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Getting on their good side

The oft-scorned horseshoe crab is winning human friends

By John Woestendiek
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SLAUGHTER BEACH, DEL. -- Of all the strange creatures at the beach - jellyfish floating like ghosts in the waves, blood-sucking deer flies searching the sand for human flesh, gold chain-wearing middle-aged men prowling the nightclubs - none has creeped out as many vacationers as this one.

With an appearance many find hideous, a personality that's hard to locate and a tendency to be dead or dying when it does come ashore, it's no wonder this decidedly uncuddly bottom feeder never made a very good first impression on the public.

Beachgoers may "oooh" at the sight of a soaring pelican. They may "ahhh" at the sight of dolphins playfully splashing in the sea. But, when it comes to horseshoe crabs, if the species aroused any emotion it was traditionally "yuck," "Is it alive?" or "Johnny, don't touch that!"

Unlike dolphins, terrapins, shorebirds, even seagrass, it had no groups devoted to its well-being, at least not until the late 1990s. And given its lowly position on the cute scale, its likeness was far less apt to be merchandised on tumblers, towels, T-shirts or other seashore souvenirs.

What little respect the horseshoe crab did have - outside of scientists and environmentalists, who have long marveled at the engineering and longevity of the species (it predates dinosaurs) - was limited to a few groups: bird-lovers (for the eggs that sustain migrating shorebirds), watermen (who view them as bait) and biomedical companies (which covet their blood for use as a high-priced detector of endotoxins).

Other than those who wanted something from it, the misleadingly named horseshoe crab - it's not a crustacean, but an arachnid - was the Rodney Dangerfield of the seashore: chomped on by sharks, dragged up from the bottom of the sea for use as bait, ground into fertilizer for farmers, milked of blood by medical labs, washed ashore upside down by waves, pecked to death by seagulls, shunned by tourists, or, worse yet, abused by thoughtless teenagers who flung them across the beach by what they thought were their tails.

Not even its coat of armor was enough to protect it - much less give this too-ugly-to-love creature what it needed: someone to love it for itself.

Or at least a good publicist.

Horseshoes, anyone?

The frolicking in Slaughter Beach begins even before summer vacationers arrive.

Starting in May, on both the bay and beach sides of the island, hundreds of thousands of horseshoe crabs come ashore to spawn in the sand. At its peak, the phenomenon can look as if the shores are being invaded by troops, or at least their helmets.

A female will drift ashore followed by a male, or two, or even five. She will lay 20,000 or so olive green eggs, then drag

the males, only about a third her size, over to fertilize them.

"It's an incredible orgy when you actually see it," said Sally Boswell, education and outreach coordinator for the Center for the Inland Bays, one of several organizations working to increase the public's appreciation of the horseshoe crab.

Few towns on the East Coast are more inundated with horseshoe crabs than Slaughter Beach. About 200 humans live there year-round, but nearly 260,000 horseshoe crabs spawned there in 2004, according to one state survey.

"We're kind of the epicenter of horseshoe crab spawning," said Mayor Frank Draper, adding that most residents have grown used to the annual spring arrival and summer-long presence of horseshoe crabs. Some use the abandoned shells - the horseshoe crab sheds them repeatedly while growing - to adorn their driveways.

Tourists, however, have been slower to accept horseshoe crabs, especially when it comes to sharing the beach with dead ones, which routinely wash ashore and produce a foul odor while rotting in the sun. For 10 years, the town paid a company to clean them off the beach, but this year it halted the practice.

"It wasn't that big of a thing," Draper said. "Most local people weren't in favor of it anyway, just people who recently moved here from places like Baltimore and wanted streetlights and curbs and horseshoe crab cleanups and other unnatural things."

Slowly though, Draper said, the public's appreciation of the horseshoe crab has increased from the days he was growing up, when they were more often referred to as "king crabs" and, up until the 1960s, ground into fertilizer and feed.

As a result of classroom lessons, nature centers and an increasing knowledge of the horseshoe crab's value to both shorebirds and the medical world (three Nobel Prizes have resulted from horseshoe crab research), public opinion is catching up with Slaughter Beach.

It was in the 1980s that Slaughter Beach, in a turning lemons-into-lemonade kind of way, adopted the horseshoe crab as a mascot. Its image now graces town stationery, a municipal flag and the Fire Department's rescue truck.

