The State of Napatree Report: 2013

A Summary of Science, Research, Management, Education, and Natural History Programs

Photo Credit: Peter Paton

Compiled By:

Janice Sassi
Napatree Point Conservation Area
Watch Hill Conservancy & Watch Hill Fire District

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Contents

State of Napatree Report: 2013

The purpose of the State of Napatree (SoN) report is to summarize the results of scientific data collection and educational programs in the Napatree Point Conservation Area, Watch Hill, RI. Scientists, educators, and naturalists working at Napatree in 2013 have contributed short, concise summaries of their projects and the results they obtained. We hope that the SoN report will be done every year and form a permanent record of the important scientific work happening at Napatree.

Compiling this report was a team effort. Janice Sassi coordinated report writing, review, and final report production. Hugh Markey, Peter Paton, and Peter August provided reviews of the SoN contributions. The SoN report was initially proposed by the Napatree Science Advisors (see below) who provided valuable help in reviewing the content and format of the 2013 compilation of projects and results. The following people contributed significantly to the work reported here: Chaplin Barnes, Grant Simmons, Janice Sassi, Kevin Rogers, Jessica Cressman, Thomas Mayo, Bryan Oakley, Reynold Larsen, Steve Brown, Hugh Markey, Tom Pappadia, and Scott Ruhren. The SoN report was made possible by the support received from the Watch Hill Conservancy and the Watch Hill Fire District.

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Prologue

After serving as the Executive Director of the Watch Hill Conservancy for the past fourteen years, Chaplin B. Barnes retired this Fall. Chap and others saw the need to protect this beautiful part of Rhode Island and Chap's dedication is a large reason why Napatree remains pristine.

During Chap's tenure as Executive Director, public outreach activities grew and a scientific baseline for the many ecosystems of Napatree was established. This State of Napatree report is a direct result of Chap's vision and leadership.

Under Chap's leadership the Napatree Conservation Area received added protection afforded by a Conservation Easement which was granted in 2013 by the Watch Hill Fire District to the Watch Hill Conservancy. This legal tool is intended to protect Napatree from development inconsistent with its natural character. On November 29, 2013, just as the finishing touches were being put on the State of Napatree report, the Watch Hill Conservancy honored Chap by declaring that this critical agreement be recorded as the "*Chaplin B. Barnes Conservation Easement.*" This is a fitting tribute to Chap's devotion to this extraordinary conservation area.

Investigators 2013

Napatree Point Children's Education Program

Steve Brown, Hugh Markey & Jessica Cressman

Napatree Point Conservation Area, Watch Hill Conservancy & Watch Hill Fire District

Photo credit: Janice Sassi

Investigators 2013
Napatree Point Children's Education Program

Steve Brown, Hugh Markey & Jessica Cressman
Napatree Point Conservation Area, Watch Hill Conservancy & Watch Hill Fire District

INTRODUCTION: The Investigator program is a free, hands-on learning experience for children ages 7-14. Children spend two hours on the beach observing natural biotic and abiotic elements, as well as analyzing or researching their finds using age appropriate picture pamphlets. The program goals are to foster a curiosity for and appreciation of the fauna and flora of the various habitats, as well as to learn facts about the ecosystems of the Napatree Point Conservation Area. While guiding the Investigators, Naturalists model proper beach conservation, such as picking up trash, staying on trails, respecting all forms of life, and avoiding climbing dunes. At the same time, Naturalists discuss how these behaviors foster the preservation of Napatree, encouraging the children to become lifelong protectors of beach habitats.

OUTREACH: We advertise the program in various ways: we email all families who previously attended the program; we provide a sign-up sheet in the children's area of the Westerly library; and we send flyers to the Westerly and Stonington School Districts, as well as to the local parochial and independent schools in the same towns. Registration is done online via Microsoft Outlook, with the parents completing a questionnaire, then compiling that data on an Excel spreadsheet (see Results). Families must sign a consent form that includes a photo release, an acknowledgement of the child's physical condition, and a liability release for the Watch Hill Conservancy. Parents may sign up for one of three sessions offered each week.

PROGRAM FORMAT: Each session begins at the gazebo in Watch Hill with Naturalists taking attendance, answering parent questions, conducting introductions and exploring the theme. The latter part may involve the Naturalists accessing prior knowledge through the use of questioning and/or visual aids.

The program is two hours long and focuses on a specific theme each week, but students are encouraged to share any and all findings made on the beach. The themes include: horseshoe crabs, fish, crabs, mollusks, shells/rocks/seaweeds. The summer's program concludes with a general scavenger hunt of the items studied. Other topics covered informally include: jellyfish, birds, tides, wrack line, food chains, predator/prey, camouflage, minerals, temperature impacts, adaptations, and tracking.

Each program ends with the group sharing their findings and what they have learned during the session. Families pick up their children at the gazebo.

RESULTS: We educated 96 different children over a seven-week period this summer, with a total of 948 total *registered* child hours on Napatree Point. We had between 18 and 29 participants signed up for each day (Figure 1), though there was never a point during the 21 days where every registered student attended. Those who did not show up were not counted (thus, the total *actual* child hours would be fewer in number). It is notable that attendance during week seven was less than 50% of the number registered for that week. Finally, though we received many accolades from parents on a daily basis, and though a few thoughtfully wrote thank-you cards with donation checks at the end, all educational results would be subjective at this time as there was no official survey completed by the participants.

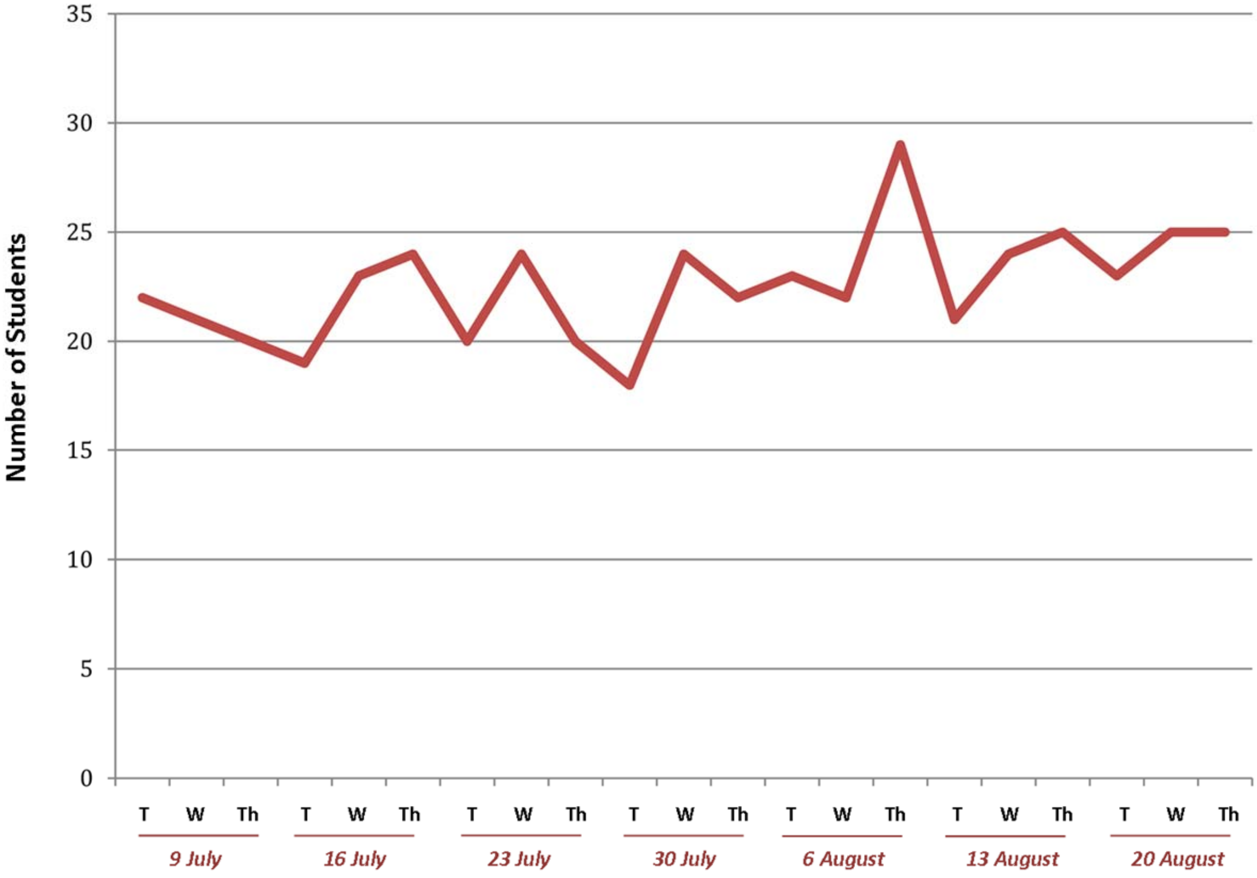

Figure 1. Registered students by class day (Tuesday, Wednesday, Thursday) for each week of instruction during the summer of 2013.

CONCLUSIONS: Registered children were beyond the 20–child capacity of the two Naturalists, so it was decided that an additional Naturalist was needed to help with the larger groups. The third leader was female, and the consensus was that the groups benefited from the presence of both male and female leaders. We suggest that a team of three Naturalists be employed each year, with both genders represented. Also, since the actual number of children who came to the program was fewer in number than those registered, the registration cut-off could be raised to 22 participants.

Issuing flyers to all local schools, along with sending out an email to all the contacts should be continued in light of the high registration numbers. The Naturalists would also like to recommend the email account be changed from live.com to gmail.com for its ease of use in large mailings.

DATA MANAGEMENT: The Excel spreadsheet of registrant data is managed by Stephen Brown until the end of the season, when it is sent to the Watch Hill Conservancy Office. The mailing addresses are recorded from the documents for correspondence purposes. Stephen Brown keeps the copies on his computer. The final consent form is also kept on the same computer. Perhaps these documents should be placed in the system Dropbox under “Investigator Program.”

Understanding the Short and Long-term Shoreline Change of Napatree Barrier Using RTK-GPS Beach Profiles and Mapping of the Last High Tide Swash

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Photo credit: Janice Sassi

Understanding the Short and Long-term Shoreline Change of Napatree Barrier Using RTK-GPS Beach Profiles and Mapping of the Last High Tide Swash

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INTRODUCTION: The objective of this project, which started in July, 2013 is to begin to understand the geologic processes and will examine the short and long-term response of the shoreline to storms using beach profiles and the position of the last high tide swash (LHTS) (commonly referred to as the wet-dry line or wrack line). The lack of infrastructure and development on the barrier makes Napatree an ideal location to examine shoreline change in the absence of the 'line in the sand' mentality inherent on more developed portions of the coastline. Storms (both hurricanes and extra-tropical cyclones), not sea level rise, are the driving force in shoreline change (Hayes and Boothroyd, 1987), particularly at the decadal scale (Morton, 2008). Napatree Barrier has migrated >60 m (200 feet) landward (towards Little Narragansett Bay) between 1939 and 2004 (Boothroyd and Hehre, 2007), via storm surge overwash and deposition of washover fans during hurricanes. This means the landform itself has migrated landward almost one barrier width since 1939!

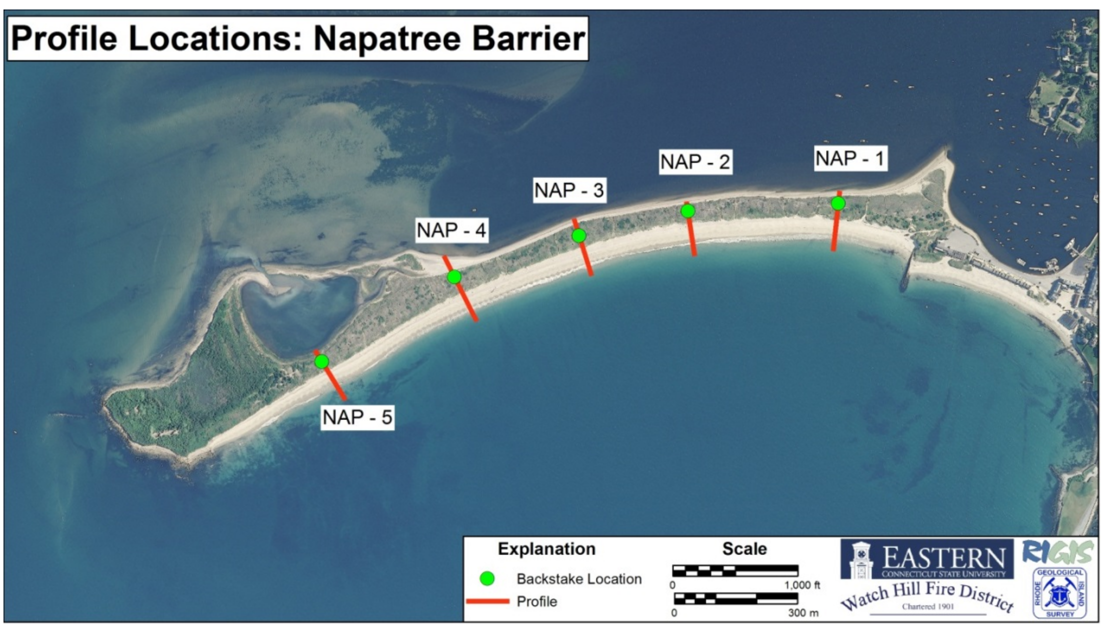

Figure 1: Benchmark and profile locations along the Napatree Barrier. Base map is the 2012 Eelgrass orthophotograph downloaded from the Rhode Island Geographic Information System.

