

# Our Mississippi

PARTNERING TO KEEP  
AMERICA'S RIVER GREAT

FALL 2019



## Forming *the* Future

### THE THUNDER OF FALLING WATER

has been reshaping this place on the Mississippi River since Ice Age glaciers retreated 12,000 years ago. For centuries, people have been drawn to the only waterfalls on the Mississippi River for reasons aesthetic, spiritual, recreational, and commercial.

Now, their form and function may change again, as the U.S. Army Corps of Engineers considers their role in the future of the Upper Saint Anthony Falls lock and dam in downtown Minneapolis with a study of the possibility of disposing this federal resource for a potentially new purpose.

At 49 feet, the Upper Saint Anthony Falls lock and dam is the first and tallest step in the navigation system of the Mississippi River. Its spillway protects the last stretch of limestone that forms Saint Anthony Falls, the only major falls on the entire Mississippi River. Without that hard cap, the river would continue its relentless erosion of the soft sandstone underneath, ultimately

### *Lock closure opens a new chapter for the Mississippi's only waterfalls*


collapsing the falls entirely.

Saint Anthony Falls sits in the heart of a Minneapolis historic district, flanked by new luxury apartments, a hydroelectric plant, and an historic stone railroad bridge now used by more than 2 million pedestrians and bicyclists annually. Any future changes here occur amid the history and hopes of many interested citizens and organizations.

Disposition studies are relatively new and rare for the U. S. Army Corps of Engineers, said Nan Bischoff, project manager for the disposition study. Such studies examine what the Corps' presence should be in projects that are no longer serving their authorized purposes. The U.S. Army Corps of Engineers initiated a disposition study of Upper Saint Anthony Falls in 2018, just four years after Congress directed that the lock be closed to navigation, an action that also protected the upper Mississippi River from invasive carp.

Initially, the study also included two lock and dam facilities immediately downstream, Lower Saint Anthony Falls and



 **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.

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**To its region's earliest residents, St. Anthony Falls were by all reports both holy and practical.**

ABOVE: The U.S. Army Corps of Engineers is seeking public input on the future use of a now-closed Lock and Dam site being used for multiple purposes.

Lock and Dam Number 1. However, in the fall of 2018, Congress passed the America's Water Infrastructure Act which directed the Corps to conduct a separate, expedited study of Upper Saint Anthony Falls. That expedited study restarted in 2019, with public comment sessions held in August.

*Bischoff and her team are currently seeking public comments on alternative visions for redevelopment of Upper Saint Anthony Falls and how the human environment, natural environment, and recreation opportunities could be maintained or improved.*

Bischoff and her team are currently seeking public comments on alternative visions for redevelopment of Upper Saint Anthony Falls and how the human environment, natural environment, and recreation opportunities could be maintained or improved. This comment period closes October 20, 2019 and a wide array of interests have already surfaced.

The Minneapolis Public Works Department has expressed concern for maintaining the city's water supply, which depends on intake pipes that lie upstream from the existing dam. An alliance of 18 organizations called the Friends of the Lock and Dam and the City of Minneapolis are advocating a community vision of the falls that emphasizes interpretation of history and place, experiential education, river access, and a trailhead to other experiences. Specific projects being explored include a visitor center, exhibition and events space, food and beverage options, open space, water access, and parking.

"Our vision is to implement the community's vision," said Kjersti Monson, CEO of The Falls Initiative for the Friends of the Lock and Dam. "There is so much constituency around the future of this site and the stories that it will tell. We want to work with the Corps to create

something of national significance. It should be treated as such and protected as such. It should not be in private hands."

"It's a fantastic site with tremendous potential" is how John Anfinson, superintendent of the Mississippi National River and Recreation Area, National Park Service, describes the future of

the falls. "It is one of the most important sites on the Mississippi River. We clearly want to be part of the future of that site."

While Anfinson said the National Park Service has no intention of owning any real estate there, he sees it as one of those places where the National Park Service should be doing interpretation. The National Park Service has been providing visitor management services at the Upper Saint Anthony Falls lock and dam since 2016, connecting with 20,000 people annually over the 110-day summer open season.

Bischoff said she and her staff will use comments to prepare a preliminary draft disposition study report and environmental scoping document. The draft report will describe three alternatives: no action, a disposal option, and a partial disposal option. The public will have an opportunity to comment once it is published, likely by summer 2020. The Saint Paul District of the Corps is working to complete the expedited study by December 2020 and to restart the separate study for Lower Saint Anthony Falls and Lock and Dam Number 1 in late 2020. —D.D.

In his work titled *12,000 Years at St. Anthony Falls*, John Anfinson—a former Army Corps historian, now superintendent of the Mississippi National River and Recreation Area—writes of tribes reaching under the spray to dig clay to decorate pots and canoes. He quotes early missionary explorer Father Louis Hennepin—the first European to see (and name) the falls. He described a Dakota man who offered his beaver robe decorated with porcupine quills to the cataract, praying that he could pass tranquilly—and later kill many buffalo.

By the mid- to late-1800s, the falls would become a pilgrimage site for writers, artists and tourists before becoming the economic engine for much of the Midwest and beyond. It makes sense then that the city of Minneapolis drew its name (*minne*—waterfall, and *polis*, city) from the great river's only falls. Minneapolis became "the greatest direct-drive waterpower center the world has ever seen," Anfinson wrote, particularly from 1880–1930, when it was the milling capitol of the world. Major food manufacturer General Mills is one of many that got its start at the falls—and still remains.

Later, the engineering structures that still stand today—part of the focus of a disposition study—allowed for trade goods to move upriver from St. Paul into Minneapolis ports.

The falls have never had the vertical drop of the more famous Niagara Falls. But they were powerful enough to impress a writer for the *Chicago Daily Tribune* who wrote on June 13, 1864, of coming upon them during the famed Grand Excursion. He wrote:

"[T]he native grandeur and beauty of the scene forces itself upon your heart, and compels you to bow down before the majesty and power of the God whose wrath, perhaps, forced the mighty rocks asunder, piled them in Titan heights upon each other, and sent the rushing waves of the Mississippi over them, roaring down their massive sides, as if in anger at their restraint. We spent three hours on this spot, and never were three hours of our life more pleasantly, and we hope more profitably spent."

It was the competition for greater profits and related near-disaster that initially led to the involvement of the U.S. Army Corps of Engineers in the falls, said Brad Perkl, St. Paul District historian. That district had been in existence just two years when a milling company dug a tunnel below the falls in order to capture water before it went down the falls. When tunneling through the sandstone, the ground collapsed, forming huge sinkholes. People rushed to the scene to plug the hole with rocks as a massive whirlpool was sucking in buildings from along the shoreline. The Corps was brought in for a more permanent fix that included an apron over the falls, originally made of wood and now of concrete. —K.S.

To comment:  
<https://www.mvp.usace.army.mil/MplsLocksDisposition/>



# Turtle project shows promise

**At first encounter** with one, you quickly realize that the fable about the tortoise and the hare did not star a turtle of the smooth (or spiny) softshell varieties.

