Orgy? Tough Life For Blue-blooded Horseshoe Crab

Anthony Fredericks readily admits he was a college professor when he attended his first orgy.

There he was, on the beach, staring at a mass of bodies clambering all over each other, watching "transfixed as couples mated on any stretch of sandy real estate they could find ... There were the usual twosomes and

threesomes, and occasionally we would come across a foursome, a fivesome, and even one over-stimulated sixsome."

It was not an especially erotic scene. It would be hard for it to be so, given that the bodies on display were, as he describes them, "submarine tanks," each with ten legs and ten eyes, that plowed into each other "with all the delicacy of a frenzied herd of bull elephants."

This was no Saturday night Cinemax movie set - nor, for that matter, some kind of weird Invasion-of-the-Body-Snatchers-meets-Caligula mash-up. This was horseshoe crab mating season, and the same scene has been unfolding - as it did many evenings in May and June - in Delaware Bay for likely as long as the bay has existed in its present form, perhaps the last 5,000 years or so.

But if the bay presents ideal conditions - just the right depth, the perfect tides - for horseshoe crabs to come ashore and mate, it has done so for only the tiniest fraction of the species' existence, because horseshoe crabs have been on Earth, in some form or another, for approximately 445 million years.

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To put that in context: they predate the earliest dinosaurs by almost *200 million years*.

Horseshoe crabs, it is safe to say, are survivors.

Key to their survival, it seems, has likely been their adaptability, their ability to shift with changing coastal conditions - as evidenced by their willing and ready takeover of a bay that for well over 99.9 percent of their time on Earth didn't even exist.

That survival has not been hurt, either, by the strong carapace that envelopes the upper half of their body, effectively sealing off their sides as they walk along the seabed and providing a kind of sheltered micro-climate in which they go about their business - as well as rendering them impregnable to all but a select few predators.

By far the time of greatest natural mortality for horseshoe crabs is during the aforementioned breeding frenzy. For adults, the problems come when, as they scramble over each other, they become flipped over on to their backs. Often, they are able to use their long tails, or telsons, to help flip them back into position; but if the telson becomes broken in the melee, or if it becomes jammed into the sand as the animal (which is not only not actually a crab, but not even a crustacean) struggles to invert itself, then the result may be terminal. Such levels of mortality are as nothing compared to the number that die *in ovo*, victims of the thousands upon thousands of migrating shorebirds that descend upon Delaware Bay at the same time as the horseshoe crabs crawl their way on to the sand.

Those shorebirds may consume three hundred tons of horseshoe crab eggs in a season - a fantastic amount. But each of the million-plus females laying each season may deposit 80,000 eggs or more before returning to the sea. The shorebirds do not, of course, eat solely horseshoe eggs - there is plenty else to munch on along the tideline; even so, there have been some concerns that possible declines in horseshoe numbers may have led to decreases in the numbers of red knots, one of the shorebird species that feasts on those eggs.

But why might there be decreases in horseshoe crab numbers? In his new book, *Horseshoe Crab: Biography of a Survivor* (Ruka Press), Fredericks details the various uses of the American horseshoe crab, and the impacts such uses may have had.

Native inhabitants of the Delaware Bay region apparently used the telsons as spear tips for catching fish; farther north, some would also use them as fertilizer, placing one or two in the ground around corn stalks. Colonists and their descendants caught wind of this latter technique, and by the mid-nineteenth century, as many as 4 million crabs per year were being taken from Delaware Bay for this purpose. That figure declined over the decades, in line with diminishing horsehose crab numbers and a change in the focus of the fertilizer industry, but as the populations began to rebound, they were hit again by the growth of eel and conch fisheries to feed the Asian market and by the use of horseshoe crabs as bait for those fisheries.

HSW Video: Horseshoe Crab's Blue Blood

Management plans and advances in the fishery reduced the number of crabs that are used for bait, but meanwhile the animals continue to be pressed into service for a surprising use: their blue (yes, blue) blood clots in the presence of toxins released by certain bacteria, and as a result is a vital component of the LAL test, used by pharmaceutical companies to test the safety of drugs and other fluids. Horseshoe crabs are collected live, drained of some of their blood, and released; but it has been estimated that as many as 15 percent of them may die in the process.

There are other threats - not the least of them coastal development that encroaches on the beaches the crabs need to breed (in addition to the American horseshoe crab, which is found along the eastern seaboard and

Gulf of Mexico, there are three other species in the Indo-Pacific), and the sensibilities of private landowners who feel that the smell of overturned, dying and decomposing horseshoe crabs is not what their property values need, and is something to be eradicated rather than encouraged.

PHOTOS: The Stinkiest Places on Earth

Fredericks describes the work of one small organization - the Delaware-based Ecological Research and Development Group (ERDG) - which has sought small-scale, ground-up solutions to those problems. Perhaps the simplest of its educational campaigns goes like this: 'Don't like the sight or smell of dying, flipped-over horseshoe crabs? Flip' em over!'

As Fredericks quotes ERDG's Glenn Gauvry as explaining as saying: "What you've got is, you've got people who used to bury crabs in holes. Here in Delaware, they'd get backhoes and just bury them under. Now they're flipping them over, and the first thing that they start to realize is the thousands that are dying on the beach, smelling up their beach and drawing flies and making recreational activity somewhat unpleasant, the vast majority would have gone back in the water if they had just been flipped over. That's the first thing we started hearing from these communities—it's like, 'Geez, we have a lot less horseshoe crabs to die on the beach.'"

Then, before you know it, far from deterring recreational activity, horseshoe crabs attract it, in the form of groups of people who want to stand and watch them come ashore and engage in their slow-paced sexual frenzies. The next stage is that coastal communities approach ERDG and ask to work with them to turn their beachfronts into horseshoe crab sanctuaries.

And thus, bit by bit, the tide turns, and when people along the beach watch the horseshoe crabs return to sea, it is perhaps with a slightly heavy heart, despite the knowledge that they will be back the next year, and the year after that, as they have done for millions upon millions of years before the first human drew breath and, perhaps, may continue to do millions upon millions of years after the last one does the same.