

Our Mississippi

PARTNERING TO KEEP
AMERICA'S RIVER GREAT

FALL '11



Laying THE Groundwork

DAVE BUSSE HAS GOTTEN AN EARFUL as he's gone out to the public asking questions like these: "How'd we do?" and "What can we do better next time?" And he's open to hearing it all—the good, the bad and particularly the instructive.

Coolidge-era planning saved the day in the Great Mississippi Flood of 2011; modern engineers preparing the flood fight manual of the future.

For as one speaker shared at a recent information gathering meeting: "Floods are won before the flood."
"And that's what we're trying to do now," Busse said. "We're trying to win the next flood."

As head of a System Performance Evaluation Team for the U.S. Army Corps of Engineers, one of Busse's jobs is to come up with a grade of sorts—for the

engineers of the 1920s who conceived and launched the Mississippi River and Tributaries Project (MR&T), and for all those whose efforts have built upon it since.

By some measures, the grade would be in the A+ range. "No one died," Busse notes. "The system prevented more

than \$100 billion in damages, and no levees on the MR&T system failed."

But the evaluation will also capture decisions made during the flood, determine what it'll take to get critical damages fixed and look at what system or operational changes (if any) should be made to help the flood fighters of the future—much like the detailed plans written decades ago that helped flood fighters this year.



Our Mississippi

is a quarterly newsletter of the U.S. Army Corps of Engineers about its work in the Mississippi River Basin. It is published in cooperation with other state and federal agencies and other river interests with whom the Corps collaborates and partners toward long-term sustainability of the economic uses and ecological integrity of the river system.





LEEVE TRIAGE

Safety team ranks damage, begins repair

THE GREAT FLOOD OF 2011 came so fast and forcefully that while there were no levee (or human) casualties, there's still a need for some infrastructure triage.

The force of the waters caused damage to the Mississippi River and Tributary System levees, most evident in earth slides, seeps and boils— in some cases the size of a pencil, in others a swimming pool. Some seeps are expected and treated as routine. But when you see water flowing out, carrying pieces of the levee with it, you have a potentially dangerous situation that needs to be carefully assessed by levee safety experts, notes Scott Whitney, a leader of the Corps of Engineers' Operation Watershed Recovery.

"Two of the biggest questions we are asking are 'Can we flood-fight it again?' and 'What are the life/safety and economic risks and consequences of failure?'" The answers to these key questions are being used to differentiate between critical and non-critical repairs."

Teams of engineers, levee operators and other experts have walked every levee (some 900 miles worth) throughout the Mississippi River and Tributaries system, closely inspecting problems evident during the flood, and others just appearing as flood waters fully subside. They're also looking at dredging needs for impassable channels, other structures and tributary needs.

By early August, some 93 repair projects with an initial repair cost of \$778 million were identified as potentially critical. Twelve were determined to be "Class 1" or at high risk for loss of life, 43 were "Class 2" (significant potential for loss of life and economic damage), and the remaining 38 were classified as "Class 3" or with high impact to navigation and/or indirect potential for loss of life. The more comprehensive damage assessment phase will continue through fall and will likely add several hundred more sites to the list.

As of mid-September, the top 10 construction projects were getting launched with \$75 million pulled from hundreds of Corps projects across the nation. Through just this self-funding strategy, however, the entire repair and recovery process would take more than a decade, Whitney said.

The list includes projects with the scariest finds, many of them centered around Cairo, Ill., where the critical mass of initial construction priorities is. Huge sand boils have seriously weakened levees there.

The activation of the Birds Point–New Madrid Floodway for only the second time in history has left more than 130,000 acres of farmland and hundreds of families trying to rebuild their lives and livelihoods with little protection from even a relatively minor flood event. Initial repair work to clear the floodway of explosives and restore some protection is the top restoration priority, closely followed by the other Cairo-area levee problems, says Kent Parrish, head of the division's post-flood levee safety team.

But other areas' levees suffered, too, leaving flood fighters worrying that in even a small flood they might not hold the waters back. In one place within the Corps' Memphis District, the river cut its way through three quarters of a bend, shortening the river by nearly nine miles, destabilizing the navigation channel and threatening destruction of the \$54 million in channel improvements already

A crew monitors a massive, pond-sized sand boil in Cairo, Ill., in the midst of the Great Flood of 2011.



invested over the years in this section of the river. In a case called Buck Chute near Vicksburg, Miss., boils and seepage discovered in a 2010 flood were so worrisome that crews patched together an emergency fix as the flood crest made its way down river. Plans for a permanent fix made the phase 1 list of critical sites.

"We're assessing everything and putting it into a bigger report," Parrish said. "We have a levee team looking at what we need to do immediately, what we need to fix in the next couple of years, and what remains to get to what Congress told us to protect the system to: the project design flood."

According to Maj. Gen. Michael Walsh, initial repairs will run around \$1 billion, full restoration efforts another \$1 billion, not including recommendations (if forthcoming) for system changes. Parrish and others hope funding for the whole fix list isn't too long in coming.

"We know where the hot spots are, and we'll be watching them like hawks and taking remedial measures if needed, like we did this time," he said. "But we breathe a lot easier when we can fix some of them. Problems from the past got worse in 2011, and it's not going to get better without doing something." —K.S.

TOP TEN PROJECTS

- *Birds Point–New Madrid Floodway (Mo.): \$18.5 million*
- *Above Cairo Parcel 2 Slurry Trench (Ill.): \$5.5 million*
- *Cache-Cairo (Ill.): \$26.1 million*
- *Buck Chute (Miss.): \$2.64 million*
- *City of Cairo (Ill.): \$3 million*
- *Abermarle Slide (Miss.): \$1 million*
- *Cairo Parcel 5 (Ill.): \$7 million*
- *Duncan Point (La.): \$8.85 million*
- *Above Cairo Parcel 2A Relief Wells (Ill.): \$1.5 million*
- *Baton Rouge Front (La.): \$1.762 million*

The 5 elements of damage assessment

- 1 Collect physical data on the damage.
- 2 Look at historic data. Has damage grown progressively through time?
- 3 Look at repair options. What is needed so it can be flood-fought again?
- 4 Have others check the data in a district quality assurance review.
- 5 Determine cost of bringing levee (or other structure) up to an acceptable level.

ABOVE, FROM LEFT: *Gates open on the Bonnet Carré Spillway; levee explosion at Birds Point–New Madrid; Morganza Floodway opened for only the second time in its history, in May 2011.*

BONNET CARRÉ AND MORGANZA, NEW ORLEANS DISTRICT, CORPS OF ENGINEERS; EXPLOSION: BROOKS HUBBARD; SAND BOIL: BOB ANDERSON.

"The things you do now put you in a better position to respond to any future flood," says Busse, a hydraulics engineer. "The seeds of the success in 2011 go back to the '20s and '30s. We're hoping to provide seeds to help the Corps and nation better prepare for future floods on the MR&T or anywhere in the United States based on what we learn."

The Mississippi River and Tributaries Project— one of the world's largest, most comprehensive and successful flood control projects ever— was launched in 1928, authorized in a flood control act passed that year, to prevent a repeat of what historians say might be the nation's greatest peacetime calamity outside Hurricane Katrina. In 1927, a great flood snapped levees like dominoes as it roared toward the Gulf, inundating 16 million acres, driving 500,000 people into disease-rampant refugee camps, leaving as many as 500 dead.