These species which inhabit large rivers with sandy bottoms and sandbars—the Mississippi among them—have speed on their side. That’s needed since, as the name implies, they have no hard shell to protect themselves from predators and must rely on the ability to sprint their way to safety.

But if they don’t have a turtle’s trademark pokiness, the story of these softshell turtles at least in the middle Mississippi resembles the fate of the tortoises in the fable by the way they’re starting to win the survival race. That’s with a little help from the U.S. Army Corps of Engineers biologists who’ve been improving their nesting sites and monitoring the response.

This year, despite lingering floodwaters that inundated nesting sites, biologists have monitored 197 newly hatched turtles—and counting. That includes 80 hatchlings of the midland smooth softshell turtle, listed as

*The numbers seem to indicate success of a project that has been steadily improving softshell turtle nesting habitat.*

an endangered species in Illinois and a special concern species in Minnesota, Missouri and Wisconsin. That’s well up from the single hatchling caught in 2018.

This year’s unusual weather also offers clues to the methods of adaptation to rising waters.

“This year with flooding, we didn’t think we’d even catch one,” said Robert Cosgriff, the project’s supervisory biologist. “Nesting sites were flooded for several months during what would be normal nesting seasons. Our thoughts were the turtles weren’t going to nest, but when we started catching them it was pretty exciting.”

Biologists think the flooding may have influenced softshell turtles to nest in higher elevation areas not inundated with water during the nesting season, or otherwise to wait until the waters receded.

## Clearing the way for better nesting sites

The numbers seem to indicate success of a project that has been steadily improving softshell turtle nesting habitat. The impoundment of the Mississippi River by locks and dams for predictable navigation depths has led to fewer naturally occurring sandbars, the favored nesting spot. Other threats have been water pollution, siltation from runoff and a commercial fishing harvest, all thought to have contributed to the population decline.

But things started looking up when the Corps of Engineers decided to boost the odds by clearing stands of willows that were blocking sandbar areas favored for nesting.

“We noticed the only sites where turtles were nesting is where sand when all the way down to the water’s edge, and they were concentrating nesting in that areas, which concentrated nest predators,” Cosgriff said. “Coyotes and raccoons were eating the hatchlings. We decided to open up areas and see if we could improve response in the amount of nesting taking place.”

The Corps team has been monitoring five nesting sites at various elevations along Ellis Bay. Two are on the Missouri side, three on a 100-acre island within Navigation Pool 26. That pool is unique in the way that sandbars form naturally in much the same way they once did on the mainstem of the Mississippi.

Numbers have varied significantly from year to year, with 68 smooth softshells caught in 2016, 67 in 2017 and just one in 2018. Spiny softshell numbers, though, jumped from 21 in 2017 to 64 in 2018. This year’s final catch of 80 midland smooth softshell turtles and 117 spiny softshell turtles—most roughly four to five weeks later than normal—indicates turtles have some flexibility and can work around flood events. They’re still waiting to see if hatchlings have enough time to put on fat reserves to survive winter hibernation.—K.S.

ABOVE: Habitat loss is just one factor putting creatures including the midland smooth turtle in peril. The U.S. Army Corps of Engineers’ modification of some of its project lands is showing promise for this and other wildlife species.



## The midland smooth at a glance

**HOME TERRITORY:** They inhabit large rivers and streams where sand or mud is abundant.

**A LONG WINTER’S NAP:** These turtles hibernate November through late March by burying themselves in mud or sand at the bottom of the river or lake.

**THEY’RE WATER CREATURES:** With skin up to four times more permeable to water than that of hardshell turtles, they can die of dehydration if kept out of water for two to three days.

**FUN FACT:** Females are twice as large as males

**BEWARE:** These turtles may look cute with their smooth leathery top and sweet pointy nose, but they can bite with the strength of a snapping turtle.

**IN ACTION:** This short video displays this turtle’s surprising speed: [vimeo.com/32061817](https://vimeo.com/32061817)

# Mississippi River Commission holds historic listening trip

**T**he Mississippi River Commission kicked off its annual inspection trip Aug. 18, its 402<sup>nd</sup> session in a long and tradition-laden visit to hear from the people whose lives depend on the river.

These trips started with the establishment of the commission in 1879, and for 140 years, the commission has made its way up and down the Mississippi River in the MV Mississippi, its traditional way of listening to the needs of local partners and inspecting flood control and navigation projects. The original mission placed upon the MRC has also continued: to lead to sustainable management and development of water related resources for the nation's benefit and the people's well-being. In its current capacity, the Mississippi River Commission is charged with overseeing the comprehensive river management program known as the Mississippi River and Tributaries project.

This year's trip came on the heels of an historic flood event as the Mississippi River watershed experienced the wettest 12-month period in 124 years of record, which is as far back as the records go, and many who spoke before the commission had related tales to tell and suggestions to make.

More than 400 people joined the commission aboard the Motor Vessel *MISSISSIPPI* during the course of the week-long trip, which covered nearly 1,000 miles of the Mississippi River and included stops in Caruthersville, Missouri;

Helena, Arkansas; Vicksburg, Mississippi; and Baton Rouge, Louisiana. In each of these cities, the commission held public hearings during which 75 total partners provided testimony. The commission provides formal responses to every person or group that testifies; the commission then takes what it heard and carries these messages to Congress.

The inspection trip also included two historic engagements. The Mekong River Commission joined the Mississippi River Commission aboard the MV *MISSISSIPPI*. The Mekong River flows across four countries—Cambodia, Laos, Thailand, and Vietnam—which presents unique water resource challenges for these for governments and for the Mekong Commission charged with managing the river for flood control and navigation. The two commissions shared their experiences as well as various ideas for improving water resource management. The Mississippi River Commission plans to join the Mekong River Commission on the Mekong River next year to continue to further this important international partnership.

The second historic engagement was the coming together of five former MRC presidents aboard the MV *MISSISSIPPI*. Lieutenant General and former Chief of Engineers Robert Flowers, Major General (R) Don Riley, Thomas Sands and John Peabody and Brigadier General Robert Crear, joined current MRC President Major General Mark Toy and current MRC member Brigadier General Peter Helmlinger. Between these seven current and former generals, there was more than 200 years of experience as they discussed the daunting water resource challenges that the commission has faced over the last 140 years as well as solutions to the water resource challenges facing the watershed in the century to come.—B.R.

BELOW, FROM LEFT: Members of the Mekong and Mississippi river commissions pose together along the Mississippi. MG Mark Toy responds to testimony before the commission as he chairs his first listening session.



## MRC FAST FACTS

### **An original member of the MRC became the 23<sup>rd</sup> President of the United States.**

Benjamin Harrison served as a member of the MRC from 1879 through 1881. While a member, Harrison earned a reputation of one who was greatly concerned with the legality of federal involvement in flood control.

Flood control advocates in Congress even attempted to have him removed from the commission. Harrison was elected U.S. President in 1888 and served one term from 1889–1893. Oddly enough, his legacy as President stands in stark contrast to his legacy on the MRC. Harrison signed substantial appropriations for internal improvements. During his presidency, Congress, for the first time

except in war, appropriated more than \$1 billion for its annual expenditure, including a healthy sum for improving the nation's rivers and harbors.



