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Major Shipping Route Fosters a Plague of Sea Life

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The St. Lawrence Seaway opened in 1959 to great fanfare. The system of canals connecting the Atlantic Ocean and the five Great Lakes cut a lucrative international trade route through the heartland and gave the United States a refuge and staging ground for ships and submarines in case of war with the Soviet Union.

No one expected the seaway to become the key player in a different war, the invasion of non-native aquatic species into the Great Lakes, which has dramatically altered ecosystems and costs hundreds of millions of dollars a year. About a third of the 186 invasive species in the Great Lakes are thought to have entered on oceangoing ships in the ballast water they take on for stabilization when carrying little or no cargo.

Zebra and quagga mussels from the Black Sea clog intake structures for municipal water systems and power plants. The mussels also gobble plankton so voraciously that little is left for other organisms. Round gobies and other invasive fish beat out native fish for food supplies, harming the lucrative commercial and sport fishing industries. Ballast is even blamed for the emergence of viral hemorrhagic septicemia, often called "fish ebola," resulting in large fish kills in the past several years.

And as infected pleasure boats are hauled to other lakes or species swim and float into tributaries, or even the Mississippi River, invasive species that came in with the ballast are spreading throughout the United States. Large quagga and zebra mussel colonies have been found in California and Nevada and are threatening to spread through California's many miles of municipal water pipes.

"The seaway turned the Great Lakes into a North American beachhead for invasives from other continents," said Jeff Alexander, author of the book "Pandora's Locks: The Opening of the Great Lakes-St. Lawrence Seaway." "There's no telling how much more damage these critters will cause and how much more money they'll cost us."

There are no federal standards for ballast treatment, although the Environmental Protection Agency and the Coast Guard are working on requirements that should reduce the amount of live organisms in ballast water.

Since 1993, ships have been required to exchange their ballast in the Atlantic before entering the Seaway, replacing water from whatever port they had last visited with high-seas water containing little life.

But until 2008, U.S.-bound ships loaded with cargo and hence containing no ballast were exempt from any regulations. These ships are called NOBOBs, for No Ballast on Board. But their "empty"

ballast tanks contain many tons of muddy slop teeming with bacteria, small marine organisms, eggs and larva.

NOBOBs typically unload their cargo -- often steel -- in Great Lakes ports like Detroit and Cleveland, suck water into their ballast tanks, then head to other Great Lakes ports -- Duluth, Toledo or Milwaukee -- to load up on grain and dump their ballast, now mixed with the biologically rich mud.

Since last year, NOBOBs have been required to "swish and spit," or wash their tanks out with salt water, before entering the Seaway. This is aimed at killing most invasive organisms that could survive in the Great Lakes, since the species of concern generally come from brackish European estuaries and their cells burst when immersed in ocean saltwater. The practice appears to have been effective, as no new invasive species have been reported in the Great Lakes since the "bloody red shrimp" made its 2006 debut, according to David Reid, a research scientist with the National Oceanic and Atmospheric Administration.

Nonetheless, scientists and legislators say the ballast water and mud that remain in tanks must be treated to avoid future invasive species or contamination by pathogens such as cholera, E. coli and cryptosporidium, which also can lurk in tanks.

"Mother Nature always throws a variant at you," Reid said. "There are organisms that can survive salt exposure and survive in the Great Lakes. Having well-documented functional treatment systems that do kill as many of the organisms in ballast as physically possible is a better idea than just relying on ballast exchange or salinity exposure with flushing."

In 2004, the International Maritime Organization, part of the United Nations, drafted a treaty mandating that dumped ballast water contain no more than 10 live organisms larger than 50 micrometers (about the width of a hair) per cubic meter of water. Pushing for stricter standards, the United States did not ratify the treaty, though it is the basis of permit requirements being considered by the EPA.

The Coast Guard issued long-awaited ballast regulations last week that basically mimic the International Maritime Organization's standards for five years and then become more stringent. The proposed regulations, open for a 90-day public comment period, are less ambitious than what environmentalists and many legislators say are needed to prevent more ballast-borne invasives.

For several years, Congress has considered legislation to set national ballast standards. The House passed a bill in 2008 that was supported by environmental and shipping interests, but the Senate did not pass it, partly because of fears raised by [Sen. Barbara Boxer](#) (D-Calif.) that the bill could preempt states' rights to regulate ballast.

With no federal action on ballast, states have been setting their own limits.

Steve Fisher, executive director of the American Great Lakes Ports Association, called different regulations in each state a "nightmare scenario." He said current technology cannot meet New York's standards, which are 100 times stronger than the IMO treaty, and he expects that the state will have to close ports or relax its rules.

Jim Tierney, assistant commissioner for water resources at the New York State Department of Environmental Conservation, disagreed. "It's not that hard to kill things," he said. "You can heat them up, crush them, pressurize them, put a chemical on them. We think this is a problem that can be solved in a very economical fashion."

Environmental groups have called for a moratorium on St. Lawrence Seaway shipping or even closing the seaway altogether. Oceangoing vessels account for only about 5 percent of Great Lakes shipping, and studies by Grand Valley State University economists found that shifting that cargo to trains and trucks would cost only about \$55 million per year and actually result in 1,300 net jobs gained.

"There's no doubt it was an engineering marvel, but economically it's been an underachiever and an environmental disaster for the Great Lakes," said Alexander, the author. "The science shows if we did close the seaway, it would protect the lakes and wouldn't hurt us much economically. But the shipping industry should be given a chance to prove itself. Let's set a standard and give them a chance to meet it. If they can't meet it, it's time to stop letting these ships in."

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