Horseshoe Crab (*Limulus polyphemus*) Fact Sheet

1. **Introduction.**

Horseshoe crabs (HSC) are really not a crab at all; their closest living relatives are spiders and scorpions. Fossil HSC from 245 million years ago look essentially the same as those living today, hence the nickname “living fossil”. Currently there are four species worldwide, three in East Asia, and one on the east coast of North America. The North American population, *Limulus polyphemus*, ranges from the Yucatan Peninsula to Maine, and are most abundant between Virginia and New Jersey.

HSC can live in a broad range of habitats, but have a crucial need for contiguous habitats for breeding, nursery area, first year staging, and nearby adult foraging. Spawning beaches are potentially the most limiting habitat. HSC generally spawn on sandy beaches protected from waves. In the mid-Atlantic, spawning occurs in the spring – particularly May and June. They spawn near the high tide line and activity is the highest around the new and full moons. The largest of all the major spawning populations is centered on Delaware Bay.

HSC dig into the sediment for their food of clams and worms. They prefer bivalves, particularly soft shelled clams. HSC themselves are most vulnerable to predation during early life stages - eggs and larva. Wave action and the digging action of spawning horseshoe crabs bring eggs to the surface where they are eaten by birds. Eggs and larva are also eaten by crustaceans and fish. Adults have few predators, though sea turtles and sharks have been known to feed on them.

As mentioned above, HSC eggs are utilized as a food source for a variety of bird species, in particular migrating shore birds. Delaware Bay is one of the four most important staging areas in North America for migrating shorebirds. Research indicates that the red knot, a shore bird, feeds predominantly on HSC eggs in Delaware Bay during its migration from wintering areas in Tierra Del Fuego, Chile to reproductive areas in the Canadian Arctic. Delaware Bay is a vital link in its north bound migration in the spring, and is used by a large portion of the population as a feeding stop over.

HSC are harvested commercially primarily for use as bait in pot fisheries for whelks and eels, artificial alternatives are still experimental. Small numbers are also used for biomedical purposes.

2. **Management overview**

Horseshoe crabs are managed coastwide through the Atlantic States Marine Fisheries Commission (ASMFC). Due to concerns about increasing exploitation of HSC and apparent declines in shorebird abundance, ASMFC developed a Horseshoe Crab Fishery Management Plan (FMP) in 1998. The FMP specifically calls for management for the continued use of HSC for current and future generations of the fishing and non-fishing public, migrating shorebirds, and other dependent wildlife. This is one of the few management plans that take an ecosystem approach. The FMP instituted state-specific harvest quotas in 2000, based on a 25% reduction of reference-period landings.

A stock assessment conducted in 2004, found that the coastwide population was subdivided into regional/local populations that showed different abundance trends. Indices for western Long Island showed no or increasing trends. Indices for eastern Long Island showed no trends for the time series, but decreasing trends since the early to mid-1990's. Indices for DE Bay showed significant declines. Due to the decline in the DE Bay HSC stock and continued declines of red knots, ASMFC developed Addendum III in 2004. This addendum put additional restrictions on the harvest of the Delaware Bay population, including 150,000 crab quota for DE and NJ. NY voluntarily reduced its horseshoe crab quota in 2004 from the ASMFC authorized cap of 366,272 to 150,000 crabs.

The 2006 assessment focused on the Delaware Bay population and determined that current fishing mortality appeared to be above the threshold. The USFWS conducted a status review of red knots and listed them as species of special concern in 2006. Due to increasing concerns about the declining population of red knots, ASMFC developed Addendum IV. This addendum further restricts DE bay states quota and open seasons. NJ decided to be more conservative and instituted a multi-year moratorium on commercial harvest in 2006. DE also imposed a moratorium. A lawsuit overturned DE’s moratorium.
The 2008 HSC status review determined the Delaware Bay population to be increasing and healthy. These analyses were not conducted for other areas.

   a. harvest limits

   New York’s ASMFC harvest quota is 366,272 crabs. New York voluntarily reduced its annual horseshoe crab quota to 150,000 crabs in 2004 in response to declines of red knots. The voluntary quota of 150,000 crabs remained in place through 2007. In 2008 NY increased the voluntary quota to 170,000 crabs, and then decreased it again to 150,000 crabs in 2009.

   The quota is broken up into 4 seasons each allocated a specific portion of the annual quota. Daily harvest limits are established for each season with thresholds established to determine when to decrease the daily limit. These were established to extend the open season and help ensure the quota is not exceeded.

   The voluntary quota was exceeded during 2005, 2006, and particularly in 2007. Due to the large overage in 2007, the daily trip limits in the spring were cut by more than half. This management change resulted in a decrease in the rate of harvest and ability to effectively manage the quota. The 2008 harvest remained below the voluntary quota.

   b. NYS harvest area closures

   NY adopted closed area regulations in 2006. These regulations allow the Department to closed areas to commercial harvest of HSC if: 1 - the area receives significant documented use by spawning HSC and shorebirds or; 2 - the area is managed by a local, state, or federal agency or governing body as a Public Recreation Area and the group requests the Department to close the area. Currently there are three closed areas, all requested by local or federal agencies: West Meadow Beach, Stony Brook; Fire Island National Seashore, Cedar Beach Park, Mt. Sinai.

   c. impact of harvest restrictions/closures in other areas

   HSC are important bait for the eel and whelk fisheries on Long Island. The restrictions on harvest on the DE population have resulted in coast wide decrease in availability of HSC, which has increased their market value substantially. DEC is concerned about increased fishing pressure and illegal fishing. During both 2005 and 2006, NY’s commercial bait fishery harvested approximately 50% of the quota in two weeks. The fishery was closed in July in both years. This impacted fishers who depend on the fall fishery. The increased restrictions on HSC harvest has impacted Long Island’s inshore baymen who rely on the harvest of a number of inshore species to make a living.

   d. abundance monitoring

   The Department utilizes a variety of information to monitor the population status of HSC in NY waters. Several long term monitoring programs consistently capture HSC and can be used to track relative abundance. These include the western Long Island seine survey, Peconic Bay trawl survey, and Ocean Surf Clam survey. In addition, Virginia Tech runs a trawl survey focused on HSC that samples NY waters as funding permits. The western Long Island and Peconic Bay surveys, which were analyzed in the 2004 assessment, show essentially the same results as 2004 (reported above in section 2).

   The Department in coordination with Cornell Cooperative Extension has initiated a HSC spawning survey in 2005 modeled on the DE Bay spawning survey. We plan on using this survey to help monitor and manage HSC in the future. We also will be investigating horseshoe crab – shorebird interactions in one embayment on the South Fork.

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