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A Look Back at the Summer of 2013

by Kevin Birk, Forecaster

Everyone remembers the extreme heat during the summer of 2012. So how did the summer of 2013 rate relative to last year's unrelenting heat? Overall, temperatures during the summer (June through August) of 2013 averaged 71.6 (71.3) degrees in Chicago (Rockford), which was just below average. In sharp contrast, temperatures during the summer of 2012 averaged 76.1 (75.2) degrees in Chicago (Rockford), and this ranked amongst some of the warmest summers on record.

To really illustrate the main differences between the two summers we can compare the number of hot days (days of 90+ degree temperatures) at both Chicago and Rockford. This past summer only produced 9 (10) such days at Chicago (Rockford). This is in comparison to a whopping 40 (37) such days during the summer of 2012. Climatology tells us that 90 degree temperatures are reached on about 15 to 20 percent of all summer days (June through August), which equates to about 15-16 days in Chicago and 10 to 12 days in Rockford. So this past summer was a bit below the average, but the summer of 2012 was extremely unusual with just over 40 percent of all summer days topping 90 degrees. In fact, looking at all the records, only the 1988 summer had more 90 degree days than the summer of 2012 in Chicago.

The highest temperatures reached at both Chicago and Rockford was 96 degrees, which meant no triple digit heat was achieved at either site this past summer. During the 2012 summer there were a total of 4 (6) 100 degree days at Chicago (Rockford), and the highest temperature for the season was 103 (105) degrees.

Aside from the dearth of extreme heat, the main thing that stood out from this past summer was the number of unseasonably cool days during the season, especially in late July. There were a total of 25 (14) days during the season in which the daily high temperature was 75 degrees or cooler at Chicago (Rockford). This is the highest number of such days since the cool summer of 2009. The most notable day was the 27th of July when the high temperature at both Chicago and Rockford only reached 65 degrees. This broke the record for the coolest high temperature for the date. This date has been highlighted in figure 1, which displays the daily temperatures during this past summer. For comparison the summer of 2012 is also shown, with the near record temperatures circled in figure 2.

A Look Back at the Summer of 2013 (cont)

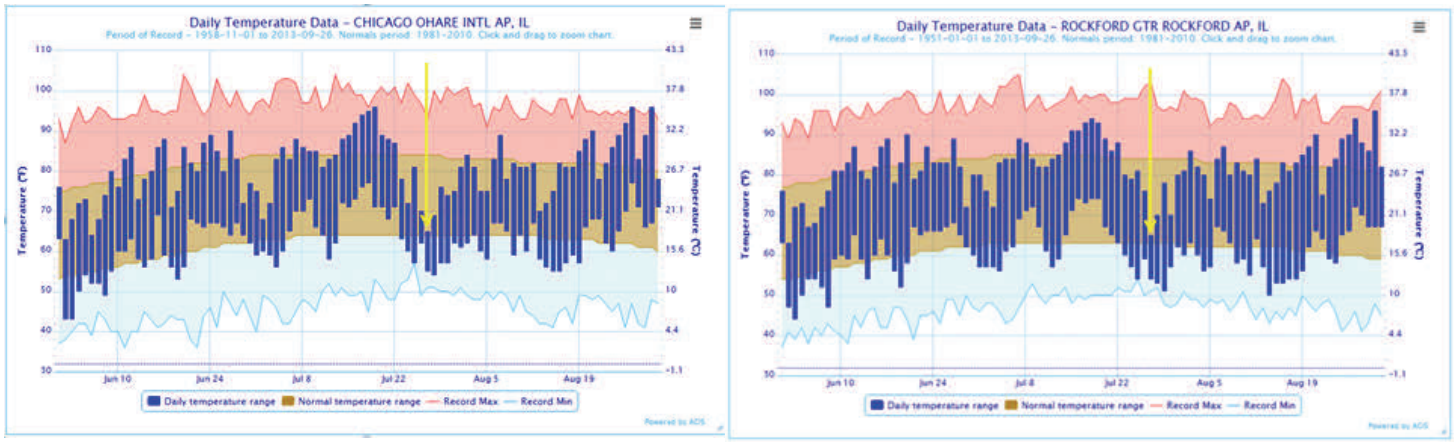


Figure 1. Daily temperatures at Chicago (left) and Rockford (right) during the summer season (June 1st to August 31st 2013). The yellow arrow shows the unseasonably cool conditions on July 27th.

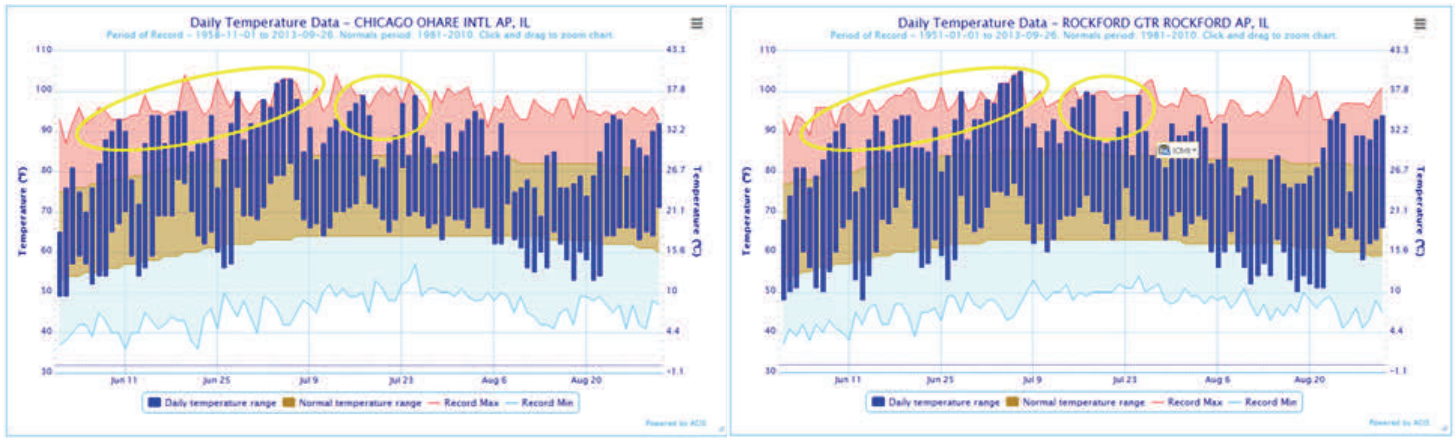


Figure 2. Daily temperatures at Chicago (left) and Rockford (right) during the summer season (June 1st to August 31st 2012). The yellow circles shows the unseasonably hot days.

Precipitation

Rainfall amounts for the entire summer of 2013 totaled 10.14" at Chicago and 12.56" at Rockford, which are a bit below normal for the season as a whole. However, these numbers alone don't tell the whole story. A total of 61% of the summer rains fell back in June. Since then, the area has been dry, with rainfall only running about 50% of normal. Figure 3 displays the percentage of normal precipitation for the months of June, July and August. Notice how far northern Illinois was amongst some of the wettest areas in the central United States, with about 150 to 200 percent of normal June rainfall, and then amongst some of the driest areas during July and August, with only 25 to 50% of normal rainfall. The figure shows that the main focus for rainfall shifted well south of the area across southern Missouri and into Kentucky during the latter portion of season.

