

# Falls City Engineer

May/June 2011

VOL. 3, Issue 3  
[www.lrl.usace.army.mil](http://www.lrl.usace.army.mil)

U.S. ARMY CORPS OF ENGINEERS  
LOUISVILLE DISTRICT



US Army Corps  
of Engineers  
Louisville District

***Special Issue:***  
***A look back at the***  
***spring floods***



# Commander's Comments

Team,

This spring brought unprecedented floods to the Louisville District. I first want to thank each of you for the support you provided to keep our region safe from flood waters. Because of your efforts and our Louisville District projects, this flood did not cause historic levels of damage, even though there were historic levels of water in many of our lakes and rivers.

During the flooding event our Emergency Operations Center operated 7 days a week, and the staff worked long hours to ensure we stayed ahead of the situation. The district deployed eight flood fight teams and seven dam safety teams throughout the region, provided 72 water pumps and distributed more than 1.9 million sandbags to counties and towns during the months of March, April and May.

During the flooding event eight of our 20 lakes reached record pools, and of those eight lakes, five had water up to or passing through their spillways. Navigation continued on the Ohio River, with the exception at Smithland Locks and Dam, where the water level was too high for safe passage.

Now, as hard as it is for me to do, I must start to say my parting words. As many of you know, I will pass command to Col. Luke Leonard July 14 and retire effective August 1. It is hard to believe that my three years in Louisville and my 26 years in the Army flew by so quickly. I have enjoyed every moment during my

time here and wish nothing but the best for the Corps of Engineers, the Louisville District and each of you. During my command I have had the privilege to witness a number of amazing projects and changes and to encounter many incredible people. I have been lucky to serve as your commander during some of the district's most challenging times —BRAC countdown, the ice storm of 2009 and the floods of 2011. With only 90 days remaining until the BRAC deadline, I remind you to buckle down and meet this challenge. I have been able to attend remarkable groundbreaking ceremonies for the Middletown Armed Forces Reserve Center and the Armed Forces Reserve Centers in Puerto Rico that symbolized the district's successful BRAC execution.

I have witnessed the growth of the district's sustainability program—including new hybrid cars in our district fleet and a LEED certified gold project at the Armed Forces Reserve Center in Fort Allen, Puerto Rico. I have been fortunate enough to attend ribbon-cutting ceremonies for some of our biggest projects to date such as the new 1,200-foot lock chamber at McAlpine Locks and Dam in Louisville, the Human Resource Center of Excellence at Fort Knox and the U.S. TRANSCOM headquarters at Scott Air Force Base. Additionally, during construction I've visited our Wounded Warrior Transition Complex at Fort Campbell, the Human Performance



Army photo digitally enhanced

**Col. Keith Landry, Ph.D., P.E.**  
**Commander and District Engineer**  
**Louisville District**  
**U.S. Army Corps of Engineers**

Wing at Wright Patterson Air Force Base and the one-of-a-kind Olmsted Locks and Dam in Illinois. All of these monstrous projects are propelling the district to greatness.

Additionally, you continue to volunteer to deploy in support of Overseas Contingency Operations in significant numbers. You have set the bar high and I encourage you to keep raising it higher.

You truly are having a positive impact on the regional economy, national economy and national security. Thank you for making my time in Louisville so rewarding. You are a team of professionals like no other.

Col. Keith Landry

## Falls City Engineer

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**District Commander**  
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**Public Affairs Chief**  
 Todd Hornback

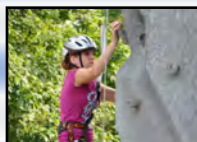
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**On the cover:** *The calm after the storm: A navigational buoy floats peacefully below Locks and Dam 52 at sunset.*

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# 2011 flood tests projects, personnel

By Ken Beyer and Carol Labashosky, public affairs

Little did anyone know that most of the flood risk reduction projects built by the Army Corps of Engineers as a result of the Flood Control Act of 1937 would be tested to their limit in the spring of 2011. The projects include reservoirs, levees, floodwalls, pumping stations and detention basins.

In the region it's commonplace for citizens to live and work behind 10 feet of a concrete floodwall or in front of a river. The public swim, boat and enjoy themselves on a Corps reservoir, but think nothing beyond the lake as a site for a fun-filled day of recreation. Until, that is, rain pelts down hour after hour and day after day after day. Or when the river rises a foot and then three more feet. Then, the question ultimately crosses people's minds, "Am I safe, am I protected?"

Maybe they ask because they don't hear the deafening sound of pumping stations across the region whizzing and purring or know that flood gates are going up along River Road and that eight flood fight teams were dispatched across three state areas to provide technical expertise to towns' leadership. They might not know that Louisville District geotechnical experts were out in heavy raincoats and boots caked with mud monitoring Corps reservoir dams to assess their integrity and in turn, ensure public safety.

During the spring floods of 2011 all that was going on—and a lot more behind the scenes work—to ensure public safety and reduce risk of flooding and related damages.

## **How did flood risk reduction projects prevent so much damage?**

"The simple answer is everything worked the way it was designed," said Col. Keith Landry, district commander. "And because of a lot of hard work by very knowledgeable, talented and dedicated people."

The district emergency operations center increased its level of operation to high—Level III—on April 12 and experienced its most rigorous challenges during the period April 24-30 when reservoirs reached their fullest capacity and emer-

gency spillways were utilized and levees were at their maximum. Not until May 19 did the frenzied pace cool off as the water trickled down the last drain pipe and lake releases decreased significantly.

Some highlights during the spring floods of 2011:

Eight of 20 lake projects in the Louisville District reached record pools. Rough River, Monroe and Patoka lakes had releases through their emergency spillways for first time ever. Nolin and Taylorsville lakes both had water in the spillway.

The Ohio River remained open for navigation except at Smithland Locks and Dam which was closed for three weeks.

At Smithland, Ky., there were concerns about the safety of navigating the fixed weir pass at Smithland Locks and Dam on April 26. The Corps, industry, the Coast Guard and helper boats coordinated to reopen the lock on May 14. Within 48 hours, all traffic—87 tows—was cleared. There had been 12-hour delays upstream and downstream.

The heavy rains have impacted Corps-operated recreation areas and campsites in Kentucky, and in many areas across Kentucky recreation services are curtailed.

The Paducah Floodway and Levee saw its highest flood of record since it was constructed.

Other levees along the Ohio River were tested when the river reached record flood levels. The Cairo gage exceeded 1937 levels by almost three feet. The Russell-Allison-Ambraw, Ill., levee system overtopped at the downstream end May 3.

During the flood events of spring 2011, the Corps worked closely with the state emergency operations centers in Kentucky, Indiana and Illinois, the National Weather Service, the Federal Emergency Management Agency (FEMA), the U.S. Coast Guard, the Great Lakes and Ohio River Division (LRD), Huntington, Chicago, Detroit, Memphis, St. Louis and Nashville districts and local communities.

"From the very beginning this was a collaborative effort," said Steve Rager, district emergency manager. "There was so much going on in so many areas and

## By the numbers

- 1.9 million sandbags provided
- 3 miles of geo cell material
- 8 flood fight teams deployed
- 7 dam safety teams deployed
- 72 pumps provided
- More than 30 employees worked in EOC for almost 4 weeks

at so many locations in multiple states, it was critical that we communicated with our state and federal partners as well as media representatives. The efforts had to be coordinated," he continued.

"When you have an event of this enormity, you can't work in a vacuum. People need to know what's going on, how it's going to affect them and what they need to do to be safe."

Planning for emergencies is a large part of the district's mission. Keeping communication lines open with federal, state and local communities' representatives to include the public and the district employees is vital to the success of an organization during an emergency.

"We learned a lot from this flood," said Landry. "We learned that our emergency operations plans not only work—they work very well. We learned that the projects proposed and built as part of the Flood Control Act of August 28, 1937, were needed and continue to be needed."



The crew at Lock and Dam 53 on the Ohio River covers the power house windows with plywood to keep drift from breaking them as the river level increased during the spring floods.

Linda Goode

# 1937 flood conditions a no-show in 2011



The Great Flood of 1937 submerged Louisville in the dead of winter.

By John Neville, public affairs

Recent rainfalls in the Ohio River Basin were historic, but it could've been much worse for the city of Louisville.

Today, systems of levees, flood walls and U.S. Army Corps of Engineers' flood reduction lakes have worked to mitigate flood damage in and around Louisville, as well as in cities located up and down the Ohio River.

With the passage of the Flood Control Act of 1936, the government officially recognized that "...destructive floods upon the rivers of the United States constitute a menace to national welfare and that flood control on navigable waters or their tributaries is a proper activity of the federal government in cooperation with states, their political subdivisions, and localities thereof."

But the projects would take decades to complete, and Mother Nature had no plans to be patient.

In late December 1936, it began to rain. And it kept raining. Louisville recorded 19.17 inches of rainfall in January, an amount nearly half the normal annual precipitation. From Jan. 20 through 24, the city received 10.3 inches of rain and several additional inches of snow and sleet.

The river was rising fast. Water poured into Louisville's streams, rivers and creeks, and it had nowhere to go. Three quarters of Louisville flooded, as did 76 square miles of Jefferson County. At the time most people lived near the river and west of downtown. One-hundred-and-seventy-five thousand residents were evacuated. The flood was blamed for 90 deaths

and more than \$50 million in property damage, estimated at about \$710 million in 2007. The property damage figure doesn't include personal artifacts, such as family photos, jewelry and children's toys. While many pets and farm animals were saved, many were not.

Water poured into Louisville Water Company's Riverside Station at Zorn Avenue forcing the boilers to shut down. This in turn halted the supply of water to several reservoirs in the city. The city was forced to impose a two-hour restriction on access to drinking water.

Overflowing sewers prevented residents from flushing their toilets. Many simply tossed their excrement out the window. Power plants were falling off the grid as rising waters flooded generators in the city's power plants. Louisville was going black. It was literally freezing at night, as temperatures dipped into the teens. And, it kept raining.

Not until early February did life in Louisville slowly begin to return to normal. Water rations were less restrictive, telephone service was restored where it was lost, and evacuated residents were allowed to return home. The cleanup was beginning.

