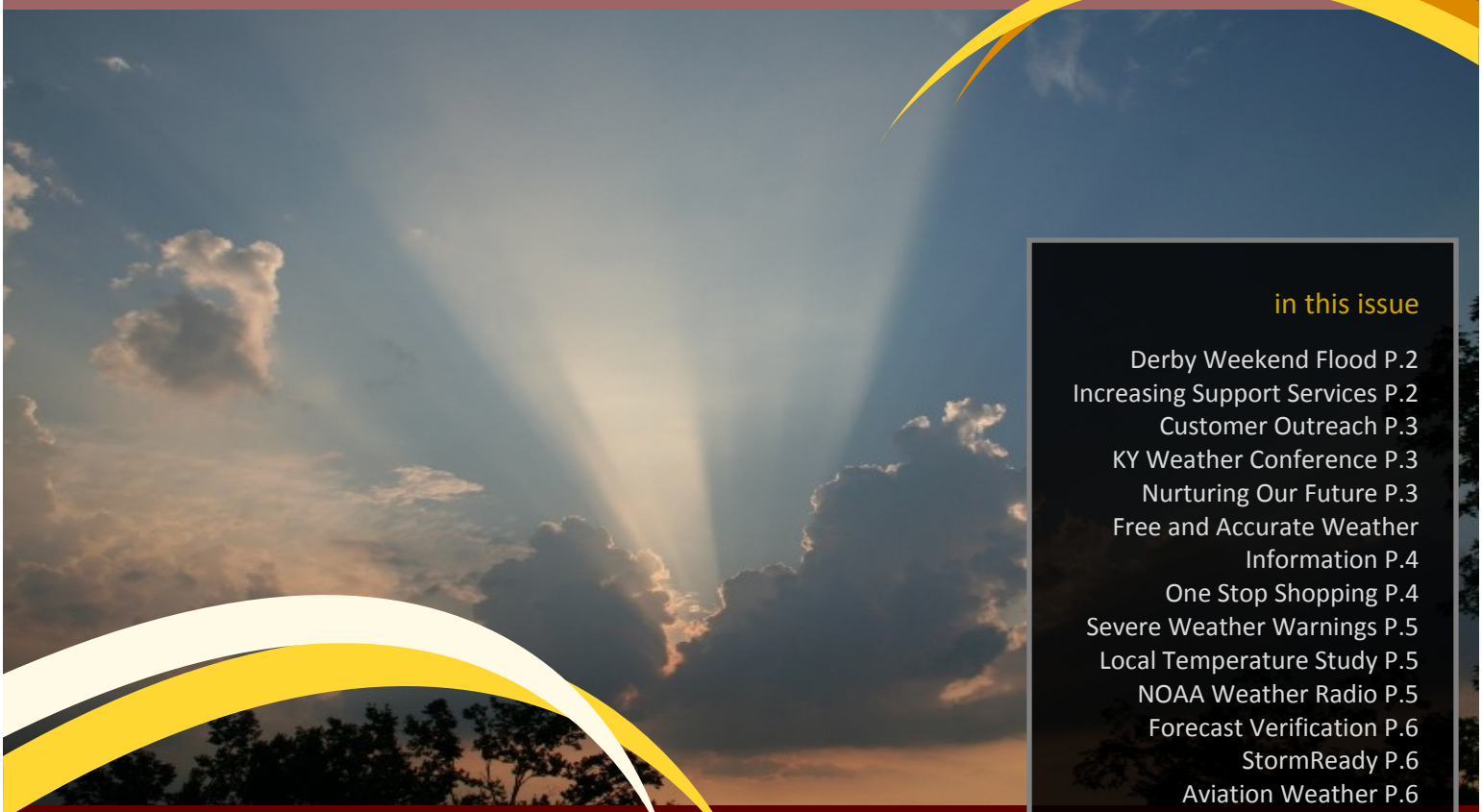
2010 Shareholders' Report

National Weather Service, Louisville
National Oceanic and Atmospheric Administration



in this issue

A Message from the Meteorologist-in-Charge

Welcome to the sixth edition of the Shareholders' Report from the National Weather Service (NWS) office in Louisville, Kentucky.

You are a shareholder in the NWS! As a taxpaying citizen of this country you have invested in your federal government, of which the NWS is a part. The NWS was appropriated $999 million for Fiscal Year 2010, which equates to just $3.10 per person in the United States. As the Meteorologist-in-Charge of your investment I feel it is my duty to report to you how your "holdings" have fared.