Humans were realizing they couldn't out-build the river— they could never build walls of earth high enough to keep the river completely restrained. Conceived by the Chief of Engineers of the time, Maj. Gen. Edgar Jadwin, the act and its Mississippi River and Tributaries Project introduced the then-revolutionary idea of leaving "room for the river," says Maj. Gen. Michael Walsh, the current commander of the Corps' Mississippi Valley Division. Under the plan, water would be moved laterally as opposed to vertically, through

Parts of the project have been operated over the years, but never until this year have all three floodways been needed at once.

floodways used in tandem with levees operated when certain river gauges reached a precisely prescribed height, Walsh said.

Parts of the project have been operated over the years, but not until this year have all three floodways been needed at once. The Bonnet Carré Spillway has been the most-often used floodway, operated 10 times since its construction to channel floodwaters from the Mississippi into Lake Pontchartrain. Morganza, which sends diversions into the Atchafalaya Basin at up to 600,000 cubic feet per second, was opened only twice, in 1973 and 2011. This was also the second activation of the Birds Point–New Madrid Floodway in Missouri, a step Walsh called "grave" because it would intentionally flood homes and rich farmland in the spillway. Even in 1937, the then–Chief of Engineers pleaded to Congress for another option, says Charles Camillo, a Corps historian and expert on the MR&T system, saying he didn't find "any plan acceptable that caused him to intentionally flood people's homes." But then as in 2011, the system was

operated according to design, leaving Walsh confident in the system's wisdom and worried about how the Corps will afford to put it all back together.

"Frankly," he said. "We are really quite proud not a single person lost their life in this white-knuckle flood."

But there's also the next flood to prepare for, and that's where a series of teams were developed under what is being called Operation Watershed Recovery. There's a System Performance Evaluation Team developing answers to key questions of system performance and recommendations for future studies or improvements. A Damage Assessment Team is ranking the most critical repair needs, and an Interagency Task Force is looking at system needs through a regional interagency perspective. At the national level, the Chief of Engineers has created an external review team that is looking holistically at how river systems like the Missouri, Ohio and Mississippi work together and whether, perhaps, more extensive floodway systems are needed.

Busse's System Performance Evaluation Team has pulled together the Mississippi Valley Division's leading experts on several system components as well as outside experts from universities and elsewhere. They'll look at flood protection levees, floodways, reservoirs, communications and more. The experts will examine how the system performed this spring, what it needs to withstand another flood event, and what changes might make it operate better in the future.




One sub-team is running models that show exactly how flood heights would have changed had a series of reservoirs not been holding back record amounts of water. Another is collecting data. What's been learned in past floods, Busse says, is that if you don't look early for pieces of scrap paper upon which decision-makers often scrawl notes, they may be lost to you forever.

How well the Corps collaborated with other flood-fighters and communicated along the way is another key part of the evaluation. One area receiving good feedback is the extensive use of social media during the flood fight; but while many loved finding information on Facebook and Twitter, others missed the face-to-face contact they'd grown accustomed to, Busse said.

The team's aiming for a report within a year. One version will be made into a reference manual, there to assist future leaders and flood fighters.

"We talk about those big floods that might happen every 50 or 100 or 200 years," he said, "But it might also happen next year. We don't want to complete this report, because we may need it next year, or— and this would be the best scenario— we won't need it for a long, long time." —K.S.

FLOOD HISTORY on the MISSISSIPPI RIVER

EVENT 1844	EVENT 1849, 1850	RESPONSE 1849	EVENT 1861–1865	RESPONSE 1879	EVENT 1927	RESPONSE 1928	EVENT 1937	RESPONSE 1938	EVENT 1965	RESPONSE 1969	EVENT 1973	EVENT 1993	RESPONSE 1999	EVENT 2008	EVENT 2011
Largest Upper Mississippi flood on record, at the time	Repeated flooding along Mississippi Valley	Swamp Act represents first steps toward federalizing flood control	Civil War leaves levees in disrepair	Mississippi River Commission (MRC) created	Great Flood of 1927: 27,000 square miles of lower river flooded, 500 dead, \$1 billion economic losses equaled a third of federal budget at the time	Flood Control Act implements Jadwin Plan/adds floodways to supplement levees	Flood: 365 die, \$500 million in losses; New Madrid Floodway opened for first time	Flood Control Act adds reservoir construction and headwaters projects	One of worst Upper Mississippi floods: 19 dead	National flood insurance provides incentives for non-structural flood control	River towns hit hard in huge Lower River flood; Morganza Spillway opened for first time, metro areas protected	Upper River flood: worst disaster since 1927; more than 1,000 levees fail	Congress approves the Upper Mississippi River Comprehensive Plan; includes non-structural approach to flood control	Huge Midwestern flood; two dozen people killed, 148 injured, 40,000 evacuated	Great Flood of 2011 flows largest on record; all 3 spillways open for first time in history; no deaths
															



Ancient relics complicate (already complicated) levee reconstruction

When hundreds of human bones were unearthed during work to control flooding near New Madrid, Mo., this spring, the Mississippi County coroner at first thought a mass burial site had somehow been exposed. In fact, as Corps of Engineers officials were figuring out back at the site, he was on the right track. Explosives needed to activate the Birds Point–New Madrid Floodway for the first time in 74 years had turned up— quite literally— an ancient Indian burial ground.

Hundreds of bone fragments were spread over 6½ acres, later determined to be the remains of some 25 people, probably from a small Mississippian village built atop a natural levee, says Dr. Robert Dunn, the tribal liaison for the Corps' Memphis District.

The Birds Point site has been in the limelight since Maj. Gen. Michael Walsh, commander of the Corps' Mississippi Valley Division, ordered the activation of the floodway on May 2, inundating 130,000 acres of fertile farmland and homes to save lives and property in more heavily populated areas not designed to flood. Making the site safe, and then rebuilding it to a partial level of protection, has since been the division's top priority. But the process has been anything but typical.

"After we activated the floodway, we learned we had residual blasting agent on site," said Dennis Abernathy, a project manager at the site. "All the explosives didn't go off. Some highways and roadways were left in very unsafe conditions."

The explosives were removed from the site, desensitized, and placed in holding tanks until they could be disposed of. During that process a contractor discovered the bones.

Officials believe the prehistoric site had been covered by river alluvium as far back as 1200 AD.

A man-made levee was built on top of the original Corps of Engineers unknowingly built the existing levee on top of that.

On May 2, the explosive breaching lifted the top seven feet of the levee and let the river rush in with tremendous force, said Dunn. "It cut a scour hole 20 feet deep. It exposed that prehistoric site and human remains were scattered over a 6½-acre area. It was extremely distressing."

The Mississippi County coroner later released the remains to the State Historic Officer's senior archaeologist. In June representatives of the Osage Nation, which had ceded these lands to the U.S. government by treaty in 1808. Osage Assistant Chief Scott BigHorse led a short prayer ceremony, and then tribal officials, Corps archaeologists and other Corps staff helped gather and move the remains since further flooding and other risks threatened. Plastic tubes of explosives were still on the ground; if hit by lightning they would have set off a major explosion and further scattered the bones, Dunn said.