### **Two members of the MRC helped design the modern New Orleans drainage system.**

In 1893 Benjamin Harrod (MRC from 1879–1904) and Henry Richardson (MRC from 1904–1909) were named to the New Orleans Drainage Advisory Board. The board drafted the original plans for the city's drainage system. Harrod is also credited with designing the confederate monument in Greenwood Cemetery and for designing the plans and layout of Metairie Cemetery.

### **A member of the MRC was sentenced to death.**

Henry Flad served as a member from 1890–1898. He was born and educated in Germany and served as a combat engineer for the Parliamentary Army during the German Republican Revolution in 1848. After the uprising was crushed, Flad received a death sentence for his role, but he fled to safety in the United States. As a member of the MRC he pioneered the design and construction of the MRC dredging fleet.

### **Two original members of the MRC squared off against each other during the siege of Vicksburg.**

Benjamin Harrod served as the division engineer under Confederate General M.L. Smith and oversaw the preparation of fortifications at Vicksburg. Cyrus Comstock was Ulysses S. Grant's chief engineer and aide-de-camp. Harrod was later taken prison after Grant's successful siege of the Confederate stronghold.

### **Flood protection was always its mission.**

The Mississippi River Commission (MRC) was established by an Act of Congress on June 28, 1879. Congress charged the MRC with the mission to develop plans to improve the condition of the Mississippi River, foster navigation, promote commerce, and prevent destructive floods—perhaps the most difficult and complex engineering problem ever undertaken by the federal government up to that time. Today the MRC, which is headquartered in Vicksburg, Miss., provides water resources engineering direction and policy advice to the Administration, Congress and the Army in a drainage basin that covers 41 percent of the United States and parts of two Canadian provinces.



## Mussel monitoring gives endangered species a better shot

**FOR THREE DAYS THIS AUGUST,** Corps biologist Bethany Hoster and four other experts worked an unusual mission.

As the flow from the Coralville Dam on the Iowa River slowed for some scheduled maintenance, the team followed tiny lines in the sand, looking for spots where mussels perhaps traveled and burrowed into the river bottom. They looked for the shells as well—particularly that of the Higgins eye pearly mussel—to be sure that not one of these endangered mussels had gotten stranded as the water receded. If they did, the goal was to move the mussels to a spot with enough water to ensure their survival.

If the effort that included multiple agencies and searches by foot and boat seems extreme to move a few mussels into deeper water, consider this. Mussels are key to water quality for the way they filter impurities, and Higgins eye mussels were virtually extinct on the Iowa River until their reintroduction some 10 years ago. A “pearl rush” by the button industry, threats to water quality and other factors left several mussels including the rare Higgins Eye on the endangered species list.

Biologists from the Mississippi River released mussels to the Iowa River because it was free of zebra mussels, making it a perfect sanctuary and incubator for more, said Joe Jordan, a biologist with the Rock Island District of the U.S. Army Corps of Engineers. Zebra mussels attach to hard surfaces like shells, rocks or barges and can outcompete native mussels for food sources and also interfere with reproduction and basic behavior. The area below the dam was thought suitable, too, because it was home to the host fish species key to mussel reproduction. Each mussel type has a preferred fish that they attach to, with the Higgins Eye preferring largemouth bass and walleye among others.

Though the monitoring effort began Aug. 6, hydrology specialists started weeks earlier dropping the river level incrementally to give the slow-moving mussels a chance to move into deeper water and to not get stranded. When outflows dropped to 150 cubic feet per second, from the normal flow of 2,000 cubic feet per second, the teams traveled downstream of the dam to find any mussels left on the banks. While the focus was on federally endangered species, they moved any species left stranded into the water as well.

“We didn’t find many mussels completely exposed,” Jordan said. “When the water dropped, we did see mussels in three to six inches of water, and we pitched those into deeper water. It usually gets a little warmer in those shallow areas, plus there’s raccoon predation that we were worried about in the nights. They scurry along the river banks looking for mussels in the shallows.”

**BELOW:** Biologists waded in the Iowa River during a dam maintenance project, moving any stranded endangered mussels to safety.

The team examined the Higgins eye mussels they found before moving them to better locations, Hoster said. The good news, she and Jordan said, was that many found were in the range of three to four years old, an indicator that reintroduction below the dam those years is showing success.—K.S.

### DID YOU KNOW?

At one point, 60 factories were harvesting 21,000 tons of shells near Muscatine, Iowa (today, home to the Pearl Button Museum).



## Fish rescue at the Bonnet Carré

**THERE’S A TRADEOFF** when you’re operating one of the largest freshwater diversions in the world, the Bonnet Carré Spillway managed by the U.S. Army Corps of Engineers. Saving a city from flood control can lead to unintended consequences to everything from oysters to beaches from the infusion of freshwater from a river spillway into the saltier waters of the Gulf. Fish, too, can become trapped.

But several rare, ancient Pallid Sturgeon potentially in harms way by the extended operation of the Bonnet Carré spillway were spared with the help of a group from the U.S. Army Corps of Engineers and partner agencies. The spillway is used to keep river waters below levees downstream including in New Orleans, and it was opened twice during this historic high water year on the Mississippi River, and for a record 118 days; the previous record was 78.

Upon closure, there’s the risk the federally endangered fish previously impacted by the caviar trade and river engineering, could get washed into Lake Pontchartrain, where the high salinity level is potentially life threatening, says Jack Killgore, who led the fish rescue operation for roughly three weeks as the Corps closed the spillway bays and gradually slowed the flows.

The team from the Corps Engineer Research and Development Center in Vicksburg, the Bonnet Carré Field Office, and Louisiana Department of Wildlife and Fisheries captured, identified—and moved safely back to the main river channel—a total of 208 shovelnose sturgeon. That compares to 78 caught during the 2011 flood. They also caught 17 pallid sturgeon, compared to 20 in 2011.

“We had a small army; we were catching sturgeon pretty regularly,” Killgore said. “Then the water shut down in the middle of the second week, the river dropped and stopped leaking through the spillway. That’s when we thought we were going to see major fish kills because of low dissolved oxygen. We were using all these different techniques to catch the sturgeon, and we finally rescued the majority.”

Killgore attributes the differing numbers to timing of the closure. Because of the duration of the flood and need to keep the spillway open longer, the closure happened in mid-summer, when waters are far warmer than during previous fish relocation operations. The pallids stay in the main channel, he said, but the shovelnose moved toward the edges of the river and channel borders where they faced a higher risk of entrainment.

### Watching for fish that endanger

The team also caught and tagged Asian carp, and at least some carp from all five known species were washed into the structure: bighead, silver, common carp, grass and black. Carp have become a serious threat to the river for their voracious eating habits that outcompete native species as well as the way they jump—and endanger fishermen and boaters—when startled. The catch of five black carp including a gravid female of 45 pounds, was particularly telling, he said, and an indicator they’ve likely now become established in the Mississippi.

