

Our Mississippi

PARTNERING TO KEEP
AMERICA'S RIVER GREAT

SPRING '11



Holding an invasion at bay

Multi-front 'war' aims to stop invasive species spread

HEAD TO THE INVASION FRONT of one of the country's most heavily publicized battles, and you'll find seasoned fishermen, muscles honed from long days hauling net-loads of massive, wriggling Asian carp.

For much of the coming month, government-funded crews will be hauling the voracious eaters, several tons at a time, with the goal of clearing as many as possible from the Illinois River, and as quickly as they can, before the fish can spawn.

Nearby are the scientists. On any given day, biologists like Kelly Baerwaldt of the U.S. Army Corps of Engineers can be found implanting the invasive silver and bighead carp with special tracking devices to monitor their movements or sampling the water column to see if their DNA has spread to new locations.

In all, the Asian Carp Regional Coordinating Committee has initiated some 45 projects funded with more than \$50 million in federal resources. The intent is to halt the potential spread of these two species of Asian carp from the Mississippi and Illinois Rivers before they can reach the Great Lakes and potentially destroy the prized fishery. Nearly \$50 million more is budgeted for the coming year.

At the same time, the Corps is moving forward with a groundbreaking study designed to find a permanent solution. The study's goal is to stop not just Asian carp—but dozens of other invasive fish, algae, water fleas, snails and more—from spreading into one basin or the other and wreaking potential environmental and economic havoc.

"The scope is monumental," John Goss, the Asian Carp director at the White House Council for Environmental Quality said of the Corps study. "It will change the ballgame in invasive species management and will make a huge difference for the whole country. And a lot is riding on it."

On the front lines

One of the more visible study leaders is Dave Wethington, the project manager for the Corps' Great Lakes and Mississippi River Interbasin Study (GLMRIS). He's spent the last three months traveling the Midwest with other Corps leaders and "Carp Czar" Goss, soliciting public ideas for halting an epidemic of aquatic invasive species.

In all, he and others visited 12 cities and heard from some 180 speakers, collecting the thoughts of many others on study websites and social media outlets. What did they hear?

"A big call for action," Wethington said.

Over the years, more than 180 invasive species have been introduced into the Great Lakes, mostly through the ballast water of ocean-going ships. Dozens of those, including the sea lamprey and the zebra and quagga mussels, have subsequently spread into the river system and beyond, crowding out native fish, clogging water intake structures and causing untold damages. Some estimates put the economic cost to the country of all invasive species at over \$120 billion a year.

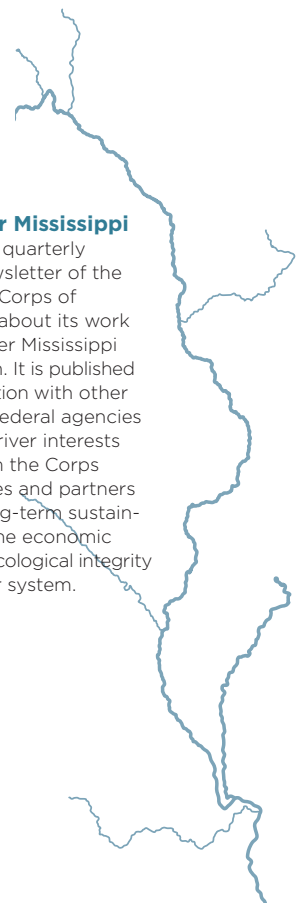
The most unusual and exciting part of GLMRIS is its potential, Wethington said.

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Our Mississippi

is a quarterly newsletter of the U.S. Army Corps of Engineers about its work in the Upper 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.





TOP, LEFT TO RIGHT: Project managers Mike Saffran, Dave Wethington and Col. Vincent Quarles take notes during a public hearing in Traverse City, Mich., for the Great Lakes and Mississippi River Interbasin Study. More than 100 people attended this one of 12 public meetings held throughout the study region. BOTTOM: Kelly Baerwaldt, a research biologist with the U.S. Army Corps of Engineers, holds a silver carp caught during monitoring.



Follow the progress through the study website, glmr.is.anl.gov, or via [Facebook.com/glmris](https://www.facebook.com/glmris) or [Twitter@glmris](https://twitter.com/glmris). Also, find a timely look at ongoing federal Asian carp control efforts at asiancarp.org.

"You're looking at direction from Congress to address not just a single species but all aquatic nuisance species and to prevent their establishment," he said. "In theory, we could be preventing the next zebra mussel."

The study's initial phase focuses on the current battle hot spot, the Chicago Sanitary and Ship Canal. More than a century ago, the canal created a link between the lake and river basins as a way to reverse the flow of the Chicago River and keep waste from flowing into Lake Michigan. It's through that link that many invasives have spread and where the Corps has now placed a

The Asian Carp Regional Coordinating Committee is going to war against what John Goss calls "one crazy species of fish."

series of electric barriers to prevent further spread of invasive fish. A concurrent GLMRIS project focuses on the closing of potential basin connections over some 1,500 river miles.

The team will review public comments as a way to further refine the scope of the \$25 million study, slated to run through 2015 and touch a portion of 31 states. In the meantime, the Asian Carp Regional Coordinating Committee is going to war against what Goss calls "one crazy species of fish."

Scientists are studying potential biological and genetic controls that include interference with the digestive or reproductive systems. Selectively toxic chemicals are being explored as river blockage tools like hydrocannons or so called "disco barriers" of noise, lights and bubbles.

Much of that research is being conducted at the U.S. Geological Survey's Columbia Environmental Research Center in Missouri, the home base of one of the country's pre-eminent Asian carp specialists, Duane Chapman. Chapman sees potential in much of the work, even though the fish continue to grow and reproduce at alarming rates.

"When it comes down to it, we're smarter than fish," he said. "Some things are really difficult to control regardless of how smart you are... We'll be stuck with zebra mussels for a long time. The carp are a more advanced organism in terms of behavior. They have Achilles heels we can exploit."

Commercial fishermen bring the weapon of mass consumption to the attack. It's hoped that establishing incentive for people to catch, and eat, the fish will reduce pressure the Great Lakes and the more northern reaches of the Mississippi. Carp are not yet established north of Lock and Dam 19 near Keokuk, Iowa, says Rob Maher, commercial fishing project manager for the state of Illinois, and more commercial fishing of carp could also keep the more northern reaches of the Mississippi from becoming overrun.