A Look Back at the Summer of 2013 (cont)

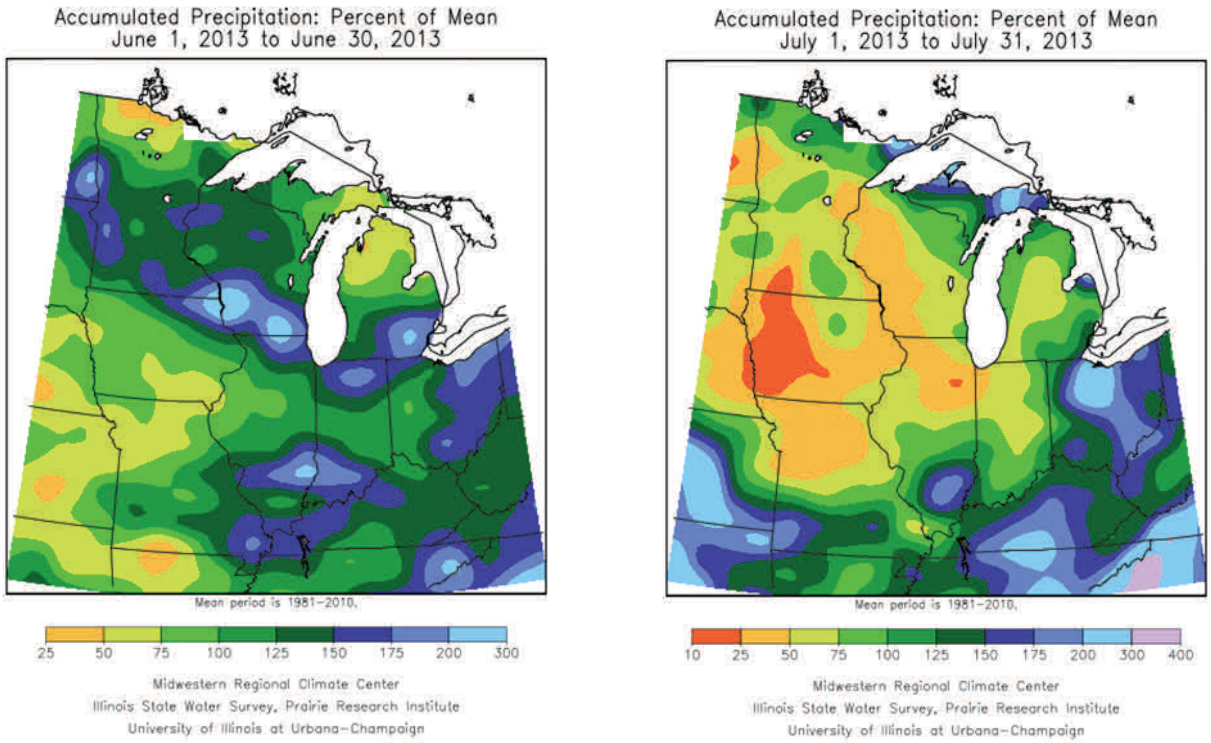


Figure 3. Precipitation percentage of normal for June (top left), July (top right) and August (bottom left).

Flooding—The Hazard for All Seasons, Including Fall

by Jim Allsopp, Warning Coordination Meteorologist

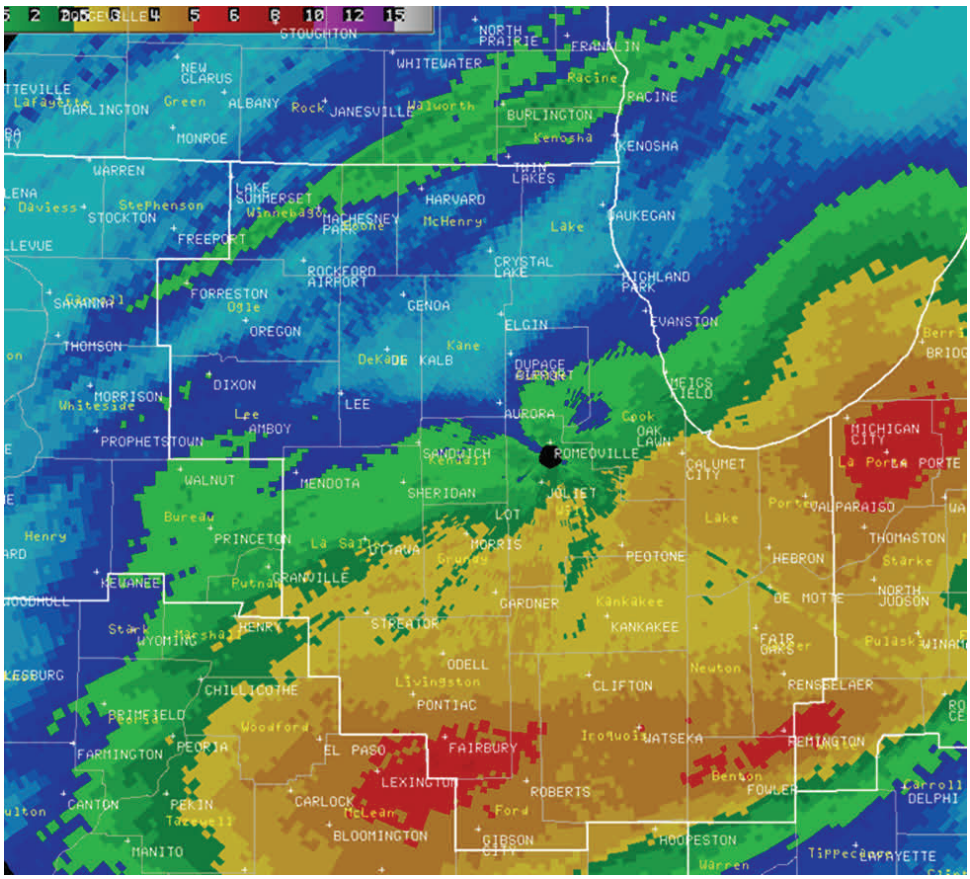
Some weather hazards are linked to a particular season in northern Illinois and northwest Indiana. Crippling snowstorms, ice storms and blizzards are confined to December through March, for the most part. Deadly heat waves generally occur from June through early September. While the Chicago area has experienced strong and violent tornadoes in August (Plainfield 1990), November (Boone County 2010), and even January (Boone County 2008), the peak for tornado activity in northern Illinois and northwest Indiana is late March through early June. But one of the local area's most destructive and deadly hazards – flooding – has no distinct season. Localized *flash* flooding peaks in mid to late summer when there is abundant tropical moisture and often slow moving storms, but widespread lowland and river flooding can occur any time of year. In fact, a flood which may have been Chicago's worst, occurred in October of 1954.

Flooding is one of the most deadly and destructive forces in nature. Nationwide, the 30 year average number of flood fatalities is 89, compared to 74 tornado fatalities. In Illinois, since 1995 there have been 29 flood related fatalities and 30 tornado fatalities. In the same time period, there have been 18 federal disaster declarations for flooding in Illinois, compared to 6 for tornadoes.

Here are samples of some of northern Illinois' and northwest Indiana's worst floods in recent decades, listed by season, including three major fall floods;

Winter - January 2008 Pontiac, Watseka, and Remington Flood

Unseasonably warm and moist conditions combined with a stalled frontal boundary and a slow moving low pressure system, resulted in heavy rainfall along and south of a line from Streator to Calumet City. Rainfall totals were 2 1/2 to more than 4 inches. The heavy rain falling on partially frozen soil, combined with snowmelt, resulted in major flooding.