And last year, Slaughter Beach went a step further, proclaiming itself a horseshoe crab sanctuary, joining four other Delaware beaches that cover 12 miles of coastline. The designation carries little legal clout, but it discourages the harvesting of live horseshoe crabs off the beach for bait, and it represents a major public relations coup for the horseshoe crab.

These days, both locals and visitors are taking part in a campaign called "Just Flip 'Em," which encourages beachgoers to rescue horseshoe crabs that, because of rough surf, end up on the beach upside down, which generally leads to death.

Studies have shown as much as 10 percent of the spawning population dies that way each year - overturned and either baked by the sun or pecked to death by birds, said Glenn Gauvry, director of the Ecological Research & Development Group.

That nonprofit, based in Lewes, bills itself as the only environmental group devoted to protecting horseshoe crabs for their own sake and is behind both the "Just Flip 'Em" campaign and the beach sanctuary designation, which started in 1999.

In 2001, horseshoe crabs received a sanctuary at sea1 as well. An area twice the size of the Delaware Bay in federal waters off its mouth was named the Carl N. Shuster Jr. Horseshoe Crab Reserve, after a horseshoe crab researcher. The designation prohibits harvesting on the continental shelf.

Gauvry, along with an area fisherman, also designed and constructed a mesh bait bag to cut down on the 3 million horseshoe crabs harvested annually in the mid-1990s as bait for conch and eel traps. The bags, now mandatory for Virginia's horseshoe crab fishery, reduce the amount of horseshoe crab needed by 50 percent.

Gauvry made custom furniture until, realizing he was contributing to the demise of the rain forest, he quit and went to work for an organization that rescued wildlife from oil spills. While researching how an oil spill would affect the Delaware Bay, he learned about horseshoe crabs, became fascinated and later started an environmental organization to advocate for them.

"A lot of environmental groups were involved with horseshoe crabs," he said, "but none of them were advocates for horseshoe crabs; it was always for some other species that depends on them."

The timing couldn't be better.

Every April, shorebirds known as red knots take off from Argentina on a remarkable 9,000-mile trip to their breeding ground in the Arctic. They make only a couple of stops to eat along the way, losing as much as half their body weight in flight.

One of those stops - some environmentalists say the most important one - is on the Delaware Bay in late May, when the horseshoe crabs are in mid-orgy.

There, along with about 30 other species of shorebirds, the red knots will gorge all day long on horseshoe crab eggs, each consuming 100,000 or more, giving them the nourishment needed to complete the trip and perpetuate the species.

Red knots' decline

In the early 1990s, biologists were alarmed to see the numbers of red knots dwindling - a trend that has continued. Last spring, 15,000 were counted, a new low, down from 43,000 counted five years earlier.

While other factors are at play - including the loss of coastal wetlands to development - some biologists placed most of the blame for the decline on a decrease in horseshoe crabs, and most of the blame for that on fishermen who harvest them as bait.

Without vast numbers of horseshoe crabs - enough to stir up the sand during spawning and expose buried eggs - birds like the red knot are unable to get their food quickly and to arrive at their breeding grounds in time to breed.

As a result, the red knot could be near extinction by 2010, according to groups such as the National Audubon Society and the American Bird Conservancy, which sought unsuccessfully this year to have the bird declared an endangered species.

The efforts of those groups to ban the harvesting of horseshoe crabs as bait, while not a total success, have resulted in major cuts in the amount of horseshoe crabs that can be harvested, putting some watermen out of work.

Since 1998, as a result of state and federal regulations, horseshoe crab landings have been reduced by 76 percent along the Atlantic. More than 3 million a year were harvested in the mid-1990s; fewer than 1 million are now.

Limits are set by the Atlantic States Marine Fishery Commission, but individual states are allowed to set stricter quotas, as some have. New Jersey enacted a ban this year, and Delaware and Maryland have repeatedly shortened the season and the number of crabs allowed to be taken.

"We've given up something every year," said Merrill Campbell, who buys and sells fish for Southern Connection Seafood in **Ocean City**. "We've compromised and compromised. But it's got to stop. We're in danger of losing our livelihood. I've been pushed as far as I'm going to be pushed."

Conch fishing on the East Coast is a $15 million industry, employing more than 300 people, according to a U.S. Fish and Wildlife Service report. The eel fishery generates an additional $2 million. There is a growing demand for both species, because of their popularity in Asian and European markets.

