National Weather Service
Louisville

Shareholders Report

2020

Table Of Contents

Front cover photo courtesy *Cliff Goff*

Introduction

It's our 16th anniversary of National Weather Service (NWS) Louisville's Shareholders Report. Our shareholders deserve a detailed report of our activities.

In 2020 we implemented COVID-19 mitigation procedures and markedly increased telework. Minimal staffing was in place in the office, with usually no more than two people present for each shift as long as the weather was quiet. Fortunately, we were able to practice physical distancing in the building and we disinfected our workstations multiple times a day. It also helped that 2020 was a warm but quiet year with only two tornadoes.

Warning Coordination Meteorologist (WCM) Joe Sullivan worked with all operational staff regarding our new Adopt- a-County initiative (see page 6). Hydrologist Andrea Schoettmer worked tenaciously on adding a new river forecast point at Burkesville, Kentucky (see page 8) .

There was significant staff turnover in 2020. Meteorologist Samantha Carr transferred to NWS Sioux Falls in May. Observation Program Leader Mike Crow retired in July. Science and Operations Officer Ted Funk was promoted to Meteorologist in Charge at NWS Indianapolis in August. Information Technology Officer Toby TenHarmsel transferred to NWS Birmingham in November. Lastly, WCM Joe Sullivan retired at the end of the year. We wish them all the best and we look forward to welcoming new faces in the future.

In June, Forecaster Brian Schoettmer was promoted on-station to Lead Forecaster and Pathways student CJ Padgett was promoted to Forecaster. Lead Forecaster Ryan Sharp was promoted to Science and Operations Officer in December.

2021 Goals

* Test and evaluate drone project (see page 5)
* Improve Tornado Warnings
* Expand the Adopt-a-County program
* Make ten YouTube videos
* Improve staffing profile and keep morale high during short-staffing and COVID-19

I hope you find that our activities demonstrate the sort of stewardship you expect from your public servants. The NWS was appropriated $1.17 billion for Fiscal Year 2020 which was an investment of only $3.54 per American. I am grateful to Lead Forecaster and Shareholders Report Editor Tom Reaugh for assembling another excellent report.

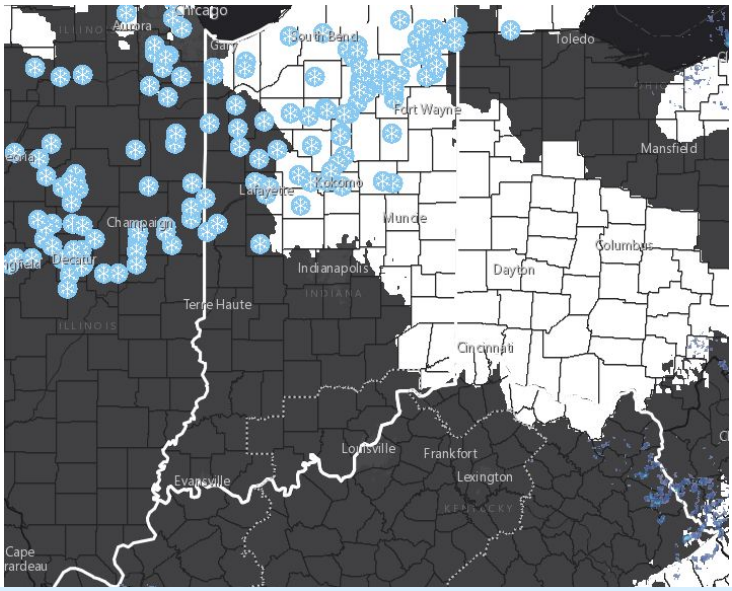
I welcome your suggestions for how the NWS can be an even better investment for you.

