

# HORSESHOE CRAB

*Limulus polyphemus*



## Life History and Habitat Needs

### Geographic Range

Horseshoe crabs range from Maine to the Gulf of Mexico, but are most abundant from New Jersey to Virginia with their center of abundance around Delaware Bay.

### Movement/Migration

Adults migrate inshore to intertidal sandy beaches to spawn in the spring. In the fall, adults move to deep bay waters or migrate to the Atlantic continental shelf to overwinter.

### Spawning

Spawning activity can be highly variable between areas. Generally, spawning occurs on protected sandy beaches from March through July, with peak activity occurring after sunset on new and full moon high tides in May and June. But in some areas, including New England, spawning activity appears to be less associated with moon phase and time of day, and more closely associated with temperature. Delaware Bay has the largest concentration of spawning horseshoe crabs.

### Habitat Use

The horseshoe crab is a benthic or bottom-dwelling arthropod that utilizes both estuarine and continental shelf habitats. This prehistoric species plays an important role in marine coastal environments by producing eggs that serve as a vital source of protein for migratory shorebirds. For example, the red knot doubles its body weight on a diet of horseshoe crab eggs prior to a non-stop migration to its Arctic nesting grounds.

Perhaps the most important stage of a horseshoe crab's life, ecologically, is spawning. Adults prefer sandy beach areas within bays and coves that are protected from wave energy. Spawning occurs multiple times per season based on a lunar cycle, and habitat varies throughout the range. From Massachusetts to Delaware, spawning beaches are typically coarse-grained and well-drained as opposed to Florida beaches, which are typically fine-grained and poorly drained. Optimal spawning beaches may be a limiting reproductive factor for horseshoe crabs because mature adults typically select beaches based on geochemical criteria. Egg development is dependent on temperature, moisture, and oxygen content of the nest environment.

The shoal water and shallow water areas of bays (e.g., Delaware Bay and Chesapeake Bay) are important nursery areas. Juveniles usually spend their first two years on intertidal sand flats in water where salinity is greater than 5. Older juveniles move out of intertidal areas to a few miles offshore until the maturity process begins around age 9 – 11 years.

Although horseshoe crabs have been taken at depths greater than 200 m, adults are most commonly found at depths less than 30 m. During the spawning season, adults typically inhabit bay areas adjacent to spawning beaches and feed on bivalves. In the fall, adults may remain in bays and sounds or migrate to the Atlantic Ocean to overwinter on the continental shelf. Deep water areas are used by larger juveniles and adults to forage for food.

## Threats to Habitat

- Coastal erosion
- Human development (particularly shoreline stabilization structures such as bulkheads, groins, seawalls and revetments)
- Sea level rise/land subsidence
- Channel dredging
- Contaminants such as mosquito larvicides applied in coastal marshes
- Oil spills in spawning areas
- Excess nitrogen

## ASMFC Fish Habitats of Concern

Nearshore, shallow water intertidal flats are important habitats for juvenile development. Beach areas that provide spawning habitat are important areas for adult horseshoe crabs. The spawning beaches within Delaware Bay are critical because they support the highest density of spawning horseshoe crabs. Prime spawning beaches within the Delaware Bay consist of sand beaches between Maurice River and the Cape May Canal in New Jersey, and between Bowers Beach and Lewes in Delaware.

Prime spawning habitat is widely distributed throughout Maryland's Chesapeake and coastal bays, including tributaries. In the Chesapeake Bay, spawning habitat generally extends to the mouth of the Chester River, but can occur farther north during years of above normal salinity levels. The distribution of high quality spawning beaches, which are exposed to only minimal human disturbance, also presents a potential bottleneck to reproductive success for this species.

## Recommendations to Improve Habitat Quality

- Identify spawning and nursery habitat and include it in all states' ASMFC annual reports. Categorize and prioritize important horseshoe crab habitat (both spawning and nursery habitat) within areas of state jurisdiction.
- Ensure that spawning and nursery habitat is conserved, and the quality and productivity is maintained.
- Consider obtaining land adjacent to critical spawning beaches through acquisition, deed restrictions, or conservation easements to ensure the long-term protection of these beaches.
- Reduce human disturbance such as beach grooming and nourishment, all-terrain vehicles and beach watercraft on spawning beaches during the spawning season.

## Habitat Research Needs

- Identify juvenile horseshoe crab habitat throughout range and document extent of use.
- Improve assessment of the long-term benefits and potential adverse impacts of beach nourishment projects on horseshoe crab spawning success.
- Determine beach fidelity by adult horseshoe crabs to determine habitat use throughout their range.

## Additional Information

Horseshoe crabs are managed under the Interstate Fishery Management Plan for Horseshoe Crab (1998), and under Addenda I (2000) through VII (2012), which can be found on the ASMFC website at [www.asmfc.org](http://www.asmfc.org) or by contacting the ASMFC Habitat Program Coordinator at 703.842.0740. 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. A benchmark stock assessment is scheduled to be conducted in 2018.

