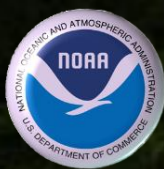


2013 Shareholders Report

National Weather Service

Louisville, Kentucky



Welcome



Welcome to the ninth edition of the National Weather Service (NWS) Louisville (LMK) Shareholders Report. Despite an abnormally low amount of severe weather in 2013, there were 14 tornadoes spread out over the 12 months. This included 3 tornadoes in December, which is only the sixth time on record for twisters in December in our area. Forecaster John Denman created a 2013 Year in Review at www.crh.noaa.gov/images/lmk/pdf/2013_review_initial_1.pdf which provides an excellent summary for the year.

This report details activities of NWS Louisville and events in its County Warning Area (CWA) during 2013. LMK accomplished many innovative projects and proactive customer service during the year which benefitted our shareholders. Our top four accomplishments were 1) PowerPoint briefing slides for emergency manager conference calls, 2) new daily weather story graphics, 3) flood inundation maps, and 4) new storm damage survey processes and procedures. These four topics along with many others are included in this annual report. I hope you find that our activities demonstrate the sort of stewardship you expect from your public servants.

The NWS was appropriated \$1.06 billion for fiscal year 2013. That equated to an expense of only \$3.35 per American. As the chief meteorologist of your investment, I feel it is my duty to report to you how your "holdings" have fared. I want to thank Lead Forecaster and Shareholders Report editor Tom Reaugh for assembling another fantastic report, and Science and Operations Officer Ted Funk for his thorough review of the document. As always, I welcome your comments and suggestions on how LMK can provide even better service for you in the future.

John Gordon
Meteorologist-in-Charge

Who We Are

NWS Louisville is responsible for weather warnings and forecasts for much more than just the Louisville metro. We are charged with providing critical weather information to 49 counties in central Kentucky and 10 counties across southern Indiana (see map below). This area includes the cities of Lexington, Frankfort, Elizabethtown, and Bowling Green in Kentucky, and Jasper and Madison in Indiana.



Contents

Briefing Slides	3
mPING	3
Aerial Surveying	4
Flood Mapping	5
Travelers Advisory	6
Tornado Activity and Response	7
StormReady	7
Squall Line Warnings	8
Decision Support Services	8
Social Media	9
New Weather Stories	9
Forecast Verification	10
Aviation Forecasting	11
Kentucky Mesonet	11
University Partnerships	12
Scholarships	13
Connecting with Kids	13
Community Involvement	14
Learn Meteorology	15
GIS Mapping	15
New Digital Rain Gauges	16
Top Local Weather Events of 2013	17
2014 Goals	17

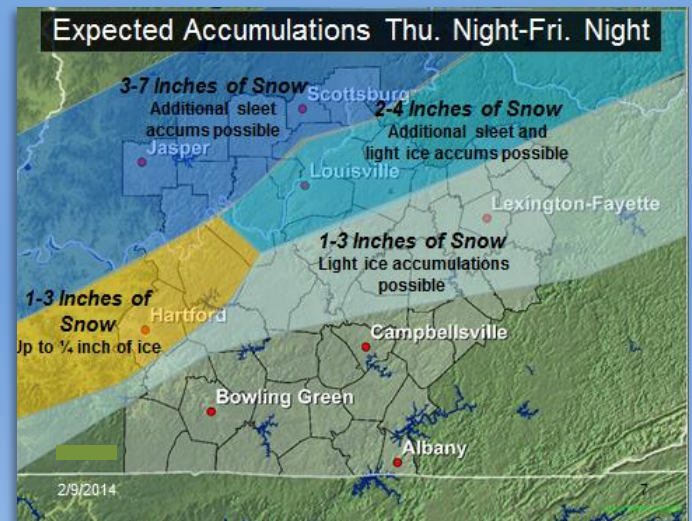
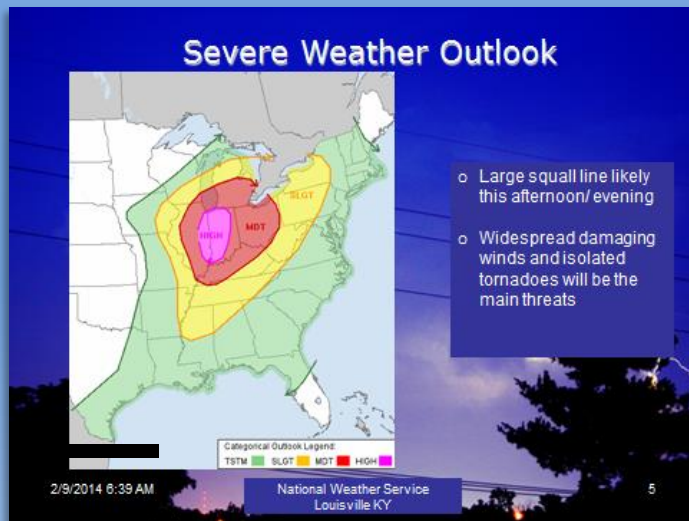
Briefing Slides Highlight Impact

Ron Steve, Lead Forecaster

Based on successes in other parts of the country, in 2013 NWS Louisville introduced web briefing conference calls to more efficiently deliver impact information before and during significant weather events. Emergency managers, school officials, and our media partners have told us the new web briefings are the single best way to convey impacts and timing before dangerous weather strikes.

Consisting of a few hard-hitting slides focused on the expected effects of a weather system, these briefings serve as a visual aid for participants on the calls. In turn, emergency managers use the briefing slides as a tool to convey information to stakeholders in their communities, including elected officials. The Emergency Manager of Madison County, KY, stated, "These slides are the best information my staff and I have for planning our response." Also, our media partners pass the information on via their blogs and websites.