John Gordon
Meteorologist-in-Charge (MIC)

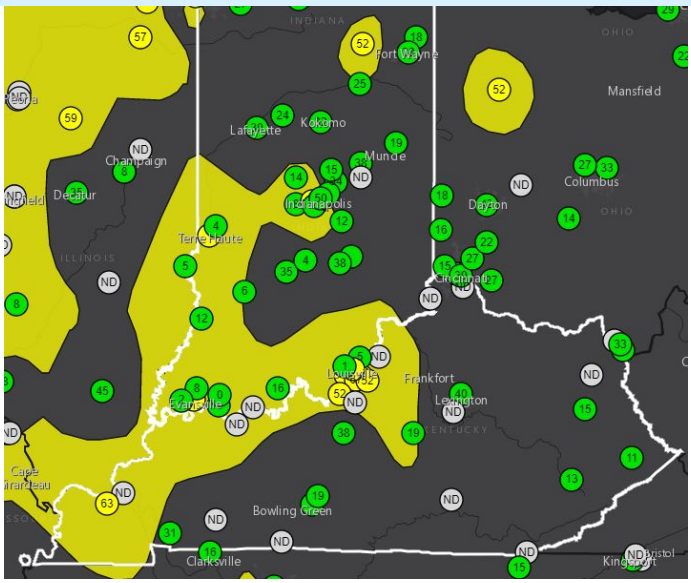
Keeping Communities SAFER

Jess Lee, Forecaster

NWS Louisville provides decision support services to local partner public service agencies. As COVID-19 testing site tents began going up in March, NWS Louisville worked with the Kentucky Emergency Management (KYEM) GIS/IT COVID-19 Response Team to develop a new operational weather dashboard to assist with KYEM's need to monitor weather conditions. In addition, our Situational Awareness For Emergency Response (SAFER) dashboard was updated to provide additional critical weather information.



Winter weather (above) and air quality (below) are just two of the many parameters the EM community can monitor via SAFER. Other available information includes earthquakes, flooding, power outages, and COVID-19 statistics.



The dashboards were designed to be all-inclusive web applications that allow our partners in areas such as public health and Emergency Management to monitor weather conditions and maintain awareness of potential hazards. Numerous geospatial datasets are utilized including current radar imagery, surface observations, and NWS Watch, Warning, and Advisory products. The dashboards make it easy to rapidly assess near-term hazards and anticipate mitigation steps.

For example, the outdoor COVID-19 testing sites are concerned with wind gusts over 40 mph and wind chills below 20 degrees. SAFER can be used to monitor the potential for these hazardous conditions to occur over the next week as well as provide real-time observations around the area when hazardous weather is ongoing. Beyond COVID-19, these dashboards will continue to be valuable situation awareness tools when providing decision support services.

Bird's-Eye View

Dan McKemy, Forecaster

Future river flood and storm damage surveys in southern Indiana and central Kentucky will take on a new dimension. Dan McKemy, a meteorologist at NWS Louisville, submitted a grant in April to obtain approval and funding for the use of Unmanned Aircraft Systems (UAS), commonly known as drones, to perform river flood and storm damage surveys. The grant was approved and funded by NOAA in May. Since then, NWS Louisville has acquired the drones needed for surveys and several office staff have been trained to pilot them.

Dan McKemy pilots a drone on a test flight

For river flooding the aerial imagery will allow NWS Louisville to create maps that will be useful to our partners to predict flooding as well as anticipate impacts the flooding may cause. For storm damage surveys the aerial imagery will help speed up the survey process as well as help to confirm whether damage was tornadic or the result of straight-line winds. Drones will capture an overview of the landscape and be able to survey areas difficult to access on the ground.

A partner's drone reveals a tornado path in Barren County in 2016.

