

RETURN the FAVOR

**reTURN THE FAVOR
HORSESHOE CRAB RESCUE PROJECT**
2014 Season Summary Report
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Background Information

Home to the densest spawning population of horseshoe crabs in the world, the Delaware Bay ecosystem plays an important role in many vital life history stages of the Atlantic Horseshoe Crab (*Limulus polyphemus*). Over 600,000 horseshoe crabs annually climb onto New Jersey beaches to spawn, typically within the intertidal zone during full and new moon high tides (Swan et al. 2013). But spawning activity can be hazardous, as crabs risk becoming stranded through two means: overturned due to wave action or impinged (caught) in man-made or natural structures. The risk of stranding is compounded by the fact that both male and female crabs come ashore to spawn numerous times each season. Strandings can result in the mortality of significant numbers of horseshoe crabs due to desiccation, predation, or overheating if they are not overturned or freed from impingements, especially during the peak spawning period (May-June).

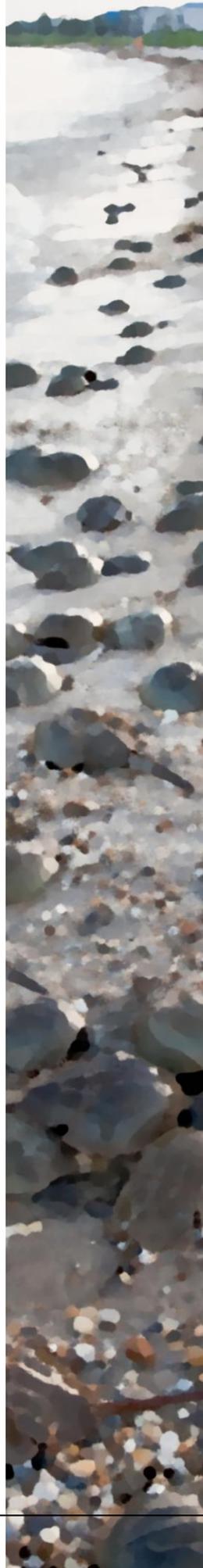
While the horseshoe crabs are breeding on Delaware Bay beaches, hundreds of thousands of shorebirds stopover on the shores of the Bay specifically to feed upon horseshoe crab eggs. These shorebirds, in the middle of migrations that can extend for 7,000 miles or even longer, depend on the presence of abundant horseshoe crab eggs so that they can gain the nutrition necessary to complete their migration and nest successfully.

But due to a combination of overharvest and habitat loss, the horseshoe crab population has declined by 90% over the last 15 years (Niles et al. 2009). As the number of horseshoe crabs spawning in the Delaware Bay has dropped, so too have the number of shorebirds. In response, many of New Jersey's important horseshoe crab spawning beaches are closed to the public from May 7 to June 7 each year so that shorebirds can forage undisturbed. Though the beach closures appear to benefit shorebird populations, horseshoe crabs that became stranded on closed beaches were inaccessible to aid for many years.

The reTURN the Favor program was initiated in the spring of 2013 as a means to lawfully reduce strandings and subsequent preventable losses of horseshoe crabs on New Jersey beaches while complying with New Jersey laws and regulations that protect horseshoe crabs and shorebirds. reTURN the Favor is a collaborative program sanctioned by the New Jersey Division of Fish & Wildlife (NJDFW) and supported by several not-for-profit organizations that enables volunteers to rescue horseshoe crabs stranded on both New Jersey's open and seasonally closed beaches.

reTURN the Favor is managed by a steering committee consisting of representatives from several member organizations (Celebrate Delaware Bay, Conserve Wildlife Foundation of New Jersey, NJDFW, and The Wetlands Institute) who develop and coordinate program logistics. The overall goals of reTURN the Favor are to: 1) rescue stranded horseshoe crabs, 2) provide an organized way to rescue horseshoe crabs on New Jersey's seasonally closed beaches, 3) increase awareness of horseshoe crabs, shorebirds, and their management, and 4) collect data and information on stranded crabs, potential hazards, and tagged crabs to aid in management and restoration.

