

Zebra mussels threaten native mussels of the



St. Croix National Scenic Riverway

By Randy S. Ferrin

When the St. Croix National Scenic Riverway, Minnesota and Wisconsin, was established in 1968 as one of the original eight components of the National Wild and Scenic River System, the Wild and Scenic Rivers Act never mentioned the incredible diversity of life found under the river's surface. Notably, nothing was said about the 40 species of freshwater mussels found there. We now know the St. Croix River's mussel assemblage is one of the most robust in the Upper Midwest, if not North America. These relatively long-lived animals, some of which typically can live for several decades, are a reflection of their environment, a true vital sign of the ecosystem's health. Yet even in the St. Croix River they are threatened by changes in water quality, loss of habitat because of sedimentation, and loss of fish host species. Two species are listed federally as endangered, and 15 others are state-listed by Minnesota or Wisconsin. The welfare of the mussel community is of great concern to the National Park Service, the U.S. Fish and Wildlife Service, and our state and tribal partners.

In addition to its other threats, these animals face a new threat from an exotic invader from Eurasia, the zebra mussel (*Dreissena polymorpha*, fig. 1). Zebra mussels came to North America via ballast water in freighters traveling into the Great Lakes. Unlike native mussels, zebra mussels do not need a fish host to aid their early development. Instead, the female zebra mussel spews up to 30,000 eggs into the water column and a nearby male fertilizes the eggs with a cloud of sperm. The fertilized eggs remain in suspension and

Figure 1. If they attach to native mussels in enough numbers, nonnative zebra mussels interfere with normal filter-feeding, movement, reproduction, and eventually respiration of the native species.

develop into free-floating microscopic veligers, which can drift in the water column for approximately 17 days. As the veliger develops, it produces a sticky, thread-like mass, the byssal thread, which allows it to stick to any hard substrate it collides with, including the hulls of boats and barges. It can also settle onto the river bottom where it likewise attaches to any hard substrate, such as the shell of a native mussel.

With the ability to float freely as veligers, or travel on the hulls of boats as juveniles or adults, zebra mussels have been able to gain considerable territory in a very short time. From the Great Lakes, zebra mussels traveled down the Illinois River to the Mississippi. Going upstream is not possible for the veligers, but by attaching to the hulls of commercial and recreational vessels juveniles and adults are carried upstream where they can remain on the boat or drop off to attach to another hard substrate. If zebra mussels attach to native mussels in enough numbers, they interfere with normal filter-feeding, move-

ment, reproduction, and eventually respiration of the native species. Zebra mussels literally smother native mussels in this manner. Even when present in nonfatal densities, zebra mussels compete for the same food source as the natives.

Sections of the Mississippi River support zebra mussels in densities of a meter (3.6 ft) deep, with tens of thousands per square meter (10.8 sq ft), killing all of the native mussels in those locations. Boats that harbor or travel in

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the Mississippi are highly likely to be contaminated with zebra mussels. Of great concern to riverway managers is the free travel allowed between the Mississippi and the St. Croix Rivers. The States of Minnesota and Wisconsin administer the lower 25 miles (40.2 km) of the riverway, while the National Park Service has jurisdiction from there to the headwaters of the unit. The states do not have the authority within their section to close the river to boats coming from the Mississippi. Since 1994, boats that harbor at marinas in the St.

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Croix River have been documented with zebra mussels attached, and the number has gone up every year since then. Finally, as feared, juvenile zebra mussels were found on substrates in the St. Croix River during monitoring dives in 2000. Luckily, the infestation has been limited to the lower 20 miles (32 km) of the riverway.

Unfortunately, this stretch contains critical habitat for one of the federally listed species, the Higgins-eye pearly mussel (*Lampsilis higginsi*, fig. 2).

Not willing to allow this to happen in the NPS-administered section, the National Park Service established a point on the river beyond which upstream travel is prohibited (fig. 3). Boats from upstream can pass downstream of the checkpoint but are not allowed to travel back. This closure got further impetus in 2001 from a biological opinion issued by the U.S. Fish and Wildlife Service related to the Environmental Impact Statement for the Lower Riverway Cooperative Management Plan (the general management plan for the lower riverway).

The zebra mussel prevention program has been very costly to the National Park Service and our partners but it serves as the final chance for the preservation of the river's native mussels. In addition to the closure, the Park Service has developed a combination passive-active monitoring program. Passive monitoring involves a network of Hester-Dendy-type plate samplers, while active involves periodic inspection dives by our interagency dive team (fig. 4). We also conduct random inspections on boats that are transported by trailer to upstream landings. Finally, educational efforts are a large component of our prevention program (fig. 5). Our strategy has remained that preventing the invasion is the best approach because we cannot turn back once zebra mussels have become established. This is a high-stakes battle and losing the riverway's incredible diversity of native mussels is not an acceptable outcome.

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NPS PHOTOS/ILLUSTRATION

Figure 2 (top photo). Although the spread of zebra mussels in the St. Croix National Scenic Riverway has been limited to the lower 20 miles of the unit, this stretch contains critical habitat for one of the federally listed native mussel species, the Higgins-eye pearly mussel.

Figure 3 (middle photo). In an effort to prevent the spread of zebra mussels into the park, the National Park Service prohibits upstream boat travel beyond a specific point on the St. Croix River.

Figure 4 (bottom photo). An interagency dive team conducts periodic monitoring of the St. Croix National Scenic Riverway to learn the status of the zebra mussel in the park and inform management action.

Figure 5 (illustration). The zebra mussel prevention program at the St. Croix Riverway includes a public education component.