Meanwhile, Corps biologists are working the invasion's leading edge. Biologist Baerwaldt is the monitoring team leader of the National Regional Asian Carp Monitoring and Rapid Response Work Group. For her, the work has been an interesting ride, from an appearance on the National Geographic Channel's *Monster Fish*, to a cheekbone fracture from a leaping silver carp. Even more interesting, she says, has been the work itself.

As the leader of the carp telemetry project, she implants the fish with a tracking system that monitors their progress toward the Great Lakes, a project for which they're now upgrading receivers to the best of their kind in the world. The team's also turning to the Corps' Engineer Research and Development Center to further refine the use of environmental or DNA to determine the presence of carp in the water system and better check their advance.

"We're using groundbreaking, innovative technology," she said. "The barrier is the first of its kind in the world in terms of magnitude. And GLMRIS continues to build on Corps efforts, looking to the future of aquatic invasive species control. This may offer the first chance in history to stop an invasive species—maybe many—before they spread."—K.S.

RISKY RIVER INVASIVES

There are some potentially devastating troublemakers knocking at the door of the Mississippi River—29 to be specific.

A list of 38 invasive species that are established in either the Great Lakes or the Mississippi River, but not in the other, have been narrowed from an initial list of more than 250 through the Great Lakes and Mississippi River Interbasin Study (GLMRIS). The next study step is a hunt for potential solutions to stop their spread.

While Asian carp pose the highest imminent risk, they're not the end of the invasive species story, says Dr. Reuben Keller, a lecturer at the University of Chicago's Department of Environmental Studies and author of a book on invasive species bio-economics.

Among the most worrisome are floaters like the water chestnut or fishhook waterflea, both carried from Eurasia in the ballast water of ships. Such species are likely to drift right past the electric barriers that have so far done a good job at holding invasive fish at bay. Others like the water chestnut could potentially "short circuit" the river ecosystem by preventing light from getting into the water column; they've wreaked havoc in similarly temperate systems like the Hudson River. Likewise, the bloody red shrimp, also now in the Great Lakes, has devastated European rivers like the Mississippi.

Invader	Latin name	Method of spread
Scud	<i>Apocorophium lacustre</i>	ballast water/sediment
Skipjack herring	<i>Alosa chrysochloris</i>	swimmer
Silver carp	<i>Hypophthalmichthys molitrix</i>	swimmer
Bighead carp	<i>Hypophthalmichthys nobilis</i>	swimmer
Inland silverside	<i>Menidia beryllina</i>	swimmer
Black carp	<i>Mylopharyngodon piceus</i>	swimmer
Dotted duckweed	<i>Landoltia/Spirodela punctata</i>	rec. boating/trailers
Marsh dewflower	<i>Murdannia keisak</i>	rec. boating/trailers
Cuban bulrush	<i>Oxycaryum cubense</i>	rec. boating/trailers

Mississippi River to Great Lakes

RISK OF SPREAD

Great Lakes to Mississippi River

Invader	Latin name	Method of spread
Red macro-algae	<i>Bangia atropupurea</i>	ballast/rec. boating
Algae	<i>Cyclotella cryptica</i>	unknown/any water
Algae	<i>Cyclotella pseudostelligera</i>	unknown/any water
Grass kelp	<i>Enteromorpha flexuosa</i>	ballast/rec. boating
Diatom	<i>Stephanodiscus binderanus</i>	ballast water
Tubificid worm	<i>Branchuriscus sowerbyi</i>	sediment transport
Bryozoans	<i>Lophopodella carteri</i>	aquatic plants
Parasitic copepod	<i>Neogergasilus japonicus</i>	parasite to fish
Spiny waterflea	<i>Bythotrephes longimanus</i>	transport
Fish-hook water flea	<i>Cercopagis pengoi</i>	ballast/rec. boating
Water flea	<i>Daphnia galeata galeata</i>	ballast water
European amphipod	<i>Echinogammarus ischnus</i>	ballast water
Bloody red shrimp	<i>Hemimysis anomala</i>	ballast water
Copepod	<i>Schizopera borutzkyi</i>	ballast water
Blueback herring	<i>Alosa aestivalis</i>	swimmer
Alewife	<i>Alosa pseudoharengus</i>	swimmer
Northern snakehead	<i>Channa argus</i>	swimmer
Threespine stickleback	<i>Gasterosteus aculeatus</i>	swimmer
Ruffe	<i>Gymnocephalus cernuus</i>	swimmer
Sea lamprey	<i>Petromyzon marinus</i>	swimmer
Tubenose goby	<i>Proterorhinus marmoratus</i>	swimmer
European pea clam	<i>Pisidium amnicum</i>	ballast water
New Zealand mudsnail	<i>Potamopyrgus antipodarum</i>	ballast water
European fingernail clam	<i>Sphaerium corneum</i>	ballast water
European stream valvata	<i>Valvata piscinalis</i>	ships
Swamp sedge	<i>Carex acutiformis</i>	rec. boating/trailers
Reed sweetgrass	<i>Glyceria maxima</i>	rec. boating/trailers
Water chestnut	<i>Trapa natans</i>	rec. boating/trailers
Testate amoebas	<i>Psammobiotus spp.</i>	ballast water



Illustrations not to scale.



LEFT: Cattle graze a savanna near the Cedar River in Muscatine County. The Nature Conservancy is looking to bovines for help in eradicating invasive reed canary grass, a large, coarse grass that reaches two to nine feet in height. This grass reproduces by seed or creeping rhizomes, spreads aggressively and over time forms large monotypic stands of little use to wildlife.

As invasive reed canary grass grows in one tall, wet and unproductive blanket across the Swamp White Oak preserve in eastern Iowa, Matt Fisher worries about the higher quality habitat it's pushing out.

Just as people don't like moving through the soggy mass, neither do the turtles, salamanders and rattlers that inhabit the rare preserve. There's less food, too, for regular visitors like the cerulean warblers, sandhill cranes and red-shouldered hawks.

Could hungry cows be part of the solution?

Fisher, eastern Iowa director for The Nature Conservancy, thinks it's worth a try in the region's Swamp White Oak preserve. After all, if you think of the history of the Great Plains, grazing was long a means of keeping balance. Bison and elk once freely roamed areas like what's now a 654-acre preserve in the Cedar River valley.

Even wildfires and grasshopper epidemics helped keep plant communities in balance until population growth altered the natural cycle. The situation worsened when the prolific reed canary grass came on the scene. The deep roots and fast growth of this cool-season grass make it good for stopping

erosion, the original reason it was imported. But those roots crowd out native species, a real problem in preserves like this one. Some 320 plant species have been documented here, with the sedge-dominated understory accented by plants like wild petunias and trout lilies.

