



The Wetlands Institute Intern Symposium

Monday, August 7, 2017

3:30 pm



The Coastal Conservation Research Program

The Environmental Education Program

**Thank you for joining us to celebrate the
accomplishments of The Wetlands Institute
2017 Summer Intern Programs!**

The Wetlands Institute Staff

Lenore Tedesco, Ph.D., Executive Director

Lisa Ferguson, Ph.D., Director of Research and Conservation

Brooke Knapick, Director of Educational Program Development

Allison Anholt, Research Scientist

Brian Williamson, Research Scientist

Victoria Musumeci, CCRP Intern Coordinator

Coastal Conservation Research Program Interns

Elliott Fackler, *Bloomsburg University*

Sydney Godbey, *Ursinus College*

Adeline Schlussel, *St. Mary's College of Maryland*

Matthew Shippee, *University of Virginia*

Michael Stankov, *University of Connecticut*

Charles P. Williams Jr., *Stockton University*

Environmental Education Program Interns

Amanda Devers, *West Chester University*

Hannah Locke, *Eckerd College*

Danielle Meeker, *Christopher Newport University*

Phoebe Shoap, *Ursinus College*

PROGRAM SCHEDULE

Welcome and Introductory Remarks – Lenore Tedesco
Citizen Conservation Award to Homer Wesolowski – Lenore Tedesco
Coastal Conservation Research Intern Program – Lisa Ferguson
Environmental Education Intern Program – Brooke Knapick

INTERN PRESENTATIONS

Temporal and spatial patterns of diamondback terrapin (*Malaclemys terrapin*) activity and road mortality along a coastal causeway – Adeline Schlussel

The Fight against Climate Change: Breaking down Barriers between Youth and Scientific Research through Education on Sea Turtles - Phoebe Shoap

Comparing the disturbance regimes and responses of colonial beach-nesting birds at two nesting sites in Stone Harbor, New Jersey – Matthew Shippee

It's true! Learning *Can* be Fun: Creating a Seasonal Seek and Find Program at The Wetlands Institute and Stone Harbor Bird Sanctuary - Amanda Devers

Documenting impingements to horseshoe crab (*Limulus polyphemus*) spawning in New Jersey's Delaware Bay with Esri Story Maps: A review of reTURN the Favor data – Elliott Fackler

INTERMISSION WITH LIGHT REFRESHMENTS

Evaluating population characteristics of northern diamondback terrapins (*Malaclemys terrapin*) within two neighboring saltmarsh creeks in southern New Jersey – Charles P. Williams Jr.

A Much Needed Makeover: Revitalizing the Salt Marsh Trail Identification Signs - Hannah Locke

Exploring Juvenile Diamondback Terrapins (*Malaclemys terrapin*) Habitat and Behavior - Sydney Godbey

Put Waste in the Right Place: Promoting Responsible Disposal at The Wetlands Institute and Sustainability at Home - Danielle Meeker

Territorialism and Nest-Site Selection in the American Oystercatcher (*Haematopus palliatus*) – Michael Stankov

ABSTRACTS

Temporal and spatial patterns of diamondback terrapin (*Malaclemys terrapin*) activity and road mortality along a coastal causeway

Adeline Schluskel, *St. Mary's College of Maryland*

Road mortality, or lethal injury caused by collisions with vehicles, poses a serious threat to nesting female diamondback terrapins (*Malaclemys terrapin*). Combating road mortality can entail identifying relevant “hot spots” and “hot moments,” or places and times terrapins are most likely to cross roads, respectively. Hot spots may be influenced by features like vegetation, bulkheads, and terrapin barrier fencing, while hot moments may be impacted by tide height and traffic. To aid local terrapin conservation, I sought to identify hot spots and moments of terrapin activity along Stone Harbor Boulevard, a five-kilometer coastal causeway and site of high terrapin mortality in Cape May County, New Jersey. To do so, I patrolled the Boulevard five times daily during the 2017 nesting season, adding to previous years of data on the times and locations of terrapin activity. I then analyzed the relationship between terrapin activity along the Boulevard in 2015-2017 and possible explanatory temporal and spatial factors. Terrapin activity and mortality seemed uninfluenced by speed limit and distance to nearest tidal creek but was concentrated near non-bulkheaded marsh, primarily on the eastern end of the Boulevard near The Wetlands Institute. Terrapin activity was also impacted by tide, date, and time of day ($P < 0.001$), with peaks at high tide heights and at varying times of day throughout the season. These results can inform road patrol timing, the timing and placement of flashing terrapin crossing signs, priority areas for barrier fence maintenance, and other conservation measures.

