

August 25, 2010

**Final Report for 2010
Limulus polyphemus
Horseshoe Crab Monitoring & Tagging Activity in
Raritan Bay & Sandy Hook Bay, Monmouth County, New Jersey
May & June 2010
Conducted by Volunteers with the Bayshore Regional Watershed Council**



**Report to: US Fish & Wildlife
National Park Service/Gateway National Recreation Area
NJDEP/Fish & Wildlife Division
Brookdale Community College, Environmental Science Department
American Littoral Society
M.A.S.T (Marine Academy of Science and Technology)**

Report prepared by:
Joseph Reynolds
Co-chair
Bayshore Regional Watershed Council
PO Box 541
Navesink, NJ 07752
(732) 872-2834
bayshorewatershed@comcast.net
www.bayshorewatershed.org

The full tagging database is available for downloading from the Bayshore Regional Watershed Council's web site:
http://www.bayshorewatershed.org/bw/Current%20Projects/*%20Horseshoe%20Crab%20Monitoring/

Summary

- During May & June 2010, a Raritan Bay – Sandy Hook Bay, Monmouth County, New Jersey Horseshoe Crab spawning survey was implemented by volunteers with the Bayshore Regional Watershed Council and with cooperation from Brookdale Community College, Environmental Science Department, and high school students with the Marine Academy of Science and Technology (M.A.S.T.), located at Sandy Hook. More than 30 volunteers were involved to implement this survey in an accurate manner.
- The spawning survey by the Bayshore Regional Watershed Council was the second in a five-year project conducted for the Sandy Hook Bay-Raritan Bay region of Monmouth County, New Jersey.
- Volunteers at five (5) sites throughout the region conducted monitoring and tagging activities during periods of high tide on dates that coordinated with full moon phases.
- Spawning activity was slow to start in May, but peaked markedly during early June.
- One site location out of the five had very little spawning activity throughout May & June, though historically this site (Conaskonck Point in Union Beach) had been reported by local, long-established residents as being productive Horseshoe Crab spawning locations from a period between the 1960s through the 1990s.
- Weather played an important factor during this study during May. Stormy weather cancelled monitoring activities at several locations in May.
- Males out-numbered females again this year, by a ratio of 3:1. Mating pairs of HSC were reported down this year, compared to last year, but clusters were reported higher this year, especially at Cliffwood Beach in Aberdeen Township, which continued again this year to be a hot spot for HSC spawning activity.

Background

Horseshoe crabs play a vital role ecologically along the shores of the New York – New Jersey Harbor Estuary, including Sandy Hook Bay & Raritan Bay. Migratory shorebirds depend on the eggs of horseshoe crabs to refuel on their migrations from South America to the Arctic. One bird in particular, the red knot, *Calidris canutus*, feeds primarily on horseshoe crab eggs during its stopover. That bird is under a status review for listing under the federal Endangered Species Act.

In 2009, volunteer members of the Bayshore Regional Watershed Council approved a measure to conduct a five (5) year study to monitor and tag horseshoe crab (*Limulus polyphemus*) spawning populations at five (5) sites along Sandy Hook Bay & Raritan Bay in Monmouth County, New Jersey. The goal of the study would be to obtain a better determination of the spawning population of this aquatic species, and to ascertain if the population is stable, increasing, or decreasing. In addition, by tagging horseshoe crabs, this study would help to better understand the migration patterns, abundance, and survival rates of recaptured tagged horseshoe crabs over the course of the program in the project area.

The five (5) monitoring sites along Raritan Bay & Sandy Hook Bay in Monmouth County, New Jersey include: 1) Plum Island at Sandy Hook Gateway National Recreation Area, 2) near the mouth of Many Mind Creek in the Borough of Atlantic Highlands, 3) Leonardo Beach in

Middletown Township, 4) Conaskonck Point in the Borough of Union Beach, and 5) Cliffwood Beach in Aberdeen Township.

Data was collected during full moon and new moon high tide event cycles in May and early June. Dates included: Saturday, May 9, 2009, Sunday, May 24, 2009, Sunday, June 7, 2009, and Monday, June 22, 2009.

Monitoring activities by volunteers were divided into two main actions: (1) counting spawning populations of horseshoe crabs and (2) tagging adult horseshoe crabs. Both activities took place at the same time by watershed volunteers in May & early June.

