

Winter 2007-2008: Record-Setting Storms Caused Major Damages in Illinois

Stanley A. Changnon, Kenneth E. Kunkel, and David Changnon

Data/Case Study 2008-02 | Illinois State Water Survey



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2008



I L L I N O I S

Contents

Abstract	v	March Storms.	25
Introduction	1	Winter Storm on March 3-4	25
Monthly Conditions	3	Snowstorm on March 7-8	26
Causes of Storms	5	Rainstorm on March 18-19	26
December Storms	9	Snowstorm on March 21	28
Ice Storm on December 1-2	9	Snowstorm on March 27	28
Snowstorm on December 4-5	9	Impacts	29
Ice Storm on December 8-9	10	Flooding	29
Snowstorm on December 15-16	10	Transportation	32
Snowstorm on December 22-23	11	Property: Homes and Structures.	33
Snowstorm on December 29-30	12	Power and Communication Systems	33
Snowstorm on December 30-31	12	Government.	33
January Storms	13	Business	33
Rainstorm on January 7-8.	13	Agriculture	33
Snowstorm on January 21-22	15	Human Health and Well-Being.	33
Summer and Winter Storms		Economic Impacts.	34
on January 29-30	15	Summary	37
Snowstorm on January 31-February 1	17	Acknowledgments	39
February Storms	19	References	41
Rainstorm on February 4-6	19		
Snowstorm on February 6-7	19		
Ice Storm on February 11-12.	20		
Heavy Rains on February 17-18	22		
Ice Storm and Snowstorm			
on February 21-23.	22		
Snowstorm on February 25-26	23		

Abstract

During the December 2007-March 2008 period, Illinois experienced a record-tying number of winter storms, a record number of rainstorms, several tornadoes, and every other form of severe weather that can occur in the Midwest. These storms resulted in 28 weather-related deaths, double the normal number, and excessive damages to vehicles, residences, and businesses in the state. Communities and government agencies faced costly repair efforts, and many people lost their homes because of major flooding.

December brought seven winter storms, a new record high, and February had four winter storms, just one value short of a record high. The 18 winter storms during December 2007-March 2008 tied the record-high value set in the winter of 1977-1978, and five storms in 2007-2008 produced blizzard conditions. There were also five warm-season type convective storms with thunderstorms, hail, and high winds, setting a new record high for a winter season. Each of the 23 storms is described in this report along with important impacts they created. In between the 23 storms during December-March were several days when record high or low temperatures occurred, plus several days with heavy fog.

Weather conditions during December 2007-March 2008 were unique for a cold season in

Illinois. Records dating back to 1890 show no prior cold season with comparable conditions. Past cold seasons having numerous winter storms did not also have warm-season type storms, as occurred during the 2007-2008 cold season. The unusually high number of cold-season storms was related to a strong, active, and progressive polar jet stream impacting North America.

The unique array of numerous storms, extreme temperatures, and fogs resulted in major losses and costs in four sectors. Property damages due to heavy snow, ice, and flooding led to losses of \$960 million. All forms of transportation suffered major losses and added costs that totaled \$735 million. Damages to power and communication systems led to repair costs totaling \$792 million. Local, state, and federal agencies expended major sums for snow and ice removal and for road and highway repairs, totaling \$617 million. All told, losses and costs resulting from the December 2007-March 2008 weather conditions in Illinois were \$3.5 billion. However, there were economic winners in the construction and service industries; their total benefits were \$971 million.



A heavy snow with blizzard conditions on December 14-15, 2007, created this post-storm scene near Gibson City.

Introduction

Illinois weather in winter 2007-2008 was unique, different than any other winter weather in the prior 110 years (Changnon, 1969). A large number of warm-season type storms were inter-mixed with a very large number of winter storms.

Indeed, the 2007-2008 winter had an odd mix of all types of severe weather, including thunderstorms, hail, tornadoes, heavy rains, and damaging winds. More thunderstorms occurred in central and northern Illinois than in any previous winter. For example, thunderstorms occurred on nine days at Champaign-Urbana, two more than the record of seven days in the winter of 1974-1975, and thunderstorms occurred with eight of the 23 storms in the December-March period.

Illinois also experienced numerous snowstorms, four major ice storms, frequent sleet, and five storms with blizzard conditions. In December, Illinois had seven severe winter storms, two more than the prior record of five set in December 1977.

The winter of 2007-2008 had 18 winter storms, well above the average of seven storms, and equal to the record set in 1977-1978 (Changnon and Changnon, 1978). Chicago had 60 inches of snow during the 2007-2008 winter, less than the record of 89.7 inches set in 1977-1978, but 20 inches above average and the seventh largest amount on record since 1890.

On days between winter storms and warm-season type convective storms, there were periods of other extreme weather conditions, including days with temperatures at or below 0°F, and other days with temperatures of 40° to 60°F. In warm periods with moist air and melting snow cover, numerous floods occurred and heavy fogs developed. Numerous storms and harmful between-storm conditions caused property damages, many deaths, and hundreds of injuries. This report describes each of the 23 storms and the impacts they produced. Causes for the unique cold season conditions are also described.



*An odd scene for mid-winter in Illinois.
Cloud-to-ground lightning occurred on the night of January 7, 2008, in rural Champaign County.*

Monthly Conditions

December 2007 in Illinois had above-average precipitation (+1.5 inches) with normal temperatures, but the state experienced seven winter storms, a record high for December. The December weather pattern featured an ongoing battle between warm and cold air masses over the central United States favoring a storm track that brought low-pressure systems across the Midwest every few days. Figure 1 shows the tracks of cyclones that caused the December 2007 winter storms. Amazingly, all five weekends that month had storms, resulting in major reductions in holiday travel and shopping. December, which is the start of the climatological winter, began with a sizable freezing rainstorm followed by an influx of Arctic air, a repeat of what had happened a year before (Changnon and Kunkel, 2007). The first snowstorm of the season occurred on December 4-5 in northern Illinois. The second weekend brought a major ice storm covering most of the state with ice layers 0.5 inch thick. December's third weekend had a major snowstorm producing more than 14 inches in east central Illinois and more than 1 inch throughout the state. On the fourth weekend, a snowstorm crossed western and northern Illinois, leaving 6 to 8 inches of snow in the northwest. The final weekend, December 29-30, had another snowstorm in northwestern Illinois where 8 inches fell. The month's final storm on December 30-31 produced heavy snow again in northwestern Illinois. In summary, seven winter storms occurred in Illinois during December 2007.

January 2008 ushered in a very different weather regime that included different types of storms, with monthly temperatures averaging 1.4°F above normal statewide and precipitation averaging

0.6 inch above normal. In early January a period of high temperatures occurred. On January 7, conditions were spring-like with record high temperatures, heavy rains, and severe weather across the state. An atypical warm spell on January 6-7 led to record-high temperatures, including values at Peoria (67°F), Chicago (65°F), and Champaign (67°F). During the evening of January 7, severe thunderstorms moved through central and northern Illinois, producing hail, damaging winds, two tornadoes, and heavy rains, which are certainly rare events for January. An important outcome was flooding along the axis of the heavy rain area across central Illinois and northwestern Indiana. After having no storms for two weeks, a snowstorm hit the northern third of the state on January 21-22. A major storm occurred in late January, bringing a mixture of warm-season conditions, including thunderstorms and a tornado, followed by winter-storm conditions, including freezing rain, snow, and high winds. This unique storm was followed by another major snowstorm on January 31-February 1. Figure 1 shows the tracks of cyclones that produced the January storms.

February marked a return to more typical winter conditions with repeated storms crossing the Midwest (*Weatherwise*, 2008), as shown in Figure 2. The statewide February average temperature was 5.2°F below average and the precipitation was 2.5 inches above average, the third wettest February on record. February snow totals were 20 to 30 inches in the northern third of Illinois; 10 to 20 inches in the central third; and 4 to 10 inches in the southern third. Two rainstorms produced heavy rainfall on February 4-6 and 17-18, but there was

a snowstorm on February 7-8; a major ice storm on February 11-12; a second severe ice storm on February 21 linked to an ensuing snowstorm on February 22-23; and a third snowstorm on February 25-26. The four winter storms were one short of the February record (five) set in 1979. Galena had 32.1 inches of snow in February, setting a new record. The winter (December-February) 2007-2008 was the third wettest on record in Illinois, averaging 11.3 inches across the state, which was 4.6 inches above average. Antioch recorded the state's highest winter snow total with 72.4 inches.

March saw a continuation of winter storm activity, and Figure 2 shows the cyclone tracks for the March storms. March 3-4 had a mixture of ice, sleet, and heavy snow in central Illinois, and on March 7-8, a major snowstorm struck extreme southern Illinois. On March 18-19, a record-setting rainstorm struck southern Illinois with more than 10 inches of rain in some locations. Then

another snowstorm struck northeastern Illinois on March 21, followed by a snowstorm along Illinois' northern boundary on March 27. The average March rainfall across southern Illinois was 10.1 inches, making this the third wettest March on record. Illinois' average rainfall for March was 4.5 inches, 1.3 inches above normal, and the March statewide average temperature was 2.7°F below normal, signaling a cold and wet March. Seasonal snow totals for December through mid-March were 92 inches in Antioch, 72.1 inches at Rockford (second snowiest on record), and 60.4 inches at Chicago Midway Airport (seventh snowiest total on record).

The temperature for December 2007 through March 2008 across Illinois was 1.6°F below average. The temperature was average for December, above average in January, and then much below average in February and March. Precipitation statewide was above average in all four months, yielding a four-month total that was 5.9 inches above average.

Causes of Storms

These cold-season climate anomalies were related to a persistently strong and active polar jet stream with imbedded progressive troughs over the United States. These jet stream characteristics led to the frequent development of surface low-pressure areas east of the Rockies. These areas intensified as they moved across the country, and often incorporated large amounts of water vapor from the Gulf of Mexico. Thus, they frequently produced high precipitation totals over broad regions. The progressive nature of the jet stream ridge/trough pattern allowed for brief, but anomalous air mass incursions into Illinois, creating broad temperature swings through the winter. Primary causes of the active and persistent storm track over the U.S. are difficult to determine definitively. However, there were a few prominent features that probably contributed to the situation. First and foremost, a moderate La Niña event was occurring. La Niña events are characterized by below-normal sea surface temperatures in the eastern and central equatorial Pacific and enhanced convection over the western equatorial Pacific. Associated with this, upper-level pressure is anomalously high in the north Pacific and anomalously low over western North America from the northwest U.S. to Alaska. This reflects a jet stream pattern that is shifted northward from its normal winter position over the North Pacific and southward over western North America. During the 2007-2008 winter, this pattern was in place and in fact was stronger and more persistent than the climatological average for La Niña events. In addition, the upper-level low-pressure area over western North America extended even further to the south than the typical La Niña pattern. Thus in 2007-

2008, the average location of the jet stream was from the Aleutian Islands into the western U.S. A second notable feature was anomalously high pressure over the western Atlantic Ocean, reflecting a shift northward in the jet stream from its average winter position.

These features are consistent with the stormy winter conditions in Illinois. The jet stream over the north Pacific and western North America was a focal point for the generation of storms and guidance of these and existing storms into the central and southern Rocky Mountains. Many storms then intensified on the lee side of the Rockies, which is a very typical characteristic of the life cycle of winter storms affecting the Midwest, and traveled into the central U.S. following an easterly-to-northeasterly path, ending up in the northeastern U.S. or southeastern Canada. Many storms followed a curved path, traveling east across the Great Plains, and then gradually curving more northeasterly, perhaps partly in response to the northward-shifted jet stream over the western Atlantic.

Evaluating the causes of a period of anomalous weather often confronts the issue of cause and effect. The La Niña event was essentially independent of the winter storminess and thus constitutes one true cause of jet stream patterns associated with stormy weather. However, the northward shift in the jet stream over the western Atlantic was not necessarily independent. While the location and development of winter storms are partly caused by jet stream patterns, the movement of air masses that results from storm circulation patterns affects the location and strength of the jet stream. Thus, the northward shift of the jet stream over the western

