

# *SHAREHOLDERS REPORT 2020*



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## TABLE OF CONTENTS

WELCOME - 03

A LIST OF MAJOR GOALS FOR 2021 - 04

PANDEMIC OR NOT, NWS INDIANAPOLIS CONTINUES TO DELIVER  
PRODUCTS AND SERVICES - 05

WEATHER WATCHER PROGRAM - 07

CLIMATE SERVICES AT NWS INDIANAPOLIS - 08

CO-OP PROGRAM - 09

SEVERE WEATHER STATISTICS - 10

HYDROLOGY - 12

NWS FORECASTER TRAINING DURING A PANDEMIC - 13

AUGUST 10, 2020 DERECHO - 14

# WELCOME

BY TED FUNK, METEOROLOGIST IN CHARGE

As a Federal government agency, the National Weather Service (NWS) provides weather, water, and climate information to support user weather-related decisions, and issues watches and warnings to protect life and property. Therefore, in essence, you are a shareholder in the NWS. As such, I welcome you to the first annual NWS Indianapolis's Shareholders Report! Our inaugural edition summarizes some of our significant office activities and weather events in 2020, with a brief look at 2021. In serving 39 counties in central Indiana, we hope you find that our efforts demonstrate the kind of stewardship you expect from your public servants.

The year 2020 will be remembered for the COVID pandemic. While this hardship affected all of us in some ways, the dedicated employees at your NWS Indianapolis (IND) office continued to provide unabated observations, forecasts, and warnings to meet our mission, and I thank them! Given the pandemic, we also found innovative ways to support our operations remotely, and this will help us serve you very well in the future.

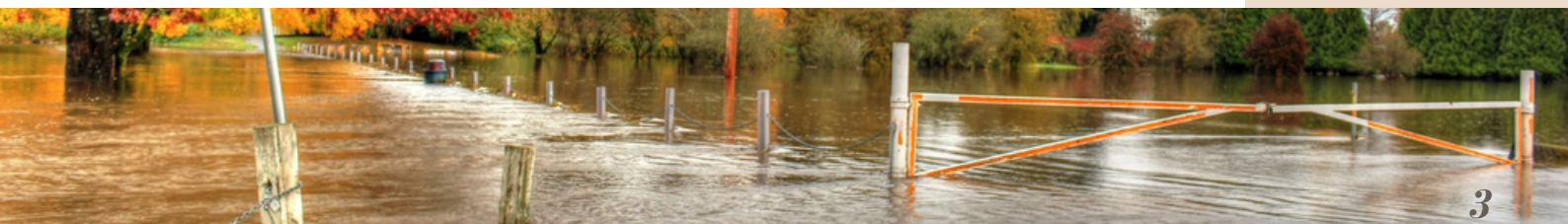
2020 also brought a few new people to our office. First, Alexander McGinnis joined the IND team as a new meteorologist in April and has progressed very well in his training and development. Next, Joe Nettesheim reported as IND's new Information Technology Officer (ITO) in early September and already has done a

fantastic job supporting our IT needs. Finally, after spending many years at the NWS office in Louisville, KY, I was selected as IND's new Meteorologist-In-Charge (MIC) and arrived in early August. I have enjoyed my relatively short time in Indianapolis and look forward to working much more with the great individuals in our office, and serving the many people of central Indiana.

I'm a big believer in personal leadership and self-reflection. In 2021, we will continue these efforts to allow our team to better serve you. This means reorganizing our operational work area once COVID abates to optimize our decision process and community services. It means strong professional relationships with our key partners, including emergency managers, TV meteorologists, INDOT, IMS, Weather-Ready Nation Ambassadors, state climatologist, FEMA, academia, and others. It also means implementing creative new graphical displays on our website to provide a better visual presentation of weather information. It means enhanced messaging and briefings to facilitate weather awareness and safety in central Indiana. And these are just a few items on our radar in 2021.

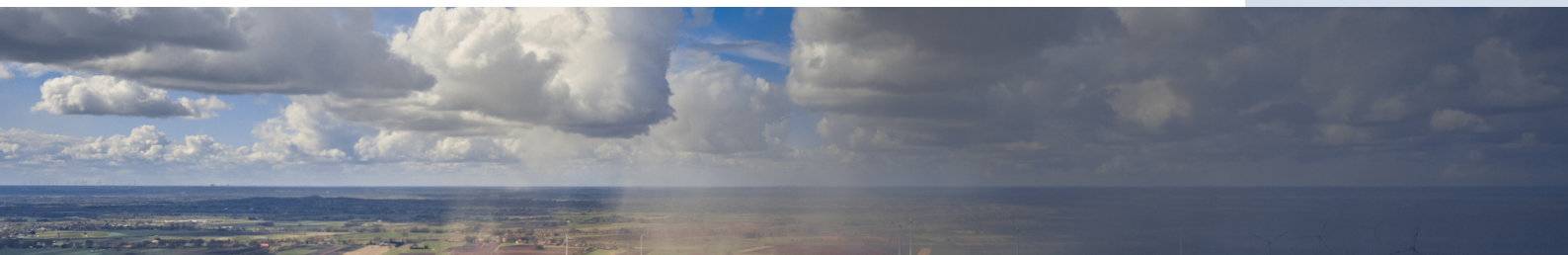
If you have comments or questions, please email us at [nws.indianapolis@noaa.gov](mailto:nws.indianapolis@noaa.gov). Or catch us on the web at [weather.gov/ind](http://weather.gov/ind), Facebook at [facebook.com/NWSIndianapolis](https://facebook.com/NWSIndianapolis), Twitter at [@NWSIndianapolis](https://twitter.com/NWSIndianapolis) (#INWX), and YouTube at [youtube.com/user/NWSIndianapolis](https://youtube.com/user/NWSIndianapolis).

