Nantucket Biodiversity Initiative's
7th Biennial Research Conference
4 November, 2017

Presentation Abstracts – alphabetical by Presenter, bold signifies presenter.

BENTHIC HABITAT MAPPING IN BAYS AND HARBORS: A CASE STUDY FROM CAPE COD NATIONAL SEASHORE

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In response to Hurricane Sandy the U.S. National Park Service (NPS) funded multi-year projects at four coastal parks to develop benthic habitat maps. These projects were designed to document current benthic habitats, and to provide a baseline data set to measure future habitat change as a result of similar storms, and/or other natural and anthropogenic impacts. The maps were created using a combination of vessel-based, acoustic surveys and sediment grab samples.
Cape Cod National Seashore was the northern most park to be mapped for the larger project. Over three field seasons (2014-2016) approximately 83 km^2 (32 mi^2) of the seafloor was mapped using a Phase-Measuring Sidescan Sonar (PMSS) within three shallow embayments (Pleasant Bay, Nauset Marsh and Wellfleet Harbor) and one nearshore area, (Herring Cove, Provincetown). The PMSS collects dual-frequency backscatter imagery (operating frequencies 550/1600 kHz) coincidently with swath bathymetry (op. freq. 550 kHz). Benthic grab samples (n = 357) were collected using a 'young-modified' Van Veen sampler at 119 stations (3 replicates per station).
The data, final maps, management uses and implications will be discussed. The maps were developed using the Coastal and Marine Ecological Classification Standards (CMECS). As the federally recognized standard CMECS will make all maps developed using this 'language' more easily interpreted for future work or to compare work in different settings, which is critical for measuring system evolution as it relates to natural and anthropogenic stressors.
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PREVENTING TICK-BORNE DISEASE ON NANTUCKET

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Over 300,000 people in the US are diagnosed with Lyme disease each year and up to one in five develop serious, long-term symptoms. According to the Centers for Disease Control and Prevention, Lyme disease is the most commonly reported vector borne illness in the United States. Unfortunately, Lyme is only the most common of a long list of tick-borne diseases, many posing even more serious health problems with no near-term – let alone permanent – solutions.

In the Northeast and upper Midwest, the risk of tick-borne disease has grown as a result of environmental changes that have improved conditions for the ecology of tick-borne disease by dramatically increasing the number of white-tailed deer, blacklegged ticks and white-footed mice, the primary reservoir of tick-borne pathogens. Few areas are as afflicted as the island of Nantucket. Between 2010 and 2014, Nantucket had the second highest proportion of confirmed and probable Lyme disease cases in Massachusetts.

Mice Against Ticks is an open, community-guided project which aims to safeguard Nantucket by permanently breaking the transmission cycle between white-footed mice and ticks through immunizing the local mouse population. This long-lasting, ecological solution should reduce the number of infected ticks, prevent new human infections and profoundly impact this growing public health challenge.

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TALES OF THREE MARSHES 2017 (THE SEAS ARE RISING)

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Observations of salt marsh biodiversity have been recorded photographically between 2004 and 2017 at Plum Island (Newburyport, MA), Sandy Neck (Barnstable, MA), and Eel Point (Nantucket MA). During this time, changes have been observed in plant and animal communities in all three locations, likely correlated to the rise in mean sea level which has occurred. The most obvious change has been the decline in salt hay (*Spartina patens*), a high marsh species which is not suited to increased tidal inundation, and a concomitant increase in salt marsh cordgrass (*Spartina alterniflora*). The repercussions of these changes to overall marsh structure will be discussed, as well as those which may result from future sea level rise.

