

TENNESSEE SEVERE WEATHER AWARENESS WEEK

FEBRUARY 20-26, 2011



Preparedness – Warning – Response



Rescuers ferry a family to safety after flood waters surrounded their homes.

Awareness Events

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

Sunday, Feb. 20

Highlighting the important role of SKYWARN spotters.

Monday, Feb. 21,

Hazards of Flooding and Flash Floods.

Tuesday, Feb. 22

Focus on lightning, often called the underrated killer.

Wednesday, Feb. 23

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. 24

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. 25

NOAA Weather Radio and Emergency Alert System Day.

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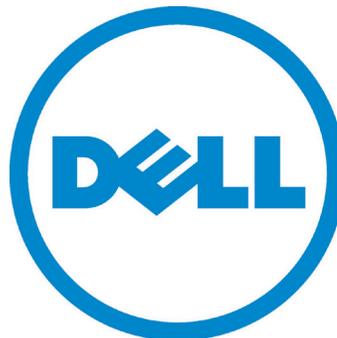
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TN Communities see StormReady as good business

For over 20 years, the State of Tennessee has encouraged economic development and community growth through a program



known as the Three-Star Excellence in Community Development.

After the Feb. 5, 2008, tornado outbreak in which 33 Tennesseans were killed, it was recognized that emergency preparedness was an area that should not be overlooked as communities grown and expand.

Under Governor Phil Bredesen, the Tennessee Emergency Management Agency (TEMA) and the Department of Economic and Community Development (ECD), which oversees the Three-Star program, began work to add emergency preparedness to the program. Beginning in 2009, a Community Emergency Preparedness focus was added to the Community Development category.

Three-Star helps Tennessee communities grow by developing strategic goals, focusing on strengths, and identifying needs to become better positioned for economic growth. The incentive-based certification program requires communities re-certify every year and they must meet tougher criteria to do so, which in turn makes them eligible for escalating amounts of grants.

To achieve the emergency preparedness focus, a community must have a certified and full-time Emergency Manager, an active Local Emergency Planning Committee, offer Community Emergency Response Team training, and conduct an annual disaster exercise. In addition, communities will receive extra credit for "Strategic Actions" like earning Emergency Management Accreditation Program certification and also gaining StormReady recognition through the National Weather Service (NWS). Since the inclusion of StormReady to the Three-Star program, 21 new Tennessee communities have been recognized.

"Once the Mayor found out about StormReady becoming a Three-Star Strategic Action, the process moved very quickly," says Cumberland County EMA Director Keith Garrison, "Three-Star definitely helped us on our way toward our 2010 StormReady recognition."

For more information on Tennessee's Three-Star program please visit www.tn.gov/eec/CD_three_star.html.



TDOT, 511 ready for your call

Tennessee 511 is an automated voice response system where motorists traveling in Tennessee can ask for specific roadways or regions and obtain information on road conditions including incidents, major construction activities and weather conditions that make travel safer for everyone.

Callers are guided through the menu through a series of requests where they can find out about their routes before they leave on a trip, whether it's going across town or going across the state.

Information also includes weather conditions and locations of rest areas and welcome centers. Callers can also obtain transfers to commercial airports, public transportation, the Tennessee Tourist Development Department and to neighboring states' 511 systems. Amber Alerts are also included in the menu of information.

Motorists can call 511 from a mobile telephone or a land line to get information. The information is updated every five minutes by the Tennessee Department of Transportation and the Tennessee Highway Patrol.

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.



cate that a storm may be producing large hail, damaging

SKYWARN® spotters enhance the storm detection capabilities by identifying and reporting potentially dangerous weather conditions. Despite sophisticated technology in use by NWS, forecasters still rely on storm spotters. Doppler radar may indi-

winds or even a tornado, but it cannot tell exactly what’s happening on the ground underneath the storm.