The remains are in the temporary custody of the Corps' St. Louis-based Mandatory Center of Expertise for the Curation and Management Archaeological Collections. Following analysis, they'll be returned to the Missouri State Historic Protection Office, which will repatriate the remains to the tribe with the closest affiliation to the site. Multiple tribes have put in claims. Depending on tribal wishes, they'll be reburied in a keepsafe cemetery or possibly on the original site.

The replacement levee at Birds Point has been realigned so the new construction doesn't cross over the ancient burial site, to prevent future disruptions.

But that isn't the end of the story. A shortage of clay, the planned material for the levee replacement top, has required the geoarchaeological investigation of two new so-called "borrow" areas just outside the floodway. A Corps survey conducted from the mid-1990s to 2005 found 75 individual sites and one group site eligible for the National Register of Historic Places. Consequently, the Corps is taking very seriously tribal requests that their ancestral burial grounds receive proper care, Dunn said.

The archaeological investigations have not affected the schedule for Operation Make-Safe, the repairs needed to get the levee back to a height safe enough to protect floodway farmers. Crews were able to work on other areas impacted by scour holes, with most work predicted to finish in late November. They were temporarily held up in August, though, when they encountered protected interlopers: Interior Least Terns who decided to nest there. —K.S.

Might we flood? Let's check the map. . .

Had floodwaters breached a mainline levee during this year's record Mississippi River flooding, detailed maps would have shown what would flood, how quickly and in what order— providing emergency crews a literal rescue road map. At the same time, daily crest maps used National Weather Service forecasts to show what would be getting wet, or not, even if all went exactly as planned.

The new inundation mapping came from the nation's Modeling, Mapping and Consequences Production Center in Vicksburg, Miss. The center regularly does analyses on the impact of a potential dam break. This spring, it went into real-time mode, using its extensive know-how for flood prediction.

While there was a technological learning curve, real flooding eventually matched closely what maps were predicting, said the center's Katy Breaux, and became a key tool for Corps officials, state emergency managers, utility companies, the Red Cross, nuclear power plants and others needing to plan for the worst.

Based on an inundation map prediction, one Vicksburg school district prepared to save its school by building a levee around it. Maps even showed volunteers how high to build the levee, giving them a distinct advantage over the waters that did indeed come. The building was saved.—K.S.

MY MISSISSIPPI

Lester Goodin, floodway farmer
Cape Girardeau, Missouri



"For us, the Mississippi River is as omnipresent in our lives as the sea is to a Fiji islander. There's a profound love for the river, and a profound anger at times.

"My family has farmed in the floodway for five generations. I have been farming it since 1972— corn, wheat, soybeans, milo— and of course never expected the

floodway to be operated. But by golly, it got operated, and... wow.

"I was very, very lucky. At my farm, the water got nine feet deep, but I was kind of in a backwater so I didn't get the erosion and massive scour that my neighbor a quarter of a mile away did. There were places that looked like the badlands of South Dakota, and that's no exaggeration, here on rich, flat land with soil as good as anywhere in the world. My father dealt with the 1937 flood, the only other time the floodway was operated. Everybody knew it could happen again, but it was going to have to be a flood of record, which we certainly got by 2½ feet.

"When I left for college, the last thing I ever wanted to do was farm. I wanted to go out into the world, and I was gone for 10 years. I went overseas, went to graduate school, worked for the government in Washington, for a newspaper in Memphis but, in 1972, I came home at age 28 to farm. I have never since then had a blue Monday. When you're a farmer, you never have existential doubts. It is just manifest that what you're doing is of central importance, feeding people, working with the soil, the land. Farming to me has inherent meaning.

"So when the floodway was detonated, sure, that was a hard Monday, but I never doubted what I'm doing with my life."

Não há mais enchentes! (No more floods)

A DELEGATION OF HIGH-RANKING OFFICIALS from Brazil toured the northern and southernmost ends of the Mississippi River late this summer, looking for ways to avoid disasters like that country's tragic mudslides which, in January, killed some 600 people in a mountainous region northeast of Rio.

Alexandre Navarro Garcia, Brazil's Executive Secretary for the Ministry of National Integration, the agency that promotes economic and social development and reduction of regional inequalities, said Brazil is looking for ways to improve its disaster response and prevention efforts.



Typically, Brazil has invested heavily in disaster response and helping with the resulting social events. How to prevent and mitigate disaster, however, was not part of the process. "Now," he explained during his New Orleans visit, "we're saying let's reverse the equation and eliminate the damage from disasters, with more prevention being part of the equation."

The group is the latest of several international delegations to express interest in modeling their own countries' systems after the Mississippi River and Tributaries Project, built after a disastrous flood in 1927. This year, that system was successful enough to stave off even a single death.

Says Charles Shadie, head of water control for the Mississippi Valley Division of the U.S. Army Corps of Engineers: "We've had a number of groups come and visit since the flooding, at least two from China, one from the Mekong River Commission. We've given them briefings on how the system performed, how we used floodways and other features to pass flood flows and not just rely on levee systems."

In Brazil, heavy January rains forced perilous evacuations of some 5,000 families. That put officials in an uncomfortable spotlight as the country prepares to host both upcoming World Cup (2014) and Olympic Games (2016) festivities. Corps officials guided the Brazilian delegation, which will visit other countries as well, around two main parts of the system. In New Orleans, the flood protection system centers around pumps, control systems and levees. Near Minot, N. Dak., overtopped levees forced thousands from their homes along the Souris River.

"We wanted them to see the vast difference as you take a watershed approach," said Scott Whitney, Regional Flood Risk Manager for the Corps' Mississippi Valley Division, "All the tools you apply here are not the same tools you apply there."

The delegation included officials from the Ministry of National Integration including Brazil's National Secretary of Civil Defense (that country's version of the U.S. Federal Emergency Management Agency). Joining them on tours of various flood control projects (including the Bonnet Carré Spillway, West Closure Complex Pump Station and Inner Harbor Navigation Canal Surge Barrier) were Joe Threat, Acting Executive Director of FEMA's Louisiana Recovery Office, along with New Orleans District Commander Col. Ed Fleming and representatives of local levee districts.

The visiting Brazilian officials said they would be examining civil defense and flood prevention systems in countries other than the U.S. but were also looking to build on a budding partnership with the U.S. Army Corps of Engineers. —K.S.

FROM THE PROJECT MANAGER

Scott Whitney, Regional Flood Risk Manager

Mississippi Valley Division,
U.S. Army Corps of Engineers



You're a leader of Operation Watershed Recovery. What is that in a nutshell?

It's basically assessing and repairing the Mississippi River and Tributaries (MR&T) system damaged during the historic 2011 Flood to ensure it is again able to provide the level of service and protection it has provided for the past 80 years. It comprises four carefully integrated components: damage assessments, a system performance evaluation, an Interagency Recovery Task Force and repair/restore construction projects. It is important to understand the MR&T is both a vital navigation artery for world trade and one of the largest and most successful flood-control systems in the world.

What makes this an especially challenging post-flood situation?

