Imperiled, some freshwater mussels endure. How?

November 13 2018, by Cory Nealon

Brandon Sansom (right), PhD student, stands in front of the mussel flume with advisor Sean Bennett, chair of geography. Credit: Douglas Levere

Freshwater mussels are among the most imperiled animals in North America, yet some colonies have managed to persevere despite habitat

loss, pollution and other threats.

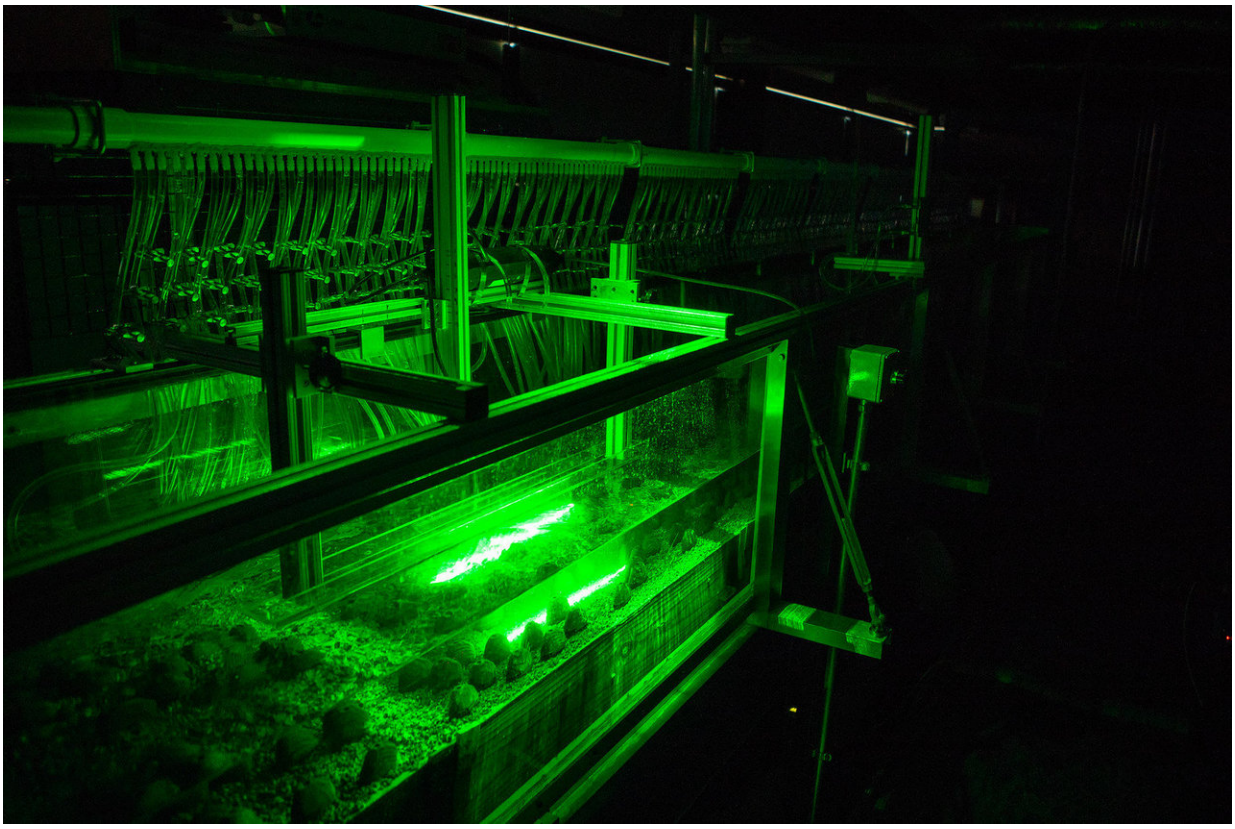
How? That's a question University at Buffalo researchers are working to answer.

A recent analysis of two creeks—one within the Great Lakes watershed, the other part of the Mississippi River basin—adds to the growing body of work showing stable populations and multiple generations of freshwater mussels in the same location for decades.

The work, described in the journal *Freshwater Biology* in August, and continuing with ongoing experiments, offers possible explanations into how these poorly understand and ecologically important mollusks are adapting to changes in their environment.

"The United States has an unparalleled collection of freshwater mussels. Yet many are endangered or threatened. Some species have been declared extinct. We'd like to know how certain species persist and why others struggle," says lead author Brandon Sansom, a Ph.D. candidate in the Department of Civil, Structural and Environmental Engineering in UB's School of Engineering and Applied Sciences.

Co-authors of the Freshwater Biology study include Sean Bennett, Ph.D., professor and chair of the Department of Geography in UB's College of Arts and Sciences; Joseph Atkinson, Ph.D., professor and chair of the Department of Civil, Structural and Environmental Engineering; and Caryn Vaughn, Ph.D., George Lynn Cross Research Professor at the University of Oklahoma.



A view of the mussel flume. Credit: Douglas Levere

Field work

North America has roughly 300 species of freshwater mussels. They play important ecological roles, including purifying water through filter-feeding and serving as a food source for fish and other aquatic wildlife.

Many are listed as endangered, while others are threatened. Reasons vary from habitat loss, pollution and declining populations of fish, which help the sedentary bivalve reproduce by serving as a host and carrier of fertilized eggs.

To conduct the study, the research team analyzed mussel populations in Tonawanda Creek, which is part of the Erie Canal and empties into the Great Lakes near Buffalo, New York. The team also surveyed French Creek, which runs from Western New York into the Allegheny River, part of the Mississippi River drainage basin.

At each creek, researchers observed 21 species. The diversity and abundance were about the same as surveys conducted nearly 20 years prior. In the study, the researchers note there are similar, long-sustained populations in the South, Midwest, Northeast and West regions of the United States.

A closer look at the simulated mussels. Credit: Douglas Levere

Mussels adapt to changing environments

Previous research has shown that mussels adapt to changing environments. They can shift their position to be parallel with the river flow, burrow deep into the river floor and find shelter behind large rocks.

To better understand how the mussels surveyed have managed to endure, the research team ran computer models simulating the animals' environment.

Specifically, the researchers tested the long-running hypothesis that, in order to thrive, mussels require water with relatively stable amounts of sediment—the loose clay, sand, gravel, and other soil particles that settle at the bottom of river beds. But the simulations indicated otherwise, that mussels can survive frequent flow events in which sediment is displaced from the river bed and transported downstream.

While not reported in the study, Sansom and colleagues have begun another simulation experiment. Working with UB's College of Arts and Sciences' machine shop, the team built a 24-foot long flume of recirculating water. It contains hundreds of imitation mussels that "filter" water via plastic tubing.

Preliminary findings suggest that mussel density and shell roughness play roles in keeping mussel beds at steady population levels, Sansom says.

More information: Brandon J. Sansom et al. Long-term persistence of freshwater mussel beds in labile river channels, *Freshwater Biology* (2018). DOI: 10.1111/fwb.13175

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