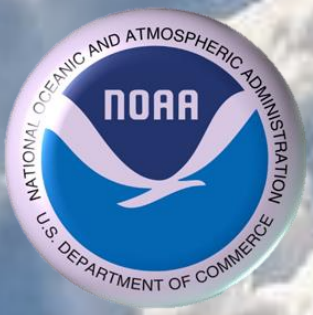
2017 Stakeholders Report



National Weather Service – Paducah KY

A Message from our Meteorologist-In-Charge

May 15, 2018 will mark my 40th year working for NOAA and the National Weather Service. During that time, I have seen many things change. I remember the days of maps rolling off of a facsimile machine, which we tore by hand, analyzed and colored by hand, and hung them up on the wall for everyone to work from. Now, all kinds of weather information, from observations, to model data, to forecasts, come in automatically and in huge volumes through AWIPS – an Advanced Weather Interactive Processing System. Earlier forecasts and warnings had to be hand-typed and punched out on teletype, versus todays method which puts together forecasts with automated grids, and warnings with computer generated polygons in a matter of seconds. Radar has gone from the "show you where it is raining" WSR-57, to a highly sophisticated WSR-88D Doppler radar that scans the atmosphere continuously.

While it is a given in this modern age, equipment will indeed update with the times, most fascinating to me is how the National Weather Service's mission has prevailed. We are still the government agency you all look to in protecting lives and property with early warnings of impending severe weather.

Now though, we are moving forward to "Evolve" into an agency that goes beyond just providing the forecasts and warnings, to one instead that actively plays a role in changing the outcomes in the lives of others, given any type of severe weather.

Can we prevent the weather event? NO! That remains the same. What we can do though is continue to work hard to provide you with enough timely information and professional support that you can make wiser decisions to prepare ahead of time for the severe weather challenge – thus creating the possibility for a better outcome by lessening the personal impact. In fact, Impact Based Decision Support (IDSS) is one of the new cornerstone directions the National Weather Service is heading toward. You may ask, "Why the change?" The answer is critical – to meet our Stakeholder's needs and work toward a more Weather Ready Nation. In reality, changing the outcome of critical weather impacts is a responsibility that everyone shares.

A Message from our Meteorologist-In-Charge

The National Weather Service Office in Paducah is composed of a staff of very talented professionals who work every day to keep America safe weather-wise. In figuring up the experience level WFO Paducah has, here are a few of the facts: NWS Paducah operates 24/7 with a staff of 25 members. Among those staff members, all combined, are 536 years of experience!! There are also 17 members who have worked at multiple offices – expanding our joint boundaries of experiences. While we may be scientists first, working together, we draw from a plethora of interdisciplinary skills that lock in a common commitment to serve our partners, customers, and the public at large.

In early 1995, the modernized National Weather Service Office in Paducah opened its doors for warning and forecast operations serving a four state County Warning Area that encompassed southeast Missouri, southern Illinois, southwest Indiana, and western Kentucky. At that time, the original staff developed an office mission statement. It read: "Striving constantly for public service excellence, we shall in team unison, through the full utilization of our science knowledge and state-of-the-art equipment, dedicate ourselves to best serve the people we protect through accurate communication, informative products and statements, and timely warnings."

While equipment and procedures do indeed change, and staff members often move up and on, one thing has remained the same over the past 22 years since NWS Paducah opened its door for service. That one thing – the thing that keeps us anchored to our core values in serving the public is – this is not about us – it is about service to you and not only the responsibility - but the accountability - that goes along with that service.

So as the future moves forward and changes remain inevitable – the staff of NWS Paducah will always stand fast on our promise to serve you and build on the trust we have developed throughout the years. And remember…we are working on this together – as a nation – a Weather Ready Nation.

Sincerely,
Beverly A. Poole
Meteorologist-in-Charge
National Weather Service Office - Paducah, Kentucky

Perryville EF4 Tornado

A Look at the Nation's Strongest Tornado in 2017

Dan Spaeth, Lead Forecaster

On Tuesday evening, February 28th 2017, a supercell thunderstorm spawned one of the longest and strongest tornadoes to ever hit our region. The tornado touched down 5 miles west northwest of Perryville, Missouri around 751 PM and lifted 1.8 miles southwest of Christopher, Illinois around 857 PM. The tornado quickly became violent and levelled several homes just north of Perryville. It was here that it achieved its greatest intensity with 185 mph winds, worthy of an EF-4 rating on the Enhanced Fujita Scale. It was the strongest tornado in the entire country in 2017.

Along its path, over a hundred homes received moderate to major damage and several were completely levelled. As the tornado approached Interstate 55 north of Perryville, it hit a salvage yard and threw several uninhabited vehicles onto or over the interstate.

Then just to the west of the Mississippi River, the tornado scarred the bare ground with striations indicative of multiple vortices. This occurs as strong tornadoes break down into multiple smaller, stronger circulations that rotate around each other. It was here that beast reached its greatest width of 0.6 miles.

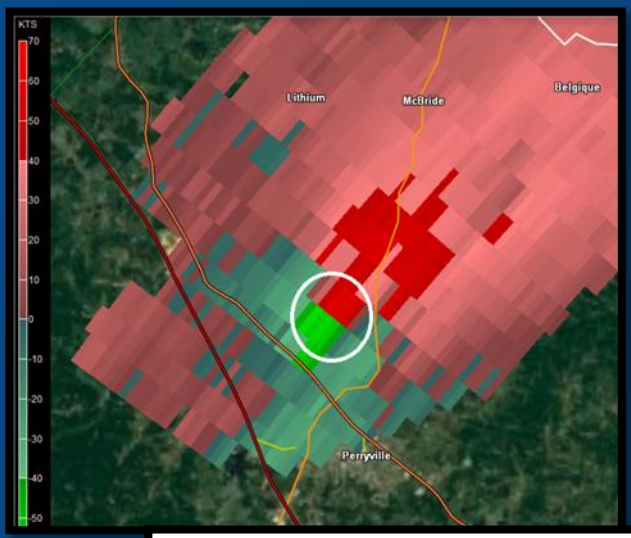
Perryville EF4 Tornado

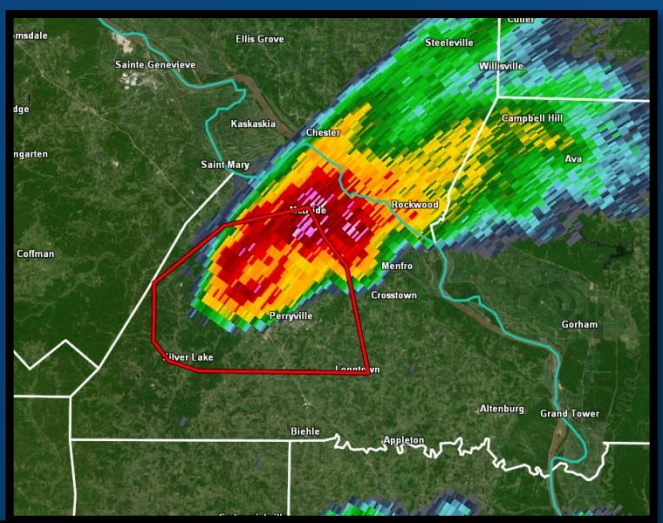
A Look at the Nation's Strongest Tornado in 2017

Dan Spaeth, Lead Forecaster

Our primary mission at the National Weather Service is the protection of life and property. In the path of this tornado, destruction was unavoidable, but only one fatality occurred and another 12 people sustained injuries. Without the efforts of the National Weather Service and its partners in the emergency management community and media, the loss of life undoubtedly would have been much greater.

Many factors played a role in limiting the human toll of this historic storm. Forecaster training and advances in radar technology and tornado research definitely played a roll, but investments in social science were critical in providing improved messaging ahead of and during the event. Ultimately, the message got out and was received. Those in the path of the tornado knew what was coming and took appropriate life-saving actions.





...A TORNADO WARNING REMAINS IN EFFECT UNTIL 815 PM CST FOR NORTHWESTERN PERRY COUNTY...

At 758 PM CST, a severe thunderstorm capable of producing a tornado was located near Perryville, moving east at 45 mph.

HAZARD...Tornado and two inch hail.

SOURCE...Radar indicated rotation. The storm is headed toward Brewer and Interstate 55 at exit 135. The rotation should pass just north of Perryville proper.

IMPACT...Flying debris will be dangerous to those caught without shelter. Mobile homes will be damaged or destroyed. Damage to roofs, windows, and vehicles will occur. Tree damage is likely.

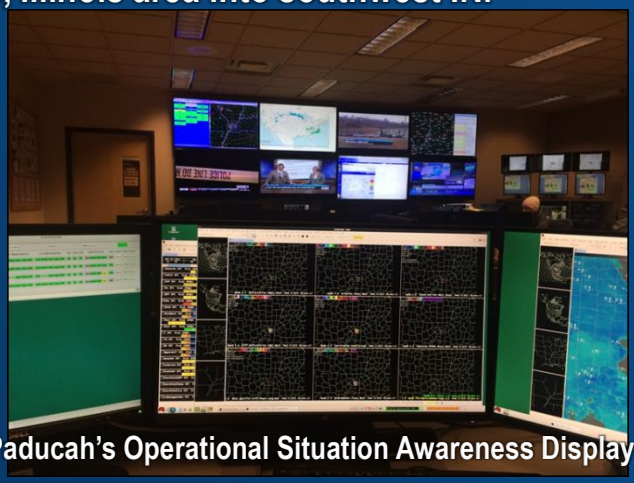
Warning for Violent Tornadoes

Thoughts from the Warning Forecaster
Chris Noles, Lead Forecaster

On the evening of February 28th, 2017, my duty was radar operator at the National Weather Service in Paducah, KY. Here is my perspective as radar operator, warning for the tornadic supercell storm that tracked from near Perryville MO, across southern Illinois, including the Crossville area, to southwest Indiana along I-64.

