

Summary of Wellfleet Harbor Horseshoe Crab Data, 2000 – 2012

Mark Faherty, Science Coordinator

Mass Audubon/Wellfleet Bay Wildlife Sanctuary

The following figures summarize the results of horseshoe crab spawning surveys conducted by staff and volunteers of Wellfleet Bay Wildlife Sanctuary during two sampling periods: 2000 – 2001 and 2008 – 2012. The data collection from 2000 – 2001 was overseen by Mary-Jane James-Pirri of the University of Rhode Island and is summarized in two documents that have previously been submitted to DMF: James-Pirri (2002), and James-Pirri et al (2005). All of the data presented in this document has previously been submitted to MA DMF, and is included in the annual compliance reports to the Atlantic States Marine Fisheries Commission.

The low number of spawning crabs in Wellfleet and Cape Cod Bay relative to other embayments has been documented in the MA DMF compliance reports for several years. In the 2008 report (Leschen 2008), while the number of crabs found on spawning surveys was low state wide (“Spawning indices were low in all areas...” and “Only 12% of surveys had more than 10 females.”), Wellfleet and Cape Cod Bay indices were even lower - a fraction of those in the other embayments around the state (See Figure 7, reproduced below). This report also noted a decline in spawning crabs compared with the historical data from James-Pirri et al, saying “We have historical data from several areas from 2000-2002 (James-Pirri et al. 2005 and unpublished 2008 data). All areas except Nauset Estuary (NE) and Pleasant Bay (PB) show downward trends, although the differences are not statistically significant.” Achieving statistical significance for local trends is increasingly difficult given the current scarcity of crabs. The charts below show that the observations made by Leschen in 2008 still hold true today.

Key findings of recent horseshoe crab research in Wellfleet:

- Wellfleet and Cape Cod Bay crabs are significantly smaller and occur at a much lower density than crabs in other MA embayments (size data previously submitted to DMF).
- Though already at low densities compared to other populations, Wellfleet crabs show evidence of a continuing decline despite the harvest closures implemented in 2011.

- Commercial shellfishermen feel that the low crab density has negatively impacted the benthic community in Wellfleet Harbor to a point that affects their ability to raise shellfish.

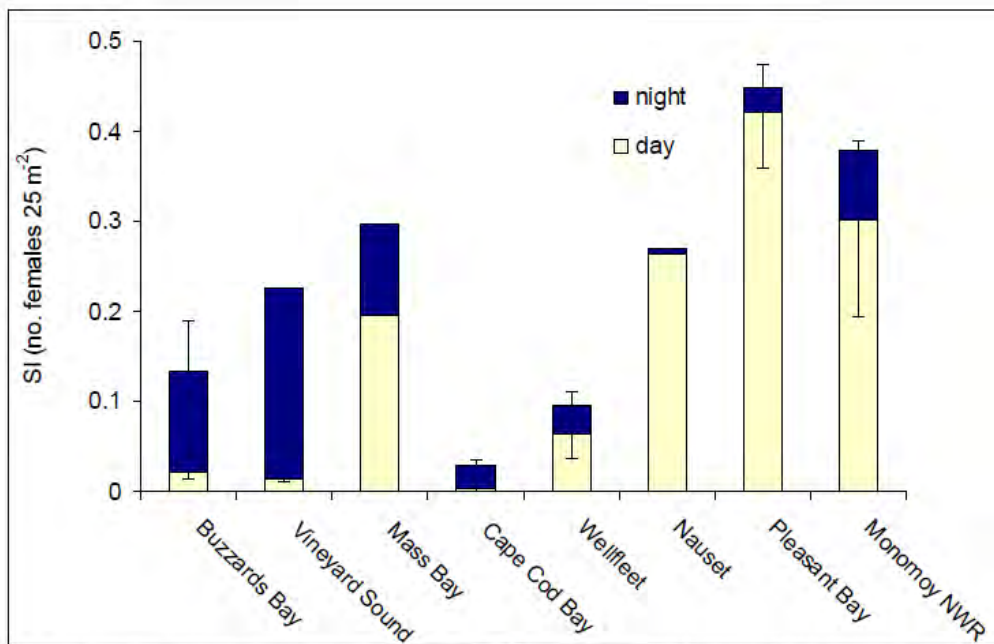


Fig. 7. Spawning index (number females per 25 m² quadrat) in MA areas. Data are combined from all beaches in each area, averaged across all moons. Upward facing error bars are SE for night; downward facing bars are SE for day. SEs cannot be calculated where only one beach in an area was surveyed in any given year.

