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MAGAZINE

MANAGING EMERGENCY COMMUNICATIONS

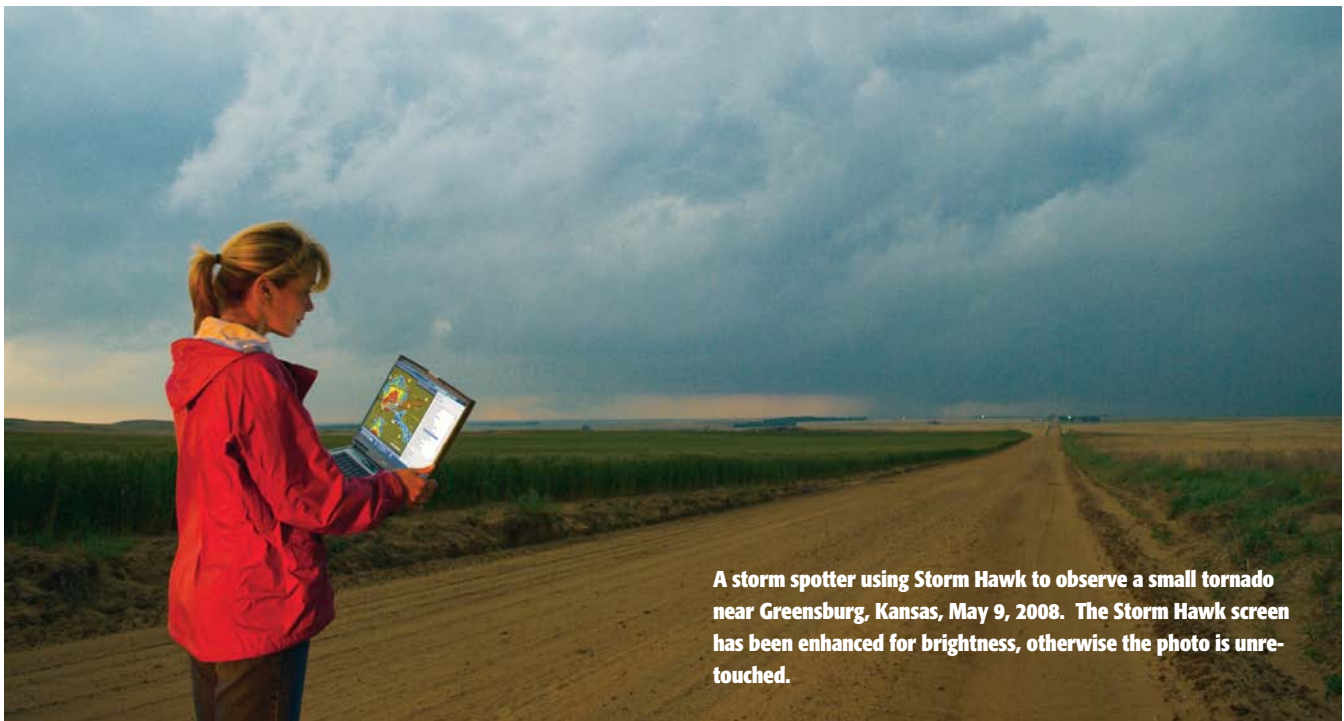
Information and  
Interoperability:  
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STORM SAFETY • HOMELAND SECURITY • UAVs • ONLINE SCANNING • 9-1-1 ANGELS

# Storm Safety for Storm Spotters

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A storm spotter using Storm Hawk to observe a small tornado near Greensburg, Kansas, May 9, 2008. The Storm Hawk screen has been enhanced for brightness, otherwise the photo is untouched.

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*May 4, 2007. Officer Tim Buckman of the Macksville, Kansas Police Department is killed when a massive tornado overtakes his position just before midnight. He was in darkness attempting to report on the storm's location. His last words were, "I don't know where I'm at. I can't see anything. It's too late..." Then his cell phone went dead.*

*May 10, 2008. Volunteer fireman Tyler Casey is dispatched to the intersection of Highway 43 and Iris Road in southwest Missouri to look for tornadoes. Upon arriving, he warned three people, one of whom was changing a tire, to seek shelter. He went back to his car to escape the tornado, but he could not get out in time. He died in a Joplin, Missouri hospital two days later.*

**W**hile Doppler radar and other technology have tremendously advanced the science of storm warnings, meteorologists with the National Weather Service and other organizations still rely on storm spotters for "ground truth" verification of what they are seeing on their instruments. This ground truth is factored into the warning decisions that keep the public safe.

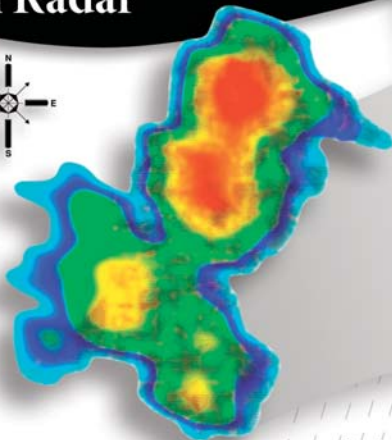
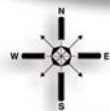
But, who is looking out for the safety of the spotters?