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NORTHERN LONG-EARED BATS ON NANTUCKET

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The rare Northern Long-Eared Bat (*Myotis septentrionalis*) (NLEB) has experienced population declines of up to 99% across the Northeast, following the spread of the fungal disease known as White-Nose Syndrome. However, the species appears to be persisting in the Cape and Islands region. In 2015, we documented presence of NLEB at multiple sites on Nantucket, using acoustic detectors, and identified a dead NLEB specimen found near Johns Point. In 2016 and 2017, we expanded acoustic monitoring and conducted a small-scale mist-netting effort to explore NLEB habitat use. In both years, we captured lactating females and volant juvenile bats of healthy weight, suggesting maternity colonies on the island are successfully reproducing. We tracked radio-tagged bats to colonies of up to 18 individuals roosting in pitch pines and houses. We also tracked a bat in fall 2016 to a crawl space hibernaculum on-island, which it shared with at least four other NLEB. We located one hibernating NLEB in the crawl space in February 2017, demonstrating at least some bats are overwintering on the island; this bat showed no visual sign of infection with White-Nose Syndrome. Our acoustic data indicate the species is widespread on the island, which is surprising considering that NLEB are typically thought of as "deep forest" bats, and forest cover on the island is only ~12%. If Nantucket is supporting persistent NLEB populations, it may be important to consider maintenance of mature forest patches in management planning, rather than focusing solely on promotion of early successional habitats.
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NANTUCKET'S NEGLECTED HERBIVOROUS INSECTS

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Little-known herbivorous insects such as gall inducers and leafminers were largely ignored in past assessments of Nantucket's biodiversity. To address this knowledge gap, we conducted intensive 3- to 7-day surveys for galls and leaf mines throughout the island and on Tuckernuck in September 2011, May and August 2012, June 2013, July 2014, and August 2015. Incidental observations and collections were made throughout the spring and summer of 2012, in November 2013, and in May 2014. In June 2016 and July 2017, we expanded our surveys to include other neglected insects such as leaf-tying micro-moths and free-living sawfly larvae. Each type of larva or characteristic plant damage was photographed, and when possible samples were collected in an attempt to rear adults. Collected and reared specimens have been sent to specialists around the world for examination. Each visit to Nantucket has yielded many new species for the island and a few new to science, some of which have now been formally described. We have also documented new host records for some species and discovered the immature stages of a few species previously known only from adults. Well over 200 gallmakers, leafminers, and associated hymenopteran parasitoids have now been found on Nantucket, most of them during our study, and we are continuing to add new species in these and other groups.
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PLANT COMMUNITY DYNAMICS OF DOUBLE-CRESTED CORMORANTS ON NANTUCKET ISLAND, MA

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Double-crested Cormorants (*Phalacrocorax auritus*) began successfully nesting on Nantucket within the last 15 years, providing an opportunity to study how a small colony (<200 pairs) of ground-nesting cormorants established and interacts with beach and dune plants. Active cormorant colonies physically and chemically alter habitat in and around the nesting area through vegetation trampling, plant removal, and nutrient deposition. However, once a colony abandons a nesting site and a consistent disturbance regime is absent, the ornithogenic nutrients in the soil can spur plant recolonization and succession. A colony abandonment occurred on the north side of Coatue before the 2015 breeding season. The number of nests in the new active cormorant colony increased from 82 in 2015 to 135 in 2017. Using GIS measurements, we documented that the area of bare sand and trampled vegetation in the active cormorant colony increased to accommodate these new nests. General plant diversity surveys were conducted in the active and abandoned cormorant colonies in 2015 and 2016. In 2017, 110 square meter quadrats were surveyed to record plant diversity and community structure of 5 habitat plots, including the active and abandoned cormorant colonies as well as the surrounding open beach, primary dune, and interdune. A total of 24 plant species were recorded across the 5 habitat plots, allowing for comparison of community structure and composition for each habitat. Analysis of the plant survey results is still ongoing. Studying the spatial relationships of the birds, humans, and plants that use this property will facilitate informed management practices.