Field Methods

Field methods and activities for counting crab populations by watershed volunteers were similar to protocol described by the USGS in their volunteer information entitled, "SURVEYING HORSESHOE CRABS" (please see USGS web site:

<http://www.lsc.usgs.gov/aeb/2065/protocol.asp>). In brief, watershed volunteers first determined the tide height or water's edge during high tide using a tide stick. When the height of the tide on the tide stick remained constant for approximately 10 minutes or began to decrease, volunteers would walk 1 meter (approx 3 feet) below the water's edge to place the first meter stick for width. From this tide meter stick, a volunteer would walk one meter (approx 3 feet) from the water's edge and place a second meter stick for width. There was a total of 2 meters or approximately 6 feet for width. For length, volunteers marked out exactly 1,000 feet of beach or as close to 1,000 feet as possible on certain small, narrow beaches. Volunteers then began to walk towards one end of the beach, counting and recording on the tally sheets all horseshoe crabs within the 2 meter width transect along the entire 1,000 feet length of the survey area.

Field methods for tagging crab population were the same protocol as described by USFWS. In brief, the protocol called for volunteers to attach a circular individual numbered disc to the left posterior (rear) of the prosoma (first section of body) by drilling a 5/32" hole through the side and then pushing the plastic pin (with tag) into the hole as far as it goes. Data sheets recorded the tag number, sex, prosomal width (PW) in millimeters (widest point of the crab), the date tagged, beach name, waterbed name, and state. The watershed council received a total of 400 tags supplied by USFWS, though only 330 tags were employed this year due to poor weather conditions.

Findings

FIRST NIGHT: Results from Friday, May 14, 2010 monitoring event from 8:30pm to approx 9pm.

Weather: Lighting & Thunder Storm

Sandy Hook/Plum Island:

Total of 4 horseshoe crabs - 1 male, 1 female, and 1 pair (male & female).

Atlantic Highlands/Mouth of Many Mind Creek:

Total of 7 horseshoe crabs - 2 males, 1 female, 1 pair (male & female) and two dead crabs (1 male & 1 female).

Middletown Township/Leonardo Public Beach

Total of 15 crabs - Several of these crabs included mating pairs.

Union Beach/ Conaskonck Point

Total of 6 horseshoe crabs - 5 males, 1 female, which included one pair.

Aberdeen Township/Cliffwood Beach

Total of 59 crabs - 20 females, 39 males, 38 clusters with the largest cluster containing 4 males to one female. 1 dead male crab.

None of the beach captains reported seeing any crabs with tags on their shell from last year's event. Yet, the Cliffwood Beach people did report finding one crab that had a 3/8" diameter hole in its shell where a tag would have been inserted, but it was on the opposite side, on the right rear of the front shell. At first they thought the hole came from last year's tagging and the tag was lost, but someone stated that the hole was on the wrong side for that to be a possibility.

SECOND NIGHT: Results for Thursday, May 27, 2010 from 8:30 - 10pm

Weather: Stormy, Thunder & Lighting Storm

Sandy Hook/Plum Island:

Volunteers counted a total of 160 crabs. This number includes 114 single males, 1 single female, 21 mating pairs, and 1 cluster with 2 males and 1 female.

Atlantic Highlands/Mouth of Many Mind Creek:

Volunteers counted a total of 58 crabs. This number includes 49 males, 1 single female, 7 pairs, and 1 dead male crab.

Middletown Township/Leonardo Public Beach:

Volunteers counted a total of 99 crabs. This number includes 68 males, 30 females, 6 pairs, and 1 dead male crab.

Union Beach/ Conaskonck Point:

Volunteers conducted a quick count due to the weather and found a total of 12 crabs. This number includes 1 single male, 4 pairs, and 3 dead crabs.

Aberdeen Township/Cliffwood Beach:

Unfortunately, this site had to cancel due to the weather.

THIRD NIGHT: Saturday, June 26, 2010, 8:30pm - 10:00pm

Weather: Clear and Calm

Sandy Hook/Plum Island

Total of 129 crabs. Out of this number there 94 single males and 3 single females. There were 9 pairs, and 3 clusters: 1 female + 2 males, 1 female + 3 males, and 1 female + 3 males. There were also 2 dead males crabs and 1 dead female crab. They also found a tagged horseshoe crab # 157059, which was tagged last year at this site on May 9,2009.

Atlantic Highlands/Many Mind Creek

Total of 70 crabs. Out of this number there 39 single males, and 12 pairs. Plus there was one cluster of 1 female and 5 males. Also, there was 1 dead female.

