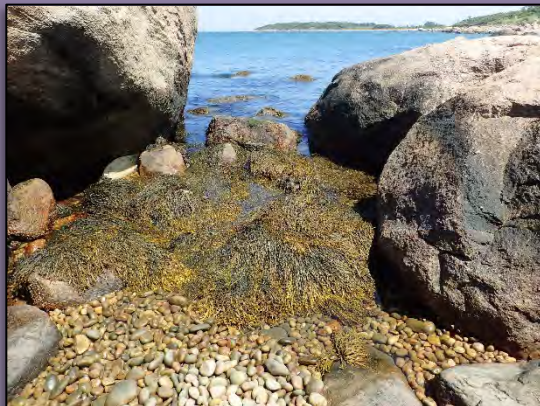
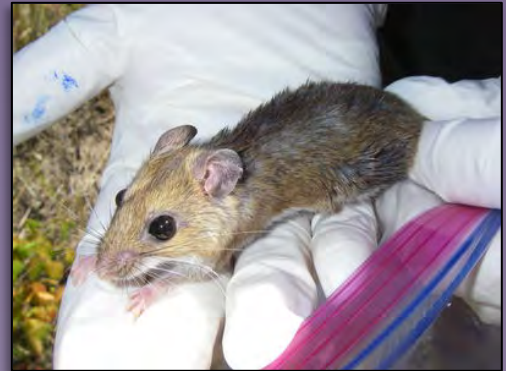


Plum Island Biodiversity Inventory



New York
Natural Heritage
Program



New York Natural Heritage Program

Established in 1985, the New York Natural Heritage Program (NYNHP) is a program of the State University of New York College of Environmental Science and Forestry (SUNY ESF). Our mission is to facilitate conservation of rare animals, rare plants, and significant ecosystems. We accomplish this mission by combining thorough field inventories, scientific analyses, expert interpretation, and the most comprehensive database on New York's distinctive biodiversity to deliver the highest quality information for natural resource planning, protection, and management. The Program is funded by grants and contracts from government agencies whose missions involve natural resource management, private organizations involved in land protection and stewardship, and both government and private organizations interested in advancing the conservation of biodiversity.

NY Natural Heritage is housed within NYS DEC's Division of Fish, Wildlife & Marine Resources. The program is staffed by more than 25 scientists and specialists with expertise in ecology, zoology, botany, information management, and geographic information systems.

NY Natural Heritage maintains New York's most comprehensive database on the status and location of rare species and natural communities. We presently monitor 181 natural community types, 803 rare plant species, and 474 rare animal species across New York, keeping track of more than 13,500 locations where these species and communities have been recorded. The database also includes detailed information on the relative rareness of each species and community, the quality of their occurrences, and descriptions of sites. The information is used by public agencies, the environmental conservation community, developers, and others to aid in land-use decisions. Our data are essential for prioritizing those species and communities in need of protection and for guiding land-use and land-management decisions where these species and communities exist.

In addition to tracking recorded locations, NY Natural Heritage has developed models of the areas around these locations important for conserving biodiversity, and models of the distribution of suitable habitat for rare species across New York State.

NY Natural Heritage also houses iMapInvasives, an online tool for invasive species reporting and data management.

NY Natural Heritage has developed two notable online resources: [Conservation Guides](#) include the biology, identification, habitat, and management of many of New York's rare species and natural community types; and [NY Nature Explorer](#) lists species and communities in a specified area of interest.

The program is an active participant in the NatureServe Network – an international network of biodiversity data centers overseen by a Washington D.C. based non-profit organization. There are currently Natural Heritage Programs or Conservation Data Centers in all 50 states and several interstate regions. There are also 10 programs in Canada, and many participating organizations across 12 Latin and South American Countries. Our collaboration with NatureServe and other states helps us put our information into a broader context. With NatureServe, we track the rarity of species and natural communities at global and state scales, allowing us to distinguish conservation priorities for species with just a few populations in the world to other species with a few populations in New York but many populations elsewhere. We can also pool our data to look across state and international lines. For example, New York data on rare species and natural communities along Lake Ontario have been combined with similar data from Canada to facilitate analyses of potential consequences of lake-level changes. New York information has also been combined with data from neighboring states to help us understand the significance of our best biodiversity sites relative to similar systems in southeastern Canada, New England, the Mid-Atlantic states, and other Great Lakes states.

Learn more at www.nynhp.org.



Plum Island Biodiversity Inventory

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Cover photographs (from left to right):

Top: Little brown bat (*Myotis lucifugus*), maritime bluff, spring ladies-tresses (*Spiranthes vernalis*).

Middle: snapping turtle (*Chelydra serpentina*), late purple aster (*Symphotrichum patens*), white-footed mouse (*Peromyscus leucopus*).

Bottom: Marine rocky intertidal, black-waved flannel moth (*Lagoa crispata*), bronzed and hairy-necked tiger beetles (*Cicindela repanda* and *C. hirticollis*).



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Executive summary

Despite a long history of human use, Plum Island, New York remains largely undeveloped and provides habitat for many plants and animals of conservation concern. The island's disposition following the future departure of the Plum Island Animal Disease Center (PIADC) has been a subject of much political and public debate. Regardless of the island's future ownership, an understanding of the current status of biodiversity will help inform ongoing and future natural resource management efforts there. In 2014 the New York Natural Heritage Program (NYNHP) was funded by the New York State Department of Environmental Conservation (NYS DEC) to undertake a year-long inventory of Plum Island's biodiversity. The inventory was a follow-up to our 2012 report, "Biodiversity and Ecological Potential of Plum Island, New York," a compilation of available biodiversity information about Plum Island, available at www.nynhp.org/PlumIsland. The 2015 field effort was funded by the Ocean and Great Lakes Program through the New York Environmental Protection Fund. NYNHP worked with NYS DEC and other conservation partners to define the scope of the inventory, which we conducted from March through December, 2015. Permission to access the island, ferry transport, and logistical help of all kinds was provided by the U.S. Department of Homeland Security and its staff and contractors. In this report we present our findings on the current status of the island's biodiversity and make recommendations for conservation and restoration.

We conducted a four-season inventory of Plum Island, beginning in March, 2015 and ending in December, 2015. Our survey targets were chosen in conjunction with the NYS DEC and included significant natural communities (ecosystems), mammals, reptiles, amphibians, inland fish, dragonflies and damselflies, butterflies, moths, certain beetles, rare plants, and invasive plants, with some other species groups recorded opportunistically. We used a variety of survey techniques including hoop traps for turtles, echolocation surveys for bats, pitfall traps for carrion beetles, light traps for moths, and visual and netting surveys for many other taxa. We combine our survey results with others' surveys for birds and plants, as well as prior knowledge documented in our earlier report, to form the most comprehensive picture to date of Plum Island's biodiversity.

Plum Island provides habitat for 67 or 111 species and communities of conservation concern, depending on how the total is calculated (Table E1). This is a significant number for an ~840-acre island, especially since biodiversity management on the island has focused historically on just a few elements of concern, such as Piping Plover (*Charadrius melodias*). Thirteen birds of conservation concern breed on the island and other federal- and state-listed birds forage along its shores and in its surrounding waters. Surveys have documented 23 plant species of conservation concern. The island is home to one of New York's largest seal haul-out sites, hosting hundreds of seals in winter months. Certain bats occasionally use the military bunkers as hibernacula and migratory tree bats pass through in spring and fall. Rare insects including moths, tiger beetles, and dragonflies and damselflies, find habitat on Plum Island.

While our 2015 survey was extensive, some information gaps remain and a single-year survey cannot document all species and natural communities present. We recommend additional inventory for native bees, marine mammals and sea turtles, rare plants, and marine habitats. In addition, as management efforts progress, surveys to document changes over time and potential improvements from restoration efforts are necessary to demonstrate success.

Further development on Plum Island would likely result in habitat loss for many rare species. Even if the island is kept largely undeveloped, its biodiversity is currently threatened by invasive plants, which choke the forest understory and cover the shrublands, resulting in lower native plant diversity and consequently fewer native animals than the island could potentially support. As an illustration, some rare plants previously documented on Plum Island could not be located in 2015



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due to the abundance of invasive species. On a small island like Plum Island, invasive plant eradication and other habitat restoration may be achievable goals, and the island could also be considered as a laboratory for introductions of species that have been extirpated from much of the region like the New England cottontail and the Threatened American burying beetle. The success of neighboring Great Gull Island may provide a template for the potential restoration of breeding colonies of gulls and terns.

Table E1. Summary of biodiversity of Plum Island, New York.

| Taxon | All species | Federal E & T ¹ | State E & T ¹ | Element occurrences | Total of conservation concern ² |
|--|-------------|----------------------------|--------------------------|---------------------|--|
| Ecological communities | 33 | - | - | 5 | 5 |
| All birds | 215 | 2 | 6 | 4 | 57 |
| Breeding birds ³ | 63 | 1 | 2 | 4 | 13 |
| Mammals ⁴ | 9 | 1 | 1 | 1 | 6 |
| Reptiles | 5 | 0 | 0 | 0 | 2 |
| Amphibians | 0 | 0 | 0 | 0 | 0 |
| Inland fish | 4 | 0 | 0 | 1 | 2 |
| Odonates | 16 | 0 | 0 | 3 | 3 |
| Moths | 256 | 0 | 0 | 11 | 11 |
| Other insects ⁵ | - | 0 | 0 | 1 | 2 |
| Plants (native) | 280 | 0 | 18 | 19 | 23 |
| Plants (nonnative/invasive) | 164/28 | - | - | - | - |
| All species and communities ⁶ | - | 2/3 | 21/25 | 45/45 | 67/111 |

¹ Endangered and Threatened.

² Total includes Species of Greatest Conservation Need (NYS DEC 2015), Species of Potential Conservation Need (NYS DEC 2015), Heritage-tracked species, and significant natural communities—ones that are rare in New York State or outstanding examples of more common communities (Edinger *et al.* 2014).

³ Not including those meeting the criteria for confirmed breeding but suspected to nest off the island.

⁴ Terrestrial mammals only, plus the seal haul-out site.

⁵ We did not conduct a complete inventory of insects and thus cannot provide a total species count.

⁶ Talled as (number including only breeding birds)/(number including all birds).



Introduction

Plum Island, New York has a long history of human use but remains mostly undeveloped. The island's disposition following the future departure of the Plum Island Animal Disease Center (PIADC) has been a subject of much political and public debate. Regardless of the island's future ownership, an understanding of the current status of biodiversity will help inform ongoing and future natural resource management efforts there. In 2014 the New York Natural Heritage Program (NYNHP) was funded by the New York State Department of Environmental Conservation (NYS DEC) to undertake a year-long inventory of Plum Island's biodiversity. The inventory was a follow-up to our 2012 report, "Biodiversity and Ecological Potential of Plum Island, New York" (Schlesinger *et al.* 2012), a compilation of available biodiversity information about Plum Island, available at www.nynhp.org/PlumIsland. The 2015 field effort was funded by the Ocean and Great Lakes Program through the New York Environmental Protection Fund. NYNHP worked with NYS DEC and other conservation partners to define the scope of the inventory, which we conducted from March through December, 2015. Permission to access the island, ferry transport, and logistical help of all kinds was provided by the U.S. Department of Homeland Security and its staff and contractors. In this report we present our findings on the current status of the island's biodiversity and make recommendations for conservation and restoration.

Much of the following introductory material was adapted from our 2012 report (Schlesinger *et al.* 2012).

Geography and geology

Plum Island lies in a small archipelago of peninsulas and islands stretching from Long Island's North Fork to Fishers Island and then to Connecticut and Rhode Island (Figure 1). Plum Island is owned by the U.S. Department of Homeland Security and lies within the Town of Southold, Suffolk County. The island is famously shaped like a pork chop and encompasses approximately 840 acres, approximately the size of New York City's Central Park. Its total length is about three miles with the long narrow panhandle measuring about 300 feet wide at the narrowest point. Land elevations vary from sea level to approximately 100 feet on a hill where the water tower is located. The southern third of the island is characterized by low hills and depressions and a series of low beach ridges alternating with freshwater wetlands (Figure 2). The middle of the island features a central plain (where Fort Terry was developed) that divides hills to the southeast, ranging from 40 to about 75 feet, from the northwestern ridge of irregular hills that rise to 100 feet above mean sea level. The eastern third of the island is a continuation of the northwestern ridge but narrows to a low stretch of land that terminates in a group of hills that rise up to 85 feet. The shoreline is characterized by wide sandy beaches in the south and east where the topography is low to a narrow shore of rocky beach on the rest of the island at the base of low, steep bluffs and cliffs where the topography is higher.

Plum Island is surrounded by four bodies of water that influence its offshore and onshore environment and biodiversity: Long Island Sound to the west and north, Block Island Sound to the east, Plum Gut to the immediate southwest, and Gardiners Bay further southwest. Around most of the island is a narrow shelf, a little wider to the east, with depths to about 20 feet. Beyond the shelf, sea depths are from 100 to 200 feet. The strait between the island and Orient Point, called Plum Gut, is narrow and deep with depths up to 188 feet and fast-running tides but no natural hazards. The strait between the island and Great Gull Island to the northeast is wider and shallower with depths from three feet around the shoals to 25 feet toward the center. The ecology of other islands in the region, including Great and Little Gull Islands, Gardiners Island, Fishers Island, Shelter



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Island, and Block Island (Rhode Island) are useful for comparison, although the biodiversity of these islands is only variously known.

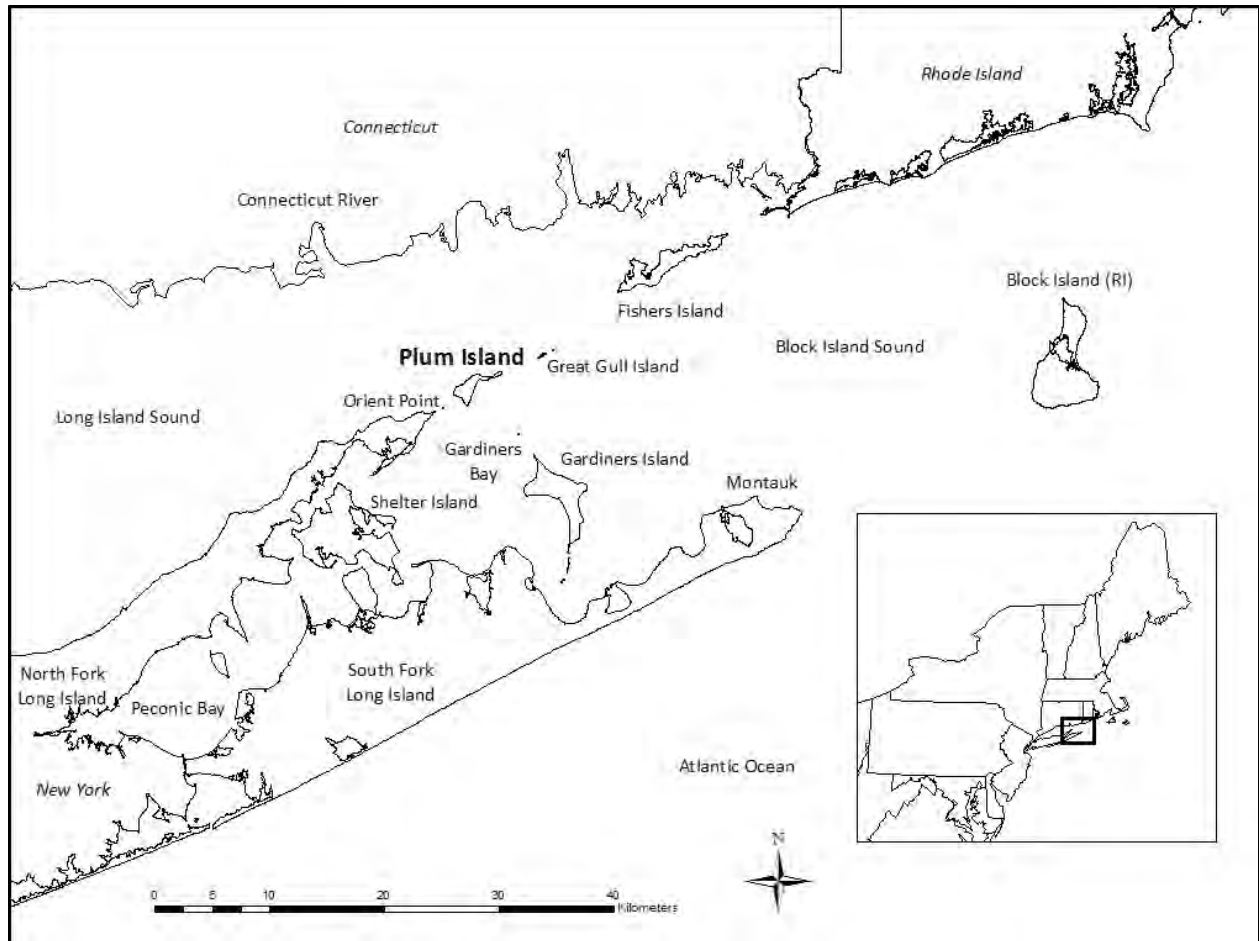


Figure 1. Plum Island with surrounding islands and points in mainland New York, Connecticut, and Rhode Island. Islands are within New York State unless otherwise noted. Inset: area of detail within the Northeast United States.

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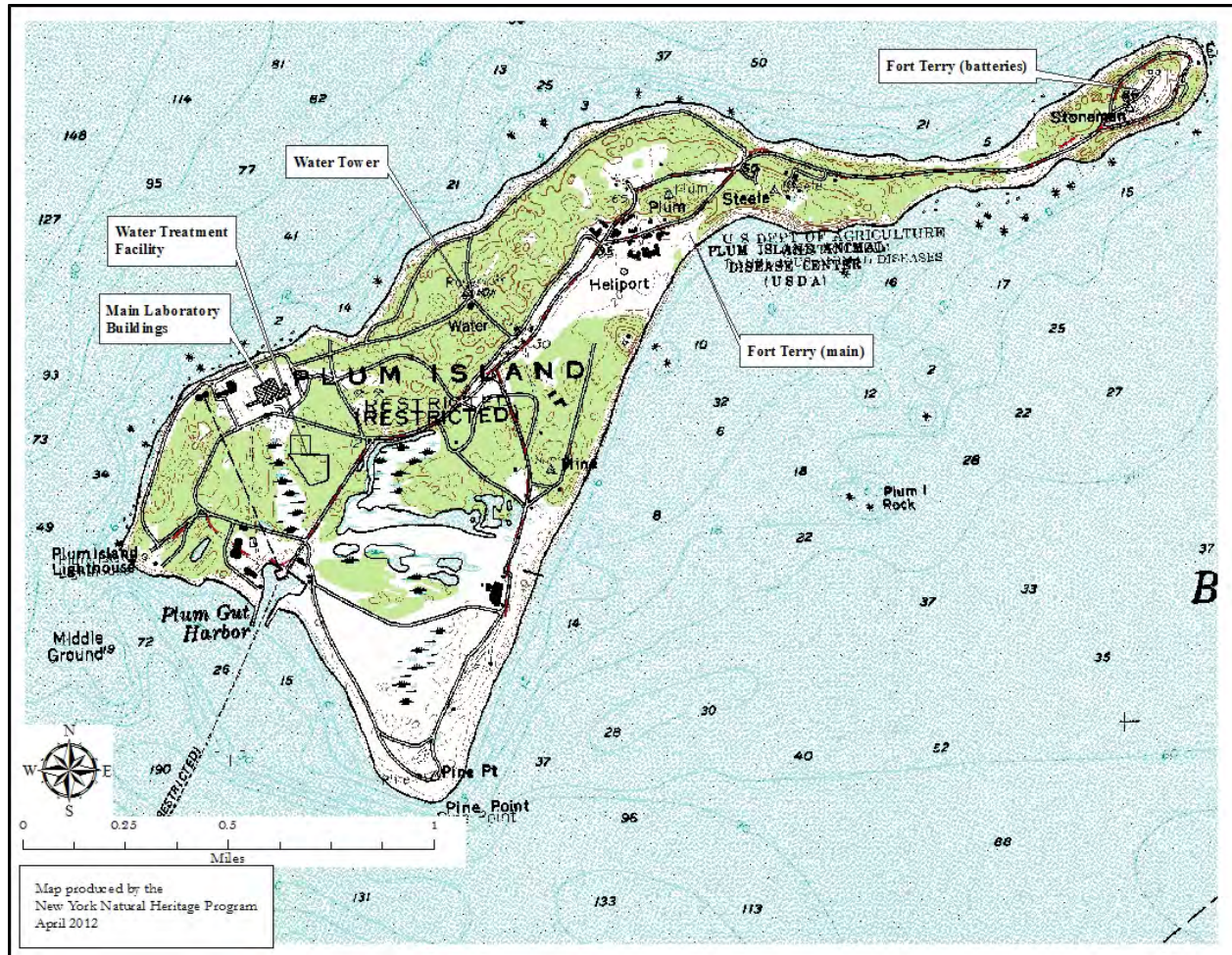


Figure 2. Plum Island, New York, with major features and human infrastructure.

The geology of Plum Island is a reflection of its glacial history, summarized here from Crandell (1962). During the Wisconsin Glacial Episode of the Pleistocene epoch the forward movement and backward melting back of the continental glaciers were instrumental in forming the island. Moraine outwash and till were laid down over existing Late Cretaceous deposits of silt, sand and gravel that had been eroded into a hilly terrain over Precambrian bedrock. As the Wisconsin ice sheet advanced, it pushed forward over the Plum Island and Long Island area carrying sand, gravel, and rocks from New York and New England. After it had reached its most southern extent, it began to melt back around 21,750 years ago. During this retreat the forward motion of the ice at times equaled the rate of melting and the glacier deposited two large moraines and outwash plains. The southern moraine was the southernmost extent of the ice sheet and is called the Ronkonkoma Terminal Moraine. As the ice sheet melted back from the Ronkonkoma moraine, its forward movement was again equaled by the rate of melting and it deposited a second moraine called the Harbor Hill Moraine that runs along the northern half of Long Island forming the North Fork, most of Plum Island, and the islands to the northeast.

The glacier first deposited thick layers of sand and gravel to form the island. Some of these layers were removed by an outwash channel beginning at the southwestern end of the island where the laboratory is located spanning to the former Fort Terry parade grounds, so this area is not as high and hilly as the rest of the island. A subsequent advance of the glacier deposited a layer of silt,

sand, gravel, and boulders (glacial till) in depths of five to 40 or more feet thick, forming the hills of the northern two-thirds of the island. This is where most of the present forests and shrublands grow. A meltwater channel eroded the till in the central part of the island to form a northeastward-trending level topography where Fort Terry is located. After the final glacial deposits had been laid down, erosion from ocean waves carried the finer sand and gravels to the southern end of the island where they formed a series of low beach ridges, allowing freshwater swales and marshes to form in between. This is where the wetland vegetation of the island can be found and where deposition has formed the wider beaches with no boulders. Elsewhere, the erosion of the upper layers of glacial till resulted in large boulders rolling down the slopes to the beach (along with some of the fort's gun emplacements in more recent history) to form the rocky beaches and rocky intertidal shore. Along the eastern shore are several exposures of gray to gray-brown sandy to solid clay that may have been deposited by the glaciers or forced upward from pre-glacial deposits.

The varied topography, along with different types of glacial till and outwash that have been eroded into new features, have resulted in 17 soil types listed for the island by the Natural Resources Conservation Service (U.S. Department of Agriculture Natural Resources Conservation Service 1995): Atsion, Berryland, Bridgehampton, Carver, Deerfield, Haven, Montauk, Montauk Variant, Plymouth, Raynham, Riverhead, Scio, Sudbury, Wallington, Walpole, Wareham, and Whitman. Descriptions of the soil types can be found at <https://soilseries.sc.egov.usda.gov/osdnamequery.asp>. This large diversity of soils and features in such a small area has resulted in the diverse flora and fauna found there today.

Climate

Plum Island has a maritime temperate climate and is greatly influenced by the surrounding ocean. The high heat capacity of ocean waters moderates the temperatures that are typical in central Long Island and the mainland to the west. This moderation of temperatures tends to delay the growing season in the spring and prolong it in the fall. The average high in midsummer on Long Island is in the low 80s and the average low in midwinter is in the low 20s (See <http://longisland.about.com/od/neighborhoods/a/Long-Island-Ny-Climate.htm>). Average monthly precipitation ranges from three to five inches in central Long Island with the lowest amount in July and the highest in March. Annual precipitation is approximately 45 inches. Plum Island is subject to a variety of storms. Spring and summer thunderstorms are a common occurrence and strong nor'easters can bring storm surges and high winds in the fall and winter. The National Oceanic and Atmospheric Administration (NOAA) website for historical hurricane tracks (See <http://www.csc.noaa.gov/hurricanes>) shows roughly eight hurricanes and tropical storms passing within 50 miles of the island since records began. An unnamed storm tracked right between Plum Island and Orient Point in 1944, and the most recent major storms to come close to the island were Hurricanes Irene (2011) and Sandy (2012). Even though hurricanes can be strong, the fall and winter nor'easters also have the high winds and waves that can influence the shoreline topography and vegetation.

History of human use

Plum Island has had a long and varied cultural history, which has had a dramatic impact on the animals and vegetation of such a small island. Prior to the arrival of European settlers, Native Americans probably used the island for fishing and farming (Bramson *et al.* 2014). The Pequot Indians grew corn there in the 1630s as a backup crop in case cornfields in Connecticut were burned by the English. In 1659 the island was sold by the Montauk Indians to Samuel Wyllys and for the next 238 years the island was used for farming and the grazing of sheep and cattle. By the mid-1700s there were three families living there and up to 50 people inhabited the island at times. In 1826 the



US government bought three acres of land on the southern shore for a lighthouse that was constructed in 1827. In the late 1800s it was a popular place for fishing camps of wealthy people and rustic buildings were built where they would stay. Others might stay with the resident farmers or the lighthouse keeper. Luminaries such as Grover Cleveland visited during these times (Bramson *et al.* 2014).

Most of the farmers sold their land by the end of the 1800s to Abraham S. Hewitt, former mayor of New London, Connecticut, who owned the entire island by 1890 (U.S. Department of Homeland Security 2010). His development plans for a summer resort never materialized and in 1898 the government bought the eastern half of the island to construct Fort Terry as a coastal defense for the Spanish-American War. It purchased the remainder of the island in 1901. The fort was active for the next 20 years during which roads, buildings, and gun installations were built, mainly along the eastern shore. There was even a small railroad to carry equipment and ammunition between installations. At the end of World War I in 1918, the fort changed to caretaker status and there was very little activity on the island for the next 23 years.

Beginning in 1941, the island was used as a base for World War II and activity increased over the next five years. In 1946, the fort was decommissioned and there was little or no activity until 1952, when the US Army Chemical Corps began renovating Fort Terry's Building 257 for use as a biological lab to study foot-and-mouth disease. Though Building 257 has been decommissioned, other Fort Terry structures on the island are still used to support the center's research mission. The buildings of Fort Terry have been vacated and new facilities have been constructed on the southwestern end of the island with a staff of about 400 people (U.S. Department of Homeland Security 2010). This has left much of the island in a semi-natural state except for the large mowed field and lawns of the Fort Terry parade ground and headquarters (see below), ferry dock facilities and buildings, and wastewater treatment plant. A network of narrow, paved and unpaved roads connect these historical and modern facilities. Its use as a highly secure government facility prevents the public, besides the staff and selected visitors, from using the island in any other manner or disturbing its plants or animals.

General methodology

Natural Heritage programs worldwide use standard methodologies for identifying biodiversity elements (species and natural communities) of concern, mapping occurrences of these elements, and ranking the viability of those occurrences. In Appendix A we provide some background on our methodology.

Natural communities

Our 2012 report (Schlesinger *et al.* 2012) contained the first-ever natural community map of Plum Island, based on remote imagery and others' field work (Figure 3). As a full groundtruthing of that map was beyond the scope of this project, we surveyed select natural communities. We surveyed the natural communities on Plum Island using two methodologies appropriate for the environmental setting. We prioritized the island's shoreline communities over the terrestrial communities based on our earlier remote mapping that suggested that shoreline communities were the most likely to be significant from a statewide perspective (Schlesinger *et al.* 2012). For the four shoreline communities (maritime beach, maritime dunes, maritime bluff, and marine rocky intertidal) we used standard Natural Heritage Community Inventory Methods described below. For the marine eelgrass meadow boat surveys we used Natural Heritage Aquatic Community Survey Methods (Hunt 2000) modified with input from the dive team and described in the Marine eelgrass meadows section



Plum Island Biodiversity Inventory

(Page 18). We classified these communities using Ecological Communities of NYS (Edinger *et al.* 2014).

We documented one new natural community occurrences of statewide significance and updated records for four previously documented occurrences (Table 1). Highlights include a new occurrence of marine eelgrass meadow for the state.

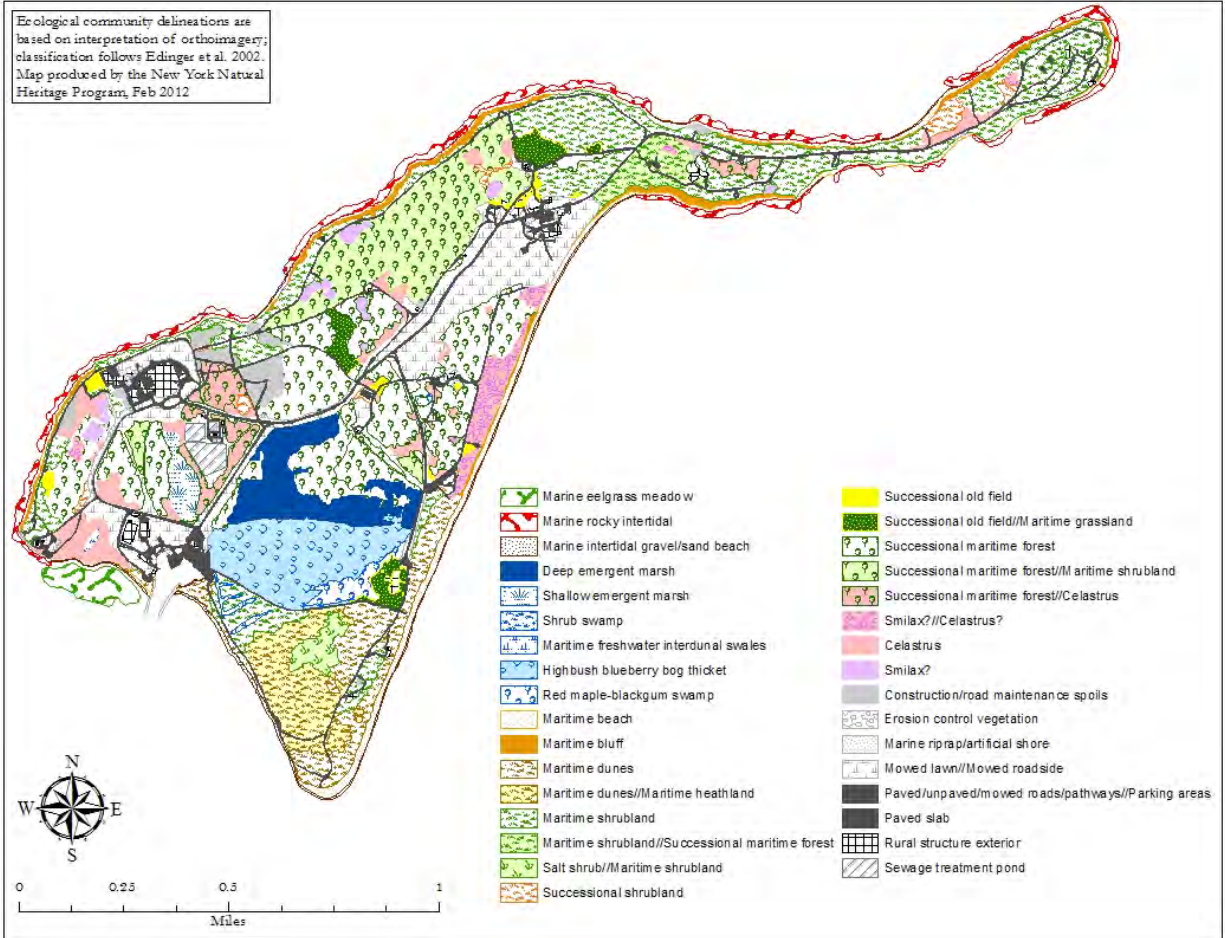


Figure 3. Natural community map of Plum Island, based on interpretation of orthoimagery, from Schlesinger *et al.* (2012).

