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## Birds gamble on survival on shores of Delaware Bay

**Changing water temperatures and more frequent, intense storms seem to disrupt the synchronization of the spawning of crabs and the birds that rely on them for food to fuel a 10,000-mile spring migration.**



**HANDFUL:** Horseshoe crab eggs in human palm in Delaware's Mispillion Harbor. (Photo: Gregory Breese/USFWS)

Not far from the casinos of Atlantic City, a different kind of wager takes place each May along the shores of Delaware Bay.



That's when red knots, birds the size of a coffee mug, stake their future on the eggs laid by tens of thousands of horseshoe crabs. Without enough crab eggs to fuel them, the long-distance fliers may not survive their 10,000-mile spring trek from the southern tip of South America to their Arctic breeding grounds.

In recent years, the red knots' bet on the crab eggs has been more of a crapshoot. First, the over-harvesting of horseshoe crabs for bait caused an egg shortage. Now, scientists also point to a wild card.

"The peak of horseshoe crabs spawning in Delaware Bay has not always been aligned with the migration of the red knots," said Gregory Breese, the U.S. Fish and Wildlife Service's project leader for the Delaware Bay Estuary Project. "That could be related to climate change."

Changing water temperatures in Delaware Bay and more frequent and intense storms appear to be disrupting the synchronization between the spawning of the crabs and the arrival of the red knots. When waters warm, the crabs lay their eggs earlier, and other creatures may beat red knots to the feast.



Other climate-related influences are also likely affecting crabs and red knots. Rising sea levels have eroded beach and shrunken crab spawning areas. Red knots spend most of their time in regions of the world already experiencing effects from climate change. When Arctic snow cover is less than average during their summer breeding season, models suggest that red knot survival rates drop, Breese said. In the winter, red knots are arriving one week later than they did a decade ago in Tierra del Fuego, an archipelago on the tip of South America.

Such climate impacts are expected to increase with time. But, said Breese, "When and if a threshold will be reached and causing a dramatic change in the red knot population is guesswork at this point."

In the 1980s, the rufa subspecies of red knot took a severe hit from overharvesting of the crabs in Delaware Bay. The rufa population, estimated at between 90,000 and 150,000 birds at the start of the decade, fell to between 15,000 and 20,000, according to Kevin Kalasz, shorebird project coordinator for the Delaware Division of Fish and Wildlife. Mid-Atlantic Coast states imposed strict limits on crab harvests, starting in the year 2000. (Human health concerns helped drive the action: Crab blood plays a key role in biomedical research, helping to detect bacterial contaminants in drugs and implanted devices.)

Rufa numbers have held steady since 2003, said Kalasz. The bird is a candidate for federal protection under the Endangered Species Act.

With crab harvests restricted, Kalasz expects climate change to factor more strongly in the red knots' survival.

Once scientists have a more precise understanding of climate change impacts on the red knot, they will be better able to devise counteracting management actions, Kalasz said. He called such research "one of our top priorities." One possible response, he said: replenishing beach area where the crabs spawn to counteract rising sea levels.

*Photos: Gregory Breese/USFWS*