

Our Mississippi

PARTNERING TO KEEP
AMERICA'S RIVER GREAT

SUMMER '15

Find more photos of the river, also from
Roadtrip with a Raindrop, on pages 6 and 7.

Mammoth find in the watershed

The remains of what may be a mammoth, discovered at a popular Corps of Engineers reservoir and recreation area, is just the latest of many prized archeological finds discovered around the Mississippi River and its watershed.

The day was sunny and perfect for boating last September 2, the day park ranger Mike Kalkwarf motored across a popular Iowa lake to scout a potential deer hunting spot and set up some trail cams. When he pulled up on a remote shore, he noticed something unusual about the rocks.

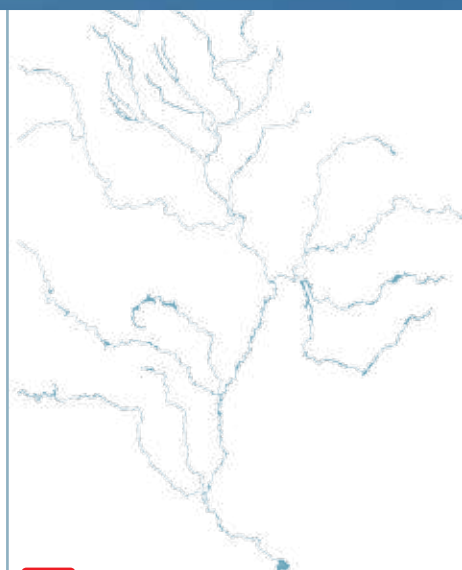
On closer look, he saw it wasn't a rock at all, but some sort of vertebral disc, a massive eight or so inches in diameter. Nearby, something that looked a lot like ribs was sticking out from the mud. It didn't take his biology degree to realize, he says, "there's nothing roaming around today with three-foot-long rib bones and eight-inch disks in their backs."

What he found was kept preserved in the mud layer of a former wetland or pond on the shore of the old river and recently uncovered by high water levels. He knew this find could be 10,000 years old, plus, dating from the days when mastodons, mammoths and giant sloths grazed these rich plains. Kalkwarf reported the curiosity to colleagues at the recreation area owned by the U.S. Army Corps of Engineers. They contacted district archeologists, and experts are now investigating a find

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This large bone fragment, suspected to be the remains of a mammoth, was found on a beach eroded by high water levels at an Iowa recreation area. Officials are not publicizing the find location to avoid looting.



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.



they believe to most likely be that of a mammoth, possibly one that once interacted with human residents of this part of the Mississippi River watershed.

Finding a remnant from the days when mammoths and their slightly smaller mastodon cousins wandered around the Midwestern plains and along the Mississippi River isn't in itself particularly rare, says Iowa state archaeologist John Doershuk. The creatures resembling a modern-day elephant were once so plentiful along the Mississippi River and Midwest that multiple mastodon skeletons have been found in a single site. In 2012, the state of Iowa made national news when two—and possibly a third, still under investigation—skeletons of mammoths, including at least one woolly mammoth, were discovered in the same farm field in Mahaska County.

But most typically, Pleistocene-age finds consist of a single tooth sticking out of a creek or eroded stream bank, something that—while still a cool paleontological find—could have fallen out at any point in the creature's life cycle and tell experts little about the way it lived or died. In this case, the pieces of a rib and spinal column appear to be part of a larger skeleton, potentially offering clues to the creature's age. The location indicates the animal was either hunted there or got stuck in what was once a wetland and was unable to get out, Doershuk said. While no link has yet been made, the bones were near an upland upon which pieces of ancient flint and other evidence of prehistoric settlement were found. The additional fact that it's on public land makes it even more exciting because of its accessibility.

"Archeological sites are by definition places where there's preserved human activ-

"We know there were people in what we now call Iowa at the later stages of time when mammoths and mastodons were still around, and we know that in other states portions of spear points have been found embedded in animals of this sort. We haven't found those in Iowa yet. We're very keen on doing so."

ity," Doershuk said. "We know there were people in what we now call Iowa at the later stages of time when mammoths and mastodons were still around, and we know that in other states portions of spear points have been found embedded in animals of this sort. We haven't found those in Iowa yet. We're very keen on doing so."

Last fall, experts removed three pieces of bone believed to be from the same rib, bones that were first tentatively identified as mastodon, then after closer inspection as more likely mammoth bones. Other bones were left at the site, frozen under a thick layer of ice. Unfortunately, much of the exposed bone disintegrated over the harsh winter, Doershuk said, creating urgency to recover remaining bones still covered under what may be a deep cap of soil. Jim Ross, St. Paul District cultural resources manager of the Corps' recreation area, says he's searching for funding to do additional analysis that would conclusively identify the bones and the associated geologic context. This may include radiocarbon dating, soil sampling and archaeological testing, all critical steps in determining what the bones are and whether there is a connection between this find and remains of flint indicative of ancient tool-making found a few dozen yards away.

"We'll look for associated artifacts or modification of the bone to maybe find butchering marks," he said. "But now, it's partially underwater and in muck, with a water source keeping it wet. We believe the water has been critical to preserving it, but it is also creating a challenge to evaluate it."

Whether or not the find leads to clues to how humans came to live in the Midwest, or perhaps even how mastodons and mammoths came to be extinct, it will remain interesting from a scientific and historic perspective. It's also another piece of the puzzle in the story of America's great river and her watershed.

ABOVE: A researcher at the find site of some ancient relics places a hand by the edge of what's believed to be a partly buried mammoth bone to help show scale. The bones, discovered last fall, stayed buried under ice until early summer, when archeologists from Iowa and the Corps further explored the bluff-side site with park rangers and an expert on soil dating.

"The Mississippi River is an archaeological site from beginning to end," says Brad Perkl, archeologist with the Corps' St. Paul District. "It's the major river in North America, so it's going to attract people for many reasons. You make a living on the river, live next to it for food and transport, and it's aesthetically pleasing. The same reasons people today are attracted to it are the same reasons people for thousands and thousands of years have been attracted to it."

Since the early 1900s, Congress has passed a series of laws requiring protection of historic and cultural resources for preservation and education purposes, and the Corps has taken that mission to heart. Most Corps districts employ historians or archeologists whose work might involve curating ancient tools, mapping historic shipwrecks, or, far more rarely, identifying ancient mammals.

Perkl and a colleague recently completed a cultural and historic properties master plan for Sandy Lake, part of the collection of Corps-run parks situated at the headwaters of the Mississippi River. A larger headwaters plan recommended similar surveys of the seven other parks. Those plans would all include maps of

potentially significant sites, spots that would be avoided when improvements to the popular recreational sites are made. That would insure no further disturbance to spots like the burial mounds at the Gull Lake recreation area; there, trails circle around 12 mounds representative of the Woodland Culture (around 800 B.C.) and are listed on the National Register of Historic Places. Sandy Lake is home

to an ancient copper tool-making site, its unique story told in a small on-site museum now under renovation.

"One of my colleagues has referred to the river as an archeological refuge," Perkl said. "I try to repeat that. There's only one site. They don't reproduce."

Elsewhere on the river, Corps archaeological finds have revealed clues to native history, trade patterns, river navigation and more, says Jimmy McNeil, an archaeologist with the Corps' Memphis District.

In 1988, the water depth was low enough to conduct an aerial survey of potential shipwrecks—and find 700 lost, abandoned or wrecked vessels between the lower Illinois and middle Mississippi, he said. An examination of earthquake features near New Madrid led to a seismological model predictive of future earthquakes. Much of the work necessitates and has led to a close working relationship with the region's native tribes.

