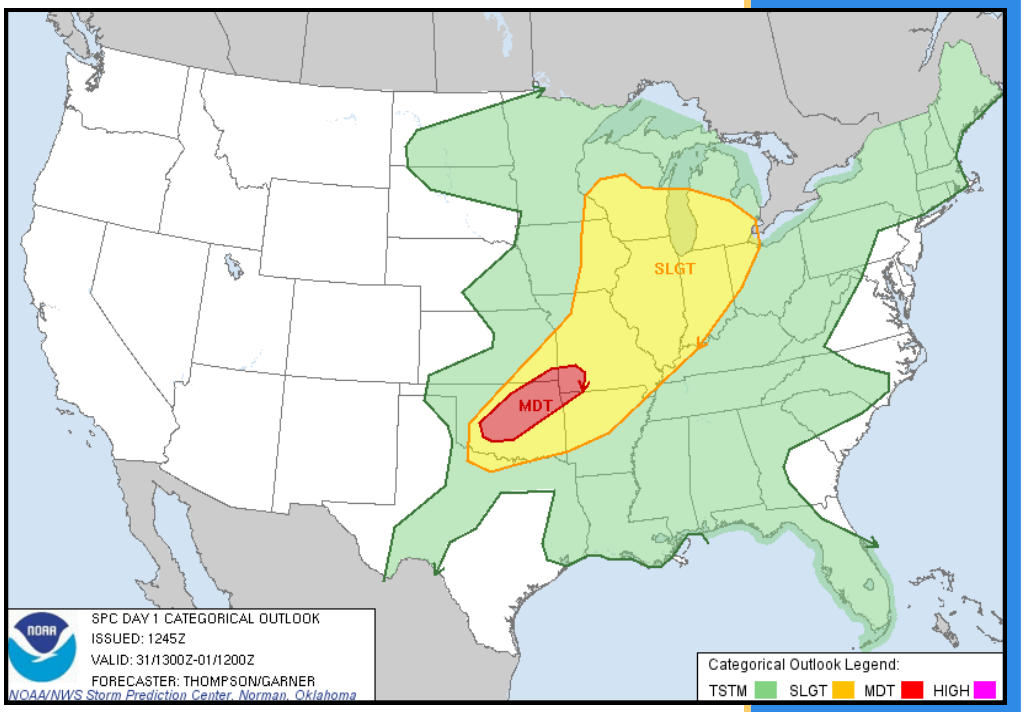
SPC (Continued)

from "Overview" to "Hazards") shows the respective SPC or SPC-related products.

Convective Outlooks:

Convective outlooks include a graphic and discussion regarding thunderstorms and severe thunderstorms (a "severe" thunderstorm produces either a tornado, damaging winds or winds equal to or in excess of 58 mph, or hail that is 1 inch in diameter or larger). The days are then broken down: days 1-3 are broken down by risk areas and days 4-8 show where there is at least a 30% probability or higher for severe storms.

Days 1 through 3 are broken into three categorical risk areas — slight, moderate, and high — in regard to the expected coverage and intensity for the categorical severe weather threat. Along with the categorical outlook, there are specific severe weather forecast probabilities (tornado, wind, and hail) for day 1 or a total (combined) severe weather probability for days 2 and 3. Thus, there are slight differences between the content in days 1-3.



SPC Day 1 Outlook for May 31, 2013.

***TSTM* area is in green, a *SLGT* risk area is in yellow, and a MDT risk is in red.**

Risk Areas
(Directly from the SPC)

TSTM - Not labeled and is shown as green in the outlook. TSTM highlights general (non-severe) thunderstorms.

SEE TEXT - A label only that means severe weather may be possible but enough forecast uncertainty exists to not issue a risk area.

SLGT - (slight risk) Well-organized severe thunderstorms are expected, but in relatively small number/coverage, or a small chance of a more significant severe event.

MDT - (moderate risk) Greater concentration of severe thunderstorms, and in most situations, greater magnitude of severe weather and greater forecaster confidence compared to a SLGT risk.

HIGH - (high risk) A major severe weather outbreak is expected, with large coverage of severe weather and the likelihood of extreme severe weather (i.e., violent tornadoes or very damaging convective wind

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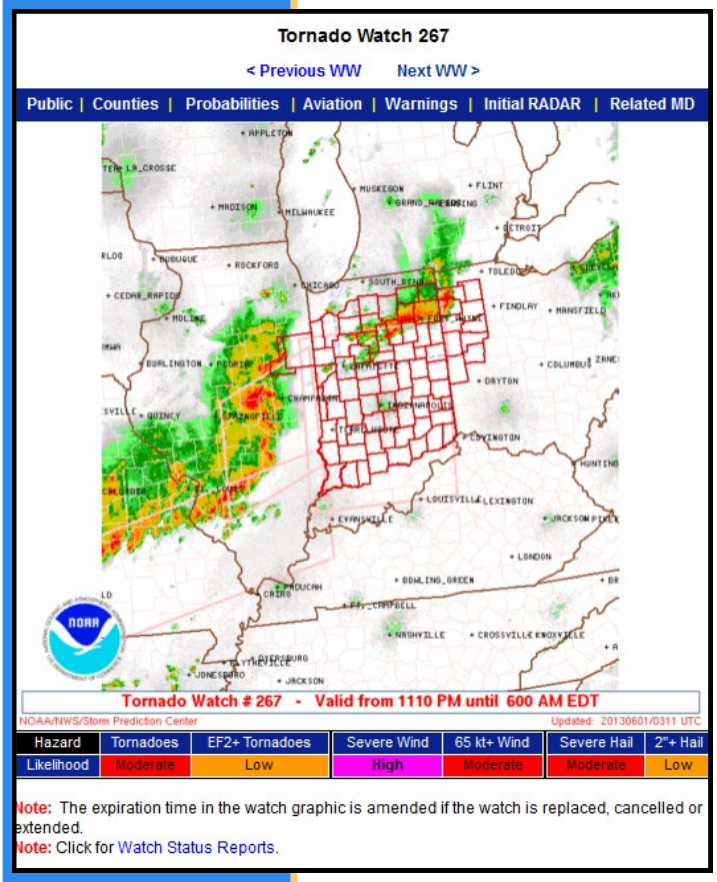
SPC (Continued)



