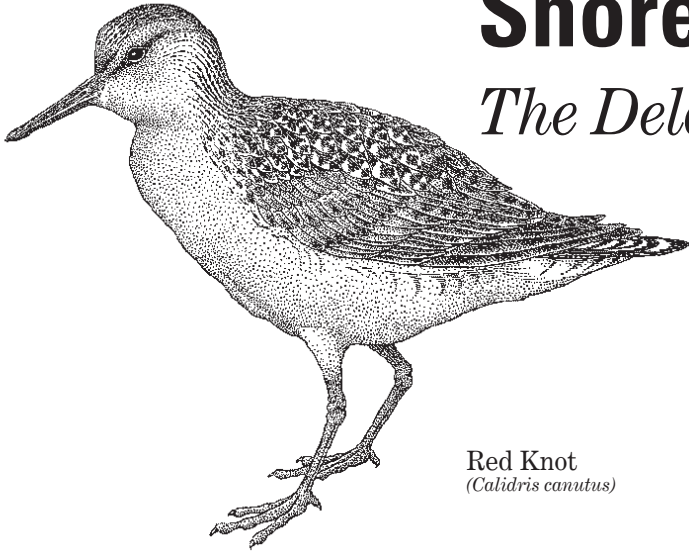


Shorebirds

The Delaware Bay Connection



Red Knot
(*Calidris canutus*)

Long Journey

Shorebirds occur throughout the world and are a familiar sight to visitors and residents of our coastal shores and waterways. These remarkable birds have some of the longest migrations known, traveling from their wintering ground at the tip of South America to their Arctic breeding grounds and back again each year. Their migration also includes some of the longest non-stop flights in the bird world, commonly exceeding 1,000 miles (1,600 km). Stopovers like Delaware Bay play an important role by providing food resources for these birds at critical times during migration. Over half of the Western Atlantic flyway's population of red knot (*Calidris canutus*), ruddy turnstone (*Arenaria interpres*), and semipalmated sandpiper (*Calidris pusilla*) may rely upon the Delaware Bay in the spring to replenish their energy reserves before heading to their Arctic nesting grounds.

Compressed Time Schedules

The northbound migration of red knots usually begins in mid-February, as they leave their wintering grounds at the tip of South America and move up the coast of Argentina. By mid-April they have reached southern Brazil, which is believed to be the last area in South America where they feed and gain weight. By the middle of May, large numbers have arrived at Delaware Bay. By the end of May or the first few days of June they have departed on the last leg of their journey, arriving in their Arctic nesting grounds in early June.

To breed successfully in the Arctic, the birds must follow a very compressed

time schedule that has them arriving just as the snow is melting. There is just enough time to establish nesting sites, perform courtship displays, incubate eggs, and replenish their energy reserves by feasting on the abundant insect life before setting off on their southbound migration in mid-July. Because the Arctic season is so short, there is almost no room for delay.

Another problem the birds face when they arrive in the Arctic is a lack of food. Insects do not emerge until well after the birds have laid their eggs. This means that the birds must leave Delaware Bay with more energy reserves than they need to simply make the trip to the Arctic. If they have not accumulated enough fat reserves at Delaware Bay, they will likely not be able to breed.

Balancing the Need for Flight With the Need for Fuel

To accomplish such feats of migration endurance, shorebirds must have large amounts of fat for "fuel", but their wing size and muscle strength limit how much weight they can lift. Therefore, they must carefully balance their need for fuel with their ability to fly. Recent research has shown that some shorebirds can dramatically change the size of their internal organs in preparation for feeding or flight.

When red knots first arrive at Delaware Bay, they have lost all their fat reserves and some muscle mass. It takes several days before they begin to gain weight. During this time, their stomach, intestines, kidneys, and liver are

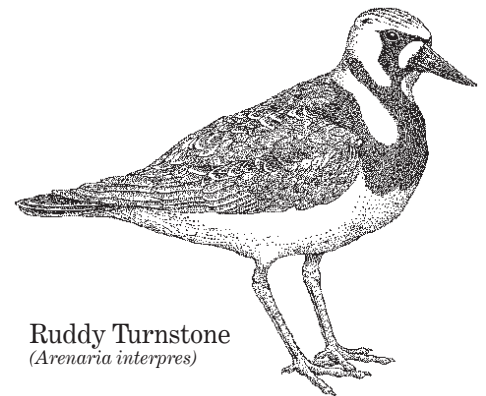
enlarging as they "rebuild" their digestive system. The birds then put on weight at an astounding rate, gaining over 4% of their body weight per day, which is comparable to a 150 pound (68 kg) person gaining over 6 pounds (2.7 kg) per day.

After they have gained sufficient weight, the birds spend several days resting without eating. During this time, they eliminate the contents of their gut and reduce the size of their stomach, intestines, kidneys, and liver since their primary needs are to fuel the flight and the first part of their breeding season. Every ounce counts as they balance the competing needs for fuel and flight to meet the demands of their compressed breeding season.

The Horseshoe Crab Connection

The world's largest spawning population of horseshoe crabs (*Limulus polyphemus*) occurs in the Delaware Bay. A single crab may lay 100,000 eggs during a season. While the crab buries these eggs deeper than shorebirds can reach, waves and other horseshoe crabs cause large numbers of eggs to rise to the surface. These "surface" eggs will not survive, but they provide food for many animals.