Among the key initiatives in the 2019 action plan, the Asian Carp Regional Coordinating Committee identified the need to address the growing threat of black carp. That species has a preferred diet of mussels, and many mussel species on the Mississippi are rare and endangered.—K.S.



**FROM TOP:** As the Bonnet Carré spillway slows to a trickle, biologists from the U.S. Army Corps of Engineers and partner agencies ensure no rare Pallid Sturgeons get pulled in by the current and trapped.

# Return of the



Ben J. Novak, Biologist

**In 1806,** while returning from his search for the Mississippi River's headwaters, explorer Zebulon Pike came upon a flock of passenger pigeons so thick "the most fervid imagination cannot conceive their numbers."

Those who witnessed a migration of passenger pigeons reacted with awe and sometimes terror, dropping to their knees in prayer. The rush of wings could sound like a tornado, and a vast flock could take hours or days to pass, leaving the ground covered in white from feathers and dung. Until now, only Hollywood could recreate the scenes that awed those Mississippi River explorers and

settlers; the passenger pigeon passed into extinction barely a century after Pike's account. But what was once the domain of science fiction—bringing back a species that doesn't currently exist beyond preserved specimens in museum exhibits—is currently the real-world mission of a science and conservation team.

The California-based non-profit group Revive & Restore is seeking to bring back the country's most iconic extinct species—and to save others from the same fate—by harnessing emerging genetic technology. The group's stated goal is to see passenger pigeon flocks again on the Mississippi (and elsewhere), even the woolly mammoth (another target species) roaming its original territories. A century after the death of the last of its kind—a pigeon named "Martha"—the passenger pigeon is the flagship species for the ambitious project.

"The project is currently in the laboratory phase," said Ben J. Novak, the biologist coordinating the pigeon project. "We're building foundational science right now. The technological breakthroughs that we have to innovate are certainly achievable in a seven to 10 year time frame."

If the project progresses on the planned timeline, he says, the birds could be restored to the forests of eastern North America within 20 years. That, he believes, will benefit other native species which rely on forest disturbances. Large flocks of pigeons were like a storm and a wildfire for the forests, thinning the canopy by crashing branches and snuffing out understory vegetation with a cover of guano. The regenerating patches of forest provided opportunities for insects, flowering plants and a complex food chain of species. Trees such as the American chestnut, whose nuts were a primary food

of the passenger pigeon and is getting its own restoration effort, require disturbances and young forests for portions of their life cycles.

## **How this might work**

The primary challenge is reproductive technology. Birds cannot be cloned because they lack a uterus for implanting a lab-developed embryo. Researchers are currently working on a complex process to develop culture methods for germ cells with the passenger pigeon genetic code that can be transferred to band-tailed pigeons to breed a new generation of passenger pigeons.

Once the passenger pigeons are hatched, the team plans to use band-tailed and rock pigeons, perhaps painted to look like passenger pigeons, as surrogate parents in simulated forest environments. When subsequent generations of passenger pigeons have begun hatching their own offspring, an enclosed soft release will condition the birds to the wild. Eventually, when the flock is about 10,000 birds, a full wild release will restore the species to their ancestral forests, with researchers supplementing the flock with more reared birds.

## **Ethical (and practical) issues abound**

One challenge for the birds' survival, even if the reproductive technique works, is the fact the habitat along the Mississippi and the country's other large rivers has changed dramatically since the early 1800s. The birds evolved in an environment of vast forests that allowed them to travel to spots where they could exploit large deposits of food, mostly tree nuts.

# Passenger Pigeon

*Scientists seek to bring an iconic species back from extinction and boost the chances of others on the brink.*

"Today the forest is not a large unbroken expanse, and if you had a bird like the passenger pigeon that was looking for big deposits of food, now that would be agriculture," said Stanley Temple, professor emeritus at the University of Wisconsin and a specialist in endangered species recovery. In the 1800s, as farmers settled the eastern and midwestern United States, a flock of pigeons could decimate a crop in a couple of hours, which led to the invention in 1860 of the underground seeder.

"I know how hard it is to bring back an endangered species without going through all the high-tech genetic manipulations. We're not going to have passenger pigeons back in our lifetime."

Though Temple says he doubts today's habitat could ever support the bird in anything nearing its pre-extinction numbers, Revive & Restore's experts disagree. They say they selected the passenger pigeon for its de-extinction model because of its critical role in the forest ecosystem. The rapid deforestation that accompanied the species' demise has halted, with some areas of its ancestral habitat experiencing an increase in tree cover in the past century. As for the birds' potential as an agricultural pest, Novak said modern farms won't be threatened.

"They're not the kind of pigeons that are going to pluck the corn," he said. "They might be detrimental to various fruit crops, like berries, but there are a lot of mitigation strategies already in place for birds."

## From billions to none

As John James Audubon described a migration in his now famous writings from 1813, "the light of noon-day was obscured as by an eclipse, the dung fell in spots, not unlike melting flakes of snow; and the continued buzz of wings had a tendency to lull my senses to repose."

Yet only a century after Audubon penned these words, the last individual was in a Cincinnati zoo, and when "Martha" died in 1914, humans had hunted to extinction the most abundant bird in North America.

The birds' demise has been credited with spurring the conservation movement.

"The pigeon symbolizes the incredible abundance that was the eastern United States," said Joel Greenberg, author of "A Feathered River Across the Sky," the definitive book on the history and demise of the passenger pigeon. "Here the forests could sustain what was one of the most abundant land birds in the world. For that abundance to collapse in 40 years was pretty incredible."

"Modern" inventions of the day ironically contributed to the demise, the telegraph and the railroad giving hunters an advantage that even billions of birds could

not overcome. The telegraph "let hunters know where they were," Greenberg said. "And if you could get it to a rail station, it could be sent to big urban markets. It gave rise to a big group of people who did nothing but hunt the birds all year long."

Their abundance was a cheap source of protein for a rapidly growing nation. Pigeons also graced elite menus. On a visit to the United States in 1842, Charles Dickens was feted in New York with a banquet that included three pigeon dishes. Efforts to reduce the mass slaughter came too late.

"There is a common human attribute that when confronted by an inconvenient truth, people deny the facts," Greenberg said. "People were aware that they were declining. People came up with the goofiest notions to obliterate the truth that human action was causing this."

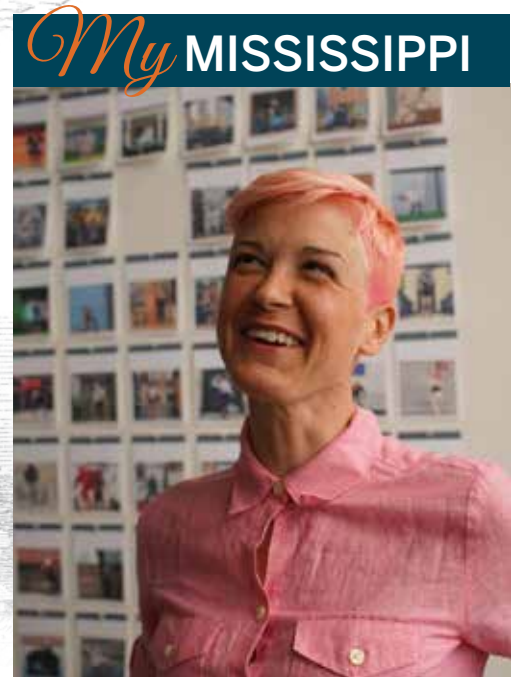
Is there a lesson for today? Worldwide, one million plant and animal species are on the verge of extinction, according to a May 2019 United Nations report linking the losses to human activity. This unprecedented reduction in biodiversity will have grave impacts on human health, food and water security, the report said.