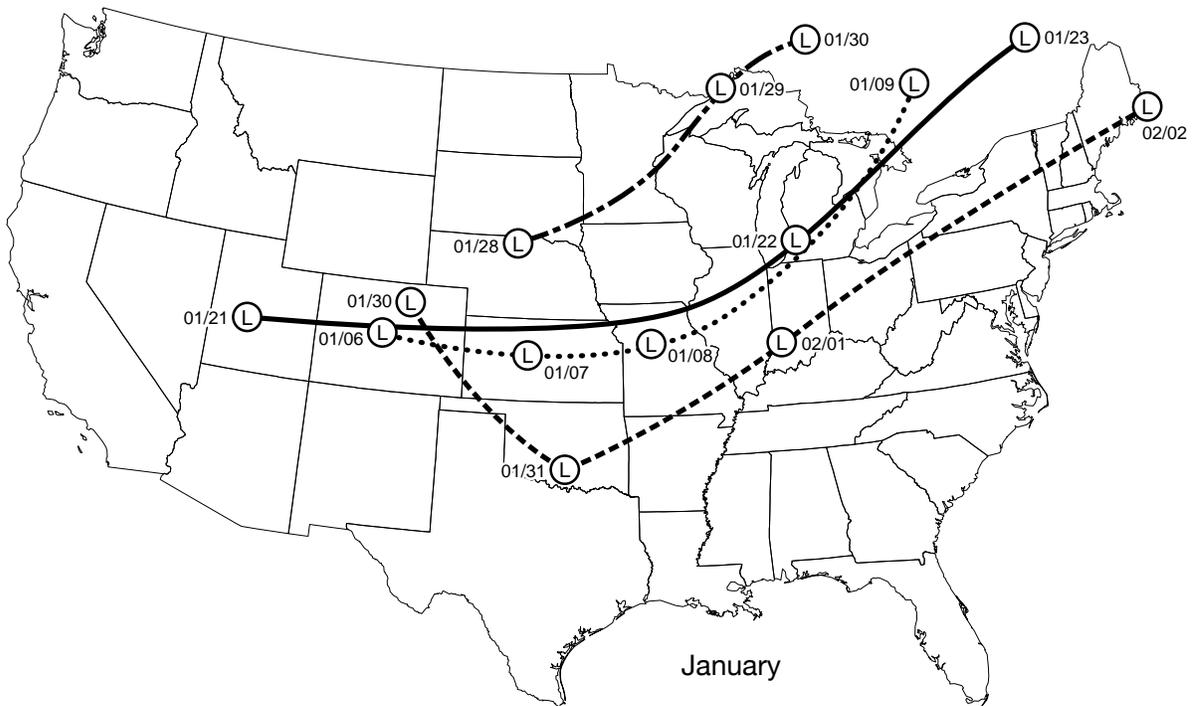
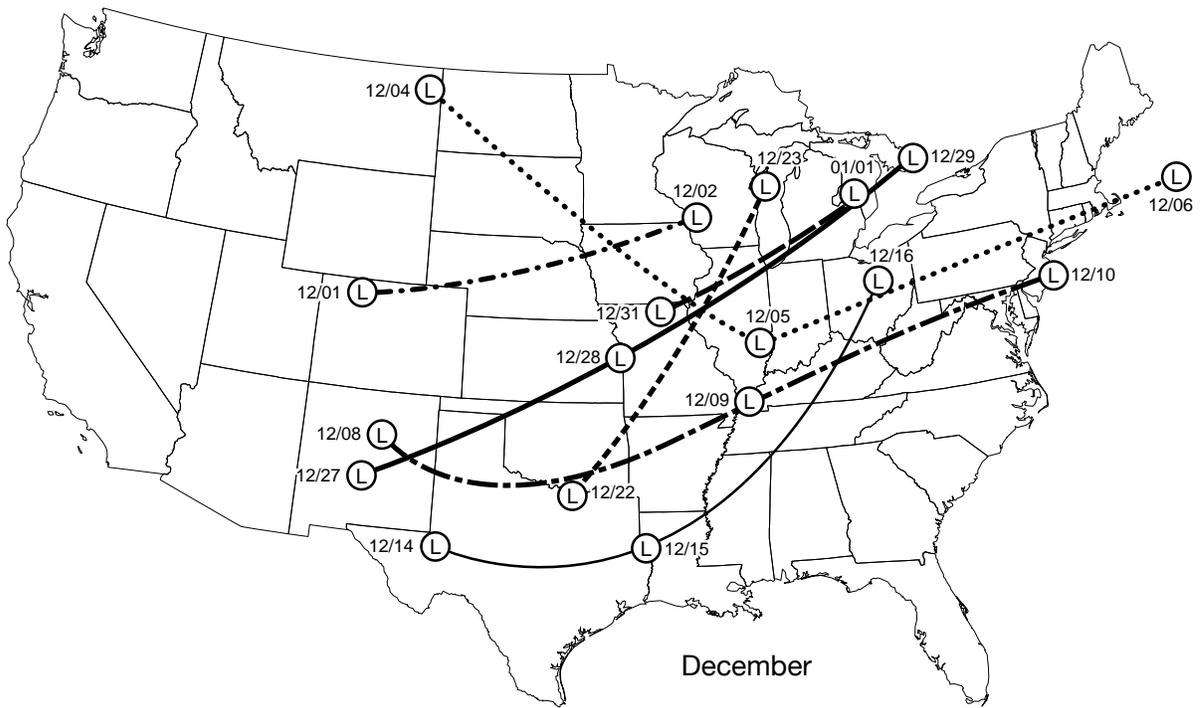


Figure 1. Tracks of the cyclones that caused storms during December 2007 and January 2008.

Atlantic may have been caused in part by the storms' circulations. Furthermore, sea surface temperatures were above normal in much of the Atlantic north of 30 deg N. This would have warmed the atmosphere and tended to shift the jet stream northward, an effect independent of the storms.

Thus, the winter storminess can probably be partly attributed to jet stream patterns caused by the La Niña event. The similarity in the paths of many of these storms across the U.S. may have been influenced by high pressure over the western Atlantic. The clockwise circulation around this anomalously high pressure area also was conducive to the flow of moisture from the Gulf of Mexico into these systems.

An evaluation of the surface low-pressure characteristics (track, minimum pressure, and movement) uncovered a few interesting findings. For this discussion, the summer- then winter-storm conditions experienced on January 29-30 were associated with one surface cyclone. In terms of cyclone tracks, 70 percent (16 of 23) of the surface cyclones moved through a part of Illinois as they migrated

from west to east. The tracks of the storm-producing cyclones for each month appear in Figures 1 and 2. On average, eight to nine cyclones move across Illinois each winter (Noel and Changnon, 1998); thus, the 2007-2008 total was double the average number. This increased cyclone frequency was also experienced in areas south of Illinois. Winter cyclone tracks that move across the United States through or south of Illinois enhance the likelihood that more precipitation will occur over the state. Cyclone minimum pressures and movement characteristics were similar to those described for winter snowstorms by Beckman (1987) and Changnon et al. (2008). Fourteen of the 23 surface cyclones with Illinois storms were deepening as they moved over or near Illinois, revealing that the storm dynamics were strengthening as the systems passed the region, which also enhanced precipitation amounts. These winter conditions led to more weather events (e.g., snowstorms, ice storms, heavy rain, and thunderstorms) and an overall wetter cool season. A discussion of each storm during the winter of 2007-2008 follows.

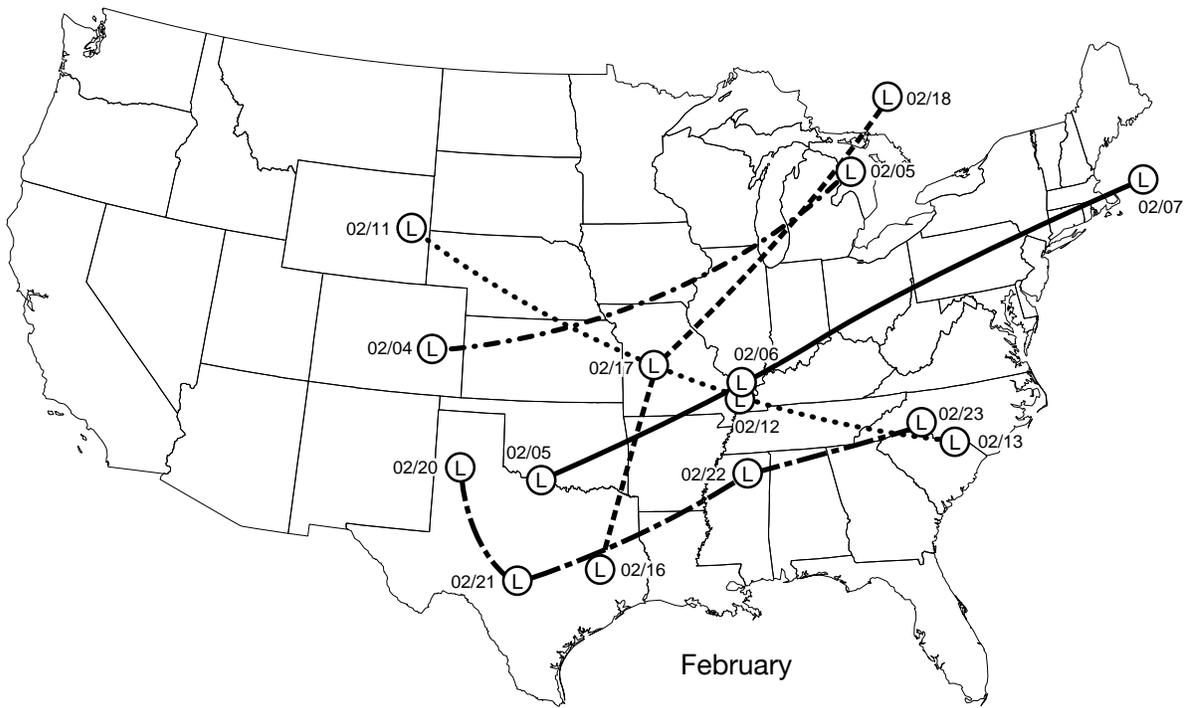


Figure 2. Tracks of the cyclones that caused storms during February 2008 and March 2008.

December Storms

ICE STORM ON DECEMBER 1-2

For the second year in a row, December began with a major winter storm in Illinois. A strong surface low-pressure system organized over the Rockies on December 1 (Figure 3). Cold air in place at the surface and warmer air moving in at mid-levels of the atmosphere created a perfect setting for freezing rain to occur in the Midwest. The surface low-pressure area quickly moved east-northeastward from the northern Colorado Rockies on December 1 to central Wisconsin 24 hours later. A strong surface high east of this system created a tight east-west surface pressure gradient across the Midwest, leading to high wind speeds associated with falling precipitation. The freezing rain spread across Missouri and most of Illinois on December 1 with snow to the north, followed by a cold front passage on December 2. Freezing rain covered the northern half of the state with layers of ice more than 0.25 inch thick in some areas (Figure 4). Thunderstorms also occurred on December 2 in southern Illinois and parts of northeastern Illinois. Ice in the DeKalb-LaSalle-Kankakee area caused numerous vehicle accidents and downed trees and power lines.

SNOWSTORM ON DECEMBER 4-5

A colder air mass moved into the Midwest after the ice storm, and on the morning of December 4, a weak surface low developed east of the Rockies in northeastern Montana. This surface low-pressure area took an Alberta Clipper track and moved southeastward over the next 24 hours to southeastern Illinois. North of the track, snow fell in an area across northern Illinois with locations in

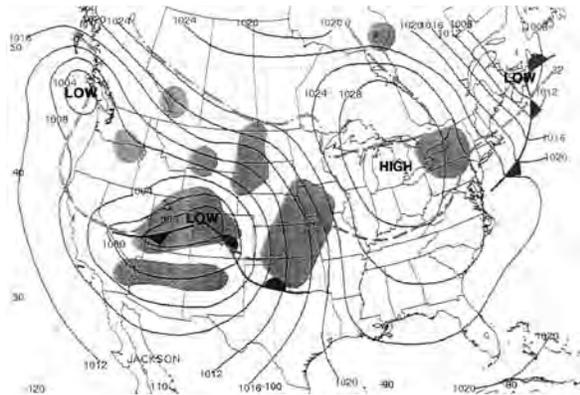


Figure 3. Surface weather map for 7 a.m. on December 1, 2007.

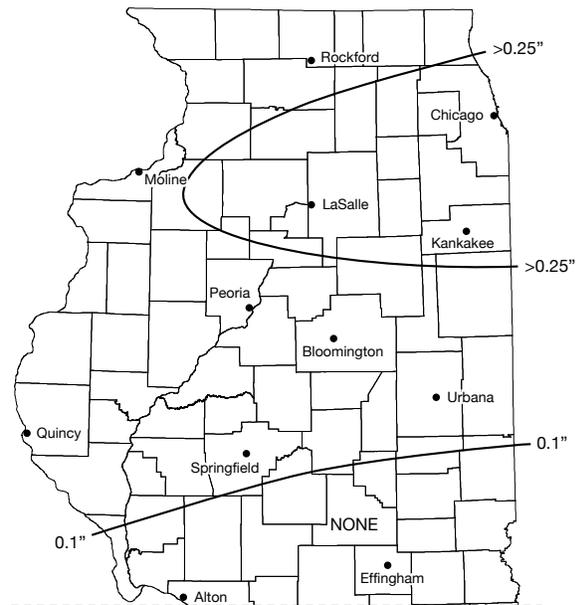


Figure 4. Ice storm on December 1-2, 2007. Thickness of ice layers in inches is shown.

northeastern Illinois receiving 6 or more inches of snowfall by the morning of December 5 (Figure 5). As this system exited to the Atlantic Coast, the coldest air of the season raced into Illinois. Since this was the first major snowfall in northern Illinois, numerous accidents occurred as high winds decreased visibility in rural areas. The storm mainly affected various transportation systems, causing numerous vehicle accidents in the northern part of the state.

ICE STORM ON DECEMBER 8-9

The Midwest experienced cold Arctic air on December 6 as another storm system organized over the Rockies. Chicago experienced a record low of 0°F on December 6. On Saturday, December 8, cold air settled south over the Midwest, a low-pressure center developed over the Rockies, and freezing rain fell across portions of Missouri and Illinois. This wave of low pressure moved along the stalled frontal boundary later on December 8-9 in western Kentucky (Figure 1). This situation produced substantial freezing rain. Portions of Missouri had 1.5 inches of ice, and up to 0.5 inch of freezing rain had occurred across central and part of northern Illinois by early on December 9 (Figure 6). On December 10, scattered areas of freezing rain and sleet again fell north of the frontal boundary, adding to the thickness of the existing glaze in parts of northern Missouri and Illinois, resulting in three consecutive days with freezing rain in parts of Illinois. The worst areas of ice damage were in Missouri, southern Iowa, and western Illinois, where many trees were downed and power lines were broken. By December 11, more than 200,000 people were without power in Missouri, 60,000 in Iowa, and 25,000 in Illinois. Power was not restored to many sites until December 14. Traffic accidents led to seven deaths in Illinois. Fog was widespread in northern and central Illinois on December 9, 10, 11, and 12.

SNOWSTORM ON DECEMBER 15-16

The stormy weather pattern continued into the third week of December. A low-pressure center had developed in eastern Texas on December 15, creating a large area of precipitation north into Missouri and Illinois (Figure 7). As the surface

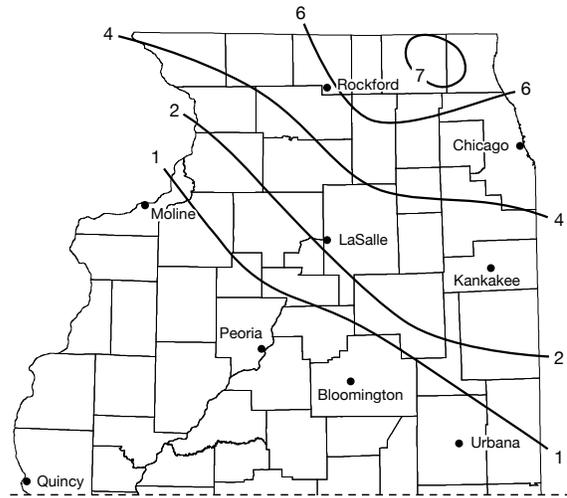


Figure 5. Snowfall in inches on December 4-5, 2007.

