Here are the historical facts about these threats to life and property.

Tornadoes in Illinois

Twin tornado funnels generated by a 1968 supercell thunderstorm move east near Charleston.

Story and Photos
By Stanley A. Changnon

As one of the major weather hazards in Illinois, tornadoes are responsible for a grim statistic: Illinois leads the nation with the most tornado-related deaths—1,364 since 1916.

Tornadoes can occur anywhere and at any time; being prepared, once a warning is issued, is very important for self protection. Fortunately, early warning systems for tornadoes are now much more accurate than they were a few years ago.

What, where and when?

A tornado is a tightly swirling circular vortex of air rotating counter-clockwise at speeds of 200 to 600 mph at the ground. These high winds destroy what they hit and shower debris around and away from the funnel, creating damages and deaths in the storm's path. Tornado funnels assume a wide variety of shapes ranging from rope-like horizontal shapes to wide, black clouds. Funnels are not always obvious if the cloud base is close to the ground.

Tornadoes originate in a large thunderstorm that has a strong vertical flow of air (updrafts) and strong crosswinds aloft. These two winds are found only in a few large thunderstorms, but when present, they create an in-cloud rotation of air that grows downward to the ground, forming a tornado.

The average tornado in Illinois lasts 25 minutes, travels 13 miles and has a funnel that is 185 yards wide. Studies of many Illinois tornadoes have revealed there are three types: small, moderate and huge.

Small tornadoes represent 42 percent of all tornadoes. The average small tornado varies from 1 to 2 miles in length and has a funnel only 150 feet wide.

(Photos courtesy Chris Novy.)

Progression of the May 30, 2004 tornado as it moved through the community of Secor in Woodford County.

Moderate tornadoes represent 45 percent of all tornadoes. Their paths range from 9 to 16 miles in length, and the funnels are typically 200 yards wide. Only 13 percent of all tornadoes that occur in Illinois are classified as huge. At 45 miles or more long with funnels one-fourth a mile wide or larger, these dangerous storms create large losses. Large tornado events also often create two or three funnels at the same time.

Tornadoes produced by thunderstorms that develop in unstable warm air masses are small and short-lived. Typical moderate-sized tornadoes are generated by a group of thunderstorms formed along a strong cold front or squall line, and these thunderstorm systems often create a family of tornadoes over a wide area. Occasionally a very large thunderstorm, labeled as a supercell storm, develops and moves for more than 100 miles and lasts three to four hours, much longer than most thunderstorms. Huge, long-track tornadoes are generated by these infrequent supercell storms.

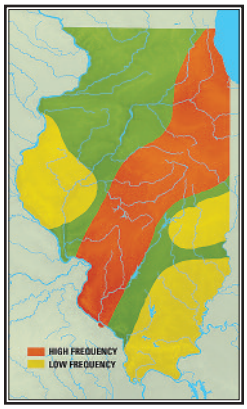
How do tornadoes move?

Illinois tornadoes have moved forward at speeds that ranged from 4 to 67 mph, with an average speed of 30 mph.

Most tornadoes move from the southwest, west or northwest. The map of all tornado tracks during 1916 to 1980 reveals that the preferred direction is from southwest to northeast, a direction that occurs with 63 percent of all tornadoes.

Where do tornadoes occur?

Illinois tornado data collected since 1916 reveal that certain parts of the state have had more tornadoes than others. Tornadoes have been most frequent in the southwestern, east-central and northeastern portions of Illinois, essentially forming a broad southwest-to-northeast corridor. Tornadoes have been least frequent in western and southeastern Illinois. Madison, Randolph, Champaign, McLean, Ford, Cook, DuPage and Will counties have had the largest numbers of tornadoes.



Areas of relative frequencies of tornadoes in Illinois

When do tornadoes occur?

Illinois tornadoes have occurred at all times of the day. Like thunderstorms, tornadoes are most frequent in the afternoon and early evening hours, when 65 percent occur, but are least frequent from 4-9 a.m. Tornadoes have occurred in every month, but the data show that the peak months are April, May and June. Tornadoes also have minor peaks of occurrence in late September and mid-December.

The average yearly frequency in Illinois is five days with 10 tornadoes. A few years (1919, 1926, 1933 and 1946) had no tornadoes and a few years had many (47 tornadoes in 1957, 40 in 1967 and 34 in 2001).