Most tornadoes that occur in our area are considered "weak" tornadoes, generally EF-0 or EF-1. Weak of course is a relative term, as even weak tornadoes cause respectable damage. However, they generally do not cause a considerable loss of life, injuries, or catastrophic damage. Significant tornadic events are associated with strong to violent tornadoes from EF-2 to EF-5 having wind speeds from 111 mph to over 200 mph. These violent tornadoes occur much less frequently, especially those of EF-3 or greater intensity. The Perryville, MO tornado reached EF-4 intensity with maximum winds of 185 mph. As this storm continued to move east/northeast, it produced another tornado that reached EF-3 intensity from the Crossville, Illinois area into southwest IN.

Just south of Vergennes, IL – NWS Storm Survey



Paducah's Operational Situation Awareness Display

My focus the night of February 28th, 2017 was on messaging, in addition to storm interrogation. This violent supercell storm was not hard to warn for. It was a classic storm with all the signatures indicative of being a tornado producer. Radar velocity data showed strong rotation within the storm. Dual polarization data revealed debris from structural and tree damage being lofted into the air. These radar identified signatures along with timely reports from storm spotters and law enforcement made the tornado warning decision process fairly straight forward.

Warning for Violent Tornadoes

Thoughts from the Warning Forecaster
Chris Noles, Lead Forecaster

The key with this particular storm was the need to convey just how deadly and damaging this tornado was. We did not want the public to think this was just a radar indicated Tornado Warning. We wanted to, well, scream, this tornado was large, long lived and deadly. Our computer generated warnings are impact based in a bullet style format produced quickly by software that works in tandem with our radar data display. This makes it easy to quickly include key wording in our warnings. This should help our users and the public better understand the threat level. With this destructive storm, we used wording such as, large dangerous tornado, and observed tornado. We included damage information such as cars being tossed, flipped on to Interstate 55 near Perryville, Missouri.

Our intention was for the enhanced wording in our warnings that night to resonate across the weather enterprise, including broadcast media and social media. Hopefully, it made the broadcaster's job relaying the threat level easier. Local TV meteorologist Jennifer Rukavina broadcast live ground truth information directly from our warnings and statements. TV meteorologists Nick Hausen and Grant Dade mentioned they monitored our internal chat room and found that helpful during the evening of the 28th. They could interact with us when needed. I was able to occasionally monitor the TV messaging on our situational awareness display at the front of our operations area. The broadcasts gave me an additional perspective on the messaging that night from my workstation. All of our TV stations were on top of this storm. Nick Hausen from WSIL mentioned that, the "OBSERVED" tag in our warnings was a big help, along with any other value added text information that confirmed the danger. Having the means to communicate directly with our media partners via our internal chat room, keeps the flow of information going and saves time. I got the feeling that night, people identified the danger level, via TV, social media and other media that emphasized the dire information contained textually in our warnings.

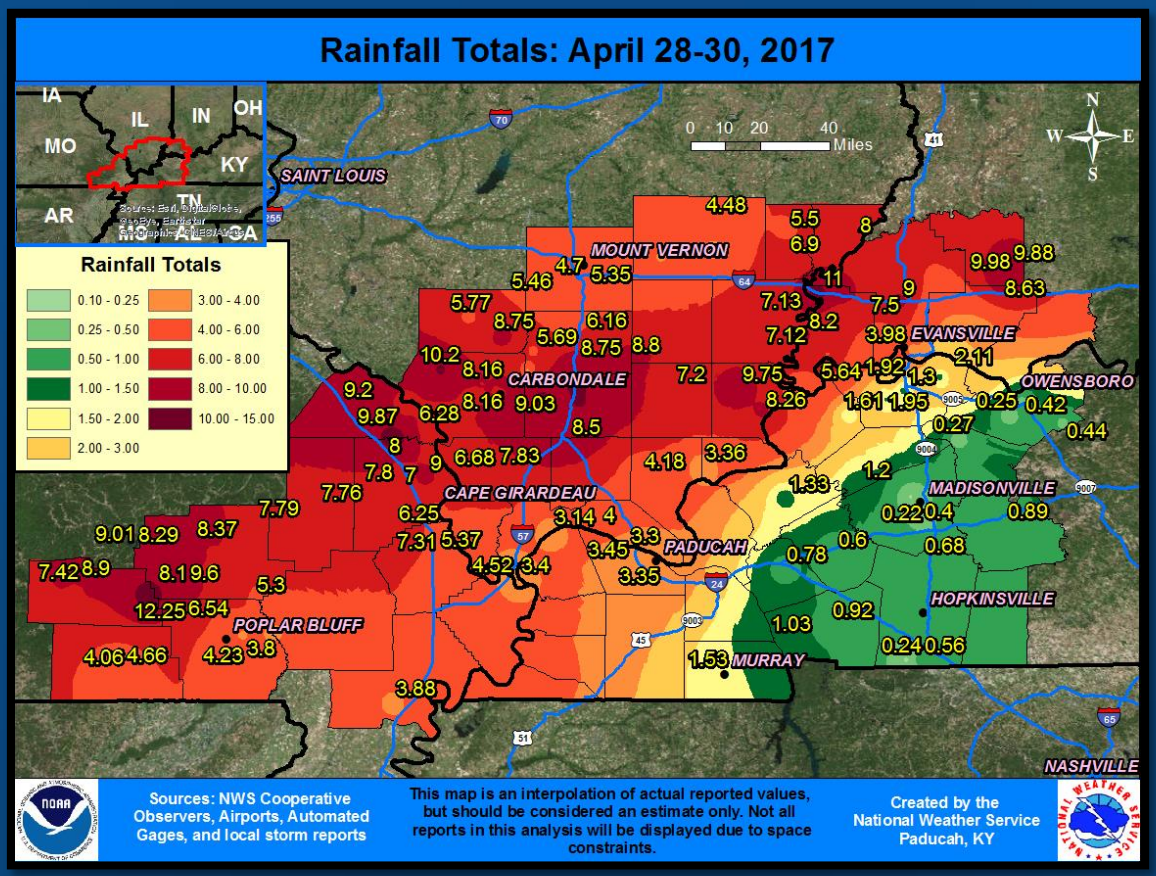
In summary, my primary objectives that night as radar operator included timely warnings with significant lead time, and clear, impactful messaging that conveyed this storm was extremely dangerous and life threatening.

Historic Flooding in Missouri

Historic Carter County Flooding

Mary Lamm, Service Hydrologist

During the last week of April 2017, several rounds of heavy rain fell across southeast Missouri. One round of rain fell on Wednesday, producing 2-3 inches of rain over the foothills of the Ozarks. Two more periods of rain fell over the weekend, dropping another 7 to 10 inches of rain. This caused the Current River and most of its tributaries to rise quickly out of their banks. The Current River at Van Buren crested Sunday evening, April 30, at a record 37.2 feet. While the property damage was extensive and tragic, there was no loss of life. Communication with local officials before, during and after proved both critical and informative.



Before the event, the NWS Paducah office was in constant communication with local officials via email and phone. We also conducted a conference call with media, emergency management and local officials to brief them of the upcoming heavy rain and flood event. This heavy rain event was also the first time that we conducted a Facebook Live session where we tried to answer many of your questions!

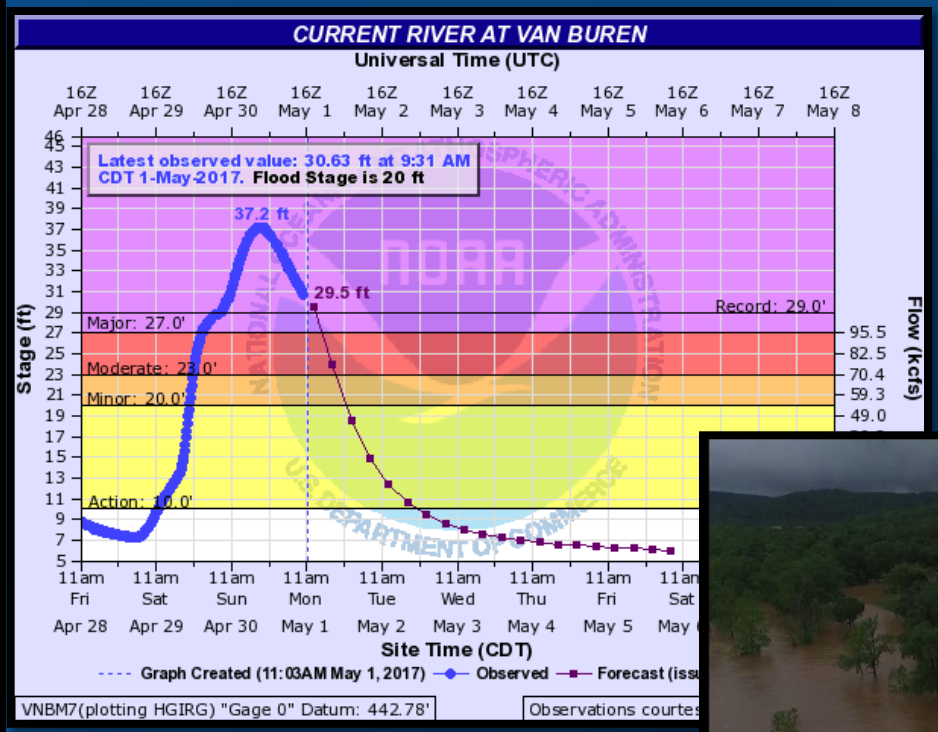
Historic Flooding in Missouri

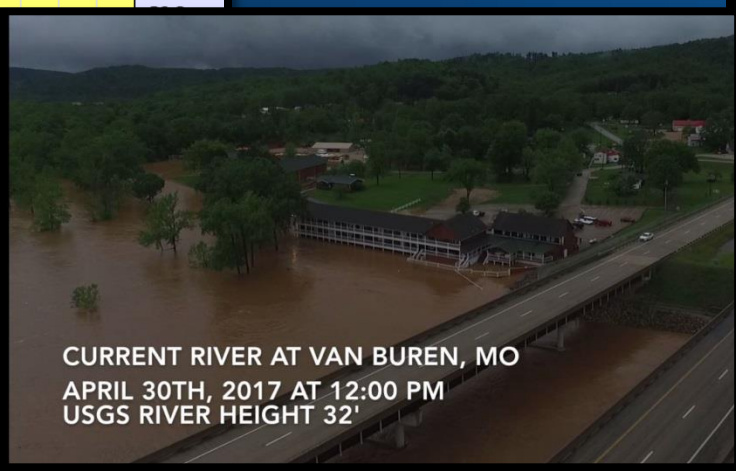
Historic Carter County Flooding
Mary Lamm, Service Hydrologist

During the event, we were receiving and giving information by phone and NWSChat (an internal chatroom specifically for media and local officials). We also issued a Flash Flood Emergency for Carter County in one of the Flash Flood Warnings after coordination with local emergency management. This wording is meant to elevate the danger of the event and get people's attention. If a Flash Flood Emergency is ever issued for your county, heed all information coming from local law enforcement and county or city officials!

