NATIONAL WEATHER SERVICE
Louisville, Kentucky

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National Weather Service


Trimble County, June 3, 2008

2008 Shareholders' Report

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WELCOME

Welcome to the third edition of the Louisville National Weather Service (NWS) office's Shareholders' Report. As a taxpaying citizen, you have invested in the Federal government, of which the NWS is a part. The NWS, as a whole, was appropriated $927 million for Fiscal Year 2008. That equates to an investment of $3.03 for every 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 document details the many activities of your Louisville NWS office, serving southern Indiana and central Kentucky. 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. I welcome your comments and suggestions as to how the NWS can be an even better investment for you.

— John D. Gordon, Meteorologist-in-Charge

Our Management Team

John Gordon, Meteorologist-in-Charge (MIC)

Joe Sullivan, Warning Coordination Meteorologist (WCM)

Ted Funk, Science and Operations Officer (SOO)

Bill Whitlock, Electronic Systems Analyst (ESA)

INSIDE THIS ISSUE

NEW NOAA WEATHER RADIO TRANSMITTER GOES ON THE AIR IN FRANKFORT

The city of Frankfort, in conjunction with the Franklin County Office of Emergency Management and the Kentucky Office of Homeland Security installed a new NOAA Weather Radio (NWR) transmitter in Frankfort in late 2008. Previously, the weather radio coverage in and around the Frankfort area had been less than adequate. The hilly terrain and lack of a suitable transmitter nearby were the main contributing factors to the lack of coverage.

Shortly after the transmitter was installed, the city of Frankfort donated the transmitter to the NWS. After we began providing the audio, the transmitter became operational. Signal strength readings were taken before and after the installation and the coverage improved dramatically. Over 90% of the residences and businesses in and around Frankfort as well as much of Anderson County now have excellent NWR coverage.

NWR broadcasts weather information 24 hours a day directly from the NWS. All warnings, forecasts, and major public safety events such as hazardous material spill announcements and Amber Alerts are disseminated over NWR. Many NWR models can be programmed to sound an alarm when the NWS issues a warning.

NWR can be purchased through any electronics outlet and most models sell for less than $100.

NOAA Weather Radio belongs in every home, business, and public gathering place. They should be as common as smoke detectors.

"As someone who listened to your alerts on the NOAA weather radio band throughout that terrible night, I feel that the NWS did a heroic job of staying on top of the developments the storms wrought and of keeping warnings fresh, updated, and timely. I have spoken with several people whose relatives, because of NWS warnings, left their homes that were in the storms' path. Those very homes were pulverized. The people are alive, in no small part, because of your warnings."

----- Matt P., NWR listener, after the tornadoes of February 5 and 6, 2008

John Gordon addresses dignitaries in Frankfort as Lexington's WTVQ Channel 36 films. L to R: John Gordon, Lieutenant Governor Dan Mongiardo, Frankfort City Commissioner Kathy Carter, and Frankfort Mayor William May, Jr.

It takes a lot of computing power to run a weather forecast model!

OUR OWN WEATHER FORECASTING COMPUTER MODEL, RIGHT HERE IN LOUISVILLE

In an effort to give the best forecasts possible to the residents of southern Indiana and central Kentucky, NWS Louisville has been running a Weather Research and Forecasting (WRF) model locally for the last year. The model runs at very high resolution and is available to forecasters four times a day. The high resolution allows forecasters to see how the complex terrain of the Ohio Valley plays a factor in our weather.

Numerical weather forecast models are complicated computer programs that simulate the atmosphere over a given time range. Numeric modeling requires extensive computing power. In the past, numerical models had only been run on supercomputers at large national computing facilities. However, with the arrival of the Linux operating system and a decline in computer hardware prices, numerical models can now be run on a series of connected desktop computers called "clusters." Currently, the Louisville WRF model runs on four Linux workstations that have a total of eight processors and 8 GB of system memory. In general, it would take nearly six hours to run a 24 hour forecast simulation on a single workstation. By hooking up the four workstations together and distributing the load, a 24 hour forecast only takes 90 minutes. The forecasts from the local WRF model are then sent to NWS forecaster workstations where they are integrated into our daily forecasts.

The efforts of local modeling have proven very successful. In the last year, the model has undergone significant adjustments to improve its performance. The model can be more accurate with temperature and precipitation than the larger scale models that are provided by the National Centers for Environmental Prediction (NCEP).

FORECASTING WITH ENSEMBLES

During the summer, forecaster Mark Jarvis worked with Science and Operations Officer Rich Grumm of the NWS office in State College, PA on ensemble forecasting research. Mark and Rich looked at pairing ensemble forecasts with climatology for the March 2008 Ohio Valley snowstorm.

Ensemble forecasting is a process in which a numerical model is run many times utilizing different initial conditions with each run, giving the forecaster a range of possible solutions. Since there can be many runs, forecasters typically use the ensemble average for the basis of the forecast.

In the research, the output of two model ensembles was paired with climatological data. Forecast maps were generated that showed where the ensembles were predicting highly unusual weather. Having strong agreement within the ensembles resulted in increased forecast confidence since the model members were forecasting nearly the same thing. In the past, significant anomalies in the forecast data preceded significant weather events.

To illustrate their research, Mark and Rich used the Ohio Valley snowstorm of March 7-8, 2008. A swath of heavy snow occurred from near Paducah through Louisville to Columbus and Cleveland. The ensembles showed significant anomalies in temperature, precipitation, and winds that were conducive for a winter storm. The anomalies were forecast 60 hours in advance of the storm. The data suggested that 10 inches of snow could fall in Louisville, which indeed is what took place.

Louisville, February 22, 2008

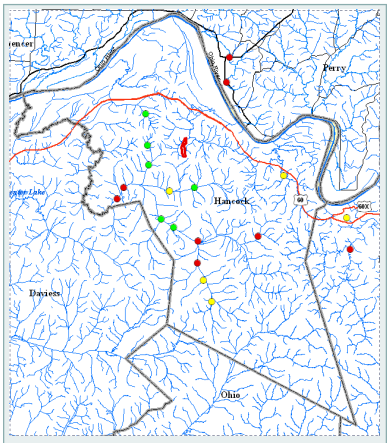
MAKING LIFE SIMPLER IN THE WINTERTIME

In recent years, winter storms with mixed wintry precipitation presented unique challenges to local forecast offices. Kentucky and southern Indiana are noted for winter storms that bring a mix of snow, sleet, and freezing rain. The coordination of headlines between Louisville and the surrounding NWS offices was difficult. In the past, this coordination issue was especially tricky with the forecast offices in Nashville and Jackson due to differing criteria for snow advisories and heavy snow warnings.