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A COMPARISON OF FORAGING ECOLOGY BETWEEN URBAN AND REMOTE SEABIRD COLONIES

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The effects of urban pressure of colonies on the foraging behavior of breeding herring gulls (*Larus argentatus)* were studied by comparing the movements of birds from three colonies (Jamaica Bay, Youngs Island, and Tuckernuck Island) in the Northeast U.S. that differ in their proximity to urban environments. GPS data loggers were deployed and retrieved from 15 individual gulls during incubation in 2016 and 2017 with a total of 1107 foraging trips observed at the two sites (n= 491 at Jamaica Bay, n=184 at Tuckernuck, and n= 432 at Youngs Island). There was considerable variation in foraging locations used between individuals within both colonies. Site fidelity was significantly higher (p=.001) for birds at Jamaica Bay, than gulls at Tuckernuck or Stony Brook. However, nested ranks tests indicated that foraging trips to these human habitats did not significantly differ in distance and time to those trips visiting estuarine and offshore habitat. Gulls belonging to the Tuckernuck island colony took significantly longer foraging trips than those at Jamaica Bay and Youngs Island (ANOVA; p=0.027), but there was no significant difference in the total distance or farthest distance traveled between the three colonies. Our preliminary results from this work suggest that the use of urban environments as foraging habitat greatly influences the foraging behavior of herring gulls at the colony level. Higher site fidelity and shorter trip durations in birds breeding in urban environments demonstrates how human habitats may be predictable and reliable resources for herring gulls foraging near large cities.

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MATERNITY COLONY AND FALL/WINTER PERSISTENCE OF THREATENED NORTHERN LONG-EARED BATS ON THE ISLAND OF MARTHA'S VINEYARD, MA.

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The federally threatened Northern Long-eared Bat (*Myotis septentrionalis)* (MYSE) is persisting in multiple locations on Martha's Vineyard, Massachusetts, despite a confirmed bat death from white-nose syndrome (WNS) in February 2017. We used a combination of acoustic monitoring, emergence counts, mist netting, and radio tracking to locate 3 summer MYSE colonies in 2015 and monitor them in 2016 and 2017. In 2015, we captured and radiotagged 8 reproductive females that occupied house and tree roosts and a single female at another site that occupied tree roosts with 5 other bats. We confirmed a third colony through mist net capture of a volant pup at a house roost. In 2016, acoustic detections confirmed activity at one colony while mist netting at house roosts confirmed lactating females at another and females with volant pups at the third. In 2017, acoustic detections re-confirmed activity at 2 colonies, and we captured lactating females at the third. To monitor for migration behavior in the fall, we radiotagged 2 female MYSE in Sept. 2015 and 1 in October 2016, and tracked them to day roosts for 14 - 24 days. These bats remained on the Island during monitoring, and one was roosting in a tree on 7 November 2016. This fall roosting behavior, coupled with four opportunistic observations of MYSE in February or March at structures, suggest that some MYSE do not migrate off-island. We hypothesize that MYSE overwinter in multiple sites on Martha's Vineyard, which may provide some protection from the most severe impacts of WNS.
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EXPLORING DIFFERENCES IN ADULT SURVIVAL AND SITE FIDELITY OF MIGRATORY AND NON-MIGRATORY AMERICAN OYSTERCATCHER (*HAEMATOPUS PALLIATUS*) POPULATIONS.

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The conservation of a species is reliant on identifying threats to critical vital rates such as survival and dispersal. Accurate estimates of these vital rates and the factors that affect them can be used to better manage populations. The Atlantic Coast population of American Oystercatchers (*Haematopus palliatus*) benefits from a large-scale conservation effort, but this long-lived species remains especially sensitive to fluctuations in adult survival. The model used here along with eight years of mark-resight data from three breeding populations with varying migration strategies (migratory: Nantucket, Massachusetts and southern New Jersey; non-migratory: Cape Romain, South Carolina) were used to estimate adult survival and site fidelity. Results indicated a migratory population in Massachusetts with the majority of individuals wintering in Florida (42%), a partially migratory population in New Jersey with a portion of the breeding population overwintering in that state (33%), and a resident population in South Carolina with 100% of the breeding population wintering in that state. Annual adult survival did not vary among populations. Although the average estimate of adult survival was high (0.89), there was an apparent decline in adult survival (from 0.94 to 0.83) over the study period. Given strong site fidelity (0.91), adult mortality is a critical factor for the viability of local populations.
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THE ORTHOPTERA OF MARTHA'S VINEYARD

