

2016 Horseshoe Crab Survey Annual Report for Delaware's Inland Bays

The Atlantic Horseshoe Crab (*Limulus polyphemus*) is one of four living species of horseshoe crabs and the only one found along the Atlantic coast of North America. Important for shorebirds, the medical industry, and American Eel and conch fisheries, this 'living fossil' is economically and ecologically valuable, though little is known about their local population. Since 2008, the Delaware Center for the Inland Bays has conducted annual citizen science surveys at which volunteers count the crabs that come ashore to lay eggs, collecting data that helps estimate population size. In 2016, over 185 different volunteers spent 708 hours gathering data on the horseshoe crabs in the Inland Bays. **For more information on this survey, visit inlandbays.org.**

Why do horseshoe crabs matter?

- Horseshoe crab eggs feed fish like Striped Bass, Weak fish, Summer Flounder, and Winter Flounder, and serve as a critical source of calories and nutrition for over 11 species of migrating shorebirds, including Red Knots, Ruddy Turnstones, Semipalmated Sandpipers, Sanderlings, and Dunlins.
- Horseshoe crabs save lives! An extract from their blood called limulus ameocyte lysate (LAL) is used to test for bacterial contamination in drugs, vaccines, and medical devices.

Why count horseshoe crabs?

- Horseshoe crabs have been overharvested. (Including over 6 million lbs harvested in 1997 alone!) Today, this species is being managed for recovery and harvest is now capped.
- Population data collected by surveys throughout the mid-Atlantic region informs recovery management plans.
- Local surveys provide data to researchers about how horseshoe crabs use the Inland Bays, and how their population size and ecology compare to those in the nearby Delaware Bay.

How are horseshoe crabs counted?

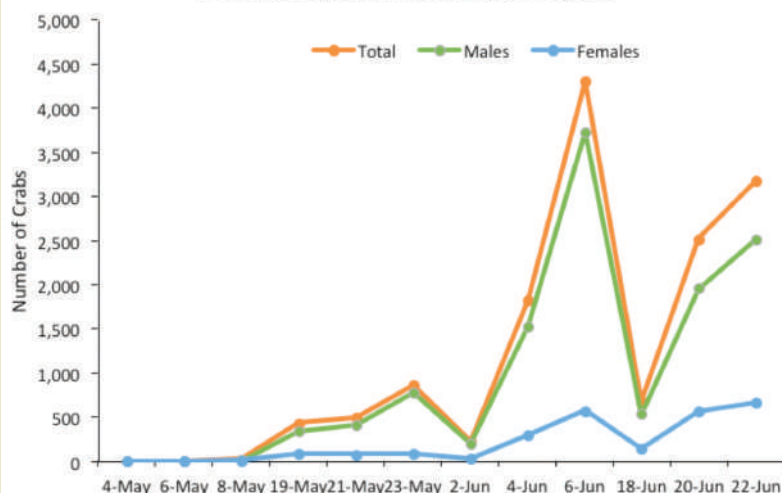
- Teams of volunteers visit their assigned beaches at the evening high tide on dates around the full and new moons in May and June.
- Moving along the beach's high tide line, volunteers measure survey spaces (using a rope and a 1-square meter "quadrat"), and count the male and female horseshoe crabs found within. This is repeated for 100 spaces per beach.
- This survey estimates the number of horseshoe crabs per length of beach, number of nesting females, and relative numbers of male and female crabs.

What can I do to help?