Table 1. Significant natural community occurrences on Plum Island.

| | Natural community | Global and state rank | Size (acres) | Element occurrence rank | No. of NYNHP occurrences in NY March 31, 2016 | No. of estimated occurrences in NY |
|----|-------------------------|-----------------------|--------------|-------------------------|---|------------------------------------|
| 1 | Maritime beach | G5 S3S4 | 45 | AB | 8 | 30-50 |
| 2 | Maritime dunes | G4 S3 | 63 | BC | 10 | 30-50 |
| 3 | Maritime bluff | GNR S2S3 | 44 | AB | 3 | 5-30 |
| 4 | Marine rocky intertidal | G4?5 S1S2 | 34 | AB | 10 | <40 |
| 5* | Marine eelgrass meadow | G5 S3 | 9.5 | C | 3 | ~30 max |

*New occurrence documented in 2015. See Appendix A for definitions of all ranks.

Shoreline communities

For shoreline communities, we used standard inventory methodology developed by The Nature Conservancy, NatureServe, and the Natural Heritage Network, and refined by NY Natural Heritage (Edinger *et al.* 2000). This methodology involves collecting data on all or most of the following for each targeted community: plant species composition and structure in all strata, unvegetated ground and water surfaces, slope, and aspect (Edinger *et al.* 2000). Taxonomic nomenclature followed the NY Flora Atlas (Weldy *et al.* 2015) for vascular plants. For marine macroalgae (“seaweeds”) we used Gosner (1978) and Villalard-Bohnsack (2003).

These data allow an accurate identification of each community surveyed. We also collect and record information on occurrence size, maturity, level of disturbance, abundance of exotic species, threats, and landscape context. These data allow us to compare the quality and assess the viability of each community occurrence in relation to others throughout the range of the community, both within and outside of New York.

Specifically, for this project we collected detailed “observation points” (i.e., NY Natural Heritage Natural Community Form 1: Transect Observation Points (Edinger *et al.* 2000)). The location of each observation point was recorded with a Garmin 60cx GPS unit. The datum on the GPS unit was set to North American Datum 1983 (CONUS) and the coordinate system was set to Universal Transverse-Mercator (UTM) Zone 18N.

In addition we sampled at least one relevé plot in each of the four shoreline communities. Relevé plot data were collected following accepted Natural Heritage sampling protocols (Edinger *et al.* 2000) sampling 10-m × 10-m plots in the following communities: maritime beach, maritime dunes, maritime bluff, and marine rocky intertidal. We visually divided the vegetation into several strata: emergent trees (variable height), tree canopy (variable height), tree subcanopy (>5 m), tree sapling (2–5 m), tree seedling (<2 m), tall shrub (2–5 m), short shrub (<2 m), dwarf shrub (<0.5 m), herbaceous, non-vascular, and vines. Large trees were not expected in the targeted shoreline communities. We followed the NY Flora Atlas (Weldy *et al.* 2015) for vascular plant nomenclature. We estimated the percent cover of each species in each stratum and collected specimens of plants that were not identifiable in the field for later identification.

In addition to floristic information, we recorded the following environmental variables at each plot: slope, aspect, topographic position, hydrologic regime, soil stoniness, average soil texture, and soil drainage. We characterized unvegetated area of the plot by the type of exposed substrate (e.g., wood, rocks, soil, water, litter, etc.). We noted the plot representativeness of the surrounding vegetation and any other significant environmental information, such as landscape context, herbivory, stand health, recent disturbance, or evidence of historic disturbance.

Ecological community data were collected in a field notebook and entered into the NY Natural Heritage Program Field Form Database in the office after field surveys were completed. We took at least one digital photograph at all plot sampling locations. One corner of each plot was recorded with a Garmin 60Cx GPS unit.

We surveyed a total of 56 observation points on six days between July 21, 2015 and August 13, 2015 (Figure 4). Vegetation cover data were collected at 48 of these observation points of which 14 were detailed relevé plots. The 8 remaining points were reference points used to confirm a community type at that point, note a boundary between two communities, and/or document the location of an invasive plant population.





Figure 4. Shoreline ecological community observation points.

We started ecological community surveys at the south tip of Plum Island at Pine Point. We worked our way northeast and east counterclockwise around the perimeter of the island. We sequentially numbered our observation points starting at PI01 at Pine Point and finishing with PI45 on the western edge of the north shore (Figure 4). The discrepancy between 56 total points and 45 labelled points is that several points have multiple data records where several shoreline communities co-occur in close proximity (e.g., PI17(1)a, PI17(1)b, PI17(1)c, PI17(2)).

We surveyed the following shoreline communities: maritime beach, maritime dunes, maritime bluff, and marine rocky intertidal.

Maritime beach

The maritime beach community at Plum Island has two variants based on substrate type. Both variants at Plum Island are classified and mapped as one occurrence of maritime beach (*sensu* Edinger *et al.* 2014). The first variant is the typical sand-dominated “maritime sandy beach” with lesser amounts (~8% cover) of small (mostly 1-8 cm), smooth stones (i.e., pebbles and cobbles) mixed in with the sand. The second variant, “maritime rocky beach,” consists of large rocks (i.e., large cobbles and boulders) with about 90% cover with most rocks ranging from 1 to 5 m diameter. Sand is a minor component of this variant (<7% cover). Both types are sparsely vegetated (4-12% herbaceous cover) and their distribution and descriptions for Plum Island are provided below.

Plum Island Biodiversity Inventory

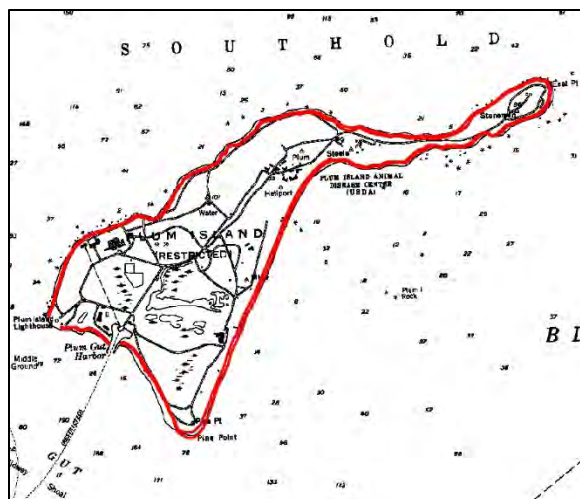


Figure 5. Maritime beach (rocky and sandy) at Plum Island.

“Maritime Sandy Beach”

We surveyed nine observation points in maritime sandy beach of which two were plots (PI02, PI03-plot, PI09b, PI10b, PI13, PI24b, PI25b, PI27, PI29B, PI30-plot). Starting at Plum Gut Harbor, the maritime sandy beach extends southeast around Pine Point, then continues northeast to Fort Terry uninterrupted for over two miles. For this stretch, the beach grades into maritime dunes and/or maritime bluff landward and marine intertidal gravel/sand beach seaward. The occurrence map likely includes portions of the latter community and it would be difficult to separate these two on air photos given their similar signature. The boundary between these two communities is the mean high water (MHW) line. Maritime sandy beach occurs around the perimeter shoreline of Plum Island in discontinuous patches, sometimes as the only beach type between the water and maritime bluff, but more often it occurs as a narrow band behind (or landward of) the maritime rocky beach (Figure 6) especially on the north shore. Maritime sandy beach is the likely beach type found in the gaps between the patches of marine rocky intertidal community (Figure 11). A summary description of the maritime sandy beach at Plum Island based on nine observation points and plots follows.

The vegetation is typically sparse (<12% cover), dominated by annuals, and most often located at the upper beach zone near the foredune (Figure 6) or at the base of a bluff. The most abundant herbs are American searocket (*Cakile edentula*) (5%), seaside goldenrod (*Solidago sempervirens*) (2%), and beach pea (*Lathyrus japonicus*) (2%). The following herbs have <1% cover each: cocklebur (*Xanthium strumarium*), common evening primrose (*Oenothera biennis*), spotted knapweed (*Centaurea stoebe*), wild radish (*Raphanus raphanistrum*), American beachgrass (*Ammophila breviligulata*), panic grass (*Dichanthelium acuminatum* ssp. *columbianum*), blue toadflax (*Nuttallanthus canadensis*), saltwort (*Salsola kali*), wild peppergrass (*Lepidium virginicum*), Greene's rush (*Juncus greenei*), Gray's flatsedge (*Cyperus grayi*), narrow-leaved goosefoot (*Chenopodium pratericola*), thin-leaved orach (*Atriplex prostrata*), beach wormwood (*Artemisia stelleriana*), sea sandwort (*Honckenya peploides*), carpet-weed (*Mollugo verticillata*), common yarrow (*Achillea millefolium*), common reed (*Phragmites australis*), common mullein (*Verbascum thapsus*), and eastern prickly-pear cactus (*Opuntia humifusa*).

The unvegetated surface has about 90.3% cover consisting of sand (73%), rocks <10 cm (6%), rocks >10 cm (2%), wrack (3%), shells (3%), wood <10 cm (3%), wood >10 cm (2%), vegetation litter (<1%), and trash (<1%). On Pine Point the width of the beach (between marine intertidal gravel/sand beach and foredune/bluff base) ranges 10-25 m (avg. 16.5 m).





Figure 6 (clockwise from top left). Maritime sandy beach; maritime beach plot (10 m × 10 m) PI03; maritime sandy beach: eastern prickly-pear (*Opuntia humifusa*); maritime rocky beach.

"Maritime Rocky Beach"

We surveyed eight observation points in maritime rocky beach and no plots were sampled (PI17(1)b, PI26, PI29A, PI32, PI34, PI37, PI38, PI39). The maritime rocky beach essentially corresponds to the extent of the marine rocky intertidal community, since both communities share the same substrate. As with the sandy beach, the boundary between these two communities is the mean high water (MHW) line with the rocky beach located landward and rocky intertidal community seaward. Starting at Fort Terry, maritime rocky beach extends east along the south shore of the island almost continuously to East Point with a few small stretches of sandy beach corresponding to the breaks in the marine rocky intertidal community map (Figure 11). The rocky beach extends west along the north shore for the length of the island with several alternating stretches of sandy beach. A summary description of the maritime rocky beach at Plum Island based on eight observation points follows.

The short shrub layer (~1 m) has 1% cover consisting of rugosa rose (*Rosa rugosa*) and false indigobush (*Amorpha fruticosa*). The dwarf shrub layer (<0.5 m) has <1% cover consisting of rugosa rose (*Rosa rugosa*) and bayberry (*Morella carolinensis*). The vine layer (<0.5 m) has <1% cover consisting of hedge false bindweed (*Calystegia sepium*) and poison ivy (*Toxicodendron radicans*). The herbaceous layer has 4% cover. The most abundant herbs are beach pea (*Lathyrus japonicus*) (2%) and seaside goldenrod (*Solidago sempervirens*) (1%), and American searocket (*Cakile edentula*) (1%). The following herbs have <1% cover each: narrow-leaved goosefoot (*Chenopodium pratericola*), common evening primrose (*Oenothera biennis*), thin-leaved orach (*Atriplex prostrata*), sea-beach sedge (*Carex*

silicea), wild radish (*Raphanus raphanistrum*), blue toadflax (*Nuttallanthus canadensis*), carpet-weed (*Mollugo verticillata*), wild peppergrass (*Lepidium virginicum*), Gray's flatsedge (*Cyperus grayi*), American beachgrass (*Ammophila breviligulata*), horseweed (*Conyza canadensis*), sheep sorrel (*Rumex acetosella*), saltwort (*Salsola kali*), common yarrow (*Achillea millefolium*), common mullein (*Verbascum thapsus*), and wild lettuce (*Lactuca canadensis*).

The unvegetated surface has 97% cover consisting of rocks >1 m (30%), rocks <10 cm (28%), rocks >10 cm (24%), rocks >5 m (7%), sand (7%), wood <10 cm (6%), wood >10 cm (6%), wrack (3%), trash (1%), and shells (<1%).

We did not observe the typical threats to maritime beaches related to overuse by people and development seen elsewhere in New York on Plum Island (e.g., driving on the beach, fragmentation, artificial barriers, trampling, horseback riding, and littering). The primary threats to the beaches on Plum Island include invasion by exotic species and trash that washes onto the shore. We observed the following non-native species on the beaches at Plum Island: spotted knapweed (*Centaurea stoebe*), wild radish (*Raphanus raphanistrum*), narrow-leaved goosefoot (*Chenopodium pratericola*), thin-leaved orach (*Atriplex prostrata*), beach wormwood (*Artemisia stelleriana*), carpet-weed (*Mollugo verticillata*), common yarrow (*Achillea millefolium*), common reed (*Phragmites australis*), and common mullein (*Verbascum thapsus*). As long as the natural maritime processes of the ocean are maintained, these species and their native counterparts will likely be kept in check and held to relatively low percent cover. Due to limited public access we observed virtually no littering by beach goers, but we observed a significant amount of ocean derived trash especially in the wrackline.

The maritime beach at Plum Island is one of about 30-50 estimated occurrences in the state and one of eight currently documented by the NYNHP. At 45 acres, it is the sixth largest of those eight occurrences, but is tied for second place in quality with Fire Island and Lloyd Neck having a NY Natural Heritage Element Occurrence Rank (EO Rank) of "AB". Orient Point is the only currently documented occurrence of maritime beach in the state with an EO Rank of "A."

Maritime dunes

We surveyed nine observation points in maritime dunes of which five were plots (PI04-plot, PI05-plot, PI07, PI08-plot, PI12-plot, PI13, PI25a, PI25b, PI43a-plot). Maritime dunes are restricted to the southern tip of Plum Island. Starting at Plum Gut Harbor the primary dune extends southeast around Pine Point, then continues northeast to Fort Terry uninterrupted for over two miles. The relatively level backdune area fills in the "V-shaped" area created by the primary dune. The backdune grades into wetland to the north. A summary description of the maritime dunes at Plum Island based on nine observation points and plots follows.

The short shrub layer (<1 m) has <1% cover consisting of beach plum (*Prunus maritima*), multiflora rose (*Rosa multiflora*), and winged sumac (*Rhus copallinum*). The dwarf shrub layer (<0.5 m) has 4% cover. The most abundant dwarf shrub is beach heather (*Hudsonia tomentosa*) (1%). The following dwarf shrubs have <1% cover each: rugosa rose (*Rosa rugosa*), winged sumac (*Rhus copallinum*), beach plum (*Prunus maritima*), bayberry (*Morella caroliniensis*), and black huckleberry (*Gaylussacia baccata*). The vine layer (<0.5 m) has 14% cover. The most abundant vines are poison ivy (*Toxicodendron radicans*) (11%), Virginia creeper (*Parthenocissus quinquefolia*) (1%), and Asian bittersweet (*Celastrus orbiculatus*) (1%) with hedge false bindweed (*Calyptegia sepium*) and round-leaved greenbrier (*Smilax rotundifolia*) (<1% cover each).



Plum Island Biodiversity Inventory

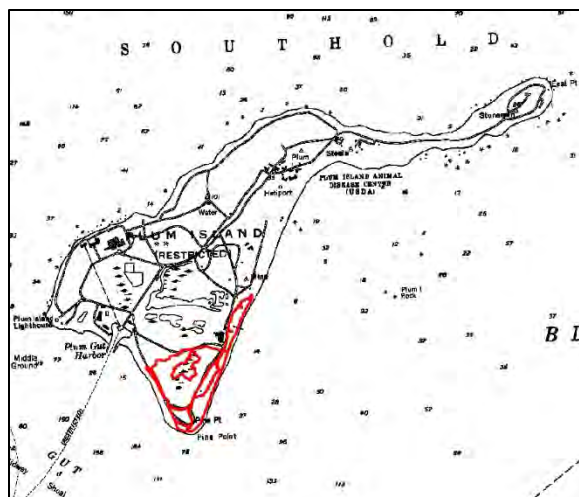


Figure 7. Maritime dunes on Plum Island.

The herbaceous layer has 52% cover. The most abundant herbs are American beachgrass (*Ammophila breviligulata*) (40%), sickle-leaved golden-aster (*Pityopsis falcata*) (5%), seaside goldenrod (*Solidago sempervirens*) (3%), and American searocket (*Cakile edentula*) (2%). The following species have <1% cover each: beach pea (*Lathyrus japonicus*), spotted knapweed (*Centaurea stoebe*), wild peppergrass (*Lepidium virginicum*), common evening primrose (*Oenothera biennis*), sea-beach sedge (*Carex silicea*), common mullein (*Verbascum thapsus*), horseweed (*Conyza canadensis*), common reed (*Phragmites australis*), sea sandwort (*Honckenya peploides*), panic grass (*Dichanthelium acuminatum* ssp. *columbianum*), seaside spurge (*Euphorbia polygonifolia*), meadow hawkweed (*Hieracium caespitosum*), carpet-weed (*Mollugo verticillata*), and cocklebur (*Xanthium strumarium*).

The unvegetated surface has 64% cover consisting of sand (32%), litter (28%), and rocks <10 cm (2%). The following components have <1% cover each: rocks >10 cm, wood <10 cm, wrack, wood >10 cm, shells, and trash.

We observed several threats to the maritime dunes on Plum Island that are common to other dunes in New York (e.g., invasive species, motor vehicle traffic, unpaved roads, beach access trails, and other development). We observed the following non-native species on the dunes at Plum Island: multiflora rose (*Rosa multiflora*), rugosa rose (*Rosa rugosa*), Asian bittersweet (*Celastrus orbiculatus*), spotted knapweed (*Centaurea stoebe*), common mullein (*Verbascum thapsus*), common reed (*Phragmites australis*), and carpet-weed (*Mollugo verticillata*). Several bisecting sand roads cross the backdune area and several beach access trails cross the top of the primary dune, especially on the east side of Pine Point. Past building development (apparently now abandoned) may have displaced former maritime dune habitat. We did not observe any new development within the dunes, but we did see old building foundations and ruins mostly in the backdune area. We did not record the locations of these structures.



Figure 8. Maritime dunes.

The maritime dune occurrence at Plum Island is one of about 30-50 estimated occurrences in the state and one of ten currently documented by the NYNHP. At 63 acres, it is one of four dunes that are under 100 acres. The other six dunes mapped by Natural Heritage are over 100 acres with the two largest at Jones Beach (905 acres) and Fire Island Democrat Point (496 acres). We are aware of another 600+ acres of maritime dunes in the Fire Island Wilderness that is not recorded in the Natural Heritage database. That site is very likely the state exemplary occurrence of maritime dunes. Despite its relatively small size, the dunes at Plum Island are in fair to good condition, within a good quality landscape, and have an Element Occurrence Rank (EO Rank) of “BC.”

Maritime bluff

We surveyed seven observation points on maritime bluffs of which four were plots (PI16, PI17(1)a, PI17(2)-plot, PI24a-plot, PI29C-plot, PI31-plot, PI40). A continuous line of maritime bluffs extend southwest for about 0.5 mi. from Fort Terry toward Pine Point. The bluff faces are larger near Fort Terry reaching 25 m high (PI24a) and diminishing to 4 m (PI16) toward the southern end. Another 0.5 mi. line of bluffs extend east of Fort Terry along the south shore of Plum Island toward East Point. Here the bluffs range 15-25 m high. Toward East Point the bluffs become densely vegetated with shrubs and are only about 4 m high. Along the north shore the bluffs occur in discontinuous patches from East Point west to the lighthouse. The north shore bluffs are smaller and more vegetated than those on the south shore. A summary description of the maritime bluffs at Plum Island based on seven observation points and plots follows.

Plum Island Biodiversity Inventory

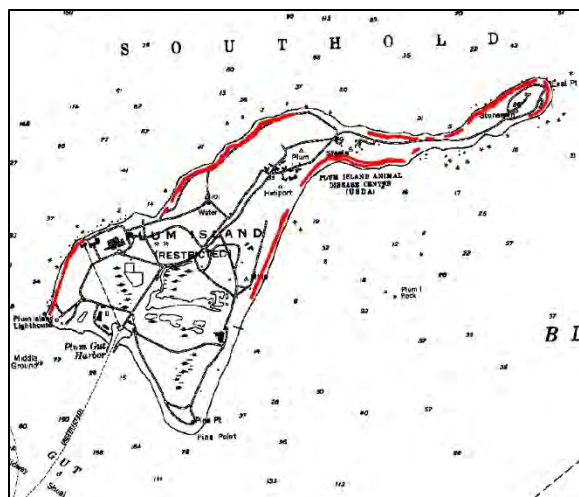


Figure 9. Maritime bluffs on Plum Island.

The tree sapling layer (4 m) has <1% cover of black cherry (*Prunus serotina*). The tall tree seedling layer (1.7 m) has <1% cover of black cherry (*Prunus serotina*) and red cedar (*Juniperus virginiana*). The short shrub layer (1 m) has 3% cover. The most abundant shrubs are bayberry (*Morella caroliniensis*) (2%), with smooth sumac (*Rhus glabra*), winged sumac (*Rhus copallinum*), multiflora rose (*Rosa multiflora*), and blackberry (*Rubus allegheniensis*) (<1% cover each). The dwarf shrub layer (<0.5 m) has 5% cover. The most abundant shrubs are dewberry (*Rubus flagellaris*) (3%), bayberry (*Morella caroliniensis*) (2%), and winged sumac (*Rhus copallinum*) (<1%). The vine layer (<0.5 m) has 16% cover. The most abundant vines are Asian bittersweet (*Celastrus orbiculatus*) (10%), Virginia creeper (*Parthenocissus quinquefolia*) (2%), Japanese honeysuckle (*Lonicera japonica*) (2%), poison ivy (*Toxicodendron radicans*) (2%), and hedge false bindweed (*Calystegia sepium*) (<1%).

The herbaceous layer has 20% cover. The most abundant herbs are common evening primrose (*Oenothera biennis*) (5%), seaside goldenrod (*Solidago sempervirens*) (4%), beach pea (*Lathyrus japonicus*) (2%), Gray's flatsedge (*Cyperus grayi*) (2%), and pokeweed (*Phytolacca americana*) (1%). The following herbs have <1% cover each: American searocket (*Cakile edentula*), wild radish (*Raphanus raphanistrum*), horseweed (*Conyza canadensis*), carpet-weed (*Mollugo verticillata*), spotted lady's-thumb (*Persicaria maculosa*), common yarrow (*Achillea millefolium*), panic grass (*Dichanthelium acuminatum* ssp. *columbianum*), sheep sorrel (*Rumex acetosella*), sowthistle (*Sonchus* sp.), orange-grass (*Hypericum gentianoides*), American beachgrass (*Ammophila breviligulata*), sea-beach sedge (*Carex silicea*), narrow-leaved goosefoot (*Chenopodium pratericola*), slender flattop goldenrod (*Euthamia tenuifolia*), Canada goldenrod (*Solidago canadensis*), black-eyed Susan (*Rudbeckia hirta*), Greene's rush (*Juncus greenei*), wild peppergrass (*Lepidium virginicum*), cocklebur (*Xanthium strumarium*), blue toadflax (*Nuttallanthus canadensis*), and common mullein (*Verbascum thapsus*).

The unvegetated surface has 70% cover consisting of sand (58%), rocks >1 m (<1%), rocks >10 cm (2%), rocks <10 cm (6%), wood <10 cm (2%), and wood >10 cm (<1%). Average bluff height: 14 m (range 4-25 m). Average bluff slope: 41 degrees (range 30-68 degrees).

We did not observe the typical threats to maritime bluffs related to overuse by people and development seen elsewhere in New York on Plum Island. The primary threat to maritime bluffs in New York is likely to be recreational overuse; specifically, climbing and sliding on the cliffs increases erosion. Additional threats include fragmentation of bluffs by development; stairways for beach access; and barriers to connectivity between the open ocean, the beach, and the bluffs. However, the primary threat to the bluffs on Plum Island is invasion by exotic species. We observed the following non-native species on the bluffs at Plum Island: Asian bittersweet (*Celastrus orbiculatus*), Japanese

honeysuckle (*Lonicera japonica*), wild radish (*Raphanus raphanistrum*), carpet-weed (*Mollugo verticillata*), spotted lady's-thumb (*Persicaria maculosa*), common yarrow (*Achillea millefolium*), sheep sorrel (*Rumex acetosella*), narrow-leaved goosefoot (*Chenopodium pratericola*), and common mullein (*Verbascum thapsus*). While the current cover of invasive species on the bluffs is relatively low, these species may become more abundant as the bluffs become more stabilized with increased vegetation cover.

The maritime bluff occurrence at Plum Island is one of 5 to 30 estimated extant occurrences statewide. At 44 acres, it is the largest of only three occurrences currently documented by the NYNHP with the other two being Montauk Peninsula (30 acres) and Shadmoor State Park (20 acres). The bluffs at Plum Island are equivalent in quality to those on Montauk Peninsula with both having a NYNHP EO Rank of “AB”. Shadmoor bluffs have an EO Rank of “BC.”



Figure 10. Maritime bluff community. Note bank swallow (*Riparia riparia*) nest holes near summit at left.

Marine rocky intertidal

We surveyed five observation points in the marine rocky intertidal community of which three were plots (PI19-plot, PI20, PI33, PI36-plot, PI44-plot). The marine rocky intertidal community starts east of Fort Terry and extends in discontinuous patches east to East Point and west along the north shore to lighthouse (Figure 11). The marine rocky intertidal signature is clear on color-infrared aerial photographs (Figure 12). It consists of a series of patches of marine macroalgae that occur on the tidally washed rocky shores surrounding Plum Island, extending out to the lowest tide level. Mapped patches range in width from about 5 to 50 meters. A summary description of the marine rocky intertidal community at Plum Island based on five observation points and plots follows.

Plum Island Biodiversity Inventory

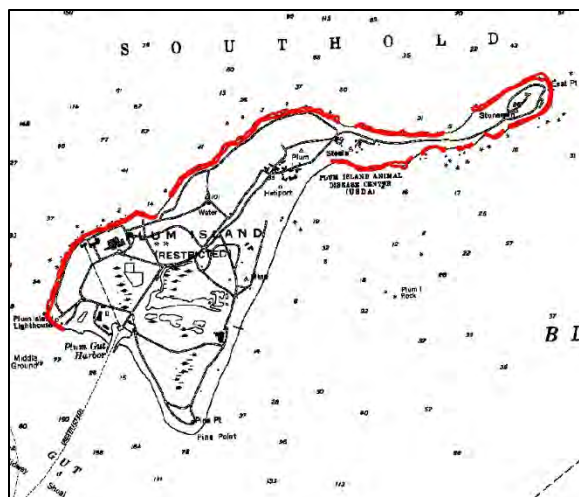


Figure 11. Marine rocky intertidal community at Plum Island.

The community was surveyed at low tide at the water line and includes subtidal underwater areas and intertidal exposed areas at low tide (Figure 12). Filamentous algae listed below are tentatively identified. The community is dominated by attached and free floating marine algae in the submerged aquatic layer and has 50% cover. The dominant marine algae includes rockweeds (*Fucus vesiculosus*, 25%, and *F. spiralis*, 7%; Figure 12) and knotted wrack (*Ascophyllum nodosum*, 11%, Figure 12) attached to rocks. Attached and suspended algae include hollow green weeds (*Enteromorpha* sp.) (1%) and brown filamentous algae (1%). The following species have <1% cover each: red filamentous algae (*Dasya pedicellata*, *Polysiphonia lanosa*), sea lettuce (*Ulva lactuca*), Irish moss (*Chondrus crispus*), and green filamentous algae (*Blidingia minima*, *Rhizoclonium* sp.). The epiphytic layer has 6% cover consisting of filamentous algae mostly attached to *Ascophyllum nodosum* and *Fucus vesiculosus* and includes red filamentous algae (*Polysiphonia lanosa*) (2%) and brown filamentous algae (*Elachista fuciola*) (1%).

The substrate has 93% cover including areas under algae cover and consists of rocks >5 m (3%), rocks >10 cm (24%), rocks >1 m (24%), rocks <10 cm (23%), and sand (8%). Water was about 0.5 - 0.75 m deep and covered about 45% of the subtidal areas and was about 0.2 m deep in small pools that covered about 12% of the intertidal areas.

Characteristic marine invertebrates include northern rock barnacle (*Balanus balanoides*), common blue mussel (*Mytilus edulis*), common periwinkle (*Littorina littorea*), rough periwinkle (*Littorina saxatilis*), and green crab (*Carcinus maenas*). We did not observe any horsehoe crabs (*Limulus polyphemus*).

We did not observe the typical threats to the marine rocky intertidal community related to overuse by people and development seen elsewhere in New York on Plum Island. The primary threat to marine rocky intertidal communities in New York is the spread of non-native marine algae, such as green fleece (*Codium fragile*). We did not find green fleece at any of our 2015 marine rocky intertidal sampling points. In addition, marine rocky intertidal community occurrences are threatened by trampling, shoreline development, pollution run-off from upland areas, and trash dumping. We did observe drain pipes that emptied into the ocean near patches marine rocky intertidal community (e.g., point PI45 on the north shore). Ocean derived pollution may threaten marine rocky intertidal communities. Over-collecting of tidal pool fauna may be a minor threat at a few sites.

Plum Island Biodiversity Inventory

The marine rocky intertidal community at Plum Island is one of an estimated 40 occurrences in the state and one of 10 currently documented by the NYNHP. At 34 acres, it is the third largest example in the state after Fishers Island (63 acres) and Napeague Bay (54 acres). The marine rocky intertidal community at Plum Island is tied with Huckleberry Island (9 acres) for highest quality example in the state with both having a NY Natural Heritage EO Rank of “AB.” However, Huckleberry Island is located in western Long Island Sound off shore from a heavily developed part of Westchester County, and given that the community was last surveyed in 1991, its EO Rank of “AB” is in question. If Huckleberry Island is resurveyed and downgraded, then that would leave the marine rocky intertidal community at Plum Island as the best example in the state.

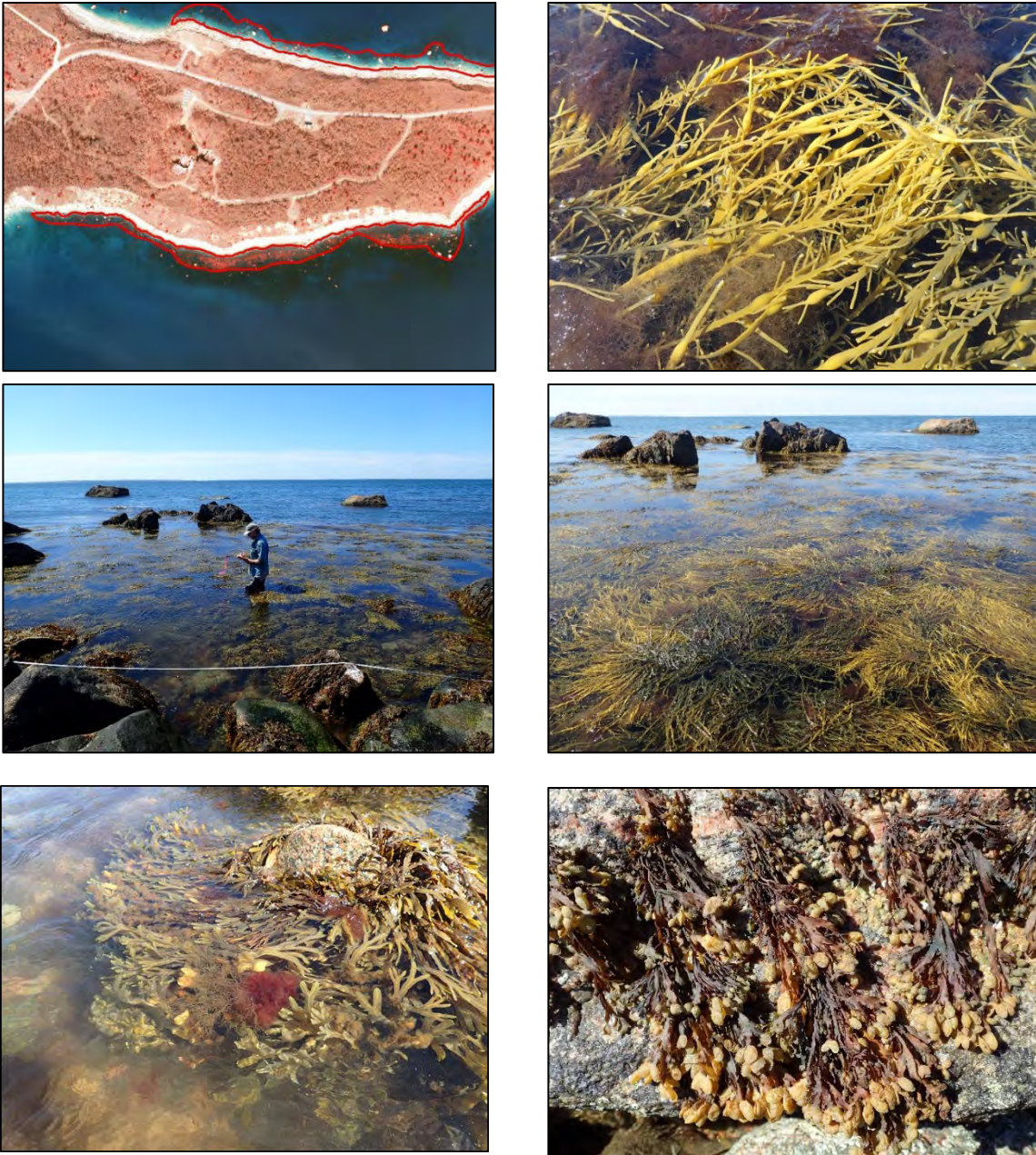


Figure 12. Marine rocky intertidal at Plum Island. Top left: Marine rocky intertidal polygon (Long Island 2010 6-inch Color Infrared). Top right: knotted wrack (*Ascophyllum nodosum*). Bottom left: rockweed (*Fucus vesiculosus*). Bottom right: rockweed (*Fucus spiralis*).