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I will present the results of seven field seasons surveying the grasshoppers, crickets, and katydids on Martha's Vineyard island. Orthoptera play significant ecological roles as consumers and as prey, and some species may be vulnerable to extirpation. But this order has been little studied in the Cape/Islands region.

My primary purpose was to synthesize existing information and current observations by myself and collaborators into a credible summary of Orthoptera occurring on the Vineyard, including their distribution and abundance. A secondary purpose was to assess the feasibility of using informal nature study methods (direct observation, photography, and sound recording, as opposed to collection of specimens) to survey this group.

For identification, I relied on multiple print, internet, and "citizen science" resources. To date the study has documented (with varying degrees of rigor) 44 species of Orthoptera on the Vineyard. In most cases, documentation consists of macro photographs showing diagnostic characteristics. The study methods used have proven adequate for all except a few difficult taxa (e.g., *Allonemobius* ground crickets) for which wholly reliable field identification methods do not exist. This project also points to further research needs, e.g., verification of some older records and development of new ID criteria.

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A HALF-CENTURY OF OSPREY POPULATION RECOVERY IN SOUTHEASTERN NEW ENGLAND.

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Osprey (*Pandion haliaetus*) populations nesting in southeastern New England (Rhode Island and Massachusetts) collapsed from about 200 active pairs in 1940 to 35 in the early 1970s. In the 1970s, within five or six years of the cessation of DDT use in the region, the Osprey population began to recover. This recovery was not synchronous across the region and current distribution and numbers differ substantially from those of the pre-DDT period. Colonies on Narragansett and Mount Hope bays in Rhode Island failed to recover their former remarkable densities, but a new concentration of Ospreys has established itself nearby in southeastern Massachusetts on the Westport River, the islands of Martha's Vineyard and Nantucket, and most recently, on Cape Cod. From this area, the species' range has gradually expanded northward, with the Massachusetts population now contiguous with the New Hampshire population and spreading west into the CT River Valley and the Berkshires. The current population in MA/RI now exceeds 700 pairs, almost three times historic numbers, and is predominantly (ca. 95%) nesting on human-made structures either erected as nest platforms or co-opted by Ospreys as nest support structures. This ability to adopt artificial structure as nest sites, as well as a broad diet that includes many of our locally common fish species, has helped drive the remarkable comeback of this raptor in our region.

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EVALUATION OF THE PREY BASE AND FEEDING RELATIONSHIPS OF THE AMERICAN BURYING BEETLE (*NICROPHORUS AMERICANUS*) ON NANTUCKET, MA.

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The American burying beetle, *Nicrophorus americanus*, (ABB), once widely distributed across the eastern two-thirds of North America, has recently experienced a dramatic decline in abundance and geographic range. In 1989, the ABB was listed as a federally endangered species. The last recorded naturally occurring ABB on Nantucket Island, Massachusetts was in 1926. In 1994, efforts began to reestablish the ABB on Nantucket using lab-reared offspring of wild-caught individuals from Block Island, Rhode Island; the only naturally extant ABB population east of the Mississippi River. Despite an initially successful reintroduction, the population shows little evidence of recruitment and likely requires human assistance for long-term success. A key requirement of the ABB's life cycle is the availability of small vertebrate carcasses used for breeding. Despite over 30 years of research, we know little about the preferred carrion base necessary to support a healthy ABB population. In this study, we investigated feeding relationships of local burying beetles using stable isotope analysis ($\delta^{13}C$ and $\delta^{15}N$) conducted on small elytral clips collected from live-captured specimens. Because burying beetles build body tissues using energy from the carcass on which it was raised, the stable isotope ratios of $\delta^{13}C$ and $\delta^{15}N$ in adult burying beetles should reflect their larval diet, indicating the carrion their parents used as a reproductive resource. A comparison of the local prey base and feeding relationships between Nantucket and Block Island will provide critical information to manage existing ABB populations, and inform ongoing reintroduction and conservation efforts and habitat management.
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UNDERSTANDING THE DISTRIBUTION OF THE *NICROPHRUS* CARRION BEETLES ON NANTUCKET, MA