Finally, I am grateful to IND Meteorologist Kacie Hoover for her excellent job assembling this report! Enjoy.



# *A LIST OF MAJOR GOALS FOR 2021*

- Revamp the NWS Indianapolis operations area to optimize internal communication and our services to the community
- Conduct various self-assessment and team leadership activities/scenarios to maximize personal and professional growth in our weather service to others
- Implement the latest severe weather and tornado research to facilitate timely, accurate warnings
- Tailor the Situational Awareness For Emergency Response (SAFER) program for use at NWS Indianapolis
- Expand the content and utility of our one-stop shop impact-based decision support services webpage ([www.weather.gov/ind/INwxbrief](http://www.weather.gov/ind/INwxbrief))
- Mature the Indiana Pathfinders program, working with INDOT and other partners, and neighboring NWS offices
- Work with key partners to promote increased personal awareness and proper response to adverse weather conditions, including during major community events
- Expand our virtual outreach efforts, including the spring symposium, safety/preparedness presentations, school talks, partner meetings, and YouTube videos
- Generate more innovative email weather briefings for our partners and Weather-Ready Nation Ambassadors
- Create and improve graphical/GIS displays of weather forecast information



## *A YEAR IN REVIEW AT INDIANAPOLIS INT'L AIRPORT*

	2020	YEARLY AVERAGE*
MAX TEMPERATURE	94° (Jul 8)	95°
MIN TEMPERATURE	2° (Feb 14)	-8°
TOTAL PRECIPITATION	44.92"	42.44"

\*Climate Normal Period 1981-2010





# *PANDEMIC OR NOT, NWS INDIANAPOLIS CONTINUES TO DELIVER PRODUCTS AND SERVICES*

BY SAM LASHLEY, WARNING  
COORDINATION METEOROLOGIST

An unprecedented 2020 is finally in the rear view mirror and we look at 2021 with optimism and hope that our strange journey will return to a more familiar road. Despite the many unique challenges and obstacles encountered in 2020, there were several positives that arose from the chaos that will help make the NWS even better prepared and versatile moving forward. Below are just a few highlights of our successes, adaptations, and adjustments that occurred in 2020.

NWS forecast and warning operations, outreach, and Impact-based Decision Support Services (IDSS) proceeded as normal through early March 2020 before the onset of Covid-19 restrictions forced unprecedented changes to local NWS operations. The year began with NWS Indianapolis active and fully engaged with core partners and the public. Over 50 presentations, meetings, exercises, tours,

and interviews were conducted by NWS Indianapolis staff during the first 9 weeks of 2020. Some of these events included a popular tabletop exercise called Weather Watchers for school officials; attendance at the Hoosier Association of Science Teachers Inc. (HASTI) annual conference; a weather safety and preparedness talk to over 500 attendees at the Indiana School Safety Specialist Academy; and nearly 20 spotter talks given in person before restrictions on travel and meetings were imposed.

What did the NWS Indianapolis staff do once restrictions began? Without question, we quickly adapted and made critical changes to shift rotations and duties to continue the NWS mission of protecting life and property without disruption. While administrative staff were primarily confined to teleworking from home for the remainder of 2020, operational staff continued to work unabated 24 hours-a-day, 7-days-a-week providing critical forecasts and warnings for decision makers and the general public in central Indiana. When severe weather threatened, staff was increased to handle the additional workload, while wearing personal protective equipment and following social distancing guidelines. Our IDSS continued remotely from NWS Indianapolis with phone calls and email briefings. In a few rare cases where onsite weather support was needed for public safety, such as the Indianapolis Motor Speedway, NWS staff rose to the occasion with safety protocols strongly followed.

Staff responsible for attending meetings and giving presentations also transitioned to a virtual setup using existing meeting software and guidelines. Live training was conducted online and recorded for new observers in the Community Collaborative Rain Hail and Snow (CoCoRaHS) network. Our staff also spoke at virtual conferences and gave interviews remotely as requested. The Fall 2020 version of the semi-annual NWS partners meeting was held virtually with local media, emergency managers, and other partners, and featured record attendance because of the virtual option.

