THE DESPERATE RACE TO KEEP A DATE WITH FATE Biologists frantically work to rebuild ravaged habitat of 2 Shore species in peril

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Author: *Amy Ellis Nutt, STAR-LEDGER STAFF*

Before the sun spilled across the marsh, before Bartone's Bait and Tackle opened for the day or the waitresses at the Maurice River Diner ("Chicken Pot Pie every Wed. and Sun.") served up the first crab omelette, there were creatures stirring on the beaches of Delaware Bay.

A couple dozen horseshoe crabs emerged from the water, teeter-tottering under seaweed-green shells the size of dinner platters. It was late April's full-moon high tide, the highest tide of the month, and these ancient mariners were performing a spawning ritual they've done for thousands of years here, by following the moonlight up onto the shores of New Jersey's western bay.

Over the next couple of weeks they will be joined by hundreds of thousands of other horseshoe crabs and tens of thousands of red knot shorebirds, legendary ornithological marathoners that every year make a nearly 10,000-mile-long road trip from the southernmost tip of South America to the Arctic Circle to breed.

After taking off from Tierra del Fuego the birds fly over the rainforests and rest briefly in Brazil before heading northwest toward the Atlantic. Their destination: the Delaware Bay, where millions of horseshoe crab eggs await -- enough to fuel them for the last leg of their journey north.

New Jersey, it turns out, is the red knot's favorite rest stop.

As recently as last month, however, the Delaware Bay beaches in New Jersey looked anything but inviting.

ECOSYSTEM AT RISK

In Hurricane Sandy's reshuffling of Jersey's coastal geography, 70 percent of the horseshoe crab habitat was lost. How many red knots would stop and how many horseshoe crabs they would find here were questions no one could answer.

Two wildlife biologists, however, have desperately tried to stack the deck in the animals' favor by moving debris from beaches and trucking in sand, so as the bay warms and the tides rise in advance of the next full moon (May 25), New Jersey will be ready for them.

The two species, one plodding and prehistoric, the other petite and a paragon of

aerodynamic efficiency, are nature's high-wire couple, engaged in a relationship so fragile that the smallest blip in the environment can imperil their annual synchrony.

The Garden State's role in the success of that relationship is unparalleled because every year the Delaware Bay's beaches are host to the largest gathering of horseshoe crabs in the world and 70 to 80 percent of the Western Hemisphere's red knots.

In New Jersey, the knots are officially an endangered species. Their population has declined over the last 30 years, and particularly in the last few. Before the 1980s, they numbered as many as 150,000, but since 2003 that number has decreased to about 15,000, according to N.J. Fish and Wildlife. The main reason, say conservationists, is the lack of supply of horseshoe crab eggs.

Horseshoe crabs once numbered more than 2 million in the Delaware Bay, according to experts, but in the 1990s fishermen discovered that the crabs made ideal bait for eel and conch, popular in the Asian sushi market. Horseshoe crab numbers plummeted until a moratorium on fishing them was signed into law in 2008 by Gov. Jon Corzine. Today, horseshoe crabs in the Delaware Bay number about 200,000, according to an annual census overseen by marine scientists from the University of Delaware, but exact figures are hard to come by.

"These organisms don't live in one spot," said Lenore Tedesco, executive director of the Wetlands Institute, a nonprofit organization in Stone Harbor that focuses on coastal ecology. "We don't know where they go."

The red knots haven't exactly been easy to find, either. As recently as 1978, ornithologists weren't aware of the key Delaware Bay stopover. In the early 1980s, however, aerial surveys revealed that not only red knots, but nearly a half million shorebirds, spanning six species, use the bay as a migratory way station.

Last October's storm scoured the bay beaches of New Jersey of 2 to 3 feet of sand and exposed sod banks that over the years had crept down from the marshes that fringe the beaches to the water's edge. A foot-high Maginot Line of mud and vegetation now greeted the crabs emerging from the water to spawn.