A survey of some 10,000 acres that could be impacted by activation of the New Madrid Floodway, for instance, found 250 sites that gave clues to what some of the region's original settlers ate, what they did, where they traveled and with whom they traded, he said. That's information that is not just fascinating, he says, but predictive. An abundance of deer or turtle bones might be used to extrapolate the environment temperature or rainfall of a given moment in time and help in predicting today's environmental future.

"When I came in in 1980, there were only a few archaeologists at the Corps, McNeil said. It's important that we can tell engineers, 'this potential project site has many historic sites within, and you need to rethink your design.' It saves money, it saves time and it saves cultural resources." —K.S.

WALK WITH THE mammoths & mastodons

YOU'VE HEARD OF LIVING HISTORY. It's pre-history that you'll experience at spots like the Mastodon State Historic Site, a spear's throw from the banks of the Mississippi River.

In a river town some 20 miles from St. Louis near Imperial, Mo., experts have found the remains of more than 60 mastodons. More importantly, they here discovered via the connection between the bones and stone weapons found in 19th-century excavations, the first solid evidence of the coexistence of humans and mastodons in eastern North America—evidence archaeologists are hoping to similarly find as they learn more about



	Columbian Mammoth	African Elephant	Woolly Mammoth	Mastodon
Height	13 feet	10–11 feet	9–11 feet	8–10 feet
Weight	8–10 tons	4–6 tons	4–6 tons	4–5 tons
Tusks	curved upward, twisted	gently curved forward	curved upward, twisted	forward, slight upturn

And then there's *T. rex* ...

Of all the artifacts to pass through archeology offices of the Corps' Mississippi Valley Division, none caused as much excitement as the 66 million-year-old *Tyrannosaurus Rex*.

The dinosaur's remains were packed up inside a small office in St. Louis, the headquarters of the Corps' Mandatory Center of Expertise for the Curation and Management of Archaeological Collections and shipped off to Washington D.C. One of just a handful of nearly complete specimens to exist in the country (two of them owned by the U.S. Army), this specimen was found on Corps land in Montana. It was shipped to the Smithsonian Institute on a 50-year loan to be the centerpiece of a new paleobiology hall opening in 2019. To best preserve the country's history and to further science education, such artifacts need to come out of the box, Corps officials said—in this case, a very, very large box.

Mastodon State Park is open daily mid-March to mid-November: mostateparks.com



the bones recently found on a U.S. Army Corps of Engineers recreation site further north near a popular Iowa lake.

Experts theorize that here some 11,000 years ago, the hunters of what's called the Clovis period were hunting them for their meat and fur. Bones of more than 60 mastodons were taken from what was possibly a hunting pit, along with the remains of giant sloths and beavers and dire wolves; to protect what was left from fossil hunters, the Missouri Department of Natural Resources bought the bone bed in 1976, and it evolved into what's now the Mastodon State Historic area. There, visitors can today wander scenic trails that mastodons and likely mammoths once tread and see a reproduction of both a mastodon and a Clovis campsite.

While this site is a rare spot that connects humans to the now-extinct ice age creatures, fossilized molars, tusks, jawbones, ribs and other remains of mastodons, Columbian mammoths and woolly mammoths have turned up in most of Iowa's 99 counties over the years, elsewhere along the Mississippi and in the western plains and Great Lakes states.

That's not surprising, says Dr. Jim Mead, current director of The Mammoth Site in Hot Springs, S.D., and chair of the Geosciences Department of East Tennessee State University. These woolly giants entered North America thousands of years ago when ocean waters were low enough to allow passage over exposed land between eastern Russia and Alaska. At his Hot Springs site, 61 sets of remains were uncovered in an apparently once steep-walled lake that big beasts apparently fell into and couldn't climb out from thousands of years ago.

Mastodons went the furthest, all the way into South America because they were browsers, Mead said. Smaller than the woolly mammoth, they looked like elephants but ate like present-day deer, he said, feeding off plants and trees. Mammoths, on the other hand, grazed like cattle, stopping their travels when grasslands ceased to exist.

The remains of many such creatures have weathered away in harsh landscapes, while others get preserved by soils, emerging through erosion or even child's play. In July 2013, four kids found a five-pound mastodon tooth while playing in a creek about 28 miles northeast of Waterloo, Iowa. A professor at Upper Iowa University estimated that the animal lived about 20,000 years ago. More mammoth remains, and that of a woolly mammoth, have been found in Mahaska County, about 130 miles south of where the children found their mammoth tooth.

It's often tough to distinguish at first if a find is a mammoth's or mastodon's, because they lived together in many places. In one region, mammoths grazed on grasses in valleys while mastodons ate the woodier plants on nearby mountains. The same happened where forests met grasslands. Scrape marks on bones indicate that humans once hunted them for food.

As for why the mammoths and mastodons don't exist now, Mead feels the answer lies between two extreme views espoused by some people—climate change and humans. Evidence of a climate change that occurred about 9,000 years ago is believed by some people to have badly affected the animals' food supplies and their numbers began dwindling.

"Bison survived the change, so did elk, moose and deer but not the American lion and others," he said, pointing out that one of the world's largest cats (25 percent bigger than the African lion) disappeared around the time mammoths and mastodons did. With the population of mammoths and mastodons shrinking, he theorizes that hunting by humans could have been the deciding factor. —M.W.



ABOVE: *Corps biologist Andrea Carpenter sets up an anabat reader, strategically placed to record bat calls and identify the potential presence of endangered creatures like the little brown bat* (LEFT).

Biologists go to bat for endangered creatures of the night

Wander the Memphis District

of the U.S. Army Corps of Engineers, and you may stumble upon a mysterious office sign titled “Bat Cave.” It’s a fitting description for what lies within, says sometime office resident Andrea Carpenter: a dark space often containing a biologist or two, staring at a computer, identifying bat calls on the screen.

There’s bat-related equipment too—call recorders, muddy boots and more—for this is the headquarters of the four batmen and

one batwoman working to identify the presence of some of the most mysterious and threatened creatures of the Eastern and Midwestern forests. Specifically, they’re looking at bat echolocation frequencies recorded with an innovative new computer program to identify the species present in a given area and how they might be affected by a building or clearing project.

The Memphis bat program was launched in 2012 when the district was preparing to do maintenance and repairs on a large number of drainage systems damaged in the 2011 flood, says Carpenter, a Corps biologist who leads the district’s bat echolocation team. At that time, the rapid spread of the disease white-nose syndrome had heightened concern for bats. The Indiana bat, present across Tennessee, had been listed as endangered since 1967, and the population of the northern long-eared, also decimated by the fungus, is now listed as a federally threatened species, she said.

“We don’t have caves where they are expected to hibernate, but some species come out to our summer roosts, which include trees with crevasses, cracks and exfoliating bark,” Carpenter said.

For help in conducting bat surveys, the district turned to the Corps’ Engineer Research and Development Laboratory in Vicksburg, Miss. There, Eric Britzke, currently the Department of Defense’s steering committee representative on the white-nose syndrome national plan, was under funding from the U.S. Fish and Wildlife Service to develop a computer program to take his doctoral research on bat call identification to another level. His program would take data from ultrasonic detectors, machines placed in the field to record bat calls, and allow someone without sophisticated training to identify which bat made the call.

The software pinpoints which bat was where via call frequency. This is key to identifying endangered species and offers new insights on bat migration patterns and other behaviors.