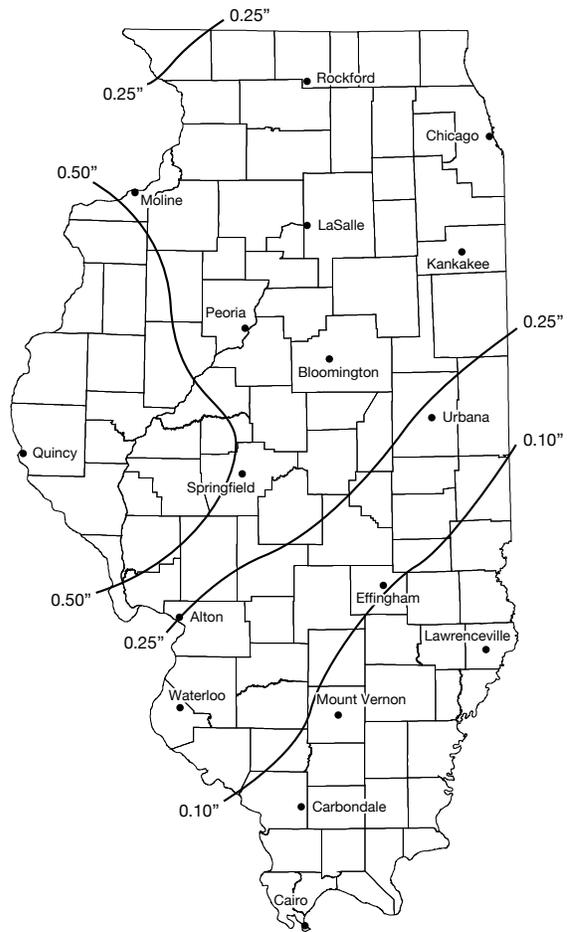


Figure 6. Ice storm on December 8-9, 2007, and thickness of ice layers in inches is shown.

cyclone intensified and moved northeast toward Ohio, snow became heavy on December 15, and the storm moved north and east. Snowfall was heaviest in Illinois and northern Indiana. By the morning of December 16, a large area of snow of 6 to 12 inches covered much of the Midwest, with 6 to 10 inches in most of central Illinois (Figure 8). St. Louis had 6.9 inches of snow on December 15, ranking as the fourth largest one-day total on record for December. High winds caused blizzard conditions leading to much drifting, which limited travel and caused numerous vehicle accidents. Four people died as a result of accidents caused by the storm. As temperatures warmed above freezing after the storm, a period of widespread fog occurred across the northern two-thirds of Illinois. Heavy fog was present on December 19, 20, 21, and 22, and hundreds of vehicle accidents resulted.

SNOWSTORM ON DECEMBER 22-23

Snow developed across the northern Midwest on December 22 in association with a deepening low-pressure system that moved from southern Oklahoma to northern Wisconsin. As this intense system moved north of Illinois on December 23, strong northwest winds and snowfall developed in the northern and western parts of the state. This became the fourth consecutive weekend with a winter storm. Snow totals in the state’s northwest were in the 4- to 6-inch range (Figure 9). Winds were gusting to 50 mph across the northern half of Illinois, creating a blizzard. High winds uprooted trees and knocked out power to 24,000 utility



A major ice storm on December 8, 2007 left this thick layer of ice on farm fences near Bushnell.

customers in Illinois. High winds caused more than 1,100 flights to be cancelled at Chicago’s O’Hare Airport.

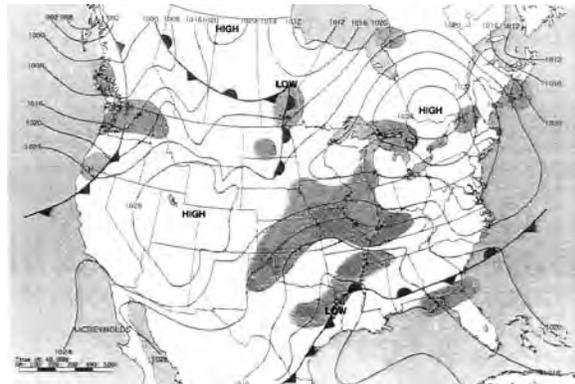


Figure 7. Surface weather map for 7 a.m. on December 15, 2007.

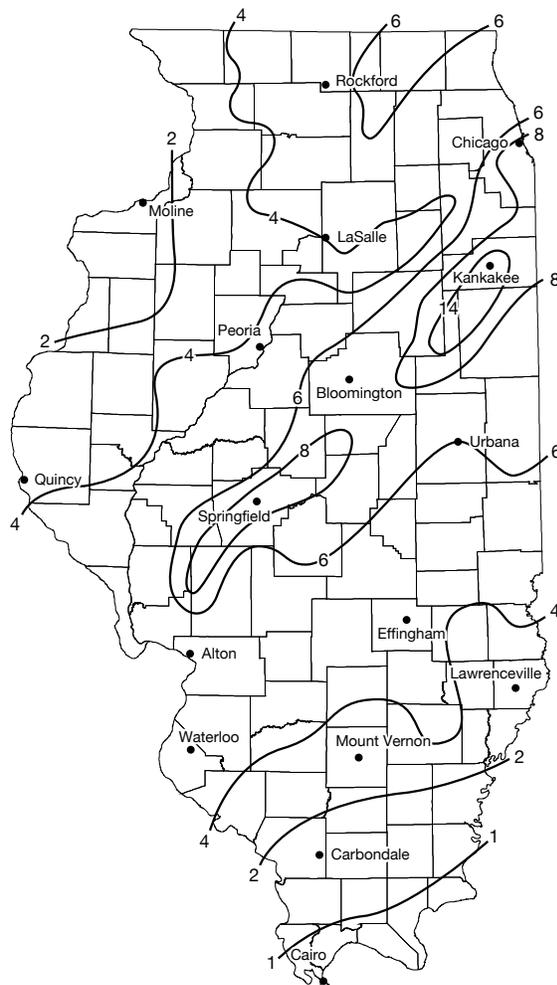


Figure 8. Snowfall in inches on December 15-16, 2007.

SNOWSTORM ON DECEMBER 29-30

Fogs were widespread across central Illinois during December 27-28, ending when a storm system from the southern High Plains arrived in the Midwest on December 28 (Figure 1). This surface cyclone tracked from southern New Mexico to Kansas City, and on to Southeastern Canada on December 27-29. It resulted in a snowstorm across Missouri, Iowa, and northern Illinois. Snowfall amounts in extreme northwestern Illinois were 6 to 8 inches (Figure 10). The snow was wet and heavy, greatly hampering travel. Many damaged roofs were reported in the area where 6 or more inches of snow fell. Numerous vehicle accidents were reported in the Freeport area.

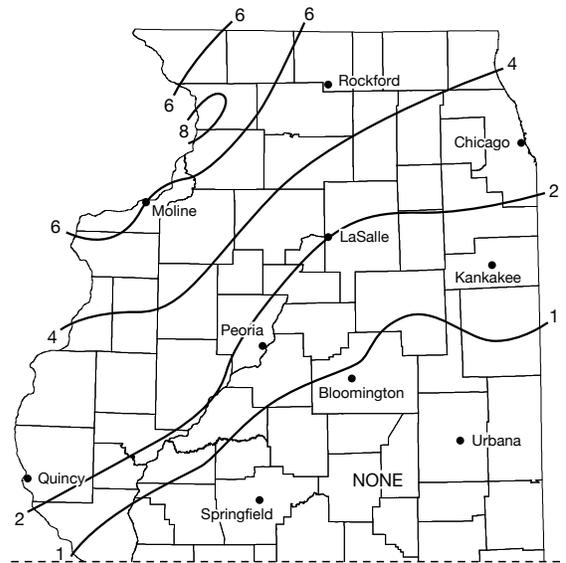


Figure 10. Snowfall in inches on December 29-30, 2007.

SNOWSTORM ON DECEMBER 30-31

The month's final winter storm resulted from a developing low-pressure center over northern Missouri on December 30. As it intensified and slowly moved northeastward to lower Michigan, it brought snowfall across northwestern Illinois on December 30-31. Heavier amounts of snow were 4 to 6 inches (Figure 11). Snow blocked traffic on Interstate 80 for several hours. Fog also occurred over most of northern Illinois on December 30-31, causing many vehicle accidents.

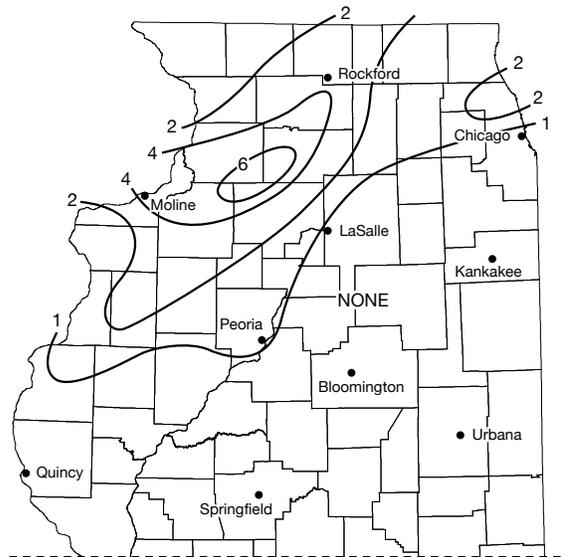


Figure 11. Snowfall in inches on December 30-31, 2007.

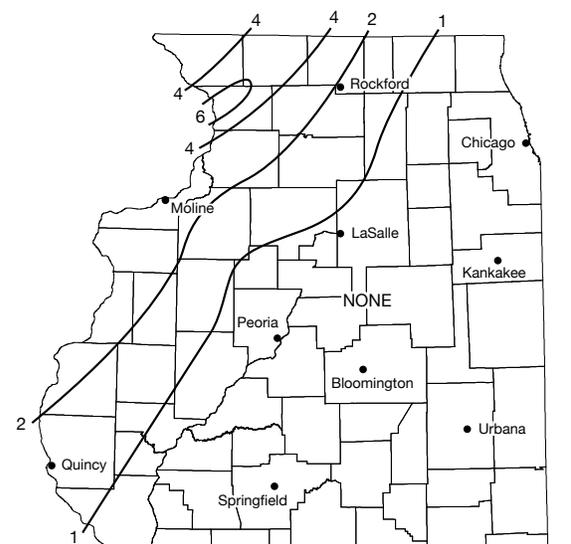


Figure 9. Snowfall in inches on December 22-23, 2007.

January Storms

RAINSTORM ON JANUARY 7-8

Unusual mid-winter conditions occurred during January, leading to record heavy rains in one storm and record heavy snows in another (*Weatherwise*, 2008). A rainstorm on the night of January 7-8, produced rain for 10 to 13 hours at many locations in central and northeastern Illinois. The storm-causing weather system originated in central Colorado on January 6, slowly moved to central Kansas on January 7, and to central Missouri by the morning of January 8 (Figure 1). It then intensified and moved northeastward into southeast Canada on January 9. The resulting heavy rains led to totals of 3 to 4 inches in a narrow band extending from southwestern Illinois into northwestern Indiana (Figure 12). The heaviest rains (4 to 5 inches) fell at Lincoln, Downs, Fairbury, and Piper City with more than 5 inches at two Indiana stations (Rochester and Winamac). The rains were record one-day amounts for January at Peoria, Lincoln, and Piper City, which are locations with long historical records. A very damaging tornado, with a EF3 scale (165 mph winds), occurred in northern Illinois at 3:30 p.m. on January 7. On its 13-mile long path, the tornado blew 12 cars of a passing freight train off the track near Harvard and badly damaged the rest of the train. Another tornado developed in southeastern Illinois, and moved into Indiana where it caused two deaths.

Rain fell onto saturated soils and quickly became runoff into streams and rivers that were already at or above average levels. The result was widespread flooding in northern sections of Illinois and Indiana. Rivers producing major floods included the Iroquois, Kankakee, northern

Vermilion, and Sangamon. These rivers are tributaries of the Illinois River and thus caused it to rise well above flood stage at LaSalle, Peoria, Havana, Beardstown, and Hardin.

The Iroquois River reached 8 feet above flood stage at Watseka, and the Vermilion crested on

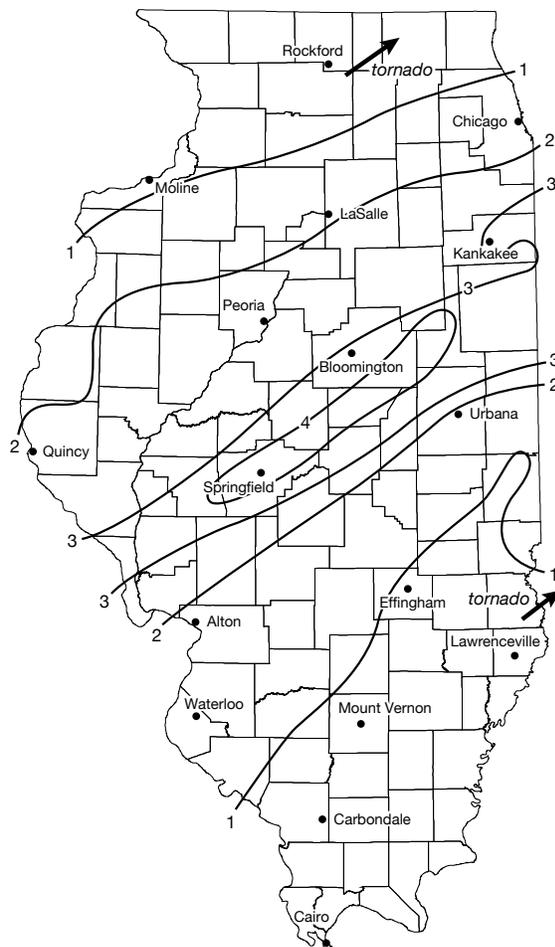


Figure 12. Rainfall in inches on January 7-8, 2008.

January 9 at 5 feet above flood stage at Pontiac. January 2008 flood crests at Iroquois and Pontiac, Illinois, and Shelby, Indiana, ranked as the second highest on record. At Pontiac the crest reached 18.8 feet on January 8, compared with a 14-foot flood stage. (The record is 19.1 feet set in December 1982.) At Iroquois the flood peak reached 25.7 feet on January 8, as compared to the flood stage of 18 feet. (The record is 26.3 feet set in June 1958.)

