Asian clams' spread in Columbia River warns of worse invaders

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The invasive Asian clam is more common in the lower Columbia River than its native habitat of southeast Asia, according to a study of the clam's abundance in the river.

The findings don't bode well for potential future invasions by the even more destructive quagga and zebra mussels. So far, the Columbia is one of the only major U.S. rivers to remain free of these notorious ecology-destroying, equipment-clogging bivalves.

To understand how new invaders might spread, a Washington State University-led team studied the existing invasive Asian clams hoping to see what might limit them. Unfortunately, the answer was—not much.

"What struck me was just the sheer variety of habitats that Asian clams were able to settle down in and survive," said Salvador Robb-Chavez, a recent WSU master's degree graduate and the study's lead author. "We found evidence of their presence just about everywhere in the lower Columbia River."

For this study, published in journal *International Review of Hydrobiology*, the researchers sampled 27 sites along 481 kilometers (about 299 miles) of the river, stretching from the ocean to Richland, Washington. They found Asian clams were able to live at a variety of temperatures, water quality and substrates, such as silt, sand or rock.

The team did find greater abundance of Asian clams below the Bonneville Dam than above it, and their greatest concentration, about 430 individual clams per meter, was found at the Sandy River confluence in Gresham, Oregon. The clams tended to be more prevalent in warmer waters and where slope of the bank or stream bed was less steep or more sandy, but few habitats were entirely devoid of Asian clams.

Considered global invaders, Asian clams have been found on almost every continent. The Pacific Northwest was one of the first places they landed in the U.S., arriving in the Columbia River around 1938, possibly released when a ship dumped its ballast water.

It takes just one Asian clam to start an invasion, since they self-fertilize. The Asian clams have disrupted the Columbia River food webs by eating up plankton that native mussels and salmon prey also need. They cause not only ecological but economic damage as well since they send plumes of larvae with mucus secretions that can clog up aquatic infrastructure.

While currently the Columbia River has a concerning Asian clam population, other places have even more, including East Coast rivers and Lake Tahoe in California, Robb-Chavez said.

And as bad as Asian clams can be, quagga and zebra mussels are worse. While they don't self-fertilize, these bivalves still reproduce extremely rapidly. For example, a female zebra mussel can release as many as 40,000 eggs up to four times a year. They have already caused millions of dollars in damage in the Great Lakes, by clogging water intakes and threatening native ecosystems.

The Columbia River has so far avoided an invasion from these mollusks which originally hail from Russia and Ukraine, but as a recent scare of zebra mussel-infested moss balls sold for fish tanks shows, it will require vigilance to keep the river clear of them.

"Humans are often responsible for spreading invasive species," said Robb-Chavez. "If you're a boater, make sure that you clean out your hull, hold and trailer, according to Department of Fish and Wildlife guidelines. If you keep fish as pets, be careful you're not accidentally importing species with items you use in your tank, and be careful where you throw things away."

In addition to Robb-Chavez, co-authors on this study include his advising professor Stephen Bollens and Gretchen Rollwagen-Bollens of WSU Vancouver as well as Timothy Counihan of the U.S.G.S.

More information: Salvador B. Robb-Chavez et al, Broadscale distribution, abundance, and habitat associations of the invasive Asian clam (Corbicula fluminea) in the lower Columbia River, USA, *International Review of Hydrobiology* (2023). DOI: 10.1002/iroh.202202134

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