Our Mississippi

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AMERICA'S RIVER GREAT

FALL '17

Mussels *on the* Move

Largest-ever mussel moves protect the 'liver of the river'

THE NEW I-74 BRIDGE that will span the Mississippi River between Moline, Illinois, and Davenport, Iowa, is drawing plenty of attention as one of the Midwest's largest public works projects. But what's been happening below is getting equal attention—and rightly so.

More than 150,000 endangered mussels that were living around the bridge base have been moved to other beds so they'll be safe from harm as part of what's been called the largest single-project mussel move in the country's history. The remainder of the bed, some one million strong, will be monitored, studied, supplemented and even shared through virtual reality as a way to spread knowledge about these little-understood creatures of the river's ecosystem. Preparations, meanwhile, are underway to move another 85,000 near St. Paul, Minnesota, this spring to make way for a project that will improve a segment of a channel in which several navigation vessels have been grounded.

Both projects are significant in their expense and scope and the way they're drawing attention to what we do and still don't know about mussels and their critical role in the river ecosystem, says Scott Gritters, mussels expert with the Iowa Department of Natural Resources.

"Twenty years ago, populations fell so dramatically that it caught us off guard," Gritters said. "Now mussels are among the most endangered fauna of North America and the world. Our public sometimes rolls their eyes about these moves, but once they understand these are critical habitats, I think they'll understand we can't just wipe them out."

Mussels filter so much water, maybe up to 10 gallons a day per single mussel—that they've often been called the "liver of the river," he said. "They are our sewage processing plant because they're filtering constantly. They're an animal that improves our water quality. If we could double their density, it would improve water quality by double."

Beyond that, adds Mike Davis of the Center for Aquatic Mollusks in Lake City, Minnesota, there's evidence that mussels are especially valuable when found in massive heaps which existed before over-harvesting and pollution nearly wiped them out. When numerous, they filter water and consume organic matter including bacteria, alter the nitrogen/phosphorus balance, provide food for fish and literally create underwater gardens, he said. "They're the freshwater equivalent of a coral reef. They become biodiversity hotspots."

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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.

Divers, right, collect samples of the river substrate to first collect and survey mussels, later to relocate them out of harm's way.

A search for a win-win

Officials with the U.S. Army Corps of Engineers St. Paul District have spent some five years studying an area in the lower pool upstream of Lock and Dam 2 where a narrow and winding portion of channel has caused problems for river navigation. Initially, teams looked at moving the navigation channel entirely to cut off the troublesome bend, said Aaron McFarlane, a biologist with the district's environmental compliance branch. But a survey of potentially impacted mussels indicated that too much harm would be done by that plan, and it would have resulted in very high mussel mortality.

"We started looking at other ways we could allow for easier maintenance of the navigation channel but minimize impacts as well. What came out of that was the idea to balance the way sediment comes in and out by constructing rock structures over approximately six acres that would keep flows in the main channel."

Some 85,000 mussels will be moved from the area slated to become rock sills. Divers went underwater and collected quarter meter square acres of substrate, put it in a bag and brought it to the surface. By collecting enough within the project footprint, they were able to determine the overall mussel density within the project area. They found four species of special conservation concern in Minnesota: the pistolgrip, the wartyback, the butterfly and the black sandshell.

The 85,000 will be moved by boat in live wells with river water and within the same pool this spring over a period of six to eight weeks—a condensed enough time frame so they don't start to recolonize prior to the rock placement. They'll be placed 10 mussels per square meter, a placement experts are hoping is optimal for them to thrive.

That so many mussels were present so close to the Twin Cities was good news in itself, McFarlane noted. Just 40 years ago, they were nearly eradicated. One report from that era described searching the lower pool and finding no mussels, living or dead, he said, and concluding: "It is possible for some mussels to remain in the pool; nevertheless prospects for a mussel renaissance is negligible at this time."

That picture differed dramatically from the accounts given by early explorers, McFarlane said, who offered accounts of crystal clear waters and river bottoms covered in mussels.

"I think we're kind of somewhere in between now with water quality helping them to recover," he said. "Efforts like this to move them and avoid impacts are hopefully going to help that progress and keep moving forward … They're a keystone species in our environment. They're long lived and an indicator of water quality. They help water quality by filtering out nutrients and transforming those into part of a food chain. They're a food for animals and fish. They stabilize the substrate. And in the Upper Mississippi and St. Croix, they're just part of the system. I think we used to have in Pool 2 some 41 documented species. Ten of those are now gone."

In Iowa, divers determined there could be well over one million mussels in harm's way of the new bridge, and other similar bridge projects are in planning stages as infrastructure ages up and down the Mississippi. Work is being done as a formal collaborative among the Iowa and Illinois Departments of Natural Resources, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, the Federal Highway Administration and the Iowa and Illinois Departments of Transportation. Together, the agencies determined a plan to move the mussels in the most imminent danger and to avoid impacting the others with the construction process.

Instead of moving all the mussels, which would be extremely costly, the plan looks at the fate of those mussels left behind. Project mitigation includes research into the most sustainable density for a bed, creation of artificial habitat spaces for particularly endangered mussels like the spectacle case, and a mussel restocking effort. The education component is especially creative, with the development of a virtual reality program that illustrates both bridge construction and mussel life beneath. Additional programs will be given throughout the Quad Cities to educate people on Mississippi River ecology and how the project is working to balance construction and environmental issues. The project already has been recognized for its innovation. The collaborative effort earned all six involved agencies the Federal Highway Administration's 2017 Environmental Excellence Award for Environmental Research.

"Other infrastructure projects are on the horizon, so we need to know how many mussels survive the in-between areas of construction and later, how they'll recolonize," Gritters said. "The agency team said, 'Let's learn from this,' and ultimately, I think we'll learn a lot and can save mussels as well as taxpayer dollars." —K.S.

That so many mussels were present so close to the Twin Cities was good news in itself, McFarlane noted. Just 40 years ago, they were nearly eradicated in the pool from a combination of overharvest from the pearl button industry and pollution.

Don't move a 'mussel'

In Missouri, it is legal to collect some (non-threatened) mussel species with a fishing permit. But in other states, like Wisconsin and Minnesota, you're forbidden from collecting any live mussels and can be penalized for collecting even the dead shell of an endangered species. Within the St. Croix National Scenic Riverway, no live mussels or empty shells of any kind can be taken, regardless of home state protection status. If you accidentally disturb a living mussel, place it back on the riverbed or lake bottom in the same place and position in which you found it to give the animal a fighting chance for continued survival. Since it's so difficult to ascertain the differing state rules and for even experts who know the rules to tell common from endangered mussels, the mussel species apart, agencies including the National Park Service advise people to stick with this easy to remember advice: "Don't move a mussel."

Sleuthing for (mussel) survival

As urban rivers become cleaner and fish passage improves, some endangered mussels have shown signs of comeback. That has not been enough, though, for the extremely rare spectaclecase pearly mussel, an elongated freshwater mussel that resembles exactly what it's called—a case for your eye glasses.

Figuring out why has taken a CSI-style investigation by scientists with the Center for Aquatic Mollusks in Lake City, Minnesota. While the findings of these detectives won't lead to arrest; it may lead to the survival of a federally endangered species, says Mike Davis, a mussel expert who heads the center.