The 1937 flood, and several since then, could've repeated themselves had it not been for the flood risk reduction projects funded by taxpayers and built by the Corps. The recent Ohio River flood pushed these projects to the limit, and the projects performed exactly as they were designed.

The recent event did flood roads and

**"You saw historic levels of water in the Ohio River and in our lakes, but you didn't see historic levels of damage"**

-Col. Keith Landry

businesses along the river near Louisville, but the damages didn't compare to what happened in 1937. With the exception of Cairo, Ill., the river crests didn't surpass the levels set in 1937. Without the lakes, that outcome would've likely been different.

"There are 79 Corps lakes across the Ohio River Basin, 20 of which are Louisville District lakes," said Emergency Management and Security Branch Chief Steve Rager. "During the event, eight of those lakes reached record pools. The bath tub was full, and it was still raining. There was enough water stored in those to put 13 feet of water into metro Louisville. That water did not reach the river. It kept the river stages down."

The district's 372 miles of levees and floodwalls also played a vital role in holding back the water. Flood teams deployed from the Louisville District to levees

(Continues on Page 5)



Mike Lush

Col. Keith Landry, Louisville District Commander (center), and Bud Schardein, Director, Louisville Metropolitan Sewer District (right), talk with news reporter Andy Alcock, WLKY, about how the Corps and the city stand united to minimize flood risk in Louisville during an interview April 26.

around the region to monitor the barriers.

The district's emergency management team mobilized the delivery of pumps to towns like Smithland, Ky., which had to be evacuated. The pumps move water from ponded interior areas over the wall and into the Ohio River.

During major flood events, constant and accurate communication is crucial. Back in the '37 flood, WHAS Radio famously provided a line of communication between city officials and the public. Despite power challenges, the channel went off the air for only 90 minutes. Today, state and federal agencies still get their messages out to radio and television by keeping the press informed, but the

Corps' use of social media—the Internet, Flickr, Twitter and Facebook sites—kept the public updated day and night. (See story on page 10)

The Ohio River Basin has drained water for millions of years, but in the last 75 years, the drain's impact on the people who live around the river has been reduced.

Comparing the spring flood of 2011 historically, damages were nominal in Louisville compared to the Great Flood of 1937. During the '37 flood, Louisville suffered \$50 million in damages; \$250 million state wide.

"You saw historic levels of water in the Ohio River and in our lakes, but you didn't see historic levels of damage," Landry said during a press conference in the district's emergency operations center May 24.

Because the Flood Control Act of 1936 gave the Corps the lead as the country's premier flood control agent, construction began heavily in the 1940s to implement flood risk reduction systems to include reservoirs, levees, floodwalls and pumping stations.

Louisville's protection system construction began in 1947 and was complete in 1956. Later, an adjunct project, Southwest Jefferson County, was built throughout the 1970s with the last section complete in 1989.

In total that system included 22 miles of levees and four miles of floodwall for a 26 mile system costing \$95.7 million—\$155 million in today's dollars. Addition-

ally, two large-scale flood risk reduction projects were completed by the Corps in 2009 and 2010 — Pond Creek and Beargrass Creek — and cost shared with sponsor, Metropolitan Sewer District. The projects included channel modification and a total of 10 detention basins throughout the city.

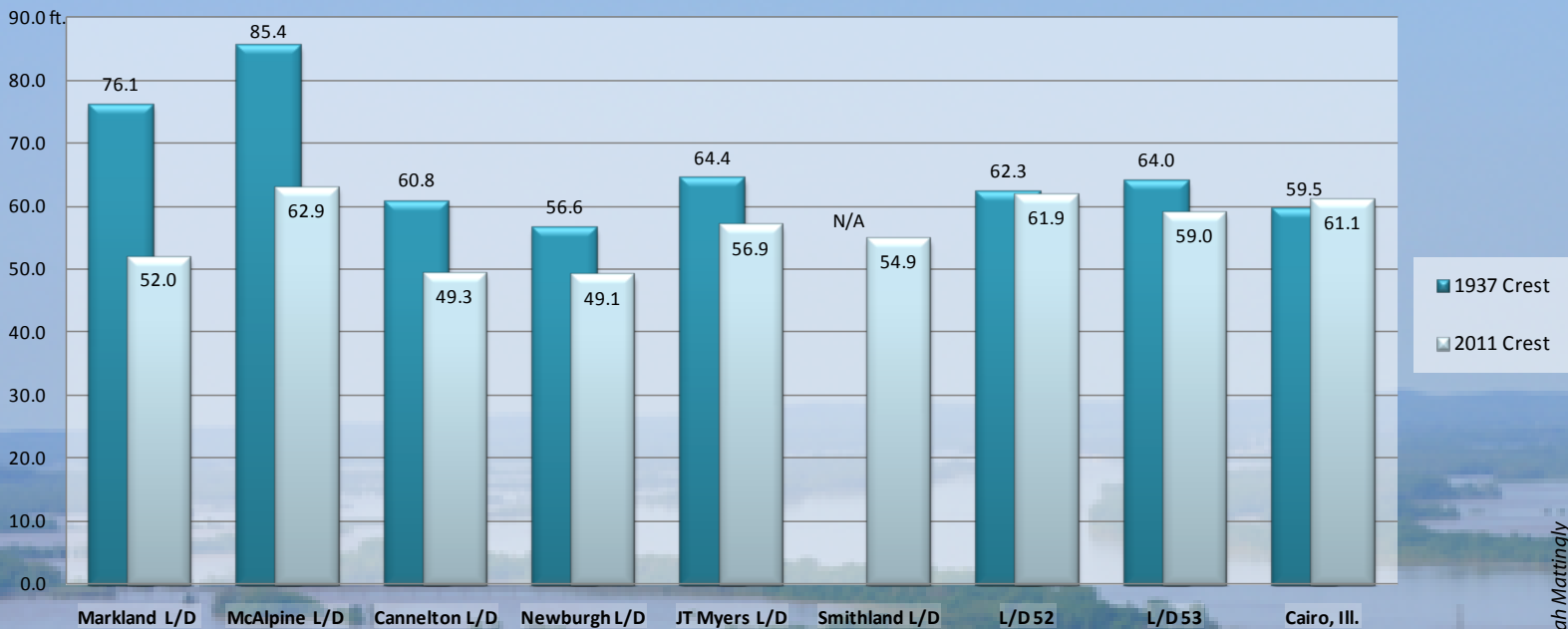
Remarkably, these projects prevented roughly \$15 million worth of damage in Louisville. Region wide, more than \$500 million was saved across the district which covers parts of Kentucky, Ohio and Indiana.

Although only Cairo, Ill., on the lower Ohio River experienced crests above '37 flood levels, the spring flood of 2011 will be remembered for producing more than 30 inches of rain from Jan. 1 to May, 2011, the most accumulation on record since 1872.



An aerial view surveyed by district leadership April 29 shows a swollen Ohio River during the spring floods.

### River crests at Louisville District sites 1937 and 2011



Sarah Mattingly

# Louisville District uses new technology to support Smithland flood-fight

*TYPAR® geocells are a honeycombed-shaped fabric structure that is filled onsite to withstand flood-related conditions. The cells can also be set up much faster than sandbags.*

*By John Neville, public affairs*

**T**hey figured they only had about 75 hours before the Ohio River crossed the shoreline and spread through the city of Smithland, Ky.

They are one of the many Louisville District flood fight teams that responded to regional flooding within the Ohio River basin, flooding that had not been seen for nearly 75 years in some parts of the region.

When the team arrived in Smithland April 21, members immediately began assessing the situation.

“We quickly tried to determine the rate that the river was rising and what level of protection the city had,” said geotechnical engineer Steven Shifflett.

The rains kept coming, and river forecasts got progressively worse. The national weather service was predicting record rainfall. The team concluded that a barrier constructed of regular sandbags couldn’t be set up within 75 hours.

“Based on [calculation] and communication with EOC (Louisville District Emergency Operations Center), we determined that the Typar® geocell wall system was the best choice to stay in front of the rising water,” Shifflett said.

The cells are composed of a durable, nonwoven fabric. The cells come welded together and fit into a 12-foot metal cage frame. The bags are filled and the frame is removed.

The key component, according to Shifflett, is the honeycombed structure of the framed cells that fits together like a puzzle. The interlock of the cells reduces seepage, the movement of water within or through a structure.

The Typar® geocells were recently tested by the U.S. Army Corps of En-

gineers Research and Development Center at their Coastal and Hydraulic Lab in Vicksburg, Miss. This test, which evaluates a system’s ability to withstand a variety of flood-related conditions, showed that the cells outperformed traditional sandbags in all tests, including time to install, seepage, time to remove and overall endurance.

As proven as the geocells are, they don’t set themselves up. At Smithland, it took a community effort to get the wall built. The district flood fight team, representatives from Typar®, local businesses and citizens all chipped in to set up the 5,000-foot wall before the looming 75-hour deadline.

“Wives and kids began to arrive,” Shifflett recalled. “They were bringing drinks for workers. Everybody was doing their part. It was really a sight to witness to see the community come together, to see how much they accomplished in such a short amount of time. They definitely had a lot of pride in their hometown.”

But the geocell wall wasn’t the only tool buying more time. The district’s emer-

gency management team mobilized the delivery of several pumps to Smithland. The pumps moved water from ponded interior areas over the wall and into the Ohio River. While pumps are very effective, Corps lakes play a huge flood reduction role with the Ohio River basin.

The basin covers more than 189,422 square miles, draining streams, rivers, tributaries and snowmelt within 14 states. During periods of heavy rain, surface water runoff is stored in the lakes until swollen streams and rivers below the dams have receded and can handle the release of the stored water. For decades, Corps lakes have saved lives and prevented billions of dollars in property damage.

Corps projects were undoubtedly pushed to the limits, and they’ve done exactly what they are designed to do. But these rains were historic, said Louisville District Commander Col. Keith Landry.

Local officials evacuated the town of Smithland, but ultimately the levee held as intended and helped protect the surrounding areas.



*Louisville District geotechnical engineer Steven Shifflett and two locals demonstrate the assembly of The Typar® geocells in Smithland, Ky. The Louisville District flood fight team and the rest of the district’s emergency operations team decided to use the Typar® geocells instead of sandbags.*

# Nolin Lake reaches record pool



Maintenance Mechanic Dwayne Armstrong inspecting drift in Wax Campground during floods in May 2011.