This year, all of the local offices have streamlined many of our **winter weather products** into just two: *winter storm warnings* and *winter weather advisories*. For example, snow advisories and heavy snow warnings will become winter weather advisories and winter storm warnings, respectively, even when we expect only snow to fall. In this way, we hope to present a clearer product to the media and a more unified presentation to the public on the Internet.

Our precipitation type and amount forecast will still be found within the text of our products. For example, if we expect 2 to 4 inches of snow, our product will state, "***A winter weather advisory for snow.***" If we expect 6 inches of snow, our product will read, "***A winter storm warning for heavy snow.***"

Because freezing rain presents such unique challenges to travel, we will continue to issue freezing rain advisories and ice storm warnings when we expect precipitation to be predominately freezing rain.



Above is an example of a map showing all the spots in a county that are prone to flash flooding. The flash flood "hotspots" are color coded according to how easily they flood. Also, by clicking on the map NWS meteorologists can get more detailed information about each hotspot. This allows us to make our warnings more specific and useful.

FLASH FLOOD AWARENESS

Flash flooding is one of the most dangerous weather phenomena we face. Docile streams can become raging torrents amazingly quickly when thunderstorms move slowly over the same spot, or when heavy rain falls on melting snow cover. Therefore, it is imperative that the NWS be able to issue accurate Flash Flood Warnings.

Toward that end, Lead Forecaster Don Kirkpatrick at NWS Louisville has spent several years conducting an exhaustive search to locate all of the spots in southern Indiana and central Kentucky that are prone to flash flooding. With this knowledge we can warn people to stay away from these specific locations in our warnings and statements.

In each of the counties for which we are responsible, local emergency management teams coordinated with the NWS to identify the locations of low water crossings and streams that easily leave their banks. Maps were constructed and are available for the warning forecaster. We can overlay radar information onto the maps and know exactly which communities are in the most danger from powerful and deadly flash floods.

STORMREADY CONTINUES TO GROW

NWS Louisville is a strong supporter of the StormReady program (www.stormready.noaa.gov), and was very pleased to welcome two new members into the Stormready family in 2008.

Joe Sullivan (left) joins Woodford County Judge Executive John Coyle and the Director of Woodford County Emergency Management Keith Slugantz in announcing the county's entrance into the StormReady program.

In a typical year, nine out of every ten presidentially-declared disasters are weather related, leading to around 500 deaths per year and nearly $14 billion in damage. StormReady started in 1999 and helps arm America with the communication and safety skills needed to save lives and property–before and during the event. StormReady helps community leaders and emergency managers strengthen local safety programs.

StormReady communities are better prepared to save lives from the onslaught of hazardous weather through better planning, education, and awareness.

In 2008, Woodford County joined the ranks of StormReady, as did Six Flags Kentucky Kingdom in Louisville. Woodford County and Six Flags were able to demonstrate that they are sufficiently prepared to provide protection to the public against the dangers of severe weather.

Also, NWS Louisville StormReady Program Leader Jim Maczko worked with the Kentucky State Parks System and the Kentucky Division of Emergency Management. Jim helped Dale Hollow Lake and Lake Cumberland State Resort Parks begin the process of developing park-specific severe weather emergency action plans, designation of severe weather shelters, and training of park management staff in weather safety and emergency response. Further work with additional state parks is likely in the coming months and years.

Patrons of Six Flags will now see these signs posted at the park.

In southern Indiana and central Kentucky there are now 18 StormReady communities. In 2009, Slugger Field in Louisville is expected to join the program.

HAZMAT

Hazardous material incidents can take place at any time. A well-known recent example was the derailment of a CSX train near Brooks, KY on January 16, 2007. In that accident, flammable materials in the boxcars exploded into flames and smoke billowing five hundred feet into the air. Nearby schools and homes were evacuated and the train continued to burn for a day and a half.

When such events occur, weather data are of utmost importance. Emergency responders need to be thoroughly knowledgeable of weather factors such as:

- wind direction and speed
- incoming cold fronts or other wind shifts
- precipitation
- how high smoke might rise
- what clouds are present
- thunderstorm chances

In addition to current conditions, officials often need a forecast of what changes in the weather are on the way over a period of hours to sometimes days.

The NWS fulfills its mission of protecting life and property by working hand-in-hand with public safety officials to minimize any harm that might come from hazardous material accidents.

Also, we broadcast the latest information on NWR, providing details on what has happened and what actions emergency officials have instructed people in the affected area to take.