Because these briefings are easy to understand and redistribute, NWS Louisville will continue using web briefings for future impactful weather. Look for these briefing slides in the Top News section of our website any time we are under a winter storm watch or warning, a moderate or high risk for severe weather, or before a widespread heavy rain or flooding event.



Example slides from briefings we constructed in 2013. Briefings are normally 4 to 7 slides long.

The mPING Project

Tom Reaugh, Lead Forecaster

Meteorological Phenomena Identification Near the Ground (mPING) is a project to collect precipitation type information from the public via mobile devices. The free mPING mobile app was developed through a partnership between NOAA, the University of Oklahoma, and the Cooperative Institute for Mesoscale Meteorological Studies. Users, who remain anonymous, can easily submit reports of what kind of precipitation they are witnessing, such as rain, snow, sleet, etc. The user's location and time of the observation are automatically included, and reports can be sent as often as every minute. The data are used by local NWS offices, especially in the winter when many different types of precipitation may be occurring. The data are also used by researchers who compare mPING reports with radar signatures to better understand how we can use radar information to monitor and forecast the weather with greater accuracy. See mping.nssl.noaa.gov to participate!

Surveying From the Sky

Brian Schoettmer, Forecaster

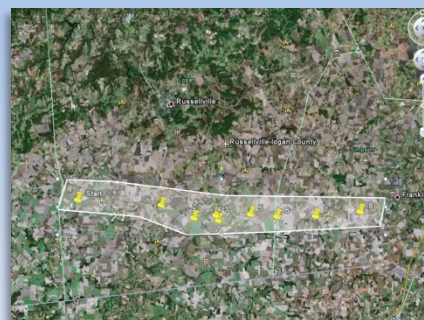
Volunteer general aviation pilots continued to help NWS Louisville with the damage survey process throughout 2013. Five different sets of volunteers flew tornado damage paths, bringing the total number of successful flights since the program started in 2011 to 11. A couple of noteworthy flights included the June 10 Logan and Simpson County EF-2 tornado and the June 26 Perry County EF-1. The photos from these aerial surveys helped to determine tornado path widths and lengths, and confirm what ground crews had discovered. The success that these pilots have achieved in just a couple of years has also helped to recruit additional pilots. As a result, the number of volunteer pilots across southern Indiana and central Kentucky has jumped to 37.

NWS Louisville held a luncheon to honor these pilots on November 9. The event featured an office tour and an awards ceremony for pilots who flew in the past year. Mark Adams, Senior Meteorologist from Ft. Knox Weather, spoke about sources pilots can use to obtain weather information while planning a flight.



An aerial photo of the June 10 Logan/Simpson County EF-2 tornado track reveals storm damage signatures that are not easily detected by a ground crew. The arrows highlight scour marks left by the tornado in an open field. Marks like these confirm that the tornado stayed on the ground even though there were no damage indicators such as structures or trees. Without aerial photos, a tornado path length or width could be recorded incorrectly.

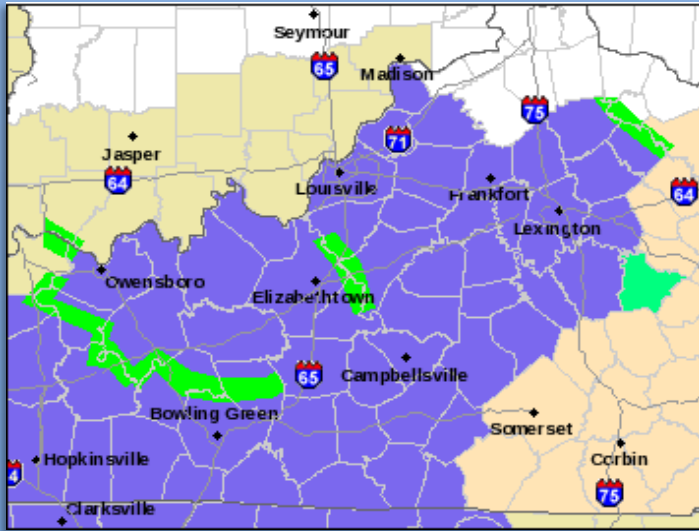
If you or someone you know is interested in joining this program, call Brian Schoettmer at 502-969-8842.



On the far left is an impressive photograph of a thunderstorm near Madison, Indiana on August 31, taken by Brent Spry. Strong winds were probably occurring with this storm, as evidenced by the curved shape of the intense rain shaft visible in the center of the picture. The upper right picture is of damage from the June 10 tornado in Logan County as seen by pilot Danny Walker. The lower right image shows the flight path flown across Logan and Simpson counties after the June 10 storms.

Mapping Flood Threats

Mike Callahan, Hydrologist



In the past, whenever part of a county experienced river flooding, the entire county was highlighted in green on the local and national watch/warning maps on our website. This was not desirable since only portions of the county along the river were affected. However, NWS Louisville has changed this. Now, only the areas along and either side of a river are highlighted in a warning polygon. Right now this only works for river flood warnings, but in future updates this will apply to river flood advisories as well.

The map at left shows river flood warning polygons (green) along the Licking River near Blue Licks Spring, the Rolling Fork River near Boston, the Green River from Brownsville to Calhoun, and the Ohio River near Newburg.

Notice, though, that the river flood advisory for the Kentucky River near Ravenna highlights all of Estill County. The change to polygons only affects *river* flood warnings. *Area*/flood warnings will still highlight the entire county.

Inundation Maps Available Online

Mike Callahan, Hydrologist

A two-year project involving many federal, state, and local agencies has been completed. As a result, the residents of Frankfort will know if their property will be threatened during a flood. A series of flood inundation maps was created and posted to the NWS Louisville website, showing the extent of flooding for every foot of flood from 29 feet to 52 feet.

The map at right shows that the intersection of Major and Wilson Streets in the Bellepoint area of Frankfort would have water between 3.4 and 5.4 feet deep if the river gage depth reached 45 feet.