By Rachel Fay Haring, Great Lakes and Ohio River Division

With water rising within inches of the spillway, Chris Boggs, park manager, Nolin River Lake, U.S. Army Corps of Engineers, knew that his staff and he were witnessing a historic event.

“No one had ever seen the water like this before,” Boggs said. “We cleared a viewing area for people to see the spillway because everyone was so curious.”

For several tense days in late April and early May, Nolin River Lake continued rising due to a torrential rain event. Prior to this event, the April rainfall average was seven inches. This accumulation doubled this year.

The lake broke its previous crest record of 549.9 feet (1983) when it reached 559.73 feet on May 7. At its peak, 9,500 cubic feet per second were being released from the lake; this is equal to about 74,000 gallons per second. This release dropped the lake levels approximately 1.2 feet per day.



An aerial shot of Nolin River Lake in Bee Spring, Ky., shows record water levels around the Moutardier Marina and boat ramp access areas. Nolin Lake was one of five Louisville District lakes that reached spillway level during the flooding event in May.

Nolin River Lake staff went on 24-hour shifts for 10 days, so they could monitor the water elevations and check their 18 piezometers twice a day.

The piezometers are located on the dam and provide readings that provide information regarding if water is seeping through the dam where it shouldn't be.

“We never had water this high before, so we paid extra attention,” Boggs said. “Everything worked the way it was supposed to, especially from a water management perspective.”

Aside from monitoring the dam, the staff was also busy stripping the recreation areas and other facilities at the lake of anything that could be saved from flood water.

“That was our biggest challenge,” said Boggs. “We have guides to know what to remove at what elevations, but it's still a lot of work.”

Because of the historic significance of this event, Boggs said the office was also receiving a large number of phone calls from locals with concerns of the rising water.

In addition to traditional media, Twitter and Facebook proved to be helpful tools during the event. During the course of the event, their Facebook page went from 120 ‘likes’ to approximately 1,200, as daily updates were posted regarding the lake elevation and questions from the public were answered.

Four meetings with the county emergency operations center were held for coordination and execution of contingency plans. Boggs said the county was proactive with the situation, and the Corps was upfront with information regarding the event. Overall, he said communication with all the stakeholders was great.

“No one had ever seen the water like this before.”

-Chris Boggs, Nolin River Lake Manager

“People appreciated our transparency,” said Boggs. “It was easy to get the information out with social media.”

Boggs also said that this was a good opportunity to explain to people how the Corps lake projects work.

“It was a real learning experience for everyone around the lake,” Boggs said.

As the water recedes, Nolin employees are busy cleaning mud off of structures, as they emerge from underwater, and replacing electrical equipment.

Since a comprehensive assessment of damage cannot yet be made until the water has fully receded, Boggs estimates \$350,000 in recreational damages as a worst case scenario. This scenario entails repairs to restroom facilities, electrical equipment, drift removal, gravel replacement, road repairs, and water heater replacement.

Nolin Lake reached summer pool the second week of June. All Corps boat ramps are open again. Boggs said the lake is open to boaters but cautions people to be safe by wearing their life jackets and watching for floating debris.

# Monroe Lake tested like never before

By Rachel Fay Haring, Great Lakes and Ohio River Division

The recent large-scale flood event that began in late April and ended in mid-May 2011 tested Monroe Lake like never before.

"We hit records here," said Patty Robertson, Monroe Lake Office Administrator for the U.S. Army Corps of Engineers (USACE).

Besides hitting a record pool level, Monroe also had a spill event, where the volume of water stored in the lake exceeded 100 percent of its design capacity. When this occurs, the additional water stored behind the dam is released by flowing through the dam's uncontrolled spillway. Uncontrolled spillways are a key component of earthen dams, like the one at Monroe. At one point there was 1.25 feet of water going through the spillway. This is only the second time in history that Monroe spilled — the first time in 2002.

Park Manager, Shannon Phelps and his staff were busy providing 24-hour surveillance to the dam and checking local roadways for flooding twice a day for the duration of the event.

Fifteen piezometers, which are instruments drilled into the dam to monitor the height of water inside the dam itself, were consistently monitored and results were reported to the Louisville District's dam safety team.

Don Ellison, a resident that has lived near Monroe Lake for 28 years was shocked at the amount of water he saw.

"It was like a miniature Colorado River," he said. "It was really dramatic to see the water roaring through the field."

The rushing water washed out part of a road near the spillway, which was closed for approximately a week. Although the road is now reopened, it will need a more permanent fix from county officials.

Robertson stated that coordination with Monroe and Lawrence county officials and Emergency Operation Centers, the Highway Department and local law enforcement departments was a smooth process.

"We learned a lot from the 2002 event as far as coordination goes," Robertson said.

The water eroded a ditch causing it to grow from three feet deep to eight feet deep and 20 feet wide. It also damaged a Corps parking lot at the project and knocked down trees.

"The water was pouring like Niagara Falls," Phelps said as he looked at the damaged parking lot.

During the flooding in April and May Corps water management specialists were releasing approximately 3,000 cubic feet per second (cfs) from Monroe Lake, which is equal to approximately 22,440 gallons per second — more water than they ever have released.

Now Monroe is releasing approximately 2,000 cfs in order to reach summer pool, but the Corps estimates it will take another month before the lake is back to

its normal level. The current pool is 8.78 feet above normal pool of 538 feet.

With nearly 1.5 million visitors a year, employees will be working to clean up debris from beaches once the water recedes. All boat ramps are open again.

The 10,750 acre Monroe Lake is located among the rolling farmlands of south central Indiana near Bloomington. Authorized under the Flood Control Act of 1938, the U.S. Army Corps of Engineers, Louisville District designed, built and operates the project to reduce flood damage from the dam on Salt Creek. Since becoming operational in February 1965, Monroe Lake has prevented more than \$63 million in flood damages.



Dave Cable

The Monroe Lake Emergency Spillway allowed water to flow down a ditch bypassing the dam back into Salt Creek during the flooding event in May. During the unprecedented floods five of the districts 20 lakes reached spillway levels.

## GIS technology aids in disaster response

By Katie Newton, public affairs

Twelve-hour days, seven-day work weeks and infrequent coffee breaks made spring demanding for Emergency Operations Center staff, but thanks to newly developed GIS technology their jobs were made a little easier.

The Common Operational Picture, a tool which has been active since 2009, was designed to be a one-stop location for all employees to see information regarding the status of projects in the Louisville District and to display information during an emergency event such as the recent spring flooding.

"It's the first place to look to understand the current status of the threats facing the district and the efforts by district staff to counteract these threats," said Terry Siemsen, Louisville District geographic information systems specialist.

The new technology allows EOC staff to keep an eye on project status, deployed teams, river gages, past precipitation, forecasted precipitation and even weather watches from the National Weather Service.

Siemsen says while reports, charts and graphs can be useful in telling a story, it is

the graphics linked to information that allow users to see and grasp the information.

Siemsen says several other USACE districts and divisions are pursuing similar programs.

"They are relying on us," Louisville District Deputy Commander Lt. Col. David Winget said. "We're leading the way across the nation with GIS technology during disasters."



# Patoka Lake endures flood



Picnic tables and parking spaces are flooded with water after heavy rains in May.

Katie Newton

By Sarah Gross, Chicago District

There are 84 piezometers at Patoka Lake and Dam. If the lake staff's only task was to check these instruments, it would take 5.6 hours.

"We saw no unusual fluctuations, or high levels, in readings on any of the piezometers, meaning the dam is maintaining structural soundness through this record flood event," said Stan Akin, park manager, Patoka Lake, U.S. Army Corps of Engineers.

Patoka Lake, a tributary of the Wabash River, provides six million gallons of drinking water per day to the Patoka Regional Water Company, serving the southern Indiana counties of Dubois, Crawford, Orange and five other counties. Since becoming operational in 1978, Patoka has prevented more than \$117 million in flood damages.

On May 3, Patoka Lake reached a record crest elevation of 549.66 feet, which surpassed the prior record of 547.5 feet in April 2008. As 22 inches of flood water poured through the emergency spillway, at its peak, the conduit (primary spillway) was releasing 3,700 cubic feet per second and dropping the vertical water level six inches a day. The lake's upstream watershed accommodates 168 sq. miles of drainage.

The lake level on June 16 was 540.32—more than four feet above summer pool.

To assist farmers and protect crops in the lowlands below the lake, the outflow from the lake has been reduced to approximately 200 cfs. At the current rate of outflow, the Corps estimates it will be several weeks before Patoka Lake returns to its normal summer pool of 536 feet.

The flood pool raised the acreage of the lake to approximately 12,000 from its normal 8,880 acres during the flood.

"Due to the flat topography of the land

encompassing Patoka, the water falls very slowly," said Akin.

The Corps worked closely with emergency management of Dubois County, the Highway Department and the Mayor of Jasper, among others to inform downstream communities of discharge plans and coordinate potential contingency plans for schools and roads.

Businesses were affected by the high water including a 5,985-acre Jasper Golf Course and a salvage art business in Jasper that had to be temporarily closed.

"We are committed to assisting the affected local businesses as much as possible and alleviating road blocks that they have to endure. The business owner in Jasper understood that the lake just had no more storage left and that we did all we could, so he and others could get their businesses up and running again," said Akin.

The communities around Patoka are known for their grow-out businesses for turkey and egg production. On multiple occasions, the conduit flow had to be almost shut off to enable these businesses to get onto the previously flooded roads to refill silos and obtain necessary supplies to regain production capabilities.

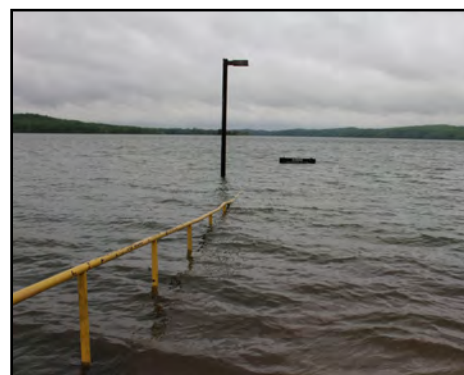
Akin lent himself to these local businesses and agencies 12-hours a day, making visits and answering phone calls and e-mails. Patoka Lake remaining staff, Tom DeKemper, John Hovis, and Dennis Pankey also worked 12-hour shifts completing a variety of operational duties which allowed Akin to keep the public informed.