Anyone can become a volunteer SKYWARN® spotter, if they value the satisfaction of knowing that their reports result in better warnings which

**SKYWARN®
Spotter Training
Schedules**

WFO Memphis: http://www.srh.noaa.gov/meg/?n=skywarn_meetings
WFO Nashville: <http://www.srh.noaa.gov/ohx/?n=ohxspotterclasses>
WFO Huntsville: <http://www.srh.noaa.gov/hun/?n=skywarn>
WFO Morristown: <http://www.srh.noaa.gov/mrx/?n=spotterclasses>

save lives.

NWS also has e-spotter — a web based program — that lets spotters send reports

online in real time. The e-spotter program is at: <http://espotter.weather.gov/>

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Turn Around, Don't Drown™



Rushing water piled these eight cars up against a house in Nashville.

Each year, more deaths occur due to flooding than from any other severe weather related hazard.

The Centers for Disease Control report that over half of all flood-related drownings occur when a vehicle is driven into hazardous flood water.

The next highest percentage of flood-related deaths is due to walking into flood waters.

Why? The main reason is people underestimate

the force and power of water. Many of the deaths occur in automobiles as they are swept downstream. Of these drownings, many are preventable, but too many people continue to drive into flooded roadways.

Most flood-related deaths could be avoided if people who come upon areas covered with water followed this simple advice: Turn Around, Don't Drown™.

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?



Lightning strikes a stadium during an athletic event.

Lightning can strike anywhere

Nationwide in 2010, 29 people were killed by lightning. Fortunately, none of those killed were in the Volunteer State. Since 1959, a staggering 3,948 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

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.

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 loca-

tion, you are in danger of being struck by lightning and your life is in immediate danger.

May Flooding



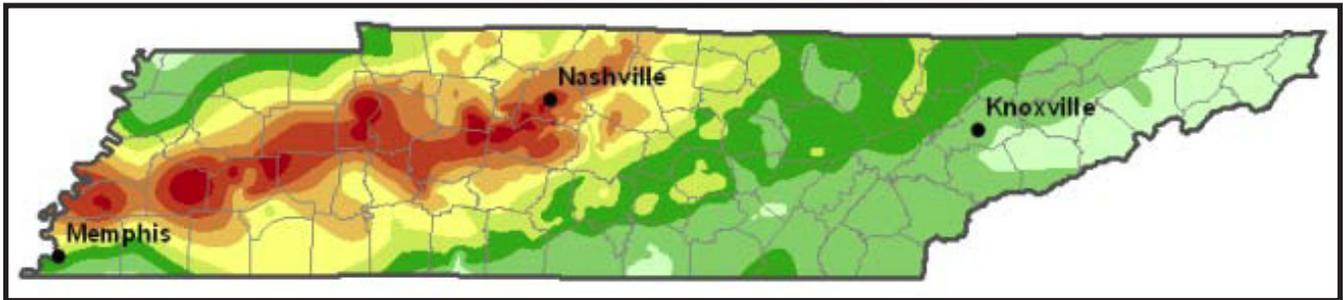
The historic rainfall that occurred in Tennessee the weekend of May 1 caused flash flooding and river flooding. As a result, 49 counties — more than half of the state — received federal disaster declarations from President Barack Obama.

The state suffered a tremendous blow to public infrastructure. The federal Public Assistance program reimbursement to local and state government, and some eligible utilities and non-profits, is estimated to be approximately \$600 million. As of February, the number of public assistance projects has reached 6,000 — a figure greater than the combined number of projects from all disasters in the state for the previous decade. Final figures will not be available until late 2011.

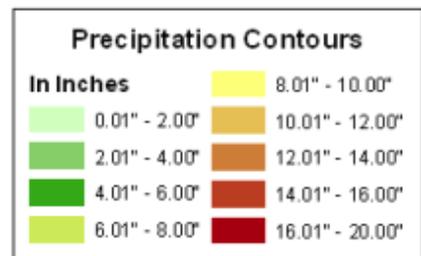
The storms and flooding in May claimed the lives of 24 Tennesseans. More than 10,000 individuals were displaced from their homes; approximately 3,000 homes were either destroyed or severely damaged. Federal programs — FEMA's individual assistance and Small Business Administration disaster loans — provided 67,683 individuals with more than \$318 million in assistance and 3,697 loans that combined are more than \$160 million.