The Fight against Climate Change: Breaking down Barriers between Youth and Scientific Research through Education on Sea Turtles

Phoebe Shoap, *Ursinus College*

There are many different organizations from coast to coast that focus on educating the public about the surrounding marsh and coastal environment. At The Wetlands Institute (TWI) the three main mission objectives include, not only education, but also conservation and research. Integrating information on research projects and conservation initiatives into general admission programs is something TWI prides itself in doing. Unfortunately, an unintended barrier is often built between impressionable young ears and eyes and scientific research. TWI uses interactive activities and programs to translate complex scientific research into education and action which, in turn, breaks down barriers and presents

information in a way that young or old visitors will not only understand, but can also put into action.

Turtles are an important area of focus at TWI with much of the education and research focused on Northern Diamondback Terrapins. However, there are seven different species of sea turtles that live in the oceans around the world, and several off the coast of New Jersey. All seven of these species are endangered and some due to climate change altering their environments such as sea level rise slowly engulfing nesting beaches and warming temperatures around the globe creating an imbalance in male and female populations. After much scientific research on Google Scholar and JSTOR, my project uses a fun and informational PowerPoint Presentation and a Magnetic Sea Turtle Matching Game to translate this complex research issue into a more tangible message that can easily be understood and retained by children, thus breaking down barriers between youth and scientific research.

Comparing the disturbance regimes and responses of colonial beach-nesting birds at two nesting sites in Stone Harbor, New Jersey

Matthew Shippee, *University of Virginia*

Stone Harbor Point, a barrier beach, and Ring Island, a saltmarsh island, are two sites located in Cape May County, New Jersey that provide nesting habitat for colonial beach-nesting birds, including the Common Tern (*Sterna hirundo*) and the state-endangered Least Tern (*Sternula antillarum*) and Black Skimmer (*Rynchops niger*). Though only 3.8 km apart, different site characteristics may result in varying types and rates of disturbance. I conducted 52 thirty-minute diurnal surveys between the two sites to compare the disturbance regimes and responsiveness of the birds. I found no statistically significant difference in the presence of aircraft, watercraft, crows, Laughing Gulls (*Leucophaeus atricilla*), Royal Terns (*Thalasseus maximus*) or total disturbances; but did find significant differences in the presence of large gulls, egrets, and people between the two sites. Response indices suggest that low-flying aircraft, watercraft creating wake, and people more frequently garnered responses from the Ring Island colony, while large gulls more frequently garnered responses from the Stone Harbor Point colony. Responsiveness to Laughing Gulls, which nest in large numbers in the area, was lower than expected at both colonies. Responsiveness also seemed to vary between focal species, but may be due to the species composition of each colony. My results offer land managers context on how to better protect colonial birds from both anthropogenic and natural disturbances during their critical reproductive period. Future research incorporating nocturnal

disturbances as well as early and late nesting periods would help to better characterize the disturbance regime at these sites.

It's true! Learning *Can* be Fun: Creating a Seasonal Seek and Find Program at The Wetlands Institute and Stone Harbor Bird Sanctuary

Amanda Devers, *West Chester University*

The Wetlands Institute is a place where learning turns into fun. Acknowledging that people learn best when they are having fun opens up a realm of creative new teaching opportunities. The Wetlands Institute (TWI) offers many educational programs both onsite at TWI and at various offsite locations in Stone Harbor and Avalon. One such offsite program is a guided tour at the Stone Harbor Bird Sanctuary. During this program, an educator leads an interpretative walk through the Sanctuary while explaining the ecosystem of the barrier islands and some of the rich history of Stone Harbor. A similar type program, Salt Marsh Safari, is offered onsite at TWI and goes over the importance of the marsh ecosystem as well as all its inhabitants that thrive there.

Both these programs give the general public an overview of the wide biodiversity of species living on the barrier islands or in the marsh. However, to get all the information, one must stay for the entire walk, which not everyone will do. In efforts to allow for flexibility and fun in learning, my project creates 8 unique, seasonally-focused seek and find cards that allow visitors at both locations to learn about the seasonal array of wildlife, plants, and birds that live and thrive in both the marsh and the Stone Harbor Bird Sanctuary. These cards offer place-based learning opportunities; are developed for all ages and seasons; and allow anyone to explore the areas on their own time and still gain important knowledge.