"Having help from other Corps districts and other stakeholders with expertise on the ground (dam safety personnel) freed up some of my time to be able to communicate timely information to stakeholders,"

stated Akin.

In 2008, during the previous record rainfall season, the lake still provided an estimated \$16.25 million, from the approximately 700,000 visitors, to the local economy. Patoka Lake offers rich recreational opportunities, operated and maintained by the state of Indiana and the Indiana Department of Natural Resources, including bass tournaments every weekend during the sport season. A couple of the tournaments were canceled because of the flooding situation. As of June 1, as safety concerns subsided, all of the 11 boat ramps at Patoka had reopened.

Partnering with the State of Indiana and the Indiana Department of Natural Resources, the Corps is continuing to enhance recreational facilities at Patoka Lake through additional construction, though these plans may need to be put on hold, as Akin estimates \$600,000 in damages to the standing properties.



The sidewalk that once led out to the sandy beach at Patoka Lake is completely submerged May 2 following days of rain.

Katie Newton

## Louisville District stays connected during flood

By Sarah Mattingly, public affairs

During an emergency, there is a great scramble for information, and at times it is difficult to disseminate news quickly through traditional media. With the increasing prevalence of social networking websites, however, this problem is becoming a thing of the past.

When heavy rains in the Ohio and Mississippi river valleys caused area lakes and rivers to rise to unprecedented levels in spring 2011, the U.S. Army Corps of Engineers was able to use social media tools to fill information gaps, quell rumors and even break news to the general public.

The Louisville District was able to communicate directly with the public through its Facebook, Twitter, Flickr and YouTube sites, which were established in early 2009.

Through Facebook and Twitter, the district shared news releases and stories as flooding increased, but “the most important thing we were able to do was to directly answer questions posed by the public in real time,” said Todd Hornback, public affairs chief. These questions

ranged from inquiries about the structural integrity of dams and the mechanics of spillways to the reasons behind particular decisions and operations.

Facebook also gave fans a venue where they could share their observations and even post their own photos as the waters continued to rise. On Twitter, live updates were posted from two news conferences—one at Rough River Lake and one in Paducah, Ky. These live tweets, in turn, were frequently passed on through retweets, extending the reach of each post well beyond the district’s followers.

Flickr enabled the sharing of photos from the many affected areas around the Louisville District as lakes hit historic levels, some of them reaching their emergency spillways for the very first time. To date, the album of flood photos has had more than 4,600 views.

On YouTube, Hydraulic Engineer Mark Philips explained how a spillway functions, and footage was posted of flood-fighting efforts in Smithland, Ky., where citizens added sandbags and geocells to

the existing levee, saving the town from the destructive waters.

Three Louisville District lakes—Nolin River, Rough River and Barren River lakes—also maintain social media sites, which have a combined following of more than 13,000 people and ensured local residents had the most up-to-date information during the flood event.

“This has been an unprecedented event, and getting information to a place where the majority of our customers can find it has been extraordinary,” said Denise Rouse, natural resource management specialist for the Louisville District.

To visit the district’s social media sites go to:

[facebook.com/louisvilleusace](https://www.facebook.com/louisvilleusace)

[twitter.com/louisvilleusace](https://twitter.com/louisvilleusace)

[youtube.com/louisvilleusace](https://www.youtube.com/louisvilleusace)

[flickr.com/louisvilleusace](https://www.flickr.com/louisvilleusace)

	13-Apr	12-May	% growth
Facebook	865	1210	29%
Twitter	655	712	8%

## Deployable tactics team assists with flooding

By Jacqueline Tate, Great Lakes and Ohio River Division



Lt. Col. Melody Charles, Louisville District, briefs William Chapman, Great Lakes and Ohio Rivers Division chief of operations, on current road conditions impacted by the flood event. As a result of heavy rainfall during the month of April, new floods of record were established throughout the lower Ohio and mid-Mississippi River basins.



An Army Corps of Engineers’ Emergency Command and Control Vehicle, a deployable tactical operations system component based out of Fort Worth, Texas, operates out of a local hotel parking lot May 5 in Paducah, Ky. The U.S. Army Corps of Engineers Great Lakes and Ohio River Division Command-forward team worked diligently on the ground to coordinate a multi-regional response to the record rainfalls and consequential flooding.

# Flooding at lock and dam structures: A closer look at Cannelton

By Sarah Gross, Chicago District Public Affairs

The recent flood event in the Ohio River Basin produced the second highest water levels ever recorded at Cannelton Locks and Dam located three miles upstream from Cannelton, Ind.

Spring rains across the Ohio River Basin meant the staff at Cannelton had to prepare for the arrival of excess water.

Based on water level predictions, the Cannelton employees started making preparations for the flood event 10 days before the crest.

“All openings in the walls of the facilities have to be bagged to keep water from the galleries where all of the heavy operating equipment is,” said Jeff Hill, Cannelton Locks and Dam lockmaster. Three days prior to the crest, the employees started sandbagging.

One item of concern for higher water is that the current moves faster in the middle and slower along the banks, and drift gets pulled into lock chambers. The forebay is always critical on the north end of the lock chambers, as northbound vessels move against the current, and the drift from the forebay can get into the vessels’ wheels

and carry them into the dam.

If the lock structure at Cannelton had to close, there also would have been no navigation over the weir-fixed crest dam that extends from the gate, as it is not wide enough for vessels to pass over.

The facility was on the verge of closing but didn’t have to because the weather service predictions reducing the crest to a 1.5 feet.

Cannelton Locks and Dam helps to establish a nine-foot channel depth between Cannelton and the McAlpine Locks and Dam near Louisville. This 114-mile-long navigational pool is the longest maintained by a dam.

Hill stressed that while locks and dams are not flood control structures and exist purely for navigation, their operation does alter during major flooding events.

The normal summer pool at Cannelton is 383 feet above mean sea level. Water has to be let out of the gates at the structure to maintain a constant pool. Cannelton Locks and Dam can release two million gallons a minute through two valves, along the five miles of hydrologi-

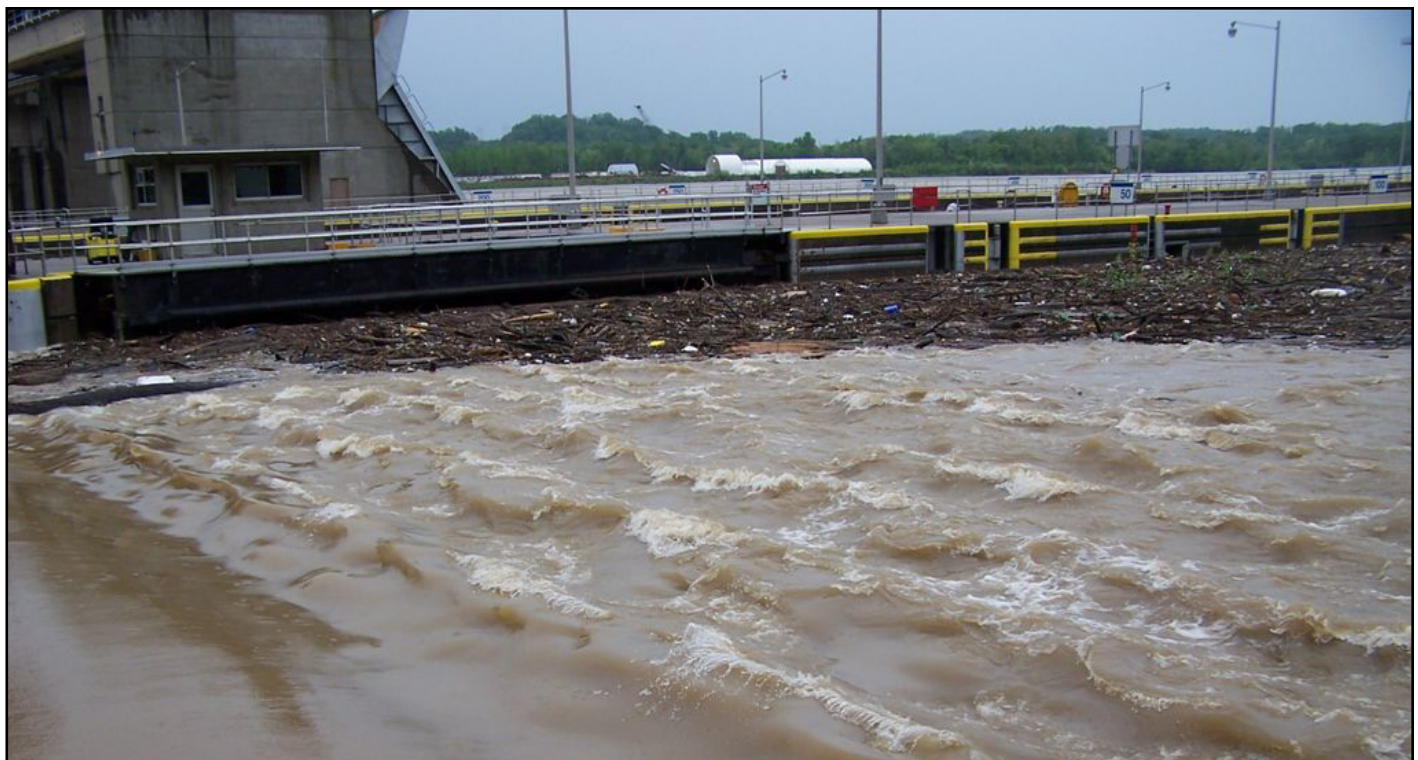
cal piping at the facility. If more river water is approaching the structure than can be maintained, this creates an uncontrollable situation, or a flood condition.

“A 114-mile pool can hold a lot of water. We were able to keep the dams below unsubmerged by holding back more stream,” said Hill.

Although there was minimal damage to the Cannelton facilities, they are still estimating \$20,000 in pre-flood preparation and post-flood maintenance costs.

## At a glance:

- Cannelton consists of two lock chambers: 1,200 feet long by 110 feet wide and 600 by 110.
- Cannelton has approximately 15 year-round employees and at least two on site 24/7.