This report details the activities of the Louisville Weather Forecast Office (WFO LMK) and events in its county warning area (CWA) during 2010. Since you are both a shareholder and a customer, I hope you find our activities have demonstrated the sort of stewardship you expect from your public servants. As always, I welcome your comments and suggestions as to how the NWS can be an even better investment for you.

----- John Gordon, Meteorologist-in-Charge

NWS Mission

The National Weather Service provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community.

Derby Weekend Flood

The incredible amount of rainfall that inundated the region May 1-2, 2010 was a result of copious amounts of Gulf of Mexico moisture being pulled northward by a slow moving cold front. Many locations in south central Kentucky along the Tennessee border received 8 to 10 inches of rainfall from early Saturday morning (May 1) to late Sunday evening (May 2). The drenching rain caused widespread and life-threatening impacts across the region including flash flooding, mudslides, dam failure, road closures, evacuations, swift water rescues, and, unfortunately, fatalities. Almost all streams and rivers in central Kentucky experienced some degree of flooding. Areas along the Green River attained "major flood" criteria, which had significant impacts on local communities. Dunham Lake Dam on the south fork of the Little Barren River in Metcalfe County was put at a high risk of failing due to flood waters eroding the barrier. Nearly the entire CWA was under a Flood Emergency Sunday and Sunday night.

"We got the most extreme top-notch service from the NWS during the Kentucky Derby."

----- Michael Dossett, Kentucky Regional Response Manager for Louisville

NWS Louisville began alerting the public to the possibility of heavy rain a full six days in advance. As the event drew closer and the gravity of the situation became more clear, flood watches were issued. On Friday Joe Ammerman, a senior meteorologist from NWS Louisville, spent the day with Churchill Downs officials providing them the freshest weather information as the Oaks and Kentucky Derby approached. A press conference that afternoon included a weather briefing given by Mr. Ammerman in which he discussed the approaching storm system's heavy rainfall (see *www.youtube.com/watch?v=tth9xN81cd0*).

As the historic event unfolded, NWS Louisville issued scores of products related to the heavy rain and flooding, constantly keeping the public aware of where the rain was and how high area streams were flowing. By Sunday the earthen Dunham Lake Dam in Metcalfe County had begun to erode and was in serious danger of failing. Warning Coordination Meteorologist Joe Sullivan traveled to the dam and provided local officials critical weather information to assist their decision-making.

After the rains subsided and the rivers and streams returned to their banks, an official government assessment of the NWS was performed. It was the conclusion of this assessment that NWS Louisville displayed exemplary performance both before and during the event, showing admirable foresight with weather forecasts well in advance of the storm. Support of emergency officials and the public during the torrential rain and flooding was a priority.

Franklin, Kentucky. Photo: Alicia Bingham

Increasing Support Services

Forecast and other pertinent weather information supported our customers and partners before, during, and after the May flood via our website. The site includes a one-stop page with the most important information available in one location. The data on this page were used extensively when NWS Louisville initiated and led three large partner meetings with officials whose districts were adversely affected by the flood. These relationships allowed several organizations to work together with the NWS after the flood to plan new river gauges and review flood stages.

To see our "one-stop" weather pages, visit *weather.gov/louisville* and click on "Items of Interest" in the left-hand menu. You can then choose from pages for general information, climate data, winter weather products, and severe weather updates.

Swift water rescue in Allen County. Note the victim's nearly submerged vehicle. Photo: Allen County *Citizen-Times*

Customer Outreach

The NWS must continue to develop and maintain close relationships with the communities that depend on our meteorological services.

In 2010 NWS representatives provided crucial on-site weather support for Thunder Over Louisville, the Oaks, the Kentucky Derby, and the prestigious World Equestrian Games.

The Louisville Metro Joint Emergency Services Unit (J-ESU) is a group of highly skilled professionals including police, fire, EMT, and HAZMAT officials who are trained to be first responders to a wide range of potential hazards. Three NWS meteorologists are on the J-ESU team to provide on-site real-time weather information for whatever hazard the responders might be facing. For example, imagine a situation where a dangerous chemical has been leaked and released into the air. Meteorologists on the team will be responsible for providing precise information on wind speed and direction to anticipate how the plume of dangerous chemicals will affect areas downwind. The J-ESU and NWS employees will be working large scale public events such as Thunder Over Louisville and the Kentucky Derby in 2011.

On March 2 Senior Meteorologist Angie Lese presented a lightning and severe weather safety talk to Lakeside Swim Club employees in Louisville. Mary Graves, the Aquatic Operations Manager at Lakeside, as well as John Warren, sales representative of Johnson Controls, Inc., worked together to organize this presentation. The class informed the Lakeside lifeguards about the dangers of lightning and other severe weather phenomena such as tornadoes, hail, and high winds, and what to do in the event of their occurrence. Ms. Lese stressed that the role of an NWS meteorologist is the same as a lifeguard's: to protect lives.