METHODS

Benchmark installation

Benchmarks were installed modified from the current design (Figure 2a) being used by the National Park Service (NPS) to document the location and elevation of "sentinel sites" in the northeastern United States (Bradley et al., 2011). Benchmarks were installed to a depth of 8.5 m (28 ft), and topped with a 3¼" bronze survey marker (Figure 2b). The benchmarks were then covered with 4" PVC caps. After installation, the elevation of the benchmarks was measured relative to the North American Datum of 1988 (NAVD88).

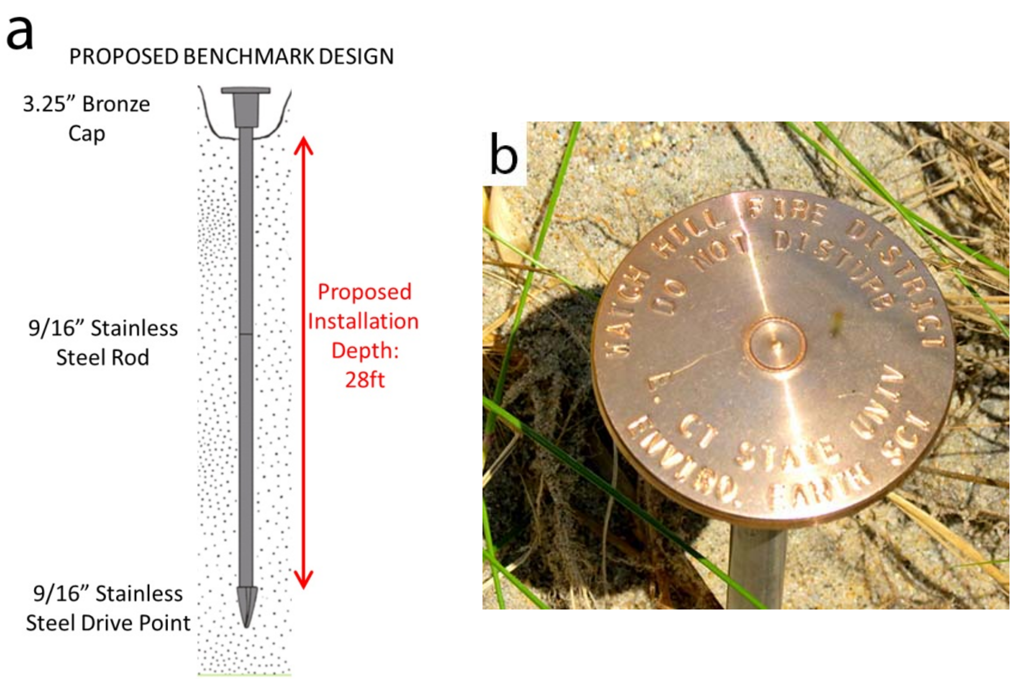

Figure 2: (a) Benchmark design consisting of 28 feet of stainless steel survey rod, driven using a construction hammer (modified from www.bernsten.com), (b) topped with a 3¼" bronze survey marker.

Beach profiles

Beach profiles are obtained using RTK-GPS (Real-time Kinematic Global Positioning System), which collects an X, Y, Z (northing, easting relative to Rhode Island State Plane Feet, NAD 1983 and elevation relative to NAVD88) measurement for points along the profile (Figure 3). Elevation is collected relative to NAVD88 and is converted to mean lower low water (MLLW) using the V-Datum tool published by the National Oceanic and Atmospheric Administration.

Profiles extend as close to MLLW as possible and traverse the barrier from Little Narragansett Bay to Block Island Sound (Figure 1).

Last High Tide Swash (LHTS)

The position of LHTS is mapped using a Trimble 6000XH handheld differential Global Position System (sub-meter accuracy) and follows the protocol of Psuty and Silveria (2011) developed for the National Park Service on the Atlantic coastline. By using LHTS as a proxy for shoreline position, it can be directly compared to shoreline positions digitized in historic vertical aerial photographs, as well as present and future orthophotographs. Additional shoreline positions are collected quarterly, as well as before and after major storm events.

Figure 3: Eastern Connecticut State University student Josh Bartosiewicz collecting an RTK-GPS beach profile on 23 July 2013.

RESULTS

Beach profiles

Profiles were first collected using RTK-GPS 23 July, 2013 (Figure 3). With no previous profiles to compare against, profiles were plotted against 2011 U.S. Geological Survey (USGS) Light Detection and Ranging (LiDAR) topographic data. Additional profiles were collected in October, 2013, and continue to be collected quarterly, as well as before and after major storm events. Tropical Storm Irene (2011) and Hurricane Sandy (2012) both occurred after the collection of the 2011 USGS LiDAR data, however, the recency of Sandy, and the more significant storm surge (1.35 m above mean higher high water for Sandy; 0.82 m for Irene) and larger waves, suggests that significant erosion of the foredune, and deposition of washover fans was related to Sandy. The impact of Sandy varied across the barrier; profiles with a higher foredune (and more reflective profile) saw erosion from the front of the dune, and an overall narrowing of the foredune (Figure 4). At the western end of the barrier, where the foredune was lower (and the profile is more dissipative; i.e., NAP-5) the crest of the foredune was removed, sediment was transported landward towards the lagoon and Little Narragansett Bay and deposited as washover fans (Figure 5).

Shoreline position

The position of LHTS was digitized from the June 2012 Eelgrass orthophotograph available from the Rhode Island Geographic Information System (RIGIS) as part of a larger research project involving Oakley, as well as colleagues from the University of Rhode Island (Jon Boothroyd and Scott Rasmussen). This LHTS position was compared to the position mapped with DGPS in July, 2013 (Figure 6). Along the northern (Little Narragansett Bay) and western portions of the barrier, the shoreline positions are similar, with the exception of changes around the lagoon. LHTS along the eastern third of the barrier migrated landward 10 - 15 m between June 2012 and July 2013, and while this change may be linked to the morphology of the barrier (i.e., reflective vs. dissipative) it is too early to know if this is a persistent trend. This will be examined with continued shoreline mapping.

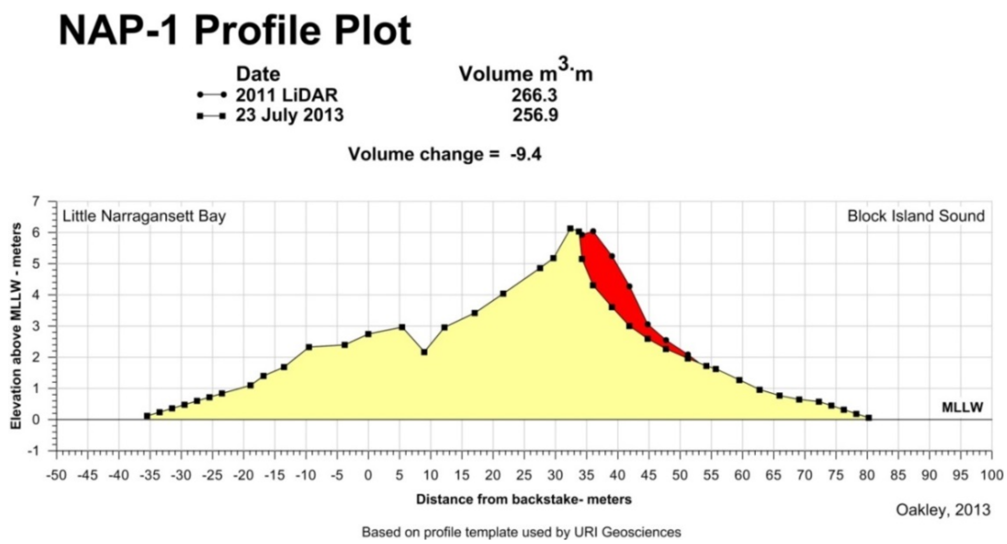

Figure 4 – Profile comparing the 2011 U.S.G.S. LiDAR data with RTK-GPS beach profile from 23 July 2013. Note significant erosion of the foredune (red), interpreted to have occurred during Hurricane Sandy.

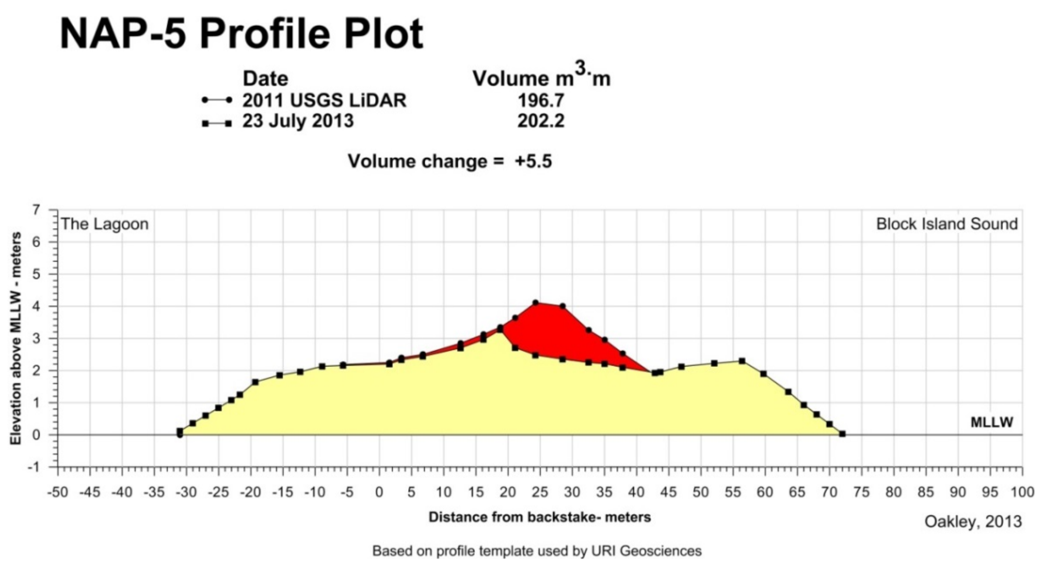

Figure 5 – Profile comparing the 2011 U.S.G.S. LiDAR data with RTK-GPS beach profile from 23 July 2013. Note significant erosion of the foredune (red), interpreted to have occurred during Hurricane Sandy.

Figure 6: Shoreline positions in June 2012 (digitized from 2012 Eelgrass orthophotograph) and July 2013 mapped using differential GPS.

CONCLUSIONS: While too early in the project to reach any significant conclusions, monitoring will continue quarterly throughout 2013 and 2014. It is likely that low-lying areas of the barrier (i.e., NAP-5, Figure 5) will continue to be overwashed in future storms. The segments of the barrier that are reflective (a high foredune; i.e., NAP-1, Figure 4) will continue to narrow as the barrier is eroded during storms. This process will continue until the foredune is overtopped and the barrier can widen via the deposition of washover fans.

Overwash should not be viewed as a negative process. Overwash and the deposition of washover fans create a more dissipative profile and is the natural process that allows the barrier to evolve in response to storms and seal level rise. This process is well-documented in the scientific literature for barriers in other regions (Dolan, 1972; Dolan et al., 1973; Leatherman, 1979). The recovery of the berm, particularly along the western portion of the barrier, suggests that a significant portion of the sediment transported offshore during Sandy was returned to the intertidal beach during subsequent periods of fair weather. However, the actual net volume of sediment lost offshore beyond the return depth (where it cannot return to the shoreline) remains unclear.