Might the ability to bring back an extinct species make it less urgent to preserve the ones perhaps on the brink? That's one ethical issue being raised about the Revive & Restore project. However, the same technology is being considered as a way to give struggling species a fighting chance. Revive & Restore is working with the U.S. Fish and Wildlife Service to explore the use of the techniques to increase the genetic diversity of the endangered black-footed ferret in the western United States.

That's where gene-editing technology holds the most promise, said Temple. If a species has come close to extinction, genetic diversity in the surviving population may be so low as to imperil recovery.

For example, if the surviving population has no resistance to a certain virus, an outbreak of that illness could destroy the species. A gene for resistance could be found in a carefully preserved museum specimen collected before the population numbers dwindled. Scientists could restore that gene to future generations, giving a recovering population the genetic diversity it needs to thrive.

Novak, who has been enthralled with the passenger pigeon since his teen years, said he is motivated by the ongoing sense of scientific discovery and the positive feedback he gets from people inspired by the project. Ultimately, he thinks of the future for his two young children. "I really want them to have a world that has more life in it, rather than less." —S.F.



**Victoria Bradford Styrbicki,**  
social choreographer and research  
artist for the "Relay of Voices" project

"My Mississippi is a pilgrimage: a 2,400-mile 'Relay of Voices' along the Mississippi River, running and biking 20–40 miles a day with my husband Tom Styrbicki. The river is the spine of our country, and it is taking us through 104 towns where we're listening deeply, gathering voices from the landscape and individual residents of this region, and learning about how they live in the present day.

"Every day, we trade off running or cycling while the other goes ahead in the van, and we spend most nights people's homes. We record interactions, observations and commentary, and we blog and post on social media, but the effort is more about our present experience than future use.

"I practice social choreography, so I'm constantly thinking about how to move a culture, a life, or the social fabric of a community. As a child growing up in Lake Charles, Louisiana, I thought of the Mississippi as just a waterway to cross to get to the other side. It's much more. At its headwaters, it's but a tiny stream one can step across on foot. Then, downriver, it opens up into a vastness where people waterski, boat, fish, and ice skate. There are even islands. Throughout much of the river, from Saint Paul on down, the Mississippi is also this huge navigational channel where another kind of exciting choreography takes place: a dance of barges, where there are all these systems and rules allowing for industrial-scale movement to transpire. In observing and listening to people's actions, behaviors, and rituals across farmland, small towns, and cities along the Mississippi, Tom and I have come see the rhythm of their lives as a story, and telling that story helps to build connection, make meaning and potentially make change. This pilgrimage, like any journey, brings all kinds of coming to knowing, and the Mississippi has all manner of stories to tell. I'm listening."



## The *American Queen* tests new water quality tracking platform

**When high water** on the Mississippi River diverted the *American Queen* onto the Ohio River in August, Thomas Ruby, supervisory hydrologist with the U.S. Geological Survey, was delighted. Normally, this one-of-a-kind, steam-powered beauty plies the Mississippi River, taking 400 passengers per trip on overnight cruises along the full length of the river. But this year's rerouting brought the vessel to his doorstep at the U.S. Geological Survey's Ohio-Kentucky-Indiana Water Science Center in Louisville, Kentucky, earlier than usual. There, he and the *American Queen* engineers installed an innovative device that will one day improve water quality monitoring on the Mississippi and across the nation.

This project has been made possible by a unique partnership between the U.S. Geological Survey, the American

The mobile “super gage” collects water temperature, conductivity, pH, dissolved oxygen, and turbidity.

Queen Steamboat Company, and the Mississippi River Cities and Towns Initiative, a coalition of local mayors that promotes economic and environmental security and stability along the Mississippi River Corridor. In just eight months, these partners formulated an idea and developed, installed, and tested a prototype. The mayors of the MRCTI hosted the formal launch of the mobile “super gage” at their September 16 annual meeting in Memphis.

“It’s really an interesting project and a great partnership,” said Shelly Hartfield, project marketing manager for the American Queen Steamboat Company.

Ruby and his team created the prototype of the mobile “super gage,” which was designed as an expansion of the U.S. Geological Survey’s national network of 10,000 fixed water monitoring gages. It is the first device to measure water conditions from a moving commercial vessel.

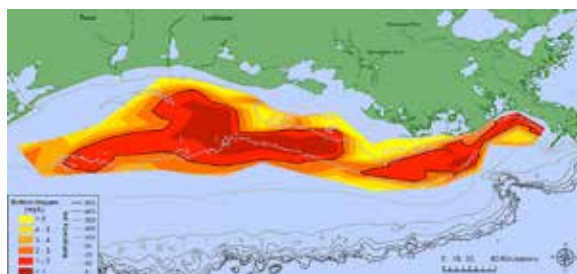
“What would happen if you took the advanced scientific data-collection capabilities that are the foundation of a USGS “Super Gage” and made it portable and easily mounted on almost any boat?” Ruby said. “You’d get an innovative way to better define the water-quality processes at work on the Nation’s inland waterways.”

“Our first task was to determine if it was feasible,” he said. To make it happen, they had to design nonstandard

equipment that would work while a boat was in motion. Instead of pipes extending off the boat into the water, the team came up with a flow-through system that pumps water into the boat, over sensors, and back into the river. The sensor unit is located back near the boat’s paddlewheel.

Since Louisville, the *American Queen* has been measuring water quality every five minutes wherever it travels on river or in port. The results are reported back to the U.S. Geological Survey via satellite and made available to the public on-line. Guests on the *American Queen* can even view the measurements in real time from a special kiosk in the Chart Room.

“We have seen no issues to date with maintenance,” said Gary Frommelt, vice president of marine operations,



American Queen Steamboat Company. “We just keep an eye out for debris around the intake. The U.S. Geological Survey takes care of equipment if there is a problem.”

The mobile “super gage” collects water temperature, conductivity, pH, dissolved oxygen, and turbidity, just like other U.S. Geological Survey gages. In addition, it measures nitrate plus nitrite, an indicator of the river’s nutrient load and a key indicator of water quality. Excess nitrogen and phosphorus create a hypoxic or “dead” zone in the Gulf of Mexico, where each summer dissolved oxygen levels become too low to support fish, shrimp, crabs and other sea life.

While the fixed gages measure all the water that passes by from upstream, the mobile “super gage” tags water quality data to a specific location which may pinpoint problem areas. Continuous real-time water-quality data are used for decisions regarding drinking water, water treatment, regulatory programs, recreation, and public safety.

The future for the mobile “super gage” looks promising. The initial results from the first 600 miles of prototype data matched the data from the standard gages. “We see ourselves putting sensors on all of our boats,” said Hartfield. “We believe other companies and those who love the river will help preserve it too.”—D.D.