WEATHER RECORDS

LOUISVILLE

All-time high temperature:
107° July 24, 1901, July 28, 1930, and July 14, 1936

All-time low temperature:
-22° January 19, 1994

Wettest Day:
10.48" March 1, 1997

Snowiest Day:
15.5" January 17, 1994

LEXINGTON

All-time high temperature:
108° July 10, 1936

All-time low temperature:
-21° January 24, 1963

Wettest Day:
8.04" August 2, 1932

Snowiest Day:
13.4" January 26, 1943

BOWLING GREEN

All-time high temperature:
113° July 28, 1930

All-time low temperature:
-26° January 12, 1886

Wettest Day:
6.15" December 7, 1924

Snowiest Day:
18.0" March 9, 1960

IMPROVING OUR CLIMATE SERVICES

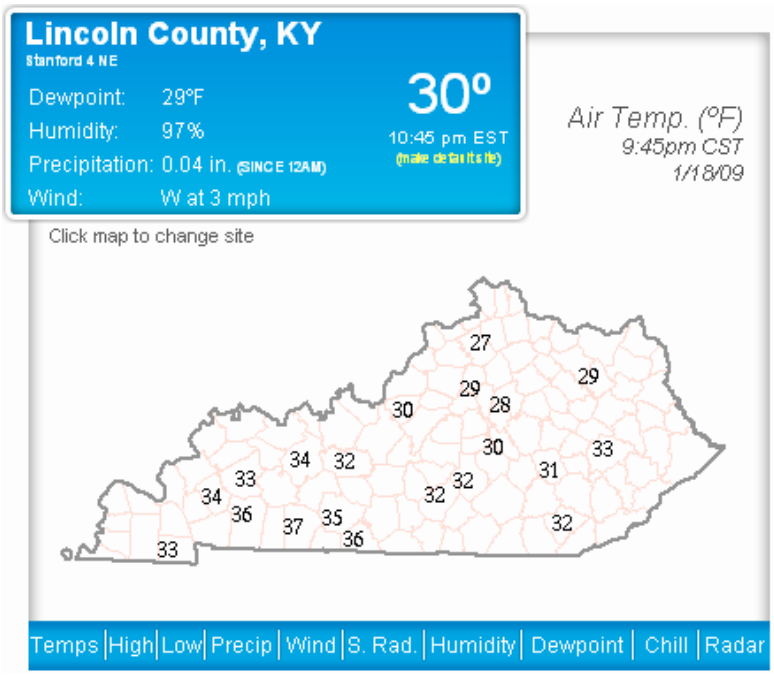
Due to customer feedback, in 2008 we orchestrated the introduction of four new climate products: daily and monthly climate reports for Bowman Field in Louisville and Capital City Airport in Frankfort. Bowman Field and Frankfort join Louisville International Airport, Blue Grass Airport, and Bowling Green/ Warren County Regional Airport in the twice-daily reports that detail each day's and month's temperatures and precipitation.

Most people like lists, so we developed several "top ten" lists of the most significant weather events to have struck southern Indiana and central Kentucky. After compiling the top ten lists, we formed a master list of the top 25 all-time biggest weather stories in our region's history. All of the lists are available on our website (weather.gov/louisville).

Also in 2008 our website's climate web pages for Louisville and Lexington were dramatically expanded, offering a great amount of new information. In addition, the historical data presented on these pages were painstakingly checked and verified, ensuring that only the most accurate information is provided.

TELL US HOW MUCH RAIN YOU GOT!

George Carlin once observed, "Nobody lives at the airport!" Mr. Carlin was absolutely right, and that's why the CoCoRaHS program is so necessary. Through this program you can tell us at the NWS exactly how much rain or snow *you* received. It's quick and easy, and takes very little time or equipment. Your reports are used by the NWS and weather sensitive businesses and organizations on a daily basis. Go to www.cocorahs.org or contact us here at the weather office for more information. The more observers we have, the better our service to the public!



The Kentucky Mesonet provides a plethora of free on-line weather information.

KENTUCKY MESONET

The Kentucky Mesonet (www.kymesonet.org) is a network of automated weather monitoring stations being developed by the Kentucky Climate Center (KCC) at Western Kentucky University .

As a member of the National Climate Services Partnership, the KCC is a partner with the National Climatic Data Center, the Midwestern Regional Climate Center, and the NWS.

The KCC works with local officials and stakeholders to identify sites that meet scientific criteria and provide added community benefits. Mesonet data are easily accessible and can be used to improve local forecasts and hazardous weather warnings, aid emergency response efforts, enhance agricultural productivity, assist local utility providers, and support business and industry.

Data from the Kentucky Mesonet will be available in every K-12 classroom throughout the Commonwealth to support science and math education. Faculty and students in Kentucky's eight public universities are charter members of the Kentucky Mesonet Consortium.

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

The Mesonet swelled to 20 sites across Kentucky in 2008. The next site scheduled to be brought on-line is located in Barren County.

NWS LOUISVILLE INVOLVEMENT IN THE KENTUCKY MESONET

The 20 Kentucky Mesonet sites across the Commonwealth continuously record temperature, dew point, relative humidity, wind, wind chill, heat index, solar radiation, and precipitation at five-minute intervals. Some sites also have additional sensors to measure soil temperature and soil moisture. These data are available in real-time and are also archived.

It is hoped that eventually enough funding can be secured to install and maintain around 100 Mesonet sites across Kentucky's 120 counties, providing automated weather observations for the entire state on a 20 square mile grid.

A conference was held in Bowling Green in October, hosted by Kentucky's State Climatologist, Dr. Stuart Foster. NWS Louisville participated in this conference to discuss the future of the Mesonet system, and to ascertain who the main users of the data are. Funding was also of great importance. The highly successful Oklahoma Mesonet was used as a model for partnership between data providers and data users, as well as for practical applications of Mesonet data.

Also in October, NWS Louisville Observations Program Leader (OPL), Mike Crow accompanied Dr. Foster on a prospective site survey near Georgetown. Mr. Crow was impressed with the significant difficulties in selecting a site appropriate for these important weather stations, since they need to be placed where they remain undisturbed for many years.

NWS LOUISVILLE HELPS LOCAL UNIVERSITIES WITH CURRICULA

NWS Louisville, along with the meteorology department at UPS, has worked closely with the University of Louisville to help set up a new meteorology undergraduate program, which will commence with the 2009-2010 school year.

We also have forged strong relationships with Dr. Stuart Foster and Dr. Greg Goodrich at Western Kentucky University. A full meteorology program exists at Western and students there serve as the official snowfall observers for Bowling Green.

"Students (who) major in meteorology will learn the key concepts and skills necessary to qualify as a meteorologist for the National Weather Service."
—WKU website

WHAT IS THE CO-OP PROGRAM?

Even with all of the state-of-the-art technology associated with the modernization of the NWS, there remains a program administered by the weather service that has stayed virtually unchanged since its inception over a hundred years ago. This is the Cooperative Weather Observer Program where over 11,000 volunteer weather observers across the country record daily temperature and precipitation data. Some also record or report additional information such as soil temperature, evaporation, wind movement, agricultural data, water equivalent of snow on the ground, river stages, lake levels, atmospheric phenomena, and road hazards.

Many Cooperative Stations in the United States have been collecting weather data from the same location for over a century!

COOPERATIVE OBSERVER PROGRAM NEWS

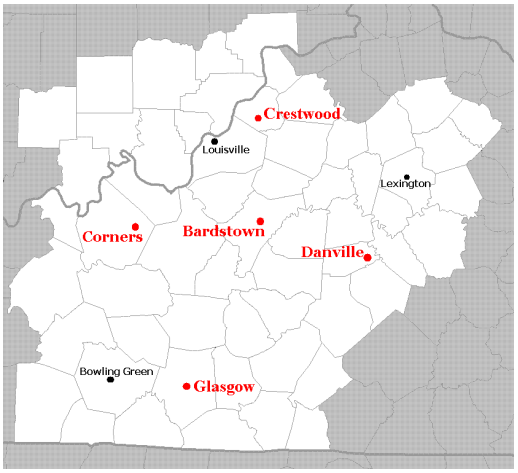
Though CoCoRaHS (page 6) and the Kentucky Mesonet (page 7) are valuable additions to our platform of weather data, the Cooperative Observer Network remains a vital part of the nation's weather and climate information system. NWS Louisville continues to fully support the observer network throughout southern Indiana and central Kentucky.