A tornado watch issued across most of Indiana.

events). The HIGH risk category is reserved for the most extreme events with the least forecast uncertainty (only used a few times each year).

Watches:

Two kinds of watches can be issued by the SPC: a severe thunderstorm watch or a tornado watch. A watch is issued when conditions become favorable for organized severe thunderstorm and tornado. Unlike a severe thunderstorm or a tornado warning issued by a local forecast office, a watch lasts a lot longer (e.g., six to seven hours) and occupies a larger space (e.g., ~20,000-40,000 square miles). To further illustrate the difference, a tornado warning is typically valid for 15 to 45 minutes from issuance!

The big difference between a watch and warning is that a **watch is for giving advance notice that conditions are favorable for severe weather imminently or in the next few hours**, where as a **warning is issued when severe weather has been observed or is expected to strike soon/about to strike**.

Given the additional lead time associated with a watch, its primary function (in regard to the public) is to encourage heightened alertness for changing weather conditions and possible warnings issued by your local forecast office.

The information discussed above came from the following webpages:

- www.spc.noaa.gov/misc/about.html

- www.spc.noaa.gov/misc/aboutus.html

For more information on the SPC, their webpage, and/or their products, please visit the above links.

What's a Watch?
Check out the YouTube video below for more info: click here or go to http://youtu.be/x3V3HZBs1Y4

Heat Safety

By Morgan Brooks

Early last July Wisconsin experienced a major heat wave. There were 10 heat related fatalities reported and several hundred people were believed to have sought medical treatment. Temperatures during the week long heat wave climbed as high as 106 degrees and heat indices climbed as high as 115. All in all, in 2012, there were at least 24 heat related deaths and over 350 people reported to have sought medical treatment.

Preparing for extreme heat is not just something you should do for your own benefit, but it is something that you should do for the benefit of your loved ones who may be prone to heat related illnesses. Individuals with a heightened risk of heat related illnesses include older adults, young children, those who are sick or overweight, as well as people living in urban areas.

Here are a few tips and tricks to help you prepare for and protect yourself and others during a heat wave:

How to prepare:

- Install window air conditions snugly and inspect air conditioning ducts for proper insulation.
- If you don't have air conditioning pick out a few cool places you can head to during the heat of the day. You might try heading to the local library, school, mall, or theater.
- Weather-strip doors and windows to insulate your home.
- Keep your storm windows up.
- Cover windows that receive direct sunlight with drapes, shades, awnings, or louvers. Just installing awnings or louvers can reduce how much heat enters a home by up to 80 percent.
- Try installing temporary window reflectors in between your windows and drapes. These can be as simple as aluminum foil-covered pieces of cardboard.
- Keep up with your local forecast.
- Have an emergency preparedness kit, a

Continued on next page...

Always check the back seat for little ones and pets! The temperature inside a car can climb much higher than the temperature outside.

For more information on last July's heat wave click here or go to

Heat Safety (Continued)

communication plan, and be prepared for power outages.

- Familiarize yourself with first aid techniques to treat heat related illnesses.

What to do during a heat wave:

- Never leave children or pets alone in vehicles.
- Drink plenty of water, even if you are not thirsty. Avoid drinks with caffeine or alcohol.
- Eat small, frequent meals.
- Wear loose, light-weight, and light-colored clothing and a wide brimmed hat.
- If you don't have air conditioning, consider going to a cool, public place, like a library, school, mall, or theater.
- Stay indoors and avoid strenuous exercise during the heat of the day.
- If you must be outside, use a buddy system and take frequent breaks. Stay in the shade if you can, exposure to direct sunlight can increase the heat index by as much as 15 degrees.
- Avoid extreme temperature
- Check on family, friends, and neighbors who don't have air conditioning or may be susceptible to heat related illnesses
- Take care of your pets. Make sure they have plenty of water and bring them into a cool area if you can.

For more heat safety information, visit our preparedness page or go to: **http://go.usa.gov/bhFR**

This heat index table is a great tool to have handy in the summertime. Refer to it to get an idea of the days risk. Also, visit our website to get the latest forecast information.

NOAA's National Weather Service

Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

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Comments and suggestions are always welcome. Your feedback is important to us.

New MKX Employee

Sarah Marquardt — Meteorological Intern

Sarah is a Wisconsin native who began her career at NOAA's Climate Prediction Center in College Park, Maryland. While at CPC, Sarah made extended range forecasts for the U.S. and the global tropics. She also helped develop an interactive forecast verification system and performed climate model analyses. Sarah has a Master's degree in atmospheric science from UW Milwaukee and a Bachelor's degree in atmospheric and oceanic science from UW Madison.

Check out the Experimental NWS Enhanced Data Display for Hourly Forecasts: click here or go to http://go.usa.gov/bB5P