Right: results of a test flight over Floyd's Fork in eastern Louisville

Adopt-a-County

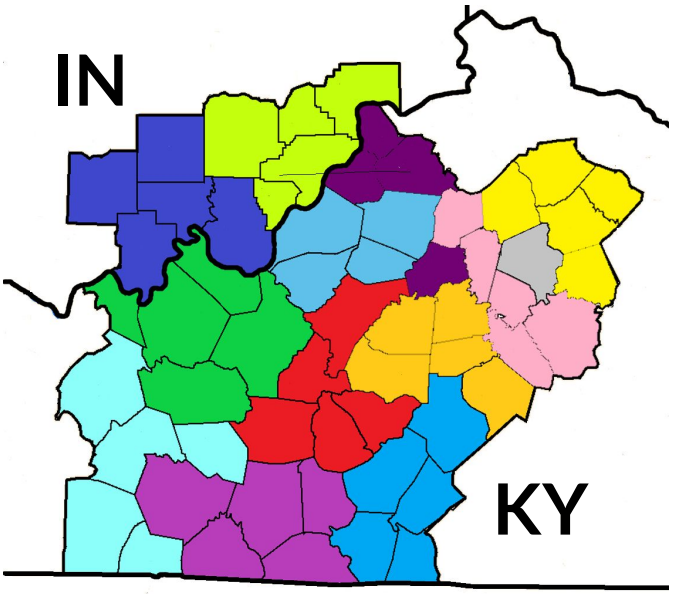
Brian Schoettmer, Lead Forecaster

Emergency Managers are among the most important partners of NWS Louisville. The relationship is mutually beneficial as Emergency Management's (EM) essential duties of hazard preparedness, mitigation, and recovery go hand-in-hand with the NWS's mission of the protection of life and property. There are 59 county EM partners as well as regional and state EM officials who work with NWS Louisville. It is difficult for NWS one person, traditionally the Warning Coordination Meteorologist (WCM), to meet the needs of all of these officials.

Toward this end, each meteorologist at NWS Louisville has "adopted" a handful of counties and is a liaison between the EMs and our office. Under this concept, one person will handle 4 or 5 counties instead of all 59 counties that would otherwise be handled by the WCM. This allows frequent and more efficient communication between partners and having a better overall understanding of each county's needs. Part of the Adopt-A-County program will be to develop an impacts catalogue that highlights the top attended events each year, trouble spots like potential hazardous material concerns, and low water crossings that contribute to flood fatality potential. With a comprehensive and up-to-date catalogue for each county, we can better serve our customers with decision support for each event and provide informed warning decisions thanks to increased knowledge of vulnerable locations.

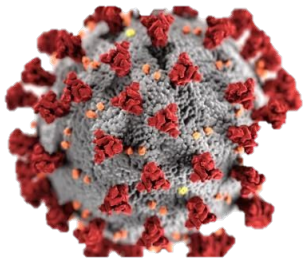
A small number of Adopt-A-County meetings took place early in 2020 before COVID-19 quickly shut down the ability to travel. NWS Louisville finished the initial round of meetings virtually during the fall and early winter. While the virtual meetings were fruitful, we look forward to meeting with our partners in person once again.

The map at right shows NWS Louisville's area of responsibility split up into groups of counties. Each group is assigned to a forecaster or other staff member who then acts as a personal liaison between NWS Louisville and the counties' Emergency Management and other public organizations.



Working from Home

Brian Schoettmer, Lead Forecaster



The COVID-19 pandemic has changed our lives, not only on a personal level but on a professional level as well. Workplaces across the world have had to adapt in many ways to continue functioning. The NWS was no exception in 2020. Changes were implemented to make the workplace safer from the concerns of COVID-19. Staffing levels in the building were significantly reduced as people stayed home to telework. Meanwhile, surfaces in the building's work areas were consistently sanitized and proper social distancing was practiced.

The biggest adaptation for the staff was the adoption of telework for all who were not needed in the office to work a forecast shift. Briefings for the entire staff were conducted on a daily basis via teleconferencing which allowed everyone to stay informed about the latest weather developments as well as staffing and facility needs. Teleworkers stayed productive with many training opportunities, daily science sharing and personal growth webinars, and extra time to work on projects.