Flood damages were excessive at Pontiac and Watseka. The Governor declared Iroquois and Livingston Counties disaster areas. Partially flooded Illinois communities included Buckley, Momence, and Mahomet. One man died when his auto hit deep water over a road near Paxton; another died

when he fell into a flooded basement in Pontiac; and three drowned in northern Indiana. More than 1,550 people had to be evacuated in Watseka; 430 homes and most schools were badly flooded in Watseka and Pontiac. More than 100 homes were evacuated in Pontiac. Saturated soils caused burials to be delayed. Power outages also occurred, and floods damaged basements, ruining furniture and rugs. Businesses were closed for 7 to 10 days. Increased sales of sump pumps, boots, and boats occurred in the region. Surprisingly, the federal government refused to grant relief aid to Iroquois and Livingston Counties, and angry local officials appealed to the Federal Emergency Management Agency (FEMA) to change their decision. On



Flooding in the streets and house yards in Watseka on January 9, 2008, a result of heavy rainfall on January 7-8.

March 7, FEMA reversed its decision and agreed that a disaster area did exist in the two counties. By March 30, FEMA had awarded \$3.3 million in grants to local residents in the two counties, and the Small Business Administration provided \$860,000 in low-interest loans to damaged businesses.

SNOWSTORM ON JANUARY 21-22

From January 17 to January 27 much of Illinois experienced a period of sustained cold weather. A relatively weak snow event occurred on January 21-22. A surface system located in western Utah on the morning of January 21 quickly moved eastward to Michigan by the morning of January 22. As a result, snow fell across the northern half of Illinois. Many areas in northern Illinois received 2-4 inches of light-density snow, and the highest amounts were 6 to 7 inches (Figure 13). This system caused only minor impacts to transportation systems in this region.

SUMMER AND WINTER STORMS ON JANUARY 29-30

Cold air penetrated the Midwest on January 20 and again on January 24, setting a record low of -11°F at Lincoln on January 25. Then, warm air moved north across the Midwest on January 28-29. This warm air advection occurred in association with a developing low-pressure system initially located in northern Nebraska on January 28 and

moving east, then northeastward, to a location north of Lake Superior by the morning of January 29 (Figure 1). Over the 48-hour period from 7 a.m. EST on January 28, the surface low pressure dropped 23 millibars (mb) from 998 mb to 975 mb. Warm, moist air covered Illinois on the morning of January 29. Temperatures ranged from 20°F to 30°F above average, and record-high values occurred at St. Louis (73°F), with Lincoln and Springfield at 64°F .

A strong cold front approached from the west, followed by cold Arctic air, and the system moved eastward across the state during the afternoon of January 29. Figure 14 shows three maps of National

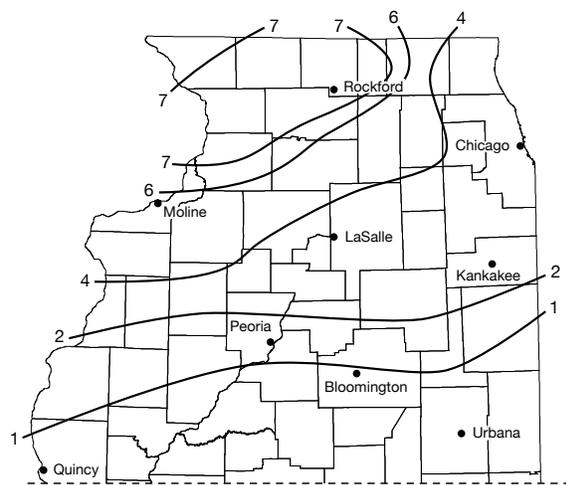
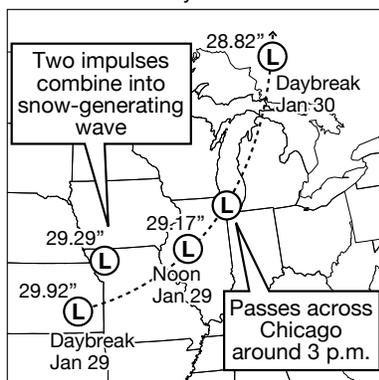


Figure 13. Snowfall in inches for January 21-22, 2008.

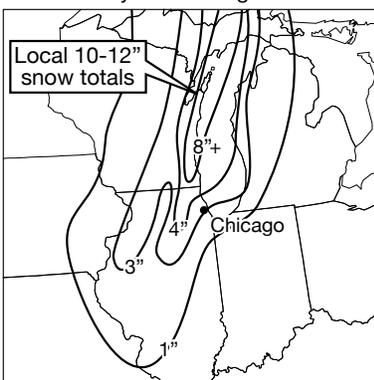
Frontal wave to intensify

Central pressures drop as system intensifies January 29



Potential snowfall

Forecast totals January 29 afternoon into January 30 morning



Predicted movement of cold air

Cold air moving across the Midwest

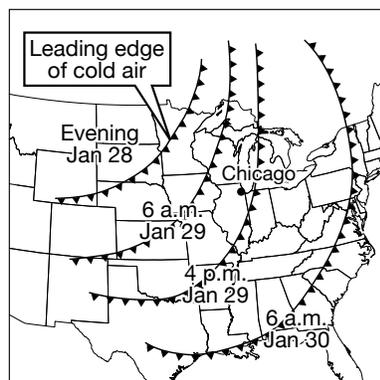


Figure 14. Map on left shows locations of low-pressure center on January 29, 2008. Map in center shows the forecasted snowfall for northeastern Illinois on January 29-30, and the map on the right shows the predicted movement of a cold front across Illinois on January 28-29 (NWS).

Weather Service (NWS) predictions of different weather conditions: (1) the locations of the lows on January 29, (2) the forecasted snow pattern for Illinois, and (3) the movement of the cold front on January 28-29. High winds at this time set records including 73 mph at Carbondale. On the morning of January 29, NWS issued warnings/advisories about the potential occurrence of strong thunderstorms, tornadoes, high winds, blizzard conditions, and a winter storm.

A north-south oriented line of thunderstorms crossed Illinois during the afternoon of January 29, bringing lightning, large hail, heavy rain, and a tornado that occurred in southern Illinois. The severe weather in southern Illinois was extensive (Figure 15) with widespread high-winds felling trees and power lines, and damaging buildings and homes. However, rainfall amounts in the southern third of Illinois ranged from only 0.1 to 0.5 inch. Immediately after the storm's passage, temperatures fell into the 20s; precipitation changed to sleet and then freezing rain; and then light snow fell for one to three hours. After the front passed, there were also very high winds. For six to seven hours winds averaged 30 to 40 mph with gusts to 55 and 60 mph. High winds and snow brought blizzard conditions to northeastern Illinois where the snow was heaviest (Figure 15); yet, the snowfall amount was less than predicted (Figure 14). By midnight on January 29, temperatures across Illinois had fallen to near 0°F. At Champaign the temperature at 3 p.m. was 54°F and then fell to 2°F by 6 a.m. on January 30. At Chicago the drop in 12 hours was from 48°F to -2°F, the third fastest major temperature drop on record.

A variety of storm damages occurred, including a large number of vehicle accidents. Power outages resulted from wind damage to wires, trees, and utility poles, and 35,000 utility customers in northern Illinois were without power on January 29. Slick surfaces and extremely cold temperatures on January 30 resulted in several school closures in central Illinois. The Kankakee and Illinois Rivers, which were above their flood crests due to the rains of the earlier January storm, were raised further on January 30 by the runoff created from the January 29 storm.

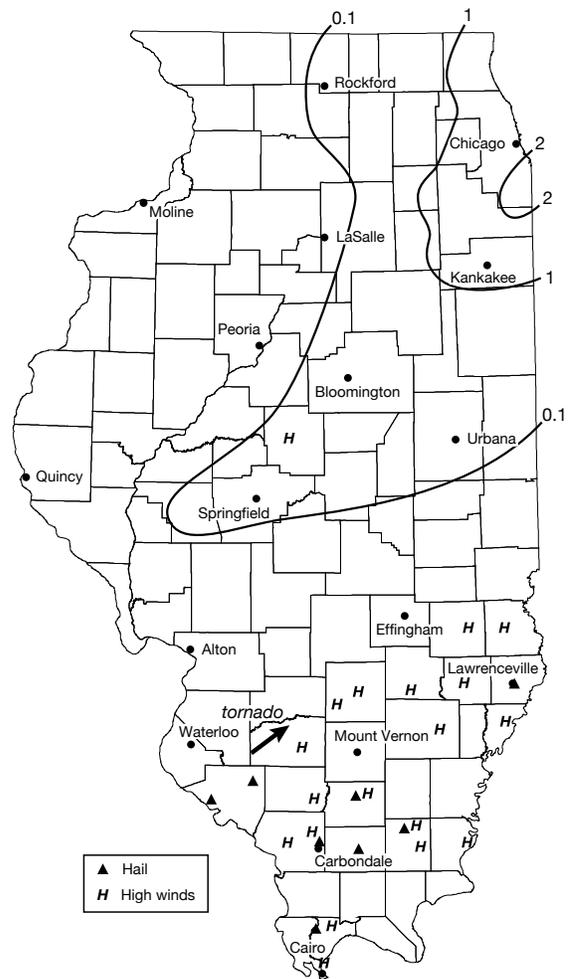


Figure 15. The snowfall in inches (shown by lines) and severe weather locations on January 29-30, 2008.



Freezing rain followed by a snowfall created this wintry scene near Kankakee on January 30. Note the downed power wires.

This storm was unique in that it combined all the features of warm-season severe storms (lightning, hail, wind, and tornadoes) with all the features of severe winter storms (sleet, freezing rain, snow, high winds, and extremely low temperatures).

SNOWSTORM ON JANUARY 31-FEBRUARY 1

A well-defined low-pressure system developed in eastern Colorado on January 30, and initially moved southeast to Texas before turning and moving northeastward up the Ohio River Valley, creating a perfect situation for a winter storm in Illinois (Figure 1). Temperatures in Illinois had fallen dramatically on the previous day and were accompanied by high winds. Snow began at mid-day on January 31 and moved across the entire state. Snowfall continued through the night and into mid-day on February 1 in eastern and northeastern Illinois. Amounts were heaviest in parts of central Illinois with 11.3 inches in Springfield, the fourth highest 24-hour total on record. An area of more than 10 inches extended northeast from the St. Louis area to Pontiac (Figure 16). Most of Illinois received 4 inches or more, and half the state had 6 inches or more. Moderately high northwest winds caused considerable drifting. Numerous vehicle accidents occurred, and two people were killed.

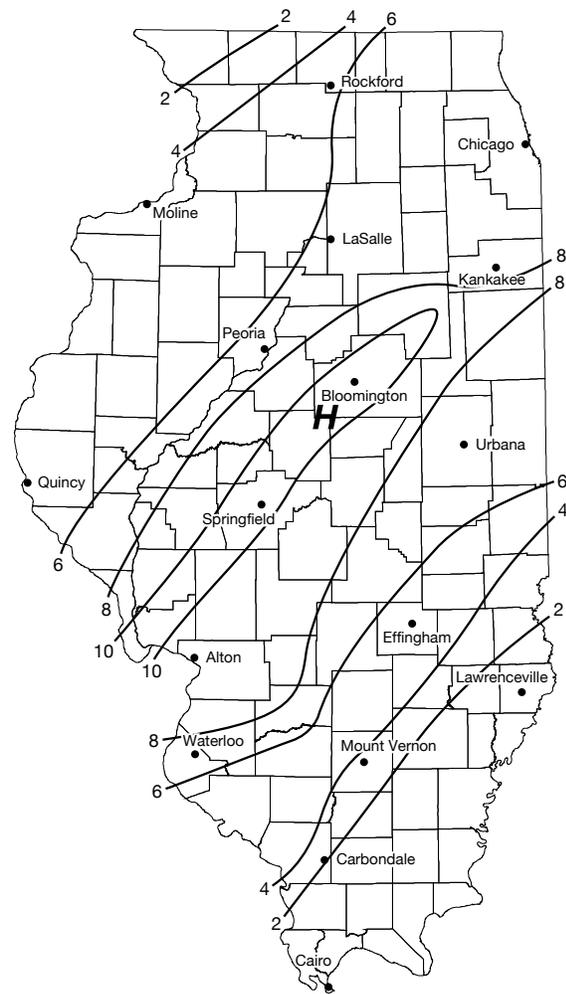


Figure 16. Snowfall in inches on January 31-February 1, 2008.



Heavy drifting snow is being plowed from a country road near Clinton on February 2, 2008.

February Storms

RAINSTORM ON FEBRUARY 4-6

The February 1 snowstorm was followed on February 3-4 by moderately high temperatures (40° to 50°F), and very heavy fog on February 4. A surface low-pressure system initially located in eastern Colorado on February 4 tracked northeastward, north of Illinois, to lower Michigan. Some areas in northern Illinois initially received periods of sleet and snowfall on February 3 before two thunderstorm systems, each producing hail and heavy rain, occurred on the evenings of February 4-5 and 5-6. These two storm systems brought copious rains to central Illinois (2 to 4 inches total [Figure 17]). This created further massive flooding in fields, streams, and rivers. Thunderstorms occurred in most parts of Illinois on February 4 (Figure 17), and some northern areas experienced freezing rain and sleet.

Many automobile accidents resulted from dense fog on February 4 and from flooding, leading to seven deaths in Illinois. The two thunderstorm systems caused many power outages. During the night of February 4-5, 16,300 utility customers in central Illinois were without power for the night. The Bloomington Airport cancelled 80 percent of its flights on February 4 because of fog. The thunderstorm system on February 4-5 produced 1 to 1.5 inches of rain across much of central Illinois, and the second system on February 5-6 produced 1 to 2.5 inches in the same area, resulting in massive flooding, and creating flash floods on several streams in central Illinois.