Storm Total Doppler radar rainfall estimates ending January 8, 2008.

Flooding—The Hazard for All Seasons, Including Fall (cont)

The Vermillion River at Pontiac reached a record flood stage, resulting in severe flooding in town and surrounding farmland. In Watseka, the Iroquois River reached the second highest crest on record, causing extensive flooding. A man was swept away and drowned near Remington, IN while attempting to evacuate flood waters.

Flooding in Pontiac, January, 2008. Photo courtesy Scott Peterson, Pontiac Flying Service

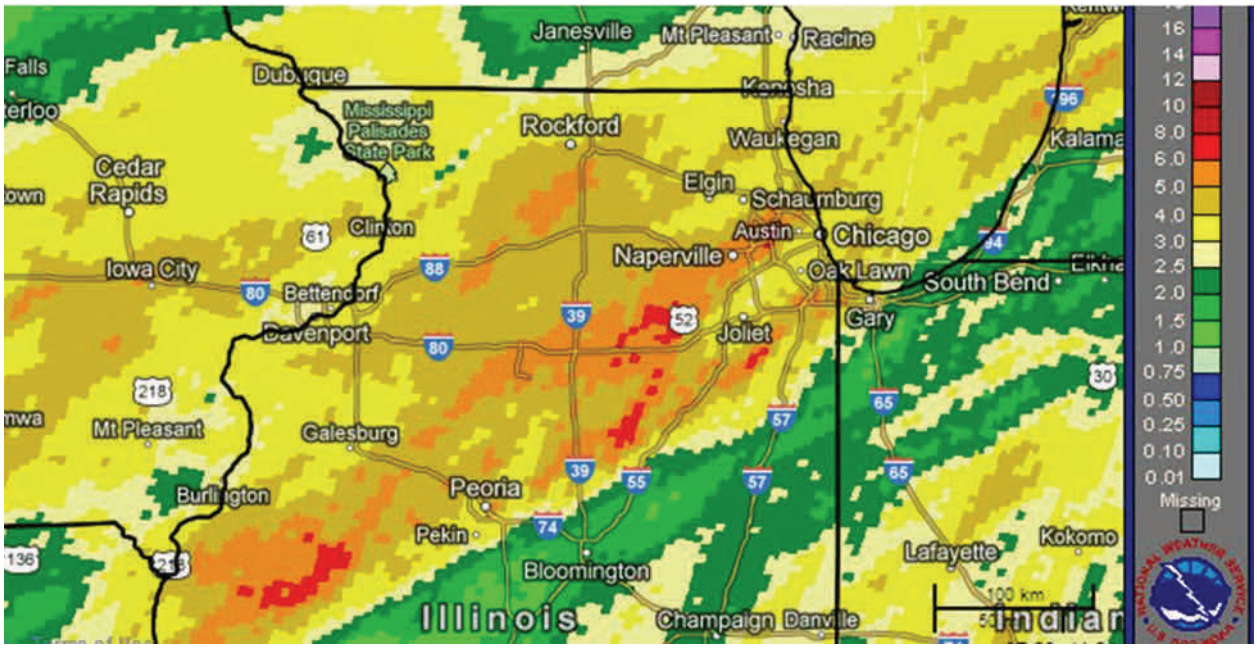
Flooding in Watseka, January, 2008.

Flooding —The Hazard for All Seasons, Including Fall (cont)

Spring - April 2013 Record Des Plaines and Illinois River Flood

In mid April, 2013, 4 to 8 inches of rain fell over already saturated soils. Water levels in area rivers were already high due to a combination of snowmelt and a wet early spring. The heavy rain caused record flooding on portions of the DesPlaines River, North Branch of the Chicago River, the Illinois River, Vermillion River, east branch of the DuPage River, and the Fox River. Marseilles was especially hard hit when barges broke loose from a tug, damaging the dam. Many homes were inundated. One person died in LaSalle County while attempting to drive around a barricaded road. Total damages were estimated at around $120 million.

48 Hour Rainfall Through 7 am April 19th as Estimated by Radar



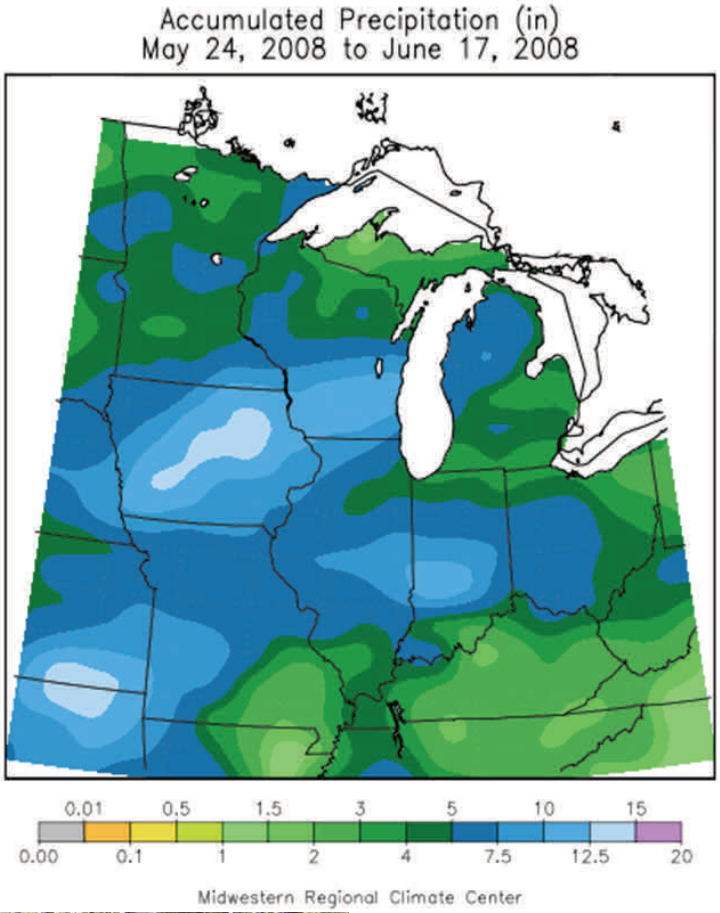
Marseilles dam damaged by barges. Photo by Kris Habermehl

Flooding in Marseilles. Photo by Kris Habermehl

Flooding—The Hazard for All Seasons, Including Fall (cont)

Summer - June 2008 Rockford Area Flood

A series of heavy rain producing storms in late May and early June over northern Illinois and southern Wisconsin caused the Rock River to reach major flood levels from Rockton through downtown Rockford by mid June. Many homes in Rockton, Latham Park, Machesney Park and Loves Park were inundated. The second highest crest on record was set on the Rock River at Rockton and a new record was set at Latham Park.