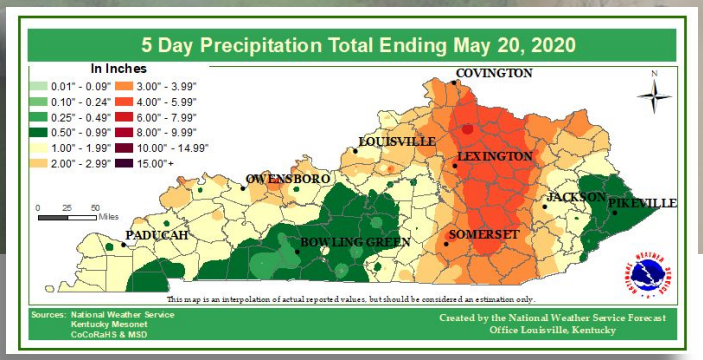
Pictured here is the home workstation of one of our lead forecasters. Though not all forecasters had a set-up like this, everyone had sufficient resources at home to assist their coworkers at the office.

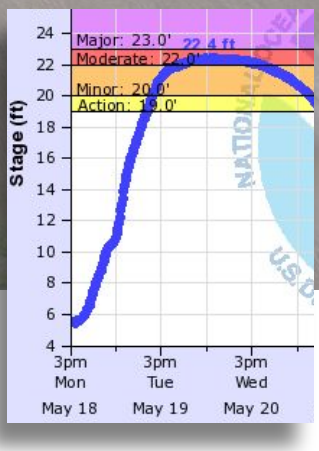
Severe weather presented special challenges as NWS offices around the country found ways to support operations from home. While there were times when more people had to be brought in to the office, staffing still needed to be limited as much as possible.

On the evening of April 8 a severe weather event unfolded across the region with meteorologists at NWS Louisville issuing essential storm watches and warnings. At home, other meteorologists were analyzing the environment and sending updated information to the office staff. Teleworkers sent storm reports and called law enforcement and emergency managers for storm damage verification. In the following weeks, teleworking forecasters produced local aviation forecasts from home. NWS Louisville will continue to fulfill our mission of protecting life and property, and no matter how long the pandemic lasts we will continue to find ways to improve our operational capabilities in this time of uncertainty.

Spring Flooding

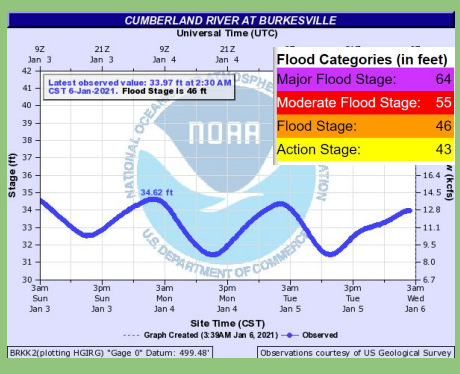
Andrea Schoettmer, Hydrologist





The most significant flooding event in the region in 2020 occurred May 15-20 due to a slow moving low pressure system over the lower Ohio Valley. Four to seven inches of rain fell over portions of eastern Kentucky with most of that falling in less than 72 hours. Several locations in Harrison, Bourbon, Nicholas, Clark, and Fayette Counties experienced flash flooding on May 19. In Harrison County, where multiple roads were closed, water entered structures and a car stalled in high water. A Flash Flood Warning with an elevated risk for "considerable" flooding was issued. The Licking River went into moderate flood at Cynthiana with a crest of 22.4' on May 19 (see graph above). As shown in the aerial photo above, this resulted in many flooded roadways along the river in Cynthiana as well as flooding in the city's parks.

