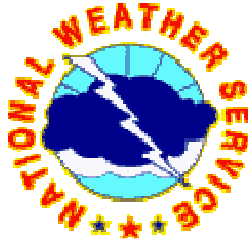


The U.P. Weather Update

Volume 5, Issue 1

June 2008



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Snowmelt Flooding Across Upper Michigan

Springtime in the Upper Peninsula means rising temperatures and the melt of the previous winter's snowfall. Although some slight reduction to the snowpack occurred in March as temperatures crept above freezing, it wasn't until April that substantial snowmelt began to occur. Several days of temperatures in the 50s and 60s resulted in snow rapidly melting, not allowing the ground and rivers enough time to absorb all of the additional water. All rivers across Upper Michigan saw rises in water levels, and several rivers rose out of their banks. The Trap Rock River in Houghton County, the Sturgeon River in Houghton and Baraga Counties, and the Michigamme River in Marquette and Dickinson Counties all crested above flood stage.

Luckily, the warmup was not as strong as seen in 2002, when record highs in the 80s resulted in all snow across the region melting in less than a week. With the snowpack measuring nearly 10 inches of liquid water equivalent that year, this resulted in disastrous flooding in many locations, with the worst across the western U.P. To gain a better handle on the amount of liquid water equivalent in the snowpack, a network of snow-water-equivalent observers was set up across the Upper Peninsula after the 2002 winter. Participants in the program take snow cores once a week, capturing the entire depth of the snowpack and melting it down to determine the amount of liquid equivalent in the snow. The weekly snow core

Continued on page 2

Portions of Sturgeon River Road near Chassell were underwater for several days due to the snowmelt.



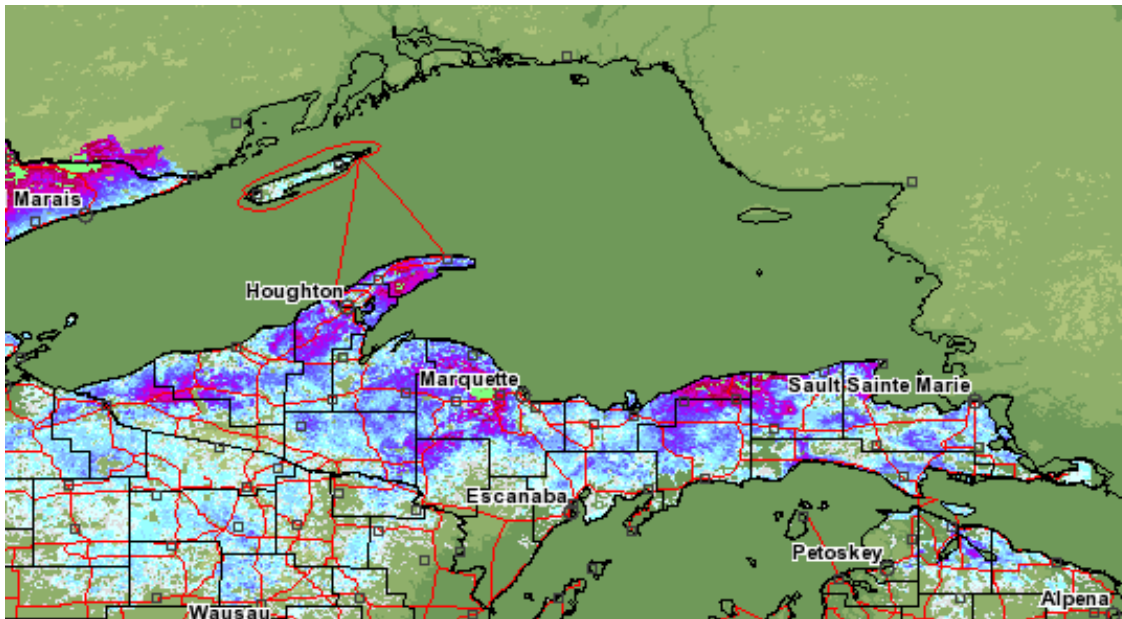
A cow found itself on the wrong side of the Alston River along Halonen Road during the flooding.



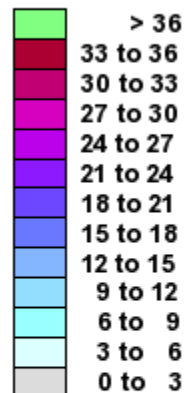
Snowmelt Flooding Across Upper Michigan (cont.)