Britzke’s work started in the mid-90s with a challenge to see if he could identify bats by call. “We saw that calls on the screen made all different shapes, and we thought, ‘maybe these represent individual species,’” he said.

To help confirm that hypothesis, Britzke and colleagues would catch bats, outfit them with glow sticks and follow them, recording sequences only when that light-tagged bat was close to the microphone. The work confirmed that individual species had their own “call-print,” with later efforts automating the distinguishing of one species from the other and filtering out bat calls from other background forest noise like echoes and insects.

While most Corps districts contract out bat survey work, Memphis has its own team. This has major benefits, including turnaround time, Britzke and Carpenter said.

How it works

The team places the anabat recording units every kilometer or so, depending on the habitat, then collects two nights’ worth of data on each. That data can only be collected within certain wind and temperature conditions that ensure the bats will be out and hunting. The units record sound as data points all night, capturing rustling grass, flowing water and cicadas.

“We have to be sure we’re putting the recorders in the right places,” she said. “We don’t want to miss an endangered or threatened bat and do a project that might impact their habitat in a negative way.”

Biologists can tell by the computer reading of frequency and shape what species are present and what they were doing. There’s a “feeding buzz” when they’re about to have a snack, a different reading for social calls. Because they “talk” to bats, the biologists often receive Batman memorabilia and bat jokes aplenty from colleagues. But all know the work is no joking matter, Carpenter said.

“We’ve learned a lot about bat behavior, how they come and use roost trees and leave for the winter,” she said. “We also learned how the smallest thing—a small clearing, for example, can impact the population.” —K.S.

Mayors seek dialogue with other major world river reps



A contingent of Mississippi River mayors is working with the United Nations to launch a dialogue with representatives of the world’s eight major river basins in Paris this December.

Mayors planning to attend the United Nations Climate Change Conference believe such information sharing will become increasingly urgent as world population growth and climate change put pressure on global food and water supplies in and around the world’s major rivers, says Colin Wellenkamp, executive director of the Mississippi River Cities and Towns Initiative. The mayors hope to learn from sustainability practices already used in countries like the Netherlands, with whom they’ve already partnered, he said. Similarly, they have many lessons to share.

“After Hurricane Katrina and Isaac, the 500-year flood of 2011 and the 50-year drought of 2012, the mayors feel they have something to share about climate disruption and resilience,” he said.

The United Nations has predicted the global population will reach 9.6 billion people by 2050, Wellenkamp said, meaning a massive increase in food demand.

“If the largest component of that food is to be generated by the major river basins of the world, we’ll need to work together to be sure those basins are resilient to the impacts of climate disruption.”

While increased food demand could offer an economic boon for the Mississippi River valley, it would also place new ecological pressure on the river, he said.

“You’d see the Gulf hypoxic zone increase exponentially. You would see all those other problems we are witnessing now. Couple those with the storm events and floods and dry events we have from climate change, and the fact we need the water for drinking water, and you have a recipe for some serious problems.”

The Mississippi River Cities and Towns Initiative is a mayor-led effort comprised of 68 Mississippi River mayors. The group started with a regional platform that they’re now taking to the world as they join in Paris the governments of more than 190 nations who’ll work to hammer out a possible agreement to reduce global greenhouse gas emissions and other issues. Mayors reached out to the United Nations Environment Program, Wellenkamp said, which is working to bring together representatives of other major river systems at the conference—the Rhine/Danube, the Volga, the Ganges, the Amazon, the Tigris/Euphrates and the Yellow. —K.S.

‘Engineering with Nature’ yields lush results on river island

Congress has long instructed that the Mississippi River be managed as both a nationally significant commercial navigation system and a nationally significant ecosystem.

Now the idea is being taken to a new and innovative level through a concept called Engineering with Nature. When sediment is dredged to keep a navigation channel at a navigable depth, for example, the shoal material is, when feasible, placed in such a way as to provide habitat for wildlife or shelter a coastline against storm surge. But what if instead of creating an island from scratch, engineers could take a cue from nature and place materials upriver of a naturally-occurring island? Might that yield even more ecosystem benefits?

That’s the question still being explored at Horseshoe Bend Island in the Corps’ New Orleans District. There, in the navigation channel of the lower Atchafalaya River, about 20 miles south of Morgan City, La., shoal material dredged from the bend had through the 1990s been placed in wetland development sites located along the river’s banklines adjacent to the channel. But by 1999, capacity was nearly exhausted, and that wetland area was out of space.

The district explored a variety of options. Those included converting wetland sites into disposal areas with no environmental benefits; piping dredged materials long-distance toward the middle of Atchafalaya Bay; or mounding the material in the middle of the river, just upriver of a naturally-occurring island. That’s the option they chose.

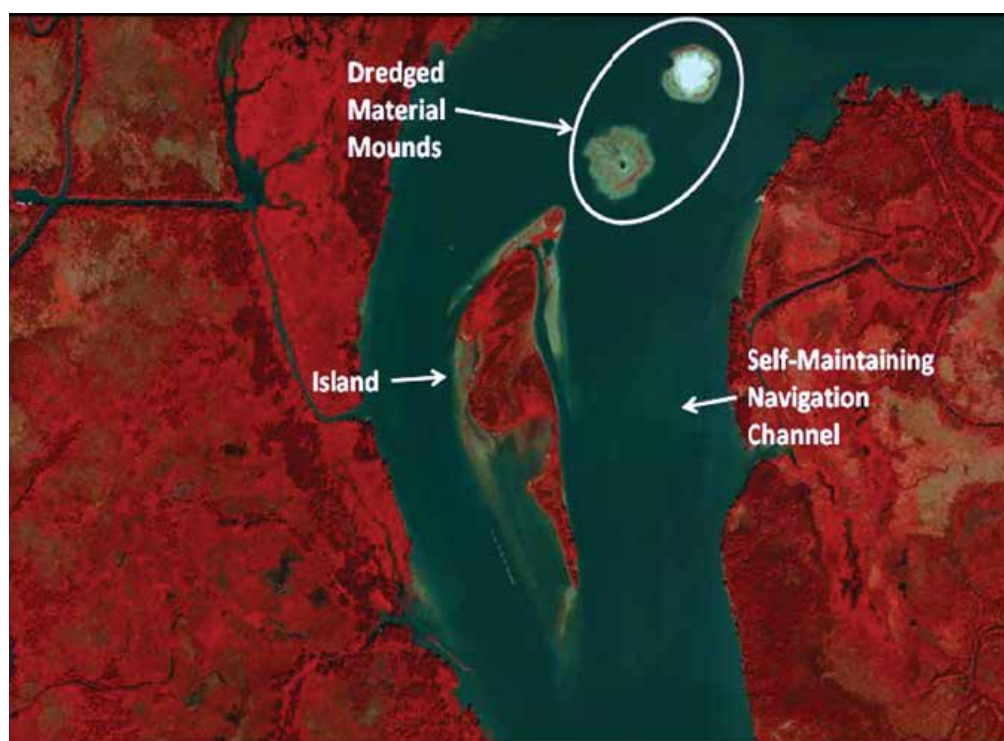
Starting in 2002, through 2014, maintenance dredging used that new protocol as part of a unique study that would examine what would happen if engineers used the river strategically in a way that let its flow help in creating an island the river had already started to form on its own. Every one to three years, between .5 and 1.8 million cubic yards of sediment was placed in the middle of the river until, eventually, a 94-acre island had formed.