NWS Louisville benefits from a vibrant partnership with Emergency Management, the Ohio River Forecast Center (OHRFC) in Wilmington, Ohio, and the United States Geological Survey. This relationship resulted in a major hydrology program highlight in 2020 with the establishment of a high-water river forecast for the Cumberland River at Burkesville, Kentucky. When the river is forecast to approach or exceed 43 feet at Burkesville, a river forecast will be issued by NWS Louisville in coordination with the OHRFC.



https://water.weather.gov/ahps2/hydrograph.php?wfo=lmk&gage=brkk2

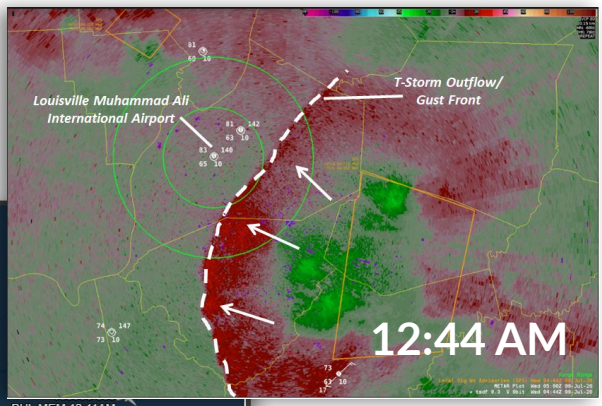
Outflanking Storms

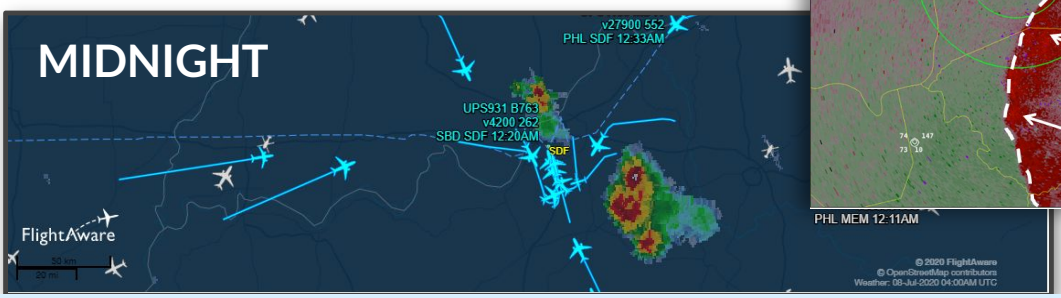
Brian Schoettmer, Lead Forecaster

Almost every night over 100 United Parcel Service (UPS) air carrier jets converge on Louisville Muhammad Ali International Airport. Air traffic controllers are very busy getting all the aircraft properly spaced and sequenced for landing. This usually goes smoothly during quiet weather; however, storms can make things tricky for both air traffic controllers and pilots. Thunderstorms cause reduced visibility, low clouds, wind shear, and wind shifts that may necessitate changing which runway the jets are using for landing. Having to change runways with bustling air traffic and thunderstorms in the area is no easy task.

On the evening of July 7-8, a complex of thunderstorms southeast of Louisville produced a strong enough gust front that it could be seen clearly on radar. Meteorologists at NWS Louisville noticed the gust of wind heading toward the airport and knew that a runway switch would be needed. A quick call to the control tower to alert the controllers of the approaching winds allowed them to redirect air traffic before the winds arrived. This very likely saved fuel and made for a less dangerous situation for both controllers and pilots.

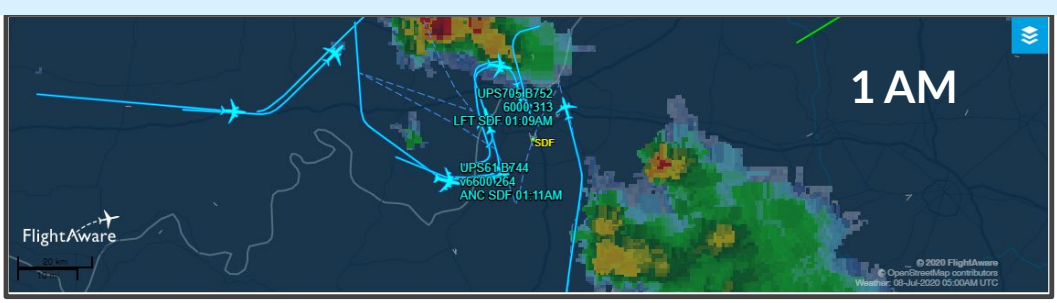
Right: Radar showing gusty winds approaching the airport. Sequence below: Incoming flights alter their approach to land.





