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Healthy mussels, healthy river: Study aims to assess the Allegheny

Western Pennsylvania Conservancy project goal is conservation, restoration

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By Don Hopey, Pittsburgh Post-Gazette

VWH Campbell Jr. / Post-Gazette

These fresh water mussels have been collected from Pool 6 of the Allegheny River as part of a Western Pennsylvania Conservancy study to evaluate the river's health.

On a flat-bottomed, 23-foot boat similar to the type serious bass fishermen favor, aquatic ecologists Tamara Smith and Jake Winkler wriggle into wetsuits, strap on scuba tanks and masks, then slip over the side into Pool 6 of the Allegheny River.

They are in 9 to 12 feet of water, half a mile down river from the Kittanning Bridge and 44 miles up from Pittsburgh's Point. The Allegheny looks more like a river here than it does in the city: smooth as green glass, with islands and wading shallows, and sloping banks rimmed with round stones and yellow flowered iron weed.

Underwater, along the river bottom, the divers are following an anchored, 100-yard-long rope across the navigation channel, feeling along by hand -- "noodling" they call it -- for freshwater mussels.

They'll probably find and collect some muckets, a rounded, palm-sized animal that's among the most common of the hinged inhabitants in this part of the river. They may also pull out a few Wabash pigtoes, elktoes, mule's ears, pocketbooks, spikes and heelsplitters. If they're really lucky they may pick up a rayed bean, one of the smallest of the Allegheny mussel species and a candidate for federal protection.

Though many people would be surprised that the mussels exist at all in the region's rivers, they are prime indicator species for good water quality and river habitat favored by many fish. The bivalves are also important links to what historically has been one of the most biologically diverse river systems in the world, and one of its most understudied -- at least until very recently.

Graphics

Mussel assessment: Allegheny, Ohio rivers
See a larger version

Life cycle of the freshwater mussel
See a larger version

The dive underway this day in the river pool created by Lock and Dam No. 6 at Clinton and Lock and Dam No. 7 at Kittanning is the 50th of 100 or more that will be done in a 30-month mussel assessment by the Western Pennsylvania Conservancy in pools 5, 6, 7 and 8, in the Allegheny River's middle, dammed section.

Conservancy divers will collect and catalogue the mussel population data, which will then be used, along with new fish studies and a detailed river bottom map, to plan, for the first time, for conservation and even restoration of the watershed's globally significant fish, shellfish and plant populations.

River of the future

"What we're left with in the river today is the result of very little planning," said Charles Bier, director of natural heritage for the Conservancy. "As a society we've made decisions about how we're going to treat the river but we haven't put it together in terms of management of an ecosystem. What we want to do is pull a lot of information together to answer the question about what we want the river to look like in the future."

The Conservancy is getting a better idea what the river looks like now by using its dive boat, equipped with advanced sonar and global positioning satellite equipment, to produce the first three-dimensional map of the river bottom in Pools 5 through 8. The map will be made available as a public planning tool and useful in identifying and assessing both existing high quality habitat and degraded areas in need of restoration.

"We understand this is a locks and dams river system that has been forever altered," said Nick Pinizzotto, senior director of the Conservancy's watershed programs, which are focused on improving water quality in the Allegheny's tributaries, especially the Little Mahoning and Mahoning creeks. in Indiana County. "But with all this new information we will be in much better position to figure out how to keep this a working river while still maintaining and enhancing its best habitat."

John Arway, chief of the Fish and Boat Commission's environmental services division, said the aquatic species and habitat data being developed by the state and federally funded studies will be important to managing everything from fish and mussel populations to navigation channels, dam reconstruction, industrial discharges, sewer overflows, and commercial sand and gravel dredging.

"With this data we'll be able to make sure that animals that are truly rare are protected and also gain knowledge about how fish live together in the rivers," Mr. Arway said. "We can start proactive management plans for fish that we were never able to do before and identify areas of greatest biodiversity."

After all the information is gathered and reviewed, Mr. Arway said, the state will be able to identify important aquatic habitats, and possibly designate underwater "ecological reserves" or "sanctuaries" that would be protected from damaging activities. Those reserves might eventually be expanded and linked with other reserves up and down the rivers.

Such reserves would be the first such designations in the nation.

"The idea," he said, "is to identify and protect important areas of critical habitat for species we have an interest in seeing survive."

Decades of degradation

Identification and protection of natural resources is not a management strategy that's played a big role in how Pittsburgh area rivers have been used in the industrial age. For 150 years, pollution, dredging, sedimentation and pooling produced by the system of navigational locks and dams have all contributed to a reduction in the types and range of mussel species found in the Allegheny and upper Ohio rivers and their tributaries.

And there hasn't been a lot of aquatic information-gathering done on the region's rivers either since Arnold E. Ortmann exhaustively collected and catalogued freshwater mussels and crayfish in the Allegheny and upper Ohio rivers while curator of invertebrate zoology at Carnegie Museum from 1903 to 1927.

One of his sampling locations was around Cogley's Island, just a mile down river from where the divers are working. Around that flat, grassy, sand spit, Mr. Ortmann pulled up and identified 38 species of mussels. Historically, the river has been home to as many as 52 different species, more than almost anywhere else in the nation. On this day the divers will be lucky to find 11 different shells.