Using typical inventory methods, foresters looked at what the river helped to create and learned “it worked even better than anticipated,” says Nathan Beane, research forester at the U.S. Army Corps of Engineers Research and Development Center in Vicksburg. Researchers found more than 80 species of plants, significantly more than 85 percent of those native species. Chinese Tallow, an invasive tree very problematic on other river islands, had not been established yet. The dominant species was willow, and those were supporting several bird rookeries.

“My first visit there, thinking this island was made of dredging materials placed there, I envisioned it not as a wasteland, but as not ideal habitat for wildlife either,” Beane said. “Until we went there.”

Researchers have so far assessed the newly-formed island. They’re now working to compare that habitat with a truly natural island and another built out of dredged material that had not been strategically placed and look for similarities and differences that might guide future decisions.

“The Corps is trying to ensure what they’re doing is good in both an environmental and economic sense,” Beane said. “The end result is formation of more island habitats in places losing islands.”



This diagram shows the location where shoal material dredged from the bottom of the Atchafalaya River to keep a proper navigation depth were strategically placed in a way that would allow the material to attach to, and grow, and existing river island and add wildlife habitat. Initial surveys indicate the intended result was achieved: an island remarkably similar to those developed by nature.



MY MISSISSIPPI

**Col. Anthony Mitchell, 46, commander,
St. Louis Engineer District**

“I grew up with my aunt in a little town called Washington, La., and with my mother in Houston, Texas, neither of which was close to the river, so growing up my experience with water was with the bayou, ponds, creeks, and streams. My first true introduction to rivers and all that rivers provide wasn’t until I became commander of the Nashville District.

“When I look at the context of having a responsibility for 300 miles of the middle Mississippi, from Saverton, Mo., to Cairo, Ill., I’m humbled by the huge responsibility that’s been given to me.

“The St. Louis District’s mission is to improve safety, reduce risk, energize the economy and improve the quality of life for the public we serve in the region and the nation. We have multiple responsibilities along the river: navigation, flood risk management, water supply, hydropower, recreation, environmental stewardship and ecosystem restoration.

“With all of the multiple missions, there is none more important than the other. When I look at the context of what we do and what we have a responsibility of providing, I can look at navigation and the millions of tons and the billions of dollars of commerce that feeds the nation. I can look at the flood risk management projects that protect thousands of lives and property valued at billions of dollars; that’s a huge responsibility. When I look at the 600-plus employees that make up my organization, who are protected by and served by the projects I am responsible for, that context is greater than I can really truly appreciate, unless I take time to think about it.

“There is no greater joy than what I have every morning when I drive over the Stan Musial Bridge, seeing the Mississippi River to my left and right, seeing barge traffic, and communities and industry along the river. I can’t help but think about how I am pretty fortunate to say that I am the Commander of this stretch of the river and the huge potential that the river provides.

“The St. Louis District has a responsibility to protect people from water, protect water from people and make water useful. The river is the means, the selfless source that allows us to do those things, providing for the greater good. It provides a source to move commerce, a source of water supply, a source for energy, a source for habitat, a source for recreation; it’s a selfless, giving thing, and for that I appreciate it.” —R.W.

Gayle Harper knew her story would somehow be intertwined with that of the Mississippi River when, at age 9, from the back seat of a blue and white DeSoto rattling over a high iron bridge, she spotted the river. “I don’t know where we crossed or where we were headed, but all the rest is as alive in me as it was in that

moment,” she wrote in the recently published *Roadtrip with a Raindrop: 90 Days Along the Mississippi River*. “I can smell the river’s earthiness, see the vast expanse of murky water and feel its movement, its power and its mystery. It had me, completely.”

To create the book these many years later, she made a 7,400-mile road trip, following the river’s roughly 2,400-mile course from the headwaters to the Gulf, while keeping pace with an imaginary raindrop

she named Serendipity. The stories of the river and its people are movingly captured via 55 vignettes with titles like “Ghost,” “Encounters,” “The Omen,” “Flying Dreams” and “Chicken and Polkas.” The book is a finalist for *Foreword Reviews’* “Book of the Year,” and she’s in high demand as a speaker on the river’s culture and mystery. Here, she shares some insight into why the book—and the river—strikes such a chord.

What do you think it was that so grabbed you?

It’s something I can only call river energy. It’s a certain openness, curiosity, authenticity and acceptance of people as they are, that you experience with river people and near the river. It’s hard to describe, but it’s easy to feel.

Now to your journey. How did it come into being?

I’d been a travel photographer and writer for 23 years. I’d been sent to wonderful exotic places and got to work with famous people. But nothing has captured my heart like the Mississippi River. Every time space opened on my calendar, I’d stand in front of the map of the river, pick a spot, throw my stuff in the car and go. While I had a growing body of work on the Mississippi River and her people, I was waiting for something to give it bones and structure. One day when researching an article, I came upon a sentence on a National Park Service website. It said a drop of water falling into the headwaters of the Mississippi will follow the river for 90 days to get to the Gulf of Mexico. I felt every cell in my body come to full attention. I absolutely knew what was coming next in my life.

How much of the trip did you plan? How much did you leave to Serendipity?

I sent an email to chambers of commerce and visitors bureaus with a link to my website and said, “This is the project I have in mind. If you are interested in having me stop in your community and you can help with lodging, please let me know.” An amazing itinerary took shape, from a little fisherman’s cabin in the north woods to a trendy downtown loft. There was a tugboat converted to a B&B, a sharecropper’s cabin, a plantation mansion, historic inns and private homes. So, I knew where I would sleep at night, but beyond that, every day was a complete surprise.

Roadtrip with a Raindrop reveals river magic

How did you find the people and their stories?

I would just wander wherever there was pretty light or someone suggested I should go. I met people in cafes, on porches, in farm fields, when stopped for road construction. They invited me to dinner, took me on boats, took me to dances, weddings, birthday parties, neighborhood barbecues. Whatever was going on in their lives, they wanted to share it. People often ask me of a favorite place. To be honest, it was wherever I was at the moment.

Is there a river ‘moment’ that stands out?

That very first day, at the headwaters, I was there before sunrise where the river springs out of Lake Itasca. I was driving very slowly, with windows down and the birds were singing, I came around a corner, and there in the road in front of me was a huge black timberwolf. I would not have known what I was seeing except that a man I’d met the day before had described it to me in minute detail. It stood right there and looked at me for the longest moment. I didn’t breathe. I could feel his wildness and power—everything about him. Then he was gone. Later that day, I met again the man who’d described it to me. He said, ‘People live their whole lives here and seldom see one. I believe this [is] a very good omen for your journey.’ I knew that to be true.

You capture the river’s spirit and culture in your book. Is it an environmental story too?

As you travel this river from north to south and see it change from a pristine, wild and scenic to places where it is polluted and its banks are lined with industrial installations, there’s no doubt it has been abused and changed radically and that it needs our help. If this project can help people see it as one river, I think that’s the most valuable thing I can do. It’s so complex that there isn’t going to be one easy answer for the whole thing. But as people learn a little more about it and feel a little more attached to it, everybody is more likely to do what they can given their perspectives and abilities for the health of the river. It seems to be what I can do.