After the event, later in May and June, IWT meetings were held as well as one-on-one meetings with counties affected by the heavy rain and flooding. IWT, Integrated Warning Team, meetings gather local media and county officials to discuss what went well during the event as well as what could be improved. They are proving to be invaluable meetings with our partners to continuously improve our products and services.

While heavy rain, flooding and other severe and winter weather events will continue to happen across the region, communication is the key to eliminating surprises and minimizing impacts.

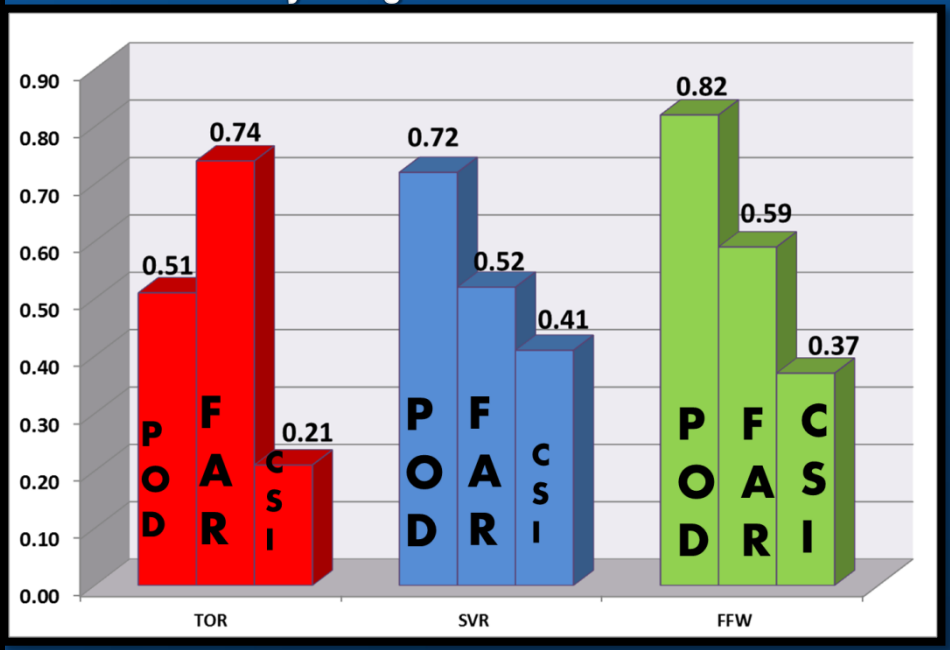




2017 Severe Weather

Analyzing the Stats
David Humphrey, Lead Forecaster

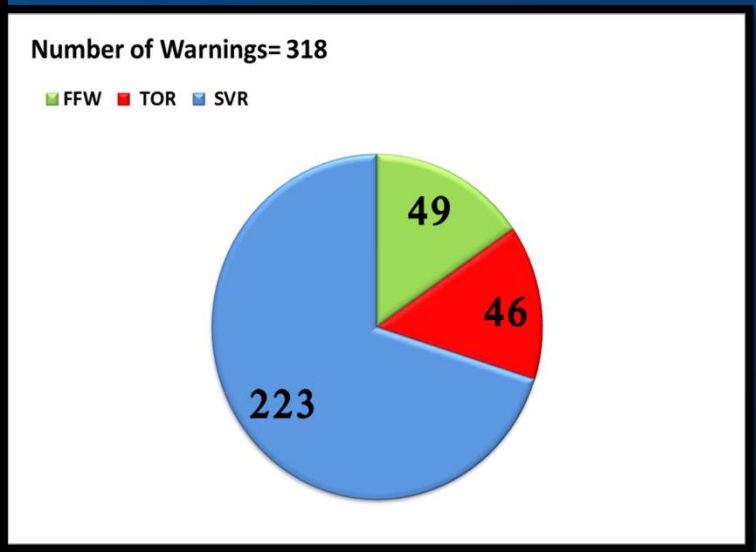
The National Weather Service in Paducah, KY issued a total of 303 warnings (tornado warnings, severe thunderstorm warnings and flash flood warnings) in the year 2017. We have verified 134 of these warnings, or 44% of the total warnings issued were verified; this represents a +6% increase from the same time 1 year ago. We provided an average of 40 minutes lead time for all warnings combined; this was a +17 minute increase in lead time from 1 year ago.

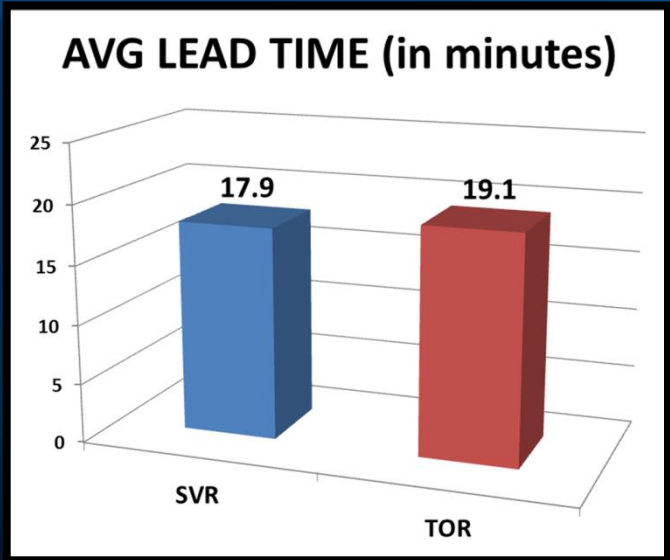


POD: Probability of Detection (The number of hits divided by the total number of events observed.)

FAR: False Alarm Ratio

CSI: Critical Success Index (Combination of the POD & FAR)





Winter Weather

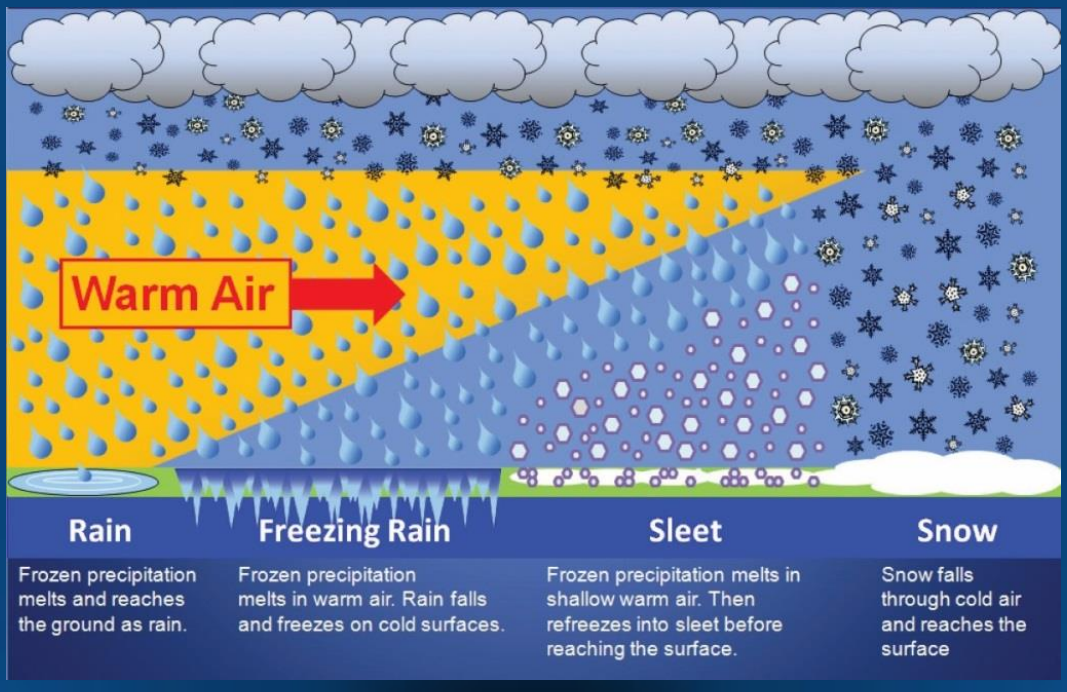
Winter Weather Forecasting Challenges
Greg Meffert, Lead Forecaster

The winter weather forecast process normally begins by trying to get an idea of how the overall "Big Picture" will be setting up for the time of concern. Which forecast model(s) have been performing the best lately? Which model(s) have the best clue as to what is currently going on in the atmosphere? Does a certain model have a good or bad "bias" (with temperatures/precipitation amounts/etc.) for the type of pattern that is setting up?

