

# People pay \$112 million a year for horseshoe crab blood. A company wants Georgia's coast in on it.



A biotech company is eyeing Jekyll Island as a testing ground for its foray into horseshoe crab ranching.

While beach-goers mainly know horseshoe crabs as prehistoric-looking creatures that wash up dead at the shoreline, the animals have been harvested for decades for their blood, which is used in testing the sterility of pharmaceuticals and medical devices.

But demand is outstripping supply from that harvest, Anthony Dellinger, president and scientist at North Carolina-based Kepley BioSystems Inc., said at a symposium at Savannah State University this month.

And the current methods are tough on the horseshoe crabs. The species here, *Limulus polyphemus*, is 20 million years old, but has been declining over the last few decades because of overharvest.

That's not only bad for the biomedical industry that relies on the horseshoe crab's blood, but also terrible for migrating shorebirds like the threatened red knots that rely on an abundance of nutrient-rich horseshoe crab eggs to fuel their long-distance migrations.

Fishermen currently harvest the crabs and transport them to labs where they're bled. They're returned to the water alive, but studies point to the toll that capture and transport take on the animals.

About a quarter of them die and those that don't can suffer reduced fertility as their bodies mend, said Kristen Dellinger, Anthony's wife and a research associate at the University of North Carolina at Greensboro Joint School of Nanoscience and Nanoengineering, with which Kepley is affiliated.

Kepley BioSystems wants to manage horseshoe crabs better. In a proposal to the National Science Foundation, the company suggests the perfect spot for this trial will be on Jekyll at the saltwater Tidelands pond, an impoundment built as a yacht basin and later used as a water-skiing venue.

The 23-acre pond is linked to tidal creeks only by culverts that allow saltwater and its array of marine life.

The horseshoe crabs, about 80 to start and potentially scaling up to 2,500, would be equipped with patented catheters to allow easy, repeated blood draws. They'd also be tagged and tracked through telemetry to monitor the health of each animal.

Similar to when a person gives plasma, the horseshoe crab's blood will be spun to remove the desired constituent, called Limulus amoebocyte lysate or (LAL), and the remainder of its blood would be returned to the crab. It's LAL that reacts with gram-negative bacteria, making it useful for pharmaceutical and biomedical device testing.

If all this sounds ridiculously high-tech for a horseshoe crab, consider the market value of their blue blood. A teaspoon of LAL is worth about \$75, Anthony Dellinger said. It's a \$112 million a year market now, with big potential to expand, particularly if LAL testing for sepsis — a leading cause of death globally — is developed as the company expects.

Kepley BioSystems is working on preliminary research for this project with a \$5,000 grant from North Carolina Sea Grant. A \$225,000 grant from the National Science Foundation is pending with initial reviews positive. If the grant comes through, Anthony Dellinger expects to be horseshoe ranching in Georgia by the end of the year.

For now, horseshoe crab harvest is almost nonexistent in Georgia. The Department of Natural Resources hasn't issued a license for biomedical harvest in about 10 years, said Doug Haymans, director of the Coastal Resources Division.

Before that, only one annual license was typically issued. The nearest processor is Charles River Laboratories in Charleston, Haymans said, and the lab has indicated to him that South Carolina harvesters can meet its needs.

Mark Risse, director of UGA Marine Extension and Georgia Sea Grant who attended the symposium, said his organization supported Kepley with the grant applications but he's cautious about the timeline, indicating that the regulatory hoops could take years to jump through.

"They are really interesting ideas and I have no problems with the needs they're talking about," he said.

More enthusiastic about implications of the project for the Georgia coast is Lance Toland, a Sea Island-based investor who is the director of the company's Horseshoe Crab Ranch and Blood Institute division. He wants to see legislation introduced to protect horseshoe crabs, he said.

“I'll be the first to tell you I'm not a tree hugger,” Toland said. “I'm not an environmentalist, none of the above. But I think there is responsible stewardship of our resources. Georgia has a small coastline, and why not make a name for ourselves in coastal ecology?”