

# Our Mississippi

PARTNERING TO KEEP  
AMERICA'S RIVER GREAT

SPRING '16

## As the river flows

Freak winter flood has many wondering, 'What's next?'

**RENEE AND WAYNE SCHROEDER** arrived home after work the night before New Year's Eve to find their mobile home caught in the swirling, rushing waters of the Big and Meramec rivers near Eureka, Missouri

The Riverbend mobile home park, on the southwest edge of the St. Louis metropolitan area, was being ravaged by a surprise flood that eventually would make its way down waterways to the great Mississippi River and then from St. Louis down to New Orleans.

"Propane tanks and tree logs were floating in the water, and tires... and a deck floated down the road," Renee Schroeder, 50, said. "It seemed like everything was coming our way. The motorcycles were bouncing in the water.

"It was very weird, everybody was shocked," she said. "C'mon, it's winter. You're not supposed to have floods. You're supposed to have ice storms."

The Schroeders weren't the only ones surprised by a ram-paging frigid flood that roared through the Mississippi River watershed over the Christmas holiday and beyond, catching

millions of people in small towns and urban centers alike off guard. Even before the flood ended Feb. 1, the U.S. Army Corps of Engineers began assessing damage to prepare for spring

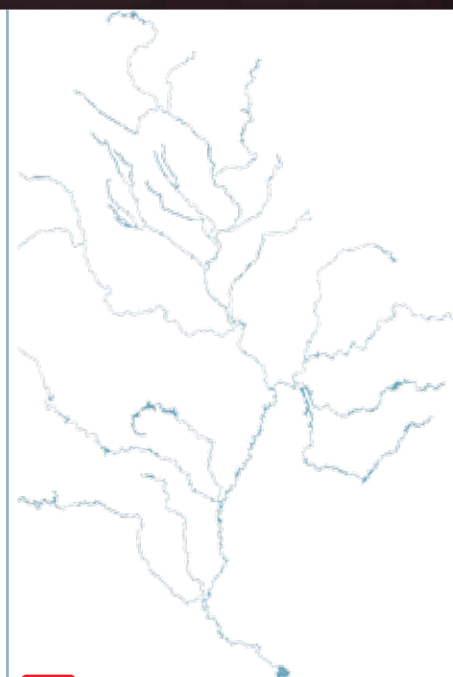
flooding. City officials wondered in public press conferences: Is there a way to be ready for the next assault by increasingly temperamental rivers? And what useful technology tested this time can help in what's still to come?

The flood that sprang up on the Schroeders smashed all-time river records at five places on the Meramec, a tributary. It also broke records in Cape Girardeau, Missouri, where the concrete floodwall held, and in Alexander County, Illinois, where flooding chased farm families onto rooftops. The Mississippi at the Gateway Arch in St. Louis crested at the third highest level on record. Thousands of homes and businesses were destroyed or significantly damaged by floodwaters, and the flood killed more than two dozen people, mostly motorists crossing streams in Missouri and Illinois.

Parts of three interstates had to be shut down in the St. Louis area, and Amtrak service was suspended. The cost of the disaster is expected to top \$1 billion.

On the plus side, the federal levee system performed as it was intended, saving millions of people from the hardships of flooding, said Bob Anderson, spokesman for the Corps' Mississippi Valley Division. The Corps opened its Bonnet Carré Spillway near New Orleans for only the 11th time since it was built in 1931. The spillway prevented flooding of New Orleans, while the system lowered pressure on the levee system and

*Continued on page 2 >>*



 **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.





helped the approximately four million people who live in the floodplain between Cape Girardeau south to Memphis and Baton Rouge to New Orleans.

The Schroeders had moved to their trailer park with their daughter, granddaughter and two dogs from a home up in the hills on “God’s Mountain.” The night the winter flood struck, they and their neighbors borrowed two jon boats to rescue pets and family members. One boat was leaking and had to be corked, so the neighbors hurried, ferrying back and forth, because they didn’t know how long it would hold out.

The next few days, cars lined up as people dropped off donations at Central Baptist Church in Eureka. The Schroeders and hundreds of others whose homes were uninhabitable picked up food and supplies—from Lysol and mops to Barbie dolls and warm woolen sweaters. Downstream, volunteers donned heavy coats and mittens for sandbagging. Governors called out the National Guard, and state prison inmates helped.

Linda Thorne, 60, of Jefferson County, Missouri, remembers: “It rained and rained; the rain would not go away.”

On New Year’s Eve, Thorne fled her trailer home in rising flood waters and took

## *On the plus side, the federal levee system performed as it was intended, saving millions of people from the hardships of flooding.*

refuge in an American Red Cross shelter at the First Baptist Church in Arnold, Missouri. Around midnight, neighbors pounded on her door, yelling, “You have to leave.” The next day, she said, “I saw my neighbor who had lost everything — and all we could do was cry.”

Thorne’s shelter was one of 15 the Red Cross opened in Missouri and Illinois that by Jan. 6 served 22,662 meals and snacks and provided 693 overnight stays—just one example of the way volunteers helped.

Bill Frederick, a National Weather Service meteorologist working with the Corps, said a record-tying El Niño weather pattern brought the relentless rains that contributed to the massive flooding. Over four days starting Dec. 26, between 9 and 14 inches of rain deluged the southern plains and Midwest states. What does that bode for the rest of this year?

“When we’ve had this weather pattern in previous years, with strong El Niños, we’ve had significant river flooding in the spring,” Frederick said, “but we can’t predict for sure.”

What is not disputed is that the holiday flood will be “the new benchmark for river flooding along the Bourbeuse and Meramec” rivers southwest of St. Louis, the National Weather Service says. Catapulting toward the Mississippi, the Meramec’s flows wreaked havoc on St. Louis suburbs. In the city of Pacific, Missouri, homes and buildings looked like little islands in a sea of brown muddy water. In Fenton and Valley Park, the flood inundated wastewater treatment plants, shutting down operations and sending raw sewage into the river.

In Eureka, heavily flooded Joe Boccardi’s Ristorante used a mobile truck and a tent outside while the restaurant was being repaired. “Joe is on the go,” the

CLOCKWISE FROM LEFT: *A railway bridge gets swallowed by the Meramec River. Highway 61 in Ste. Geneviève abruptly ends. Gravois Road, vanishing into the Meramec. Linda Thorne’s mobile home.*

PHOTOS:

ads said. “Come hell or high water, we’re serving pizza, salads and appetizers in Eureka.”

James and Peggy Harris of Valley Park evacuated their home, fearing extensive damage as in past floods. However, this time they were thrilled that the Valley Park levee completed in 2005 did its job and their house was protected.

“The levee cost was pretty high but it was worth it,” James Harris, 61, said.

In Alton, Illinois, an “army of volunteers,” including high school students, helped build a 1,000-foot wall in 24 hours, said Mayor Brant Walker.

“Had we not put up the wall as quickly as we did, we would not have saved downtown,” he said. “I don’t know how we did it, but by the grace of God, we did it.”

Alton was proud of its new—and successful—floodwall design. It was also the first time, Walker said, that he’d sandbagged in snow, noting: “We faced not only the river; we faced the elements.”

“Doing it Again. Beating Ole Man River” was the rally cry for Ste. Geneviève, a historic Missouri town filled with French colonial charm, when the Great Flood of 1993 struck. This time,

Ste. Geneviève was aided by a new federal levee. It performed beautifully, said Sandra Cabot, tourism director at the Great River Road Welcome Center in town.