Marine eelgrass meadows

For the marine eelgrass meadow boat surveys we used NY Natural Heritage Aquatic Community Survey Methods (Hunt 2000) modified with input from the dive team. We created two Plum Island Eelgrass Survey forms; the first was completed by the on-boat data collector who recorded start and stop times, GPS coordinates, water depth, wave height, etc.; the second form was completed by the diver who recorded biotic and abiotic data present at the observation point (see examples of both forms in Appendix B). We incorporated distribution and percent cover figures from Methods for Mapping and Monitoring Eelgrass Habitat in British Columbia (Environment Canada 2002) to the forms. The forms were photocopied onto waterproof paper and completed using a #2 pencil attached to a plastic clip board.

Specimens collected by divers were placed in clear plastic collection vials and labelled. Plant specimens were pressed and dried in a plant press. Digital photographs were taken of each specimen. All fauna specimens and photos were identified in the office to closest taxonomic level possible. The following references and resources were used to identify marine organisms: Weiss (1995), Gosner (1978), and the Eelgrass Fauna Gallery (http://www.seagrassli.org/media_and_more/gallery/fauna_gallery/fauna_gallery_index.html).

We surveyed a total of six observation points on October 27, 2015 (Figure 13) and eelgrass was found at only one site. Vegetation cover and faunal data were collected at all six observation points. Three points were sampled in the same patch of marine eelgrass meadow of which one was a 1 m × 1 m plot (PIES01, PIES05a, PIES05b-plot). (Note: PIES = Plum Island Eelgrass Survey.)



Figure 13. Plum Island Marine Eelgrass (PIES) boat survey points.

Plum Island Biodiversity Inventory

The survey team included the following: a DEC boat (Figure 14); boat crew: Todd J. Glavin (DEC Boat Captain), Jennifer L. O'Dwyer (DEC Dive Safety Officer), Gregory J. Edinger (NYNHP Chief Ecologist and Data Collector); divers (Figure 15): Steven Resler (DOS Lead Diver), Erin L. White (NYNHP Zoologist and Diver).



Figure 14. DEC boat used for Plum Island Eelgrass Survey.

We looked for eelgrass at five points around the island. The first and fifth points were within the same patch that was hypothesized as an eelgrass habitat – the area between the ferry harbor and the lighthouse. We started eelgrass surveys about 130 m northwest of the western ferry harbor jetty and about 30 m offshore. We worked our way southeast then east counterclockwise around the perimeter of the island. We sequentially numbered our observation points starting at PIES01* and finishing with PIES05b near the original starting point (Figure 13). A summary description of the marine eelgrass meadow at Plum Island based on two observation points and one 1 m × 1m plot all sampled within the same patch of eelgrass follows.

The epiphytic layer on eelgrass (*Zostera marina*; Figure 15) has <1% cover of red filamentous algae (*Ceramium* sp. and *Champia parvula*). The submerged aquatic layer (0.5 m) has 47% cover. The most abundant species are eelgrass (*Zostera marina*) (38%), red alga (12%), green algae (2%), brown algae (2%), and brown filamentous algae (<1%). The unvegetated surface has 66% cover consisting of sand (65%), rocks <10 cm, silt, and shells (<1% cover each). Fauna observed included common tortoise limpet (*Testudinalia testudinalis*), common periwinkle (*Littorina littorea*), sponges (*Scypha* sp.), snails, tube worms, fishes, and eelgrass shrimp (*Hippolyte* sp.).

Point PIES01 located about 130 m northwest of the western ferry harbor jetty and about 30 m offshore. Water depth 11.3-11.6 feet measured at 0932 (depth finder). Surface calm, waves 0.5 feet (visual estimate). Patchy cover (40-55%) of eelgrass (*Zostera marina*) found and surveyed. A mass of *Zostera* was collected from the anchor. *Zostera* is dominant in the wrack line on shore.

Point PIES05a-b located about 40 m west-northwest of the western ferry harbor jetty and about 45 m offshore. Water depth 9.0-9.4 feet measured at 1305 (depth finder). Waves 0.5 feet (visual estimate). Continuous *Zostera* cover under the boat (90%) with decreasing cover toward jetty (5%) with sand. *Zostera* extends to shore and stops just short of mean low water/tide line.

The greatest threats to marine eelgrass meadows in New York are decreased water quality from excess nitrogen, harmful algal blooms, increased turbidity from sedimentation, and damage from fishing/shellfishing gear and boating activities. Additional existing or expected threats include continued decline in water quality and clarity from development, hardened shorelines, polluted run-

off, and potentially from a loss of filter feeders; physical disturbances from construction of marinas and docks, navigational channel dredging (which potentially destroys eelgrass beds, increases turbidity, and alters habitat suitability), storm surges, and wind/wave action (which may be exacerbated by climate change); seagrass wasting disease; bioturbation and overgrazing; increased water temperatures from climate change; and sea level rise. Some invasive exotic species, including tunicate colonies (*Didemnum* spp.) and macroalgae (*Codium fragile*), are also threatening this community.

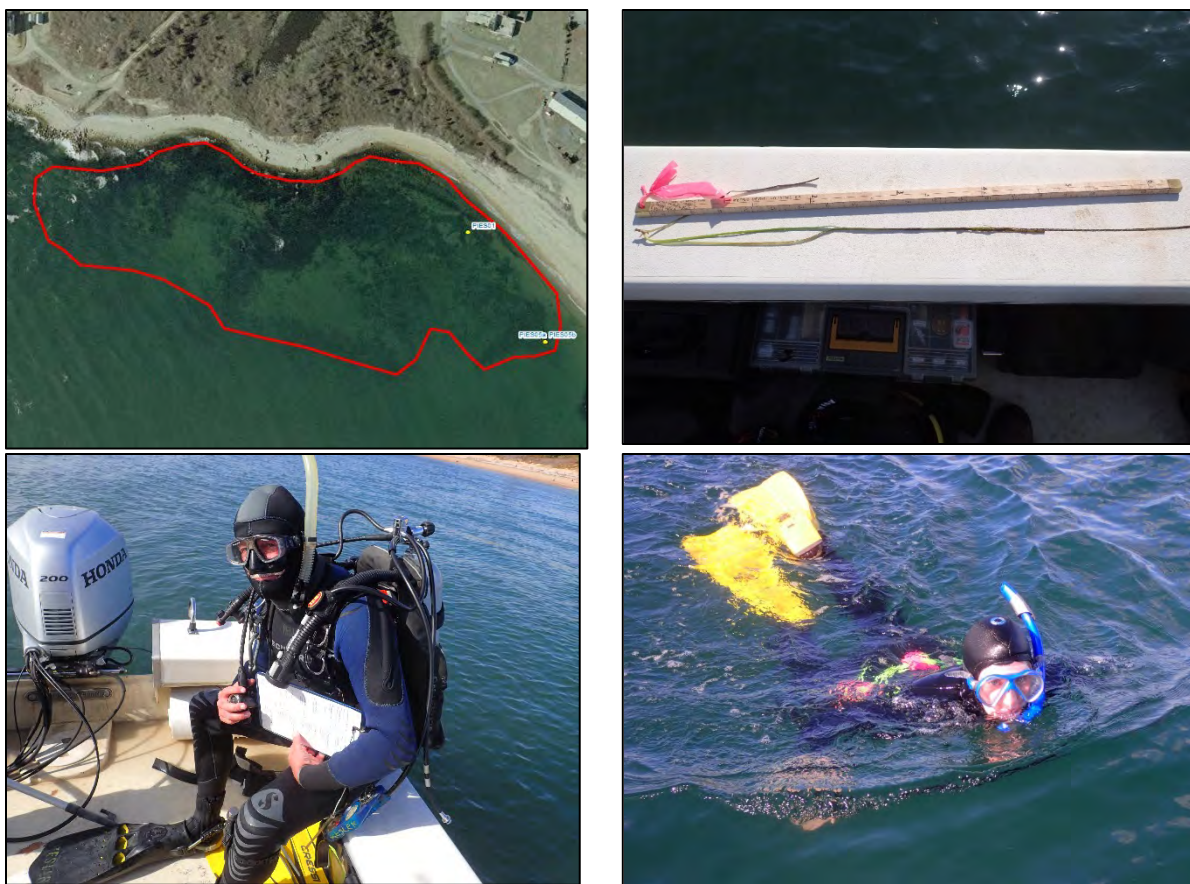


Figure 15 (clockwise from top left). Marine Eelgrass Meadow (Long Island 2004 1-foot Natural Color); Eelgrass (*Zostera marina*) specimen over 1 m long; Marine eelgrass meadow snorkel survey (Erin White); Marine eelgrass meadow SCUBA survey (Steve Resler).

The marine eelgrass meadow community at Plum Island is one of fewer than an estimated 30 occurrences in the state and one of three currently documented by the NYNHP. At 9.5 acres, it is the smallest of the three occurrences (Shelter Island – 330 acres and Napeague Harbor – 35.5 acres). Statewide the aerial extent and ecological integrity of this community is very rapidly to severely declining. While historical seagrass acreage in New York has not been documented, historical photography and records indicate that there may have been 200,000 acres in 1930; today, only 21,803 acres remain (NYS Seagrass Taskforce 2009). This is due, in part, to effects from historical seagrass wasting disease and current increased nutrient loading, decreased water quality and clarity, harmful phytoplankton blooms, habitat degradation, and fishing and boating disturbances (NYS Seagrass Taskforce 2009). Given the alarming decline of this community in the state, mapping and monitoring all patches of eelgrass like the one at Plum Island is becoming increasingly important.

Animals

We focused our animal surveys on at-risk species: those listed as Endangered or Threatened by New York State and those tracked by NYNHP. In some cases—reptiles and amphibians, dragonflies and damselflies, moths, other flying insects—surveys for single species use the same methods and sampling design as surveys to enumerate all the species in the group, so our lists of those taxa are more complete, including common species. While we recorded some birds incidentally, birds were not a focus of our efforts since Audubon New York had been surveying there for years for the Important Bird Area designation (Burger and Liner 2005). We summarized Audubon NY's surveys for this report.

Mammals

New England cottontail

The New England cottontail (*Sylvilagus transitionalis*) is a distinct species from the very common eastern cottontail (*Sylvilagus floridanus*), and is known to have occurred historically as far west as the Hudson River in New York, east to the Atlantic, and north into southern Maine. On Long Island it was known from Nassau and Suffolk Counties including on Shelter Island and at Montauk Point (Connor 1971). The two cottontail species are only reliably distinguished by skull morphology and through analysis of genetic material. They may differ in habitat. Eastern cottontails will use open areas more readily while New England cottontails avoid traveling outside dense brush.

We conducted surveys by walking rough transects and searching within dense brush, where New England cottontails typically hide, scouting for pellets and browse. We focused survey efforts on the two largest, densest patches of green brier (*Smilax rotundifolia*) located near the north-central shore of the island. Green brier is a favorite source of food and cover for New England cottontails. We visited the green brier patches twice, once in March and again in December of 2015. We had time on the second trip to survey additional habitats including an old field and a thicket adjacent to a wetland.

No cottontails were observed on the island by Heritage biologists during the extent of this project. Cottontails or their pellets, browse, or tracks were also not found during the targeted surveys. We were informed by Plum Island staff that they had also not observed any cottontails on the island. The potential predators of cottontails on the island are likely limited to hawks and falcons and there is an abundance of forage available due to deer control efforts. Due to the limited predators and abundant forage, it seems likely that there would be a high enough number of cottontails on the island that they would be detectable if present. Therefore, it is unlikely that New England cottontails currently exist on Plum Island, but we cannot determine this for certain since it is very difficult to confirm the absence of a species, especially one that inhabits dense brush. It is unknown but possible, given the proximity of known historical records, that this species occurred on Plum Island historically.

Bats

We conducted winter surveys of historic bunkers on Plum Island to evaluate their potential to serve as bat hibernacula. We spoke with Plum Island staff to gain information on which bunkers had certain characteristics, such as dark, intact interior rooms, that may provide habitat for bats as winter hibernacula. We surveyed two bunkers at the beginning of the project in March, and then assessed other bunkers over several trips during the summer. Those deemed to have potential were visited during December. A team of between 3 and 6 individuals (consisting of 2-3 Natural Heritage biologists accompanied by 1 to 3 Plum Island staff) surveyed the bunkers during the day with headlamps or flashlights. We methodically searched each room in the bunker for hibernating bats,



including those that may roost in the open, on the bunker ceilings, and in crevices or cracks in the bunker walls (as Northern long-eared bats [*Myotis septentrionalis*] and small-footed bats [*Myotis leibii*] are known to do). Any bats observed were identified in the field by sight, assisted by binoculars, and photographed for species confirmation. Bat photos were later reviewed by state DEC biologist, Carl Herzog, to confirm identification.

Many of the bunkers on the island (Floyd, Eldridge, Kelly, Dalliba, Campbell, Greble, Bradford) are above ground, small, and degrading, missing doors, windows, and walls, leaving them likely too exposed to serve as ideal winter hibernacula, although they could use these locations as roost sites in warmer temperatures. Four bunkers (Battery Steele, Dimmick, 217, and Stoneman) appeared to have some more promising characteristics such as being partially underground or had exterior walls that were still intact.

In March, we surveyed Battery Steele (Figure 16) and Dimmick. No bats were found in Battery Dimmick. Although it is a large structure, due to the degraded state and lack of protected interior rooms, it is likely not used as a hibernaculum except maybe temporarily in the fall or early winter on milder days. The best winter habitat we found for bats on the island was at Battery Steele, which had interior rooms deep within the bunker and in some cases, doors had rusted to the ground partially open. While the doors were open enough to allow human access, they were likely still enclosed enough to provide a buffer to temperature changes to some degree within them. Some of the rooms had an outer door and a room located beyond the first room; those likely provided the best habitat having the darkest conditions with the least exposure. Four bats were found at Battery Steele on the March survey, 3 big brown (*Eptesicus fuscus*) bats and 1 little brown bat (*Myotis lucifugus*; Figure 16); all in interior rooms. A brief revisit was made in April on an evening when bats were not active during the night acoustic survey, to see if they were in the hibernacula due to the cooler temperatures. On that survey, we found a big brown bat still roosting in the hibernacula and likely the same little brown bat was found dead on the floor near where we had seen it in March.

In December, we resurveyed Battery Steele. There were no bats found. It is likely that the few bats we had found the preceding spring were just not hibernating fully yet due to the warmer temperatures. We also surveyed Battery Stoneman and Battery 217 on the same trip and neither had bats. Stoneman looked promising at first but there were no interior rooms to offer protection, so it would not likely serve as a hibernacula. Battery 217 also looked promising and did have a few interior rooms that were darker and provided some protection from winter exposure. There were also many cracks and crevices for bats to hide. It is likely that Battery 217 could serve as a hibernacula for some bats. However, since Battery Steele had the better habitat and only housed a few bats, it is not likely that any of the bunkers on the island serve as major hibernacula.

We did not detect the federally threatened northern long-eared bat (*Myotis septentrionalis*) on the winter surveys. However, there is a well-documented population of northern long-eared bats still occurring on Long Island and it is still unknown where they hibernate during the winter. Northern long-eared bats often hide in crevices in the hibernacula walls making them hard to detect. Also, they are even harder to detect now that they occur in such low numbers since populations have suffered a dramatic decline of 99% in New York State from 2007-2015 due to white-nose syndrome. Since they are so difficult to detect it would take a tremendous amount of survey effort to locate one in a bunker if they are present. It is certainly possible that they could hibernate in a bunker on Plum Island such as Battery Steele or 217, especially since we found other bats including another *Myotis* species using them.



Figure 16. Exterior of Battery Steele and little brown bat (*Myotis lucifugus*) hibernating in Battery Steele.

We used both passive and active survey methods to obtain the greatest accuracy of information on which species of bats are using Plum Island during the spring, summer, and fall. Active surveys, which consisted of driving or walking with the detector at night, enabled us to target a variety of habitats throughout the island, such as water sources that may attract bats, and also to sample pathways through the woods that bats may use as flyways during foraging.

For the passive surveys, we placed a stationary detector at a sampling location in the field and left it out for up to a month at a time. This method allowed us to greatly increase the number of nights sampled in the spring and the fall which was important since migration patterns of bats can be sporadic depending on weather and other conditions.

For the active surveys, we used a Pettersson M500 microphone connected to a Windows 8 tablet running Pettersson's BatMicRecorder software. The display screen on the tablet enabled us to view live spectrograms of the bat echolocations. The active detector was full-spectrum and therefore allowed us to view more qualities of the sound to aid in identification. We conducted acoustic driving surveys monthly from April through October, following the same prescribed route (Figure 17) except during July when night work for deer control prohibited the survey. The surveys were conducted within the first 2 hours following sunset. Bat echolocations were identified, where possible, to species by reviewing each call file manually and examining characteristics of each pulse such as minimum frequency, duration, and slope.

For passive surveys, we used an Anabat II detector with an omni-directional microphone housed in a plastic container sealed with a lid for weather protection, with a hole in the side for the microphone. The Anabat II is a zero-crossing detector that collected files of a smaller size allowing for greater storage capacity. We attached the detector horizontally approximately 4-5' high in a tree. The detector was moved between four locations on different surveys: at the edge of the wetland near the observation tower (Figure 18), at a second location on the same wetland, on a small raised bank along an access road through the forested section of the island, and along an access road near the water tower (Figure 17).

Plum Island Biodiversity Inventory

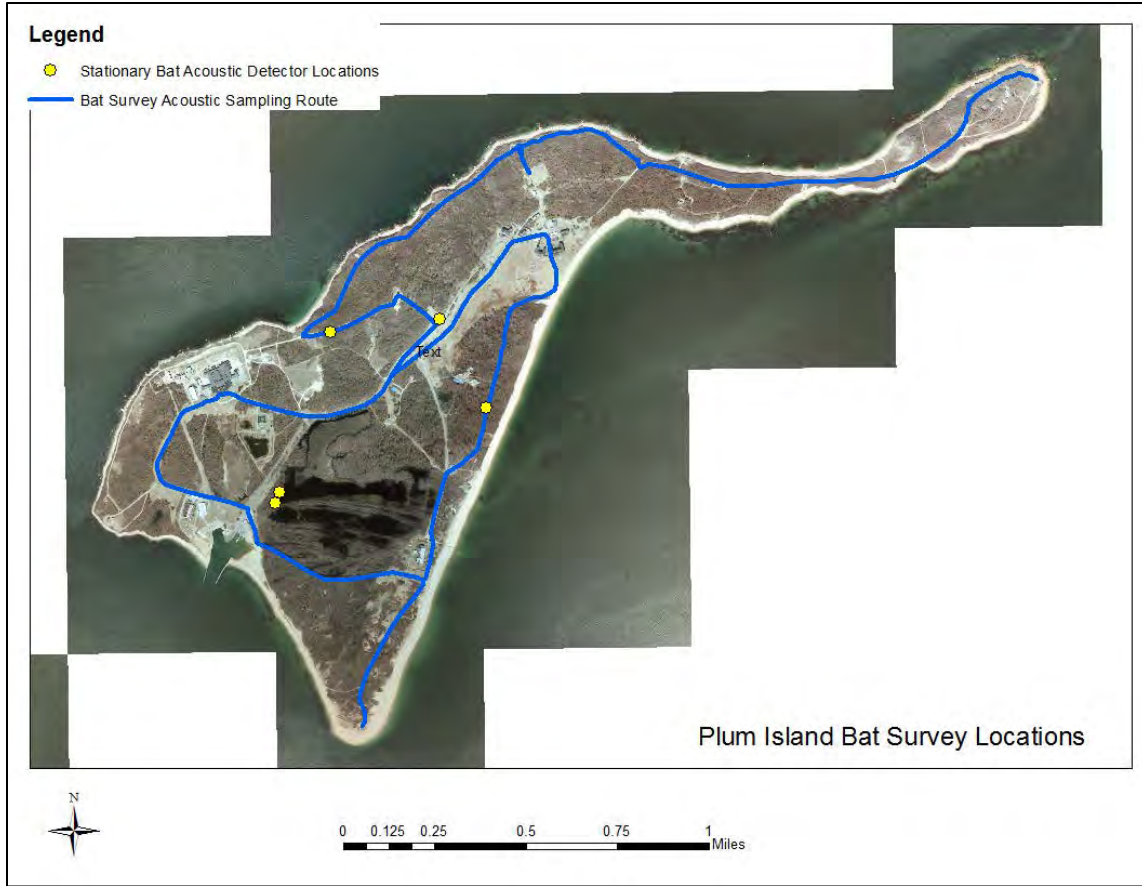


Figure 17. Bat survey route and stationary detector locations on Plum Island.



Figure 18. Bat detector location in April on the wetland near the observation platform.

Including all acoustic surveys, we collected over 1350 sound files, 63% of which were noise or low quality calls that could not be identified to species. Of these, 499 call files were of high enough quality to determine the species. Each file represents a pass of at least one bat by the detector. We identified three species of bats using the island through this method (Table 2). Eastern red bats (*Lasiurus borealis*) and big brown bats (*Eptesicus fuscus*) were present in the summer indicating their status as summer residents of Plum Island, and hoary bats (*Lasiurus cinereus*) were present only during migration in the spring and fall. Hoary bats had a particularly high activity rate in the spring. Eastern red bats were also detected during migration but only in the fall, and at a relatively high activity rate.

The species documented were all expected and common elsewhere on Long Island. One of the more interesting findings was the prevalence of hoary bats during the spring and fall and eastern red bats during the fall, which supports findings by other researchers that some tree bats may migrate along the coast.

We also did not detect the federally threatened northern long-eared bat (*Myotis septentrionalis*) on the summer surveys. Although northern long-eared bats typically occur in more forested habitat than is present on the island, they sometimes may use smaller forest patches. There is a well-documented population remaining on Long Island, so there is a chance that they could turn up on future surveys foraging or roosting on the island during the summer.

Table 2. Bat species detected at Plum Island by season.

| Common name | Scientific name | Hibernating | Spring | Summer | Fall |
|------------------|--------------------------|-------------|--------|--------|------|
| Little brown bat | <i>Myotis lucifugus</i> | X | | | |
| Big brown bat | <i>Eptesicus fuscus</i> | X | X | X | X |
| Hoary bat | <i>Lasiurus cinereus</i> | | X | | X |
| Eastern red bat | <i>Lasiurus borealis</i> | | | X | X |

Other small mammals

We conducted small mammal trapping in August and September with two goals: to inventory other small mammals of the island to determine which species are present, and to target White-footed Mice (*Peromyscus leucopus*) to collect hair samples for sub-species level analysis. Meadow voles (*Microtus pennsylvanicus*) and White-footed Mice were previously documented on Plum Island. Since unique subspecies of *Peromyscus leucopus* are known to inhabit Martha's Vineyard (*P.l. fuscus*) and Monomoy Island (*P.l. ammodytes*) (Bangs 1905), we wanted to see if Plum Island may harbor a unique subspecies as well. We contacted Dr. George Argyros, a professor at Emory and Henry College in Virginia, about performing DNA analysis on hair samples collected from any Plum Island mice we were able to capture.

We used 29 H.B. Sherman folding live traps baited with a mixture of peanut butter and oatmeal placed in 5 areas around the island for two nights each in August and September. We surveyed five sites in August, noted in lavender and dark purple dots in Figure 19. The five sites surveyed in September are noted in this figure as purple and dark purple dots. Habitats surveyed included a shrubby/grassy dirt roadside, roadside with dense greenbrier (*Smilax rotundifolia*), an open grassy meadow, a wooded area, and maritime dunes. Five traps were placed at each site 10 m apart during trap nights, with the exception of the meadow, which had 9 traps set since this was the only habitat where we expected Meadow Voles. During surveys, traps remained open from about 4pm until 9am the following morning. Dry nights remaining at 55° F or higher were targeted for trapping.



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When a mammal was captured in a trap, we transferred it to a clear zip-lock bag (ensuring access to air for breathing) or held it in a gloved hand. We took measurements of the ear length, body length from head to tail, tail length, and hind foot length. These measurements and other body characters were used for species level identification. We then removed a hair sample from the back of the neck with tweezers and placed the sample in a vial with ethanol. To ensure we did not remove more than one hair sample per individual, we marked each individual on the stomach with a permanent marker. When possible, total handling time did not exceed three minutes before the animal was released.

In August, we captured two White-footed Mice on separate trap nights at Pine Point in maritime dune habitat. We captured a Meadow Vole in the meadow by the DO shack. In September, we captured a White-footed Mouse at Pine Point and we found a dead Meadow Vole on the east end of the island, away from trapping areas, at Battery Dimmick. We collected hair samples from all individuals and sent them for subspecies analysis, which is still pending at the time of this report. Our trapping effort did not reveal species previously unknown to Plum Island.

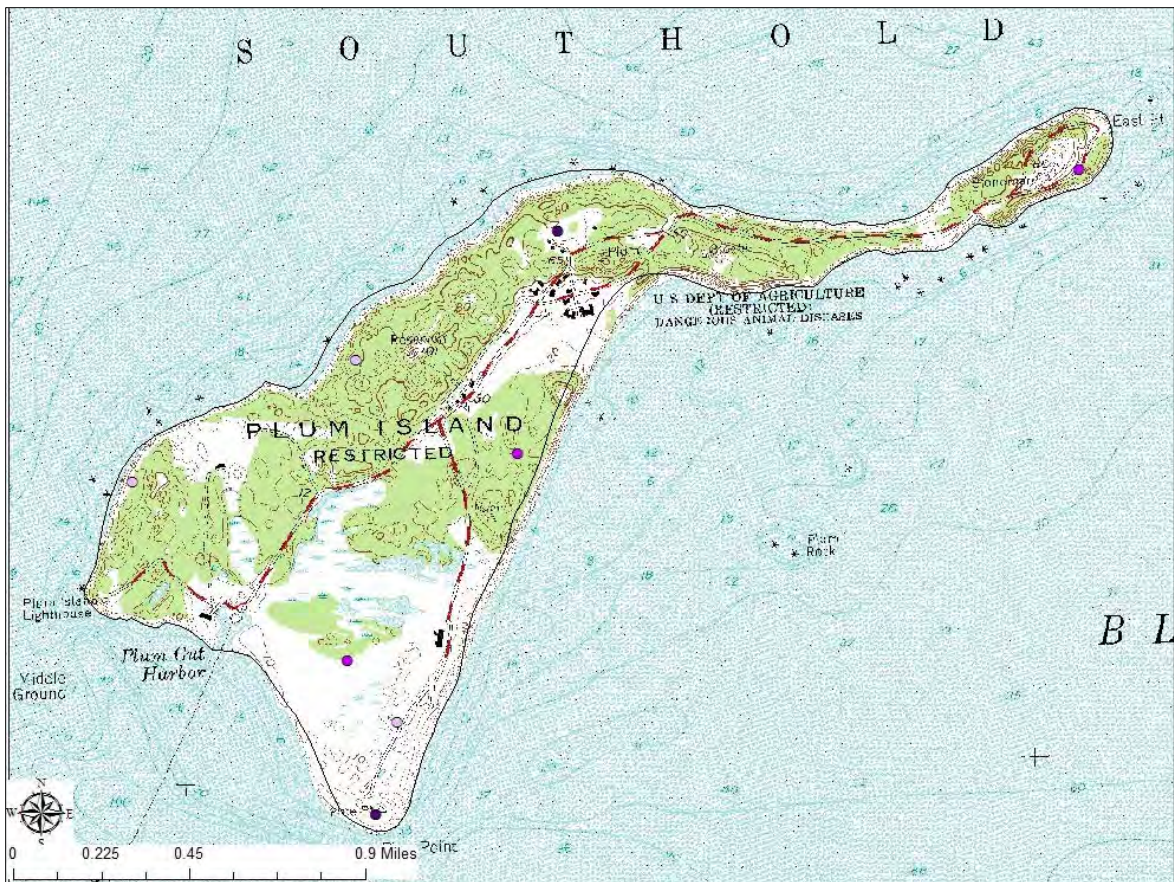


Figure 19. Map of Plum Island showing main sites of small mammal trapping effort. Sites surveyed in August are lavender, sites surveyed in September are purple, and sites surveyed both months are dark purple.



Figure 20. White-footed mouse (*Peromyscus leucopus*) captured in a small mammal trap on Plum Island.

Seals

The southeast shore of Plum Island remains one of the largest seal haul-out sites in New York State. Audubon New York has counted seals during their bird surveys regularly since 2010. The large majority of seals on Plum Island are harbor seals (*Phoca vitulina*), although gray seals (*Halichoerus grypus*) are also regularly observed in small numbers. Audubon did not attempt to divide their counts by species; unless the observer has a good view of the animal’s head it is hard to tell harbor seals from gray seals. These counts should be considered minimum numbers as these surveys were not necessarily timed with low tide, when the greatest use of the haul-out site would be expected.

Table 3. Seals counted at the Plum Island haul-out site by Audubon New York during their bird surveys.

| Years | Maximum number of seals observed at time of count |
|------------|---|
| 2010-2011 | 130 |
| 2011-2012 | 141 |
| 2012-2013 | 177 |
| 2013-2014 | 89 |
| 2014-2015 | 189 |
| 2015-2016* | 177 |

* Surveys through January 2016 only.

After a dramatic increase in seal use of Long Island’s waters starting a decade or so ago (Bass *et al.* 2015), the numbers at Plum Island’s haul-out appear to have stabilized. Interestingly, while Plum Island’s haul-out hosts harbor seals primarily, nearby Great Gull Island has mostly gray seals (Matthew Male, Great Gull Island Project, personal communication).

Birds

We compiled data from Audubon New York’s regular surveys of the island to create a bird checklist by season. We did not conduct our own field surveys for birds given the extensive coverage of the island by Audubon since 2006, with regular standardized walking routes and island-wide coverage beginning in 2011. From 2006 to 2010, Audubon surveyed the island 20 times. From 2011 to 2016, Audubon surveyed 16-20 times per year. Nocturnal surveys had not been conducted previously, so Audubon’s surveyor accompanied us on the nights of June 22 and October 7, 2015. We stopped at several locations along our bat route and Audubon played calls of owls, nightjars, and marsh birds. We did not detect any nocturnal bird species on those visits, although we recorded a Great Horned Owl (*Bubo virginianus*) just prior to the start of the June survey.