## My MISSISSIPPI



**JimBob Allgood**

TV personality and tour operator with Redneck Adventures TV Group and Miss-Lou Tours, Natchez, Mississippi

“My Mississippi is my life. It’s my own personal Disney World. It’s my playground. I love it. I was born on the River in Natchez and learned its ways from my parents, who were best friends with Cajuns from Ville Platte, Louisiana, who had this motto: “If it had fins, fur, fangs, or feathers, if it swam, crawled, ran, or flew, we chased it, caught it, and cooked it in a big black pot.” That was my childhood, and that’s still my life. For 20 years I have been blessed to run Miss-Lou Tours and Redneck Adventures, a nationally syndicated cable show with YouTube channels, two Roku channels, and two Amazon Fire TV channels. It all started when we won the “Pitch to America” contest on Jay Leno’s Tonight Show almost 15 years ago. Since then, we’ve taken folks on tours and “Redneck Renewal Retreats,” where we go kayaking, skeet shooting and even catfish catching. We use small fishing bows and arrows to shoot jumping Asian carp, too; that’s a blast by the way. Sometimes in the backwaters we see 60–100 eight- to 12-foot-long alligators in one day. The river might look mild, but it is mighty and wild and deserves respect.”

### FUN FACT

#### How did Waterproof, Louisiana, get its name?

During one of the Mississippi River’s great floods, the people of one rural community read a newspaper report indicating that everything in the region was inundated “except one waterproof knoll.” When the flood subsided, the community relocated to that knoll and took the town the name Waterproof. Years later, the name of the town led to the embarrassment of a reporter covering yet another flood when he reported a local tragedy under the headline “Four Waterproof People Drown.”

# RIVER PANORAMA RESTORED



In the 1850s the Mississippi River was very much in the 'Wild West.' It was a faraway place. Songs were written about the 'Mighty Mississippi.' It was a major thoroughfare for discovery with all the military, scientific and fur-trading expeditions. There was adventure and the unknown. People were bringing back images that nobody had ever seen," said Melissa Wolfe, curator of American art at the St. Louis Art Museum.

Wolfe was standing before *Panorama of the Monumental Grandeur of the Mississippi Valley*, a 350-foot-long, 90-inch tall painting commissioned in 1850 and representing 25 sometimes larger-than-life scenes depicting ancient and then-current activities. But this popular museum exhibit was no mere painting.

Before the Civil War it toured the eastern United States as a traveling show. As scenes were unrolled under dramatic lighting, a narrator recounted dramatic tales of history, danger and intrigue for a full three hours, with intermission. Adults were charged a quarter, children, 12 cents.

"Believing in 'Manifest Destiny' was what you were supposed to do if you were an American citizen then. The Mississippi was a symbol of that," Wolfe said.

The rolled canvas, painted long before American art was considered worthy of display in fine museums, has spent much of its life in storage. Last summer conservators at the St. Louis Art Museum completed their eight-year restoration of the roll.

"Panoramas were incredibly popular and entertaining. They would be like the Imax movies of the 1850s," Wolfe said. "There were lots of them. One of the most popular topics in popular culture in the United States was the Mississippi River.

"Then, a few years before the Civil War, the panoramas just fell out of being popular. They were big and heavy. People weren't making money with them. Most of them were cut down—a single scene would become a painting—or they were thrown away. We are very lucky because this is the last extant panorama we know of that is of the Mississippi."

This panorama was painted by Irish-born John J. Egan in Philadelphia. He died in 1882 and the panorama was donated to the Penn Museum at the University of Pennsylvania, where it long sat in basement storage and was later shipped to St. Louis. After the painting's centennial celebration, it stayed, when neither side wanted to pay return shipping. The fact the work for a long time wasn't seen as "art," was a boon to the museum, says

Claire Winfield, one of the conservators who repaired sections and splotches of paint that were damaged during the panorama's years of travel and century of storage. "After they fell out of favor, the ones that weren't thrown out and destroyed would be in museum basements, a community center or somebody's home."

The Panorama has a permanent home in the St. Louis Art Museum's grand entrance and Sculpture Hall. To minimize damage, new scenes will be rolled into view only a few times a year. As Winfield, who grew up along the Lower Mississippi in Baton Rouge, would painstakingly match colors and strokes, she said she also often contemplated the river's enormous role in American history.

"This is such a very interesting part of pop culture that we haven't learned about in normal art history classes. To have a piece like this still with us is great. It is a big draw still because it is so large and is in a prominent place. It is probably one of the most viewed paintings in our collection." —R.S.

**SEE IT:** The Panorama is displayed in the Sculpture Hall of the St. Louis Art Museum in Forest Park. It also can be seen on the museum web site: [SLAM.ORG/COLLECTION/OBJECTS/841/](http://SLAM.ORG/COLLECTION/OBJECTS/841/)



ABOVE: Staff of the St. Louis Art Museum painstakingly restore a 350-foot long mural commissioned in 1850 and representing scenes like the early native settlement of Cohokia (TOP PHOTO). The mid- to late-1800s were a heyday for Mississippi River art. Among other notable artists of the day was Henry Bosse, a cartographer and photographer with the U.S. Army Corps of Engineers.

## My MISSISSIPPI



**Kathe Hambrick, founder, curator, and former executive director of the River Road African Museum in Donaldsonville, Louisiana and director of interpretation of the West Baton Rouge Museum in Port Allen**

"My Mississippi is a place of memories. It's a river of danger, of beauty, of tears. My first serious encounter with the Mississippi River was in 1991 when I moved back to Ascension Parish from Southern California and stood atop the levee in front of the Tezcuco Plantation. As I gazed at the river's dark waters, I just had a very sad recollection of what it must have been like for enslaved people brought up the river from New Orleans to the plantations in this area.

"I began to think about how frightened and lonely they must have felt, missing their families, missing their homeland in Africa, being put on slave ships, crossing the Atlantic, coming up through the Gulf of Mexico, and becoming part of the slave trade. Knowing that these people had contributed so much to the economy and culture of Louisiana, the nation, and the world, it made me feel so deeply saddened that their stories, and the horrific truth of what had happened here, were still being swept under the rug. But by meditating and looking at the river, I realized that we must regard the pain and suffering of the past and then look beyond it in order to heal ourselves as Americans. So I set out to create a healing restorative space for the visitors and descendants.

"Our museums voice a comprehensive narrative that also honors the contributions of the Italian, French, Spanish, Cajun, Native American, and Jewish people of this region of River Parishes. There's nowhere in America like the communities of South Louisiana up-river of New Orleans where the cultures are so blended. I often remember that day, looking out at my Mississippi, that beautiful dangerous river of memory. More than two decades later, I'm still telling its stories."