That diminution is reflective of even bigger problems for fresh water mussel populations across the nation where two-thirds of 312 species are at risk of extinction and one in 10 may have already vanished forever, according to Rivers of Life, a publication by the environmental group, NatureServe.

"The study found that the highest percentage of animals at risk of extinction are those that live in and depend on rivers, and that's because of the way the rivers have been managed for the last century and a half," Mr. Bier said. "The best remaining populations on Earth are in the Allegheny River but their range is reduced by 95 percent."

Mussels are found in sections of the river that hold the best and most natural remaining habitat: shallows not dammed pools, with steady flow and current, a bottom of sand and gravel and stone where they can burrow in and anchor, and a healthy population of "host" fish, to carry around and distribute their eggs.

Because freshwater mussels don't move around much and live so long, Mr. Bier said, they are one of the best indicators of long-term river health, similar to the canary in the coal mine.

"If the canary continues to chirp the air is fine. If the mussels are no longer found, or if populations are depressed, or there's just a bunch of old animals, then the mussels are going to die out," Mr. Bier said.

"One of our concerns, is that the middle Allegheny River is isolated. When you get above East Brady the river is free flowing for 120 miles fro the Kinzua Dam and it's a gem of an ecosystem. with islands, shallow depths, the riffles and a high and healthy population of northern riffleshell and clubshell mussels. They're great canaries that are telling us it's a good and healthy system up there, but isolated in this middle part."

Contributing to that biologic isolation is the poor water quality of the Allegheny's tributary streams. Crooked Creek, Red

Bank Creek, Buffalo Creek, the Kiskiminetas River, and the Clarion River all have significant water quality problems caused by some combination of agricultural runoff, abandoned mine drainage, sewage or sedimentation.

Somewhat surprisingly, researchers have found that down the Ohio River, 160 miles below Pittsburgh, water quality improves enough to support 34 different mussel species. It is in that middle section, up the Allegheny to East Brady and in the upper Ohio River from Pittsburgh to the state line, where the aquatic species need help to reestablish a toehold.

"What we'd like to see happen is to establish focal points of high diversity and rich habitat in this lower 70 mile stretch of the Allegheny," Mr. Bier said. "This [diving] project is about mussels, but we'd like to see hellbenders [aquatic salamanders, 12 to 29 inches long] back in the lower Allegheny River and fish that over time can depend on good habitats that we don't have to just hope will be there in the future.

"We'd like to restore stepping stones of habitat down through that whole length of river and allow species to have aquatic sanctuaries where they could link up."

Underwater sanctuaries

One of the places those sanctuaries might work is around Phyllis and Georgetown islands, on the Ohio River 35 and 38 miles below Pittsburgh's Point. Those islands, part of the Ohio River Islands National Wildlife Refuge, are shrinking, due in part to legal sand and gravel dredging in the area near the Pennsylvania-Ohio state line that has accelerated island erosion.

The U.S. Fish and Wildlife Service recently filed an application with the U.S. Army Corps of Engineers for permission to build stone and rock filled dikes around parts of those islands to stop the erosion. Establishing a reserve around the islands could provide additional protections.

Jacqui Bonomo, the Conservancy's vice president of conservation, said the 75-year-old land trust has a conservation and restoration agenda for the Allegheny and upper Ohio, that includes selecting a pilot river restoration project site by the end of 2008 and securing funding in 2009. Its report on mussel populations will be submitted to the Fish and boat Commission.

"In any listing of the land and water resources that need to be preserved in this state the Upper Ohio River system, including the Allegheny, just jumps out," Ms. Bonomo said. "Nature is resilient. Even though the rivers operate as a series of lakes, there is some shallow habitat around islands and at the base of the dams. We think if we can create additional good habitat for the mussels and fish, the potential for the rivers to come back is good."

She said it will be "critical" to get a significant pieces of the restoration work done in conjunction with the U.S. Army Corps of Engineers lock and dam replacement project on the upper Ohio River, either at part of the project or as mitigation for the dam work.

An hour and a half after they went under, the divers finally resurface. When they climb aboard the boat, Eric Chapman, the Conservancy's director of aquatic science, steers it to shore.

There, next to a muskrat den under an exposed tree root where dozens of opened mussel shells are scattered like dirty dinner plates, Mr. Winkler and Ms. Smith open mesh collection bags and begin to identify, sort and measure the live mussels they've gathered from the river bottom.

They've only covered half of the 100 yard long sampling area but the mesh bags are bulging. Beth Meyer, an assistant zoologist with the Conservancy, records the data.

"Elktoe."

"Spike. Spike. Another spike."

"Young mucket."

"Pocketbook."

"Here's a black sandshell, it's longer than a spike," Mr. Winkler said. "And a golf ball. We always find golf balls."

They also find a lot of the bottle cap-sized Asian clams, an invasive species that they don't count. After the mussel data is recorded, the animals will be returned to the river unharmed.

"We found a lot of mussels at first , then the line crossed a lot of bedrock in the middle," Ms. Smith said, as she pulled from the bag another large mucket that was spitting water. "It was good down there."

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