Jeff Hill

Debris fills the lock chamber at Cannelton Locks and Dam in Cannelton, Ind., after heavy rains caused water levels to rise in the Ohio River Basin.

# Grisoli tours flooded areas



Mark Rankin

Chris Lasher, Livingston County Judge-Executive, briefs U.S. Army Corps of Engineers Deputy Commanding General for Civil and Emergency Operations Maj. Gen. William T. Grisoli and Director of Contingency Operations and Homeland Security Karen Durham-Aguilera on a levee holding back the Ohio River from the town during a recent tour.

By Mark Rankin, Nashville District Public Affairs

U.S. Army Corps of Engineers Deputy Commanding General for Civil and Emergency Operations Maj. Gen. William Grisoli and Director of Contingency Operations and Homeland Security Karen Durham-Aguilera toured the Lake Barkley dam and power plant, the Kentucky Lock, the towns of Smithland and Paducah, Ky., flood protection barriers, structures and pumping stations along the levees.

Bob Sneed, chief of water management, U.S. Army Corps of Engineers, Nashville District, briefed Grisoli on flood control reduction operations and projects upstream. Sneed explained how the Great Lakes and Ohio River Division operates, maintains and utilizes Lake Barkley and Lake Cumberland, two of the largest flood control reservoirs east of the Mississippi River, and how the Corps of Engineers started the process of recovering flood storage capacity in lakes impacted by the series of heavy rain events during April and May.

Lake Barkley Resource Manager Mike Looney briefed Grisoli on the current Lake Barkley status, and Power Plant Specialist, Jamie Holt from the Lake Barkley power plant briefed him on day-to-day operations and described the Dam Safety Action Classification System (DSAC).

“He had lots of questions,” said Holt. “It makes us feel good to know that our leadership has pride in our contributions.”

Grisoli then toured the nearby towns of

flood stricken Smithland and Paducah.

Under close watch, Livingston County officials said Smithland’s levee was in a critical situation as constant pressure from tons of water pressed against a constructed Typar® geocell wall system provided by the U.S. Army Corps of Engineers. Livingston County Judge-Executive Chris Lasher, Emergency Management Director, Brent Stringer and Sheriff Bobby Davidson commended the Corps for their support and contributions.

“We are doing all we can to save our town, and if it were not for this reinforced protection to the levee, it would be flooded,” Lasher said.

High water from the Cumberland and Ohio rivers, heavy rains and sand boils caused Lasher to issue an evacuation order for town residents. The 1123 Sapper Company, a National Guard unit from Lexington, Ky., patrolled the area and maintained checkpoints throughout Smithland.

“I’m just impressed with the response of this community,” said Grisoli. “It’s not normal that towns come together, train themselves and use resources like Smithland did.”

In Paducah, City Engineer-Public Works Director Rick Murphy, Mayor Bill Paxton and Floodwall Superintendent Kenny Brannon drove along the levee and showed Grisoli the city’s floodwall, pumps, piping and the ongoing work it was doing to protect the Julian Carroll

Convention Center and the Expo Center along the flood wall.

Paxton thanked Grisoli for the work his team had done in Paducah against the flood fight and especially how they continue to work alongside City of Paducah staff to monitor the levee, gates and floodwall.

“I’m comfortable with the Corps working with us and appreciate their contributions to our community,” said Paxton.



Mark Rankin

Paducah City Engineer-Public Works Director Rick Murphy and Mayor Bill Paxton talk with Army Corps of Engineers Deputy Commanding General for Civil and Emergency Operations Maj. Gen. William Grisoli and Director of Contingency Operations and Homeland Security Karen Durham-Aguilera about the city’s floodwall, pumps, piping and the ongoing work it’s doing to protect the Julian Carroll Convention Center and the Expo Center along the flood wall.

# Coordination efforts key in keeping towns, farmland, power plant dry

By Rachel Faye Haring, Great Lakes and Ohio River Division

Levee Unit 5 was the focus of a major effort, which resulted in a victory during the recent flood event. Sandbagging efforts by local officials and citizens, with technical assistance from U.S. Army Corps of Engineers (USACE) personnel assured the integrity of the levee.

When the water started to rise, local farmers, members of the National Guard and Department of Corrections inmates began a sandbagging effort that prevented catastrophic flooding of 50,500 acres of farmland and the small communities of Lyles, Skelton and Griffin, Ind. The sandbagging was also responsible for protecting the access to the Gibson Station power plant, the fifth largest coal power generating plant in the U.S.

Will Puckett, senior engineer in the Geotechnical and Dam Safety Section USACE, said that without the sandbagging, the levee certainly would have overtopped. Thanks to nearly half a mile of sandbags that were placed, the water was contained and the levee performed as it was designed.

One individual was extremely helpful to the Corps. Chris Hiedenreich of the local Committee for the Care and Maintenance

of the Wabash Levee Unit Number 5, allowed the Corps to store some of their specialty equipment in his shop at night. He also provided keys to levee gates so USACE personnel could easily access the areas that needed monitoring.

Hiedenreich and the other committee members were responsible for coordinating with government and USACE officials, as well as personally going out to the levee and assisting in placing sandbags.

Hiedenreich described the coordination with USACE personnel as "wonderful" and said that because of the combined efforts there was a "huge" victory at the levee.

"Thanks to all of the wonderful volunteers, the great coordination with the Corps and everyone's efforts, we saved it," Hiedenreich said.

After the water started to recede, work at Levee Unit 5 was not done. A large number of sand boils still had to be monitored.

A sand boil occurs when water passing under a levee erupts through the ground surface on the landward side of the levee in the form of a bubbling spring. In rare cases, sand boils could cause the levee to subside.



John Neville

A Louisville District flood fight team placed sandbags around this sandboil at Levee Unit 5 located near Evansville, Ind., which was created when water under pressure welled up and through the levee.

The Corps and local officials discussed remediation efforts and closely monitored the sand boils.

During a flood fight, USACE provides communities, based on a request from the affected state, with sandbags and technical assistance, loans other materials and equipment such as pumps, builds emergency levees and offers contract services as necessary.

## Eco-meets support America's Great Outdoors Program

By Jon Fleshman, planning, programs and project management

Corps of Engineers Park Ranger Alicia Cannon let Caneyville, Ky., first graders touch a non-venomous snake during their visit to Louisville District's Rough River Lake May 19, 2011, for a mini eco-meet. Cannon's repertoire included live ferrets, snakes and a turtle. Park Ranger Adam Taylor led the youngsters in a game of "Oh Deer" while teaching them about the holding capacity of animals and the land. Lead Ranger Allen Ramey helped the 6- to 8-year-olds identify local fauna and flora during a walk in the woods. One of the goals of President Obama's America's Great Outdoors initiative is to "build stewardship values and



engage youth in conservation and recreation." The Louisville District's 20 lakes had almost 18 million visitors in fiscal year 2010 and each of the lakes supports a variety of outdoor recreation and education events throughout the year.



Jon Fleshman

Park Ranger Adam Taylor and parents watch while a first grader chases a companion around the circle during a game at the Rough River Lake mini eco-meet.

# Birds Point-New Madrid Floodway intentional levee breach lowers river; water-logged towns breathe sigh of relief

By Carol Labashosky, public affairs

Ryan Jeffries, Louisville District Chief of geotechnical and dam safety, said he felt the blast in his Paducah, Ky., hotel room when the Army Corps of Engineers detonated explosives May 2 at Birds Point, Mo.

Jeffries had just spent a 14-hour day in the rain providing technical advice to flood-threatened communities of Smithland, Ky., Brookport, Ill., and Paducah, Ky. with Louisville District Commander Col. Keith Landry.

"It rattled the windows, like an earthquake. You couldn't mistake it," Jeffries said.

The Corps opened the Birds Point-New Madrid floodway for the first time since 1937 that night. The intentional breach relieved pressure on numerous levee systems along the lower Ohio and Mississippi rivers and their tributaries. Approximately 133,000 acres of designated floodway was intentionally flooded to protect more than 2.5 million acres at risk from additional flooding—approximately 20 times the area that was impacted by operating the floodway. At Cairo, Ill., the Ohio River gage was 61.72 feet before the blast and the following morning was 60.32 feet and dropping.

The blast was expected to provide relief at evacuated Smithland, Ky., and Brookport, Ill., in the Louisville District's footprint where high water was testing the integrity of their precarious levees. Jeffries looked at the gage readings and noted the drop. "This will help all these towns (we visited) to some extent," he said.

Following the blast May 2, the Nation-

al Weather Service lowered its crest projection for the Ohio River at Smithland, Ky., approximately 65 miles upriver from the intentional breach, to 55 feet from the previous 58-foot prediction. But even so, that forecast was more than 3.5 feet higher than the record set at that location in 1997, according to weather service records. Flood stage there is 40 feet.

Nearly 4,000 residents in the cities of Smithland, Hickman and Ledbetter had been evacuated and nearly 1,000 more from Brookport, Ill., also evacuated the day after the Birds Point breach.

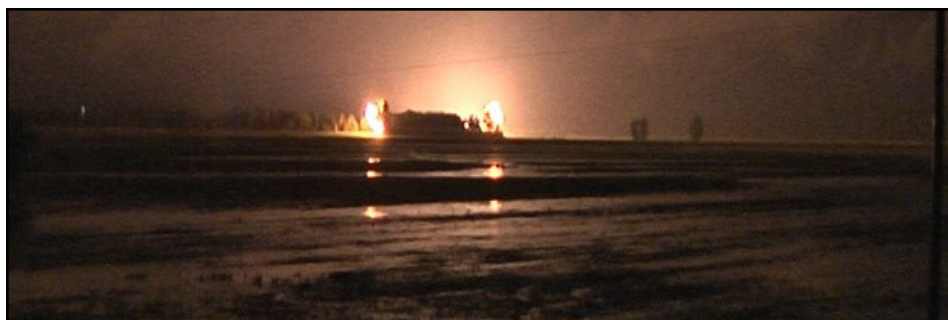
"We visited the mayor of Brookport at her home to ensure she had a clear understanding of the potential risk her community was facing from the rising Ohio River," said Jeffries.