Results are preliminary and represent all data submitted to the reTURN the Favor program through August 14, 2014.



2014 Program Developments

After reviewing results and recommendations from the inaugural 2013 season, the reTURN the Favor steering committee made several program updates for the 2014 season. First, a unified brand and message were created and used to create new program resources including brochures, school flyers, informational cards, an infographic, and summary letters. These materials were disseminated to schools, libraries, private households, nonprofits, and businesses in southern New Jersey. Improved datasheets were created to incorporate fields such as impingement hazard locations and horseshoe crab tag re-sights. A website (www.returnthefavornj.org) was created as a portal for program partner organizations and for public outreach. For interested volunteers, the website provided background information on the program and a list of reTURN the Favor walk opportunities. For partners, the website provided resources including program materials (e.g., printable datasheets, protocols, brochures, informational cards), background information (e.g., 2013 program reports, presentations, tide charts, New Jersey horseshoe crab moratorium links, locations of seasonally closed beaches), and an electronic form for convenient data submission.

Steering committee members hosted a partner workshop in February for organizations interested in participating in the program. Five organizations partnered on the project: Bayshore Center at Bivalve, Citizens United to Protect the Maurice River and Its Tributaries, Friends of Cape May National Wildlife Refuge, New Jersey Audubon, and The Nature Conservancy. As partners, these organizations sponsored 1-4 beaches

Table 1. Sponsoring organization(s) for each reTURN the Favor location.

| Location | Partner |
|--------------------|---|
| Cooks Beach | New Jersey Audubon |
| East Point | Citizens United |
| Fortescue/Raybins | Bayshore Center at Bivalve |
| Gandys Beach | Bayshore Center at Bivalve |
| Highs Beach | New Jersey Audubon |
| Kimbles Beach | Friends of Cape May NWR |
| Money Island | Bayshore Center at Bivalve |
| Moores Beach | Bayshore Center at Bivalve |
| North Cape May | The Wetlands Institute |
| Pierces Point | New Jersey Audubon |
| Reeds Beach | The Wetlands Institute/ Celebrate Delaware Bay |
| Rutgers Beach | New Jersey Audubon |
| Sea Breeze | (no sponsor) |
| Stone Harbor Point | The Wetlands Institute |
| Sunray Beach | The Nature Conservancy |
| Thompsons Beach | (no sponsor) |
| Villas | The Wetlands Institute |

Each partner committed to develop a schedule for ideal reTURN the Favor walk times on their beaches, submit public walk opportunities to the reTURN the Favor website, recruit volunteers, and ensure that data was submitted. Each partner had the flexibility to manage their beach as it fit their organization. Some relied on staff to conduct rescue walks, while others held public walks. Still others utilized independent volunteers.

Two recruitment and training workshops were held in March and April, one at The Wetlands Institute in Stone Harbor, NJ, and one at the Bayshore Center at Bivalve in Bivalve, NJ. Workshop participants (44 in total) received information on the program, methods, and next steps for involvement. Representatives from NJDFW

addressed the need to respect conservation regulations in place for horseshoe crabs and shorebirds. The trainings emphasized the best times to conduct rescue walks - falling tide, full or new moon, and dusk to dawn when the beaches are seasonally closed for shorebirds. Participants were trained either to lead their own walks or to lead walks with public volunteers for their representative organizations. Walk leaders were provided a permission letter, t-shirts, datasheets, outreach materials, and a scientific collecting permit.



2014 Results and Discussion

Overall Results

The final totals from the 2014 season of the reTURN the Favor program far exceeded both those of the 2013 season and the pre-season goals set by the steering committee (Figure 1). In total, 31,461 horseshoe crabs were rescued during 2014 by reTURN the Favor volunteers, more than six times the 2013 total (Danihel et al. 2014). Seven New Jersey-based organizations utilized staff and volunteers to conduct reTURN the Favor walks at 15 sponsored spawning beaches, with members of the public conducting independent walks at two additional beaches (Table 1).

