



Weather Currents



Summer 2014

Volume 12, Issue 2

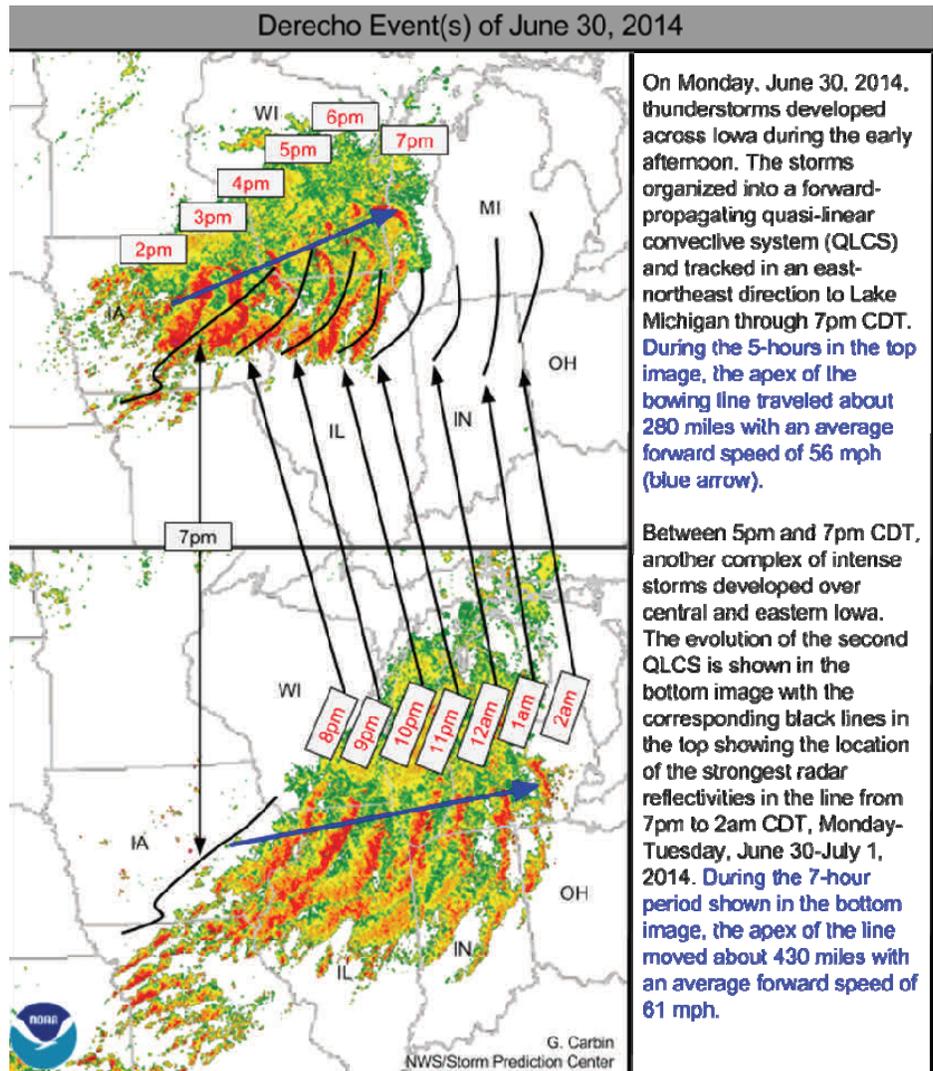
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The High Impact Derecho of June 30th & the Importance of Severe Thunderstorm Warnings