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In 1993 the federally endangered American Burying Beetle (*Nicrophorus americanus*, ABB) was reintroduced to Nantucket, MA. As the ABB numbers were monitored each year three other Nicrophorus species were also encountered in the pit fall traps, *N. orbicollis, N. marginatus, and N. tomentosus.* Beetles were trapped in pitfall traps at 12 sites in the Eastern Moors, Nantucket. This study summarizes the distribution changes from year to year of these three other *Nicrophorus* beetle species in comparison to the ABB. We also investigated the trap data for correlation in changes of species abundance. The whole suite of carrion beetles is ecologically important because some are generalists, while others are specialists and some are diurnal while others are nocturnal. Understanding the changing distribution of a beetle species community is important when managing the reintroduction of an endangered related species.
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CREEK DISTANCE AND SEAGRASS DENSITY EFFECTS ON CRAB SPECIES ABUNDANCE

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Crabs are important predators who affect the seagrass ecosystems of Nantucket. Some crabs such as Carcinus maenas, are invasive, and can cause problems. Yet we have little idea about the factors that determine the distribution and seasonality of crabs on Nantucket. I hypothesized that highly structured habitats, such as seagrass beds and proximity to feeding grounds such as salt marshes can influence their distribution. Here I show how crab species diversity in Nantucket seagrass beds varies throughout the summer and how it is affected by seagrass density and proximity to healthy salt marshes. I recorded abundance and size of crabs caught in baited traps and seine nets over ten weeks in 2017. I show that crab abundances are higher closer to the salt marsh creek. Different species also varied in their abundance throughout the summer, suggesting differing temporal dynamics between species. There was evidence of interspecies and intraspecies interaction and predation. Overall my results show that crab species distribution and interactions are linked to both habitat and to temporal changes.
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PATTERNS IN VEGETATION COMPOSITION OF TWO FORMER CRANBERRY BOGS PRIOR TO ECOLOGICAL RESTORATION IN SOUTHEASTERN MASSACHUSETTS

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Cranberry bogs form a vital part of the economy and cultural heritage of southeastern Massachusetts. An expansion of bog area throughout the country, and an effort to modernize them with higher-yielding cultivars, puts Massachusetts at a disadvantage. Sustaining a viable cranberry industry in Massachusetts requires pathways for: (1) upgrading some bogs with higher yielding cultivars, and (2) providing exit strategies for retiring bogs. Because many bogs were formed on natural peat wetlands, ecological restoration has emerged as a logical and inexpensive alternative. Two southeastern Massachusetts bogs have been restored in the past decade, but there has been no attempt to quantify plant responses.
The long-term goal of this study aims to measure the effect of soil conditions on plant responses in Lower Coonamessett (LC) and Tidmarsh West (TW) bogs by surveying before and after vegetation composition and environmental characteristics. Pre-restoration results indicate that LC has higher species richness and floristic quality, while TW has higher diversity and a lower proportion of wetland indicator species. Soil moisture is significantly higher at Lower Coonamessett bog and might control vegetation composition. Ultimately, the time since abandonment and the site-specific hydrology likely influence vegetation patterns at these sites and could lend to different restoration results. This study is essential to maximize ecosystem services, minimize undesired consequences, and provide a measure of success to guide future restorations of former cranberry bogs in the region.
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RADICAL TEMPORAL SHIFT IN THE GENETIC COMPOSITION OF NEW ENGLAND CHICORY POPULATIONS