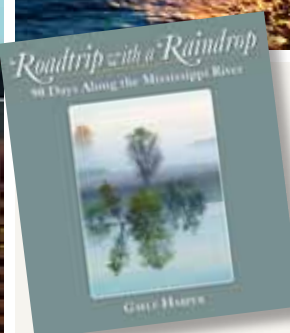
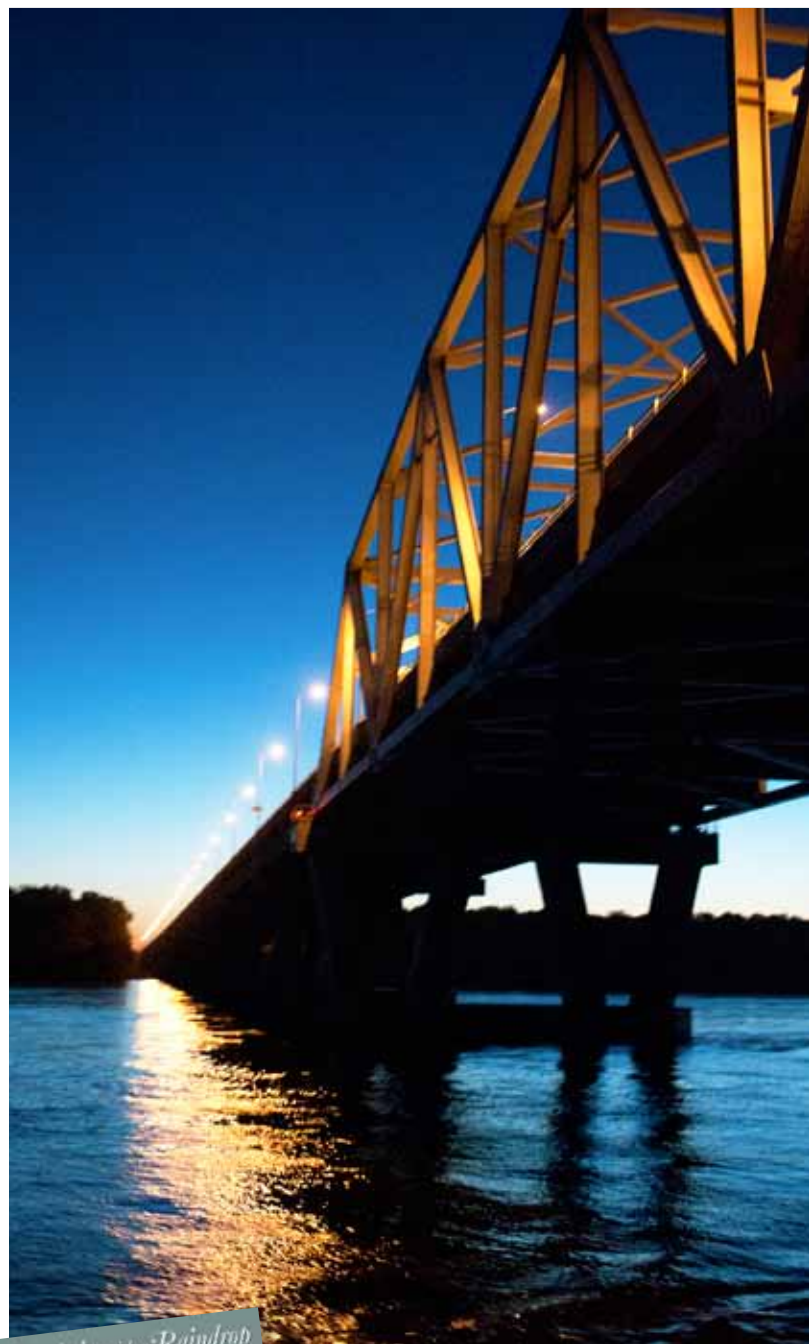
How did you come to see the river as one?

The first time I was on it was in a canoe; it was so tiny I could touch both sides with a canoe paddle. I watched it grow all those miles until it dissolves into the Gulf of Mexico. Not only is it one river, but that river is one part of the entire flow of water in, around and through our planet. As you travel north to south, everything about the river changes – the cultures, geography, agriculture and lifestyles as well as how people make a living and have fun. And yet, you feel that same river energy everywhere. It’s in the people and in the river itself. In some ways, it’s like the feeling you get when you are in the redwoods or by the ocean. It has an incredible presence and power. It’s a miraculous force of nature.

ALL PHOTOS COURTESY GAYLE HARPER.



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Photos are excerpted from this book, available in traditional outlets and via gayleharper.com. Also look for an upcoming video from the 90-day road trip; that features sounds like thunderstorms, Indian drumming, and more.

Corps ranger wins prestigious environmental education award



Corps ranger Dawn Kovarik thanks a student helper in a water safety presentation in Illinois.

When Corps ranger Dawn Kovarik gets a room full of her toughest audience in the regular water safety classes she teaches around Illinois, she goes straight to the scariest message she's come up with for this group. Hint: It's not about drowning. Teen males think they're "bullet proof," she notes, pushing the limits of their abilities in water sports, sometimes experimenting with drugs and alcohol—both tendencies raising the drowning risk.

What works best is this: "being pulled from the water by a rescue

diver does not impress girls." If that isn't enough, she turns to a purple robot named Seamoor, a Corps-built mechanical cartoon-like sea serpent that can dive around hard floors, move its head, blink and speak directly to the public. It's a fun tool for a serious message and just one of the innovations in environmental education that helped to earn Kovarik the Environmental Education Association of Illinois' prestigious Non-Formal Educator of the Year award for 2015. She's the first Corps employee to win such an honor.

But it isn't the award that Kovarik—Interpretive Services and Outreach department lead at Rend Lake, a recreation area boasting 500 campsites in four campgrounds—counts as a highlight of a career now focused on instilling a water safety culture in the lives of students in grades pre-K through fourth.

"One of my biggest feelings of accomplishment was when an 8-year old boy, from a school that we had done water safety programming, saved his grandfather from certain death during a fishing trip, by acting quickly when his grandfather fell from their boat into the water," she said. "When reporters ask him how he knew what to do the young man said that he had learned what to do from the water safety programs that he had seen at his school."

She missed her daughter's first birthday because she was helping to hunt for a missing child who had drowned. That memory is as motivational as anything, she said, to be sure she's creative enough in her teaching that messages stick, that people leave knowing that no one is except from drowning "but with a few precautionary measures, such as wearing your life jacket and learning how to swim, you can improve the odds of survival."

Kovarik and her staff teach on-site at Rend Lake, Illinois' second largest man-made lake and one of five lakes in the St. Louis District of the U.S. Army Corps of Engineers. They also take their message to schools, parades, churches, day care centers, engineering conferences, Walmart and the Pentagon—her session there, a true career highlight. Seamoor may come along as "King Seamoor and the Knights of Water Safety," the sky-bound star of "Seamoor and the Intergalactic Water Safety Patrol or maybe the uber-cool lead of Seamoor's Surfer Safari, or even as Seamoor 'on' Safari.

"I've always been a hands-on learner," she said. "Therefore, I tend to focus my teaching methods on having a lot of visual items that my audience can see as well as touch."

While her work targets all ages, children are her favorite audience, and the younger, the better.

"As Herbert Hoover once said, 'Children are our most valuable natural resource.' They have such a hunger for information. And we must take good care of this natural resource because they will one day make the decisions that will run the world. We must give them a solid foundation with which to make decisions, whether it is concerning water safety or living green and taking care of our great earth." —T.B.



Seamoor, the water-safety robot

KEEP SUMMER SAFE

- Wear your life jacket. It saves lives by keeping you afloat and providing time for rescue. A person who falls in and gasps can inhale up to one liter of water and drown in less than a minute.
- Learn to swim—well.
- Know your limits and abilities, and swim accordingly.
- Never swim into a lake to retrieve objects floating away. Even strong swimmers can experience trouble in a swift current.
- Stay within designated swim areas. Many undesignated areas in rivers or lakes near shorelines, even at Corps lake and river projects, have dangerous dropoffs.