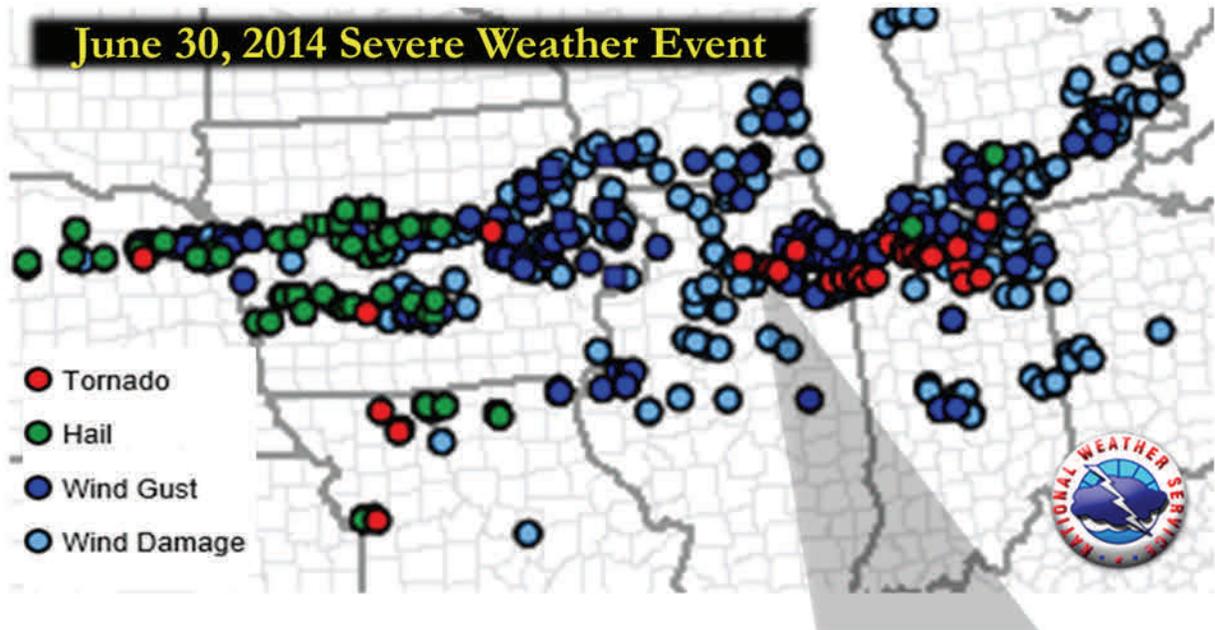
by Matt Friedlein and Ricky Castro

The most widespread severe weather episode for the local area thus far in 2014 occurred on the final day of June. A long-lived and significant wind producing complex of thunderstorms known as a derecho moved across parts of north central and northeast Illinois and across northern Indiana and even parts of lower Michigan and Ohio. This was the second of two derecho events which occurred across the Midwest on June 30th, with the first unfolding from eastern Nebraska across Iowa and into far north central Illinois and southern Wisconsin. Such a close occurrence of two major wind events is quite rare.



Website:
weather.gov/Chicago
 815-834-1435

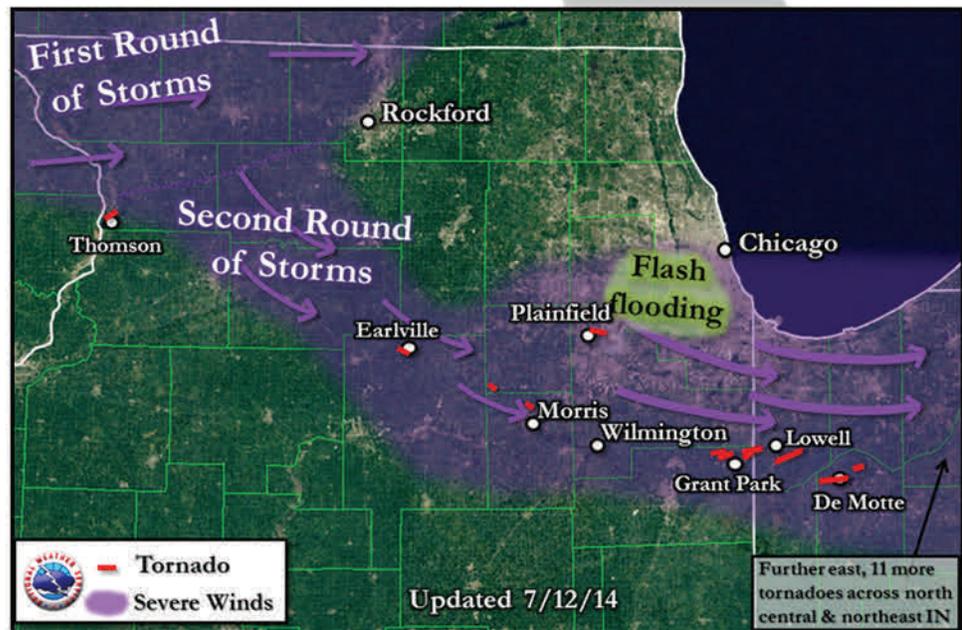
The second derecho impacted the local area between 8 pm and 11 pm and produced severe winds in a swath from near Oregon and Amboy southeastward across the I-80 corridor and into northwest Indiana. The winds brought down hundreds, if not thousands of trees, including across southern parts of the Chicago metro area. Some communities were without power for over 24 hours. While the severe winds were the most widespread hazard, there were nearly a dozen embedded tornadoes across the NWS Chicago County Warning Area. This includes from one rotating storm within the line of storms which moved from near Earlville in LaSalle County to near Morris and into Kankakee County before continuing just south of Lowell in Indiana.



**Event #s for
the entire
Midwest &
Great Lakes**

**Severe Wind
Reports
Over 450**

**Tornadoes
Over 25**



NWS Chicago Forecast Area Tornadoes of June 30, 2014

	Areas Impacted	Counties	EF Scale	Max Wind	Path Length
1	Earlville, IL	LaSalle	1	110 mph	1.5 mi.
2	Near U.S. Highway 52 5 mi. west of Lisbon, IL	Kendall	1	100 mph	1.5 mi.
3	5 mi. NNW Morris	Grundy	0	85 mph	2 mi.
4	Plainfield and Romeoville, IL	Will	1	95 mph	3 mi.
5	Northwest of Grant Park, IL	Kankakee	1	110 mph	4 mi.
6	Northwest of Grant Park, IL	Kankakee	1	100 mph	4 mi.
7	Northeast of Grant Park, IL	Kankakee	1	110 mph	3.4 mi.
8	Northeast of Grant Park, IL	Kankakee & Lake (IN)	1	110 mph	1.7 mi.
9	South and Southeast of Lowell, IN	Lake (IN)	1	110 mph	6 mi.
10	De Motte, IN	Jasper	1	105 mph	6 mi.
11	Northeast of De Motte, IN	Jasper	1	100 mph	1 mi.