A total of 219 reTURN the Favor walks took place at 17 New Jersey spawning beaches between May and July 2014 (Table 2). The average walk lasted one hour and covered a distance of 1 km with an average of 3 participants. 32 different walk leaders conducted reTURN the Favor walks privately and/or led public walks for their associated organization. With the help of outreach materials and the reTURN the Favor website, over 500 volunteers from the public participated in program walks. In total, 746 hours were contributed by reTURN the Favor walk leaders and participants.

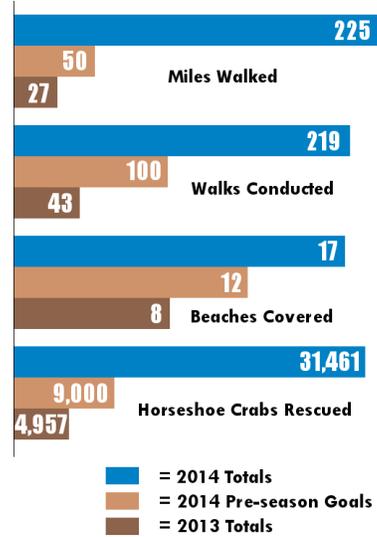
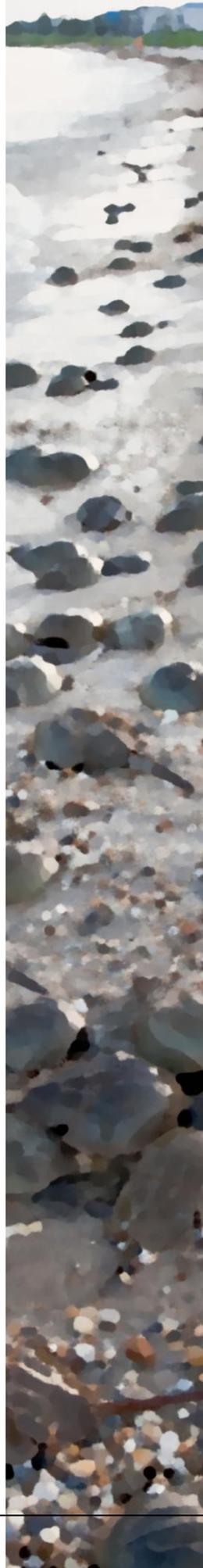


Figure 1. 2014 reTURN the Favor results vs. pre-season goals and 2013 results.

Table 2. Results from the 2014 reTURN the Favor season by beach.

| Location | Walks | Crabs Rescued | | | | Total | Total Per Walk |
|--------------------|------------|---------------|----------------------|---------------------|---------------|--------------|----------------|
| | | Overturned | Man-made Impingement | Natural Impingement | Total | | |
| Cooks Beach | 6 | 21 | 245 | 69 | 335 | 55.8 | |
| East Point | 12 | 170 | 921 | 25 | 1,116 | 93.0 | |
| Fortescue/Raybins | 16 | 1,219 | 3,913 | 0 | 5,132 | 320.8 | |
| Gandys Beach | 10 | 269 | 276 | 5 | 550 | 55.0 | |
| Highs Beach | 2 | 59 | 0 | 0 | 59 | 29.5 | |
| Kimbles Beach | 9 | 90 | 0 | 33 | 123 | 13.7 | |
| Money Island | 15 | 1,176 | 90 | 128 | 1,394 | 92.9 | |
| Moores Beach | 20 | 7,262 | 76 | 765 | 8,103 | 405.2 | |
| North Cape May | 19 | 391 | 5 | 1 | 397 | 20.9 | |
| Pierces Point | 2 | 9 | 0 | 23 | 32 | 16.0 | |
| Reeds Beach | 70 | 8,796 | 970 | 18 | 9,784 | 139.8 | |
| Rutgers Beach | 2 | 21 | 16 | 102 | 139 | 69.5 | |
| Sea Breeze | 1 | 118 | 15 | 10 | 143 | 143.0 | |
| Stone Harbor Point | 3 | 1 | 0 | 0 | 1 | 0.3 | |
| Sunray Beach | 13 | 758 | 0 | 0 | 758 | 58.3 | |
| Thompsons Beach | 1 | 450 | 253 | 52 | 755 | 755.0 | |
| Villas | 18 | 2,591 | 49 | 0 | 2,640 | 146.7 | |
| Total | 219 | 23,401 | 6,829 | 1,231 | 31,461 | 143.7 | |