"In some places, there are acres and acres of it," Fisher said of the invasive grass. "Nothing uses it, very few things eat it, and it's hard to walk through... It's good for a couple of things, but it's bad for everything else."

Enter grazing, a concept that's grown in popularity among land use experts who find it a more sustainable use for floodplain land than row crops. Fisher's working with a few farmers to see how grazing might control the invasive grass, in combination with other eradication methods.

Goats have been used to control dogwoods and prickly ash, but big grazers like cattle and bison are better fits for this, particularly early in the growing season when it's tender (and tasty) and hasn't yet become a solid stand.

"If we can use grazing as a way to beat that grass down, treat it with herbicide and bring in native plants to help compete, over time, we may win that way. To date it's just my working hypothesis."—K.S.



Chefs battle carp with the fork

“DON’T UNDERESTIMATE THE POWER OF COOKING.” That’s the message shared by a Baton Rouge chef recently to a U.S. Army Corps of Engineers panel soliciting ideas on how to stop Asian carp from spreading from the Mississippi River system into the Great Lakes.

“These fish are laughing at us,” Chef Philippe Parola said in a New Orleans hearing. “But not for long because the skillet is ready, I guarantee.”

The “invasivore” movement is striking a chord nationally as environmentalists and business people alike seek ways to eat away the problem of invasive species, creating both a new health food source and potential jobs along the way.

Taking a page from Parola’s playbook, a Milwaukee chef has added an invasivore night to his regular tapas menu, featuring delicacies like carp cakes, smoked carp steak and carp napoleon. A Rockford physician’s taking scraps from fish filets being sent to China and creating a new powdered protein supplement. And an article in Middlebury College’s quarterly magazine recently highlighted Chef Richard O’Donohue’s “kitchen with a cause.”

The Michigan-born chef has served some 800 pounds of “Rock Island sole” (a reference to the Illinois city near where the fish were caught) in Indian dishes or a favorite potato, feta and carp casserole. Students were quoted as liking both the taste—and the cause.

But Parola doesn’t think a feel-good campaign is needed to restore the river’s natural balance. Once people have tasted the fish he’s redubbed silverfin—in cafeterias, on their home grills, or as the pecan crusted, Cajun blackened and classic fishcake forms he has planned for grocery-sold frozen filets—he’s convinced we’ll have another case of the redbelly. That species was nearly fished to extinction when Cajun chef Paul Prudhomme came up with a wildly popular recipe for blackened redbelly.

“I don’t have a Ph.D., but I can guarantee one thing: I know food. I know food marketing, and I know what consumers want. My weapon for this problem is a fork.”

The owner of Inland Fisheries Processing and Marketing Research Center, Parola has a history of both culinary success and marketing unusual products. He’s launched culinary campaigns for Louisiana alligator meat and even the rat-like nutria. He launched the Asian carp plan when two jumped into his boat as he fished for an alligator gar to take on a filming of a Food Network special. “This fish,” he noted, “sure jumped in the wrong boat.”

He took it straight to the kitchen, cooked it up and says it’s one of the best fish he’s ever tasted, better even than catfish or tilapia. While its tiny bones make preparation labor intensive, it’s also devoid of contaminants like mercury, high like salmon in healthy Omega 3’s—and plentiful.

“This fish is incredible,” he said. “I just need to convince the guys at Congress to let me make a presentation. Thirty minutes of time, and I guarantee you they’re going to be blown away. I want to cook for (carp czar) John Goss.” —K.S.

“I don’t have a Ph.D., but I can guarantee one thing: I know food. I know food marketing, and I know what consumers want. My weapon for this problem is a fork.”

—CHEF PHILIPPE PAROLA

Silverfin Steak & Fresh Berries

SERVES 4



- 4 Silverfin steaks
- 2 ounces each: raspberries, blueberries, seedless grapes
- 2 tablespoons pecan oil
- 2 ounces unsalted butter
- 2 tablespoons heavy cream
- 3 ounces white wine
- 1 lemon, juiced
- 2 oranges, juiced
- seasoning to taste

Preheat oven to 325°. Heat oil and butter in an oven-proof skillet until very hot. Place seasoned Silverfin steaks in skillet and brown both sides. Add white wine, lemon and orange juice. Bring to a boil. Add fresh berries. Transfer to oven and bake for 12 minutes at 325°. Serve topped with sauce and berries.

FIND MORE SILVERFIN RECIPES AT CHEFPHILIPPE.COM

ABOVE: Chef Philippe Parola holds an Asian carp caught on an outing with commercial fishermen Rusty Kimble (captain) and Preston Terrell (deckhand) in Simmesport, Louisiana.

The Corps’ secret weapon: its army of volunteers



Bob Morris spends his days as tour guide, wildlife photographer, historian and host—in other words, a Mississippi River volunteer.

The retired U.S. Air Force colonel is among the thousands of volunteers who work along the Mississippi River and its tributaries, helping to keep the river clean, setting up eagle cams, teaching water safety, leading tours, handling camping emergencies and much more.

Bonuses come regularly, usually in the form of some great wildlife spotting. In Morris’s case, perks also include the chance to meet visitors from around the world and share his contagious love for—and knowledge of—the mighty river.

He leads tours at the National Great Rivers Museum in Alton, Ill., and the Melvin Price Locks and Dam. While explaining how the engineering marvel is used for both barges and flood control, he may also share the typical meal eaten on a barge on a Saturday night or the wing span of a pelican.

The engaging volunteer has learned plenty since the museum opened in 2003, both by studying the river history and picking up fascinating trivia from visitors like the 80-year-old towboat captain he took on a recent tour, or the couple fresh

In 2010, nearly 10,000 volunteers logged 186,352 work hours throughout the Mississippi Valley Division of the Corps, an estimated \$3.8 million in work value to the nation.

off oil spill cleanup duty in Louisiana. With everyone, he loves sharing his personal passion for the river—both through one-on-one interaction and through his donated nature photography on display throughout the museum.

“My role is to give people an appreciation of the river, an appreciation for the environment and also an appreciation for the people who help support this navigation system,” he said. “There is also a great heritage of the Mississippi, and it is always changing.”