Co-op observer Milestones and awards in 2008

Twenty-year service awards were presented to our observers in Bardstown and Danville.

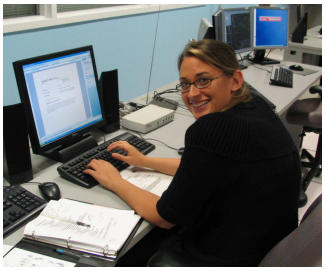
Fifteen-year service awards were given to our weather watchers in Crestwood and Glasgow.

A new co-op observer station was opened in July at Corners, located in eastern Breckinridge County.



STUDENTS PLAY AN IMPORTANT ROLE

In 2008, the NWS offices in Louisville, Indianapolis, Chicago, and northern Indiana participated in the Fourth Annual College Road Show. Representatives from the NWS offices traveled to various universities in the region to present to students a mixture of scientific meteorology, information on NWS operations, and career guidance. These shows are designed to assist students in deciding if they would like to work for the NWS after graduation, and what the best strategy is for attaining employment in the field of meteorology.



Stephanie Dunten

One of the most advantageous things a student can do is to spend a summer working at an NWS office. In 2008, Stephanie Dunten and Andy Boxell, both from of Valparaiso University, worked full time at the Louisville office. They worked on a variety of projects and shadowed forecasters on the forecast desks. They organized the NWS booth at the Kentucky State Fair, assisted in planning the National Weather Association's (NWA) national conference held in Louisville in October, took field trips to the Doppler radar tower and various river gauge sites, and much more.

Andy Boxell

NWS Louisville was also host to five student volunteers in 2008, each of whom performed an impressive amount of work. Some of the projects they completed included work on Geographic Information Systems (GIS) projects, preparation of the NWA conference, lists of the most important weather events in this region's history, a poster about the February 5-6, 2008 tornado outbreak, calling all schools in southern Indiana and central Kentucky to make sure their NOAA Weather Radios were working correctly, and calculating historical severe weather statistics for every county in the area.

Top to bottom: Jane Marie Wix, Jake Stengel, Michael Mathews, Evan Webb, and Eric Russell

If you know of a student who is studying meteorology in college and would like to apply for a summer position with the NWS, simply contact our office. Space is limited, but we will accommodate as many students as possible.

BOOK THE NWS!

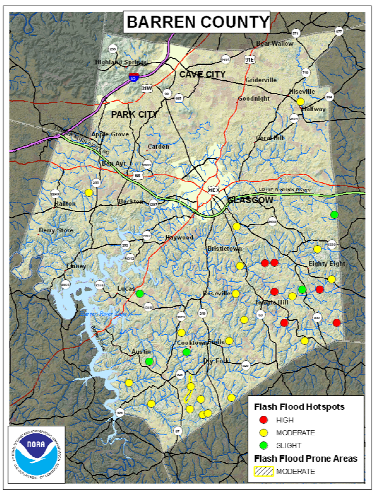
The National Weather Service participates in many public speaking events every year. We commonly are invited to talk to a variety of groups, including Rotary Clubs, Lions Clubs, Optimist Clubs, Chambers of Commerce, the Red Cross, schools, and Boy and Girl Scouts for their weather merit badges.

The talks we give vary according to our audience. We usually hit on topics such as weather safety, kinds of severe weather, our duties as meteorologists, basic meteorology, major historical weather events, and detailing services provided by the NWS.

We also attend events such as area science fairs, the Kentucky State Fair, and ColorFest at Bernheim Forest. For the past few years we participated in *Kentucky Tonight* on KET, joining host Bill Goodman, and also helped take calls from the public and answer their meteorological questions.

In 2008, we visited all television stations in Lexington and Louisville, and held a spring weather seminar for media outlets in Bowling Green. The TV weather men and women benefit from new science and technologies developed by the NWS, and we use the opportunity to learn what services our media partners need from us.

If you're looking for a speaker for your next event, consider the NWS. We have meteorologists, hydrologists, and information technology and electronics specialists who will be happy to speak on the weather and what we do. Simply contact the office and we'll schedule the talk.

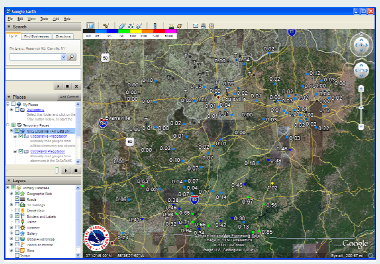


NWS BEGINS USE OF GOOGLE EARTH MAPS

We have begun plotting daily rain, snow, and temperature data in .kml format for customers who have access to Google Earth. We plot data from co-op observers (page 8), airports, CoCoRaHS observers (page 6), and automated gauges. The plots are generated around 10:00am EST each day, and are available via the "Rivers and Lakes" page on our website.

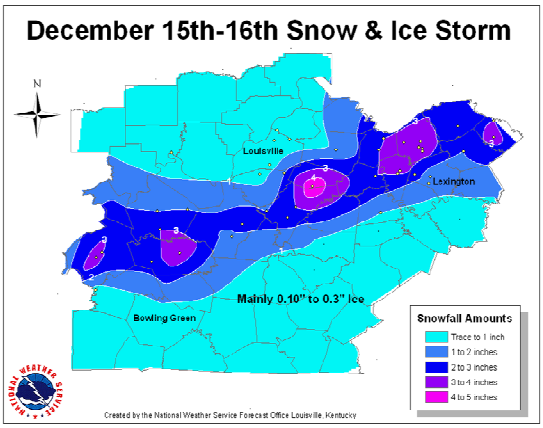
Like all Google Earth maps, more information will appear as the user zooms in, and map layers can be toggled on and off.

If you look at one of the maps, note that there are "holes" in the data. If you live in one of these data-sparse regions, consider joining CoCoRaHS to help fill the void!