Overtured Horseshoe Crabs Rescued

A majority of the total rescued crabs (23,401 crabs, 74%) were stranded due to natural wave action or movements during spawning activity. When considering both total numbers and when controlling for effort by calculating per-walk averages, the sponsored spawning beaches with the most overtured crabs were Reeds Beach (8,796 crabs total or 126 crabs/walk), Moores Beach (7,262 crabs total or 363 crabs/walk), and Villas (2,591 crabs total or 144 crabs/walk) (Figure 2, Table 2). The cause of naturally overtured horseshoe crabs could be due to local characteristics of the habitat such as beach slope, or of characteristics of the local spawning population; for example, a higher proportion of injuries such as missing telsons.

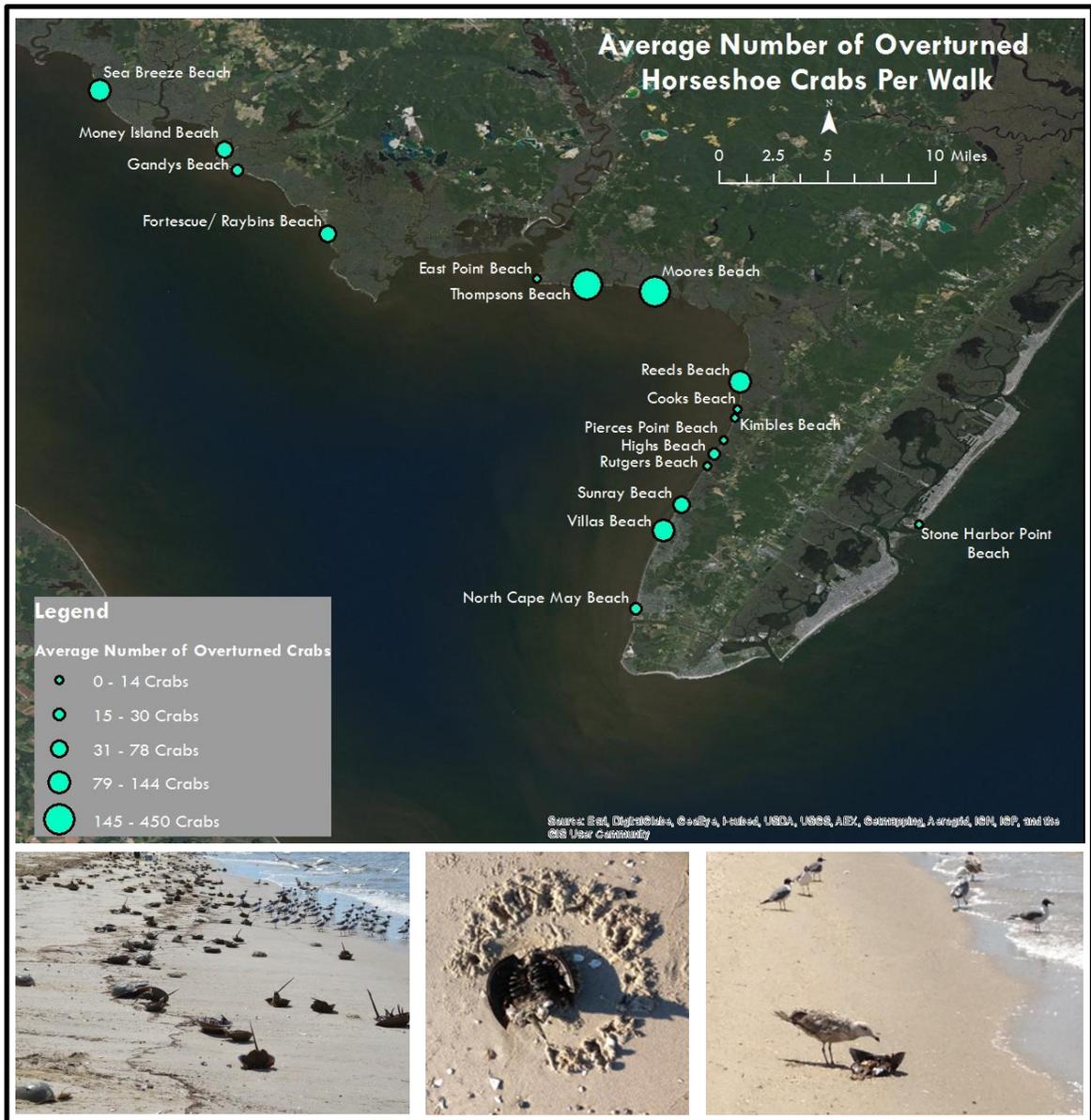


Figure 2. Map displays the number of overtured horseshoe crabs rescued on spawning beaches in 2014. Graduated symbols reflect the number of crabs that were rescued per reTURN the Favor walk at each location. Overtured crab photos: numerous stranded (left), stranded (middle), depredated (right).



Horseshoe Crabs Rescued from Man-Made Impingement Hazards

An additional 6,829 (22%) horseshoe crabs were impinged or stuck in man-made impingement hazards such as rubble, bulkheads, rip rap, trash or other debris, and dilapidated housing structures (Table 2, Table 3). Beaches with the most crabs rescued from man-made hazards included Fortescue/Raybins (3,913 crabs), Reeds (970 crabs), and East Point (921 crabs). When controlling for effort, Fortescue/Raybins (245 crabs/walk), East Point (77 crabs/walk), and Cooks Beach (41 crabs/walk) had the most horseshoe crabs impinged in man-made hazards (Figure 3, Table 2). Fortescue’s high impingement numbers are attributed to a relatively large number of spawning crabs and approximately 0.5 kilometers of concrete rubble present along the upper beach face.



