

Delaware Bay Shorebirds - Searching for Conservation Solutions to Protect Nature's Amazing Spring Spectacle



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We awake before sunrise, and after two weeks of long days and nights, drag ourselves down to gather at Cedar Creek boat ramp. The wind, which has blown for the past 4 days, has diminished and the pungent scent of the salt marsh fills the cold morning air. A few early fisherman glare at the ragtag team of state and federal staff, private organization staff, and our vitally needed Corp of volunteers that make our research work possible. The team members dressed in soiled field attire and loading a heaping pile of equipment into the boat, rarely get asked what they are doing. Onlookers just inquisitively stare at us as if we're a little crazy. Not having had a good night sleep in several days, a few members of the research team are inclined to agree. Their thoughts are then interrupted by a voice over a two-way radio. With a strong English accent, Nigel Clark of the British Trust for Ornithology broadcasts "We've sorted out our catch site, and will set the net around the point in the back harbor just below the rubbish." The team members regain their focus and push on with they day's plan.

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Standing behind the boat console, I ask the remaining team members to put on a life vest and climb aboard. We slowly putt around the back of the harbor to a secluded tidal ditch without disturbing the birds. The group quickly sorts out the gear, and vanishes into the salt marsh grass and phragmites. They will try to catch a few winks in hopes of being a little better rested when the work begins.

An hour passes, and a whisper over the radio informs us, "the birds are building up in front of the catch area nicely - - - if we get 100 Knot we will go". Lying on my back on a soft bed of salt hay, I see flocks

of Red Knot streaming in overhead. Phil Atkinson whispers over the radio, "birds are coming in very nice and we have a catch, if we get all the birds out of the safety, we'll fire - - - we may go without notice". The team members at base camp begin to sit up and reposition themselves to be ready. Before all are set, we here a voice over the radio; "three, two, one - - - FIRE". An instantaneous blast of 16 grams of black powder thunders across the Mispillion River and steel projectiles catapult a net across the beach through a cloud of gray smoke.

In a strange execution of ordered chaos, a dozen scientists emerge from the low dune greenery, running at full sprint toward the net. It's a large catch, perhaps several hundred shorebirds, and time is of essence. The net must be secured on the edges and covered with shade cloth to calm the birds. The birds must then be carefully extracted from the net and placed, one by one, into protective burlap holding cages. Unlike

a past era, these shorebirds are not victims of market hunting for sale in New York or Boston, but part of a research effort to collect data needed for environmental management. The information gained will help guide conservation efforts that ensure the long-term protection of an amazing natural spectacle that takes place each spring on Delaware Bay: the spring stopover of globe trotting shorebirds. Birds safely secured, team members from the United States, United Kingdom, and the Netherlands, catch their breath and prepare to process the birds. Each will be banded; color flagged, and have detailed measurements recorded.

As a native Delawarean, I have enjoyed the

annual ritual of horseshoe crabs and shorebirds on Delaware Bay for as long as I can remember. For me, this had always been a passing outdoor activity between waterfowl hunting and crabbing. Yet for many years, I simply took this incredible natural spectacle on Delaware Bay for granted. I'd read most of the folders and handouts prepared about this phenomenon, and vividly remember the hoopla of the joint proclamation by the Governors of Delaware & New Jersey to establish the first Western Hemisphere Shorebird Reserve Network site in 1985. This program linked sites like Delaware Bay in a hemisphere-wide chain of shorebird protection sites, with each site vital to the shorebird's existence.



Horseshoe crab eggs, a vital food resource for the migratory shorebirds

Delaware Bay is an estuary of extraordinary biological value. Each spring, hundreds of thousands of shorebirds time their arrival in the bay to coincide with the highly predictable, and massive, spawning of horseshoe crabs. These tiny birds, weighing only a few ounces, fly between the South American wetlands and the Arctic Tundra, about 9,000 miles, each spring and fall. They depend on places like Delaware Bay to rest and feed in preparation for their long journeys lasting

up to 70 hours nonstop and covering over 2,000 miles at a time! For species such as the Red Knot, Ruddy Turnstone, Sanderling, and Semipalmated Sandpiper, the amazing superabundance of horseshoe crab eggs provides a vital food resource that enables the birds to complete their next flight to the frozen, wind blown arctic tundra with enough fat reserves to keep warm and nest. Upon their arrival at Delaware Bay, these shorebirds must refuel after flying thousands of miles, doubling their weight in about 10 days. Failure to do this may be a matter of life and death. After departure,

the birds may not be able to eat until the tundra snow melts and some insects begin to emerge. If they do not have enough fat reserves from Delaware Bay, they may starve or freeze to death.