Another hurdle was man-made detritus from now-extinct bay towns -- mostly cinder blocks, fused bricks and slag from the old glass furnaces of southern New Jersey -- laid down by former residents trying simply to protect their beaches from erosion.

The crabs' biggest barricade was the debris of the towns themselves, including massive sections of concrete pipe, left behind in 1998 after the state plowed under homes that had became too expensive to insure against flooding.

"At Moores Beach the state bought the houses and took them down but left the rubble," said Steve Hafner, assistant director of field operations at Stockton College's Coastal Research Center. "It's a pile of crap no animal can use."

That was abundantly clear as a team headed by two wildlife biologists raced to repair parts of five beaches on the Jersey side of the bay.

"The crabs are starting to come ashore in a few places," said Larry Niles, a wildlife biologist with the International Shorebird Project, which is part of the Conserve Wildlife Foundation of New Jersey. "We have our permit (to truck in sand) only until the crabs came in."

The early arrival of some crabs two weeks ago, he said, was inevitable. And in the first light of a spring morning, the evidence littered Moores Beach -- horseshoe crabs, which usually come ashore with the males already attached to the females, lay upended in thick wet waves of clay uncovered by the hurricane. Other crab pairs, wedged mercilessly between shards of brick and cement, waved their long, menacing-looking tails (used not for defense but to right themselves in the sand), as if in some slow-motion sword fight.

CLEARING THE WAY

Over the past few months, Niles, the former chief of the Endangered and Nongame Species Program at New Jersey's Division of Fish and Wildlife, scrambled to secure money for a limited beach restoration. Ultimately, $1.4 million in public and private funds was spent to remove 900 cubic yards of debris and lay down 32,000 cubic yards of sand. The total area covered: 1.25 miles of coastline that includes parts of five beaches: Pierces Point, Cooks, Kimbles and south Reeds (all in Middle Township) and Moores Beach in Maurice River Township.

"There were a lot of pilings uncovered on the shoreline (by Sandy), old bulkheads, concrete, brick," said Peter Bosak, superintendent of Cape May County Department of Mosquito Control, whose trucks removed 50 tons of rubble from Reeds. "People told us it couldn't be done."

Niles had reason to worry it wouldn't. In early May, when the front loaders and dump trucks finally began to rumble out to Moores, the last beach to be restored, the vehicles immediately started to sink. The muddy, makeshift road over the marsh to the bay couldn't support their weight.

"We had to rebuild the road," Niles said, "So we brought in crushed concrete and filled in the holes and just kept going."

A GROWING URGENCY

Niles, who along with his wife Amanda Dey, senior biologist with the Endangered and Non-Game Species division of N.J. Fish and Wildlife, lives in Cumberland County, has been here on the Delaware Bay nearly every day for the past two months. The couple has studied the red knots and followed them (more than once) from Tierra del Fuego to

the Arctic Circle (and back again), for 30-plus years. They also lived through last October's storm and knew when it was over the beaches would be devastated.

They also knew they had to do something about it.

"No sand means no horseshoe crabs and no horseshoe crabs means no eggs and no eggs means the birds go hungry," Niles said, shaking his head. "I couldn't sleep."

Nor could Dey.

"The Delaware Bay needs to be a constant for these birds because there are so many vagaries," she said.

By last Monday, Niles and Dey were finally able to catch some shut-eye. The restoration and replenishment of a small, but significant stretch of Delaware Bay was finished.

"It's in our backyard. It's right here," Tedesco said. "How could we not protect it? For economic development, for conservation -- for pride?"

Gone were the concrete sewer pipes and cinder blocks, the discarded tires, glass slag and bricks. The sod banks and rows of long-buried cedar trunks -- remnants of the old road that ran in front of the homes at Moores Beach -- were covered with fresh sand.

Nature's annual spectacular on the beaches of the Delaware Bay was ready to begin.