A second blast was conducted at New Madrid, Mo., and a third occurred near Hickman, Ky. The second and third blasts, downstream of Birds Point, allowed floodwater to return to the Mississippi River.

Maj. Gen. Michael Walsh, commander of the Corps' Mississippi River Valley Division made the decision to order the breach. He warned that without punching a hole in the levee, massive flooding would threaten to inundate communities throughout the Mississippi and Ohio river valleys. "Nobody has seen this type of water in the system," he said. "This is unprecedented."



[Click here to watch the Birds Point-New Madrid levee detonation on YouTube.](#)



Brooks Hubbard, Los Angeles District

The U.S. Army Corps of Engineers breached the levee at Birds Point May 2 as part of the activation of the floodway to lower river levels and to provide relief at Smithland, Ky., and Brookport, Ill.

## Levee performs as designed, keeps town dry

By Rachel Fay Haring, Great Lakes and Ohio River Division

After several intense days in Vincennes, Ind., residents and U.S. Army Corps of Engineers personnel are starting to breathe a little easier.

During the recent major flood event, the Breevort/Vincennes Levee in Vincennes was under hourly surveillance to monitor the rising water and sinkholes that formed due to a deteriorated sewer line that was failing. Levee inspections were provided by Corps employees, who also offered recommendations to the Vincennes Water Utilities (VWU), who are responsible for the levee. Additionally, the Corps provided pumps to bypass the sewer line. The pumps were tested, and are in a standby status, ready to be used if needed.

The sinkholes were formed when flood water began flowing under the levee and carrying dirt and sediment with it. The water and additional material also found their way into an abandoned sewer line, which runs parallel to the levee. The continued flow of water and sediment into the sewer line caused the ground above to destabilize and sink.

Although the sinkholes could have caused the levee to become unstable, quick actions by the local officials, with technical assistance from the Corps, have temporarily stabilized the sinkholes until a long-term solution can be carried out.

George Minges, geotechnical engineer for the Corps, who had been responding to the flood since Easter, stated that the cooperation with local officials couldn't have been better.

Minges stated that the levee performed exactly as it was designed and successfully protected the town of Vincennes from flood water.



Rachel Fay Haring

# “Best Corps Day ever” lives up to hype

By Katie Newton, public affairs

What was promoted as “the best Corps Day ever” exceeded expectations June 10 when Corps employees and their families attended the celebration at Taylorsville Lake.

“It was certainly the biggest and the best ever,” said Diane Hibbs, Louisville District CPAC chief.

Operations Division, which hosted the event, pulled out all the stops. Festivities ranged from face-painting to rock climbing and everything in between.

There were inflatables for children, a cornhole tournament, “closest to the pin” golf contest, a rock wall to climb, a dunking booth and picnic tables in the shade where many decided to sit and enjoy a day of fellowship with co-workers, friends and family.

The day also featured many educational activities with tours of the historic village and control tower, guided nature hikes, geocaching and natural resource management water safety tours.

So folks could escape the high temperatures, there were also several arranged activities in the shade of the main tent, including bingo games, showcase performances and a kiss a pig contest where Col. Keith Landry had to pucker up.

During the opening ceremony, Bruce Murray, former chief of the district’s



Debra Hunter

Louisville District Commander Col. Keith Landry puckers up to kiss the pig during the opening ceremony at Corps Day Friday, June 10 at Taylorsville Lake.

engineering division, was entered into the Louisville District Gallery of Distinguished Civilians.

Don Pay, Mayor of Taylorsville, Ky., attended the event to present the district with a framed proclamation recognizing June 10, 2011, Corps Day in Taylorsville. He, along with Spencer County Judge-Executive Bill Karrer expressed their appreciation for Corps staff and the Taylorsville

Lake Project which functioned as intended and protected the town of Taylorsville from high water during the spring floods.

“The Army Corps of Engineers came through for us,” said Pay.

Landry also seized the opportunity to share his sincerest thanks to Corps staff for all of their efforts and especially to Operations Division for their hard work to put together, “the best Corps Day ever.”

## Reflections of inquiring minds at Green River Lake

By Jon Fleshman, planning, programs and project management

Various intensities of reflections of Green County Early Childhood Center teachers and students appear in the aquarium glass at the Green River Lake Visitor Center May 12. The center was recently reopened to the public after \$450,000 of Recovery Act funds were used for the re-construction of ADA accessible restrooms, construction of space for future exhibits, renovation of the entry vestibules, renovation to improve accessibility to the ranger kiosk space and replacement of theater chairs to provide ADA seating. The work was done by T&T Enterprises, LLC of Leitchfield, Ky.

The annual economic benefits generated from public recreational visitors to Green River Lake is from \$30 million to \$35 million.



Jon Fleshman

A young visitor from the Green County Early Childhood Center peers into the aquarium in the newly renovated Green River Lake Visitor Center May 12.

# Serving Soldiers at Fort Campbell

Project manager Nora Hawk (center) uses blueprints to point out some features of the Recovery Act-funded Warrior-in-Transition Complex nearing completion on Fort Campbell, Ky. Spec. Danny Carver (left) and Capt. Jennifer Grier are members of the U.S. Army Warrior Transition Battalion which will occupy the buildings after they are completed this fall. The \$24.8 million four-story barracks on the left is being built by the joint venture of Clark and Caddell; the \$7.08 million battalion headquarters, out of view, and the company headquarters on the right are being built by Nationview, LLC. Having separate contracts for the barracks and the operations and administrative buildings made it possible to set aside the second contract for small business contractors.



Jon Fleschman

## Markland gate leaves find temporary home until installation

Gary Birge, Markland lockmaster, captured these shots of a set of the Markland miter gate leaves hanging on their storage pier in Warsaw, Ky. The gates will be hung beginning in July. The installation—including the new embedded quoins, strut arms and anchor arms—will complete the final phase of the Markland Lock Rehabilitation project.



Gary Birge

## Dorko rewards Human Performance Wing team

Maj. Gen. Jeffrey Dorko, deputy commanding general for Military and International Operations, (DCG-MIO) toured Wright-Patterson Air Force Base, May 26. A courtesy visit was made to the Human Performance Wing (HPW) Director Thomas Wells; the National Museum of the U.S. Air Force (NMUSAF) Director John “Jack” Hudson; and the 88th Air Wing Base Civil Engineer Group. During his visit, Dorko met with staff at the Corps Area Office and presented an award to the HPW Project Team. Attendees included Maj. Doug Massie, executive officer for DCG-MIO; Don Johantges, supervisory program manager; George Jageman, chief of construction; Dewey Rissler, chief of Air Force section; Rick Markwell, area engineer; and Kevin Jefferson, deputy area engineer.



Gary Stevens

Maj. Gen. Jeffrey Dorko presents Kevin Jefferson, area deputy engineer and Dewey Rissler, chief of Air Force section with an award to the Human Performance Wing Project Team May 26.



# Prehistoric mounds surveyed at Roush Lake

By Scot Dahms, Upper Wabash Project Office

Members of the Engineer Research and Development Center-Construction Engineering Research Laboratory (ERDC-CERL) and U.S. Army Corps of Engineers, Louisville District, were at J. Edward Roush Lake, Ind., in April to investigate three prehistoric mounds within the Kil-So-Quah Campground.

The purpose of the investigation was to examine the extent and nature of cultural-bearing deposits related to the mounds, and to strengthen their eligibility for listing the campground on the National Register of Historic Places, a national inventory of significant historic properties and resources.

The Kil-So-Quah Campground is owned by the Corps but outgranted to the Indiana Department of Natural Resources (IDNR). The survey team included Dr. Michael Hargrave, Carey Baxter and Carl Carlson-Drexler from ERDC-CERL, Dominique Cordy, a DA intern on loan from the Honolulu District, and Keith Keeney, Louisville District archeologist.

“ERDC’s mission is to conduct research and development in support of Army installations. We are trying to help the Army use geophysics as a noninvasive way to meet federal historic preservation laws,” Hargrave said. He noted that they had worked at many Army installations including Fort Riley, Fort Bragg and Fort Leonard Wood.

The three mounds examined during this investigation were archaeological sites 12HU25 (the Big Bangs Mound), 12HU26 (the Little Bangs Mound) and 12HU27. To minimize further impacts to the mounds, as well as to deter unwanted attention, noninvasive techniques were used to examine the sites including ground penetrating radar (GPR), magnetic gradiometry and electrical resistance. After all the data were collected, images of features and objects beneath the surface can be examined and interpreted for evidence of habitation. “Archaeologists are particularly interested in cultural features, which are remnants of human activity such as storage pits, hearths, burials and house remains,” Hargrave said.

Geophysical data were collected along



Carl Carlson-Drexler (left), Dominique Cordy and Mike Hargrave use ground penetrating radar on a camp pad in Kil-So-Quah Campground at J. Edward Roush Lake in Indiana.

a grid system with units measuring 20 by 20 meters square. The units and other surface features such as trees, roads and campsites were recorded using a Global Positioning System (GPS) unit and georeferenced into a Geographical Information System (GIS). Long tapes were used to mark a path for the various techniques to follow. The operators kept the units going in a straight line so the data recorded accurately and in the correct place.

For GPR, energy waves are sent beneath the ground to a certain depth hitting objects and bouncing back to a unit on the surface. The strength of the waves being bounced back and the time it took to get back were used to produce a map showing areas of particular interest called “anomalies.” An anomaly indicates that there is something beneath the surface at a certain location but it does not tell the operator what the something is. A wheel on the unit also keeps track of its location inside the grid, so all data can be compiled in a 3D format for interpretation.

GPR units work best in dry sand and worst in wet clay. In wet clay, the ground is more conductive, meaning that there is not much penetration of the energy into the ground to show the anomalies. Rains

during the investigation challenged the team’s efforts to collect reliable data on the sites. Plus, the area is known to contain a high amount of clay in its soil.

Magnetic gradiometry uses an H shaped unit with sensors at the top and bottom of the vertical parts of the H. As the unit passes over an area, the sensors are able to detect magnetic items in the ground. The sensors measure the magnetic character of the ground and can detect iron objects, hearths and other man-made features. The surveyors time their pace so that they pass over a meter mark on the tape each time the instrument beeps. This ensures that the data points are evenly spaced. The data is compiled in a 2D format. Overall, the magnetic gradiometer is a faster method than the GPR.