Migratory shorebirds at Mispillion River



My relaxing spring excursions to view shorebirds ended almost a decade ago in 1996 when the Delaware Chapter of the Sierra Club challenged a permit for beach replenishment at Bowers Beach. They raised concerns about potential toxins, impacts to horseshoe crabs, and impacts to shorebirds. With our State beach program confronted with the option of a long debate over these

concerns, we decided to try and address the technical question head on with scientific research. The toxin concerns were quickly addressed through sampling that showed sediments were clean. The issues related to horseshoe crabs and shorebirds were a bit more difficult to address, as we had very little useable data. At the same time, a new issue was surfacing regarding a bay wide concern over the harvest of horseshoe crabs. With an increase in the number of harvest permits being requested and issued, questions were being raised about the potential for over harvesting of horseshoe crabs. If the crab population were to crash; watermen, shorebirds, bird watchers, and the biomedical industry that depends upon lysate, extracted from the blood of horseshoe crabs to test pharmaceutical products, would all suffer.

Despite all the attention to this shorebird phenomenon and the dedication of Delaware Bay as a Western Hemisphere Shorebird Reserve Network Site over a decade earlier, we quickly realized that very little monitoring had been done on this resource. Delaware's natural resource managers were facing very real questions that demanded immediate answers, but had no data on which to make sound decisions. We were caught in a bare moment, like standing on a crowded street with our pants down around our ankles. Long-term monitoring is one of those luxuries that rarely is a high funding priority until we are in crises and require the data that just does not exist.

The implications of a decision on horseshoe crab and shorebird management would directly impact the lives of many people. With the stakes so high, hard lines were quickly drawn in the sand. The data showed no clear direction to take, yet the "available data" was quickly being manipulated to support all sides of the issue. A quick reflection of past conservation actions will point out that effective environmental conservation programs, those that stand the test of time and changes in political winds, can only be built on the basis of solid, thorough research. Acknowledging this, a clear mission for the Delaware Coastal Programs emerged - - build a

coalition to start collecting the data necessary to guide a science based management process for shorebird conservation. Eight years after this realization, a devoted group of people known as the Delaware Shorebird Monitoring Team rarely have an opportunity for a relaxing excursion to simply watch and enjoy this amazing phenomenon on Delaware Bay. Throughout the 30 day migratory stop at Delaware Bay, we run ourselves ragged driven by our recognition of the critical need and our obligation to collect the data required to guide decisions that ensure others will enjoy the amazing shorebird migration spectacle for generations to come.

Monitoring Program

A detailed understanding of shorebird populations and habitat requirements within the Delaware Bay can, in part, be acquired through the monitoring and tracking of shorebirds staging in Delaware Bay habitats during their spring migration. Monitoring shorebirds, such as Red Knot, Ruddy Turnstone, and Sanderling during their spring stopover on Delaware Bay is practical

Setting the net



since it is a major concentration point in the annual migratory cycle of these species. Attempting to monitor anywhere else is far more difficult since the birds are dispersed in breeding grounds, are located in a number of remote wintering areas, and migrate over a long period in autumn. If we want good data and information about the shorebirds of the Western Hemisphere's Atlantic Coast Migratory Route, Delaware Bay is the pivotal location for a monitoring program.



Color banded Red Knot

The Delaware Shorebird Monitoring Team, comprised of a team of professional scientist and volunteers, monitors the health of migrant shorebirds passing through Delaware Bay by using two main activities. These include canon net and mist net catching, and counting and undertaking bird color mark studies.