The geographical extent of the damage. There have been 11 or 12 major flood events since the MR&T system was put into place in the '30s. Never have we had this magnitude of damage. At the same time, this is not the only natural disaster that our country is trying to rebuild and recover from, given recent drought, wildfires, flooding, tornadoes and hurricanes. When combined with the ongoing economic struggles, it is likely the recovery process will span several years and leave our citizens, businesses and communities in a condition of prolonged risk.

What are you finding in the damage assessment process?

Since the day waters started to rise, the Corps and our partners have had boots on the ground assessing and documenting flood effects. As floodwaters recede, teams have been deployed to inspect, investigate and record damages to project areas. These teams have now largely completed this effort with careful documentation that characterizes the location, nature, extent, repair alternatives and preliminary repair cost estimates for hundreds of damaged areas. In early August, a Phase I prioritization was conducted to rank order the most critical "repair" areas, and that identified nearly 100 projects with an estimated repair cost of some \$800 million. Currently, we are completing a similar ranking of several hundred "restore" sites. That additional cost will be in the \$1.2 billion range.

Are bigger system changes being looked at?

We're evaluating a complex array of possible site-specific and systemic modifications that would likely have positive impact on future performance and functionality of many MR&T system components. It is still a bit premature to presume which of these will progress given the ongoing data collection and evaluation process.

You also help to lead an Interagency Task Force. What is the importance of collaboration in a project like this?

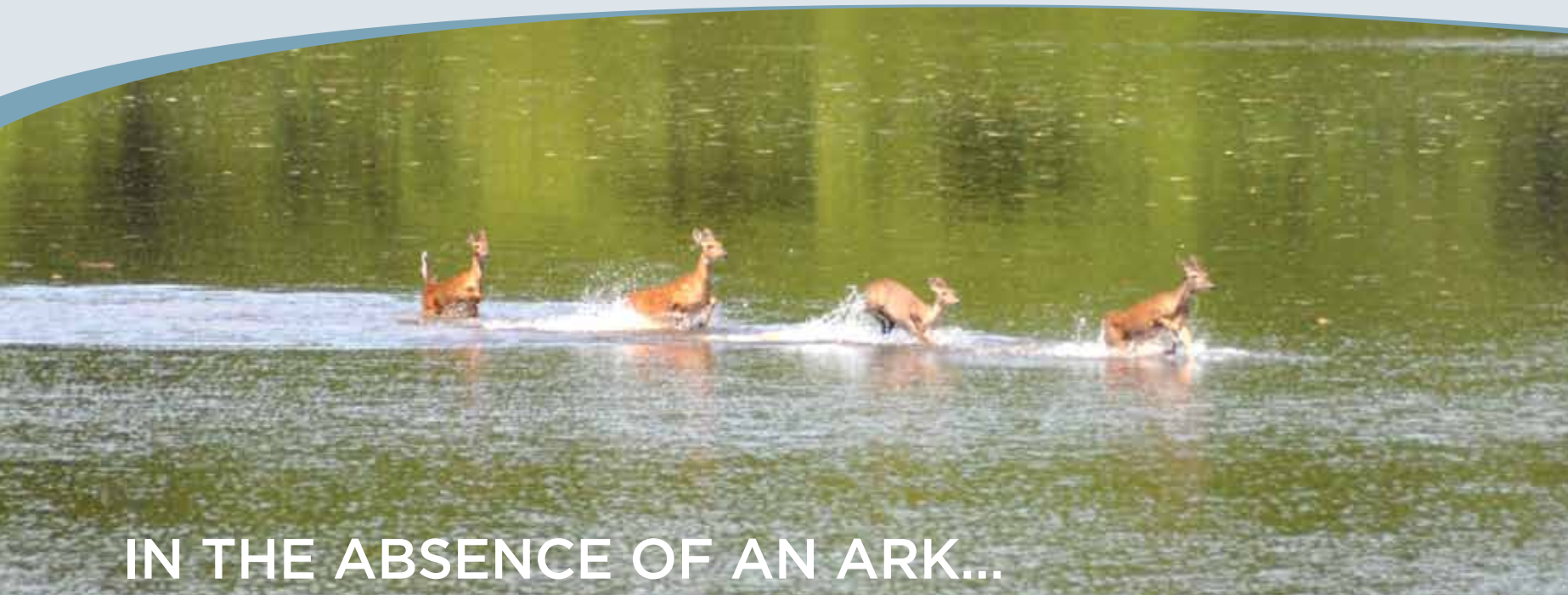
The MR&T system was established in response to a national catastrophe. Only through states, agencies and levee boards coming together and speaking with one loud voice on the national level were we able to achieve the creation of the MR&T system, and that's the only way we'll be able to rebuild it. The Corps invited seven states and 10 federal agencies to set priorities and plan a comprehensive approach to restoring the flood protection system. All share a responsibility in the recovery efforts, and by pooling resources, talents and expertise, the task force can focus on key elements that protect the lives and livelihoods of millions of Americans as we prepare for spring floods.

Is the American public well informed about flood risk and consequences?

That's a pretty definitive no, but they're getting there. I think most people don't think about a flood until it's upon them. Effective flood risk management requires the integration of mitigation planning, preparedness, response and recovery programs and activities into a coordinated flood risk management "life-cycle" framework. The Corps flood risk management program is focused on ensuring our programs and authorities and those of our federal, state, local and tribal partners are coordinated so that our combined actions achieve more effective awareness and management of the inherent and preventable flood risks. At the end of the day, Mother Nature will grade the success of our collaborative efforts during future flood events. —K.S.

DID YOU KNOW?

During the 20th century, floods were the number-one natural disaster in the United States in terms of the number of lives lost and property damage.



IN THE ABSENCE OF AN ARK...

Scientists use variety of tools to reduce flooding

impacts on wildlife and water

When the U.S. Army Corps of Engineers opened the Morganza Spillway to give record floodwaters a place to go other than into the cities of Baton Rouge and New Orleans, officials worried about what was in the new path of the rushing waters—certainly small towns and wildlife aplenty.

The opening would for only the second time in the floodway's history flood the eastern part of Atchafalaya basin, the nation's largest swamp, with deer, bobcat, beaver, coyote, mink, armadillo and even the endangered Louisiana black bear. If they couldn't offer an ark, they could at least give the creatures a fighting chance by opening the spillway more slowly than was done in 1973. That year the outcome was "less than desired," said Bo Boehringer, press secretary for the Louisiana Department of Wildlife and Fisheries, while this year, wildlife impacts were minimal.

This time, he said, "It was a more controlled opening (of 25 percent capacity) so that rising water would alert the wildlife that it was time to move. Biologists have told me that for the most part, the wildlife moved out of the flood zone to higher ground. When the water receded, they went back home so to speak."

Wildlife officials did take precautions, preparing for supplemental feeding and even relocation of bears, if necessary, plus shutting traffic down near levees to reduce stress on fleeing animals. Fred Kimmel, assistant administrator for the wildlife division of the Louisiana Department of Wildlife and Fisheries, said he watched the mass exodus of deer hopping through floodwaters, even squeezing under fences, to get to higher ground atop the protected levee. But as many as 30 percent of deer, he estimates, didn't make it, mainly those in the northern reach caught in the middle of the five-mile wide, 20-mile long basin.