For agencies like the Corps, volunteers are a godsend, says Deb Griffith, head ranger at the Cross Lake Recreation Area, located in an idyllic northern Minnesota setting alongside one of the river’s first dam and reservoir structures. They’re the face of the Corps, she says. They’re also some pretty cost-effective hands.

In 2010, nearly 10,000 volunteers logged 186,352 work hours throughout the Mississippi Valley Division of the Corps, an estimated \$3.8 million in work value to the nation. Thousands more slogged through forests with trash bags, GPS units or binoculars to clean up or track eagle nests or identify invasive species within the Upper Mississippi National Wildlife and Fish Refuge.

Free camping’s a perk for some volunteers like Sandy and John Hillmer, who work as campground hosts at Cross Lake. In return, they help with after-hours emergencies or field critical questions such as “where are the fish going to bite today?”

Others, like Jerry Goran—2010 volunteer of the year for the Winona District of the Upper Mississippi River National Wildlife and Fish Refuge—are happy for the compensation of some provided garbage bags. Those, Goran uses to clean sandbars of glass, cans, towels, abandoned clothing, even make-shift toilets. This year, he’s taking a GPS along to register coordinates of invasive plants like purple loosestrife, which are causing problems in many river pools.

“I love the river. I love the sandbars. We picnic on them, barbecue on them, swim on them. I didn’t want to look at the garbage people leave, so I started cleaning it up.”

For Mark McGrew, volunteer work at the Corps-run Saylorville Lake reservoir was a literal lifesaver.

He first volunteered in the spring of 2006 as a way to improve his health while recovering from a massive heart attack and waiting for a possible heart transplant. He’s since logged 1,110 volunteer hours, most days arriving at dawn to get his day’s work assignment—usually involving the operation of heavy machinery to help with reforestation or cultivation and planting of deer food plots.

When too ill to work, he says, staff would “welcome me back with open arms.” He was at work when word came that his transplant list number came up; two weeks after he left Mayo clinic with a new heart, he was back on the job.

“What I get out of volunteering at Saylorville is quite simple,” he said. “I get to feel like a contributing man again, but I still have time for when I need to be sick.”

In part, I fought all those years for life because I felt like I would miss out on the magic of Saylorville if I hadn’t made it.” —K.S.



Mark McGrew



John and Sandy Hillmer

Campground host, Cross Lake Recreation Area, Minn.

Best advice to volunteers: “You have to be able to talk to people and not be embarrassed or afraid and be able to take on odd questions and just work with them.”

Favorite wildlife moment: The mother deer and twin fawns that lived on their campsite one summer.



Jerry Goran

Clean-up volunteer, Fountain City, Wisc.

Pet peeve: Broken glass

Secret clean-up weapon: Rosco, a Springer Spaniel who pitches in to help with zebra mussel clean-up by diving for river clams and fetching them for Goran, who cleans them of invasive mussels then tosses them back.



Jeanne and Bob Duncanson

Eagle’s nest trackers between Red Wing, Minn. and Prairie du Chien, Wisc.

What they’ve learned on the job: It’s so much fun to watch eagles carry twigs and weave them into a nest. They also are in couples, male and female, always and forever until one of them dies.



Stan Bousson

Volunteer photographer, Moline, Ill.

Volunteer claim to fame: He set up three new webcams at Lock and Dam 13 so wildlife enthusiasts can watch eagles on their nests or spot migrating pelicans coming up river. SUMRIVER.ORG/WEBCAM.HTML HOST



Stan Bousson photographs eagles along the river near Moline.

Want to volunteer? Go to the Corps’ volunteer clearinghouse to apply for work as a visitor center host, park and trail maintenance worker, water safety program presenter, fish and wildlife habitat restorer, or more, within any of the 2,500 recreation areas run by the Corps of Engineers. The Army Corps of Engineers is the steward of some 12 million acres of public lands and waters at 400 lake and river projects in 43 states. All run in part through volunteers. ln.usace.army.mil/volunteer/

Racing the clock to rebuild New Orleans



Towering cranes fill the skyline in the New Orleans' St. Bernard parish, lifting concrete buckets and driving steel piles while—in Corps districts up and down the river and across much of the nation—special-made clocks count down to zero.

By midnight June 1, the official start of the 2011 hurricane season, the U.S. Army Corps of Engineers intends to have met its goal and completed construction on the best hurricane storm protection system in the city's history. But a constant reminder of the urgency of the task—the Corps' top domestic priority—is evident in the clocks stationed around the region, counting down days, hours, minutes and seconds "To Mission Complete."

One countdown clock is stationed on a wall as far north as St. Paul, Minn. Members of that Corps district have helped take a role in the construction of a 23-mile concrete wall that includes two navigable sector gates, two highway gates and one railroad gate. The end product is so massive it's been dubbed by some the "Great Wall of Louisiana."

The St. Paul District has had as many as 70 team members work on the hurricane protection system since Hurricane Katrina overtook the levee system of New Orleans 5 1/2 years ago, flooding most of the city. Because of the urgency of providing protection, the Corps is working to complete what typically would take 15–20 years in just 36 months here in just the St. Bernard parish. Involving contractors as early collaborators with project design teams is one innova-



More than 100 cranes fill the skyline of the St. Bernard parish in New Orleans as crews rush to complete construction of 14-foot concrete walls atop existing levees to protect against potential hurricane force waves.

tive way time has been saved, said Technical Manager Tom Novak, as teams of crews construct 13-14 foot high concrete walls atop existing 20-foot levees to better protect against pounding hurricane force waves.

The project is part of a new 350-mile system of levees and floodwalls under construction. When completed, the system will fully protect the city against at least a 100-year storm, or that with a one percent chance of occurring in any given year—the city's best level of protection in its history.

While senior program managers in New Orleans retain overall responsibility for the task, technical management duties have been spread out among other divisions and district with specific technical expertise.

The St. Louis District, for example, has worked on storm protection systems in Metro New Orleans and Terrebonne Parish. Rock Island's New Orleans Support Team was assigned to the Protection and Restoration Office, the office in charge of floodgate and pump station projects, along with levee and floodwall projects on the East Bank in Orleans, Jefferson and Plaquemines Parishes.—K.S.

'Wet cycle' upping flood risk, studies show

Recent flow studies across the Upper Mississippi River watershed have led to similar conclusions—findings that will come as no surprise to river dwellers weary of hauling sandbags or cleaning up after the latest flood event. Wet weather cycles, land use changes and factors related to climate change, perhaps not fully understood, have led to higher river flows and more frequent flooding.