Despite the restrictions and challenges associated with the pandemic of 2020, the NWS Indianapolis office still managed to participate in nearly 200 events during the year! The NWS staff has also been busy creating new graphics and methods of communicating weather data to our partners which will expand in 2021. A new experimental Decision Support Services Briefing webpage was released late in the year and can be found at [www.weather.gov/ind/INwxbrief](http://www.weather.gov/ind/INwxbrief). This page includes new statewide graphics that incorporate data from all 6 NWS offices serving Indiana and are updated routinely. This page can be used for situational awareness and self briefings. Additional new graphics are coming in 2021 and include a detailed forecast matrix, similar

to the one pictured to the right. This matrix will be used in emails and IDSS briefing packages, tailored to specific event locations and partner specified threat levels. The NWS Indianapolis staff is eager to continually improve our products and services to aid our decision making partners. Please send any comments or suggestions for improvements to [Sam.Lashley@noaa.gov](mailto:Sam.Lashley@noaa.gov) at any time. We look forward to hearing from you!

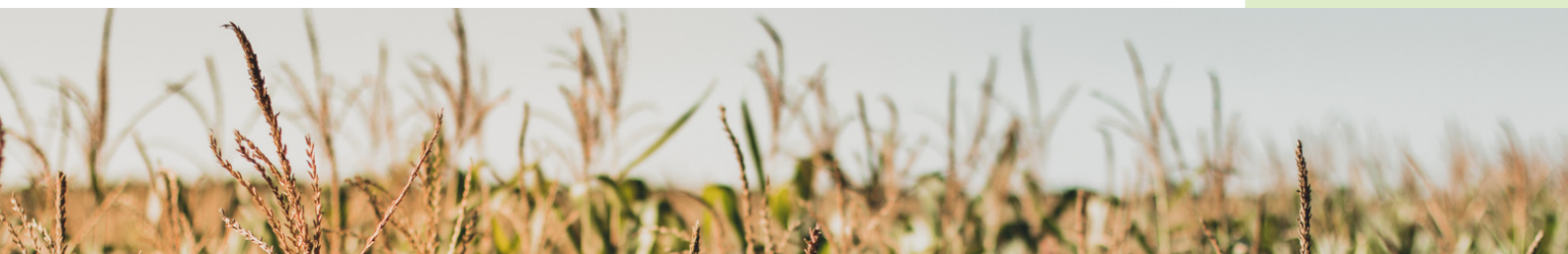
EXAMPLE OF A FORECAST MATRIX

	Wed 12/09 7 AM	Wed 12/09 8 AM	Wed 12/09 9 AM	Wed 12/09 10 AM	Wed 12/09 11 AM	Wed 12/09 12 PM	Wed 12/09 1 PM	Wed 12/09 2 PM	Wed 12/09 3 PM	Wed 12/09 4 PM	Wed 12/09 5 PM	Wed 12/09 6 PM	Wed 12/09 7 PM
Temperature	34°F	34°F	36°F	39°F	44°F	46°F	48°F	50°F	51°F	50°F	48°F	45°F	42°F
Wind Chill	25°F	27°F	28°F	32°F	36°F	40°F	42°F	45°F	51°F	47°F	44°F	39°F	37°F
Wind Speed	12 mph	9 mph	8 mph	9 mph	12 mph	11 mph	10 mph	9 mph	9 mph	8 mph	6 mph	6 mph	5 mph
Wind Direction	SW	SW	SW	W	W	W	W	W	W	W	W	W	W
Wind Gust	17 mph	12 mph	11 mph	12 mph	17 mph	16 mph	14 mph	11 mph	11 mph	11 mph	10 mph	8 mph	5 mph
Chance of Precipitation	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Weather	None	None	None	None	None	None	None	None	None	None	None	None	None
Sky Cover	46%	37%	28%	15%	1%	3%	4%	3%	3%	2%	3%	5%	6%
Ceiling	17600 ft	18100 ft	19100 ft	SKC	SKC	SKC	SKC	SKC	SKC	SKC	SKC	SKC	SKC
Visibility	9.5 SM	9.0 SM	9.5 SM	10.0 SM	8.5 SM	8.5 SM	9.5 SM	10.0 SM	10.0 SM	10.0 SM	10.0 SM	10.0 SM	10.0 SM
Snow Ratio	3.1	3.1	3.1	3.1	3.1	3.1	2.1	2.1	2.1	2.1	2.1	2.1	3.1

Issued: Wednesday December 09, 2020 01:48 PM

Threat Level	None	Limited	Elevated	Significant	Extreme
Temperature	≥0 °F	0 to -19 °F	-20 to -29 °F	-30 to -39 °F	≤-40 °F
Wind Chill	≥0 °F	0 to -19 °F	-20 to -29 °F	-30 to -39 °F	≤-40 °F
Wind Speed	≤25 mph	25 to 29 mph	30 to 34 mph	35 to 39 mph	≥40 mph
Wind Gust	≤35 mph	35 to 44 mph	45 to 57 mph	58 to 73 mph	≥74 mph
Chance of Precipitation	≤15 %	15 to 24 %	25 to 54 %	55 to 74 %	≥75 %
Sky Cover	≤20 %	20 to 39 %	40 to 59 %	60 to 79 %	≥80 %
Ceiling	≥3000 ft	3000 to 1001 ft	1000 to 501 ft	500 to 201 ft	≤200 ft
Visibility	≥5.0 SM	5.0 to 3.0 SM	3.0 to 1.0 SM	1.0 to 0.5 SM	≤0.5 SM
Snow Ratio	≤5.1	5 to 9.1	10 to 14.1	15 to 19.1	≥20.1