We wished to assign abundance codes to each species by season, focused primarily on the period from 2011 to 2015, when Audubon’s surveys became more standard and regular. We used data from 2006-2010, and from 2016, in certain cases. Our “seasons” represent key life-history periods: spring migration (April-May), breeding (June-August), fall migration (September-October), and nonbreeding (November-March). Occurrence and abundance codes were adapted from the American Birding Association system (<http://listing.aba.org/checklist-codes/>). If a species was recorded in only 1 year from 2011-2015, only in the pre-2011 surveys, or in 2016 only, we called it “Accidental.” If it was recorded in 2 or 3 years between 2011 and 2015, it was considered “Casual.” If a species was recorded in 4 or 5 of the last 5 years, it was considered to be “Regular” and then was categorized by its abundance.

The primary measurement of abundance was Audubon’s “day total,” the number of individual birds seen over the course of a survey day. We calculated the average day total per species per year so that rare large flocks did not determine the abundance code. “Uncommon/Rare” birds were Regular species whose average day total was fewer than 3 birds. “Common” species were ones whose average day total was 3-25 birds and species with higher counts than that were called “Abundant.” We based these cutoffs on the distribution of day totals by season across species, to try to balance out the number of species in each category. Codes and criteria are summarized in Table 4.

Table 4. Occurrence and abundance codes for birds of Plum Island, based on surveys by Audubon New York. Codes are adapted from American Birding Association system (<http://listing.aba.org/checklist-codes/>). Codes in bold are final categories used in the species list (Appendix C).

| Occurrence code | Abundance code | Criteria |
|-------------------|----------------------|---|
| Regular | Abundant | Recorded in 4 or 5 years from 2011 to 2015; 26 or more individuals seen on an average day |
| | Common | Recorded in 4 or 5 years from 2011 to 2015; 3 to 25 individuals seen on an average day |
| | Uncommon/Rare | Recorded in 4 or 5 years from 2011 to 2015; 1 or 2 individuals seen on an average day |
| Casual | - | Recorded in 2 or 3 years from 2011-2015 |
| Accidental | - | Recorded in 1 year from 2011-2015, or only in other survey years |

From 2006-2016, 220 bird species were detected on Plum Island. The highest species counts were in April-May and September-October (Table 5), representing peak migration months. A total of 61 Species of Greatest Conservation Need (SGCN; NYS DEC 2015) have been documented on the island, with 17 of these being considered High-priority SGCN. In addition, three Species of Potential Conservation Need were documented.



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Audubon has noted 49 species as Confirmed breeders, four more as Confirmed but likely nesting off the island, and an additional 13 as Probable breeders. Of the Confirmed and Probable Plum Island breeders, 10 are SGCN.

Table 5. Number of species detected on Plum Island by Audubon New York from 2006-2016, in five occurrence/abundance categories by season.

| Code | Apr-May | Jun-Aug | Sept-Oct | Nov-Mar |
|---------------|---------|---------|----------|---------|
| Abundant | 21 | 13 | 12 | 15 |
| Common | 54 | 37 | 46 | 44 |
| Uncommon/Rare | 48 | 48 | 49 | 34 |
| Casual | 25 | 19 | 20 | 24 |
| Accidental | 9 | 9 | 19 | 12 |
| Total | 157 | 126 | 146 | 129 |

At-risk species

We obtained detailed observation data from Audubon New York for species tracked by NYNHP: Common Eider (*Somateria mollissima*), Northern Harrier (*Circus cyaneus*), Glossy Ibis (*Plegadis falcinellus*), Least Tern (*Sternula antillarum*), Common Tern (*Sterna hirundo*), and Roseate Tern (*Sterna dougallii*; Figure 21). Common Tern observations were so frequent and dispersed around the island that we did not map them. Roseate Terns were also found all along the shoreline but the numbers were highest in the mapped area (Figure 21). Historically, the Northern Harrier had bred in the meadow near the DO Shack (north-central part of the island) but breeding now seems to take place in the dunes south of the large wetland (Figure 21). Breeding locations for the eider and harrier will be mapped in the NY Natural Heritage database as element occurrences. Along with the known Piping Plover occurrence on the beach south of Lab 257, these represent the locations of the most at-risk birds that use Plum Island.





Figure 21. Observations of at-risk birds on Plum Island by Audubon New York. The Roseate Tern polygon represents the area with the highest concentration; the species was seen frequently at other points around the island.

Reptiles and amphibians

Because of the potential for several rare species (Schlesinger *et al.* 2012), we aimed to document the herpetofauna of the island as fully as possible. We used the following methods to survey for reptiles and amphibians: nocturnal calling surveys and deployment of recording devices for frogs in March, April, and May; hoop traps for turtles in June and July; minnow traps for salamanders in June; and visual surveys for all species, including flipping potential cover objects, from April through October. On June 24 and 25 we had teams of expert herpetologists join us.

On our March visit, we deployed two Wildlife Acoustics SongMeters, recording devices intended to capture animal vocalizations that can be programmed to record at certain times and for specific lengths of time. We placed one at the large wetland and one at the former wastewater basin. From March 19 to April 1, the devices were set to record at 8000 mHz in stereo for 5 out of every 15 minutes throughout the day. From April 15 to May 26, the devices were set to record for 5 out of every 30 minutes starting at 4:30pm and ending at 5:35am. We ended up with 4,737 sound files.



Figure 22. Locations of recording devices for amphibians on Plum Island.

We reviewed call files using Wildlife Acoustics Song Scope software, which enabled us to screen call files visually for sound, which is much faster than reviewing them aurally. When sounds were detected on the spectrogram, we listened to that section of the recording to identify the sound. We did not detect animal noises of any kind in the recordings from March and from May 21-26, approximately one-third of the sound files. We did not have time to listen to all the recordings.

We conducted nocturnal calling surveys for frogs in conjunction with bat surveys in April and May. On April 14, we conducted 3-5-minute calling surveys at four wetland locations, including a repeat 5-minute visit to the former wastewater basin on April 15. We did not hear any frogs during these surveys, nor at any of our other diurnal and nocturnal surveys around the island the rest of the year.

Our visual and minnow-trap surveys in the island's wetlands did not yield any detections of amphibians. We set several minnow traps in the large wetland, the inland freshwater wetland, and in one of the channels at the south end of the wetland complex. The traps were baited with sardines and we included glow sticks, which are known attractants for salamanders. We caught only fish (and a rare dragonfly [below]) with these traps.

The lack of amphibians in the large wetland may be attributed to the wetland's chemistry (see Fish, below), particularly its high conductivity, suggesting saltwater infusions from storms.

We conducted visual surveys throughout the island for reptiles and amphibians, particularly on June 24 and 25 when five expert herpetologists from Long Island joined us. We waded in the wetlands, flipped cover objects in the forests and grasslands, and checked crevices in structures. These surveys confirmed some known species from the island but did not add additional species.

We detected three reptiles during our surveys around the island: box turtle (*Terrapene carolina*; Figure 23) and road-killed garter snake (*Thamnophis sirtalis*) and brown snake (*Storeria dekayi*; Figure 23). Road-killed brown snakes were found twice during the field season, and in October the island's fire chief told us he encountered live ones sometimes near the fire station. With the confirmation of brown snakes on the island, the list of known reptiles now includes five species (Appendix D).



Figure 23. Brown snake (*Storeria dekayi*) and eastern box turtle (*Terrapene carolina*) from Plum Island.

We deployed hoop traps (Figure 24) for aquatic turtles in the large wetland from June 22-24 and July 21-23, the small channel wetland at the south end of the large wetland June 24-25, and in the small freshwater wetland June 24-25 and July 21-23. Traps were left open overnight and baited with partially open cans of sardines. We captured two turtle species: painted turtle (*Chrysemys picta*; Figure 25) and snapping turtle (*Chelydra serpentina*; Figure 26). Both of these species are common throughout New York and the Northeast US. No rare turtles were captured.



Figure 24. Erin White checking a hoop trap for turtles.



Figure 25. Kelly Perkins holding painted turtles (*Chrysemys picta*) at the large wetland; close-up of painted turtles.



Figure 26. Snapping turtles (*Chelydra serpentina*) caught in the large wetland. Note 4-inch sardine can for scale.

Fish

On June 22 and 23, 2015, NYS DEC fisheries staff from Long Island conducted surveys of the large wetland and the wetland channels south of the main wetland using fyke nets, a 50-foot seine, and minnow traps. They caught only four species (Appendix D), with mummichog (Figure 27) being the most abundant. Two of the species, goldfish and mosquitofish, were not native, but the other two are SGCN. All four species are salt tolerant, suggesting regular infusions of salt water into the wetland. NYSDEC's water chemistry measurements in the large wetland yielded conductivity values of 117 and 254 $\mu\text{mho}/\text{cm}^3$, which is between pure freshwater and brackish water (Table 3 of <http://www.vl-pc.com/index.cfm/technical-info/conductivity-guide/>).



Figure 27. Mummichog (*Fundulus heteroclitus*) in a minnow trap from the large wetland on Plum Island.

Invertebrates

Dragonflies and damselflies

We performed dragonfly and damselfly (odonate) surveys on island visits during the months of June, July, and August. We conducted targeted surveys of potential adult breeding habitats on the island, which would presumably be any freshwater or brackish water habitats. We did visual searches at wetlands June-August, identifying odonates to species level when possible through the use of binoculars. When it was necessary to confirm observations, we used an aerial insect net to capture

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individuals before photographing and releasing them. In a few cases, we retained a voucher specimen for later confirmation using a microscope. In addition to these targeted surveys, odonate species were noted when observed in habitats away from breeding grounds while they were foraging. Overall, we documented sixteen odonate species during our 2015 inventory (

Table 6). We confirmed three rare species. Needham’s Skimmer (*Libellula needhami*, G5, S3) and Rambur’s Forktail (*Ischnura ramburii*, G5, S2S3) were breeding at the large wetland near the harbor with the bird observation tower. We collected a Golden-Winged Skimmer (*Libellula auripennis*, G5, S1S2) dragonfly larva in June in a minnow trap set in the small inland freshwater wetland off the road to Lab 257, to the northeast of the large wetland. This larva was identified by odonate expert Ken Tennesen.

Table 6. Dragonfly and damselfly observations during breeding season of 2015. Rare species are noted with an asterisk. “Big Wetland” refers to the large wetland near the harbor with the bird observation tower.

| Scientific name | Common name | Locations observed | Jun | Jul | Aug | Sep |
|---------------------------------|------------------------|---|-----|-----|-----|-----|
| <i>Anax junius</i> | Common Green Darner | East end field, pond near water treatment area, seal haul-out, Parade Grounds | | X | X | X |
| <i>Enallagma civile</i> | Familiar Bluet | Big Wetland, east end field | | X | | |
| <i>Erythemis simplicicollis</i> | Eastern Pondhawk | Big Wetland | X | X | | |
| <i>Ischnura posita</i> | Fragile Forktail | Big Wetland | X | X | | |
| <i>Ischnura ramburii</i> | Rambur’s Forktail* | Big Wetland | X | X | X | |
| <i>Ischnura verticalis</i> | Eastern Forktail | Big Wetland | | X | | |
| <i>Libellula auripennis</i> | Golden-winged Skimmer* | Inland freshwater wetland | X† | | | |
| <i>Libellula needhami</i> | Needham’s Skimmer* | Big Wetland | | X | X | |
| <i>Libellula pulchella</i> | Twelve-spotted Skimmer | Big Wetland, pond near water treatment area | X | | | X |
| <i>Pachydiplax longipennis</i> | Blue Dasher | Big Wetland, pond near water treatment area | X | X | | |
| <i>Pantala flavescens</i> | Wandering Glider | Pine Point | X | | | |
| <i>Pantala hymenaea</i> | Spot-winged Glider | East end field | | X | | |
| <i>Perithemis tenera</i> | Eastern Amberwing | Big Wetland | X | X | X | |
| <i>Platbemis lydia</i> | Common Whitetail | Big Wetland, pond near water treatment area | X | | | |
| <i>Sympetrum</i> sp. | A Meadowhawk | Big Wetland | | | | X |
| <i>Tramea carolina</i> | Carolina Saddlebags | Big Wetland, pond near water treatment area | X | | | |
| <i>Tramea lacerata</i> | Black Saddlebags | Parade Grounds, Big Wetland, east end field, pond near water treatment area | X | X | | |

* Rare species; † Larva



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Rambur's Forktail is known from northern South America northward along the U.S. Atlantic coast (Abbott 2007). In New York, there are occurrences in Staten Island, New York City, and Long Island all the way out to Greenport, NY. Needham's Skimmer (*Libellula needhami*) is known from brackish sites in southern NY and Long Island. The large wetland where they were observed breeding is presumed to have some salt content and these species are known to be tolerant and even thrive in brackish habitats. We observed individuals of both species near the bird observation tower, as this area was accessible to us. Future inventory should include searching the entire wetland to determine the full extent of the breeding population. Golden-Winged Skimmer (*Libellula auripennis*) is known from southern NY and Long Island freshwater ponds. As a late instar nymph was collected from the small inland freshwater pond to the northeast of the big wetland, this can be treated as a confirmed breeding record. Future inventory should include searching this small wetland in July and August for adults, as well as nearby foraging areas. Captures and close observation of adult *L. needhami* and *L. auripennis* are recommended, as the two species are so similar in appearance. Another rare species known from Greenport, NY sites, Four-spotted Pennant (*Brachymesia gravida*), was not documented in 2015. Future colonization of this species on Plum Island is possible.

The two glider species (*Pantala* sp.), the two saddlebag species (*Tramea* sp.), and Common Green Darners are species known for their strong flight and migratory capabilities and were often observed foraging on the island away from aquatic breeding habitats. These individuals may therefore not be breeding on the island. The other odonate species observed are fairly ubiquitous throughout the state, common in lentic habitats and are likely breeding in the big wetland.



Figure 28. Rambur's forktail (*Ischnura ramburii*), left, and Needham's skimmer (*Libellula needhami*), which is faded after processing with acetone to preserve the specimen.



Figure 29. Large wetland on Plum Island, habitat for rare dragonflies and damselflies.

Beetles

We conducted two targeted survey efforts for beetles and incidentally collected and photographed beetles encountered during other surveys. A full inventory of the beetles of Plum Island was beyond the scope of our project but we aimed to identify as many species as we could.

On May 26 we surveyed the beach of the south shore of the island, from just east of Fort Terry to the harbor, for tiger beetles. This stretch of beach was known from a 2009 survey to support a large population of the hairy-necked tiger beetle (*Cicindela hirticollis*, G5, S1S2), an SGCN that has declined all over Long Island. We wished to update the data in our database on this population. Three of us walked the beach—at the water, in the center, and along the vegetated edge—and counted individuals of the two species present, *C. hirticollis* and *C. repanda* (which is by far the more common species elsewhere; Figure 30). We detected 800-900 *C. hirticollis* and about 170 *C. repanda*. The large population of *C. hirticollis* on this beach can be attributed to the lack of beach driving, natural sand and dune accretion, and minimal beach recreation. Beach driving and heavy recreation have apparently caused the species to become extirpated from many of Long Island’s beaches (Schlesinger and Novak 2011, Mawdsley *et al.* 2013).



Figure 30. The common bronzed tiger beetle (*Cicindela repanda*), left, and the rare hairy-necked tiger beetle (*C. hirticollis*).

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We surveyed intensively for the American burying beetle (*Nicrophorus americanus*), a federally listed member of the carrion beetle family (Silphidae) whose only remaining population in the eastern U.S. is on nearby Block Island. We followed the survey protocol in the federal recovery plan for the species (Raithel 1991) with some modifications. We installed pitfall trap transects in three locations on the island: at the East End, in the parade grounds near Fort Terry, and near Pine Point. Each trap consisted of a one-quart, wide-mouth mason jar in a hole with the top flush with the ground. We placed about 1 Tbsp of sardines in a small plastic container with a cheesecloth cover secured by a rubber band at the bottom of each jar. To deter predators, we used landscape cloth pins to secure a square of ½” hardware cloth on top of the jar. We used Styrofoam plates secured with landscape cloth pins and weighted with rocks as rain guards.

We installed 16 traps near Fort Terry and 12 traps at the East End on June 22, and eight traps at Pine Point on June 23. We retrieved all remaining traps on June 25. Raccoons dug up several traps at the East End and Fort Terry and significant rainfall flooded some traps. All told, we had 60-70 functioning trap-nights.



Figure 31 (clockwise from top left). Matt Schlesinger digging a hole for a pitfall trap; installing a predator guard; *Nicrophorus tomentosus*; *Necrophila americana* (yellow front) and *Nicrophorus orbicollis* (red blotches).

We caught several species of carrion beetle (Appendix D), but not the American burying beetle. The most common species we caught was *Nicrophorus orbicollis* (Figure 31). Moth traps were

also effective at catching beetles, particularly carrion beetles. See Appendix D for the full list of beetles identified from all our sampling methods.

While we did not expect to find American burying beetles, to our knowledge no surveys for the species had been conducted previously on Plum Island, which has apparently suitable habitat and is close to the remaining population on Block Island. Between the pitfall traps and season-long moth traps, we stood a good chance of detecting the species if it had been present. Since there are no historical records for the species on Plum Island, we cannot be certain it once occupied the island, although it was known from nearby Long Island and likely had a substantial prey base in the large waterbird colonies that used to occur on Plum Island. Perhaps if raccoons were eradicated from the island, large breeding bird colonies could be re-established (or return naturally) and American burying beetle could be introduced. The island appears to host a strong population of other carrion beetles, which is considered an indicator of the reintroduction potential for American burying beetle (C. Greenwood, SUNY Cobleskill, personal communication). Should restoration of this unique and rare decomposer be pursued, Plum Island may be a good candidate site.

Moths

Six trapping sites were selected for systematic sampling based on a preliminary visit to the island in March 2015 (Figure 32). Site selection was predicated on two criteria: (1) specific habitats likely to support rare or threatened species (selected based on knowledge of the life history requirements of rare moth communities in the northeastern United States), and (2) representative habitat that was not seriously affected by invasive plant species. We also attempted to give consideration to locations sheltered from the wind, where possible (strong winds may influence an insect's flight capabilities, and in extreme cases, damage or knock over the traps used for collection). The selected sites included two locations in early successional sandplain grasslands (Sites 1 and 2), one location in a successional hardwood forest (Site 3), and three locations within a mixture of stabilized maritime dune, heathland and wetland habitats (Sites 4, 5, and 6). On one occasion, Site 2 was relocated to an open meadow near the intersection of the road to the water tower and the main road because of deer management activities.

Sampling was conducted at roughly 14-day intervals from May 12 to October 21, 2015. If rain was forecast on any given target sampling night, the visit was rescheduled as close as possible to the original day. Each sample was conducted on a single night, using one 15W black light bucket trap, run with a photo sensor and a 12V deep cycle battery, at each site. Each trap had several dichlorvos pest strips to kill captured insects. The complete catch from each trap was collected the next morning and frozen for storage and subsequent identification.

Sample collection was conducted by Neil Schoppmann or by NYNHP staff (Matt Schlesinger, Erin White, and Kelly Perkins) with assistance from Plum Island staff (Gary Mandelburg, Kurt Klotzer, Meghan Jackson, and Katie Guarrasi). Moth identifications were conducted by Neil Schoppmann with rare or difficult species confirmed by Hugh McGuinness during a visit to the National Museum of Natural History in Washington, D.C. For the purpose of this study, only the Macrolepidoptera (a collective of taxonomic families that tend to be relatively large, easy to identify and have well documented life histories) were recorded. The bycatch of each trap (all insect specimens other than the Lepidoptera) was refrozen and returned to the NYNHP for further sorting.



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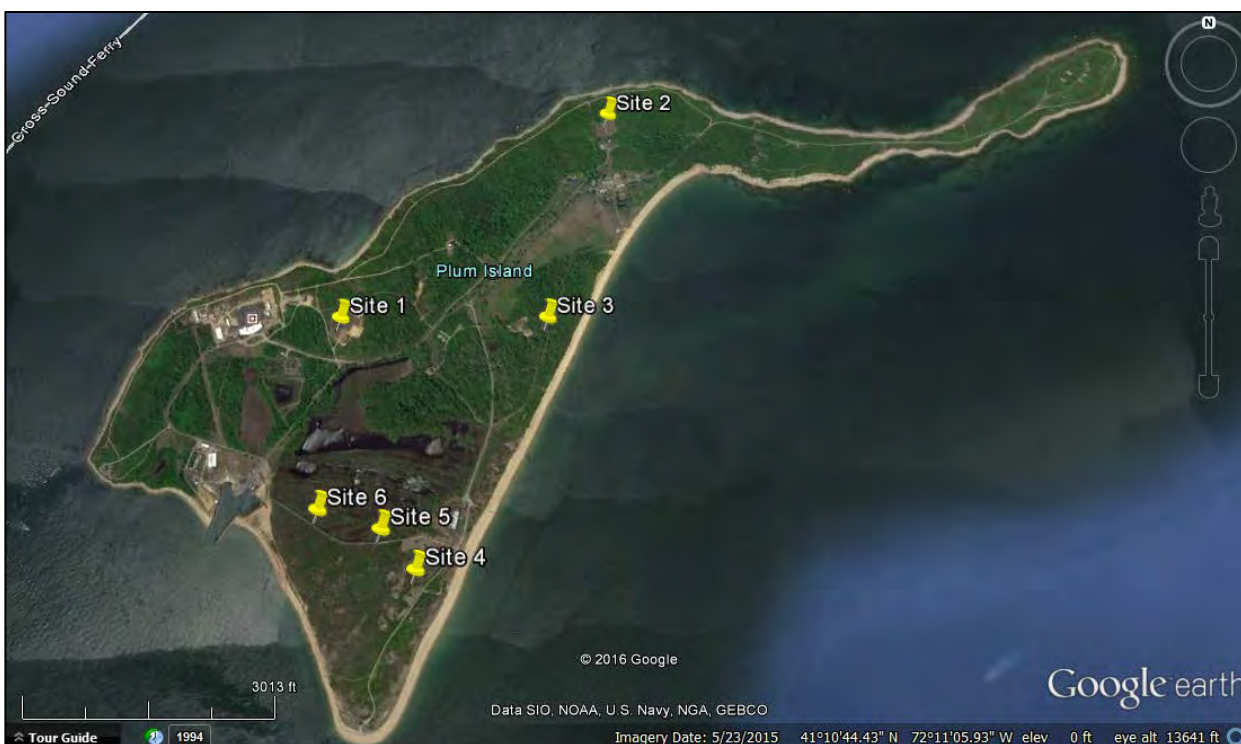


Figure 32. 2015 nocturnal collection sites for Plum Island Lepidoptera.

Over the course of the 2015 sampling season, a total of 4,460 moths were collected from 63 sampling events. From these, we identified 3,814 specimens of 256 species (Appendix D). Eleven of the species collected are actively tracked by the NYNHP because they are rare and/or declining in New York State. While 11 rare species of moths is a substantial number, the island has potential for many more species with vegetation management (Schlesinger *et al.* 2012).

Table 7. Rare moth species captured on Plum Island in 2015 that are actively tracked by NYNHP. Ranks are defined in Appendix A.

| Family | Scientific name | G-rank | S-rank |
|------------|--------------------------------|--------|--------|
| Erebidae | <i>Cisthene packardii</i> | G5 | SU |
| Erebidae | <i>Virbia aurantiaca</i> | G5 | SU |
| Noctuidae | <i>Abagrotis nefascia</i> | G4T3 | S1S3 |
| Noctuidae | <i>Apamea inordinata</i> | GU | S1 |
| Noctuidae | <i>Apamea lintneri</i> | G4 | SU |
| Noctuidae | <i>Eucoptcnemis fimbriaris</i> | G4 | S1 |
| Noctuidae | <i>Lepipolys perscripta</i> | G4 | S1 |
| Noctuidae | <i>Papaipema duovata</i> | G4 | SH |
| Noctuidae | <i>Schinia spinosae</i> | G4 | SU |
| Noctuidae | <i>Sympistis riparia</i> | G4 | SU |
| Sphingidae | <i>Sphinx gordius</i> | G4 | S1S3 |

The most significant find of the 2015 moth survey was *Papaipema duovata* Bird, which feeds on seaside goldenrod (*Solidago sempervirens* L.) and is typically found on the borders of salt marshes or other coastal wetlands. Prior to this find, *P. duovata* was thought to be extirpated from the state. As a caterpillar, *P. duovata* bores into the stem of its host plant, and feeds internally until pupation. It flies as an adult from September until late November (NatureServe 2016). Its cryptic behavior, in

combination with the widespread distribution of its hostplant, suggest that its sparse collection record may be partially a product of undersampling. Further collection efforts (in this case, preferably non-destructive light-trapping) would be ideal to confirm the presence of a stable population on the island.



Figure 33 (clockwise from top left). Moth trap, a salt marsh moth (*Estigmene acrea*) that hitchhiked to the island with us on the ferry, black-waved flannel moth (*Lagoa crispata*), and io moth (*Automeris io*).

Five of the rare species recorded (*Abagrotis nefascia* Smith, *Apamea inordinata* Morrison, *Sphinx gordius* Cramer, *Eucoptocnemis fimbriaris* Guenée and *Lepipolys perscripta* Guenée) have a New York State ranking of S1, meaning they are critically imperiled (NatureServe 2016). Each of these species are specialists of plants that occur in xeric habitats, including maritime dunes, grasslands, heathlands, and pine barrens. The habitat availability for xeric community specialists has declined significantly in the last century through fire suppression and anthropogenic development (Noss *et al.* 2001). Thus, all five of the above species are valuable conservation targets for future management efforts.

The remaining five tracked species (*Virbia aurantiaca* Hübner, *Cisthene packardii* Grote, *Sympistis riparia* Morrison, *Apamea lintneri* Grote and *Schinia spinosae* Guenée) are listed as SU, meaning that they cannot be properly ranked because of a lack of information concerning their distribution, population trends, or biology (NatureServe 2016). Of these five, *V. aurantiaca* and *C. packardii* are commonly recorded in the mid-Atlantic and southern states, and are known to feed on forbs and lichens, respectively. Their perceived rarity may be due, in part, to New York's location near the northern extent of their range. *Schinia spinosae*'s host plant and life history requirements are unknown. Although rarely collected in New York State, it is present in coastal areas from Massachusetts to Florida. *Apamea lintneri* and *S. riparia* are both likely to be specialists of coastal xeric habitats based on the available knowledge of their plant hosts (*A. lintneri* feeds on American

beachgrass, *Ammophila breviligulata* Fern., while *S. riparia* is suspected to feed on Beach Plum, *Prunus maritima* Marshall) (David Wagner, personal communication; Mikkola *et al.* 2009). As such, they likely face pressure from habitat loss similar to the S1 species recorded, and would benefit from the same management practices.

Other invertebrates

In addition to our targeted surveys for odonates, certain beetles, and moths, we opportunistically caught and observed other insects. We looked for all opportunities to catch and identify butterflies (Figure 34) and bumble bees in particular, but found low diversity and abundance of these taxa. Additional invertebrates we have identified are listed in Appendix D.



Figure 34. Monarch (*Danaus plexippus*) on Plum Island.

Plants

Plant surveys took place on June 3 and 4, August 12, 13 and 14, September 9 and October 6 and 7. Past field work by Dick Stalter and Eric Lamont for the *Flora of Plum Island* (Lamont and Stalter 2013) had documented twenty-two state endangered, threatened, and rare species. Seventeen of the species were found during their survey and five species were historical specimens that they did not relocate. Surveys in 2015 took place for all of the rare species by searching likely habitat on foot at the appropriate time of year. See Table 9 for a list of species with their habitats and best time to survey. All areas of the island were searched except for some of the pond areas in the southeast and some of the northwest and west boulder beaches that were too inaccessible. Naturalist MaryLaura Lamont joined NYNHP botanist Steve Young in the field on four of the eight field days and botanist Eric Lamont joined the survey on one day (Figure 35). The extra pairs of eyes and the surveyors' knowledge of the flora of the island helped discover new plant locations.

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Figure 35. Eric Lamont (left) helped survey for spring ladies-tresses (*Spiranthes vernalis*; right).

Invasive species were also noted during the survey. The original survey by Stalter and Lamont listed twenty invasive plants for the island. This survey confirmed their existence and noted general abundance but no detailed mapping took place except for newly discovered species.

All plant species encountered were noted on the plant list provided by the Flora of Plum Island. New species were added and photos taken when they were discovered. Seven of the seventeen rare species found by Lamont and Stalter were relocated and one new rare species, saltmarsh aster (*Symphotrichum subulatum*), was found (Table 8, Table 9, Figure 36). One of the historical rare species, saltmarsh spikerush (*Eleocharis uniglumis*), was relocated. It was last seen on the island in 1932. Only two rare species, spring ladies-tresses and whorled milkweed, had a large number of plants over a large area which is similar to the findings of the *Flora of Plum Island* survey.

Table 8. Rare plants known currently and historically from Plum Island.

| Scientific name | Common name | 2015 occurrence rank | Size |
|---|------------------------|----------------------|---------------|
| <i>Asclepias verticillata</i> | Whorled Milkweed | Good | 50 plants |
| <i>Carex bormathodes</i> | Marsh Straw Sedge | Failed to Find | Rare |
| <i>Carex merritt-fernaldii</i> | Fernald's Sedge | Failed to Find | Rare |
| <i>Chamaecyparis thyoides</i> | Atlantic White Cedar | Failed to Find | Extirpated |
| <i>Crocantemum dumosum</i> | Bushy Rockrose | Failed to Find | Unknown |
| <i>Cyperus erythrorhizos</i> | Red-rooted Flatsedge | Poor | A few plants |
| <i>Cyperus lupulinus</i> ssp. <i>lupulinus</i> | Great Plains Flatsedge | Failed to Find | Rare |
| <i>Cyperus polystachyos</i> | Coast Flatsedge | Poor | A few plants |
| <i>Cyperus retrorsus</i> | Retorse Flatsedge | Failed to Find | Rare |
| <i>Dichanthelium scoparium</i> | Velvet Panic Grass | Failed to Find | Rare |
| <i>Eleocharis fallax</i> | Creeping Spikerush | Failed to Find | Unknown |
| <i>Eleocharis uniglumis</i> | Saltmarsh Spikerush | Fair | 100s of stems |
| <i>Erechtites hieraciifolius</i> var. <i>megalocarpus</i> | Large Fruited Fireweed | Failed to Find | Rare |
| <i>Liatris borealis</i> ssp. <i>novae-angliae</i> | Northern Blazing Star | Failed to Find | Unknown |
| <i>Ligusticum scoticum</i> | Scotch Lovage | Failed to Find | Unknown |
| <i>Myriophyllum pinnatum</i> | Green parrot's-feather | Failed to Find | Rare |
| <i>Oenothera oakesiana</i> | Oakes Evening Primrose | Poor | 3 plants |

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| Scientific name | Common name | 2015 occurrence rank | Size |
|---|-----------------------|----------------------|--------------|
| <i>Polygala cruciata</i> | Crossleaf Milkwort | Failed to Find | Rare |
| <i>Polygonum glaucum</i> | Seabeach Knotweed | Fair | 39 plants |
| <i>Ptilimnium capillaceum</i> | Mock Bishop-weed | Failed to Find | Rare |
| <i>Silene caroliniana</i> ssp. <i>pennsylvanica</i> | Wild Pink | Fair | 42 plants |
| <i>Spiranthes vernalis</i> | Spring Ladies-tresses | Good | 141 plants |
| <i>Symphotrichum subulatum</i> | Saltmarsh Aster | Poor | A few plants |

Table 9. More characteristics of Plum Island's rare plants.

| Scientific name | State rank ¹ | Last observed year & habitat | Best time to survey |
|--|-------------------------|----------------------------------|---------------------|
| <i>Asclepias verticillata</i> | R | 2015; mowed fields | July & August |
| <i>Carex bormathodes</i> | T | 2002; a wetland | June & July |
| <i>Carex merritt-fernaldii</i> | T | 2003; dry sands | June & July |
| <i>Chamaecyparis thyoides</i> | T | Before 1915; wetland edge | All year |
| <i>Crocanthemum dumosum</i> | E | 1914; dry thicket | May to October |
| <i>Cyperus erythrorhizos</i> | R | 2002; marshes, pond shores | August to October |
| <i>Cyperus lupulinus</i> ssp. <i>lupulinus</i> | T | 2002; dry sands | August to October |
| <i>Cyperus polystachyos</i> | E | 2015; backdune ditch | August to October |
| <i>Cyperus retrorsus</i> | E | 2003; dune/swale area | August to October |
| <i>Dichantheium scoparium</i> | E | 2007; wet sands bordering marsh | July to November |
| <i>Eleocharis fallax</i> | E | 1984; dried out pond bottom | August to October |
| <i>Eleocharis uniglumis</i> | T | 2015; pondshore | August to October |
| <i>Erechtites hieracifolius</i> var. <i>megalocarpus</i> | E | 2002; upper beach and strand | September & October |
| <i>Liatris scariosa</i> var. <i>novae-angliae</i> | T | 1932; sandy field | August to November |
| <i>Ligusticum scoticum</i> | E | 1896; north shore | May to October |
| <i>Myriophyllum pinnatum</i> | E | 2003; ponds | July to October |
| <i>Oenothera oakesiana</i> | T | 2015; beach and backdune | August to November |
| <i>Polygala cruciata</i> | R | 2003; marshes | August to October |
| <i>Polygonum glaucum</i> | R | 2015; sand beach | August to November |
| <i>Ptilimnium capillaceum</i> | R | 2003; marshes | August to October |
| <i>Silene caroliniana</i> ssp. <i>pennsylvanica</i> | T | 2015; sandy roadside | June to September |
| <i>Spiranthes vernalis</i> | E | 2015; mowed fields and roadsides | August |
| <i>Symphotrichum subulatum</i> | T | 2015; backdune ditch | August to November |

¹ E = Endangered; T = Threatened, R = Rare.