The studies are part of a flood risk management program of the Corps of Engineers, one seeking to minimize future flood risk rather than deal with a disaster post-flood. This involves making as accurate of calculations as possible of what flood protection measures are needed, officials say.

On the Red River of the North, for example, a Corps study showed the flow rate average in the last 50 years has more than doubled over the prior half century cycle, said Aaron Snyder, project management branch chief for the St. Paul District of the U.S. Army Corps of Engineers. Flows have risen from 3,400 cubic feet a second in 1950 to 8,000 cubic feet per second today. In a nutshell, a massive 2009 flood that was previously thought to be a 125-year event would now be categorized more as a 50-year flood event.

"If we'd done a study in 1950, we'd have said, you don't need a big diversion project, you don't have that large of a problem," Snyder said. "Now, what the data shows is there is more water in the system than there was before and we are in a wet cycle. This cycle is clearly based on the recent large peaks on the river and shows that there is a significant threat to the metropolitan area which includes more than 200,000 people."

Tributary flows increasing too

Similar findings came from studies done on two Mississippi River tributaries in Iowa—the Des Moines River and the Iowa River. The Des Moines River study, completed and presented to city, county and state officials earlier this year, focused on flows at Corps reservoirs and downtown Des Moines.

"History tends to be interpreted by absence. If you've never seen a flood above a certain height, you tend to think it can't happen," said Kevin Landwehr, chief of the Hydrology and Hydraulics Branch of the Corps' Rock Island District. "After the 1993 flood, the question quickly became, 'was that a once in a lifetime event or is this something we are likely to see again and need to plan for?'"

When another major flood followed in 2008, people suspected the flood frequency was greater than previous data suggested and the study was initiated. The study showed that at one downtown Des Moines location, what was previously thought to be a 200-year flood (with a 0.5 percent chance of occurring in any given year), is actually a 100-year flood with a 1 percent annual chance of occurrence.

Having more precise data helps communities better understand and ultimately manage their flood risk, Landwehr said. In this case, it's being used to help evaluate whether existing or proposed levee systems and flood risk management projects provide adequate protection levels.—K.S.

For more information on the Des Moines River study, go to mvr.usace.army.mil/PublicAffairsOffice/DMRRFFS/DMRRFFS-Findings.htm



FROM THE PROJECT MANAGER

Jamie McVicker

National project manager, stimulus-funded national periodic levee inspection program; levee safety program manager, St. Louis District.

McVicker headed up the recent inspection of 4,800 miles of levees nationwide, made possible through the American Recovery and Reinvestment Act of 2009. These and all routine levee inspections have become more rigorous as a result of the National Levee Safety Act of 2007. That act provided a new checklist and framework for the inventory and inspection of levees—embankments raised to prevent a river from overflowing—and a prime means of flood protection across the country. The aim: development of a comprehensive national database for tracking levee conditions and risk so that funding can go to those with the highest potential risk and consequence.

Q: When did the work begin?

A: Routine inspections have been going on for a number of years. It's really just become more formalized. A lot of this is post-hurricanes Katrina and Rita. The stimulus-funded inspections started in the 2009 time frame, and a lot of them are ongoing now. All will be complete by the end of this fiscal year in September.

Q: What are you finding?

A: What we're finding is very, consistent deficiencies across the United States, especially with vegetation and encroachment. We have current policy that shows that within the cross-section of the levee, there are certain boundaries that need a vegetation-free zone. We're concerned not only with the integrity of the levee but also accessibility during flood-fighting. You don't want a lot of branches and trees hanging over the area when you're bringing vehicles in to fight a flood. We've also got animal burrow situations.... Pump station deficiencies are huge.

Q: How are levees rated?

A: Acceptable is saying all the items and components are acceptable. It's very hard for a levee system to get an acceptable rating. If rated minimally acceptable, one or more items are rated minimally unacceptable or unacceptable but there's a determination that unacceptable items are not going to prevent the system from operating as it was

designed to in the next flood event.

If there are a number of unacceptable items, or if one more unacceptable rating would prevent the system from performing as designed—or if one of the deficiencies noted in a past inspection was not corrected within the time frame we set—there's the potential for an overall unacceptable system rating.

Q: What's the consequence of an unacceptable rating?

A: There is a likelihood they'd become inactive in our PL 84-99 rehabilitation and inspection program. What that means is in the event there is damage from a flood to the levee system, the federal government will not be able to come in and assist a local sponsor with those repairs. It's a very difficult situation for them to be in because a lot of these levee/drainage districts don't have the money to be able to fix a levee if it did breach.

Q: How many levees are we talking about?

A: There are more than 2,000 systems in the nation, about 14,700 miles of levees within the Corps of Engineers portfolio. But across the country, there are 100,000-plus miles of levees, some of those owned and operated by other agencies.

Q: How prepared do the levees look for potential spring flooding?

A: A lot is inconclusive right now. The Memphis District did deliver some unacceptable ratings for a few of their levee systems. In St. Louis, we had some minimally acceptable ratings. Most are for encroachment and closure structures that have deteriorated or ineffective animal control programs.

Q: What do you hope comes out of all of this?

A: The overall goal, in my opinion, is an awareness of what the risks are and awareness by the general population that certain infrastructure does need attention. It's just a matter of communicating the risk that is there, and there's always a risk when you live or work behind a levee, regardless of the integrity of that system.

Q: After the risk is identified, then what?

A: We're going to have a better picture of what the state of our infrastructure is and plan on very transparent communication with sponsors, the general public and congressional partners. We'll let them know what safety concerns have been found for a given levee system to set the groundwork for at least knowing what we have to deal with. This is probably the most painful step, but it's critical. You can't move to correct something if you don't know what the problem is.



MY MISSISSIPPI

Kempton Baldridge, River Chaplain, 55, Paducah, Ky.

I'm one of nine merchant marine chaplains in the U.S., and work on what the Coast Guard calls the "Western rivers"—the Mississippi, the Ohio, and many others. We have over 2,200 miles of river and a potential congregation of 60,000 professional mariners. They lead unusual, demanding lives, with some risk and a lot of sacrifice.

I spend most of my time on the water, but my drop-everything mandate is responding to casualties. When somebody doesn't wake up at 5 o'clock for watch, that's devastating to a crew. I get to their boat as fast as I can. I go to the funeral. And weeks later, I might ride with the crew up and down the river. They're still suffering.