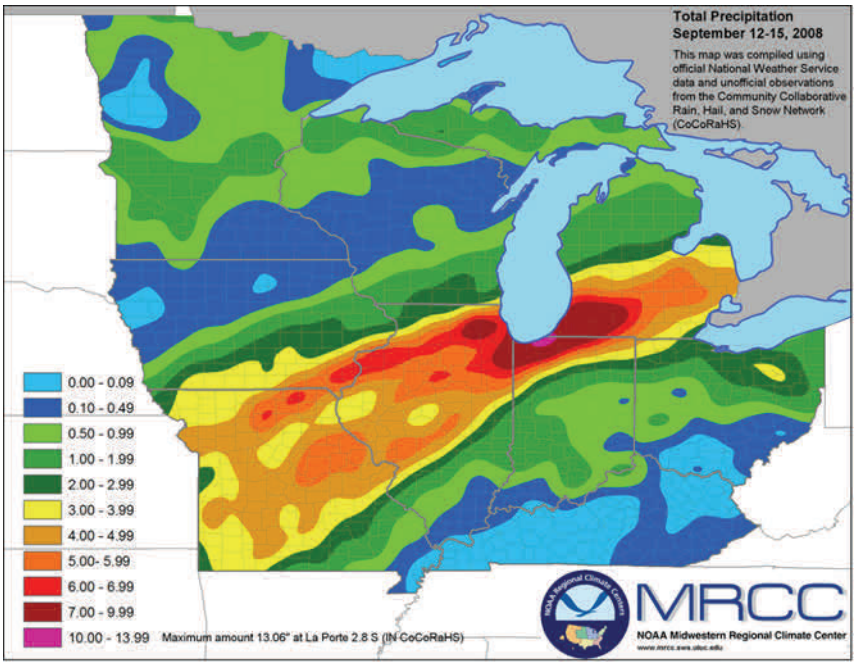
7 to 12 inches of rain fell over northern Illinois and southern Wisconsin in the weeks leading up to record flooding of the Rock River in 2008. Map from Midwest Regional Climate Center.

Flooding in the north suburbs of Rockford, June, 2008. Photo by Jim Allsopp, NWS

Flooding—The Hazard for All Seasons, Including Fall (cont)

Fall - September 2008 Tropical Storms Flood

After a fairly dry late summer, the remnants of Tropical Storm Gustav brought heavy rainfall of 2 to 4 inches to the Chicago metro area in early September. This saturated soils and sent rivers rising. A week later the remnants of Tropical Storm Ike dumped another 4 to 10 inches of rain on the area on September 13 and 14, resulting in widespread flooding. Record crests were set on the Illinois River at Morris, Ottawa, and LaSalle. Those crests were later exceeded in April of 2013. Total damages were estimated at $131 million across northern Illinois and northwest Indiana.



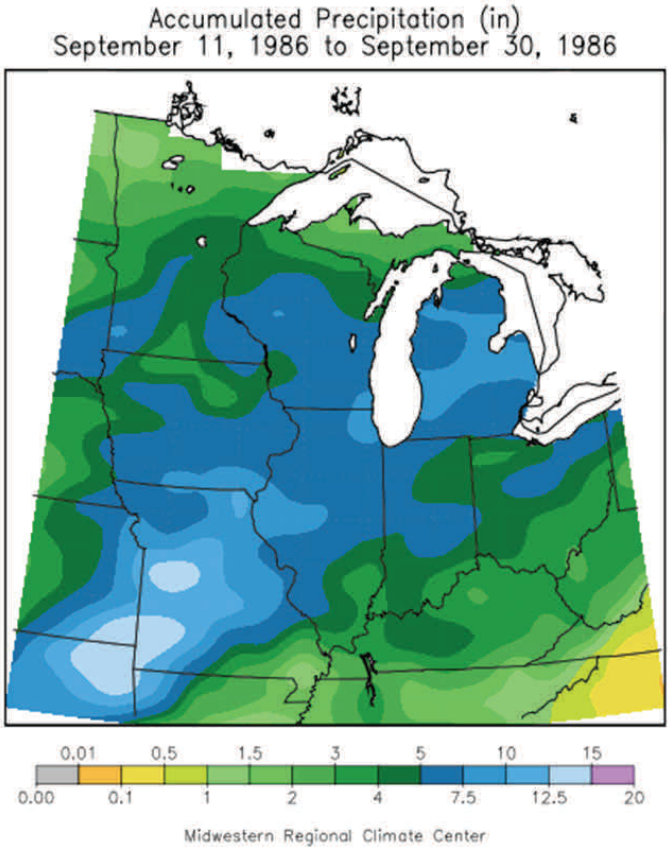
Flooding at O'Hare Airport September, 2008. Photo by David Lastrucci

Flooding—The Hazard for All Seasons, Including Fall (cont)

Flooding on the Illinois River at Peru September, 2008.

Fall - October 1986, Record Des Plaines River Flood

In the period from September 11 through September 30, 9 to 16 inches of rain occurred across southeast Wisconsin and northeast Illinois. Counties primarily affected by the rains were Boone, McHenry, and Lake in Illinois. Significant flooding on the Des Plaines and Fox Rivers began on September 26, in northern Lake County and ended on October 6, in Cook County. Flood crests exceeded previous records along the Des Plaines, while the Fox River crested just below the flood of record. The Des Plaines River flooded Gurnee, Libertyville Estates and the densely urbanized floodplains in Cook County. The flooding damaged approximately 2,200 houses and 150 business establishments in Lake and Cook Counties, with damage estimated at $42 million. At the height of the flooding, 3,300 persons were displaced from their homes. Automobile traffic was snarled in Cook County because so many east-west roads were closed where they crossed the Des Plaines River.



Heavy rain fell over southeast Wisconsin and northeast Illinois in September, 1986. Map from Midwest Regional Climate Center.

Flooding—The Hazard for All Seasons, Including Fall (cont)

Fall - October 1954, Chicago's Wettest October and Worst Flood

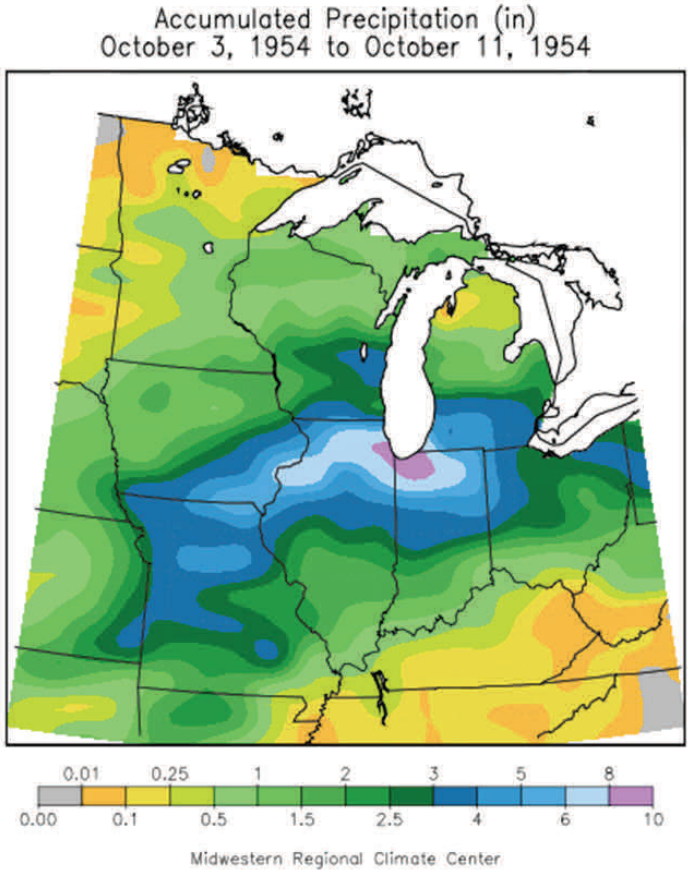
Heavy rain fell from October 3 through 5 and again from October 9 through 11. The first wave of storms brought 3.95 inches on the 3rd and another 0.86 inches on the 5th at Chicago's Midway Airport. A total of 6.72 inches fell in a 48 hour period from the 9th through the 11th, setting a new 48 hour rainfall record for the city. Some areas in the south suburbs received 10 to 12 inches of rain. The official total for the month for Chicago was 12.06 inches, making it the wettest October on record. The heavy rains produced the worst flooding the city had ever seen. The flooding caused $25 million in damages (1954), or the equivalent of $211 million today. Remarkably there were no deaths directly attributed to the flood but at least a dozen people were killed in accidents related to the storms and flood.