Figure 1. Figure from Leschen (2008), copied from the original MA DMF document, showing the low number of crabs in Wellfleet and Cape Cod Bay relative to other embayments.



Figure 2. Map of the four Wellfleet Harbor survey beaches included in this report.

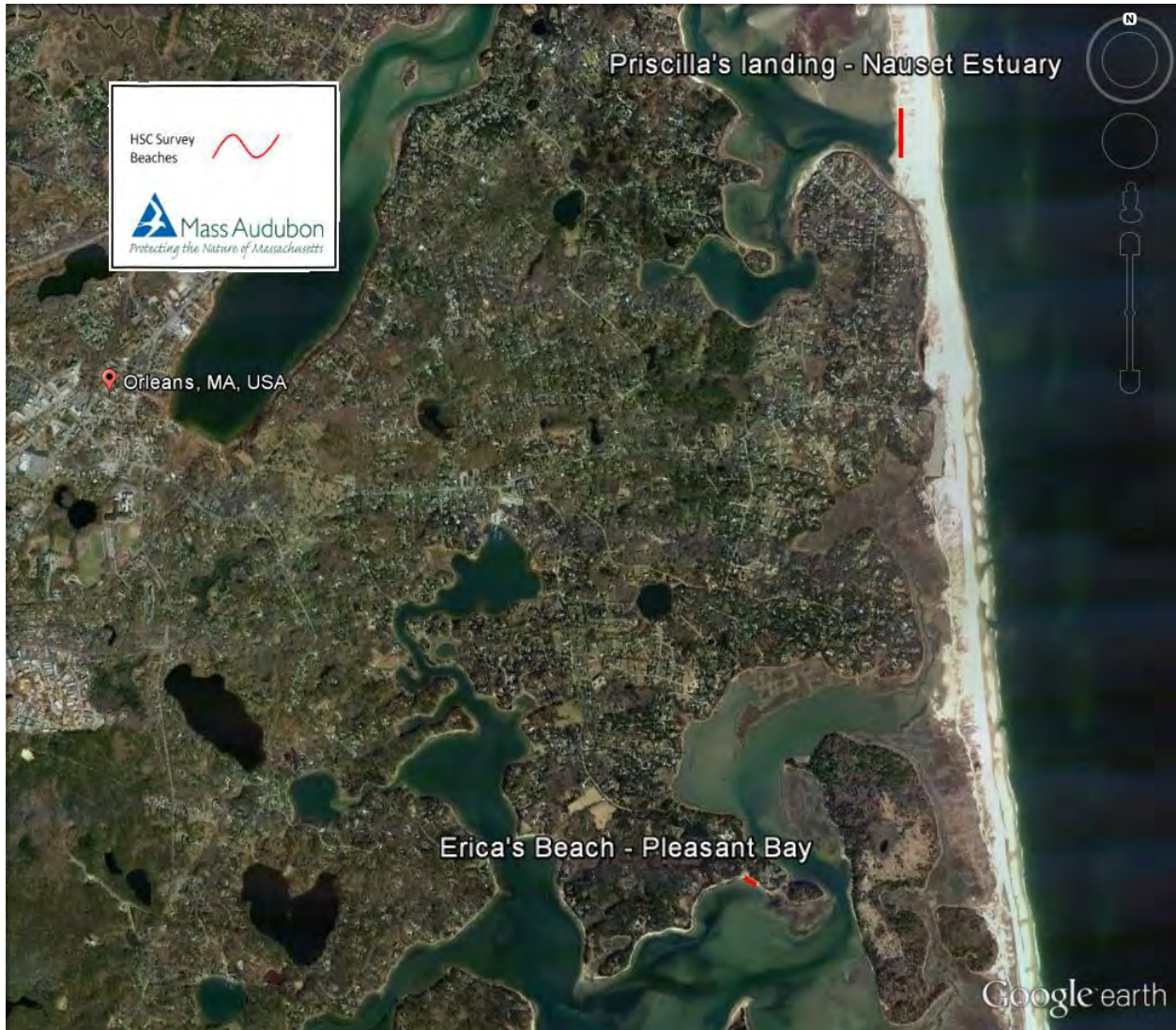