What I do is a ministry of presence. On a six-hour watch, they'll ask about something they heard was in the Bible, or they want to talk about the war, or racism, or ask my opinion of women working. They struggle with marital issues. And some have me on speed-dial, if they can't reach their AA sponsors.

I'm an Episcopal priest, but I find my greatest joy affirming guys in their own traditions. They call me Chap or Chappie, like a character in a John Wayne movie. That's fine with me.

Floodspeak 101

100-year flood: The area has a 1 percent (1 in 100) or greater probability of occurring.

500-year flood: An area has a 0.2 percent chance (1 in 500) of a flood every year.

Flash flood: Short-term flooding caused by heavy rainfall in a short period of time (6 hours or less), or a dam failure.

Flood: Longest term flooding over several days due to rainfall over an extended time period, snow melt or ice jams.

Flood watch: Issued when flooding is possible, but not imminent or occurring.

Flood warning: Issued when flooding is imminent or occurring.

Flash flood warning: Issued when flooding is in progress or will occur within six hours.

Floodplain: Strip of relatively flat and normally dry land alongside a stream, river or lake that is covered by water during a flood.

Flood of record: Highest observed river stage at a given site.

Floodway: The area of the floodplain where water is likely to be the deepest and moving the most quickly. This area should be kept free of obstructions to allow floodwaters to move downstream.

Levee: A man-made structure, usually an earthen embankment often reinforced with soil cement, designed to contain or divert the flow of water. Source: National Weather Service

Do you live behind a levee?
Find helpful hints at: mvd.usace.army.mil/docs/SoYouLiveBehindLevee.pdf

On the trail of spring wildflowers

Spring along the Mississippi brings bright budding trees and a gauzy blanket of delicate color as wildflowers appear in valleys and meadows. As one species blooms and fades, another takes its place, creating a succession of beauty throughout the season. An added bonus is that as you travel north along the Mississippi River, you can experience the first blooming of species again and again, as spring comes a little later with each passing mile. Spring wildflowers are especially plentiful in the following three habitat types, found in abundance up and down the river and its watershed. —L.E.



FLOWER HABITATS

WOODLANDS
Botanists term the first flowers of spring ephemerals, a reference to the fact they must bloom, be pollinated and make seeds before tree leaves block much of the sunlight from the forest floor. But what they lack in longevity, early bloomers make up for in loveliness.

PRAIRIES
On the prairie, the sequence of spring wildflowers tends to begin later and move more slowly than in woodlands. Early in the season, look for prairie smoke, prairie phlox, pussy-toes, wild strawberry, and yellow star grass. But these are true highlights.

WETLANDS
You may get a little muddy searching for these flowers, but put your boots on and head across country, for the effort is worth it. In addition to the flowers listed here, marshy areas come late spring may be home to wild iris, cardinal flowers, swamp milkweed, and white turtlehead.

WHAT TO LOOK FOR

DUTCHMAN'S BREECHES (1)
An early bloomer, it's easy to remember this flower's name once you see how it resembles little pairs of pants hanging on a slender stalk. Generally white and sometimes tinged with pink, it's closely related to the common garden flower bleeding heart.

COLUMBINES (2)
Blooming mid-spring, these are common on sloping hills. It resembles a small shrub, growing to heights of two feet or more, with dangling red-and-yellow flowers divided into five tubes or compartments (those tubes are so long that only hummingbirds, moths, and butterflies are able to reach the nectar).

PASQUE FLOWERS (3)
The first to appear in spring, these grow from a brownish crown of leaves and are identified by their hairy, gray-green stems and single large flower that is blue, purple, or white, with a yellow-orange center.

SHOOTING STARS (4)
Among the prettiest of all flowers, the name derives from the way their pinkish, star-shaped flowers bend downward, looking like a shooting meteor.

MARSH MARIGOLDS (5)
Sometimes called a cowslip, these resemble a giant buttercup and favor marshes and the sides of streams. Their leaves are a glossy, dark green.

POND LILIES (6)
Later in spring, these begin to appear on bodies of still or slow-moving water. Their large leaves are attached to a long stalk that grows in the muddy bottom of the water and their yellow flowers have thick petals. Over time, they can form huge colonies.

GOOD VIEWING BET

FRONTENAC STATE PARK
Hike the trails at Frontenac State Park near Red Wing, Minnesota. The park also offers great viewing of migrating birds that use the Mississippi River as a flyway.

dnr.state.mn.us/state_parks/frontenac
651-345-3401

SAM VADALABENE BIKE TRAIL
Prairie wildflowers line portions of the Sam Vadalabene Bike Trail, which runs for 20 miles parallel to the Great River Road from Pere Marquette State Park to the city of Alton in Illinois.

visitalton.com
800-258-6645

PORT LOUISA NATIONAL WILDLIFE REFUGE
Slip on your waders and visit the Port Louisa National Wildlife Refuge near Wapello, Iowa. The refuge includes more than 8,000 acres of marshes, backwaters, and flood plain.

fws.gov/midwest/portlouisa
319-523-6982

Wildflower fun FIND A FLOWER FESTIVAL

Woodland Wildflower Walk	Effigy Mounds National Monument near Marquette, Iowa	April 22, 10 a.m.	nps.gov/efmo or 563-873-3491
Bluebell Festival	Carley State Park and the town of Plainview, Minnesota	May 6–8	plainviewcvb.com
Mother's Day Flower Hike	Holland Sand Prairie near Holmen, Wisconsin	May 7, 10 a.m.	mississippivalleyconservancy.org or 608-784-3606, ext. 1
Nature through the Five Senses	Mississippi River Visitors Center, Rock Island, Ill.	May 15, 2–3 p.m.	missriver.org or 309-794-5338
Wildflower Walk	Saylorville Lake Visitor Center near Des Moines, Iowa.	May 7, 2 p.m.	515-964-0672



The 5 showiest songbirds of spring

The songbird seems to know exactly what's needed after a long, gray Midwestern winter: a splash of color. Several of the world's most beautiful tanagers, warblers and buntings travel up the Mississippi River come spring, staking out prime breeding ground, or just making some quick stopovers en route to summer homes in Canada. These true snowbirds winter in Central and South America and Mexico, with their return home a showy, north-bound beauty pageant.



Blackburnian Warbler
Most easily identified by their orange blaze at the throat, these five-inch-long birds like to hang around the tops of trees and especially favor spruce and hemlocks.
Listen for: A series of thin, very high notes.



