TENNESSEE SEVERE WEATHER INFORMATION BOOK

Preparedness – Warning – Response
Awareness Events

The National Weather Service, Tennessee Emergency Management Agency and other supporting groups conduct annual educational activities and drills to help people prevent injuries and deaths from tornadoes, damaging winds, flash floods, lightning, and hail. Each day focuses on a specific type of severe weather or on the warning and drill system.

SUNDAY, FEB. 19
Highlighting the important role of SKYWARN spotters.

MONDAY, FEB. 20
Hazards of Flooding and Flash Floods.

TUESDAY, FEB. 21
Focus on lightning, often called the underrated killer.

WEDNESDAY, FEB. 22
Emphasis on tornado safety. A state-wide tornado drill will be conducted on this day. Schools and state, county, and other interested agencies are encouraged to participate. If adverse weather threatens, then Thursday will be the alternate drill day.

THURSDAY, FEB. 23
Severe Thunderstorms are much more frequent than tornadoes in the Mid-South. Straight line winds can reach well over 100 miles per hour and can be devastating.

FRIDAY, FEB. 24

SkyWarn needs you

SKYWARN® is the National Weather Service (NWS) program to recruit and train storm spotters, who serve as the ears and eyes that can share the “ground truth” with forecasters.

Despite sophisticated technology in use by NWS, forecasters still rely on storm spotters. Anyone can become a volunteer SKYWARN® spotter, if they value the satisfaction of knowing that their reports result in better warnings which save lives.

NWS also has e-spotter — a web based program — that lets spotters send reports online in real time at: http://espotter.weather.gov/

Your local NWS office has schedules for training.

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April tornadoes kill 316 in southeastern states

On April 27, 2011, a tornado outbreak peaked a 4-day episode of significant severe weather that impacted the southern plains and southeastern United States. Six National Weather Offices (Memphis; Jackson, Miss.; Huntsville, Ala.; Birmingham, Ala.; Morristown, Tenn.; and Peachtree City (Atlanta), Ga.) tracked the third deadliest tornado event since formal tornado record keeping began in 1950.

With 316 fatalities (31 in Mississippi, 234 in Alabama, 32 in Tennessee, 15 in Georgia, and 4 in Virginia), it follows only the 1974 Super Tornado Outbreak (368 deaths) and the 1965 Palm Sunday Tornado Outbreak (337 deaths) in its tragic consequence. In addition, there were more than 2,400 injuries. Damages from this outbreak totaled over $4.2 billion.

Nationwide, 199 tornadoes developed across 14 states on April 27. Storm survey teams confirmed a total of 122 tornadoes from the afternoon and evening of April 27.

Of the 316 deaths reported, 313 were associated with the afternoon/evening tornadoes. In all, 31 of these tornadoes were rated as EF3 or stronger. Eleven tornadoes were rated EF4 and four were rated EF5. The average EF4 and EF5 tornado path length was 66 miles.
Epic flooding along Mississippi River

The spring of 2011 brought epic flooding across the lower Mississippi River basin, and all the tributaries in western Tennessee. A series of storm systems, that pushed across the central United States during early spring, combined with winter snowmelt across the upper Mississippi River basin, were a unified force that resulted in record flooding. Snowpack on the order of 12-25 inches across the upper Midwest produced an ample supply of water for the Mississippi River and its tributaries. The month of March produced widespread heavy rainfall across the Upper Mississippi River and the Ohio River basins, with some areas seeing local rainfall totals of up to 10 inches.

By the end of March, many points along the Mississippi River were already in flood stage. April did not provide any relief from the intense amounts of rainfall to the already swollen rivers. A series of strong upper level systems swept across the country from mid to late April providing additional heavy rainfall on the order of 5-10 inches. This added precipitation combined with the arriving snowmelt at the confluence of the Mississippi and Ohio Rivers near Cairo, Ill., to set the stage for an epic flood.

By early May, the river had already crested in portions of Southern Missouri. Evacuations were already taking place in towns along the river in Lake, Lauderdale, and Dyer counties in West Tennessee. Continuing southward into Mississippi, officials at the popular Tunica Casinos were forced to close their doors and evacuate for the first time ever.

Meanwhile across the region, tributary rivers were also exceeding their banks and flooding local towns and farmland. The city of Dyersburg, Tenn., experienced the worst urban flooding as some 600 homes and businesses were inundated by the North Fork of the Forked Deer River.

When the crest reached Memphis, local and national media centered on the city in response to the flood. The river officially crested at Memphis on May 10, 2011. Two weeks after the crest at Memphis, the river finally fell below flood stage.