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Water Quality: 2013

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Napatree Point Conservation Area, Watch Hill Conservancy & Watch Hill Fire District

Photo credit: Jessica Cressman

Water Quality: 2013

Jessica Cressman & Grant Simmons
Napatree Point Conservation Area, Watch Hill Conservancy & Watch Hill Fire District

INTRODUCTION: The University of Rhode Island Watershed Watch Program is a statewide volunteer water quality monitoring program that began in 1988. As stated by the URI Watershed Watch Program, the goals of this program are "to promote active individual participation in water quality protection, to educate the public on water quality issues, to obtain multi-year surface water quality information and data to ascertain current conditions and to track trends, and to encourage management programs based upon sound water quality information." The Watch Hill Conservancy began monitoring the waters surrounding Napatree Point in 2008, including one point sampled on the ocean side of the beach. Since then, two more sites have been added: one off the bayside of the beach and one in Foster's Cove. Data from previous years are available on line on URI Watershed Watch's website at: www.uri.edu/ce/wq/ww.

Figure 1. Locations of sampling sites along Napatree Point.

METHODS: Water quality monitoring was conducted at three sites in Watch Hill, Rhode Island: two inside Little Narragansett Bay and one on the ocean side of Napatree beach (Figure 1). Monitoring began the week of May 5th 2013 and continued through the week of October 20th 2013. Data were collected each week measuring the water clarity, water temperature, dissolved oxygen content and salinity at each of the three sites. On every third week of the month, additional samples were collected and analyzed by staff at URI Watershed Watch to assess the levels of chlorophyll, phosphorous, nitrite and ammonium nitrogen, as well as determine the amount of fecal coliform and enterococci bacteria. Water collection was conducted every

Thursday between 6:30 and 8:30 in the morning and was canceled only if the weather was unfavorable (i.e., thunderstorms or heavy fog). If canceled, attempts were made to sample on the following days. Water collection was not conducted the week of May 5 and the week of May 19 due to continual morning fog, the week of June 9 due to staff illness, and the week of June 24 due to boat problems. As of September 14, a total of 16 sampling weeks were submitted to URI.

At both the ocean side and the bayside sites, water was collected at two different sampling depths; a "shallow" sample collected 1m below the surface and a "deep" sample collected on the ocean floor. On the ocean side, water was collected at 6.5m (deep) and at 1m (shallow) below the surface. On the bay side, water was collected at 2.5m (deep) and 1m (shallow). Only a 1m sample was collected in Fosters Cove due to the shallowness of the inlet. All water was collected using the sampling device (Figure 2) provided by URI Watershed Watch. The device is weighted and attached to a rope marked off in 1m increments. Each device has a stopper that can be pulled out once the device is lowered to the desired depth, ensuring the water sampled is being collected at the appropriate depth. Salinity was evaluated on site using a refractometer and temperature was recorded using a thermometer at each sampling depth. Dissolved oxygen of each sample was processed on land after the collection process. All data were recorded on sampling post cards provided by URI Watershed Watch and was submitted monthly (Figure 2).

LOCATION: **MONITOR(S):**

DATE MONITORED: (mo/day/yr) **TIME:** (military)

SECCHI DEPTH (measure 4 times):

__________ __________ __________ __________ meters

Depth to bottom is _______ meters. Is Secchi visible on bottom? yes or no

CHLOROPHYLL SAMPLES: FILTERED and FROZEN: yes or no

DEPTH MONITORED (meters)	Surface	1 meter	Record actual depth ____m deep	____m deep
WATER TEMPERATURE (deg. C)				
DISSOLVED OXYGEN (mg/L) (Measure twice at each depth)	N/A			
SALINITY (ppt)	N/A			

(for below, circle best description, see monitoring manual for details)

LIGHT: 1= Distinct shadows 2= No shadows 3= Very overcast
WIND: 0= Calm 1= Light 2= Gentle 3= Moderate 4= Strong
RAIN W/IN 48 Hrs. 1= None 2= Light 3= Moderate 4= Heavy

STATE OF TIDE: EBB ____ FLOOD ____ HIGH ____ LOW ____ N/A ____

Figure 2. Water sampling device and monitoring postcard.

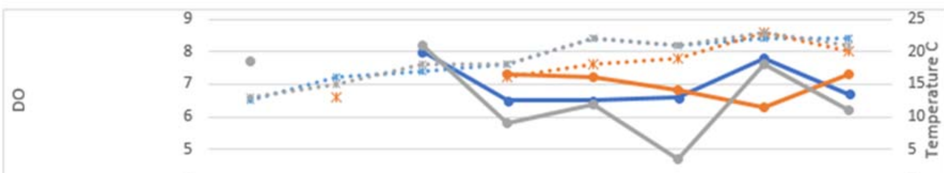
RESULTS: A total of eight sampling weeks were included in this report. Results regarding temperature, dissolved oxygen, chlorophyll and bacteria were obtained from URI Watershed Watch. On June 8, only the bayside and cove sites were monitored due to high storm surge.

Dissolved Oxygen

Overall, the amount of dissolved oxygen in the water at each of the three sampling sites remained well above 5 mg/L at both shallow and deep depths (Figures 3 & 4), which is suggestive of a healthy water system. Levels below 5 mg/L can be stressful and potentially lethal to marine life. On July 18, the amount of dissolved oxygen at the cove site dipped slightly below 5 mg/L (4.7), but recovered the following week. This could have been a response to the high water temperature of 23Cº recorded on that day.

	16-May	30-May	8-Jun	20-Jun	5-Jul	12-Jul	18-Jul	25-Jul
Bayside	6.9	7.4	7.6	6.3	6.3	5.9	6.4	6
Oceanside	7.3	8		6.9	6	6.7	7	6.8
Bayside Temp	12	13	16	17	20	21	21	21
Oceanside Temp	10.5	11		16	17	17.5	21	19

Figure 3. Temperature and dissolved oxygen content of deep samples.



	16-May	30-May	8-Jun	20-Jun	5-Jul	12-Jul	18-Jul	25-Jul
Bayside			8	6.5	6.5	6.6	7.8	6.7
Oceanside				7.3	7.2	6.8	6.3	7.3
Cove	7.7		8.2	5.8	6.4	4.7	7.6	6.2
Bayside Temp	12.5	16	17	18	22	21	22	22
Oceanside Temp		13		16	18	19	23	20
Cove Temp	13	15	18	18	22	21	23	21

Figure 4. Temperature and dissolved oxygen content of shallow samples.

Salinity

Since all three sites are salt water environments, the overall salinity content of the water remained constant throughout the sampling period. At deep sampling depths, the salinity peaked at about 45 parts per thousand (ppt) and gradually plateaued. At shallow sampling depths, there was more variation between sites. This is most likely a product of the amount of water flowing out of the Pawcatuck River (a fresh to brackish water body).

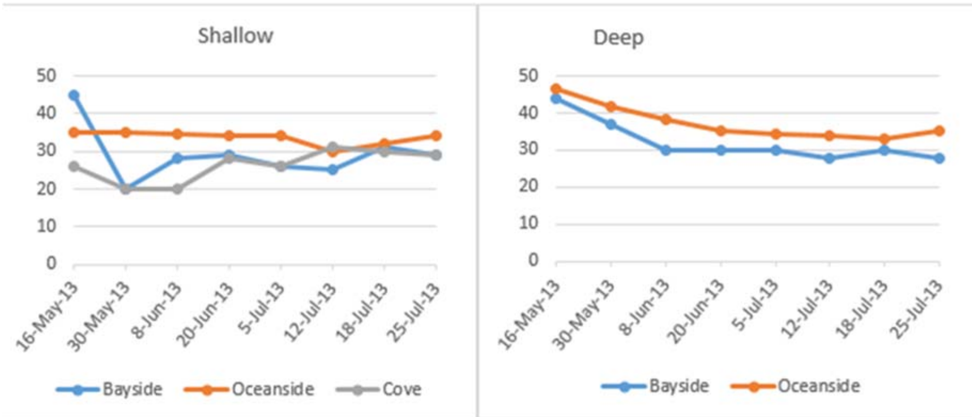


Figure 5. Salinity at shallow and deep depths.

<u>Chlorophyll</u>

Chlorophyll concentrations are a measure of the amount of algae in the water. Excessive growth of algae can be hazardous to people and lead to anoxic (oxygen deprived) water conditions. Chlorophyll samples were collected at shallow depths of each of the three sites (1 m below the surface). The mean chlorophyll levels at each site varied throughout the sampling period, but never reached levels above 13 parts per billion (ppb). Watershed Watch assigns categories to reflect the status of water bodies based on chlorophyll concentrations. Chlorophyll levels above 20 ppb are considered suggestive of a “poor” or unhealthy marine ecosystem. Concentrations were the most varied at the cove site, since it receives the least amount of salt water influx. At no point through the season did chlorophyll levels reach potentially harmful levels.

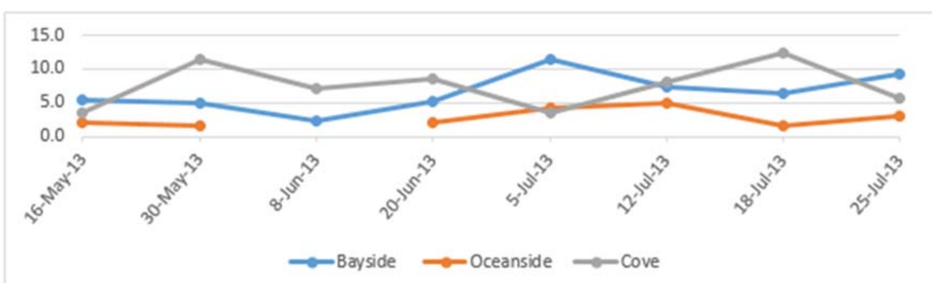


Figure 6. Mean chlorophyll concentrations, measured in ppb.

<u>Bacteria</u>

Two groups of bacteria were monitored to indicate the presence of human sewage and other disease causing pathogens in the water, fecal coliforms (*E. coli*) and enterococci. Increased bacterial levels pose a health risk to humans who use the water for recreational purposes. By Rhode Island Department of Environmental Management (RI DEM) and the Connecticut Department of Energy and Environmental Protection (CT DEEP) standards, waters containing shellfish beds cannot exceed 14 fecal coliform parts per 100 ml sample (measured as a geometric mean of multiple samples). In waters used for recreational purposes, such as swimming, the Rhode Island Department of Health requires that a single water sample cannot exceed 104 enterococci parts per 100 ml. However, the RI DEM and CT DEEP require that the geometric mean cannot exceed 35 parts per 100 ml. Bacteria levels of both fecal coliform and enterococci were consistently low (less than 10 parts/ml) during the majority of the sampling period (Table 1). The largest increase in the amount of bacteria in the water occurred in June, when levels of enterococci reached 53 parts per 100 ml. However these levels were still below the standards set my RI DEM and CT DEEP, of 104 parts per 100 ml.

Little Narragansett Bay (including tidal Pawcatuck River) and Napatree Point

Watershed code	MONITORING LOCATION	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	GEOMEAN
		- - Most Probable Number of Fecal coliform per 100 mL - -						
WD	STB - P'tuck North of WWTF	<10	10	<10	10	-	-	**<10**
WD	STB - P'tuck South of WWTF	**124**	10	<10	<10	-	-	**<10**
LN	STB - Mouth of P'tuck	<10	**31**	**42**	10	-	-	**11**
LN	STB - Watch Hill Harbor	<10	10	<10	<10	-	-	**<10**
LN	STB - Lil NB, North Sandy Pt	<10	<10	<10	<10	-	-	**<10**
LN	STB - Lil NB, S Barn Is. Ramp	<10	10	<10	<10	-	-	**<10**
LN	Napatree Point - Bayside	<10	Not run	-	<10	-	-	**<10**
LN	Napatree Point - Cove	20	Not run	-	<10	-	-	**<10**
CW	Napatree Point - Oceanside	<10	Not run	-	<10	-	-	**<10**
Watershed code	**MONITORING LOCATION**	**MAY**	**JUNE**	**JULY**	**AUG.**	**SEPT.**	**OCT.**	**GEOMEAN**
		- - - - Most Probable Number of Enterococci per 100 mL - - - -						
WD	STB - P'tuck North of WWTF	42	31	31	10	-	-	**25**
WD	STB - P'tuck South of WWTF	31	<10	42	<10	-	-	**<10**
LN	STB - Mouth of P'tuck	<10	31	<10	<10	-	-	**<10**
LN	STB - Watch Hill Harbor	<10	<10	10	<10	-	-	**<10**
LN	STB - Lil NB, North Sandy Pt	<10	<10	<10	<10	-	-	**<10**
LN	STB - Lil NB, S Barn Is. Ramp	<10	10	<10	<10	-	-	**<10**
LN	Napatree Point - Bayside	<10	53	-	<10	-	-	**<10**
LN	Napatree Point - Cove	<10	<10	-	20	-	-	**<10**
CW	Napatree Point - Oceanside	<10	<10	-	<10	-	-	**<10**

Table 1. Bacteria levels of sites within Little Narragansett Bay (data table from URI Watershed Watch). Numbers in red exceed bacteria levels established by RIDEM and CT DEEP. Note – the May 2013 Napatree Cove fecal coliform sample exceeds the threshold and should be red. The error is being corrected in the Watershed Watch database. Other nearby locations are included for reference.