Rose-breasted Grosbeak
Bold red, black, and white markings make these eight-inch-long birds easy to identify (watch for the rosy triangle on their breasts). The birds typically spend their time amid tree foliage but occasionally feed on the ground.
Listen for: A series of whistled phrases, similar to a robin but more varied and melodic.



Indigo Bunting
With their brilliant blue feathers, these five-inch-long birds are the azure jewels of spring. They prefer roadside and woodland edges to deep forest, and in the spring, migrating flocks of indigo buntings may sometimes be seen on the ground.
Listen for: A series of warbling, musical tones, often sung in paired notes.



Scarlet Tanager
These stunning birds generally stay high in the trees but may forage on the ground during the spring migration. They are easy to identify with their bright red bodies punctuated by black wings.
Listen for: A song that's been compared to a robin with a sore throat, a series of short, rising and falling notes.



Baltimore Oriole
The brilliant orange-and-black plumage of this oriole make it a favorite of many birders. The eight-inch-long bird can often be seen in parks because of its preference for shade trees next to open areas.
Listen for: A series of whistles, sometimes with prominent harsh or raspy notes.

For more information—including recordings of these songs—see: allaboutbirds.org, birds.cornell.edu, birds.audubon.org

FLOWERS VIA WIKIMEDIA COMMONS: LARGE ORIOLE, GROSBEEK, INDIGO BUNTING; BILL STRIPLING, WARBLER, SMALL ORIOLE; MDF VIA WIKIMEDIA COMMONS; TANAGER; ED GAILLARD

LARGE ORIOLE, GROSBEEK, INDIGO BUNTING; BILL STRIPLING, WARBLER, SMALL ORIOLE; MDF VIA WIKIMEDIA COMMONS; TANAGER; ED GAILLARD

ALIEN INVASION?

Around the world, plants, animals, fungi, and other life forms are moving into places where they don't belong, most by accident—hidden in the crevice of a shoe or piece of firewood, or clinging to an oceangoing ship. The result can mean big trouble for wildlife, forests and people. About 7,000 invasive species larger than microorganisms have come to the U.S., and roughly 10 percent cause problems. The U.S. now spends more than \$130 billion dollars a year to battle the problem. SOURCE: SCIENCEFORKIDS.ORG

I P P I S S I S S I M G
 V N I N V A S I V E C E
 C G A C A R P P L K P P
 G N P Z A T H R E A T E
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 X R T R G M M O C A F X
 O A L I U T R I U I W Z
 I Z E N F O R E S T E P
 C P V G N I D R I B A S

FIND THE WORDS related to invasive species. Words can be found forward, backward, up, down, or diagonal.

- | | |
|-------------|----------|
| PEST | BOATING |
| THREAT | CANOE |
| INVASIVE | GRAZING |
| MUSSELS | CATTLE |
| CARP | BIRDING |
| ALIEN | SPRING |
| SNAIL | FIREWOOD |
| WATER | FOREST |
| MISSISSIPPI | PEOPLE |
| RIVER | SPECIES |



Book 'em!

With this "Nab the Aquatic Invader" activity, you'll meet dangerous critters like Gabby "the lowlife" Round Goby and Zeke "the prowler" zebra mussel. Kids of all ages will also learn how to help protect the Mississippi River and Great Lakes while conducting background checks and working to book the wily suspects. Answering a quiz on their source and spread is key to an arrest. Have a question? The site also lets you ask an expert. iiseagrant.org/NabInvader/great_lakes.html



LOWER MISSISSIPPI: THE NATURE CONSERVANCY

Restoration focus expands to Lower Mississippi

The Nature Conservancy is turning the efforts of its Great Rivers Project to the heavily leveed swamps and bayous of the Lower Mississippi River, looking toward a partnership effort with the U.S. Army Corps of Engineers and others to help restore more balance among the river's many uses.

The organization is looking for cost-share partners to help further advance a Corps study, completed in January 2010 by the Memphis District, that looked at restoration needs on nearly 1,000 river miles between Cairo, Ill. to just south of New Orleans. This area has lost nearly 80 percent of its original forested wetlands, some 1,600 lakes and 145 side channels, but it remains a floodplain ecosystem larger than the Florida Everglades.

The Corps study established federal interest in looking at potential restoration needs on some 3 million acres of the lower river, says Gretchen Benjamin, Program Director, Large Rivers, for The Nature Conservancy's Great Rivers Partnership. The next step would further define current conditions, identify resource issues and restoration alternatives and also look at ways to provide more recreational access in the region, she said.

Among other things, the study would look at improving habitat for important and endangered species like the pallid sturgeon, least tern, piping plover and a native mussel called the fat pocket-book—all present in the study region.

One key partner in the effort would be the Lower Mississippi River Conservation Committee, a collection of state agencies working with the Fish and Wildlife Service and now in formal partnership with the Corps. That group has defined some 150 side channels, Benjamin said, that could be reconnected to the main stem of the Mississippi as a way to help restore natural cycles that could both provide more wildlife habitat and also more naturally redistribute sediment and potentially reduce the nitrogen and phosphorus loading contributing to Gulf hypoxia, Benjamin said.

"It's a different river south of Cairo, but we could be doing some positive things for the lower river like we have been able to for the past 20-some years on the upper river," she said. "It's exciting, it's important to do, and I think it's possible to balance the different uses of the river. That's really all we're looking for is that balance."



The Atchafalaya Basin, the largest swamp in the United States, is part of a Lower Mississippi River watershed area targeted for restoration through a partnership between The Nature Conservancy, U.S. Army Corps of Engineers and other organizations.

MY MISSISSIPPI

Austin Janes, 13, and Salwa Mikhail, 14
 Tom and Becky for Hannibal, Mo. Chamber of Commerce



In its 55th year, the Tom and Becky Program is once again appraising 7th graders competing to become young ambassadors for Mark Twain's riverside hometown. It's a no-pay job, but the winners, who dress as Tom Sawyer and his girlfriend Becky Thatcher, get lots of attention as they greet dignitaries and tourists, appear in parades and at ribbon-cuttings and have their spirit of adventure captured in countless photos.

AUSTIN: "My Mom was a Becky 25 years ago and encouraged me to try out, telling me how much fun she had with it, and that it made her grow up a little and really think about the world. You have to give a brief speech, then semi-finalists are picked who have to go all around town to study up for a 110-question test—everything about Hannibal, and Mark Twain, and the Mississippi. Then it's narrowed down to five boys and five girls. When I was picked as the official Tom, on the third of July, it was a shocker.