South of Ste. Geneviève, the iconic Highway 61 made famous by Bob Dylan suddenly stopped and disappeared. It was swallowed up in Mississippi floodwaters for miles and miles after breaches in the farm levee. At nearby St. Mary, the Mississippi swamped a bank, the post office and homes that are usually 5 miles from the main channel.

South of Cairo, at the foot of Illinois, the Corps’ Mississippi River and Tributary System of flood control took over. Anderson called it “the biggest, most successful flood system in the world.” About 600 Corps employees battled the flood up close; about 400 worked support jobs.

The Corps reached out to the public using more in-person visits, texts and social media.

“People on the front lines used smart phones to put together clips on how a sand boil is managed, on how a levee slide is formed,” said Anderson.

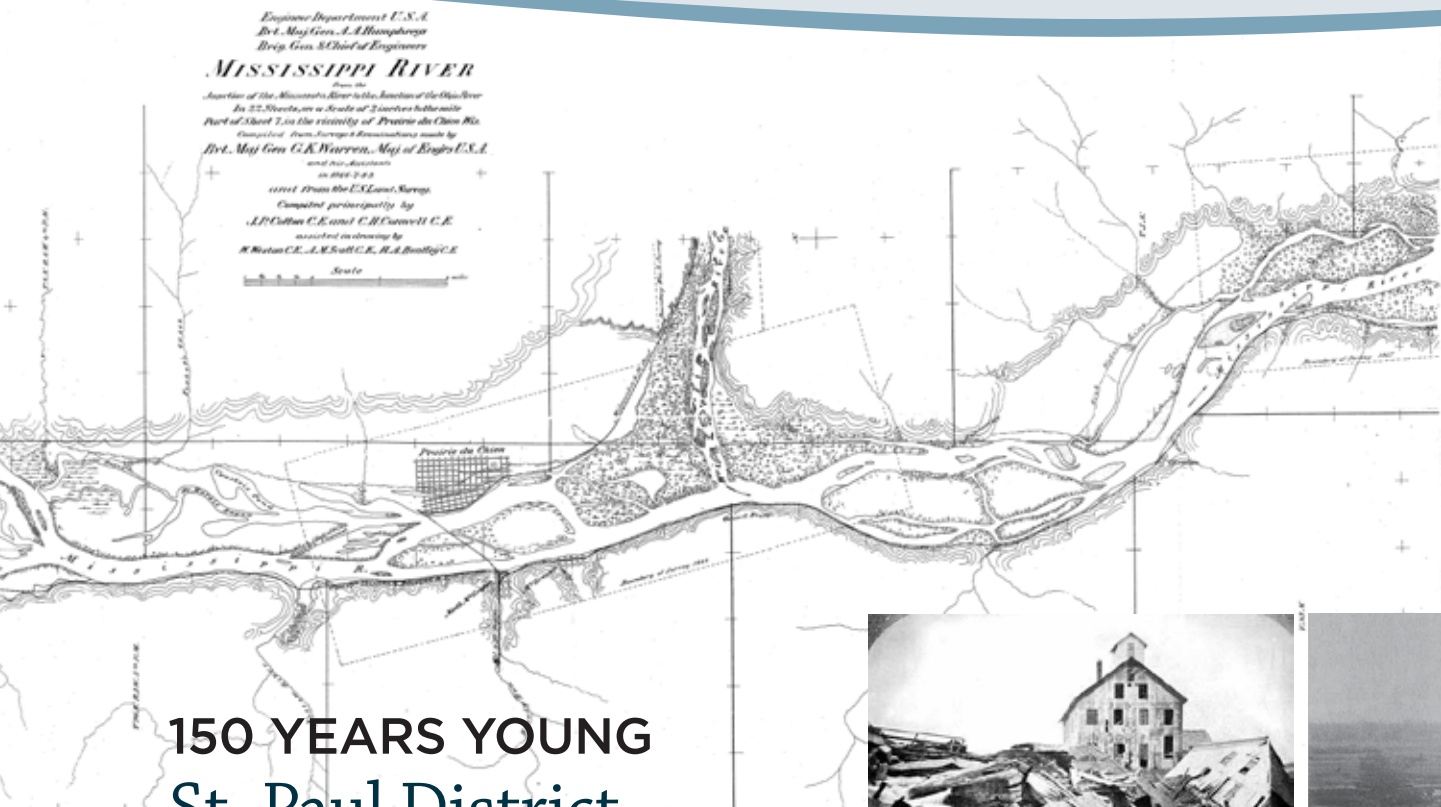
Mayors in the Mississippi River Cities and Towns Initiative also shared information in an unprecedented way, passing information to colleagues down river on what worked when the flood reached their city, and what didn’t.

“We find ourselves in a new normal that requires we adapt to increasing frequency of storm events,” said Mayor Hiram Copeland of Vidalia, Louisiana, the Initiative co-chair.

For Renee and Wayne Schroeder life, like the river, rolls on.

They have replaced the insulation, water pipes and carpets in their trailer. They only hope they won’t have to go through this again this spring. —M.G.





## ST. PAUL DISTRICT *by the numbers*

- 280** length in miles of Mississippi River the district maintains
- 100,000** day users come each season to the Pine Lake reservoir system, one of six run by the Corps in the headwaters region
- 139,000** square miles covered by the district
- 10,600,000** tons of commodities carried through Lock 8 in 2015

## 150 YEARS YOUNG St. Paul District commemorates a century and a half of evolving missions

**M**ajor Gouverneur Kemble Warren was a soldier volunteer, better known for his skill in carefully mapping the country's growing West and its mighty Mississippi River than for his battle prowess. But the young engineer's eye for topography proved key to a strategic win in the Battle of Gettysburg.

The West Point graduate was dubbed "Savior of Little Round Top" for the way he protected and defended that strategic position, even with a bloody wound to his neck. And he would soon turn that eye for strategy and topography toward the country's center.

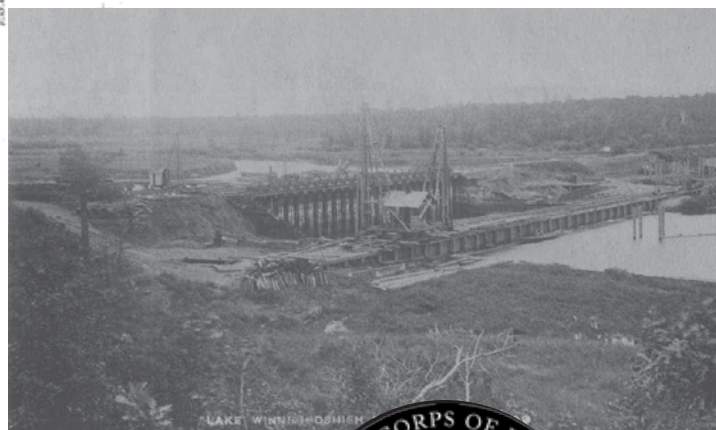
There, the growth of industries like lumber and grain led to calls for safer ways to carry goods via the then-natural and often shifting Mississippi River, and the government turned to the U.S. Army Corps of Engineers and the soldier/surveyor to help from a base in St. Paul, Minnesota.