Continued from page 1 measurements, along with airplane flights by the National Operational Hydrologic Remote Sensing Center (NOHRSC) that measure the snowpack near the end of the season, are vital in allowing forecasters at NWS Marquette and the North Central River Forecast Center to anticipate locations where the snowpack contains large quantities of water and provide long-range forecasting for river locations that may flood.

Snow Depth at 8am, Wednesday April 16

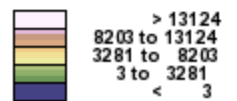


Inches of depth

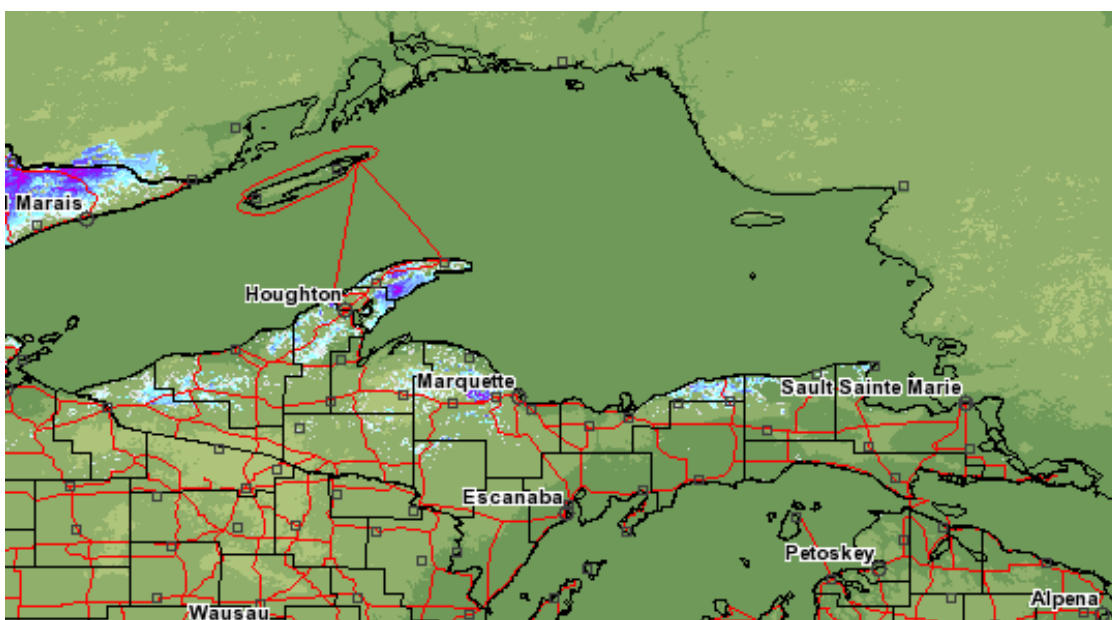


Not Estimated

Elevation in feet (Not estimated)



Snow Depth at 8am, Wednesday April 23



Note that some locations saw a reduction in snow depth of 24-36 inches in 7 days!

2007 Year in Review

January saw above normal temperatures for the month and generally below normal precipitation and snowfall across the area. Temperatures were much higher than normal during the first week of the month, with several daily records set across Upper Michigan. After this stretch, temperatures were slightly below normal for the month. The most significant storm to impact the majority of the region entered the area on New Year's Eve, with precipitation changing from rain to snow in the overnight hours.

Temperatures were well below normal during the month of February, and precipitation was also generally below normal, except in locations that received heavy, persistent lake effect snow. Munising was one of the places hardest hit by the snowfall generated by the northwest wind over Lake Superior, totaling 52.7 inches of snow during the month. A location 10 miles south of Grand Marais had 67.6 inches of snow, with a peak snow depth of 40 inches in the middle of the month. The only widespread heavy snow of the month occurred on the 25th and 26th as a storm system moved across Lake Michigan. The peak amounts of snow were 18 inches in Escanaba and Arnold to 21 inches at Trenary.

Temperatures, snowfall, and precipitation were all above normal during the month of March. The major storm of March affected the Upper Peninsula from the 1st through the 3rd, resulting in heavy snow, sleet, thunder, and wind gusts over 50 mph. Except for Menominee County, almost all of Upper Michigan received more than 10 inches of snow, with much of the higher terrain in the west and north central receiving 20+ inches and the NWS Marquette office receiving 31 inches of snow over the 3 days.