"Us Toms and Beckys make about 300 appearances each year. We'll be on Main Street in costume and people will ask, 'Where's the nearest bathroom?' Or 'We're in Hannibal for the weekend. What should we do?' We have to know all of that. This year we even met Prince Albert of Monaco.

"The worst part is the cold. My pants only go down to my knees, and my shirt isn't very thick. Plus the moccasins I wear, you can feel every little rock. But I've met people from all over, from Russia and China and Japan and I've learned how important Hannibal and the Mississippi are in history."

SALWA: "Me and my mom, we had some disagreements about my costume. She wanted a lot more bows, but I said, 'Simpler is better.'"

"I didn't know Austin before this but we've gotten to be really good friends. They say the Toms usually outgrow the Beckys by the end of the year, but that doesn't seem to be working this time. When we re-enact Tom and Becky's engagement, we rub cheeks a little and I've got to bend down to reach him.

"I've actually read *The Adventures of Tom Sawyer* twice — once in third grade on my own, then again in 7th grade, when it's required reading here in Hannibal. What's most interesting to me, and which people might not know, is that Mark Twain wasn't just a writer. He was an inventor and a steamboat pilot and he traveled and had children and did lots more.

"I've lived by the river for the past seven years, and when anyone visits we take a river boat ride. To me, the Mississippi is about family."—S.A.

What's your Mississippi? Email responses to: editor@ourmississippi.org

DID YOU KNOW?

The first bridge across the Mississippi River was built in 1855. It spanned the river in Minneapolis where the current Hennepin Avenue Bridge is located.

The Bridge

A 3-D rendering of the new bridge in St. Louis

Construction is underway on a new Mississippi River bridge, a 1,500-foot cable-stayed structure (more than four football fields in length) that will span the river at St. Louis, Mo. The project also includes approaches on both the Illinois and Missouri sides to get traffic to the bridge.

Crews have recently completed foundations for the main span of the bridge along with coffer dams on both sides of the river. This massive undertaking will, when completed, require 14.8 million pounds of girders, equivalent to the weight of 935 elephants, according to the bridge construction website. The cable-stayed portion of the bridge will additionally require 8 million pounds of reinforcing steel, equivalent to the weight of 363 school buses.

Total construction costs are estimated at \$640 million, but the bridge, when completed, will be the third longest cable-stayed bridge in the U.S.

Tour it: The Mississippi River Bridge team is offering public tours of the main span construction process. Tours are held the last Friday of each month at 12:30 p.m. and 2 p.m. Signed releases, available on the website, and reservations, are required. 314-453-1808

Chart the progress: Go to newriverbridge.org to learn more and link to construction webcams, or follow via Facebook: [facebook.com/NewMississippiRiverBridge](https://www.facebook.com/NewMississippiRiverBridge).

U.S. Army Corps of Engineers, Rock Island
PM-A (Dolan), Clock Tower Building
P.O. Box 2004
Rock Island, IL 61204-2004

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News Briefs

Collaboration offered for river planning projects

Does your city have a need to better connect a river to downtown, protect against flooding or another river-related needs for which it could use some planning help?

Three community projects within the Upper Mississippi River watershed will be selected to serve as topics for a trip of planning charrettes, or intensive collaborative planning sessions, at the 2011 Upper Mississippi River Conference Sept. 21-23.

Visit the conference website at riveraction.org/umrc2011 to apply for selection. Also featured on the site are results from last year's planning sessions.

Race to the Great Outdoors

America's Great Outdoors Initiative—a presidential initiative designed to connect people to nature as part of a 21st-century conservation and recreation agenda—continues at the Corps-run Riverlands Migratory Bird Sanctuary in West Alton, Mo., with an April 30 adventure race and campout. High school-aged teams of four can sign up to try their hand at rock climbing, canoeing, starting a campfire, navigating via GPS and more. The free event includes race activities, dinner and breakfast, but participants must provide their own camping gear for the race-ending concert and campout.

For more information, call 618-462-6979 or download forms at mtrf.org. Learn of other ways to connect at americasgreatoutdoors.gov.



MY MISSISSIPPI

Tim Mason, 60, McGregor, Iowa
Amateur historian and shantyboat man

There's not a time from my childhood when I was not on or in what we called "the Riv." I was the youngest boy of 10, in the little town of Marquette, Iowa, river mile 634.5. We had a small wooden houseboat my parents christened *Maggie* (PICTURED), and we spent many lazy summer days and nights aboard. We went swimming, fishing, gigging for frogs and playing on the islands while our mom fried fish.

My wife Sara and I got our own houseboat about five years ago. We call it *Driftless*, and there's no finer on the Upper Mississippi. Last summer I added the word "Shantyboat" above its name. My wife and I manage to spend almost 60 nights a year on board, away from our slip. We're nearly self-sufficient, with solar panels and everything we need, and a Honda 50-horsepower, four-stroke motor that seems to almost make its own gasoline. We fly pirate flags and Tibetan prayer flags and play river music. Now my three grandkids are growing up swimming and fishing off Papa's houseboat, and always begging me for another story from my own childhood.

Over the years I've collected photographs, newspaper articles, books, poetry, oral histories, and even music about shantyboats. A 1916 *New York Times* article claimed there were more than 50,000 river people living in the Mississippi basin on those crudely-built shantyboats, tying up wherever, on banks that were still undeveloped and unclaimed.

Some families lived on them for decades or generations. They were a subculture that was not very recognized by society at the time. The kids got no formal education, but at the same time they realized the beauty of the river, and the natural world around them. Why don't people live like that anymore?

Questions or comments:

U.S.A.C.E. REGIONAL OUTREACH SPECIALISTS

Kevin Bluhm, St. Paul, 651-290-5247
Angela Freyermuth, Rock Island, 309-794-5341
Kristin Kosterman, St. Paul, 651-290-5737
Hilary Markin, Rock Island, 309-794-5730
Laurie Farmer, St. Louis, 314-331-8479
Kimberly Rea, West Alton, 636-899-0050

Mailing list changes:

U.S.A.C.E. REGIONAL OUTREACH SPECIALISTS

Marsha Dolan, Marsha.G.Dolan@usace.army.mil

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Contributors this issue:

EDITOR/LEAD WRITER

Kim Schneider

DESIGNER

Diane Kolak

Send story ideas to
editor@ourmississippi.org

CONTRIBUTING WRITERS

Susan Ager
Lori Erickson
Hilary Markin
Tim Mason

