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## What is Effective Decision Support?

The term “decision support” has a broad definition, ranging from a simple, even subconscious, action, such as advising a colleague that they should grab an umbrella before heading outside, to a customized, detailed forecast in response to an emergency situation.

The past year provided a number of examples where decision support was crucial in the response and recovery to extreme events. This special double-issue of the Central Region Newsletter recognizes the events and people that serve as the nexus of decision support services, and the impact decision support has on our nation.

Instead of presenting a formulated definition of decision support, we can shape our view from the key attributes National Weather Service employees and individuals interested in the field of decision support identified during the **2011 Decision Support Services Deployment Boot Camp**:

- Communication, communication, communication
  - Speak to customers in their language, not as a scientist
  - Know your audience
  - Provide guidance by communicating uncertainty and contingency forecasts
- Provide useful and timely information
  - Customized to customer needs when possible
- Anticipate what users need
  - Sometimes they don't know what you can offer or what they can get on their own - demonstrate or show them
  - Sometimes they don't know their criteria levels. Assist them with determining criteria or threshold levels when appropriate.
- Know your role within the Incident Command Structure scheme
- Present a professional and positive image, being empathetic to those around you
- Build strong relationships and trust with your partners
  - Provide on-site availability and share the contact information for 24/7 accessibility with the local NWS office
- Be flexible and adapt to the situation, things will change

Throughout the discussions, the predominant themes involved building relationships, effectively communicating, and being adaptable and flexible. These attributes help make decision support services both effective and crucial. As NOAA moves forward with its Weather-Ready Nation initiative, decision makers and the public will increasingly look to NOAA for information and services to make informed decisions.

### DECISION SUPPORT CONTINUUM



Do you have examples of effective decision support provided in your community? Please consider taking a few moments to document these real life scenarios as they occur and send them to [noaa.centralregion@noaa.gov](mailto:noaa.centralregion@noaa.gov). **E-Central News > NOAA in the Heartland** will be highlighting your stories of decision support that occur throughout the region with a new feature section in future issues. From remote or on-site support to a man-made or natural disaster, there are many opportunities to learn from each other as we strive to provide outstanding service to the public. So tell your own story, brag on your office, share lessons learned or challenges overcome. *Effective decision support is enhanced when we can learn and improve from the successes and lessons of each event.*

# 2011 Decision Support Services Deployment Boot Camp

National Weather Service Meteorologists and Hydrologists participated in the inaugural Decision Support Services (DSS) Deployment Boot Camp at the National Weather Service Training Center September 13-16. This pilot course was designed to build capacity and capability for those providing quality on-site decision support services in critical situations. Participants were challenged to clarify and practice skill sets needed to deliver quality DSS for high impact events through a variety of presentations, large and small group discussions, and facilitated interactive exercises. "Training National Weather Service Emergency Response Specialists to provide critical decision assistance for high impact events will help build the foundation for a weather-ready nation," said Lynn Maximuk, Director of Central Region Headquarters.

Participants were introduced to partners and NWS employees who have been dispatched to support such events. This created a greater understanding of partner requirements and a common operating picture, spanning internal and interagency boundaries.

The DSS Deployment Bootcampe was built on five foundational components of effective DSS:

1. Trust-based relationships with core partners,
2. Learning partners' evolving and incident dependent decision thresholds,
3. Educating partners about NWS expertise and services,
4. Designing emergency response services around partners' needs and operations, and
5. Providing value-added risk communication in critical situations.



Participants practice bridging techniques in preparation for a media interview.

Interactive exercises and simulations between Emergency Managers and partnering agencies from the Federal Emergency Management Agency (FEMA), the United States Army Corps of Engineers (USACE), and the Environmental Protection Agency (EPA) helped participants sharpen and strengthen their skill sets. Activities included providing ICS-style briefings, developing multimedia presentations, conducting media interviews, filing documentation, and utilizing social media and mobile technology tools in the context of incident support. "Workshop feedback surveys indicate 100% of the participants improved their understanding of decision support services and now feel better equipped to provide effective decision support services when deployed to an ICS-structured event," said Kim Runk, Chief of Integrated Services, Central Region Headquarters.

Class members used their newly honed skills and tools in full-day incident simulations built around three scenarios: an urban tornado, an inland oil spill and mainstem river flooding. Insights and best practices from a partner perspective were shared in panel discussions, including the Operations Chief, Plans Chief, and Communications Unit Leader from the Joplin Tornado response and recovery operation; USACE members who were involved with the Joint Information Center for the Missouri River Flood; and EPA partners familiar with the Enbridge oil spill clean-up.