MAPPING THE WEATHER

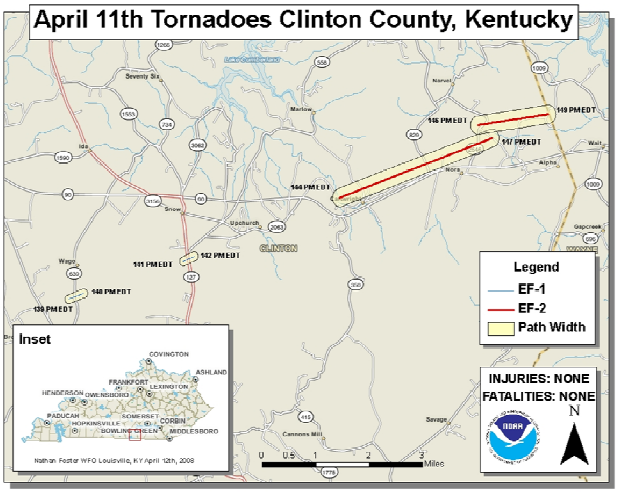
GIS, or Geographic Information Systems, is a rapidly expanding technology that creates, stores, and analyzes spatial data and associated attribute data. For example, locations that report daily weather information to the NWS are plotted via latitude/longitude pairs. Each location will have data associated with it such as rainfall, snowfall, temperatures, etc. Given enough locations, we can then use GIS to run a statistical calculation to interpolate between the data points and provide an estimation of how much rain fell across an area, or what the high temperatures were on a given day. A major utility of this tool is to create more useful and legible maps on our website.



When we combine GIS with Global Positioning System (GPS) information, we can more accurately track tornado damage paths and quickly provide the public with a visual representation on a map that is easy to understand.

Our project to learn all the points in our area of responsibility that are prone to flash flooding (see image upper left, and article on page 4) has been greatly enhanced by GIS. Emergency managers from every county were asked to list their most notorious flash flood hotspots. Previously, the locations were compiled only onto paper maps, but now are digitized using GIS to make much better use of the information. Now forecasters can quickly access the data on their computers to find out which spots flood easily, roads that are impacted, stream names, and how the floodwaters typically behave at those locations.

(continued in the sidebar on page 16)



FROM FLOOD TO DROUGHT

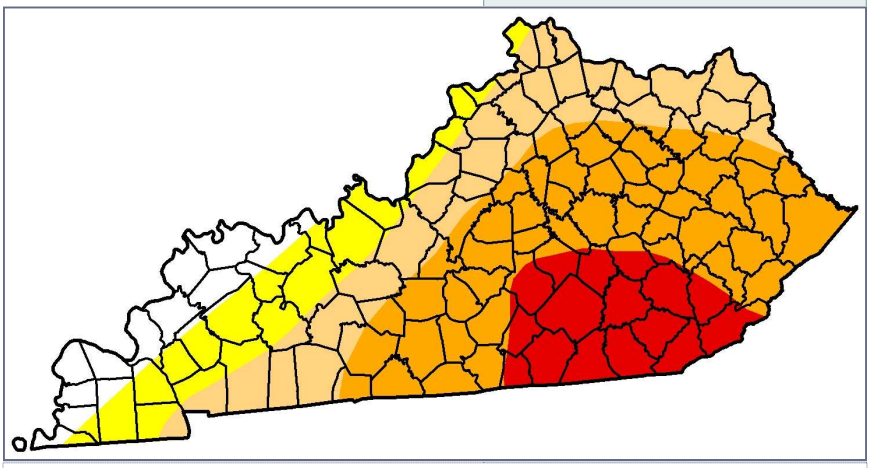
Caught in floodwaters near Sadieville, Kentucky on March 4.

The year began with quite a bit of flooding from January through April, though most of it was minor. By the end of June, NWS Louisville had issued 48 Flood Advisories, 205 Flood Statements, and 45 Flood Warnings. Almost every local river basin experienced some degree of flooding, including the Ohio River. The Blue River at White Cloud, Indiana attained its highest crest on record (24.2 feet) on March 20. By the end of the wet season, precipitation totals were as much as 9 inches above normal in northern Kentucky and southern Indiana. Departures were less in southern Kentucky, but were still on the order of 2 to 3 inches wetter than normal.

The weather turned dry during the summer and fall. Much of Kentucky descended into severe drought in late September, with extreme drought in southeastern sections of the state in October and November. Precipitation ran 7 to 9 inches below normal for the June through November time period. Insult was added to injury when the remains of Hurricane Ike blew through much of the region, causing the U.S. Department of Agriculture to declare the entire Commonwealth a disaster area by the end of October due to the combined effects of wind and drought.

Fortunately the 2008 drought was not as devastating as the dry weather in 2007, which set in earlier in the year, was more severe, and was exacerbated by a killing freeze in April. In 2008, streamflows were low in the smaller streams but the larger rivers continued to flow due to the release of water from reservoirs.

Increased rains in December alleviated the drought and brought soil moisture levels back to near normal.



Severe drought (orange) and extreme drought (red) in Kentucky in November.

NWS PLAYS AN ACTIVE ROLE IN WATER CONCERNS

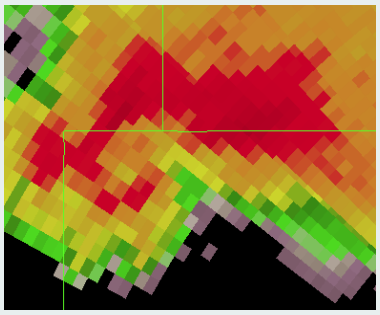
Along with several other state and Federal organizations, NWS Louisville attended the Kentucky Drought Meeting on August 19. Our main purpose was to provide both short and long term forecasts for rainfall and river levels. The goal was to begin formulating a statewide drought response plan.

On September 10 we participated in the Ohio River Navigation Meeting, during which we provided forecasts to the Coast Guard, U.S. Army Corps of Engineers, and private firms.

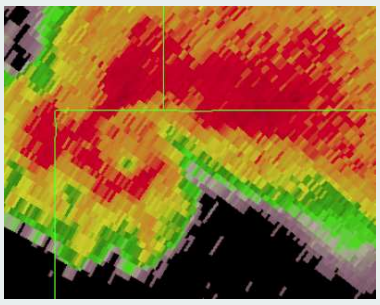
NWS Louisville also joined in dam break exercises at Rough River Lake and Green River Lake, since the NWS is the primary warning broadcaster should a dam fail. We have pre-written statements stored in our computer system that only need to have a few blanks filled in, so that we can get Flash Flood Warnings to the public at a moment's notice in the case of a dam break. Those warnings go directly to NWR and our website, along with local media.