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The current flora of Massachusetts, including Cape Cod and the Islands, consists of both native and non-native species. *Cichorium intybus* (chicory) is known to be a domesticated, weedy and invasive species. Anthropogenic colonizations are reshaping the biodiversity and the evolutionary path of many plant species. As introduced species have spread within recent times, they provide an opportunity to investigate the genetic changes through time and space, using herbaria DNA samples. Employing modern and historical collections dating back to 1846, we have provided a more complete understanding of the population history of the nonindigenous weed chicory in North America. Multiple haplotypes were introduced by 1890s and they are still here today. New England floral composition has changed over the past hundred years. Our data indicate that intraspecific genetic changes also contributed to the success of chicory in the novel habitat. Chicory population structure seems to have changed dramatically in the last 20+ years as the species evolved to changing climate.
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Poster Abstracts– alphabetical by Presenter, bold signifies presenter.

USING POND NUTRIENT LEVELS TO PREDICT METHYLMERCURY CONCENTRATIONS IN FRESHWATER FISH

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Methylmercury (MeHg) is a neurotoxic pollutant that bioaccumulates and biomagnifies in food webs throughout freshwater ecosystems, threatening the health of humans who consume predatory freshwater fish. However, due to the variability in physical and chemical conditions across freshwater bodies, predicting the magnitude of MeHg bioaccumulation in a given freshwater system is difficult, even with known values of mercury contaminants in that lake or pond. Eutrophic, high-nutrient pond conditions have been linked to decreases in zooplankton MeHg concentrations. The same trend may extend to not only the planktivorous juveniles but also the adults of those fish at the top of the food web that humans consume. We measured nutrient and phytoplankton levels in six pond systems on Nantucket Island to determine whether an increase in these factors is related to reduced MeHg levels in pond fish. While we found just one fish species across all six ponds (*Perca flavescens*), we collected enough individuals of three additional species (*Lepomis gibbosus*, *Fundulus majalis*, and *Morone americana*) from multiple ponds to analyze differences in MeHg across both fish size and varying pond conditions (such as temperature, salinity, dissolved oxygen, N, P, and *Chl a* content). Although our analysis is ongoing, we hope to determine whether pond nutrient levels may serve as sufficient predictors for the safety of fish stocks within a given freshwater system.
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USING LIGHT-LEVEL GEOLOCATORS TO STUDY MIGRATION AND NESTING PHENOLOGY OF EASTERN WILLET ON MARTHA'S VINEYARD, MASSACHUSETTS

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While many aspects of Eastern willet (*Tringa semipalmata*) life history have been studied, their migration behavior was a mystery until new technology became available in the last decade. From 2013 – 2016, we used light-level geolocators to study willet migration and nesting phenology on the island of Martha's Vineyard, Massachusetts as part of an Atlantic coast study examining life history phenology along an latitudinal gradient. We captured 8 willet on their nesting territories and attached geolocators to their upper leg. Data recovered from 5 geolocators showed fall migration departure dates of Aug 2 ± 3.2 days (n = 10), and a single, transoceanic flight to the North coast of South America where willet made landfall at stopover sites in Suriname, French Guyana, or Brazil before settling into their wintering sites in the state of Maranhao, Para, or Bahia Brazil. The following spring, they departed on April 17 ± 3.1 days (n = 6), and made stopovers in North Carolina and Georgia. They arrived at their nesting territories on May 1 ± 1.8 days (n = 6), and initiated nests on May 18 ± 2.0, n = 6. The nest phenology dates from these Martha's Vineyard willet were intermediate between willet from areas south and north, and filled in a gap in data linking eastern willet nesting phenology to the wave of salt marsh 'green-up' that follows latitudinal gradients in the spring. We encourage other researchers from the Islands to collaborate on regional studies investigating wildlife behavior at the population level.
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OBSCURE LOCATION NAMES ON NANTUCKET SPECIMENS

