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Horseshoe Crab

Life History

Horseshoe crabs (*Limulus polyphemus*) are a marine arthropod found along the Atlantic coast from northern Maine to the Yucatan Peninsula and the Gulf of Mexico. The Delaware Bay supports the largest spawning population in the world. Adults either remain in estuaries or migrate to the continental shelf during the winter months. Migrations resume in the spring when the horseshoe crabs move to beach areas to spawn. Juveniles hatch from the beach environment and spend the first two years in nearshore areas.

Spawning usually coincides with the high tide during the full and new moon. Breeding activity is consistently higher during the full moon than the new moon and is also greater during the night. Adults prefer sandy beach areas within bays and coves that are protected from surf. Eggs are laid in clusters or nest sites along the beach with females laying approximately 90,000 eggs per year in different egg clusters.

The eggs play an important ecological role in the food web for migrating shorebirds. The Delaware Bay Estuary is the largest staging area for shorebirds in the Atlantic Flyway. An estimated 425,000 to one million migratory shorebirds converge on the Delaware Bay to feed and rebuild energy reserves prior to completing their northward migration.

Commercial & Recreational Fisheries

Horseshoe crabs provide the backdrop for one of the most interesting marine resource management issues along the Atlantic coast. In addition to their role as a food source for birds, horseshoe crabs provide bait for commercial American eel and conch fisheries along the coast. Their unique blood is also used by the biomedical industry to produce Limulus Amoebocyte Lysate (LAL). The challenge of fisheries managers is to ensure that horseshoe crabs are managed to meet all these diverse needs, while conserving the resource for future generations.

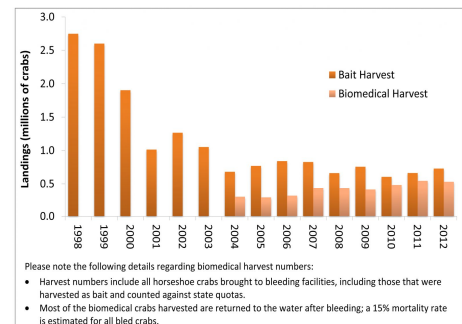
From the 1850s to the 1920s, between 1.5 and two million horseshoe crabs were harvested annually for fertilizer and livestock feed. Harvest dropped throughout the 1950s and ceased in the 1960s. Between 1970 and 1990, reported commercial harvest ranged from less than 20,000 pounds to greater than two million pounds annually. Since the mid- to late 1990s, commercial harvest has been sold primarily as bait for the American eel and whelk pot fisheries. Increased need for bait in the whelk fishery likely caused an increase in horseshoe crab harvest in the 1990s, with a peak of nearly six million pounds in 1997. Reported coastwide bait landings in 2012 remained well below the coastwide quota at 729,100 crabs.

Commercial fishermen have adopted new gear such as bait bags and cups allowing them to effectively catch eel and conch while using as little as a tenth of the bait. The majority of horseshoe crab harvest comes from the Delaware Bay Region, followed by the New York, New England, and Southeast Regions. Trawls, hand harvests, and dredges make up the bulk of commercial horseshoe crab bait landings. Discard mortality occurs in various dredge fisheries and may vary seasonally with temperature, impacting both mature and immature horseshoe crabs; however, the actual rate of discard mortality is unknown.

Horseshoe crabs are also collected by the biomedical industry to support the production of LAL (short for Limulus amoebocyte lysate), a clotting agent that aids in the detection of human pathogens in patients, drugs, and intravenous devices. No other procedure has the same accuracy as the LAL test. Blood from the horseshoe crab is obtained by collecting adults, extracting a portion of their blood, and releasing them alive. Since 2004 when reporting began, biomedical use has increased with an estimated 611,800 crabs captured in 2012. As required by the FMP, bled crabs are returned to the water from where they were harvested except in some states where bled crabs are sold to the bait industry to minimize the impact on the population. The Board is working with the biomedical industry to find ways to incorporate biomedical data into a regional stock assessment.

