October 15, 2011

Final Report for 2011
Limulus polyphemus
Horseshoe Crab Monitoring & Tagging Activity in
Raritan Bay & Sandy Hook Bay, Monmouth County, New Jersey
May & June 2011
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)

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The full tagging database is available for downloading from the Bayshore Regional Watershed Council's web site:
http://www.bayshorewatershed.org/bw/Current%20Projects/%2A%20Horseshoe%20Crab%20Monitoring/

Summary

• During May & June 2011, a Raritan Bay – Sandy Hook Bay, Monmouth County, New Jersey Horseshoe Crab spawning survey was implemented by volunteers with the Bayshore Regional Watershed Council, 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. Volunteers with Bergen County Parks were also on hand. 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 third 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 & new moon phases.

- Monitoring activities were cancelled on Wednesday, 17, 2011 due to higher than normal tides resulting from off-shore storms that washed out many beaches and created unsafe conditions for volunteers. Thus, once again weather played an important factor during this study during May.

- There was an approximately 50 percent increase in the total amount of crabs counted in 2011 than in the two previous years of the study. Atlantic Highlands experienced a huge influx of single male crabs/pairs/clusters in early June, following an off-shore storm that perhaps weaken mating opportunities for HSC in the end of May. Sandy Hook, however, experienced less total crabs this year than in previous years.

- Males out-numbered females again this year, by a ratio of 10:1. 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. Red Knots have been reported feeding at two sites in the study area: Conaskonck Point in Union Beach and at the tip of Sandy Hook.

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 is 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 will 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 June. Dates included: Tuesday, May 3, 2011 at 8:30pm, Tuesday, May 17, 2011 at 8:30pm, Wednesday, June 1, 2011 at 8:30pm and Wednesday, June 15, 2011 at 8:30pm.

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 go. 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.

RESULTS

FIRST NIGHT: Results from Tuesday, May 3, 2011 monitoring event from 8:30pm to approx 10pm.
Weather: Partly Cloudy, air temperatures in the 70s, water temperatures in the mid 50s.

Sandy Hook/Plum Island:
Total of 6 horseshoe crabs - 4 male, and 1 pair (male & female).

Atlantic Highlands/Mouth of Many Mind Creek:
Total of 23 horseshoe crabs - 8 single males, 2 single females, 5 pairs (male & female) and 1 cluster (2 males & 1 female).

Middletown Township/Leonardo Public Beach
Total of 15 crabs, 6 mating pairs and three singles

Union Beach/ Conaskonck Point
Total of 2 horseshoe crabs -2 males

Aberdeen Township/Cliffwood Beach
Total of 19 crabs - 7 females, 12 males, 4 pairs, 2 dead crabs (1 male & 1 female).

SECOND NIGHT: Results for Tuesday, May 17, 2011

Unfortunately, the monitoring event had to be cancelled due to higher than normal tides from an off-shore storm that created very narrow beaches, flooded roads, and unsafe conditions for volunteers.

THIRD NIGHT: Wednesday, June 1, 2011, 8:30pm - 10:00pm
Weather: Clear and Calm, temperatures in the 70, water temperatures in the 60s, low 70s.

Sandy Hook: Plum Island
Total: 132 crabs
81 single males
1 single female
10 pairs
6 clusters with the largest having 8 males
3 dead males and 3 dead females

Atlantic Highlands: Mouth of Many Mind Creek
Total: 649 crabs
447 single males
8 single females
47 pairs
23 clusters with the largest having 6 males
4 dead crabs: 3 males & 1 unidentified sex

Middletown Township: Leonardo Beach
Total: 354 crabs
288 males
66 single females
38 clusters
These totals include the crabs that were in the clusters.

Union Beach: Conaskonck Point
Total: 84 crabs
28 single males
2 single females
24 pairs
2 clusters

Aberdeen Township: Cliffwood Beach
Total: 480 crabs
390 males total
231 single males
90 females total
0 single females
89 clusters of 2 or more crabs with the largest having 9 males and 1 female
only one cluster was found with more than 1 (2) female crabs in it
57 clusters of 2 crabs only (1 male and 1 female)
found 0 male on male clusters this year other than very brief (few second) encounters
2 dead male crabs

FOURTH NIGHT: Wednesday, June 15, 2011, starting at 8:30pm to 10:00pm
Weather: Clear and Calm, air temperatures in the 70, water temperatures in mid 60s to low 70s.

Sandy Hook: Plum Island
131 total crabs
101 single males
5 single females
6 male/female pairs
1 cluster (2 males/ 1 female)
8 dead males
2 dead females

Atlantic Highlands: Mouth of Many Mind Creek
Total: 70 crabs
59 single males
0 single females
3 pairs
0 clusters
5 dead crabs: 3 males & 2 unidentified sex

Middletown Township: Leonardo Beach
Total: 117 crabs
87 single males
0 single females
15 pairs (male & female)

Union Beach: Conaskonck Point
Total: 85 crabs
59 single males
0 single females
12 pairs
2 dead crabs, unidentified

Aberdeen Township: Cliffwood Beach
149 total live crabs
108 single males,
139 total live males, including 31 which were in clusters and 10 females which were all in clusters
0 single females,
11 clusters consisting of 2 or more crabs and all but one cluster included a female; There was a greater prevalence of brief encounter 2 male clusters than former survey nights presumably due to the lack of females:
There were 3 dead females &c2 dead males.
One live single male counted was formerly tagged. His number is 190307***
***The crab must have been tagged sometime this season, because the number is not yet in the system to track.

2011 & 2010 & 2009 TOTAL LIVE CRAB NUMBERS (*minus found dead crabs on beach*)

Sandy Hook Hook/Plum Island:

	Total Crabs	Single males	Single females	pairs	Clusters
2009	319	191	124	123	1
2010	326	285	41	32	4
2011	269	186	6	17	7

Atlantic Highlands/Many Mind Creek:

	Total Crabs	Single males	Single females	pairs	Clusters
2009	180	133	45	76	2
2010	146	123	26	21	1
2011	742	514	10	55	24

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

	Total Crabs	Single males	Single females	pairs	Clusters
2009	43	31	9	9	0
2010	235	176	68	20	0
2011	486	378	66	21	38

Union Beach/Conaskonck Point:

	Total Crabs	Single males	Single females	pairs	Clusters
2009	100	65	38	34	2
2010	48	34	10	10	0
2011	171	89	2	125	2

Aberdeen Township/Cliffwood Beach:

	Total Crabs	Single males	Single females	pairs	Clusters
2009	532	453	114	92	22
2010	428	230	198	148	50
2011	648	351	90	36	68

Total Crabs for the region for 2011 & 2010 & 2009:

	Total Crabs	Single males	Single females	pairs	Clusters
2009	1,174	873	330	334	27
2010	1,183	737	343	261	55
2011	2,316	1,518	174	254	139

Conclusion

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

It is interesting to note the scarcity of horseshoe crabs at Sandy Hook this year while other locations including Atlantic Highlands and Union Beach noticed enormous spikes in horseshoe crab activity compared to previous years. 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 10 or more 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 project would have not been accomplished. Gratitude and appreciation to everyone!