Figure 36. Some rare plants of Plum Island (clockwise from top left): red-rooted flatsedge (*Cyperus erythrorhizos*), saltmarsh aster (*Symphyotrichum subulatum*), wild pink (*Silene caroliniana* ssp. *pennsylvanica*), and seabeach knotweed (*Polygonum glaucum*).

Table 10 lists the survey results for the invasive species found including their rank and general abundance. Four new invasive species were found during the survey: pale swallow-wort (*Cynanchum roscicum*), wineberry (*Rubus phoenocolasius*), porcelain berry (*Ampelopsis glandulosa* var. *brevipedunculata*), and memorial rose (*Rosa luciae*). Asian bittersweet (*Celastrus orbiculatus*) was observed to be the most widespread invasive species where it covered large areas of shrubs and trees as well as the old bunkers. In the open fields and roadsides, spotted knapweed (*Centaurea stoebe* ssp. *micranthos*),

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autumn olive (*Elaeagnus umbellata*), multiflora rose (*Rosa multiflora*), and Japanese honeysuckle (*Lonicera japonica*) seemed to be the most widespread species. In the wetlands, Phragmites (*Phragmites australis*) was by far the most common, filling in many of the open pond areas. Purple loosestrife (*Lythrum salicaria*) is also spreading into more wetlands. At the top of dunes, rugosa rose (*Rosa rugosa*) and tree-of-heaven (*Ailanthus altissima*) were common. The stands of rugosa rose are some of the largest and densest seen on the coastal plain. These high-abundance species will take much time, effort, and money to control if they are deemed to be priorities in the future. There are five species that are ranked very high in the state but are low in abundance on the island and should be a priority to control: porcelain berry, garlic mustard (*Alliaria petiolata*), pale swallow-wort, Morrow's honeysuckle (*Lonicera morrowii*), and wineberry. Memorial rose is a new invasive for the state and not yet ranked. It was observed at only one location so it should also be a control priority.

Table 10. Invasive plants detected on Plum Island.

| Scientific name | Common name | Invasive rank* | Plum Is. abundance |
|---|-----------------------|----------------|--------------------|
| <i>Acer platanoides</i> | Norway Maple | VH | Medium |
| <i>Acer pseudoplatanus</i> | Sycamore Maple | H | Low |
| <i>Ailanthus altissima</i> | Tree-of-heaven | M | High |
| <i>Albizia julibrissin</i> | Silk Tree | L | Low |
| <i>Alliaria petiolata</i> | Garlic Mustard | VH | Low |
| <i>Ampelopsis glandulosa</i> var. <i>brevipedunculata</i> | Porcelain Berry | VH | Low |
| <i>Artemisia vulgaris</i> var. <i>vulgaris</i> | Mugwort | H | Low |
| <i>Berberis thunbergii</i> | Japanese Barberry | VH | Medium |
| <i>Celastrus orbiculatus</i> | Asian Bittersweet | VH | High |
| <i>Centaurea stoebe</i> ssp. <i>micranthos</i> | Spotted Knapweed | H | High |
| <i>Cirsium arvense</i> | Canada Thistle | H | Low |
| <i>Cirsium horridulum</i> var. <i>horridulum</i> | Yellow Thistle | U | Low |
| <i>Cirsium vulgare</i> | Bull Thistle | U | Low |
| <i>Cynanchum rossicum</i> | Pale Swallow-Wort | VH | Low |
| <i>Elaeagnus umbellata</i> | Autumn Olive | VH | High |
| <i>Lonicera japonica</i> | Japanese Honeysuckle | VH | High |
| <i>Lonicera morrowii</i> | Morrow's Honeysuckle | VH | Low |
| <i>Lythrum salicaria</i> | Purple Loosestrife | VH | Medium |
| <i>Phragmites australis</i> | Old World Common Reed | VH | High |
| <i>Pinus thunbergiana</i> | Japanese Black Pine | M | Low |
| <i>Robinia hispida</i> var. <i>hispida</i> | Bristly Locust | L | Low |
| <i>Robinia pseudoacacia</i> | Black Locust | VH | High |
| <i>Rosa luciae</i> | Memorial Rose | NR | Low |
| <i>Rosa multiflora</i> | Multiflora Rose | VH | High |
| <i>Rosa rugosa</i> | Rugosa Rose | M | High |
| <i>Rubus phoenocolasius</i> | Wineberry | VH | Low |
| <i>Schoenoplectiella mucronata</i> | Bog Bulrush | NR | Low |
| <i>Tribulus terrestris</i> | Puncture Vine | NR | Low |

*L = Low; M = Moderate; H = High; VH = Very High; U = **Unranked; NR = Not Ranked.





Figure 37. Some invasive plants of Plum Island (clockwise from top left): Tree-of-heaven (*Ailanthus altissima*) and rugosa rose (*Rosa rugosa*) covering the dunes; Asian bittersweet (*Celastrus orbiculatus*); wineberry (*Rubus phoenocolasius*); Old World common reed (*Phragmites australis*) encroaching on a wetland with a rare plant.

Thirty-two new species were added to the Plum Island Flora list during these surveys (Table 11). Thirty new species were added to the list from the botanical survey. The prickly pear cactus was added by Greg Edinger during community surveys and *Ruppia maritima* was added by Chart Guthrie of the NYSDEC during fish surveys.

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Table 11. Species detected in 2015 on Plum Island that were not listed in Lamont and Stalter (2013).

| Scientific name | Common name | Plant family | Habitat |
|---|-----------------------|------------------|----------------------|
| <i>Acer platanoides</i> | Norway Maple | Aceraceae | Roadside |
| <i>Chamaecrista nictitans</i> | Partridge Pea | Fabaceae | Shrub edges |
| <i>Chenopodium pratericola</i> | Desert Goosefoot | Chenopodiaceae | Beaches |
| <i>Cynanchum rossicum</i> | European Swallow-wort | Apocynaceae | Shrublands |
| <i>Cyperus filicinus</i> | Fern Flatsedge | Cyperaceae | Open sands |
| <i>Dysphania botrys</i> | Jerusalem Oak | Chenopodiaceae | Beaches |
| <i>Eleocharis parvula</i> | Dwarf Spike-rush | Cyperaceae | Brackish pond flats |
| <i>Galium album</i> | White Bedstraw | Rubiaceae | Fields and roadsides |
| <i>Herniaria hirsuta</i> ssp. <i>cinerea</i> | Green Carpet | Caryophyllaceae | Dunes and gravel |
| <i>Impatiens capensis</i> | Orange Jewelweed | Balsaminaceae | Marshes |
| <i>Leonurus cardiaca</i> | Motherwort | Lamiaceae | Roadsides |
| <i>Lycopus uniflorus</i> | Northern Bugleweed | Lamiaceae | Marshes |
| <i>Myriophyllum humile</i> | Low Water-milfoil | Haloragaceae | Artificial basin |
| <i>Nipponanthemum nipponicum</i> | Montauk Daisy | Asteraceae | Open sandy areas |
| <i>Opuntia humifusa</i> | Prickly-pear Cactus | Cactaceae | Beaches |
| <i>Persicaria extremiorientalis</i> | Far Eastern Smartweed | Polygonaceae | Disturbed areas |
| <i>Populus tremuloides</i> | Quaking Aspen | Salicaceae | Roadside |
| <i>Potamogeton bicupulatus</i> | Snail-seeded Pondweed | Potamogetonaceae | Ponds |
| <i>Rosa luciae</i> | Memorial Rose | Rosaceae | Dunes |
| <i>Rubus phoenocolasius</i> | Wineberry | Rosaceae | Woodland edge |
| <i>Ruppia maritima</i> | Widgeon-grass | Ruppiaceae | Brackish ponds |
| <i>Schoenoplectiella mucronata</i> | Bog Bulrush | Cyperaceae | Artificial basin |
| <i>Schoenoplectus americanus</i> | Three-square Bulrush | Cyperaceae | Marshes |
| <i>Scirpus cyperinus</i> | Woolgrass | Cyperaceae | Artificial basin |
| <i>Symphiotrichum ericoides</i> | White Heath Aster | Asteraceae | Fields and roadsides |
| <i>Symphiotrichum patens</i> | Late Purple Aster | Asteraceae | Sandy roadsides |
| <i>Symphiotrichum subulatum</i> | Saltmarsh Aster | Asteraceae | Backdune ditch |
| <i>Teucrium canadense</i> | Canada Germander | Lamiaceae | Beach |
| <i>Trifolium aureum</i> | Golden clover | Fabaceae | Fields |
| <i>Verbascum thapsus</i> | Mullein | Scrophulariaceae | Roadsides |
| <i>Vicia cracca</i> | Cow Vetch | Fabaceae | Fields |
| <i>Viola lanceolata</i> × <i>primulifolia</i> | Hybrid Violet | Violaceae | Beach |

Only seven of the seventeen known rare plant species, one of the historical species, and one new species were found during this survey. All of the rare plant species that were not found were listed as rare in the Flora of Plum Island so it is unfortunate but no surprise that they could not be found again. The species that were not found also occur in dynamic habitats like beaches, fields and wetlands that change from year to year. The last year of intensive surveys for the Lamont and Stalter flora was 2004, eleven years before the 2015 surveys and much has changed since then. Hurricane Sandy brought big changes to the salinity of the wetlands in the southeast after flattening the dunes in front of them. Invasive species, especially Asian bittersweet and Phragmites, have expanded greatly and taken over large areas of native vegetation. Natural succession has reduced the open



roadside vegetation in areas of reduced mowing where some of the rare plants occurred. On the other hand, too frequent mowing of the fields and some roadsides has also reduced some populations of rare plants. In the wetlands and ponds of the southeast corner of the island, natural succession has filled in open areas where rare plants were collected for the Lamont and Stalter flora. This was observed by Eric Lamont when he returned to the island in 2015 to assist with this survey. The creeping spikerush population, *Eleocharis fallax*, is still one of only two populations in the state but it was not found in 2015. It should be searched for a few more times and if not found should be considered extirpated.

For the plants that were found, five of them are listed in fair or poor condition with low numbers of plants but they were also listed as rare in the Flora of Plum Island. The two species that were ranked as good in this survey, whorled milkweed and spring ladies-tresses, were also the only ones seen in good numbers in the Flora of Plum Island. The ladies-tresses occurrence was the largest population in the state in 2005 and it remains so in 2015 although the numbers have gone from over 1000 to 141 plants.

One of the most interesting new plants that was found was green carpet, *Herniaria hirsuta* ssp. *cinerea*, a plant that is native to Eurasia and North Africa. It had not been seen in New York State since it was collected near a Yonkers wool mill in the Bronx in 1898, a span of 117 years. While it is common on the West Coast, it has only been collected in a handful of counties east of the Mississippi, including the Boston and Philadelphia areas, so how it got to New York is still a mystery. One plant was also found in the parking lot of the Plum Island ferry at Orient Point so it may be spreading to Long Island from Plum Island.



Figure 38. Green carpet (*Herniaria hirsuta* ssp. *cinerea*) from Plum Island.

Biodiversity summary

Full species lists for taxa surveyed in this project are in Appendix D. Here we summarize the number of species known from Plum Island for surveyed taxa, and the number of conservation concern by taxonomic group (Table 12). We also use previous knowledge documented in Schlesinger *et al.* (2012). Depending on whether the tally includes all birds, including casual visitors and accidentals, or just breeding birds, Plum Island has been documented to contain 111 or 67 species and communities of conservation concern. While it would might be helpful for context to compare this number to other locations, similar data are not available from other islands or areas of similar size, and the level of inventory effort Plum Island has now received exceeds that of most areas of similar size, making any comparisons difficult. Regardless, it is clear that 67 species and communities of conservation concern on a ~840-acre island is significant.

Table 12. Summary of known biodiversity of Plum Island, New York.

| Taxon | All species | Federal E & T ¹ | State E & T ¹ | Element occurrences | Total of conservation concern ² |
|--|-------------|----------------------------|--------------------------|---------------------|--|
| Ecological communities | 33 | - | - | 5 | 5 |
| All birds | 215 | 2 | 6 | 4 | 57 |
| Breeding birds ³ | 63 | 1 | 2 | 4 | 13 |
| Mammals ⁴ | 9 | 1 | 1 | 1 | 6 |
| Reptiles | 5 | 0 | 0 | 0 | 2 |
| Amphibians | 0 | 0 | 0 | 0 | 0 |
| Inland fish | 4 | 0 | 0 | 1 | 2 |
| Odonates | 16 | 0 | 0 | 3 | 3 |
| Moths | 256 | 0 | 0 | 11 | 11 |
| Other insects ⁵ | - | 0 | 0 | 1 | 2 |
| Plants (native) | 280 | 0 | 18 | 19 | 23 |
| Plants (nonnative/invasive) | 164/28 | - | - | - | - |
| All species and communities ⁶ | - | 2/3 | 21/25 | 45/45 | 67/111 |

¹ Endangered and Threatened.

² Total includes Species of Greatest Conservation Need (NYS DEC 2015), Species of Potential Conservation Need (NYS DEC 2015), Heritage-tracked species, and significant natural communities—ones that are rare in New York State or outstanding examples of more common communities (Edinger *et al.* 2014).

³ Not including those meeting the criteria for confirmed breeding but suspected to nest off the island.

⁴ Terrestrial mammals only, plus the seal haul-out site.

⁵ We did not conduct a complete inventory of insects and thus cannot provide a total species count.

⁶ Talled as (number including only breeding birds)/(number including all birds).

Management and restoration

Plum Island's biodiversity is highly significant for New York State, exemplified by its high-quality shoreline communities, remaining populations of rare plants, extensive use by at-risk birds for breeding, and habitat for rare insects. However, we believe that the island has the potential to house even more extraordinary biodiversity with appropriate management. We recommend that a



full biodiversity management plan be written for the island, with review from the conservation and science communities. In the meantime, we offer these suggestions for restoring and improving the island's biodiversity. We separate them into sections for natural communities, animals, and plants, recognizing that there is considerable overlap among these sections given that many recommendations for species are habitat based.

Natural communities

We credit the resource managers at Plum Island for the beach, dune, and bluff protection efforts observed during our surveys: restricting access to dunes, bluffs, and plover nesting areas, removing trash, preventing motor vehicles on beach, restricting beach access to existing dedicated trails, restoring and replanting dunes lost to storm surges, and preventing development near the bluffs. These practices should continue into the future along with the following suggested management recommendations:

- *Maritime beach*
 - Maintain dynamic beach and dune processes, prevent recreational overuse (driving on the beach is particularly destructive) and encourage beach visitors to carry away all of their trash.
 - Monitor rare plant and animal populations, including seabeach amaranth (*Amaranthus pumilus*), beach-dune tiger beetle (*Cicindela hirticollis*), and the nesting use of beaches by species such as piping plover (*Charadrius melodus*).
 - Maintain connectivity between maritime dunes, maritime beaches, salt marshes, and the open ocean to allow seed dispersal and to enable species to freely move between habitats during nesting season.
 - Remove any shoreline armoring to increase overland sediment input; improve water quality by reducing or eliminating any wastewater and stormwater discharge and pesticide application; restore tidal regime by removing any culverts, dikes, and impoundments, plugging any ditches, and replacing any static flow restriction devices with those that are calibrated for local tidal hydrology.
- *Maritime dunes*
 - Maintain dynamic beach and dune processes, including allowing dunes to be breached and overwashed by storm events. Minimize breach closure, groundwater pollution, and road fill. Development should avoid fragmentation of such systems to allow dynamic ecological processes (overwash, erosion, and migration) to continue.
 - Prevent recreational overuse (e.g., driving and trampling) and encourage the public to stay on marked trails.
 - Undertake dune restoration using native species as needed and avoid planting potential invasives, like rugose rose (*Rosa rugosa*).
 - Prevent the spread of invasive exotic species into the dunes through appropriate direct management and by minimizing potential dispersal corridors, such as beach access trails and roads.
 - Ensure connectivity between maritime communities and the open ocean to allow species to freely move between habitats during nesting season. Any development effort that disrupts connectivity between the open ocean and the maritime dune system should be avoided (e.g., a road running parallel to the beach between the beach and dunes). Connectivity between these habitats is important not only for nutrient flow and seed dispersal, but also for animals that move between them seasonally. Similarly, fragmentation of linear dune systems should be avoided.



- *Maritime bluffs*
 - Maintain the dominant ecological processes responsible for keeping this dynamic community in disclimax. Natural disturbances, including wave erosion and strong offshore winds, should be expected to lead to slumping, cliff retreat, and sea cave formation.
 - Prevent recreational overuse and encourage the public to stay on marked trails. In particular, continue to restrict sliding and climbing on the face of the bluffs using signage and fencing. In places where trails run directly along the top edge of maritime bluffs, those trails should be re-routed away from the edge and split rail fences could be used to direct visitors to designated overlooks. Because the face of the bluffs can be expected to migrate inland, it is important to protect adequate open space to accommodate such change.
 - Avoid planting invasive exotic species to stabilize the bluffs; if stabilization of this inherently unstable community is necessary, select native plants, perhaps American beachgrass (*Ammophila breviligulata*). Prevent the spread of invasive exotic species into the bluffs through appropriate direct management and by minimizing potential dispersal corridors, such as beach access trails and stairways.
 - This community is best protected as part of a large maritime system, encompassing grasslands, shrublands, bluffs, heathland, forests, barrens, and dunes. Development should avoid fragmentation of such systems to allow for nutrient flow, seed dispersal, and seasonal animal migrations within them. Connectivity to offshore communities should also be maintained as much as possible to maintain “maritime” conditions, which imply deposition of salt spray and shearing from offshore winds.
- *Marine rocky intertidal*
 - Where practical, establish and maintain a natural shoreline buffer to reduce stormwater, pollution, and nutrient run-off, while simultaneously capturing sediments before they reach the rocky shore. Buffer width should take into account the erodibility of the surrounding soils, slope steepness, and current land use. Avoid habitat alteration within the intertidal area and surrounding landscape.
 - Restore sites affected by unnatural disturbance (e.g., remove obsolete sea walls and drain pipes in order to restore the natural tidal regime). Prevent the spread of invasive exotic species into the intertidal area through appropriate direct management.
 - Development activities near this community type should strive to minimize particulate-laden run-off into this community. Water traveling on the ground or seeping through the ground also carries dissolved minerals and chemicals. Fertilizers, detergents, and other chemicals can increase the nutrient levels in tidal areas. Herbicides and pesticides often travel far from where they are applied and have lasting effects on the quality of the natural community.
- The *marine eelgrass meadow* community at Plum Island appears to be in good condition. The current condition of this community should be maintained or improved by keeping the following suggested management recommendations in mind:
 - Improve water quality by reducing pesticide/herbicide application.
 - Set guidelines and gear restrictions to minimize disturbances from shellfishing, boating, and dredging.
 - Reduce or mitigate shoreline development and armoring as much as possible. Strive to minimize or eliminate hardened shorelines and maintain low-sloped shorelines within the



tidal zone; healthy marine eelgrass meadows will slow ocean currents and reduce shoreline erosion.

- Monitor the spread of invasive exotic species in this community, particularly tunicate colonies (*Didemnum* spp.) and macroalgae (*Codium fragile*) and, as needed, control their encroachment.
- Include marine eelgrass meadow restoration and long-term monitoring in Harbor Management Plans, as appropriate.
- Consider new or revised State Significant Coastal Fish and Wildlife Habitat designations to protect Plum Island's marine eelgrass meadows.

Animals

- Should restoration of the island's native biodiversity be a management goal, fullscale eradication of raccoons (*Procyon lotor*) would be a worthy effort. In our understanding, the original goal of the USDA APHIS's raccoon control efforts was eradication, but it was deemed infeasible; further conversation with animal control experts would be necessary before this were attempted. However, it seems clear that the accidental introduction of raccoons in 1995 was responsible for the disappearance of the island's substantial colonies of breeding gulls and wading birds (Schlesinger *et al.* 2012), which could be encouraged to return or re-established (as on nearby Great Gull Island). The presence of large waterbird colonies could also provide a necessary prey base for American burying beetle, should (re)introduction be of interest. Thus, the eradication of raccoons could have several cascading effects.
- We recommend minimizing disturbance to hibernating bats that are present in Battery Steele and may be present in Battery 217 during the winter months of December through March or perhaps mid-November through mid-April in colder years. Disturbance from training activities in the bunkers could impact hibernating bats by causing them to come out of bouts of torpor, which expends unnecessary energy that they need to make it through the winter.
- We documented several road-killed snakes in our single season of field work. Although the animals killed represented common species, nothing is known about their populations' ability to withstand roadkill. We can surmise that the populations of these animals on an 840-acre island are small and not easily replenished through immigration. Some signs warn drivers about crossing turtles near the wetland, but perhaps additional speed restrictions or speed bumps would help ensure that large numbers of animals are not killed by vehicles.
- The NYS DEC fisheries staff suggests no intensive management within the large wetland. It is not clear whether stocking native fishes is worth the effort, as it can be costly and the competition with the non-native species may be problematic. Removal of the non-natives would also be very costly and take several treatments and years to eradicate them. Those species found are salt tolerant and it is unclear to us if the water is inundated with sea water on a regular basis, which also may explain the presence of silversides.
- European Common Reed (*Phragmites australis* ssp. *australis*) encroachment is a potential threat to odonates at the large wetland with the bird observation tower, as it may decrease oviposition sites available for female damselflies; many odonates oviposit on native emergent plants. Maintaining some natural, wooded landscape surrounding the pond is important for maintaining water quality for invertebrate larvae. This is also essential for the maturation and roosting of adult odonates, especially when they are newly emerged from their aquatic larval stage and thus more vulnerable to predation.
- Little published information is available citing specific cases of negative impacts to rare odonates or other wetland-dwelling odonates, but any activities that degrade hydrology of habitat would



threaten populations. We recommend avoiding changes in dissolved oxygen content, pesticide application, increases in the sediment load of the water body, and chemical contamination by runoff of agricultural or other discharge. Removal of large areas of forest or shrub habitats adjacent to their breeding habitats could also threaten populations, as these adjacent habitats are important for recently emerged adults until they reach maturity.

- The most immediate threat to the insect diversity of Plum Island is the continued propagation of invasive plant species, particularly Asian Bittersweet (*Celastrus orbiculatus* Thunb.) The plant community (and by extension, much of the native insect community) has been largely extirpated from the island's eastern panhandle, and is being replaced by a monoculture of bittersweet. A similar trend appears to be taking place in several areas of successional hardwood forest around the rest of the island. Without any management intervention, the Plum Island insect community will likely face continual decline concomitant with the loss of host plant availability. Although complete eradication from the island is likely to prove infeasible, we recommend that bittersweet is managed by careful herbicide applications or mechanical removal. Herbicides should be used, if at all, with great caution given their potential to harm native species.
- The rare moths we captured were denizens of dune, wetland, and sandplain areas. These areas are compromised to varying degrees by invasive plants, and we recommend avoiding more permanent alterations of these habitat types (e.g., through development), which would degrade these populations further or eliminate them.
- The island's sandplain grasslands (represented by moth trapping Sites 1 and 2 in collection efforts) appear to be in good condition, based on the presence of specialist rare species (*Lepipolys perscripta*, *Abagrotis nefascia*). Both areas, particularly Site 1, appear to be maintained by semiregular disturbances from vehicle traffic and other anthropogenic activity. No management should be required to maintain the moth community recorded in this survey. However, while light disturbances are effective in maintaining an early-successional habitat, the island's sandplains should not be subjected to major disruptive events (e.g., use as a staging area for construction, major excavation projects, etc.).
- Moth trapping Sites 4, 5, and 6, which together sampled the stabilized dunes, heathlands and wetlands on the island's southern peninsula, hosted a majority of the rare species collected in this survey, of which *P. duovata* is the most significant find. This section of the island is likely best served by management practices intended to maintain a range of successional stages. Currently, the area consists mostly of stabilized dunes, and is developing towards a heathland or forested habitat. Periodic vegetation removal or controlled burns would maintain stretches of more open, exposed soil habitat required for early successional plants like toadflax (*Linaria* spp., the host of *L. perscripta*) and coastal jointweed (*Polygonella articulata* Michx., host of *E. fimbriaris*) and help to ensure long-term persistence of the rare species present (Wagner *et al.* 2011). In the event of any mechanical or fire management, it is important to leave some part of the target habitat intact, to provide refuge for species that would be adversely effected based on the timing of their lifecycles (e.g., species that are pupating underground or flying as adults at the time of management are unlikely to be affected, but species feeding as caterpillars will face elimination from the managed area).
- Less frequent mowing of the parade grounds and other grassland habitats would benefit butterflies, bees, and some specialist birds. Adoption of the mowing recommendations for plants (below) would also benefit animals.

Plants



- The two main management challenges for rare plants are figuring out proper mowing schedules and the control of invasive species. The two most common rare species, spring ladies-tresses (*Spiranthes vernalis*) and whorled milkweed (*Asclepias verticillata*), occur in and around the parade grounds, which has seen a change in mowing schedules over the years. We recommend that the parade grounds and adjacent areas where the orchids grow be mowed only once a year, in November, so the rare species have a chance to flower and set seed. The parade ground near Fort Terry structures could be mowed more often to provide shorter grass for people to use. The roadsides where wild pinks (*Silene caroliniana* ssp. *pensylvanica*) have been seen should have a wider and shorter mowed area to prevent competition from other plants. They should also be mowed only once a year in November. Changes in mowing should be evaluated year-to-year to see the effect they are having on the rare plants.
- Invasive plant species are having a detrimental effect on the native vegetation and rare species on the island. An invasive species management plan should be written to prioritize invasive species control. For example, there are four or five highly invasive plants that are just coming on to the island and a rapid response to these invasions could prevent larger problems in the future. Common invasives are also present in large number and their impact should be evaluated. For example, a large area of wetland plants has been lost to Phragmites, including almost the entire pond southeast of the lab. In addition, an invasive species research program could help to determine the direction of a control effort.

Inventory and monitoring

We were fortunate to have excellent access to most of the island in all seasons, which enabled us to conduct a thorough biodiversity inventory focused on rare species and natural communities. Our surveys, combined with bird surveys conducted by Audubon New York, can form the baseline for a long-term monitoring and adaptive management program. Should management and restoration efforts proceed on the island, future inventories can help determine the effectiveness of those efforts. Here we suggest inventory work to follow up on our study and expand its taxonomic scope.

Natural communities

- Our 2012 report included a draft wall-to-wall natural community map based on interpretation of aerial photography informed by the field work of others. A complete ground-truthed natural community map would provide a useful basis for management.
- We had just one day of surveying for eelgrass; additional survey time within the known patch and throughout the island would help ensure we have fully documented the extent of this important offshore natural community. In addition, surveys are better timed for good weather in September, when the full fauna may be witnessed.
- Additional surveys of benthic and hard bottom marine habitats surrounding Plum Island would be useful, as would a bathymetry study.

Animals

- We recommend future surveys of the bunkers on Plum Island to continue to monitor their use as bat hibernacula and to look for northern long-eared bats (*Myotis septentrionalis*). Also, follow-up surveys of the bat use of the island during summer is also recommended. We did not encounter northern long-eared bats during the summer, but there is some potential for them to be there.



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Using a stationary detector to collect more data over the summer may be a good low cost method for future surveys.

- Now that more is known about the eelgrass meadows around Plum Island, surveys for use of these meadows by sea turtles is recommended. Documentation of sea turtle use of these meadows may influence suggested boating speeds in certain months.
- Surveys of marine mammals to document the extent of their use of the waters surrounding Plum Island could inform boating speeds and fishing regulations.
- Future inventory for dragonflies and damselflies should include searching the entire large wetland to determine the full extent of the breeding populations of Rambur's Forktail and Needham's Skimmer. Searching the small, freshwater wetland to the northeast for adult Golden-Winged Skimmers is recommended. Capture may be necessary for species determination as it is so similar to Needham's Skimmer. Another rare species known from Greenport, NY sites, Four-spotted Pennant (*Brachymesia gravida*), was not documented in 2015. Future colonization of this species on Plum Island is possible.
- Further collection efforts (preferably non-destructive light-trapping) for the moth *Papaipema duovata* would be ideal to confirm the presence of a stable population on the island.
- A survey of the island's native bees and wasps would inform a recent statewide emphasis on understanding the status of pollinators.

Plants

- There were some small areas of the island, especially wetland areas, that were difficult to access, because of time constraints or lack of watercraft, that still could be surveyed for rare plants.
- The dynamic habitats like beaches, fields, and roadsides could also yield new finds with repeat surveys, especially since summer 2015 was especially dry.
- Our eight days of survey could not duplicate the years of surveys that were carried out by Lamont and Stalter. We may have missed the rare species they observed in low abundance either because they are no longer there, or they are in the seed bank waiting for the next disturbance. Repeat surveys over a number of years may result in the rediscovery of these rare species.
- Surveys of the macroalgal community would expand our knowledge of Plum Island's marine environment.

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Appendix A: Natural Heritage methodology

HERITAGE METHODOLOGY

The Natural Heritage Network specializes in compiling biodiversity information through conducting surveys for rare species and significant natural communities and delivering the resultant data to facilitate conservation. Natural Heritage Programs, NatureServe, and The Nature Conservancy have spent more than two decades developing and refining the inventory methodology used internationally by the Natural Heritage Network. The Natural Heritage Network considers each plant species, animal species, and natural community type to be an “element” of biodiversity. The documented locations of rare plants, rare animals, and significant natural communities are called “element occurrences.” These terms are used throughout this report. We used our database of element occurrences as one component of the remote GIS assessment in this project.

THE COARSE FILTER/FINE FILTER APPROACH

Heritage inventory methodology works by focusing on the identification, documentation, and mapping of all occurrences of rare species and significant ecological communities. A “coarse filter/fine filter” approach is used to identify and prioritize the protection of these significant biological resources. Ecological communities represent a “coarse filter,” aggregates of biodiversity at a scale larger than the species level as defined in Reschke (1990) and Edinger *et al.* (2014). Their identification and documentation can be used to describe whole assemblages of plant and animal species, both common and rare. The conservation of the best remaining examples of the natural communities ensures the protection of most of the common species that make up the biological diversity of the state. Rare animals and plants often have narrow or unusual habitat requirements. These species may “fall through” the coarse filter, and are sometimes not protected within representative communities. Identifying and documenting viable populations of each of the rare species serves as the “fine filter” for protecting the state’s biological diversity. This coarse filter/fine filter approach to a natural resources inventory has proven to be an efficient means of identifying the most sensitive animals, plants, and ecological communities of an area.

Element Occurrence Quality/Viability: Individual occurrences of rare plants, rare animals, and natural communities are ranked according to their quality, or perceived viability, based on factors such as size, condition, and landscape context in which they are found. All occurrences of the elements documented in this report have been assigned a quality rank of A-F, H, or X (Table A-1). Combinations of letters, or intermediate ranks, such as AB, BC, and CD are also possible.