To access the maps, visit weather.gov/louisville and click on the Rivers and Lakes tab. Then click on the Frankfort dot on the map, the Hydrograph Page for FFTK2 link, and finally the Inundation Mapping tab.

The lead federal agencies involved in the development of these maps were the NWS, U.S. Geological Survey, and U.S. Army Corps of Engineers. The Kentucky Division of Water provided critical elevation data, and Franklin County and the City of Frankfort contributed seed money to get the project going.

This was only the second such study in Kentucky, the first being the Little River at Hopkinsville. Other flood inundation mapping projects are being planned for the Licking River at Falmouth and the North Fork Kentucky River at Hazard.



The Travelers Advisory Returns

By John Gordon, Meteorologist-in-Charge

As we strive for excellence in our winter weather services, NWS Louisville works to: 1) do what's best for the customer, 2) be as definitive as possible in the first one to two days of the forecast, and 3) proactively issue and update forecasts even for perceived minimal events if the previous forecast does not reflect ongoing or expected weather. There have been three minor precipitation events over the last four years which caused widespread problems:

December 5, 2009 – Light freezing drizzle developed on the first Saturday in December (one of the busiest shopping days of the year), resulting in icy roads and hundreds of accidents despite the absence of heavy precipitation.

January 26, 2010 – In the pre-dawn hours, Louisville received only about half an inch of snow. However, temperatures fell sharply between 4 and 8 AM from 33° to 27°. Many people referred to this event as a flash freeze. Over 400 traffic accidents resulted during the Tuesday morning rush, 11 of which involved school buses.

January 21, 2013 – Scattered heavy, but brief, convective snow showers moved through the Bluegrass Region and northern Kentucky. There was a 90-vehicle pileup on Interstate 275 in a snow shower that caused sudden whiteout conditions, resulting in the death of a 12-year-old girl. Most locations actually received no snow, and even in the convective snow showers accumulations were less than an inch.



Winter Weather Advisory

Issued for a mixture of snow, sleet, and freezing rain or freezing drizzle, or for average snowfall amounts of less than 4 inches, e.g., 1-2, 1-3, 2-4.

Winter Storm Warning

Issued for a high probability of heavy snow or sleet, significant accumulations of freezing rain or freezing drizzle, or a combination.

In an effort to tackle these types of vexing winter events that are below Winter Weather Advisory issuance criteria but still have high impact, NWS Louisville brought back a forecast product from the past: the Travelers Advisory (TA). The TA is issued for winter weather events that cause difficulties for commuters and travelers, but have almost no impact for those away from roadways. We issue TAs for events such as flash freezes, black ice, areas of freezing fog, and freezing drizzle. The TA is not so much a product based on criteria, as it is based on public impact.

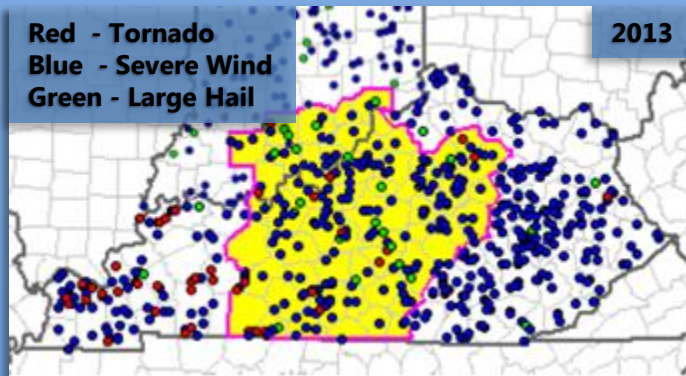
NWS Louisville began issuing TAs during the winter of 2012-13. Feedback was solicited from all 5 media markets we serve, Emergency Management Agencies, highway departments, and NWS Louisville staff members. Comments were varied; however, the majority of media were in favor of the TA. Winter weather causes highway departments and Louisville's Traffic Response and Incident Management Assisting the River Cities (TRIMARC) system great heartache. They are appreciative of anything we can do to help protect life and property on roads across southern Indiana and central Kentucky.

Tornado Activity and Response

Joe Sullivan, Warning Coordination Meteorologist

One could say that 2013 was a year in which our Warning Coordination Program was driven by outside forces. Events occurring in Oklahoma and Washington, DC played as large a role in the program as any weather that occurred in the Ohio Valley during the year. Androids and iPhones also helped steer activities in the program.

Reduced funding for travel due to the Federal sequestration resulted in far fewer Skywarn Spotter training classes. Fortunately, there were few storms that required spotter input. After several very active severe weather years in central Kentucky and southern Indiana, 2013 was relatively quiet with only 14 tornadoes recorded in the 59 counties served by NWS Louisville (yellow area in image below). That was down from the 26 that occurred in 2012 and just a fraction of the 61 that touched down in 2011. Of the twisters that were recorded in 2013, three reached EF-2 intensity. The first was in Warren County January 30, the second in Logan and Simpson Counties June 10, and the third in LaRue County June 26. Unlike 2012, no lives were lost to these tornadoes, and thankfully only 7 injuries were sustained.



As a result of the devastating tornado that struck Moore, Oklahoma in May, many schools across the country began questioning whether they were sheltering in the best possible locations during tornado warnings. In Kentucky the state legislature passed a bill requiring schools to work with their local public safety officials to revisit all of their disaster plans, including tornado shelter locations. This resulted in numerous visits by NWS Louisville staff to K-12 schools in central Kentucky for that purpose. Several more will occur during 2014.

StormReady Expands

Joe Sullivan, Warning Coordination Meteorologist

NWS Louisville participated in one of the most aggressive efforts in the history of the StormReady program. Every state park in Kentucky offering overnight accommodations was inspected for – and awarded – StormReady Supporter recognition. The culmination of a multi-year effort begun by former NWS Louisville Lead Forecaster (and current Grand Rapids, Michigan Warning Coordination Meteorologist) Jim Maczko, the Kentucky State Parks system became the first in the nation to achieve this status. Overnight guests in Kentucky's parks can rest comfortably knowing that, while the parks are not stormproof, the infrastructure and trained staff at each facility are prepared to keep visitors safe.