Below normal temperatures were observed in the month of April with above normal precipitation along the Lake Superior shoreline due to a historical late-season snowstorm. The snowstorm resulted in almost every long-term historical climate station experiencing one of its top 5 snowiest Aprils on record. It was the snowiest April at the NWS Marquette office, the Houghton County Air-

port, and Munising. The large-scale system snowfall occurred on the 4th and 5th, with lake effect persisting for the next 3 days. A whopping 24 inches of snow fell at the NWS office on the 4th, which was the 2nd heaviest calendar day snowfall in the 46 years of records at the location. Storm totals included 59 inches in Painesdale, 57 inches in Phoenix in Keweenaw county, and 48.5 inches at the NWS office. Along the Lake Michigan shoreline, accumulations of 13.5 inches were recorded at Garden Corners and 11 inches in Manistique, with just an inch of snow in Iron Mountain, Escanaba, and Menominee. Bitterly cold temperatures were also experienced during the month, with the NWS office setting the record for latest below zero temperatures on two consecutive days, the 9th and 10th.

The month of May saw above normal monthly temperatures and below normal precipitation. Several locations received severe weather on the 14th along with the most widespread rain of the month. A location 1 miles southeast of Negawnee received hail as large as 3 inches. A touch of winter weather was still seen during the month, with the first ever occurrence of freezing drizzle in the month of May at the NWS Marquette office occurring on the 20th.

Temperatures were well above normal in the month of June, with most locations experiencing one of the top 10 warmest Junes on record. Rainfall was generally below normal except over the south central Upper Peninsula. June was perhaps the most active month from a severe weather standpoint. Several strong tornadoes affected Wisconsin on June 7th, and a weak tornado crossed over the Menominee River into Menominee County just west of Banat. Damaging winds affected 6 counties on the 18th, and several locations saw severe weather on the 20th. The most memorable of the storms this day went through Marquette County, causing extensive hail damage with several reports of 1.5" hail in Marquette and hail up to 3 inches in diameter over Harvey.

July continued the trend of below normal precipitation across Upper Michigan. Ontonagon

2007 Year in Review (cont.)

reported its driest July on record, receiving just 0.70 inches. Many locations saw brief periods of rain, but no soaking rains were experienced across the region. Temperatures were again above normal during the month.

August continued the trend of above normal temperatures and below normal precipitation. In fact, the 4 month period of May through August was the driest on record at both the NWS Marquette office and Newberry. Effects of the precipitation deficit became more noticeable during this period, and the U.S. Drought Monitor had classified about half of the Upper Peninsula as experiencing extreme drought conditions and the rest under severe drought conditions. Several wildfires sparked during the month, with the largest of the fires in northern Luce County at Sleeper Lake. The fire grew to 18,000 acres and was the largest in Upper Michigan in 30 years, prompting a partial closure of M-123 and the deployment of a couple hundred firefighters.

Drought relief came to the U.P. during the month of September, with record setting rainfall. Many locations had top ten September precipitation totals, with the wettest September on record at Ontonagon, and the wettest month ever at the Houghton County Airport. While several soaking rains moved across the area, the heaviest rain at most locations fell on the 4th. The NWS Marquette office received 4.29 inches of rain that day, the greatest one day precipitation total in the 46 years at its current location. By the end of the month, the western half of the U.P. was categorized in the severe drought category, with the rest of the U.P. in the moderate drought category. Temperatures were once again above normal.

Wet conditions persisted across Upper Michigan in October, with the Houghton County Airport, Ironwood, and Iron Mountain all having the wettest October on record. Extremely warm conditions were also observed, with the warmest October on record at Ontonagon and Manistique. The warm temperatures resulted in little snowfall during the month, with the snowiest location (Van Riper State Park) only receiving an inch of snow during the month. By the end of the month, most

of the area was listed as abnormally dry in the U.S. Drought Monitor, with locations along the Wisconsin border remaining in the moderate drought category.

The month of November saw near normal temperatures, with precipitation and snowfall slightly below normal. Many locations saw their first measureable snowfall during the first week of November, with some locations seeing as much as 10 inches of snow. Many locations near Lake Superior experienced blizzard conditions with a quick-moving storm on the 27th. Although only a few inches of snow fell at any location, very strong winds caused blowing snow and near whiteout conditions for 2 to 3 hours. Wind gusts were measured over 60 miles per hour in several locations, with peak gusts of 71 mph at Copper Harbor and 74 mph at the Stannard Rock lighthouse.