In 1866—some 150 years ago this August—Warren reported for duty in St. Paul, Minnesota, with orders to set up an engineering office. As a first mission, he was to create and maintain a navigation channel of at least four feet in depth between St. Paul and St. Louis. From there, the district moved on to challenges as diverse as building the first roads in Yellowstone National Park and the country's first national dam with a hydroelectric plant.

And as the navigation industry grew quickly more sophisticated, the district would build and maintain locks and dams needed to keep a nine-foot channel depth required by today's more sophisticated tows. Flood control became a mission too, with the district credited with the nation's first non-structural flood control project, in Prairie du Chien. They'd eventually be called upon to restore fish and wildlife habitat and develop some of the Midwest's most popular recreation areas.

"When you think about it, I would say the history of the St. Paul District is the history of the Upper Midwest," says Vanessa Hamer, a district historian. "It is all connected, all tied into the river and economics and social trends of the Midwest."

Just three years after the young officer arrived, the Corps was called upon for engineering help in the midst of an unusual emergency. Two mill owners were digging a



ABOVE, FROM LEFT: *A river map, created by Brig. Gen. Kemble Warren, the district's first commander and an early chronicler of the middle west. St. Anthony Falls, creating havoc, after the 1869 Eastman Tunnel collapse that had residents turning to the new U.S. Army Corps of Engineers for engineering help. Experimental Winnibigoshish Dam, authorized in 1880, tested construction methods using earthen embankments that would be used on the rest of the particularly remote system to provide consistent water flow through the navigation system. By the late 19th century, this early settlement attracted the region's first tourists.*

tunnel across the river near Nicollet Island as part of their expansion plans but, before they finished, the tunnel collapsed. The district rebuilt and secured St. Anthony Falls—structures still in place today.

In the late 1880s, the attention turned to the north as the U.S. Government sought a longer-term solution for keeping river levels navigable, even in times of drought. In 1884, the district completed America's first reservoir on Lake Winnibigoshish, located near Deer River, Minnesota, and more would follow. The logbooks of reservoir tenders of the time read much like those of similarly isolated lighthouse keepers, Hamer says. Mentions of wind chills of 50 below were not uncommon, or notes about sharing hammers with a keeper of the next reservoir over.

Eventually word got out about how great these reservoir areas were for fishing, hunting and nature time. "Dam tenders had people just coming and knocking on their doors and saying, 'Can we put our boat in? Go fishing? Put our tent up? Go hunting?'" said Ray Nelson, a retired park ranger. "Even gangsters showed up to get away from the hubbub of Chicago."

In 1944, Congress passed a law that gave the Corps official permission to manage resources for recreation. Flood risk management duties followed, and as the public's environmental awareness grew, so did that of the Corps, and more active restoration and regulatory missions followed.

"As the Midwest progressed and developed and changed over time, that's reflected in the district," Hamer said. "That's the only way you can move forward—keeping your eye on what's come before you." —K.S.



### Birthday Open Houses

The district is hosting several open houses and celebrations throughout the year, including one in Fountain City (April 29), site of a 1937 "Boatsman's Ball" and where today key channel maintenance equipment is headquartered. Other open houses on May 13 and July 9 are being held in conjunction with popular fishing events: the governor's May 13 fishing derby at the Sandy Lake recreation area and on July 9 at Lock/Dam 6 in conjunction with July's Catfish Days. A July 16 open house will include a tour of Lock and Dam 1, site of the nation's first hydroelectric plant at a dam, in conjunction with Highland Fest. Watch for details on the district's Facebook page for details about the big Aug. 16 birthday celebration. [FACEBOOK.COM/USACE.SAINTPAUL/](https://www.facebook.com/usace.saintpaul/)





CRITTER FEATURE: THE CANVASBACK

## Restoration Program key to species comeback

It was the entree of choice for the Victorian elite, often served after a first course of oysters and bowls of terrapin soup. *The New York Times* named it the “gastronome’s favorite fowl.” And while George Washington was said to prefer his with a chafing dish of hominy and good bottle of Madeira, President Benjamin Harrison said back in 1890 that he liked finding his on a brisk morning in the marsh.

But for the canvasback ducks of the Mississippi River flyway, popularity among the day’s rich and famous was a dubious—and near disastrous—honor.

“Before we had a lot of regulations on migratory waterfowl, market hunters would kill large numbers at a time, box them and sell them to restaurants in the east or Chicago,” says Mike Griffin, Mississippi River Wildlife Biologist for the Iowa Department of Natural Resources. “The canvasback was the Mississippi River duck.”

In the early 1900s, the river’s duck was nearly hunted to extinction. The population rebounded with passage of the Migratory Bird Treaty Act of 1918, which empowered the federal government to set seasons and bag limits on the hunting of migratory game birds. In the 1930s, a series of droughts brought another population crash, and they’re at risk today from declining wetland habitats. But glance over Lower Pool 9 near Ferryville, Wisconsin, at the height of spring migration, and you’ll see that something is different at this stopover point as the Upper Mississippi River corridor has more than 80 percent of the continental population of canvasbacks annually migrating through.

For one, the navigation pool offers their favorite food source, in abundance. As one piece of the just-completed \$9.4 million Capoli Slough restoration project, part of a broader Upper Mississippi River Restoration (UMRR) program, biologists and engineers have restored the traditional river landscape of backwaters and islands, previously eroded by wave action. That has

allowed restoration experts to propagate plants like wild celery—so dear to the canvasback that the species is named after the plant. Other food sources support fish, turtles, frogs, mink and more.

“A lot of the projects are based on trying to get more vegetation into the river, and that’s really good for the fall and spring migration for ducks on the Mississippi River,” Griffin noted. The Harper’s Slough restoration project in Pool 9, now being constructed through the UMRR program, will further expand vegetation by slowing wind and wave action, allowing for even more of the starchy tubers that help diving ducks put on fat and survive their migration routes, he said.

Some canvasbacks spend the winter in the Chesapeake Bay, others in the Gulf of Mexico. But what’s been striking is to see what’s happened over time in the river pools offering migration staging areas, says Mississippi River biologist Brenda Kelly of the Wisconsin Department of Natural Resources. She works in partnership with other agencies to conduct population surveys by both ground and plane. What she sees on a peak migration day is “more birds than you can possibly imagine.”

“There are so many birds, it is one continuous raft,” she said, “and you could almost walk across the lower pool on the backs of cans!”

A typical November migration count day might bring 250,000 canvasback ducks to a survey area—and that’s just on a sampling as she counts by sections as she scans from the plane. One day in 2011 when the migration was hit just right with a flight count, the number exceeded 700,000, though that was unusual.

“There was a point in time you didn’t see the numbers you do today,” she said. “But now we’ve opened the food buffet for these birds, and that gets them to stick around here, not departing until freeze-up.”

“We consider this one of our ambassador species,” she says. “If you look in terms of what might get someone to drive to the river to see—be it through binoculars or looking down the barrel of a shotgun—the canvasback ranks high on the list. It’s the king of the ducks.” —K.S.