Table A-1. Explanation of element occurrence quality ranks used in NY Natural Heritage Biotics database reports.

| Element Occurrence Rank | Definition |
|-------------------------|------------|
| A | EXCELLENT* |
| B | GOOD* |
| C | MARGINAL* |
| D | POOR* |



| | |
|---|---|
| E | EXTANT. Existing, but not enough information to rank A-D |
| F | FAILED TO FIND. Not found at the previously documented site, but potential habitat was observed and /or a more thorough searching is needed. |
| H | HISTORICAL. No recent field information. For animals this means the particular population has not been seen, or in the case of a nest, has not been active within the last 15 years. For plants a “historical” rank means that the population has not been observed within the last 20 years. |
| X | EXTIRPATED. Believed to no longer exist. In many cases, habitat has been significantly altered and is believed to be no longer suitable for maintenance of the element. |

*Definitions of and criteria for these quality ranks, also called viability ranks, differ by element group (plant, animal, or natural community) and even by species of plant or animal. In 2008, NatureServe introduced a new approach to “generic” ranking of occurrences based on apparent viability of the population or community (<http://explorer.natureserve.org/eorankguide.htm>).

Plant and animal occurrences, or populations, can be assigned any of the ranks listed above. Species occurrence ranks are based on historical evidence of presence and/or on current population data. The element occurrence rank of a species is determined by evaluating total population size, density, condition, the reproductive health of the population, ecological processes needed to maintain the population, total landscape condition, and a series of other factors. Each of these factors is compared against specifications gathered from other populations throughout its global range. A final element occurrence rank is calculated from this comparative review. Generally, an A-ranked occurrence is considered to represent one of the largest, most viable populations within a natural landscape known to support populations of the species. Significant natural communities are also assigned any of the ranks listed above, which are based on quality and are evaluated within the context of the known or hypothesized distribution of that particular community. Several ecological and spatial factors must be considered when determining the element occurrence rank of a community. These include the occurrence size, maturity, evidence and degree of unnatural disturbance, continued existence of important ecological processes, overall landscape context, and existing and potential threats. A-ranked community occurrences are among the largest and highest quality of their type. These community occurrences should be large enough to provide reasonable assurance for long-term viability of component ecological processes. They are essentially undisturbed by humans or have nearly recovered from past human disturbance, typically exhibiting little or no unnatural fragmentation. Exotic or particularly invasive native species are usually lacking in high-quality community occurrences, or, if present, are observed at very low levels.

State Conservation Rank

A rank assigned by New York Natural Heritage indicating how imperiled the species or community type is in New York State. The conservation rank is based on how rare the species or community type is in New York, and on population trends and threats.

Basic ranks are as follows:

- S1 - Critically Imperiled
- S2 - Imperiled
- S3 - Vulnerable



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- S4 - Apparently Secure
- S5 - Definitely Secure
- SH - Historical in New York, not seen in last 30 years but could still be present
- SX - Extirpated, no longer present in New York
- SU - Unrankable - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
- SNR - Not Ranked, state conservation status not yet assessed.
- SNA - Not Applicable, because the species is not a suitable target for conservation activities (e.g., species is a hybrid, a domesticated species, not native to New York, an accidental or infrequent visitor outside of its normal range, a transient or migrant just passing through the state, or a species with only unconfirmed or doubtful reports).

Variations of these ranks include the following:

- Range ranks, such as S1S2, indicate not enough information is available to distinguish between two single ranks.
- ? after a rank, such as S2?, indicates some uncertainty about the true rank, but is most likely the assigned rank.
- B after a rank, such as S2B, indicates the rank applies to the breeding populations in New York of a migratory animal.
- N after a rank, such as S3N, indicates the rank applies to the non-breeding populations in New York of a migratory animal.

Global Conservation Rank

A rank indicating how imperiled the species or community type is throughout the world. The conservation rank is based on how rare the species or community type is across its global range, and on population trends and threats. For species, these ranks provide an estimate of extinction risk; while for natural communities, they provide an estimate of the risk of elimination.

Basic ranks are as follows:

- G1 - Critically Imperiled (very high risk of extinction)
- G2 - Imperiled (high risk of extinction)
- G3 - Vulnerable (moderate risk of extinction)
- G4 - Apparently Secure
- G5 - Definitely Secure
- GH - Possibly Extinct, not seen anywhere in last 30 years but could still exist
- GX - Extinct, no longer present anywhere in the world
- GU - Unrankable - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
- GNR - Not Ranked, global conservation status not yet assessed.



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- GNA - Not Applicable, because the species is not a suitable target for conservation activities (e.g., species is a hybrid, or a domesticated species).

Variations of these ranks include the following:

- Range ranks, such as G1G2, indicate not enough information is available to distinguish between two single ranks.
- ? after a rank, such as G2?, indicates some uncertainty about the rank, but is most likely the assigned rank.
- T ranks, such as T3, indicate the rank applies to a subspecies or variety, but not to the species as a whole.

Global conservation status ranks are assigned by NatureServe, with guidance from local Natural Heritage Programs and from experts on particular taxonomic groups.



Appendix B. Data forms used in marine eelgrass survey

PLUM ISLAND EELGRASS SURVEY 2015 Date _____ Obs. Point # _____

PATCHINESS



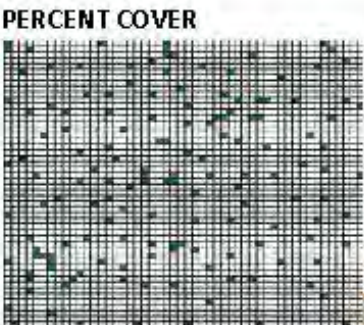
CONTINUOUS



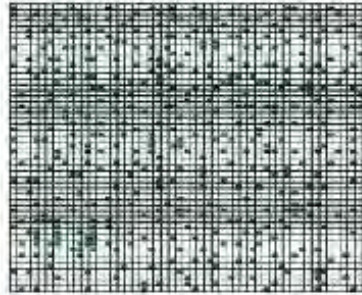
CONTINUOUS WITH BARE PATCHES



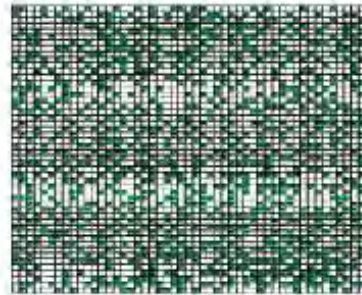
PATCHY COVER



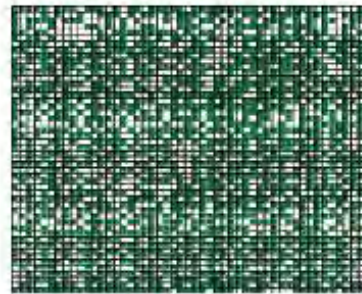
PERCENT COVER



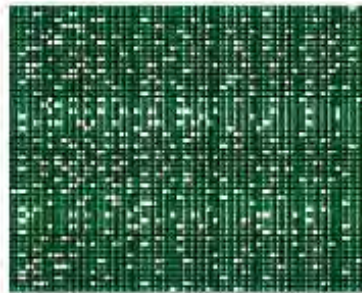
11-25%



26-50%



51-75%



>75%



Plum Island Biodiversity Inventory

PLUM ISLAND EELGRASS SURVEY 2015 Date _____ Obs. Point # _____

Depth _____

Time _____

Zostera marina _____ %
Height from bottom _____ m

NEUSTON (organisms that float on the top of water (epineuston) or live right under the surface (hyponeuston))

GREEN ALGAE _____ %
Codium
Ulva
Enteromorpha

PLANKTON (organisms that live in the water column that cannot swim against a current)
Leidy's Comb Jelly
Beroe's Comb Jelly
Moon Jelly

BROWN ALGAE _____ %
Sargassum filipendula

NEKTON (actively swimming aquatic organisms)
Silversides
Sheepshead Minnow
Atlantic Menhaden
Puffer
Black Seabass
Tautog

RED ALGAE _____ %
Champia parvula
Polysiphonia

ROCKS >1m _____ %

BENTHIC EPIFAUNA (organisms found on the seabed)
Slippershell
Shrimp
Bay Scallop
Jingle Shell
Seahorse
Fluke – Summer Flounder
Crabs

ROCKS >10 cm _____ %

ROCKS <10 cm _____ %

SAND _____ %

SILT _____ %

BENTHIC INFAUNA (organisms found in the seabed)
Clams
Northern Quahog

SHELLS _____ %



Plum Island Biodiversity Inventory

PLUM ISLAND EELGRASS SURVEY 2015 Date _____ Obs. Point # _____

Time Start _____ Time Stop _____

Boat Crew _____

Divers _____

UTM _____ / _____

POS count _____ Accuracy +/- _____ meters

Lat _____ N / Long _____ W

Cover type found: *Zostera marina* edge of patch within patch

Marine algae edge of patch within patch

Unvegetated sand rock

Depth to bottom _____ meters/feet Time depth taken _____

How measured depth gauge tape/rod depth finder

Wave height _____ meters/feet Secchi depth _____ meters/feet

Soil Sample

Depth of Sample

Texture

Color



Appendix C: Seasonal occurrence and abundance of birds of Plum Island

Appendix C. Seasonal occurrence and abundance of birds of Plum Island. Superscripts: C = confirmed breeding; P = probable breeding; Hi = High-priority Species of Greatest Conservation Need; S = Species of Greatest Conservation Need; SP = Species of Potential Conservation Need. Occurrence/abundance categories: Abundant, Common, Uncommon/rare, Casual, Accidental (see Table 4 for definitions).

| Common name | Scientific name | Apr-May | Jun-Aug | Sep-Oct | Nov-Mar |
|---------------------------------------|----------------------------------|---------|---------|---------|---------|
| Greater White-fronted Goose | <i>Anser albifrons</i> | - | - | - | Acc |
| Snow Goose | <i>Chen caerulescens</i> | - | - | - | Acc |
| Brant | <i>Branta bernicla</i> | Cas | - | Cas | Cas |
| Canada Goose ^C | <i>Branta canadensis</i> | Abu | Abu | Abu | Abu |
| Mute Swan ^C | <i>Cygnus olor</i> | Unc/Rar | Unc/Rar | Unc/Rar | Unc/Rar |
| Wood Duck ^C | <i>Aix sponsa</i> | - | Com | Com | - |
| Gadwall | <i>Anas strepera</i> | Com | - | - | Com |
| Eurasian Wigeon | <i>Anas penelope</i> | - | - | - | Cas |
| American Wigeon | <i>Anas americana</i> | Abu | - | - | Com |
| American Black Duck ^{C,Hi} | <i>Anas rubripes</i> | Com | Com | Com | Abu |
| Mallard ^C | <i>Anas platyrhynchos</i> | Unc/Rar | Com | Unc/Rar | Com |
| Blue-winged Teal ^S | <i>Anas discors</i> | - | - | Acc | - |
| Northern Pintail ^S | <i>Anas acuta</i> | - | - | - | Cas |
| Green-winged Teal | <i>Anas crecca</i> | Com | Com | Com | Com |
| Greater Scaup ^S | <i>Aythya marila</i> | - | - | - | Cas |
| King Eider | <i>Somateria spectabilis</i> | Acc | - | - | - |
| Common Eider ^{P,S} | <i>Somateria mollissima</i> | Abu | Com | Com | Com |
| Harlequin Duck ^S | <i>Histrionicus histrionicus</i> | - | - | - | Cas |
| Surf Scoter ^S | <i>Melanitta perspicillata</i> | Abu | Unc/Rar | Com | Abu |
| White-winged Scoter ^S | <i>Melanitta fusca</i> | Com | Unc/Rar | Com | Abu |
| Black Scoter ^S | <i>Melanitta americana</i> | Abu | Com | Com | Abu |
| Long-tailed Duck ^S | <i>Clangula hyemalis</i> | Unc/Rar | Unc/Rar | - | Com |
| Bufflehead | <i>Bucephala albeola</i> | - | - | - | Cas |
| Common Goldeneye ^S | <i>Bucephala clangula</i> | Com | - | - | Abu |
| Hooded Merganser | <i>Lophodytes cucullatus</i> | Unc/Rar | - | - | Com |
| Red-breasted Merganser | <i>Mergus serrator</i> | Com | Unc/Rar | Com | Abu |
| Red-throated Loon | <i>Gavia stellata</i> | Unc/Rar | - | Com | Com |
| Pacific Loon | <i>Gavia pacifica</i> | - | - | - | Acc |
| Common Loon ^S | <i>Gavia immer</i> | Com | Unc/Rar | Com | Abu |
| Horned Grebe ^S | <i>Podiceps auritus</i> | Unc/Rar | - | - | Com |
| Red-necked Grebe | <i>Podiceps grisegena</i> | - | - | - | Cas |
| Northern Gannet | <i>Morus bassanus</i> | Com | - | Unc/Rar | Abu |
| Double-crested Cormorant ^C | <i>Phalacrocorax auritus</i> | Abu | Abu | Abu | Abu |
| Great Cormorant | <i>Phalacrocorax carbo</i> | Unc/Rar | Unc/Rar | Com | Com |
| Brown Pelican | <i>Pelecanus occidentalis</i> | - | - | Acc | - |
| American Bittern ^S | <i>Botaurus lentiginosus</i> | - | - | Acc | - |
| Great Blue Heron | <i>Ardea herodias</i> | Unc/Rar | Unc/Rar | Unc/Rar | Unc/Rar |
| Great Egret ^{P,S} | <i>Ardea alba</i> | Unc/Rar | Com | Unc/Rar | Unc/Rar |
| Snowy Egret ^S | <i>Egretta thula</i> | - | Cas | Cas | - |



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| Common name | Scientific name | Apr-May | Jun-Aug | Sep-Oct | Nov-Mar |
|--|-------------------------------------|---------|---------|---------|---------|
| Little Blue Heron ^S | <i>Egretta caerulea</i> | - | - | Acc | - |
| Green Heron | <i>Butorides virescens</i> | Cas | Cas | - | - |
| Black-crowned Night-Heron ^{C,S} | <i>Nycticorax nycticorax</i> | - | Unc/Rar | Unc/Rar | - |
| Glossy Ibis ^{P,S} | <i>Plegadis falcinellus</i> | - | Acc | - | - |
| Turkey Vulture ^P | <i>Cathartes aura</i> | Com | Unc/Rar | Unc/Rar | Com |
| Osprey ^C | <i>Pandion haliaetus</i> | Com | Com | Com | Com |
| Northern Harrier ^{C,S} | <i>Circus cyaneus</i> | Unc/Rar | Unc/Rar | Unc/Rar | Unc/Rar |
| Sharp-shinned Hawk | <i>Accipiter striatus</i> | Unc/Rar | - | Unc/Rar | Unc/Rar |
| Cooper's Hawk | <i>Accipiter cooperii</i> | Unc/Rar | Unc/Rar | Unc/Rar | Unc/Rar |
| Northern Goshawk ^S | <i>Accipiter gentilis</i> | - | - | - | Acc |
| Bald Eagle ^S | <i>Haliaeetus leucocephalus</i> | Unc/Rar | - | Unc/Rar | Unc/Rar |
| Red-shouldered Hawk ^S | <i>Buteo lineatus</i> | Cas | Cas | - | Cas |
| Broad-winged Hawk | <i>Buteo platypterus</i> | Cas | Cas | - | - |
| Red-tailed Hawk ^C | <i>Buteo jamaicensis</i> | Com | Com | Com | Com |
| Rough-legged Hawk | <i>Buteo lagopus</i> | - | - | - | Acc |
| Virginia Rail | <i>Rallus limicola</i> | Unc/Rar | Unc/Rar | - | Unc/Rar |
| Sora | <i>Porzana carolina</i> | - | Acc | - | - |
| Black-bellied Plover ^S | <i>Pluvialis squatarola</i> | - | Com | Com | Com |
| American Golden-Plover ^{SP} | <i>Pluvialis dominica</i> | - | - | Acc | - |
| Semipalmated Plover | <i>Charadrius semipalmatus</i> | - | Cas | Cas | - |
| Piping Plover ^{C,Hi} | <i>Charadrius melodus</i> | Unc/Rar | Com | Unc/Rar | - |
| Killdeer ^C | <i>Charadrius vociferus</i> | Com | Com | Com | Com |
| American Oystercatcher ^{C,S} | <i>Haematopus palliatus</i> | Com | Com | - | Unc/Rar |
| Spotted Sandpiper ^C | <i>Actitis macularius</i> | Unc/Rar | Com | Unc/Rar | - |
| Solitary Sandpiper | <i>Tringa solitaria</i> | Unc/Rar | Unc/Rar | Unc/Rar | - |
| Greater Yellowlegs ^S | <i>Tringa melanolenca</i> | Com | Unc/Rar | Unc/Rar | Unc/Rar |
| Willet ^S | <i>Tringa semipalmata</i> | Com | Unc/Rar | - | - |
| Lesser Yellowlegs | <i>Tringa flavipes</i> | Unc/Rar | Unc/Rar | Unc/Rar | - |
| Whimbrel ^{Hi} | <i>Numenius phaeopus</i> | - | Cas | - | - |
| Ruddy Turnstone ^S | <i>Arenaria interpres</i> | - | Cas | Cas | Cas |
| Red Knot ^{Hi} | <i>Calidris canutus</i> | - | - | Acc | - |
| Sanderling ^{SP} | <i>Calidris alba</i> | - | Com | Com | Com |
| Semipalmated Sandpiper ^{Hi} | <i>Calidris pusilla</i> | - | Cas | Cas | - |
| Least Sandpiper | <i>Calidris minutilla</i> | Unc/Rar | Com | Com | - |
| Purple Sandpiper ^S | <i>Calidris maritima</i> | Com | - | - | Com |
| Dunlin | <i>Calidris alpina</i> | - | - | Cas | Cas |
| Short-billed Dowitcher ^{Hi} | <i>Limnodromus griseus</i> | - | Acc | Acc | - |
| Wilson's Snipe | <i>Gallinago delicata</i> | Cas | Cas | - | Cas |
| American Woodcock ^S | <i>Scolopax minor</i> | Cas | Cas | Cas | Cas |
| Bonaparte's Gull ^S | <i>Chroicocephalus philadelphia</i> | - | - | - | Cas |
| Laughing Gull ^{CO,S} | <i>Leucophaeus atricilla</i> | Com | Abu | Abu | Com |
| Ring-billed Gull | <i>Larus delawarensis</i> | Unc/Rar | - | Unc/Rar | Unc/Rar |
| Herring Gull ^{CO} | <i>Larus argentatus</i> | Abu | Com | Abu | Abu |
| Iceland Gull | <i>Larus glaucoides</i> | Cas | - | - | Cas |
| Lesser Black-backed Gull | <i>Larus fuscus</i> | - | - | Cas | Cas |
| Great Black-backed Gull ^P | <i>Larus marinus</i> | Abu | Com | Abu | Com |



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| Common name | Scientific name | Apr-May | Jun-Aug | Sep-Oct | Nov-Mar |
|--|-----------------------------------|---------|---------|---------|---------|
| Least Tern ^{P,S} | <i>Sternula antillarum</i> | - | Cas | - | - |
| Caspian Tern ^S | <i>Hydroprogne caspia</i> | - | - | Acc | - |
| Black Tern ^H | <i>Chlidonias niger</i> | - | - | Acc | - |
| Roseate Tern ^{CO,Hi} | <i>Sterna dougallii</i> | Unc/Rar | Com | - | - |
| Common Tern ^{CO,S} | <i>Sterna hirundo</i> | Abu | Abu | Abu | - |
| Forster's Tern ^S | <i>Sterna forsteri</i> | - | Unc/Rar | Unc/Rar | Com |
| Black Skimmer ^{Hi} | <i>Rynchops niger</i> | - | Acc | - | - |
| Razorbill ^S | <i>Alca torda</i> | - | - | - | Cas |
| Rock Pigeon | <i>Columba livia</i> | Cas | Cas | Cas | - |
| Mourning Dove ^P | <i>Zenaida macroura</i> | Unc/Rar | Unc/Rar | Unc/Rar | Com |
| Yellow-billed Cuckoo | <i>Coccyzus americanus</i> | - | Unc/Rar | Unc/Rar | - |
| Black-billed Cuckoo ^S | <i>Coccyzus erythrophthalmus</i> | Cas | Cas | - | - |
| Great Horned Owl ^C | <i>Bubo virginianus</i> | Cas | Cas | Cas | Cas |
| Snowy Owl | <i>Bubo scandiacus</i> | - | - | - | Cas |
| Eastern Whip-poor-will ^{Hi} | <i>Antrostomus vociferus</i> | - | Acc | - | - |
| Chimney Swift | <i>Chaetura pelagica</i> | Com | Unc/Rar | - | - |
| Ruby-throated Hummingbird | <i>Archilochus colubris</i> | Com | Unc/Rar | Unc/Rar | - |
| Belted Kingfisher ^C | <i>Megaceryle alcyon</i> | Unc/Rar | Unc/Rar | Unc/Rar | Unc/Rar |
| Red-bellied Woodpecker | <i>Melanerpes carolinus</i> | Unc/Rar | - | Com | Unc/Rar |
| Yellow-bellied Sapsucker | <i>Sphyrapicus varius</i> | Unc/Rar | - | Unc/Rar | Unc/Rar |
| Downy Woodpecker ^C | <i>Picoides pubescens</i> | Unc/Rar | Unc/Rar | Unc/Rar | Com |
| Hairy Woodpecker | <i>Picoides villosus</i> | Unc/Rar | - | Unc/Rar | Unc/Rar |
| Northern Flicker ^P | <i>Colaptes auratus</i> | Com | Unc/Rar | Com | Com |
| American Kestrel ^S | <i>Falco sparverius</i> | Unc/Rar | Unc/Rar | Unc/Rar | Unc/Rar |
| Merlin | <i>Falco columbarius</i> | Unc/Rar | Unc/Rar | Unc/Rar | Unc/Rar |
| Peregrine Falcon ^S | <i>Falco peregrinus</i> | Cas | Cas | Cas | Cas |
| Eastern Wood-Pewee | <i>Contopus virens</i> | Com | Unc/Rar | Unc/Rar | Unc/Rar |
| Yellow-bellied Flycatcher | <i>Empidonax flaviventris</i> | - | Acc | - | - |
| Alder Flycatcher | <i>Empidonax alnorum</i> | Acc | - | - | - |
| Willow Flycatcher ^C | <i>Empidonax traillii</i> | Unc/Rar | Unc/Rar | Unc/Rar | - |
| Least Flycatcher | <i>Empidonax minimus</i> | Acc | Acc | Acc | - |
| Eastern Phoebe ^C | <i>Sayornis phoebe</i> | Com | Unc/Rar | Com | Unc/Rar |
| Say's Phoebe | <i>Sayornis saya</i> | - | - | Acc | - |
| Ash-throated Flycatcher | <i>Myiarchus cinerascens</i> | - | - | - | Acc |
| Great Crested Flycatcher ^C | <i>Myiarchus crinitus</i> | Com | Unc/Rar | Unc/Rar | - |
| Eastern Kingbird ^C | <i>Tyrannus tyrannus</i> | Com | Unc/Rar | Com | - |
| White-eyed Vireo ^C | <i>Vireo griseus</i> | Com | Com | Com | - |
| Yellow-throated Vireo | <i>Vireo flavifrons</i> | Cas | - | Cas | - |
| Blue-headed Vireo | <i>Vireo solitarius</i> | Com | Unc/Rar | Unc/Rar | - |
| Warbling Vireo | <i>Vireo gilvus</i> | Cas | Cas | - | - |
| Red-eyed Vireo | <i>Vireo olivaceus</i> | Unc/Rar | Unc/Rar | Unc/Rar | Unc/Rar |
| Blue Jay ^P | <i>Cyanocitta cristata</i> | Com | Unc/Rar | Com | Com |
| American Crow ^C | <i>Corvus brachyrhynchos</i> | Com | Com | Com | Com |
| Fish Crow | <i>Corvus ossifragus</i> | Cas | - | - | - |
| Horned Lark ^{Hi} | <i>Eremophila alpestris</i> | - | - | - | Acc |
| Northern Rough-winged Swallow ^C | <i>Stelgidopteryx serripennis</i> | Com | Com | - | - |



Plum Island Biodiversity Inventory

| Common name | Scientific name | Apr-May | Jun-Aug | Sep-Oct | Nov-Mar |
|-------------------------------------|---------------------------------|---------|---------|---------|---------|
| Purple Martin ^P | <i>Progne subis</i> | - | Com | - | - |
| Tree Swallow ^C | <i>Tachycineta bicolor</i> | Com | Abu | Abu | Com |
| Bank Swallow ^C | <i>Riparia riparia</i> | Abu | Abu | - | - |
| Barn Swallow ^C | <i>Hirundo rustica</i> | Abu | Abu | Unc/Rar | - |
| Cliff Swallow | <i>Petrochelidon pyrrhonota</i> | Acc | - | - | - |
| Black-capped Chickadee ^C | <i>Poecile atricapillus</i> | Com | Com | Com | Com |
| Tufted Titmouse ^C | <i>Baeolophus bicolor</i> | Unc/Rar | Unc/Rar | Unc/Rar | Unc/Rar |
| Red-breasted Nuthatch | <i>Sitta canadensis</i> | Cas | Cas | Cas | Cas |
| White-breasted Nuthatch | <i>Sitta carolinensis</i> | Unc/Rar | Unc/Rar | Unc/Rar | Unc/Rar |
| Brown Creeper | <i>Certhia americana</i> | Cas | - | Cas | Cas |
| House Wren ^C | <i>Troglodytes aedon</i> | Com | Com | Com | - |
| Winter Wren | <i>Troglodytes hiemalis</i> | - | - | Acc | - |
| Marsh Wren | <i>Cistothorus palustris</i> | Acc | - | - | - |
| Carolina Wren ^C | <i>Thryothorus ludovicianus</i> | Com | Com | Com | Com |
| Blue-gray Gnatcatcher | <i>Poliophtila caerulea</i> | Com | Com | - | - |
| Golden-crowned Kinglet | <i>Regulus satrapa</i> | Com | - | Com | Com |
| Ruby-crowned Kinglet | <i>Regulus calendula</i> | Unc/Rar | - | Com | Unc/Rar |
| Northern Wheatear | <i>Oenanthe oenanthe</i> | - | - | Acc | - |
| Eastern Bluebird | <i>Sialia sialis</i> | Unc/Rar | - | - | Com |
| Veery | <i>Catharus fuscescens</i> | - | - | Acc | Acc |
| Hermit Thrush | <i>Catharus guttatus</i> | Unc/Rar | - | Unc/Rar | Unc/Rar |
| Wood Thrush ^S | <i>Hylocichla mustelina</i> | Cas | Cas | - | - |
| American Robin ^C | <i>Turdus migratorius</i> | Abu | Abu | Abu | Abu |
| Gray Catbird ^C | <i>Dumetella carolinensis</i> | Abu | Abu | Abu | Unc/Rar |
| Northern Mockingbird ^C | <i>Mimus polyglottos</i> | Com | Com | Com | Com |
| Brown Thrasher ^{P,Hi} | <i>Toxostoma rufum</i> | Unc/Rar | Unc/Rar | Unc/Rar | Unc/Rar |
| European Starling ^C | <i>Sturnus vulgaris</i> | Abu | Abu | Abu | Abu |
| American Pipit | <i>Anthus rubescens</i> | - | - | - | Acc |
| Bohemian Waxwing | <i>Bombycilla garrulus</i> | - | - | - | Acc |
| Cedar Waxwing ^C | <i>Bombycilla cedrorum</i> | Com | Abu | Com | Com |
| Snow Bunting | <i>Plectrophenax nivalis</i> | - | - | - | Com |
| Ovenbird | <i>Seiurus aurocapilla</i> | Cas | - | - | - |
| Northern Waterthrush | <i>Parquesia noveboracensis</i> | Unc/Rar | Unc/Rar | Unc/Rar | - |
| Blue-winged Warbler ^S | <i>Vermivora cyanoptera</i> | Cas | Cas | - | - |
| Black-and-white Warbler | <i>Mniotilta varia</i> | Com | Unc/Rar | Unc/Rar | - |
| Tennessee Warbler ^{SP} | <i>Oreothlypis peregrina</i> | - | - | Acc | - |
| Orange-crowned Warbler | <i>Oreothlypis celata</i> | - | - | - | Acc |
| Nashville Warbler | <i>Oreothlypis ruficapilla</i> | Cas | - | Cas | - |
| Common Yellowthroat ^C | <i>Geothlypis trichas</i> | Abu | Abu | Com | - |
| American Redstart ^C | <i>Setophaga ruticilla</i> | Abu | Com | Com | - |
| Cape May Warbler ^{Hi} | <i>Setophaga tigrina</i> | - | Acc | Acc | - |
| Northern Parula | <i>Setophaga americana</i> | Com | Unc/Rar | Unc/Rar | - |
| Magnolia Warbler | <i>Setophaga magnolia</i> | Unc/Rar | - | - | - |
| Blackburnian Warbler | <i>Setophaga fusca</i> | Cas | - | - | - |
| Yellow Warbler ^C | <i>Setophaga petechia</i> | Abu | Com | Unc/Rar | - |
| Chestnut-sided Warbler | <i>Setophaga pensylvanica</i> | Cas | - | Cas | - |



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| Common name | Scientific name | Apr-May | Jun-Aug | Sep-Oct | Nov-Mar |
|--|----------------------------------|---------|---------|---------|---------|
| Blackpoll Warbler | <i>Setophaga striata</i> | Cas | - | Cas | - |
| Black-throated Blue Warbler ^S | <i>Setophaga caerulescens</i> | Unc/Rar | Unc/Rar | - | - |
| Palm Warbler | <i>Setophaga palmarum</i> | Com | - | Com | Unc/Rar |
| Pine Warbler | <i>Setophaga pinus</i> | Unc/Rar | - | Unc/Rar | - |
| Yellow-rumped Warbler | <i>Setophaga coronata</i> | Com | Unc/Rar | Abu | Com |
| Prairie Warbler ^S | <i>Setophaga discolor</i> | Unc/Rar | Unc/Rar | Unc/Rar | - |
| Black-throated Green Warbler | <i>Setophaga virens</i> | Com | - | Unc/Rar | - |
| Wilson's Warbler | <i>Cardellina pusilla</i> | Acc | - | Acc | - |
| Eastern Towhee ^C | <i>Pipilo erythrophthalmus</i> | Abu | Abu | Com | Unc/Rar |
| American Tree Sparrow | <i>Spizella arborea</i> | - | - | - | Com |
| Chipping Sparrow ^C | <i>Spizella passerina</i> | Com | Unc/Rar | Com | Unc/Rar |
| Clay-colored Sparrow | <i>Spizella pallida</i> | Acc | - | - | - |
| Field Sparrow | <i>Spizella pusilla</i> | Unc/Rar | - | Unc/Rar | Unc/Rar |
| Savannah Sparrow | <i>Passerculus sandwichensis</i> | Com | - | Com | Unc/Rar |
| Grasshopper Sparrow ^{Hi} | <i>Ammodramus savannarum</i> | - | Acc | - | - |
| Fox Sparrow | <i>Passerella iliaca</i> | Com | - | - | Unc/Rar |
| Song Sparrow ^C | <i>Melospiza melodia</i> | Abu | Com | Com | Com |
| Lincoln's Sparrow | <i>Melospiza lincolni</i> | - | - | Acc | - |
| Swamp Sparrow | <i>Melospiza georgiana</i> | Unc/Rar | - | Com | Unc/Rar |
| White-throated Sparrow | <i>Zonotrichia albicollis</i> | Com | - | Abu | Com |
| White-crowned Sparrow | <i>Zonotrichia leucophrys</i> | Com | - | Unc/Rar | - |
| Dark-eyed Junco | <i>Junco hyemalis</i> | Com | - | Com | Com |
| Scarlet Tanager ^S | <i>Piranga olivacea</i> | Cas | - | Cas | - |
| Northern Cardinal ^P | <i>Cardinalis cardinalis</i> | Com | Com | Com | Com |
| Rose-breasted Grosbeak | <i>Pheucticus ludovicianus</i> | Unc/Rar | - | - | - |
| Blue Grosbeak | <i>Passerina caerulea</i> | Acc | - | - | - |
| Indigo Bunting | <i>Passerina cyanea</i> | Com | - | Unc/Rar | - |
| Bobolink ^{Hi} | <i>Dolichonyx oryzivorus</i> | Acc | - | Acc | - |
| Red-winged Blackbird ^C | <i>Agelaius phoeniceus</i> | Abu | Com | Com | Com |
| Eastern Meadowlark ^{Hi} | <i>Sturnella magna</i> | Unc/Rar | - | Unc/Rar | Com |
| Rusty Blackbird ^{Hi} | <i>Euphagus carolinus</i> | Cas | - | Cas | - |
| Common Grackle ^C | <i>Quiscalus quiscula</i> | Abu | Com | Com | Abu |
| Brown-headed Cowbird ^C | <i>Molothrus ater</i> | Com | Com | - | Com |
| Orchard Oriole ^P | <i>Icterus spurius</i> | Unc/Rar | Unc/Rar | - | - |
| Baltimore Oriole ^C | <i>Icterus galbula</i> | Com | Unc/Rar | Unc/Rar | - |
| Purple Finch | <i>Haemorhous purpureus</i> | - | - | Cas | Cas |
| House Finch ^C | <i>Haemorhous mexicanus</i> | Com | Com | Com | Com |
| Red Crossbill | <i>Loxia curvirostra</i> | - | - | - | Cas |
| White-winged Crossbill | <i>Loxia leucoptera</i> | - | - | - | Acc |
| Common Redpoll | <i>Acanthis flammea</i> | - | - | - | Cas |
| Pine Siskin | <i>Spinus pinus</i> | - | - | Com | Abu |
| American Goldfinch ^C | <i>Spinus tristis</i> | Com | Com | Com | Com |
| House Sparrow ^C | <i>Passer domesticus</i> | Unc/Rar | Unc/Rar | - | Unc/Rar |



Appendix D. Plum Island species lists

These lists were assembled from the inventory results reported here plus surveys, reports, and literature previously compiled in Schlesinger *et al.* (2012). Some marine species may have been observed considerably offshore of Plum Island. Moths are listed separately from other invertebrates because common names are not available for many species. Superscripts: C = confirmed breeding; P = probable breeding; Hi = High-priority Species of Greatest Conservation Need; S = Species of Greatest Conservation Need; SP = Species of Potential Conservation Need; HT = Heritage tracked, but none of the other designations.