Note - Grey color indicates no thresholds assigned



# WEATHER WATCHER PROGRAM

BY ANDREW WHITE, METEOROLOGIST

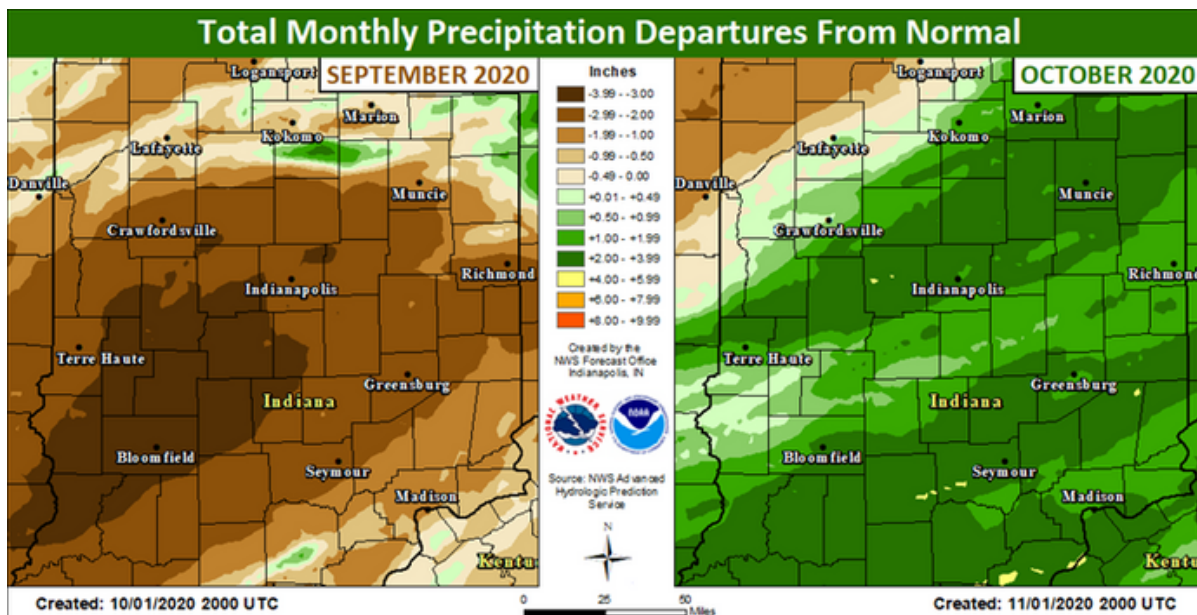
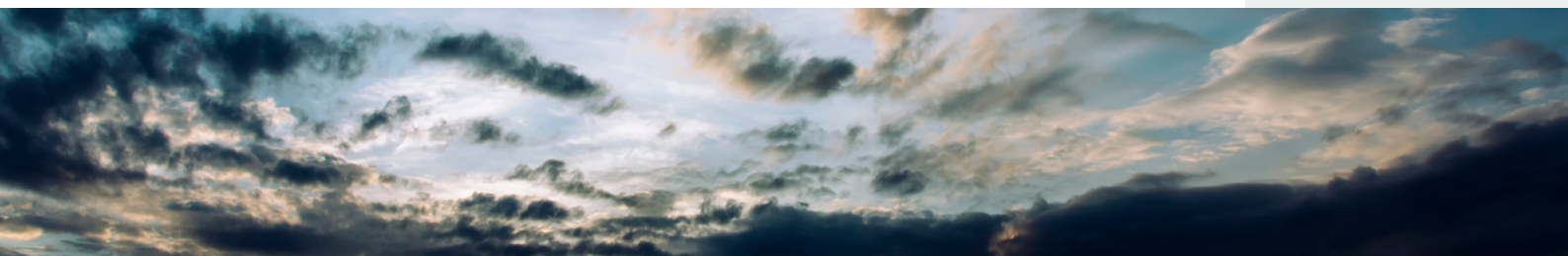
One of the most critical goals of the NWS is creating a Weather Ready Nation. One initiative to reach this goal is the Weather Watcher program. The goal of the program is to train event planners how to prepare their outdoor events for hazardous weather and to provide a consistent method for monitoring the weather both before and during the event. The website that was created for monitoring weather through the Weather Watcher program can be found at [www.weather.gov/ind/weatherwatcher](http://www.weather.gov/ind/weatherwatcher).

To achieve this goal, we have worked with Emergency Managers across the state



NWS Meteorologist conducting a Weather Watcher exercise to event planners and school officials in Fountain County, IN.

to conduct exercises where we train the event planners in their counties on how the program works and then we go through a scenario to put that training into action. Recently, this program has expanded into the school corporations and we are working with athletic directors and other school officials to keep school sporting events safe. We will continue to refine the program and find new avenues to spread the use of the program in 2021 to better serve our constituents.



September 2020 ended up being the driest September on record for the Indy Airport with only 0.12" of total rain. This dry month fell in the middle of yet another record that was set. From August 19 to October 14, daily precipitation totals did not exceed a tenth of an inch, setting a record 57 day stretch with minimal daily precipitation. The rest of October, however, ended up with enough precipitation to end the month with above normal totals.