CONCLUSIONS: The waters surrounding Napatree Point play an integral part of this barrier beach ecosystem. Overall, the waters samples collected during the 2013 field season were suggestive of a healthy marine environment. Data regarding phosphorous, nitrogen ammonium and nitrite levels are still being processed by URI Watershed Watch. This report will be updated in November, when water collection ends and all data has been reviewed.

Piping Plover Monitoring at Napatree Point Conservation Area, 2013

Kevin Rogers
Napatree Point Conservation Area, Watch Hill Conservancy & Watch Hill Fire District

Photo Credit: Janice Sassi

Piping Plover Monitoring at Napatree Point Conservation Area, 2013

Kevin Rogers
Napatree Point Conservation Area, Watch Hill Conservancy & Watch Hill Fire District

INTRODUCTION: Piping plovers (*Charadrius melodus*) are small shorebirds that nest in open, sandy areas along the Atlantic coast and Great Lakes region. They were common in the 19th century but they face many threats and are now listed as threatened on the Endangered Species Act. Until the Migratory Bird Treaty Act of 1918, Piping Plovers were a common victim of the millinery trade and the development of coastal areas has destroyed large portions of their habitat. Because Piping Plovers lay their eggs right out in open beach areas, they are also very susceptible to both nest predators and weather events such as high surf and extreme tides. In addition, Piping Plovers are negatively impacted by human disturbance, especially dog-walkers which are perceived to be canine predators.

Napatree Point Conservation Area provides a large area of nesting habitat for Piping Plovers, making it an important site for the recovery of the Atlantic coast population. The US Fish & Wildlife Service (FWS) has monitored Piping Plovers on Napatree since 2001. A partnership was formed between the Watch Hill Conservancy and the FWS to implement the actions outlined in the Piping Plover Recovery Plan.

METHODS: In early April, staff from WHC and FWS erected symbolic fencing around predicted nesting areas. Predictions are based on past nesting locations and experiences of FWS biologists. Fencing consists of 8-foot galvanized U-poles driven into the sand with a strand of rope running between each pole. A sign requesting that beach-goers stay out of closed areas is then attached to every other pole.

The methods reported here follow FWS protocols for Piping Plover monitoring. Once Piping Plovers start arriving from their wintering grounds, Napatree is surveyed three times a week by WHC and FWS staff. A survey is a standardized search for breeding activity. All areas with plover tracks and scrapes are noted to designate territories and all Piping Plovers encountered are tallied. Once eggs are laid, the geographic coordinates of each nest found are obtained by GPS and the nest is monitored from a distance. If no birds are found to be incubating a known nest, it is checked for failure. If the nest has failed, every effort is made to try to determine the cause of failure. Once a nest has hatched, the chicks are monitored every other day until they have fledged. Plovers are not banded at Napatree.

In most years, eligible nests have exclosures constructed around them. In order for nests to be exclosed, they must have a full 360-degree view, not be on a steep slope, and be high enough on the beach that it is not likely to be flooded during an extreme tide. However, this year FWS did not exclose many nests because of the sharp increase in Fish Crow activity at other Rhode Island beaches. Fish Crows commonly key in on exclosures, perch on them, and attempt to break in, often causing the plovers to abandon their nest.

RESULTS: This year, the first Piping Plover nest was initiated on May 11. Five pairs established territories on Napatree, which is a continuation of a downward trend since 2011 (Figure 1). Piping Plovers initiated nine nests with a total of 32 eggs laid (Figure 2). Only one of those nine nests, containing four eggs, was able to hatch. It hatched on June 26, and all four of those chicks survived long enough to fledge on July 21. We are confident in our estimate of five nesting pairs of Piping Plovers based on nest site locations and the timing of the initiation of new nests following nest failures. However, since Piping Plovers are not banded at Napatree we cannot be absolutely certain that only five pairs nested.

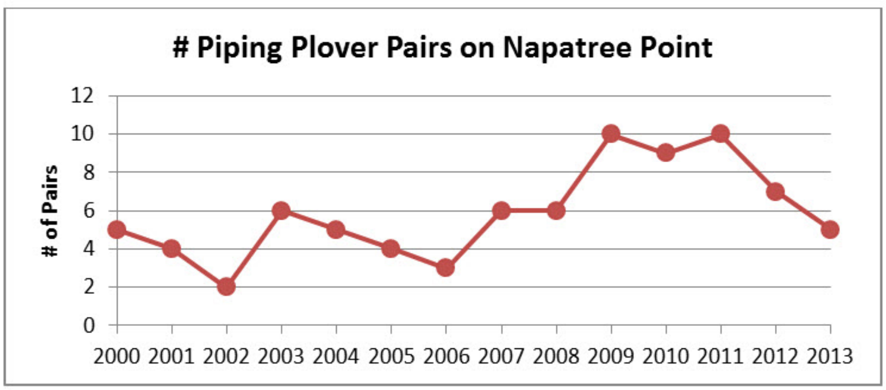


Figure 1. Piping Plover nesting history at Napatree Point.

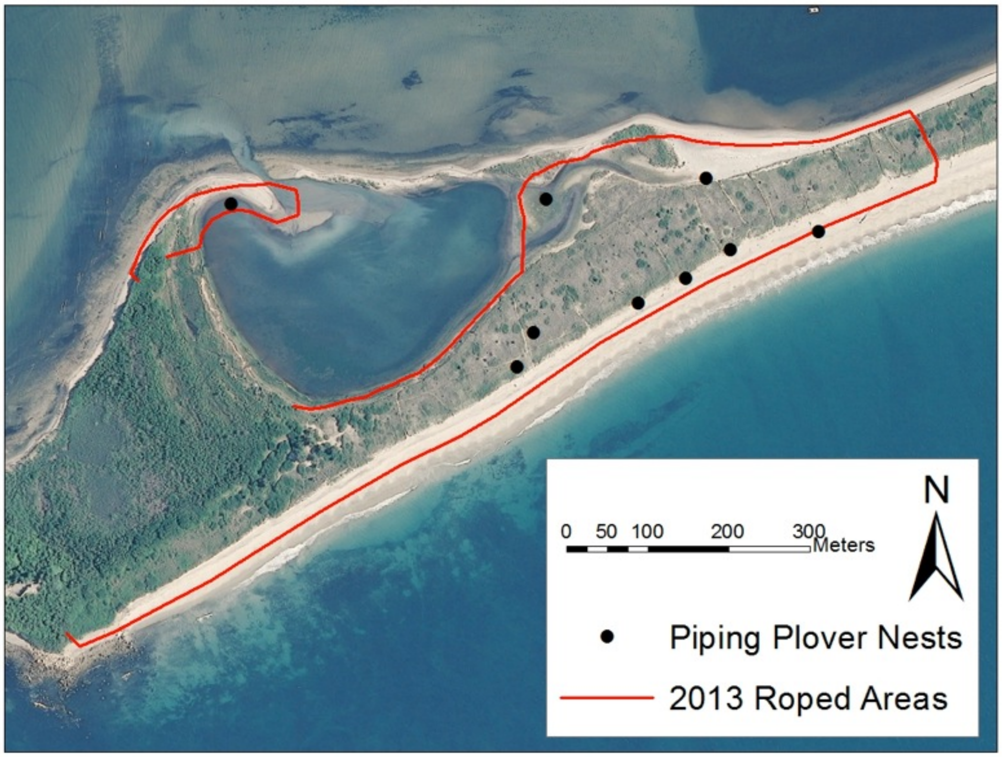


Figure 2. Piping Plover nest locations in 2013.

Out of nine nests, one hatched, four overwashed in extreme tides, one was depredated by a gull, and three had unknown reasons for failure. The three unknowns were likely depredated, but no evidence was found to confirm that. Three out of the four overwashed nests were flooded between June 8 and June 11 when the monthly new moon tides were at their highest. The fourth nest overwashed on June 30 when a high wind event created high surf.

Four chicks fledging from five pairs gave Napatree 0.8 fledglings per pair (productivity), which is the highest productivity since 2010 (Figure 3). The number of fledglings per nest attempt in 2013 was 0.44. In order to sustain the piping plover population at least 1.25 chicks per pair must be fledged.

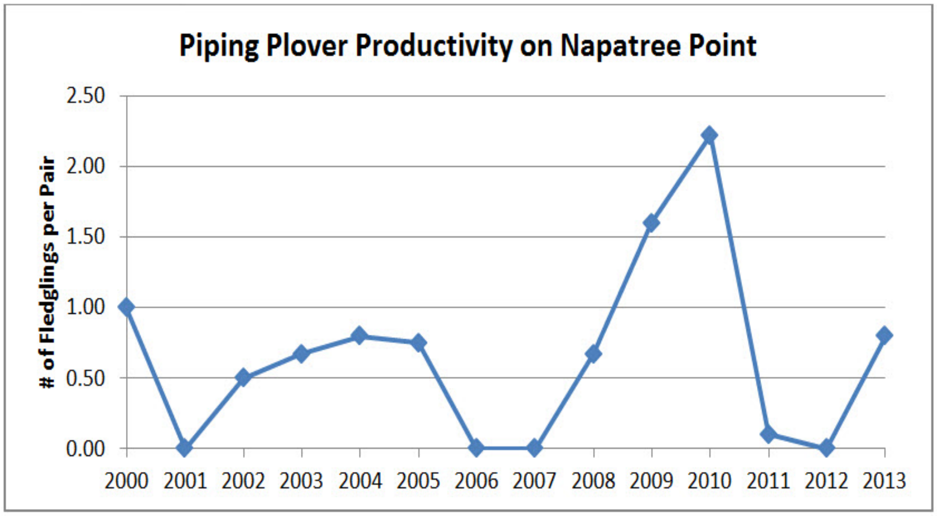


Figure 3. Piping Plover nesting productivity at Napatree Point.

CONCLUSIONS: Despite having the highest productivity in 3 years (Figure 3), the number of pairs that are choosing Napatree as a nesting site continue to decrease (Figure 1). This is likely due to the threat of mammalian depredation being extremely high at Napatree. There was a successful litter of two fox kits on Napatree in the early spring and their tracks were observed on nearly every portion of Napatree. The one area where no fox tracks were observed, the "Far Spit," was the location where the lone successful Piping Plover nest hatched. Predator management options will be discussed by FWS and WHC in an attempt to limit mammalian predators deterring Piping Plovers from nesting on Napatree next season.

Project *Limulus* on Napatree Point:
Horseshoe Crab Surveys in 2013

Kevin Rogers
Napatree Point Conservation Area, Watch Hill Conservancy & Watch Hill Fire District

Photo credit: Janice Sassi

Project *Limulus* on Napatree Point:
Horseshoe Crab Surveys in 2013

Kevin Rogers
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INTRODUCTION: Horseshoe crabs (*Limulus polyphemus*) have existed for over 300 million years. This particular species of horseshoe crab lives along the Atlantic Coast of the United States and must spawn in the intertidal zones of protected, sandy beaches. Often, this means coming into the shallow waters of coves and bays such as Little Narragansett Bay, which borders Napatree Point to the north. Napatree provides excellent breeding habitat that allows horseshoe crabs to spawn without being flipped over by large waves. Horseshoe crabs come up during the extreme high tides nearest to the full and new moons during May, June, and into July. It is during these spawning periods that horseshoe crabs are the easiest to count.

The Watch Hill Conservancy (WHC) has partnered with Sacred Heart University's Project *Limulus* (PL) to monitor the horseshoe crabs that use Napatree Point. Started in 1998 in collaboration with the US Fish & Wildlife Service (USFWS), PL relies on citizen volunteers to contribute valuable data to this scientific research. This information helps PL to estimate and monitor the population size, identify the most important spawning and nursery areas, and help answer other research questions that may be critical for the conservation of this species.

METHODS: There are four separate parts to this project: spawning surveys, juvenile surveys, tagging adults, and reporting previously tagged adults.