# Falling for **fall color**

**What colors do you imagine these leaves will turn in fall?  
Color them with crayons or markers.**

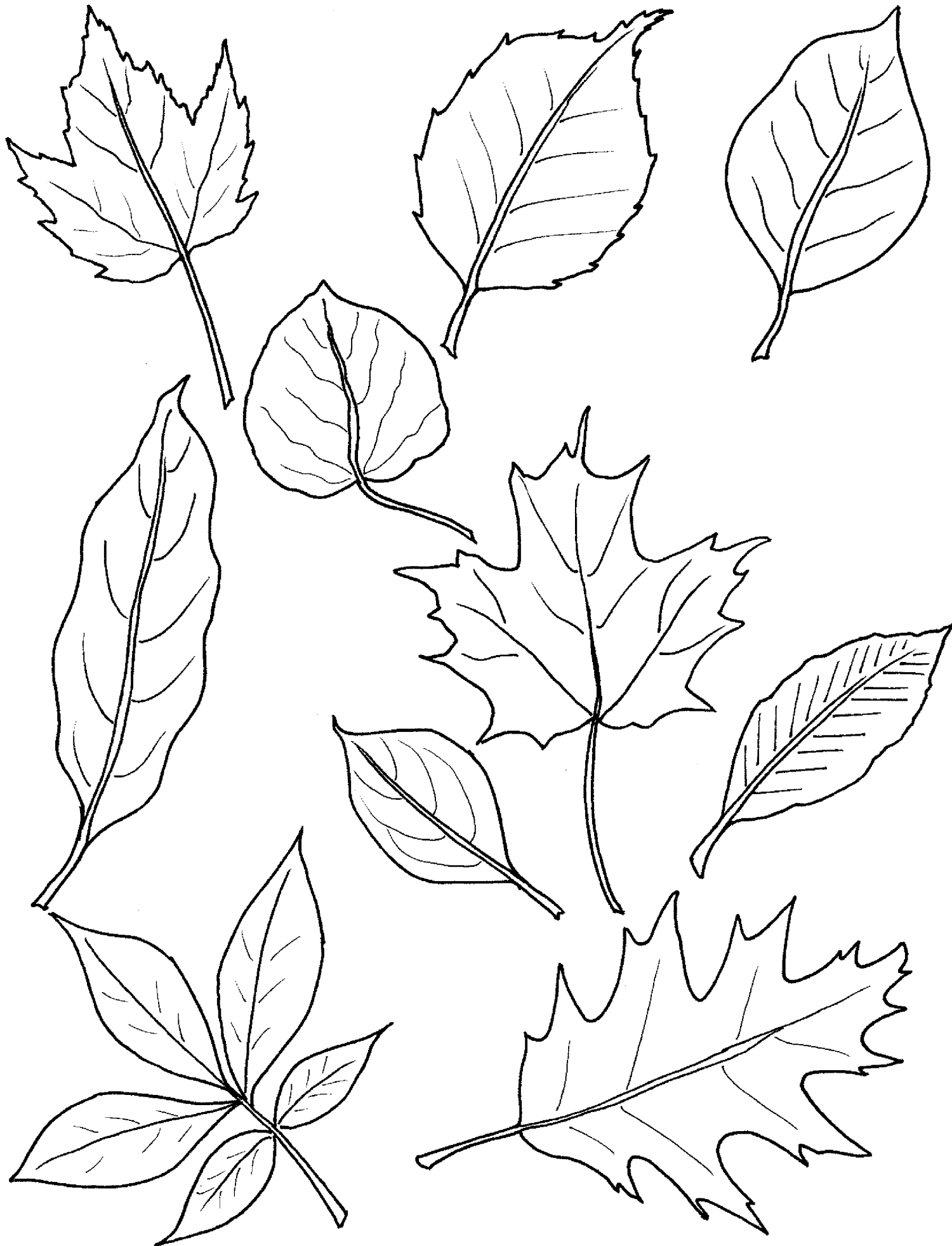
## THE CHANGE OF SEASON

from summer to fall brings with it cooler weather, shorter days, and the changing color of leaves. Fall foliage, composed of radiant reds, brilliant oranges, stunning yellows, and everything in between, seems like magic in its transformation. But this is a magic that can be explained with some simple understanding of what leaves actually are.

Plants, like every other living thing, need to eat, but they are special in that they have the ability to make their own food. Leaves are in charge of this important task, utilizing the sun's energy to produce carbohydrates (plant food) using a special chemical called chlorophyll. Chlorophyll is a green pigment – which explains the color of leaves during spring and summer. As winter approaches, the days become shorter and plants prepare to stop food production. This means that the chlorophyll breaks down and other pigments in the leaves that are yellow and orange are no longer masked by the green and become easier to see. During this change, other chemicals can be produced that have a red or purple pigmentation. Additionally, the breakdown of chlorophyll and other waste products can produce a brownish color. The mixtures of these pigments produce the brilliant colors we see in fall.

Different trees have different amounts of red, orange, yellow, and other pigments which explains why certain trees, such as maples, turn yellow and red, while other trees, such as oaks, turn a reddish brown. Plants will eventually drop their leaves in order to prevent frost damage and save energy for winter.

So while fall foliage may have more to do with food than with magic, it is still a wonder to behold every year! —INSIYAA AHMED IS A PARK RANGER WITH THE RIVERS PROJECT OFFICE OF THE U.S. ARMY CORPS OF ENGINEERS.



**Find more science learning fun at the Corps' National Great Rivers Museum in Alton Ill.**



This powerful mural, three miles north of the St. Louis Arch, shares a story of one Mississippi River Underground Railroad crossing site to freedom.

## OUR MISSISSIPPI TRAVEL

# The Great River Road to Freedom

**“This is a high-risk activity,”**

says Dr. Noelle Trent, Curator of the National Civil Rights Museum in Memphis. “The ground, the environment, or even the very sky can be both an ally and an enemy at the same time. A full moon is a liability.”

She’s speaking of the Underground Railroad, a network of “stations” and “conductors”—safe houses and helpers—which helped and hid escaped slaves as they fled north to freedom. An assortment of related sites and museums lie up and down the Great River Road and are available for a poignant, and important, visit.

“With the convenience of travel today we lose the understanding of how difficult and dangerous this is,” she said. “People have to really use their imaginations.”

In a cellar across town, two blocks from the Mississippi River, visitors to Slave Haven Underground Railroad Museum get that opportunity.

“It’s quite an experience to stand in the actual space where they huddled and waited until they were given the signal it was safe for them to leave and dash out to the river,” says Elaine Turner who operates the museum as well as Heritage Tours, a company that highlights African-American history. The museum’s home is the Burkle Estate, the 1856 home of a family of German immigrants who helped hide runaway slaves.

The Fugitive Slave Act in 1793 made it punishable to assist or even turn a blind eye to a runaway, and another such act in 1850 made it even stricter. Still there were untold many—freemen, abolitionists, and Native Americans—who took the chance to help those who had the courage to risk it all.

As they fled under cover of darkness, only the stars and the river could guide them. “Rivers were the main arteries that took people to freedom,” says Turner.

## Gateway to Freedom

Dred Scott, the slave who sued for his freedom and reached the Supreme Court to lose in the infamous Dred Scott Decision, first addressed the courts in the Old Courthouse in St. Louis, not far from the present-day Gateway Arch. With the Free State of Illinois right across the river, many fled Missouri through here.