The lasting impact of the flooding will be apparent in many communities as they continue to rebuild and recover from the damage. In Nashville and other counties, local governments are addressing flood zone planning and considering mitigation projects that will reduce the impact of future floods.

in Tennessee



Weekend Rainfall Totals for May 1-2, 2010



At left, Nashville's K.R. Harrington Water Treatment Plant is nearly submerged by the Cumberland River. Below, First Avenue in Nashville flooded.



Improving Weather Radio Alerts Continues



NOAA's National Weather Service (NWS) continually provides forecasts and weather information, weather watches, warnings and other emergency messages to the public and emergency managers through the NOAA Weather Radio (NWR) network. The primary purpose of this system is to reliably deliver All-Hazard emergency information (warnings) to those people most im-

mediately at risk, with sufficient lead time to allow them to take action to reduce the likelihood of property damage, injury or death.

The objective of the Weather Radio Improvement Program (WRIP) is to update and modernize current NWS dissemination systems to meet current and future stakeholder missions, requirements and needs.

The timeline to complete this WRIP across all NWS Weather Forecast Offices is estimated to be by the end of 2012.

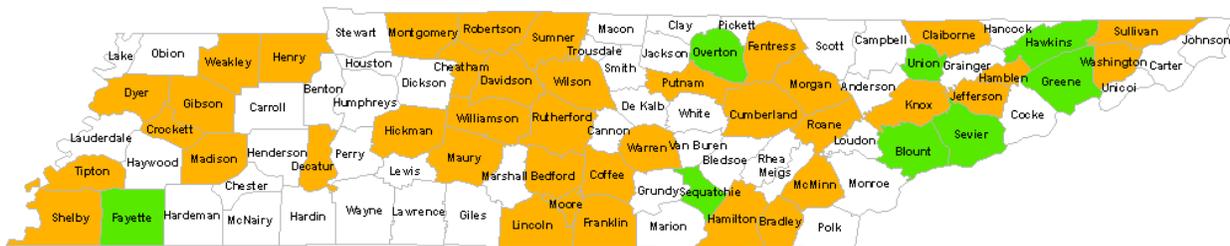
What is La Niña?

Many have likely heard the weather terms "La Niña" or "El Niño" thrown around before but what exactly is La Niña or El Niño? La Niña is characterized by unusually cold ocean temperatures in the Equatorial Pacific.

A moderate to strong La Niña pattern is expected through at least the first six months of 2011, so how does this translate to severe weather across the Southeast region, particularly the state of Tennessee?

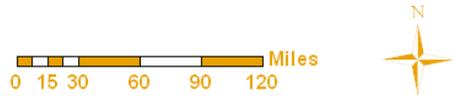
It is difficult to truly quantify how severe weather events are influenced by La Niña climate patterns. However, recent studies have shown that La Niña patterns result in more significant tornado outbreaks in the Southeast (between the I-40 and I-20 corridors) in the months of January and February, compared to a neutral or El Niño pattern. Typically, the peak severe weather "season" in the Southeast occurs during the months of March, April and May. So during La Niña patterns, severe weather and potential tornado outbreaks can occur earlier in the year compared to normal.

