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## New clues could save shorebirds

### Overharvesting of crabs robs red knots of food

By MOLLY MURRAY  
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Shorebirds such as the red knot will depend on an abundant supply of horseshoe crab eggs when they arrive here next month on their northern migration.

Just how many eggs has always been a question.

A new study gives state regulators a series of benchmarks -- from the number of eggs needed to the percentage of red knots that make optimum weight gain -- to guide future regulations.

The benchmarks come at a critical time for red knots. Some scientists predict that, unless dramatic steps are taken, the species will be extinct in the next year.

Egg availability "is the central issue for the red knot on Delaware Bay," said Larry Niles, a wildlife biologist who has spent more than two decades studying red knots.

He was joined in his research by a regional and international team of scientists, including biologists from Delaware's Natural Heritage Inventory Program and the British Trust for Ornithology, a group that comes to Delaware each year during the spring shorebird migration.

Egg densities are far below the target levels, Niles said. On the New Jersey side, they typically range from 2,000 to 4,000 eggs per square meter, he said. The density is higher on the Delaware side of Delaware Bay but nowhere close to the target of 50,000 eggs per square meter, he said.

Red knots, the robin-sized shorebirds that pass through Delaware Bay each spring, gorge on the eggs over a two-week period. The birds, which fly nonstop from the southern tip of South America, are tired and thin when they reach Delaware's shores. Before they fly north to Arctic breeding grounds in Canada, they need to fatten up. Horseshoe crab eggs are rich in fat and protein.

The target weight is 180 grams, Niles said. And 60 percent to 80 percent of the birds passing through should meet that goal to ensure breeding success and a rebound in the population, he said.

Red knot populations, along with other key species of shorebirds that migrate through the Delaware estuary, have dropped dramatically since 1981 when scientists in New Jersey did an aerial survey of Delaware Bay and concluded there were some 425,000 shorebirds along the beaches in Delaware and New Jersey.

Of those birds, 95,000 were red knots, 80,000 were ruddy turnstones, 175,000 were semi-palmated sandpipers and 30,000 were sanderlings -- all species that feed heavily on horseshoe crab eggs.

At the time, scientists concluded that Delaware Bay was a temporary way station for 70 percent to 80 percent of the ruddy turnstones in the Western Hemisphere and for half of the world population of semi-palmated sandpipers.

Some 80,000 to 100,000 red knots spent their winters along the southern coastal tip of South America. The semi-palmated sandpipers gathered along the northern coast of South America.

By 2003, the numbers of red knots counted in the Delaware Bay aerial survey had fallen to 16,000 birds. Ruddy turnstones were off by 50 percent, semi-palmated sandpipers off by 60 percent and sanderlings down by 35 percent.

Scientists blame overharvesting of horseshoe crabs -- and thus a reduction in the number of eggs -- for the declining population figures. Birds that don't gain enough weight here in Delaware Bay simply aren't as fit when they go to breed in the harsh conditions of the Arctic, Niles said.

Coastal states have severely limited horseshoe crab harvests over the past decade. New Jersey has a harvest moratorium in place, and Delaware limits the harvest to male crabs only, after the peak of the shorebird season.

Delaware's efforts to enact a moratorium were successfully challenged in court.

"All of the restrictions have had an impact," Niles said.

The scientists who worked on the project agreed that closing the harvest is still the best option, rather than waiting for a slow recovery, he said.

"Right now, we're flirting with long-term disaster for the red knot," he said.

Variables such as weather -- last year, a late season nor'easter washed away eggs on the beach just as the birds were arriving and it lowered water temperatures so crabs didn't resume spawning right away -- or an oil spill could have catastrophic impacts.

The good news, based on winter surveys in South America, is that the population didn't decline further from last year to this, Niles said.

Meanwhile, Kevin Kalasz, a biologist with Delaware's Natural Heritage Program, said a team of researchers is working on a new model that will help predict various scenarios for shorebirds and horseshoe crabs.

The goal is to allow regulators to come up with management alternatives that could be done quickly to react to changing conditions, he said. The model does include catastrophic events, he said.

The link between the crab spawn and bird migration is so closely related that "timing is critical," Kalasz said.

Another key is to have high enough crab populations that crabs will be spawning over a long period of time, he said.

While scientists have focused much of their research on Delaware Bay, Delaware's Inland Bays may be an alternative location for crab spawning and shorebird activity.

Kathleen McCole, a senior at the University of Delaware, outlined her findings in a study she did of horseshoe crab spawning in Indian River and Rehoboth bays Friday at a Center for the Inland Bays Science and Technical Advisory Committee Meeting.

McCole found that crabs do spawn in the two bays -- and often at levels that compare to Delaware Bay beaches like at Lewes.

And she also found reservoirs of eggs buried in the sand.

Most amazing, she found that the crab eggs don't always hatch right away.

Last October and November, she sampled the sand and found viable horseshoe crab eggs buried along the shoreline.

"Maybe those beaches provided some protection," she said.

Douglas C. Miller, associate professor of oceanography at the University of Delaware College of Marine and Earth Studies, worked with McCole on the research project.

He said it is hard, at this point, to determine the ecological significance of horseshoe crab spawning in the Inland Bays on the larger connection between horseshoe crabs and shorebirds.

"It's surprising how little is known about the population dynamics," he said.

## Additional Facts

### RED KNOTS POPULATION

In 2003: **16,000**

In 2007: **12,375**

*Source: Delaware Bay survey*