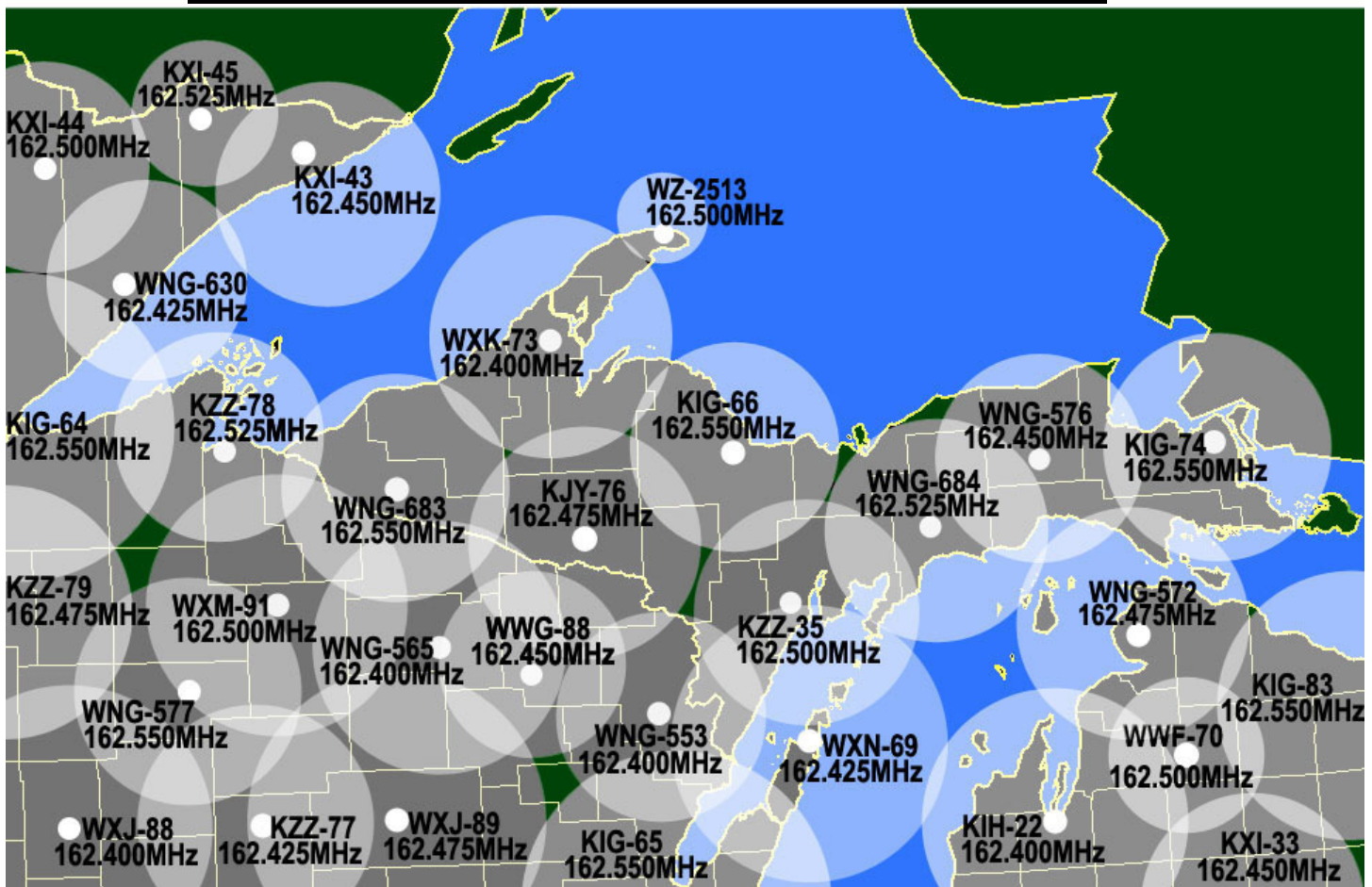
December brought temperatures slightly below normal, with snowfall near or above normal for the month. Several lake effect snowfalls occurred during the first half of the month, while a change in prevailing wind direction to westerly in the middle of the month brought moderating temperatures and drier conditions. A major system just before Christmas could have resulted in heavy snow across Upper Michigan, but the storm track over the western U.P. resulted in most locations receiving heavy rainfall instead of snowfall.