Next would be to try and determine where the pressure systems will be lining up. Surface lows that pass to the south of our region offer the highest chance for wintery precipitation, given enough cold air is already in place, or if enough cold air could be drawn south into the region as the precipitation moves through the area. We rarely see a sustained winter event with surface low pressure systems that pass to the north of the region.

It is important to assess the expected thermal profile, which is how the temperature changes as one moves up in the atmosphere. We need to determine not only what the surface temperatures are going to be, but also if any warm layers aloft could potentially melt any snow before it falls into colder air near or at the surface.

If above freezing layers are deep enough aloft and cold air remains trapped near the ground, we need to address sleet and/or freezing rain concerns. (see Figure below)



Winter Weather

Winter Weather Forecasting Challenges
Greg Meffert, Lead Forecaster

Finally, once we try to determine what type of precipitation will fall, we need to determine the amount of precipitation that will fall. This is a very difficult task indeed, given the fact that specific models not only differ on their temperature solutions, but also differ on how much precipitation will occur.

A favored way to deal with all of these different model solutions is to blend them to get a "middle of the road" solution. A preferred way to accomplish this is to run a computer tool called "Forecast Builder". Forecast Builder creates a first guess forecast by blending solutions of our more preferred forecast models. This gives our office and other surrounding offices a good "common ground" to use as a starting point in the forecast collaboration process that occurs between neighboring forecast offices.

It is important that we as a group of offices come up with a seamless final forecast, so there are no big differences across our common forecast borders. Forecast Builder was developed to aid in this process. Once the Forecast Builder is run, offices then collaborate on the science discussed previously, and make any necessary changes. The result is a rather seamless winter weather forecast that can be delivered to our customers and stakeholders!

Winter Weather News

WSSI Coming Soon!
Mike York, Meteorologist

Over the past decade or so, the NWS office at Paducah has dealt with the most extreme winter storms on record for this area. The pre-Christmas 2004 snowstorm and the 2009 ice storm are both record holders for our region. In addition, our region experienced its third and fourth heaviest snowstorms a few winters ago. The onslaught of extreme winter weather in recent years has been a challenge, and WFO Paducah has risen to the occasion.

To remain on the forefront of winter weather service to our customers, the NWS Paducah office has volunteered to participate in a couple of national projects. Our office is one of a select number of offices that is issuing probabilistic snow forecasts. In addition, we also are participating in the Winter Storm Severity Index Project. Both of these new endeavors will provide our customers with enhanced knowledge of impending winter storms.

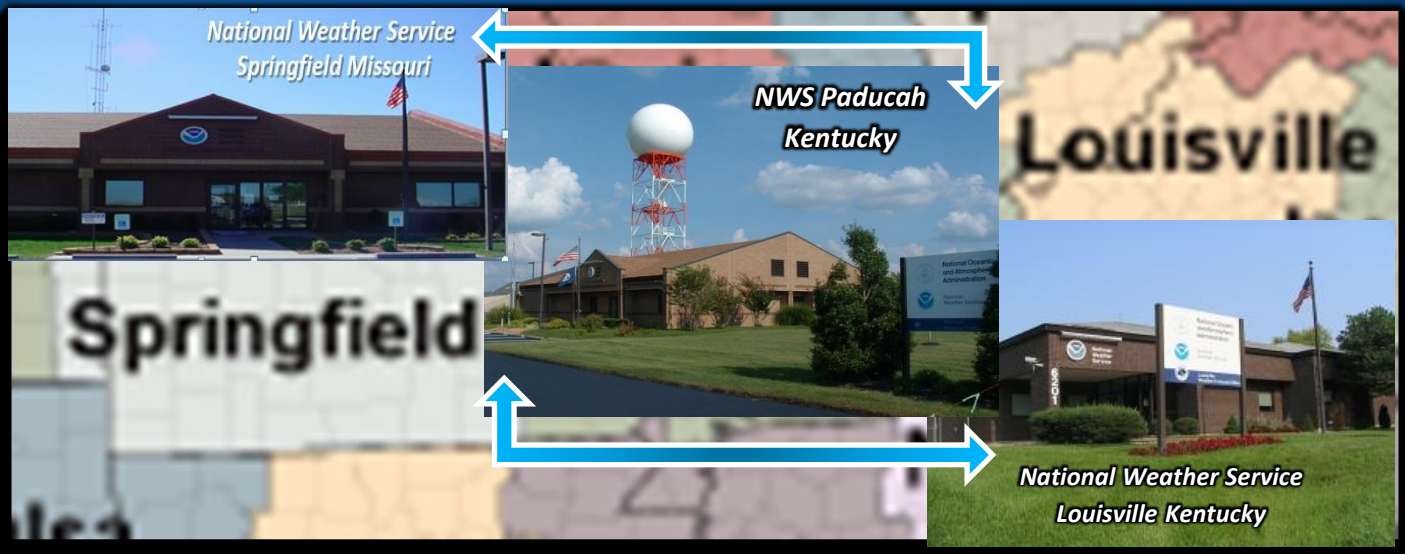
The Winter Storm Severity Index (WSSI) rates potential winter storms on a numerical scale, similar in some ways to the hurricane scale. The index attempts to categorize the impact of the storm on society, taking into account various factors such as precipitation amount, wind speed, and temperature. The probabilistic snow forecasts provide our customers with a "best-case" and "worst-case" scenario, along with the most likely scenario. This is done by assigning percentage probabilities to the range of snowfall amounts that are possible. Both the WSSI and the probabilistic snow forecasts are available on the NWS Paducah website when snow is forecast.

WFO Paducah conducts annual Winter Weather Workshops for its external partners to share the latest advances in winter research and forecasting. These seminars are conducted at four locations around our four-state service area each November. Our office also conducts an annual winter weather seminar for its own forecasting staff. Our Science and Operations Officer (SOO) Pat Spoden has overseen a number of winter weather research projects, including the creation of poster presentations which were displayed at national conferences.

The NWS Paducah office continues to stay ahead of the latest cutting-edge technology to ensure that its partners and all its customers receive the most timely and accurate forecasts and warnings.

Service Backup

Offices Assisting Offices
Kevin Smith, Meteorologist



Did you know…?

To provide a "seamless" suite of weather and warning services to the public, each NWS office has the capability to provide backup services to another NWS office, next door or hundreds of miles away!

In the event of natural disasters, communication or power disruptions, or any other unforeseen situations, surrounding NWS offices can take over forecast and warning services for an impacted office.

If a primary NWS office cannot provide backup services, another (secondary) office can take over.

NWS Paducah Kentucky is the primary backup office for NWS Louisville Kentucky and the secondary backup office for NWS Springfield Missouri.

During the significant ice storm in early 2009 that disrupted communications from the NWS Paducah office (and eventually the NWS Louisville office), forecast and warning services were provided by NWS Louisville, NWS Springfield, and a cadre of NWS personnel from other offices.

This significant weather event also served to develop and install new and innovative methods for emergency communications now used by most NWS offices.

Service Backup is available to assist other offices:

- Before, during, and after significant and widespread weather events.
- When another site is participating in office-wide training or decision support services.

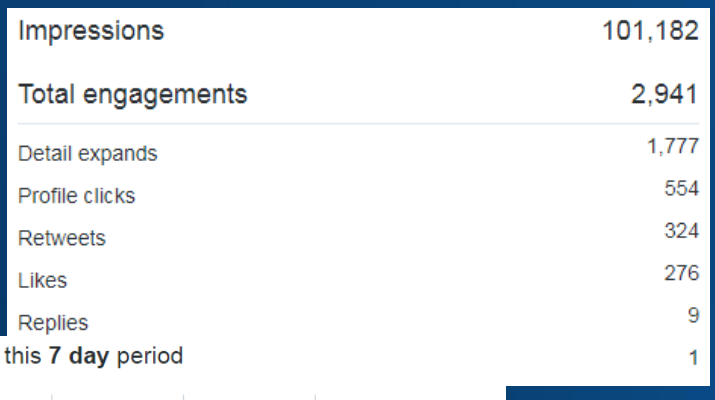
Social Media

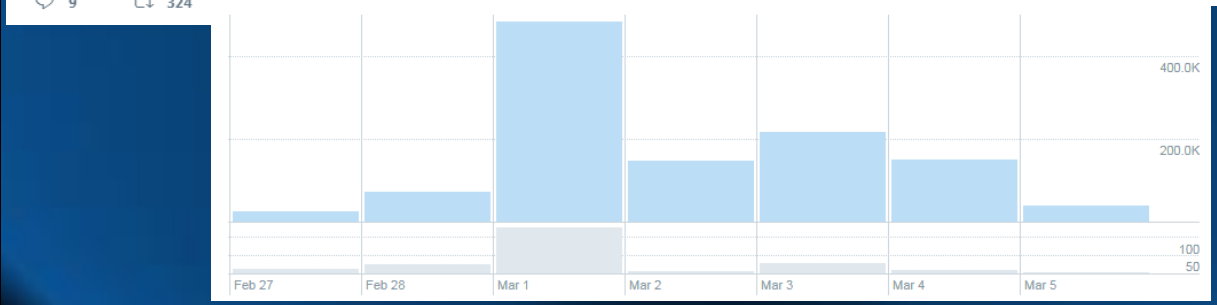
Enhancing our Mission

Sean Poulos, Ashley Ravenscraft, Derrick Snyder, Meteorologists

NWS Paducah uses social media to enhance our mission of protecting life and property and to help build a Weather Ready Nation. Social Media is used to acquire ground truth reports during impactful weather events, whether it be severe weather reports, flooding, snowfall, etc. It has allowed us to acquire near-real time reports much faster. It also helps us establish trust with the public when we are able to have a more "one on one" interaction with them, for example through Facebook live or posted multimedia briefings, or even something as simple as responding to tweets/comments/messages. Facebook and Twitter allow us to efficiently share information regarding public safety with a large audience in a matter of a couple of minutes… sometimes seconds!