There were dozens of warnings issued by the NWS Chicago office on the evening of June 30th. The degree and widespread nature of damage due to winds across the area remind us of the importance of heeding severe thunderstorm warnings. Such warnings are issued when NWS meteorologists expect storms to have either or both 1.) 58mph winds or stronger and 2.) quarter size hail or larger.

Safety advice for during a severe thunderstorm warning is as follows:

- Get inside a sturdy structure and stay away from windows. Do not venture outside.
- Heading into the basement or the lower level is encouraged as some storms have winds as strong as tornadoes, and some storms can rapidly intensify and produce a tornado.

As a last resort, if unable to reach a sturdy shelter and caught in a severe thunderstorm:

- If in a car, keep both hands on the wheel and pull over into a gas station or parking lot. Turn on your emergency flashers if only able to pull over to the side of the road. Stay away from power lines and large trees.
- If unable to reach a shelter or a vehicle, as an absolute last resort, find the lowest spot and use whatever is at your disposal to shelter yourself from the hail and winds.

Below is a quick graphic that we like to share to remind people of these safety tips. You can find the full resolution at: http://www.crh.noaa.gov/images/lot/prepare/NWS_severe.PNG

Severe Thunderstorm Safety

- **Take Severe Thunderstorm Warnings seriously** as they pose threats to life and property
- Go into a sturdy shelter and stay away from windows
- Have a means to hear additional warning info

Destructive Winds



Lee County

Large Hail



Iroquois County

- Outdoor large venues can be particularly vulnerable to severe storms

National Weather Service Chicago: weather.gov/chicago   

As always, severe weather preparedness comes first. This means to prepare and practice a plan at home, work, and any other location you frequent. Stay informed on days with thunderstorm chances. Have multiple means to receive a warning and ensure you act swiftly when one is issued. The average lead time for severe thunderstorm warnings is 15-20 minutes, however that is only an average and some storms intensify rapidly or move quickly, and not all warnings may have that much lead time. In addition, some people may need longer time to reach safety, including those who may be outdoors. So consider your situation on a day or night when thunderstorms are possible and stay in tune with the latest forecast.

On that note, we will end by proudly saying that there were no injuries across the local area reported to us in the widespread damaging wind event of June 30th! This speaks to the continuous preparedness and communication efforts by our core partners in emergency management, law enforcement, and broadcast media. It also says how many folks took their planning and practicing for severe weather seriously and used it during that evening, as well as spread the word on approaching severe thunderstorms. All of us at NWS Chicago thank those of you for your efforts toward being a "Force of Nature!"

For more on the June 30th, 2014 severe weather event, see our [event review page](#).



National Weather Service in Your Community

by Mike Bardou, Jamie Enderlen, and Matt Friedlein

The NWS is continuing its mission of building a Weather-Ready Nation. This goal is as critical for northern Illinois and northwest Indiana as anywhere, with over 10 million residents, hundreds of thousands of daily tourists, and robust commerce including aviation and marine travel, which are all vulnerable to extreme Midwestern weather hazards.

Building a Weather-Ready Nation begins with establishing partnerships through outreach to enhance preparedness. Such partnerships include other government agencies and emergency managers, the media, researchers, the insurance industry, non-profits, the private sector, the Weather Enterprise, and more. Understanding the needs of these decision-makers helps all of us empower the public to make quick, smart decisions that can save lives prior to hazardous weather.

Following is a quick summary of such efforts at NWS Chicago thus far in 2014:

NWS Chicago Outreach in 2014 (January-July)

- 40 Non-Operational Briefings & Presentations**
- 13 Office Tours**
- 3 Safety Preparedness Campaigns**
- 2 Preparedness and Safety Expos**
- 2 River Ice Spotter Training**
- 1 Media Workshop**

NWS Chicago StormReady Outreach in 2014

- 17 Sites interested in becoming StormReady**
- 14 Completed StormReady renewals**
- 3 New Sites (Lisle, Chicago O'Hare International Airport, St. Charles)**



The NWS Chicago has over 50 StormReady designations within the County Warning Area through July 2014

For more on the StormReady program, please visit [this web site](#).