Vertebrates

| Common name | Scientific name |
|------------------------------------|--------------------------------|
| Mammals | |
| White-footed mouse | <i>Peromyscus leucopus</i> |
| Meadow vole | <i>Microtus pennsylvanicus</i> |
| Muskrat | <i>Ondatra zibethicus</i> |
| Beaver | <i>Castor canadensis</i> |
| Norway rat | <i>Rattus norvegicus</i> |
| Little brown myotis ^{Hi} | <i>Myotis lucifugus</i> |
| Big brown bat | <i>Eptesicus fuscus</i> |
| Hoary bat ^S | <i>Lasiurus cinereus</i> |
| Eastern red bat ^S | <i>Lasiurus borealis</i> |
| Raccoon | <i>Procyon lotor</i> |
| Harbor seal | <i>Phoca vitulina</i> |
| Gray seal | <i>Halichoerus grypus</i> |
| White-tailed deer | <i>Odocoileus virginianus</i> |
| Northern right whale ^{Hi} | <i>Eubalaena glacialis</i> |
| Bottlenose dolphin | <i>Tursiops truncatus</i> |
| Common dolphin | <i>Delphinus delphis</i> |
| Harbor porpoise ^{Hi} | <i>Phocoena phocoena</i> |
| Birds | |
| Greater White-fronted Goose | <i>Anser albifrons</i> |
| Snow Goose | <i>Chen caerulescens</i> |
| Brant | <i>Branta bernicla</i> |
| Canada Goose ^C | <i>Branta canadensis</i> |
| Mute Swan ^C | <i>Cygnus olor</i> |
| Wood Duck ^C | <i>Aix sponsa</i> |
| Gadwall | <i>Anas strepera</i> |

| Common name | Scientific name |
|---------------------------------------|----------------------------------|
| Eurasian Wigeon | <i>Anas penelope</i> |
| American Wigeon | <i>Anas americana</i> |
| American Black Duck ^{C,Hi} | <i>Anas rubripes</i> |
| Mallard ^C | <i>Anas platyrhynchos</i> |
| Blue-winged Teal ^S | <i>Anas discors</i> |
| Northern Pintail ^S | <i>Anas acuta</i> |
| Green-winged Teal | <i>Anas crecca</i> |
| Greater Scaup ^S | <i>Aythya marila</i> |
| King Eider | <i>Somateria spectabilis</i> |
| Common Eider ^{P,S} | <i>Somateria mollissima</i> |
| Harlequin Duck ^S | <i>Histrionicus histrionicus</i> |
| Surf Scoter ^S | <i>Melanitta perspicillata</i> |
| White-winged Scoter ^S | <i>Melanitta fusca</i> |
| Black Scoter ^S | <i>Melanitta americana</i> |
| Long-tailed Duck ^S | <i>Clangula hyemalis</i> |
| Bufflehead | <i>Bucephala albeola</i> |
| Common Goldeneye ^S | <i>Bucephala clangula</i> |
| Hooded Merganser | <i>Lophodytes cucullatus</i> |
| Red-breasted Merganser | <i>Mergus serrator</i> |
| Red-throated Loon | <i>Gavia stellata</i> |
| Pacific Loon | <i>Gavia pacifica</i> |
| Common Loon ^S | <i>Gavia immer</i> |
| Horned Grebe ^S | <i>Podiceps auritus</i> |
| Red-necked Grebe | <i>Podiceps grisegena</i> |
| Northern Gannet | <i>Morus bassanus</i> |
| Double-crested Cormorant ^C | <i>Phalacrocorax auritus</i> |
| Great Cormorant | <i>Phalacrocorax carbo</i> |



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| Common name | Scientific name |
|--|---------------------------------|
| Brown Pelican | <i>Pelecanus occidentalis</i> |
| American Bittern ^S | <i>Botaurus lentiginosus</i> |
| Great Blue Heron | <i>Ardea herodias</i> |
| Great Egret ^{P,S} | <i>Ardea alba</i> |
| Snowy Egret ^S | <i>Egretta thula</i> |
| Little Blue Heron ^S | <i>Egretta caerulea</i> |
| Green Heron | <i>Butorides virescens</i> |
| Black-crowned Night-Heron ^{C,S} | <i>Nycticorax nycticorax</i> |
| Glossy Ibis ^{P,S} | <i>Plegadis falcinellus</i> |
| Turkey Vulture ^P | <i>Cathartes aura</i> |
| Osprey ^C | <i>Pandion haliaetus</i> |
| Northern Harrier ^{C,S} | <i>Circus cyaneus</i> |
| Sharp-shinned Hawk | <i>Accipiter striatus</i> |
| Cooper's Hawk | <i>Accipiter cooperii</i> |
| Northern Goshawk ^S | <i>Accipiter gentilis</i> |
| Bald Eagle ^S | <i>Haliaeetus leucocephalus</i> |
| Red-shouldered Hawk ^S | <i>Buteo lineatus</i> |
| Broad-winged Hawk | <i>Buteo platypterus</i> |
| Red-tailed Hawk ^C | <i>Buteo jamaicensis</i> |
| Rough-legged Hawk | <i>Buteo lagopus</i> |
| Virginia Rail | <i>Rallus limicola</i> |
| Sora | <i>Porzana carolina</i> |
| Black-bellied Plover ^S | <i>Pluvialis squatarola</i> |
| American Golden-Plover ^{SP} | <i>Pluvialis dominica</i> |
| Semipalmated Plover | <i>Charadrius semipalmatus</i> |
| Piping Plover ^{C,Hi} | <i>Charadrius melodus</i> |
| Killdeer ^C | <i>Charadrius vociferus</i> |
| American Oystercatcher ^{C,S} | <i>Haematopus palliatus</i> |
| Spotted Sandpiper ^C | <i>Actitis macularius</i> |
| Solitary Sandpiper | <i>Tringa solitaria</i> |
| Greater Yellowlegs ^S | <i>Tringa melanoleuca</i> |
| Willet ^S | <i>Tringa semipalmata</i> |
| Lesser Yellowlegs | <i>Tringa flavipes</i> |
| Whimbrel ^{Hi} | <i>Numenius phaeopus</i> |
| Ruddy Turnstone ^S | <i>Arenaria interpres</i> |

| Common name | Scientific name |
|--------------------------------------|-------------------------------------|
| Red Knot ^{Hi} | <i>Calidris canutus</i> |
| Sanderling ^{SP} | <i>Calidris alba</i> |
| Semipalmated Sandpiper ^{Hi} | <i>Calidris pusilla</i> |
| Least Sandpiper | <i>Calidris minutilla</i> |
| Purple Sandpiper ^S | <i>Calidris maritima</i> |
| Dunlin | <i>Calidris alpina</i> |
| Short-billed Dowitcher ^{Hi} | <i>Limnodromus griseus</i> |
| Wilson's Snipe | <i>Gallinago delicata</i> |
| American Woodcock ^S | <i>Scolopax minor</i> |
| Bonaparte's Gull ^S | <i>Chroicocephalus philadelphia</i> |
| Laughing Gull ^{CO,S} | <i>Leucophaeus atricilla</i> |
| Ring-billed Gull | <i>Larus delawarensis</i> |
| Herring Gull ^{CO} | <i>Larus argentatus</i> |
| Iceland Gull | <i>Larus glaucoides</i> |
| Lesser Black-backed Gull | <i>Larus fuscus</i> |
| Great Black-backed Gull ^P | <i>Larus marinus</i> |
| Least Tern ^{P,S} | <i>Sternula antillarum</i> |
| Caspian Tern ^S | <i>Hydroprogne caspia</i> |
| Black Tern ^{Hi} | <i>Chlidonias niger</i> |
| Roseate Tern ^{CO,Hi} | <i>Sterna dougallii</i> |
| Common Tern ^{CO,S} | <i>Sterna hirundo</i> |
| Forster's Tern ^S | <i>Sterna forsteri</i> |
| Black Skimmer ^{Hi} | <i>Rynchops niger</i> |
| Razorbill ^S | <i>Alca torda</i> |
| Rock Pigeon | <i>Columba livia</i> |
| Mourning Dove ^P | <i>Zenaida macroura</i> |
| Yellow-billed Cuckoo | <i>Coccyzus americanus</i> |
| Black-billed Cuckoo ^S | <i>Coccyzus erythrophthalmus</i> |
| Great Horned Owl ^C | <i>Bubo virginianus</i> |
| Snowy Owl | <i>Bubo scandiacus</i> |
| Eastern Whip-poor-will ^{Hi} | <i>Antrostomus vociferus</i> |
| Chimney Swift | <i>Chaetura pelagica</i> |
| Ruby-throated Hummingbird | <i>Archilochus colubris</i> |
| Belted Kingfisher ^C | <i>Megasceryle alcyon</i> |
| Red-bellied Woodpecker | <i>Melanerpes carolinus</i> |



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| Common name | Scientific name |
|--|-----------------------------------|
| Yellow-bellied Sapsucker | <i>Sphyrapicus varius</i> |
| Downy Woodpecker ^C | <i>Picooides pubescens</i> |
| Hairy Woodpecker | <i>Picooides villosus</i> |
| Northern Flicker ^P | <i>Colaptes auratus</i> |
| American Kestrel ^S | <i>Falco sparverius</i> |
| Merlin | <i>Falco columbarius</i> |
| Peregrine Falcon ^S | <i>Falco peregrinus</i> |
| Eastern Wood-Pewee | <i>Contopus virens</i> |
| Yellow-bellied Flycatcher | <i>Empidonax flaviventris</i> |
| Alder Flycatcher | <i>Empidonax alnorum</i> |
| Willow Flycatcher ^C | <i>Empidonax traillii</i> |
| Least Flycatcher | <i>Empidonax minimus</i> |
| Eastern Phoebe ^C | <i>Sayornis phoebe</i> |
| Say's Phoebe | <i>Sayornis saya</i> |
| Ash-throated Flycatcher | <i>Myiarchus cinerascens</i> |
| Great Crested Flycatcher ^C | <i>Myiarchus crinitus</i> |
| Eastern Kingbird ^C | <i>Tyrannus tyrannus</i> |
| White-eyed Vireo ^C | <i>Vireo griseus</i> |
| Yellow-throated Vireo | <i>Vireo flavifrons</i> |
| Blue-headed Vireo | <i>Vireo solitarius</i> |
| Warbling Vireo | <i>Vireo gilvus</i> |
| Red-eyed Vireo | <i>Vireo olivaceus</i> |
| Blue Jay ^P | <i>Cyanocitta cristata</i> |
| American Crow ^C | <i>Corvus brachyrhynchos</i> |
| Fish Crow | <i>Corvus ossifragus</i> |
| Horned Lark ^{Hi} | <i>Eremophila alpestris</i> |
| Northern Rough-winged Swallow ^C | <i>Stelgidopteryx serripennis</i> |
| Purple Martin ^P | <i>Progne subis</i> |
| Tree Swallow ^C | <i>Tachycineta bicolor</i> |
| Bank Swallow ^C | <i>Riparia riparia</i> |
| Barn Swallow ^C | <i>Hirundo rustica</i> |
| Cliff Swallow | <i>Petrochelidon pyrrhonota</i> |
| Black-capped Chickadee ^C | <i>Poecile atricapillus</i> |
| Tufted Titmouse ^C | <i>Baeolophus bicolor</i> |
| Red-breasted Nuthatch | <i>Sitta canadensis</i> |

| Common name | Scientific name |
|-----------------------------------|---------------------------------|
| White-breasted Nuthatch | <i>Sitta carolinensis</i> |
| Brown Creeper | <i>Certhia americana</i> |
| House Wren ^C | <i>Troglodytes aedon</i> |
| Winter Wren | <i>Troglodytes hiemalis</i> |
| Marsh Wren | <i>Cistothorus palustris</i> |
| Carolina Wren ^C | <i>Thryothorus ludovicianus</i> |
| Blue-gray Gnatcatcher | <i>Poliophtila caerulea</i> |
| Golden-crowned Kinglet | <i>Regulus satrapa</i> |
| Ruby-crowned Kinglet | <i>Regulus calendula</i> |
| Northern Wheatear | <i>Oenanthe oenanthe</i> |
| Eastern Bluebird | <i>Sialia sialis</i> |
| Veery | <i>Catharus fuscescens</i> |
| Hermit Thrush | <i>Catharus guttatus</i> |
| Wood Thrush ^S | <i>Hylocichla mustelina</i> |
| American Robin ^C | <i>Turdus migratorius</i> |
| Gray Catbird ^C | <i>Dumetella carolinensis</i> |
| Northern Mockingbird ^C | <i>Mimus polyglottos</i> |
| Brown Thrasher ^{P,Hi} | <i>Toxostoma rufum</i> |
| European Starling ^C | <i>Sturnus vulgaris</i> |
| American Pipit | <i>Anthus rubescens</i> |
| Bohemian Waxwing | <i>Bombycilla garrulus</i> |
| Cedar Waxwing ^C | <i>Bombycilla cedrorum</i> |
| Snow Bunting | <i>Plectrophenax nivalis</i> |
| Ovenbird | <i>Seiurus aurocapilla</i> |
| Northern Waterthrush | <i>Parkeesia noveboracensis</i> |
| Blue-winged Warbler ^S | <i>Vermivora cyanoptera</i> |
| Black-and-white Warbler | <i>Mniotilta varia</i> |
| Tennessee Warbler ^{SP} | <i>Oreothlypis peregrina</i> |
| Orange-crowned Warbler | <i>Oreothlypis celata</i> |
| Nashville Warbler | <i>Oreothlypis ruficapilla</i> |
| Common Yellowthroat ^C | <i>Geothlypis trichas</i> |
| American Redstart ^C | <i>Setophaga ruticilla</i> |
| Cape May Warbler ^{Hi} | <i>Setophaga tigrina</i> |
| Northern Parula | <i>Setophaga americana</i> |
| Magnolia Warbler | <i>Setophaga magnolia</i> |



Plum Island Biodiversity Inventory

| Common name | Scientific name |
|--|----------------------------------|
| Blackburnian Warbler | <i>Setophaga fusca</i> |
| Yellow Warbler ^C | <i>Setophaga petechia</i> |
| Chestnut-sided Warbler | <i>Setophaga pennsylvanica</i> |
| Blackpoll Warbler | <i>Setophaga striata</i> |
| Black-throated Blue Warbler ^S | <i>Setophaga caerulescens</i> |
| Palm Warbler | <i>Setophaga palmarum</i> |
| Pine Warbler | <i>Setophaga pinus</i> |
| Yellow-rumped Warbler | <i>Setophaga coronata</i> |
| Prairie Warbler ^S | <i>Setophaga discolor</i> |
| Black-throated Green Warbler | <i>Setophaga virens</i> |
| Wilson's Warbler | <i>Cardellina pusilla</i> |
| Eastern Towhee ^C | <i>Pipilo erythrophthalmus</i> |
| American Tree Sparrow | <i>Spizella arborea</i> |
| Chipping Sparrow ^C | <i>Spizella passerina</i> |
| Clay-colored Sparrow | <i>Spizella pallida</i> |
| Field Sparrow | <i>Spizella pusilla</i> |
| Savannah Sparrow | <i>Passerculus sandwichensis</i> |
| Grasshopper Sparrow ^{Hi} | <i>Ammodramus savannarum</i> |
| Fox Sparrow | <i>Passerella iliaca</i> |
| Song Sparrow ^C | <i>Melospiza melodia</i> |
| Lincoln's Sparrow | <i>Melospiza lincolni</i> |
| Swamp Sparrow | <i>Melospiza georgiana</i> |
| White-throated Sparrow | <i>Zonotrichia albicollis</i> |
| White-crowned Sparrow | <i>Zonotrichia leucophrys</i> |
| Dark-eyed Junco | <i>Junco hyemalis</i> |
| Scarlet Tanager ^S | <i>Piranga olivacea</i> |
| Northern Cardinal ^P | <i>Cardinalis cardinalis</i> |
| Rose-breasted Grosbeak | <i>Pheucticus ludovicianus</i> |
| Blue Grosbeak | <i>Passerina caerulea</i> |
| Indigo Bunting | <i>Passerina cyanea</i> |
| Bobolink ^{Hi} | <i>Dolichonyx oryzivorus</i> |
| Red-winged Blackbird ^C | <i>Agelaius phoeniceus</i> |
| Eastern Meadowlark ^{Hi} | <i>Sturnella magna</i> |
| Rusty Blackbird ^{Hi} | <i>Euphagus carolinus</i> |
| Common Grackle ^C | <i>Quiscalus quiscula</i> |

| Common name | Scientific name |
|-----------------------------------|------------------------------|
| Brown-headed Cowbird ^C | <i>Molothrus ater</i> |
| Orchard Oriole ^P | <i>Icterus spurius</i> |
| Baltimore Oriole ^C | <i>Icterus galbula</i> |
| Purple Finch | <i>Haemorhous purpureus</i> |
| House Finch ^C | <i>Haemorhous mexicanus</i> |
| Red Crossbill | <i>Loxia curvirostra</i> |
| White-winged Crossbill | <i>Loxia leucoptera</i> |
| Common Redpoll | <i>Acanthis flammea</i> |
| Pine Siskin | <i>Spinus pinus</i> |
| American Goldfinch ^C | <i>Spinus tristis</i> |
| House Sparrow ^C | <i>Passer domesticus</i> |
| | |
| Reptiles | |
| Garter snake | <i>Thamnophis sirtalis</i> |
| Brown snake | <i>Storeria dekayi</i> |
| Snapping turtle ^S | <i>Chelydra serpentina</i> |
| Painted turtle | <i>Chrysemys picta</i> |
| Eastern box turtle ^{Hi} | <i>Terrapene carolina</i> |
| | |
| Fish | |
| Mummichog ^S | <i>Fundulus heteroclitus</i> |
| Mosquitofish | <i>Gambusia affinis</i> |
| Goldfish | <i>Carassius auratus</i> |
| Atlantic silverside ^S | <i>Menidia menidia</i> |



Plum Island Biodiversity Inventory

Moths

| |
|---|
| Apatelodidae |
| <i>Apatelodes torrefacta</i> |
| |
| Drepanidae |
| <i>Drepana arcuata</i> |
| |
| Erebidae |
| <i>Allotria elonympha</i> |
| <i>Amolita roseola</i> |
| <i>Apantesis carlotta</i> |
| <i>Apantesis nais</i> |
| <i>Apantesis phalerata</i> |
| <i>Argyrostromis anilis</i> |
| <i>Bleptina caradrinalis</i> |
| <i>Caenurgina erechtea</i> |
| <i>Catocala ?similis</i> |
| <i>Catocala amica</i> |
| <i>Catocala andromedae</i> |
| <i>Catocala coccinata</i> |
| <i>Catocala dejecta</i> |
| <i>Catocala ilia</i> |
| <i>Catocala micronympha</i> |
| <i>Catocala paleogama</i> |
| <i>Catocala serena</i> |
| <i>Catocala sordida</i> |
| <i>Catocala ultronia</i> |
| <i>Chytolita morbidalis</i> |
| <i>Cisseps fulvicollis</i> |
| <i>Cisthene packardii</i> ^{HT} |
| <i>Crambidia pallida</i> |
| <i>Cynia tenera</i> |
| <i>Drasteria graphica atlantica</i> |
| <i>Drasteria occulta</i> |
| <i>Euparthenos nubilis</i> |

| |
|--|
| <i>Grammia parthenice</i> |
| <i>Halysidota tessellaris</i> |
| <i>Hypena baltimoralis</i> |
| <i>Hypena scabra</i> |
| <i>Hypercompe scribonia</i> |
| <i>Hypoprepia fucosa</i> |
| <i>Idia aemula</i> |
| <i>Idia americalis</i> |
| <i>Idia diminuendis</i> |
| <i>Idia forbesi</i> |
| <i>Idia rotundalis</i> |
| <i>Ledaea perditalis</i> |
| <i>Lophocampa caryae</i> |
| <i>Lymantria dispar</i> |
| <i>Macrochilo orziferalis</i> |
| <i>Metalectra discalis</i> |
| <i>Paltthis angulalis</i> |
| <i>Pangrapta decoralis</i> |
| <i>Panopoda rufimargo</i> |
| <i>Parallelia bistriaris</i> |
| <i>Phalaenophana pyramusalis</i> |
| <i>Phalaenostola larentioides</i> |
| <i>Phoberia atomaris</i> |
| <i>Pyrrharctia isabella</i> |
| <i>Renia adspersigillus</i> |
| <i>Renia discoloralis</i> |
| <i>Renia flavipunctalis</i> |
| <i>Spilosoma congrua</i> |
| <i>Spilosoma latipennis</i> |
| <i>Virbia aurantiaca</i> ^{HT} |
| <i>Virbia opella</i> |
| <i>Zale horrida</i> |
| <i>Zale intenta</i> |
| <i>Zale lunata/ minirea</i> |

| |
|-------------------------------------|
| <i>Zale unilineata</i> |
| <i>Zanclognatha cruralis</i> |
| <i>Zanclognatha marcidilinea</i> |
| |
| Geometridae |
| <i>Anavitrinella pampinaria</i> |
| <i>Antepione thisoaria</i> |
| <i>Besma quercivoraria</i> |
| <i>Biston betularia</i> |
| <i>Campaea perlata</i> |
| <i>Chlorochlamys chloroleucaria</i> |
| <i>Costaconvexa centrostrigaria</i> |
| <i>Cyclophora packardi</i> |
| <i>Cyclophora pendulinaria</i> |
| <i>Dyspteris abortivaria</i> |
| <i>Ennomos magnaria</i> |
| <i>Epimecis hortaria</i> |
| <i>Epirrhoë alternata</i> |
| <i>Euclaena ?marginaria</i> |
| <i>Euclaena irritaria</i> |
| <i>Euclaena johnsonaria</i> |
| <i>Euclaena muzaria</i> |
| <i>Euclaena serrata</i> |
| <i>Eugonobapta nivosaria</i> |
| <i>Eulithis diversilineata</i> |
| <i>Eumacaria madopata</i> |
| <i>Eusarca confusaria</i> |
| <i>Entrapela clemataria</i> |
| <i>Gueneria similaria</i> |
| <i>Heliomata cycladata</i> |
| <i>Hethemia pistaciaria</i> |
| <i>Hypagyrtis unipuncta</i> |
| <i>Idaea dimidiata</i> |
| <i>Itame virginialis</i> |

| |
|----------------------------------|
| <i>Lambdina fervidaria</i> |
| <i>Lobocleta ossularia</i> |
| <i>Lomographa vestaliata</i> |
| <i>Lytrosis unitaria</i> |
| <i>Macaria bisignata</i> |
| <i>Melanolophia canadaria</i> |
| <i>Melanolophia signataria</i> |
| <i>Metarranthis ?hypochraria</i> |
| <i>Metarranthis duaria</i> |
| <i>Metarranthis obfirmaria</i> |
| <i>Nematocampa resistaria</i> |
| <i>Nemoria bistriaria</i> |
| <i>Orthonama obstipata</i> |
| <i>Pasiphila rectangulata</i> |
| <i>Patalene olyzonaria</i> |
| <i>Pero anceltaria</i> |
| <i>Pero honestaria</i> |
| <i>Pero morrisonaria</i> |
| <i>Plagodis fervidaria</i> |
| <i>Pleuroprucha insulsaria</i> |
| <i>Probole amicaria</i> |
| <i>Prochoerodes lineola</i> |
| <i>Protoboarmia porcelaria</i> |
| <i>Rheumaptera prunivorata</i> |
| <i>Scopula inductata</i> |
| <i>Scopula limboundata</i> |
| <i>Speranza pustularia</i> |
| <i>Synchlora aerata</i> |
| <i>Tetracis cachexiata</i> |
| <i>Tetracis crocallata</i> |
| |
| Lasiocampidae |
| <i>Malacosoma americana</i> |
| <i>Malacosoma disstria</i> |



Plum Island Biodiversity Inventory

| |
|---|
| Limacodidae |
| <i>Apoda y-inversum</i> |
| <i>Euclea delphinii</i> |
| <i>Lithacodes fasciola</i> |
| <i>Parasa chloris</i> |
| <i>Prolimacodes badia</i> |
| <i>Tortricidia flexuosa</i> |
| <i>Tortricidia testacea</i> |
| |
| Megalopygidae |
| <i>Lagoa crispata</i> |
| |
| Noctuidae |
| <i>Abagrotis alternata</i> |
| <i>Abagrotis cupida</i> |
| <i>Abagrotis magnicupida</i> |
| <i>Abagrotis nefascia</i> ^{SP} |
| <i>Achatia indistincta</i> |
| <i>Acronicta americana</i> |
| <i>Acronicta basta</i> |
| <i>Acronicta heasitata/tristis</i> |
| <i>Acronicta interrupta</i> |
| <i>Acronicta modica</i> |
| <i>Agnorisma badinodis</i> |
| <i>Agriopodes fallax</i> |
| <i>Agrotis ipsilon</i> |
| <i>Agrotis venerabilis</i> |
| <i>Agrotis vetusta</i> |
| <i>Amphipoea interoceanica</i> |
| <i>Amphipyra pyramidoides</i> |
| <i>Anicla illapsa</i> |
| <i>Apamea inordinata</i> ^{SP} |
| <i>Apamea lintneri</i> ^{HT} |
| <i>Apamea vulgaris</i> |
| <i>Atbetis tarda</i> |
| <i>Balsa labecula</i> |

| |
|--|
| <i>Callopietria mollissima</i> |
| <i>Cerma cerintha</i> |
| <i>Choephora fungorum</i> |
| <i>Chrysodexeis includens</i> |
| <i>Chytonix palliatricula</i> |
| <i>Condica videns</i> |
| <i>Cosmia calami</i> |
| <i>Crocigrapha normani</i> |
| <i>Dargida diffusa</i> |
| <i>Dargida rubripennis</i> |
| <i>Deltole bellicula</i> |
| <i>Elaphria alapallida</i> |
| <i>Elaphria grata</i> |
| <i>Epiglaea apiata</i> |
| <i>Eucirroedia pampina</i> |
| <i>Eucoptocnemis fimbriaris</i> ^S |
| <i>Eudryas grata</i> |
| <i>Eudryas unio</i> |
| <i>Euplexia benesimilis</i> |
| <i>Eupsilia ?vinulenta</i> |
| <i>Euxoa bostoniensis</i> |
| <i>Euxoa detersa</i> |
| <i>Euxoa pleuritica</i> |
| <i>Feltia geniculata</i> |
| <i>Feltia herilis</i> |
| <i>Feltia jaculifera</i> |
| <i>Fishia illocata</i> |
| <i>Helicoverpa zea</i> |
| <i>Himella fidelis</i> |
| <i>Homophoberia apicosa</i> |
| <i>Homorthodes lindseyi</i> |
| <i>Iodopepla u-album</i> |
| <i>Lacanobia grandis</i> |
| <i>Lacinipolia renigera</i> |
| <i>Lacinipolia vicina</i> |
| <i>Lepipohys perscripta</i> ^{SP} |

| |
|--|
| <i>Leucania extincta</i> |
| <i>Leucania linda</i> |
| <i>Leucania limita</i> |
| <i>Leucania ursula</i> |
| <i>Leuconycta diphteroides</i> |
| <i>Litbophane antennata</i> |
| <i>Marathyssa inficita</i> |
| <i>Morrisonia evicta</i> |
| <i>Mythimna oxygala</i> |
| <i>Mythimna unipuncta</i> |
| <i>Nephelodes minians</i> |
| <i>Noctua pronuba</i> |
| <i>Ochrupleura implecta</i> |
| <i>Orthodes cynica</i> |
| <i>Orthodes detracta</i> |
| <i>Orthodes majuscula</i> |
| <i>Orthosia rubescens</i> |
| <i>Paectes oculatrix</i> |
| <i>Paectes pygmaea</i> |
| <i>Papaipema duovata</i> ^{HT} |
| <i>Phlogophora periculosa</i> |
| <i>Phosphila misceloides</i> |
| <i>Phosphila turbulenta</i> |
| <i>Plusia contexta</i> |
| <i>Polygrammate hebraeicum</i> |
| <i>Ponometia candefacta</i> |
| <i>Protolampra brunneicollis</i> |
| <i>Protorthodes oviduca</i> |
| <i>Proxenus miranda</i> |
| <i>Schinia arcigera</i> |
| <i>Schinia lynx</i> |
| <i>Schinia nundina</i> |
| <i>Schinia spinosae</i> ^{HT} |
| <i>Sericaglaea signata</i> |
| <i>Spodoptera ornithogalli</i> |
| <i>Sunira bicolorago</i> |

| |
|--|
| <i>Sympistis riparia</i> ^{HT} |
| <i>Trichoilita signata</i> |
| <i>Ulolonche culea</i> |
| <i>Ulolonche modesta</i> |
| <i>Xestia dilucida</i> |
| <i>Xestia dolosa</i> |
| <i>Xestia smithii</i> |
| |
| Nolidae |
| <i>Baileya levitans</i> |
| |
| Notodontidae |
| <i>Datana drexelli/major</i> |
| <i>Datana ministra</i> |
| <i>Datana perspicua</i> |
| <i>Gluphisia septentrionis</i> |
| <i>Heterocampa guttinitta</i> |
| <i>Heterocampa obliqua</i> |
| <i>Heterocampa umbrata</i> |
| <i>Hyperaeschra georgica</i> |
| <i>Nadata gibbosa</i> |
| <i>Peridea angulosa</i> |
| |
| Saturniidae |
| <i>Automeris io</i> |
| |
| Sphingidae |
| <i>Darapsa myron</i> |
| <i>Eumorphia acbemon</i> |
| <i>Eumorphia pandorus</i> |
| <i>Paonias excaecata</i> |
| <i>Sphocodina abbotti</i> |
| <i>Sphinx gordius</i> ^{HT} |
| |
| Yponomeutidae |
| <i>Atteva aurea</i> |



Plum Island Biodiversity Inventory

Other invertebrates

For dragonflies and damselflies we followed the protocol for documentation from the New York Dragonfly and Damselfly Survey (White *et al.* 2010), while for butterflies we supplemented our survey results with observations from 2005 by MaryLaura Lamont as reported in Schlesinger *et al.* (2012). Apart from carrion beetles, other taxa were detected opportunistically and identified as time permitted, and this list just scratches the surface of the island's invertebrate fauna.