Middletown Township/Leonardo Public beach

Total of 81 crabs. Out of this number there were 66 single males, 5 single females, and 5 pairs. There was also found one tagged male crab #190701, which was tagged in 2010 earlier in the mating season.

Union Beach/Conaskonck Point

Total of 16 crabs. Out of this number there were 7 single males, 4 pairs, and 1 dead male crab.

Aberdeen Township/Cliffwood Beach

Total of 172 crabs. Out of this number there were 154 males, 15 females, There were also 148 pairs and 12 clusters. Moreover, there were 3 dead male crabs.

FOURTH NIGHT: Saturday, June 26, 2010, starting at 8:30pm to 9:30pm

Weather: Clear and Calm

Sandy Hook/Plum Island

There was a total of 33 crabs. This number includes 31 males and 1 couple.

Atlantic Highlands/Many Mind Creek

There was a total of 11 crabs. Out of this number there 7 single males, 2 single females, and 1 pair. Plus there was one male crab found with a tag, #190767. I checked the records and this was crab that the Atlantic Highlands crew tagged two weeks earlier, so this crab liked this spot in June.

Middletown Township/Leonardo Public beach

Total of 40 crabs. Out of this number there were 23 single males, 9 single females, and 4 pairs.

Union Beach/Conaskonck Point

Total of 14 crabs. Out of this number there were 12 single males, 1 pairs.

Aberdeen Township/Cliffwood Beach

Total of 41 crabs. Out of this number there were 37 males, and 4 dead male crabs.

2010 & 2009 TOTAL LIVE CRAB NUMBERS (minus found dead crabs on beach)

Sandy Hook Hook/Plum Island:

	Total Crabs	males	females	pairs	Clusters
2009	319	191	124	123	1
2010	326	285	41	32	4

Atlantic Highlands/Many Mind Creek:

	Total Crabs	males	females	pairs	Clusters
2009	180	133	45	76	2
2010	146	123	26	21	1

Middletown Township/Leonardo Public beach (Ideal Beach & Leonardo in 2009):

	Total Crabs	males	females	pairs	Clusters
2009	43	31	9	9	0
2010	235	176	68	20	0

Union Beach/Conaskonck Point:

	Total Crabs	males	females	pairs	Clusters
2009	100	65	38	34	2
2010	48	34	10	10	0

Aberdeen Township/Cliffwood Beach:

	Total Crabs	males	females	pairs	Clusters
2009	532	453	114	92	22
2010	428	230	198	148	50

Total Crabs for the region for 2010 & 2009:

	Total Crabs	males	females	pairs	Clusters
2009	1,174	873	330	334	27
2010	1,183	737	343	261	55

Conclusion

Although it is too early to express anything specific, these first-year and second-year findings illustrate that late May and early June is the height of spawning activity for horseshoe crabs in Raritan Bay and Sandy Hook Bay.

Also, it appears that Cliffwood Beach in Aberdeen Township & Plum Island at Sandy Hook are the hot spots for HSC spawning activity, with Leonardo Beach in Middletown Township coming in third. It is interesting to note the scarcity of horseshoe crabs at Union Beach compared to other nearby monitoring sites to the east and west, even though historically this site once had high spawning activity. While further monitoring will be conducted in subsequent years, the lack of spawning activity may be due to physical factors, such as tidal height, wave height, water temperature, and/or geology (slope of the shoreline, shape of the beach, or sand grain size). Additional research is required here.

It is also poignant to note the uneven population ratio of crabs at most monitoring sites in the bay. In some cases for every female or mating pair that was found, up to six or more individual or single males turned up.

Appreciation and gratitude is given to the project partners. This study is a cooperative effort involving the U.S. Fish and Wildlife Service, National Park Service, Gateway National Recreation Area, New Jersey Division of Fish and Wildlife, Bayshore Regional Watershed Council, Brookdale Community College, Environmental Science Department, and the Marine Academy of Science and Technology, and Marine Academy of Science and Technology (M.A.S.T.) at Sandy Hook.

In addition, appreciation is given to the more than 30 volunteers from the watershed council and local citizens who gave up a bit of their time in May and June to assist in this project, so other people might gain a better understanding of horseshoe crab activity in Raritan Bay & Sandy Hook Bay, Monmouth County, New Jersey. With the help of everyone involved, this first-year project would have not been accomplished. Gratitude and appreciation to everyone!