Senior Meteorologist Joe Ammerman from NWS Louisville gives a weather briefing to the press shortly before the running of the 136th Kentucky Derby.

Volunteer weather spotters are a cornerstone of our severe weather warning program. These weather watchers report severe weather directly to the NWS. To train the spotters NWS Louisville holds many training classes each February through April.

Kentucky Weather Conference

For two days in November NWS Louisville participated in the Kentucky Weather Conference in Bowling Green. The conference was open to the public and was attended by over 100 people from several weather sensitive walks of life including emergency managers, HAM radio operators, the media, storm spotters, and students. The purpose of the conference was to present informational seminars designed to educate the audience on weather related topics such as radar technology, flooding, El Niño, computer forecast modeling, winter weather, and tornadoes.

Dr. Greg Forbes of The Weather Channel, who surveyed tornado damage with Dr. Tetsuya Fujita in Kentucky following the April 3, 1974 Super Outbreak, attended the second day of the conference and led one of the seminars.

Nurturing Our Future

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

Continuing our efforts with the future of meteorology, four college students volunteered at the Louisville office over the summer and completed an impressive portfolio of work. Some of their larger projects included updating tornado track maps using Geographical Information Systems (GIS) technology, developing a map-based spotter database in Google Earth, expansion and redesign of our website, and completion of a full-color poster commemorating the 2009 Kentucky Ice Storm. Most importantly the students shadowed forecasters on operational shifts, learning the ropes of what it's like to be a full-time meteorologist in the NWS.

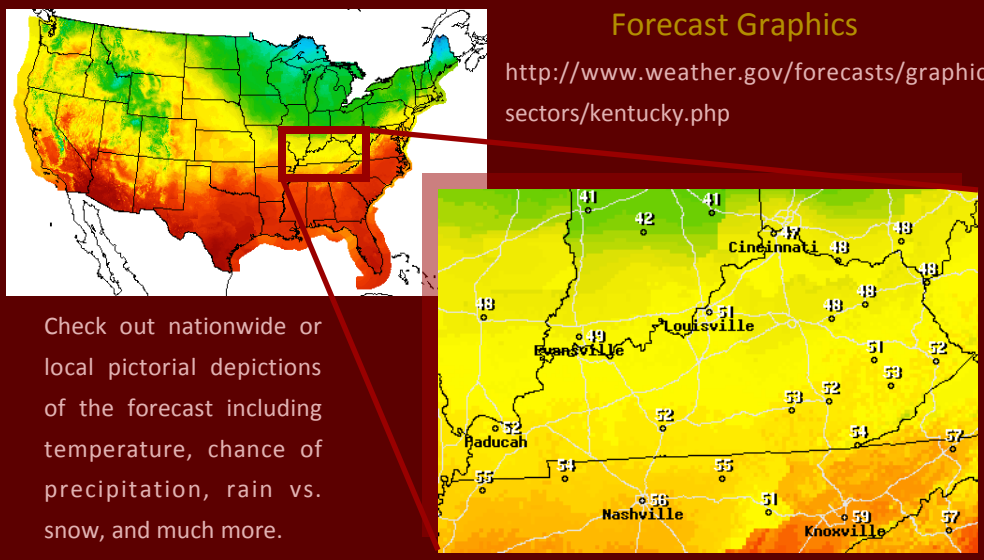
John Gordon (far left) informs and entertains students during the 2010 college road show.

Free and Accurate Weather Information

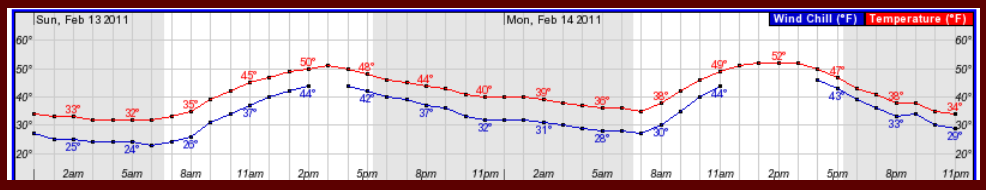
Your tax dollars support the NWS, so all the weather data we generate are given free of charge. One of the best ways to receive warnings, forecasts, and climate information is via our web site at *weather.gov/louisville*. Below we highlight just a few of the features of our expansive presence on the World Wide Web.