Spawning surveys occur during the high tides surrounding the full and new moons during May, June, and July, since that is when spawning is most likely to occur. At Napatree, the survey runs along the northern shore from the rock jetty adjacent to Watch Hill Harbor west into the lagoon and stopping at the active osprey nesting pole. All horseshoe crabs within 3 meters of this shoreline are counted, sexed, and noted whether they are paired or alone.

Juvenile surveys take place in the lagoon and are a count of the number of juveniles found anywhere in that vicinity. The juveniles are measured to determine distribution of the cohorts using this nursery area. Project *Limulus* has established size classes for juvenile horseshoe crabs based on the carapace width (mm). For example, class 8 juveniles are animals between 18-22 mm carapace width, class 9 is 23-29 mm, class 10 is 30-36 mm, class 11 is 37-41 mm, and class 12 is 42-53 mm.

The tagging of adults can occur at any time, but typically occurs during the return trip after spawning surveys. Sex, width, and shell condition are recorded. Tags are attached by creating a small hole in the shell of the horseshoe crab and then inserting the tag into that hole. These round white discs are imprinted with a unique USFWS Federal ID number and a telephone number to call to report locating an animal which has been tagged.

During horseshoe crab surveys, tagged individuals are frequently located. These animals are carefully captured long enough to record the tag number along with the sex, width, and shell condition. These recapture data are integral in estimating population size and whether the animal returns to the same beaches to spawn.

RESULTS: In 13 surveys, WHC counted 1685 spawning horseshoe crabs with most being paired (Figure 1). Of these, 66 horseshoe crabs were previously tagged. Over the course of summer 2013, WHC tagged 123 horseshoe crabs. WHC also counted 650 juvenile horseshoe crabs, in 6 surveys, using the nursery area of the lagoon. Most of the juveniles were in size class 9, 10, or 11 (Figure 2).

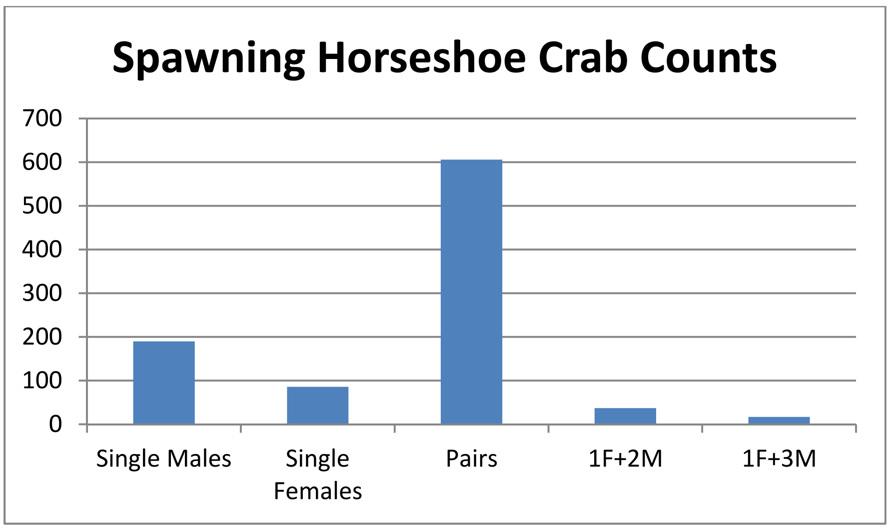


Figure 1. Numbers of horseshoe crabs counted in 2013.

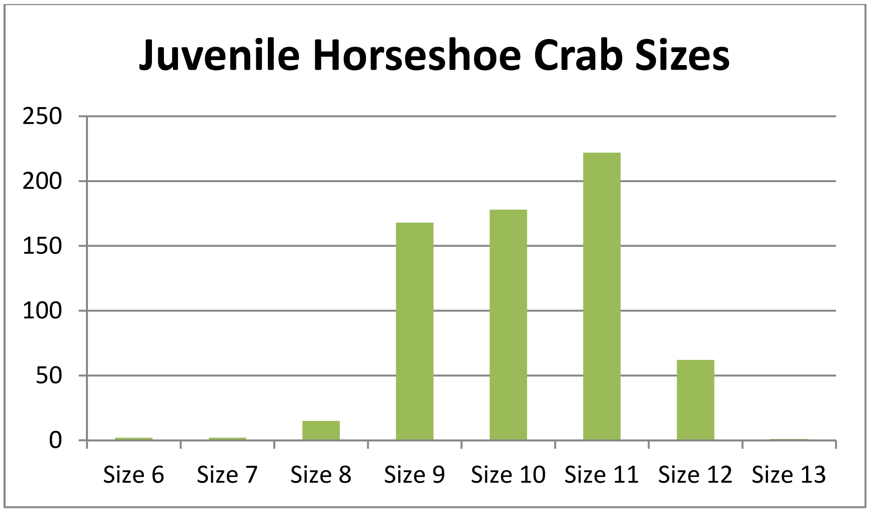


Figure 2. Size classes of juvenile horseshoe crabs counted in 2013.

CONCLUSIONS: Horseshoe crabs are an important part of the Napatree Point ecosystem and should continue to be monitored. Their eggs provide a source of fat and protein to most of the shorebirds that stop at Napatree during migration. Their shells also provide habitat for several species of ocean-dwelling invertebrates and plants. Since horseshoe crabs have been harvested for bait and medical research the population has sharply declined, making it even more important that this species is conserved on Napatree Point.

Visitor Activity on Napatree

Jessica Cressman
Napatree Point Conservation Area, Watch Hill Conservancy & Watch Hill Fire District

Photo credit: Janice Sassi

Visitor Activity on Napatree

Jessica Cressman
Napatree Point Conservation Area, Watch Hill Conservancy & Watch Hill Fire District

INTRODUCTION: In previous seasons, daily data regarding the number of boats anchored, number of visitors and number of dogs seen on Napatree had been inconsistently documented. This season a standardized data sheet to record visitor levels was created to document these numbers. These data will provide useful information when considering management options on Napatree Point.

METHODS: Data were collected starting in May using the data sheet created by beach naturalists (Figure 1a). At least one naturalist was present on the beach each day of the week. Data recorded included the number of boats anchored on the bayside, number of people on the beach, number of dogs seen off leash, number of dogs seen on leash, number of dogs seen in roped-off areas, total number of dogs seen, number of people seen in roped off areas and any incidents involving interactions with patrons. Data regarding the number of beach-goers and the number of anchored boats were usually recorded during the afternoon when the numbers were at their highest. Data regarding the number of dogs seen represented a total count for the entire time naturalists were on the beach. A data sheet was also created for staff (Tom Pappadia) working at the entrance of the beach. The form (Figure 1b) documented the number of people seen entering the beach and the number of dogs turned away at the gate each day.

DAILY DATA 2013

Observer: ______________ Date: _________ Time on beach: _______________

# of boats: ________ # of people: _________

# of dogs on leash: ________ #of dogs off leash: _______ # of dogs in RA: ________

TOTAL # of dogs seen: _______ Bird Survey: Yes / No

Number of People in RA: _________

NOTES:

PAPATREE POINT DATA 2013

DATE	TIME	# PEOPLE	# DOGS	NOTES

Figure 1a (left). Data sheet recording daily visitor activity levels. Figure 1b (right). Data sheet used by Tom Pappadia to record visitor entering Napatree at the beach entrance.

RESULTS: Between the months of May and September, a total of 17,923 people and 7,292 boats were documented using the beach or waters at Napatree. Both the number of visitors and anchored boats peaked during the months of July and August and decreased in September. Overall, more visitors used Napatree on the weekends than on the weekdays (Figures 2 & 3).

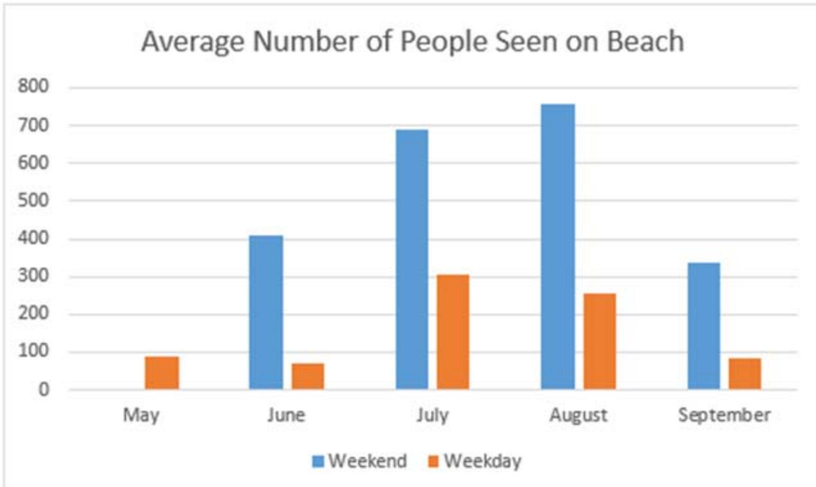


Figure 2. Average daily number of people seen on Napatree, by month.

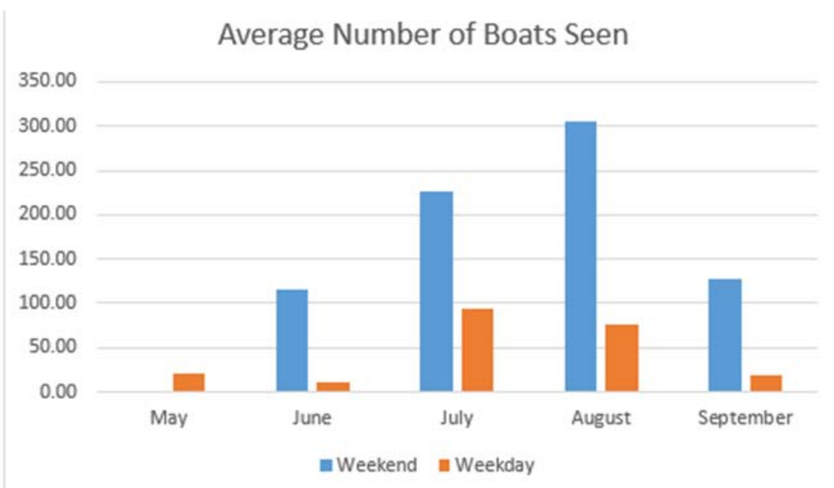
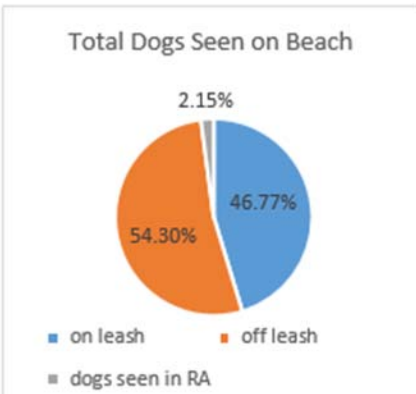


Figure 3. Average daily number of boats anchored on Napatree, by month.

The total number of dogs observed on the beach was recorded daily. The Town of Westerly's dog ordinance prohibits dogs on any town beach from May 2- September 2, during the hours of

8:00 am - 6:00 pm. Westerly Town law also states that all dogs must be leashed at all times, regardless of the date, and remain out of restricted areas. A total of 186 dogs were documented on the beach between April 11- September 9; of these, 102 (54.8%), were in violation of the Westerly dog ordinance. Of all the dogs documented on the beach, the majority (54.3%) were seen off leash and 2.15% were seen inside roped off areas (Figure 4). Overall, the number of dog observations decreased significantly from May through August, and peaks in April and September when the ordinance is no longer in effect (Figure 5). In addition to the total number of dogs seen each day, the registration and name of boats containing dogs was documented. One boat was seen allowing their dog on the beach on three separate occasions (twice in one day).



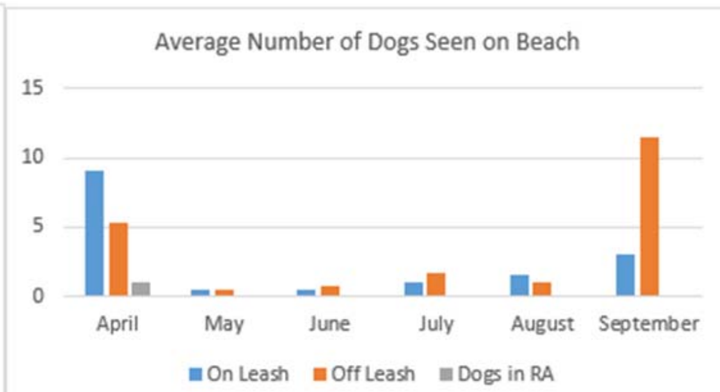


Figure 4 (left) & Figure 5 (right). Number of dogs seen on the beach and average daily number seen per month.