SNOWSTORM ON FEBRUARY 6-7

A severe blizzard struck northern Illinois on February 6-7, becoming the tenth winter storm

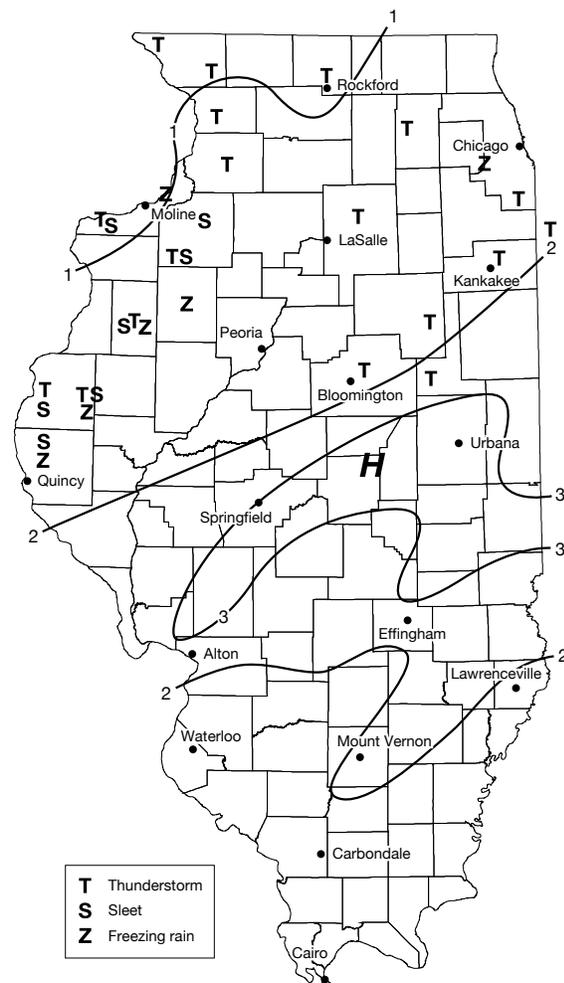


Figure 17. Rainfall in inches on February 4-6, 2008.

of the season. Figure 18 shows the NWS forecast weather for February 6, calling for a peak of snow across northern Illinois, a correct forecast. The surface cyclone originally developed on the morning of February 5 near Wichita Falls, Texas, before deepening and moving northeastward to southern Illinois and western Kentucky on the morning of February 6, and then off the New England coast on February 7. Snowfall amounts exceeded a foot and high winds with gusts greater than 45 mph reduced visibility. Some locations got 3 inches of snow in one hour. Many roads were closed, and the NWS reported it was the worst storm in the northern area since 1999. The snowfall pattern (Figure 19) shows the sharp increase in amounts across northern Illinois. Snowfall amounts exceeded 13 inches from Galena east through Rockford and on to Waukegan. Amounts decreased rapidly to the south with the 1-inch snowfall line extending east from north of Quincy to Bloomington, and then northeast to Park Forest. Some locales reported thunder and lightning with this storm. Most schools, including Northern Illinois University, canceled classes due to this winter storm.

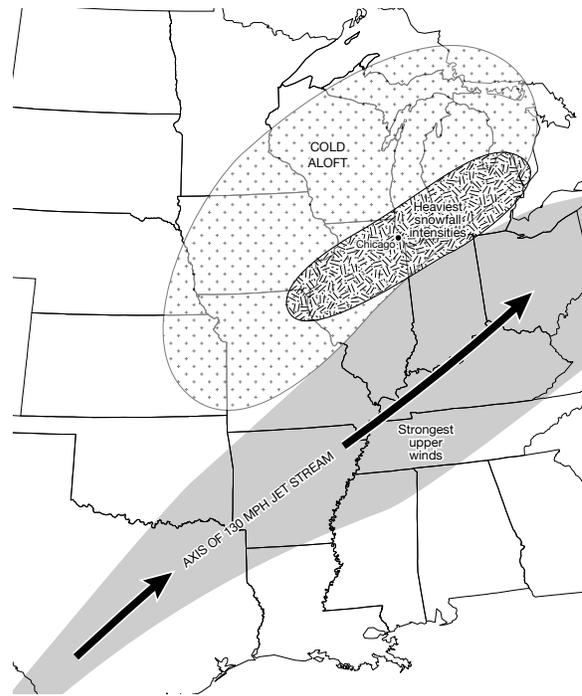


Figure 18. Predicted Midwestern weather conditions for February 6, 2008.

ICE STORM ON FEBRUARY 11-12

By February 11, Arctic air extended south to the Gulf of Mexico (Figure 20), and a new low-pressure system was developing over the north central Rockies. This low moved in an Alberta Clipper track southeastward to Kentucky on February 12 before heading to North Carolina on February 13. This cyclone track, south of Illinois, led to a major ice storm across southern Missouri and Illinois. Very high winds were present in Illinois on February 10-11. The southern third of Illinois received the ice storm (Figure 21) on the night of February 11-12. Ice layers were thickest in the far south, including Carbondale and Cairo, with layers ranging from 0.5 to 0.75 inch thick. Sleet also fell, and the resulting sleet and ice layers were 2 to 3 inches thick. Widespread school closings occurred on February 12, vehicle accidents were numerous, and many areas experienced power outages that lasted until February 14 or 15. High winds struck the area again on February 17 with gusts to 55 mph, bringing down more trees and power lines.

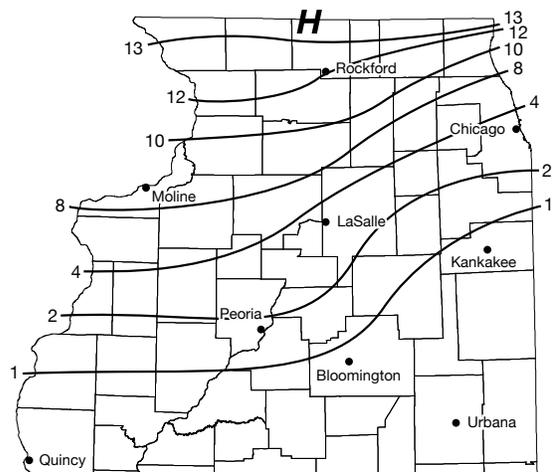


Figure 19. Snowfall in inches on February 6-7, 2008.

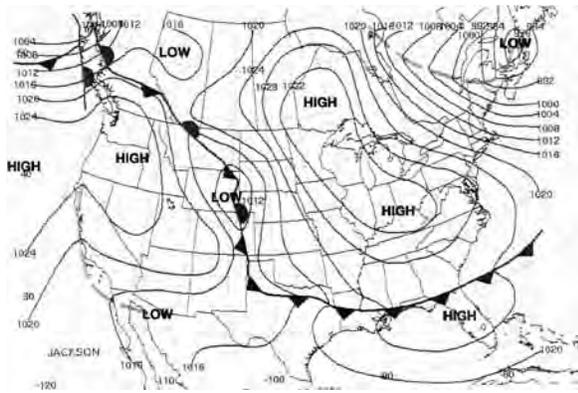


Figure 20. Surface weather map for 7 a.m. on February 11, 2008.

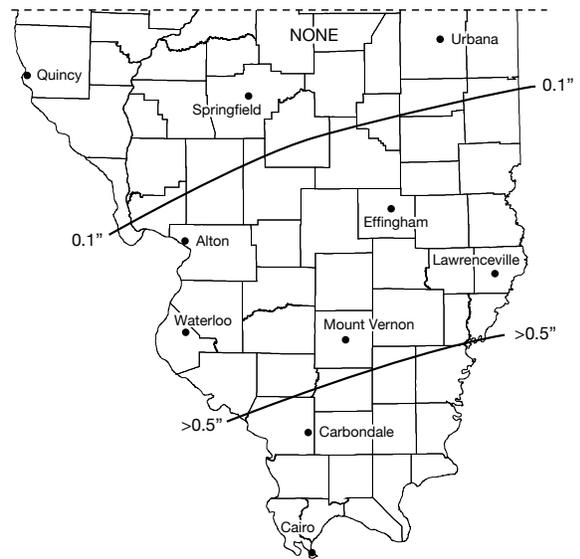


Figure 21. Ice storm on February 11-12, 2008. Ice thickness is shown in inches.



Flooding from the Illinois River in the Havana area on February 7, 2008.

HEAVY RAINS ON FEBRUARY 17-18

A storm system moving northeast into the Midwest on February 17 (Figure 22) produced heavy rains in Missouri and Illinois. The track of this quickly intensifying storm system ran from east central Texas to central Missouri and on to the central Great Lakes, a path that kept Illinois in the warm sector of the storm (Figure 2). Rainfall amounts ranging from 0.5 to 2 inches fell over most of Illinois during the night of February 17-18 (Figure 23). Rains were heaviest in western Illinois. These rains added to the on-going flooding in central Illinois. The La Moine and Spoon Rivers rose above their flood stages. Thunder was reported in several central Illinois communities, and two fires resulted from lightning strikes.

ICE STORM AND SNOWSTORM ON FEBRUARY 21-23

Figure 24 depicts the NWS forecast of the movement of a deep low-pressure storm center just south of Illinois on February 21. It defines a large glaze/ice area that was expected to occur across the southern third of the state. The low-pressure system was located in southwest Texas on the morning of February 21 and moved northeast to northern Mississippi by the morning of February 22, before moving on to North Carolina on February 23. Initially, glaze developed across the southern third of Illinois during February 21 (Figure 25), and ice layers reached thicknesses of 0.25 inch or more in the state's 12 southernmost

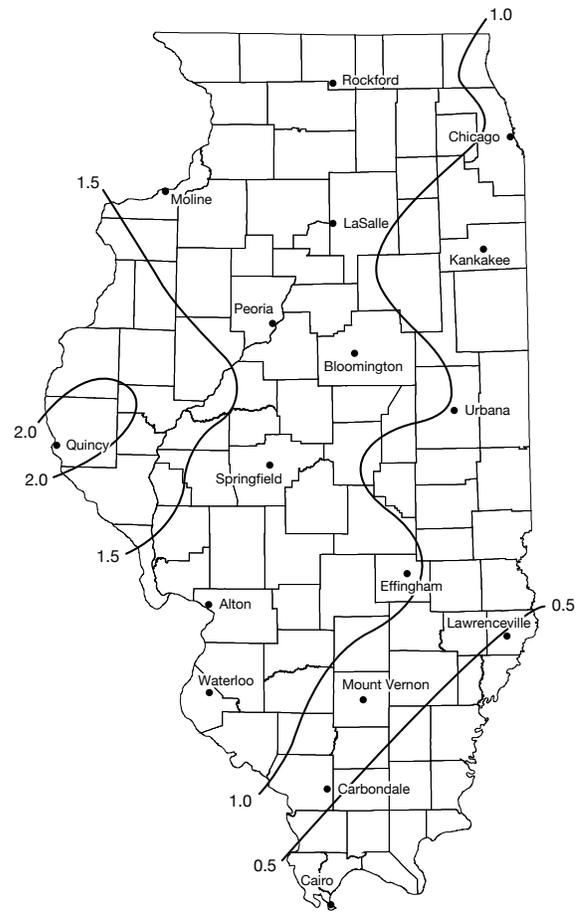


Figure 23. Rainfall in inches on February 17-18, 2008.

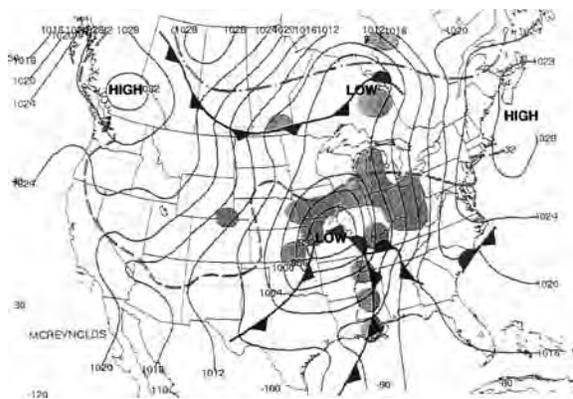


Figure 22. Surface weather map for 7 a.m. on February 17, 2008.

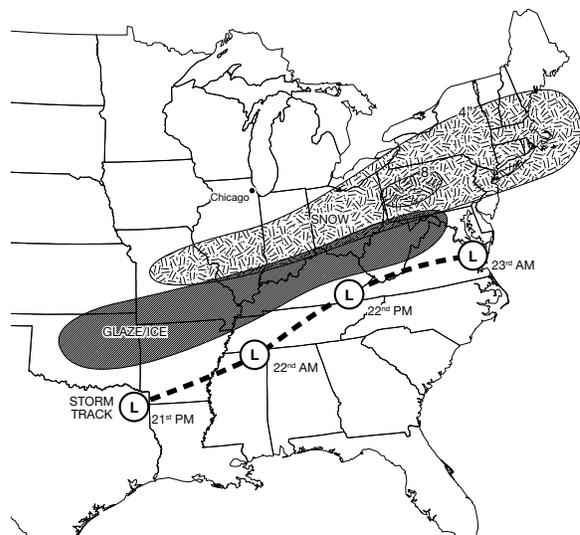


Figure 24. Predicted weather conditions for the Midwest on February 21, 2008.

counties. Sleet was also heavy with deposits of 2.5 inches at Carbondale, Benton, and other locales. Southern Illinois University at Carbondale closed because of the storm's severity. Property and power line damages from the ice were considerable in the extreme southern end of the state.

As the wave of low pressure in Texas moved northeastward along the Arctic air boundary on February 21 and 22 (Figure 26), snow began to fall across portions of Illinois shortly after the freezing rain and sleet ended. Its movement to the northeast led to a snowstorm in Illinois on February 22-23. The snowfall peaked in central Illinois (Figure 27) where more than 5 inches of snow occurred. Urbana set a one-day record for February with 5.9 inches. Moderate to high winds produced extensive drifting. School closings occurred in numerous central Illinois communities, and vehicle accidents were numerous in Champaign, Douglas, and Vermilion Counties.