Forecast Graphics

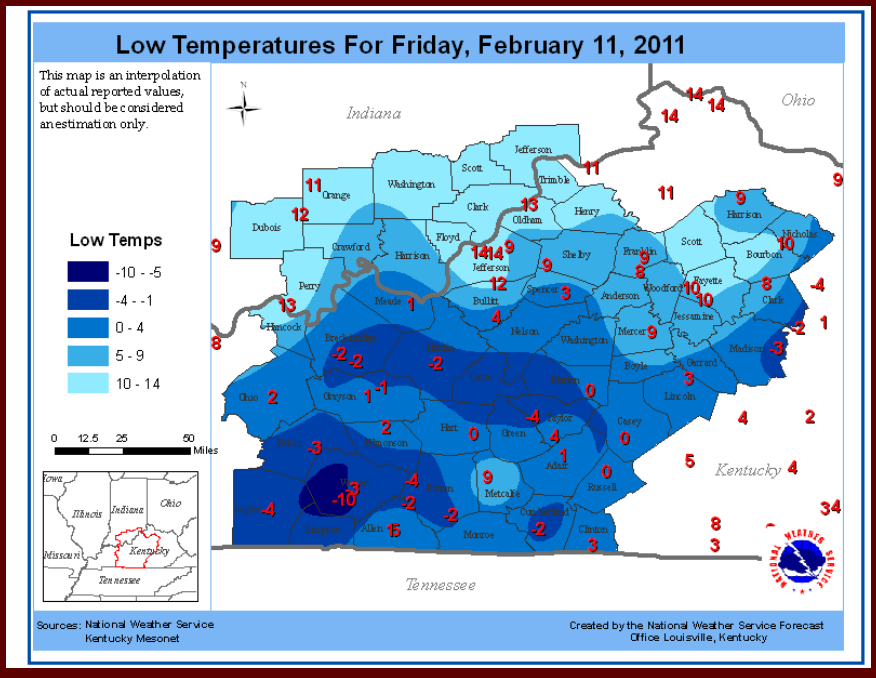
http://www.weather.gov/forecasts/graphical/sectors/kentucky.php



Check out nationwide or local pictorial depictions of the forecast including temperature, chance of precipitation, rain vs. snow, and much more.



Graphical descriptions tell you hour by hour exactly what the weather will be. Click on the "Hourly Weather Graph" link near the bottom of any point-and-click forecast page.



We produce quick-glance maps of observed temperature, precipitation, snowfall, snow depth, and wind gusts.

One Stop Shopping

We know time is precious so we strive to supply our customers with the weather information they need most in an easily accessible way. To that end we have created several "one-stop shopping" pages designed to deliver the most pertinent information with the least amount of effort from the customer.

Weather

The one-stop weather page provides a quick look at local radar and satellite pictures, conditions expected in the next 12 hours, and an outlook for thunderstorm and heavy rain potential.

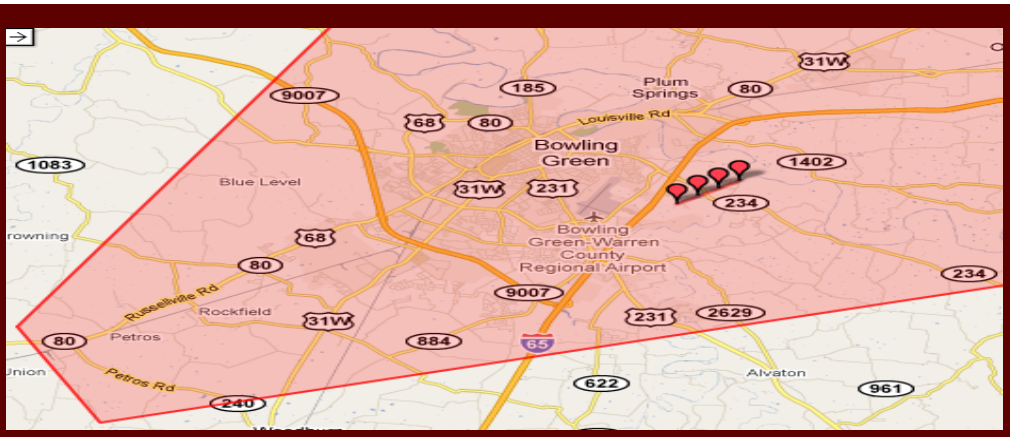
Climate

The information presented here includes the daily climate reports for Louisville, Frankfort, Lexington, and Bowling Green at the top of the page. There are also long range outlooks for temperature, precipitation, and drought. In addition there are many helpful links to other climate related data such as weather records, archived radar images, and local tornado climatology.