- **Highest Temperature:** 99°F at Baraga on July 31
- **Lowest temperature:** -31°F at Champion on March 6
- **Most rain in 24 hours:** 4.70 inches at Hancock on September 3-4
- **Most snow in 24 hours:** 27.0 inches at Painesdale on April 4-5
- **Most rain in 1 month:** 11.24 inches at the Houghton County Airport in September
- **Most snow in 1 month:** 81 inches at Atlantic Mine in February
- **Reported tornadoes:** 1, EF-0 intensity in Menominee County

NWR Updates

NOAA Weather Radio coverage across Upper Michigan continues to expand. On March 11, a new transmitter came online in Copper Harbor, providing coverage for portions of Keweenaw County that are not able to receive transmissions from the transmitter in Houghton. This is also of benefit to any boaters near the tip of the Keweenaw Peninsula. Beginning on April 15, the transmitter in Crystal Falls started broadcasting to Iron, Dickinson and Baraga counties in Upper Michigan, and Forest and Florence counties in Wisconsin. Delays have continued to plague the Marenisco transmitter, but this transmitter is expected to begin broadcasting during the next few months. The Marenisco transmitter will cover Gogebic and Ontonagon counties in Upper Michigan, and Iron and Vilas counties in Wisconsin. In addition, work has begun on projects to install low power NWR transmitters, similar to Copper Harbor, in Munising and Grand Marais in Alger County. These projects should be completed by early fall. With the addition of the new transmitters, virtually all of Upper Michigan will be within the coverage of a NOAA Weather Radio transmitter.

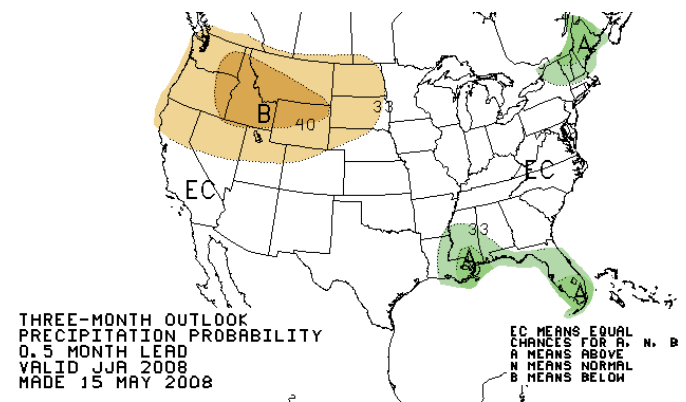
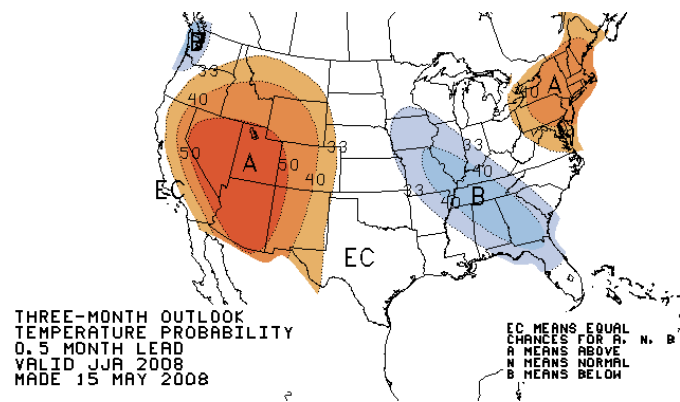
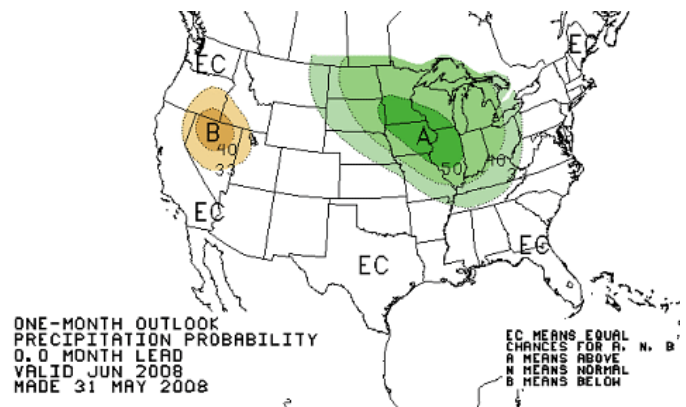
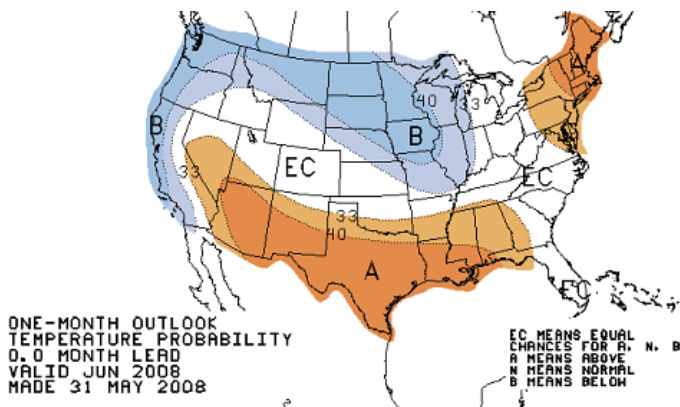
The shaded white circles represent the approximate broadcast range of each transmitter, but please note that terrain and weather conditions can cause the broadcast distance to vary greatly from what is shown. **NOTE: At the time of publication, WNG-683 was not yet broadcasting.**