# *CLIMATE SERVICES AT NWS INDIANAPOLIS*

BY MIKE RYAN, LEAD METEOROLOGIST

NWS Indianapolis leads the only statewide team dedicated to climate services in the country. The climate team was started in 2012 as a collaboration from all areas of the weather enterprise that serves the Hoosier state with climate needs. The team consists of over 30 members from the 6 NWS offices that cover Indiana, the state climatologist located at Purdue University, and other state and regional officials such as the Indiana Department of Homeland Security, the Indiana Department of Natural Resources, Agricultural Extension Offices, the Midwest Regional Climate Center, the Purdue Climate Change Research Center, and the Environmental Resilience Institute at Indiana University.

The Indiana Climate Services team engages in quarterly conference calls with additional webinars dedicated to climate service related topics. In 2020, the team was instrumental in further enhancing existing relationships while engaging new partners across the state and regionally through the lower Great Lakes and Ohio Valley. In 2021, ongoing research projects including the development of a statewide

Severe Weather Climatology and studying extreme precipitation trends across the state will continue. This effort will support longer range decision support services for local, state, and regional partners in an effort towards creating a Weather Ready Nation.

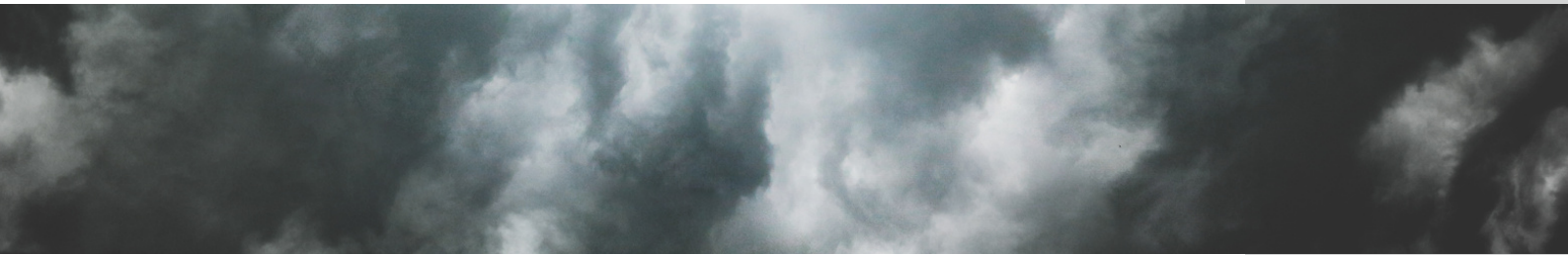
In 2019, a Drought Mitigation team was born out of the Climate Services team and is led by the Indiana Department of Homeland Security. Calls are conducted monthly, and at times weekly when needed, to assess evolution of drought conditions and their potential impacts across the state and to develop specific guidance to share with the National Drought Mitigation Center. NWS Indianapolis is an important part of this team as well, providing specific information on precipitation trends and forecasts that are incorporated into the drought guidance developed each week.

Formation of both the Climate Services and Drought Mitigation teams have increased communication and collaboration between multiple partners at the local, state and regional levels. The partnerships formed on these teams will continue to grow, enabling them to expand efforts further in 2021 and the years to come. The response to both teams' efforts from partners has been overwhelmingly positive while serving as a template for other states who endeavor to create similar groups.



# BELOW AVERAGE TORNADO YEAR

	CENTRAL INDIANA	STATE OF INDIANA
YEARLY AVERAGE	12	27
2020	1	17



## COOP PROGRAM

BY EARL BREON, OBSERVING PROGRAM LEADER

The Cooperative Observer Network is comprised of volunteers who take daily temperature and precipitation recordings. These observers adhere to strict reporting

and equipment maintenance guidelines so their data can stand up to the scrutiny required to enter into the Climate Record for their area. These data are routinely used to verify insurance claims, justify weather-related disaster relief funding, assist tracking energy usage and needs by energy companies, and determine building codes and infrastructure needs by city planners and engineers.

COOP Station including temperature, precipitation, and evaporation equipment.





# *SEVERE WEATHER STATISTICS*

BY SAM LASHLEY, WARNING  
COORDINATION METEOROLOGIST

Do you know why the NWS Indianapolis office contacts you during and after weather events to ask for damage reports? The answer is because we always strive to know exactly how we performed and how we can improve after each event. Perfection is a realistically impossible goal, but improving from year to year as technology, expertise, and training improve is a realistic expectation and one we take seriously.

Severe weather verification statistics are compiled at every NWS office based on reports received from trained spotters, emergency managers, media, and corroborated public reports. These numbers allow for an objective assessment of NWS performance to identify areas where our warning performance can be improved. All warnings and collected reports are archived at the National Center for Environmental Information (NCEI) and are also entered and certified monthly by each NWS office into the official Storm Events Database. This information is available to the public about two months after each event.