Documenting impingements to horseshoe crab (*Limulus polyphemus*) spawning in New Jersey's Delaware Bay with Esri Story Maps: A review of reTURN the Favor data

Elliott Fackler, *Bloomsburg University*

Each spring, Atlantic horseshoe crabs leave the safety of the sea and crawl onto Delaware Bay beaches to spawn, the site of the largest spawning concentration in the world. Ideally, these crabs would encounter gently sloping, natural beaches on which to spawn. In reality, the beaches are often steeply sloped or littered with debris and human-built structures. As crabs encounter these obstacles they become overturned and unable to right themselves, or impinged,

unable to move. Either way, they are left vulnerable to desiccation and predation by large gulls.

Although an ecologically, economically, and medically important species, the horseshoe crab's population has declined drastically within the last century. To help combat this problem, a citizen science program called reTURN the Favor (RTF) was started in 2013 to rescue crabs on designated NJ Bayshore beaches. While rescuing overturned and impinged crabs, volunteers record data on their numbers and locations. From 2014–2017, 1,892 RTF walks were conducted and 69,864 crabs were rescued from impingements, 66% of which were man-made.

To document these impingements in more detail, I reviewed data collected by RTF volunteers and visited a selection of RTF program beaches from late-June to mid-July 2017, collecting photographs, notes, and GPS coordinates of hazards. I compiled the gathered information into an interactive map product called Esri Story Maps, which will be useful as an outreach and education tool for program volunteers and members of the public. Derived maps may be used as guidance for future beach restoration projects to mitigate spawning impingements and crab mortality.

Evaluating population characteristics of northern diamondback terrapins (*Malaclemys terrapin*) within two neighboring saltmarsh creeks in southern New Jersey

Charles P. Williams Jr, *Stockton University*

Knowledge of diamondback terrapin demographics is necessary for understanding potential impacts from road mortality, habitat loss, and bycatch drownings on local populations. The primary objective of my study was to examine and compare the population structure of terrapins within two neighboring creeks, Josh and Charles Creeks in Cape May County, New Jersey. Both populations have previously been subject of a mark-recapture study. To capture terrapins, I deployed seven modified commercial-style crab traps in each creek weekly from June to July 2016 and 2017, for a total of five to six sampling days per creek per year. Upon capture terrapins were scanned for microchips, measured, sexed, and microchipped if needed before release. Over the two year study I captured a total of 196 terrapins (Charles Creek: N=90, Josh Creek: N=106), six of which (3.1%) were recaptured. Preliminary population assessments for each creek using the Schnabel Method were nearly identical (Charles Creek: N= 883, Josh Creek: N=889), however these estimates suffered from a lack of recaptured individuals. Though sex ratios did not differ significantly

from a 1:1 ratio in 2016, they were significantly female skewed in 2017 ($p < 0.01$ for both creeks). Comparisons of carapace length suggest that male body size did not differ significantly between years, however females in Josh creek were significantly larger in 2016 ($p=0.03$). There was no significant difference in carapace size between creeks (Male: $p=0.48$, Female $p=0.32$). Further sampling is needed to acquire a more accurate population size to better understand the local terrapin population.

A Much Needed Makeover: Revitalizing the Salt Marsh Trail Identification Signs

Hannah Locke, *Eckerd College*

The Wetlands Institute (TWI) is a place of education, where people from all walks of life come to learn about the surrounding salt marshes. TWI has wonderful programs that teach people about the wetlands. However, not all visitors to TWI are able to attend these programs. For that reason, TWI has educational signs along the salt marsh trail to help educate visitors about what they are seeing around them. Most of the current signage is a part of the National Park Service's New Jersey Coastal Heritage Trail that extends throughout south Jersey. The program was created by the U.S. Department of the Interior to educate the public about the environmental history of the area, including habitats, plants and wildlife.

A series of signs installed on TWI property were effective in displaying some of the wildlife that exists in the marshes, but fell a little short in fully encompassing all the life that calls TWI home. Additionally, after years of wear and tear, some of the signs have seen significant damage and in some cases the signs are no longer standing. Visitors come to TWI to learn about the salt marshes and the signs on the property should reflect that passion for learning.

To that end, my project works to update the existing signage, while also adding new educational signs. The revitalized signage along the salt marsh trail creates new opportunities for visitors to learn about the plants and wildlife living within the salt marsh.