Storm spotters are usually law enforcement, firefighters, or emergency management personnel pressed into action during threatening weather. These professionals have a myriad of duties throughout the year of which watching the weather is a small part. Few have any formal training in meteorology even though getting in front of a tornado can be just as dangerous



Storm Hawk displays a severe thunderstorm polygon warning (hatched area) with cloud to ground lightning (dots). The push pin symbol indicates the location of the user. At upper right is a lightning detection message.

## The Storm as it appears on Radar



## The Storm's Projected Path

Best and Safest Viewing Area  
(Right of Storm's Path)

Stay to the "right" of the storm relative to its direction of movement as viewed on radar. That is the optimum area for both safety and visibility.

as fighting a wildfire or confronting a criminal suspect.

Hazards faced by storm spotters include:

- Lightning
- Wind-driven debris
- Direct injury from a tornado or other extreme wind (i.e., vehicle lifted and tossed)
- Contact with power line, hazmat, or unstable debris during search and rescue operations

This article will provide information pertaining to spotter safety up until the time the storm strikes.

### BEFORE THE STORM ARRIVES

Your local National Weather Service office likely offers a severe storm spotting course. These are valuable because they help you sort dangerous cloud formations from harmless clouds that can mimic the appearance of tornadoes and other dangerous storms.

Some of the risk of storm spotting can be managed by obtaining basic information prior to heading into the field. That information is contained in the tornado or severe thunderstorm watches issued by the National Weather Service's Storm Prediction Center in Norman, Oklahoma, such as this one:

IMMEDIATE BROADCAST REQUESTED  
TORNADO WATCH NUMBER 386  
NWS STORM PREDICTION CENTER NORMAN OK  
230 PM CDT THU MAY 29 2008

THE NWS STORM PREDICTION CENTER HAS ISSUED A TORNADO WATCH FOR PORTIONS OF:  
PARTS OF NORTHERN KANSAS  
MUCH OF CENTRAL AND PARTS OF EASTERN NEBRASKA

EFFECTIVE THIS THURSDAY AFTERNOON AND EVENING FROM 230 PM UNTIL  
1000 PM CDT.

...THIS IS A PARTICULARLY DANGEROUS SITUATION...

DESTRUCTIVE TORNADOES...LARGE HAIL TO 4 INCHES IN DIAMETER... THUNDERSTORM WIND GUSTS TO 80 MPH...AND DANGEROUS LIGHTNING ARE POSSIBLE IN THESE AREAS.

THE TORNADO WATCH AREA IS APPROXIMATELY ALONG AND 95 STATUTE MILES EAST AND WEST OF A LINE FROM 35 MILES NORTH NORTHEAST OF ONEILL NEBRASKA TO 45 MILES WEST SOUTHWEST OF RUSSELL KANSAS.

FOR A COMPLETE DEPICTION OF THE WATCH SEE THE ASSOCIATED WATCH OUTLINE UPDATE (WOUS64 KWNS WOU6).

REMEMBER...A TORNADO WATCH MEANS CONDITIONS ARE FAVORABLE FOR TORNADOES AND SEVERE THUNDERSTORMS IN AND CLOSE TO THE WATCH AREA. PERSONS IN THESE AREAS SHOULD BE ON THE LOOKOUT FOR THREATENING WEATHER CONDITIONS AND LISTEN FOR LATER STATEMENTS AND POSSIBLE WARNINGS.

OTHER WATCH INFORMATION...CONTINUE...WW 384...WW 385...

DISCUSSION...SUPERCELLS EXPECTED TO DEVELOP RAPIDLY ACROSS WATCH AREA REMAINDER OF AFTERNOON. STRONG SHEAR AND MLCAPES AOA 3000

J/KG SUPPORT TORNADOES AND VERY LARGE HAIL WITH ANY SUPERCCELL. POTENTIAL FOR LONG LIVED SUPERCCELLS ACCOMPANIED BY STRONG TORNADOES.

AVIATION...TORNADOES AND A FEW SEVERE THUNDERSTORMS WITH HAIL SURFACE AND ALOFT TO 4 INCHES. EXTREME TURBULENCE AND SURFACE WIND GUSTS TO 70 KNOTS. A FEW CUMULONIMBI WITH MAXIMUM TOPS TO 550. MEAN STORM MOTION VECTOR 24035.