Figure 3. Map of the two other survey beaches included in this report – Priscilla’s Landing (Nauset Estuary) and Erica’s Beach (Pleasant Bay).

I. Comparison of Wellfleet Spawning Data with Other Embayments

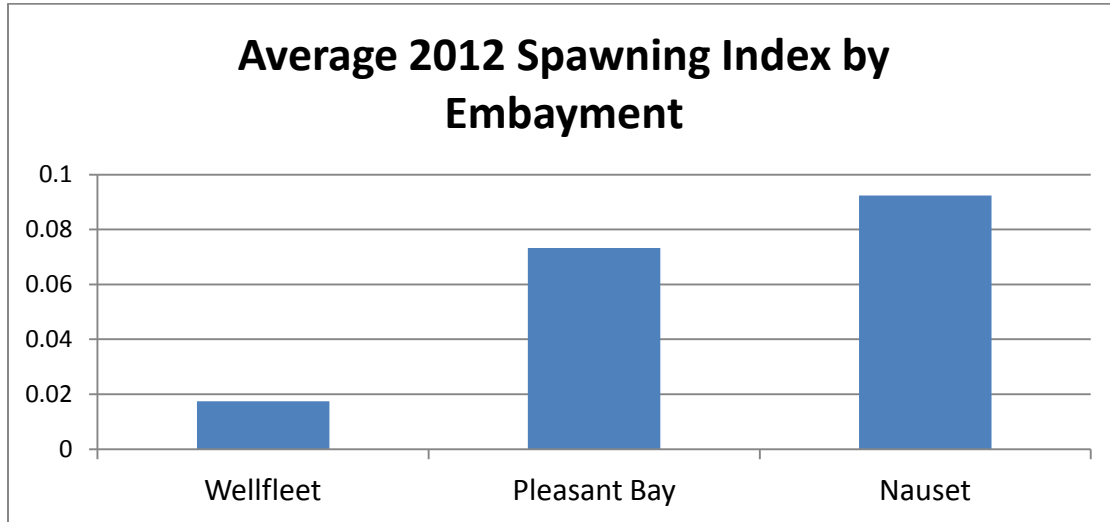


Figure 4. Average spawning index (females/25m²) in Wellfleet, Pleasant Bay and Nauset Estuary in 2012.