Tennessee StormReady Counties

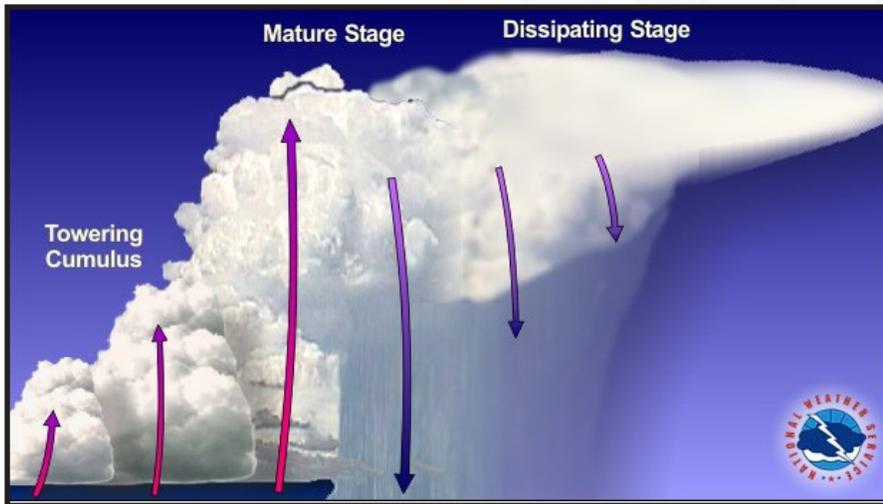


Tennessee StormReady

- Future StormReady Counties
- StormReady Counties
- StormReady Counties Added 2010



T-storms can wreak havoc in Tennessee



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 pro-

TECTS 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

Watches & Warnings Are Different

A severe thunderstorm watch means that conditions are favorable for severe thunderstorms to develop. These are issued by the Storm Prediction Center in Norman, Okla., typically before severe weather is developing.

A severe thunderstorm warning means that a severe thunderstorm has either been indicated on radar or witnessed by storm spotters firsthand. Your local NWS Forecast Office issues these when severe weather is developing or occurring.

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.

Tornadoes strike anytime in state

A tornado is a violently rotating column of air that extends from the base of a storm cloud to the ground. Some conditions that are conducive for tornado formation include warm, moist, unstable air, strong atmospheric winds that increase in speed and change direction with height, and a forcing mechanism to lift the air.

When a combination of these factors comes together just right, tornadoes form. The most common time of year for tornado formation in Tennessee is during the spring months of March, April, and May, with a secondary tornado season in November and December. Additionally, the afternoon and evening hours are the times of day at which most tornadoes occur, as they



Tornado touches down in Gallatin on April 7, 2006.

are the times at which the maximum heating takes place.

However, tornadoes can occur at any time of day and at any point during the year, given the right environment

Winter tornadoes uncommonly deadly

Research has shown that most of us minimize the threat of tornadoes during the winter, since the traditional tornado season falls in the spring months.

So when tornadoes develop in the winter, people who are not expecting it are unprepared, and thus, in additional danger.

More recently, a winter-time tornado outbreak occurred on Feb. 5-6, 2008 (the Super Tuesday outbreak), in which 31 Tennesseans lost their lives and another 148 were injured.

The longest tornado during that outbreak tracked 49 miles across four counties, and alone was responsible for 22 deaths and 63 injuries.

On Nov. 9-10, 2002, another night-time tornado outbreak occurred.

In all, 17 people were killed, and 86 more were injured. An F3 in Cumberland Co. was responsible for four of these deaths and 18 of the injuries, and an F3 in Morgan County accounted for another seven deaths and 28 injuries.

TORNADO STRENGTH GUAGED BY ENHANCED FUJITA SCALE

EF Rating	Wind Speeds	Potential Damage Threats
EF 0 (weak)	65-85 mph	Light damage, shallow rooted trees pushed over, some damage to gutters or siding.
EF 1 (weak)	86-110 mph	Moderate damage, mobile homes overturned, roof surfaces peeled off.
EF 2 (strong)	111-135 mph	Considerable damage, large trees uprooted or snapped, mobile homes destroyed.
EF 3 (strong)	136-165 mph	Severe damage, trains overturned, well built homes lose roofs and walls.
EF 4 (violent)	166-200 mph	Devastating damage, well-built homes leveled, cars thrown.
EF 5 (extreme)	Over 200 mph	Incredible damage, well built homes disintegrated, automobile-sized objects thrown >300ft.