Help was to be had in St. Louis. Mary Meachum and her husband, Reverend John Berry Meachum—both former slaves who had purchased their freedom—founded the First African Baptist Church in St. Louis and provided a safe house in their home. (They also operated a “floating school” on a river boat to circumnavigate a state law prohibiting

education for black people.)

On the night of May 21, 1855, Mary helped a group of freedom runners cross the river. Unfortunately, five were caught and Mary was found guilty of assisting them. The Mary Meachum Freedom Crossing Site lies riverside along the Mississippi Greenway, three miles north of the Arch. A visitor’s center features a colorful mural and is staffed by graduates of the Urban League’s Save Our Sons program.

## Alton, Illinois

Though the covert network would eventually be called “railroad,” the practice pre-dated trains. As early as the late 18<sup>th</sup> century, slaves were fleeing to Canada. When some states abolished slavery, fugitives had a closer border to cross. One of the first “Free State” stops was Alton. Some found their way into nearby free black communities, while others continued north.

Situated in a former safe house, Alton Museum of History & Art contains abundant artifacts and documentation of the town’s role in the Underground Railroad. In 1837, the Illinois Anti-Slavery Society met for the first time in Upper Alton Presbyterian Church, and later in The Old Rock House, both a block from the museum.

In the local cemetery is a monument to Elijah Lovejoy, a minister and publisher of an abolitionist newspaper. When a pro-slavery mob came to town to destroy his printing press and materials, he died in a shootout and became a martyr for the abolitionist societies to rally around.

Alton Hauntings Ghost Tours may sound like something suited for Halloween, but the three-hour tours mix an abundance of local history in with supernatural legends. A farm implement dealer, Nathaniel Hansen, built a sub-basement in his home and a brick-lined tunnel that allowed people to move in and out unseen. Today that tunnel only extends 20 yards to the street, but the ghost tours bring you inside and let you experience the darkness the fleeing slaves endured.

The Underground Railroad is an important thread in the story of this river, and we will never know how many found freedom or died trying. But the larger story that they all shared must never be forgotten, and these places along the river will preserve the story for future generations. —K.R.

# 3 REASONS TO LOVE The Natchez Balloon Festival

In the sweet Southern hamlet of Natchez, Mississippi, October 18, 2019 marks the 34<sup>th</sup> anniversary of the Natchez Balloon Festival, filling an already lively town with three full days of brilliant colorful fun on a bluff overlooking the Mississippi River. Visit musts:

## WATCH THE WEATHER

When conditions are right, 50-70 hot air balloons will soar over the Mississippi River creating an awe-inspiring sight and balloon pilots make two flights each day over the three-day weekend.

## SEE THE GLOW

At the Balloon Glow Event, pilots shoot flames into the balloons after dark.

## BET ON A BEAN BAG

During the Hot Air Balloon Bean Bag Toss, balloon crews compete by dropping bean bags from their balloon baskets to try to hit a target on a Mississippi River barge, as part of the Great Mississippi River Balloon Race. —J.T.



## River Road African American Museum

In 1868, in Donaldsonville, Louisiana, Pierre Caliste Landry became the first black mayor elected in the USA so it is fitting that the River Road African American Museum is located in his city. Housed in the former home of educator Sylvia Watkins, the museum examines the experiences and contributions of African-Americans throughout the rural parishes along the Mississippi. The journey to freedom is a component of the exhibits as well.

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## Sleep like a Mississippi River pirate

Until about the 1820s when steamboat travel increased, the Mississippi River had its share of notorious pirates, some of whom would locate themselves along isolated frontier settlements, lure passing boats by posing as farmers with goods to sell, and

steal livestock, cargo and slaves.

Now, travelers can try their hand at playing pirates themselves in a way by staying on a pirate ship turned Airbnb, docked at a Mississippi River in St. Paul, Minnesota. The ship was originally commissioned by a Disney resort then purchased by a Minnesotan with a flair for fun.

The ship is decked out with cannon balls, swords, coins, pirate themed DVDs, bottles of rum and more, mostly collected from the owner's trips to the Bahamas. There's a limit for four people for an overnight, up to 20 for a pirate party. The owner told the *Star-Tribune* about his mission: "We all know people who are struggling. The ship helps us laugh at it briefly ... Pirates were in pretty bad shape, but they seized the day and just went for it."

PAUL LEVESQUE



## Rock Island Arsenal offers new way to tour

Those curious about the Rock Island Arsenal can now take two self-guided virtual tours with the help of new brochures produced by the U.S. Army Sustainment Command History Office. The brochures

with QR codes that connect to smart phones offer instant information on 31 sites on the arsenal and 31 weapons and vehicles on display.

The links take visitors to summaries of the site being viewed as well as photos and infographics, and all was designed to help tell the story of this historic installation on a Mississippi River island between Iowa and Illinois.

The brochures are available at locations open to the public around the installation, including the Visitor Control Center at the arsenal's Moline Gate, the RIA Museum, the Colonel Davenport House, and the Mississippi River Visitor Center operated by the Rock Island District of the U.S. Army Corps of Engineers. A box containing the brochures has also been set up at Memorial Field.

## Gulf Hypoxic Zone smaller than predicted

The churning winds of Tropical Storm Barry were good news for the size of the 2019 low-oxygen area (hypoxic zone) of coastal Louisiana waters this summer. Predicted to reach 8,717 square miles in size, this ocean bottom area was 6,952 square miles, approaching the land area of New Jersey.

"Without Tropical Storm Barry, this year probably would have been the largest hypoxic area ever measured," said Dr. Nancy Rabalais, senior research professor at Louisiana State University who has been mapping the hypoxic zone since 1985. Storm winds in the week before the annual survey temporarily mixed oxygen back into lower water levels.

The hypoxic zone forms when nitrogen and phosphorus carried downstream from agricultural lands fuel rapid growth of microscopic plants and animals. When these creatures die and drop to the ocean floor, bacteria consume them, using all available oxygen.

Rabalais and her team also measure the physical, chemical and biological parameters of the water column and link the size of the hypoxic zone with conditions in the Mississippi River watershed. The collected data also help scientists refine the predictive models that forecast the extent of the hypoxic zone in a given year.

Send story ideas to [editor@ourmississippi.net](mailto:editor@ourmississippi.net)

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### Questions or Comments:

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

Insiyaa Ahmed, St. Louis, Mo. 636-899-0076	Katelynn Dearth, St. Louis, Mo. 636-899-0086
Vanessa Alberto, St. Paul, Minn. 651-290-5388	Angie Freyermuth, Rock Island, Ill. 309-794-5341
Kevin Bluhm, New Orleans, La. 651-290-5247	
Elizabeth Burks, Memphis, Tenn. 901-544-0761	

### Mailing list changes:

Andrea Sterling, 651-290-5664

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### Contributors this issue:

EDITOR/ LEAD WRITER Kim Schneider	CONTRIBUTING WRITERS Insiyaa Ahmed Debra Dietzman Sharon Flesher Brian Rentfro	Kevin Revolinski Rick Stoff Janis Turk
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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.