Primary funding for the workshop was provided by the NWS Weather-Ready Roadmap effort and Central Region Headquarters. As testimony to the value and importance of this project, one guest facilitator, Emergency Manager Shea Lane noted, "If I'm Incident Commander or Ops Chief on a major incident, I like to have a meteorologist on-site, so I can keep my eyes on the fire knowing someone else I can trust is watching my back." A fellow first responder, Kevin Brown, added, "I agree. That's why this program's goal is so exciting to me. Growing the number of qualified NWS Emergency Response Specialists will be a huge benefit to those of us who lead disaster recovery teams and manage incident support functions."



Group members discuss the potential impacts and evacuation areas of a simulated river flooding.



(L to R) J.P. Martin (WFO Bismark, ND) and Mike Hudson (Central Region Headquarters).

# 2011 Decision Support Services Deployment Boot Camp



## BOOT CAMP PARTICIPANTS

**FRONT ROW** (L to R): **Steve DiRienzo** (WFO Albany, NY), **Donna Dubberke** (WFO Quad Cities, IA), **Mark Tew** (Western Region Headquarters), **Kelly Hooper** (WFO Paducah, KY), **Sally Pavlow Johnson** (NWS Headquarters), **Jennifer Zeltwanger** (Central Region Headquarters), **Becky Kern** (WFO Omaha, NE), **Megan Terry** (WFO Springfield, MO), **Bethany Hale** (NOAA Central Region)

**SECOND ROW** (L to R): **Todd Heitkamp** (WFO Sioux Falls, SD), **Andy Foster** (WFO Springfield, MO), **John Koch** (Eastern Region Headquarters), **Dan Byrd** (WFO Jackson, MS), **Fred McMullen** (WFO Pittsburgh, PA), **Jason Runyen** (WFO Corpus Christi, TX), **Tracy Howieson** (Southern Region Headquarters), **Leslie Wanek** (Western Region Headquarters), **Heather Orow** (WFO Detroit, MI)

**BACK ROW** (L to R): **Steve Buan** (North Central River Forecast Center), **Kevin Low** (Missouri Basin River Forecast Center), **Mike Hudson** (Central Region Headquarters), **Al Pietrycha** (WFO Goodland, KS), **Roger Lamoni** (Western Region Headquarters), **Chris Foltz** (WFO Goodland, KS), **Wendy Pearson** (Central Region Headquarters), **Brad Grant** (Warning Decision Training Branch), **Kelsey Angle** (WFO Topeka, KS), **Matt Solum** (Western Region Headquarters), **Kim Runk** (Central Region Headquarters), **JP Martin** (WFO Bismarck, ND), **Jim Keeney** (Central Region Headquarters), **Lynn Maximuk** (Central Region Headquarters), **Tim Erickson** (WFO New Orleans, LA)

## Historic Flooding in the NOAA Central Region

**MISSISSIPPI AND OHIO RIVER FLOODING** Heavy rainfall in March set the stage for flooding in the Ohio and Mississippi River basins. Then April and May brought record-setting rains. April 2011 was the wettest month ever recorded for some portions of the Ohio and mid-Mississippi Valley. The record-setting rainfall in April and the first part of May caused rapid and dramatic rises on the region's rivers. With each round of heavy rain came new and higher crests. Parts of the Mississippi River rose above flood stage by the third week of April. Portions of the Mississippi River reached crests that rank in the top five highest on record and some locations reached all time record high levels. Stress on the region's levee system along the mid-Mississippi and lower Ohio Rivers reached critical levels early in May. The US Army Corps of Engineers activated an emergency procedure (blowing up a two-mile section of the Bird Point/New Madrid levee) to prevent the Mississippi River and Ohio Rivers from flooding several river towns. River water blanketed thousands of acres, negatively impacting the environment and causing billions of dollars in damages.

**MISSOURI RIVER FLOODING** During the summer of 2011, flooding occurred along the entire length of the longest river in the United States, the Missouri River, as well as many of its tributaries throughout Montana, North and South Dakota, Nebraska, Iowa, Kansas and Missouri. The Missouri River's headwaters begin at Three Forks, MT and join the Mississippi River in St. Louis, MO. The Missouri River flooding was due to unseasonably heavy snows across the Great Plains. This was followed by a May that brought three to six times the normal rainfall in eastern Montana, northern Wyoming and the western Dakotas.