Figure 3. Map displays the number of horseshoe crabs rescued from man-made impingements on spawning beaches in 2014. Graduated symbols reflect the number of crabs that were rescued per reTURN the Favor walk at each location. Man-made impingement photos: Fortescue (left), Gandys (middle), South Reeds (right) beaches.

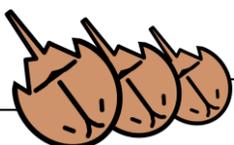


Table 3. Number of horseshoe crabs rescued from man-made impingement hazards by impingement hazard type and reTURN the Favor location.

| MAN-MADE IMPINGEMENT CATEGORY & LOCATION | CRABS RESCUED PER WALK | CRABS RESCUED TOTAL |
|--|------------------------|---------------------|
| bin blocks/concrete rubble/riprap | | 5,120 |
| East Point | 26 | 313 |
| Fortescue | 244 | 3,902 |
| Gandys Beach | 27 | 271 |
| Money Island | 6 | 89 |
| Moores Beach | 4 | 70 |
| North Cape May | 0 | 1 |
| Reeds Beach | 3 | 206 |
| Sea Breeze | 15 | 15 |
| Thompsons Beach | 253 | 253 |
| boat ramp – rocks, pilings | | 480 |
| East Point | 40 | 480 |
| debris | | 20 |
| Money Island (abandoned crab pot) | 0 | 1 |
| Moores Beach (ladder, monofilament line) | 0 | 2 |
| Reeds Beach (mattress box spring, tires, wire) | 0 | 17 |
| equipment – pipes, plastic fittings from oyster lab | | 16 |
| Rutgers Beach | 8 | 16 |
| abandoned structure – house, bulkhead, boat ramp | | 901 |
| Cooks Beach | 41 | 245 |
| Fortescue | 1 | 11 |
| Reeds Beach | 9 | 645 |
| house – pilings/bulkhead/fencing/steps | | 77 |
| Gandys Beach | 1 | 5 |
| Reeds Beach | 1 | 72 |
| outfall pipes, wooden piling | | 34 |
| North Cape May | 0 | 4 |
| Villas | 2 | 30 |
| undescribed | | 182 |
| East Point | 11 | 128 |
| Moores Beach | 0 | 4 |
| Reeds Beach | 0 | 30 |
| Villas | 1 | 19 |
| GRAND TOTAL | | 6,829 |