Every watch explains the type of severe weather expected. In the example above, the forecast is for "tornadoes and a few severe thunderstorms with hail surface and aloft (for pilots) to 4 inches

(in diameter). Extreme turbulence (for pilots) and surface wind gusts to 70 knots (knots X 1.15 = mph, so 70 knots = 81 mph)." In this case, four-inch diameter hailstones would represent a significant hazard to the spotter as would the predicted 80 mph winds. It is important to note that the large hail and high winds *can occur in non-tornadic thunderstorms that occur within the watch* as well as with any tornadic thunderstorms.

The next piece of critical information is the "mean storm motion vector" which is a cumbersome phrase meaning "predicted storm movement." In this example the storm is expected to move from 240 compass degrees (north = 0°; east 90°; south = 180°, etc., so 240° is *from* the west southwest *toward* the east northeast) at 35 knots (40 mph). This information will assist you in choosing the vantage point from which you wish to view the storms. By having this information you can, (A) Choose a location that will give you a good view of approaching storms, keeping in mind it is generally best, for tornado spotting, to be on the south side of the storm and (B) Pre-plan an escape route away from a storm.

Finally, there are two types of watches. The standard watch that indicates a possibility of tornadoes or severe thunderstorms and the relatively rare "Particularly Dangerous Situation" (PDS) watch as in the example above. Fewer than 10% of watches are PDS. While all tornado situations are dangerous, a PDS indicates the potential for violent, long-track tornadoes. When a PDS watch is issued for your area, a heightened state of readiness should exist not just for spotters but for all emergency services if intense thunderstorms approach.

#### AS THE STORM APPROACHES

Lightning is one of the most serious hazards to spotters. You are quite safe inside your car as long as you are not touching metal equipment. That said, to enhance your safety further, when choosing a location, don't park on the very top of the hill. Crest the hill on the side facing the storm so your metal automobile does not become a lightning bull's-eye.

Make sure you have a view of the *base* of the thunderstorm, especially if you are in hazy conditions or the visibility is

otherwise obstructed. By getting close enough (but not too close!) to discern the cloud base, you can more easily pick out tornadoes, hail shafts, and other important features. To the extent possible, make sure you stay to the "right" of the storm's path to minimize the rain and hail you will experience. During the afternoon, angle your view with the sun in the west (behind the storm) so it improves contrast as the storm approaches.

At night, a spotter has to watch for cloud features while lightning flashes. It is also important to look for what we call "power flashes" - brief bluish light bursts that occur when electrical transformers blow in high winds or during tornadoes. Sometimes mistaken for lightning, power flashes are a key indicator of damaging winds, whether caused by a tornado or not, and should be reported to the National Weather Service immediately.

#### STORM CHASERS

A word about storm chasers. Chasers are meteorologists and storm enthusiasts who roam from short and long distances (sometimes even visiting the United States from other continents in spring) in search of tornadoes and other spectacular storms. While some storm chasers break the speed limit or set up tripods in the middle of rural roads, most are professional, public service-minded (who usually report what they see to the NWS), and a potential *resource* for local law enforcement. How so? Most chasers are happy to work with local officials when they are approached in a non-intimidating way. They usually don't mind if you watch alongside and are happy to give you tips about the correct interpretation of what you both are viewing. If you would like to know more about storm chasers, go to: [www.storm-track.org](http://www.storm-track.org).

#### TECHNOLOGICAL TOOLS


Night spotting or spotting in poor visibility is dangerous. There are new technological tools available to help keep you out of harm's way while enhancing your ability to report on storms. These combine mobile communications, GPS, and meteorological data.

Any system designed to assist storm spotters must be meteorologically robust (i.e., contains all critical information

such as radar, warnings, and lightning data) but also easy to use and interpret. Tornadoes can be wrapped in rain or under cloud bases that are quite low to the ground, making them difficult to see (especially in darkness or in areas with trees or hills) until they are nearly on top of the spotter. One system that meets these specifications is Storm Hawk®.

With Storm Hawk, the movement of the storm *relative to the position of the spotter* can be discerned so it is clear whether the spotter is in a dangerous position and whether evasive action might be appropriate. Proactive monitoring is especially critical when storms are moving quickly. On June 5, 2008, tornado-bearing thunderstorms in the Great Plains states had forward motions as fast as 70 mph. When tornadoes are moving faster than a mile-a-minute, quick spotter information is especially vital to meteorologists but it also puts spotters in greater than average jeopardy.

On the first page of this story is a photo taken during Storm Hawk field testing as a small tornado passed just west of the town of Greensburg, Kansas on May 9, 2008. The photo is unretouched except for brightening the Storm Hawk screen. The base of the storm is clearly visible and storm features can be discerned. By being to the right of the storm's path, the observer is safe and has minimal rain and hail to obstruct her view.

Two hours later, two motorists were killed and two others injured 30 miles east of Greensburg when a tornado crossed U.S. 54 and flung their cars off the road. It was dark and the motorists were unaware a tornado was bearing down on them. This latest incident again reinforces the critical importance of situational awareness for storm spotters and emergency workers in severe weather situations. 

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