The June 2011 runoff in the Missouri River Basin above Sioux City was the single highest monthly runoff amount since 1898. The US Army Corps of Engineers Mainstem Reservoir System is composed of six Corps dams on the Missouri River:

- Fort Peck in eastern Montana
- Garrison in central North Dakota
- Oahe in central South Dakota
- Big Bend in central South Dakota
- Fort Randall in southern South Dakota
- Gavins Point along the South Dakota / Nebraska border

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# Historic Flooding in the NOAA Central Region

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The Missouri River Mainstem Reservoir System is multi-use and operated through the difficult challenge of balancing eight, diverse, Congressionally-authorized purposes. Flood risk management is but one of these mandates, which require the reservoirs capture spring and summer runoff and allow the Corps to manage releases throughout the year in order to accommodate the other seven authorized purposes: navigation, irrigation, water supply, hydropower, fish and wildlife, recreation, and water quality. To manage this, the Corps follows the directions of the Missouri River Mainstem System Master Water Control Manual.

If this reservoir system were not in place, flows on the Missouri River would have been unregulated and considerably higher than those experienced during the summer of 2011.

**SOURIS RIVER FLOODING NEAR MINOT, NORTH DAKOTA** NWS personnel were on-site at the Minot, ND EOC as of June 1. On June 2, the river at Minot hit its first peak at 1553.6' (moderate flood level), and fell slowly until June 13. During that time, NWS personnel provided daily briefings and decision support to Incident Command General Staff, detailing expected rainfall, runoff, and impact on the Souris River. Additionally, RFC and USACE hydrologists provided daily remote briefings to state and local city officials to explain official river forecasts and contingency forecasts based on several days of Quantitative Precipitation Forecasts (QPF).

Even though river levels had been steadily falling for almost two weeks, on June 13 Minot still remained in a very serious situation where each rain event had the potential to push them into higher river elevation levels. Because of saturated soils and full reservoirs with no capacity for additional inflow, any rainfall occurring in the basin resulted in nearly 100% runoff.

On June 19-20, a large area of the upper basin received 2-4 inches of rainfall in less than 24 hours. The rainfall that fell in the headwaters, combined with full reservoirs, saturated soils, increased releases from upstream dams, and a relatively steep, narrow channel in the Minot area, all culminated in record breaking flood levels at the end of June 2011.

## The Role of DSS in a Weather-Ready Nation

The vision for the Weather-Ready Nation initiative is to help people make better decisions with better information. The emphasis on and end goal of better decisions represents a new culture for NWS, one focused on demand-driven support services. This transformation means the job is not done after products are issued and the measure of success is not based solely on metrics of accuracy or lead time. Success now depends on mitigated impacts. Improved forecast accuracy and precision play a critical role in mitigating impacts, but more can and must be done.

"Currently, NWS decision support services during high-impact events require at times an extraordinary response in terms of planning, personnel and technology," said Mike Hudson, Central Region Chief Operations Officer (COO) and Roadmap team member. "The goal is to transform such that this extraordinary response becomes ordinary, regardless of the severity of the event. We want to become so important to our partners' operations that they would not consider making a weather-sensitive decision without consulting us."

Building capacity to provide decision support is critical to delivering what our customers need. Central Region Headquarters recently adjusted its organizational chart to facilitate the hiring of two Emergency Response Specialists (ERS) into the Regional Operations Center (ROC). Kelsey Angle and Jennifer Zeltwanger began these new positions on October 24. Working under the direction of the COO, this group of ERSs will formalize the operations of the ROC. They will provide decision support services to regional-level partners such as FEMA, EPA, and other federal partners. ROC ERS personnel will serve as a "mutual aid" group to support Central Region offices during high-impact events.

The Weather-Ready Roadmap is also piloting concepts to provide effective decision support services. A total of nine pilot projects have been approved, and six are being launched during the fall of 2011. These include ERS pilots at WFOs Sterling, VA and New Orleans, LA; an ecological forecasting pilot at WFO Tampa Bay, FL; a Warn-On-Forecast pilot at Charleston, WV; a Regional Operations Center in Fort Worth, TX; and an NWS Operations Center in Silver Spring, MD.

### Roadmap 2020: The Vision

- America is a Weather-Ready Nation through superior Impact-Based Decision Support Services (IDSS).
- Our accurate and timely forecasts, warnings, and information save lives and enhance the U.S. economy.
- NOAA/NWS is the authoritative source for Federal, State, and Local Government partners for weather, water, and climate information.