Canon and mist netting is conducted to collect data on individual shorebirds. Each bird caught using these methods is weighed, measured, sexed, and assessed for breeding plumage. These individual "vital statistics" allow researchers to assess the health of the shorebirds and provides critical information on weight gains over the spring migration-staging period in Delaware Bay. The

monitoring of body conditions enables the quality of the habitat in Delaware Bay to be assessed. However, in assessing the habitat in Delaware Bay, one must take into consideration that long-term trends have not yet been fully established. We estimate it will take 20 years of monitoring to do this with a reasonable level of confidence. In addition, each shorebird is banded with a numbered metal band as well as color band. The metal band identifies individual birds, allowing researchers to track its progress and life span if recaptured. The color bands allow for population and migration studies.

Re-sighting of color marked birds provides statistically defensible estimates of population size as well as estimates of shorebird survival. Color marking enables the monitoring of adult survival with a smaller number of marked birds than just using metal rings (which require re-capture of birds) since you can see color bands at distance through binoculars or spotting scopes. However, it does require marking a substantial number of birds for large populations and requires large numbers of birds be observed annually for color bands. Team members typically observe and count the presence or

Processing team collecting data



absence of markings on 30 to 50 thousand pairs of shorebird legs on Delaware Beaches each May through their spotting scopes.

Shoreline counts provide detailed estimates on habitat use. One of our most enjoyable assignments is to take a boat trip from Prime Hook to Woodland Beach estimating the birds along the entire length. On a calm day, the shoreline is always full of wonderful surprises such as a chance to see a tricolor heron or a bald eagle. Windy days can be wet, miserable, and sometimes leave us with a touch of motion sickness. Each trip, I am still amazed at the extent of our protected bay shoreline, but concerned that our shorebirds prefer the same small habitat sites extensively used by humans. This often places them in conflict due to disturbance from their daily feeding by those recreating at these sites.



Team members use spotting scopes to count color bands.

Progress to Date

Over the past six years, the Delaware Bay Shorebird Monitoring Team has captured and collected detailed data on over 10,000 birds. In addition, detailed records have been kept on bird population counts, horseshoe crab egg abundance in beaches, and the location and type of habitats that the birds use the most. We know more than ever about these birds and their activities during their stay in Delaware, yet still have much more to learn to effectively manage these species in balance with the other, potentially conflicting needs. Improving our understanding with long-term data is crucial to find a way to balance the needs of our watermen, the biomedical industry, and our

ecotourism industry for bird watching.

The research and monitoring efforts are beginning to shine some light on the status of Delaware Bay shorebirds that depend upon horseshoe crab eggs. Our initial data analysis is beginning to indicate that bird species like the Red Knot appear to be fattening up at a good rate while they are here. However, there is a concern in that the information shows that Red Knots that depart at weights below 180 grams are twice as likely not

to survive to the next year as those that depart weighing 180 grams or more. Unfortunately, it is still not clear why an increasing number of birds in recent years are departing at the lower weight. The problem may be related to a lack of food on

Delaware Bay beaches, by problems in the flyway further south that are delaying the arrival of the birds, or a combination of these and other factors. As a result, conservative management actions are being recommended that range from further reductions in horseshoe crab harvests or the delay of harvesting until after the birds depart, to a complete moratorium on the harvesting of horseshoe crabs.

Other data gives us guidance on key issues like habitat use. We now know with confidence that the birds do not use areas along the shoreline evenly. For example, the Red Knot ranges for 48 miles of the Delaware Coastline from Woodland Beach to Cape Henlopen. However, over 90% of this species observed are consistently using very



Processing team members work through the night

select habitat sites like Mispillion Harbor, Slaughter Beach, and South Bowers Beach along an area that in total includes only about one and a quarter mile, or 2.6% of the shoreline in the habitat range. These sites are key to protect for the future of this species. Research on the characteristics of good horseshoe crab spawning beaches, and thus good shorebird habitat; indicate that factors such as coarse beach sand, moderate to steep slope, protection from the wind, and a shallow near shore bay bottom make the best habitats. This information provides hope that in the near future we will know how to create key habitat sites along the bay to actively manage the environment to help spawning crabs and foraging shorebirds. A minor expansion of activities such as our bay beach replenishment program to selected areas for habitat may

enable these coastal protection practices to be used to create needed habitat in new areas more protected from human disturbance.