TEMA preps for big disaster

This year marks the bicentennial of the last major earthquakes on the New Madrid Seismic Zone. In 1811, a series of earthquakes shook the region, uplifted sections of land that caused the Mississippi River to run backwards and subsiding other areas which created the Reelfoot Lake.

This Spring, Tennessee's emergency managers will try to imagine themselves coping with a quake of nearly identical proportions in order to test the state's catastrophic planning while participating in the National Level Exercise for 2011. (see NLE 2011 to Focus on Earthquake Risk)

The Tennessee Catastrophic Event Annex was developed to increase not only the state's readiness to a catastrophic earthquake, but to improve regional and national readiness. The annex defines the answers to the question, "What will the State of Tennessee do if an earthquake should impact the western portion of the state tomorrow?"

2011 Exercise to focus on Mid-South Earthquake risk

On May 16, a major earthquake will rock the mid-South and unleash a level of destruction upon more than eight states. Unlike other forecasts of doom, this prediction is based on the certainty of a National Level Exercise scheduled to put local, state and federal officials through the paces of responding to a catastrophic earthquake in the heart of the United States.

The Tier I exercise, known as NLE 2011, will simulate the decisions and actions that top officials should be prepared to take in the first 96-hours after such a devastating earthquake. This is the first NLE to focus on a natural hazard, rather than a terrorism-focused scenario.

"We know there will not be enough stuff to go around when there are eight states all asking for the same resources," said Tennessee Emergency Management Agency Director James Bassham.

To assist the federal government with prioritizing resources for impacted areas, Tennessee and the other seven states in the Central United States Earthquake Consortium have participated in numerous workshops and planning sessions, including one in Nashville last November with more than 400 participants from federal and state agencies.

The NLE 2011 will include activities by local responders, federal and state emergency management officials, private sector partners at multiple venues around the region, as well as in Washington D.C. and various FEMA regional offices.

The exercise is designed to assess response and recovery capabilities both nationally and regionally.

Are You Ready for the ShakeOut?

With 14 million people living and working near the New Madrid Seismic Zone, a major earthquake could cause unprecedented devastation. What we do now, before a big earthquake, will determine what our lives will be like afterwards.

The Great Central U.S. ShakeOut will involve participants in



more than eight states, and public advocacy by hundreds of partners.

The drill will be held statewide on April 28 at 10:15 a.m.

Anyone wanting to participate can register (so they can be count-

ed and receive communications) online at <http://www.shakeout.org/centralus> and at the minimum practice "drop, cover, and hold on" at the specified time. It is only a five minute commitment for something that can save your life. It all begins with registering, which is free and open to everyone.

Information Resources on the Internet

National Weather Service

NWS Nashville: www.srh.noaa.gov/ohx

NWS Memphis: www.srh.noaa.gov/meg

NWS Morristown: www.srh.noaa.gov/mrx

NWS Huntsville: www.srh.noaa.gov/hun

All NWS Offices: www.weather.gov

Tennessee Emergency Management Agency

www.tnema.org

Twitter: http://twitter.com/T_E_M_A

Facebook: <http://www.facebook.com/TNDisasterInfo>

Flickr: http://www.flickr.com/photos/t_e_m_a

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
Morristown.....	Tim Troutman.....	(423) 586-8706
Morristown.....	George Matthews	(423) 586-6429
Memphis.....	Richard Okulski	(901) 544-0411
Memphis.....	Jim Belles	(901) 544-0411
Huntsville, AL.....	David Nadler.....	(256) 890-8503

USGS hydrologic data tools – including the recent development of an automatic alert system

WaterWatch (<http://waterwatch.usgs.gov>) is a U.S. Geological Survey (USGS) World Wide Web site that displays maps, graphs, and tables describing real-time, recent, and past streamflow conditions for the United States. The real-time information generally is updated on an hourly basis. WaterWatch provides streamgauge-based maps that show the location of more than 3,000 long-term (30 years or more) USGS streamgages; use colors to represent streamflow conditions compared to historical streamflow; feature a point-and-click interface allowing users to retrieve graphs of stream stage (water elevation) and flow; and highlight locations where extreme hydrologic events, such as floods and droughts, are occurring.