Many of our storm reports from recent impactful weather events have come from social media, as it is easily monitored and a great way to quickly share information. One perk is that it allows users to send pictures in (i.e. storm damage, snowfall) that are very useful in warning operations. Below are a few images/statistics from the February 28th - March 1st tornado event, where the information our office shared about the Perryville EF-4 tornado reached over 100,000 people on both Facebook and Twitter. During that week, our posts had over 1.1 million impressions (or views) on Twitter. Our Facebook followers have increased from ~56,000 at the beginning of 2017, to over 68,000 in January 2018.

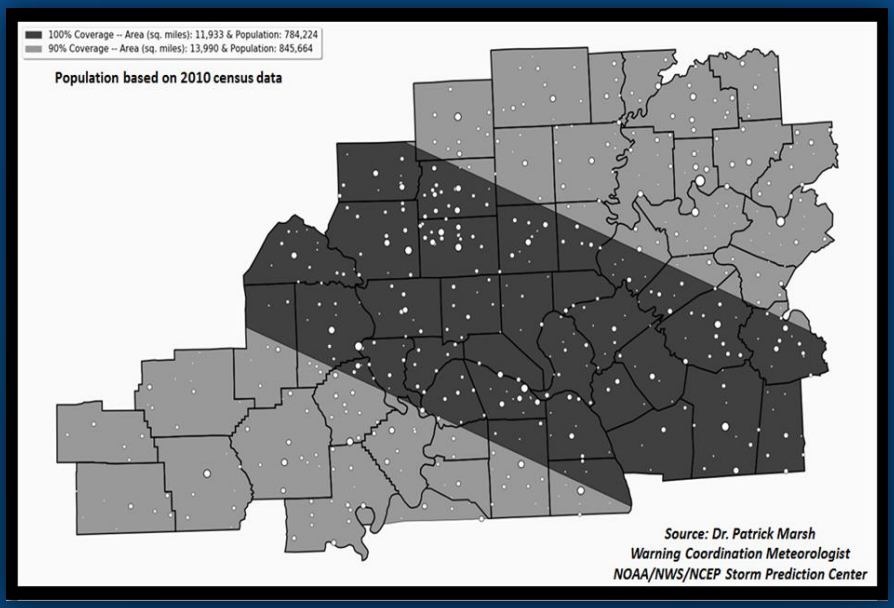




Great American Eclipse

Providing Onsite Weather Support
Ryan Presley, Meteorologist

Reaching beyond weather, 2017 provided a unique opportunity for astronomers - for it was the first time since 1979 that a total solar eclipse was viewable from the mainland United States. Not only that, it was also the first time since the mid 1400's that a total solar eclipse immersed much of the immediate NWS Paducah forecast area into complete totality!



On August 21, 2017, NWS Paducah carried the unique distinction of having not only the point of greatest eclipse, but also the point of greatest duration within its area of forecast responsibility. According to NASA, the point of greatest eclipse is where the axis of the Moon's shadow passes closest to the center of the Earth, while the point of greatest duration is where totality lasts the longest along the very center of the eclipse. Hopkinsville, Kentucky served as the closest city to the point of greatest eclipse, while Carbondale, Illinois was nearest to the point of greatest duration.

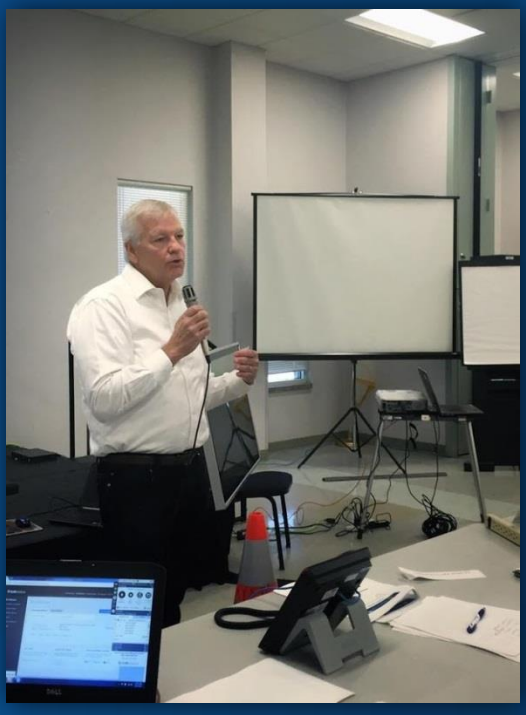
This unique distinction made our immediate area a prime destination for folks looking to catch a glimpse of the rare astronomical phenomenon. To prepare for such a large influx of eclipse viewers, emergency management agencies and first responders on a local, state, and federal level held numerous meetings, participated in practice drills, and created disaster response plans to prepare for worst-case scenarios.

Great American Eclipse

Providing Onsite Weather Support
Ryan Presley, Meteorologist

NWS Paducah was part of the planning process due to the potential impact of hazardous weather on eclipse activities. As part of our effort to provide enhanced weather support during significant events, our office provided weather briefings to emergency management agencies and first responders as early as two weeks prior to the eclipse.

Over the weekend and eclipse day, NWS Paducah deployed two meteorologists to strategic locations within our forecast area. These included Rick Shanklin at the Kentucky EOC Regional Response Coordination Center in Hopkinsville, Kentucky and Ryan Presley at the Illinois EMA Southern Area Command Center in Marion, Illinois. Pat Spoden was dispatched to the Lyon County EOC in Eddyville, Kentucky on the day of the eclipse. In addition to onsite support, NWS Paducah provided a continuous weather watch from the office and relayed numerous updates via social media.



On the left: Rick Shanklin provides a briefing at the Kentucky EOC Regional Response Coordination Center in Hopkinsville, KY.

Above: Looking inside the Illinois EMA Southern Area Command Center in Marion, IL.

Great American Eclipse

Providing Onsite Weather Support
Ryan Presley, Meteorologist

Fortunately, the weather cooperated fairly well for most eclipse festivities. It was very hot and humid by eclipse day, with high temperatures in the lower to mid 90s and heat index values reaching above 105 degrees in the afternoon. For many, viewing of the eclipse was ideal with sunshine in abundance for much of the day—well, except during totality! However, those less fortunate had their view spoiled by the cumulus that developed in the late morning and early afternoon. Thunderstorms were few and far between, albeit enough to be of concern in some parts of the area later in the afternoon as highways became jammed with crowds dispersing from their viewing locations.

Oh, and in case you missed all the hoopla this past year, you'll have another chance to catch a total solar eclipse in April 2024! Once again, totality will cover a good chunk of the NWS Paducah forecast area. In fact, the paths of the 2017 and 2024 eclipses cross just south of Carbondale, Illinois. However, with the eclipse in April, something tells me that clouds and rain may be more of a concern. So while we plan for the worst, we'll certainly hold out hope for the best…

Fire Weather

Dispatched to Montana
Kelly Hooper, Incident Meteorologist

Fire season was fairly tranquil across the region for the year. In fact, no red flag warnings were issued since April 2nd 2016. A red flag warning is issued when we have relative humidity below 25% combined with sustained winds greater than 15 mph, and ten hour fuel moisture (vegetation) below 9%. Wind is usually the largest contributor to losing control of a fire, but it usually is not the cause for a fire to start.

The main reason for the low threat this past year in this part of the country was low pressure over the eastern half of the country for extended periods of time. When low pressure resides over the east, high pressure ridging often occurs over the western US. This created drought conditions over the west. Later in the summer, monsoonal (moisture) flow starts up out west, and it creates thunderstorms. These storms often contain very little or no rainfall, but produce numerous lightning strikes which are the catalyst for wildfire starts.

That's exactly what happened in several western states this year. When this happens, Incident Management Teams (IMT) are dispatched to these fires and often request an Incident Meteorologist (IMET). I was dispatched to Montana to provide weather support to first responders on the Sapphire Complex just south of Missoula. I supported several teams while I was out west on this complex from late July through most of August and early September. There are 72 fully equipped IMETS in the service with many more in training. I actually had three different trainees on this fire. All were very talented and had to complete a task book to become certified to serve a team solo. I did have the opportunity to sign off on one of the very talented trainees this year. Rain and snow ended the fire season for Oregon, Washington and Montana. However, IMETs are still being dispatched to lingering California fires. In a few more months, fire season will begin in the southeast US and we will start all over again.

Aviation Planning

Airport Tabletop Emergency Exercise
David Blanchard, Meteorologist

Annually, an "Airport Tabletop Emergency Exercise" is executed at the McCracken County Emergency Operations Center (EOC) by the management of Barkley Regional Airport to increase readiness for disaster response for events such as aircraft mishaps, natural disasters, and terrorist attacks. Attendees are first responders from local communities, including state police, local police/airport security, local and airport fire/rescue departments, area ambulance services, and area hospital personnel. A representative from air traffic control attends, and a representative from the National Weather Service also attends, since the Paducah office is on the airport grounds.

Every third year, a live exercise drill is conducted, which includes actual dispatch of multiple first responders such as fire/rescue, police, and medical personnel to a mock disaster or incident such as an aircraft crash or a terrorist attack, usually on the airport grounds. An Incident Command Post is set up to direct operations, and a Public Information Officer is assigned to communicate with the media and public.

