

# Fighting invasive species in Michigan's lakes

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Everyone knows that clean water is important. But for the state of Michigan, surrounded on three sides by the Great Lakes, it is absolutely essential—to the economy and the environment. That's why the research being done by U-M professor Vincent Deneff is so critical.

Deneff, an LSA assistant professor of ecology and evolutionary biology, has been studying microbes and their relation to the aquatic systems of the Great Lakes region since 2000, when he first came to Michigan to work on his doctorate at Michigan State University. Deneff's research focuses on [invasive species](#) such as zebra and [quagga mussels](#), and attempts to answer questions about how mussel invasion affects different bacteria and how the mussels themselves are actually changing what is happening in the lakes.

"Part of my research focus is on the effect of mussels on cyanobacteria [blue-green algae, so named because of the 'cyan' blue color of the bloom], trying to learn more about things like under what conditions do they get eaten, what determines how they get eaten, how does this change over time and are those changes happening because of evolution," Deneff says.

Algae are simple plants that form the base of "food webs." But they can also be dangerous. Some types produce toxins that can kill fish, mammals and birds, and may cause human illness. Others clog the gills of fish, or smother corals and submerged aquatic vegetation. Still others discolor water or cause drinking water and fish to taste bad.

Quagga and [zebra mussels](#) are aquatic invasive species originally native to eastern Europe. They get their names from the zebra-type striping on the shells (a "quagga" is an extinct subspecies of African plains zebra). Both species are small, but they can cause a lot of trouble: they are prolific breeders and have a long history of invasion.

Mussel invasions have a catastrophic impact on ecosystems. They clog water intake structures, affecting water treatment and power plants. They can negatively impact recreational activities on lakes and rivers; even something as simple as walking along a beach becomes difficult when it is heavily encrusted with sharp mussel shells. Mussels on boat hulls can affect boat steering and interfere with engines. Ecological problems also result from mussel invasions. Zebra and quagga mussels can displace native aquatic species, either by killing them outright or by "outcompeting" the native mussels and other filter feeding invertebrates for food.

Denef's research will contribute to a better understanding of mussels and other invasive species, leading to a cleaner environment and improved water quality, which in turn results in economic benefits to fisheries, the tourist industry and a better healthy overall food web.

The Denef lab currently is working on three interconnected research projects:

- Invasive species: a long-term assessment of the the zebra mussel invasion in the inland lakes of southern Michigan (with MSU);
- Land use and climate change: a study of how climate-affected environmental factors constrain the structure and function of the Great Lakes "food web," with a look toward predicting how climate change will impact carbon emissions (with GVSU and NOAA); and
- Interactions between phytoplankton and heterophic

bacterioplankton: a look at the inland lakes of southern Michigan to determine how phytoplanktonic algae can compete successfully with other algal species.

"Our research will contribute to a better understanding of mussels," Deneff explains. "Learning more about how blooms persist, the role of the zebra and quagga [mussels](#), and how mussel invasion impacts carbon cycle issues, will help lead to a better understanding of what's happening in freshwater systems and a cleaner environment for the people—and the waters—of Michigan."

Provided by University of Michigan

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