Here are some specifics on the flood from a report prepared by the U.S. Geological Survey in 1955. There were 24 river gage stations where discharge exceeded record peak flow. There was severe flooding of the Little Calumet River basin. Every home in Midlothian was inundated, affecting more than 4,000 families. Many businesses in industrial areas of Harvey and Blue Island were damaged, including oil refineries and steel plants. Many other south suburban towns also had extensive flooding. At least 57 railroad underpasses in Cook County were closed.

Severe flooding occurred on the upper Kankakee River in northwest Indiana. Flooding of Salt Creek resulted in more than 5,000 basements flooded in La Grange and Western Springs. The Des Plaines River also flooded, causing damage and blocking roads. In Joliet hundreds of basements were flooded and an American Steel and Wire plant was shut down. Flooding in Troy (now Shorewood) reached a new record, closing roads. The Fox River from Aurora southward through Dayton also saw record floods. The National Guard was called out to protect the power plant dam at Dayton. Failure of the dam could have been disastrous for Ottawa. Residents were evacuated from low lying areas in Ottawa.

There was also severe flooding in Chicago. The South Branch of the Chicago River reached record stage. Water is normally diverted from Lake Michigan into the Chicago Sanitary and Ship Canal, to the Des Plaines River. But the flooding in Chicago was so severe that the lock gates had to be opened for the first time since they were completed in 1900, allowing discharge into Lake Michigan. This led to concerns about drinking water from Lake Michigan. Flooding of the Chicago River inundated railroad yards and basements of many buildings in Chicago, including the basement of the Post Office. Union Station flooded, impacting 40,000 suburban commuters. The basement of the Chicago Daily News was also flooded, forcing it to use the facilities of other newspapers. The flooding knocked out two of Commonwealth Edison's electric generating plants, causing a 50 percent cut in power to the Loop.

Flooding—The Hazard for All Seasons, Including Fall (cont)



Summary

Flooding can happen any time of year in northern Illinois and northwest Indiana. Unlike a tornado which has a narrow and usually short path of destruction, flooding can affect much larger areas, impacting hundreds of thousands of people, disrupting commerce and travel, and damaging homes and businesses. Keep these flood tips in mind:

- If you live near a creek, stream, or flood-prone low lying area have a plan in case flooding occurs.
- Monitor stream forecasts at the National Weather Service's Advanced Hydrologic Prediction Service page, http://water.weather.gov/ahps2/index.php?wfo=lot.
- About half of all flood deaths occur in vehicles. Don't drive into flooded areas, especially when water is flowing. Even a 4 wheel drive truck or SUV can be carried away by 2 feet of moving water.
- Don't allow children to play near flood waters, flooded drainage areas, or retention ponds.
- Moving water has a tremendous amount of power. And the road bed may be washed out by flood waters. Flooded roads are especially dangerous at night.
- Remember, Turn Around, Don't Drown! For more flood safety information, visit http://tadd.weather.gov/

If you have pictures or would like to share your story about the October 1954 flood, please contact jim.allsopp@noaa.gov.

Ever Wonder Why Leaves Turn Brilliant Colors During Autumn?

by David L. Beacher, Senior Meteorologist

With the minutes of daylight progressively decreasing, and cool air seeping back into the region, our eyes begin to search for the brilliant colors that trees put on display. We all have had at one time in our lives an opportunity to jump into a pile of freshly fallen leaves, filled with colors of orange, red, purple, yellow. But have you ever asked yourself what causes leaves to change colors?

A common misconception is that cool weather or frost cause leaves to change color; however, temperature does have some influence on the color and intensity, it is merely one of many key variables that help produce a fall canvas. It all goes back to the growth cycle of deciduous trees. Deciduous generally refers to plants or trees that have foliage and is shed on an annual basis, traditionally at the end of the growing season or falling off at maturity. The process of new stems growing occurs from overwintering buds as daylight begins to increase in the spring. Warm weather helps to expedite the growth process, thus if the spring warmth arrives early or is more intense, this can jump start the growing cycle. As the leaves grow, chlorophyll continues to be produced by the tree and aids in masking the various pigments that a particular species of tree may have. For example the yellow pigment is called xanthophyll, orange is carotenoids. The red and purple pigments come from anthocyanin. The anthocyanins are unique in that these pigments are generally not present during the growing season, but are produced from sugars that are trapped within the leaf.

The chlorophyll begins to break down as exposure to light begins to become limited, thus nearing the end to a growing cycle. The ability for leaves to continue production of chlorophyll becomes blocked off in the fall. Thus chlorophyll slowly disappears, and this can occur in a short period of time. This allows the pigments to begin showing up and the brilliant color show begins. The initial pigments also break down with the remaining pigment known as tannins, which are brown. Let's take a brief look into the role weather plays on how vibrant colors are.

Temperatures, amount of sunlight, soil moisture are major variables in determining the foliage display. The most rapid process occurs when sunlight is maximized and low temperatures occur after the period when chlorophyll is no longer being produced. Freezing conditions also inhibit the process responsible for producing the vibrant colors, thus bringing an early end to the foliage. Drought has a tendency to stress deciduous trees and can trigger leaves to begin falling early, thus not completely allowing the chlorophyll to breakdown in a smooth process. The most ideal foliage occurs when abundant moisture during the growing season is followed by a dry, cool, sunny autumn. The lack of wind and rain, following these ideal conditions, only prolongs the fall canvas.

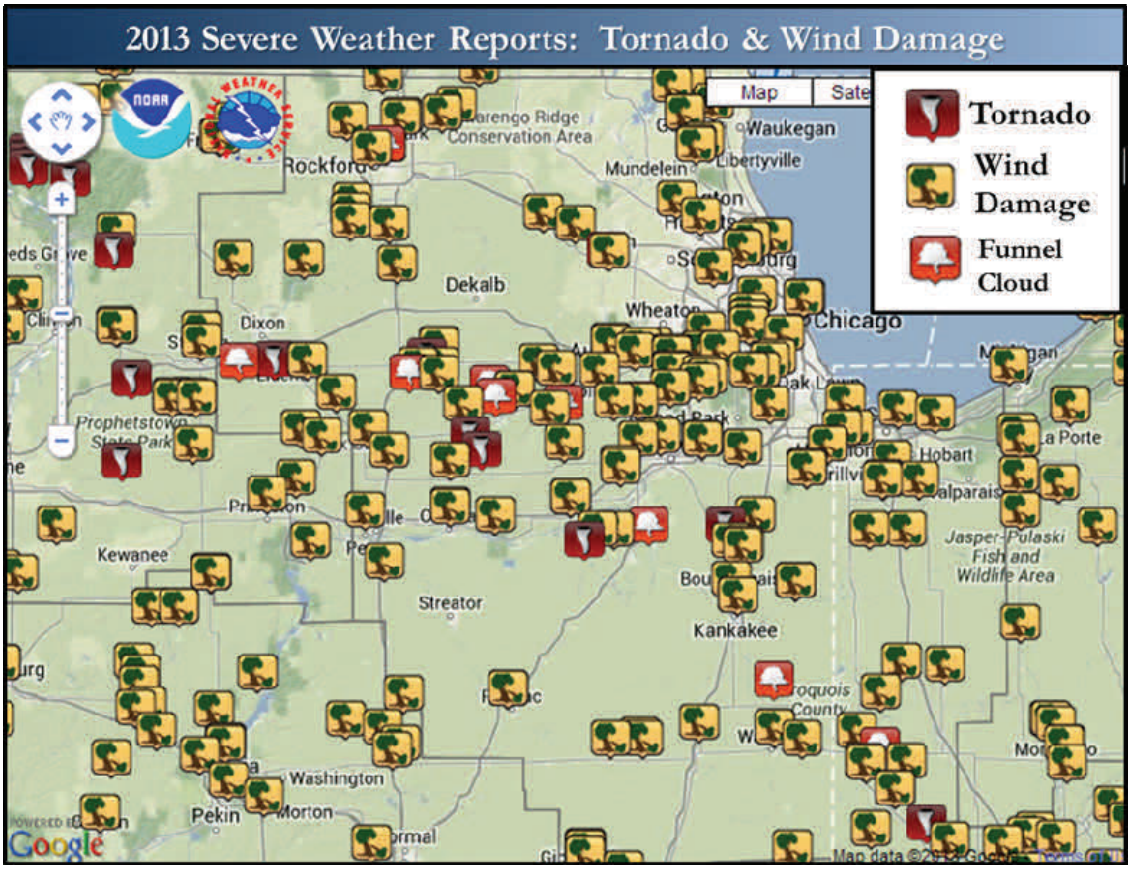
This photo comes from the Ottawa National Forest. Photo courtesy: Susan Trull.