## THE CANVASBACK *at a glance*

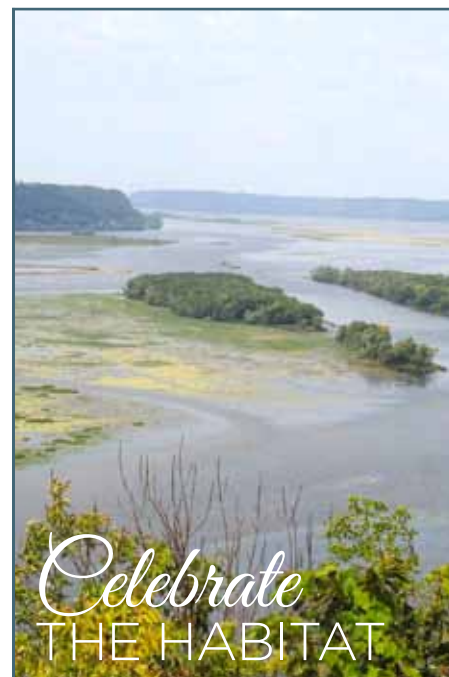
**LOOK FOR:** a large, sleek duck with long, ski slope-style bill. The males sport a deep, rust colored head, canvas-colored back and black chest, while the head and backs of females and the young are more brownish.

**THEY ARE WHAT THEY EAT:** The species name, *Aythya valisineria* comes from the name for wild celery, *Valisineria americana*, whose winter buds are the

preferred food during the non-breeding period.

**POPULATION TRENDS:** Low levels in the 1980s put the canvasback on special concern lists, but numbers have increased greatly since.

**FIND THEM:** Overlooks abound, as do canvasbacks and other migratory waterfowl, in open areas above the dams in Pools 7, 8 and 9.



A May 13 dedication program will be held for the Pool 9 Slough restoration program, created under the authority of the Upper Mississippi River Restoration program, a cooperative effort of the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Wisconsin and Iowa Departments of Natural Resources and local interests that uses 30 years of science data and restoration innovation to boost habitat and ecosystem health. FOR MORE: [WWW.MVP.USACE.ARMY.MIL](http://WWW.MVP.USACE.ARMY.MIL).



## Raising the grade on the Upper Mississippi

When the Mississippi River's watershed got its first report card via America's Watershed Initiative last year, the Upper Mississippi River basin made the honor roll of sorts, measuring highest of all six sub-basins. But even the C it earned as part of the overall basin grade of D+ leaves plenty of room for improvement.

Finding ways to raise the grade is the focus of the 9th annual Upper Mississippi River Conference slated for Oct. 13 and 14 in the Quad Cities. The conference is jointly sponsored by River Action, The Nature Conservancy, Western Illinois University, Exelon, Waterways Council, Inc., Hanson Professional Service, Inc., HDR Engineering, Stanley Consultants, and the Illinois Corn Growers Association. It will feature sessions by river experts as well as collaborative discussion about ways river citizens can help raise the grade in all the broad areas measured: ecosystems, economy, recreation, flood control and flood risk management, transportation, water supply and Gulf hypoxia.

"Receiving an overall grade of D+, the Mississippi watershed faces many interconnected challenges," said Kathy Wine, executive director, River Action, Inc. "A working conference is a necessary step in developing a shared vision, to identify and form partnerships, and to advance solutions in the



Upper Mississippi and beyond."

The grade card idea emerged from the 2010 America's Inner Coast Summit, launched with leadership from The Nature Conservancy and the U.S. Army Corps of Engineers. The multi-year analysis included participation from some 700 experts across the entire watershed—parts of 31 states and 41 percent of the continental United States.

No basin scored an overall A or B, but the Upper Mississippi River basin scored relatively high in areas like recreation (due to popularity of hunting and fishing licenses), healthy stream-side habitat and water abundance. Of more concern were low scores in water quality, infrastructure maintenance and population change in floodplains, a factor that creates a higher level of flood risk. MORE: AMERICASWATERSHED.ORG.

For information about the 9th annual UMRC: RIVERACTION.ORG

### Abby Urban, Lead Keeper, National Mississippi River Museum & Aquarium, Dubuque, Iowa

"I grew up near LaCrosse, Wisconsin, a river and college town like Dubuque, and animals have always been my passion. Now I help manage the living collections department at the museum and aquarium. All of our six keepers—also called aquarists—need to be very well rounded. We are the eyes and ears of the department, looking out for medical concerns, prepping food, coming up with enrichment projects to stimulate animals or adjusting temperatures and lighting to facilitate breeding. It's an all-encompassing job because we care for well over 300 species of fish, birds, reptiles and amphibians.

"I can't name one animal I'd select as a favorite. But since 2007, I've been involved in increasing the population of the critically endangered Wyo-

oming toad and want to see it succeed. In seven years we have released more than 35,000 tadpoles into the wild. That sounds really, really big, but think about what one trout or bass could eat. Still not many make it to adulthood to breed.

"For us it's not an option to display animals only for entertainment. We want to help out a species and contribute to its success. Extinction is a scary thing: It's permanent.

My husband and I and our two kids live just outside a nature center in a green subdivision. It's what I've always wanted for my kids, to be out in nature. My 6-year-old daughter told me a story about a spider at school that somebody was going to smooch, but she was the one to get a cup and take it outside. That warms my heart."

### MY MISSISSIPPI



## PARTNERING ON subsidence 'superstations'

LOUISIANA has lost in coastal wetlands the equivalent area of the state of Delaware since around the 1930s, when scientists first began documenting coastal subsidence, or the gradual sinking of its marshes. Today, Louisiana wetlands are vanishing at the rate of one football field an hour, faster than any other spot in the world, and that process increases the likelihood of flooding and damage from storms.

But while the loss rate is a well-accepted fact, there are many holes in the research on the hows and whys. A partnership between the U.S. Army Corps of Engineers, Tulane University and others, under the auspices of the Mississippi River Geomorphology and Potamology Program, is working to close gaps in the understanding of subsidence of the Delta at a particularly critical time, experts say.

The program addresses the need for the Corps to use the most technically competent scientific data possible to carry out its navigation and flood risk management missions in an environmentally responsible way, says Dr. Barb Kleiss, the program's technical director. The state of Louisiana wants to be similarly responsible in its investment of funds to counter subsidence, adds Dr. Mead Allison, director of Physical Processes for The Water Institute of the Gulf in Baton Rouge, an advisor to the state's coastal protection and restoration effort.

"We are tasked with examining what major scientific holes still exist in our understanding and how we go about rapidly

closing these holes before billions are invested," said Allison, a professor in Tulane University's Department of Earth and Environmental Sciences. "The subsidence issue and our poor understanding of it puts at risk many of the things we want to do, like predicting the lifespans and elevations of levees and the rates and lifespans of land building from artificial river diversions as well as determining relative sea level rise rates and the elevated risk to coastal communities."

According to Dr. Torbjörn Törnqvist, Tulane's Vokes Geology professor and chair of its Department of Earth and Environmental Sciences, the partnership idea arose out of an international subsidence research conference held in New Orleans in 2013, and the recognition of the need to better coordinate subsidence science.

One major conclusion, Törnqvist said, was the need to integrate data from the various techniques now used to measure subsidence, all different and employed at so many different locations that aggregating data is almost impossible. One cutting-edge method involving optical fiber strain meters, now used on one section of the Ganges, may be employed as teams look for the best available science.

"One idea is to carry out these methods simultaneously at the same location so we can learn a lot more than with people working in an isolated way, doing their own thing," he said. —K.S.

*Louisiana's sinking coast. The state has the highest rates of relative sea level rise on the planet.*





## MIGRATION CELEBRATION



It's the **Year of Birding** on the Mississippi River, a migratory flyway dotted with vast wildlife refuges, thriving bottomland hardwood forests, parks and islands—all offering critical habitat for rest and food.