Drought Relief Across Upper Michigan

The U.S. Drought Monitor (USDM) is a multi-agency effort involving NOAA's National Weather Service (NWS) and National Climatic Data Center (NCDC), the USDA, state and regional center climatologists, and the National Drought Mitigation Center. The USDM is issued weekly and categorizes locations into 5 different drought categories. Over the last two years, some portion of Upper Michigan has been included under a drought category every week, with the most intense drought conditions occurring in the latter portions of Summer 2007. The drought across the region has eased with well above normal rainfall during the fall and above normal snowfall during the winter. As a result, with the April 17th issuance of the Drought Monitor, the entire Upper Peninsula has been removed from all drought categories, the first time that no portion of the U.P. has been included in the Drought Monitor since June 6, 2006.

Forecasts from the Climate Prediction Center (CPC) give a chance of above normal precipitation across Upper Michigan through the month of June, with near normal precipitation expected for the 3 month period of June, July, and August. Forecasts from the CPC give a chance of below normal temperatures across Upper Michigan through the month of June, and a chance of above or below normal temperatures for the 3 month period of June, July, and August.



Employee News

Since our last newsletter, we have received notification of one employee who will be leaving our office. Mike Megluevich, one of our Electronics Technicians, will be promoted to the Electronics System Analyst position at the Kansas City office in Pleasant Hill, MO. Mike will be starting at his new position this month. A replacement has not been determined as of this writing. Best of luck to Mike in his new position in Missouri!

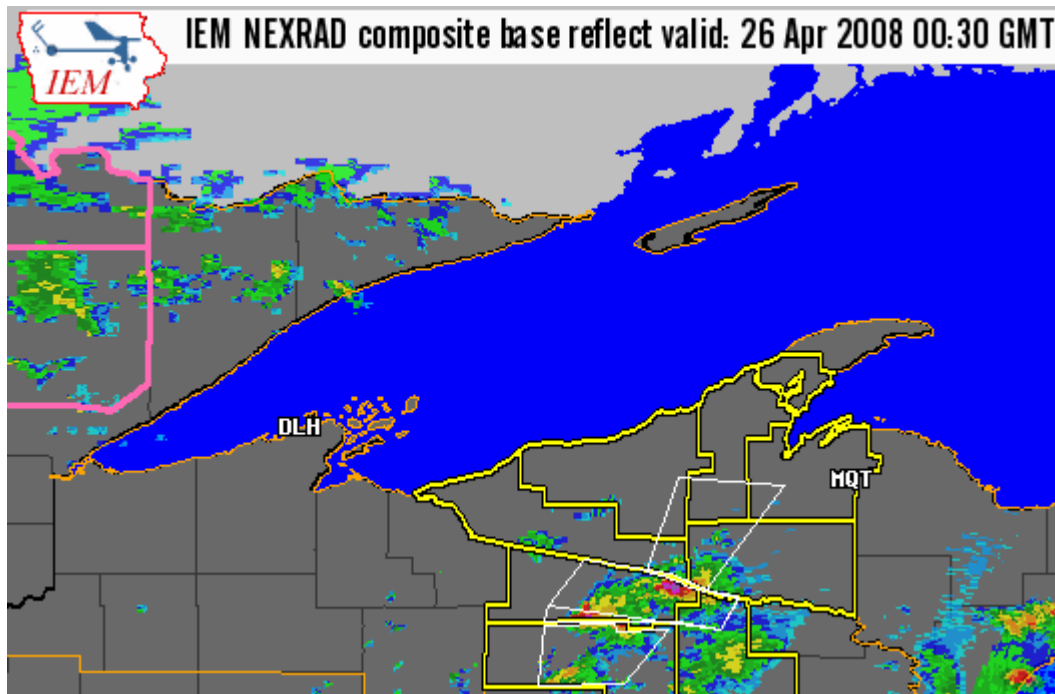
National Weather Service Begins Issuing Storm-Based Warnings