The Mississippi River at Memphis was above minor flood stage for a total of 30 days, moderate flood stage for 21 days, and major flood stage for 8 days. At the height of the flood in early to mid-May, two of five gauges in the NWS Memphis service area hit record levels: Tiptonville, Tenn. — 48.35 ft. and Caruthersville, Mo. — 47.61 ft. The official crest at Memphis was 48.03 ft., just inches shy of the record set in 1937. Damage estimates for the entire Mississippi River Valley region were between $2-4 billion dollars.
Nationwide in 2011, 26 people were killed by lightning. Fortunately, none of those killed were in the Volunteer State. Since 1959, nearly 4,000 people in the United States, including 140 in Tennessee, have died. As a result, Tennessee is in the Top 5 of states in terms of lightning fatalities.

In an average year, 25 million lightning strikes are recorded across the United States alone.

Lightning is an incredibly powerful electrical discharge, containing up to 100 million volts of electrical charge and capable of reaching 50,000 degrees Fahrenheit.

Cloud-to-ground lightning is the result of incredible differences in electrical charge between thunderstorms and the earth’s surface.

The sound of thunder travels around one mile every five seconds and is often audible up to 10 miles. If you can see lightning and hear thunder at your location, you are in danger of being struck by lightning and your life is in immediate danger.

**RULES FOR SAFETY**

- Stay away from windows.
- Avoid telephones and electrical appliances (wires connecting to these devices run outside of the home and act as lightning rods).
- Don’t wash dishes or take a shower. The pipes will conduct electricity.
- Unplug computers and other sensitive electrical devices. Surge suppressors may not protect these items if lightning hits close to home.
- Lightning can strike twice, and often will.

**Safety during athletic events**

Officials responsible for sports events and other outdoor activities often lack an adequate knowledge of thunderstorms and lightning to make educated decisions on when to seek safety. Numerous lightning deaths and injuries have occurred because people made decisions that unknowingly put their lives or the lives of others at risk.

For organized outdoor activities, the National Weather Service recommends that organizers have a lightning safety plan, and that they follow the plan without exception. The plan should give clear and specific safety guidelines in order to eliminate errors in judgment.

These guidelines should answer the following questions:

1. When should activities be stopped?
2. Where should people go for safety?
3. When should activities be resumed?
4. Who should monitor the weather and who is responsible to make the decision to stop activities?
5. What should be done if someone is struck by lightning?
Tennesseans repeatedly faced deadly tornadoes, severe storms and record flooding. In fact, 2011 was another record-breaking severe weather year for the state, following on the heels of the historic May 2010 flood. Combined, 2011’s five Presidential disasters in Tennessee, the most of any state in the U.S. that year, caused 37 fatalities, millions in damages to private property and public infrastructure, and impacted 66 of Tennessee’s 95 counties.
NWS upgrading to Dual-Pol radars

By early 2013, the NWS’s entire array of Weather Surveillance Radar–1988 Doppler (WSR-88Ds) are scheduled for a major software and hardware upgrade. The upgrades in Tennessee were completed in 2011. The upgrade, known as dual-polarization (dual-pol) technology, will greatly enhance these radars by providing the ability to collect data on the horizontal and vertical properties of weather (e.g., rain, hail) as well as non-weather targets, known as ground clutter.

Most weather radars, such as the WSR-88Ds, transmit radio wave pulses that have a horizontal orientation. Dual-Pol radars transmit pulses that have both horizontal and vertical orientations. The horizontal pulse measures the dimension of a cloud’s precipitation (snow, ice pellets, hail, and rain) particles, while the vertical pulses allow for a combination of measures to provide size, shape and variety of objects. This additional information will result in improved estimates of rain and snow rates, better detection of large hail location in summer storms, and improved identification of rain/snow transition regions in winter storms.

Dual-Polarization Radar (horizontal and vertical radio wave pulses tells us about the size, shape and variety of objects)
A severe thunderstorm is a thunderstorm that produces one or more of the following: hail that has a diameter of one inch or larger, winds greater than or equal to 58 mph, and tornadoes. About 10% of all thunderstorms in the U.S. meet severe criteria. Severe thunderstorms can occur at any time of year, although the most common time of occurrence is during the spring months of March, April, and May. There is also a lesser known secondary season during the fall, in November and early December.

Many people believe that a car is a safe place to be during a lightning strike because of the rubber tires. However, the real reason has nothing to do with rubber tires. The conductive metal frame of the automobile actually protects a vehicle’s occupants during a lightning strike by directing the electrical current around the passenger compartment. There is no electrical field inside a hollow conductive shell, which means the charge from the lightning will travel along the metal frame and not inside of your car. As long as your car has a fully enclosed metal top, and you don’t touch any conductive parts connected to the outside surfaces, you should be safe in your car.