Hargrave stated that the magnetic gradiometer can locate concentrations of iron oxide in the soil that have been altered by heat. Cooking pits and other fire locations can be located. When iron oxide is heated, its magnetic field aligns with the earth’s magnetic field. Over time, the earth’s magnetic field changes and the magnetic gradiometer is able to locate anomalies where materials containing iron oxides  
*(Continues on Page 18)*

were heated in the past. Hargrave stated that using the magnetic gradiometer in a modern campground can be quite challenging as numerous metallic objects have been lost or disposed of there. Hargrave called it a “magnetic mine field.”

The last geophysical method used during the investigation was electrical resistance. Hargrave stated that this was the slowest method being used but believed that it was the best for identifying mounds. A unit contains three probes that are stuck into the ground. The outside probes inject a weak electrical current and the center probe measures its potential, allowing the instrument to calculate resistance. Electrical resistance is measured as deep in the ground as the sending and receiving probes are apart. The spacing between the probes can be increased to reach greater depths. The unit they used was set up to measure 50 centimeters into the ground. By mapping localized variation in electrical resistance, they can detect mounds constructed from distinct soils and sometimes objects within or below the mound. The grid system utilizing metric tapes for magnetic gradiometry is also used for electrical resistance.

Jeremy Sobecki, IDNR assistant property manager for the J. Edward Roush Fish and Wildlife Area, assisted with the investigation. Some clearing of small trees was conducted by IDNR to facilitate use of the different equipment. The clearing was kept to a minimum to decrease any additional adverse effects or attention being drawn to the mounds.

Keeney said that the Big Bangs and Little Bangs mounds date to the Middle

and Late Woodland periods. Radio carbon samples taken from the mounds suggest that they date from A.D. 420 to 600. No date of occupation is known of the mound for site 12HU27. People of that time period were mostly horticulturalist and foragers for food resources, maintaining a sedentary lifestyle around major habitation sites such as field camps or villages. They were also known to make loess mounds on existing clay soil, often located at the edge of bluffs overlooking great distances.

The transition between the Middle and Late Woodland periods is poorly understood in the Upper Wabash River region. The Late Woodland period is generally perceived to be a period of decline in the importance of the ritual that characterized the Hopewell influence of the Middle Woodland period, along with its associated mound building and external trade.

Late Woodland societies developed along different lines regionally, but in general seem to have depended initially upon the exploitation of local wild resources, with a later shift towards harvesting seeds and the domestication of plants. The cultivation of maize characterized the latter portion of the period. The societies were small and dispersed and located in a variety of environmental settings.

Prior to the development of the lake and campground, the Big Bangs Mound was described as a shallow, flat platform mound measuring approximately 40 to 50 feet in diameter, four feet high and consisting of layers of burned logs and earth, flint chips and fire-cracked rock – all signs of intense occupation.

At least two episodes of mound-build-

**“There are cultural resources here, they are being impacted, and we need to do something about them.”**

**-Keith Keeney  
Louisville District archaeologist**

ing occurred at Big Bangs. Large limestone rocks were placed on top of the logs and marked the edges of the log deposits. The Little Bangs Mound was similar to Big Bangs though without the log features, measuring approximately 25 to 30 feet in diameter and approximately 3 feet in height. Little is known of the mound at site 12HU27.

The most challenging aspect of the project is the location of the mounds in a developed campground. Two of the three reported mounds, Big Bangs and Little Bangs, are surrounded by campsites that include gravel pads bordered by horizontal timbers held down by rebar, a road and a steep bluff on the lake side.

Keeney believes that parts of the original mounds lie beneath the existing campground pads and road. To the naked eye, the mounds do not jump out and grab your attention. Previous excavations on the mounds from universities have changed their form, however. To most campers, they probably just look like piles of dirt placed there at one time or another. One mound was unfortunately used as an off road ramp for youngsters and their bikes and the other has a pedestrian trail through it to get from one campsite to another.

“There are cultural resources here, they are being impacted, and we need to do something about them,” Keeney said. Based on what is found in the mounds, the application to be eligible for the National Register of Historic Places could be strengthened.



Dominique Cordy (left) and Carey Baxter use electrical resistance on Little Bangs Mound at Roush Lake.

Scot Dahms

*Take me out to the ballgame:*

# Louisville District sponsors water safety day at Slugger Field

By Wendy Pohl, Patoka Lake

The Louisville District sponsored Water Safety Day during a Bats game at Slugger Field May 15. Despite the chilly weather and rain, more than 2,000 people attended. Rough River Lake's water safety trailer was set up at the entrance to the ball field. Inside, the Corps had tables at the front entrance and in the children's play area where District Commander Col. Keith Landry helped park rangers distribute water safety items to the public. Bobber the Water Safety Dog and Buddy the Beaver attended and were a hit with the kids. The Bats provided 750 T-shirts with Bobber and the Bats logos to attendees, and two water safety banners were on display at the stadium. Landry threw out the first pitch of the game and did a live radio interview about the importance of water safety. Corps personnel were available to the public to talk about Corps lakes and the many different things they have to offer. Wendy Pohl, Patoka Lake; Adam Taylor,

Rough River Lake; Alicia Cannon, Barren River Lake, Thomas Jackson, Carr Creek Lake; Michael Hatcher, operations; and

Jim Goode, Green River Lake; supported the event.



Carol Labashosky

Louisville District Commander Col. Keith Landry and Bobber the Water Safety Dog pass out coloring books and water safety materials to children visiting the Louisville Bats game at Slugger Field May 15.

## Weather Day at the Great American Ball Park

By Linda Romine, William H. Harsha Lake

William H. Harsha Lake Park Rangers Linda Romine and Chris Bass and C.J. Brown Dam and Reservoir Park Ranger Phillip Martin, participated in Weather Day at the Great American Ball Park before the Cincinnati Reds versus Pittsburgh Pirates game May 19.

Approximately 5,500 local school children from Ohio, Kentucky and Indiana were invited to a weather safety program presented by local channel 19 meteorologists Pat Barry and Steve Horstmeyer.

Afterward, the children were free to visit booths set up in the fan zone at the ball park. Water safety coloring books and junior safety ranger stickers were distributed to the children who stopped by the U.S. Army Corps of Engineers table.

Romine discussed the Corp's role in the recent flood event as well as flash flood safety. Children were also quizzed about



Courtesy William H. Harsha Lake

ways to be safe around the water during calmer weather.

Martin dressed up as Bobber the Water

Safety Dog and was an instant hit.



# First gold for LRL Reserve Team

By Jon Fleshman, planning, programs and project management

The Maj. Gen. Salvador Padilla Armed Forces Reserve Center in Fort Allen, Puerto Rico, is the Louisville District Reserve Support Team's first project to be certified at the gold level under the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) criteria.

"As a new and environmentally friendly facility, this building sets the standard for future construction here in Puerto Rico," said Lt. Col. Carlos Caez, the Puerto Rico National Guard construction and facilities manager. "Thanks to the efforts of the Corps of Engineers and contractors we were able to accomplish all the requirements for LEED Gold certification. We look forward to more construction projects of this type that bring a real solution to the environmental concerns of our island."

Under the LEED for new construction version 2.2 rating system, there are four levels of certification: certified, silver, gold and platinum. The project is rated based on five environmental categories that include sustainable sites, water efficiency, energy and atmosphere, materials and resources and indoor environment. According to an Army Sustainable Design and Development policy update, beginning Oct. 1, 2013, most new military construction will be required to be certified LEED silver or higher by the Green Building Certification Institute.

"The Green Building Council told us March 31 we had achieved gold," said the project's manager, Veronica Rife of the Louisville District. The Louisville District oversees Army and Air Force Reserve construction nationwide for the Corps of Engineers. "We were committed to getting at least silver, but knowing we actually hit the gold standard is very satisfying to the customer and contractor as well as the district."

Korte Company was the prime contractor and its president and chief executive officer, Todd Korte, said this

is his company's fifth USGBC-certified gold building. Korte characterized specific challenges of building this Reserve center as "areas of opportunity." He said they dealt with the "opportunities" by buying Forest Stewardship Council-certified wood from the continental United States and educating local subcontractors on the LEED process.

"The project was completed about five months early on an island where projects routinely complete late," Korte said. "At the ribbon-cutting ceremony, key speakers from the Corps of Engineers and the governor's office attributed much of the project's success to the contractor team's ability to collaborate with mainland and Puerto Rico subcontractors and vendors."

The \$15 million Reserve center will serve about 150 personnel on a rotating basis, said Rife, and it is required under the Base Realignment and Closure law. The two-story 55,000-square-foot facility resembles a community college and will be used for classroom training. The building surrounds a central palm-tree lined courtyard that permits abundant natural light to be used and enjoyed by occupants on both floors.

Initiatives for which the project received points, known as credits, included:

- Reducing potable water use by 54 percent from the baseline design
- Achieving an energy cost-savings of 26.5 percent using the American Society of Heating, Refrigeration and Air-conditioning Engineers methodology
- Diverting 18,690 cubic yards (98.52 percent) of on-site generated construction waste from landfill;
- Using 34.54 percent of total building materials' content, by value, manufactured using recycled materials
- Using 23.6 percent of total building materials, by value, extracted, harvested or recovered and manufactured within 500 miles of the project site

"The Puerto Rico National Guard takes pride in contributing to the preservation of our environment," said Maj. Gen. Antonio J. Vicens, Adjutant General of Puerto Rico. "Thanks to the U.S. Army Corps of Engineers, this new state-of-the art Armed

Forces Reserve Center is an outstanding example of how we help to protect the environment for future generations."



Courtesy of the U.S. Army

The courtyard of the Maj. Gen. Salvador Padilla Armed Forces Reserve Center at Fort Allen, Puerto Rico, permits abundant natural light to be used and enjoyed by occupants on both floors while reducing energy consumption.



Courtesy of Mike Tubbs, Korte Company

An exterior view of the Armed Forces Reserve Center at Fort Allen, Puerto Rico, that received LEED gold certification.



Courtesy of Mike Tubbs, Korte Company

Korte Company and Corps of Engineers project managers Derek Brauer and Veronica Rife collaborated on this project that received Leadership in Energy and Environmental Design certification at the gold level from the U.S. Green Building Council.