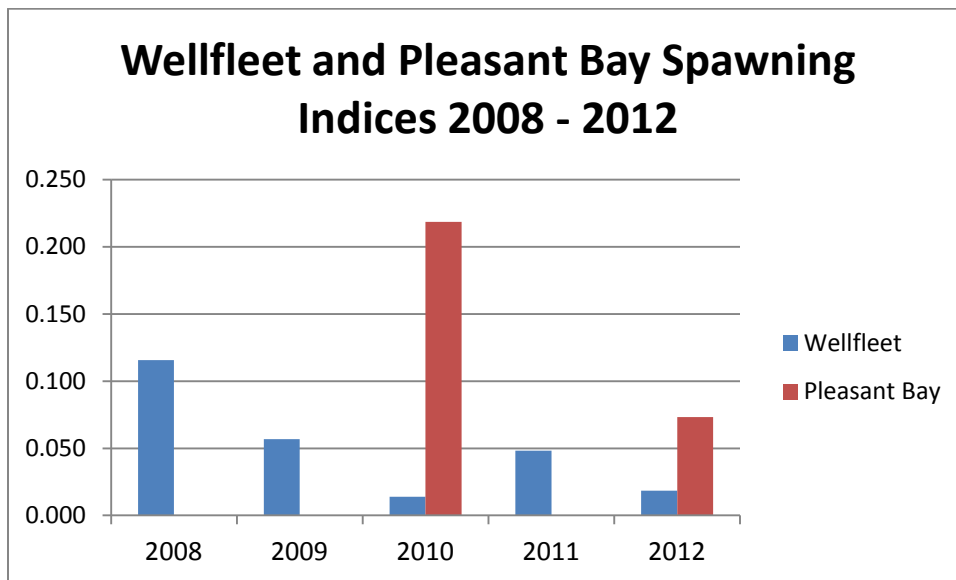


Figure 5. Comparison of spawning index (females/25m²) in Wellfleet and Pleasant Bay from 2008 - 2012. Data are not available for Pleasant Bay for every year.

II. Comparison of Wellfleet Spawning Data Across Years

A. Spawning Density (total crabs/25m²).

Since they include all crabs, including single males, these are higher than the spawning indices.

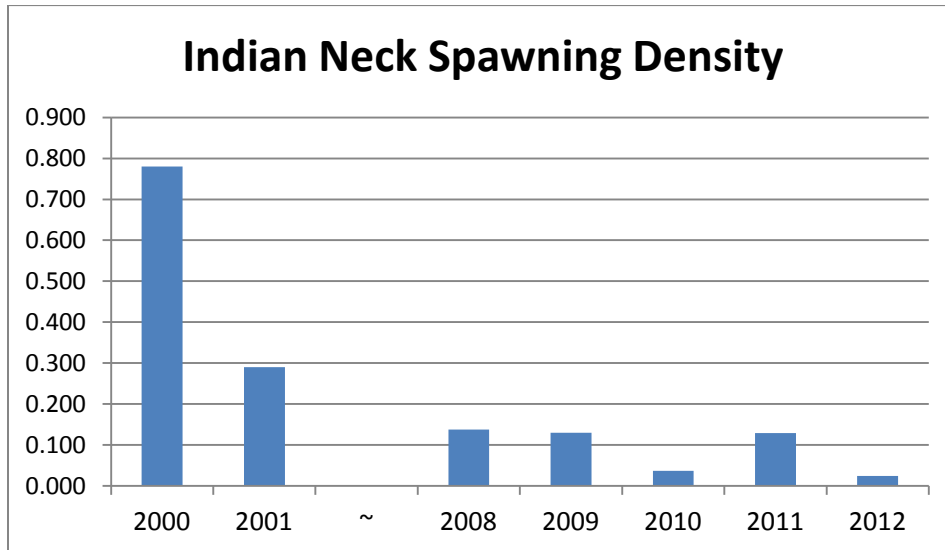


Figure 6. Spawning density (total crabs/25m²) at Indian Neck (known as Chipman's Cove in James-Pirri 2002).

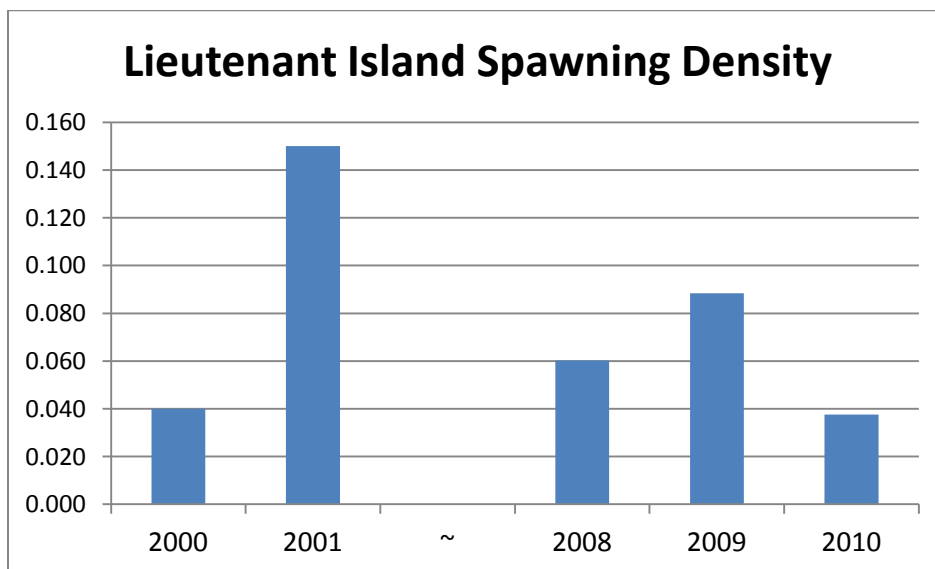


Figure 7. Spawning density (total crabs/25m²) at Lieutenant Island. No surveys were conducted in 2011 or 2012.