Satellite view of Barkley Regional Airport (Google Maps)

Aviation Planning

Airport Tabletop Emergency Exercise
David Blanchard, Meteorologist

On August 25th of this year, one of the standard annual exercises took place. Recently, the Federal Aviation Administration (FAA) has required more reviews of documentation regarding airport procedures, especially emergency procedures. A segment of this documentation was reviewed at this meeting. A primary subject discussed was the firefighting and rescue capabilities of the airport fire station crew and equipment, within limits dictated by the types of aircraft that typically use the airport. Some other items reviewed were: fire/rescue response "alert levels" 1 through 4, which describe possible types of airport incidents; emergency communications; locations of assembly points around the airport grounds for use of emergency personnel; how large of a secure perimeter will be set up in the case of an off-airport aircraft crash; and where the Public Information Officer will typically set up.

The Paducah National Weather Service office participates in these exercises because it is important to maintain a good relationship with our nearby partners, plus it will help us to be on the same page if a significant incident occurs on or near the airport. In years past, our office has been directly involved in drills, providing current weather data and short-term forecasts for the event, similar to what might happen in a real disaster. In at least one "tabletop" exercise, our office was asked to consider a scenario that included a large fire at a nearby fuel storage facility, hypothetically prompting the evacuation of our building. It is better to be prepared than sorry.

Aerial Photo of Barkley Regional Airport (courtesy: City of Paducah)

Weather Ready Nation

WRN Ambassadors
Rachel Trevino, Meteorologist

The National Oceanic and Atmospheric Administration (NOAA) began the Weather Ready Nation Ambassador (WRN Ambassador) initiative to develop partnerships with businesses, academia and other organizations to promote awareness and preparation for extreme weather, water and climate events. The intention is for Ambassadors to train their employees and group members on weather preparedness, and also share information on awareness and preparedness with their customers, stakeholders, and community. By becoming an Ambassador, NOAA will provide outreach materials, explore ways to collaborate with your business or organization, and recognize your organization as an Ambassador.

Weather-Ready Nation

National Weather Service Paducah has 40 WRN Ambassadors so far, and we want more! We want you! If you have a business or any type of organization, and are interested in becoming an Ambassador, go to the website https://www.weather.gov/wrn/ambassadors. Here you can learn more about becoming a WRN Ambassador and even start the process of becoming one. This site can answer many of your questions, and you can become an active participant in promoting a Weather Ready Nation.

Outreach & Support

NWS Paducah at BBQ on the River
Derrick Snyder & Ashley Ravenscraft, Meteorologists

From Sept. 28-30, 2017, NWS Paducah provided on-site and remote Impact-Based Decision Support Services (IDSS) to emergency management for the 23rd annual Barbecue on the River Festival in Paducah, KY. The festival is one of the largest in NWS Paducah's county warning area, drawing an estimated 40,000 attendees. Additionally, NWS Paducah staff manned an outreach tent, providing the community weather safety information and answering questions from the public.

Forecasters from NWS Paducah provided daily weather forecasts via email or phone for emergency managers for the duration of the festival. Additionally, NWS Paducah staff attended a daily planning briefing for emergency managers, first responders and festival staff held before the festival opened to the public.

Pictured left to right: NWS Paducah Meteorologists Ashley Ravenscraft, Sean Poulos, Derrick Snyder, and Rachel Trevino at the NWS Paducah outreach booth for the 2017 BBQ on the River festival.

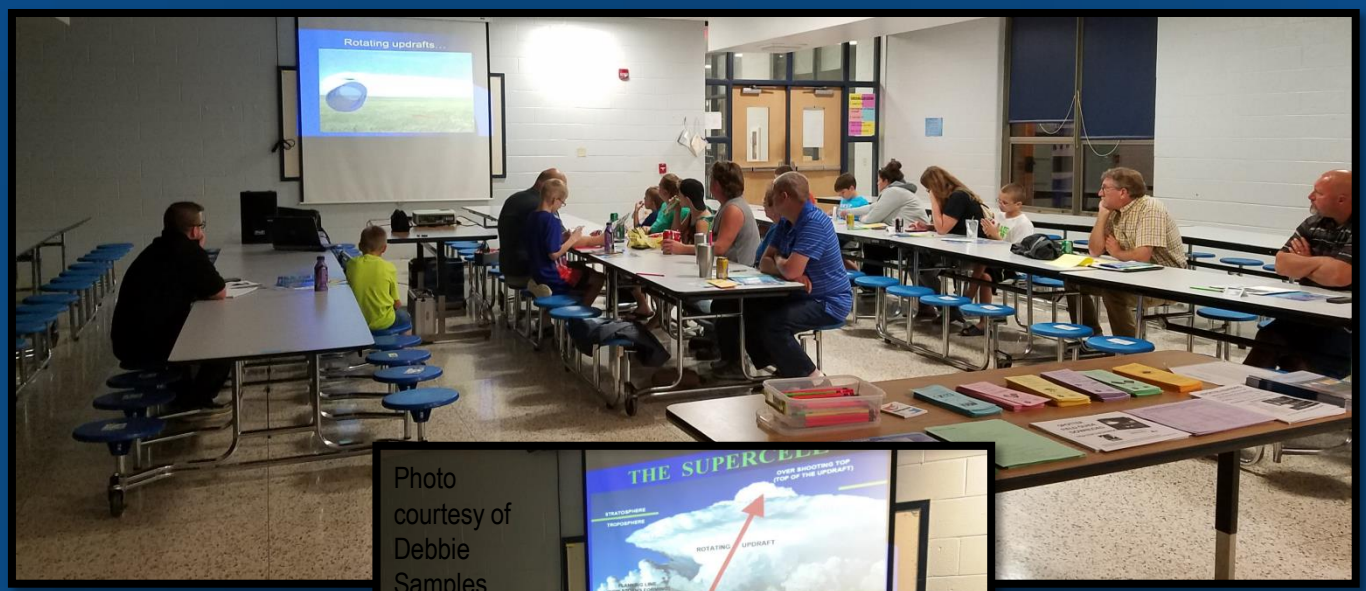
Spotter Training

Spotter Training for Kids
Christine Wielgos, Meteorologist

On September 18, 2017, I traveled to Wingo Kentucky to conduct a spotter training class. However, this was not your ordinary spotter class.

Debbie Samples, Special Education Teacher at Graves County Elementary School, developed a weather club for her elementary aged students. I had been to the school a few times to teach these eager to learn students about different aspects of weather over the past few years. However, it was time to up the ante. These students were ready to take on a more challenging task - becoming weather watchers.

Approximately 26 parents and students attended the spotter training class on September 19th to learn the basics of identifying severe weather. While the presentation given was the same class given at regular spotter training classes, I did my best to take some extra time to explain the concepts at an elementary level so the students could absorb as much as possible.



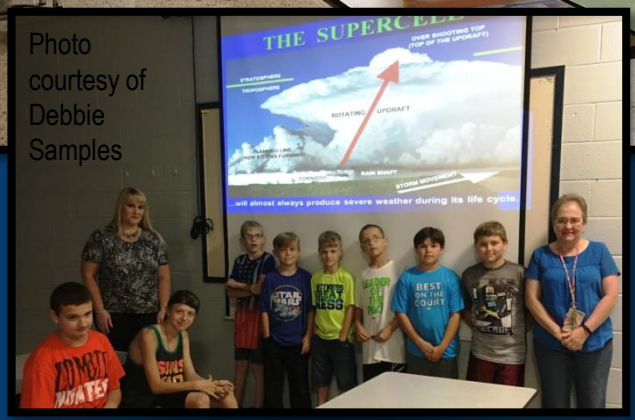


Photo courtesy of Debbie Samples

Beyond the Job

Volunteer Efforts to Serve Those in Need
Debbie Hooper, Administrative Assistant

Year round the entire staff is involved in fundraisers for the NWS Relay for Life Team to raise money for the American Cancer Society. We have fun during our Taco Tuesday luncheons, chili cook-offs, and then during the Relay for Life event, selling BBQ nachos and drinks. The event was held June 3 with seven participants, and we were able to donate over $400.

I volunteer for special projects to keep our office involved in the community. During August 2017, we participated in the "Feds Feed Families Food Drive" and collected non-perishable food. We were able to donate 93 pounds of food to three local food banks. During September, we participated in the "Coats for Kids" campaign and donated a few coats for distribution to local children in need.

Finally, our office had three volunteers work a total of 25 hours during the "Week of Service" in September at the annual BBQ on the River charity event. The volunteers were able to earn money for their designated charity. In addition to those who volunteered their personal time to the BBQ on the River, the National Weather Service also had a booth during the 3-day event to distribute brochures, provide weather safety tips, answer questions, and demonstrate the NOAA All-Hazards Radios and the tornado machine.

Pictured left to right: Kelly Hooper, Debbie Hooper, & granddaughter Jaylin Mardis, Mary Lamm, Chris Lamm, & daughter Alexandra Lamm at Relay for Life.
On the right: Beverly Poole, Lane Sirls, & Debbie Hooper at BBQ on the River.

The Magic of the Mesonet

Kentucky Mesonet Making a Big Impact for Kentuckians

Rick Shanklin, Warning Coordination Meteorologist

Kentucky is home to one of the nation's most comprehensive state Mesonets. Weather data has been collected from the network for about a decade, beginning with the first station in 2007. The network now consists of 68 stations which are primarily solar powered. The stations collect and transmit the data wirelessly to Kentucky's Climate Center at Western Kentucky University in Bowling Green, KY. These stations fill in many of the gaps between the ASOS and AWOS stations across Kentucky with high quality, near real time (5 minute data intervals), weather and climate data.

Data provided by each station consists of temperature, dewpoint temperature, solar radiation, wind speed and direction, precipitation and derived parameters. In addition, a growing number of stations measure soil moisture and temperature at depths from 2 inches to 40 inches. The high quality and very reliable data are used extensively by the WFOs serving Kentucky in the real time issuance of warnings, as well as in forecast preparation and in the provision of climate services. The data is also used extensively by many other interests, including the agricultural and water management sectors, for current management sectors.