[Map](#) | [Table](#) | [Google Map](#)

Locations above flood stage

(7 streamgages are currently reporting water levels above the National Weather Service defined flood stage)

USGS station ID	USGS station name	NWS flood stage (ft)	Most recent stage (ft)	Most recent flow (cfs)	Historical peaks (cfs)	Most recent local date/time	NWS station ID
06478690	WEST FORK VERMILLION R NEAR PARKER, SD	9	12.21	Ice	6,370	2011-01-12 08:15:00	PKRS2
06770200	Platte River near Kearney, Nebr.	6	6.18	Ice	23,700	2011-01-12 08:15:00	KEAN1
06294000	Little Bighorn River near Hardin MT	8	10.53	Ice	22,600	2011-01-12 07:15:00	HRDM8
06466010	Missouri River at Niobrara, Nebr.	21	21.11			2011-01-12 08:15:00	MRNN1
07074850	White River near Augusta, AR	26	32.33	63,500	252,000	2011-01-12 08:00:00	AUGA4

USGS WaterAlert

(<http://water.usgs.gov/wateralert>) is a service that sends e-mail or text messages when certain parameters (including gage height, discharge, precipitation, and water quality) measured by a USGS data-collection station exceed user-definable thresholds. The development and maintenance of the WaterAlert system is supported by USGS and its data-collection partners, including numerous federal, state, and local agencies. Real-time data from USGS gages are transmitted via satellite or other telemetry to USGS offices at various intervals; in most cases, once every 1 or 4 hours. Emergency transmissions, such as during floods, may be more frequent.

StreamStats (<http://water.usgs.gov/osw/streamstats/tennessee.html>) is an integrated GIS application that makes the process of computing streamflow statistics for ungaged sites much faster, more accurate, and more consistent than previously used manual methods. Examples of streamflow statistics that can be provided by StreamStats include the 100-year flood, the mean annual flow, and the 7-day, 10-year low flow.

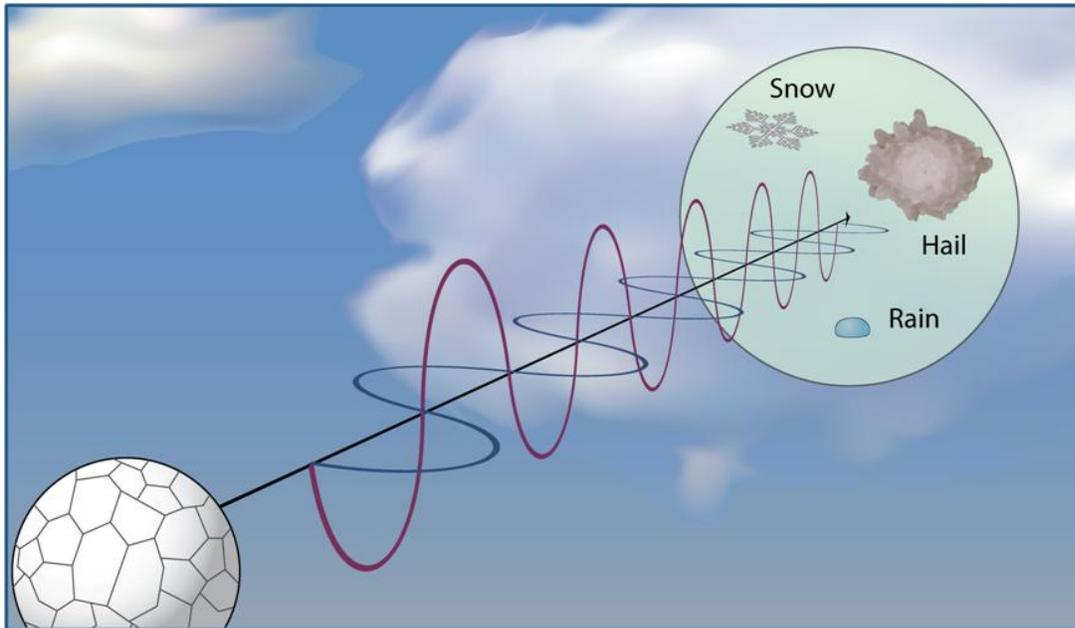
For more information on flooding in Tennessee visit <http://tn.water.usgs.gov/flood/> or contact Shannon Williams, Assistant Director, USGS Tennessee Water Science Center, (615) 837-4755 or swilliam@usgs.gov.