In addition to the state parks' recognition in Kentucky, NWS Louisville staff worked with emergency management in Dubois and Scott Counties in southern Indiana to earn StormReady County designation, and with Western Kentucky University to achieve StormReady University status.



Warning Strategy for Squall Lines

Tom Reaugh, Lead Forecaster



Squall lines present many challenges for weather radar operators. These storms often move very quickly, giving little time for warnings to be placed ahead of them. Additionally, they can be hundreds of miles long, affecting dozens of counties simultaneously. They are also notorious for generating tornadoes that spin up very rapidly, do significant damage in a small area, and dissipate just as quickly. Issuing severe thunderstorm warnings and tornado warnings for these systems can be exceptionally tricky.

When a line of severe storms crosses southern Indiana or central Kentucky, NWS Louisville uses two forecasters to issue warnings on the line. One radar analyst issues severe thunderstorm warnings for counties along and ahead of the line. The other meteorologist concentrates on identifying transient small circulations that may, or may not, become tornadoes, and issues any necessary tornado warnings. In this way we can have one person dedicated solely to the important job of finding, and warning on, tornadoes that spin up along the line of storms, while non-tornadic areas are still covered by severe thunderstorm warnings for damaging wind or hail potential. In 2013 this method was used successfully on January 30 when a powerful squall line swept through central Kentucky and generated seven small tornadoes.

Many Facets of Weather Support

Mike Paddock, Forecaster

NWS Louisville forecasters continued to expand Decision Support Services in 2013. Several members of our staff who are certified in hazardous materials (HAZMAT) operations provided on-site weather monitoring and forecast assistance to the Louisville Metro Joint Emergency Services Unit (J-ESU) for Thunder Over Louisville, the Kentucky Oaks, and the Kentucky Derby. The J-ESU is a group of highly skilled professionals including police, fire, EMT, HAZMAT, and public health officials who are trained to be first responders to a wide range of hazards.



See our short video of the Milton-Madison Bridge span demolition on our YouTube channel at youtube.com/user/NWSLouisville/videos

NWS Louisville representatives provided crucial weather support for several activities. Joe Sullivan deployed to a HAZMAT clean-up site in Louisville where weather-sensitive chemicals were exposed to rain developing just west of the incident site. Information Technology Officer Toby TenHarmsel provided on-site weather support to emergency managers and support staff during one phase of the Milton-Madison Bridge demolition. Forecaster Mike Paddock provided remote weather support to Nelson and Boyle County emergency management for several days leading up to the Kentucky Bourbon Festival, Kentucky State BBQ Festival, and Perryville Civil War Days, with a combined average annual attendance of 112,000. Joe Sullivan and Ron Steve participated in a Chemical Stockpile Emergency Preparedness Program (CSEPP) training exercise by providing on-site weather monitoring and forecast support at two locations: the Kentucky State Emergency Operations Center (EOC) in Frankfort and the Lexington EOC.

Stay Informed via Social Media

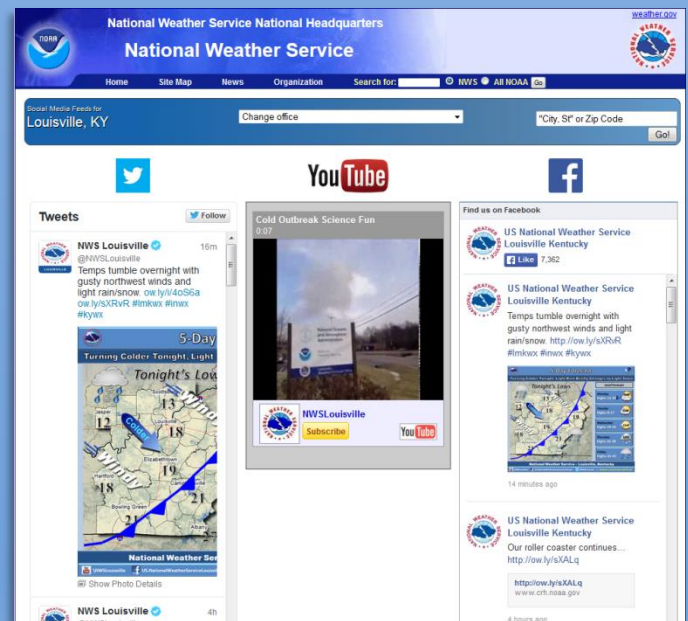
Linda Gilbert, Meteorologist

NWS Louisville has once again expanded its presence in the social media world by joining YouTube. While not as much activity occurs through this channel as compared to our frequent updates via Facebook and Twitter, the benefits of having a venue in which to share videos has been tremendous. When you visit youtube.com/user/NWSLouisville/feed, you will find a variety of videos ranging from public service announcements, courtesy of Senator Dan Coats of Indiana, to what happens to a cup of hot water when it is tossed into near zero degree air temperatures. Additionally, you'll find weather and other pertinent videos linked to our page that we think you will enjoy or find informative. Be sure to subscribe to us!

Have you seen the new Social Media Dashboard, now available on our website? When you visit the Dashboard you'll be able to view all of our latest posts made through Twitter, YouTube, and Facebook without having to sign into any of those sites. It's a great way to get a peek at what we're talking about in the social media world. Additionally, it's easy to access other NWS offices without leaving the page.

On Facebook we gained 2245 new "likes" in 2013, an increase of approximately 68% over the course of the year. The number of "likes" spikes when significant weather is expected in the local forecast area.

At Twitter we started in January with 705 followers, increasing to just over 2900 by the end of the year. Spikes can also be seen on Twitter, much like Facebook, of an increased number of followers, as well as mentions, during times of inclement weather.