The shorebirds are especially dependent upon these eggs, due to their need for an abundant predictable food supply. The



Ruddy Turnstone
(*Arenaria interpres*)

birds stop at only a few places during their spring migration. At each stopover, they have only limited time to meet their food requirements before they must move on. Weather delays or reduced food supplies at critical stopovers can have significant effects on adult shorebird survival and breeding success.

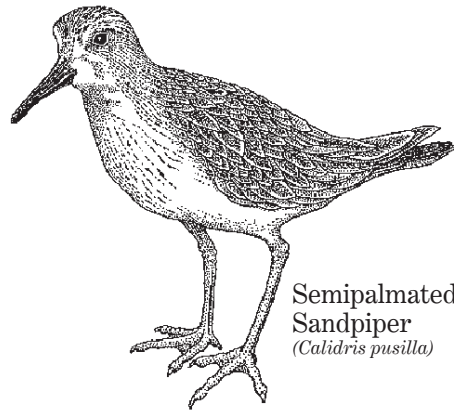
Threats to Survival

Shorebirds face many potential threats as they travel from the tip of South America to the Arctic. The threats at their stopover areas in South America and Delaware Bay are of most concern because the birds are heavily concentrated for very short time periods. Potential threats in these areas include oil spills and other pollution, loss of habitat from development, loss of habitat due to shoreline alterations, loss of habitat due to sea level rise, disturbance due to human activities, competition with gulls for food, and reduced food availability.

Since Delaware Bay is the last stopover for shorebirds en route to the Arctic, it is their last chance to gain sufficient energy reserves for the breeding season. It appears that with sufficient food available, the birds can make up for some deficiencies further south. For this reason a risk averse strategy is being used to help ensure that shorebirds have enough food to meet their needs while in the Bay.

A Fishery Management Plan for Birds?

During the 1990's, horseshoe crab harvesting substantially increased. The crabs are used as bait to catch eel and conch for overseas markets. Concern was raised that the level of harvest was reducing the egg supply for shorebirds. In 1998, the Atlantic States Marine Fisheries Commission (ASMFC), a management organization with representatives from each state on the Atlantic Coast, developed a horseshoe crab management plan to address this concern. The ASMFC plan and its subsequent addenda established mandatory state-by-state harvest quotas and created the 1,500 square mile (388,500 ha) Carl N. Shuster, Jr.



Semipalmated Sandpiper
(*Calidris pusilla*)

Horseshoe Crab Sanctuary off the mouth of Delaware Bay. The most recent addendum (March 2004) further reduced harvest in the Delaware Bay area and established a closed season during the month of May to help ensure that shorebirds have sufficient eggs to feed upon.

Watermen have voluntarily reduced their use of horseshoe crabs as well. Conch and eel fishermen have been using mesh bait bags in their traps, that allow them to effectively fish with only a small portion of one crab per trap, compared to the past technique of using a whole crab in each trap. The bait bags have largely reduced the demand for bait by 50 to 75 percent in recent years. Research is also being conducted to identify supplemental and artificial baits for the conch and eel fisheries, which will further reduce the need for horseshoe crabs.

Although restrictive measures have been taken in recent years, horseshoe crab populations are not showing immediate increases. Because horseshoe crabs do not breed until they reach nine or more years of age, it may take some time before the population measurably increases.

You Can Help

When humans approach birds too closely on the beach, the birds take flight and move to other areas. This uses energy that could be used to build up their fat reserves for the long journey ahead.

When using the beach, keep a safe distance so the birds do not stop feeding and take flight. View them from a distance with binoculars or spotting scopes. Use designated viewing areas and photography blinds when available. If you have a dog with you, keep it on a leash. Limit motor vehicle use on the beach to designated areas.

Best Viewing

The best time to observe shorebirds feeding on horseshoe crab eggs at Delaware Bay is the last half of May. The prime locations are from Port Mahon to Slaughter Beach in Delaware and from Fortescue to Norbury's Landing in New Jersey.

For additional information about shorebirds and viewing locations contact:

Delaware

Delaware Department of Natural Resources and Environmental Control
302/653-2883 x 101

For a copy of the Delaware Bay Shorebird Viewing Guide call
302/739-5297

New Jersey

New Jersey Division of Fish, Game and Wildlife
609-628-2103
609-259-6962

Cape May Bird Observatory
609/861-0700
609/884-2736

U.S. Fish & Wildlife Service

Bombay Hook National Wildlife Refuge
302/653-6872

Cape May National Wildlife Refuge
609/463-0994

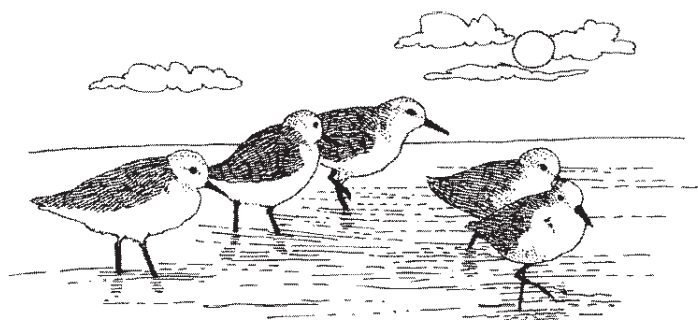
Delaware Bay Estuary Project
302/653 9152

Prime Hook National Wildlife Refuge
302/684-8419

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<http://www.fws.gov>
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Sanderling
(*Calidris alba*)