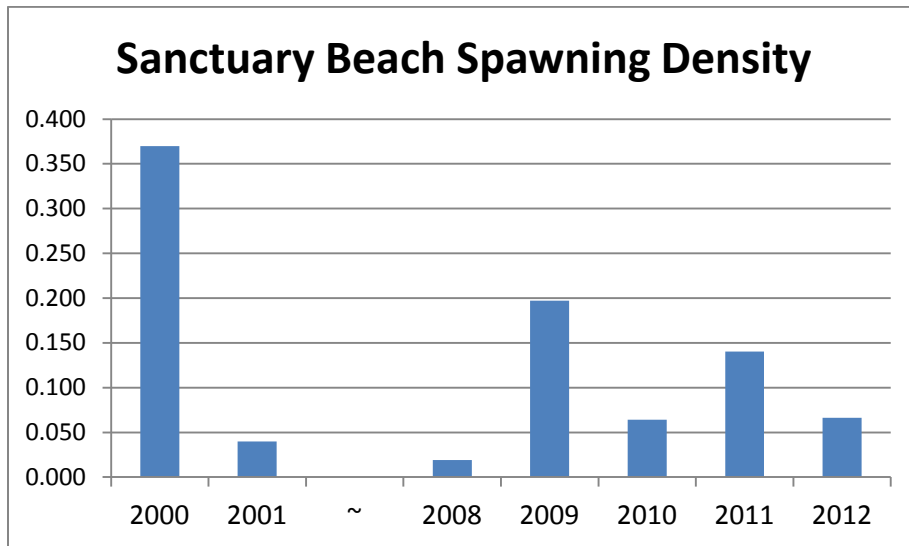


Figure 8. Spawning density (total crabs/25m²) at Wellfleet Bay Wildlife Sanctuary.

B. Spawning Indices (females/25m²)

Spawning indices show similar trends to the spawning density charts, but only include females.

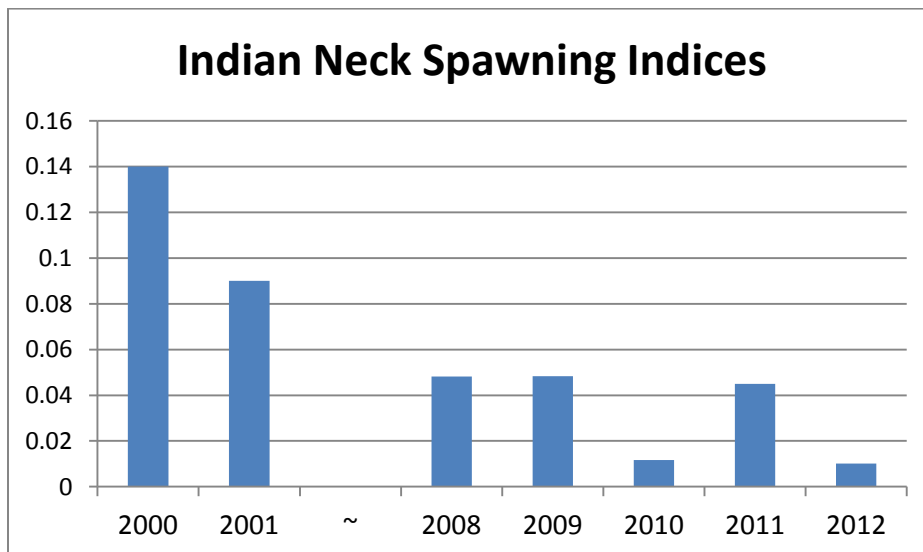


Figure 9. Spawning indices (females/25m²) at Indian Neck.