These interests use it for both current purposes and for benefits stemming from the historical data which is stored by a data logger at each site. Recently, Western Kentucky University's Research Foundation was approved by the state agricultural development board for a $105,000 grant of state funds for software and instrumentation improvements to the Kentucky Mesonet. The Kentucky Mesonet site can be accessed at http://kymesonet.org.

Calloway County, KY Mesonet- 1 Mile West of Murray

ROB-E

Filling the Need for Real Time Data

Pilar Trevino, Electronics Technician

With the increasing IDSS demand and the need for real time location based data, IDSS ROB-E was created. It is an easily deployable sensor group that provides Temp/Dew Point/Humidity/Heat Index data at a one minute sample rate. The original prototype was deployed at the 2016 BBQ on the River IDSS event in Paducah, KY. It verified the need for on-site data, as the conditions by the river and the BBQ stands produced greater Heat Indices than the ASOS, which was located 10 miles away.

The installation of the IDSS ROB-E System at Hopkinsville, KY was completed Aug 16, 2017 as part of the IDSS for the Great American Eclipse. The system was modified to a five second sample rate which allowed a better view of the effects of the eclipse in greater detail. During the eclipse, a 4.32 degree drop was observed after one hour and 24 minutes. After an additional 1 hour and 46 minutes, the temperature was back at 91 degrees. The ROB-E system at Cairo, IL also had a successful day during the eclipse. At 1206pm, the temperature began a drop from 91.7 to 83.89 degrees, taking an hour and 26 minutes. It then took an hour and two minutes for the temperature to warm back up to 92.7 degrees.

With the increased IDSS responsibility and the need for on-site observation data, the IDSS ROB-E has proven its value. It has provided NWS personnel with on-site data to help with IDSS. I plan on the possibility of packaging the data as a stranger station, which would allow the data to be ingested into AWIPS automatically.

CoCoRaHS

Benefits of CoCoRaHS
Christine Wielgos, Meteorologist

Henry Reges, National Coordinator for CoCoRaHS (Community Collaborative Rain, Hail and Snow Network) visited the NWS Paducah KY office on November 8th, 2017. His goal was to provide a better understanding on exactly what CoCoRaHS is and its benefits.

CoCoRaHS is a non-profit, community based network of volunteers who measure and report rain, hail and snow in their backyards. The network was born in response to an epic flood that impacted Ft. Collins CO back in 1997. There was a large gradient in rainfall amounts from the thunderstorms that impacted the area. A need arose for individuals to measure and report precipitation to provide a better representation of local events. CoCoRaHS helps provide a finer mesh of data by supplementing other networks (such as cooperative observers). The network started out small (few dozen volunteers in northern CO) but has quickly grown to 20,000 volunteers across the U.S., Canada Puerto Rico, the U.S. Virgin Islands and the Bahamas.

Volunteers can measure rainfall amounts and snowfall, as well as provide hail data. The equipment used is simple and easy to set up but does cost $30. Training is provided on how to install gauges, properly measure rainfall and sending reports. Measurements are taken at around 7AM and volunteers can use an app or submit the data using an online form.

cocorahs.org

Volunteers Wanted

Preserving Historical Records
Deanna Lindstrom, Observation Program Leader

Volunteer weather observers (Co-Op) are becoming harder to find in this fast paced society. People are too busy working and/or doing other things. In the Paducah County Warning Area, many counties have official temperature and rainfall stations with historical records that go back 50 to 100 years. These climate record sites are used to maintain the database of averages and normals for each individual county across the United States. The Paducah NWS has lost or will be losing several historical record sites in the Paducah CWA and it is getting harder to find replacements.

We are looking for a few good men and women that have a love of weather and climate that would be willing to help us continue this program. I am listing several that are currently or will be in need of new volunteer observers to record and take daily temperatures.

In Southwest Indiana…Stendal, Petersburg, Poseyville , Hazelton
In Southern Illinois…Anna, Mt. Carmel, Marion, Cairo
In Southeast Missouri…Van Buren, New Madrid, Qulin, Marble Hill
In West Kentucky…Bardwell, Morganfield, Greenville, Crutchfield

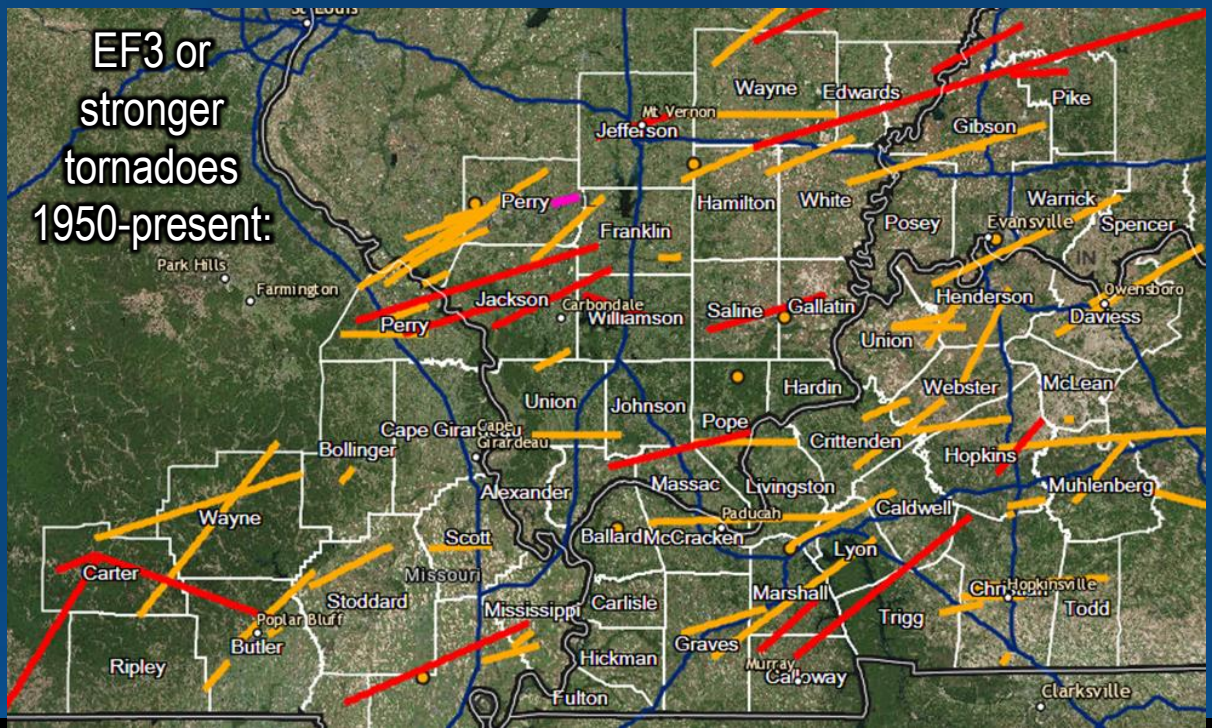
If you are interested in learning more about the program or becoming a CoOp Observer, call Deanna Lindstrom (Observation Program Leader) at 270-744-6440 ext. 675.

Tornado Climatology

Creation of Local Tornado Climatology Webpage
Sean Poulos, Meteorologist

A local tornado climatology webpage was created this past year that contains considerable information on historic tornado tracks within our forecast area. All documented tornadoes that have occurred since 1950 were ingested into an interactive map for viewing. The page was created using the online ArcGIS portal and uses a map journal design. Details for all 58 counties in our forecast area are contained within the journal part on the left side of the page. The interactive map is on the right side, which changes data and zoom extent depending on which section you are scrolling through. Each county section also contains information such as the warmest and coldest temperatures observed, along with the greatest rainfall and snowfall statistics for that county.

Having detailed records of all the documented tornadoes in our local area will help our office in serving our partners and customers, particularly when asked about past events. The goal is for the webpage to be updated annually with new data. For the most recent events, continue to refer to our event summary webpages under the Climate and Past Weather drop down menu on our main website. A similar webpage design was recently used to create a large hail climatology page.



IDSS BOOT CAMP

Dan Goes To (Boot) Camp!
Dan Spaeth, Lead Forecaster

In order to provide useful guidance in providing on-site Impact-based Decision Support Services (IDSS), the National Weather Service Training Center in Kansas City, Missouri, has developed a week long IDSS Boot Camp. In September, I had the pleasure of attending the first ever Winter-themed Boot Camp along with 11 other meteorologists from all over the country. The focus of this one was on providing effective support for Winter Storms.

The week started with a series of lectures and exercises on effective communication to our partners and the general public. A social scientist shared data showing what information our partners need from us and how best to present it in various situations. A veteran of numerous on-site IDSS deployments then shared several logistical tips and best practices along with a list of things to avoid while deployed.

On the final day we got to apply what we had learned in a full scale simulation in an Incident Command System (ICS) setting. The simulation required the help of numerous people including a nearby Emergency Manager. We, the participants, were significantly outnumbered by all of the facilitators. Thanks to their help, we got experience providing various briefings and interacting with the media and VIPs. This was a valuable experience that I'll be able to put to good use in the near future.

Hazardous Weather Testbed

The Future of Warnings
Pat Spoden, Science and Operations Officer

I was fortunate to be part of the Hazardous Weather Testbed (HWT) in Norman, OK in May 2017. Although several tests were going on at the same time, I was focused on the use of the PHI (Probabilistic Hazard Information) tool. This is a prototype of the new software which forecasters will be using in the near future. It will not only provide the information you see today, but it will also provide detailed probabilistic grids to help decision makers. It can provide details such as if a certain location has a 10% chance of a tornado or 90% chance, and everything in between. There is also opportunity to chat directly with the Emergency Managers.