**MILLIONS OF BIRDS** make their way along the celebrated route each spring—some 40 percent of the country's migratory species—and those include colorful warblers, neotropical songbirds, impressively large white pelicans and more. But while every spring brings ample opportunities to catch colorful birds in flight and song, this year brings a particularly important reason to celebrate as well as a long list of special events.

The focus on connecting people with the river and its bird life coincides with the 100-year anniversary of passage of the Migratory Bird Treaty Act. This established migratory birds as a federal trust resource, key because migratory birds know no borders and yet the federal government previously had no authority to protect them from unregulated hunting and other human influence. The act made it illegal for anyone to take, possess, import, export or purchase any migratory bird except as allowed under federal regulations. Since its passage, the act has been expanded through treaties with countries including Canada, Mexico, Japan and Russia.

The act's protections were credited with the comeback of many species, including the snowy egret, a graceful bird nearly hunted to extinction for the popularity of its delicate feathers for fashionable hats. The U.S. Fish and Wildlife Service has expanded on the protections into habitat improvements, funded in part by its duck stamp, generally purchased by hunters but increasingly by bird watchers as

well. The stamp allows entrance to Fish and Wildlife Service refuges in lieu of the day fee, says Amber Floyd, the refuge manager of the U.S. Fish and Wildlife Service's Dohoney National Wildlife Refuge.

Floyd is also part of the group sponsoring the Year of Birding. The Mississippi River Connections Collaborative is a formal partnership between the National Park Service, U.S. Fish and Wildlife Service, Mississippi River Trails Inc. and Mississippi River Parkway Commission, which actively collaborates with agencies like the U.S. Army Corps of Engineers. The group has already held the Summer of Paddling (2012), Year of Biking (2013), Year of Geotourism (2014) and Year of Fishing (2015). The goal this year, as in the past, is to introduce or renew a passion for birding while connecting people to the river, encouraging river stewardship and sharing lessons on water safety.

In much the same way the previous years have introduced thousands to new activities, organizers hope the birding year will similarly encourage people to experience the sights and sounds of the river as they change throughout the year, says Kim Rea, recreation manager of the U.S. Army Corps of Engineers' Rivers Project Office. The partnership will offer more than 100 activities and events for youth and family, all of which include an educational component and promote citizen science, volunteerism and ultimately bird conservation. —K.S.



### Is three no longer a crowd?

They've become YouTube sensations, even the centerpiece of T-shirts being sold to support future refuge webcams—the three bald eagles nesting and apparently helping to raise young from the three eggs on a Mississippi River nest in Fulton, Illinois, near Lock and Dam 13.

The Stewards of the Upper Mississippi River Refuge, which manages the webcam, have named the eagles Hope, Valor and Valor 1 and added captions like 'Um, I haven't left yet!' on shots of a crowded nest. But staff members of the U.S. Fish and Wildlife Service's National Wildlife and Fish Refuge are also hoping to learn from the rare opportunity, says Pam Steinhaus, an Illinois-based refuge visitor services manager.

"Will this be something we see more and more often as the eagle population increases?" one social media post asked. "How will this trio handle nest duties? We'll just have to wait and watch!"



# Scope out the beauty

From the Gulf to the headwaters, you'll find rare and showy birds worth traveling to see at key spots along the Mississippi River flyway. Here are a few not to miss—and parks and refuges at which you'll not likely miss them.



## MAY 14: MIGRATORY BIRD DAY

May 14 is a particularly good day to celebrate; Trempealeau National Wildlife Refuge in Trempealeau, Wisconsin, will hold a celebration that includes bird banding amid a month already focused on their warbler watch and formal walks. It's also a great time, here and elsewhere on the U.S. Fish and Wildlife Service's Upper Mississippi Wildlife and Fish Refuge to see American White Pelicans and Great Egrets, gathering en masse. Guided bird walks also will be held that day at La Riviere Park in Prairie du Chien, Wisconsin, and at the Effigy Mounds National Monument in Marquette, Iowa. MORE: [MR-CC.ORG/YEAR-OF-BIRDING-2016/](http://MR-CC.ORG/YEAR-OF-BIRDING-2016/) AND [FWS.GOV/BIRDS/MBTREATY100/](http://FWS.GOV/BIRDS/MBTREATY100/)



### COMMON LOON

Considered by many a symbol of wilderness, the yodel and its moaning calls, most frequent at dawn and dusk, signal early summer in the north woods.

#### ITASCA STATE PARK, ITASCA, MINNESOTA

More than 22 species of birds frequent this park, home to the headwaters of the Mississippi River.



### YELLOW RUMPED WARBLER

April to mid-May is a high point for visitors who come to witness the dazzling mix of yellows on their throats, sides and rumps.

#### TREMPEALEAU NATIONAL WILDLIFE REFUGE, TREMPEALEAU, WISCONSIN

North of LaCrosse, established in 1936 by President Franklin D. Roosevelt as "a refuge and breeding ground for migratory birds and other wildlife."



### DICKCISSELS

You may hear this sparrow-like bird before you see it. Look for a rust-colored shoulder patch and a black V (breeding males) on the yellow chest; listen for the "dick, dick, ciss, ciss, ciss" call.

#### TWO RIVERS NATIONAL WILDLIFE REFUGE, BRUSSELS, ILLINOIS

At the confluence of the Illinois and Mississippi rivers, this mosaic of habitats is preserved for migrating birds.



### CERULEAN WARBLER

This species of concern, noted for the way it's colored a cerulean blue above and white on the chest, is often spotted high in the forest canopy but prefers a multi-layered forest habitat.

#### WYALUSING STATE PARK, PRAIRIE DU CHIEN, WISCONSIN

On a bluff some 500 feet above the confluence of the Wisconsin and Mississippi rivers, this park is known for its scenic overlooks. Spot migrating warblers near the boat landing.



### AMERICAN WHITE PELICAN

One of the largest birds in America, this pelican swims on the surface, dips its bill into the water and scoops fish into its pouch.

#### RIVERLANDS MIGRATORY BIRD SANCTUARY, WEST ALTON, MISSOURI

The 3,700 acres of wetlands with overlooks and trails is run by the U.S. Army Corps of Engineers. There's also an Audubon center on site and places aplenty to see many showy birds.



### PROTHONOTARY WARBLER

This small songbird's name stems from a group of Catholic church scribes who wore bright yellow hoods, as the tiny warbler seems to.

#### HATCHIE NATIONAL WILDLIFE REFUGE, STANTON, TENN.

Situated in a swampy portion of the Hatchie River floodplain, the refuge is popular for wildlife viewing and seasonal hunting and fishing.



### PAINTED BUNTING

Sporting most every color of the Crayola box, these mid-sized buntings are part of the Cardinal family.

#### DAHOMY NWR, BOYLE, MISSISSIPPI

This largest contiguous tract of bottomland hardwood forest in northwest Mississippi offers perfect habitat for migrating birds and overwintering waterfowl.



### ROSEATE SPOONBILL

This wading bird is known for a bill like a rounded spatula and a vibrant pink color like a flamingo.

#### ST. CATHERINE'S CREEK NATIONAL WILDLIFE REFUGE, NATCHEZ, MISS.

Here, find the dynamic bottomland hardwood forest ecosystem of the Lower Mississippi River Valley.



### BLACK-BELLIED WHISTLING DUCKS

Sociable and noisy, these colorful beauties rest on low snags above the water.