### A Weather-Ready Nation requires an integrated service approach

- Linked sciences (climate, water, weather, other NOAA)
- Extreme environmental events increasing in frequency and intensity
- Coastal population growth and climate change increase community vulnerability
- **IDSS**: Partners want to know what we know
- Probabilities, accuracy, timeliness, and accessibility

## On-Site Decision Support Responses to Minot Flooding

As a flood evolves due to ever changing hydro-meteorological conditions, NWS on-site personnel are an essential resource for local decision makers with the responsibility to protect the lives and property of the community. During the Souris River flood at Minot, one specific instance of decision support stands out. About three days into the flood fight, the river stage observations were indicating that the unprecedented flood wave was moving nearly twice as fast as the prior record flood of 1976. The North Central River Forecast Center updated the forecast, bringing the river crest into Minot 48 hours earlier than previously forecast.

The Army Corps of Engineers then advised the City of Minot that they could no longer support the flood fight to preserve two bridge crossings within the city. If the city chose to keep fighting to defend both bridges, the Corps felt that both would be lost. They recommended that all resources be shifted to protecting the Broadway Bridge. The city officials were very upset with this turn of events. By giving up a bridge crossing, it would be out of service for many weeks, disrupting lives within the community for weeks after the flood was over. The city turned to the on-site NWS personnel and pressed them about their level of confidence and for a more thorough explanation about what was happening on the river upstream of the city, especially in Canada. After a short period of discussion, the city agreed to the Corps recommendation and all resources were directed immediately to the protection of the Broadway



Emergency response helicopter places one ton sand bags along the levee in Minot to avert a full breach.

Bridge. NWS on-site personnel helped community leaders convey a clear message to the public. The City of Minot mayor requested that the NWS explain to the public why the flood crest was moving much more rapidly than had been observed in the past, and how that influenced the city's decision to abandon the flood fight at one of the bridges in order to save the other.

The next day, as construction crews were building the levee to protect the north approach road to the Broadway Bridge from being inundated by the river, water started eroding through the levee. Emergency response was called in, and a helicopter placed one ton sand bags along the levee to avert a full breach from occurring and thus losing access to and use of the bridge. Had there been a delay in the decision to protect just one bridge, it is likely that the levee building process would not have been far enough along for the heroic emergency response to be effective and both bridges would have been lost. In this instance, a remote consultation with the NWS would have cost the city valuable time that flood fighters did not have to spare. In Minot, throughout the Central Region, and across the country, NWS hydrologists and meteorologists provide critical on-site support to decision makers during flood fight operations - saving lives, saving property and saving time.



NWS on-site personnel, Steve Buan, explains to the public how the flood crest required the city to abandon the flood fight at one of the bridges in order to save the other.

# Responding in Crisis: Kalamazoo River Oil Spill

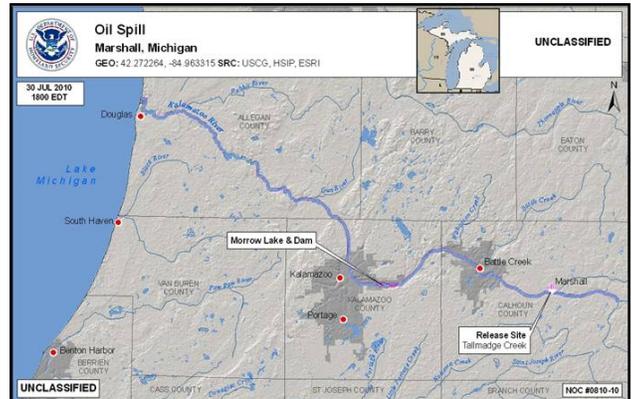
On July 26, 2010 a failure occurred along a 30-inch pipeline, spilling nearly 1 million gallons of crude oil into Talmadge Creek, which later flowed into the Kalamazoo River. This situation created significant injury to environment and natural resources, voluntary evacuations, hospitalizations due to chemical exposure, and thousands of animal rescues. The response spanned two counties and there were concerns over spilled oil traveling to Lake Michigan and the potential impacts. The Kalamazoo River was at flood stage when the spill occurred and waters receded afterwards.

Thousands of responders deployed to the scene over the course of the event, including many NOAA personnel. This event is a perfect example of how NOAA works together to collaborate and provide effective decision support services for an ecological disaster, resulting in the protection of both life and livelihoods of those impacted and responding.