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Biological specimens from Nantucket Island date back to the 1880s. When specimens are collected, it is important to record collection data including date and location. This is useful for a number of reasons, including being able to understand species' distribution and changes over time, habitat needs, or even relocating populations decades later. Of those specimens stored at the Maria Mitchell Association, some are labeled with locations names that are no longer used or are unclear. This is particularly true of older botanical specimens. We have begun mapping names of places we know in order to associate coordinates with specimens. We hope to crowd-source local knowledge to place obscure location names on a map. Additionally, we hope to map and record current local nicknames of places that people use in their natural history observation notes.
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ISLAND-WIDE COLLABORATION FOR INVASIVE PLANT MANAGEMENT TO SUPPORT LOCAL ECOSYSTEMS

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The Nantucket Invasive Plant Species Committee (IPSC), is a standing committee of the Nantucket Biodiversity Initiative. We facilitate cooperation among island conservation organizations and town entities to document and manage Nantucket's invasive non-native plant species. Committee members include both conservation professionals and local citizens interested in non-native invasive plant species identification, management, research, and education. Outreach to the public has included invasive plant identification and management workshops, one-on-one mentoring with local students and class projects, and information booths at events such as the local Island Fair and Spring Fest. The IPSC also coordinates volunteer weed digs and pulls to protect key natural areas and inhibit the spread of invasive plants. We have increasingly focused on educating the public about incorporating native plants in landscaping while managing invasives to enhance biodiversity and ecosystem function. To that end the IPSC created a "Landscaping with Native Plants on Nantucket" pamphlet detailing native species and uses. We have also provided technical expertise in the form of an invasive plant list for the wetlands regulations to the Town of Nantucket Conservation Commission. Recently we have worked with the Nantucket DPW to adjust mowing regimes along bike paths to reduce spotted knapweed, and with Waste Options Management (the Nantucket landfill operator) to provide an invasive plant disposal dumpster to facilitate high-temperature composting of weeds. Here we present a summary of recent IPSC efforts promoting islanders' awareness and participation in maintaining native plant communities while managing invasive plant species to support biodiversity.

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IN PRAISE OF THE AMANITA MUSCARIA - HALLUCINOGENIC SOMA: AN INTERTWINING OF NEW ENGLAND POETRY, A QUAKER HYMN AND ISLAND ECOLOGY.

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The Quakers of Nantucket, a strict founding society, have an association with hallucinogenic mushrooms, namely Amanita muscaria, the fly agaric. It is common on the Island (personal observation and Lawrence Millman. 2011. Fascinating Fungi of New England). The study of mycological hallucinogens is broad, even fanciful: that Santa's reindeer feed on psychedelic mushrooms aiding their flight on Christmas Eve. The mycological ethnobotanists Gordon and Valentina Wasson brought attention to psychedelic mushrooms through a Mexican cult (Life Magazine, 1957). Later they focused on Amanita muscaria (Wasson "Soma: The Divine Mushroom of Immortality", 1968), noting the ritualistic taking of "Soma" in Siberia and Finland. The Wassons also observed that Soma had roots to the Vedic religion. Vedic priests drank themselves into a stupor to gain deep religious experience. New England poet John Greenleaf Whittier brought this to attention in his narrative poem "The Brewing of Soma" (Atlantic Monthly, April 1872). Here, Whittier is critical of human frailties but his final six stanzas (of seventeen) reflect his fundamental Quaker views, including that drugs are not necessary for religious experience. These latter stanzas were first used in a hymn (Horder's Congregational Hymns, 1884) and later co-opted into Episcopalian hymnals (we note 424 diverse hymnals). These include the Nantucket Quaker and Congregational strongholds. It is somewhat incongruous that Quaker Whittier's poetry, based on the use of hallucinogenic mushrooms, became one of the all-time great hymns, "Dear Lord, and Father of mankind, forgive our foolish ways…". And today's congregations sing lustily, extoling the Nantucket's mushroom diversity.

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