#### BAYOU SAUVAGE NATIONAL WILDLIFE REFUGE, NEW ORLEANS, LOUISIANA

Within the city limits of New Orleans, it's one of the nation's largest urban refuges.





## Flood deaths pose cautionary tale

A December of record high temperatures coupled with a month of record rainfall in some Midwestern states came together to form a giant of a storm. Winter Storm Goliath's tornados, blizzards, and the resulting flooding came on so quickly that 26 deaths in two states—mostly in the tributaries of the Mississippi—were attributed to its fury.

The fact that most of the deaths were in cars swept away by floodwaters led the National Weather Service to push its 12-year-old “Turn Around, Don’t Drown” campaign encouraging common sense, particularly the recognition that it’s never safe to drive or walk into floodwaters.

The surprise winter storm swept from the southern plains to the Northeast the last week of December 2015. Goliath rampaged across the Midwest, dumping more than 10 inches of rain in 36 hours in parts of Missouri and triggering flooding that swelled tributaries and eventually dumped into the Mississippi River.

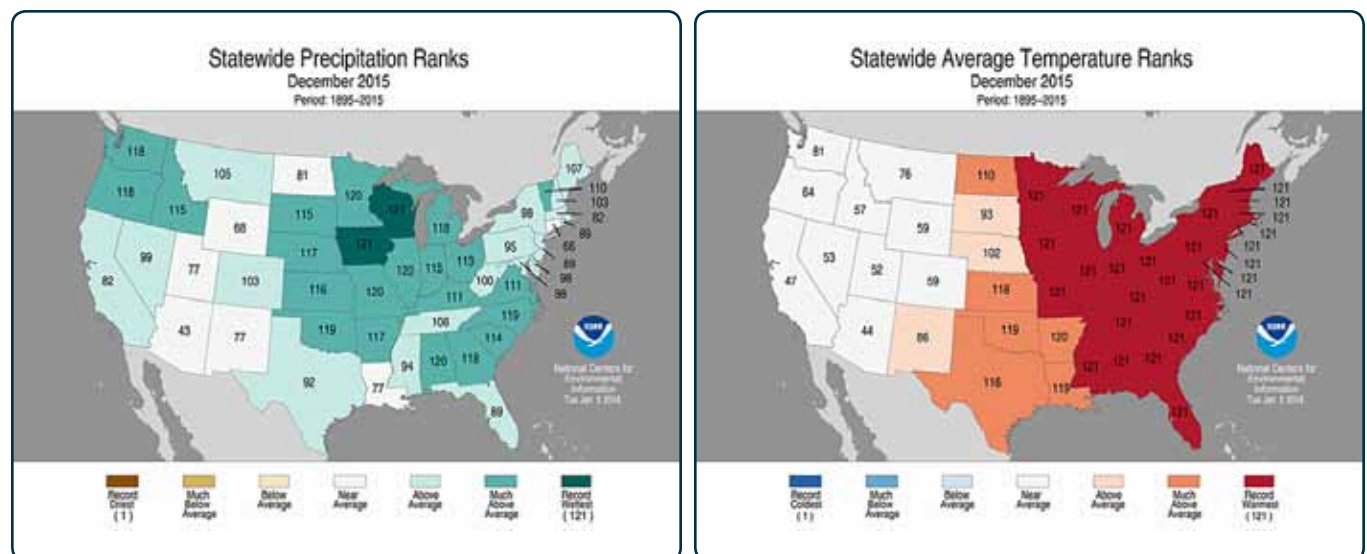
Devastation and damage were widespread, but most tragic were the deaths attributed to flooding. Among those were five international soldiers from four countries who drowned when their car was swept away by floodwaters near Fort Leonard Wood, Missouri. According to the *Army Times*, the young soldiers in their late 20s and early 30s—all part of a program that brings in troops from other countries to study engineering, military policing and chemical defense—were returning to the fort from Osage Beach when their car went off the highway just 15 miles northwest of the city. Two people in Pulaski County also drowned when they drove onto a flooded road and their car was swept away, leading the sheriff to issue particularly strong warnings against driving at night when streams often turn into rivers.

Flash floods are the top cause of weather-related deaths in the U.S. According to the Centers for Disease Control and Prevention, more than half of flood-related drownings happen when vehicles are driven into flood water. Six inches of fast-moving water can topple an adult, 12 inches of rushing water can sweep away a small car, and two feet of rushing water can carry away most vehicles. In addition to the risk of being swept away, flood waters may contain sewage, chemicals, venomous snakes, or other hazards. If floodwaters rise around your car but the water is not moving, abandon the car and move to higher ground. Do not leave the car and enter moving water. Avoid camping or parking along streams, rivers and creeks during heavy rainfall; those areas can flood quickly and with little warning.

Looking ahead to the possibility of spring flooding, people should keep in mind the simple but effective National Weather Service warning phrase as they approach what appears to be a flooded roadway: “Turn around. Don’t drown.” —B.G.O.



Keith Roeder flees with his clothing as he evacuates his trailer as the Meramec River rises.



### Col. Jeffery Anderson, U.S. Army Corps of Engineers District Commander, Memphis, Tennessee

### MY MISSISSIPPI

“My mom and dad are from St. Paul, Minnesota, and I remember going to visit my grandparents in a high-rise building that overlooked the stock yards. I didn’t truly appreciate that was the Mississippi River at that point, but those are my earliest memories of the river.

“Memphis is a very interesting place on the river. The district is tied 98 percent to the Mississippi. What happens on the river really dictates what we do or we don’t do here. The rainfall and the way it makes the river rise and fall dictates what we do. It dictates our navigation mission, it dictates our flood risk management mission and it dictates our dredging mission.

“There are a lot of really great people and professionals who are always working to make the district and the Corps a better place and to serve the public better. My role is really to talk with our external stakeholders when things are a little sticky. And this part of the world is so different from other parts of the world. In New York, I say I can send a text, and that’s communication. Here, that’s not. Communication is done face to face over lunch or at a shared meeting space.

“Any time I can go to my marine maintenance facility or get out on the river is for me a great day. Before I came here I didn’t understand the connection with the economic vitality of the nation, which I now do every time I see a barge go by, especially in Memphis, which is really the



transportation hub of the Southeast. It really is a lifeline to the inner part of the country.

“I came from the Pentagon, where I worked running the Army’s environmental program. One of the projects we’re working on here is with The Nature Conservancy, on the Lower Mississippi River Resource Assessment getting recreation onto the lower part of the river. We’ve seen progress. I’ve tried to get out with one of the guys I work with and paddle the river. It has never worked out. I still have time though.”





## Turning to tech for flood safety

New technology—from tiny drones to virtual buoys—helped government teams monitor flood impacts and keep boat crews safe in raging floodwaters.

# OYSTER RESCUE

Spillway opening—and freshwater influx—prompts relocation effort to spare struggling industry

**Maj. Gen. Michael Wehr** ceremoniously removed the first needle of the Bonne Carré Spillway Jan. 10 before the mayor of New Orleans and a crowd of hundreds, diverting Mississippi River waters that were raging in a rare winter flood to Lake Pontchartrain and protecting the nearly 300-year-old city just 30 miles downriver.

The head of the U.S. Army Corps of Engineers' Mississippi Valley Division then made a less celebratory trip to the Mississippi Department of Marine Resources. That agency is in charge of a constituency the spillway waters wouldn't be saving through the spillway opening but instead potentially stressing: oysters.