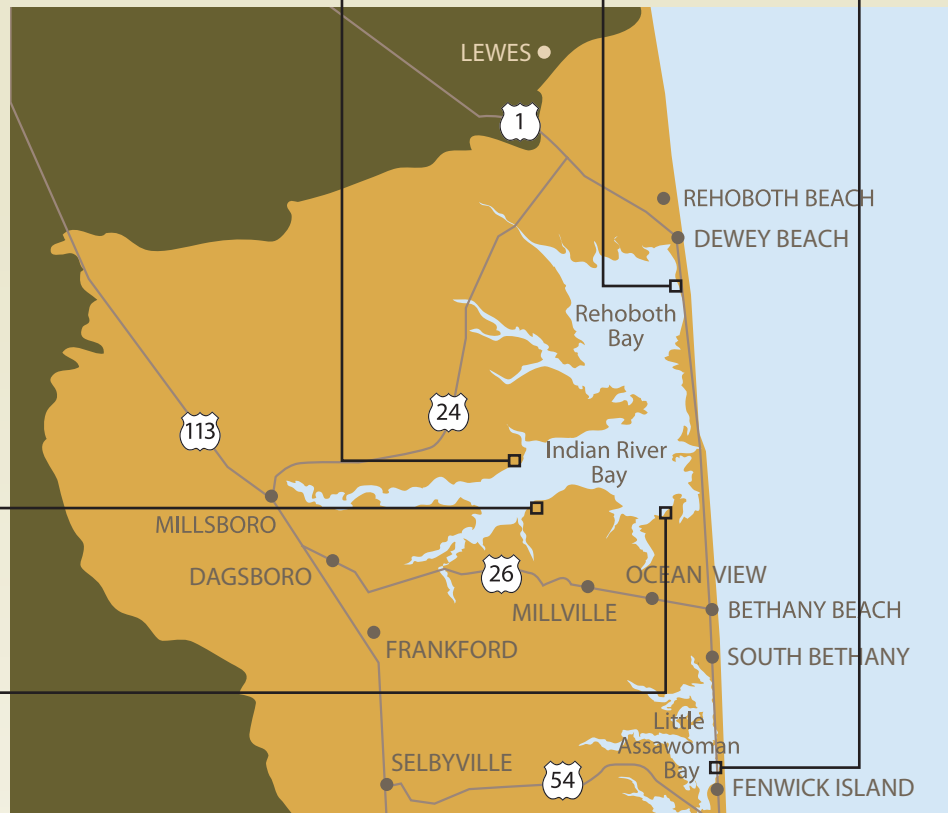
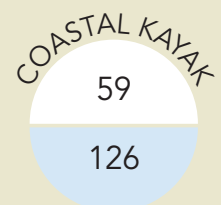
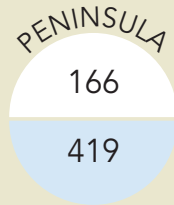
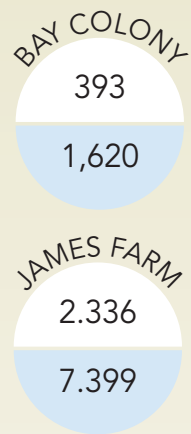
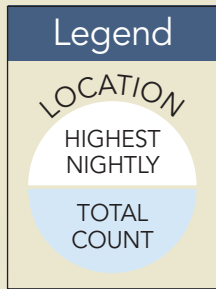
Join a survey team! If you would like to participate in the annual survey, send an email with your contact information to environment@inlandbays.org and attend the survey training meeting in Spring.

Horseshoe crabs are broadcast spawners; numerous males spawning with a single female creates a greater chance of egg fertilization. The graph above indicates that a majority of CIB survey participants counted roughly five males for each female crab.

2016 Total Horseshoe Crab Counts



2016 Crab Counts



2016 Survey Facts and Figures

- 12,028 males and 2,499 females were counted in 2016, for a total of 14,527 of individuals counted at all beaches. This information will be provided to agencies that manage the Atlantic Horseshoe Crab, and will be used to estimate the status and health of the horseshoe crab population in the Delaware region.
- The average number of male crabs for each female crab was roughly 5. This is a normal average for this study and this region.
- The peak of the spawning season in 2016, determined by the night with the greatest cumulative number of crabs across all beaches, was June 6. 4,302 crabs were counted on that night alone.
- The single greatest count for the year, at any one beach, occurred at the James Farm on June 22, when 2,336 crabs were counted. This equates to nearly 24 crabs for every square meter of shoreline at that site!
- Importantly, the past two years of this survey have shown that while Delaware Bay has an overall greater number of crabs than the Inland Bays (due to its size and amount of sandy shoreline), the density of spawning crabs in both places is roughly equal. This means that beaches in the Inland Bays are used just as intensively as those of Delaware Bay, which is recognized worldwide for its horseshoe crab spawning activity.

- While the Inland Bays were known to have a sizeable horseshoe crab population, until recently it was unclear how numbers in these coastal bays compared to Delaware Bay. The equivalent spawning densities in both areas underscores the importance of sandy shorelines in the Inland Bays, and highlights the importance of the Inland Bays to the regional population of horseshoe crabs.
- Interestingly, the Inland Bays continue to have more males for every female than neighboring estuaries such as Delaware Bay and Maryland's coastal bays. The reason for this is as yet unknown, but could represent a difference in subpopulations among the regions.
- Data collected in 2016 in the Inland Bays adds to the long-term regional dataset that helps scientists track changes over time to assess the effectiveness of the current harvest caps.



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