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## Shrimp joins Great Lakes invader list

### New species, found in Michigan, is latest ecological threat from Caspian region

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Add a bug-eyed shrimp to the ballooning list of Great Lakes invaders that has likely hitchhiked its way into the region aboard an overseas freighter, and nobody can say we didn't have fair warning it was coming.

Eight years ago, two researchers at a Canadian university predicted the half-inch, bright orange *Hemimysis anomala* was a likely candidate to follow other notorious Caspian Sea region invaders such as the zebra mussel into the Great Lakes, if more wasn't done to stop the discharge of contaminated ballast water from oceangoing freighters traveling up the St. Lawrence Seaway.

On Nov. 7, the shrimp turned up about 70 miles from downtown Milwaukee, near Muskegon, Mich.

"You could see them free-swimming," said Steve Pothoven, a fishery biologist with the National Oceanic and Atmospheric Administration, who spotted the shrimp with his colleagues. "I'd describe it as a swarm."

Anthony Ricciardi of McGill University in Montreal, one of the scientists who predicted the shrimp's arrival, describes it differently.

It is another sign, he said, of an "ecological takeover" of the Great Lakes by species native to the Black and Caspian Sea regions. Ricciardi has no problem ticking off examples.

"The dominant mollusk in most parts of the Great Lakes is now the zebra and quagga mussel," he said. "The dominant zooplankton is the fishhook water flea. . . . our bottom-dwelling fish are becoming more and more dominated by the round goby and ruffe. And now we have another one."

This new species of shrimp is likely to turn up in other areas of the Great Lakes, speculated research scientist David Reid, who works with Pothoven at NOAA's Great Lakes Environmental Research Laboratory. The reason: The Muskegon port typically receives very little overseas traffic. That, he said, means the initial invasion likely happened somewhere else in the lakes.

## **Species planted in Europe**

The fat-rich shrimp, a high-quality food source, have actually been planted in some reservoirs in Europe to boost fish populations. The problem is the shrimp themselves feed on tiny zooplankton and phytoplankton that directly or indirectly sustain the Great Lakes native fish species, said Reid.

"It will have an ecosystem effect. How significant that will be, we don't know," he said.

Ricciardi, recognized as one of the foremost authorities on Great Lakes invasions, predicts the impacts will be big.

"I don't expect this to be benign," he said. "You're going to get the biggest disruption from something that's quite different from what's already here, and this is one of them."

"Wherever it goes, it causes strong reductions in small zooplankton," he added. "That will have repercussions for the rest of the food web."

Pothoven said he knew the minute he saw the writhing shrimp it was something new. He sent a species sample to a Caspian Sea species expert in Duluth, Minn., who confirmed it as a freshwater shrimp that has been invading its way across Western Europe during the past few years.

## **Invader No. 183**

Pothoven said juveniles and mature females have been found in the channel connecting Muskegon Lake to Lake Michigan, indicating that the species is likely reproducing in the Great Lakes. If so, that apparently brings the number of Great Lakes invaders to 183, and it probably won't be long until No. 184 is found; for the past three decades a new exotic species has been discovered in the Great Lakes, on average, about every 6½ months.

The majority of them are arriving in the lakes in the accidental aquariums that are freighter ballast tanks. Ballast water is used to stabilize a less-than-full cargo ship on the open seas. The problem is a ship's ballast pump can suck in species along with water, and those organisms can be set free when the ballast water is exchanged for cargo when a ship arrives in the Great Lakes.

Since the early 1990s, Great Lakes-bound overseas freighters have been required to exchange their ballast water in midocean. The idea is to kill any freshwater organisms with salty water from the open seas.

But about 90% of overseas freighters arrive in the Great Lakes laden with cargo, and have therefore historically been exempt from the exchange law. Yet those "empty" ballast tanks still hold residual pools as well as muck that can be teeming with life.

"This just highlights the fact that we have not successfully plugged the ballast water hole," said Reid.

But Reid says there is a bright spot. The Canadian government began requiring overseas ships to flush their empty ballast tanks with saltwater before entering the Seaway, and early studies show that is an effective means of killing unwanted critters.

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