This investigation, lead by Minnesota DNR malacologist Bernard Sietman, centered around the missing "person"—ie: the host fish.

There exists what you might call a secret relationship between native freshwater mussels and fish—sometimes a secret even from the unsuspecting fish, Davis says. Mussels reproduce only by using a fish host to carry the larvae, with some species able to use only a single type of fish, others several. Sometimes the mussel will mimic a food item like a lure. The spectaclecase, he says, releases globs of larvae like a string of little flags and set them adrift for fish to both feed on and carry on their gills to the spot where the tiny mussels will fall and grow. When the particular mussel and particular fish can no longer both reach the same section of river, the mussel has no means of reproduction.

"We do research here into the host fish relationship and have made some pretty interesting discoveries, corrected some misconceptions," Davis said. "But our big breakhrough this year was finding the host fish for the federally endangered spectaclecase."

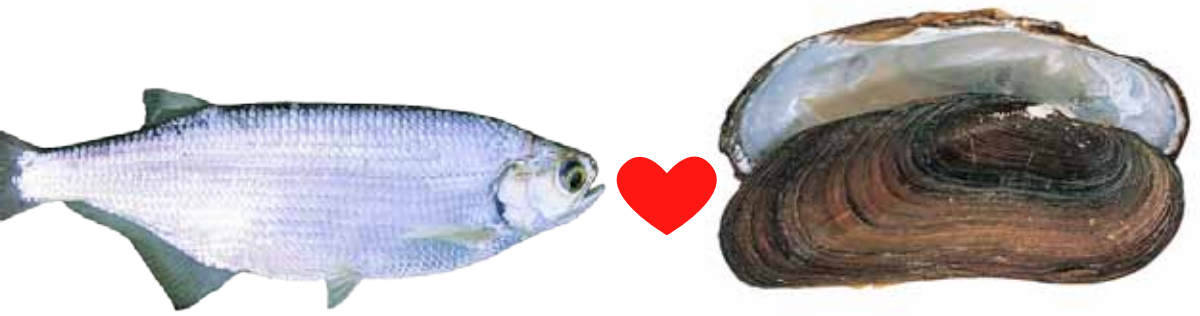
For 20 years, biologists have been hunting for the host fish of this species that was listed as endangered in 2012, but to no avail. While that mussel is fairly widely distributed, its habitat and populations are fragmented. DNA analysis, however, showed that populations found in Ozark streams, Appalachia and in the St. Croix in Minnesota were all related, suggesting a migratory fish as host. But which fish?

Historical records were the key to the next step. Spectaclecase mussels of a variety of ages, including very young, were found beneath the Taylor's Falls dam on the St. Croix, but only old mussels or shells were found above. That showed the detectives that the host fish is still around but not able to traverse the dam, and museum records further narrowed options to American eels and the silvery-colored mooneye or goldeye—two members of the same fish family.

Testing showed that the eel was not a larvae host, but figuring that out for the other two fish wasn't as easy. "The problem is, they're extremely fragile," Davis said. "No one has ever been able to keep them alive long enough to get mussel larvae on them to see if it works."

For help, the center turned to the Minnesota Zoo, experts in housing fish in tanks. On the first attempts to keep the particular fish in tanks, the fish would rub their eyes on the edge, get infected and die. The zoological experts suggested a bubble curtain, to which the center added more elaborate filtration and sterilization equipment—enough to offer the chance to raise juvenile spectaclecase mussels and solve the two decades-old mystery.

"We've now got hundreds of thousands of them, and we've shipped some to other propagation labs that are also trying to raise them," Davis said. "They seem to be doing well. The secret here was how to keep the host fish alive, and the final piece clinched it." —K.S.



A MATCH MADE IN THE *Mississippi*

The spectaclecase is a large mussel that can grow up to nine inches in length and which has a shell that's elongated and sometimes curved and inflated (as if to leave room for spectacles). Historically found in at least 44 streams in 14 states, it's been extirpated from three states and is today found in only 20 streams. This species often clusters in firm mud and sheltered areas such as beneath rock slabs or between boulders.

The goldeye and mooneye fish are very bright silver fish notable for their very large eyes. They are the only two remaining species in the family *Hiodontidae* and while similar, differ some in appearance. The goldeye (shown) has a more elongated body and more gold coloring to the eye. They're found in large rivers and are tolerant of turbid waters and are often found in areas with swift currents, often below dams. Like the mussels that rely on them, they don't tolerate industrial chemical pollutants well.

MY MISSISSIPPI

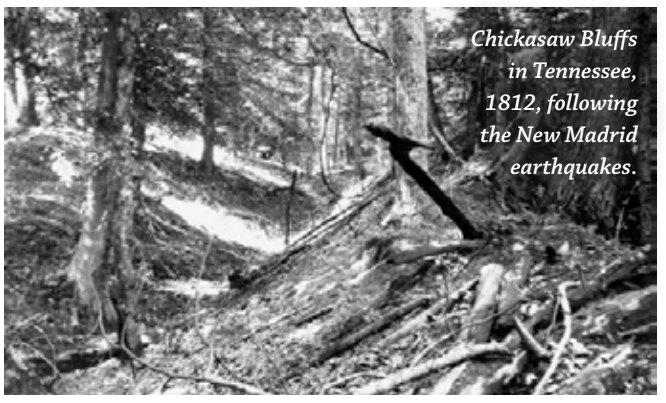
Jeff Grunwald, Administrator, New Madrid Historical Museum

"My earliest memories of the Mississippi River go as far back as I do. I was born in Davenport, Iowa, and my grandparents lived in Clinton, Iowa. There are a couple bridges in that little town, and whenever we visited we would drive across, looking down at the big river.

"My wife is from New Madrid, Missouri, and we always planned to move back here. When we did, in 2012, a few of the board members at the museum contacted my wife. They needed help. She had a lot going on, but I was like, 'I'll do it.' I was a history and political science major, and I had spent a career in sales. It seemed like the right combination. So I started part-time in April 2013, and soon after it turned to full-time. By September they asked me if I wanted to run the place.

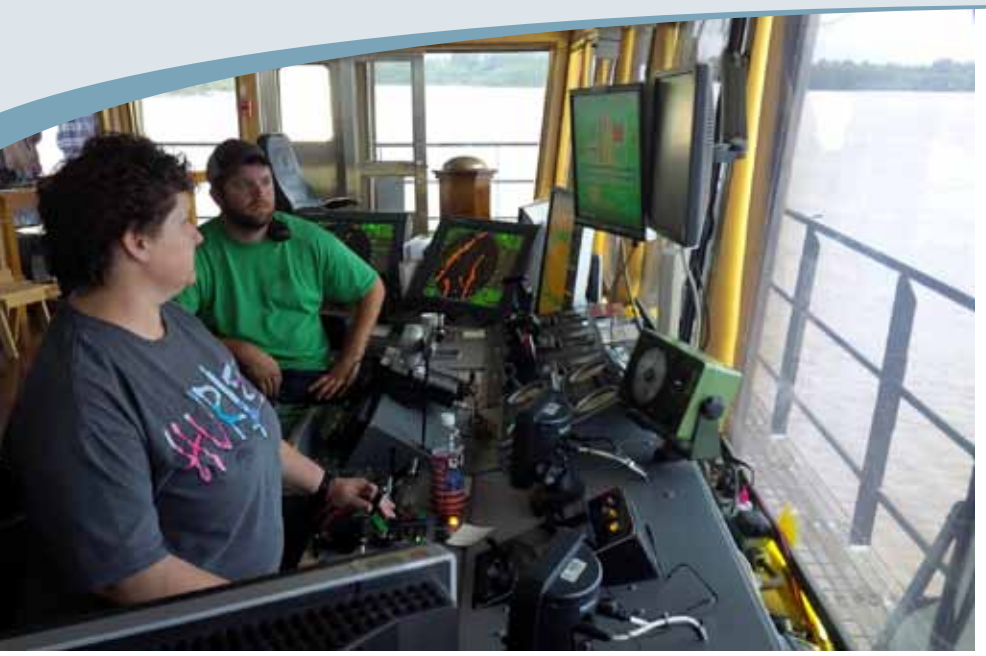
"Now I run a museum in a little town without a stoplight. We get about 6,000 visitors a year through here, usually from all 50 states and between 15 and 20 countries.