A Look Back at the 2013 Severe Weather Season

by Matt Friedlein Senior Meteorologist

The severe weather season, on both national and local scales, was quieter than normal. In the past five years, the Chicago County Warning Area (CWA) has averaged 350 reports of severe weather (tornadoes, wind, or hail). Through September of this year, preliminary numbers indicate 272 reports of severe weather. This number will likely end up even further below the five-year average after the summer's preliminary reports are finalized for the Storm Data publication, with duplicate reports removed. Of all this year's severe weather reports, over one third (100) were from the June 12th and June 24th widespread damaging wind events.

Following is a graphical depiction of the tornado, wind, and funnel cloud reports from the season. Again, some of these reports have not been finalized yet.



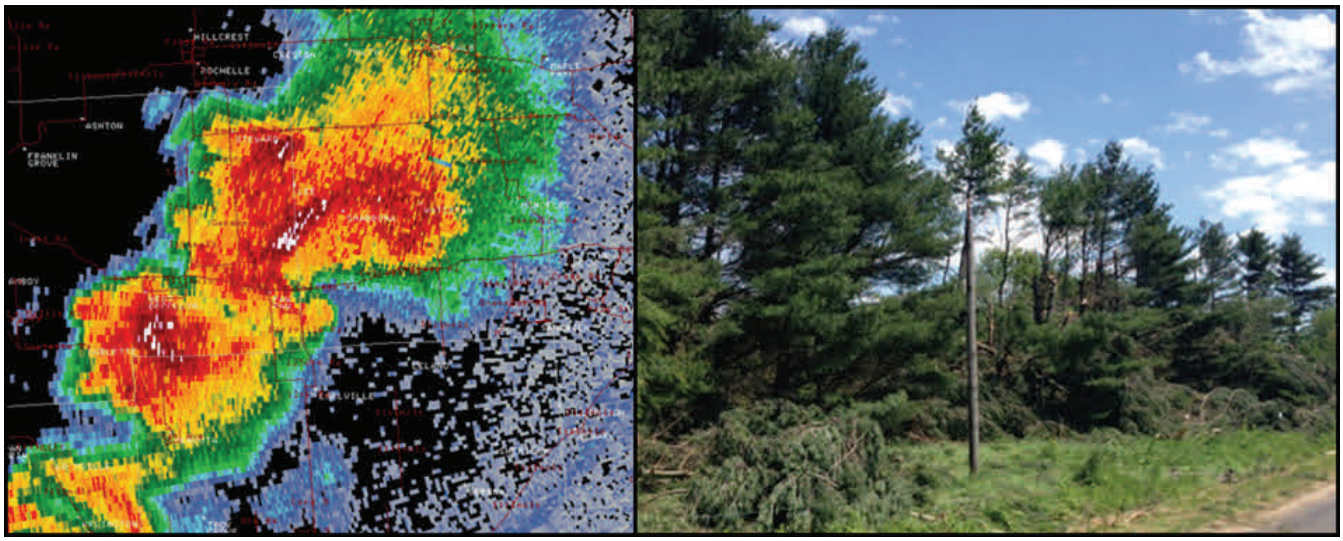
2013 Chicago CWA Tornadoes

Date	EF Rating	Starting Location	County
April 18th	EF-0	2.8 ESE Gibson City	Ford, IL
May 28th	EF-0	2 WSW Gorman	Grundy, IL
May 31st	EF-0	1.1 NNW Templeton	Benton, IN
June 12th	EF 1	2.7 SSW Shabbona	DeKalb, IL
June 12th	EF-0	4.7 NW Manteno	Will, IL
June 24th	EF-0	1.5 SSW Harmon	Lee, IL
September 1st	EF-0	4 NW Serena	LaSalle, IL

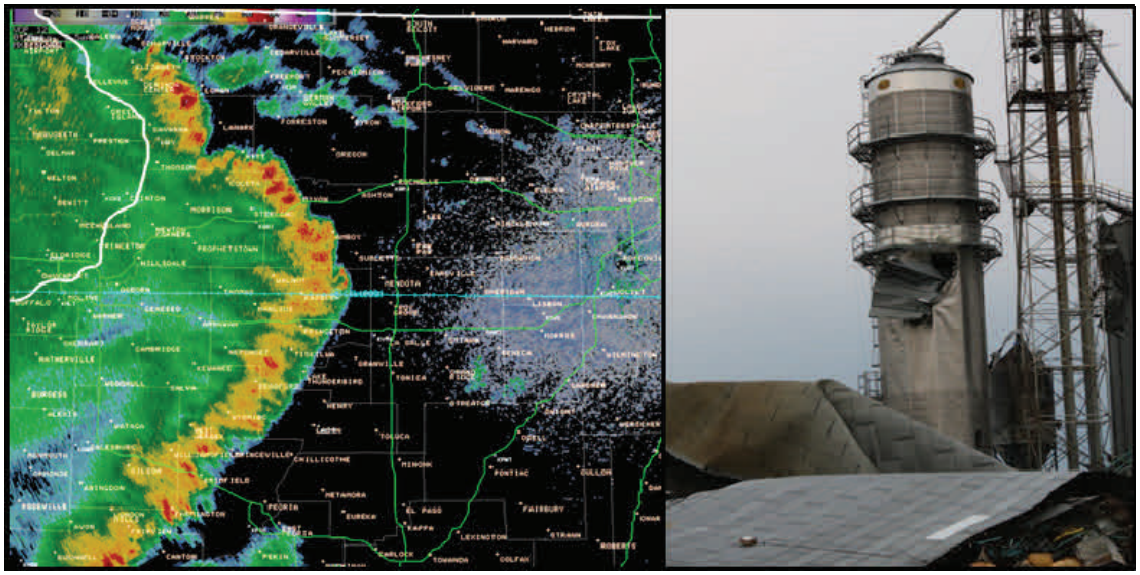
A Look Back at the 2013 Severe Weather Season (cont)

The June 12th and 24th events were the most noteworthy of the season for northern Illinois and northwest Indiana. Both featured well-organized thunderstorm complexes that brought swaths of wind damage. Detailed event reviews from each of these events can be found at these links: June 12th June 24th

The June 12th event began with discrete rotating storms, or supercells, in northwest and north central Illinois, as seen in the below radar image. The supercells brought multiple funnels as well as one tornado near Shabbona Lake State Park where the below damage photo is from. These storms generally phased into a progressive arc of storms producing concentrated wind damage into the southwestern and southern Chicago metro area and into northwest Indiana. There was one more embedded tornado near the border of Will and Kankakee Counties. The storms moved across Indiana and Ohio during the night of the 12th.

