

Boaters: Take action against zebra mussels

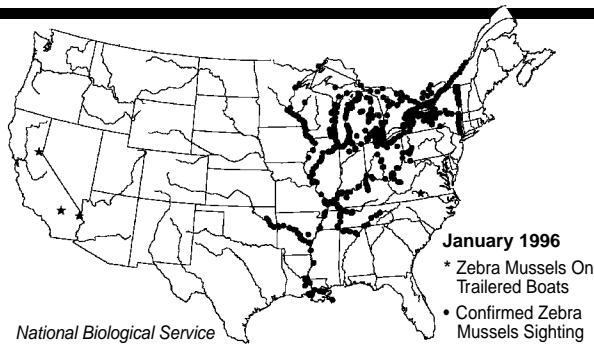
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Sea Grant is a program within the National Oceanic and Atmospheric Administration (NOAA), Department of Commerce. Ohio Sea Grant is one of 29 state programs nationwide that work to improve the wise use and management of marine and Great Lakes resources for public benefit. Sea Grant uses university expertise in research, education, and technology transfer to help solve the problems and challenges of the oceans and the Great Lakes.

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Zebra mussels (*Dreissena polymorpha*) have spread throughout the Great Lakes and in waterways in 19 states and two provinces since they were accidentally introduced into Lakes Erie and St. Clair in the 1980s. In 1991, a second species, quagga mussels (*Dreissena bugensis*), was discovered. Quagga mussels survive in deeper, colder waters than zebra mussels.

The mussels' range will continue to expand naturally as flowing water carries their young – veligers – downstream. Commercial and recreational vessels and equipment also can spread zebra mussels when they move from infested waters to uninfested waters. Adult mussels may attach to hard surfaces, and veligers may be transported in water. Veligers are transparent and small – about the size of the period at the end of this sentence – and may be able to survive in any residual water. Zebra mussels spawn when the water temperature is between 57° and 68° F (14° to 20° C). Young quagga mussels have been observed in water as cool as 46° F (8° C).¹

Some inland lakes have already been colonized by zebra mussels because of human activities. For example, White Star Quarry, a 15-acre, 90-foot-deep Ohio lake, is not connected to any other waterway and is not used by boaters. It *is*, however, used by divers and anglers; and now it, too, is colonized by zebra mussels.²

Nearly anything that has been in zebra and quagga mussel infested waters *may* have the mussels on them.

This list of potential carriers includes:

- plants and animals
- fishing gear and bait buckets
- any water
- scientific equipment
- snorkeling and scuba gear
- boats, trailers, and related equipment

Placing these items in uninfested waters without following precautions may lead to an *accidental* introduction of these pesky mussels. The guidance provided in this publication is not guaranteed to remove or kill all the mussels; but it should vastly reduce the number being transported away from infested sites, and thus greatly reduce the probability of accidental further spread.

There are currently several states and provinces with laws that prohibit *possession of* or *intentional* introduction of non-native species such as the zebra mussel.

How to slow the spread

The first step in prevention of spread is to develop an attitude of concern. Second, accept the fact that your activities are a potential means of transportation, and third, adhere to the recommendations in this publication and to those issued by natural resources agencies.

An interagency Great Lakes task force recommends the actions that are listed below. Be advised that these recommendations are still being studied by researchers and resource managers; therefore, the recommendations may change.

Actions to follow after using a boat or other equipment in any body of water.

- i **Remove any visible vegetation** from items that were in the water, including boat, propeller, trailer, and all equipment. (Zebra mussels readily attach to aquatic vegetation.)
- i **Flush** engine cooling system, live wells, and bilge with hot water. **Rinse** any other areas that get wet, such as water collected in trailer frames, safety light compartments, boat's decking, and the lower portion of motor cooling systems.

Water hotter than 110° F will kill veligers, and 140° F will kill adults. If hot water is not available, use tap water. Do not use salt and chlorine water mixtures as both mixtures are very toxic to other organisms and may also damage your equipment.

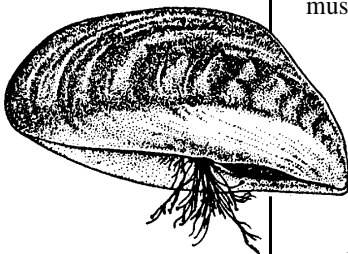
- i **Air dry boat** and other equipment for five days before using in uninfested waters. If boat and equipment are completely dry for two days, it *may* be safe to use in uninfested waters. Zebra mussels *may* survive up to two weeks out of water.

By 1995, California Agriculture Station employees had found zebra mussels on six boats that had been transported overland from the Great Lakes; two of which were transporting live mussels.

- i **Examine boat exterior** for mussels if it has been docked in infested waters. If mussels are found or exterior is heavily fouled by algae, either clean fouled surfaces or leave boat out of the water for at least five days before entering uninfested waters. Any mussels scraped off should be bagged and discarded in the trash.

If your gear feels gritty, then young microscopic mussels may be attached.

- i **Do not re-use bait. Empty your bait bucket on land.** Never release live bait in water.



For other publications or advice from local experts, contact the Sea Grant program or state natural resources management office nearest you. Phone numbers of several Sea Grant programs follow.