WFO Chicago Hosts Two Hollings Scholar Students This Summer

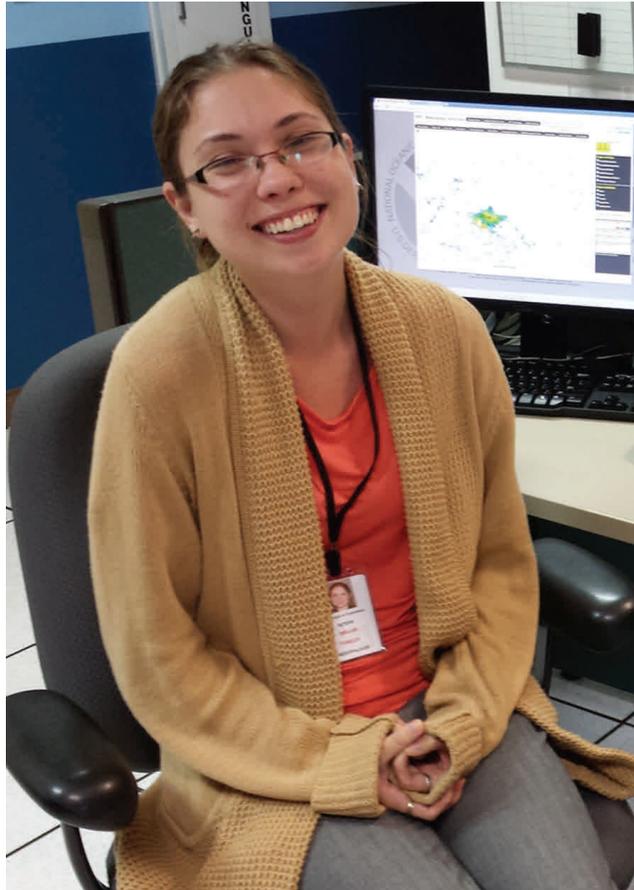
by Gino Izzi

This summer our office had an opportunity to host two students who were recipients of the prestigious National Oceanic & Atmospheric Administration (NOAA) Ernest F. Hollings scholarship. Sophomore undergraduate students from a wide array of disciplines, including meteorology, compete for this scholarship each year which is typically awarded to around 100 students from across the nation. In addition to tuition assistance, recipients of distinguished scholarship also choose a paid summer internship and associated project that they complete the summer prior to their senior year. The scholars have the opportunity to select from internship opportunities from across the country, including Alaska and Hawaii!! NOAA pays for travel and lodging for the students enabling them to participate in any internship from across the country! This was the first time our office hosted a Hollings Scholar and it was an extremely rewarding experience for our staff and for the students alike. We were very lucky to have Chris Soelle from University of Missouri and Megan Fowler from Texas A&M University choose to complete their summer internships here.

Chris Soelle's project was to design and create an implementation plan for severe weather for elementary and secondary schools. Chris took a multifaceted approach including creating a presentation, detailed school severe weather preparedness handbook which can be obtained online, and a 4 part series of YouTube educational videos for school administrators. The NWS Chicago plans to take all of Chris' hard work and use it to begin a campaign to help local schools become weather ready.



Megan Fowler worked on a project to examine various meteorological variables and assess their ability to be used as predictors for an increase in the number of heat related fatalities. In particular, Megan attempted to quantify the effects of duration of high heat and humidity values by looking at cumulative hourly values of excessively high heat indices. Megan's work had some promising results which did offer some potential improvement in current exclusive use of heat index for NWS heat watches and warnings, though further work will need to be done.



The NWS Chicago was extraordinarily lucky to have had two so incredibly talented students as our first ever Hollings Scholar students. Their hard work and exciting results have laid the ground work for exciting future endeavors. We are very sad to see Megan and Chris leave, but it is very exciting to see that the future of meteorology is going to be in such great hands! NWS Chicago would like to thank Megan and Chris for all their hard work and wish them the best of luck in their senior year, perhaps graduate school and then into productive meteorology careers!

More information on the Ernest F. Hollings Scholarship can be found here:

<http://www.oesd.noaa.gov/scholarships/hollings.html#page=timeline>

Undergraduate students entering their sophomore year studying meteorology or a variety of other majors including oceanic, environmental, biological, and atmospheric sciences, mathematics, engineering, remote sensing technology, physical and social sciences including geography, physics, hydrology, and geomatics, are strongly encouraged to consider applying for this scholarship.

Student Volunteers Visit a NWS Cooperative Weather Station—Midway 3SW by Bill Nelson

Four student volunteers at the National Weather Service's (NWS) Chicago Forecast Office in Romeoville recently accompanied the office's Observing Program Leader (OPL) on a semi-annual inspection visit to the NWS Cooperative weather station, Chicago Midway 3SW, located in Burbank.

The students, Megan Fowler and Chris Soelle, Hollings Scholar students, and Casey Hilgenbrink and Russell Danielson, student volunteers, are working at the forecast office to gain experience and expertise as future meteorologists.

The primary purpose of the visit was to inspect the operational condition and calibration of NWS owned observing equipment used by the sites' observer, Frank Wachowski. Mr. Wachowski uses the equipment to record and transmit the daily maximum and minimum temperatures, rainfall and snowfall every day of the year. He also downloads and transmits digital data from a recording rain-gage at the beginning of each month. The NWS then compiles and archives the data for use in research and studies. It is from these records that the weather database for the Midway Airport/Burbank area is derived.