"The museum was founded in 1975. At first it was just antiques—furniture, quilts, things like that. Then they got a few pieces of pottery from the Mississippian period. Then Civil War bullets, Civil War cannonballs. But visitors wanted to know about the "Great Quakes." The earthquakes that hit here in 1811 and 1812 are still the most powerful east of the Rocky Mountains. The history of New Madrid is pretty rich for a little town!



Chickasaw Bluffs in Tennessee, 1812, following the New Madrid earthquakes.

"I'm not a super outdoorsy guy, not the type that goes out and gets all Emersonian. But as a part of the museum we advertise our RiverWalk. It's as lovely a little half-mile walk on the river as you're ever going to find. It's gorgeous, it's peaceful. You watch the river roll by. To me, that view speaks to the permanence of nature, the ephemerality of human beings: we're just here for a little bit, but that river is just going to keep rolling, like it has forever." —B.U.



She runs the dredge

If anyone needs an example of how to get anywhere you want in life, they'd need look no further than Stacye Sinn (ABOVE), the first woman to have held the position of "pipelineman" in the U.S. Army Corps of Engineers.

In her job on the Dredge HURLEY, Sinn works to keep pipes aligned with the dredge, govern the pipe's movements and thus clear channels for towboat passage. The job doesn't necessarily require brute strength, she says, and the Corps provides advancement opportunities for men and women alike. But getting there did require a bit of hard work and perseverance

She started out as a helper below deck in 2008, working for the Corps for two years before leaving in 2010. She re-applied in October 2012, starting as a service worker to get back into the organization and training on the pipeline on her own time until she impressed enough people and she was offered a pipeline job. Eventually, she was promoted and continued to train on her own time, this time in the pilot house where winches and pumps are controlled. After months of training, she was promoted to pipelineman and now controls the process that removes sediment and pulls the HURLEY forward.

During dredging season, which is typically between June and November, her schedule is 15 days on, six days off, and she rotates between day and night shifts. Sinn's longest stretch on the river was 63 days.

Dredging the Mighty Mississippi

River dredging has been around since 5,000 B.C. The Egyptians dredged the Nile, the Mesopotamians dredged the Tigris, and today, the U.S. Army Corps of Engineers dredges the mighty Mississippi River.

Dredging the Mississippi River has become a staple navigation mission of the Corps, and one of the many ways the Corps dredges is by removing the sand and sediment from the bottom of the river, like a vacuum.

In the early days of dredging, people physically scooped up sand and sediment from the bottom of the river with a cloth bag. Today, the Corps owns and operates dredging ships that extract this sand and sediment from the bottom of the river.

The Mississippi River has many twists and bends that create an abundance of sedimentation. The Corps does not dredge from bank to bank, but still must sustain navigation. In order to do that, the Corps maintains a navigation channel with the minimum authorized dimensions of nine feet deep and 300 feet wide. The Corps started the dredging mission in the 1800s then in 1894 built the dredge ALPHA which the Mississippi River Commission decided would be instrumental in maintaining a navigation channel on the river.

The ALPHA continued to dredge the river for four years. In those years, the ALPHA pumped a total of 1,080,342 cubic yards of sediment. Improvements in dredge design have led to efficiency. Today, the Corps' Dredge HURLEY has the capability of pumping the same amount of sediment in nine days.

The HURLEY, one of the largest dustpan dredges on the Mississippi River at 300 feet long, has a triangle-shaped apparatus on an arm that vacuums up sediment from the river bed. Anchors are put down in front of the dredge, and winches are used to pull the ship forward. While the ship is pulled forward, the dustpan, powered by ladder pumps, sweeps back and forth vacuuming up sediment. The Hurley, recently equipped with a modernized ladder pump, is now able to suck up 50 percent more sediment.

After it vacuums the sediment from the bottom of the river, the HURLEY pumps the material through a 1,000-foot-long floating pipeline and redeposits it outside the navigation channel. On a daily basis, the HURLEY pumps and redeposits 125 thousand cubic yards of sediment from the bottom of the Mississippi.

Vickie Watson, a U.S. Army Corps of Engineers, Memphis District dredging project manager, likes to remind others that if the Corps did not dredge the river, many agricultural products and commodities would not be transported to the rest of the U.S.

"The farmlands here don't just feed this area. They feed the country and the world," Watson said.

The river generates $405 billion a year, sustains 1.3 million jobs and supports manufacturing, tourism and agriculture industries. Sixty percent of all grain that is exported is transported to the Mississippi River Port of New Orleans and South Louisiana. Commercial navigation moves more than 536 million tons of crops and other cargo on the Mississippi River, which is roughly 22 percent of all U.S. waterborne commerce. —K.W.

For information on anniversary activities: www.mvm.usace.army.mil/

FOCUS ON Memphis

The Memphis District of the U.S. Army Corps of Engineers has launched a year of events and activities to commemorate 135 years of existence.

The Memphis District in particular was formed out of a major 1882 flood that devastated local levee systems and created hundreds of crevasses totaling 56 miles in length. The then newly-formed Mississippi River Commission charged the U.S. Army Corps of Engineers with implementing its flood control plans. Among those was the establishment of four administrative districts, the second of which had its headquarters in Memphis and which eventually became the Memphis District.

Flood risk management was the primary mission assigned to the districts in those early years, but in 1891 representatives from several large steamboat companies asked the MRC to improve navigation during low water conditions on the river. In response to this, the Corps constructed the first experimental hydraulic dredge—the ALPHA—and by 1901, nine Corps dredges were operating on the river.

Flooding remained the greatest concern however, and enormous floods struck the region in 1897, 1912, 1916 and 1922. Then in 1927 the most destructive flood in U.S. history took the lives of as many as 500 people along the Mississippi River. With each successive event, as the flood control system was improved, the south has seen less and less damage due to Corps work. Today, the 450 employees of the Memphis district have a broader mission that includes flood risk reduction, dependable navigation, environmental stewardship, emergency operations, and other authorized civil works.

Flood Protection gets new Armor

ABOVE FROM TOP: ***The current mat sinking unit was built in the 1940s and has allowed the literal sinking of concrete mats to control erosion. The new model will be more automated and efficient, allowing for double the output.***

When the Great Flood of 1927 breached multiple levees, inundating more than 18 million acres and leaving 700,000 homeless, the federal government vowed to prevent a similar tragedy in the future. Their solution was the Mississippi River and Tributaries (MR&T) flood control and navigation project, authorized in a landmark 1928 flood control act.