RADAR IMPROVEMENT

Over the summer the resolution of the NWS Doppler Radar was significantly increased. The upgrade provides finer detail at greater distances from the radar, enabling warning meteorologists to more easily detect radar signatures associated with severe storms and tornadoes. The increased resolution will be especially useful for small tornadoes and storms far from the radar site.



Above is an example of the former resolution of the NWS Doppler Radar, showing a potentially tornadic storm. Below is the same storm shown with the new resolution. The hook echo is much easier to recognize.



We can also better detect strong winds, rotation, and the potential for hail in severe thunderstorms with this new technology, which allows us to make even better warning decisions.

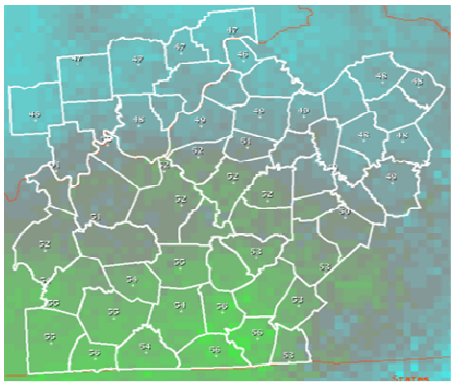
IMPROVING OUR FORECASTING SKILL

Meteorologists care deeply about their forecasts. For most of us, the forecast process doesn't stop at the end of our shift. After we send our forecast out to the world, we watch the weather to see if our forecast is correct or not. In general, meteorologists are a very conscientious bunch when it comes to their job.

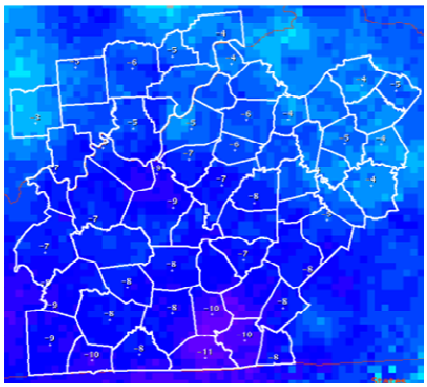
Toward that end, we need to pay close attention to our performance. By studying how well or poorly our forecasts verify with what actually happened, we can learn from our mistakes, understand biases, and enhance our forecasting skills.

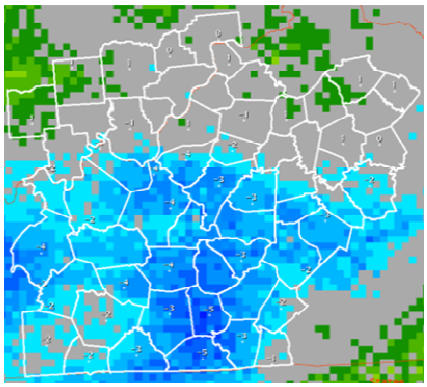
Beginning in 2008, Forecaster Liz Stoppkotte introduced NWS Louisville to a tool called "BOIVerify," which was developed at the NWS office in Boise, Idaho. This tool provides instant feedback on forecast accuracy. Currently the tool is being applied to high and low temperature forecasts, though its uses will be expanded in the future.

(continued on page 13)



Above is the official NWS high temperature forecast for a given day. We forecasted temperatures ranging from the upper 40s in the north to the middle 50s in the south. On the left below, BOIVerify shows the errors committed by a computer model for this day's highs. The blue colors show that the computer model's predicted temperatures were much too cold. On the right is the NWS forecast error, which also shows a cool bias but of much less magnitude. So, this tells us that the NWS forecaster was able to improve upon the computer model output and issue a better forecast for the public in this instance.





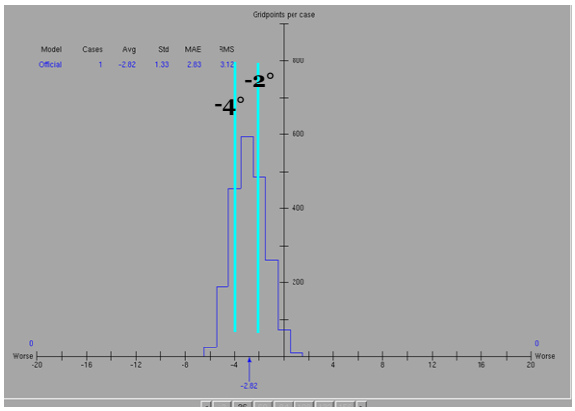
IMPROVING OUR FORECASTING SKILL

(continued from page 12)

BOIVerify collects temperatures recorded by area weather stations and co-op observers (page 8), and compares them to our NWS forecast and to forecasts generated by our computer models.

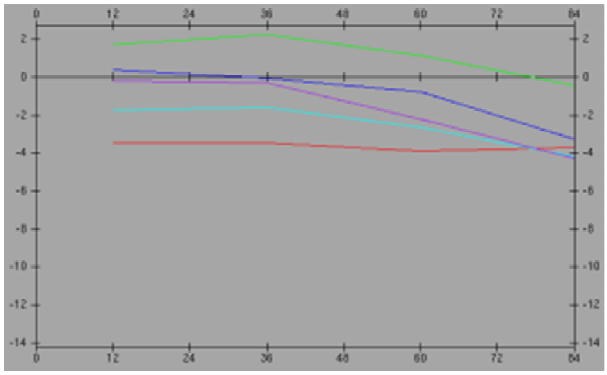
BOIVerify is a powerful tool which can generate many charts and graphs for dissection of the forecast. For example, histograms, as shown below, are used to quantify forecast errors. Also, as seen at the bottom of the page, graphs can be generated to show trends over a period of time at a chosen location in our forecast area.

Though forecasts will never be perfect in our lifetime, BOIVerify allows meteorologists the opportunity to enhance their talents and to improve their skill in composing your daily weather predictions.



The histogram shown above quantifies the amount that our high temperature forecast was in error across our entire area of responsibility. In this particular example, our forecast averaged about two and a half degrees too cold.