Dual Polarization Radar

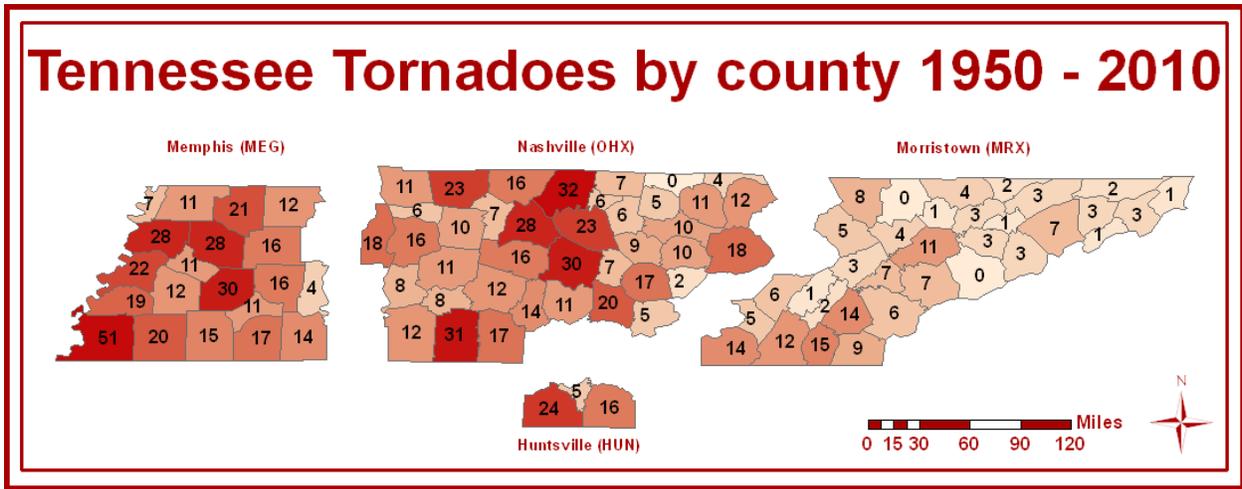
Beginning in 2011, and continuing through 2012, the NWS will undertake the most significant upgrade in radar technology since the late 1980s. Dual Polarization Radar is coming to a National Weather Service Office near you!

What is Dual Polarization, and how will it affect us? To understand Dual Polarization one must first understand the basics of the WSR-88D. It all starts with a beam of energy (pulse) that is cast out from a transmitter. This transmitter is spinning in a circle as these pulses are sent out into the atmosphere. Each time one revolution has completed the transmitter changes its elevation and repeats the process again. The true difference however between conventional and Dual Polarization radar lies in the pulse itself. A conventional pulse is sent out in a horizontal orientation, where as a Dual Polarization pulse is sent out with both horizontal and vertical orientation.

Conventional WSR-88D measures three base products which include base reflectivity, base velocity, and spectrum width. Dual Polarization radar will add 3 more base products and a total of 11 additional derived products. The major benefits with these new products include the ability to better differentiate raindrop size and shape, the ability to better differentiate between liquid and frozen precipitation, and better estimations of precipitation rate. Ultimately this will lead to improved forecasting of flooding, flash flooding, and winter weather precipitation accumulations. In addition to these improvements, severe weather warning decisions will be improved with regards to severe hail development.



Tennessee Tornadoes By County 1950- 2010



NOAA Weather Radio Across Tennessee and Surrounding Areas