The data for 2020 have been collected, entered, and certified. While the

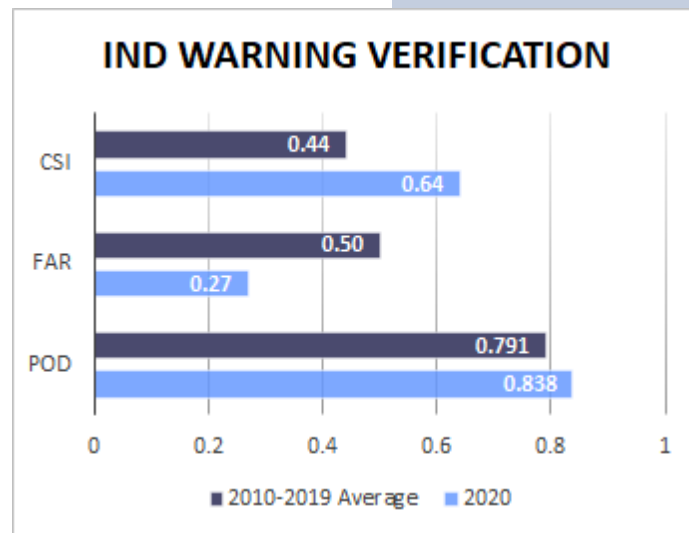
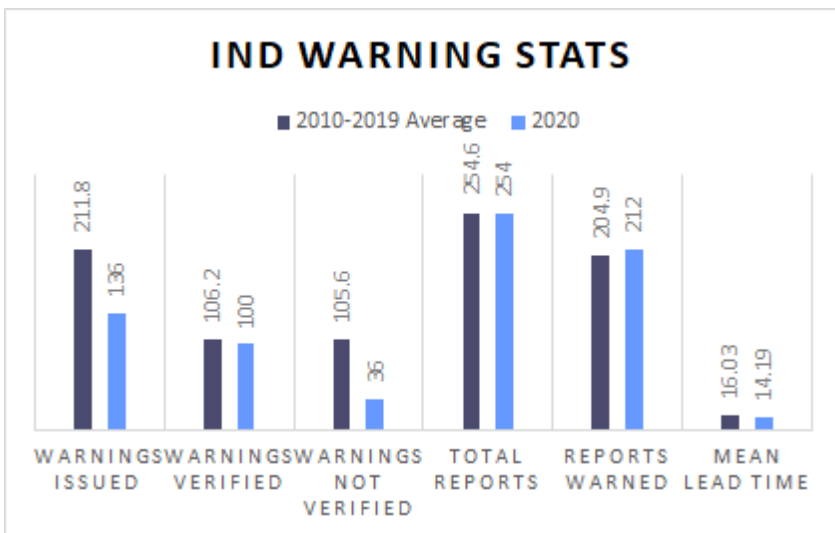
verification database is quite comprehensive, we can look at some basic analytics to find trends, successes, and areas for improvement. The charts on the next page highlight the primary numbers to assess performance. The charts contain a comparison between the annual average for each variable during the previous 10 year period, or 2010-2019, and the actual values for 2020. Several items stand out. First, the chart on the left shows that the total number of severe weather reports for 2020 was right on the 10 year average of 254. Despite that, the number of warnings issued (136) was considerably less than the 10 year average (~212), but the number of warnings verified for the year (100) was close to the long term average (~106). This information shows how we reduced the number of warnings that did not verify with severe weather reports, which we call the false alarm rate, or FAR. It is important to remember that severe weather may have occurred within a warning area but no reports were received by the NWS. This contributes to the FAR and demonstrates why all of your reports, even if just a few trees are blown down or minor property damage occurs, are important and should be sent to the NWS office. Reducing the FAR helps make NWS warnings more effective in eliciting responses from the public to seek shelter.

NWS Indianapolis is working hard to not only reduce our FAR but also improve our probability of detection (POD). The POD statistic is computed when a warning is issued prior to severe weather occurrence

and credible reports are received within the warning area. The chart on the right shows that in 2020, the NWS Indianapolis office had about a 5 percent improvement in POD with ~84% of warnings verified, up from the 10 year average of ~79%. The most significant improvement was with our FAR previously discussed, coming in at just 27%, down from the 10 year average of 50%. This means for every 4 warnings issued in 2020, only 1 did not verify with severe weather reports. The Critical Success Index (CSI) is a computed statistic that measures overall warning performance by weighing POD and FAR. An ideal score is 1 and the worst score possible is 0. NWS Indianapolis had a significant improvement in CSI over the 10 year average as well, up from 0.44 to 0.64. Finally, the average lead time for warnings, or time from warning issuance to the first report of severe weather, was down a bit from 16 to 14 minutes as seen in the chart on the left. Forecasters likely used these extra 2 minutes to further evaluate storms which helped contribute to the reduced

false alarms and improved detection. Fast moving storms can also reduce lead times and several of our bigger severe weather events in 2020 were due to fast moving lines of storms, including the derecho event that impacted a large part of the Midwest in August.

Tornado events in central Indiana as well as much of the country were well below normal in 2020. There was only 1 tornado reported in central Indiana during the entire year, well below the 10 year average of 13. The Indianapolis office only issued 5 tornado warnings for the year, well below the average of 38 per year. Unfortunately the 1 tornado was a weak, brief spin-up and the tornado warning was issued after the tornado was on the ground. Nevertheless, a severe thunderstorm warning was in place prior to the tornado. Short duration, spin-up tornadoes remain a warning challenge for meteorologists and we will continue to study these events and work toward improved detection and warnings.





