Horseshoe Crab:

A PROFILE

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Horseshoe crab with barnacles attached to shell, Fortescue Beach.

Matt Hencheck/NJ Div. Fish and Wildlife

Scientific Name: *Limulus polyphemus*

The Atlantic horseshoe crab, *Limulus polyphemus*, sometimes referred to as the "American horseshoe crab," is one of four worldwide horseshoe crab species that have roamed the earth for more than 445 million years, even before the dinosaurs. While "crab" is in the name, horseshoe crabs are more closely related to spiders.

Range: Atlantic coast from Maine to Gulf of Mexico; most abundant from New Jersey south to Virginia. Delaware Bay has the largest spawning population of horseshoe crabs worldwide.

Size, Maturity and Age: Size varies greatly. Females are larger than males and can reach lengths of up to 33.5 inches (including tail). Males are around half to three-quarters of a female's size. Horseshoe crabs reach sexual maturity around 10 years of age with a life expectancy of twenty years, on average. During the years before maturity, they will molt an average of 18-20 times before reaching their maximum size.

Biological Characteristics: The body has three parts: front shell/head (prosoma), back shell (opisthosoma) and a tail (telson) with small "spikes." The tail is used to flip over their body when turned upside down in the tide. Contrary to popular belief, the tail is not a defense mechanism against predators. Horseshoe crabs have several pairs of eyes, each with different degrees of light sensitivity. These crabs have no teeth; instead, they use bristles at the base of their legs to pass food to their mouth.

Food: Primarily mollusks, crustaceans and various types of worms but also algae and small animals on the ocean floor. Few predators can prey on horseshoe crabs because of their exoskeletal structure. Some species of sharks and sea turtles, as well as humans, are among these predators. While horseshoe crabs do not have many predators as adults, horseshoe crab eggs and larvae are a vital component in numerous biological food chains. These eggs and larvae provide a crucial food source for migrating shore birds, as well as for sea turtles.

Habitat: During spawning season (spring), adult horseshoe crabs congregate on sandy beaches that are not disrupted by wave action in order to mate. Females lay many egg clusters for a seasonal total that may reach 100,000 eggs. After spawning season, adults migrate to nearby estuaries or to the continental shelf. Juvenile horseshoe crabs will spend roughly the first two years of their life in nearshore areas.

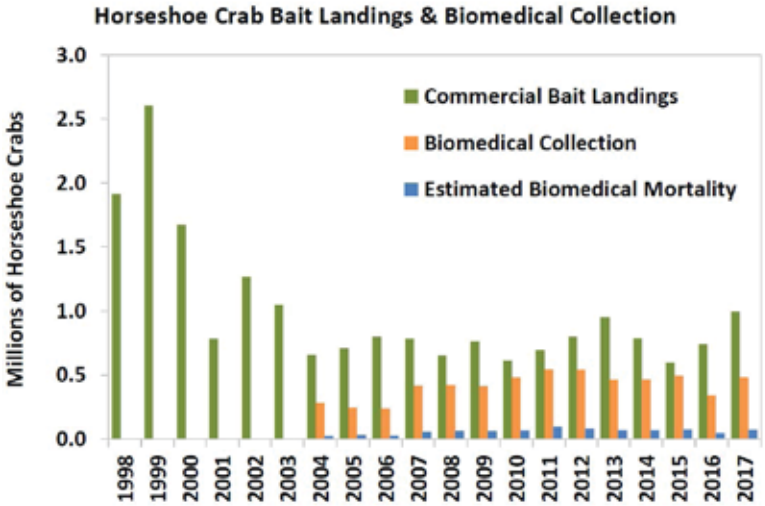
A cluster of mating horseshoe crabs during peak spawning season at Fortescue Beach.

Matt Hencheck/NJ Div. Fish and Wildlife

Habitat Importance: Beach development and shoreline erosion, both natural and man-made, are growing threats to future populations of horseshoe crabs. The limited number of suitable beaches for spawning make horseshoe crabs a vulnerable species. Without adequate beaches for egg-laying, both the horseshoe crab — and the shorebirds that rely on the eggs to fuel their long migration flight — are at an extreme risk.