Tips and facts courtesy Vicksburg District, U.S. Army Corps of Engineers. For more information on Corps of Engineers recreation sites and activities visit: CorpsLakes.us



DID YOU KNOW?

The Great River Road
is America's greatest drive,
stretching **3,000 miles** from Minnesota
to the Gulf of Mexico.



River-wide travel website seeks insider input

Under the theory that the best travel advice comes from the people who live there, representatives of the Mississippi River Connections Collaborative and National Geographic Society are traveling the river this summer and early fall, meeting with river residents to find the gems they believe should be part of a first ever river-wide travel site.

The Mississippi River Geotourism Program will feature a MapGuide to the places and experiences most recommended and respected by local people, says Jim Dion, director of Tourism Programs, Maps Division, of the National Geographic Society. The site will be made available to the traveling public in October 2016, and features will allow a traveler to develop itineraries based on geography or a theme and use interactive apps, online maps and various social media platforms to get them there. To date, more than 200 local people have submitted more than 300 nominations to the site. And from July 13 through late October, teams will visit local residents and tourism officials to further develop the site with a focus on sustainable tourism.

The society has so far curated multiple map-based geotourism projects in spots like Sri Lanka, the Bahamas and Portugal's Douro Valley. This project differs from others in that the Mississippi is one of the world's truly great river systems, and the "iconic centerpiece of the American experience," Dion said. "We want to invite people to come explore the heart, soul and nature of the Mississippi River."



SHOAL CHUB AT A GLANCE

Appearance: A small minnow, it has a long snout that overhangs the mouth. Silver in color, it has round black spots on its back and sides. It typically measures 1½ to 2½ inches in length.

Habitat: Found in large rivers, often with continuously murky waters over fine gravel or sandy substrates

Features: Use external taste buds to locate food rather than via sight.

Status: Abundant in the Lower Mississippi but endangered in some rivers including the Ohio.

SHOAL CHUB: MADE FOR THE MISSISSIPPI

Think of Mississippi River fish, and what might come to mind is catfish, the one most likely found blackened or fried on southern river town menus.

But the most common fish in the lower Mississippi isn't the monster blue—or the highly publicized Asian carp. It's the Shoal Chub (*Macrhybopsis hyostoma*), one of the smallest fish living in one of the country's largest rivers. And this minnow is of value for more than a few reasons, says Dr. Jack Killgore, research fisheries biologist with the Corps' Engineer Research and Development Center in Vicksburg, Miss.

"A lot of times you have representative species of certain habitats. The lower Mississippi, because it's such a deep and fast-flowing river with shifting sand waves, is a pretty hostile place for any fish to live, especially one that's two to three inches long at max."

Look closely at a Shoal Chub, and you'll see they have long barbels and external taste buds. Those features, rather than sight, are used to find food. That's more than a little helpful amid the waves of sand that slowly move along the bottom of the fast-flowing lower Mississippi, Killgore notes.

The fact they're thriving is good news for larger fish like the catfish and endangered pallid sturgeon—a couple of the many fish who make meals of the here-abundant chub.

The fact they're thriving is good news for larger fish like the catfish and endangered pallid sturgeon—a couple of the many fish who make meals of the chub. It's also good news for the Mississippi since the particular fish is a good indicator of habitat quality, he said.

"These fish swim in the sand waves eating some of the small insects. It appears the shoal chub is uniquely adapted for life on the lower Mississippi."

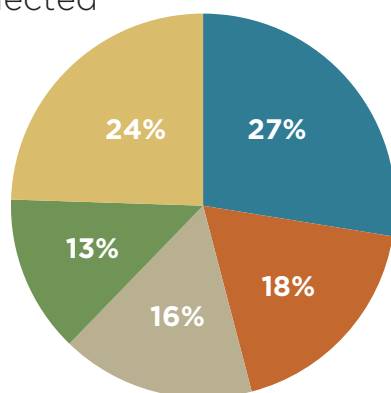
Killgore and other researchers frequently trawl for fish as they conduct river research, generally for the benefit of endangered species like the pallid sturgeon. Of all the species collected during trawling, the shoal chub is the most abundant, unexpectedly so both because it's counterintuitive that such a tiny creature could survive in such a turbulent system, he said, and also because the species is declining to the point of endangered status in impounded areas of other major river systems. If you made a list of the 60 or so species researchers typically collect on the lower Mississippi, however, the shoal chub is often two or three times more abundant than all the others combined.

"It's indicative of the high quality habitat that exists in the lower Mississippi River," he said. "A lot of us who work here, from the Fish and Wildlife Service, Corps and border states, we understand that. We would like for the public to get a better idea of the importance of the lower river in maintaining a healthy fish population. There is a lot of natural habitat left and an unrestricted, unregulated flow regime that maintains the healthy fish populations that exist here. This is a very, very small fish that to me plays a very important part in characterizing the fish community." —K.S.

Lower Mississippi River Species Collected with Trawls

59,630 fish collected

- Shoal Chub
- Freshwater Drum
- Blue Catfish
- Channel Catfish
- Other Species



New lock type proposed to control Asian carp spread

Efforts to contain invasive and voracious Asian carp within the Illinois River, keeping them out of prized Great Lakes fisheries, have now focused on an existing lock at Brandon Road near Joliet. That's a spot where, study leaders say, a single control structure could block Asian carp and other unwanted species from traveling via any of the five ways a species could move from the Mississippi River basin toward the Great Lakes.

The latest report from the Great Lakes and Mississippi River Interbasin Study suggests the construction of a new type of lock never before built. The "flushing lock" would push water in the lock back in the direction from which it came, flushing back fish that might have become entrained inside or pulled with a barge as it entered the lock chamber. Construction costs are estimated at more than \$1 billion as compared to the \$18 billion cost estimate for a permanent separation between the Great Lakes and Mississippi River watershed. LEARN MORE AT GLMRIS.ANL.GOV.

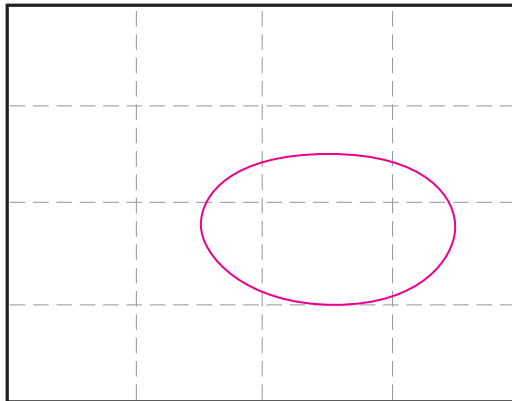
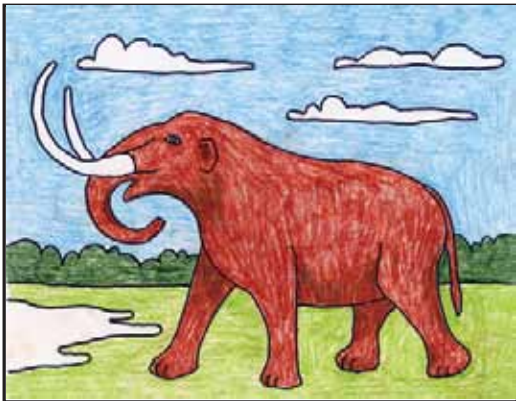