Stock Status

Little is known about the status of the horseshoe crab population. Limited time-series of horseshoe crab population data make it difficult to assess its status. However, the 2013 stock assessment update indicates horseshoe crab abundance has increased



Coastwide Horseshoe Crab Bait Landings & Biomedical Harvest. Source: ASMFC State Reports, 2012



2013 stock assessment update indicates horseshoe crab abundance has increased in the Southeast (North Carolina through Florida) and remains stable in the Delaware Bay region (New Jersey through coastal Virginia). The New York and New England regions continue to see a decrease in abundance. These continued declines are being investigated by the Stock Assessment Subcommittee.

Atlantic Coastal Management

Horseshoe crabs are managed under the Interstate Fishery Management Plan for Horseshoe Crab (December 1998). In 2000 under Addendum I, the Commission established state-by-state quotas in all Atlantic states for crabs harvested for bait. In 2006, in response to decreasing migratory shorebird populations Addendum IV was approved. This enabled the Commission to reduce quotas in New Jersey and Delaware and added additional protection in Maryland and Virginia to increase horseshoe crab and egg abundance in and around Delaware Bay. These measures were in place from 2006 - 2012.

2013 marked the first year the Horseshoe Crab Management Board used the Adaptive Resource Management (ARM) Framework to set horseshoe crab harvest levels for the Delaware Bay area. The ARM Framework, established through Addendum VII, incorporates both shorebird and horseshoe crab abundance levels to set optimized harvest levels for horseshoe crabs of Delaware Bay origin. For both the 2013 and 2014 fishing seasons, the Board approved a 500,000 male-only crab harvest. This total harvest is allocated among the four states that harvest horseshoe crabs from the Delaware Bay crab population (New Jersey, Delaware, Maryland, and Virginia). The allocation is based upon multiple decision options, including the proportion of horseshoe crab harvested that originate from Delaware Bay and allowance for additional male harvest by Virginia and Maryland to compensate for protecting female horseshoe crabs when the ARM harvest output includes a moratorium on female crabs. Since 2008, New Jersey has had a moratorium on horseshoe crab harvest.



A close-up view of spawning horseshoe crabs. Photo credit: Dr. Rob Robinson, British Trust for Ornithology.

Contacts

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[Management Board, David Simpson, Chair](#)
[Technical Committee, Penny Howell, Chair](#)
[Delaware Bay Ecosystem Technical Committee, Gregory Breese, Chair](#)
[HSC Advisory Panel, Dr. James Cooper, Chair](#)
[Shorebird Advisory Panel, Sarah Karpanty, Chair](#)

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[Addendum VII \(February 2012\)](#)
[Addendum VI \(August 2010\)](#)
[Addendum V \(September 2008\)](#)
[Economic Assessment of Mid-Atlantic Horseshoe Crab and Dependent Fisheries including a Qualitative Discussion of the Potential Effects of Addendum IV \(February 2008\)](#)
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[2013 Horseshoe Crab Stock Assessment Update \(Aug 2013\)](#)
[ASMFC Stock Assessment Overview for Horseshoe Crab \(Feb 2010\)](#)
[Terms of Reference & Advisory Report to the Horseshoe Crab Stock Assessment Peer Review \(Nov 2009\)](#)
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[A Framework for Adaptive Management of Horseshoe Crab Harvest in the Delaware Bay Constrained by Red Knot Conservation \(Nov 2009\)](#)
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[ASMFC Horseshoe Crab Board Sets 2014 Specifications for Horseshoe Crabs of Delaware Bay Origin \(November 2013\)](#)
[ASMFC Adaptive Resource Management Framework Important Tool in Red Knot Rebuilding \(October 2013\)](#)

[ASMFC Approves Resolution to Ban the Import and Use of Asian Horseshoe Crabs as Bait \(February 2013\)](#)
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[Horseshoe Crab and Whelk Processors & Dealers Contribute \\$10,000 to Horseshoe Crab Survey \(June 2012\)](#)
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