History and Management: Historically, horseshoe crabs were very popular in the bait industry for American eel and whelk fishermen. In the 1990s, a severe decline in the horseshoe crab population resulted from consistent high harvests by the commercial fishing industry. To curtail the rapid population decline, New Jersey implemented a moratorium prohibiting horseshoe crab bait harvest in New Jersey waters. While some states along the Atlantic coast still have a limited bait fishery, there are widespread efforts to reduce horseshoe crab losses because of their ecological importance.

Medicinal Purpose: Horseshoe crabs are highly important to the biomedical industry for a blood extract known as *Limulus* amebocyte lysate (LAL), used to detect endotoxins such as *E. Coli* and *Salmonella* in medicines and medical devices. Although a synthetic alternative is commercially available, the



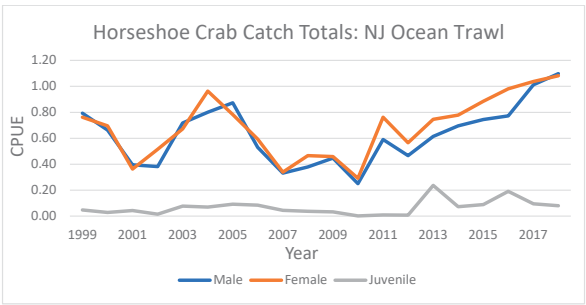
Biomedical Graph Source Document: http://www.asmfc.org/uploads/file/5ccae597HSC_StockAssessmentOverview2019.pdf

pharmaceutical and medical device industries have been reluctant to make that switch given the serious health risks posed by a potential error in identifying the endotoxin contamination. Bleeding horseshoe crabs is a highly specialized practice requiring a scientific collecting permit in New Jersey. While there is some mortality associated with extracting blood from crabs, the effect on horseshoe crab populations is negligible. A mortality rate of 15% of all bled crabs was used in the most recent coastwide stock assessment conducted by the Atlantic States Marine Fisheries Commission.

Current Research:

Author Samantha MacQuesten counts the number of male and female horseshoe crabs within a quadrat at Fortescue Beach.

- Several companies are attempting to create a synthetic bait product as effective as horseshoe crabs. If a lower cost product is successful, harvesting crabs would be unnecessary, positively impacting the commercial bait industry and horseshoe crab conservation efforts.
- To estimate the spawning population in the Delaware Bay, a survey was created in 1990. Each year in May and June, different entities from New Jersey and Delaware volunteer to survey the spawning beaches in each state. Due to the ever-changing landscape of the spawning beaches and their accessibility by both crabs and humans, the number of surveyed beaches changes each year. The 2019 survey covered 29 beaches. To perform the survey, volunteers use quadrats that measure one square meter with randomized sampling numbers and walk the beach counting the number of female and male horseshoe crabs that fall into each sampled quadrat. The same beaches are surveyed during the full and new moon cycles of the peak spawning period (May and June) at high tide. These data give scientists a representative number of spawning crabs for the entire season.
- Additional data to estimate the horseshoe crab population in the Delaware Bay region comes from the New Jersey Division of Fish and Wildlife's Ocean Trawl Survey. (See graph below.) While variability exists among the survey years, common trends are evident. The survey indicates varying trends in population fluctuations. Of interest is that populations of both males and females appear to be continuously increasing over the last five years.



Horseshoe crabs have been around for millions of years, yet humans are the biggest contemporary obstacle they have faced. It is highly important that we continue to protect this vital species by preventing overfishing and by protecting the beaches essential to their reproduction.

Sources:

- *http://www.asmfc.org/species/horseshoe-crab*
- *https://myfwc.com/research/saltwater/crustaceans/horseshoe-crabs/facts/*
- *https://www.vims.edu/research/departments/fisheries/programs/multispecies_fisheries_research/species_data/horseshoe_crab/index.php*
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