Pictured from left to right:

*Top: Frank Wachowski,
Russell Danielson and
Casey Hilgenbrink*

*Bottom: Chris Soelle and
Megan Fowler*

During the visit, the students learned of the various equipment used in the cooperative network and the method of transmitting the data, how the data is of importance locally and nationally. Mr. Wachowski is widely known in the metro area as "Chicago's Weather Man" for his knowledge of the its weather history and understanding of the local weather patterns. Thus, the students also learned quite a bit about Chicago's weather history, including the different observing locations, and what it was like experiencing some of the major weather events.

All NWS Cooperative weather stations have a standardized rain gage, with approximately 35 percent of the sites having temperature equipment, and 10 to 20 percent having other equipment. All sites are visited and inspected at least once a year to keep the equipment in good working condition and to maintain a relation with the observer. However, 15 to 20 percent of the sites require a second visit due to the type of equipment used which includes a recording rain-gage, soil thermometers, or evaporation monitoring equipment.

The NWS weather records for Frank's location goes back to September 1, 1980 when Frank volunteered his services and location to record precipitation and temperature data as part of the NWS's Cooperative Observing network. However, Frank began taking his own weather observations at the same location in 1951 when he was only 14 years old. He was chosen as the Weather Channel's "WEATHER OBSERVER of the MONTH" for February 2002. In 2004, Mr. Wachowski was a recipient of the NWS's highest national award – the THOMAS JEFFERSON AWARD - due to his tremendous efforts in providing the NWS with accurate readings and, as complete as possible, a climate record of the area around Midway Airport. Frank has been a frequent guest on local TV stations. In fact, Frank is presently the only source for sunshine data for the entire Chicago Metropolitan region.

The length of weather records for NWS Cooperative stations around Illinois varies from just a couple of years to a few years past the century mark. Nationwide, the data for some Cooperative sites in the eastern states go back over 200 years.

The NWS maintains a network of close to 300 volunteer coop observers in Illinois and 11,000 nationwide. These observers provide the NWS with various data that is published and used for climatological studies and research, court cases, etc. The observers also provide real-time information that is used in the issuance of flash flood watches and warnings, river stage forecasts, soil saturation, and more. The types of data provided by the observers include high and low temperatures, rainfall and snowfall, river stages, soil temperatures, evaporation rates, etc. Thus, the Cooperative Weather Program is very important to the mission of the NWS.

By documenting daily weather conditions, Cooperative Observers carry on the tradition of early American science -minded citizens such as Thomas Jefferson and Benjamin Franklin.

WFO Chicago Welcomes New Forecaster Kevin Donofrio

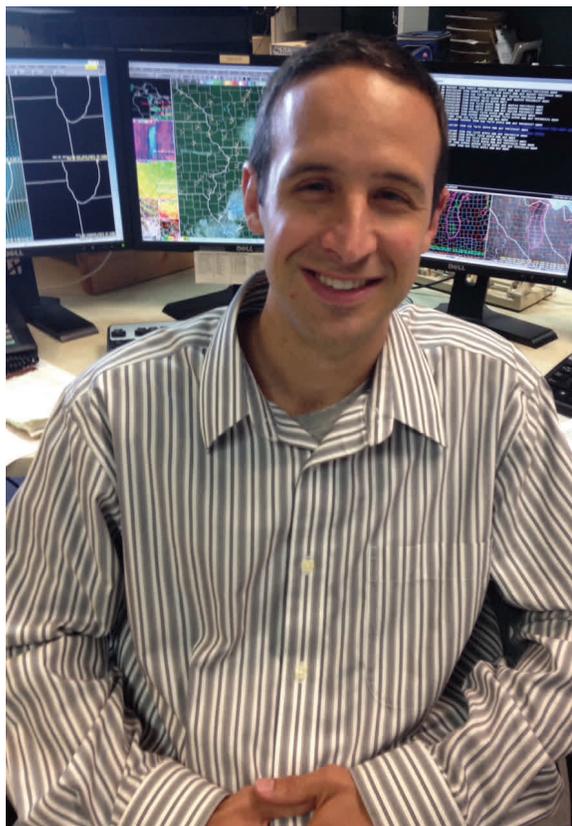
We welcome a new forecaster this summer to WFO Chicago, Kevin Donofrio. Kevin is originally from Downers Grove, IL and attended Downers Grove North High School.

Kevin completed his undergraduate degree in General Engineering from the University of Illinois in 1999, but has always had a passion for meteorology. After some time in the software industry, he returned to graduate school to complete his masters degree in Atmospheric Science in 2007.

Kevin's National Weather Service experience includes time as a volunteer at the Cheyenne, WY office in the Spring of 2007, followed by intern, forecaster and lead forecaster positions at NWS Duluth, MN and Portland, OR from the spring of 2007 to the summer of 2014.

Kevin is excited to return to his hometown with this wife and three kids, and looks forward to the challenges of forecasting in Chicago.

Welcome Kevin!