How dangerous are tornadoes?

Tornadoes rank as the most deadly weather hazard in Illinois. Statistics reveal that the long-term average number of lives lost in Illinois in a given year is 14, and average of 112 persons are injured.

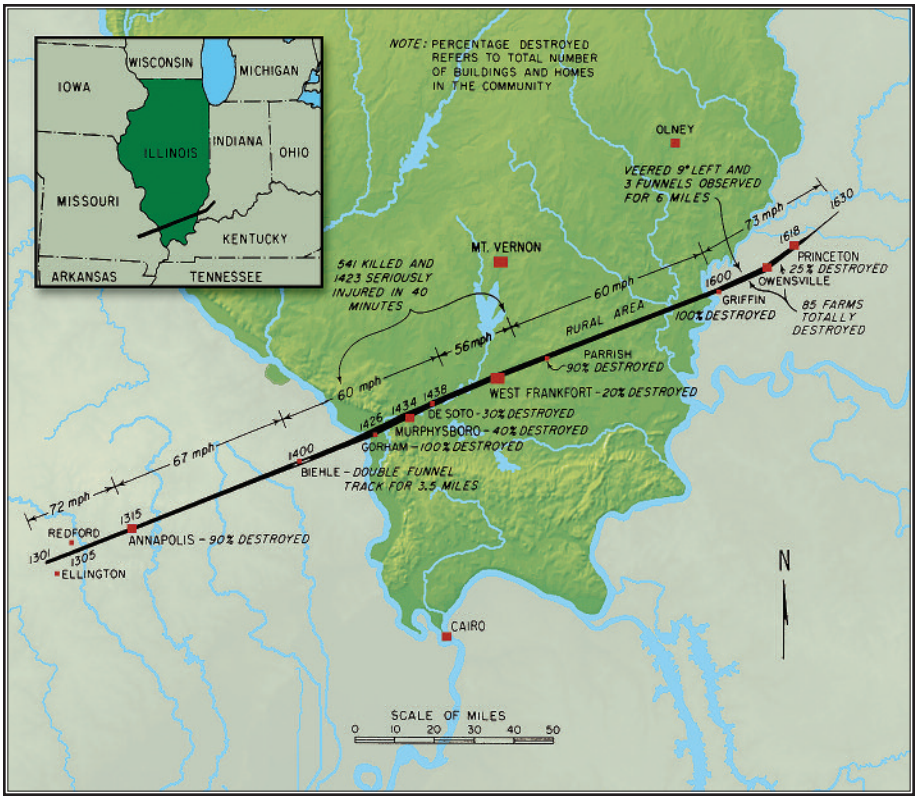
In some years, however, hundreds have been killed. A long tornado in May 1917 killed 202 persons, and a long-track tornado in March 1925 killed 595 persons and injured 3,300.

This famed tornado was labeled the "Tri-state Tornado" because it began in southern Missouri, crossed southern Illinois and moved 65 miles into Indiana—moving at 62 mph and lasting 3.5 hours. Its path was 219 miles long and its funnel width varied from 0.5 to 1 mile wide as it crossed southern Illinois. During a 40-minute period, 541 persons were killed in the Murphysboro-West Frankfort area.

Tornadoes cause large damages to property, including homes, businesses, and vehicles. The Tri-state Tornado destroyed five coal mines and caused $89 million in damages (in 2008 dollars). The average annual loss due to tornadoes in Illinois is $80 million. This value ranks as the third highest weather loss value in Illinois, ranking behind losses due to floods ($257 million a year) and those due to winter storms ($102 million).

Annually, Illinois tornados result in an average of 14 deaths, 112 people injured and an $80 million loss in property.

(Photos courtesy Chris Novy.)



The path and damages of the Tri-state Tornado on March 18, 1925.

Tornado protection

Advances in weather sciences since the 1940s have led to greater knowledge of the conditions that cause tornadoes. Technological developments have allowed the remote detection of storms with tornadoes and provide valuable information about when and where to forecast tornadoes. Since 1970, the average annual number of tornado deaths in Illinois has dropped to four, reflecting increases in safety measures due to the advances in forecasting accuracy and storm detection.