SNOWSTORM ON FEBRUARY 25-26

The last winter storm in February occurred on February 25-26. On February 25, the NWS predicted that the storm track for February 25-26 would move from north central Kansas to central Kentucky across southern Illinois. The forecast also called for rain changing to snow across northern Illinois (Figure 28). Some freezing rain preceded the snow as the storm intensified and moved east across the state. This snowstorm affected the northern half of Illinois with 6-inch amounts occurring west of

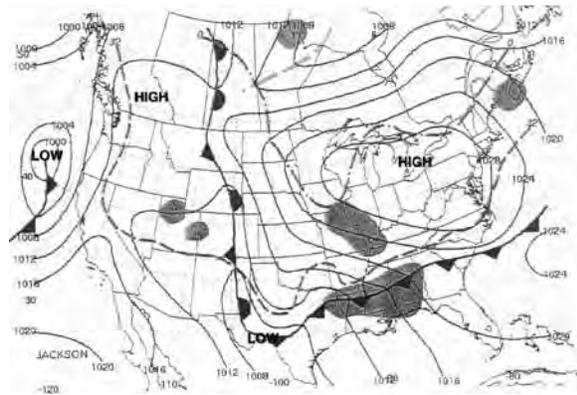


Figure 26. Surface weather map for 7 a.m. on February 21, 2008.

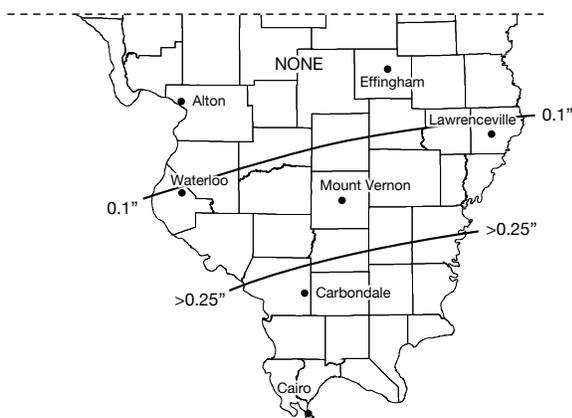


Figure 25. Ice storm on February 21, 2008, and ice thickness is in inches.

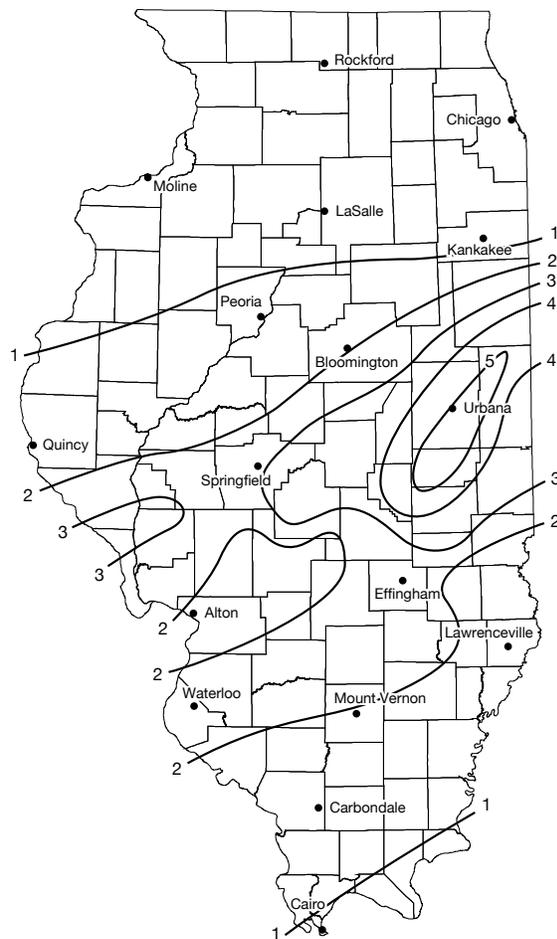


Figure 27. Snowfall in inches on February 22-23, 2008.

Chicago (Figure 29). The snow greatly reduced visibility, leading to reductions in commercial flights in and out of Chicago. The sequence of ice and then snow resulted in dangerous road conditions with many accidents in northeastern Illinois.

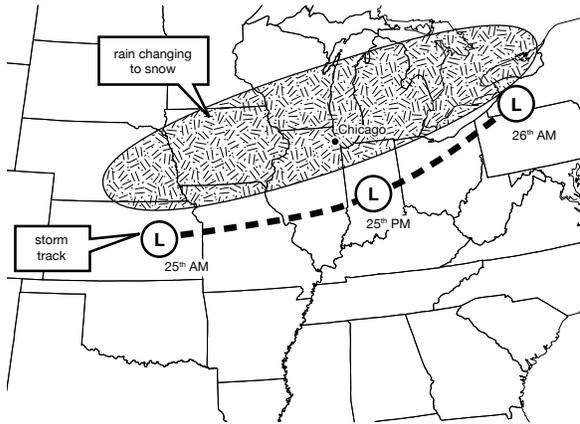


Figure 28. Predicted weather conditions for February 25 and 26, 2008.

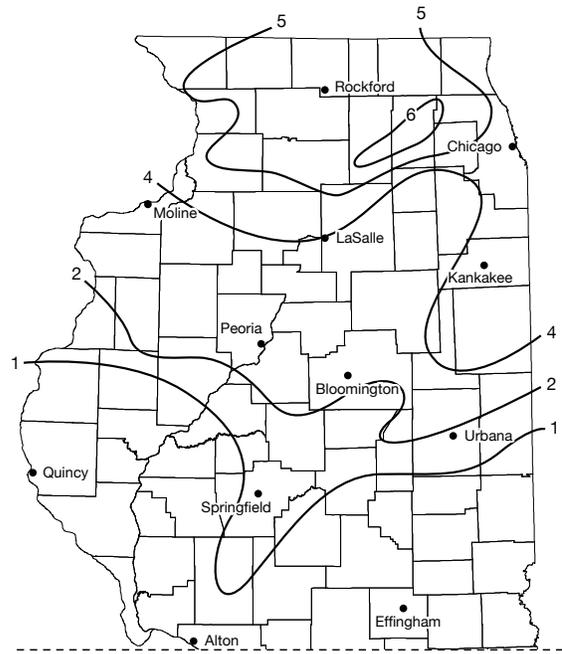


Figure 29. Snowfall in inches on February 25-26, 2008.



Excessive tree damages seen at Carbondale resulting from a major ice storm on February 21, 2008.

March Storms

WINTER STORM ON MARCH 3-4

A low-pressure center located in the Great Plains on March 2 (Figure 30) moved southeast into south central Texas on March 3 before moving northeast to Tennessee on March 4 and to central New York on March 5. This track led to a winter storm centered over Illinois on March 3-4. On March 3, a mixture of sleet, rain, freezing rain, and snow pellets occurred in central and southern Illinois (Figure 31). Ice layers reached 0.5 inch in parts of east central and southeastern Illinois, including Effingham and Mt. Vernon. On March 4, snow fell over most of central Illinois with 6-inch

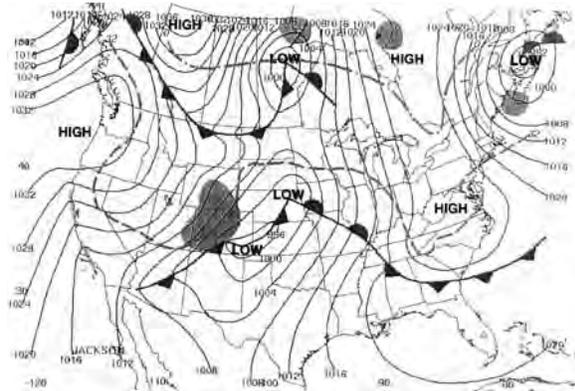


Figure 30. Surface weather map for 7 a.m. on March 2, 2008.



A mixture of freezing rain and snow produced this scene near Decatur on March 4, 2008.

amounts northeast of St. Louis. The storm produced 10 inches in St. Louis, the highest one-day March value on record. High winds across central Illinois created blizzard conditions. Traffic was delayed in many locations, including Interstate 55, and numerous truck and auto accidents occurred in the area between St. Louis and Springfield.

SNOWSTORM ON MARCH 7-8

A NWS prediction of the storm track for March 7-8 (Figure 32) called for a long path of heavy snow from Arkansas to New York. This major winter storm slowly intensified and moved from southern Texas (March 6) northeast to southern Alabama (March 7) and then more northward to southeastern Ohio (March 8) before moving off the Maine coast on March 9. This track produced a band of heavy snow in extreme southern Illinois (Figure 33). Snowfall totals in parts of Ohio set new one-day records.

RAINSTORM ON MARCH 18-19

A major storm system moved slowly from the Texas panhandle to central Illinois and on to the Northeast U.S. during March 17-20. The NWS-predicted weather map (Figure 34) shows a huge area of warm, moist air, a condition conducive to heavy rain. The deep low-pressure center was in southwestern Illinois by 7 a.m. on March 18 (Figure 35). As a result, very heavy rains fell in Arkansas, Missouri, Illinois, Kentucky, Indiana, and Ohio. More than 12 inches fell in parts of southern Illinois in 24 hours, setting new records of daily rainfall at Marion (11 inches), Anna (11.64 inches), and Harrisburg (12.83 inches). More than 5 inches of rain fell across the southern third of the state (Figure 36), and rain extended into northern Illinois. Thunderstorms occurred over the southern half of Illinois.

This heavy rainfall fell on saturated soils from the previous rainstorms, resulting in extensive, massive flooding across southern Illinois, as well as in adjacent states. The national flood zone resulting from the storm (Figure 37) extended from Texas across Illinois, with a huge flood crest on the Big Muddy River. Flooding eroded a rail line near Vienna, causing a washout and the wreck of a passing Union Pacific train. Two people were drowned

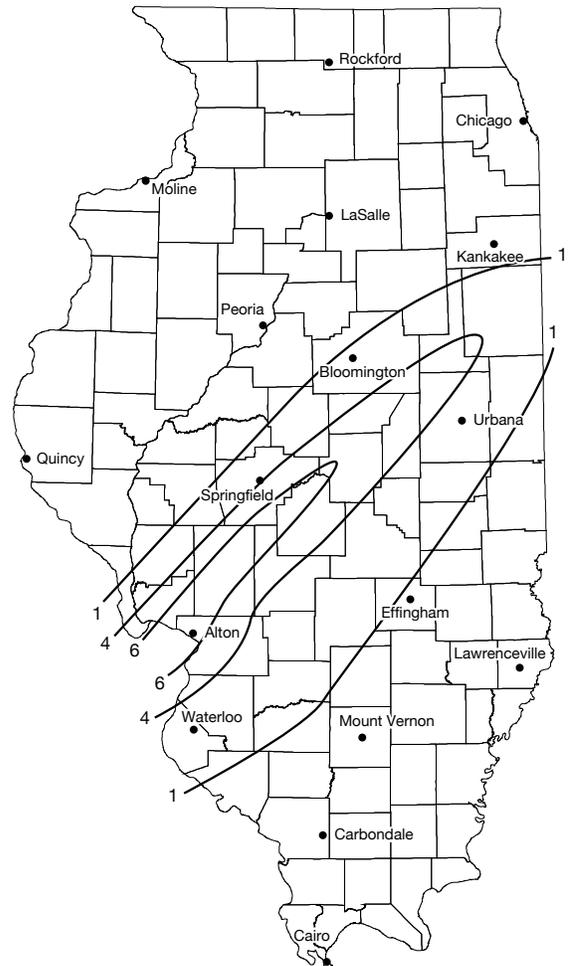


Figure 31. Snowfall in inches on March 3-4, 2008.

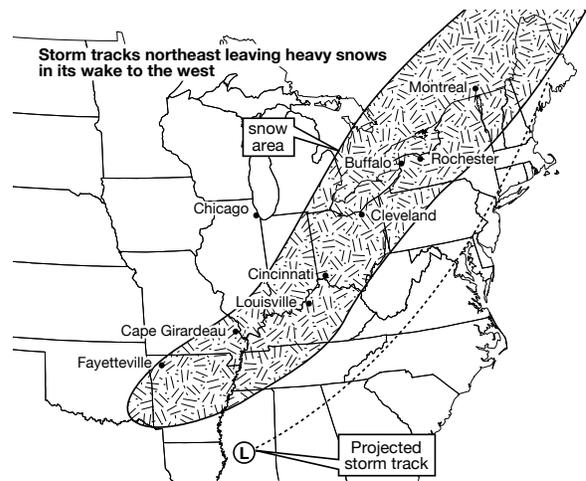


Figure 32. Predicted storm track for March 7-8, 2008 (NWS).

when flood waters swept their truck into a river near Mt. Vernon. Many roads were closed, and access to the Harrisburg Hospital was cut off by flooding. The Big Muddy River crested on March 21 at 36.5 feet at Plumfield, which is 16.5 feet above its flood stage (Figure 37). The Governor declared 19 counties in southern Illinois as disaster areas.

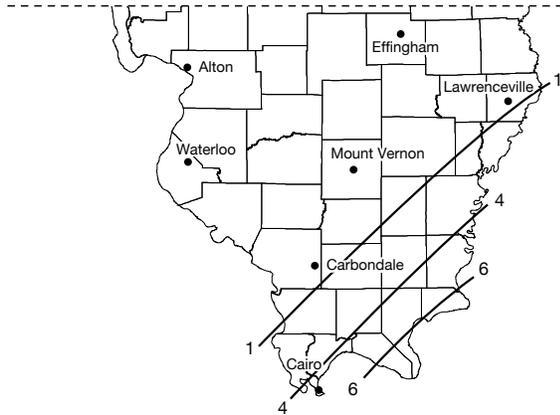


Figure 33. Snowfall in inches on March 7-8, 2008.

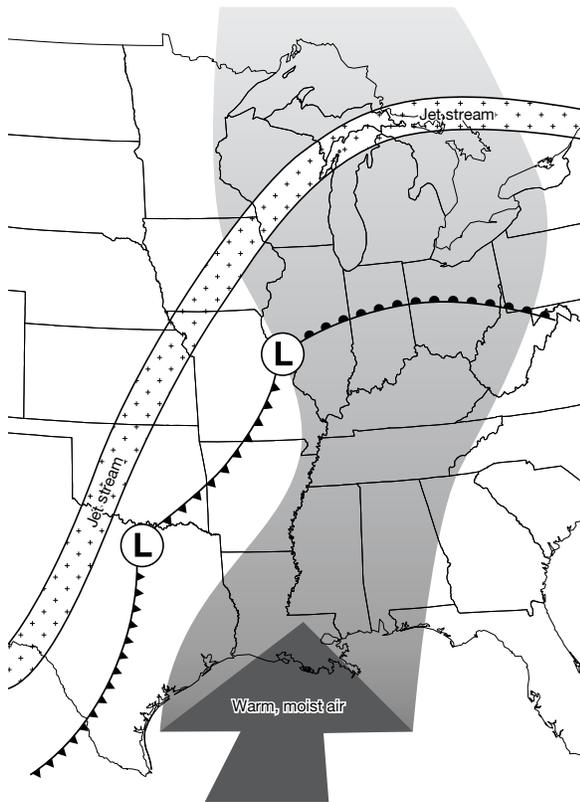


Figure 34. Predicted weather conditions for March 18-19, 2008.

