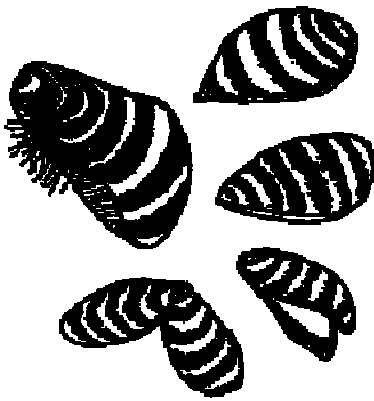


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Zebra Mussels



What are Zebra Mussels and Where Do They Come From?

Zebra mussels are small shellfish marked by alternating light and dark bands. They are typically 2 inches or less in size and have a life span of four to eight years. Zebra mussels have an extremely high reproductive rate of 30,000 to 1,000,000 veligers per year and are able to reproduce at one year of age.

Zebra mussels are native to the drainage basins of the Black, Caspian, and Aral seas of Eastern Europe. It is believed that ships originating from European ports carried the mussel in freshwater ballast, which was

Zebra Mussel (*Dreissena polymorpha*)

discharged into ports within the great lakes. The first North American zebra mussel discovery was in Lake St. Clair, Michigan in June of 1988. The mussel has been found in all five of the Great Lakes; the St. Lawrence River; the Finger Lakes region of New York; throughout the Mississippi River basin, Lake Champlain, Vermont; East Twin Lake, Connecticut; and the southern portion of Lake George. With infestations to the south and west, it is anticipated that their arrival in New Hampshire is just a matter of time. The Connecticut River may be the first place we see them.

Adult and juvenile mussels are transported by waterfowl, boat hull, sea planes, dive gear, live wells and nearly anything else that goes from one waterbody to another. Larvae stage mussels (veligers) can be transported in anglers' bait buckets and boat engine cooling water. Similar to other introduced non-native species such as milfoil, these exotic mussels can reproduce rapidly because natural predators are not present to keep the population in check.

Why are Exotic Mussels a Concern in North America?

Zebra mussels and the closely related quagga mussel are not native to the United States. They disrupt the ecology and cause problems to humans wherever they have appeared. They are the only freshwater mussels that can secrete durable elastic strands, called byssal fibers, by which they can securely attach to nearly any surface, forming barnacle-like crusts. Through this mechanism these mussels can attach to stone, wood, concrete, iron, steel, aluminum, plastic, fiberglass, and PVC. They have also recently been found growing on softer substrates like plants, mud, and even other zebra mussels.

What Problems Do Exotic Mussels Cause?

The zebra mussels' ability to rapidly propagate and physically attach to objects creates several problems:

- Zebra mussels filter small particles such as phytoplankton (microscopic plants), small zooplankton (microscopic animals), and detritus (pieces of organic debris) from water. Mussels are capable of filtering up to 1 liter of water within a 24 hour period. Large populations of mussels can severely alter the lake or riverine food web by stripping the water column of algae, which is the base of the aquatic food web.
- Raw water intakes such as those at drinking water, electric generation, and industrial facilities can become infested with zebra mussels. A water supply system serving 50,000 people in a Michigan city had to shut down due to pump failure because of zebra mussels clogging the intake system.
- Beaches in infested areas may be impacted by the sharp shells that wash up in shallow areas, which can cut bathers and litter beaches. Decomposition of mussels can also create obnoxious odors.

Impacts on boating and navigation include:

- Organisms attached to hulls increase drag and reduce speed, thus increasing fuel consumption.
- Growth of larval mussels drawn into a boat's engine cooling water intake may occlude the cooling system, leading to overheating and possible damage to the engine.
- If shells are drawn into the engine, abrasion of cooling system parts, especially impellers, could result.
- Marker buoys can sink under the weight of mussel encrustation.
- Docks can be destabilized or sunk by mussel colonization.

What Kind of Habitat Do These Mussels Prefer?

□	Grow °F	Spawn °F	Current Rate m/sec	Depth m	Salinity Levels parts per th.
Zebra	68-77	53	0.15-0.5	0-28	0.2-40
Quagga	39-48	39	0.15-0.5	Wide range	0.2-40

Zebra mussels prefer lakes that are not overly enriched, but which have a higher calcium content. Given the mussels preference for higher calcium levels, some New Hampshire waterbodies are at a risk for infestation, especially waterbodies with calcium levels greater than 12 ppm, like the Connecticut and Merrimack rivers.

How Can Exotic Mussels Be Controlled?

An effective way to permanently eliminate infestations has not been found; therefore, emphasis must be placed on controlling impacts on ecosystems and water users. Researching scientists are looking into control by chemical, biological, and physical means. Chemical agents, such as chlorine, are being investigated. However, because the mussels can survive in such a wide range of conditions, the amount of chlorine needed to affect the mussels would likely affect everything else in the waterbody.

Physical methods include manually removing the mussels, ultraviolet radiation, acoustic vibration, and screens. For drinking water, electrical generation and industrial facilities, screen mesh can exclude adult and juvenile mussels from water intake systems. This method is only effective in excluding those mussels that originate upstream of the screens or filters. Veligers can pass through the screens and infest downstream areas.

Biologic controls make use of predators. These predators include diving ducks (scaup, mallards, canvasbacks, and squaws), and freshwater fish (yellow perch, drum, or sheepshead carp). This method will only work if these species are natural to the area. Diving ducks, for example, are migrating birds and are only in the area seasonally. However, migrating populations have increased around Lake Michigan due to an increase in food (the Zebra mussels).

What Can People Do To Help?

Tell your lake, river or watershed association, your local marina, your municipal officials, or anyone with an interest in water management about the zebra mussel. If you are in the power generation industry, plan now for the mussel's invasion to your facility. Call the UNH Cooperative Extension Services or NH Sea Grant, both in Durham, to learn about their zebra mussel public education program. You can also contact DES, the state agency with the primary responsibility of protecting and managing the state's lakes and rivers. Also visit the Fish and Game website for more information on bait regulations that relate to this topic: www.wildlife.state.nh.us/.

When boating in infested waters, be sure to "de-mussel" your boat before you leave the area. "De-musseling" includes performing the following activities AWAY FROM ANY SURFACE WATER:

- Draining the bilge, live wells and engine cooling system.
- Dumping any bait buckets.
- Inspecting the boat by checking the hull, trim plates, anchors, and the trailer.
- Washing down the boat with hot water (140°F), if mussels are found, and allowing the boat and trailer to sit for 5-7 days dry.
- Wash trailer, boat live well, etc with 10 percent bleach solution.

Participate in a zebra mussel monitoring program. Again, UNH and Sea Grant can be contacted at (603) 749-1565. They will provide you with information you need to identify the zebra mussel so you can actively monitor your river, lake, and/or power generation facility. The best defense is to prevent the zebra mussel from entering the waters of New Hampshire. If they arrive, we will all need to implement the proper controls to prevent these undesirable invaders from spreading.