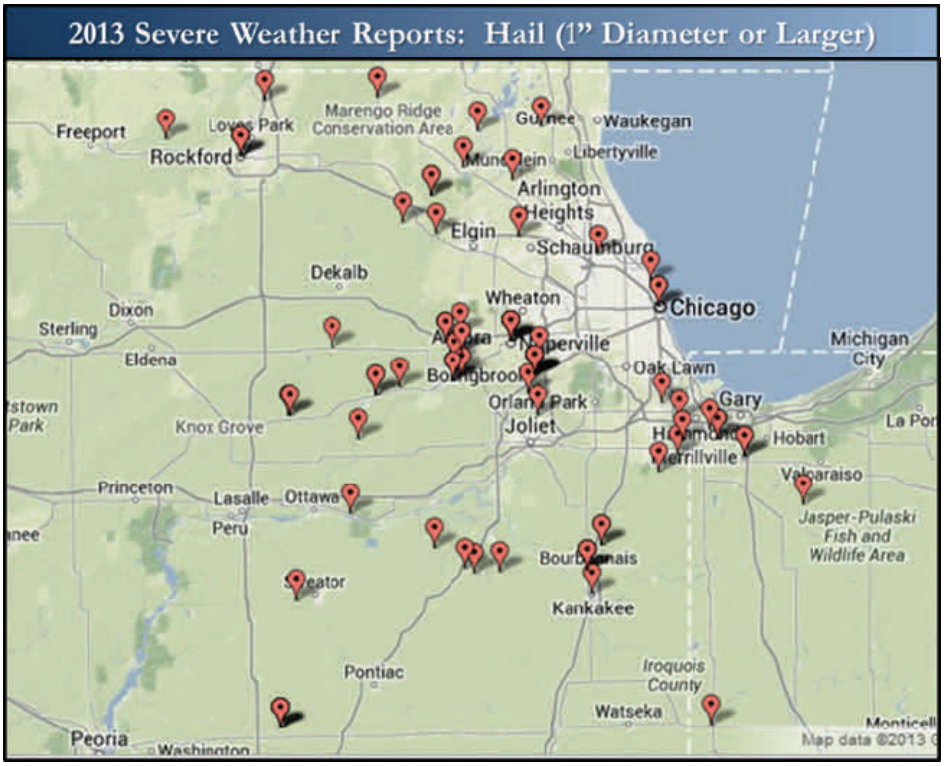


The early afternoon into the mid-evening of June 24th brought a long-lived severe wind complex, or derecho, originating in eastern Iowa and moving through northern Illinois. This event overlapped some of the same area from the June 12th event, mainly along the U.S. Highway 30 and 34 corridors. Some of the most severe wind damage occurred in Lee County to grain storage bins and farmsteads. There also was an embedded tornado in Lee County. Below is a radar image and damage from the early stage of this event.

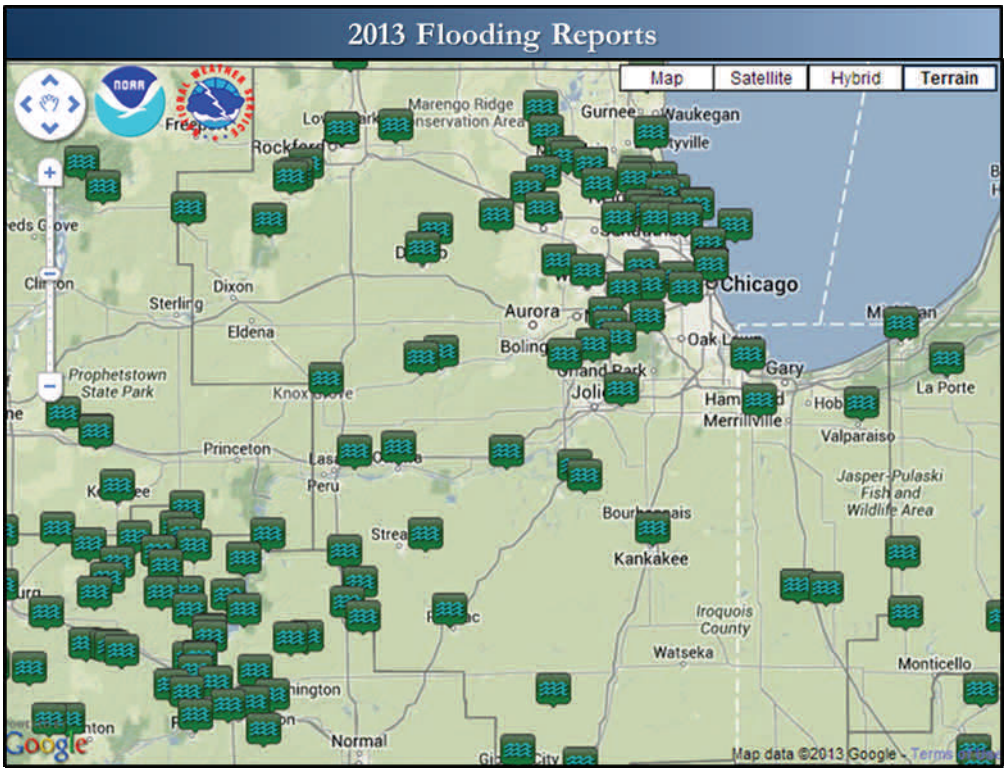


A Look Back at the 2013 Severe Weather Season (cont)

Below is a plot of all severe hail reports in the Chicago CWA from this season.