At midnight, planes were landing from the south. After the gusty winds blew in, planes began landing from the north.

Images from FlightAware



Rigorous Training

Ryan Sharp, Science and Operations Officer

Over the past few years, several NWS Louisville meteorologists either retired or received promotions that took them to other weather forecast offices. To fill the vacated seats, we have welcomed several new meteorologists.

CJ Padgett was promoted from a paid student position to meteorologist in June after graduating from Western Kentucky University. In September 2019 Brian Neudorff made a career change and joined our team after having been chief meteorologist at KMVT in Twin Falls, Idaho.

Above: CJ Padgett works on the forecast. Below: Brian Neudorff with his workstation.

Both meteorologists have worked hard to get trained in their new positions at NWS Louisville. After going through several basic required courses, they were brought up to speed in our observational and aviation programs so they could join the forecaster rotation. To get to the point where they can issue warnings for severe weather, there is a rigorous radar training regimen, including online instruction totalling roughly 150 hours, and weather event simulations during which they practice issuing warnings in a simulated environment. In years past, some of the simulation training took place during a 1-week workshop at the National Weather Center in Norman, Oklahoma. Training for 2021, with COVID-19 restrictions in place, will be virtual, with small groups of classes running through simulations in the cloud.

After passing these and other courses, meteorologists are able to issue warnings for severe weather as well as run through the full forecast process. Training never ends, though, even for experienced NWS meteorologists. A proficiency process is in place to test our meteorologists, including on-the-job scenarios they could experience during a shift, how to give weather briefings to our core partners, infusing newly available tools from the research community, and leading or assisting in running various office programs.

Tiger of the Air

Tom Reaugh, Lead Forecaster

On the 27th of March 1890, a tornado tore into Louisville with such immediacy that few in its path had a chance to escape. Dozens of lives were extinguished in a matter of minutes. The vortex left a frightening gash across Louisville and in the hearts of those it terrified on that awful spring evening 130 years ago.

Earlier that morning low pressure was detected over Kansas, with a warm front reaching east into the Ohio Valley. As the low moved into Illinois, it pulled rich Gulf moisture northward. Powerful thunderstorms erupted during the afternoon and evening across parts of Missouri, Illinois, Indiana, Kentucky, and Tennessee.

The Louisville tornado touched down southwest of the city and roared into town around 8pm. Possibly reaching as much as F4 strength, it tore through suburban neighborhoods and the edge of downtown before crossing the Ohio River, struck Jeffersonville's riverfront, and then followed the river northeastward until it hit the Louisville water plant at Zorn Avenue, destroying its standpipe. Millions of dollars in damage was done and at least 76 people perished.

To commemorate the event, NWS Lead Forecaster Tom Reaugh teamed with University of Louisville student Nate DeSpain to construct a Story Map detailing the events of the tornado and its lasting effect on Louisville. The story can be viewed online at *weather.gov/lmk/events*. It includes narrative, maps, and over two dozen pictures of the storm's devastation.

Below: Main Street between Eleventh and Twelfth. *Photo courtesy the Filson Historical Society, Louisville, KY*

National Weather Service
6201 Theiler Lane
Louisville, Kentucky 40229

weather.gov/louisville
nws.louisville@noaa.gov
(502) 969-8842

Forecast Line: (502) 968-6025

Back cover photo: Comet Neowise at sunset over Patoka Lake, Indiana on July 18. *Dan McKemy*