

Aquatic Invasive Species: Zebra and Quagga Mussels. Be Afraid. Be Very Afraid.

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Flathead Lake has already been impacted dramatically by introduced species, and the federal, state and tribal management agencies are in a quandary regarding what to do about nonnative lake trout. Well, it is possible that none of that will really matter if zebra or quagga mussels make it to Flathead Lake. So let me tell you about the mussels and why you should care.

Zebra and quagga mussels are native to Eurasia, from the Black and Caspian Seas. They first arrived in North America in 1988. They initially established themselves in Lake Erie via the St. Lawrence Seaway (the commercial shipping route to get to the Great Lakes), transported in the ballast water of ships. Over the next 10 years they spread to all of the Great Lakes and the bulk of the Mississippi River system. Since they first arrived in Western North America in 2007, they have spread to all of the Western States except Montana, Wyoming, Idaho, Washington and Oregon. In short, they have taken over most of our country.

Ecologically, they can be devastating. They dramatically change ecosystems through the monopolization of available resources. They are filter feeders, sucking in water (up to 1 liter/day each) and consuming the food particles (including the plants and animals, algae and zooplankton, that fish feed upon). In some lakes in the Midwest they have eaten nearly 80% of all available food, leaving very little for other species and causing crashes in fish populations. They outcompete native mussels, concentrate toxins in their tissues and feces, cause algal blooms and disrupt foodwebs.



They are prolific. A single female can produce more than 1 million eggs in a 4-5 year lifetime. They can grow in dense congregations (up to 100,000/m²!) on just about anything: rocks, docks, sand, mud, boats, trailers, other mussels, etc. Our native species do not utilize them as a food source, and there are not any diseases in North America known to affect them. So when they get to a new water body they do extremely well and their populations grow rapidly. And yes, from our examination at the Bio Station we believe they could survive and reproduce in Flathead Lake.

They greatly affect people in many ways. Since they grow on everything, they can turn pleasant sand and gravel beaches into expanses of razor sharp shells. And due to the fact that they concentrate toxins, these shells cause infections when people cut their feet. Angling opportunities are decreased due to less fish. Some states have even been closing mussel infested waters to recreation to prevent their spread.



On top of all this, they can cost us a lot of money. They can grow inside pipes and can entirely clog a pipe up to 4 inches in diameter. This is a problem for any water user and particularly for water delivery systems. Agricultural, municipal and private water users have to spend time and money to clean out pipes and canals. Power plants have to shut down in order to clean their infrastructure. All of these costs are passed along to you, the consumers of water and power. Power

producers alone in the Great Lakes spent over \$3 billion during the 1990s on mussel remediation, and it has been estimated that mussels would cost the Columbia River Basin hydropower system roughly \$90 million per year. As you can see, these are not small numbers that we, water and power users, would pay for.

As if this weren't enough, studies in other states have shown that Aquatic Invasive Species (I have not yet found a published study on mussels alone) can cause lakeshore property values to decrease by over 19%. So for many reasons, we do not want the mussels to get here.

For this issue, people are both the problem and the solution. The mussels spread overland by hitchhiking from one water body to another on boats, trailers, fishing gear and other aquatic recreational equipment. The adult mussels can close up and survive in the air for weeks. Juveniles can survive in water in your boat's bilge or even in the cooling system of its engine.

Flathead Lake is the most visited water body in Montana and people come from all over the nation to enjoy its gorgeous waters. They bring their boats. They come to recreate and fish. We go and visit friends and family to recreate on water in other states that have mussels. We run the risk of bringing them back with us to Flathead Lake.

States that have invested heavily up front in education and outreach about prevention have fared much better than states that did not address this risk head on. Over the last few years, Montana Fish Wildlife and Parks has ramped up its efforts to prevent the invasion and let the public know about this risk. Boat inspection stations have been set up at the Montana borders and entry points to the Flathead watershed. We are being urged to "Inspect, Clean, Drain and Dry" our boating and fishing gear in between uses. Hot water (>140 deg F), drying and freezing are the best way to kill the mussels and other aquatic invasive species.

Until recently, the mussels had not been eradicated from any large water bodies. However, in the last couple of years there have been some successes. But success depends on early detection of the mussels before they have spread in large numbers. The state, several volunteer groups and the Bio Station are already monitoring for zebra and quagga mussels.

Bio Station researchers led by geneticist and faculty member, Gordon Luikart, have been developing a new monitoring technique to assist with this. We are now using environmental DNA (eDNA) where we take a water or plankton sample, identify all the DNA present in that sample, and then compare that data with large genetic databases to see what is in there. In short, we do not even need to catch and find a mussel to know if they are in Flathead Lake. We can detect the presence of mussels from even a few sloughed cells.

At the Bio Station we are working hard to refine this test in order to add another layer of protection to Flathead Lake. Early detection through this monitoring could preserve the lake's ecological health and fish populations (whichever those might be). Additionally, we all need to be aware of and diligent about preventing the spread of the mussels and other aquatic invasive species by "Inspecting, Cleaning, Draining and Drying" our gear, and talking to our neighbors and out-of-state visitors about this significant threat to our enjoyment of Flathead Lake.

For more information, please watch our video about the threat of Zebra and Quagga mussels and our eDNA monitoring efforts at <https://flbs.umt.edu/giving/default.aspx>.



Mussels can clog a 4 inch pipe so no water can get through it.