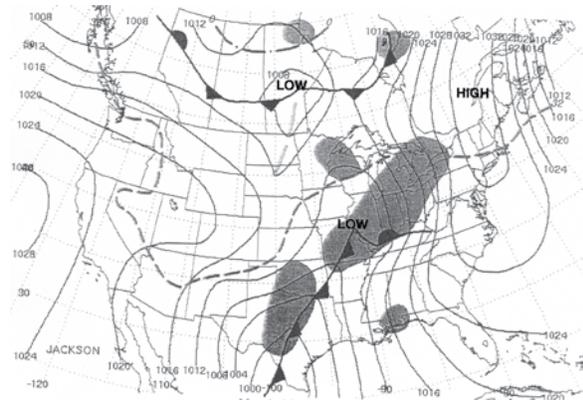


Figure 35. Surface weather map for 7 a.m. on March 18, 2008.

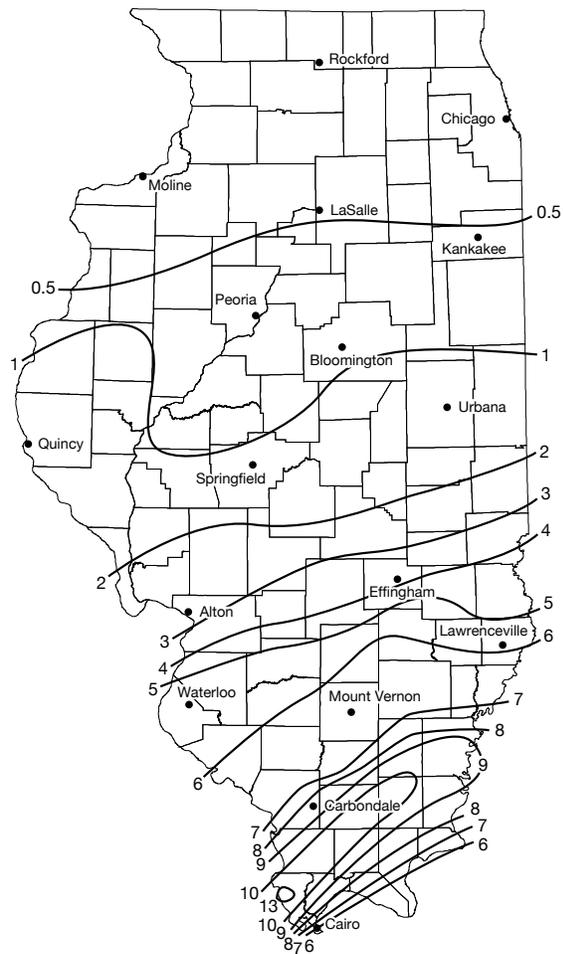


Figure 36. Rainfall in inches on March 18-19, 2008.

SNOWSTORM ON MARCH 21

A major, fast-moving snowstorm struck northern Illinois on March 21 as an Alberta Clipper moved across the upper Midwest from central Wyoming (March 20) to southern Ohio (Figure 2). Locations in extreme northern Illinois, such as Gurnee and Woodstock, got 12 to 14 inches of snow (Figure 38). Chicago O'Hare had 4.7 inches and Midway had only 2.7 inches, demonstrating the sharp decrease in snowfall amounts southward from the state's northern border. The storm resulted in major flight delays at Chicago O'Hare; 450 flights had to be cancelled just before the Easter holiday.

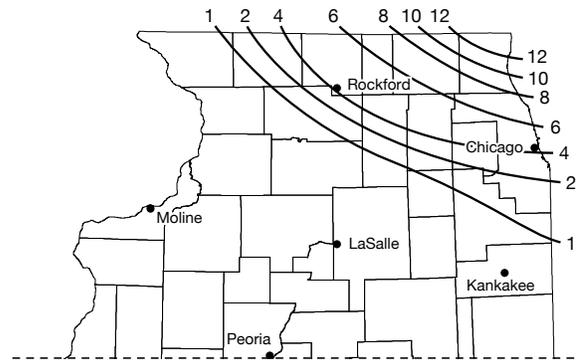


Figure 38. Snowfall in inches on March 21, 2008.

SNOWSTORM ON MARCH 27

A snowstorm occurred along the northern boundary of Illinois on March 27 (Figure 39). A weak surface low developed in the Oklahoma panhandle, then deepened and moved into south central Kansas on March 27 before moving east to south central Pennsylvania on March 28. As the system moved across central Illinois (Figure 2), precipitation in northern Illinois began as sleet intermixed with rain followed by snow. Thunderstorms occurred in the Chicago area. Major traffic problems related to snow and ice were reported. This became the 18th winter storm of the 2007-2008 cold season.

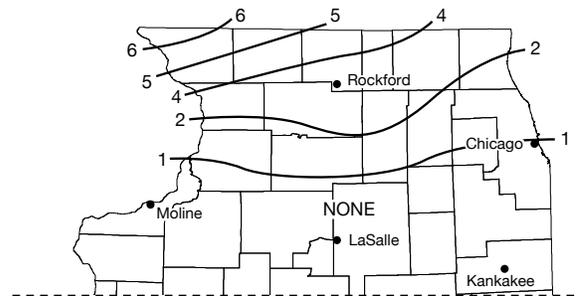


Figure 39. Snowfall in inches on March 27, 2008.

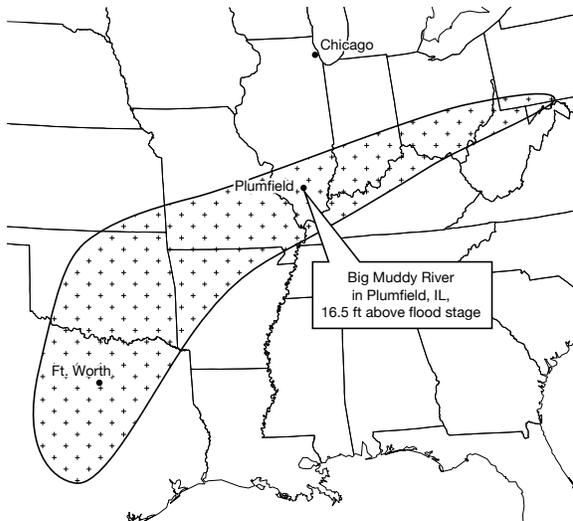


Figure 37. Regions affected by flooding on March 21, 2008.



A flooded farm in central Illinois following heavy rains on March 18-19, 2008, largely the result of many snows and rains in previous months.

Impacts

The 18 winter storms and five rainstorms during December-March produced a myriad of physical, societal, and economic impacts in Illinois, many serious in nature. The storms are listed by date of occurrence in Table 1. Figure 40 illustrates some of the major problems that occurred during the four-month cold season, based on headlines from regional newspapers. These impacts included various transportation problems, power outages, and costly efforts to deal with weather-related problems.

Other major problems were caused by massive flooding that resulted from the heavy rains and melted snowfall, as illustrated in Figure 41 by articles from area newspapers. Many flood problems occurred in north central Illinois along the Vermilion, Iroquois, Kankakee, and Illinois Rivers. Serious flooding developed across southern Illinois in February and March.

FLOODING

Flooding had a significant impact in Illinois during the winter. Several Illinois rivers were at or well above flood stages in January. Those in various areas included:

- North: Pecatonica, Rock, and Fox Rivers
- Northeast-central: Kankakee, Iroquois, and Vermilion (north)
- Central: Mackinaw, Salt Fork, and Sangamon

The Illinois River in January exceeded flood stage levels by 5 feet or more at Morris, LaSalle, Peoria, Havana, and Beardstown because of flooding from its tributaries, including the Kankakee, Fox, Vermilion, Mackinaw, and Sangamon Rivers.

Flood peaks on the Illinois River occurred during mid-January and flooding continued into March. All measurement sites from Morris to Hardin remained above flood stage until late March. Floods along these rivers, and the Missouri River,

Table 1. Dates of Storms that Occurred During December 2007-March 2008

<i>Snowstorms</i>	<i>Ice storms</i>	<i>Rain storms</i>
	Dec. 1-2	
Dec. 4-5		
	Dec. 8-9	
Dec 15-16*		
Dec. 22-23*		
Dec. 29-30*		
Dec. 30-31		
		Jan. 7-8
Jan. 21-22		
Jan. 30		Jan. 29
Jan. 31-Feb. 1		
		Feb. 4-6
Feb. 6-7*		
	Feb. 11-12	
		Feb. 17-18
Feb. 22-23	Feb. 21	
Feb. 25-26		
Mar. 3-4*		
Mar. 7-8		
		Mar. 18-19
Mar. 21		
Mar. 27		

* - Blizzard conditions existed.

Ice storm leaves many struggling

Ice cut electricity to almost a million homes and businesses, closed schools and canceled flights Tuesday as a major storm

Deadly storms

Blinding snowstorm hits

head east

DANGEROUS ROADS

3 crashes include school buses; area flood watch issued

By Sharon K. Wolfe
swolfe@antagran.com

BLOOMINGTON — Dense fog

WINTER WEATHER

Towns scramble to find more road salt



Fog's role cited in fatal car-train wreck

Vehicle crashed thro

Outage left thousands without power

Olympia closes schools after Minier site affected

WINTRY WEATHER

2nd big storm gives

U.S. airline delays accumulate

Midwest fresh snow

Hundreds of flights grounded; schools, malls, offices closed

19 counties in Illinois declared disaster areas

Figure 40. Assorted newspaper headlines illustrating the impacts of the winter weather conditions in 2007-2008.

Storm front brings rain and flood warnings

Watseka struggles to stay dry

Streets in town look like rivers;

IROQUOIS, LIVINGSTON COUNTIES

Officials rip FEMA over rejection of disaster relief

16 dead

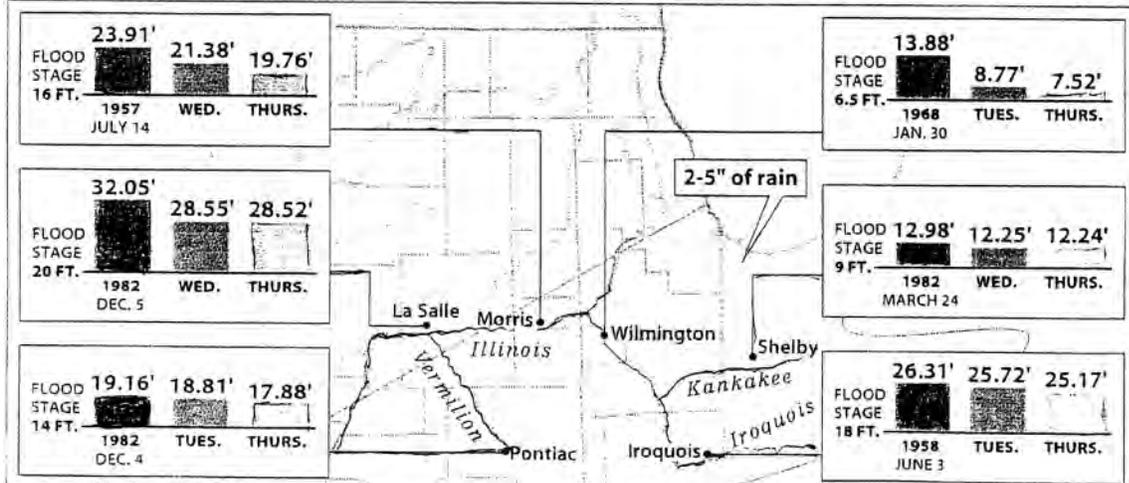
as Midwesterners eye rising rivers

Flood teams assess extent of damage

Pontiac economy may feel flood's wrath later

RIVER LEVELS RELATIVE TO FLOOD STAGE

Record highest Recent peak Thursday level



FEDERAL EMERGENCY MANAGEMENT AGENCY

Counties get disaster declaration

Agency will flood-damage communities
 Flooding makes many area roads unpassable

Figure 41. Assorted newspaper headlines and illustrations pertaining to the massive flooding during January-March 2008.

brought the Mississippi River well above flood stage. The river along the Illinois-Missouri border from Grafton south was 2 to 8 feet above flood stage in late March, and at Cairo it crested 14 feet above flood stage.

Heavy rains on January 7-8 occurred along a SW-NE axis that lay over the basins of the Sangamon, Mackinaw, Vermilion, Iroquois, and Kankakee Rivers. The four December snowstorms in northern Illinois resulted in considerable snowmelt that flooded the Pecatonica, Rock, and Fox Rivers. Many communities experienced some level of flooding, and Pontiac and Watseka had excessive flood damages. In Watseka, 430 homes were badly damaged and local residents were evacuated. The floods on these rivers, plus the flooded Rock River, helped bring the Mississippi River above flood stage from Dubuque to Cairo by late February. The Mississippi River remained above flood stage through April.

Levels of all major reservoirs in Illinois were 1 to 4 feet above average by the end of February. Shallow groundwater levels in Illinois were 0.4 feet above average across the state. Heavy snow and rain, coupled with frozen soils, led to more flooding during February and into mid-March. Many roads and highways were closed because of flooding during parts of January, February, and March. Massive flooding in southern Illinois from the record rainstorm on March 17-18 led to two deaths, and 19 counties were declared disaster areas. Figure 41 presents news headlines that illustrate the myriad of flood-related problems that occurred in Illinois during January-March 2008.