No longer would the southern river states work to manage floods by building levees high enough to simply withstand the most recent great flood of record. Instead, the comprehensive MR&T project has attempted to accommodate the natural tendency of the river to expand during floods by designing and implementing engineering features to manage the greatest flood with a reasonable chance of occurring.

Some of the multi-faceted program's key features have become outdated, though, as they are nearly 70 years old. With parts difficult to find and prohibitively expensive and with safety an increasing issue, the Corps is replacing its mat sinking unit through an innovative partnership between the Mississippi Valley Division team and the Corps' Marine Design Center based in the Philadelphia District.

Detailed design has begun on a more automated means of shoring up banks for flood control and navigation, a project nicknamed "Armor One" that uses the latest technologies. The Marine Design Center is the lead project manager, and they're partnering with the National Robotics Engineer Center, TerranearPMC and Bristol Harbor Group on design and prototype testing.

The process has already come a long way since the days when crews shored up the river to control erosion by cutting willow trees, weaving them into mats and sinking them with stones along the bank. When the demand for willow trees outweighed local supply, the Corps experimented with concrete mats being used in Japan at the time. Since the 1940s then, the Mississippi Valley Unit has used articulated concrete to maintain the desired channel alignment by laying it in the river to control channel changes through bank erosion, laying more than 1,000 miles of the mats since the program was first implemented by deploying crews of men and women who spend four months on the river to maintain riverbanks for levee protection and navigation needs.

In 1948, the current unit represented state of the art technology, but today, the cost of maintainance and repair is up to $5 million annually. An April 2014 study recommended replacement as Corps commanders likened the unit to a circa-1948 car with no seatbelts, backup camera or airbags and with terrible fuel efficiency.

Detailed design and construction of the smaller, more automated and efficient "Armor One" is estimated to take between 8 and ten years and to cost approximately $125 million. Coincidentally, that is about the same cost in today's dollars that it cost to construct the original unit in 1948. The early phases are complete, and the next fiscal year will cover full design, acquisition of equipment and construction of a prototype that will be used for function and safety testing. Also included in Phase III is the beginning of the mat boat design and robotics safety compliance.

For more, watch the video "Managing the Mighty Mississippi": youtube.com/watch?v=JsAIDt9764Y

According to the U.S. Army Corps of Engineers, "Armor One will help us keep the Mighty Mississippi in its current channel for years to come. Millions of lives, the navigation industry and our national economy depend on the Mississippi remaining right where it is now."

MR&T *at a glance*

The Mississippi River and Tributaries project employs a variety of engineering techniques to provide enhanced flood protection to more than four million people living in the 22.4 million-acre project footprint, while maintaining a mutually compatible and efficient navigation channel.

While the nation has contributed $15.1 billion toward the project, there's been a 54:1 return on investment including $823 billion in flood damage prevented since 1928.

Features include:

- An extensive levee system, complete with relief wells and seepage berms, to prevent disastrous overflows from inundating developed lands
- Floodways and backwater areas to provide room for the river to expand
- Channel improvements and stabilization features, such as revetments, dredging and stone dike structures, to protect the foundation of the levee system from scour and to ensure proper alignment and depth of the navigation channel. The mat sinking unit falls in this category
- Tributary basin improvements in the form of drainage ditches, levees, headwater reservoirs, flood gates and pumping stations that maximize the benefits realized on the main stem by expanding flood protection coverage and improving drainage into adjacent areas within the alluvial valley.

CARP CONTROL

Thinking out of the box to stop Asian carp

ABOVE: ***Teams work to catch invasive carp, which jump when startled.***

In recent years, many shopping malls have used a low-cost yet effective way to scatter flocks of teenagers whose rowdy behavior is bad for business: They've played classical music over their speaker systems. Sure enough, the youths usually find other hangouts where the background soundtrack is more to their liking, sparing mall managers the need for a more confrontational approach—like calling the cops.

U.S. Army Corps of Engineers teams operating in the Mississippi River watershed are finding that similar ingenuity is needed in their battle against a much bigger nuisance: invasive fish, mollusks, plants and other organisms that move from one region to another, where they crowd out native species and upend natural systems.

Of particular concern at present are Asian carp. Several carp species were imported to the southern U.S. from China in the 1960s. At the time, it seemed like a smart way to rid catfish ponds and sewage treatment lagoons of algae and plants, which the carp gobble up as if they were vacuum cleaners with fins. But the wily fish escaped into the Mississippi. Voracious, prolific and large—the average Asian carp weighs 30-40 pounds and consumes as much as 20 percent of its body weight daily—they have migrated northward for decades. They've conquered most of the big river and have turned up in dozens of tributaries.

"We're trying to prevent the transfer of Asian carp and other aquatic nuisance species—swimmers, floaters and hitchhikers," says Andrew Leichty, project manager of one U.S. Army Corps of Engineers project trying to prevent that spread. "The concern is if they got into the Great Lakes and potentially established a population there they could infect the roughly 5,000 other tributaries that go into the Great Lakes."

The Corps has developed two major studies listing a range of options for keeping the carp at bay through the Great Lakes and Mississippi River Interbasin Study, or GLMRIS, released in 2014. The section Leichty heads offers new proposals for blocking the carps' path at a key choke point called the Brandon Road Lock and Dam on the Des Plaines River near Joliet, Illinois.

How do you prevent fish from swimming where you don't want them to go? One obvious answer would be putting dams, berms or other structures in their path. But other options require less time and money than the new dam option, which also would disrupt navigation.

A "shopping mall" option within the project is looking at placing speakers underwater in a specially designed channel near the Brandon Road complex and perhaps inside the lock itself. Those would emit blasts of what engineers call "complex noise" to scare the fish away, regularly changing the sound so the fish don't become accustomed and complacent.

To humans, such noise might resemble extremely loud static on the television or radio, combined with "chirps" or pulses. According to the U.S. Geological Survey, pond and laboratory studies have shown that silver and bighead carp—the two most-feared Asian carp species—react negatively to "complex sounds," while many native fish species don't, evident in the way the carp alone jump from the water to the sound of motors.

This is just one of many outside-the-box technologies that scientists with the Army Corps and other agencies are developing to combat invasive species, one of the most persistent threats to our nation's waters. The GLMRIS study identified 35 nuisance species in the Mississippi River and Great Lakes watersheds that are considered high risks to migrate between them. The Mississippi system is vulnerable to invasion by a number of potentially damaging critters including the blood-sucking, eel-like sea lamprey and a fish-killing virus, the report said.

Short of physically walling off the two watersheds from each other, no single technology works against every invader. So the Corps is proposing to use a combination of them within a specially designed channel that can also be used to test deterrents that could be developed in the future. In addition to the "complex noise," the Brandon Road study recommends installing an electrical force field designed to scare off fish or zap those that don't turn back. If any small fish make it through, stunned but not dead, water jets installed along the bottom of the channel would propel them back where they came from. Another device under consideration is a "flushing lock" where invaders that float on the water's surface would be washed away.