When the spillway opened in the midst of a record 2011 flood, the influx of freshwater proved too much a shock for Mississippi Gulf oysters that thrive in a certain mix of fresh and salt water. Due to drought, the oysters couldn't acclimate quickly enough to the rush of fresh water that upset the water balance. The state lost 85 percent of its oyster harvest that year, at a one-year economic loss of \$60 million, said Melissa Scallan, public affairs director of the Mississippi Department of Marine Resources.

Following that flood, the Corps committed to better coordination with impacted people and agencies. This time, the marine conservation agency was ready. Using a portion of an \$11 million disaster relief grant stemming from the earlier flood impacts, the department hired oyster fishermen to move a reef's-worth of oysters out of the path of oncoming waters.

"In 2012, because of the spillway opening, we didn't harvest a single sack and had to close the season, so oyster fishermen have suffered a lot," Scallan said. "What we came up with was a program to take oysters from our westernmost reef in the Mississippi Sound and relocate them to other places. And we had to work quickly."

*"What we came up with was a program to take oysters from our westernmost reef in the Mississippi Sound and relocate them to other places. And we had to work quickly."*

—MELISSA SCALLAN

In three days, she said, some 70 fishermen moved 40,000 sacks of oysters from the threatened reef to two reefs out of the way of the fresh water influx. At 300 oysters a sack, that's an estimated 12 million oysters relocated and potentially saved.

No one expected this flood, or at least its unusual winter timing, she and others noted. The January opening was the earliest in the 80-year history of the spillway, which has been opened 11 times in history. Fortuitously, the oyster season was temporarily closed for other reasons and fishermen were eager for the work. Working alongside state employees (in Mississippi, the state owns the oyster reefs), they worked from sunrise until late at night gathering oysters into sacks, loading them onto a barge and relocating them to more suitable reefs where they were then disbursed via a large hose resembling a fire hose. While the success will be clearer at next year's harvest time, oysters tend to be fairly resilient, Scallan says, and are likely to survive due to the fishermen's efforts and close coordination with the Corps.

"We got updates when the Corps was going to open the spillway and how many bays they were going to open, and they didn't open it all at once so we were able to keep up with them," she said. "We are here to protect the resources—oysters, shrimp and fish—but we also understand that the first priority is the protection of life and property. That was their first consideration." —K.S.

### DRONES

One of the newest weapons in the flood fighting arsenal at the U.S. Army Corps of Engineers' Mississippi Valley Division is a handful of tiny drones, some weighing 8 ounces. Easier to employ and far less expensive than planes and helicopters, the Corps' new drones were used during the winter's unexpectedly early flooding as a way to get before-and-after pictures of areas inundated by floods, find potential issues in levees and identify areas of damage as floodwaters receded.

Jack Smith, geospatial coordinator for the Mississippi Valley Division, notes that drones can help with most anything the primarily flood control and navigation-focused division deals with—from keeping channels clear and navigation operational to ensuring that levee systems are intact. The new drones include fixed-wing versions that can fly up to 400 feet and quadcopters with vertical takeoff capability; those will be used for inspections, he says, and will offer survey capability the division has never had before.

"For instance, the Bonnet Carré Spillway, it's 7,000 feet long and has 350 operable bays with no walkway for access," he said. "If the structure has been damaged by a boat, we wouldn't know if the structure was stable or not, so we wouldn't want to put somebody out on the structure. But we can send the drone and get a very detailed inspection to see what's going on. It gives commanders a lot of capability without risking life."

The drones have been used by the Corps' New Orleans District to survey coastal marshes previously accessible only by airboat. They're being used, as well, to create terrain models of spillway structures to identify potential scour issues after operation. And they'll be used to inspect flood-control structures for damage and prepare for spring flooding. Permission to operate them is needed from both Corps headquarters and the U.S. Department of Defense due to privacy and other regulations. Operators also received training comparable to that required for an aircraft pilot, but Smith thinks the results will be worth the added effort.

The St. Louis District and Vicksburg District also have drone capabilities. "If we were in a record flood situation and had a substantial levee slide, we would certainly want to use these drones to survey the damage."

### VIRTUAL NAVIGATION AIDES

Technology helped, too, when floodwaters led to the sinking of the tow vessel *William Strait* in the middle of the navigation channel and quick action was needed to be sure additional boats didn't follow.

The Coast Guard worked with the Lock Operations Management Team from the Coastal and Hydraulics Laboratory at the Army Corps of Engineers Research and Development Center to create a "virtual buoy" of sorts until the the wreck could be removed. The ship sunk in 20 feet of water on the lower Mississippi River near Memphis on Dec. 14, 2015, following a collision with the tow vessel *Margaret Ann*.

Because the waters were still raging and the wreck was not visible, the teams broadcast a virtual aid via an Automatic Identification System that transmits a constant bearing and range that can be seen on electronic charting systems and radars. Most commercial vessels operating on U.S. waters were required to use AIS technology by March 1, 2016.

"The multiagency collaboration on e-navigation and AIS began over 10 years ago, and in 17 years of federal service, it has been one of the most successful partnerships in which I have had the pleasure to work," said Michael F. Winkler, a research hydraulic engineer at CHL. "The effort went from general discussion to successful transmission in just over 48 hours." —K.S.



# Bonkers for Birds

**THERE ARE FIELD GUIDES**—and then there's "Bonkers for Birds," a guide drawn, colored and written by 4th and 5th graders. Renderings are so charming you'll not want to go back to mere photos or illustrations to learn more or seek to identify Mississippi River birds like the yellow warbler or the downy woodpecker. Run by the U.S. Army Corps of Engineers' National Great Rivers Museum, the program started with a class of 24 in 2007 and has grown to well over 100 classrooms, each assigned to render a particular bird species while learning about behavior, migration patterns and more. Find this year's winners and the resulting "guide" at [meetingoftherivers.org/html/bonkers.html](http://meetingoftherivers.org/html/bonkers.html).



Draw a line from the state to its "state bird."  
*(Some states share the same bird.)*



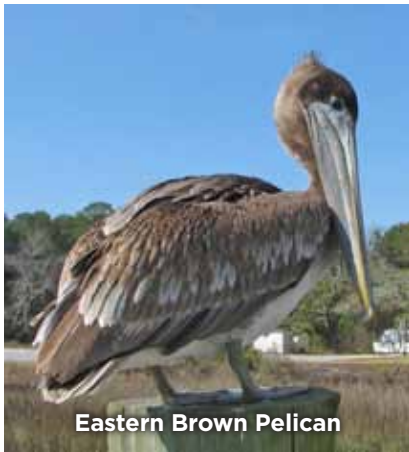
Mockingbird



American Robin



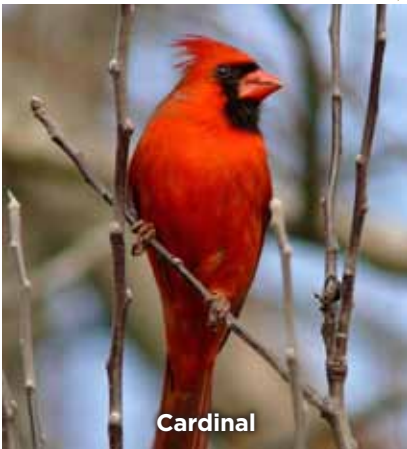
Common Loon



Eastern Brown Pelican



Eastern Bluebird



Cardinal



American Goldfinch

Illinois: Cardinal. Iowa: American Gold Finch. Kentucky: Cardinal. Minnesota: Common Loon. Missouri: American Robin. Mississippi: Mockingbird. Tennessee: Eastern Bluebird. Wisconsin: Mockingbird. Arkansas: Eastern Brown Pelican.