Make 2015 the Year of Fishing

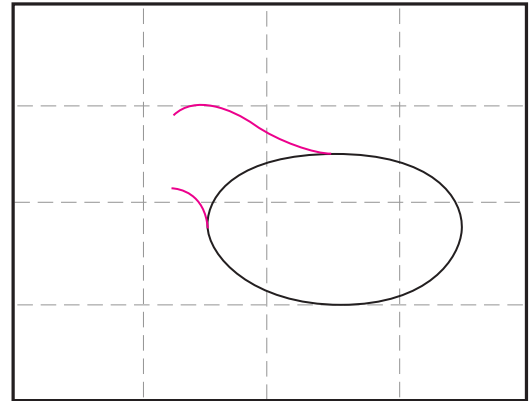
The Mississippi River Connections Collaborative is focusing this year on traditional sports like fishing, in the hope this great way to explore the outdoors continues to be passed down to new generations. Drop in a line, or join others in one of the collaborative's events. MR-CC.ORG

OUR MISSISSIPPI KIDS

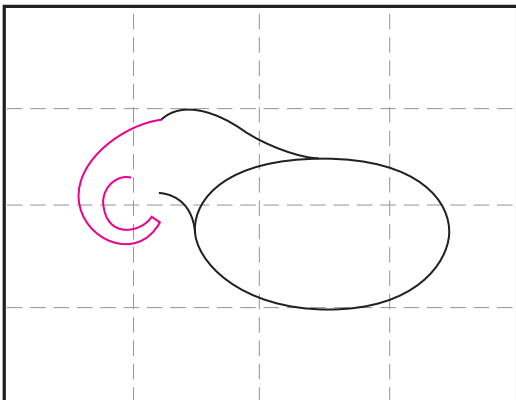
Take one step at a time (and many steps back in time!) to **DRAW A MASTODON.**



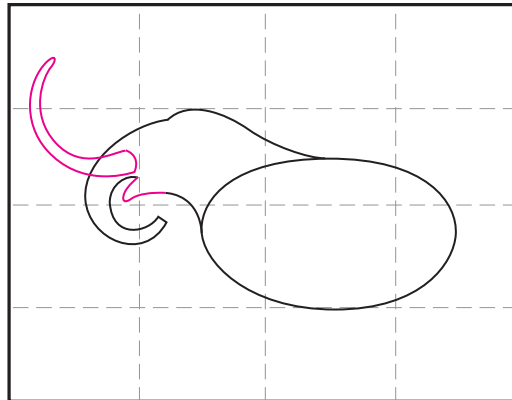
1. Make guide lines. Draw an oval.



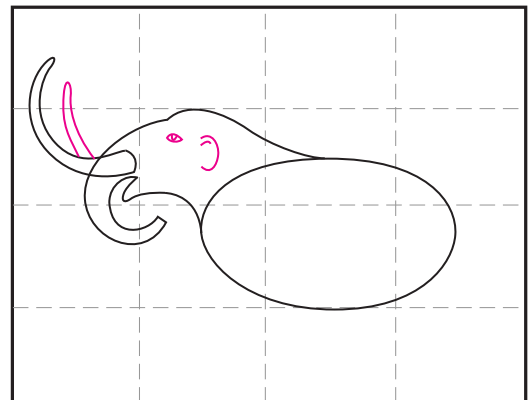
2. Start the head as shown.



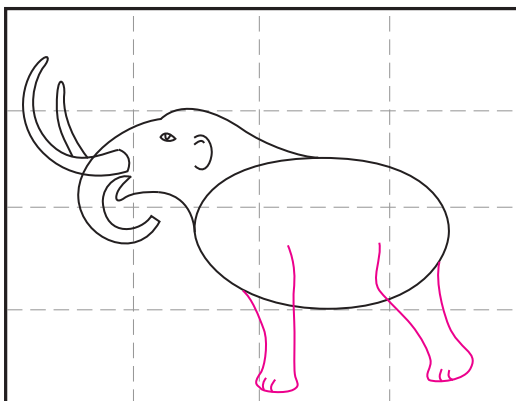
3. Add the trunk, leave space for mouth.



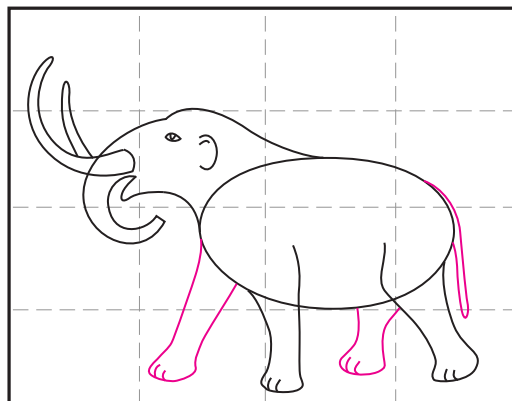
4. Finish mouth. Add a big horn.



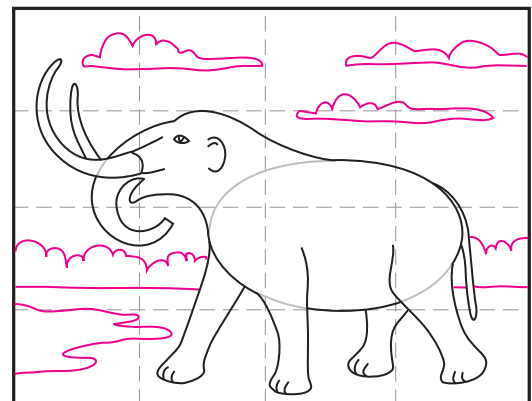
5. Draw back horn. Add eye and ear.



6. Draw two legs as shown.



7. Draw back legs. Add tail



8. Erase gray lines. Add background.

Kids at Carlyle Lake help bring back the monarch

Families from all over the St. Louis area

helped Bring Back the Monarch May 16 at the Visitor Center at Carlyle Lake, Ill. The monarch butterfly population has been declining drastically over the past several years. In partnership with the Illinois Department of Natural Resources and the Butterfly House, the Corps of Engineers team educated kids on the life cycle of the monarch butterfly and their importance as pollinators. Kids were able to take part in educational activities, and helped with planting wildflowers and milkweed in a garden to help attract more monarchs to the area. —R.W.



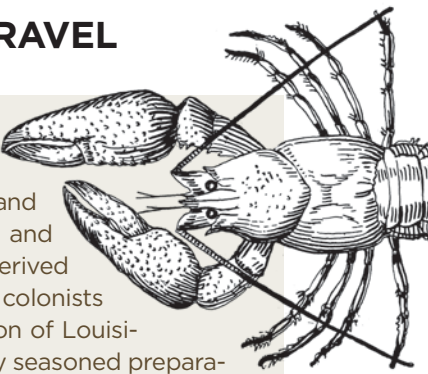
Kim Hammel, ranger at Carlyle Lake, provides cups of native wildflower seeds for kids to help plant a butterfly garden to attract monarch butterflies at Carlyle Lake.



OUR MISSISSIPPI TRAVEL

CAJUN OR CREOLE?

For a quick way to remember the difference between Cajun and Creole cuisine, think city food and country food. Cajun food derived from the Acadians, French colonists who settled in a swampy region of Louisiana called Acadiana. It is highly seasoned preparations of regional foods, served country style. Cayenne pepper, a medley of vegetables, onion, celery, garlic, paprika, thyme, parsley, green onions and bell pepper are some of the key ingredients that provide its distinct taste. Creole culture, according to Louisiana Tourism, stems from 18th-century French and Spanish upper-class settlers in New Orleans who brought their city food take—mainly European sauces, spices and preparations—to the Cajun food they encountered. If you're still wondering, see if the dish includes tomato, a key ingredient in Creole cuisine not typically found in Cajun dishes. —T.B.