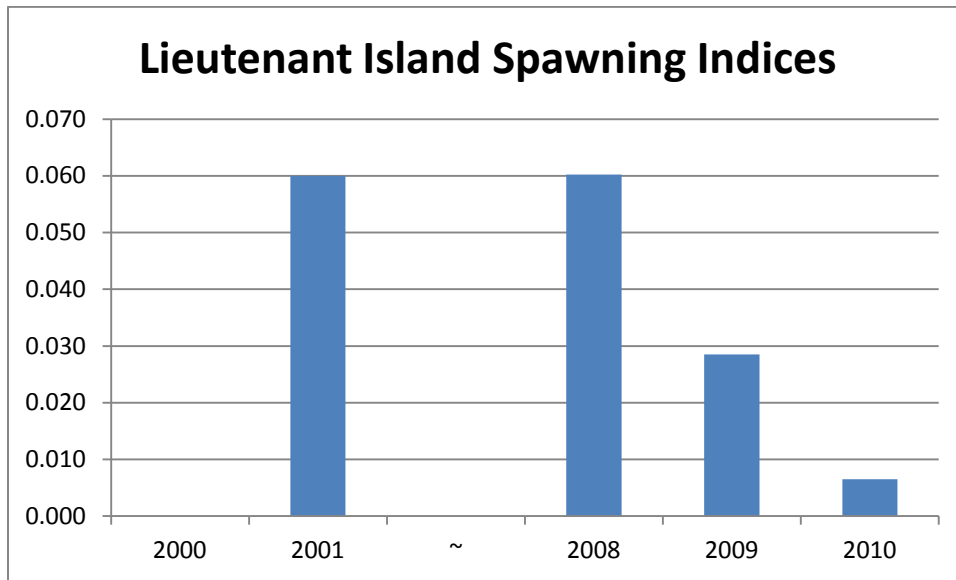


Figure 10. Spawning indices (females/25m²) at Lieutenant Island.

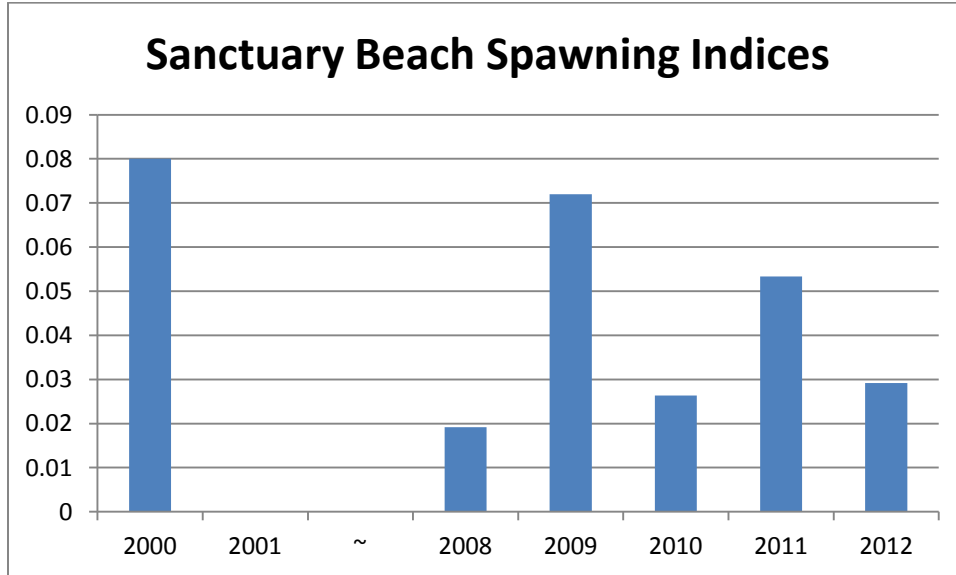


Figure 11. Spawning indices (females/25m²) at Wellfleet Bay Wildlife Sanctuary.