For now, it's all still on the drawing board. The Corps will distill public comments received through November 16, conduct further studies and submit a report by the Chief of Engineers. If approved, Congress would need to provide roughly $275 million in construction costs. In the meantime, there's a team effort that includes intensive monitoring and commercial fishing to keep the population down.

"It's all hands on deck so to speak," Leichty said. No one solution is going to stand alone by itself and (stop the carp). We're clearly at the front edge of this issue. There are a lot of things that can be tested and brought online in the future." —K.S.

Learn more: glmris.anl.gov/brandon-rd

Hippos to the rescue?

Failing by just one vote in the U.S. Congress, the "American Hippo Bill" of 1910 nearly introduced hungry African hippos into Louisiana bayous. There, the theory went, they would munch away at the invasive, water-clogging, fish-killing water hyacinths, an aquatic plant that had been imported for the 1884 World's Fair in New Orleans.

This plan garnered extensive support and endorsements from Theodore Roosevelt and *The New York Times* for its multiple potential benefits, historians say. The plan to earmark $250,000 (in 1910 dollars) for the importation of the hippos that proponents dubbed "lake cow bacon" was also advocated to solve what was then a national U.S. shortage of meat for protein.

FORESTS FOREVER

Floodplain forest plan shows challenges galore and good news, too

Management of river resources has historically focused on what was underwater: fish, aquatic plants and the like. But a Corps-developed Upper Mississippi River Systemic Forestry Stewardship Plan has over the past five years helped develop and guide a new understanding of forest benefits and challenges.

Similar initiatives along the lower river, such as the Lower Mississippi Valley Joint Venture (www.lmvjv.org), are also addressing challenges to the long-term maintenance and enhancement of forest resources.

"The plan has given us a guide to streamline our questions and processes better," says Andy Meier, a U.S. Army Corps of Engineers forester with the St. Paul District. "It's served as a catalyst to get a lot of conversation and collaboration going."

Bottomland forests are critical habitat, something underscored by the forestry plan. They provide spawning habitat for fish during spring floods, they intercept rainfall and filter out impurities, they help with flood control, and they can even store large amounts of carbon that they pull from the air. That's in addition to the nesting and other habitat provided for the migrating songbirds and waterfowl that turn the flyway into a highway this time of year. However, the floodplain forests of the Mississippi River are being increasingly threatened by invasive plants, by a low level of tree species diversity, and invasions of destructive insects and diseases. The plan identified more than a dozen invasive plants and harmful insects, pointing out as the greatest threats the emerald ash borer beetle, which is wiping out whole sections of the river's ash forests, and several invasive plants.

While funding hasn't allowed for all risks to be comprehensively addressed, the plan has helped to focus existing funding on spots with the greatest needs, Meier said.

Implementing the Plan

The Stewardship Plan pinpoints priority actions to improve management of floodplain forests, including data collection and ways to use that data to implement "on-the-ground" forest restoration projects. Foresters in the St. Paul, Rock Island and St. Louis Districts have focused significant effort on surveying the current forest condition to identify areas where management will have the greatest impact, Meier said. This has enabled collaboration with other agencies and organizations to begin working on numerous data-driven forest restoration projects.

One focus spot has been Reno Bottoms near the town of Reno, Minnesota. Parts of this forest are thought to be very similar to forest conditions that were more common in the pre-lock and dam era, making it an area of particular importance to maintain and enhance. There, a team of agencies, led by the US Fish and Wildlife Service, Upper Mississippi River National Wildlife and Fish Refuge in cooperation with the St. Paul District and state Departments of Natural Resources, is restoring an area nearly completely covered with reed canary grass back to floodplain forest. Though the anticipated funding source for this project did not become available, much of the work has been enabled by a significant investment of resources from Audubon Minnesota.

In other locations, foresters are using direct seeding, which involves planting tree seeds instead of seedlings, to quickly establish high densities of seedlings. In still others, foresters are using cottonwood and willow cuttings—pieces of wood cut from established trees that are pushed into the ground. Cottonwood and willow are able to form new roots at the base of these cuttings and become new trees. This approach enables foresters to plant directly in the middle of invasive plants, creating shade to reduce the dominance of those invasives.

These young forests provide quick habitat. Red-winged blackbirds have been observed nesting in branches of cuttings just six or so feet tall, a year after planting in reed canary grass. Other birds like the yellow warbler, indigo bunting and eastern towhee, thrive in the shrubby habitat of young forests. It's expected that in 10 to 15 years, the trees will form a continuous enough canopy to begin shading out the reed canary grass, Meier said.

A hopeful prognosis

Floodplain forests may likely never reach the density they had prior to construction of locks and dams. But there is hope for a contiguous tree canopy along much of the shoreline, of diversity of trees to host a variety of plant and animal life. Analyses have shown the forest to be in relatively good shape, despite encroachment by the grassy invaders. But the cautionary tale, Meier said, is that many trees are nearing the end of their life spans, and as they die off, open holes in the canopy can easily convert to invasive grass. Young trees don't survive in very wet areas, either, and many acres of forest are likely to be lost in the coming decades because the areas they are growing in are too wet for tree seedlings to grow.

"If nothing is done now to prevent these future losses, it is likely that the acreage of floodplain forest will decline in future decades," he said. "It's not doom around the door, but it's doom down the hallway I guess. We've got a little time to figure out what we need to do to deal with it." —K.S.

More plan details: mvd.usace.army.mil/Portals/52/docs/regional_flood_risk_management/our_mississippi/UMRSystemicFSP7-26-12.pdf

WANTED, DEAD (NOT ALIVE)

A Delta-damaging invader

ABOVE: *Roseau cane in Louisiana, brown from the effects of the invader.*

A SMALL INSECT being called the Roseau Cane Mealy Bug may be the most dangerous fugitive in Coastal Louisiana. Nothing has been able to stop the native of China or Japan that has contributed to the die-off of Roseau cane throughout coastal Louisiana. The most devasting part is that the cane is one of the most important plants binding together the fragile Lower Mississippi River Delta, a restoration focus of many agencies as well as a navigation focus for the U.S. Army Corps of Engineers.

"The rate at which it seems to be expanding and the severity of its impacts is alarming," the Louisiana Department of Wildlife and Fisheries said in a public release.

Roseau cane is a tall wetland grass that helps protect Louisiana in several ways. Unlike some marsh vegetation, Roseau cane stands up well to tropical storm events. It is one of the most erosion-resistant marsh plants on the bird's foot delta. It also assists in building land by trapping sediment from the Mississippi River. The loss of it could lead to even more rapid land loss in the delta, turning what is now marsh into open water.

More than 100,000 acres of Roseau cane-dominated wetlands has been affected by the insect as biologists continue to look for ways to stop its spread. Even as marsh rapidly turns to open water, there is currently no viable solution to combat the loss. —K.S.

Early Corps river model gets new life

IN THE 1940S, PRIOR TO COMPUTER SIMULATIONS, the U.S. Army Corps of Engineers constructed a complex Mississippi River Basin model. Sprawled over 200 acres in Jackson, Miss., the topographical labyrinth depicting streams and inlets was then the largest river model ever built, and it played a critical role in protecting the region from flooding.

But the model isn't just a hydraulic engineering marvel. The Mississippi River Basin model also holds an interesting history as it was built by prisoners of war during a wartime labor shortage in the United States as troops were off fighting in World War II. The majority of laborers were German engineers who had been among the Afrika Korps, soldiers fighting in the deserts of North Africa.