Our social media dashboard at srh.noaa.gov/CmsSrAdditions/smpanel/?sid=lmk&embed

Bold New Look for Weather Stories

This Afternoon

Winter Weather Advisory

- A few additional snow showers will be possible this afternoon but significant additional accumulations are not expected.
- Hazardous travel conditions are possible this afternoon due to blowing snow with westerly wind gusts to 25-35 mph.

National Weather Service—Louisville, Kentucky

WWSLouisville | US.NationalWeatherServiceLouisville.gov | @NWSLouisville

Linda Gilbert, Meteorologist

In late 2013, NWS Louisville made significant improvements to the Weather Stories we post on our website. Changes in software have allowed us to use new graphics, opening up a wide door of design capabilities. Previously, the Weather Story was limited to just a basic map background with text and a small set of icons. Since the latest changes, the ability to use pictures as backgrounds and alter the look of the product has vastly reformed the aesthetics of the Weather Story.

How Well Do Our Forecasts Verify?

Ryan Sharp, Lead Forecaster

Each day as we prepare new forecasts, we look back at our previous forecasts and those of computer models to see how well they did versus reality. Thus, we are able to detect when a certain model tends to be too warm or cold, for example, allowing us to adjust subsequent forecasts to improve upon the model data.

We perform this verification on several weather parameters for which we forecast: high and low temperatures, hourly temperatures, dew points, and winds. In 2013 we added probability of precipitation (PoP) to the list. The verification software sends personalized e-mails to all forecasters each month to let them know if their forecasts tend to be too wet, too dry, or right on. As an office, the program shows that we are improving on computer guidance for all forecast periods for precipitation, as shown below.

For Short Term (12-48 hour) Forecasts in 2013:

- Office Average Wet PoP, 51%
- Office Average Dry PoP, 14%
- Percentage Improvement over computer guidance forecasts, 27%

What is a wet PoP?

When precipitation is measured (at least 0.01") across our area, it is the average Probability of Precipitation (PoP) that we had in our forecast.

For Long Term (60-168 hour) Forecasts in 2013:

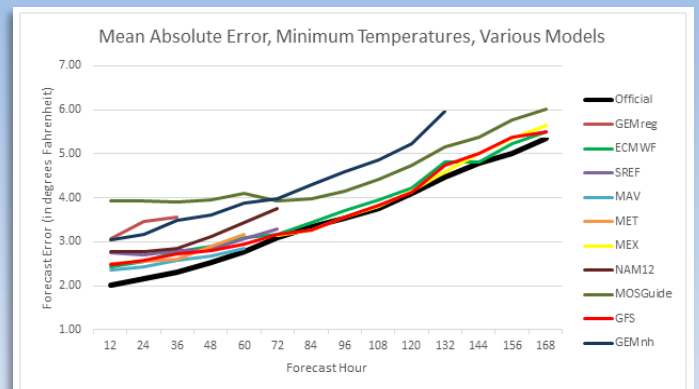
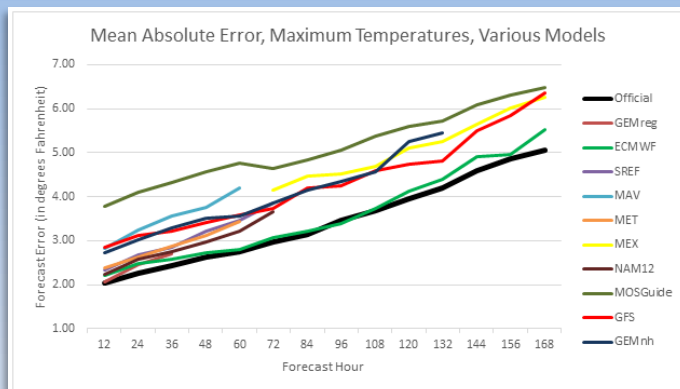
- Office Average Wet PoP, 34%
- Office Average Dry PoP, 15%
- Percentage Improvement over computer guidance forecasts, 14%

What is a dry PoP?

When precipitation does not fall across our area, it is the average Probability of Precipitation (PoP) we had in our forecast.

NWS Louisville also does well against computer guidance for forecasts of high and low temperatures. The charts below indicate our forecast temperature errors, labeled "Official" and shown in black, for both categories for the short term (12 hours) out to Day 7 (168 hours). Several of our models are listed (e.g., GEMreg is the Canadian forecast model on a regional scale), as well as ensemble forecasts (e.g., SREF stands for Short-Range Ensemble Forecast), and statistical guidance (e.g., MAV,

which is based off the Global Forecast System, or GFS). The lower the line on the chart, the less error in the forecast. As you can see, the bold black line (NWS Louisville forecast) remains consistently lower than the computer model forecasts, showing an overall improvement of 23% over these models. The lines slope up because forecast error increases farther out in time.



Forecasting for Aviation

Brian Schoettmer, Forecaster

Meteorologists at NWS Louisville issue forecasts for three major airports in central Kentucky: Louisville International (Standiford Field), Lexington's Blue Grass Airport, and Bowling Green – Warren County Regional. Forecasts at these airports are critical in helping air traffic flow management. Decisions concerning how much fuel jets carry and which airports will be designated as alternate landing sites in bad weather conditions are based off of these forecasts. Of particular importance, flight planners and pilots are interested in how low cloud bases and surface visibilities will become because of the impacts on takeoff and landing operations. If cloud bases or visibilities get too low, aircraft cannot take off and land efficiently, which wastes expensive fuel and delays flights. Situations like this can cost airlines and air freight carriers money and time if they do not have an adequate forecast.