Exploring Juvenile Diamondback Terrapins (*Malaclemys terrapin*) Habitat and Behavior

Sydney Godbey, *Ursinus College*

Diamondback terrapins are a species of turtle unique in their preference for habitat within brackish water. A moderate amount is known about adults less is

known about juvenile terrapins, therefore less is understood about habitat preferences and behavior at this life stage. To address this gap in knowledge, I explored methods for locating juvenile terrapins and examined their habitat preference and behavior within the salt marsh at The Wetlands Institute in southern New Jersey. This property has numerous of nesting terrapins and microchipped head-started juveniles released annually. I adaptively selected and searched 5 m² plots (N=30) for juveniles during June and July 2017 and recorded vegetation composition and soil salinity. I also established two enclosed arenas in the salt marsh and tracked location and movements of head-started terrapins placed within. Individual behavior, type of habitat, and weather conditions were recorded for every terrapin encounter. I located two dead terrapins within the plots, and I found eight terrapins opportunistically throughout the property, five of which were alive. My data suggests most terrapins in the first arena remained within grasses or wrack. In the second arena it seemed most terrapins burrowed beneath mud, possibly a behavior related to thermoregulation. Arena 2 terrapins also had preference in their habitat with a p value of 0.00013. Although my techniques yielded mixed results, with adjustments these methods could be highly useful in understanding the early life stages of juvenile terrapins and contribute to more effective conservation of the species throughout its life span.

Put Waste in the Right Place: Promoting Responsible Disposal at The Wetlands Institute and Sustainability at Home

Danielle Meeker, *Christopher Newport University*

Sustainability is something everyone should strive to achieve. With their sustainability initiative, The Wetlands Institute (TWI) has made strides towards becoming a more eco-friendly work place. The goal of the sustainability initiative is “to make a positive impact on the environment and to increase awareness of how easy it is to make a meaningful contribution towards a healthier, more sustainable world”. TWI has the power to set an example for their community and educate people on ways to become more sustainable in their own home and work place environments.

TWI's sustainability initiative is broken up into various Go Green Initiatives. These initiatives include: Print Smart, Responsible Disposal, Rethinking Supplies, Healthy Work Environment, and Renewable Energy. Identifying the objective with the highest amount of public education and engagement, my project focuses on improving aspects of the Responsible Disposal initiative. By properly labeling indoor trash and recycling receptacles and providing

educational signage around frequently used cans, TWI will have improved compliance with Cape May County Municipal Utilities Authority's Single Stream Recycling program. In addition, the construction of a new compost bin made from recycled pallets will provide a source of enriched soil from garden waste and kitchen scraps. Educational signage placed near the new compost bin and a Composting 101 brochure will help educate and promote composting at home. Lastly, the creation of a Science Feature dedicated to home sustainability will further our mission to increase awareness. Through this combination of improvements, I have enhanced some of TWI's sustainability initiatives.

Territorialism and Nest-Site Selection in the American Oystercatcher (*Haematopus palliatus*)

Michael Stankov, *University of Connecticut*

The American Oystercatcher (*Haematopus palliatus*) is a shorebird common on the eastern coast of the United States. The oystercatcher is known to be highly territorial during the breeding season, aggressively defending its territory while nesting or brooding. Oystercatcher territories are not necessarily centered on their nests – instead, factors such as proximity to foraging grounds and landscape features like dunes can define their territorial borders. In an effort to better understand this phenomenon, I observed defense behaviors of seven pairs of nesting oystercatchers at Stone Harbor Point, a natural conservation area in Cape May County, New Jersey from June 27 – July 23, 2017. For each defense behavior detected during a series of 30-minute observation periods (N=37), the location and behavior of the focal bird and the perceived threats that provoked their response were recorded. The locations of these interactions were plotted in ArcGIS to model the primary conflict zones for oystercatchers – these zones were used to represent territorial borders for each nesting pair. Additionally, to better understand the habitat features that make up oystercatcher territories, data on the physical landscape features found in proximity to their defense reactions were derived from aerial images. Oystercatchers were found to defend most often (51%) over dry beach and rarely defended in proximity to extensive vegetation. Additionally, oystercatchers with chicks tended to defend closer to the water than incubating ones, but this result was not statistically significant ($P = 0.20$). These results indicate the importance of open sandy beaches in future oystercatcher conservation efforts.

The Wetlands Institute staff and interns would like to extend a heartfelt *THANK YOU* to the many collaborators, volunteers and docents who helped make our programs a huge success!



Coastal Conservation Research Interns:
Elliott Fackler, Syd Godbey, Addie Schluszel, Mike Stankov, Pat Williams and
Matt Shippee



Environmental Education Interns:
Hannah Locke, Danielle Meeker, Phoebe Shoap and Amanda Devers