Additional data on visitor traffic were recorded at the entrance to Napatree Point by Tom Pappadia. Mr. Pappadia worked the gate at Napatree every weekend, usually between the hours of 8:00 am - 4:00 pm, and recorded the number of people entering the beach and the number of dogs he turned away. Occasionally he would work one additional week day. At the end of each day, 20% of the visitors entering the beach was deducted from his total number to account for people leaving and then re-entering the beach. A total of 18,986 people were documented accessing the Napatree through the main gate, and 119 were turned away. Similar patterns were seen regarding the number of visitors by month, and an overall increase in July and August was observed (Figure 6). The month of June had the highest average number of dogs turned away at the gate (Figure 7). This is most likely due to visitors being unaware that the dog ordinance had already gone into effect.

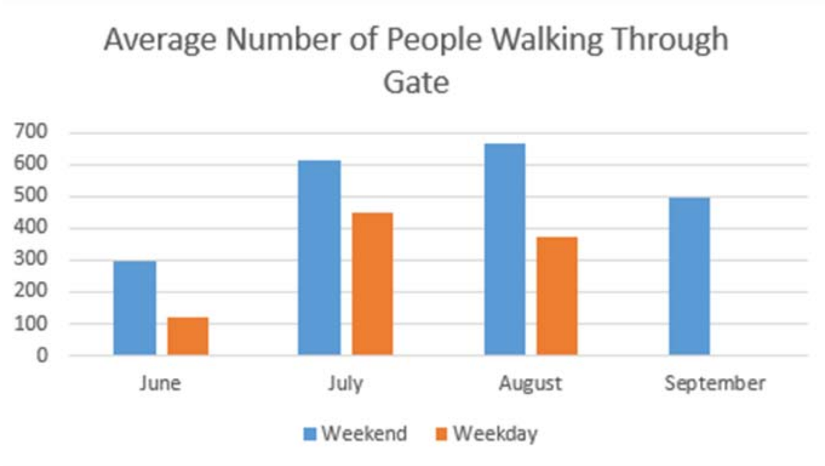


Figure 6. Average daily number of people accessing Napatree though the main gate, by month.

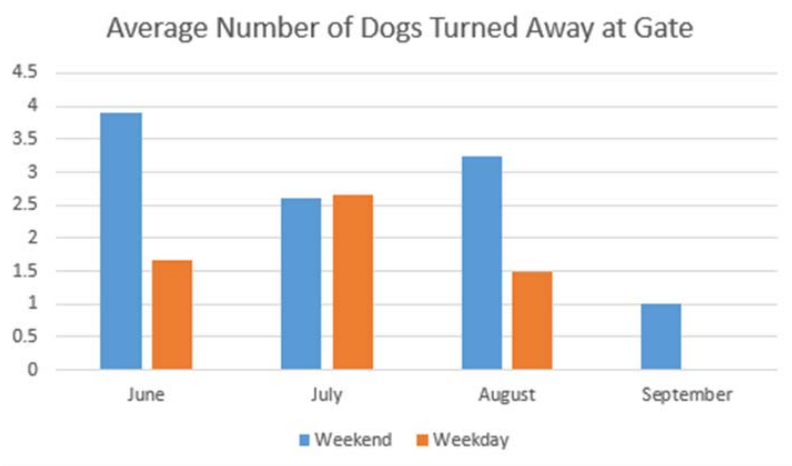


Figure 7. Average daily number of dogs turned away at the gate, by month.

CONCLUSIONS: Overall, there were few conflicts regarding people violating the dog regulations this season. The majority of boaters with dogs were initially compliant when asked to put their dogs back on their boat. From the data, it is clear that the weekends are the busiest times, and when the most incidents involving dogs occur. Due to the increase of visitors to Napatree on the weekends, the number of possible violations will increase proportionally. Therefore, having at least two staff members patrolling the beach has and will continue to decrease the occurrences of violations.

Shorebird Disturbance in the Napatree Lagoon: Summer, 2013

Thomas Mayo
College of the Environment and Life Sciences, University of Rhode Island

Photo credit: Janice Sassi

Shorebird Disturbance in the Napatree Lagoon: Summer, 2013

Thomas Mayo
College of the Environment and Life Sciences, University of Rhode Island

INTRODUCTION: The lagoon located on the northwestern part of the Napatree Point Conservation Area provides an abundance of shallow shoreline, including spits and rocky sandbars, that serve as both protection and a food source for fish and wildlife. It is a popular place for many threatened shorebird species as well as many summer time beach-goers. Over the years, Watch Hill Conservancy employees have observed many types of disturbances of the bird populations. New policies and regulations have been implemented to reduce human disturbance to wildlife in the lagoon area, especially to shorebirds. This study was conducted to understand the frequency and nature of disturbances to shorebirds and can serve as a baseline for future management activities. A full description of the methods used, results obtained, and their implications is in preparation and will be completed by summer 2014. The purpose of this report is to introduce the study and present some initial results.

METHODS: This disturbance study focused on shorebird flushing in and around the lagoon and along the northern barrier of Napatree (Figure 1). A single observation position was maintained during data collection that allowed good viewpoint from the northeastern-most osprey pole to the far west of the lagoon. Data were collected from 8:00 AM to 4:00 PM every weekend from mid-May through August 2013. Anything that caused shorebirds to suddenly take flight was considered a disturbance event.

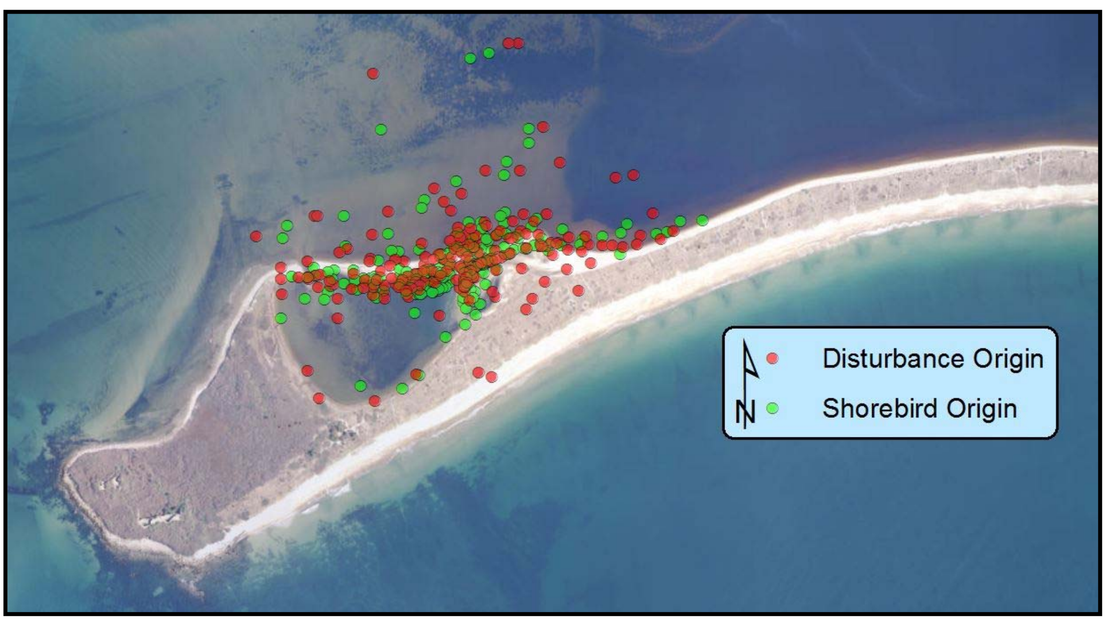


Figure 1. Napatree Lagoon study site.

To gauge the distance between the cause of a disturbance and the shorebirds, GIS software and GPS hardware were utilized. A post-hurricane Sandy shoreline was mapped, along with other features including stationary signs, roped fences, and osprey poles. These features were used to gauge where a disturbance and flush were located on the map. A daily map was then georeferenced back into ArcMap GIS software to show these locations and to calculate distances. Variables recorded for each disturbance included time of day, type of disturbance, amount of disturbance, and any species of bird observed that was flushed were recorded. Along with the records of disturbance, other variables were collected throughout the day. These variables were broken down into two zones. In each zone there was a pedestrian and watercraft count that included weather conditions and tidal state.

RESULTS: 211 disturbance events were recorded over the summer (Figure 2). Multiple disturbances, defined as activities resulting in multiple flushes but recorded as a single event, occurred slightly more often than single disturbances.

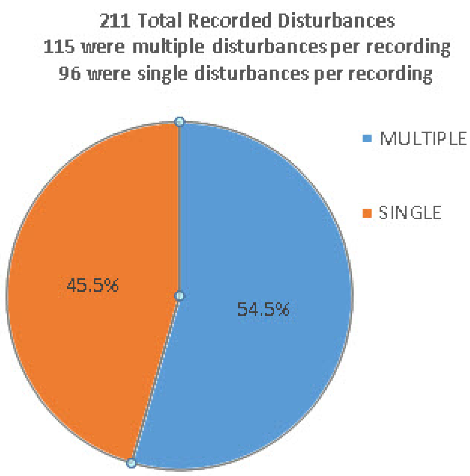


Figure 2. Frequency of shorebirds disturbance.

Disturbances were caused primarily by pedestrians (Figures 3 and 4). About one-fourth of the disturbances were caused by watercraft or aircraft.

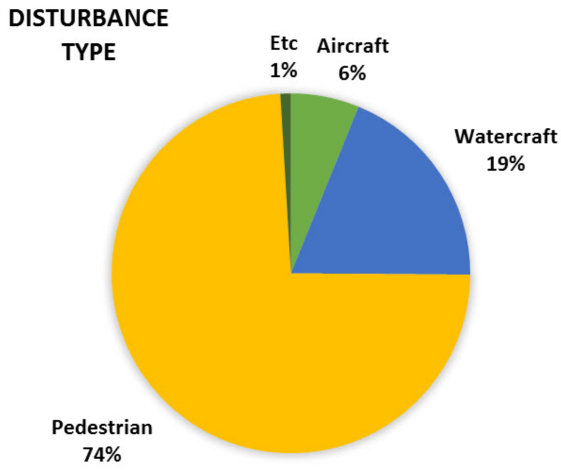


Figure 3. Sources of shorebird disturbance.

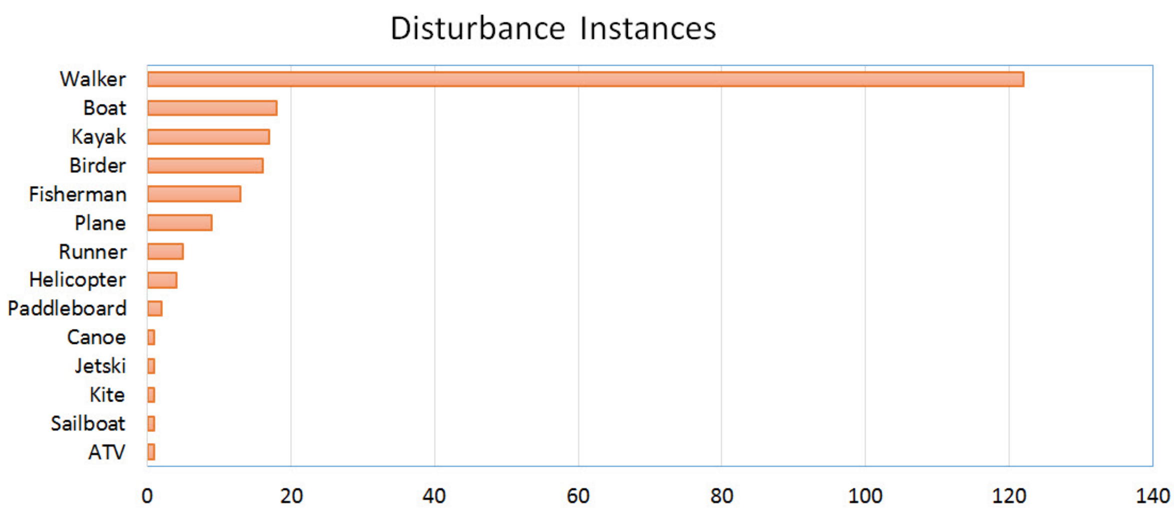


Figure 4. Sources of disturbance to shorebirds and their frequency of occurrence.

