

**Rollison:** Hi, this is Nan Rollison with the U.S. Fish and Wildlife Service. Today, we're talking with Greg Breese, shorebird biologist with the Service's Coastal Program, working on Delaware Bay issues. Thanks for being with us today, Greg.

**Breese:** Thanks for having me.

**Rollison:** The U.S. Geological Survey just announced their new study just published in *Molecular Ecology* that indicated climate change may have played a historical role in the populations of horseshoe crabs. Your office works on shorebird issues. Can you talk to us a little bit about what the connections are between shorebirds, horseshoe crabs and climate ?

**Breese:** Certainly, and the connections are quite intertwined. Horseshoe crabs spawn and if they spawn in large enough numbers, they produce a lot of surplus eggs which end up on the surface of the beach. Shorebirds, like redknots, have learned to make use of that and so are heavily dependent on gaining a lot of weight in the Spring when they migrate in to Delaware Bay feeding on primarily or exclusively on horseshoe crab eggs. This is a very tightly synchronized phenomenon where horseshoe crabs have to spawn when the shorebirds have left South America and are flying over the Atlantic Ocean and arriving at Delaware Bay basically at a fat-free weight—in trouble if they don't have enough food. And so climate change could potentially disturb that synchronization between two species, and so it's very important to understand what climate change could do and how it could affect shorebirds and horseshoe crabs.

**Rollison:** I understand sea turtles also feed on horseshoe crabs ?

**Breese:** Yes they do. We don't know nearly as much about sea turtles and their dependence upon horseshoe crabs as much as we know about redknots, for instance, and their dependence on horseshoe crabs. But there's a lot of literature and observations that suggests that Delaware Bay is an important nursery area for sea turtles and that they feed heavily on horseshoe crabs as well. So, horseshoe crabs, if their population changes, and declines as Tim King's article suggest, then it would have an impact on sea turtle populations as well, which are already endangered, so they are already at low numbers.

**Rollison:** The horseshoe crab, this is a species that's pretty unique.

**Breese:** Horseshoe crabs are fascinating creatures just by themselves irregardless of shorebirds or sea turtles using them. They are an ancient species—they've been around I think for over 400 million years. They aren't really related to the blue crab, they are related to spiders. In addition, they are, some parts of their anatomy and physiology have proven extremely useful to humans. For instance, they have a large optic nerve and a lot of what we've learned about human vision is because of research on horseshoe crabs.

**Rollison:** You mentioned this issue of synchronization. Is that really that big a deal if the crabs come up a week later, and the birds get there two weeks later. Can you talk a little bit about why this idea of timing is so important?

**Breese:** It's extremely important because of a few different things. So the redknots for instance, let me give you a little history. They winter down in the tip of South America and so the far south extreme of the western hemisphere. And so they migrate up along the coast of South America and somewhere around southern Brazil they basically fly to Delaware Bay, perhaps stopping at northern Brazil somewhere, but not for any significant length of time. They reach Delaware Bay they've lost all their fat reserves –they are down to lean (body) weight. They have to have a food source that is highly reliable, and highly abundant right when they are there.

**Rollison:** But the redknots especially are at critical population levels now I understand?

Breese: Yes, redknots have declined dramatically in the 1990s and early 2000s. They went from a population (estimate) of say 60, 000 to 90,000 and they are down to 20,000 – 30,000.

Rollison: Down here around Maryland and Virginia, when the waterfowl , the snow geese and other species come in and out Spring and Fall migration, its' a big tourist draw. Is that something that Delaware Bay communities also benefit from ?

**Breese:** Oh absolutely. A huge draw. Delaware Bay is known worldwide as one of the most important and fascinating shorebird stopovers in the Spring. People come from out of the country -they come from all around the country. The phenomenon of literally millions of horseshoe crabs spawning on the beaches and shorebirds in the millions feeding on the eggs is just an amazing thing. It's been compared with the Serengeti and other amazing spectacles of nature that you've heard about.

**Rollison:** Well, we wish you the best of luck. This is Greg Breese from the Delaware Bay Project in the Service's Coastal Program. Thanks for taking time with us today.

**Breese:** Thank you.