Beginning in October of 2007, the National Weather Service changed the way it issues severe thunderstorm, tornado, and flash flood warnings. In the past the NWS issued warnings on a county by county basis or “county-centric” warnings. This usually led to many parts of counties receiving a warning even though they were not in the direct path of a storm. Now, warnings are issued using a “storm-centric” philosophy which will highlight the specific threat area that the storm will affect. We will essentially be drawing polygons based on individual storms to highlight the threat areas. The polygon warning approach offers the potential of reducing warning aerial coverage, where no imminent threat exists, compared to whole county warnings.

”By evolving from “county-centric” to “storm-centric” warnings we will improve the accuracy of warnings and minimize the impact on residents outside the polygon area.” –Matt Zika (Warning Coordination Meteorologist)

The Storm-Based concept allows us to:

- Focus on the true area threatened by a given storm.
- Reduce the area not threatened.
- Easily handle storms moving along county borders.
- Support weather radio evolution to alert areas smaller than a county.
- Support the development of graphical/web-based products that show where the greatest threat exists.



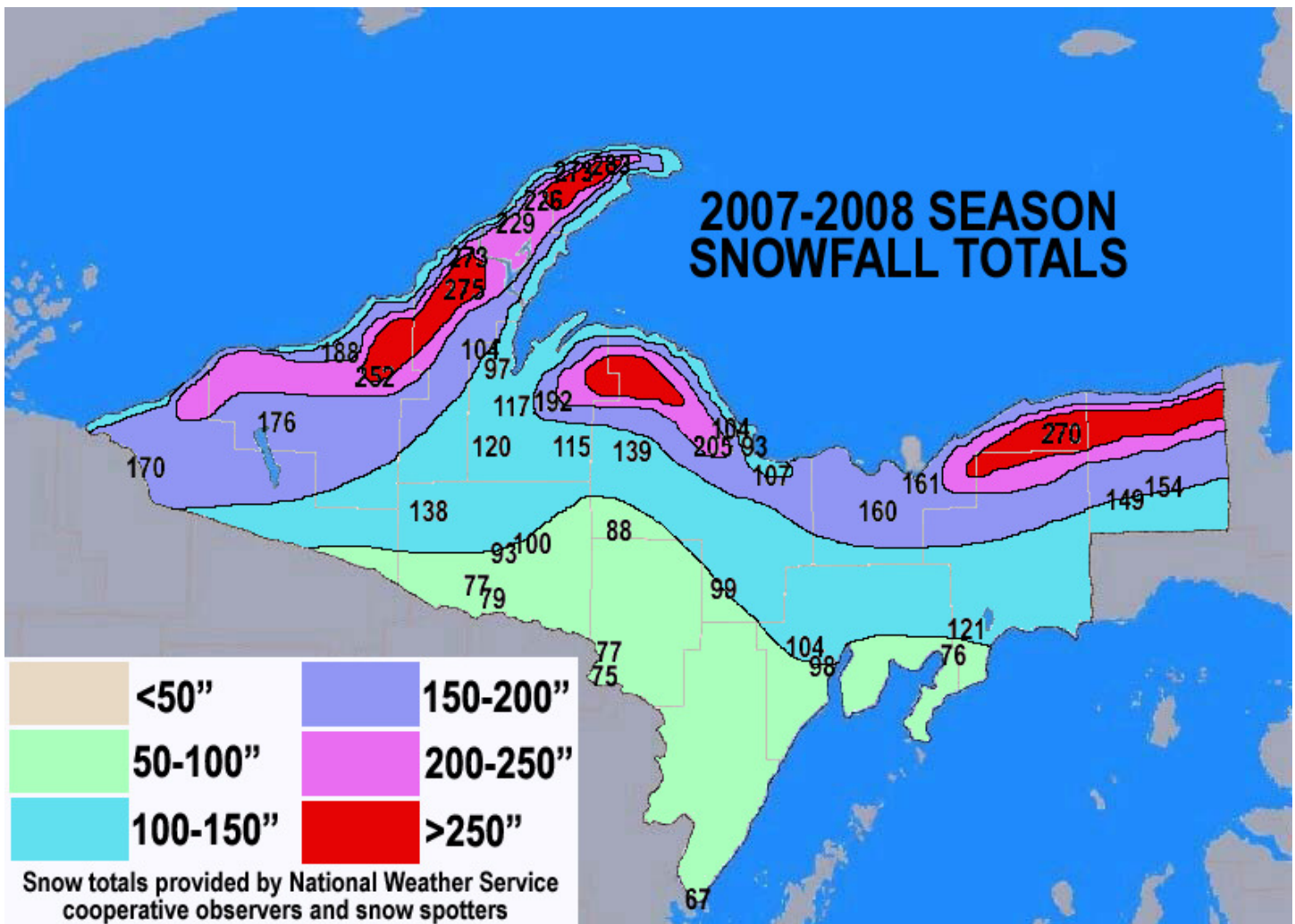
This picture illustrates the difference between county-based and storm-based warnings. The yellow boxes show all counties that are at least partially covered by a severe thunderstorm warning, while the white boxes depict the specific storm-based warning. The warning issued for the storm southeast of Marrenisco included portions of 5 Upper Michigan counties, including Gogebic, Ontonagon, Houghton, Iron, and Baraga. The square mileage of those counties equals 5496 square miles, while the warning issued by our office only equaled 792 square miles, a 85% reduction in coverage. As a result, people in cities such as Ironwood and Houghton were not under a warning for a storm that was not affecting their area.