During the response, NOAA utilized expertise and skills from numerous offices. The National Weather Service enlisted Forecast Offices in Grand Rapids and Detroit/Pontiac, the North Central River Forecast Center in Minneapolis, the Central Region Operations Center in Kansas City and Incident Meteorologists deployed from offices within NWS Central Region to the spill response site. The National Ocean Service Office of Response and Restoration (NOAA HAZMAT) responded, as well as staff from the National Marine Fisheries Service Restoration Center, NOAA's Office of General Counsel for Natural Resources, NOAA Homeland Security Office, and the Office of Oceanic and Atmospheric Research's Great Lakes Environmental Research Lab and Air Resources Lab.

NWS Forecasters deployed to the Incident Command Post (ICP) in Marshall and the Michigan State Emergency Operations Center (SEOC) at the request of the EPA and State of Michigan. The Incident Meteorologists provided weather forecasts during briefings and were available on-site for questions and to provide forecast interpretations and impacts. Another crucial role was providing technical weather support to EPA to monitor the air for fumes and chemicals. Additional duties included being a liaison to other NOAA offices and resources, and serving as consultants for the incident severe weather safety plan.

Weather issues impacting the response included rain, lightning, heat (above 80 degrees), gusty winds, fog and low clouds, as well as frost and ice. The range of potential impacts highlights the benefits of having on-site support, which leads to the best decision support for the safety and success of the mission. Forecast support for fumes and airborne chemicals provided for the EPA, State, and County Health Departments included model benzene and other airborne by-products, wind speed and direction at surface and multiple levels above ground, and inversion forecasting.



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# What Did Boot Camp Have to Do with Servant Leadership?

By Kim Runk, Chief of Integrated Services, Central Region Headquarters

The creation of DSS Deployment Boot Camp is, in some respects, an exercise in leadership development. In his excellent book, "The Servant", author James Hunter defined leadership as "the skill of influencing people to enthusiastically work toward goals identified as being for the common good, with character that inspires confidence." Effective leadership is about identifying those opportunities mutually perceived as worthy goals aimed at the common good, and then collaborating with the right team of people to achieve them.

As the NWS pursues its strategic Weather-Ready Nation initiative, the keystone of success will arguably revolve around enhancing collaborative relationships with core partners. Leadership gets things done, but it works best when our leadership approach is focused on what we do *with* people, not what we do *to* people. Truly great leaders, then, are skilled at building healthy relationships with others who share the same vision and wish to pool their talents to pursue the same ends.

This reality has certainly been underscored over the past three years as we dispatched to various locations to provide on-site assistance to emergency responders and community leaders. From the Red River Floods to Deepwater Horizon to the Joplin tornado, any successes we have achieved resulted from building relationships of trust, understanding needs, and communicating information in clear, insightful ways that directly aid risk reduction decisions.

DSS Deployment Boot Camp was designed as a learning environment to help participants explore those very concepts and skill sets. While it was not classified as a leadership workshop, its goals are absolutely consistent with Hunter's fundamental definition of what leadership really is. If first class DSS is foundational to the agency's progress, investing in the skills and capabilities necessary to nurture effective collaborative partnerships and together execute superior emergency response service for America is, at its core, a leadership venture.

One exciting aspect of spotlighting DSS as a strategic initiative is that, unlike many forms of organizational change, this one does not present a major challenge with respect to instilling a sense of urgency, or motivating broad-based interest and buy-in. In an agency like the NWS, where the mission itself speaks to emphasizing service to others, there is a natural magnetism to opportunities for providing decision support to core partners in life-threatening situations. Employees want to engage in activities where the impact of their expertise and feedback for their efforts are immediate; and where the work itself feeds their personal core values. The primary core value with which DSS resonates is the drive to contribute substantively and meaningfully toward meeting the legitimate needs of others. This is the essence of servant leadership, and it is built into the DNA of many – perhaps most – NWS employees.

For many forecasters, love of meteorology or hydrology is not the sole draw of a career with NWS. There is also an innate desire, not just for success but for significance. For these individuals, public service is more than a job, it's a noble cause. For them, the NWS focus on DSS represents a way to touch and influence societal benefit, even if it requires self-sacrifice. This prospect addresses a deeply rooted desire to serve and make a difference. The vision of a "Weather-Ready Nation" translates to improved community emergency preparedness, reduced fatalities from weather disasters, lower mitigation costs, and more rapid post-event recovery. There is power in the clarity and simplicity of knowing you contributed to that. It is its own incentive and reward to someone with the heart of a servant.