At the testbed, there were 3 forecasters, 2 emergency managers, and 1 broadcast meteorologist. The 3 meteorologists used both old and real-time cases. One meteorologist would focus on lightning potential, another on severe thunderstorms, and a third on tornadoes. Each forecaster would issue warnings and statements using the PHI software. These warnings would flow directly to the emergency managers and broadcasters. The test allowed researchers to see how we all communicated using the new paradigm. At the end of each day, all of us sat down and discussed the pros and cons of our communication and how to make it better.

The Hazardous Weather Testbed in Norman is held each spring. Looking forward to next year's test!

42nd Annual NWA Meeting

"Putting Science into Service"
Pat Spoden, Science and Operations Officer

The National Weather Association (NWA) held its annual meeting in California this year. It was the 42nd annual meeting and over 400 people attended. Over 100 oral presentations were given and 140 posters. The NWA focuses on operational meteorology, but research is welcome as well. In addition to the meeting, there was a Weatherfest on Saturday before the meeting where NWA members volunteered to participate in opportunities to educate the public.

The theme for this year's meeting was "Putting Science into Service." Topics not only covered the usual case studies, but how our graphics/texts are used by the public and how we can improve on them. The presentations were great, but the real information usually gets passed on during breaks and during the evening when people gather and talk to each other.

Each Sunday, before the meeting actually starts, there is a broadcaster workshop and a student workshop. These are specially designed to help those particular groups. Included in the student workshop was a speed mentoring session where students sat briefly at different tables that included people who work in the government, academia, broadcasting, and the private sector. This exercise helps to provide the students with contacts they can use to get their professional life started (and during their work as well). Next year the meeting will be closer, in St. Louis, Missouri.

The Science Team

Maintaining Proficiency through Practice
Ryan Presley, Meteorologist

The forecast area served by NWS Paducah certainly receives its fair share of severe thunderstorm and tornado events. In fact, since 2005, our forecast area has had the unfortunate distinction of having the strongest tornado in the nation in three of those years. This includes the F4 tornado that struck Hopkins County, Kentucky on November 15, 2005, the EF-4 tornado that devastated Harrisburg, Illinois on February 29, 2012, and the EF-4 tornado that hit Perryville, Missouri on February 28, 2017. Our area has also consistently ranked high on the total tornado count many of these years.

With the compilation of all these severe weather events, you might think it would be relatively easy to maintain proficiency at issuing severe thunderstorm and tornado warnings. However, the unfortunate reality is that many of these events come in waves, and long periods of time, often measured in months, can span from one event to the next. Add to that the irregular shifts worked by our forecasters, and the time span between working a significant event can literally span a couple of years for some.

To keep the tornado warning proficiency on a more even platform through peaks and lulls in the weather cycle, the NWS Paducah Science Team rolled out a new project in the spring of 2017. Led by Pat Spoden, the team consists of Dan Spaeth, Greg Meffert, Mike York, Christine Wielgos, Robin Smith, and Ryan Presley. Each month, we take turns gathering the environmental and radar data for a particular tornado case and share it with our forecasters as a simulated warning event. The tornado cases span all types—from supercell to QLCS—and may not even be within our local forecast area. All forecasters who have warning responsibility are required to issue simulated warnings and answer questions about their warning decision once per month.

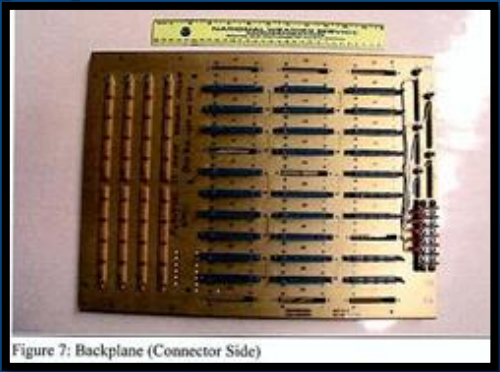
Challenges still exist in balancing the goals of tornado detection, better lead time, and reduced false alarms. However, our goal is to maintain better proficiency across the board so we all have an advantage when it comes to protecting your families and ours the next time bad weather strikes close to home.

The ET Update

Working on Upgrades
Logan Brinegar, Electronics Technician

An Electronic Technician here at WFO PAH is responsible for performing many tasks, both onsite at the office and remote locations throughout the county warning area. This past year has been very interesting and busy due to upgrades and refurbishments of some of our existing systems. One example of these various upgrades would be the implementation of S.L.E.P. (Service Life Extension Program). The SLEP modification is designed to not only prolong the service life of our existing radar, but it has also increased its proficiency and productivity. I have assisted in two SLEP modifications, one taking place at the Paducah, KY location and the other at the Owensville, IN location. During the week that we performed the SLEP, we removed and replaced several pieces of equipment including but not limited to; a transmitter backplane, a new modulator, and signal processor. Pictures of these items are inserted below.

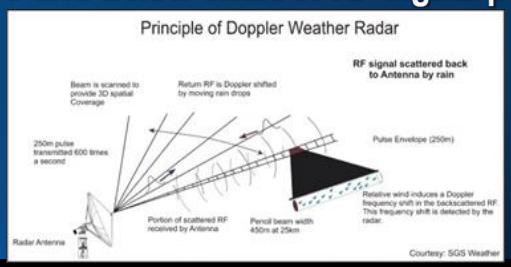
Klystron



Transmitter Backplane

Modulator Switch

By performing these tasks, this has added more VCP's to the radar capabilities, and has allowed more possible upgrades in the future. I also assisted in performing corrective maintenance at KVWX. Some of those tasks were removing and replacing DC servo drive motors. These motors allow the radar dish to move in both azimuth and elevation. We also did a transmitter alignment. This allows the technician to tune the output RF pulse from the klystron to the site designated frequency. The RF signal is what detects weather conditions and is returned back to the dish. Below are pictures of the DC motors and a flow chart of RF signal path returns.



NOAA Weather Radio

Upgrading NWR Circuits
Shane Luecke, Electronic Systems Analyst

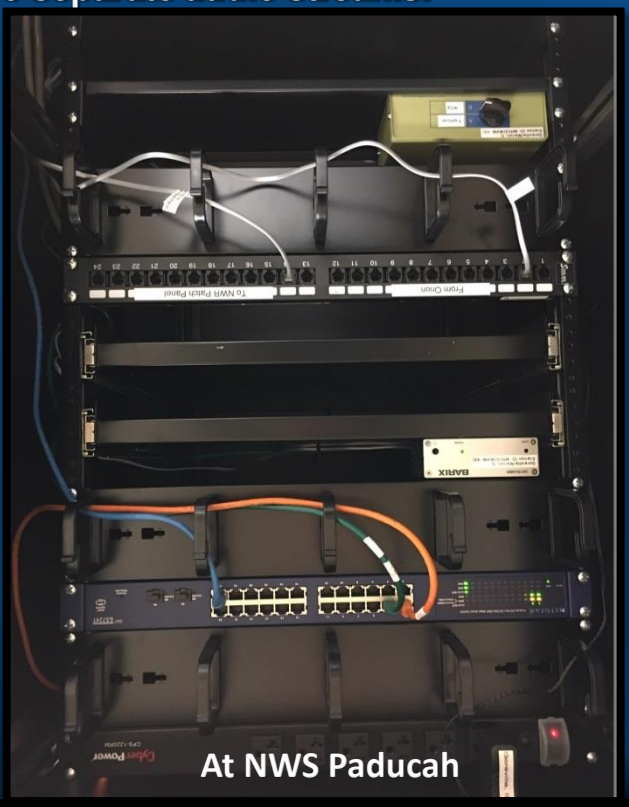
On May 8th, 2017, the National Weather Service in Paducah began testing 4G communications.

NWS Paducah is a pilot site for testing this new way of streaming NOAA Weather Radio (NWR) audio from the Weather Forecast Office (WFO) to the NWR transmitter site.
Converting old dedicated analog that is slated to go away in a few years, to the new 4G, is a pilot project that National Weather Service Headquarters is testing to see if this is a viable and reliable way to get the audio from the WFO to NWR transmitter sites.

WXM-49 Marion, IL was the first site to be converted for us. So far the testing has been 99.5% successful with no major drawbacks so far.

WFO Paducah has a total of 11 NWR sites and 9 separate audio streams.

NWR Transmitter WXM-49 at Goreville, IL



At NWS Paducah

Safety First!

Safety Reminders
Robin Smith, Hydrometeorological Technician

Safety is paramount within our organization and the public. At our office, we have a detailed safety training program which reduces the chance of injury to the staff. This enables our operations to continue without interruption.

Public safety is a key part of the Weather Ready Nation Program. Providing information to law enforcement, emergency managers and the public is instrumental. By providing safety instructions to our stakeholders during adverse weather conditions, everyone can be prepared and take the appropriate actions when needed. When the threat of severe weather exists, we issue Public Information Statements and Special Weather Statements detailing what our stakeholders should be doing to prepare if severe weather occurs.

If caught outside when a tornado or severe thunderstorm is approaching, you should find a ditch, culvert or other low lying area to lay down flat. Cover your head with your hands for protection. If you are in a building, go to the basement or a small interior room on the lowest floor. Never remain in a mobile home or portable building; have a plan where to go during a tornado or severe thunderstorm.

During flooding events, the key phrase to remember is “Turn Around – Don’t Drown”. You should drive if only absolutely necessary. Do not attempt to drive through a flooded roadway. The roadbed may be washed out under the flowing water. Six inches of swift moving water can knock a person off their feet. Never allow children to play around high water, storm drains or viaducts. Floods kill more people in the United States than any other type of hazardous weather.

If there is a threat of cold weather, heavy snow or an ice storm, you should dress in layers so you can add or remove clothing as the temperature changes. Wear properly fitted clothing and boots. Drink warm fluids frequently but avoid alcohol. If a person is experiencing symptoms of hypothermia or frostbite, seek medical help.

If all of the staff and our stakeholders are properly prepared, and know the safety rules and precautions, we can enhance the Weather Ready Nation to the best of our abilities.