

## Blue bloods

### Fears about overfishing and habitat loss spur count of state's horseshoe crabs

By Beth Daley, Globe Staff | June 9, 2008

WAREHAM - It was date night last Sunday on Swifts Beach.

During the evening high tide, as females began laying blue-green eggs in the soft sand, male horseshoe crabs scuttled over to fertilize a new generation of crabs in the shallow water. It's a mating ritual about 350 million years old that best resembles one steel helmet with a spiky tail attempting a tight embrace with another.

Scientists are growing increasingly concerned about the fate of these prehistoric-looking creatures whose milky blue blood is critical for detecting contaminants in medical equipment and injectable drugs. Worried that fishermen will soon want to harvest more of the crabs to use as bait for conch and eel, the state recently halved the number of horseshoe crabs that can be harvested each year to 165,000.

But scientists don't know how many crabs even live in state waters, making it difficult for them to say with confidence how many can be safely caught. So last month, marine officials launched the state's first annual spawning survey to better understand trends in the horseshoe crab population over time.

"Anecdotally, we hear a lot that there are fewer crabs today than in the past, but we really don't know," said Alison S. Leschen, a marine biologist with the Massachusetts Division of Marine Fisheries, as she and another worker completed a count of 33 crabs at Swifts Beach.

In peak spawning season, usually during high tides in May and June around full and new moons, dozens of volunteers and biologists count the crabs before the creatures scurry off into estuaries or deeper waters. Some horseshoe crabs are being equipped with radio tags by a University of Rhode Island researcher to better understand their behavior.

"This is the beginning of us really trying to understand them," Leschen said. While some studies were done in the early 2000s on isolated spawning populations on Cape Cod, there has never been a comprehensive study.

The animals have remained virtually unchanged since before dinosaurs existed, but their reputation has not.

Native Americans once used crab shells to bail water from canoes while Cape Cod settlers ground them up to scatter as fertilizer on farms. The creatures, which eat young clams, were so despised by shellfishermen that Chatham and other Cape Cod communities had a three-cent bounty on each tail until around 1960. In Orleans, it was a nickel.

Attitudes changed when it was discovered that horseshoe crabs help shellfish by acting as tiny vacuum cleaners on the sea floor, eating marine worms that prey on them. The crabs also churn up clean sand and nutrients - shellfishermen call it sweetening the bottom - for young shellfish to burrow into.

Scientists are captivated by the crabs' strange medicinal powers and their age-old physiology. Even though their hard shells and claws seem crab-like, the horseshoe crab is more closely related to spiders and scorpions. Data from studying horseshoe crabs' complex eyes helped a scientist win a Nobel Prize in 1967 in part for discovering how sensory cells in the retina help the brain process visual cues.

Today, their greatest value is in their blood. Horseshoe crabs have copper-based blood, which turns blue after it hits oxygen. Human blood is iron-based and red.

In the 1960s, Frederik Bang and Jack Levin, Johns Hopkins physicians working at the Marine Biological Laboratory in Woods Hole, discovered that the crabs' blood clotted when it came in contact with bacterial toxins - even in tiny amounts. In the 1970s, the blood began being used commercially and its extract is now used in a critical contaminant

test for medical devices, injectable drugs, and intravenous solutions to assure they are safe for human use. Once bled, the horseshoe crabs can be released back into the wild, where most survive.

The fishing industry takes a higher toll. Fishermen usually harvest horseshoe crabs when they are spawning in shallow water or on beaches where they are easy to scoop up. Dealers buy them for about \$2 each.

And fishing pressure is increasing. Over the last few years, restrictions on horseshoe crab harvests in Delaware Bay have been tightened to protect the red knot, an imperiled shorebird that eats horseshoe crab eggs. As a result, bait dealers have headed northward in search of crabs to use as conch and eel bait.

Last year, Massachusetts officials watched as New York absorbed much of the demand from Delaware Bay. Fishermen exceeded that state's quota by nearly a factor of two before officials lowered the daily harvest limit. Fearing that Cape Cod and nearby areas would be next, Massachusetts put in emergency regulations this April halving the catch.

Yet many environmentalists are deeply concerned that the crabs are still allowed to be harvested in the middle of spawning, before females may have finished laying eggs. Maryland, Delaware, and New Jersey don't allow crabs to be caught until June 7 - after spawning has slowed. Rhode Island doesn't allow any horseshoe crab harvesting in a five-day window surrounding new and full moons in May, June, and July. Yet Massachusetts allows fishing at anytime during spawning except on weekends.

"We feel there is a real problem with horseshoe crabs so let's be careful about harvesting them," said Bob Prescott, director of Massachusetts Audubon Wellfleet Bay Sanctuary. He applauded the state for lowering the number of horseshoe crabs that can be caught, but said it's not prudent to allow all of them to be taken during spawning. "It's a resource, but it needs to be managed properly."

Associates of Cape Cod, a Falmouth company that buys crabs for their blood, is content with the state's management of crabs. Some horseshoe crab fishermen and dealers say the new regulations don't hurt them, mostly because fewer than 165,000 crabs have historically been caught each year.

"I am for the regulations because the medical aspect is so important," said Heather Haggerty, a horseshoe crab dealer in New Bedford.

A small number of fishermen who catch the crabs offshore say the rules, which also include a 400-horseshoe crab daily limit, are too restrictive. State officials said they are considering giving some offshore fishermen a weekly quota instead.

Leschen, of the state, said that fishing is a problem, but it is not the only one: Horseshoe crabs are also losing habitat as docks are built and shoreline is armored against erosion. And eggs, larvae, and even adult crabs are likely being buried every spring when communities dump tons of sand on beaches to "nourish" them.

"We need to get a handle on the population, so horseshoe crabs will be around for another 100 million years," Leschen said.

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