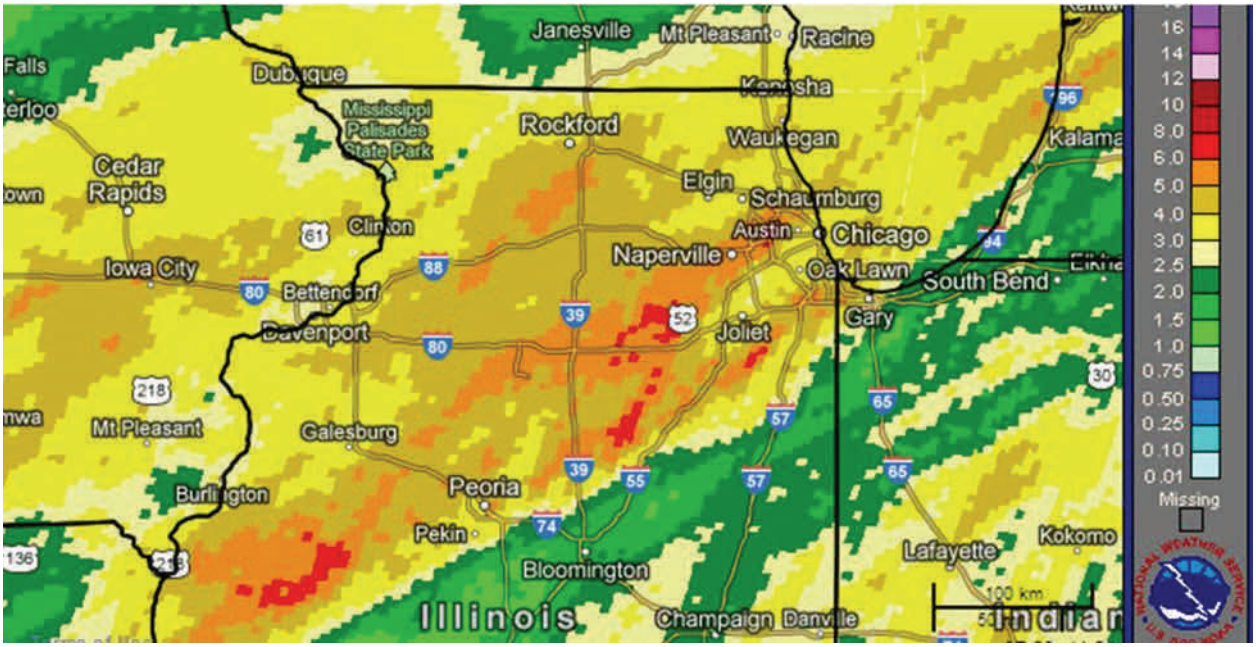


The effects of heavy rainfall can be as high impacting and even last longer than severe weather. Below is a map of reports of flooding, including flash flooding, for 2013 through September. Many of these came from the April 17th-18th early season widespread flash flood event, which led to record flooding along some area rivers and streams, most notably along the Des Plains and Illinois Rivers. An event rainfall map can be seen further below, with a full write-up here.



A Look Back at the 2013 Severe Weather Season (cont)

48 Hour Rainfall Through 7 am April 19th as Estimated by Radar



Another noteworthy flash flood event occurred after very heavy rainfall on the north side of the Chicago metro area during the early morning hours of June 26th, including over six inches in Cary. Numerous roadways were flooded and closed, including a portion of the Edens Expressway. Rainfall reports from that event can be found here.

It is important to remember that while this article covered the severe weather season, powerful storms can and do happen in the autumn across the area, and at times even in the winter. People should ensure they are comfortable with their severe weather plan year-round.

WFO Chicago news stories regarding autumn severe weather:
October 26th, 2010 Severe Storms and Tornadoes
November 22nd, 2010 Rockford Area Tornado
November Area Tornadoes

NWS Chicago Volunteer Observers Honored

by Bill Nelson, Observation Program Leader

Two volunteer groups were honored by the National Weather Service's (NWS) Chicago office during an open house held on Saturday September 21.

The first group was the Chicago office's snow teams – CAST/RAST (Chicago Area Snow Team and the Rockford Area Snow Team). These volunteers take snowfall and total snow depth every 12 hours and report the data via a web site during the winter season – usually from the middle of October to the end of the following April.

The second group of volunteers consists of members of the NWS's Cooperative Observer Program. These observers take precipitation readings (a few also take temperature readings) every morning at around 7AM, year-round.

Ed Fenelon, Meteorologist-In-Charge, and Bill Nelson, Observation Program Leader, of the NWS's Chicago Forecast Office in Romeoville, presented the observers with Length of Service Certificates, and expressed appreciation for their years of dedicated service. Also in attendance were Beth Hall, Director of the Midwest Regional Climate Center, Jim Angel, Illinois State Climatologist and Bill Morris, Service Hydrologist, Chicago Forecast Office.

Pictured from left to right are Ed Fenelon, Dr. Beth Hall, Dr. Jim Angel and Bill Morris.

All Cooperative observers record daily precipitation (rainfall and snowfall), and a few report daily maximum and minimum temperatures, soil temperatures and frost depth data, then send the data into the NWS. Monthly, the NWS compiles and archives this data for use in research and studies. It is from these local observations that the weather database for northern Illinois and northwest Indiana are derived.

The length of weather records for NWS Cooperative stations around Illinois and Indiana varies from just a couple of years to more than 100 years. Nationwide, the data for some Cooperative sites in the eastern states go back over 200 years.

NWS Chicago Volunteer Observers Honored (cont)

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

COOP and CAST/RAST Observers

NWS personnel welcome the observers

NWS Chicago Volunteer Observers Honored (cont)

Members of the Chicago & Rockford Area Snow Teams

Members of the NWS Cooperative Observer Network

NWS Chicago Volunteer Observers Honored (cont)

Here are the individual Cooperative observers and the towns where they take the observations:

Special Service Awards:

Pictured from left to right; Gary Havlik—Batavia, Tim Powers—Hebron, Jim Marocchi—Winfield, Kevin and Gary Gruhkle—Yorkville

10 Year Length-of-Service Awards:

Pictured from left to right; John Skach—Oak Brook, Pat Skach—Oak Brook, Dwight Diercks—Plainfield

NWS Chicago Volunteer Observers Honored (cont)

10 Year Length-of-Service Awards:

Pictured from left to right; Valerie and Mike Andres—Roscoe, Ron and Ruth Erickson—Momence

10 Year Length-of-Service Awards:

Pictured from left to right; Dr. Judy and Conrad Serwatka —Valparaiso, Debra and John Rubel—Woodstock

NWS Chicago Volunteer Observers Honored (cont)

Here are the individual Cooperative observers and the towns where they take the observations:

10 Year Length-of-Service Awards:

Ray Ribich from Glen Ellyn received his 10 Year Award from Bill Morris at Ray's home.

15 Year Length-of-Service Awards:

Pictured from left to right; Pat Schatz—Kankakee, Dick Rieckhoff—Milford, Phil Rider—Mundelein

NWS Chicago Volunteer Observers Honored (cont)

25 Year Length-of-Service Awards:

Pictured from left to right; Robert and Ed Slaby—Bourbonnais, Lou and Barbara Dolmon—Crystal Lake

30 Year Length-of-Service Awards:

Pictured from left to right; Frank Wachowski —Chicago Midway 3 SW, Jim Morse—Pontiac, Minor Avery—Steward

NWS Chicago Volunteer Observers Honored (cont)

Not able to Attend:

10 Year Length-of-Service Award:

Mike Anderson – Elburn

John Kozik – St Charles

15 Year Length-of-Service Award:

Larry Acker - Polo

Here are the individual snow team members and the towns where they take the observations:

CAST/RAST Members:




Pictured from left to right; Dave Bunte—Beecher, Mark Kennely –Downers Grove, Jennifer Ayala—Grayslake, Greg Soulje—LaGrange

NWS Chicago Volunteer Observers Honored (cont)

CAST/RAST Members:

Pictured from left to right; Phil Schwartz—Melrose Park, James Higgley—Mount Morris, Greg Dubin—Mundelein, Sam Augustyn—Oak Lawn

Pictured from left to right; David Santori—Peotone, Mark Petnuch—Richton Park, Steve Gregory—Schaumburg, Linda Morrison—Schererville

NWS Chicago Volunteer Observers Honored (cont)

CAST/RAST Members:

Pictured from left to right; Richard Sale—Willowbrook, Kevin and Gary Gruhkle—Yorkville

Not able to Attend:

Penny Latona – Beach Park
Suzanne Rodriquez – Highland, IN
Brian Wootton, Naperville
Mark Tschirhart, Woodstock