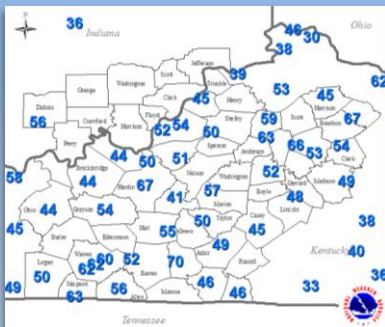


A storm bears down on Madison Municipal Airport in Indiana on August 31. *Photo courtesy Theresa Strohl.*

During 2013, NWS forecasters cut down on the false alarm rate (forecasting something to happen that did not happen) of low ceilings and visibilities at all three airports by 21% over computer forecast model guidance. Lowering the false alarm rate saves air carriers substantial amounts of money due to saved fuel and better air traffic flow management. In addition, forecasters often call the airports ahead of incoming storms to let air traffic controllers know about imminent, abrupt changes in the weather.

KY Mesonet Proves Its Worth...Again

John Gordon, Meteorologist-in-Charge



Wind gusts on December 21, which were used in real time to aid in storm verification and surveys, and may be used in future research and training.

Over the past several years, one of the biggest operational changes at NWS Louisville has been the use of Kentucky Mesonet data. A mesonet is a dense network of automated surface observing stations that provides temperature, precipitation, dew point, wind speed, wind direction, and other valuable information. These data are critical when forecasting severe weather onset, ridge/valley temperature splits, frontal passages, winter precipitation type, and other phenomena.

The most critical Kentucky Mesonet information for the NWS is high quality wind gusts, which provide ground truth that aids the severe weather warning decision process. During the severe weather of October 31 and December 21, the Mesonet wind gust observations immeasurably aided warning forecasters deciding which storms needed warnings. For more information on the Mesonet, see www.kymesonet.org.

Partnering with Local Universities

Ted Funk, Science and Operations Officer, and John Gordon, Meteorologist-in-Charge

In 2013, NWS Louisville continued its "Seminar-A-Semester" series with the atmospheric science departments at Western Kentucky University (WKU) and the University of Louisville (UofL). In this program, NWS meteorologists presented topics of mutual interest to university faculty and students to bring an operational perspective to the necessary theory taught in class.



Lead Forecaster Tom Reaugh, in black sweater on the right, and Meteorologist Linda Gilbert, in maroon blouse next to Tom, enjoy a meal with WKU students after speaking with them about tornado climatology and employment opportunities in meteorology.

At WKU, meteorologists Mike Paddock and Mark Jarvis reviewed 2011 and 2012 severe weather events and the use of atmospheric computer models. Tom Reaugh and Linda Gilbert discussed tornado climatology in Kentucky (www.crh.noaa.gov/lmk/?n=tornado_climatology) and career opportunities in meteorology.

At UofL, Mark Jarvis, Ryan Sharp, Kevin Deitsch, and Linda Gilbert teamed up to discuss severe weather parameters, computer model data, a local snow event, and career opportunities. In addition, during the spring semester at UofL, Ted Funk taught a full course on severe and hazardous weather, while Hydrologist Mike Callahan taught a GIS-based class.

In February, meteorologists from NWS Louisville and nearby NWS offices traveled to the meteorology departments at Purdue University and Ball State University. We brought students a mixture of science, insight into how the NWS works, career and interview advice, a lesson on how to build a resume, and, most of all, tips on how to separate yourself from the rest!

Continuing our efforts with students, five college students worked at the Louisville office over the summer and completed an impressive portfolio of work. Zack Leasor, Andrew Dockery, and Emily Yates, all from WKU, Clifford Goff from the UofL, and Samantha Garrett from Ball State University participated in the student volunteer program at our office. Some of the projects they completed included extensive GIS work, new webpages such as a brand new aviation page (crh.noaa.gov/lmk/?n=lmk_avit_sa), a historical weather poster on the 2008 Hurricane Ike windstorm, and much more. Most importantly, the students shadowed forecasters on operational shifts, learning the ropes of what it's like to be a full-time meteorologist with the NWS.



These programs have proven to be very successful, with students expressing great appreciation for NWS Louisville's involvement at their schools.



Earning Scholarships at the NWS

Ted Funk, Science and Operations Officer

The National Oceanic and Atmospheric Administration (NOAA) Ernest F. Hollings student scholarship program is designed to increase undergraduate training in oceanic and atmospheric science and research, and to recruit and prepare students for public service careers within NOAA and other governmental scientific agencies. The Hollings scholarship program provides successful applicants with academic assistance and a full-time 10-week internship research position during the summer at a NOAA facility.

NWS Louisville submitted three research project opportunities to the NOAA Office of Education website, where many other potential projects were housed from other offices and agencies. Hollings scholars from across the country then were able to review all projects and contact offices whose opportunities were of interest. From there, the student and office would discuss the project in more depth to determine if there was mutual interest for the student's summer internship.

In the fall, a few Hollings scholars contacted NWS Louisville about our project proposals. After interviewing each, we selected two outstanding students to work on two of our research opportunities in the summer of 2014. Jessica Tomaszewski from the University of Oklahoma will work on "*Environmental Parameters to Distinguish Tornadoic Vs. Non-Tornadoic Supercells and Squall Lines*," while Allison Young from Valparaiso University will research "*The Influence of ENSO and NAO on Wintertime Weather in the Ohio and Tennessee Valleys*." Each student will be mentored by an NWS Louisville project leader, with research results culminating in a presentation at NWS Headquarters near Washington, DC and in an electronic and/or journal article.

We are very excited to have two Hollings scholar students at our office this coming summer. It will definitely be a mutually beneficial experience.



Connecting with Kids

Linda Gilbert, Meteorologist

In 2013, NWS Louisville participated in the Jefferson County Public Schools (JCPS) Middle School "Make the Connection" initiative. This program, organized by the JCPS Volunteer Talent Center, gives local businessmen and women a chance to speak to seventh grade students about the roles they play in their communities, with a focus on the importance of education and planning for the future.