DSS Deployment Boot Camp is one step in a long journey toward building a Weather-Ready Nation. There is much work left to assemble a larger, more comprehensive training framework which ensures the NWS is properly prepared to conduct effective in-person, on-scene DSS, in addition to technological tools to provide remote multi-point support, along with continued improvements needed to maintain the consistency and accuracy of the foundational forecast database on which interpretive services are based.

Even though it is only a first step, it is an important one and, in my opinion, a bold and positive one. It was built with an eye toward expanding our capability to provide effective on-site DSS to core partners. It incorporated many of those key partner agencies in planning and execution, thus putting into practice our commitment to make service improvements customer-centric, emphasizing the crucial nature of cultivating relational chemistry, understanding customer operations, appreciating their needs, and learning to speak in their language. It encouraged an environment where ideas flowed freely, with lots of time for discussion and personal discovery. It followed the maxim of "train like you fight" through simulation experiences. It pledged us to being better tomorrow than we are today. And finally, it aimed to integrate all these components in a concerted effort to "influence people to work enthusiastically toward goals identified as being for the common good." In other words, to create a new generation of servant leaders.

## EMPLOYEE SPOTLIGHT: *Kelly Hooper*



Rattlesnake Wildfire Complex, Scott Mountain, Boise National Forest helispot and lookout post. The lookout was wrapped in flame-retardant aluminum because the fire was trying to make a run up the mountain.

### What do you do for NOAA?

I'm a Journeyman Forecaster and Incident Meteorologist. My job is to provide forecasts and warnings for my given area. There are 70-80 Incident Meteorologists in the U.S. I go to different disasters around the country, live in tents and support hundreds or thousands of disaster relief workers to keep them safe. Even after the disaster is over, there's still danger - exposure, lightning, wind. We'll respond to wildfires, floods and man-made disasters such as oil and chemical spills. We average a 12-15 hour response time from the phone call.

### Is there an emotional toll?

It's really satisfying to see the customer face-to-face. But when you see what people have lost - homes, families - you're going to shed a tear. Some lose everything and have a good attitude. Some have their private stuff strung across the county or even the state. I've seen policeman cry.

The Joplin tornado was the worst I've ever seen. There were bodies strung all over the place, in such a concentrated area.

There were a lot of elderly and low-income people with no insurance. People in ripped clothes with no homes thank and hug you. You don't forget that. You remember it your whole life. I've had tears in my eyes almost since we started this interview.

It's emotional, rewarding and extremely challenging to go to a place you've never been and forecast weather you've never experienced. But helping folks who are in need is what matters. I've had opportunities to move up the ladder, but I pass them up. I don't want to lose a job that makes me feel great for a desk in a cubicle and a bit more money.

### How does your family feel about your job?

Sometimes I don't want to go, especially after the seventh or eighth disaster of the year. My wife makes me follow through with what I would have done anyway. I grew up on a farm. When it's time to put the crop in, you put the crop in. You can rest later. I was scheduled to be on vacation when the Joplin tornado hit, but I knew that if I didn't help, I'd be ashamed of myself. My wife used her vacation to join me and volunteer. It's a family affair. Our oldest children are in service-oriented fields.

My younger two children are both on full scholarships at the University of Kentucky. One is pre-med; the other wants to be a schoolteacher for special needs children. Without any prodding from me, they both chose careers helping others. They're definitely my greatest accomplishment.

### You've received letters of commendation from mayors and Senator Rand Paul?

The letters are nice to hang on the wall like a trophy. But what I like is when I go back to those places, and they remember me. You know you've made a difference if they remember you.

### How can people contact you?

By email [Kelly.Hooper@noaa.gov](mailto:Kelly.Hooper@noaa.gov) or phone 270-744-6440 x468.

Email [noaa.centralregion@noaa.gov](mailto:noaa.centralregion@noaa.gov) and share your ideas on the next employee to feature.

## Responding in Crisis: Kalamazoo River Oil Spill

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The deployed incident meteorologists were in close coordination with numerous NOAA staff that provided a wide range of support services off-site. The North Central River Forecast Center provided customized river forecasts of water levels at several points along the river (normally not issued regularly), "worse-case scenarios", and river travel times from point-to-point. They worked with the USGS and Army Corps of Engineers to model the flow of oil downstream, provided 90-day probabilistic river level forecasts, as well as river ice growth potential.

NOAA Office of Response and Restoration (NOAA HAZMAT) deployed to the ICP and provided natural resource damage assessment and floodplain analysis. GLERL was involved to assess impacts and oil spill trajectories once the spill reached Lake Michigan, and participated in public briefings and EPA science coordination calls.