Connecticut.....	806/445-8664
Delaware.....	302/831-8185
Florida.....	904/392-1837
Illinois-Indiana.....	847/872-0140
Louisiana.....	504/388-6349
Maryland.....	410/267-5660
Michigan.....	517/353-5508
Minnesota.....	218/726-7677
Mississippi-Alabama.....601/875-9341
Massachusetts.....	617/253-9308
Maine-New Hampshire.....603/749-1565
New Jersey.....	908/349-1152
New York.....	800/285-2285
North Carolina.....	919/515-5287
Ohio.....	614/292-8949
South Carolina.....	803/722-5940
Texas.....	409/762-9800
Wisconsin.....	414/465-2795

Sea Grant Nonindigenous Species (Internet Site)
<http://www.ansc.purdue.edu/sgnisl/>

¹For more information about zebra and quagga mussels, request Ohio Sea Grant's fact sheet *Zebra mussels in North America: The invasion and its implications* (OHSU-FS-045).

²For more information on this subject, request Ohio Sea Grant's fact sheet *Zebra mussel migration to inland lakes and reservoirs: A guide for lake managers* (OHSU-FS-058) or *Safe use of zebra mussels in classroom and laboratories* (OHSU-FS-059).

³A 1990 Ohio Sea Grant study revealed a loss of effectiveness of TBT-based spray coatings used on accessories after 9 to 12 weeks in the water.

How to protect your boat and motor

The longer a boat remains in zebra mussel-infested waters, the more apt it is to be fouled by zebra mussels. Therefore, boats that are docked or moored are more likely to be fouled by mussels than boats that are launched and retrieved in a single day.

Usage

The most expensive type of destruction to your boat is probably motor damage. Veligers can cause this harm when they are taken into the cooling system, where they can attach, grow and block intake screens, internal passages, hoses, seacocks, and strainers.

The best prevention against such damage is to use your boat. Try to run your boat twice a week at high speed for 10 to 15 minutes. The mussels can't attach when the water velocity exceeds 1.5 meters a second (about 3.5 mph or about 3 knots) and may be washed off at speeds exceeding two meters a second (about 4.5 mph or 4 knots). The high-speed running will also help flush any attached young mussels from inside the motor systems, and the heat generated past the water pump will kill any veligers that may have been drawn into the system.

For outdrives and inboard units, run the engine at operation temperature for one-half hour each week. Watch temperature gauges and record readings for each use; any increase in readings over the previous use warrants disassembly and inspection of the cooling system. Consider installing a high temperature alarm.

After returning to the dock, flush any veligers out of the lower unit's intake by running tap water through the system. (Never use a chlorine mixture in the engine cooling system.) Do this by having a hose fitting installed on the intake system or investigate current commercial "engine boot" systems that contain lower unit water and that recirculate the heated water through the engine. This flushing practice, however, won't prevent veligers from entering the intake screens while your boat is at the dock.

Mussels can also accumulate around propeller shafts and can cause increased wear and possible damage to drive shafts or shaft seals. Reduce the amount of time in the water by tipping the drive units *up* and *out* of water when at dock.

During pre-season maintenance, and frequently thereafter, inspect cooling systems, intake screens, lower unit steering and hydraulic controls, propellers and propeller shaft seals. Frequently inspect the rubber boot that surrounds the I/O unit at the hull because mussel shells can tear the boot, resulting in water entering the hull. Check water pump impeller for damage from shell fragments if adults are found near the intake systems. At the end of the season, follow the pre-season guidelines and disassemble everything, including the parts between the seacock and the engine.

Antifoulant products

Maintain a good quality antifoulant paint on the hull and other accessories because such paint releases toxins. Most marine algae, slime growths, and mussels – including zebra and quagga mussels – are sensitive to these chemicals and will not attach to them. Several types of antifoulant paints exist, including copper-based, tributyltin (TBT)-based, copolymer, vinyl/epoxy binder, resin binder, and hard- and soft-film types.

Copper-based paints are used on fiberglass and wooden hulled boats and accessories (trim tabs, etc.). They are usually viable for one or two seasons. A primer may be necessary on some surfaces, and the old coating must be removed first. A primer coat is absolutely necessary before applying to aluminum because the aluminum and copper react with each other (electrolytic action) and cause corrosion. (Most lower motor units are aluminum.)

Tributyltin (TBT)-based antifoulants are restricted by a 1984 federal law because they are extremely toxic. Early forms of TBT antifoulant paints leached biocides into the water and contaminated and killed nontarget organisms.

A few states have approved use of newer "slow-release" TBT paints (bulk brush-on) for application only on the hulls of aluminum boats and vessels exceeding 82 feet in length. This treatment can last two to three seasons when properly applied. The person applying the paint is required to obtain a pesticide applicator's license, generally available through your state's agriculture agency, to purchase and apply this antifoulant. Some states and provinces, including Michigan and Ontario, have banned the use of TBT paints altogether. Check applicability and legality of use of these paints with the product's manufacturer, boat dealer or regulatory agency. Where legal, a TBT-based spray for use on outboards, I/O sterndrives, propellers and internal passages is available for over the counter purchase.³

Copolymer coatings are best for high-speed boats because they are thinner and smoother than the others. They are also recommended for trailered or rack storage boats because they only react when immersed in water. Other coatings oxidize when exposed to air for as little as one week and become useless.

Vinyls, epoxies and resin coatings allow biocides to leach to the surface.

Soft-film types result in a soft residue remaining after the biocide is leached out and are well suited for boats that remain in the water.

Hard-film types can be sanded to restore effectiveness.

Consult your manufacturer or boat dealer to determine the type best suited for your hull and accessories. Applying paints to some accessories may cause a loss in performance. Apply spray inside passages as far as possible. Some units require an annual breakdown for lubrication of the drive shaft; this is an excellent opportunity to spray deep inside otherwise hidden water passages.

Never apply a new antifoulant over an existing coating of another type. Remove old paint and read container labels for compatibility.

Zebra and quagga mussels are not just a temporary inconvenience; they are here to stay, and we must learn to live with them. Adopt preventative measures now to slow the spread and reduce any likelihood of damage to your boat.