Winter Weather

This page includes maps of current watches and warnings, expected snowfall amounts, and ice accumulation forecasts.

All of our one-stop pages are available via *www.crh.noaa.gov/lmk/?n=optional_links*.



Severe Weather Warnings

The NWS is the sole provider of official severe weather warnings in the United States and her territories. The protection of life and property is our #1 goal.

In 2010 NWS Louisville severe weather warnings provided the public with an average of 12 minutes advance notice before severe weather struck. Those warnings, disseminated via our webpage as well as NOAA Weather Radio (NWR), gave residents time to reach suitable shelter before their neighborhood was impacted by strong winds or large hail. Of the eight documented tornadoes that struck the CWA in 2010, half of which were of EF1 strength, there were no tornado-related fatalities or injuries.

A Tornado Warning was in place for nearly ten minutes before the tornado that did this damage struck near Mount Washington, Kentucky on October 26.

Local Temperature Study

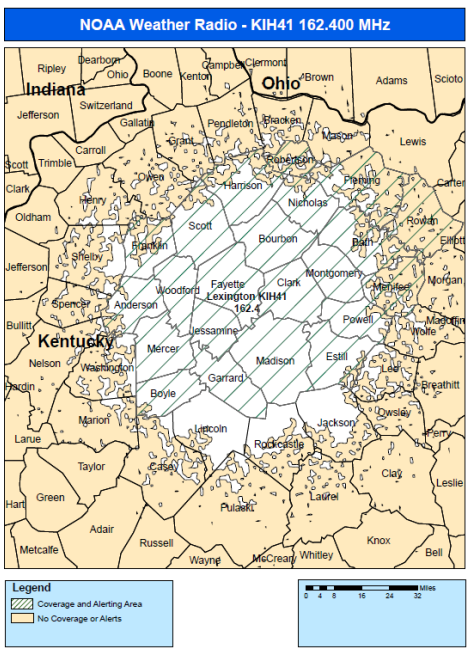
Work continues on increasing the resolution of morning low temperature forecasts across southern Indiana and central Kentucky, with the help of several more Kentucky Mesonet stations coming online along with personal weather stations. Senior Meteorologists Ryan Sharp and Tom Reaugh, with the assistance of volunteer Dave Schneider, have worked hard on collecting and analyzing morning low temperature data at nearly 80 sites across the region. The data are broken up into four types of mornings based on winds and cloud cover at Louisville, and then analyzed for spatial patterns within the data. The widest range of temperature readings are found to occur on mornings where conditions are clear and calm. For example, when the morning low at Louisville International Airport is 25 degrees, temperatures in the rural southeastern parts of Jefferson County can be in the middle teens! Armed with this knowledge, we can craft much more accurate forecasts.

Improving NOAA Weather Radio Availability

NWS Louisville has been conducting a drive study to determine the coverage of the NWR signal in our County Warning Area (CWA). The data are being used to determine what products are broadcasted from which transmitters to provide the best possible service to our customers.

One of the challenges facing the NWR program in central Kentucky and southern Indiana is the hilly terrain. In the past the coverage areas have been defined mainly by distance of the receiver from the transmitter. With actual drive study data we are able to identify locations that are better covered by a transmitter that might actually be farther away. This is especially true in the eastern part of our CWA. We have coordinated with the Jackson, Kentucky NWS office and have modified the product listing for several transmitters.

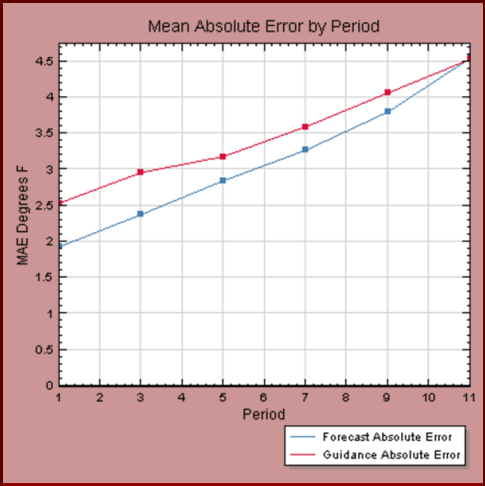
As of now we have completed the drive study in approximately 50 of the 59 counties in our CWA. We are planning to concentrate on five southern Indiana counties in March 2011 and hope to completely finish the study by the middle of the year.



NWR coverage map in the Lexington area.

Forecast Verification

Over the past several years, the NWS has increased efforts toward verifying our forecasts, especially temperatures. The graph below shows one example of how our daily high temperatures at Lexington verified against one popular computer forecast model over a ten month period in 2010.