# HYDROLOGY

BY ANDREW WHITE, METEOROLOGIST

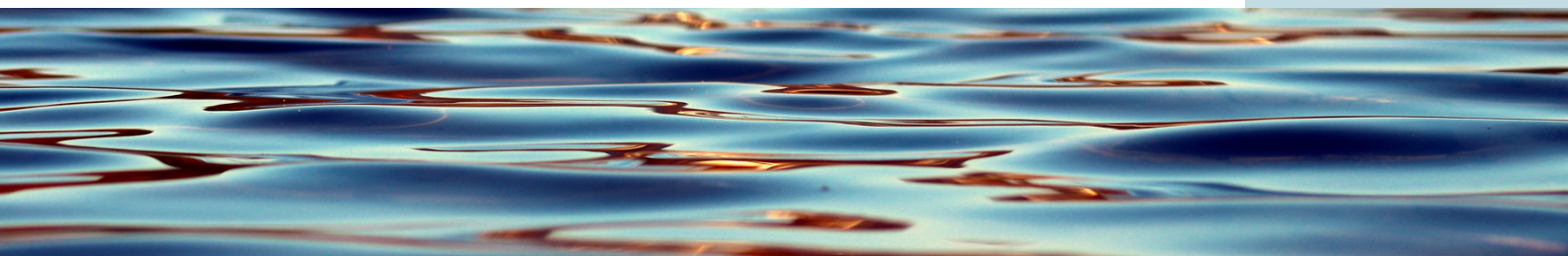
The NWS Indianapolis Hydro Team has been hard at work in 2020 to ensure both life and property remains safe in the midst of flooding events and other hydrologic hazards. We work closely with the United States Geological Survey (USGS) to ensure that the 135 stream gages across central Indiana are accurate and operating. We also coordinated with the USGS relating to 6 newly installed gages to ensure data was accessible through our network.

Another highlight was the introduction of ensemble river outlooks to our river forecast points across central Indiana (shown graphically below). This new river outlook shows the potential for flooding events further in advance than our previous forecasts were able to do.

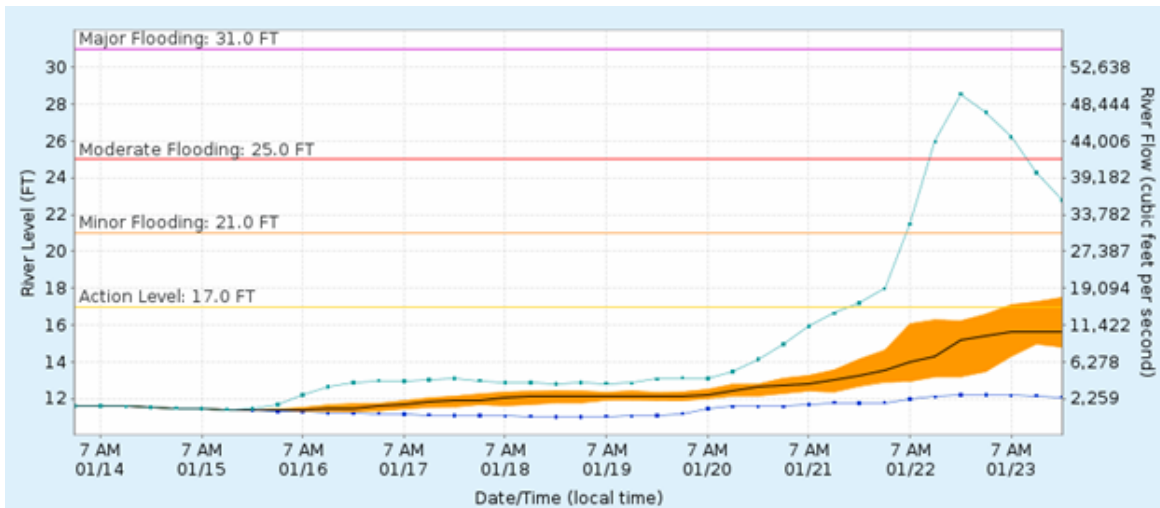
While not being an exact forecast, it can provide an early heads up for potential flood events in the future. More information on this new product can be viewed at: [nws.weather.gov/products/PDD/PDD\\_MMEFS\\_11232012.pdf](https://www.weather.gov/products/PDD/PDD_MMEFS_11232012.pdf)

During 2020, 102 river flood warnings were issued across the major and minor rivers of central Indiana. While flooding was frequent during the late winter and early spring, by summer the majority of the flooding had come to an end with only very infrequent flooding into the fall.

In 2021, we hope to continue to expand our partnerships with agencies across the state to provide the best service possible. We will be looking at the data network and finding areas where to prioritize new river gages along with a continuing effort to utilize Meteorological Model Ensemble River Forecasts (MMEFS) to give additional lead time to future flooding events.