Far more horseshoe crabs (3,902 total crabs or 244 crabs/walk) were rescued from the concrete rubble at Fortescue than any other location (Table 3). This section of beach alone accounted for 57% of all horseshoe crabs rescued from man-made impingement hazards, despite only 7% of all rescue walks occurring there. Other problematic areas include the concrete rubble at Thompsons Beach (253 crabs/walk), the remnants of an old boat ramp at Cooks Beach (41 crabs/walk), abandoned bulkheads and destroyed houses at Reeds Beach (645 crabs total), and the boat ramp at East Point (26 crabs/walk). The presence of man-made impingement hazards is a risk to all crabs in the nearshore waters and, once stuck, these crabs have a small chance of survival unless rescued.



Horseshoe Crabs Rescued from Natural Impingement Hazards

Natural impingements such as marsh grasses and peat outcrops accounted for 1,231 (4%) crabs rescued. Moores Beach (765 crabs), Money Island (128 crabs), and Rutgers Beach (102 crabs) had the most crabs rescued from natural impingements. When controlling for effort, Rutgers Beach (51 crabs/walk), Moores Beach (38 crabs/walk), Cooks Beach (12 crabs/walk), and Pierces Point (12 crabs/walk) had the most crabs rescued from natural impingements (Figure 4, Table 2). Due to beach erosion, sea level rise, and other factors, the quality of spawning beach habitat has degraded along the Delaware Bay. Continued beach restoration can improve spawning habitat and reduce risk from natural impingement to horseshoe crabs spawning on these receding beaches.