This chart indicates our average error in degrees for our daily high temperature at Lexington from the period of January through October in 2010. In this case our forecasts (in blue) were superior to the forecasts made by one specific computer forecast model (in red).

We also place a great deal of importance in trying to reduce repeated errors, or, "bias." Bias is especially apparent in daily low temperatures. We have learned to add a few degrees to our forecast for central Louisville compared to the more rural suburbs due to the urban heat island in the city core. On calm, clear nights during all seasons, low temperatures at Frankfort frequently dip below those of Lexington due to Frankfort's location in a protected valley.

It is the meteorologist's responsibility to recognize the shortcomings of the computer models and to react accordingly, adding value to the computer model output and providing a superior forecast product.

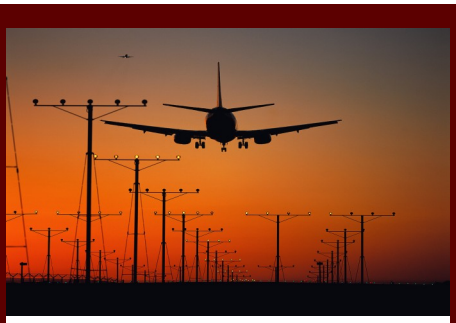
StormReady

Congratulations to Lake Cumberland State Resort Park and Dale Hollow Lake State Resort Park: the first state parks in the entire nation to become StormReady!

Officials from NWS Louisville officially declared the parks StormReady at a June 17 ceremony held at Lake Cumberland. Speakers at the event included NWS Louisville MIC John Gordon, NWS Central Region Warning Coordination Meteorologist Jim Keeney, Kentucky's State Emergency Manager Charlie O'Neal, and Kentucky Department of Parks Commissioner Gerry van der Meer.

StormReady communities, businesses, and organizations are better prepared to save lives from the onslaught of severe weather through advanced planning, education, and awareness achieved by maintaining a close relationship with the NWS. Strict requirements must be met and periodic check-ups must be made by NWS personnel for anyone to continue their membership in the program. See *www.crh.noaa.gov/lmk/?n=stormready* for more information.

Emergency Manager for the Commonwealth of Kentucky, Charlie O'Neal, speaks at the Lake Cumberland State Resort Park StormReady ceremony on June 17.



Aviation Weather

2010 was a busy year for the aviation program at NWS Louisville. Many of the public airports located throughout southern Indiana and central Kentucky were visited for the purpose of promoting weather awareness among pilots and airport personnel. There was also an effort to recruit pilots in support of a new plan to use general aviation to obtain picture or video of storm damage from an aerial perspective. This information will be key in rating tornadoes and estimating severe thunderstorm wind speeds by viewing swaths of damage from the air.

A group of NWS meteorologists also visited the meteorology headquarters at United Parcel Service (UPS) in 2010. The group met UPS meteorologists, sharing ideas and solutions to problems faced when issuing airport weather forecasts for Standiford Field. NWS meteorologists also spent time with UPS dispatchers as they made decisions for UPS flights and flight paths based on weather information. Since these dispatchers use NWS forecasts every day, it gave the forecasters insight of how customers use our products.

The NWS Louisville Aviation Program Leader visited the Chicago NWS office for a week during the summer. With a very busy airspace including O'Hare and Midway airports, aviation services are key in the Chicago area. Forecast methodologies were brought back to the Ohio Valley which could benefit our airports in central Kentucky.

Historic Flooding Leads to New River Forecasts

The rainfall of May 2010 resulted in major flooding across much of central Kentucky. Drakes Creek at Alvaton in Warren County experienced it worst flood on record. The crest at that location was 42.1 feet, easily beating the previous record level of 40.4 feet set on June 23, 1969. Records at Alvaton go all the way back to 1940.

Because of the high water, US 231 was closed at the bridge over Drakes Creek next to Phil Moore Park. This is a major four-lane highway since it is the main road between Bowling Green and Scottsville. As a result, after the flood Warren County Emergency Management requested a new flood crest forecasting service from the NWS for this location. Flood crest forecasts will be issued for Alvaton anytime the creek is expected to exceed its 22 foot flood stage.

Minor flooding begins at 22 feet, moderate flooding at 29 feet, and major flooding at 36 feet. The gauge at this location is maintained by the United States Geological Survey (USGS) and reports via satellite every hour. The latest stage can be seen on the NWS's Advanced Hydrologic Prediction Service (AHPS) webpage at *water.weather.gov/ahps2/index.php?wfo=lmk*.