Virtually unaffected by the flood were the tree climbers, including the bears, the population of most concern initially. Only one adult bear is known to have died: It climbed atop a railroad track to rest and was hit by a train. Some bears were even observed swimming from high ground back into the water, Kimmel said.

The biggest remaining concern involves the fawns. The deer were displaced during their critical third trimester, and some babies may have been lost from the stress. To help the population more quickly rebound, the state has altered the hunting season in the area, reducing the primitive firearm season by seven days in November and making other changes. (FOR THE COMPLETE LIST OF CHANGES, SEE WLF.LOUISIANA.GOV/HUNTING/REGULATIONS.)

Snatching the sturgeon

Other lessons learned in previous floods were applied to the rescue of another endangered species, the pallid sturgeon. The Bonnet Carré Spillway was of particular concern for this ancient species of fish, more closely related to the shark than any freshwater fish.

Explains Dr. Jack Killgore, a leader of the Fish Ecology Team at the Corp.'s Engineer Research and Development Center in Vicksburg, Miss.: "This year, the spillway reached a peak discharge of over 300,000 cubic feet per second of water that created a huge side channel, sucking the sturgeon in with it since the water velocity exceeds their swimming speeds. But crews were ready, and preparation enabled them to save, collect, tag and return 20 pallid sturgeon and 78 shovelnose to the Mississippi River." (SEE RELATED STORY, PAGE 7).

Another species of concern was the dreaded Asian carp, for the fear of its further spread into other bodies of water. "One of the legacies of the

2011 flood is these carp getting into places we normally wouldn't find them," Killgore said. "Given the volume of water that went into Lake Pontchartrain, there's no telling how many carp came in with that water." He does believe, however, that the species is unlikely to establish a reproducing population there.

Oysters devastated again

Not faring well at all were oysters—including people who depend upon oyster harvest for their livelihood. The prolonged influx of fresh water from the Bonnet Carré Spillway, Mississippi and Atchafalaya Rivers was too much for many oysters to survive, and that compounded impacts still heavily felt from the BP Oil spill, according to officials like Olivia Watkins of the Louisiana Department of Wildlife and Fisheries. This year's situation is so dire that both Louisiana and Mississippi have sought disaster declarations for their oyster industries (and the blue crab industry in Mississippi), with officials estimating 85 percent mortality on the western Mississippi Sound commercial reefs.

Though the Mississippi oyster harvest is expected to be closed for dredging, there will be a limited season for tongers—oyster fishermen who harvest by hand with giant tongs. (SEE "MY MISSISSIPPI," PAGE 7)

Testing the waters

Experts feared the large volume of freshwater influx from the Bonnet Carré might cause similarly devastating effects to recreation and fish in brackish Lake Pontchartrain, where water quality monitoring continued through late September.

They were happy, however, about what didn't happen. Unlike after previous openings, no toxic mat of blue-green algae appeared, even though the huge amounts of nutrient rich river water entering the lake made it seem likely. Some citizens reported what they thought was a bloom, but it turned out to be huge swirls of duckweed—not pretty, but not toxic. "Nobody can really put their finger on why it didn't happen," said Danny Wiegand, an environmental engineer with the Corps' New Orleans District. "Weather always plays a factor. Maybe Tropical Storm Lee helped dissipate any blooms with all of its wind and wave energy."

Monitoring teams from the U.S. Geological Survey also surveyed for oil and grease in the Atchafalaya Basin, where spillway waters rushed over hundreds of gas and oil wells. Only a few samples showed any detection of hydrocarbons at all and they were at very low concentrations. Likewise, the Department of Environmental Quality found no oil sheen in monitoring fly-overs.

Some species of sport fish could potentially benefit from the added nutrients carried by the river water, suggests Dr. Barb Kleiss, Science and Technology Director with the Corps' Mississippi Valley Division, noting that the ecosystems of many of the areas are actually adapted to periodic flows from adjacent rivers. Environmental monitoring results and resulting suggestions for future spillway operations will be shared with a System Performance Evaluation Team, which is looking at continued ways to reduce environmental impacts during flood fights. —K.S.

ABOVE, FROM LEFT: *Deer leap through floodwaters toward higher ground within the Atchafalaya Basin; Duckweed covers part of the surface of Lake Pontchartrain after an influx of Mississippi River water; a USGS employee monitors water quality; a Louisiana Black Bear has found higher ground—in a tree.*



Dr. Jack Killgore holds an endangered pallid sturgeon.

TO THE RESCUE OF THE RIVER'S ANCIENT FISH

As others concentrated on the safety of people lying in the path of Mississippi River floodwaters, Dr. Jack Killgore was leading a rescue operation for fish—specifically the endangered pallid sturgeon.

The worry was a series of spillways opened to relieve pressure on the main river levees. When one, the Bonnet Carré, was last opened in 2008, teams rescued 14 endangered pallid sturgeon that had gotten sucked into floodways and trapped. By some estimates, another 70 may have been carried into salty Lake Pontchartrain by the current and lost. That lake has high salinity, Killgore said, and is potentially life threatening for the ancient freshwater fish.

When the spillway was opened this year, he and others from his Corps fish ecology team and the Louisiana Department of Wildlife and Fisheries were ready.

"As soon as the structure is closed, and water begins to recede, it dries up quickly, fish are concentrated, and we're able to catch them with electrofishing gear, gill nets, cast nets," he said.

His team will make recommendations to the System Performance Evaluation Team as to what potential operational changes might increase the sturgeon's chances of survival. Overall, things worked impressively according to plan, with more fish rescued than in 2008, Killgore said, although a slower closing of the spillway gates could be helpful.

This year, the water dropped back in a day or two, compared with a couple of weeks in 2008—which meant more stranded fish, he said. "But we were ready. We had training in 2008, you could say." —K.S.

MY MISSISSIPPI

George Storrs, 63, oyster tonger, McHenry, Mississippi



"A tonger, he doesn't catch the oyster with a dredge, which is a big mechanical device you use with a boat. He uses a long stick with a pivot and a big head on the bottom, and these heads have teeth on them. You gather up the oysters, close the rakes and bring 'em up and dump them in the boat onto a culling board.

It's there so you can go through the oysters, pile them up 'til you figure you have a sack or so. You can't take anything under three inches.

"These days, since that fresh water hit us (from the opening of the Bonnet Carré), I think 65-70 percent of the tonging reef, of our large oysters, they're dead. The percentage left we could make a little money with. But it's not going to be a glory year. It's going to be hard, hard to make a living. Shame on me for not being a stockbroker, but this is what I do.

"It was terrible after the hurricane. We had to replenish these reefs. All the areas that got devastated were areas we could harvest off of. Areas closed due to water quality seemed to be just fine. They let us go into other areas, and we loaded thousands of sacks. They broadcast them back onto the reefs—dredging reefs and tonging reefs. After that, it was pretty good for a couple of years, and then there was the big scare with the oil deal.

"I started doing this 36 years ago. I saw these boats working out there way back in the early '70s and thought, 'Shame on me if I'm broke and hungry if I can at least go out and go fishing.

"In a good year, I can make \$50,000, which is fair. If I get \$10,000 or \$12,000 out of it this year, it'll be a miracle, but I'm going to do it anyway. It's terrible important to me. No -- it's wonderfully important. I can see the sun every morning. Some mornings you can see a full moon going down when the sun comes up, and that is a fabulous experience. It's something 99 percent of people on this earth don't get to see.