Volunteers from NWS Louisville talked to area middle school students about goal-setting, doing well in school, career interests, how adults use academic skills, and what we do as NWS meteorologists. This provided a wonderful opportunity for NWS staff to make a difference at a critical point in the students' lives by joining our community in sending a positive message to our school children.



Interacting with the Community

Linda Gilbert, Meteorologist

NWS Louisville participated in a number of outreach activities in 2013 with efforts to increase community partnerships and involvement. Building relationships strengthens communication with safety officials and the public when severe weather strikes.

The First Annual Local Emergency Planning Committee (LEPC) Safety Fair was held on July 27 at the Mount Vernon Missionary Baptist Church in Louisville. Organized by Louisville's Department of Public Health & Wellness, LEPC, and MetroSafe, the NWS, along with several other organizations, was invited to have a booth at this informative fair. This allowed residents to engage with us, emergency personnel, environmentalists, educators, and many others. Kids and adults alike were fascinated by our tornado machine. Additionally, we answered questions, passed out pamphlets on a wide variety of weather-related topics (with an emphasis on weather safety), and had a display depicting catchy weather safety phrases and pictures. We hope to repeat our presence at future fairs in an effort to maximize our reach to the community.



Meteorologist Linda Gilbert runs the NWS booth at the LEPC Safety Fair. The tornado machine is on the right.



A new concept is under development in Madison County, KY to provide a safe haven during tornado watches and warnings for people living in mobile and manufactured housing. Our presence was requested by the Madison County Emergency Management Agency to provide a scientific view on the dangers of being in a mobile home during severe weather, particularly tornadoes. Following a recent severe weather outbreak, Kentucky Public Health officials and local emergency management agencies came together to work on saving lives through this groundbreaking project. So far, ten counties across the Commonwealth are participating in the early stages of this project by recruiting local churches to open their doors to mobile home residents during tornado watches. The goal is to minimize the mobile home fatality rate by providing shelter during potentially deadly weather.

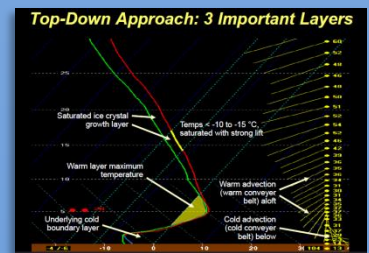
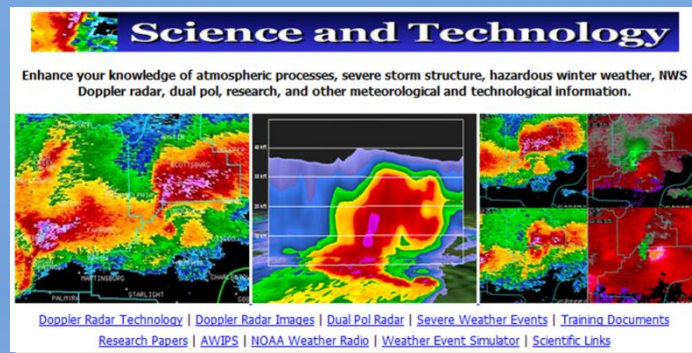
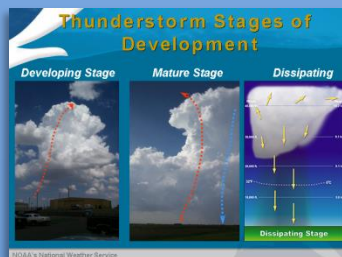
Learn Meteorology from the NWS

Ted Funk, Science and Operations Officer

Staff members at NWS Louisville participate in recurring training on many meteorological subjects throughout the year to remain up-to-date on the latest technology, operational research, forecast and warning techniques, and computer models. We incorporate this knowledge into all of our services to protect life and property, and to best serve you.

If you would like to learn much more about meteorology, visit our elaborate Science and Technology website, which we completely updated in 2013. The site, www.crh.noaa.gov/lmk/?n=scienceandtechnology, features an abundance of training material on atmospheric processes important to the development and forecasting of winter storms and severe weather, the structure and evolution of severe thunderstorms, and NWS Doppler radar and dual polarization principles and examples. We also feature selected local and national research papers, technological summaries of certain NWS hardware systems, reviews of past hazardous weather events in our area, and links to many other scientific organizations.

We update the site periodically with new information when it becomes available. Feel free to contact us if you have questions, comments, or suggestions for our Science and Technology site.

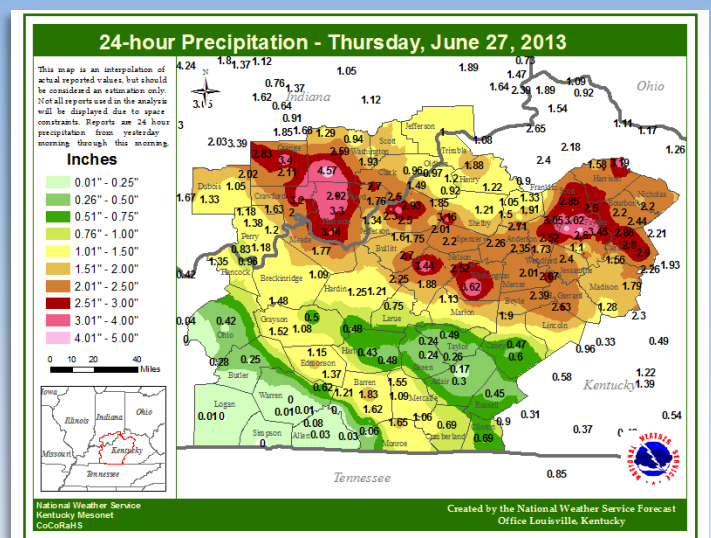


Just a few examples of the meteorological training materials found at www.crh.noaa.gov/lmk/?n=scienceandtechnology.