In the graph below, the forecast hour is shown along the top and bottom of the chart, and the amount of error along either side. The dark blue line in the middle is the NWS forecast, and the other lines are computer model forecasts. The closer the line is to zero, the better the forecast. In this example, the NWS forecast outperformed the models, and most forecasts had an increasingly cool bias as the forecast went out farther in time.



OFFICE BEAUTIFICATION

Our Fourth Annual Beautification Day was held in July. Employees and students pitched in to clean out our storeroom, shine the break room, and organize the library. Some worked outside, sprucing up the landscaping around the office. We also enjoyed a cookout and everybody brought a dish to pass at the luncheon.

It's very important to work in pleasant surroundings, and NWS Louisville employees are willing to roll up their sleeves and make sure the office remains attractive both to us and to our guests.

Student Jane Marie Wix and MIC

The entrance to our building on Theiler Lane in Louisville.

THE WEATHER CHANNEL VISITS LOUISVILLE

In August, reporters from a production company based in Chicago visited NWS Louisville to get our perspective on the Super Outbreak of tornadoes that took place on April 3-4, 1974. The material they gathered will be aired February 24-26, 2009, as part of "When Weather Changed History — Super Outbreak" on The Weather Channel. Louisville was virtually at the epicenter of the outbreak, and suffered a visit from a tornado that reached F4 strength on the Fujita Scale.

Ted Funk and Joe Sullivan were interviewed. Ted talked about how today's radar and forecasting technologies are vastly different than those of 35 years ago. The "Super Tuesday" tornado outbreak of February 5-6, 2008 was used for comparison to the 1974 event. Joe discussed how our severe weather spotter and outreach programs have increased public understanding and awareness of severe weather.

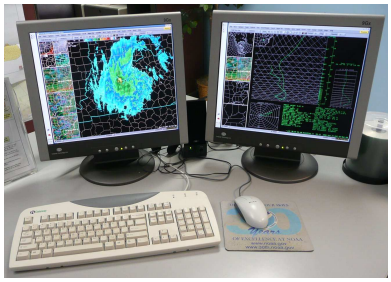
Also interviewed was Dave Reeves, who was a forecaster at NWS Louisville at the time of the 1974 outbreak and still resides in Louisville.

A tornado west of Richmond, Kentucky on April 3, 1974

Tornado damage in Northfield, Kentucky on April 3, 1974

PRACTICE PRACTICE PRACTICE

NWS Louisville forecasters undergo periodic training to keep up with the latest technological changes and scientific challenges in issuing forecasts and warnings. One particularly useful way we train is by using the Weather Event Simulator (WES). Similar to pilots who train in simulators to enhance their flying and emergency response skills, our meteorologists are required to go through several simulations per year on selected high impact weather events from the past.



Meteorologists replay big weather events and issue warnings and forecasts in real time on the WES.

Past weather cases are re-played in real-time format on the WES. Forecasters work individually with facilitators, and the one-on-one training is used to review and understand important forecast and warning concepts, learn what we did well in a particular case, and how we can do better in future similar events. For example, for severe weather simulations, forecasters assess radar signatures and the near-storm environment, then issue severe thunderstorm and/or tornado warnings as if the event was occurring in real time. Flash flood-related training is usually integrated into the severe weather cases as well.

(continued in the sidebar on page 16)

NWS CONDUCTS IMPORTANT RESEARCH

Forecasting is just one part of our jobs here at the NWS. Another important facet of our work is conducting meteorological research. In 2008, several projects were undertaken, including:

- Studying historical tornado events to determine patterns in tornado occurrence in the Ohio and Tennessee Valleys
- Examining the 5-6 February squall line that spawned numerous tornadoes in central Kentucky
- We teamed up with NWS offices in St. Louis and Chicago to investigate a line of severe storms that brought powerful winds to Chicago in August, resulting in intense lightning and winds at Wrigley Field when 40,000 fans were present for a game
- Working with meteorologists at NWS Indianapolis and UPS in Louisville dissecting the September wind storm
- Using verification statistics to examine how consistent our forecasts are from one day to the next
- The flash flood hot spot project (page 4) neared completion

The National Weather Association hosted its annual conference in Louisville.

NWS LOUSVILLE ACTIVELY PARTICIPATES IN METEOROLOGICAL CONFERENCES

Conferences are excellent opportunities to learn about new meteorological discoveries and developments, and also form bonds between NWS employees from vastly different parts of the country.

In October, NWS Louisville was honored to help organize the National Weather Association's 33rd Annual Conference, and to host it at the Galt House in Louisville. To the best of our knowledge it was the first major weather conference ever to be held in Louisville. Thanks in part to the city's excellent location, amenities, and transportation options, conference attendees were able to come from as far away as Alaska, Canada, and the Florida Keys. As a matter of fact, more people attended the meeting than ever before in its history. The theme of the conference was "Utilizing Our Past to Improve Our Future," and several people from NWS Louisville presented papers.

In January, John Gordon and Angie Lese spoke in New Orleans at the annual conference of the prestigious American Meteorological Society.

John Gordon traveled to Alabama and Colorado during the spring to connect with meteorology students and faculty at local colleges.

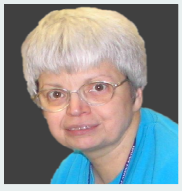
Several people at NWS Louisville are currently authoring important research projects that will be presented at future conventions.

NEW ARRIVALS AND PROMOTIONS

- Jackie Brown arrived as our new Administrative Assistant in February
- Angie Lese was promoted to Lead Forecaster in April
- Students Stephanie Dunten and Andy Boxell joined the Student Career Employment Program in May
- Liz Stoppkotte was promoted from Meteorological Intern to Forecaster, and transferred here from Billings, MT in June

RETIREMENTS AND DEPARTURES

- Administrative Assistant Pam Lozier accepted a position with the Federal Aviation Administration in January
- Lead Forecaster Alex Beauvois retired in February after 38 years of federal service
- Forecaster Marilyn Scholz (below) retired in January 2009 after 36 years of federal service, including more than 34 years at NWS Louisville



MAPPING THE WEATHER

(continued from page 10)

Such information will lead to greater specificity in NWS Flash Flood Warnings, so that only the locations that are truly in danger are warned.

The number of GIS applications at the NWS will continue to expand. We also are developing very detailed maps of NWR reception to help pinpoint areas that need better coverage (see the article on the new Frankfort NWR on page 2). We are developing automated procedures to create GIS interpolation maps of rainfall, snowfall, and temperatures on our website for quick visualization of weather events by the public.