The Contrasting Effects of the Near Record Cold Winter/Spring of 2013-14 and Near Record Warm Winter/Spring of 2011-12 on Lake Michigan Surface Water Temperatures in the Summer

by Kevin Birk and Ricky Castro

One of the coldest winter through spring periods on record occurred earlier this year across much of the Great Lakes, and this produced the most extensive ice coverage the lakes have experienced since the late 1970s. Figure 1 below displays the extent of the ice coverage across the Great Lakes as of February 13th 2014. At its maximum extent, over 90% of the lakes were frozen over. The colder than normal air temperatures lingered across the area into the spring, allowing the ice coverage to linger over portions of the lake through much of April. As a result of this, lake water temperatures have been extremely slow to warm over Lake Michigan through the middle of July, with values remaining well below their typical values for the time of year across much of the lake. In some cases, water temperatures on some parts of the lake have, at times, even been near their coldest values on record dating back to the early 1980s. This is in sharp contrast to water temperatures observed during the summer period 2 years ago following the record warm winter through spring period. This very warm period produced only minor ice coverage mainly near the shores, which quickly melted by March. This lack of ice coverage, along with the continuation of much above normal air temperatures over the Great Lakes into the summer set the stage for a rapid warm up of the lake early in the spring, with water temperatures running above, to much above, their typical values.

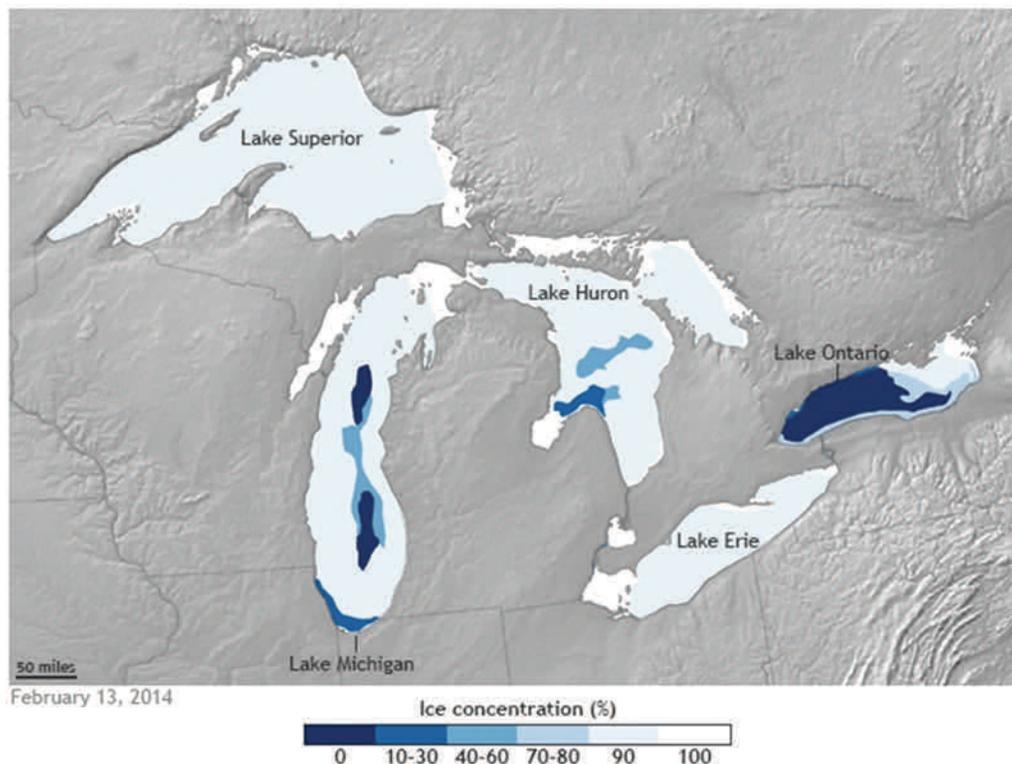


Figure 1. Figure displaying the ice coverage on the Great Lakes as of February 13th, 2014.

There are two weather observation buoys located in the central portions of the lake. One is located on the southern end of the lake 43 nautical miles east-southeast of Milwaukee, WI, while the second is located on the north end of the lake halfway between North Manitou and Washington Islands. These buoys record various weather parameters over the lake, including surface water temperatures. Typically these buoys are removed for the winter season due to icing, and then returned to service in April or May. This past spring these buoys were not deployed for the season until late May. Since this time, the surface water temperatures reported have been much below average, and far colder than they were during the same period in 2012.

Figure 2 below displays the surface water temperature trends from late May through July 20th at the south buoy. The red line displays the trend during the period during 2012, with the blue line displaying the current year. The black line in the figure represents an approximation of the average temperature trend. Notice the stark contrast between the two years. By late May 2012 lake surface temperatures at the south buoy had no problem warming above 10° Celsius (50° Fahrenheit) and then to around 20° Celsius (68° Fahrenheit) by early June, which was well above normal for the time of year. In contrast, this past year surface water temperatures were fairly steady around 3° Celsius (~38° Fahrenheit) in the deeper waters of the lake, with only a very modest warming trend prior to around the 20th of June. This slow climb in temperatures during this period was likely partially due to the fact that extensive periods of marine fog occurred over much of the lake during this time. As warmer and very moist air masses began to impact the Great Lakes Region into June, this high dew point air moved over the much colder than normal lake waters, making the air mass quickly become saturated and allowed fog to form over the lake. Although these air masses did help warm the lake some, the extensive and somewhat persistent fog blocked the late May and June sun from helping warm the lake. Finally, however, by late June and early July, lake water temperatures have begun to warm at a much higher rate, but still remain below average as of July 20th.