Debate still rages among scientists and the public on the population levels of these shorebirds, the Red Knot in particular. At present, the data appears to indicate that there has been a significant decline from the 1980's population estimate prepared by Brian Harrington of Manomet Observatory for Conservation Sciences. The decline is described as being in the range of 30% to 80% of the hemispheric population. Regardless of the unresolved level of the decline, the best estimates showing the lowest decline are deeply troubling for all concerned about the future of Delaware Bay's living resources.

The United States Fish and Wildlife Service is currently directing a scientific peer review of the existing data for a truly objective look at the data collected on these shorebirds and promises to help guide us through the maze of conflicting information that has been presented about their status. It should give us a solid grounding for science based management while guiding us about how to strengthen our monitoring program. Both are extremely important to the long-term

Mist Netting can get muddy





Processing team banding bird

conservation of the species while minimizing hardship to other groups that, like our shorebirds, depend upon horseshoe crabs.

Delaware Bay Shorebird Conservation – Our Unfinished Agenda

Despite our progress, we have far more work in the years to come. In addition to continuing the long-term monitoring, we must now use it to guide us through the challenges of meeting the multiple needs of the shorebirds, watermen, the biomedical industry, and bird watchers. A sound monitoring plan, guided by professional scientists and made possible by the indispensable manpower of unpaid volunteers is now in place. With each passing year, we will be provided with better science to guide our management efforts. These management efforts must be rooted in conservation science. Improved science is our best hope to find common ground for making management decisions regarding

shorebird conservation.

We must also recognize that broad management efforts will be needed that balance regulation, habitat management and restoration, and changes in human behavior. Effective long-term conservation of horseshoe crabs and shorebirds will require the contribution and sacrifice of many, and must be done in a fair and equitable manner to ensure long-term success.

Make no mistake, the conservation of horseshoe crabs and shorebirds has a cost. Our watermen are realizing the sacrifices made in a once

lucrative fishery, and may face more. The biomedical industry may need to re-invest in the horseshoe crab species with fiscal support of conservation. Our bird watchers must learn to reduce the bird disturbance, which can have profound negative impacts on shorebirds, as they strive to get close enough for a really good look. Our naturalist and environmental community may need to consider fiscal support for these conservation efforts through larger non-game wildlife tax check-off contributions, donations, or

Relaxing on the boat ride to the next catch





Using a spotting scope to observe shorebirds

flock of about 9,000 Red Knot. They were far more vocal than the previous evening. As the sun sets, the calls increased until birds began to take flight. They circled higher and higher with more birds joining in an upward spiraling flight as if those on the beach were answering the call to come along from those flying above. In a few moments, which seemed like eternity, the beach had all but cleared and the entire flock spiraled up and out of sight in the dim light. I realized that the amazing spectacle that occurs each year on Delaware Bay was even more amazing for a select few like me who have been lucky enough to observe this synchronized migratory departure.

perhaps by lobbying for legislation that requires a watchable wildlife stamp to be permitted to observe this natural spectacle on State lands to support conservation of horseshoe crabs and shorebirds. We must all prepare to share the conservation cost for these species.

I now think back to 1995, the last time I took a leisurely excursion to enjoy this amazing shorebird spectacle that occurs on Delaware Bay. I ran my small Jon Boat down the St. Jones River, out along the bayshore past Bowers Beach, and finally dropped anchor near Brockenbridge Gut. As I sat quietly on this unusually calm evening, I watch two watermen check a drift net while listening to the chorus of migratory calls from a

As I now ponder decisions on recommendations for shorebird conservation each year, I suppose one of my greatest desires is that in a few generations, some waterman harvesting horseshoe crabs for bait or the biomedical industry, a birdwatcher, or a young biologist will be out along the bay and experience the euphoria of seeing such an amazing natural occurrence as a synchronized migratory departure of shorebirds. If that occurs, we will have effectively used science to overcome our emotions, generated the political will to take action and shared the very real cost of conservation. What better reason to devote each May of my life to the monitoring of Delaware Bay Shorebirds?

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