"If I had to do it all over, I'd still do it, even with years like this one."

Is it the Upper River's turn for more flood protection?

THE UPPER MISSISSIPPI RIVER SYSTEM doesn't have a unified flood protection project like the lower river does with the Mississippi River and Tributaries Project. At least not yet.

The foundation is being laid through the Upper Mississippi River Comprehensive Plan. Authorized by Congress in 1999, the plan is being developed through a comprehensive, system's approach requiring collaboration of federal and state agencies, local communities, non-governmental organizations and landowners.

Unlike the MR&T lower river system, the upper river basin project would be funded through multiple public and private sources, not just the federal government. But it represents a big step forward, participants say, and an ambitious undertaking.

The project area covers the entire basin north of the confluence of the Mississippi and Ohio Rivers at Cairo, Ill., a region with a population of 13.4 million. But there's strong motivation behind it: the Great Flood of 1993, which resulted in 47 deaths, the evacuation of 72,000 homes and at a cost of \$15 billion in direct damages, but with another \$19 billion in damages prevented by existing flood-control features.

One objective is to raise the height of most levees north of St. Louis, all through local funds. Other elements of the project are targeting critical transportation infrastructure and the Mississippi River tributaries.

"We're still fine tuning some elements, but our goal is to have a design or levee system that's able to convey a major flood like 1993 through the upper valley and not create extensive damage," said Mike Klingner, vice chair of the Upper Mississippi, Illinois and Missouri Rivers Association.

That group has been working toward a unified system since 1954, when it formed following the year's Flood Control Act, to help oversee aging levees built in the 1880s through 1920 by local levee and drainage districts, Klingner said. After most Upper Mississippi River levees failed in 1993, the group brought in consultants from the Netherlands—a country well familiar with levee systems—to create a concept for unifying flood control, navigation and environmental interests, ideas eventually worked into the comprehensive plan.

Congressional authority directs the Corps to make recommendations on management plans and actions relating to water resource and related land resource problems and opportunities that would reduce systemic flood risks. Consideration, says Chuck Spitzack, Corps' Program Manager for the Upper Mississippi River Comprehensive Plan, will be given to structural and non-structural flood control and floodplain management strategies, continued maintenance of the navigation project, management of bank caving and erosion, watershed nutrient and sediment management, habitat management and recreation needs.



THE GREAT FLOOD OF 1993
47 deaths
72,000 evacuated homes
\$15,000,000,000 in direct damages
\$19,000,000,000 in needed levee repairs

ABOVE: *The Great Flood of 1993, with the Mississippi River out of its banks in Alexandria City, Missouri.*

The Corps initially investigated the possibility of a federally funded system for the Upper Mississippi and Illinois Rivers. While none of the eight examined alternatives met the national economic requirements for a federally constructed project, the need and interest in a comprehensive approach remains, he said.

Current efforts include furthering work on a flood risk management plan for the Upper Mississippi and Illinois Rivers; investigating the need for protection of critical transportation infrastructure like roads and bridges; investigating reconstruction of existing flood damage reduction projects; and comprehensive watershed planning on tributaries of the Mississippi, Spitzack said. The plan would work with the MR&T system to ensure no project makes things worse for it. Although the focus is on flood risk management, the comprehensive, collaborative approach will integrate management for water quality.

The first tributary watershed to be studied under the plan is the Iowa-Cedar Rivers Basin. Spitzack hopes the project, headed by a collaborative Iowa-Cedar Rivers Basin Interagency Team representing some 20 organizations, can be a model for other tributaries on integrated water resources management. All share many similar challenges such as the fact that by the time water hits the flowing river, it's often already a problem, says Matt Fisher, Eastern Iowa Project Director for The Nature Conservancy. The Iowa-Cedar project team is looking for "win-win" situations such as planting new cover crops that could reduce flooding, improve water quality and provide farmers with another income source. Urban residents might incorporate more rain gardens and pervious pavement in construction projects.

"It's such a big watershed, it's a real challenge," he said. "We have to change the hearts and minds of thousands of people who make little differences every day that can lead to big things." —K.S.

ARRA FUNDS HELPED RESIDENTS KEEP TRAVELING MID-FLOOD



ABOVE: *Newly raised Highway 67, flood-proofed through ARRA funds.*

As rains pounded Southeast Missouri and filled the Wappapello Lake reservoir to its highest level in history, traffic flowed as usual on nearby Missouri Highway D and U.S. Route 67, upstream of the dam. Historically impassable when water is high, traffic was able to move during a record flood only because of recent improvements made through the American Recovery and Reinvestment Act, according to Cindy Jackson, operations manager for Wappapello Lake.

The U.S. Army Corps of Engineers received \$16 million to raise Highway 67 to a safer level through the recovery act, initiated by President Barack Obama in 2009 to stimulate the economy. In this area, it additionally allowed for safe travel from Poplar Bluff to St. Louis and beyond as floodwaters rose.

"The newly raised lanes opened only weeks before the flood and, without that work, Highway 67 would have been impassable at Greenville and Otter Creek south of Greenville," Jackson said.

A second ARRA-funded road construction project at the East Fork of Lost Creek on Highway D-5 allowed people who lived on the other side of the creek to get around by bridge—not boat. The entire project, which will raise the height of the highway, has not been completed, but early improvements kept residents from being trapped by floodwaters.

ARRA projects additionally helped reduce the length of flood recovery. ARRA work at popular Peoples Creek Campground (visited by more than 1.5 million people annually) made it easier for campground officials to recover following inundation of some 40 feet of water. The campground is designed to flood, but Jackson said the ARRA-funded improvements helped with drainage, structures and utility work, made recovery quicker and reduced impact to campers.—M.M.

1993 FLOOD: ANDREA BOOHER, FEMA NEWS PHOTO.

Incoming commander, Maj. Gen. John Peabody

It's not a *bad* thing to be remembered as the person who helped keep Asian carp from the Great Lakes, Maj. Gen. John Peabody says, and he's confident that'll be the case. (His going-away present, as he leaves command of the Corps' Great Lakes and Ohio River Division for the Mississippi Valley Division, was in fact a blown-glass carp). He just hopes that's not his only legacy.

"The real challenge for the Corps in this region is the deteriorating infrastructure and our inability to maintain it to the standards we need to," he said.

The Lakes and River Division is particularly heavy in infrastructure; the replacement value of its many navigation locks, flood control dams, reservoirs, hydropower plants and other features is estimated at \$80 billion.

During his tenure there, he developed a rigorous system for tracking needs—keeping detailed data on unplanned closures, tracking deterioration trends over time and setting resulting priorities—so that in a time of particularly limited federal resources, precious funds go where the need is greatest.

Similarly, to optimize efficiency and effectiveness across the region, he worked to apply a concept more typically used in military campaign design.

Outgoing commander, Maj. Gen. Michael Walsh

Maj. Gen. Michael Walsh thought he'd maybe get to fit in a little rest when the U.S. Army Corps of Engineers transferred him from Iraqi battlefields four years ago to a stateside post along a historic stretch of the Mississippi River. He's still waiting.