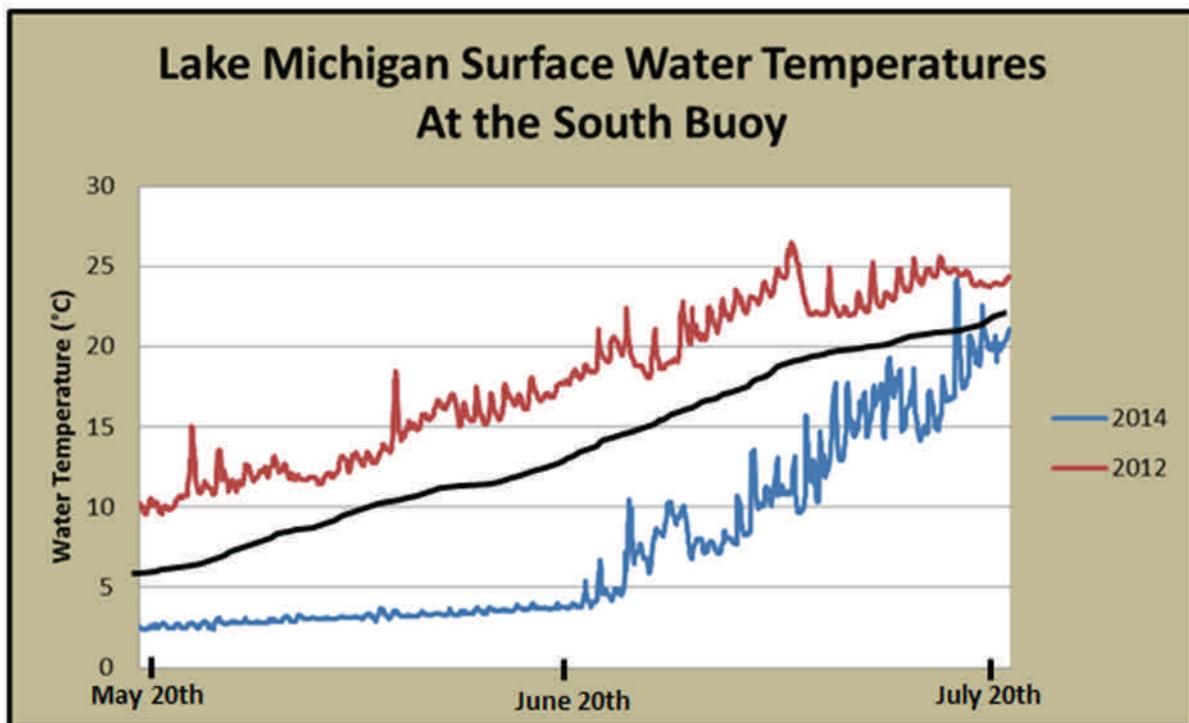


Figure 2. Timeline of surface water temperatures at the Lake Michigan south buoy from late May through late July. The red (blue) line shows the period of water temperatures during 2012 (2014). The black line in the figure is an estimation of the typical timeline of surface water temperatures at the south buoy.

Water temperatures along the shores of northeastern Illinois and northwestern Indiana have also remained cold. However, temperatures in the shallower water near the shores have not been nearly as cold as the deeper waters of the lake this summer. In spite of this, however, it is apparent from the table below that water temperatures on the shores of northeastern Illinois and northwestern Indiana are several degrees colder currently than they were the same time in 2012.

Table 1. Surface water temperatures along northeastern Illinois and northwest Indiana beaches on 7/20/12 and 7/20/14

LAKE MICHIGAN WATER TEMPERATURES (°F)		
	JULY 20 TH , 2012	JULY 20TH, 2014
CHICAGO SHORE	81	70
CHICAGO CRIB	78	56
CALUMET BEACH	77	70
SIXTY THIRD ST BEACH	77	69
OHIO ST BEACH	76	67
MONTROSE BEACH	76	66
OSTERMAN BEACH	77	65
LAKE FOREST	76	58
WAUKEGAN BEACH	77	64
MICHIGAN CITY	59	50
SOUTHERN BUOY	75	67

To continue the comparison between 2012 and 2014, figure 3 is the same as Figure 2 for the South Mid Lake Buoy, except it is for the buoy located near the shores of St. Joseph, Michigan. Notice as in the table above that although the water temperatures were overall warmer during 2012 than 2014, the differences here near the shore are somewhat less than that found out at the south buoy in the deeper waters of the lake. This is mainly due to the fact that the shallower water near the shores allows it to warm up faster, making the differences between water temperatures following a very warm winter and those following a very cold winter a bit less dramatic by the summer months.