# Flood preparedness

Source: FEMA

Flooding is the nation's most common natural disaster. Flooding can happen in every U.S. state and territory. However, all floods are not alike. Some can develop slowly during an extended period of rain, or in a warming trend following a heavy snow. Others, such as flash floods, can occur quickly, even without any visible signs of rain. It's important to be prepared for flooding no matter where you live, but particularly if you are in a low-lying area, near water or downstream from a dam. Even a very small stream or dry creek bed can overflow and create flooding.

## **Step 1: Get a Kit**

Get an emergency supply kit, which includes items like non-perishable food, water, a battery-powered or hand-crank radio, extra flashlights and batteries. You may want to prepare a portable kit and keep it in your car. This kit should include: copies of prescription medications and medical supplies; bedding and clothing, including sleeping bags and pillows; bottled water, a battery-operated radio and extra batteries, a first aid kit, a flashlight; copies of important

documents: driver's license, social security card, proof of residence, insurance policies, wills, deeds, birth and marriage certificates, tax records, etc.

## **Step 2: Make a Plan**

Prepare your family. Make a family emergency plan. Your family may not be together when disaster strikes, so it is important to know how you will contact one another, how you will get back together and what you will do in case of an emergency. Plan places where your family will meet, both within and outside of your immediate neighborhood. It may be easier to make a long-distance phone call than to call across town, so an out-of-town contact may be in a better position to communicate among separated family members. You may also want to inquire about emergency plans at places where your family spends time: work, daycare and school. If no plans exist, consider volunteering to help create one. Be sure to consider the specific needs of your family members

- Notify caregivers and babysitters about your plan.
- Make plans for your pets

- Purchase a flood insurance policy if you do not already have one or review your current insurance policy to ensure your home and contents are adequately covered.
- Visit [FloodSmart.gov](http://FloodSmart.gov) to learn more about individual flood risk, explore coverage options and to find an agent in your area.

## **Step 3: Be Informed**

Familiarize yourself with these terms to identify a flood hazard:

- **Flood Watch:** Flooding is possible. Tune to weather radio for information.
- **Flash Flood Watch:** Flash flooding is possible. Be prepared to move to higher ground; listen to weather radio.
- **Flood Warning:** Flooding is occurring or will occur soon; if advised to evacuate, do so immediately.
- **Flash Flood Warning:** A flash flood is occurring; seek higher ground on foot immediately.

When waters rise, be safety wise



Todd Hornback

# New faces and fond farewells

## *New March/April employees*



Nathan Bryan  
Geotechnical Engineer  
Engineering Division



Jeffrey Koopman  
Project Engineer  
Engineering Division



Chun-Yi Kuo  
Geotechnical Engineer  
Engineering Division



Vickie Rogers  
Office Assistant  
Operations Division

## *Not pictured:*

Christopher Bass, Operations Division  
Justin Bates, Engineering Division  
Gary Blair, Engineering Division  
Donna Bowling, Operations Division  
Jimmy Carey, Construction Division  
Patricia Cockrell, Operations Division  
Ricky Combs, Operations Division  
Barry Cunningham, Operations Division  
Gary Curry, Operations Division  
Russell Curtis, Operations Division  
Nicholas DeVore, Operations Division  
John Dike, Operations Division  
Hargis Epperson, Operations Division  
Corey Foster, Operations Division  
Matthew Garringer, Operations Division  
Charles Grass, Engineering Division  
Keith Hayes, Operations Division  
Jason Heivly, Operations Division  
John Jolly, Operations Division  
Jason Laib, Operations Division  
Welborn Majors, Operations Division  
Phillip Martin, Operations Division  
Roger Meisner, Operations Division  
Marshall Moore, Operations Division  
Mark Ostbloom, Safety Office  
Celeste Parkerson, Operations Division  
Randall Roberts, Operations Division  
Lawrence Stivers, Operations Division  
Garth Stout, Operations Division  
Sara Sugarman, Operations Division  
Carl Suk, Operations Division  
Joshua Sullivan, Operations Division  
Larry Thomas, Operations Division  
Stephen Turner, Operations Division  
Aubrey Ward, Operations Division  
William White, Operations Division  
Brian Wilson, Operations Division  
Howard Woolum, Operations Division

## *March/April retirements*

Esther Anderson, Operations Division  
Sandra Briggs, Planning, Programs, and Project Management  
Janet Crum, Contracting Division  
Ralph Forney, Construction Division  
Ronald Shields, Construction Division  
Jeffrey Swift, Operations Division  
Michael Witcher, Engineering Division

## **By the numbers**

### *Louisville District totals*

- 1,364 employees
- 14 Department of the Army interns
- 32 volunteers deployed

# Seafood Sampler

Put on your flippers and dive in to some tasty seafood treats this summer



## Crabcakes

### Ingredients:

- 1 pound fresh crab meat
- 1 egg
- 2 tablespoons mayonnaise
- 1/2 teaspoon ground mustard
- 1 dash Worcestershire sauce
- salt and pepper to taste
- 4 oz. buttery round crackers, crushed
- 2 cups oil for frying

### Directions:

In a medium-size mixing bowl, combine crabmeat, egg, mayonnaise, mustard powder, Worcestershire sauce and salt and pepper to taste.

In a large skillet, heat 1/4 inch of vegetable oil to a high heat. Roll heaping spoonfuls on the crab mixture in the crackers, then place the ball in the hot oil. Flatten lightly with a spatula so that the crab cake is 1/2 inch thick. Fry the crab cakes, flipping to ensure both sides get browned.



## Hushpuppies

### Ingredients:

- 2 eggs, beaten
- 1/2 cup white sugar
- 1 large onion, diced
- 1 cup self-rising flour
- 1 cup self-rising cornmeal
- 1 quart oil for frying

### Directions:

In a medium bowl, mix together eggs, sugar and onion. Blend in flour and cornmeal.

Heat 2 inches of oil to 365 degrees F. Drop batter by rounded teaspoonfuls in hot oil, and fry until golden brown. Cook in small batches to maintain oil temperature. Drain briefly on paper towels. Serve hot.



## Creamy Coleslaw

### Ingredients:

- 2 tablespoons sugar
- 1/2 teaspoon salt
- 1/4 teaspoon ground mustard
- 1/4 teaspoon paprika
- 4 egg yolks
- 1/2 cup water
- 1/3 cup white vinegar
- 2 cups shredded green cabbage
- 2 cups shredded red cabbage

### Directions:

In a heavy saucepan, whisk the sugar, salt, mustard, paprika and egg yolks until smooth. Gradually whisk in water and vinegar. Cook and stir over medium heat until a thermometer reads 160 degrees F and mixture is thickened. Remove from the heat; cool to room temperature.

Place the cabbage in a bowl; add dressing and toss to coat. Refrigerate.



# Frequently Asked Questions

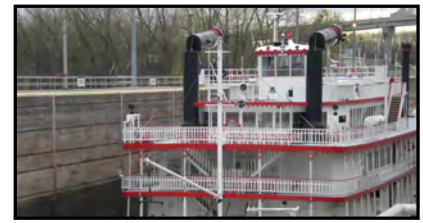
The Louisville District Public Affairs office receives many inquiries. Below is the answer to a question the district is often asked.

By Vanessa Whitworth, public affairs

**Q:** We have a new boat and will be locking through a Corps navigation lock – what should we expect?

**A:** The Secretary of the Army has established the following priority for passing vessels through locks. Precedence for lockage is established when a craft passes the arrival point located above or below the lock. The first priority is U.S. government fleet vessels; 2nd priority is commercial passenger vessels; 3rd priority is commercial tows or vessels and 4th priority is recreational boats. Some things to remember when using navigational locks:

- Extinguish all open flames
- Stay within the navigation channel as marked by buoys
- Slow your boat to a no-wake speed as you approach the wall
- Idle speed when approaching, entering and leaving the lock
- Life jackets are required to be worn by all passengers while locking.
- Lines should be wrapped around the pin of floating mooring bits and tended at all times in case it needs to be released quickly.
- Avoid restricted areas prominently marked by buoys and fixed signs



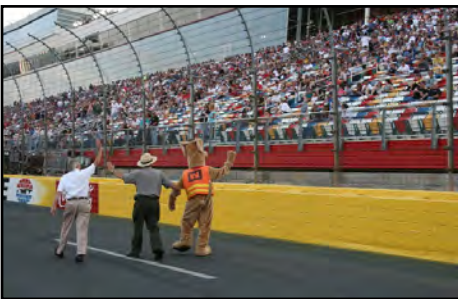
The lockmaster has full authority over the movement of vessels in the lock and its approach. Failure to follow the lockmaster's instructions will delay the lockage.

For more information go to: [www.lrl.usace.army.mil](http://www.lrl.usace.army.mil)

Click on navigation information.

## NASCAR water safety day July 7

The Army Corps of Engineers Louisville District will support its second of a series of NASCAR events to promote water safety July 7 at Kentucky



Speedway in Sparta, Ky. Bobber the Water Safety Dog will be there and Col. Keith Landry will accept kudos on behalf of the district for emergency operations support provided to the Commonwealth during the spring flood of 2011. The Corps water safety message is, "Like your favorite drivers wear their protective gear, we want you to wear yours on the water," said Diane Stratton, Rough River Lake, Ky., park manager.

For more information go to [www.kentuckyspeedway.com/tickets/tickets.aspx](http://www.kentuckyspeedway.com/tickets/tickets.aspx)



Richard Tucker, Ride to the Rock for Autism

Bobber gets his photo snapped with the vehicle promoting water safety. The Corps will promote water safety at a second NASCAR event July 7.

## Snapshot from the past



Paducah, Ky., residents flee their homes by boat during the 1937 flood. The City of Paducah is now surrounded by a 12.2-mile flood protection project.

Falls City Engineer is an unofficial publication under AR 360-1, published bimonthly for Louisville District employees and members of the public by the U.S. Army Corps of Engineers, CELRL-PA, P.O. Box 59, Louisville, Ky. 40201-0059 under supervision of the public affairs office. Views and opinions expressed are not necessarily those of the Department of the Army or the Corps of Engineers.



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