Over the years, the river model ran nearly 80 simulations. But for the past couple decades, as computer models made it obsolete, it's been mostly abandoned. Weeds and trees have grown over the handmade topography that was so meticulously shaped with concrete and steel decades ago.

Now, a nonprofit called Friends of the Mississippi River Basin Model is looking to revive the historically-rich site.

The nonprofit, which formed in 2016, is beginning with clean-up days, helping to clear debris in Buddy Butts Park where the model is located. The group's goal is to enrich the park with benches, picnic tables, restrooms, trails, and, eventually an education and science center, says Sarah McEwen, a water resource civil engineer and president of the nonprofit.

McEwen says she was fortunate to grow up in a family of engineers. As a child, she played with robots and had easy access to science education. She hopes that by reviving the park and providing educational opportunities, the project will intrigue children, sparking their interests in science and engineering.

"I grew up the child of two engineers," McEwen says. "I had every advantage in the world when it came to math and science. This project, to me, is a way for the kids of Jackson, Mississippi to have immediate access to engineering concepts and principles, and learn about hydrology and flood control."

Origin of a flood model

In 1927, a historic Mississippi flood broke levees, destroyed thousands of homes and displaced a half million people. The damage translated to one third of the federal government's budget at the time, and then-President Herbert Hoover called it "the greatest peace-time calamity in the history of the country." In an attempt to tame the river, levees were built and flood mitigation programs put into place. Still, another devastating flood occurred in 1937, leaving millions homeless and claiming lives. Given how large the Mississippi river region was, leaders realized they needed to approach flood mitigation on a grand scale that encompassed the entire region rather than addressing flood control on local levels.

The U.S. Army Corps began building the river basin model in 1943. Short on labor due to World War II, POWs from the nearby Camp Clinton were re-assigned from picking cotton on plantations to building the Mississippi River Basin Model, according to historic documents.

ABOVE: ***This aerial view gives a size perspective of the massive early river model, the photo at right perspective on the prisoners of war who for the most part did the construction.***

Learn more:
friendsofmrbm.org/

It took from 1943 to 1966 to completely build the model. However, parts of the model were used beginning as early as 1949. The model was used until 1973, though it did come out of retirement in the late 1980s and early 1990s to run simulations that determined how raising levees along the Birds Point-New Madrid Floodway in Missouri would affect the Mississippi River and Tributaries Project System.

With shovels, pick axes and wheelbarrows, the POWs who constructed the river model moved more than one million cubic yards of earth. Their labor would translate to $14 million in 2017, according to McEwen. The POWs were compensated: a German lieutenant received $20 per month, a captain received $30 and officers of a higher rank were paid $40, McEwen says. They were paid in canteen scrip and deposit slips.

Eventually, Friends of the Mississippi River Basin Model would like to reconstruct an interactive POW barrack on site so visitors can learn more. —B.A.

MY MISSISSIPPI

Glenn Smith, 61, Public Relations and Marketing at Hospitality Enterprises, New Orleans, Louisiana

"If you ask what the Mississippi River is to me, it's the lifeblood of the state of Louisiana. And, the city of New Orleans and the French Quarter are the lifeblood of the tourism industry in Louisiana. Without the river, we wouldn't have the tourism industry. What amazes me about the Mississippi River is that 27 states could put cargo on a barge and float it down the the Mississippi River and then export it to the rest of the world. You get to feel the connection to the country and the rest of the world through the Mississippi River.

"My family got into the tourism business in 1984 with the World's Fair. We built the Creole Queen to be a water taxi from the Hilton hotel to the entrance of the fair. After the fair was over, we had the river boat so we said 'let's operate it as an excursion.' When people come to New Orleans, they can get a lot of their fun cards punched. We have jazz. We have blues. We have food, culture and history. I'm part of the Mississippi River Connections Collaborative, which puts the spotlight on the river, and my family's company Hospitality Enterprises does several sightseeing tours throughout New Orleans. We have a Creole dinner jazz cruise that goes up and down the Mississippi River. We also do two historic, battle fight cruises highlighting the War of 1812. A historian is on board who gives a narrative of the period, and he's dressed in that period like a soldier would be. One of my favorites is the plantation tours that take you into antebellum mansions.

"We also do a walking ghost tour in the French Quarter. To lead one of those, you have to have a good grip of history. You have to get dressed up to look like you're Tom Cruise in 'Interview with a Vampire.' It looks like you just woke up in the cemetery. If you set the right mood, somebody can feel a gnat land on their arm and swear it's a ghost. New Orleans is an occult city, and yet you have the oldest practicing cathedral in North America here, the St. Louis Cathedral, which makes this an interesting place. There's good ghosts and bad ghosts. I've experienced the aura of the French Quarter; it's a relatively haunted area. I was at an event at the hotel a couple years ago. When you went into the rooms, you could just feel the hair on your arms stand up. Can I explain it? No. But can you feel it? Absolutely." —B.A.

Our Mississippi goes to camp

Students worked out their bodies and minds during the 2nd annual "Our Mississippi" Summer Boot Camp in June 2017. The boot camp is organized through a continued partnership between the St. Louis District of the U.S. Army Corps of Engineers and NewPOT Solutions Charitable Foundation (newpotscf.org) and is designed to engage students in science, technology, engineering and mathematics (STEM). The three week program challenged students to conduct experiments, design engineering marvels, and explore possible STEM careers. The program has also expanded since its first year, from serving one cooperating school district in 2016 to four school districts throughout the St. Louis region in 2017. A total of 75 students from the Riverview Gardens, University City, Hazelwood, and Ferguson-Florissant school districts enrolled in the immersive experience.

This year, the program focused heavily on providing hands-on experience in STEM fields and careers.

"We wanted to give the students a taste of actual STEM-related careers," said Roxane Krutsinger, Natural Resources Specialist for the St. Louis District. "We were able to collaborate with partners such as Southern Illinois University Edwardsville, National Park Service and Ameren to inspire students to step outside their comfort zone and take an interest in STEM careers. Many students said they never knew these jobs existed. That was our goal, to expose them to new things."

The program included workshop sessions, hands-on activities, service projects and field trips to showcase potential STEM-related careers and ideas for community involvement and volunteering. A field trip to a local park had students removing invasive species and improving native habitat. This community-based activity introduced students to the concept of invasive species, while highlighting volunteerism as a valuable experience. Brandon Williams, a 7th grade student in the program said, "The NewPOT STEM Boot Camp was a great experience and it was very educational. Every kid should do this camp."

"Our mission is to develop, mentor and support the personal, academic and athletic career potential of underserved students. Yet, through our programming, our objective is to create tomorrow's professional workforce," said Kevin Potter, president and founder of NewPOT Solutions Charitable Foundation. "Our partnership with the U.S. Army Corps of Engineers has created STEM economic access and inclusion for our scholars. Our partnership with the Corps has allowed us to build on the possibilities."

The boot camp culminated in a career day that brought professionals from 12 organizations to interact one-on-one with the students. Students spoke with scientists, architects, law enforcement officers and wildlife managers to learn about their daily job tasks and education requirements.

"The NewPOT STEM Camp was very inspiring to me and it helped me think I can accomplish anything I put my mind to. Next year, I will be in a private school and I hope to participate in the 2018 camp!" said Sydnee Jackson, a student at Wedgewood Middle School in the Ferguson-Florissant School District.