River gauge equipment on the side of the US 231 bridge over Drakes Creek near Alvaton, Kentucky.

Drakes Creek during low flow at the gauge site.

Co-Op Observer Program

Co-operative weather observers are volunteers who record weather data, such as temperature and precipitation, and send their data to the NWS each day. There are 87 such observers in NWS Louisville's forecast area. Many observers enter their data in a simple online form.

Our observer in Keene, Kentucky, a former B-17 pilot in World War II, completed 55 years of dedicated service as a co-op observer in 2010.

One new co-op location was added with the establishment of a station at Knob Lick, Kentucky. The observer moved to Knob Lick from Alaska a few years ago, so he should have no trouble with snowfall measurements!

An unofficial observing site began at Lyndon, Kentucky in Jefferson County. The site is considered unofficial because of its proximity to Bowman Field, where official readings are taken. Nevertheless, our volunteer provides us with daily figures for our precipitation and temperature databases.

Fire Weather Forecasts

The exceptionally dry fall across the Ohio Valley made for a very active fall fire weather season in late 2010. The combination of already dry ground litter (small sticks and twigs) with the falling leaves provided plenty of fuel for fires to consume. Numerous wildfires were noted through the fall, and NWS Louisville received several requests for highly detailed spot forecasts in particular wildfire locations. NWS Louisville provided critical services via phone and the internet to different agencies across southern Indiana and central Kentucky as they requested Red Flag Warnings to notify the public of how dangerous it was to burn in the dry and windy conditions. Hoosier National Forest, along with the Indiana and Kentucky Divisions of Forestry, Department of Natural Resources, and Mammoth Cave National Park were all kept informed of the fire weather situation. A total of 47 spot fire forecasts were prepared by NWS Louisville, most of which were for prescribed burns.

Three Fire Weather Watches and nine Red Flag Warnings were issued in 2010, which was the most Red Flag Warnings issued by this office in a single season in the past 25 years. Of the counties for which Red Flag Warnings were issued, 64% officially verified the sustained winds greater than 15 mph and relative humidity below 25% needed to make a Red Flag Warning valid. The warnings were issued with an average lead time of 7.1 hours.

The Fire Weather Program Leader at NWS Louisville taught firemen how weather conditions affect wildfire behavior, with more classes anticipated in 2011. Also, the program leader completed necessary prerequisites in preparation for providing on-site meteorological support for events including wildfires and prescribed burns. Visits to the various agencies which are served by NWS fire weather and spot forecasts are planned for 2011.

CoCoRaHS and the Kentucky Mesonet

The Community Collaborative Rain, Hail, and Snow Network (CoCoRaHS), headquartered at Colorado State University, is a nationwide network of volunteers who report rain, snow, and hail information each day via a public website (*www.cocorahs.org*). There are 15,000 CoCoRaHS stations across the country including about 300 in central Kentucky and southern Indiana. The reports sent in by the volunteers are displayed on colorful maps on the website.

CoCoRaHS is fun and simple. All you need is an inexpensive rain gauge and an open spot on which to mount it. Then, report how much rain is in the gauge each day, or as often as possible. In the winter, we appreciate snowfall and snow depth measurements as well.

The data collected are used extensively by the NWS, emergency managers, city utilities, the U.S. Army Corps of Engineers, members of the media, farmers, teachers, and many others. We're always looking for more observers, so please consider signing up today via the CoCoRaHS website! We're especially in need of volunteers in the counties of Marion, Taylor, Adair. Other than a rain gauge, all that's needed is an enthusiasm for reporting the weather and a desire to learn more about how weather impacts our lives and the lives of those around us.

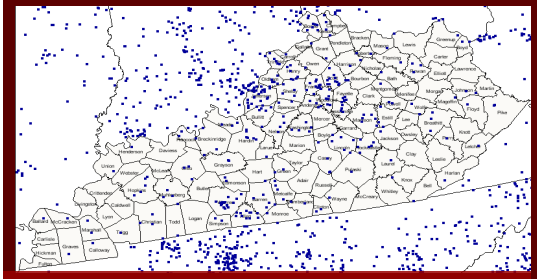
The Kentucky Mesonet, which provides free data online at *www.kymesonet.org/index.html*, is a research grade network of automated surface weather monitoring stations developed by the Kentucky Climate Center at Western Kentucky University (WKU).

The Kentucky Climate Center, housed in the Department of Geography and Geology at WKU, is the State Climate Office for Kentucky. The Kentucky Climate Center is a partner with the National Climatic Data Center, the Midwestern Regional Climate Center, and the NWS.