Award-Winning GIS Maps

Ted Funk, Science and Operations Officer

Hydrologist Mike Callahan and Forecaster Erin Rau worked extensively to develop computer scripts that create Geographic Information System (GIS) maps of rainfall, snowfall, wind gusts, and high and low temperatures for central Kentucky and southern Indiana. The maps are used by the USGS, local and national media, emergency managers, private meteorologists, climatologists, and other customers and partners. Similar maps are now generated and displayed at over 20 NWS offices. Based on their tremendous effort, the NWS awarded Mike and Erin the distinguished Isaac M. Cline Regional Award for Hydrometeorology.



Conversion to Digital Rain Gauges

Mike Crow, Observing Program Leader

In 2013, NWS Louisville installed three digital weighing rain gauges, known as Fisher-Porter Rebuilds, or FPR-Es, bringing the total number of units in central Kentucky and south central Indiana to 13. FPR-E gauges were designed to replace punch tape gauges that had been in use since the early 1960s. The 1960s version of the Fisher-Porter (F&P) gauge recorded accumulated rainfall every 15 minutes. Rain was collected by a funnel in the gauge and stored in a bucket. A weighing mechanism in the gauge converted the weight of the water in the bucket to inches of rainfall. A timing mechanism initiated a punch cycle every 15 minutes and encoded accumulated rainfall on a tape in tenths of an inch. At the end of each month, the observer retrieved the roll of tape and mailed it to the NWS. Cooperative Program Managers at the NWS would check the tape for errors and send the tapes to the National Climatic Data Center in North Carolina for additional quality control and eventual publication.



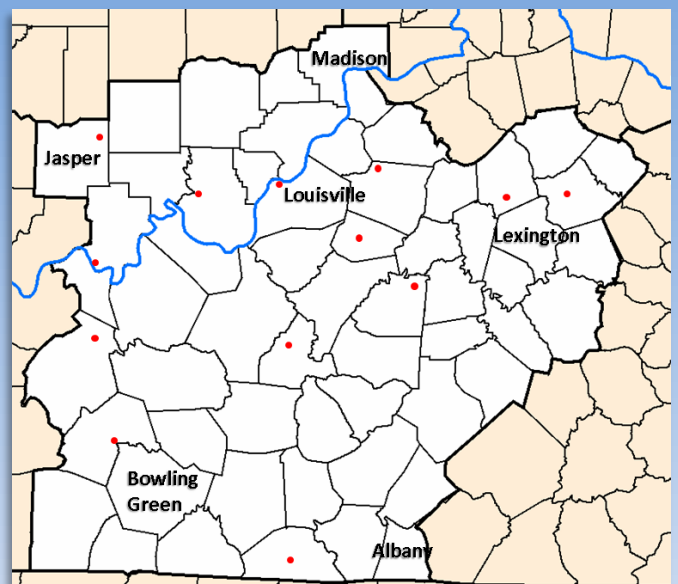
Hydrometeorological Technician Rick Lasher services an old F&P style rain gauge.



An FPR-E gauge.

The Fisher-Porter Rebuild (FPR-E) uses the same base plate as the old F&P gauge, but replaces the punch tape mechanism with a load cell and a digital data logger. Instead of removing and mailing a punch tape at the end of each month, the observer downloads a data file onto a flash drive. The data file contains the same 15-minute rain accumulation data as the legacy F&P, along with data on the performance and function of the gauge. After the data download is complete, the observer can send the data to the NWS in an email.

In 2013, office staff installed FPR-E gauges at Fordsville, KY (May 23); Paris, KY (May 30); and Georgetown, KY (June 12). Summer volunteers Clifford Goff (UofL) and Andrew Dockery (WKU) assisted with the installation at Georgetown on one of the hottest and most humid days of the summer season. The installation at Georgetown came almost a year to the day after the installation of the first FPR-E gauge at McAlpine Lock and Dam (June 13, 2012).



Red dots on the map above show where FPR-E rain gauges are located in southern Indiana and central Kentucky.

Interested in becoming a weather observer for the NWS? Visit the Cooperative Observer Program website at nws.noaa.gov/om/coop/ for more information, or give NWS Louisville a call at (502) 969-8842. Thank you!

Top Local Weather Events of 2013

Tom Reaugh, Lead Forecaster



Tornado debris from a destroyed barn in Bourbon County on December 21. *Photo courtesy Andrea Terry.*

A squall line erupted during the evening hours of December 21 ahead of a sharp cold front that brought widespread wind damage and 2 to 4 inches of rain. The line of storms also gave central Kentucky our first December tornado since 1971 and the first multiple-tornado December day on record!



A photogenic tornado in Logan County on June 10. *Photo courtesy Katelyn Jernigan.*

A high-end EF-2 tornado, with maximum wind speeds of 135 mph, cut a 14-mile long path across Logan and Simpson Counties on June 10. The worst damage occurred northeast of Adairville, where several homes sustained extensive damage and three people were injured. Five homes sustained extensive damage and five grain bins were blown away. Numerous other outbuildings were damaged or destroyed.



An EF-0 tornado tore apart this Marion County trailer on January 30. *Photo courtesy Hayden Johnson.*

A powerful line of storms moved through the Ohio Valley during the pre-dawn hours of January 30. The storms developed ahead of a strong cold front trailing from a strengthening surface low that moved into the lower Great Lakes. These storms tapped into incredibly strong winds just above the surface and produced scattered damage throughout southern Indiana and central Kentucky. A total of seven tornadoes touched down – quite unusual for January!

Goals for 2014

- Continue to expand level of response and on-site support of public events through decision support services (DSS)
- Develop Kentucky-centric DSS briefing webpages
- Improve accuracy of tornado warnings
- Help the city of Louisville become StormReady
- Implement an online storm spotter class
- Host Hollings scholar students
- Expand our social media presence
- Commemorate 40th anniversary of the April 3, 1974 Super Tornado Outbreak
- Work more closely with local media, especially television stations



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