While the camp involves a formal partnership, the U.S. Army Corps of Engineers and "Our Mississippi" also offers an educators guide and resources, including access to public lands, that are increasingly being used by home schooling parents and others looking for supplemental educational resources (SEE STORY BELOW). —B.M.

River as Classroom

Tom Sawyer and Huck Finn learned plenty of lessons on the Mississippi River. Now, so are a growing number of home schoolers turning to the U.S. Army Corps of Engineers, its partners and the river itself for "school."

"We see a lot of home school parents come together and bring students on field trips together," says Julie Watson, education director of the Audubon Center at Riverlands in West Alton, Missouri. "I have several parents come each semester, and it's really fun for me. I end up seeing these children grow quite a bit actually."

This fall, several home schoolers came to the center to tag butterflies, study spiders and learn about birds—a focus of the center located on the U.S. Army Corps of Engineers–run Riverlands Migratory Bird Sanctuary. Watson takes every chance she gets, she says, to also use the visits to present critical ideas like water quality and the power students have over that.

For Christy Schaper, in her fourth year of homeschooling sons Blake, 11, and Jacob, 12, there's no better educator than the natural world.

"At home, we were using a textbook to study birds, and we were able to check out a kit from the Corps-operated National Great Rivers Museum to explore the birds of our region with posters and stuffed animals that make bird calls," she said. "Then with the help of the Audubon Center, we were able to go on a bird walk and identify birds specific to our region. Taking information from a book and connecting it to the world right outside our doors and windows add an element of connection that simply cannot be achieved by reading a textbook alone." —K.S.

JEEPERS CREEPERS! Have you seen any of these creatures along the Mississippi?

Along the Mississippi River, you'll find plenty of beauties: doe-eyed deer, blue and purple Jacob's Ladder blooms and roseate spoonbills, whose pink feathers make them look as though they could be cousins to flamingos.

But, the Mighty Mississippi is also home to some beasts. Sure, you may know about the gators of the bayou and the venomous snakes slithering through Mississippi. Also taking up residence along the river, though, are some lesser-known creatures of the creepy and crawly variety. They squirm, snap and slither. And one is a meat-eating plant you could file in both the "beauty" and "beast" categories.

It's true; field books can hold scary stories, too. Here's some of the Mississippi River's creepiest creatures.

TURTLE OR ALLIGATOR?

Alligator snapping turtles hold the record as the largest freshwater turtle in North America, with males reaching carapace (AKA *shell*) lengths of 31 inches and weights of 200 pounds. But, what makes this turtle especially creepy is how it catches its prey, which could include anything from acorns to beavers, in addition to fish, turtles and snakes. This turtle hunts by lying motionless in the water with its camouflaged mouth open, awaiting its prey.

"What is really cool about the alligator snapping turtle is the little structure in its mouth that it wiggles to make it look like a worm," says Bronson Strickland, a professor and extension wildlife specialist with Mississippi State University Extension Service. "Little fish come to investigate and meet their demise."

SALAMANDERS WITH MISSING LIMBS AND SLIPPERY SKIN

Salamanders slither through the wetlands along the Mississippi. But a couple are especially eerie. Take for instance the three-toed amphiuma, which has small fore- and hind limbs, each limb with three tiny toes. These three-toed amphiumas are often missing toes and entire limbs. These creatures are alert, fast and slippery, but, if they're captured, they might bite viciously.

Another, the western lesser siren, produces lots of mucus on their skin. Coupled with their wiggly and squirmy movements, it's nearly impossible to hold them. Ick factor aside, these salamanders don't bite and are completely harmless to humans.

"These are both slippery, slimy, eel-looking creatures," says Andrea Schuhmann, a natural history biologist with the Missouri Department of Conservation. "Both are eaten by the western mudsnake which uses its pointed tail to spike the slippery prey."

A PRETTY PLANT THAT LAUNCHES UNDERWATER ATTACKS

These aquatic plants may look pretty with their bright yellow flowers resembling snapdragons, and their slender stalks extending out of the water. But, the rootless bladderworts are carnivorous and use their small buoyant sacs (bladders) to launch attacks on glass shrimp, insect larvae, newborn tadpoles and other insects.

Each one of their bladders has a trapdoor with special trigger hairs. When an aquatic bug brushes one of the trigger hairs, the plant's trapdoor swings open and the water and prey rushes in. The trapdoor closes within a half second, and the predatory plant digests its prey and resets the trap in about 15 minutes.

"They like to grow in very still water and boggy areas," says Deanne Drake, aquatic vegetation specialist with the Wisconsin Department of Natural Resources.

Wisconsin has eight bladderwort species. The human eye can observe the process in a glass jar, Drake says. "Looking down in dark water would be difficult to see anything, though," she says.

A DRAGON LOOKALIKE THAT COMES OUT AT NIGHT

The mudpuppy's head makes it a darn close doppelganger to a mythical dragon. But this creature has gills and a fish-like body. As if its appearance isn't creepy enough, the mudpuppy is mostly nocturnal and unlike almost every other reptile or amphibian in Iowa, this one is active in the winter.

The Iowa Department of Natural Resources has teamed up with the U.S. Fish and Wildlife Service and Minnesota herpetologist Jeff LeClere to do a first-of-its-kind study of mudpuppy populations on the Mississippi River. The DNR has known that fully aquatic salamanders exist in the area because anglers have accidentally caught them before. Now, the team wants to learn more about the mysterious creature and what its life is like in Pool 11 in the Upper Mississippi near Guttenberg, Iowa. Yes, they're slimy and yes, they're creepy looking, but mudpuppies are actually harmless.

ACTIVITY

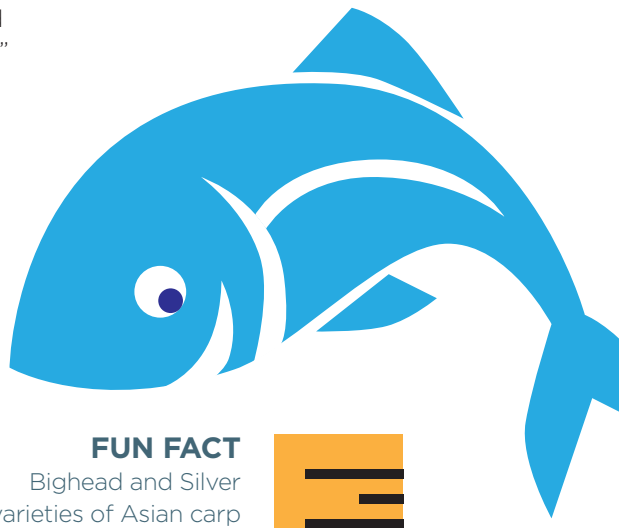
Can you jump like an Asian Carp? Let's see how high you can jump!

You will need: pieces of tape, a tape measure, and a pencil.

1. Mark how tall you are by standing next to a wall and place a piece of tape at the top of your head to show your height before starting.
2. Have your parents or a tall friend stand beside you to mark the height of your jump with another piece of tape. Then jump as high as you can!
3. Using the tape measure, start at the floor and measure up to both pieces of tape. Use the worksheet below to calculate your jump height.