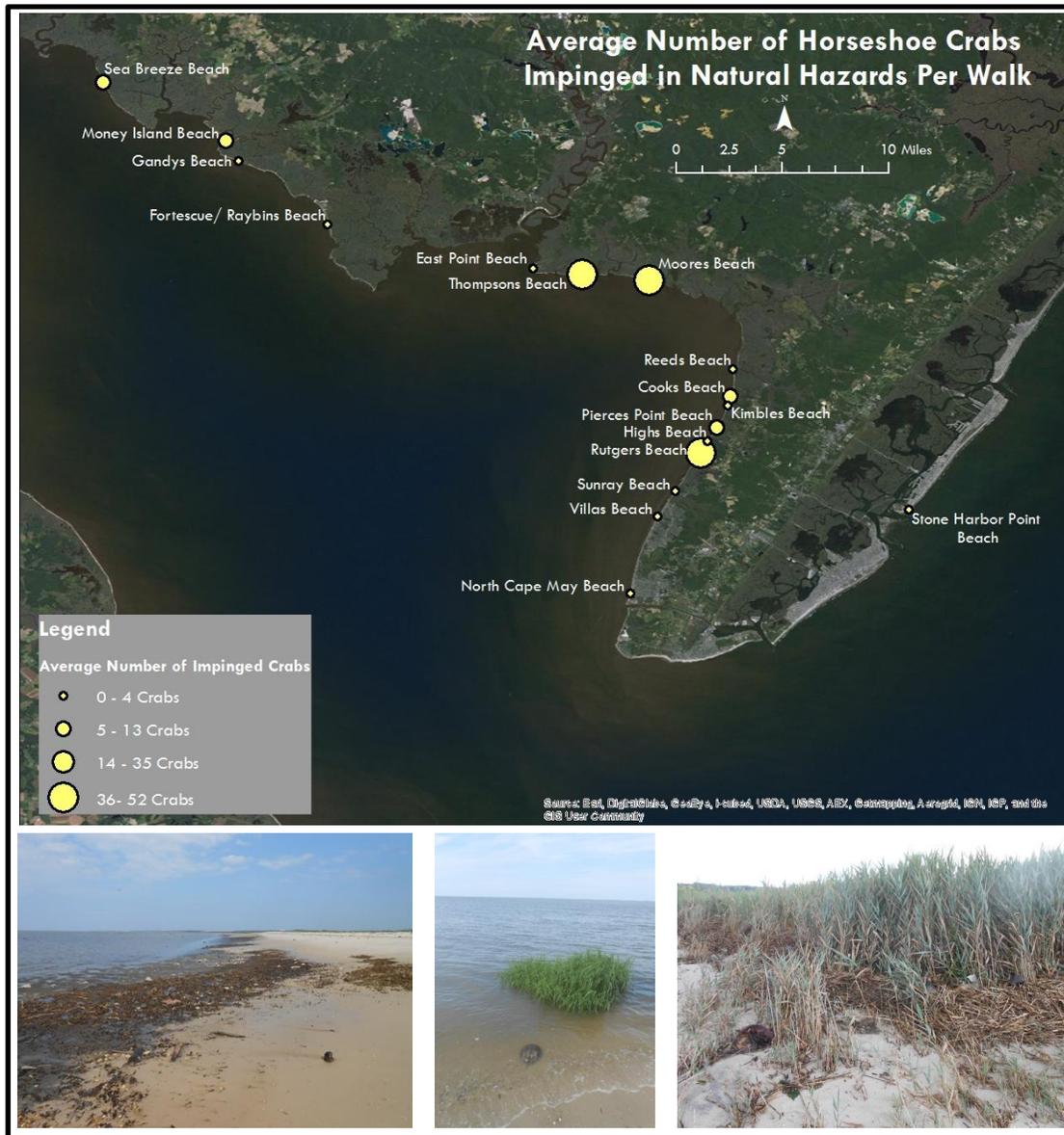
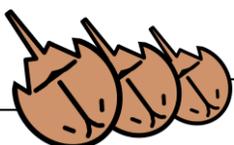


Figure 4. Map displays the number of horseshoe crabs rescued from natural impingements on spawning beaches in 2014. Graduated symbols reflect the number of crabs that were rescued per reTURN the Favor walk at each location. Natural impingement photos: Moores Beach (left), Money Island (middle), Kimbles Beach (right).



Additional Results

Thompsons Beach, which was not included in the original list of sponsored beaches and only had one walk, scored high in overturned (450 crabs), man-made impingements (253 crabs), and natural impingements (52 crabs). Sponsoring walks at Thompsons Beach will be a priority in 2015. Other sites to include in future seasons are Sea Breeze and Dyer's Cove.

Of the 31,461 rescued horseshoe crabs, 23,442 (75%) were male and 8,019 (25%) were female. The 3:1 male to female ratio of stranded crabs is representative of the ratio within the Delaware Bay spawning population (Swan et al. 2013).

During reTURN the Favor walks, 58 observations of 51 tagged individuals were recorded and batch-submitted to U.S. Fish and Wildlife Service. By identifying tagged crabs, reTURN the Favor contributes to federal and statewide efforts to study horseshoe crab population dynamics and movements.

The project received a great deal of positive feedback from partners, volunteers, residents, and others. One partner stated:

“[I] can hardly think of a volunteer activity that has a higher return for the volunteer. They have a gorgeous experience out on the bay, get to [rescue] crabs – they save a life.”