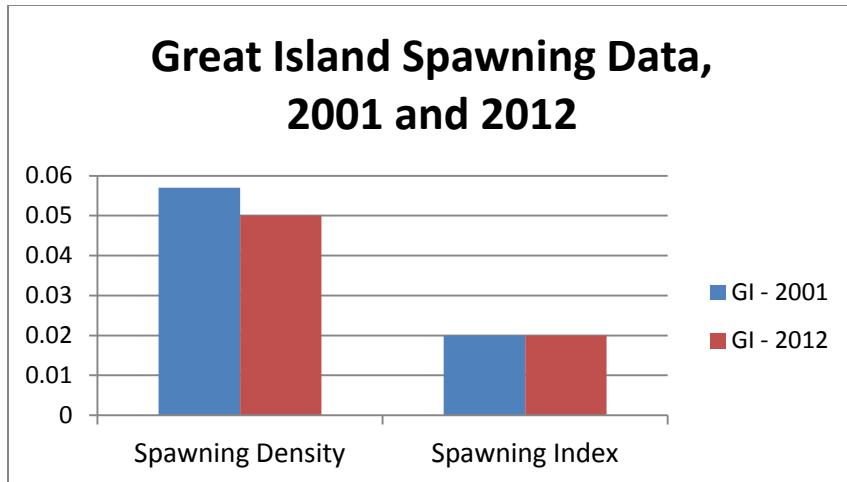


Figure 12. Spawning density and spawning indices at Great Island in the two years for which we have survey data, 2001 and 2012. Numbers of crabs were very low in 2001 and they continue to be low based on the 2012 resurvey. Since Great Island is part of the Cape Cod National Seashore, technically no harvest is allowed.

III. Day vs. Night Surveys

The above charts use only data from the daytime surveys, since night surveys were only conducted at one site in recent years – Indian Neck. The below chart shows that the number of crabs, and the resulting trends, are similar for day and night survey data.

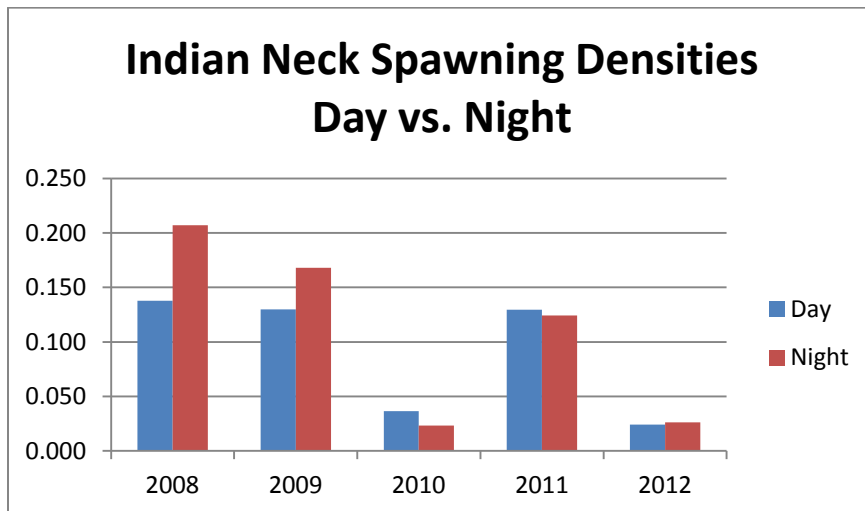


Figure 13. Spawning densities for day and night surveys at Indian Neck. Trends are similar for both survey types.

References

James-Pirri, MJ . 2002. Population Demographics and Spawning Densities of the Horseshoe Crab, *Limulus polyphemus*, within Cape Cod National Seashore, Cape Cod Bay, and Monomoy National Wildlife Refuge, Massachusetts. Final Report to National Park Service.

James-Pirri, MJ; Tuxbury K, Marino S, Koch S, 2005. Spawning densities, egg densities, size structure, and movement patterns of spawning horseshoe crabs *Limulus polyphemus* within four coastal embayments on Cape Cod, Massachusetts. *Estuaries*. 28 (2): 296–313.

Leschen, A. 2008. Massachusetts 2008 Compliance Report to the Atlantic States Marine Fisheries Commission– Horseshoe Crab. Massachusetts Division of Marine Fisheries Report.