The frequency of shorebird disturbances was positively correlated with the amount of human activity at Napatree (Figure 5). The rate of disturbances was 1-3 per hour for most of the summer but on a couple of days (July 4, July 20) disturbance rates were very high (4-7 per hour) (Figure 6).

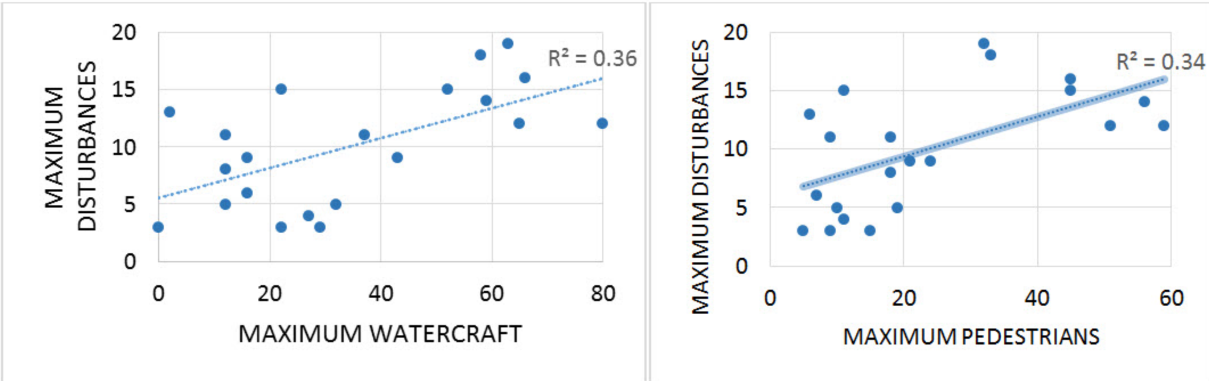


Figure 5. Relationship between the number of disturbances per day and the maximum number of boaters and pedestrians observed each day in the vicinity of the lagoon.

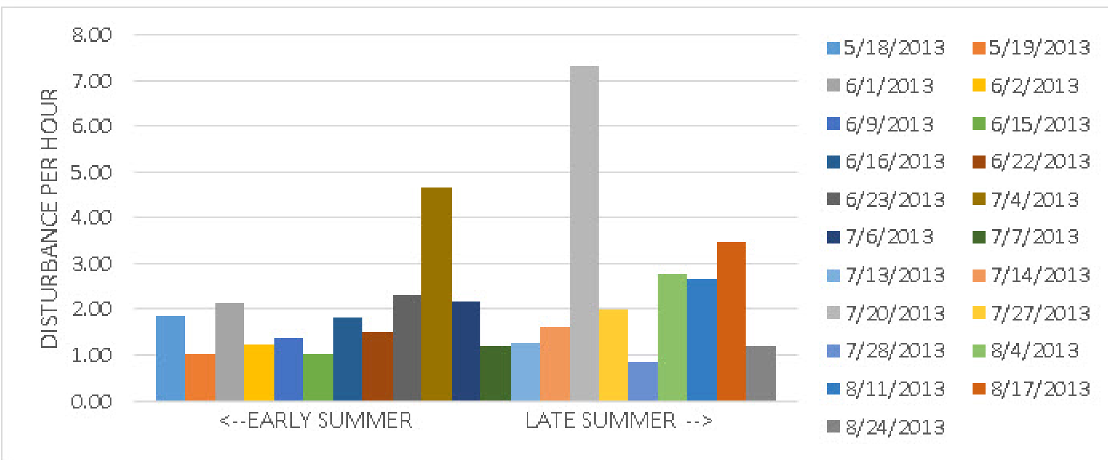


Figure 6. Daily rates of disturbance during the summer of 2013.

CONCLUSIONS: From an observational standpoint there were a significant and continuous number of disturbances throughout the year. During the prime daylight hours, shorebirds spent a significant amount of time being disturbed. A discernible spatial area can be seen from Figure 1 of disturbance locations around the lagoon and northern barrier. Different types of pedestrians were the most abundant type of disturbance, while watercraft were the next highest. A surprising number of aircraft had an impact on the number of disturbances as well. As the maximum number of both watercraft and pedestrians increase, the total number of shorebird disturbances also increases.

DATA MANAGEMENT: Data are currently on a personal hard drive and will be analyzed throughout the current school year.

Camera Trap Reconnaissance of Wildlife in the Fort Mansfield Shrublands: Winter/Spring Sampling, 2013

Peter August[1] & Janice Sassi[2]
[1] Department of Natural Resources Science, University of Rhode Island
[2] Napatree Point Conservation Area, Watch Hill Conservancy & Watch Hill Fire District

Photo credit: Janice Sassi

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Peter August[1] & *Janice Sassi*[2]
[1] Department of Natural Resources Science, University of Rhode Island
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INTRODUCTION: The densely vegetated maritime shrublands of the western end of Napatree Point are habitat for a diversity of animals. Among the mammals, some species are predators of nesting shorebirds of the Napatree beaches, dunes, and lagoon area. Other species are prey for the predatory mammals and birds. The purpose of our survey was to assess the diversity and relative abundance of mammals (and occasionally birds) in the maritime shrubland habitat of Napatree Point, Watch Hill, RI. These data will contribute to the overall ecological knowledge of the Napatree Point Conservation Area and provide objective data on the abundance of potential predators of shorebirds in the area.

METHODS: We deployed a camera trap (Reconyx Rapid Fire) station in the shrublands (71.885661^{o} Lon, 41.306583^{o} Lat) to monitor animal activity (Figure 1). The camera was mounted approximately 1 m off the ground on a tripod and set on 23 February 2013. The SD card containing photographs was retrieved on 15 March, 6 April, and 30 April. The camera ran continuously during the period of deployment and was set to record five consecutive photographs every time the motion sensor beam was broken. Each photo was stamped with the date, time, temperature, moon phase, and which shot in the five-photo sequence it was. Photos taken in the day were color and photos taken at night were black and white and were illuminated by an infrared flash. For data analysis, an animal that was continuously present for a string of consecutive photos was recorded as a single occurrence. All times were adjusted for daylight savings time.

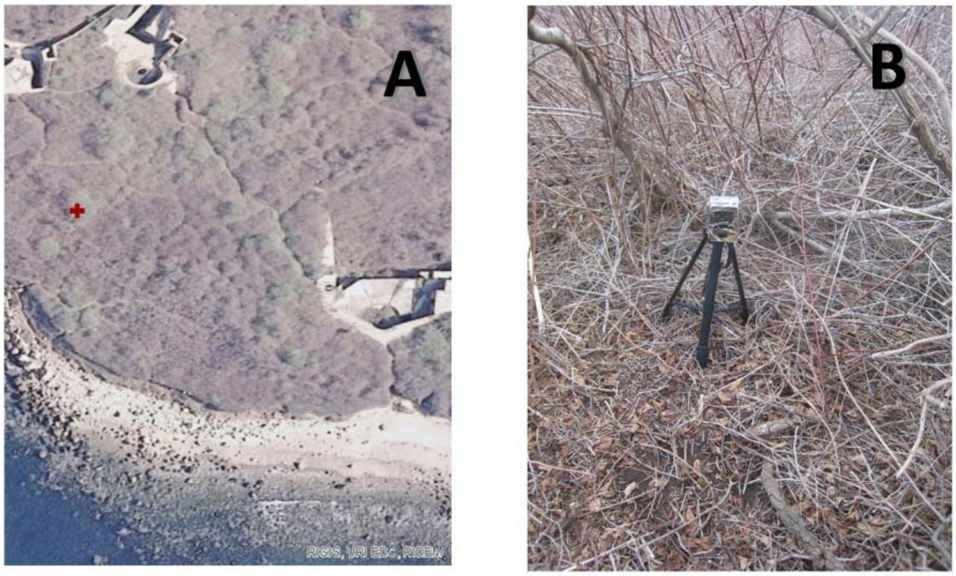

Figure 1. (A) Location of camera trap setting (red "+") near Fort Mansfield. (B) Camera trap in maritime shrubland habitat.

RESULTS: Six species of mammals and one bird species were recorded (Table 1, Figure 2) over a 64 night period. On four instances, the identity of a passing mammal was not ascertained and four different bird photos were unidentified.

Species	Common Name	Number of Visits	Notes
Peromyscus spp	Deer Mouse	32	
Didelphis marsupialis	Virginia Opossum	2	
Sylvilagus floridanus	Florida Cottontail Rabbit	25	
Neovison vison	Mink	1	
Vulpes vulpes	Red Fox	19	Two kits and one adult were seen in many photographs. The first instance of kits was on 21 March
Odocoileus virginianus	White-tailed Deer	1	
Cardinalis cardinalis	Northern Cardinal	1	

Table 1. Species recorded in the Fort Mansfield camera trap.

Figure 2. Examples of photos obtained by the camera trap. (A) Mink. (B) Red fox and kit.

Animals were photographed during the day and night, with the greatest activity in late afternoon and early evening (Figure 3). Rabbits were regularly photographed during the whole sampling period (Figure 4). Mice were abundant, except during a three week period when red foxes were most active in the area.

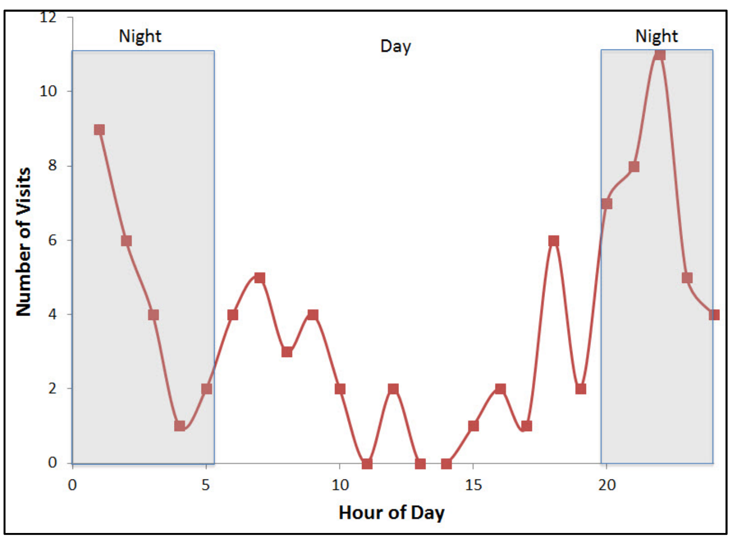

Figure 3. Camera trap visits by mammals and birds over 24 hour daily period.

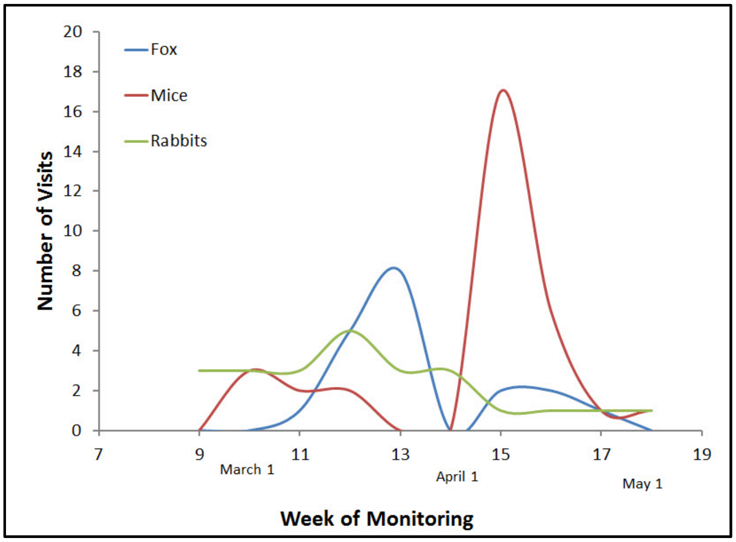

Figure 4. Camera trap visits by species by week of monitoring. Note the decline in mouse visits during peak activity by foxes.

CONCLUSIONS: Maritime shrub habitat supports an active mammal community. Predators (Fox, Mink, Opossum) are continually present but activity is sporadic. Rabbits and mice are common. Wildlife are active in winter and under a variety of weather conditions. We suggest continued monitoring over different seasons to expand confirmation of known predators at Napatree.

DATA MANAGEMENT: Photographs are stored in the NP-Data folder on DropBox under Biological/Photos/CameraTrap. The spreadsheet CAMERATRAPDATATABULATION_23Feb-30April2013.xlsx contains the raw data (species, date, time), corrections for daylight savings time, and calculation of hour of day and week of year.

