DNR News
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Asian green mussels found in lowcountry waters

A fast-growing species of marine mussel that's a native of coastal and estuarine waters from the Persian Gulf to Hong Kong now has a foothold in Lowcountry waters, and it may be around for a while if winter temperatures aren't low enough to kill it off completely.

Biologists with the S.C. Department of Natural Resources (DNR) discovered hundreds of dead shells of the green mussel, *Perna viridis*, recently when they worked to unclog water supply lines to tanks in one of their outdoor saltwater systems at the Marine Resources Division in Charleston. The tanks, normally used to raise red drum, receive water pumped from Charleston Harbor and are regularly inspected to monitor water quality and circulation. Besides supplying the DNR culture facilities, these pumps also push raw seawater up into four 75,000-gallon tanks, where suspended solids are allowed to settle out before the water is used in other laboratories at the Marine Resources Center research complex.

Wallace Jenkins, a senior fisheries biologist with the DNR, suspects that water circulation to some of the tanks was brought to a halt when a pump that had been out of use for nearly two months was brought back online. A series of four identical pumps and supply lines are rotated through a schedule that allows two of them to be "drying out" at any given time, effectively killing off most of the fouling growth that inevitably plagues systems drawing in raw seawater. During the two month "down time", the static water in the pipe was intentionally allowed to become depleted of oxygen in order to kill fouling organisms that settle in the line. "A likely scenario," says Jenkins, "is that larval mussels settled heavily in the 6" diameter pipeline while water was flowing through it, but died when the water became anoxic."

More information about the green mussel, images, references and links to other web resources can be found at the website of the Southeastern Regional Taxonomic Center (SERTC) at

http://www.dnr.sc.gov/marine/sertc/The%20Asian%20Green%20Mussel.pdf. To assist in efforts to monitor the progress of this introduction, you can email reports of the green mussel in SC waters to knottd@dnr.sc.gov.

According to David Knott, a senior biologist with the Marine Resources Research Institute of DNR, "The green mussel is no stranger to the southeastern US, and efforts will soon be underway to monitor it in its newly adopted home in South Carolina." Less than a decade after it first appeared on the coasts of Trinidad, Venezuela, and Jamaica, the unwanted guest arrived in Tampa Bay in 1999. The presence of green mussels has also been documented in Atlantic coastal waters in both Florida and Georgia. Many researchers believe that a likely mode of arrival to the Caribbean region was in ballast water or fouling the hulls of ships traversing the oceans from Asian ports.

Invasive species biologists in the US began to pay close attention to this bivalve after inspectors found it clogging screens around the intake structures of a power generating station in Tampa. Its rapid growth rate and spread from the Bay into coastal waters to the north and south along Florida's Gulf coast were an early indication that the mussel could become a big problem throughout southeastern coastal states. Further alarm was raised by the intensity of its settlement on coastal structures like bridges, pilings and seawalls. Settlement and growth of the mussel can be so heavy that it can capsize or sink buoys, moorings and floating docks. Fisheries scientists at the University of Florida have also expressed concern about the potential of the mussel to move onto oyster reefs, and they noted instances where mussel growth largely replaced the biomass previously achieved by oysters.

Following the 2002 discovery of the species near St. Augustine, Florida, scientists with Georgia's Marine Extension Service began to anticipate northward movement of larvae, carried in ocean currents along the coast of Georgia. Over the past three years, they have documented the mussel's spread up the coast, but until the recent discovery in Charleston Harbor, it had not been reported north of the Savannah River.

"The mussel may have been transported to our local waters in a number of ways," says Knott. "Larval stages may have been carried in ship's ballast tanks and then discharged in the Harbor or just offshore, but they also could have been carried there by coastal currents after the spawning of adult populations along the Georgia coast. Adult mussels may also have been transported to the state by hitchhiking on hull-fouled coastal barges or on dredging equipment that was operating in areas where the mussel is already established. The commercial trade in oysters is also a well-documented pathway for the introduction of hitchhiking organisms from distant locations."

Knott announced this new northern record for the mussel at a conference with members of the Gulf and South Atlantic Regional Panel on aquatic nuisance species in Charleston last week. When introduced species begin to cause ecological, economic or human health problems, they're referred to as invasive or nuisance species.

Not only is the green mussel a fast grower, it's also a precocious parent, capable of

spawning at the tender age of only two or three months. Even a small mussel population can produce millions of recruits that will settle on practically any hard surface in shallow water and mature before the end of the summer. “Those abilities,” says Knott, “are what make this mussel such a potential threat to coastal structures and enterprises.”

Scientists have suggested that the northward spread of the green mussel may be limited by low winter water temperatures. In the mussel’s native range, year-round temperatures are typically around 79-82 degrees, however, monitoring in Florida showed that the mussel can thrive in water as cool as 54 degrees. Thermal tolerance tests showed that a temperature of 43 degrees was lethal to the mussels, but even after a two-week exposure to 50 degrees roughly half of the experimental mussels survived. Based on these tests and climate records for the South Carolina coast, some researchers predicted that the mussel might extend its range as far north as the Murrells Inlet area. Temperature records maintained by the DNR show that it is rare for near-surface waters in the Charleston area to dip below 50 degrees for a period as long as two weeks, suggesting that the mussel may be able to sustain populations here except under unusually cold winter conditions.

Only time will tell just how much of a nuisance the Asian green mussel will prove to be in South Carolina waters. In the meantime, despite any efforts of state biologists and resource managers to determine the extent of the invasion and the rate of the mussel’s spread, little can be done to prepare for what’s to come, or to respond to it. To date, there have been virtually no examples of successful eradication of an invading marine species anywhere on the planet, according to Knott.

The closely related green-lipped mussel from New Zealand is a familiar item on restaurant menus around the world; however a commercial market for the invasive Asian species hasn’t developed outside of its native range. “Until more is known about how the new arrival might accumulate filtered substances from waters in its newly adopted habitat, it’s wise to refrain from eating the mussel,” Knott says. The unknown level of risk of sickness from consumption applies even to areas in the state that are open to harvest of native shellfish.