HEIGHT JUMPING [ ] — **HEIGHT STANDING** [ ] = [ ]

in inches or centimeters — *in inches or centimeters* — **HOW HIGH YOU JUMPED**



FUN FACT

Bighead and Silver varieties of Asian carp can jump up to 10 feet out of the water when frightened, according to the U.S. Fish and Wildlife Service.

Travel the river's haunts

Tales of the unexplained follow the twists and turns of the Mighty Mississippi River's current—from the headwaters in Minnesota, through America's heartland, into the deep south and, finally, New Orleans.

Some credit a theory within paranormal pseudoscience that certain energies are made stronger when they are near water. According to paranormal investigators, ghost tour providers and authors of books on river haunts, this makes the banks of the Mississippi River a hotspot for ghost stories of the sort especially popular come autumn and Halloween.

Historian and paranormal investigator Troy Taylor, author of more than 100 books on unexplained happenings, has translated his stories into popular ghost tours in Alton, Illinois, a spot he calls the "most haunted small town in America."

"From fire to flood to the Civil War to epidemics, everything is affected by the history that has happened there," he says.

Ghost of New Orleans

New Orleans, near the end of the Mississippi River, boasts probably the highest concentration of ghostly tales and tours, those situated amid the voodoo museums and palm reading kiosks. Through the centuries, floods, diseases, war and criminal activity spread across New Orleans, leaving death and destruction in its path.

Infamous sites include the LaLaurie Mansion on Bourbon Street with tales of a torture chamber, and the St. Louis Cemetery No. 1, which holds the remains of Marie Laveau, New Orleans' Queen of Voodoo. It is considered one of the most haunted cemeteries in the United States. Tales are common of people witnessing the ghost of Marie Laveau, with her signature red and white turban, walking through tombs, as are tales of witnesses being scratched, pinched and shoved to the ground. It is fair to say that she is not always friendly. **Dare go?** NEWORLEANSONLINE.COM/NEWORLEANS/TOURS/CEMETERY-TOURS.HTML

Murder at the Myrtles

Just an hour north of New Orleans is one of the most haunted plantations in the South, The Myrtles Plantation. Located a stone's throw from a bend in the Mississippi, the Myrtles was built in 1796 and has a history of murder, deaths from epidemics, and rumors of being built on a Native American burial ground.

Guests who visit on tours and overnights report apparitions appearing at bedsides holding a candlestick but never saying a word, children playing in the hallways when no children are present, and objects that have been mysteriously moved. **See for yourself:** MYRTLES PLANTATION.COM/TOUR

Most Haunted Small Town In America

Ghost tours in Alton, Illinois, located at the confluence of the Mississippi River and the Missouri River, include stories of deceased confederate soldiers walking along Hop Hollow Road where their bodies were unceremoniously dumped and forgotten, a church where a suicidal minister is said to still reside, and even a haunted tuberculosis center.

In his book *Haunted Alton*, Taylor talks of the First Unitarian Church, a favorite among tour attendees. It is here that "doors in the sanctuary open and close, gusts of cold air blow by, and shadows move across the walls." While those experiences are eerie enough, the most stunning encounter occurred, he said, when 30 tour attendees "clearly saw the silhouette of a man standing on the other side of the glass" that separates the sanctuary from a meeting room. "It was only a black shadow, but it was clearly a person." As guests hurried to the doorway to see who was standing on the other side, they discovered the sanctuary to be completely empty. **Take a tour:** ALTONHAUNTINGS.COM

The Ghosts of Quarters One

Sheila Schafer, co-founder of Rock Island Paranormal Society, said her group was "the first tour to bring people into Quarters One, which is the second largest mansion in the military's collection." The home, built directly across from a Confederate Prisoner of War Camp with more than 1,900 reported deaths, makes for the perfect ghost story backdrop. Schafer claims she once chased a shadow throughout the home but was never able to catch it. Other visitors recount their experience of seeing a Confederate POW leaning against a post at the driveway entrance smoking a pipe.

According to Schafer, nearby Sylvan Island in Moline is also a paranormal hotspot in the river. Most notably, paranormal investigators have heard Native American drums beating and watched misty figures walking around. **For more Rock Island area haunts to visit:** HAUNTEDPLACES.ORG/ROCK-ISLAND-IL

Haunted St. Paul, Minnesota

In St. Paul, Minnesota, many ghost tales similarly revolve around native history, one that here begins with the Sioux Indians and continues though the arrival of French-Canadian traders and European settlers.

Some of those former occupants may still be around, says Alan Brown, author of "Ghosts Along the Mississippi River." He shares several tales of restless spirits who refuse to leave buildings they've perhaps resided in for centuries. At Forepaugh's Restaurant, a man (who isn't really there) is often seen walking through the dining room, while at the Griggs Mansion, the most haunted house in St. Paul, there are reports of an apparition of a tall thin man walking through the home and people waking to a spectral being floating above their bed.

Whether only some (or none) of the tales are true, Brown says, "ghost stories should be enjoyed and valued because they preserve the history and values of the people who pass them along." They're especially fun as presented by costumed interpreters in the city's **Ghost and Graves tour:** WABASHASTREETCAVES.COM/GHOST_&_GRAVES_TOUR.HTM —D.T.

New Orleans launches its 300th birthday bash

The year was 1718 when Jean-Baptiste Le Moyne, Sieur de Bienville founded New Orleans just 100 miles from the mouth of the Mississippi. The original city was centered around Jackson Square, today a center of tourism. After a hurricane destroyed the city in 1722, streets were laid out in the grid pattern that now makes up the French Quarter. A celebration of all that's come since is starting this fall, leading into the city's Tricentennial

year. The official kickoff is the New Orleans Book Festival, Nov. 11, followed by the NOLA 300 conference's presentations on the city's past, present and future. The first day of the Tricentennial Carnival Season kicks off with Mardi Gras-themed fireworks on Jan. 7. **For more not to miss, follow:** 2018NOLA.COM

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River Mayors partner on disaster prevention fund

In the wake of recent natural disasters, the mayors of the Mississippi River have stepped in to form a federal and private sector partnership, pledging to match development projects that target Mississippi River resilience and sustainable economics.

The fund will come via a partnership with CDP, an international not-for-profit organization that houses the world's largest collection of self-disclosed corporate environmental data. The Mississippi River Cities and Towns Initiative not only announced the formal investment partnership. The group of river mayors also unveiled this fall a series of initiatives related to recent storm-related disasters. The mayors called for a national infrastructure proposal that includes an investment plan for disaster mitigation and resilience.

The announcements were made in St. Louis, Missouri, where more than two dozen mayors covering the length of the Mississippi River met for their annual meeting. The initiatve is a mayoral-led effort commited to creating a coordinated voice for the Mississippi River.

Culture in Color

A series of striking murals on the sides of downtown buildings are creating quite the buzz in Dubuque—and that's just what was intended. Organizers from a group called "Voices from the Warehouse District" organized the project that started with four murals and is now on pace to complete 14.

River history and the local culture and ecosystem are incorporated into many of the murals. Others have a theme related to location, such is the case with the cosmetology themes on the side of the Capri College building. There will be 20 murals in total, funded through a state grant and local businesses, all designed to create economic development either through increased visitation or the "cool city" approach to retaining local talent.

Our Mississippi

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

Send story ideas to editor@ourmississippi.org

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