River-inspired foods worth traveling for

Antoine's is credited with inventing Oysters Rockefeller, aptly naming the combination of chopped oyster, greens and so much rich butter it reminded founder Antoine Alciatore of the richest man of the day. Antoine's is now rich in history as it celebrates 175 years of business this year as the nation's oldest continuously family owned restaurant, years spent inventing French Creole cuisine and white tablecloth dining and of hosting innumerable special occasions and celebrities like Franklin Roosevelt, Pope John Paul II and the Rolling Stones.

Across Louisiana and in other river towns, you can sample your way through foods rich in both taste and history. Even Bananas Foster, best known by the way it's served with a dramatic (literal) flare table-side, has a story. It was invented at similarly elegant and iconic Brennan's, where, like Antoine's, dining areas double as museums to Mardi Gras traditions. Renovations include a new outdoor room with banana trees and wall murals of 19th century Mardi Gras scenes, but the trademark dessert is made still from the recipe invented in the 1950s when owner Owen Brennan challenged his chef to better use the many bananas shipped into this major port.

As you head up or down the river, try these other foods, iconic in their own way:

Catfish in Vicksburg, Miss., where Rowdy's Family Catfish Shack (60 Highway 27) has been voted best catfish by locals for almost 20 years in the running.

ROWDYSCATFISHSHACK.WEBS.COM

Barbecue in Memphis, Tenn., where pork's the star, and it's hard to go wrong with a choice like ribs at Charles Vergo's Rendezvous. But make plans to attend the World Championship Barbecue Cooking Competition in May; there, even the Memphis District of the U.S. Army Corps of Engineers gets in on the act, pitting their volunteers and team-made secret recipe against entries from around the country. HOGSFY.COM

Levee-High Pie in Kimmsworth, Mo., where the award-winning, Oprah-featured Levee High Apple Pie from the Blue Owl Bakery is made with 18 apples and pays homage to the levee protecting the pretty river town. THEBLUEOWL.COM

Trappistine Creamy Caramels, Dubuque, Iowa, come infused with the spiritual feel of the bluff-top abbey in which they're made by nuns—or maybe it's the sinful richness that makes them so addictive. Buy them at spots like the National Mississippi River Museum and Aquarium. MONASTERYCANDY.COM

Appetizers, hot-dish-style in St. Paul, where the oddly named Psycho Suzi's boasts a sweet waterfront location, docking for boaters and a tongue-in-cheek take on Minnesota potlucks "hot dish" with appetizers like potluck pickle roll-ups. Get even closer via Padelfort Riverboats, which offer Monday picnic lunch and nightly sunset dinner cruises. PSYCHOSUZIS.COM

Oysters Rockefeller, Bananas Foster, Eggs Sardou, the Po-Boy or Muffaletta, the Hurricane and the Sazerac. These famous foods and cocktails are not just ever-present in New Orleans—they were all invented there.

MY MISSISSIPPI

Charles Carter, 33, waiter at Antoine's in New Orleans, celebrating its 175th anniversary

"I actually grew up in the French Quarter, five blocks from the river. My family has always lived along the river, but we never worked on the river. We always worked at Antoine's. A great-uncle of mine was a waiter here for 52 years. My dad was a waiter here for 32 years. This is my seventeenth year. I started at 15 as an apprentice. As a kid I'd come to Antoine's with my dad and eat ice cream out of a coffee cup. I've had uncles and cousins and brothers work here, too, about 16 of us in the last 70 years.

"Antoine's covers a quarter of a city block. We've got 15 dining rooms and fully loaded can serve 1,200 people. In the old days you might work as an apprentice for 5 or 10 years. You had to wait for a waiter to die before you could move up. I'm serving people the same way they would have been served 50 years ago. An apprentice needs to memorize the whole menu—about 80 items (which used to be only in French) and 200 or 300 wines. And we need to memorize all the orders—we don't write anything down, unless there are more than 10 people.

"After Katrina, things changed. We lost a lot of long-time waiters. Now you can make waiter in three or four years. A waiter makes more than twice what an apprentice does.

"Some local families request me personally, and sometimes if I'm not there they'll go someplace else. We have a special relationship. I know how they like their stuff and what they drink. I've served their grandparents, and now their grandkids. It keeps it kind of intimate. But it's nice to serve dignitaries, too. I served President George W. Bush in the months after 9/11, and I served President Carter and his wife on their anniversary.

"The biggest change is computers now that we have to punch orders into. And people don't dress the way they used to. When I started, if you didn't have a jacket, they'd provide you with one. Even if it was crushed velvet, you had to wear it or you didn't eat. Times have changed, but tank tops are still a big no-no. Sometimes shorts slip into the dining room on women, but never on men.

"One waiter has been here 47 years. I hope to be, too. Until the doors close, I'll be rolling. No more floods and no more oil spills and we'll be all right."



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FLOOD FIGHTING & PREVENTION



It takes a region to fight a flood

Record rainfall in Oklahoma and Texas meant record-early flood fighting as rain waters flooded the Arkansas and Red Rivers and barreled toward the Mississippi and Atchafalaya Rivers and Gulf of Mexico.

Intense rain fell daily between May 4 and May 30, bringing more than 10 inches of rain across the entire watershed, 20-plus across northern Texas and eastern Oklahoma. The rainfall was 600 percent above normal. The Corps of Engineers' Mississippi Valley Division assisted its Southwest Division by providing veteran flood flight personnel. The New Orleans District additionally provided a survey crew and drone to assist in dam and levee monitoring inspections. The National Flood Fight Materials Center, located in the Rock Island District, additionally provided assistance.

Through June, the Vicksburg and New Orleans Districts continued to fight floods along the Red and Arkansas Rivers and their tributaries as the Red River at Shreveport crested above 34.5 feet—the highest since the lock and dam system there was completed in 1995. Navigation also was impacted, with some Red River locks closed due to high water. But Corps-constructed flood-control infrastructure prevented a catastrophe along both the Red and Arkansas Rivers. The Arkansas River, which flows into the Mississippi River, expanded from an average of 50,000 cubic feet of water per second to roughly 300,000 to 350,000 cubic feet per second. —R.A.

Testing flood systems—before the flood

Engineers from the Memphis District's Engineering and Construction Division have developed a system that allows them to test the effectiveness of the some 2,000 relief wells installed along its system of levees, tests that can take place without the need to wait for a flood.

To conduct the test, a pump is lowered down the well shaft and water is pumped in at a high rate (500 gallons per minute). By measuring the speed at which the water level drops in the well, the engineers can determine if the well filter is clogged with iron bacteria or sand. If this is found to be the case, the well is cleaned and restored to full functionality.

Relief wells are an important part of the Memphis District's flood risk reduction system on the lower Mississippi and other area rivers. Those wells are vertical shafts installed on the land side of levees built in areas that are prone to underseepage and sand boils. The wells intercept this water that may be seeping from the river and under the levee and provide a controlled outlet for the water—much like a safety relief valve. The wells consist of a screen surrounded by filter material designed to prevent water flowing through it from eroding foundation material into the well. —J.P.

Scan here with your smartphone to go to the *Our Mississippi* website. Here, you can subscribe to our e-edition, read past editions and find river-related education materials.



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