This personal connection that volunteers make is equally as valuable an outcome as the rescued crabs themselves, as it cultivates a person connected to the conservation needs of the horseshoe crab.

Conclusions

The 2014 reTURN the Favor season surpassed original goals set for the season with over 31,000 rescued horseshoe crabs and the active participation of seven organizations and their dedicated staff and volunteers. Compared to last season, the 2014 season efforts rescued six times the number of crabs, conducted five times the number of walks, and involved three times the number of participating volunteers. Improved organization of the program allowed the simple act of rescuing stranded crabs to become an impactful one, as high numbers of crabs can be helped with a unified effort. For a struggling horseshoe crab population in New Jersey, these numbers count. The reTURN the Favor program also provides an opportunity to engage in meaningful conservation activity for audiences near and far, as it reaches both local community members and seasonal tourists.

Most strandings (74%) were due to natural wave actions or movements during spawning. This is a natural part of the risk of spawning on beaches. However, with the population struggling to recover, it is important that as many breeding-age crabs as possible survive spawning activity and return to the ocean. This enables them to potentially spawn many more times during the season and for years to come, making reTURN the Favor an important part of the recovery process.

Data gained from the reTURN the Favor program provides a unique opportunity to better understand the stranding issue and, where possible, guide restoration activities along the Delaware Bay to improve habitat quality. Tallying the numbers of horseshoe crabs found in man-made and natural impingement hazards as well as describing and gathering waypoints



of these hazards will enable restoration activities to be focused to areas of greatest need and/or impact. Loss of most of the 8,060 impinged crabs rescued during 2014 season was near certain if not for the efforts of participants of reTURN the Favor and others concerned with the welfare of horseshoe crabs. Opportunities to eliminate simple hazards, such as beach debris, will be identified. Others, such as the large amounts of man-made structures at Fortescue, Raybins, Reeds Beach, and East Point, will require a combination of short and long-term approaches to minimize crab loss.

Momentum from the successful 2014 reTURN the Favor season will be utilized to help set and accomplish goals for the 2015 season. The steering committee will continue to use the input of partners and volunteers to further refine walk scheduling, data collection protocols, and other program logistics to make the program as effective as possible. In particular, program partners will work to identify resources and develop targeted strategies for reducing loss of stranded crabs during times when there is a critical need for rescue walks. These include high tides, storms, or reports of large numbers of crabs, as well as at beaches with high numbers of impinged crabs.

The reTURN the Favor program provides a critical structure to limit short-term losses of horseshoe crabs, but also to collect data to identify hazards and prioritize habitat management and restoration efforts for the long-term population recovery of the species. So far, it appears to be succeeding – through two seasons, the program has already rescued over 36,000 horseshoe crabs that likely would otherwise have been lost. Every indication is that reTURN the Favor will continue to grow and become a vital part of both horseshoe crab conservation and the Delaware Bay community in 2015 and beyond.

Acknowledgements

The positive outcomes of this project would not be possible without the exhaustive efforts of the volunteers, partners, and steering committee members who participated in reTURN the Favor. Thanks to the New Jersey Department of Environmental Protection for program support and scientific collection permits. Maps and pictures were produced by Lenore Tedesco, Katie Sellers, and Kelly Pittenger of The Wetlands Institute. Sidebar photograph by Jan van de Kam.

Literature Cited

- Danihel, M.S., L.M. O'Donnell, and T.R. Catania. (2014) reTURN the Favor Horseshoe Crab Rescue Project Pilot Year Summary Report. <http://returnthefavornj.org/>. (Accessed August 19, 2014).
- Niles, L.J. et al. (2009) Effects of Horseshoe Crab Harvest in Delaware Bay on Red Knots: Are Harvest Restrictions Working? *BioScience* 59 (2): 153-164.
- Swan, B.L. et al. (2013) The 2013 Delaware Bay Horseshoe Crab Spawning Survey. Horseshoe Crab Survey Information. <http://horseshoecrabsurvey.com/>. (Accessed August 13, 2014).

