

# Invading Gobies Conquer Great Lakes

In April 1990, David J. Jude found a round goby in the St. Clair River outside Detroit. A biologist at the University of Michigan in Ann Arbor, he immediately recognized the threat of invasion signaled by the North American debut of this European fish. Almost immediately, as he had feared, the goby began nesting in the adjoining Lakes Huron and Erie. Last week, Canadian officials announced that the fish has reached Lake Ontario.

This latest sighting, in Canadian waters near the base of the St. Lawrence Seaway, confirms that the round goby (*Neogobius melanostomus*) now populates all five Great Lakes, marking a remarkable rate of dispersal. In many shore areas, it has become the dominant fish.

Certainly, notes Ron Dermott of Canada's Department of Fisheries and Oceans in Burlington, Ontario, it "should be considered a permanent resident of the Great Lakes."

The good news is that these tiny predators have a voracious appetite for zebra mussels, earlier invaders from the fish's home waters in and around the Black Sea. Like the mussels, this goby probably hitched across the Atlantic in the ballast water of some freighter. Unfortunately, gobies don't eat just zebra mussels. These bottom-dwelling fish will also devour eggs and fry of any fish sharing their habitat, which include smallmouth bass, walleye, and perch.

Usually much smaller than a smelt, gobies aggressively defend their turf—generally rocky shoals or gravel. Males, which build and guard their nests, appear to fear little, Dermott says, and they will tenaciously "drive off fish twice their size."

In several areas, this goby has already extirpated the mottled sculpin (*Cottus bairdi*), a Great Lakes native that it resembles in size, shape, and habitat, Jude notes. The aggressive goby simply claimed the sculpin's food, took over its nesting areas, and ate sculpin young.

The mushrooming population of zebra mussels throughout the Great Lakes has fostered the goby's expansion, Jude says. These mussels "are a dead end ecologically," he notes, because "there's almost nothing eating them." Whatever nutrients the mussels consumed became locked away from the rest of the ecosystem—until the gobies arrived.

With sharp biting teeth up front and shell-crushing molars in the back of their throats, gobies "were really designed to eat mussels," Jude observes. Upon entering the Great Lakes, they found a virtually untouched mussel banquet.

Research by Gerald R. Smith at Michigan determined that a single goby can



Round head of the pugnacious goby.

down five or more mussels per hour. However, Jude asserts, "there's no way gobies will ever control them, because they miss zebra mussels too big to eat, and those continue to spawn."

Would-be goby predators have had a tough learning curve, Jude's studies indicate, because the 5-inch-long invaders behave in ways "none of our native fish ever do," he says. They jerk, scoot, then stop, only to shoot out unexpectedly in another direction. Other times, he notes, gobies dive under the gravel and vanish. Jude has watched hungry bass become flummoxed by the gobies' seemingly erratic activity.

However, the predatory fish seem to be wising up. Increasingly, anglers are catching game fish that have stomachs full of gobies—suggesting these larger fish may begin reining in the gobies' territorial dominance.

Yet that fuels another concern. Mussels pick up and store toxic pollutants from the water. Mussel-eating gobies will pass those toxicants on to the fish that prey on gobies, which can then transfer the poisons further up the food chain—potentially into people. "Right now, we're investigating how much of a [human] problem this will become," Jude says.

Aside from a public-information campaign, in Canada "there is no control strategy under consideration," Dermott says. Indeed, once a nonnative species is established, eliminating it becomes almost impossible, argues John Mills, Environment Canada's regional director-general in Toronto. "Our management approach, then, is to attempt to limit its spread," he told SCIENCE NEWS.

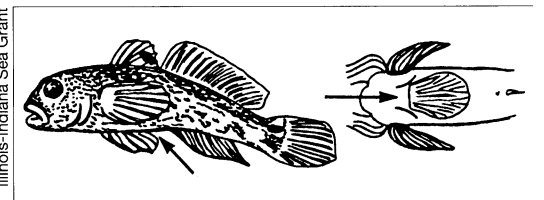
Government officials in Canada and the United States have launched campaigns to help boaters and anglers recognize the goby and prevent its transfer to new waters. In particular, Dermott emphasized, gobies should never be used as bait,

transported live, or even returned to the waters from which they were caught.

The campaign may help limit the fish's migration to inland lakes in Canada, but U.S. officials face a tougher threat outside Chicago. Roughly a century ago, the Chicago and Calumet River systems were engineered to flow from Lake Michigan toward the Mississippi River. Federal monitoring data now confirm that both lake outlets have developed resident populations of round gobies.

The concern, explains Mark Steingraeber of the U.S. Fish and Wildlife Service (F&WS) in La Crosse, Wis., is that if the goby reaches the Mississippi River, it will have largely unimpeded access to waterways throughout most of the central United States, as the zebra mussel does. By last month, he notes, "the round goby had moved inland some 30 miles [via these river systems] into the Mississippi River basin." That's almost a tenth of the way to the Mississippi.

Hoping to halt, or at least slow, the gobies' advance, F&WS scientists in Ann Arbor, Mich., have been working on a new



Round goby has distinguishing pelvic fin (lower arrow). Other fish have two separate fins in place of a goby's single fused fin (arrow) on underside of fish (right).

electric barrier for installation, probably next year, further down the gobies' path to the Mississippi.

Explains Melissa Kostich, who is working on the project, the intent is to install electrodes into the cement wall of a narrow channel to impart an irritating 4-volt current in the water throughout a span several yards long. Though similar devices already deter salmon from moving upstream in some areas, this one must deter downstream movement. The critical difference: If the electricity stuns a fish, it will continue to float downstream—an unacceptable outcome. The current also must not harm other water life or people.

In Michigan field tests of a goby-laden river, a small version of the device deterred "almost 100 percent" of the gobies. The goal, Kostich says, is to install this barrier as part of an integrated series of deterrents, perhaps including annoying sound and an irritating curtain of bubbles.

—J. Raloff