2007-2008 Seasonal Snowfall Review

The pattern of the seasonal snowfall magnitudes matches fairly well with climatology. The southern U.P. received the least amount of snowfall, with totals generally below 100 inches. The locations favored by lake effect snow are shown very clearly, with locations in the Keweenaw Peninsula, Huron Mountains, and along the Grand Marais shoreline receiving the greatest amounts of snow.

However, some locations did receive above normal snowfall. Delaware received the greatest amount of snow, with 283 inches recorded by the Keweenaw County Road Commission. Although this falls well short of the record 390.4 inches received during the 1978-1979 winter, this is well above the average snowfall for the location, which is around 190 inches. Newberry was also above normal, as the city typically receives around 120 inches. Finally, locations in Gladstone and Menominee were above normal for snowfall totals as well.

We wish to thank all of our cooperative observers and snow spotters who provide us with their daily and seasonal snowfall information. Without data from them, it would be impossible for us to put together our annual snowfall graphics.



Visit us at Upcoming Events

There are two upcoming outreach events during the summer which the NWS will have booths.

We will have a booth at the 2008 "Balloons on the Bay" event in Escanaba. This event will be held on June 27th and 28th at the U.P. State Fairgrounds. For more information, call the Delta County Chamber of Commerce at (906) 786-2192, or visit <http://deltami.org/>.

In addition, be sure to visit our booth at the annual U.P. State Fair, also held at the U.P. State Fairgrounds in Escanaba. If you visited us in 2007, you'll remember we had a lot of great things including: a rain gauge display (right), a wind instrument display, weather radios, real-time NWS radar images, and numerous photos and facts of U.P. weather. This is your chance to interact with us in person. We hope to see you at the booth August 12th through the 17th. For more information on the fair, call (906) 786-4011, or visit <http://www.michigan.gov/upsf>.



Ryan Turner (above) demonstrates how the precipitation gauge display works at the U.P. State Fair.

The Last Word

by
Tom Green



Thank you for taking the time to read the newsletter that we've put together this spring. Many people from our office took the time to generate content, write articles, and publish this issue.

Our purpose at the National Weather Service is to serve you, the public. If you have any questions, comments, or suggestions about what we do or how we do it, you can call (906) 475-5212, or email us at w-mgt.webmaster@noaa.gov. In addition, the phone number allows you to listen to recordings of the 7-day forecast for Marquette County, the climate summary for our office located in Negaunee Township, the open waters forecast for Lake Superior, and the near-shore forecast for our areas of responsibility in Lake Superior and Lake Michigan.

Sincerely,

Tom Green