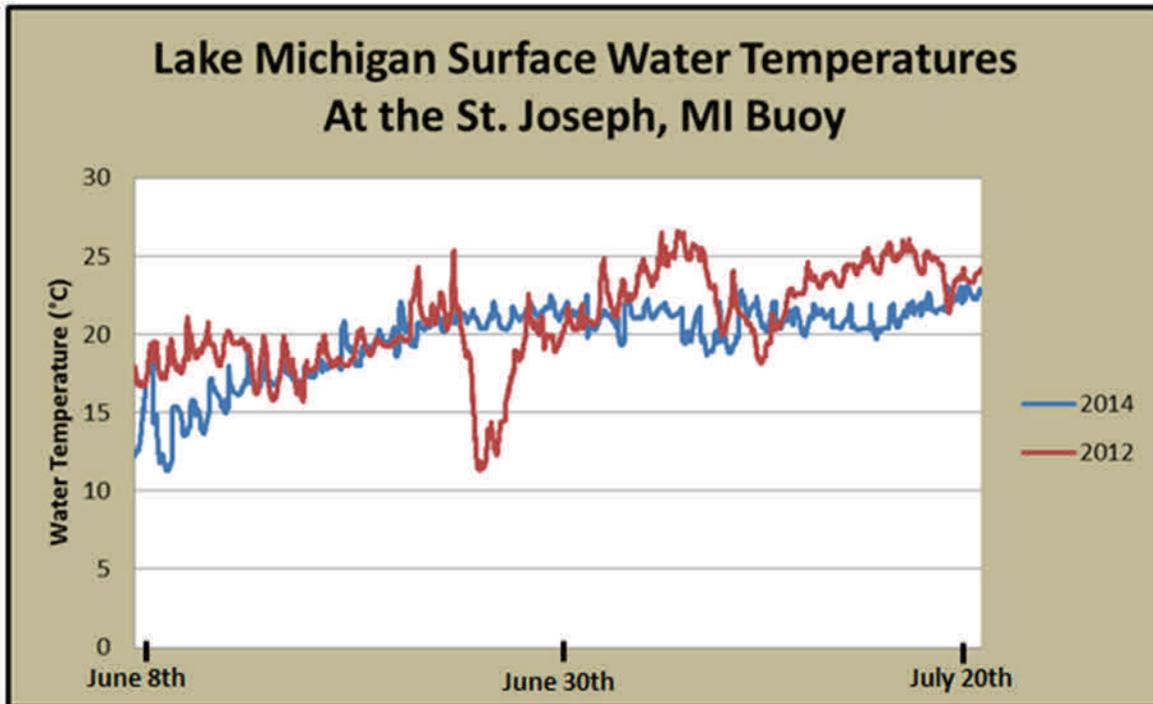


Figure 3. Same as figure 2, except at the St. Joseph, Michigan near shore buoy.

Although water temperatures warm faster near the shores, they also tend to be quite variable. For example, note the sharp dip in water temperatures in figure 3 above around June 26th, 2012 (red line). This is not bad data. The water temperature dropped from around 22° Celsius to around 12° Celsius in a very short period of time. This was the result of strong winds and high waves, leading to the mixing of the water near the surface with the colder water below the surface. However, after the winds and waves subsided, surface water temperatures quickly recovered back to near 20° Celsius.

Another process that can result in rapid fluctuations of surface water temperatures in the near shore areas is known as upwelling. This is when winds blowing from land over the lake (offshore winds) push the warmer surface waters away from shore, with colder water from below rising to the surface to replace the lost volume. The effects of mixing and/or upwelling this summer have been even more dramatic than in July 2012, likely due to the waters below the surface also being much colder than usual. In fact, there have been several days this July in which water temperatures at some Illinois beaches have dipped down to the 40s!

Overall, it is clear that the effects of the nearly record breaking cold winter this past year has produced a lasting effect on the water temperatures of Lake Michigan this summer, which has continued to result in much colder than usual water temperatures, making swimming very uncomfortable. Typically the climatological warmest water temperatures are reached during August, when the average temperatures at the south buoy on Lake Michigan reaches 22° Celsius (71° Fahrenheit). It is possible that these water temperatures could be achieved in the coming weeks, however, with the likelihood of below average temperatures expected into August across the Great Lakes, it will make it difficult for water temperatures to warm significantly.

Weather Puzzle

By Terrie Sheetz

Summer in the City

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

AIR QUALITY
 BASEBALL
 BEACH
 CAMPING
 CLOUD
 DAY CAMPS
 HAIL
 HEAT INDEX

HIKING
 LIGHTNING
 MINI GOLF
 OUTDOOR CONCERTS
 PICNIC
 PLAYGROUND
 SIX FLAGS
 SMOG

SUMMER CABIN
 SUMMER CAMPS
 SUNSHINE
 THUNDERSTORMS
 TORNADO
 WATERSPOUTS
 WEATHER WARNING
 WEATHER WATCH