

Zebra Mussels Rule

by Peter Kendall, Chicago Tribune Environmental Writer

Nine species of water plants that were on the verge of extinction in Lake Erie have made an abrupt recovery.

In Wisconsin, duck species that had long been in decline suddenly are showing up in huge numbers.

Off the shore of Chicago, populations of native Lake Michigan crayfish are soaring.

All this would seem to be great news for the environment of the Great Lakes. Perhaps the first clue that there is trouble beneath the surface, though, comes from the fact that all this apparent good news has been attributed to a single cause: zebra mussels.

Five years after the zebra mussel invasion reached southern Lake Michigan, scientists have just begun to understand what the invaders are doing to the Great Lakes.

Surprisingly, some of it seems beneficial. Unfortunately, though, there's still plenty of bad news packed inside the diminutive, striped mollusk.



When zebra mussels first began multiplying in the lakes after traveling as stowaways in the ballast tanks of European freighters, the greatest fear was that they would stick to water-intake pipes, clogging power plants and shutting down industry.

Only now is it becoming clear that their impact is much more profound.

To the amazement of scientists, the fingernail-sized mussels are setting

the biological agenda for the Great Lakes. Tiny hand-maidens of natural selection, the mollusks are picking winners and losers, deciding which species thrive and which disappear.

They are winning battles for food, blocking natural spawning practices and clarifying water until it makes life hard for some, easy for others.

Fish populations are imperiled, native mollusks are threatened, weeds are choking harbors.

Toxic algae seem to be getting a competitive boost from the zebra mussel, causing outbreaks that could poison water supplies.

And in a discovery that might have the widest implications, scientists say the zebra mussels are drawing pollutants out of sediment where they had been buried for decades, reintroducing them to the food chain.

In effect, they might be repolluting the lakes.

"This is the largest biological impact that the Great Lakes have ever experienced," said Nancy Tuchman, a Loyola University Chicago biologist. "It is modifying every link in the food chain, from the very bottom, which is algae, to the very top, which is game fish.

"It is very complex," she said. "And it is not necessarily bad. But it is so completely different from the natural balance of the flora and fauna."

Scientists hadn't anticipated what the zebra mussel might do to the Great Lakes because they didn't fully appreciate its incredible ability to filter water.

To eat, the mussel gulps in huge volumes of water and filters out all the tiny particles, such as microscopic zooplankton, mud and pollutants.

What they like, they eat. What they don't like, they roll into tiny packets and spit out, creating something scientists call "pseudofeces."

In a day, a single zebra mussel filters about a quart of water. Where conditions are right, there can be thousands of zebra mussels in a space 1 yard square.



The mussel population has reached the point where it is acting as a colossal biological filter for the largest bodies of fresh water in the world.

Historically, visibility for divers in Lake Michigan was about 10 feet. Since 1990, it has jumped to as much as 40 feet.

Suddenly, light is reaching places it never had before, and that is changing everything.

Since the 1970s, biologists from Loyola University Chicago have been studying a rock reef in 21 feet of water about one mile off the Evanston shore.

Historically, the crayfish population there was a little less than one crayfish every square meter (1.2 square yards).

In 1992, Loyola's Tuchman began documenting an increase in light levels at the reef. The next year, the bare rock suddenly was covered with plants.

"It looked like green hair all over the bottom," Tuchman said.

The next year, the bottom was teeming with invertebrates. The year after that came a boom in crayfish.

By 1994, Tuchman counted 5.2 crayfish per square meter in the reef. This summer, the number has risen to 6.2 crayfish per square meter.

“It is amazing to be documenting such large changes in such a short period of time,” she said.

Things haven’t been so good for the yellow perch.

Since about the time the zebra mussel arrived, the perch population in Lake Michigan has been crashing – not because the older fish are dying, but because new generation aren’t forming.

By one theory, the zebra mussel is competing with perch larva for food: They both eat zooplankton.

Another theory is more complex, but leads to the same place.

Alewife, another invader species, feeds on young yellow perch. Some scientists are wondering whether the improved clarity of the water is allowing the alewife to see the perch better, allowing the predator to clean out virtually the whole brood every year.

“You might have one exotic helping another exotic to wipe out a native species,” said Ellen Marsden, director of the Lake Michigan Biological Station for the Illinois Natural History Survey.

Lake Erie exhibits a similarly complex interplay of species. This time, though, a native species seems to be coming out ahead.

Anglers have found that smallmouth bass are growing at prodigious rates. It turns out that the smallmouth have been pigging out on another Great Lakes invader and stowaway, the round goby.

The gobies are one of the few fish with the proper teeth and jaws to chew through the zebra mussel’s shell. The goby eats zebra mussels in the Black and Caspian Seas,

where both creatures are native, and the zebra mussel – as a foodstuff – is helping the goby make it here.

The new food chain, then, looks like this: Gobies eat zebra mussels and bass eat gobies.

But some scientists are worried about what happens when people eat the bass.

While filtering the water at the bottom of the lakes, the zebra mussels also are vacuuming up decades-old pollutants that have settled to the bottom.

Pollutants are stored in the fat of animals, and zebra mussels happen to be extraordinarily fatty – about 10 times fattier than native clams.

Scientists at the Ohio Sea Grant program are studying fish high on the food chain to see if pollutant levels are rising in their flesh.

(Those studies also would have implications for duck hunters. Diving ducks have returned in huge numbers to several places around the Great Lakes to gorge themselves on zebra mussels.)

Unlike the bass and the ducks, lake trout don’t seem to be faring well in the new Great Lakes the zebra mussel is creating.

The lake trout, a magnificent carnivore at the top of the lakes food chain, had disappeared from Lake Michigan, but state and federal programs had appeared to be successful in reintroducing a self-maintaining population.

Each fall, lake trout were laying their eggs among rocks; where they settled down into the nooks and crannies to overwinter, then hatch in the spring.

But zebra mussels now are clinging to those rocks, blocking off the nooks and crannies. Studies by Marsden show that the eggs apparently are unable to survive among the mussels.

“What we are faced with is the lake trout reproduction success really being socked,” she said.

Fish populations aren’t the only ones that are suffering.

In 1992, scientists decided they would study how native, thin-shelled clams were affected by zebra mussels. The next year, however, they abandoned the study – they no longer could find enough of the clams to continue. The zebra mussels apparently had edged them all out.



Photo by Kevin Cummings, Illinois Natural History Survey

A similar thing happened in Lake Michigan with certain species of snails.

Scientists had noticed that zebra mussels, eager to clamp onto anything, were latching onto snails, creating what scientists called “snail balls” – a clump of zebra mussels clinging to a snail, eventually killing it.

“We want to look more closely at it, but we are having trouble finding them anymore in an area where they were once abundant,” Marsden said.

In yet another unforeseen effect of the zebra mussel, an algae that produces a toxin that can be fatal to people has gone through several outbreaks – called “blooms” – in Lake Erie.

For some reason, the zebra mussel’s amazing filter system takes a pass on the algae, not even wrapping it in pseudofeces.

Scientists are waiting to see whether the algae blooms begin occurring elsewhere.

“This is another new effect on the block that hasn’t played itself out yet,” said Leroy Hushak, associate director of Ohio Sea Grant.

“But it could have a major effect on costs if it starts fouling municipal water supplies.”