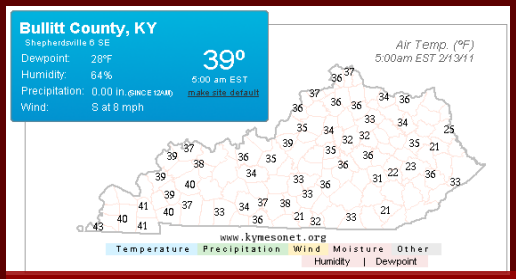
Mesonet data are easily accessible and can be used to improve local forecasts and severe weather warnings, aid emergency response efforts, enhance agricultural productivity, assist local utility providers, and support business and industry.

Data from the Kentucky Mesonet are used in advanced research in atmospheric science, hydrology, water resources, and agriculture.

The Kentucky Mesonet is part of a larger effort at WKU to build a cyberinfrastructure for environmental monitoring and decision support, thereby strengthening Kentucky's economic competitiveness through advanced science and technology.



CoCoRaHS station locations in and around Kentucky.



Kentucky Mesonet station locations.

Anniversary of the Lexington Tornado

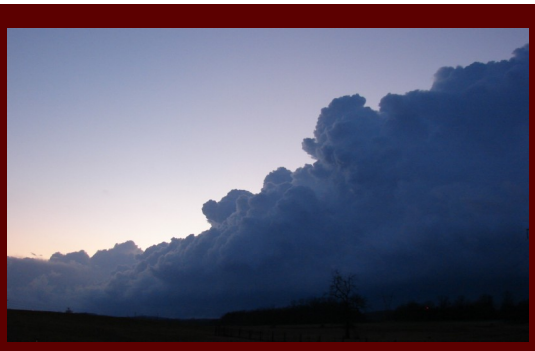
March 10, 2011 will be the 25th anniversary of one of the worst tornadoes ever to strike Lexington, Kentucky.

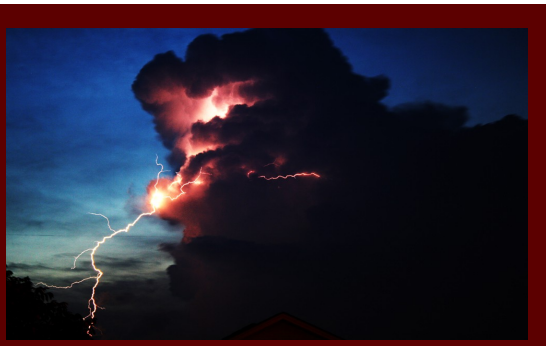
At 4:50 p.m. the tornado began in the vicinity of Tates Creek Road and Man o' War Boulevard. A barn was destroyed near the intersection of Wilson Downing Road and Tates Creek Road. The twister, about 100 yards wide, traveled to the northeast, heavily damaging Gainesway, Southeastern Hills, and many neighborhoods along Man o' War Boulevard before lifting at Richmond Road across the street from Saint Joseph East Hospital. Park Hills Shopping Center was damaged, and Pimlico Parkway and Mammoth Drive were badly hit. Roofs were torn off at Ak-Sar-Ben Park. Overall, 845 homes were damaged, with 200 of them suffering near-F3 destruction.

A man at 3576 Bold Bidder broke his neck when a brick wall collapsed on him, but otherwise injuries were relatively few (twenty) and there were no fatalities. About 150 families required emergency shelter.

By coincidence, the tornado occurred on the date of the annual statewide tornado drill test.

Jim Barnes of 1448 Cañonero Drive said he was grilling steaks in his driveway as the storm hit. He quipped to the *Herald-Leader*, "When I flipped one of the steaks and it didn't come back down, I knew it was time to go inside."





Our Goals for 2011

NWS Louisville will continue to be a dynamic, active office in 2011 dedicated to serving the people of southern Indiana and central Kentucky with the most accurate and accessible local weather information available. We pledge to use our shareholders' funds in the most prudent and beneficial ways possible. The following are the top priorities for the office in the coming year:

- Install and utilize a situational awareness display to keep forecasters abreast of the latest weather conditions and any weather-sensitive events such as hazardous material spills
- Complete the NWR drive study project
- Overhaul the storm spotter program
- Implement a new, more robust forecast verification program
- Make severe weather statistics available within 48 hours after the storm
- Begin an enhanced impact-based Short Term Forecast
- Author educational weather pages for use on our website
- Restructure our Continuity of Operations Plan, which details how the office will continue to function in the face of an emergency such as a tornado strike or other damage to the office
- Secure hazardous material training for three more staff members to be used in decision support services
- Enhance our ability to improve temperature and fog forecasts

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