ACKNOWLEDGEMENTS: This project was supported by the University of Rhode Island Coastal Institute, the USDA Renewable Resources Extension Act, and the URI College of the Environment and Life Science Extension Program in Natural Resource Conservation and Management.

Eelgrass in Little Narragansett Bay*

Michael Bradley[1]*, Marci Cole Ekberg*[2] *& Peter August*[1]
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Credit: Eelgrass ecosystem mural by Amy Bartlett Wright. Reproduced with permission from Save the Bay, Providence, Rhode Island.

* *This article was originally published in the Watch Hill Conservator, June 2013, Volume 6, Number 2, Watch Hill, RI. It is reproduced here with permission.*

Eelgrass in Little Narragansett Bay

Michael Bradley[1]*, Marci Cole Ekberg*[2] *& Peter August*[1]
[1] Department of Natural Resources Science, University of Rhode Island
[2] Save the Bay, Rhode Island

What is eelgrass?

Zostera marina, commonly known as eelgrass, is the primary seagrass species found in Rhode Island coastal waters. Eelgrass is a flowering underwater plant which grows in shallow waters at depths ranging from approximately 3 to 12 feet in Little Narragansett Bay (LNB). Like all flowering plants, eelgrass requires sunlight for photosynthesis and has a root system (rhizomes) in the subaqueous soil for absorption of nutrients and stabilization. The long, slender green blades capture rays of sunlight to produce oxygen and bend with the ebb and flow of the tides. It reproduces by seed or vegetatively by sprouting new shoots from rhizomes. It is not considered seaweed or algae which float in the water or anchor to a rock. Eelgrass can form large meadows or small separate beds, which range in size from many acres to just a yard across.

Why is eelgrass so important?

Eelgrass is one of the most diverse and productive underwater habitats found in North America. This critical estuarine habitat provides a primary source of food and shelter to an abundance of marine life, including economically important finfish and shellfish species, such as flounder, tautog, bay scallops, quahogs, lobster, and blue crabs. The bay scallop fishery has been nonexistent in Rhode Island since 1957, largely due to the loss of eelgrass beds. Recently born bay scallops as well as blue mussels rely on eelgrass beds as attachment sites where they are afforded protection, food, and structure. It is widely understood that the vitality of an estuary's eelgrass beds is an indicator of its health. Because of its importance, eelgrass is protected both at the federal (EPA) and state (CRMC) levels of government.

Historically, eelgrass beds flourished in many areas of Rhode Island and helped support a thriving commercial scallop industry. Increased water pollution, shoreline development, boat traffic, eelgrass wasting disease, and hurricane damage have significantly reduced the Bay's eelgrass beds. The loss of eelgrass beds has affected fish and wildlife populations and has virtually eliminated commercial scalloping in Rhode Island. Eelgrass is also sensitive to increased water temperatures, as we are now seeing with climate change.

Monitoring eelgrass in Little Narragansett Bay using aerial photography

Beginning in about 1994 Save the Bay (STB) began mapping and monitoring eelgrass in Narragansett Bay. In 1996 and 2006, aerial photographs were taken to map the extent of eelgrass in Narragansett Bay and other locations including Block Island. Previous to 2012, eelgrass had been mapped in Rhode Island on a piece-meal basis, meaning some sites were mapped in one year and others the next. LNB for example is part of the effort by the U.S. Fish and Wildlife Service to map eelgrass for Long Island Sound. In 2011, STB and numerous other state agencies undertook an ambitious project to map eelgrass for all coastal Rhode Island waters, including the coastal ponds, Block Island, and LNB, during the same calendar year. In order to do this, aerial photographs had to be taken for all coastal areas in Rhode Island during a specific time of year and under certain environmental conditions conducive to identifying eelgrass on an aerial photo. To accurately map eelgrass, the photos need to be taken when eelgrass is growing (June – July) and during low tide, calm winds, low sun angle, little or no cloud cover, and low water turbidity. After a year of unsuitable acquisition windows due to hurricanes (Irene) and other bad weather, the photos where finally taken on June 28th and 30th, 2012.

Eelgrass mapping

Once the photos are taken, they are opened in a computer program for viewing and interpretation. The eelgrass data layer is developed in a Geographic Information System (GIS) by digitizing and delineating the bed edges. The GIS enables scientists to view large photographic files and zoom and move to many study areas quickly and efficiently. In addition, because other agencies (like the USFWS) use a GIS to develop their eelgrass layers, they can be shared and overlayed on top of each other to view changes in the extent of the beds (Figure 1). The GIS also enables scientists to calculate the acreage of eelgrass that has been mapped.

Because other photographic signatures such as algae covered rocks also look the same in the photos as eelgrass beds, the delineations of eelgrass are taken into the field and verified. A GPS and an underwater camera are used to record the location and the habitat type.

While we are still analyzing historical data to determine the trends of eelgrass within LNB, the changes for eelgrass in just 3 years north of Napatree Point indicate that eelgrass bed edges are fairly dynamic in nature. With a total area of 201 acres in 2012, the eelgrass beds here represent the largest beds in Rhode Island coastal waters. LNB stakeholders should do what they can to conserve and protect this important estuarine habitat.

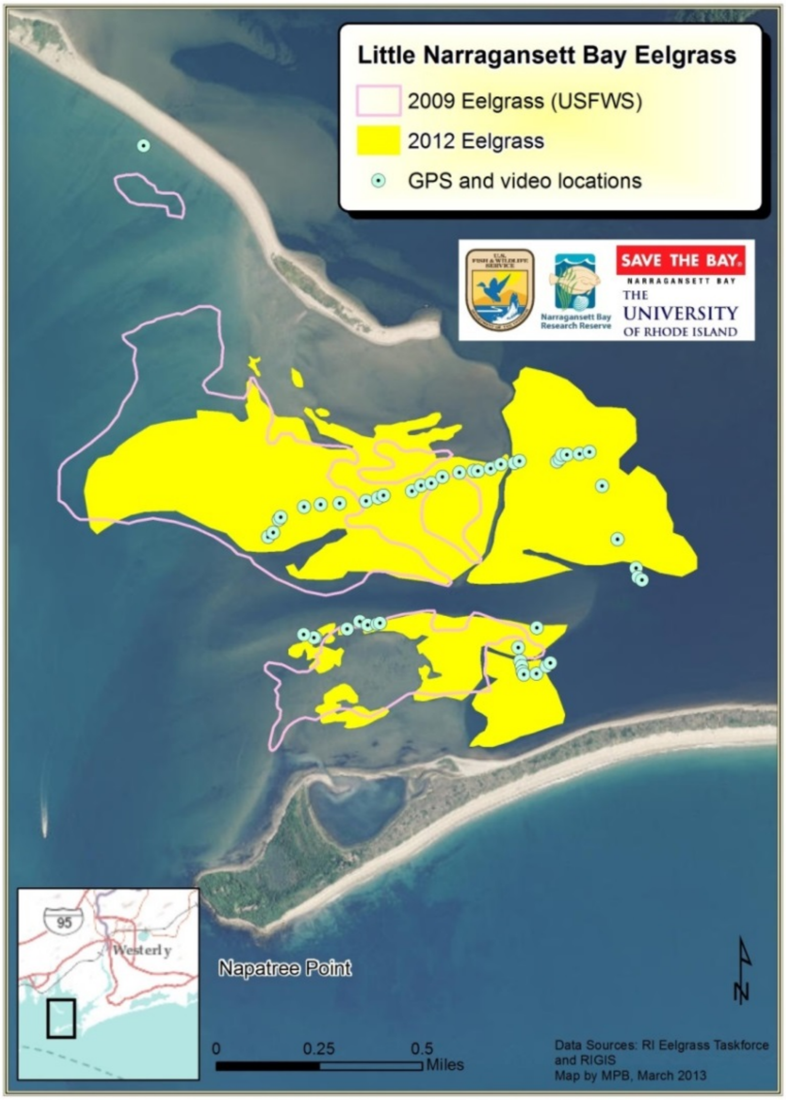

Figure 1. Map of eelgrass off Napatree Point in Little Narragansett Bay

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Notable Sightings of Fauna and Flora at Napatree Point in 2013

Monarch butterflies in migration. Photo credit: Janice Sassi

Diamond-back terrapin.
Photo credit: Janice Sassi

Prickly-pear cactus.
Photo credit: Janice Sassi

Notable Sightings of Fauna and Flora at Napatree Point in 2013

Monarch Butterflies

In previous years, Napatree Point has been an important staging area for monarch butterflies which find suitable vegetation such as Eastern Baccharis (AKA: Sea Myrtle or Groundsel Bush) to fuel their migration to Mexico. For unknown reasons, dramatically fewer monarchs were seen in 2013.

Diamondback Terrapin

The discovery of a baby diamondback terrapin (*Malaclemys terrapin*) on Napatree Point Conservation Area has caused a great deal of excitement in the scientific community. On June 9th, beachgoer Kim Larrabee became aware of a little boy who had the turtle in a pail on the beach. Feeling certain this was something special, Kim located our Naturalists who photographed it and returned the terrapin to the proper area.

The hatchling was identified as a northern diamondback terrapin, a state endangered species named for the concentric markings on its carapace (shell) which resemble facets of a diamond. The range of the northern diamondback terrapin is from Cape Cod to Cape Hatteras, NC.

Once plentiful, they were hunted almost to extinction in the 1900s and were considered to be a delicacy. Now, coastal development has drastically affected their population. Diamondback terrapins require salt marshes for foraging, nurseries and overwintering. Although they can tolerate salt water, they are typically found in brackish habitats.

With a lifespan between twenty to forty years, the female does not mature for eight to ten years. She will lay her eggs in the sand or scrub vegetation where the eggs will incubate approximately two and one half months. The length of incubation and the gender of the hatchlings are tied to temperature-the warmer the nest, more females will result. Males will grow to five to ten inches in length and the females will be larger.

Since the first discovery, there have been two unconfirmed and one other verified reports of diamondback terrapin on Napatree. On October 1, Gerry Gorman reported finding a dead Diamondback terrapin by a culvert in front of 112 Avondale Road Westerly. The animal may have been hit by a car.

URI researchers, Drs. Malia Schwartz and Peter Paton are investigating the distribution of this species in southern Rhode Island. Currently, the only known population is in Barrington.

Prickly Pear Cactus

Prickly pear cactus (*Opuntia sp.)* is found on the east coast from Florida to the sand dunes of Cape Cod. A Rhode Island endangered species, prickly pear cactus has never been documented on Napatree Point.

Numerous spiny, flat, paddles (cladodes) of prickly pear washed ashore on Napatree during Hurricane Sandy which occurred October 29, 2012. These pieces may have originated from a population of plants on Long Island.

By early July 2013, several young prickly pear cactus plants were growing on both the ocean and bayside of Napatree. The location of these plants were recorded using a GPS and these places will be checked in 2014 for regrowth.

Notable Bird Sightings: 2013

Compiled by Reynold Larsen, Kevin Rogers, eBird

Recognized as an Important Bird Area (IBA) by the National Audubon Society, Napatree Point Conservation Area is a vital resource for breeding species such as the Piping Plover and various migrants including shorebirds and hawks. The partial list below is assembled from sightings reported by Reynold Larsen (who has been recording Napatree bird species since 1963), Naturalist Kevin Rogers, and other contributors to eBird.

Species	*Date Observed*
White-winged Crossbill	February 5
Snowy Owl	February 5
King Eider	May 16 to June 10
Long-tailed Duck (2)	June 1
Yellow-billed Cuckoo	June 8
Royal Tern	August 8
Whimbrel (2)	August 27
Dickcissel	August 27
Black Tern (2)	August 28
Wilson’s Phalarope	September 1
Hudsonian Godwit	September 5
Western Sandpiper	September 13
Blue-winged Warbler	September 14
Northern Waterthrush	September 14 and 28
Caspian Tern (2)	September 18
Baird's Sandpiper	September 26
Lapland Longspur	September 28 to October 7
Pectoral Sandpiper	October 13
Cedar Waxwing (2)	October 28

The following is a list of significant numbers of a species seen on Napatree during one survey:

Species: Number Observed	*Date Observed*
Brant: 284	April 24
Ruddy Turnstone: 225	May 28
Black Skimmer: 8	July 10 (A historic high)
Willet: 21	July 12

Roseate Tern: 18	July 23
American Oystercatcher: 64	August 15
Red Knot: 13	August 27

Miscellaneous: Two chicks were fledged by an Osprey pair nesting on a platform located N41º 18.479' W071º 52.801'