TRANSPORTATION

Limited visibility from snowstorms and frequent fogs often led to vehicle accidents. In fact, more than 5,600 weather-related accidents were reported in the four-month period. An EF-3 scale tornado on January 7 blew over 12 cars of a train, spilling toxic materials. Homes in nearby Harvard had to be evacuated. Flooding washed out a railroad line in southern Illinois, leading to a train wreck. Both of Canadian National's north-south mainlines in southern Illinois closed because of flooding from the March 18-19 rainstorm. Tracks were washed out or were under water. Trains were halted for three

days, and Amtrak had to bus passengers around the blocked areas. Railroads in northern Illinois had many problems caused by heavy snow and cold temperatures. Many trains were delayed. On several days in February, the Canadian National and Union Pacific Railroads had to employ snowplows to clear their lines from the heavy, often drifting snow. On a few occasions, several trains were stopped when blowing snow got into the diesel engines. Plows even went into the Chicago area to clear heavy snows for the first time in 30 years.

Storms, fogs, and high winds also curtailed commercial flights; Chicago's O'Hare Airport set a record for the number of flight cancellations. On December 22-23 O'Hare canceled 1,100 flights, and Bloomington Airport had 80 percent of its 230 flights canceled on February 4. O'Hare reported that 47 percent of all flights in January were late due to bad weather, and these late arrivals often clogged the airport and slowed outgoing flights. The late season snowstorm on March 21 caused 450 flights at O'Hare to be cancelled, a major blow just before Easter. The U.S. Department of Transportation reported the first quarter of 2008 (January-March) was the worst on record for flight delays and cancellations with 41 percent of the cancellations due to bad weather (*Chicago Tribune*, May 8, 2008). In March, 36 percent of all flights at Chicago's O'Hare Airport were delayed, the worst performance of any airport in the U.S.

Frequent wide temperature swings from near 0°F to 50°F, coupled with several heavy rains, created a major pothole problem in streets and highways in many parts of the state. Damages to vehicles were widespread, attracting significant media attention. In Chicago, 120,000 potholes were filled between December 1 and March 31. Costs were increased due to the higher price of oil used for asphalt. IDOT dispatched 60 repair crews every day during January-April for highway pothole repairs. The numerous potholes created badly damaged streets and state highways, and the ensuing repairs led to slowdowns of commuter traffic in the Chicago area. Commuters suffered costly vehicle repairs and higher gas costs all because of the winter weather of 2007-2008. Many local and state groups worked throughout February to fill potholes, leading to added costs for work crews. The

never-ending needs to clear the roads after the winter's 12 snowstorms led to huge salt applications. As a result, many communities ran out of salt in February. The snow removal budget (i.e., salt, fuel, overtime for workers) for several northern Illinois communities was exceeded by mid/late winter, creating severe long-term budget issues and concerns.

A massive mud slide from the bluffs of the Illinois River occurred in March in Jersey County. The mud slide, which was one-half mile wide, covered Illinois Route 100, and traffic was halted for three weeks.

Flooding along the Mississippi and Illinois Rivers during February, March, and into April halted navigation of barges on the rivers. Barges were parked, halting grain shipments and creating costs for shippers who shifted to rail shipments, and also a loss to barge operators.

PROPERTY: HOMES AND STRUCTURES

Ice storms, heavy snow, and occasional high winds caused trees and poles to fall or blow down, resulting in damage to many structures. High winds across southern Illinois in a February storm caused excessive damage to homes and parked vehicles. Flooding also caused major damage to more than 1,000 homes in central and southern Illinois.

POWER AND COMMUNICATION SYSTEMS

Storms and high winds caused several major power outages and broken telephone lines as poles fell and trees landed on power lines. Power companies had to bring workers from out-of-state firms to assist in repairing damages. Power outages on December 11 affected 25,000 utility customers, with 24,000 without power on December 22-23. High winds and a tornado in southern Illinois on January 29 led to outages for 35,000 utility customers, and 16,300 were without power on February 4-5. Power companies had to import workers from out-of-state during three storms to restore power.

GOVERNMENT

Local and state government agencies initiated frequent extra efforts to clear snow and assist in damage repairs. FEMA initially refused to provide federal aid for the severe flood damages at Watseka and Pontiac, but later relented with aid. The storms

led to many school closures. For example, most schools across southern Illinois were closed by the ice storms on February 11-12 and 21, while schools in northern Illinois were closed multiple times because of snowstorm-related problems. Pothole repairs were very costly to local communities and to the State of Illinois. Unable to keep up with repairs, the IDOT spent \$25.5 million to have outside contractors assist IDOT in pothole repairs in Northeastern Illinois (*Chicago Tribune*, April 29, 2008).

BUSINESS

Stormy conditions, between-storm fogs, and flooding greatly reduced retail sales. Since many stores were forced to close on several days and numerous employees could not reach their places of employment, many suffered income losses.

Weather extremes also caused major property damages that resulted in significant economic impacts for insurance firms. Allstate, a major U.S. insurance firm, had storm catastrophe losses that totaled \$568 million, whereas the previous year's cold season loss was only \$161 million (*Chicago Tribune*, April 24, 2008). The firm's net income for the first quarter of 2008 was \$348 million, compared to \$1.5 billion the year before.

AGRICULTURE

December's six winter storms helped replenish the soil moisture in Illinois, but led to heavy runoff in some northern areas. By the end of December, Illinois River levels were close to flood stage at LaSalle and Havana. The flooding and continued soil saturation across Illinois during the late winter and spring 2008 greatly delayed spring planting. Such delays put corn and soybean crops at much greater risk from mid-summer dry conditions and high temperatures. Prolonged high soil moisture also made livestock feeding very difficult. Heavy March rains drowned numerous wheat fields in southern Illinois. Heavy rain combined with flooding resulted in considerable soil erosion in central and southern Illinois.

HUMAN HEALTH AND WELL-BEING

The various storms and fogs led to several deaths. The December 8-9 ice storm led to seven deaths with four more from the December 15-16

snowstorm. The January 7-8 heavy rains led to two deaths. Accidents from the February 1 storm killed two people, and the heavy fogs on February 7 resulted in seven deaths. Ice storms on February 11-12 and 21 caused many accidents and four deaths, and the floods of March 17-18 led to two more deaths. The winter total was 28 deaths in Illinois. There were thousands of injuries from falls and auto accidents. The main hospital in Rockford reported they treated triple the normal number of broken legs and arms experienced in winter.

The seemingly endless series of 18 winter storms and five convective rainstorms in four months incited depression and strong negative reactions amongst many citizens. By mid-February, thousands were complaining and expressing their desire for winter to end. Figure 42 shows clippings from regional newspapers, illustrating the negative reactions that began appearing in the press from mid-February onward. Note the news article at the end of February, which said of the winter, "It's Been Endless" (*Champaign Urbana News-Gazette*, February 28, 2008). An editorial in the *Chicago Tribune* (March 12, 2008) pointed out that the winter in Chicago had been (1) wet (second wettest on record), (2) snowy (third highest on record), (3) cold (30th coldest in 137 years), (4) filled with gray skies (ninth cloudiest on record), and (5) filled with many snow days (46 of 70 days, the most on record).

ECONOMIC IMPACTS

Measures of the economic losses and costs related to the myriad of impacts previously described were obtained from firms, business associations, and insurance companies. In some instances, losses and costs had to be estimated based on measures from prior storm studies. The four ice storms were costly events, as were the heavy rainstorms on January 7-8 and March 18-19. The most damaging snowstorms were those on December 15-16, January 31-February 1, February 6-7, February 22-23, and February 25-26. The total losses and costs from the storms and other severe weather conditions during December 2007-March 2008 are listed in Table 2. Losses totaled nearly \$3.5 billion.

Despite the myriad of widespread damages to various business sectors, certain industries benefitted from severe storms, an outcome found with all bad weather events (Changnon and Kunkel, 2006). Private firms were employed by individuals and communities to help clear snow from streets and driveways, resulting in \$35 million added income for this sector. Massive damages to structures, homes, and business buildings from heavy snow and/or flooding resulted in major funding for the construction industry for rebuilding and repairs. The estimated added income to the construction industry was \$750 million. Ruined sections of homes and buildings also required furnishing replacements totaling expenditures of \$50 million, producing added income to that business sector. The excessive vehicle damages from accidents related to the snow and icy conditions led to repairs, providing an income of \$110 million for auto repair firms. Another group that benefitted included firms employed to help repair roads and highways, representing an income of \$26 million. The total benefits from the 2007-2008 winter events were \$971 million.

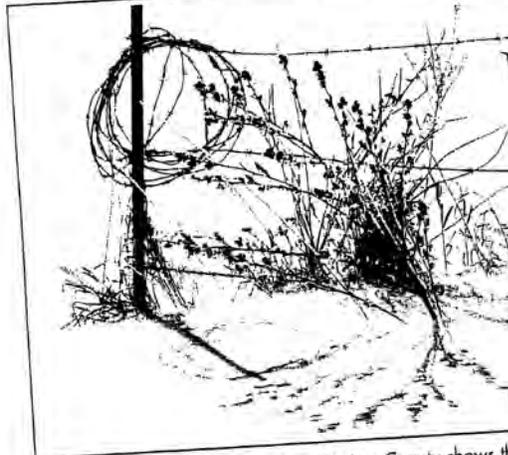
Table 2. Losses and Costs Resulting from the Weather and Storms during December 2007-March 2008

<u>Sector with losses/costs</u>	<u>Dollar amount (millions)</u>
Property, insured	775
Property, uninsured	185
Airlines	395
Railroads	122
Trucking firms	218
Retail businesses	325
Government	617
Power and telephone	792
Travelers/commuters	39
<u>Environment</u>	<u>80</u>
TOTAL	\$3,458

'It's been endless'

Bad conditions taking a toll on Midwest residents

PRETTY, BUT ENOUGH!



This rural scene near Galena in Jo Daviess County shows the beauty of winter, but the weather can wear thin after awhile. Thankfully, February finally will come to the end of the month of the year even though less than...

Wacky weather weariness

Yes, we know we asked for it. Just a month on this very page, we whined insufferably about a spell of unseasonable niceness that led us to wash the car and tidy the house. We should have been snowbound and shivering. "The weather gods are going to give us what we deserve," that tirade began.

afternoon. Sidewalks are treacherous and impassable, parking lots have mountains of dirty ice. "February has hosted just 11 inches of snow," Tom Skilling's report says, and that sounds high.

The relentless gray has us feeling blue.



Shhhh, it's almost here

This will come as no surprise to the weary multitudes around here. But Chicago has gone no longer than a few days of snow, sleet, slush, hail, rain and a mix of the above. This weather here pay much attention to.

ter-builder, and it's not especially peel winter's icy grip for another two weeks, with the vernal equinox March 20th.

Homeowners, motorists digging out from yet another snowstorm

A softness in the air.

22 more days of February

Dreary weather, colds and coughs are enough to put anyone down in the dumps and longing for warmer, drier days

Figure 42. Newspaper headlines and stories illustrating the frustration of the Illinois public with the prolonged stormy weather of 2007-2008.



Large hailstones fell at Lawrenceville on January 29.

Summary

During the December 2007-March 2008 cold season, Illinois experienced a record-tying number of winter storms, a record number of rainstorms, three tornadoes, and every form of severe weather that can occur in Illinois (Changnon and Kunkel, 2006). As a result, the state had 28 weather-related deaths, double the normal number, and very costly damages to vehicles, residences, and businesses. Communities and state agencies faced costly repair efforts, and many people lost their homes because of flooding.

Various record numbers of storms occurred that winter. December brought seven winter storms, a new record high, and February had four winter storms, a value just one below the record high. The 18 winter storms during December 2007-March 2008 tied the record-high value set in the winter of 1977-1978, and five storms in 2007-2008 had blizzard conditions. There were also five warm-season type convective storms with thunderstorms, hail, and high winds, setting a new record high for the winter season. The temporal distribution of the three types of storms during December 2007-March 2008 is illustrated in Figure 43. A non-stormy period

occurred for two weeks in January, but otherwise, storms occurred frequently. In the days between the 23 storms during December-March, record high or low temperatures often occurred, and heavy fogs descended on seven days, all of which added to the damages. The numerous storms of the four-month period were a result of frequent surface low-pressure centers from the west or southwest that passed across the state or just south of Illinois. The increased frequency of surface cyclones was related to a strong, active, and progressive polar jet stream located across North America during the 2007-2008 winter.

Two major storms occurred for each type of storm. Snowstorms on December 15-16 and January 31-February 1 produced heavy snows in some locations greater than 10 inches and greater than 1 inch of snowfall across the entire state. There were two outstanding ice storms. One on December 9-11 produced freezing rain across the state, and one on February 11-12 produced thick ice layers across southern Illinois. Two of the five rainstorms were exceptionally large-scale events, one on January 7-8 with greater than 5 inches and

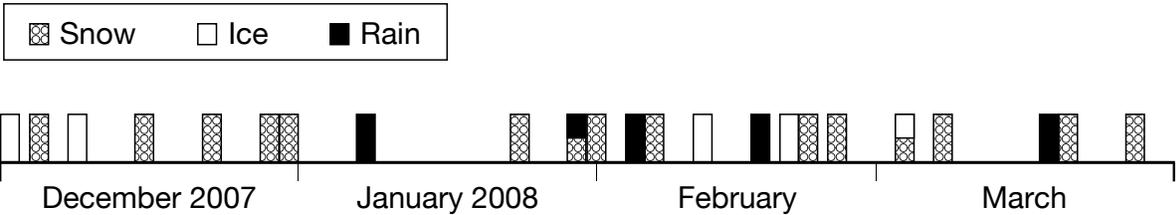


Figure 43. The temporal distribution of snow, ice, and rain storms in Illinois during the December 2007-March 2008 period.

one on March 18-19 with greater than 13 inches of rain. Flooding became a major problem from early January through April in all parts of Illinois.

The unique array of numerous storms and also extreme temperature and fogs resulted in major losses and costs in four sectors. Property losses due to heavy snows, ice, and flooding led to losses of \$960 million, mostly covered by insurance companies. All forms of transportation, including airlines, railroads, and vehicles, suffered major losses and added costs that totaled \$735 million. Damages

to power and communication systems led to costs totaling \$792 million. Local, state, and federal agencies had to expend major sums for snow and ice removal and for road and highway repairs, totaling \$617 million.

Losses and costs of the December 2007-March 2008 weather conditions totaled \$3.5 billion. However, there were economic winners in the construction and service industries, with profits totaling \$971 million.



Flooding near Pontiac has washed out a bridge, as seen on January 9.

Acknowledgements

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A tornado moves across northern Illinois towards Harvard on January 7.

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