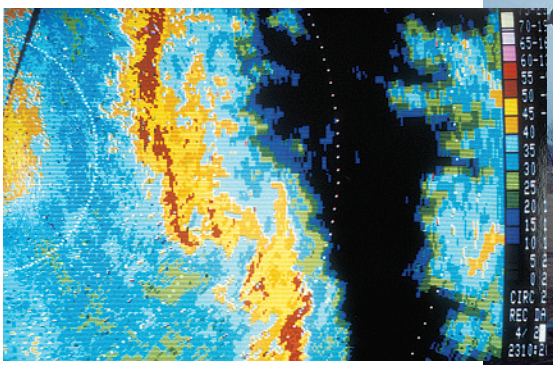
The National Weather Service first issues a "tornado watch" for areas where atmospheric conditions indicate a tornado is expected to develop. Then, after one is detected either by doppler radar or visually, the National Weather Service issues a "tornado warning" for the area where the storm is moving. Volunteer "spotters" assist the National Weather Service when a watch is issued for a region.

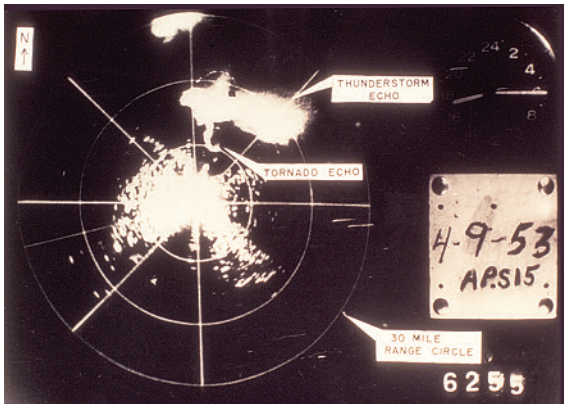
Once a tornado watch is issued, begin planning to move to a safe location and listen to the radio or watch TV for further information. If your area is upgraded to a warning, a tornado is seen or reported near by, or a community warning system is sounded, act quickly. Many people are killed by flying debris.

Where to go to be safe depends on where you are.

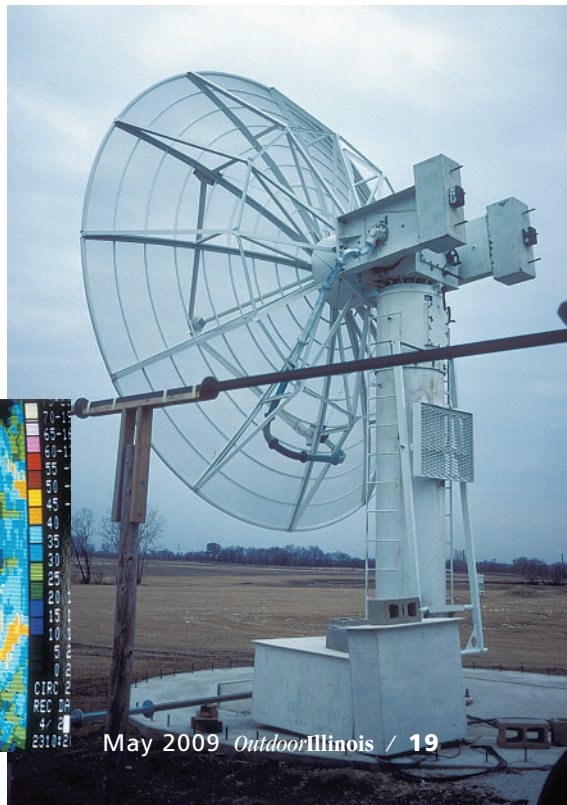
In open country, get in a ditch or depression in the ground. If you are traveling in a vehicle, drive away at a right angle after the tornado motion is defined. Those in a building structure should go to the cellar or, if no cellar exists, go into the innermost sturdy place and get under a table.

The antenna of the first doppler weather radar, which was developed in 1969 by the State Water Survey for storm research. A doppler radar portrayal of two intersecting thunderstorms with a tornado at their juncture.





The State Water Survey's early research radar was the first in the nation to detect a tornado in April 1953. This scope photo shows the thunderstorm echo and its hook, the tornado funnel, north of the radar site near Champaign.

Schools and most business organizations have a tornado protection plan for employees, students, and clients to follow for safety. Know and understand the procedures for buildings you frequent.

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