We will use GIS to add and remove places in our database to make our Tornado Warnings and Severe Thunderstorm Warnings easier to understand. We also hope to make many of our GIS maps and raw data available to the public and educational and governmental institutions for their use.

PRACTICE

(continued from page 14)

In the fall, we perform winter weather scenarios to prepare for the winter season, whereby forecasters assess various atmospheric processes that are very important in determining precipitation type, intensity, and .

Continuing education is an ongoing activity at NWS Louisville, and performing weather simulations and reviews is an integral part of this effort.

LEADERSHIP AT NWS LOUISVILLE

In June, Louisville was the host city for the first Leadership Excellence And Development (LEAD) workshop, which was attended by NWS employees from across the central part of the nation (the NWS's "Central Region"). Louisville will again host the workshop in June 2009.

In order for the NWS to remain relevant, we must be able to adapt and change with the times. The LEAD program allows everyone in the NWS an opportunity to improve themselves and to make a positive difference in their personal and professional lives.

Discussion topics include:

- Communication
- Relationships
- Mentorship
- Conflict Resolution
- Empowerment
- Servant Leadership
- Vision
- Diversity
- Creative Solutions

NWS Louisville forecasters Angie Lese and Jim Maczko participated in the workshop. Angie commented, "It was an intensive but very gratifying experience that focused on learning what leadership truly means and how we can all be great leaders. I will be able to apply what I learned in the workshop to my working relationships with everyone in the office."

The NWS is increasingly placing a priority on employee development and LEAD is one important tool used in reaching this goal.

NWS Louisville continues to enrich leadership principles both within the weather office and in the community as well. As part of LEAD, Science and Operations Officer Ted Funk conducted a full-day interactive introductory leadership workshop that explored leadership characteristics, service to others, relationships, communication skills, teamwork, mentorship, and empowerment.

After the initial workshop, activities were held for the staff so that we could practice and enrich our leadership skills. These principles are now put into practice every day and enhance our service to the public by enabling us to be a diverse, synergistic team dedicated to serving the meteorological and hydrological needs of the citizens of southern Indiana and central Kentucky.

Ted's leadership workshop was so successful in Louisville, that he has been invited to present it to other NWS offices as well. In 2008 he traveled to Buffalo, NY and Wilmington, OH to share his expertise with those offices.

TOP WEATHER EVENTS OF 2008

WINDSTORM
SEPTEMBER 14

The remnants of Hurricane Ike combined with an Ohio Valley cold front to cause extremely strong winds across the region. In Louisville, countless trees were felled, over 1000 power lines were torn down, and more than 100 roads were blocked by debris. At one point, a record 237,000 people in Louisville were without power, some of whom were in the dark for a week or more. Many schools were closed for the whole week. Four fatalities were blamed on the storm.

Corydon, Indiana

Meteorologically, three primary factors combined to produce the fierce winds. The interaction of Ike with the cold front helped reinvigorate the tropical system's winds when it was well inland. Second, there was quite a bit of sunshine, which helped to "mix" the atmosphere and bring intense winds aloft down to the surface. Third, there was a very tight surface pressure gradient that moved rapidly northeast through the Ohio Valley. These phenomena are often responsible for strong winds in thunderstorms, but there were actually no thunderstorms at all with Ike in this region. The winds were instead associated with a very strong large-scale storm system. Wind gusts over 60 mph were recorded from Kentucky to New Hampshire as the system raced to the northeast.

For more information on these events, see our website at www.crh.noaa.gov/lmk/?n=past_events

TORNADOES
JANUARY 29

A powerful cold front sparked a lengthy squall line that crossed all of southern Indiana and central Kentucky. A large number of locations had 60 to 100 mph winds, causing extensive property damage. There were also four short-lived tornadoes, one of which led to a fatality when a tree fell onto a mobile home near Henryville, Indiana.


Henryville, Indiana

TORNADOES
FEBRUARY 5-6

A squall line combined with supercell thunderstorms to give us our second-most prolific tornado outbreak on record. Four people lost their lives in one of two EF-3 tornadoes that tore across Allen and Monroe Counties. Nineteen tornadoes roared through central Kentucky.


Frankfort, Kentucky

SNOWSTORM
MARCH 7-8

Snow fell throughout much of Kentucky and southern Indiana, including up to a foot of accumulation along and either side of the Ohio River, with Louisville receiving some of the highest amounts. Fortunately the storm occurred over a weekend and was well forecast. Temperatures warmed soon after the storm, however, which led to significant flooding.


Crawford County, Indiana

NATIONAL WEATHER SERVICE 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.

The Louisville office of the NWS opened on September 11, 1871, and has faithfully served the citizens of southern Indiana and central Kentucky ever since. We look forward to continuing to offer our service to the community for many years to come, through the tireless efforts, dedication, and leadership of our entire staff.

National Weather Service
6201 Theiler Lane
Louisville, Kentucky 40229

Ph. 502.969.8842

Fax 502.968.5663

w-lmk.webmaster@noaa.gov

Austin, Indiana, September 9, 2008

OUR GOALS FOR 2009

- Update our website, and make them more user-friendly
- Create a comprehensive winter weather briefing page
- Decrease our tornado warning false alarm rate by 10%
- Partner with structural engineers, media, the Civil Air Patrol, and other aviation groups for more detailed damage surveys
- Continue our local leadership enrichment program
- Improve our skill at forecasting fog and low temperatures
- Redefine our short term forecast philosophy
- Continue researching the September 14, 2008 windstorm
- Create a plan to improve gridded data services
- Hold a Customer Input Workshop to help NWS Louisville staff better understand how customers use our products
- Work with Kentucky Emergency Managers and state parks to make all state parks StormReady
- Provide career development and scientific training at Valparaiso, Ball State, Purdue, and Western Kentucky Universities
- Develop on-line spotter training materials
- Work with Franklin County Emergency Management to adjust the river stages on the Kentucky River at Frankfort
- Compare the Super Tuesday Tornado Outbreak of February 2008 with the Enigma Tornado Outbreak of February 1884 over roughly the same region
- Perform NWR signal strength surveys for our entire area of responsibility
- Complete various GIS projects, including the flash flood hotspots and NWR signal strength mapping
- Conduct research on typical large scale weather regimes that result in heavy snows for the Ohio and Tennessee Valleys

Austin, Indiana, September 9, 2008