## NEW SHORT-RANGE ENSEMBLE GRAPHICS HIGHLIGHTING POTENTIAL FLOODING THREAT





# *NWS FORECASTER TRAINING DURING A PANDEMIC*

BY DAVE BEACHLER, SCIENCE AND OPERATIONS OFFICER

Training and competency drills are conducted annually by employees of the NWS to increase their knowledge and proficiency. On average, each employee completes in excess of 80 hours of combined training. This may consist of time reviewing a prior event on our in-house Weather Event Simulator (WES), university-related learning modules, tabletop exercises with partners for weather scenarios, and new techniques developed from research groups. Despite challenges in 2020 due to the COVID pandemic, the staff at NWS Indianapolis continued to meet their training deadlines, albeit through different platforms and techniques.

Traditional training consists of the staff working together in-person in a functional exercise setting. However, operational changes due to COVID forced innovation to meet these needs through the use of telework platforms. Prior to the pandemic, a telework shift conducted at home was not routinely performed by NWS employees. Now, through creative and

diverse methods to meet our challenges, NWS Indianapolis has adopted a “be flexible” mantra to help complete training tasks while supporting our daily operations and service from home.

While social distancing has helped keep us safe, it also limits the number of in-office staff for routine operations. Nevertheless, during hazardous weather situations, we still expand our in-house personnel to an extent, maintaining safety protocols, to keep the community aware and protected from whatever situation the atmosphere throws at us. Additional support and benefits are provided by the teleworkers at home during these hazardous events.



NWS workstation used during both training operations and active hazardous weather.

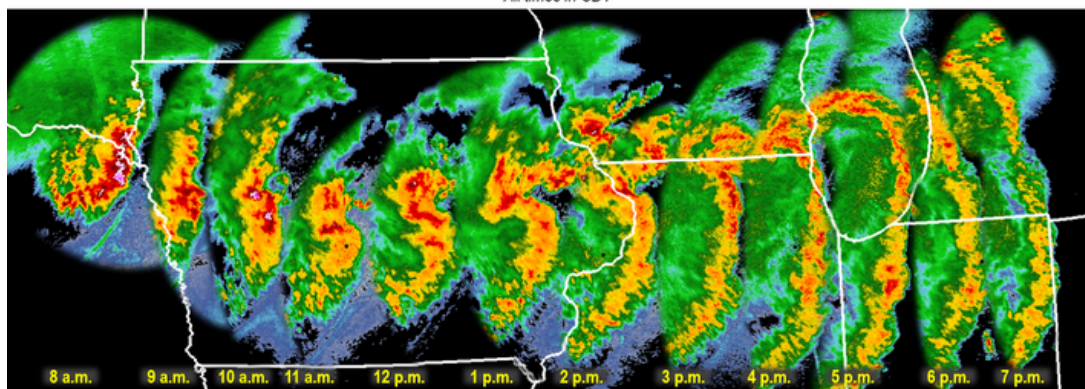
As the Science and Operations Officer overseeing operations and all training of the staff, I have adopted routine office-hours. This is an opportunity at least once a month for me to tag-up with employees to conduct a video discussion about recent training and questions they might have. This encourages deeper discussions on the scientific processes within the atmosphere prior/during/after hazardous weather events. Despite all of the challenges we as a society and agency have faced, there has never been a stronger relationship between the NWS and our core partners.

# AUGUST 10, 2020 DERECHO

BY KACIE HOOVER, METEOROLOGIST

August 10, 2020 Derecho: Lowest Angle NWS Radar Reflectivity at One-Hour Time Steps

All times in CDT



This long-lasting, severe wind thunderstorm complex (known as a derecho) produced hundreds of reports of damage along with likely a few tornadoes.

NWS Chicago | [weather.gov](https://www.weather.gov)

Aug 11, 2020

This past August, the Midwest was rocked by a strong derecho (a large, fast-moving line of bowing thunderstorms) event that brought widespread damaging winds across numerous states. The storms rapidly strengthened over western Iowa and continued their destructive path through Illinois, Indiana, and Michigan. In the days leading up to this event, the Indianapolis office messaged about the chance for severe thunderstorms, but exact storm evolution as the system approached central Indiana was not yet clear. Within the first couple hours of the work day on the 10th, as storms quickly intensified over Iowa, the Indianapolis office swiftly ramped up messaging for the severe weather that would eventually reach the state by late afternoon and evening. Forecasters both in the office and working from home collaborated throughout the day to continually stay on top of the derecho's evolution. Updated forecasts and social media graphics were sent out, local emergency managers and

partners were contacted, and NWS staff spoke with local newspapers about storm expectations and associated public safety measures. A severe thunderstorm watch went into effect for portions of our county warning area (CWA) shortly before 4:30pm and was later expanded to cover the whole CWA. By 5:30pm, NWS Indianapolis began issuing severe thunderstorm warnings as the derecho entered the northwest corner of central Indiana. These warnings for damaging winds continued until around 10pm as the system pushed eastward through the state.

At its peak, the derecho produced estimated wind gusts as high as 130 to 140 mph in Iowa, flattening crops and structures. In Indiana, a few tornadoes formed in the northern part of the state that were later rated EF-0 and EF-1 by NWS Northern Indiana. In the NWS Indianapolis CWA, winds of 50 to 70 mph were observed which led to numerous downed trees and power lines, and power outages.

The progression of the derecho as it made its way across the Midwest. Image courtesy of NWS Chicago.



# *SHAREHOLDERS REPORT 2020*



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