During his tenure at the Mississippi Valley Division, Gen. Walsh led the region through five major river floods—including the worst on record, one resulting in not a single death or levee break. There was also the two hurricanes and the need to complete the largest design-build construction project in the country's history. The price tag for the Hurricane Storm Damage Risk Reduction System for New Orleans alone was \$10 billion, roughly twice the division's regular annual budget.

He's now trying to get a massive flood control system put back while a key Congressional goal is massive budget reduction.

In the midst of it all, how does a general decompress?

"I'd say in Army parlance, you have to take a knee," he said. "When I take a knee, I go back to the house and read." Currently in his stack is a biography

MEET THE GENERALS



Maj. Gen. John Peabody, far left, takes command of the Corps' Mississippi Valley Division Nov. 10, when outgoing commander, Maj. Gen. Michael Walsh moves to Washington to be the Deputy Commander for Civil and Emergency Operations.

This included putting certain districts in charge of given specialty areas. So, for example, the Huntington District, Huntington, W. Va., will take charge of dam safety design and review.

Other successes have been Great Lakes cleanup projects and Asian carp prevention. He was part of the effort that built a solid interagency team unified under a single purpose, he says: preventing Asian carp from making its way into the Great Lakes and researching/applying many methods to attack carp as an organism.

As he prepares to move his family to Vicksburg, Miss., he says he's looking forward to experiencing the region's rich culture and history—which includes some of history's most brilliant military campaigns—as well as its food and recreation, and also to meet his new team.

"If you don't have balance, this job can eat you up," he said. "The thing that gives me great comfort is the fantastic professionals we have throughout the Corps. Everywhere you go, they're wonderful."

The way the Mississippi Valley Division has built many inter-agency teams is also impressive, he said. It's extensive collaboration with other agencies, federal and NGO, states and local governments on environmental issues, he says, is as well-developed as anywhere in the Corps.

He knows that one of the top missions for MVD is to gain a clear understanding of the damages from the 2011 flood and to manage limited resources to repair the damages from the historic flooding.

Finishing the hurricane damage risk reduction system will be another top priority, he says, as will Louisiana coastal concerns. As a current member of the Mississippi River Commission, he has a strong working knowledge of the watershed, and he's already heard public hearing testimony from some of those most affected by the flood.

"Every month and every day of the year is actually a potential flood season," he said. "You can't take it for granted that you won't get flooded when it's not flood 'season.' I have a certain sense of urgency about the whole thing. There's no question that if we have a similar weather event today as we had in April and May, we would have greater impacts to our structures because they already are damaged."

of Teddy Roosevelt, two about battles in the Pacific, another— *The Gamble*—about the war in Iraq, several others about the world water crisis—all dog-eared, highlighted and underlined. "Then I get off the knee and keep moving."

Water's an issue he plans to keep moving on. The nation undervalues its water resources and infrastructure, particularly in the middle coast, he says, whether you're talking about drinking water, navigation needs, flood control, hydropower or the ecosystem, he says.

"I've been assigned to many different places, to two combat areas. Getting a canteen of water in some places is very challenging. At home, I open up the tap. That's not the case all over the world."

One of his achievements at the Mississippi Valley Division has been to move forward the thinking of water resources as a system—that done mainly through his 200-year vision campaign for the Mississippi River Watershed (the world's third-largest). He envisions a national map with circles around each key watershed, newly-formed compacts or commissions each working on the issues inside.

"Water quality and quantity, power, hydropower, hypoxic zones— those are all issues we know are on table and can be resolved if we start working the policy issues now and start the science and engineering afterwards."

While at MVD, he says he moved the division to more regional than district-specific thinking, launching inter-district sharing of resources, bringing together the best in a given area to work on a project. Another success is what he calls the great untold story of the "white-knuckle" 2011 flood: that not a single life was lost.

"A lot of good people were paying attention to details," he said, "and it worked."

As he moves on to take a high-level post as the Corps' Deputy Commanding General for Civil and Emergency Operations, he hopes to continue the discussion, nationally, on system thinking and investment. That would include systemic flood control projects, among other issues.

"I was asked at a meeting this week what my thoughts are about my new job," he said. "My response was I was too busy working my current job— Tropical Storm Lee; flood damage, problems in Minot, North Dakota, navigation chokepoints, with three areas of the Mississippi River now closed for navigation. It's been more than enough to keep me going intellectually."

One Trunk with Many Branches

Complete the map and create a legend:

1. Highlight the Mississippi River in blue and then label it on your map. Add a blue dot where the Mississippi River begins. Start your map legend by adding a blue line and labeling it "Mississippi River."
2. Label the states along the Mississippi River on your map.
3. Using a different color for each river, highlight and label the major tributaries of the Mississippi River and add them to your legend.
4. Label the major cities located at the confluences on your map.
5. Which major tributary of the Mississippi River is closest to your home?

6. What is the importance of tributaries in terms of migration of people, wildlife, and goods?



Legend

Reprinted from *Our Mississippi: Educational Activities about the Upper Mississippi River for Grades 5-6*. Teachers may order booklets and CDs with printable activity sheets by visiting OurMississippi.org.



MY MISSISSIPPI

Suzy Heck, 64, founder of Heckhaven Wildlife Rehabilitation Center in Lake Charles, Louisiana

When they opened the spillways, the rising waters threatened the breeding ground of ospreys. Ospreys are raptors, like eagles, that feed mainly on fish, and nest in the very tops of cypress trees. The water was so close that alligators could swim by and snatch the babies or the eggs for lunch. So a few people from state and federal wildlife agencies, as well as some volunteers, went out in boats in late May to gather what they could from six nests on Cow Island (about 40 miles southwest of Baton Rouge). They brought me three eggs and 13 baby osprey, some only a day old. Those babies are ugly! Long necks, no feathers— they look like dinosaurs.

Unfortunately, the eggs didn't make it, and we lost the four weakest babies. But we fed the others ground-up fish with tweezers, then moved them outdoors with Phoenix, our resident osprey, who helped us raise those babies, teaching them how to tear up fish and how to flap their wings to fly.

By July and August, we were able to release back to Cow Island eight of the osprey, hoping their parents take them back to teach them how to dive from the sky for fish. One injured a wing on the drive over, so we'll keep him until spring. Saving nine osprey may not sound like much, but every animal has a purpose and a place in our world. —S.A.



OUR MISSISSIPPI TRAVEL



Catch the Great Bird Migration

The Riverlands Migratory Bird Sanctuary is a popular autumn stopover for birds like white pelicans, great egrets, trumpeter swans, great blue herons. And it has just gotten better for nature tourists who want to (comfortably) watch the graceful spectacle.

The Audubon Center at Riverlands (301 RIVERLANDS WAY, WEST ALTON, MO.) held an October grand opening of its newest center, a focal point for the group's extensive research and outreach work on the Mississippi River. Architecturally designed to resemble a nest, the center offers watching through 20-foot glass windows situated to maximize bird sightings in places like Ellis Bay, notable for its year-round raft of the impressive white pelican.

Wondering why so many birds call this place home—on a permanent or temporary basis? Interactive displays talk about why this spot near the confluence of the Mississippi, Missouri and Illinois Rivers is so important to the some 350 species who use the Mississippi as a flyway.