# Soak in the charm of a Mississippi River town

## Ste. Geneviève



**Missouri's oldest town,** Ste. Geneviève (VISITSTEGEN.COM) began as a French settlement in 1735, along the west bank of the Mississippi. Full of narrow streets and fenced gardens, this is the only original French Colonial Village remaining in the U.S. Ste. Geneviève was also the government seat for one of five Spanish districts in the area and one of Missouri's first five counties. In 1785, a disastrous flood triggered the town's move to its present location, approximately 60 miles south of St. Louis and near Gabouri Creek. Today, 150 buildings are on the National Register of Historical Places—and charm abounds.

### Live like it's 1735

Step back in time at ASL Pewter Foundry (ASLPEWTER.COM), where lead-free pewter products replicate historic designs; or admire vintage-style lace at Odile's Linen & Lace, Etc. (ODILESLACE.COM). Historic home tours are easy to find. Colonial living quarters, and a historically-stocked mercantile characterize the Felix Vallé House State Historic Site (VISITMO.COM/FELIX-VALLE-HOUSE-STATE-HISTORIC-SITE.ASPX), which also encompasses the vertical-log 1792 Bauvais-Amoureux House and the 1819 Dr. Benjamin & Emlie Shaw House. The nation's most authentically restored Creole home, the Bolduc House Museum, displays Native American and African exhibits and a garden with plants used in traditional French recipes.

### Stay

Ste. Geneviève's B & Bs range from the Southern Hotel, set amid old-growth trees and lush landscaping, to the 1789 limestone Hubardeau Guest House with lodging and cooking facilities, or the antique-filled 1880s Main Street Inn Bed & Breakfast. Several hotels are also available.

### Eat & Drink

Two breweries (one also distills spirits) and 10 wineries include Sainte Geneviève Winery, whose



(SAINTGENEVIEVEWINERY.COM) cozy tasting room occupies another antique brick house. Among numerous dining choices, the first brick home built west of the Mississippi houses the Old Brick House Restaurant (THEOLD-BRICKHOUSE.COM), where old-fashioned ambience meets prime rib and fried chicken. Bird lovers are in luck. Offering contemporary surroundings and cuisine, Audubon's Of Ste. Geneviève (AUDUBONSTEGEN.INFO) honors ornithologist John James Audubon, who entered a merchandising partnership with local resident Ferdinand Rozler, in 1811. Tiny Sara's Ice Cream offers big cones and creamy milkshakes from an antique soda fountain.

### Naturally beautiful

Running year-round, the Ste. Gen-Modoc River Ferry transports passengers across the mighty Mississippi to Fort de Chartres, Pierre Menard Home and Fort Kaskaskia State Historic Parks, among other interesting Southern Illinois attractions. Hiking and additional outdoor activities also draw visitors to several parks located in or near Ste. Geneviève (VISITSTEGEN.COM/ATTRACTIONS/RECREATION.HTML), or explore the Great River Road for more French colonial country, wineries, bald eagle spotting and more (GREATRIVERROAD.COM). —L.W.G.



It's hard to get closer to the Mississippi River than from a kayak, cradled between majestic bluffs, paddling perhaps beneath a flock of migrating birds. The Mississippi River Water Trail, designated a national water trail in 2012, continues to make that easier and ever more interesting.

The Water Trail starts at Saverton, Missouri, just below Lock and Dam 22, and it flows 121 miles downstream—mostly along the main stem of the Mississippi but including backwater areas for beginning paddlers—to St. Louis Missouri at the Arch. From the Arch to the Gulf, though, paddlers can move onto the Lower Mississippi River Water Trail, carefully mapped and described at rivergator.org.

Both trails provide wildlife viewing opportunities, and the Mississippi River Water Trail in particular boasts many day use and primitive camping areas where paddlers can stop for lunch or spend the night. There are also many river communities along the way offering adventure and exploration of the river's rich culture and fun attractions.

The upper trail is run by the Mississippi River Water Trail Association (MRWTA) in partnership with the Army Corps of Engineers, Rivers Project Office, and the American Canoe Association. It was established to support and enhance the Mississippi River Water Trail and share information about its natural beauty, history and recreational opportunities along the route. It also collaborates to foster sound safety and conservation practices along the river and to promote active outdoor lifestyles and environmental stewardship.

To add another element of adventure to a paddling trip, the association has added geocaches to the route. It also sponsors regular events to remove the intimidation factor



of paddling the river and share safety messages. Paddlefest is the signature event. Held each May at the Rivers Project Office of the U.S. Army Corps of Engineers in West Alton, Missouri, it makes paddling the river easy by providing kayaks, canoes, paddleboards and even the chance to venture out with a skilled crew on a 15-person voyageur canoe.

Find other festivals, races, even classes on going through the river's locks and dams, on the water trail website (GREATRIVERWATERTRAIL.ORG). You'll also find water trail maps and tips on the best stretches for paddlers by ability level. —J.B.



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## Mayors visit D.C., work toward cleaner water and more

The mayors of the Mississippi convened in Washington in early March, laying out their legislative agenda for a year they're commemorating under the slogan "300 Years of America's Manifest Destiny." This year marks the 300th anniversary of the river town Natchez, with plans underway to celebrate the 2018 tricentennial of New Orleans.

The meeting was the fourth at the nation's capitol for the mayors, who have come together to form the Mississippi Rivers and Towns Initiative. The focus was on ways to secure a sustainable water future for the 20 million people who depend on the river as a drinking source. They also signed agreements with two federal agencies, coordinating recovery from historic winter flooding. In a meeting with the U.S. Army Corps of Engineers, the mayors focused on issues facing navigation infrastructure as well as ways to take advantage of international trade opportunities. Additionally, mayors signed an agreement with the U.S. Geological Survey related to a comprehensive nutrient monitoring program for the river valley, and with the Upper Mississippi River Basin Association on a plan to improve water quality.

## Looking to explore the river's heart?

**Check here>>**

The National Geographic Society has a theory that the best travel advice comes from the people who live in a given region. Travelers are likely to think that correct after even a quick glance at a new Mississippi River Geotourism website.

The site is a map-based planning tool, modeled after similar projects in tourist areas around the world, including Sri Lanka, Portugal and the Bahamas. But the heart of each site is the recommendations selected for the way they capture the "heart, soul and nature" of an area. In the case of the Mississippi River, those were curated through trips, last summer through this past fall, down the entire length of the river, meeting with river residents about their favorite local gems.

Site visitors won't find a list of every lodging opportunity along the river's entire reach, but the 31 on the site each reads like a destination in itself, options like a riverfront condo in LeClaire, an ecolodge that edges a state park and Shawnee Hills wine country, and a Ste. Geneviève Empire-style bed & breakfast once home to the region's first physician. The site also features 442 places to go (and more as more are curated) plus 271 things to do, categorized into food and drink, outdoor adventure, tour-based fun and more. Have an insider favorite? Make your nominations now before the formal rollout in June. MISSISSIPPIVER.NATGEOTOURISM.COM



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