**Safety Tips**
- Have a plan. Prepare ahead of time so you and your family know what actions to take when severe weather occurs.
- Get indoors! There is no safe place outdoors during a thunderstorm.
- Stay informed! When severe weather threatens, stay tuned to NOAA Weather Radio, local television and radio stations, or the National Weather Service webpage at www.weather.gov for up to date information on the weather situation.

- Know what county you are in. When a warning is issued, the threatened area will be identified by the counties that contain it.
- Have a NOAA Weather Radio. This is the best way to receive the latest and most up to date weather information from the National Weather Service.
Memories of super storms must remain fresh in mind

Tornadoes in Tennessee are not rare; they occur every year. But tornadoes in some parts of Tennessee are fairly rare and many people mistakenly believe they are protected by a ridgeline or river, etc. Certainly tornadoes are more common in West and Middle Tennessee versus East Tennessee.

Turning to history, one date illustrates the dangers of complacency: April 3, 1974 — “The Tornado Super Outbreak”, where more than 140 tornadoes killed over 300 people nationwide. On this day, East Tennessee got hit harder than West and Middle Tennessee. To this day, those tornadoes are considered a benchmark for East Tennessee and the nation for the most extreme tornado event.

Thirty-seven years later, on morning of Wednesday, April 27, 2011, the Storm Prediction Center issued a “High Risk” outlook for severe weather. It seemed that everyone had been talking 4-5 days about the expectation for tornadoes; everyone had been mentally preparing for this event — we were ready.

The storms started before daybreak and had tallied their first fatality before mid-morning. More storms, more tornadoes, and more fatalities followed in the mid-afternoon. Then in the evening, and well into the night, the big wave hit — supercell after supercell, tornado after tornado, and unfortunately, fatality after fatality. The “Tornado Super Outbreak” for a new generation was occurring.

For Tennessee, the final tornado ended around midnight in the northeast corner of the state, where it raced into Virginia causing still more damage. Mind-numbing and heart-stopping, the outbreak smashed records from the 1974 outbreak over 60 tornadoes in Tennessee and devastation for miles and miles.

When we ask ourselves, “was this the worst it could get?” No, not really. Tennesseans were relatively lucky. Alabama had direct hits on several city populations, whereas, in Tennessee, most of the strikes were outside of densely populated areas.

The storms that day and night laid down a carpet of tornado paths from near Chattanooga, to the Smoky Mountains, to Johnson County in the northeast corner of the state. The tornadoes, especially the big tornadoes, narrowly missed the population centers east of Chattanooga, south and east of Cleveland; south of Knoxville and Maryville, and east of the Tri-cities. If the storms had passed 10-20 miles to the west, it’s likely that the fatality count would have been much higher in our state.

What are the chances it could happen again in 2012? A once-in-50 year event like 2011 or 1974 has a 2 percent chance that it could happen in any given year. It’s just a matter of a strong enough jet stream, enough lift, and enough moisture coming together to cause an outbreak. We could continue to be lucky, but for certain we had better be prepared for severe weather because it will happen again.
On Feb. 13, the Tennessee Emergency Management Agency launched Ready TN, a smartphone application to promote preparedness and provide situational awareness in Tennessee.

Drawing from reliable sources of information, such as TEMA, NWS, the Tennessee Department of Transportation and the American Red Cross, Ready TN provides community level situational awareness before, during and after emergencies. The application does not replace calling 9-1-1 for emergencies. It should not be used as a substitute for a weather-alert radio during potentially life-threatening weather conditions, such as tornadoes.

As a preparedness tool, Ready TN helps citizens know the hazards in their community and the preparations they should take to be ready during any emergency. Ready TN also provides updates on weather and road conditions, and information about shelters and recovery operations during and after emergencies.

Emergencies impact individuals first and grow to include civic resources, such as police, fire, EMS and emergency management. Therefore, emergency preparation is an individual responsibility.

While initially available only for android devices, Ready TN should be available to Apple iOS devices iPhone and iPad shortly. Tennesseans will also be able to reach out to their local elected and public safety officials through the handy on-device reference of phone numbers and email addresses. To interact with state agencies, Ready TN provides links to all of the state social media portals.
More Information About Topics In This Booklet

Listed below are the contacts if you need more information. Please contact your nearest National Weather Service Office.

Nashville................................................. Tom Johnstone ............................................. (615) 754-4634
Nashville................................................. Larry Vannozzi ........................................... (615) 754-4634
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Memphis................................................. Jim Belles .................................................. (901) 544-0411
Huntsville, AL........................... Chris Darden .................................................. (256) 890-8503
Huntsville, AL........................... David Nadler .................................................. (256) 890-8503