In the battle of watermen versus bird lovers, Campbell contends, watermen have been outspent, out-talked and out-maneuvered.

"They've got the money and the lawyers and the political connections," he said. "We're just not on that level."

Gauvry and other experts believe the horseshoe crab population in the Delaware Bay has stabilized, while bird groups say it has fallen dangerously low. The fishery commission has estimated there were about 13.3 million horseshoe crabs in the Delaware Bay in 2004.

Campbell, who serves on an advisory panel for the commission, says, estimates aside, horseshoe crabs seem bigger and more abundant this season and that trawlers that once worked all night to get their limit now return after a couple of

hours.

"A horseshoe crab is a renewable resource. People seem to forget that," Campbell said. "Do you think I'm gonna want to take too many and jeopardize my business? No."

Medical role

Four nights a week, about 1,700 horseshoe crabs are dredged from the bottom of the ocean, brought to the dock in **Ocean City**, loaded on a refrigerated truck and taken on an early-morning, 30-minute ride to Salisbury.

There, they are lined up on racks, swabbed and injected with needles connected to tubes through which their blue, copper-based blood flows into bottles.

It's worth about $500 an ounce.

At the end of the day, or early the next, the crabs will be driven back to the dock and returned to the sea - under law, to approximately the same location they were taken from.

Their blood, meanwhile, will be centrifuged, washed, sonicated and spun again, then sent from the Cambrex lab in Salisbury to the headquarters near Frederick. There, after further refinements, it becomes Limulus Amebocyte Lysate, or LAL, used to test drugs, vaccines, IV fluids and medical implants for bacterial contamination.

Five biomedical companies on the Atlantic coast bleed horseshoe crabs - about 260,000 a year, about 100,000 of those by Cambrex, which through its subsidiary, BioWhittaker, is the world's largest producer of LAL.

Horseshoe crabs are the only source of lysate, a clotting agent that attaches to bacterial toxins. The product is considered the most efficient method of detecting endotoxins, which can lead to septic shock and death.

The crabs come off the truck stacked in big blue vats, which are labeled "To Bleed." After the process, they go into vats labeled "Bled." Employees in white lab coats and blue hair nets - called "rackers," "bleeders" and "taggers" - go about their jobs in a highly sanitized environment.

"It's all very antiseptic, considering these are creatures who have been hauled out of the mud," said Kathleene Sterling, who directs the operation, which moved to Salisbury from Chincoteague, Va., in 2004 and is Cambrex's only bleeding facility.

She dropped her hand in a vat and allowed a crab to grab her finger. "I don't think they're creepy at all," she said.

The horseshoe crabs curl up when lifted, allowing them to be wedged into the rack. When injected, they flail their legs and raise their tails, then, a few seconds later seem to relax. The light blue blood drips into bottles about half full of anticoagulant. It takes about five crabs to fill a bottle. When the flow stops, the needles are removed.

"The crab stops when he doesn't want to give you anymore," Sterling said. "You will never bleed a horseshoe crab to death."

Studies performed for Cambrex place the mortality rate of bled crabs at about 7.5 percent. Other studies of the industry have placed it as high as 15 percent. The crabs can legally be kept out of the water 72 hours, but Sterling said Cambrex generally returns those it bleeds to the ocean the same night.

George Johnson, Cambrex section manager, said the company has developed a genetically engineered synthetic product, now being sold only for research purposes, that could someday replace the need for horseshoe crabs, just as the crabs once replaced the need for rabbits, previously used to test for endotoxins.

After bleeding, some crabs are tagged, ensuring that they don't get bled more than once a year. The tags contain a toll-free U.S. Fish and Wildlife number. Those who find and report tagged crabs receive a pewter horseshoe crab pin in the mail.

That the horseshoe crab has progressed to jewelry - albeit government-issue - could be seen as a milestone in its slow climb to public appreciation.

Gauvry gives his group some of the credit for making that happen. He gives some, too, to the red knot advocates, even though he doesn't agree with their stance and sees them as holding the advantage: Horseshoe crabs don't have the fan base that birds do. They're harder to love.

"Horseshoe crabs don't have warm brown eyes with lashes," he said. "They don't make an endearing sound. You have to work at it a little bit."

john.woestendiek@baltsun.com

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