Riverlands Migratory Bird Sanctuary

The center also shares a home with the National Great Rivers Museum and its popular tours of the Melvin Price Locks and Dam. There, one of the most unexpected sights may be a great blue heron or white pelican lounging alongside a massive tow.

USA Today has called Riverlands and the new center one of the nation's top 50 places to watch birds, and it's never better than in autumn, when migration season is closely followed by the spectacle of hundreds of bald eagles looking for areas of open water come winter.

Electronic kiosks help visitors identify birds by sight, sound and location, and outdoor observation decks and new trails ease the exploration of Riverlands' 3,700 acres. The eco-friendly center, which has earned silver LEED status, will reuse rainwater from the roof, and its landscaping has been designed to draw birds closer for a more intimate birding experience.

- If you go, watch for:
- A mix of shorebirds stopping to rest midway from their Canadian breeding grounds to winter homes in South America, including the American golden plover and various species of sandpiper (mid-October).
 - The arrival of trumpeter swans, as many as 600 and particularly prevalent in Ellis Bay and Teal Pond (early November), and other waterfowl that drift in between mid-October and February.
 - The return of the eagles, from December through February. Big Muddy Adventures offers a novel viewing vantage point, leading paddling trips in partnership with the center through the not-quite-frozen waters in and around Riverlands. 2MUDDY.COM

FOR MORE INFORMATION, GO TO: RIVERLANDS.AUDUBON.ORG. —K.S.

Catch the Great Towboat Migration

Not as romantic as paddlewheelers nor as zippy as power boats, towboats are such workhorses of the Mississippi River that they don't get a second look very often.

But Pamela Eyden, author of *The Little Tow-Watcher's Guide to Towboats and Barges on the Upper Mississippi*, says the more you watch, the more interesting they become, and the better connected you'll be to the river and its issues.

Eyden's towboat fascination began the first time she stood at a visitor platform and watched a towboat approaching a lock. When the front three barges inched forward into the lock chamber, they cleared the lock walls by just two feet in what she now dubs "an elephant ballet."

She says: "A lot of us do well to steer a car into a garage with that much clearance. Whoever was piloting that towboat had come from the open river, where the currents are contrary and a stiff wind was blowing, and had pushed a 105-foot-wide tow as long as four football fields into a 110-foot-wide lock, without bumping a thing."

A newcomer to a river town, the avid bird watcher started taking a closer look, especially when towboats passed at night, searchlights swinging. Soon after, the idea of a tow-watching book modeled on bird watching guides was born. Tow watching, she found, has a distinct advantage: the boats move a lot more slowly than birds and pass with their names boldly printed upon them.

To make your experience more fun, Eyden suggests watching by:

- **Towboat names**, which are often exotic (*Lady Potasa*, *Crimson Glory*, *Sierra Dawn*), majestic (*Cooperative Vanguard*), hopeful (*Prosperity*) or just odd (*Fogilphol*). Many are named for honored captains.

- **Company logo**, usually a big graphic on the smokestack, easily identifiable. Just a few decades ago there were lots of small shipping companies, each with a few towboats that have since been absorbed into big companies. All towboats on the river are licensed to U.S. companies; you won't find a Liberian flag on a Mississippi River towboat.

- **Decks**. If a towboat has three decks, the pilot house will be at the top, with captain's quarters nearby. Some of the crew will be housed on the second deck. The galley (kitchen) is on the main deck, along with the dining room and lounge. Most crew work six hours on, six hours off, around the clock, seven days a week.

- **Cargo**. What type of barges is the towboat pushing? If they're covered, box-like barges they may be loaded with corn, soybeans, coal or salt. Low-slung tanker barges may be carrying anhydrous ammonia or petroleum products. Are they riding high in the water or low? High-riding barges are probably empty and often catch the wind, making them harder to maneuver. —K.S. & P.E.



The Little Tow-Watcher's Guide to Towboats and Barges on the Upper Mississippi is available at river bookstores or bigrivermagazine.com. The best close-up views are from observation platforms along many river dams. To see what's headed your way, check: www2.mvr.usace.army.mil/omni/webprts/omni_vl/river_lock.cfm.

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News Briefs



Leave only footprints. . .

The U.S. Army Corps of Engineers is partnering with the Leave No Trace Center for Outdoor Ethics, a non-profit organization formed to promote proper use of public lands while minimizing negative impacts. One of the organization's training workshops was recently

held at Hickory Ridge Wilderness Campground, a popular Corps camping area at Iowa's largest lake, Lake Red Rock. This hike-in, paddle-in rec area is best known for its oak-hickory forest and primitive accommodations. (FOR MORE: LAKEREDROCK.ORG)

Ranger Amy Schmitt attended the training on sustainable use of public lands. Among other things, the center suggests visitors to public lands:

- Plan ahead and prepare. Repackage food to minimize waste and stay in small groups when possible.
- Travel and camp on durable surfaces, using existing trails and campsites. Keep campsites small and at least 200 feet from lakes and streams.
- Pack waste (including toilet paper) in and out and use small amounts of biodegradable soap for dish washing.
- Leave what's found. Don't touch cultural or historic artifacts or even natural objects like rocks and plants, and avoid transporting non-native species.
- Use a lightweight stove for cooking and a candle lantern for light. Fires, if used, should be kept small and burned down to ash.
- Respect wildlife and other visitors, observing wildlife from a distance. Never feed animals. Let nature's sounds (not loud voices or noises) prevail.—K.S.

Cause for celebration: Model program restores 100,000th acre

The Upper Mississippi River Restoration-Environmental Management Program celebrated its 25th anniversary— and 100,000 acres of restored river ecosystem— on Sept. 23 at a Rock Island, Ill., event attended by Jo-Ellen Darcy, Assistant Secretary of the Army for Civil Works. The program was authorized as part of the Water Resources Development Act of 1986, in which Congress recognized the Upper Mississippi River as both a “nationally significant ecosystem and nationally significant commercial navigation system.” It was the first national program to combine ecosystem restoration with scientific monitoring and research efforts on a large river system and has led to many improvements in river health and system understanding. EMP works across five states— Iowa, Illinois, Wisconsin, Minnesota and Missouri— and as a collaboration between multiple agencies. —H.M.

FOR MORE: MVR.USACE.ARMY.MIL/EMP/

From swamp animals to Po-Boys

Nobody throws a party like New Orleans. Where else would you find a month of festivals honoring Louisiana swamp animals, William Faulkner and the Po-Boy? The Swamp Festival's held annually at Uptown's Audubon Zoo, where visitors can learn Cajun dance moves, eat gumbo and commune with creatures from the swamp— all at the same place (AUDUBONINSTITUTE.ORG). A literary feast follows, Nov. 9-13, with the annual “Words and Music: A Literary Feast in New Orleans” event headquartered at Faulkner House Books, whose owners also head the Pirate's Alley Faulkner Society. The festival features writing seminars and competitions, readings, live concerts, more (WORDSANDMUSIC.ORG). Top the month off with the Po-Boy Preservation Festival, where you'll learn the history of the iconic sandwich— and find samples from more than 40 restaurants (POBOYFEST.COM). —K.S.



KIM SCHNEIDER.

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This newsletter is a quarterly update of ongoing efforts in the Upper Mississippi River Basin and does not necessarily reflect the views of the U.S. Army.

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