| Scientific name | Common name |
|---|------------------------|
| Gastropods | |
| <i>Limax maximus</i> | Leopard slug |
| Dragonflies and damselflies | |
| <i>Anax junius</i> | Common green darner |
| <i>Enallagma civile</i> | Familiar bluet |
| <i>Erythemis simplicicollis</i> | Eastern pondhawk |
| <i>Ischnura posita</i> | Fragile forktail |
| <i>Ischnura ramburii</i> ^S | Rambur's forktail |
| <i>Ischnura verticalis</i> | Eastern forktail |
| <i>Libellula auripennis</i> ^{HT} | Golden-winged skimmer |
| <i>Libellula needhami</i> ^S | Needham's skimmer |
| <i>Libellula pulchella</i> | Twelve-spotted skimmer |
| <i>Pachydiplax longipennis</i> | Blue dasher |
| <i>Pantala flavescens</i> | Wandering glider |
| <i>Pantala hymenaea</i> | Spot-winged glider |
| <i>Perithemis tenera</i> | Eastern amberwing |
| <i>Plathemis lydia</i> | Common whitetail |
| <i>Sympetrum</i> sp. | A meadowhawk |
| <i>Tramea carolina</i> | Carolina saddlebags |
| <i>Tramea lacerata</i> | Black saddlebags |
| Butterflies | |
| <i>Danaus plexippus</i> ^{SP} | Monarch |
| <i>Papilio polyxenes</i> | Black swallowtail |
| <i>Colias eurytheme</i> | Orange sulphur |
| <i>Colias philodice</i> | Clouded sulphur |
| <i>Pieris rapae</i> | Cabbage white |

| Scientific name | Common name |
|--|-------------------------------|
| <i>Cupido comyntas</i> | Eastern tailed blue |
| <i>Vanessa cardui</i> | Painted lady |
| <i>Vanessa atalanta</i> | Red admiral |
| <i>Epargyreus clarus</i> | Silver-spotted skipper |
| <i>Thymelicus lineola</i> | European skipper |
| <i>Poanes hobomok</i> | Hobomok skipper |
| Fishflies | |
| <i>Chauliodes pectinicornis</i> | |
| <i>Chauliodes rusticornis</i> | |
| Caddisflies | |
| <i>Cheumatopsyche</i> sp. | |
| <i>Hydropsyche betteni</i> | |
| <i>Oecetis inconspicua</i> | |
| <i>Triaenodes aba</i> | |
| <i>Triaenodes nox</i> | |
| <i>Limnephilus indivisus</i> | |
| <i>Limnephilus submonilifer</i> | |
| <i>Platycentropus radiatus</i> | |
| <i>Phryganea sayi</i> | |
| <i>Ptilostomis angustipennis</i> | |
| Beetles | |
| <i>Carabus nemoralis</i> | Woodland worm and slug hunter |
| <i>Cicindela hirticollis</i> ^{Hi} | Hairy-necked tiger beetle |
| <i>Cicindela punctulata</i> | Punctured tiger beetle |
| <i>Cicindela repanda</i> | Bronzed tiger beetle |



Plum Island Biodiversity Inventory

| Scientific name | Common name |
|---------------------------------|--------------------------------|
| <i>Copris minutis</i> | |
| <i>Cyclocephala borealis</i> | |
| <i>Diaperis maculata</i> | |
| <i>Dichelotarsus</i> sp. | |
| <i>Exomala orientalis</i> | Oriental beetle |
| <i>Harmonia axyridis</i> | Multicolored Asian lady beetle |
| <i>Harpalus affinis?</i> | |
| <i>Hydrochara soror</i> | |
| <i>Maladera castanea</i> | Asiatic garden beetle |
| <i>Necrophila americana</i> | American carrion beetle |
| <i>Nicrophorus orbicollis</i> | |
| <i>Nicrophorus sayi</i> | |
| <i>Nicrophorus tomentosus</i> | Tomentose carrion beetle |
| <i>Oiceoptoma inaequale</i> | Ridged carrion beetle |
| <i>Pelidnota punctata</i> | Grapevine beetle |
| <i>Photinus</i> sp. | Firefly |
| <i>Phyllophaga</i> sp. | May beetle |
| <i>Poecilus</i> sp. | Carabid beetle |
| <i>Tetraopes tetraphthalmus</i> | Red milkweed beetle |
| <i>Tomarus gibbosus?</i> | |
| <i>Trox</i> sp. | |
| | |
| Bees | |
| <i>Bombus impatiens</i> | Common eastern bumble bee |
| <i>Bombus griseocollis</i> | Brown-belted bumble bee |



Plum Island Biodiversity Inventory

Plants

Species on this combined list are from the *Flora of Plum Island* (Lamont and Stalter 2013) and from surveys in 2015.

| Scientific name | Common name | Family | Habit | Native ¹ | Source ² | S-rank and state listing ³ |
|---|-----------------------------|---------------|-------|---------------------|---------------------|---------------------------------------|
| <i>Abutilon theophrasti</i> | Velvet-leaf | Malvaceae | Herb | No | L & S | |
| <i>Acalypha rhomboidea</i> | Common copperleaf | Euphorbiaceae | Herb | Yes | L & S | |
| <i>Acer platanoides</i> | Norway maple | Aceraceae | Tree | Inv | New | |
| <i>Acer pseudoplatanus</i> | Sycamore maple | Aceraceae | Tree | Inv | L & S | |
| <i>Acer rubrum</i> var. <i>rubrum</i> | Red maple | Aceraceae | Tree | Yes | L & S | |
| <i>Achillea millefolium</i> var. <i>millefolium</i> | Common yarrow | Asteraceae | Herb | No | L & S | |
| <i>Agalinis purpurea</i> | Purple false foxglove | Orobanchaceae | Herb | Yes | L & S | |
| <i>Ageratina altissima</i> var. <i>altissima</i> | White snakeroot | Asteraceae | Herb | Yes | L & S | |
| <i>Agrostis perennans</i> | Autumn bent | Poaceae | Gram | Yes | L & S | |
| <i>Agrostis scabra</i> | Rough bentgrass | Poaceae | Gram | Yes | L & S | |
| <i>Agrostis stolonifera</i> | Creeping bentgrass | Poaceae | Gram | No | L & S | |
| <i>Ailanthus altissima</i> | Tree-of-heaven | Simaroubaceae | Tree | Inv | L & S | |
| <i>Aira caryophylla</i> | Silver hairgrass | Poaceae | Gram | No | L & S | |
| <i>Albizia julibrissin</i> | Silk tree | Fabaceae | Tree | Inv | L & S | |
| <i>Alisma subcordatum</i> | Broad-leaved water-plantain | Alismataceae | Herb | Yes | L & S | |
| <i>Alliaria petiolata</i> | Garlic mustard | Brassicaceae | Herb | Inv | L & S | |
| <i>Allium vineale</i> | Wild garlic | Alliaceae | Herb | No | L & S | |
| <i>Amaranthus retroflexus</i> | Redroot pigweed | Amaranthaceae | Herb | Yes | L & S | |
| <i>Ambrosia artemisiifolia</i> | Annual ragweed | Asteraceae | Herb | Yes | L & S | |
| <i>Amelanchier canadensis</i> | Oblong-leaved serviceberry | Rosaceae | Shrub | Yes | L & S | |
| <i>Ammophila breviligulata</i> ssp. <i>breviligulata</i> | American beachgrass | Poaceae | Gram | Yes | L & S | |
| <i>Amorpha fruticosa</i> | False indigobush | Fabaceae | Shrub | No | L & S | |
| <i>Ampelopsis glandulosa</i> var. <i>brevipedunculata</i> | Porcelain berry | Vitaceae | Vine | Inv | New | |
| <i>Anagallis arvensis</i> | Scarlet pimpernel | Primulaceae | Herb | No | L & S | |
| <i>Anaphalis margaritacea</i> | Pearly everlasting | Asteraceae | Herb | Yes | L & S | |
| <i>Andropogon glomeratus</i> var. <i>glomeratus</i> | Bushy bluestem | Poaceae | Gram | Yes | L & S | |
| <i>Andropogon virginicus</i> var. <i>virginicus</i> | Broom-sedge | Poaceae | Gram | Yes | L & S | |



Plum Island Biodiversity Inventory

| Scientific name | Common name | Family | Habit | Native ¹ | Source ² | S-rank and state listing ³ |
|---|----------------------------|-----------------|-------|---------------------|---------------------|---------------------------------------|
| <i>Antennaria plantaginifolia</i> | Plantain-leaved pussytoes | Asteraceae | Herb | Yes | L & S | |
| <i>Anthoxanthum odoratum</i> | Sweet vernal grass | Poaceae | Gram | No | L & S | |
| <i>Apocynum cannabinum</i> | Clasping-leaved dogbane | Apocynaceae | Herb | Yes | L & S | |
| <i>Arabidopsis thaliana</i> | Wall-ress | Brassicaceae | Herb | No | L & S | |
| <i>Arctium minus</i> | Lesser burdock | Asteraceae | Herb | No | L & S | |
| <i>Arenaria serpyllifolia</i> var. <i>serpyllifolia</i> | Thyme-leaved sandwort | Caryophyllaceae | Herb | No | L & S | |
| <i>Arisaema triphyllum</i> ssp. <i>triphyllum</i> | Common jack-in-the-pulpit | Araceae | Herb | Yes | L & S | |
| <i>Aristida dichotoma</i> var. <i>dichotoma</i> | Shinners three-awned grass | Poaceae | Gram | Yes | L & S | |
| <i>Aristida oligantha</i> | Prairie three-awn grass | Poaceae | Gram | No | L & S | |
| <i>Aronia arbutifolia</i> | Red chokeberry | Rosaceae | Shrub | Yes | L & S | |
| <i>Artemisia vulgaris</i> var. <i>vulgaris</i> | Mugwort | Asteraceae | Herb | Inv | L & S | |
| <i>Asclepias incarnata</i> ssp. <i>pulchra</i> | Swamp milkweed | Apocynaceae | Herb | Yes | L & S | |
| <i>Asclepias syriaca</i> | Common milkweed | Apocynaceae | Herb | Yes | L & S | |
| <i>Asclepias verticillata</i> | Whorled milkweed | Apocynaceae | Herb | Yes | L & S | S3 - R |
| <i>Asparagus officinalis</i> | Common asparagus | Asparagaceae | Herb | No | L & S | |
| <i>Atriplex cristata</i> | Crested saltbush | Chenopodiaceae | Herb | Yes | L & S | |
| <i>Atriplex prostrata</i> | Creeping saltbush | Chenopodiaceae | Herb | No | L & S | |
| <i>Avenella flexuosa</i> | Wavy hair grass | Poaceae | Gram | Yes | L & S | |
| <i>Baccharis halimifolia</i> | Eastern baccharis | Asteraceae | Shrub | Yes | L & S | |
| <i>Baptisia tinctoria</i> | Wild-indigo | Fabaceae | Shrub | Yes | L & S | |
| <i>Barbarea vulgaris</i> | Yellow rocket | Brassicaceae | Herb | No | L & S | |
| <i>Berberis thunbergii</i> | Japanese barberry | Berberidaceae | Shrub | Inv | L & S | |
| <i>Betula lenta</i> | Sweet birch | Betulaceae | Tree | Yes | L & S | |
| <i>Betula populifolia</i> | Gray birch | Betulaceae | Tree | Yes | L & S | |
| <i>Bidens cernua</i> | Nodding beggar-ticks | Asteraceae | Herb | Yes | L & S | |
| <i>Bidens discoidea</i> | Small beggar-ticks | Asteraceae | Herb | Yes | L & S | |
| <i>Bidens frondosa</i> | Devil's beggar-ticks | Asteraceae | Herb | Yes | L & S | |
| <i>Botrychium dissectum</i> | Cut-leaved grape-fern | Ophioglossaceae | F | Yes | L & S | |
| <i>Brassica nigra</i> | Black mustard | Brassicaceae | Herb | No | L & S | |



Plum Island Biodiversity Inventory

| Scientific name | Common name | Family | Habit | Native ¹ | Source ² | S-rank and state listing ³ |
|--|-----------------------------------|-----------------|-------|---------------------|---------------------|---------------------------------------|
| <i>Bromus inermis</i> | Awnless brome | Poaceae | Gram | No | L & S | |
| <i>Bromus japonicus</i> | Japanese brome | Poaceae | Gram | No | L & S | |
| <i>Bromus tectorum</i> | Cheat grass | Poaceae | Gram | No | L & S | |
| <i>Cakile edentula</i> var. <i>edentula</i> | American searocket | Brassicaceae | Herb | Yes | L & S | |
| <i>Calystegia sepium</i> ssp. <i>sepium</i> | Hedge false bindweed | Convolvulaceae | Vine | No | L & S | |
| <i>Capsella bursa-pastoris</i> | Common shepherd's purse | Brassicaceae | Herb | No | L & S | |
| <i>Cardamine hirsuta</i> | Hairy bitter-cress | Brassicaceae | Herb | No | L & S | |
| <i>Carex annectens</i> | Yellow-fruited sedge | Cyperaceae | Gram | Yes | L & S | |
| <i>Carex bormathodes</i> | Marsh straw sedge | Cyperaceae | Gram | Yes | L & S | S2S3 - T |
| <i>Carex longii</i> | Long's sedge | Cyperaceae | Gram | Yes | L & S | |
| <i>Carex merritt-fernaldii</i> | Fernald's sedge | Cyperaceae | Gram | Yes | L & S | S2S3 - T |
| <i>Carex pennsylvanica</i> | Pennsylvania sedge | Cyperaceae | Gram | Yes | L & S | |
| <i>Carex scoparia</i> var. <i>scoparia</i> | Broom sedge | Cyperaceae | Gram | Yes | L & S | |
| <i>Carex silicea</i> | Sea-beach sedge | Cyperaceae | Gram | Yes | L & S | |
| <i>Carex swanii</i> | Swan sedge | Cyperaceae | Gram | Yes | L & S | |
| <i>Carex vulpinoidea</i> | Fox sedge | Cyperaceae | Gram | Yes | L & S | |
| <i>Carya alba</i> | Mockernut hickory | Juglandaceae | Tree | Yes | L & S | |
| <i>Carya glabra</i> | Pignut hickory | Juglandaceae | Tree | Yes | L & S | |
| <i>Celastrus orbiculatus</i> | Oriental bittersweet | Celastraceae | Vine | Inv | L & S | |
| <i>Cenchrus longispinus</i> | Long-spine sandbur | Poaceae | Gram | Yes | L & S | |
| <i>Centaurea stoebe</i> ssp. <i>micranthos</i> | Spotted knapweed | Asteraceae | Herb | Inv | L & S | |
| <i>Cephalanthus occidentalis</i> | Common buttonbush | Rubiaceae | Shrub | Yes | L & S | |
| <i>Cerastium fontanum</i> ssp. <i>vulgare</i> | Big chickweed | Caryophyllaceae | Herb | No | L & S | |
| <i>Cerastium semidecandrum</i> | Five-stamened mouse-ear chickweed | Caryophyllaceae | Herb | No | L & S | |
| <i>Chamaecrista nictitans</i> | Partridge pea | Fabaceae | Herb | Yes | New | |
| <i>Chamaecyparis thyoides</i> | Atlantic white cedar | Cupressaceae | Tree | Yes | L & S | S2 - T |
| <i>Chenopodium album</i> | Lambs-quarters | Chenopodiaceae | Herb | No | L & S | |
| <i>Chenopodium berlandieri</i> var. <i>macrocalycium</i> | Pit-seeded goosefoot | Chenopodiaceae | Herb | Yes | L & S | |
| <i>Chenopodium pratericola</i> | Desert goosefoot | Chenopodiaceae | Herb | Yes | New | |



Plum Island Biodiversity Inventory

| Scientific name | Common name | Family | Habit | Native ¹ | Source ² | S-rank and state listing ³ |
|---|--------------------------|------------------|-------|---------------------|---------------------|---------------------------------------|
| <i>Chimaphila maculata</i> | Spotted wintergreen | Ericaceae | Herb | Yes | L & S | |
| <i>Cichorium intybus</i> | Chicory | Asteraceae | Herb | No | L & S | |
| <i>Cirsium arvense</i> | Canada thistle | Asteraceae | Herb | Inv | L & S | |
| <i>Cirsium vulgare</i> | Bull thistle | Asteraceae | Herb | No | L & S | |
| <i>Clethra alnifolia</i> | Coast pepperbush | Clethraceae | Shrub | Yes | L & S | |
| <i>Commelina communis</i> var. <i>communis</i> | Asiatic dayflower | Commelinaceae | Herb | No | L & S | |
| <i>Comptonia peregrina</i> | Sweet fern | Myricaceae | Herb | Yes | L & S | |
| <i>Convolvulus arvensis</i> | Field bindweed | Convolvulaceae | Vine | No | L & S | |
| <i>Conyza canadensis</i> var. <i>pusilla</i> | Canadian horseweed | Asteraceae | Herb | Yes | L & S | |
| <i>Cornus florida</i> | Flowering dogwood | Cornaceae | Tree | Yes | L & S | |
| <i>Crocantemum dumosum</i> | Bushy rockrose | Cistaceae | Herb | Yes | L & S | S1H - E |
| <i>Cycloloma atriplicifolium</i> | Winged pigweed | Chenopodiaceae | Herb | No | L & S | |
| <i>Cynanchum rossicum</i> | Pale swallow-wort | Apocynaceae | Vine | Inv | New | |
| <i>Cyperus bipartitus</i> | Slender flatsedge | Cyperaceae | Gram | Yes | L & S | |
| <i>Cyperus erythrorhizos</i> | Redroot flatsedge | Cyperaceae | Gram | Yes | L & S | S3 - R |
| <i>Cyperus esculentus</i> var. <i>leptostachyus</i> | Yellow nut-grass | Cyperaceae | Gram | No | L & S | |
| <i>Cyperus filicinus</i> | Fern flatsedge | Cyperaceae | Gram | Yes | New | |
| <i>Cyperus grayi</i> | Gray's flatsedge | Cyperaceae | Gram | Yes | L & S | |
| <i>Cyperus lupulinus</i> ssp. <i>lupulinus</i> | Great Plains flatsedge | Cyperaceae | Gram | Yes | L & S | S1 - E |
| <i>Cyperus lupulinus</i> ssp. <i>macilentus</i> | Great Plains flatsedge | Cyperaceae | Gram | Yes | L & S | |
| <i>Cyperus polystachyos</i> | Many-spiked flatsedge | Cyperaceae | Gram | Yes | L & S | S1S2 - E |
| <i>Cyperus retrorsus</i> | Retorse flatsedge | Cyperaceae | Gram | Yes | L & S | S1 - E |
| <i>Cyperus strigosus</i> | Straw-colored flatsedge | Cyperaceae | Gram | Yes | L & S | |
| <i>Dactylis glomerata</i> | Orchard grass | Poaceae | Gram | No | L & S | |
| <i>Danthonia spicata</i> | Poverty oatgrass | Poaceae | Gram | Yes | L & S | |
| <i>Datura stramonium</i> | Jimsonweed | Solanaceae | Herb | No | L & S | |
| <i>Daucus carota</i> | Wild carrot | Apiaceae | Herb | No | L & S | |
| <i>Decodon verticillatus</i> | Hairy swamp loosestrife | Lythraceae | Herb | Yes | L & S | |
| <i>Dennstaedtia punctilobula</i> | Eastern hay-scented fern | Dennstaedtiaceae | F | Yes | L & S | |



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| Scientific name | Common name | Family | Habit | Native ¹ | Source ² | S-rank and state listing ³ |
|---|-------------------------|-----------------|-------|---------------------|---------------------|---------------------------------------|
| <i>Dianthus armeria</i> ssp. <i>armeria</i> | Deptford pink | Caryophyllaceae | Herb | No | L & S | |
| <i>Dichanthelium acuminatum</i> ssp. <i>columbianum</i> | Panicgrass | Poaceae | Gram | Yes | L & S | |
| <i>Dichanthelium clandestinum</i> | Deer-tongue witchgrass | Poaceae | Gram | Yes | L & S | |
| <i>Dichanthelium ovale</i> ssp. <i>pseudopubescens</i> | Egg-leaved witchgrass | Poaceae | Gram | Yes | L & S | |
| <i>Dichanthelium scoparium</i> | Broom panic grass | Poaceae | Gram | Yes | L & S | S1 - E |
| <i>Digitaria sanguinalis</i> | Hairy crabgrass | Poaceae | Gram | No | L & S | |
| <i>Diodia teres</i> var. <i>teres</i> | Buttonweed | Rubiaceae | Herb | Yes | L & S | |
| <i>Diphasiastrum digitatum</i> | Fan club-moss | Lycopodiaceae | F | Yes | L & S | |
| <i>Draba verna</i> | Whitlow-grass | Brassicaceae | Herb | No | L & S | |
| <i>Drosera intermedia</i> | Spoon-leaved sundew | Droseraceae | Herb | Yes | L & S | |
| <i>Dryopteris intermedia</i> ssp. <i>intermedia</i> | Evergreen woodfern | Dryopteridaceae | F | Yes | L & S | |
| <i>Dysphania ambrosioides</i> | Mexican tea | Chenopodiaceae | Herb | No | L & S | |
| <i>Dysphania botrys</i> | Jerusalem oak | Chenopodiaceae | Herb | Yes | New | |
| <i>Echinochloa crus-galli</i> | Barnyardgrass | Poaceae | Gram | No | L & S | |
| <i>Echinochloa walteri</i> | Walter's barnyard grass | Poaceae | Gram | Yes | L & S | |
| <i>Elaeagnus umbellata</i> | Autumn olive | Elaeagnaceae | Shrub | Inv | L & S | |
| <i>Eleocharis fallax</i> | Creeping spike-rush | Cyperaceae | Gram | Yes | L & S | S1 - E |
| <i>Eleocharis flavescens</i> var. <i>olivacea</i> | Yellow spike-rush | Cyperaceae | Gram | Yes | L & S | |
| <i>Eleocharis obtusa</i> | Blunt spike-rush | Cyperaceae | Gram | Yes | L & S | |
| <i>Eleocharis parvula</i> | Dwarf spike-rush | Cyperaceae | Gram | Yes | New | |
| <i>Eleocharis uniglumis</i> var. <i>halophila</i> | Salt-marsh spike-rush | Cyperaceae | Gram | Yes | L & S | S2S3H - T |
| <i>Eleusine indica</i> | India goosegrass | Poaceae | Gram | No | L & S | |
| <i>Elymus virginicus</i> var. <i>virginicus</i> | Virginia wild rye | Poaceae | Gram | Yes | L & S | |
| <i>Epilobium coloratum</i> | Eastern willow-herb | Onagraceae | Herb | Yes | L & S | |
| <i>Eragrostis curvula</i> | Weeping lovegrass | Poaceae | Gram | No | L & S | |
| <i>Eragrostis pectinacea</i> var. <i>pectinacea</i> | Lovegrass | Poaceae | Gram | Yes | L & S | |
| <i>Eragrostis spectabilis</i> | Purple lovegrass | Poaceae | Gram | Yes | L & S | |
| <i>Erechtites hieracifolius</i> var. <i>hieracifolius</i> | American burnweed | Asteraceae | Herb | Yes | L & S | |
| <i>Erechtites hieracifolius</i> var. <i>megalocarpus</i> | Large-fruited burnweed | Asteraceae | Herb | Yes | L & S | S1 - E |



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| Scientific name | Common name | Family | Habit | Native ¹ | Source ² | S-rank and state listing ³ |
|---|---------------------------------|---------------|-------|---------------------|---------------------|---------------------------------------|
| <i>Erigeron philadelphicus</i> var. <i>philadelphicus</i> | Philadelphia fleabane | Asteraceae | Herb | Yes | L & S | |
| <i>Erigeron strigosus</i> var. <i>strigosus</i> | Prairie fleabane | Asteraceae | Herb | Yes | L & S | |
| <i>Erodium cicutarium</i> ssp. <i>cicutarium</i> | Red-stemmed stork's bill | Geraniaceae | Herb | No | L & S | |
| <i>Eubotrys racemosa</i> | Coastal fetter-bush | Ericaceae | Shrub | Yes | L & S | |
| <i>Eupatorium hyssopifolium</i> | Hyssop-leaved thoroughwort | Asteraceae | Herb | Yes | L & S | |
| <i>Eupatorium perfoliatum</i> | Common boneset | Asteraceae | Herb | Yes | L & S | |
| <i>Eupatorium pilosum</i> | Rough boneset | Asteraceae | Herb | Yes | L & S | |
| <i>Euphorbia cyparissias</i> | Cypress spurge | Euphorbiaceae | Herb | No | L & S | |
| <i>Euphorbia maculata</i> | Spotted spurge | Euphorbiaceae | Herb | Yes | L & S | |
| <i>Euphorbia polygonifolia</i> | Seaside spurge | Euphorbiaceae | Herb | Yes | L & S | |
| <i>Eurybia divaricata</i> | White wood-aster | Asteraceae | Herb | Yes | L & S | |
| <i>Euthamia caroliniana</i> | Grass-leaved goldenrod | Asteraceae | Herb | Yes | L & S | |
| <i>Euthamia graminifolia</i> | Fragrant grass-leaved goldenrod | Asteraceae | Herb | Yes | L & S | |
| <i>Eutrochium dubium</i> | Eastern Joe-Pye weed | Asteraceae | Herb | Yes | L & S | |
| <i>Fallopia convolvulus</i> | Black bindweed | Polygonaceae | Vine | No | L & S | |
| <i>Fallopia scandens</i> var. <i>scandens</i> | Climbing false buckwheat | Polygonaceae | Vine | Yes | L & S | |
| <i>Festuca rubra</i> ssp. <i>rubra</i> | Red fescue | Poaceae | Gram | No | L & S | |
| <i>Festuca trachyphylla</i> | Hard fescue | Poaceae | Gram | No | L & S | |
| <i>Fimbristylis autumnalis</i> | Slender fimbry | Cyperaceae | Gram | Yes | L & S | |
| <i>Fuirena pumila</i> | Dwarf umbrella-sedge | Cyperaceae | Gram | Yes | L & S | |
| <i>Gaillardia</i> × <i>grandiflora</i> | Firewheel | Asteraceae | Herb | No | L & S | |
| <i>Galinsoga parviflora</i> | Small-flowered quickweed | Asteraceae | Herb | No | L & S | |
| <i>Galium album</i> | White bedstraw | Rubiaceae | Herb | No | New | |
| <i>Galium aparine</i> | Cleavers | Rubiaceae | Herb | Yes | L & S | |
| <i>Galium tinctorium</i> | Stiff marsh bedstraw | Rubiaceae | Herb | Yes | L & S | |
| <i>Gaylussacia baccata</i> | Black huckleberry | Ericaceae | Shrub | Yes | L & S | |
| <i>Glaucium flavum</i> | Yellow hornpoppy | Papaveraceae | Herb | No | L & S | |
| <i>Glyceria striata</i> | Fowl manna grass | Poaceae | Gram | Yes | L & S | |
| <i>Helianthus petiolaris</i> ssp. <i>petiolaris</i> | Prairie sunflower | Asteraceae | Herb | No | L & S | |



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| Scientific name | Common name | Family | Habit | Native ¹ | Source ² | S-rank and state listing ³ |
|--|------------------------------|------------------|-------|---------------------|---------------------|---------------------------------------|
| <i>Hemerocallis fulva</i> | Orange daylily | Xanthorrhoeaceae | Herb | No | L & S | |
| <i>Herniaria hirsuta</i> ssp. <i>cinerea</i> | Green carpet | Caryophyllaceae | Herb | No | New | |
| <i>Hibiscus moscheutos</i> ssp. <i>moscheutos</i> | Swamp rosemallow | Malvaceae | Shrub | Yes | L & S | |
| <i>Hieracium scabrum</i> | Rough hawkweed | Asteraceae | Herb | Yes | L & S | |
| <i>Honckenya peploides</i> ssp. <i>robusta</i> | Sea-chickweed | Caryophyllaceae | Shrub | Yes | L & S | |
| <i>Hudsonia ericoides</i> | Golden-heather | Cistaceae | Shrub | Yes | L & S | |
| <i>Hudsonia tomentosa</i> | Sand-heather | Cistaceae | Shrub | Yes | L & S | |
| <i>Hypericum boreale</i> | Northern St. John's-wort | Hypericaceae | Herb | Yes | L & S | |
| <i>Hypericum canadense</i> | Canadian St. John's-wort | Hypericaceae | Herb | Yes | L & S | |
| <i>Hypericum gentianoides</i> | Orange-grass St. John's-wort | Hypericaceae | Herb | Yes | L & S | |
| <i>Hypericum mutilum</i> | Dwarf St. John's-wort | Hypericaceae | Herb | Yes | L & S | |
| <i>Hypericum perforatum</i> | Common St. John's-wort | Hypericaceae | Herb | No | L & S | |
| <i>Hypericum punctatum</i> | Spotted St. John's-wort | Hypericaceae | Herb | Yes | L & S | |
| <i>Hypochaeris radicata</i> | Spotted cat's-ear | Asteraceae | Herb | No | L & S | |
| <i>Ilex verticillata</i> | Common winterberry | Aquifoliaceae | Shrub | Yes | L & S | |
| <i>Impatiens capensis</i> | Orange jewelweed | Balsaminaceae | Herb | Yes | New | |
| <i>Iris versicolor</i> | Blueflag | Iridaceae | Herb | Yes | L & S | |
| <i>Juncus bufonius</i> | Toad rush | Juncaceae | Gram | Yes | L & S | |
| <i>Juncus canadensis</i> | Canada rush | Juncaceae | Gram | Yes | L & S | |
| <i>Juncus dichotomus</i> | Forked rush | Juncaceae | Gram | Yes | L & S | |
| <i>Juncus effusus</i> var. <i>solutus</i> | Common rush | Juncaceae | Gram | Yes | L & S | |
| <i>Juncus greenei</i> | Greene's rush | Juncaceae | Gram | Yes | L & S | |
| <i>Juncus secundus</i> | Secund rush | Juncaceae | Gram | Yes | L & S | |
| <i>Juncus tenuis</i> | Path rush | Juncaceae | Gram | Yes | L & S | |
| <i>Juniperus communis</i> var. <i>depressa</i> | Dwarf juniper | Cupressaceae | Shrub | Yes | L & S | |
| <i>Juniperus virginiana</i> var. <i>virginiana</i> | Red cedar | Cupressaceae | Tree | Yes | L & S | |
| <i>Krigia virginica</i> | Virginia dwarf-dandelion | Asteraceae | Herb | Yes | L & S | |
| <i>Lactuca canadensis</i> | Canada lettuce | Asteraceae | Herb | Yes | L & S | |
| <i>Lactuca serriola</i> | Prickly lettuce | Asteraceae | Herb | No | L & S | |



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| Scientific name | Common name | Family | Habit | Native ¹ | Source ² | S-rank and state listing ³ |
|---|-------------------------------|----------------|-------|---------------------|---------------------|---------------------------------------|
| <i>Lamium amplexicaule</i> | Henbit deadnettle | Lamiaceae | Herb | No | L & S | |
| <i>Lathyrus japonicus</i> var. <i>maritimus</i> | Beach pea | Fabaceae | Herb | Yes | L & S | |
| <i>Lechea maritima</i> var. <i>maritima</i> | Beach pinweed | Cistaceae | Herb | Yes | L & S | |
| <i>Leersia oryzoides</i> | Rice cutgrass | Poaceae | Gram | Yes | L & S | |
| <i>Lemna minor</i> | Lesser duckweed | Araceae | Herb | Yes | L & S | |
| <i>Leonurus cardiaca</i> | Motherwort | Lamiaceae | Herb | No | New | |
| <i>Lepidium campestre</i> | Field pepperweed | Brassicaceae | Herb | No | L & S | |
| <i>Lepidium virginicum</i> var. <i>virginicum</i> | Wild peppergrass | Brassicaceae | Herb | Yes | L & S | |
| <i>Lespedeza capitata</i> | Round-head bush-clover | Fabaceae | Herb | Yes | L & S | |
| <i>Lespedeza violacea</i> | Wand bush-clover | Fabaceae | Herb | Yes | L & S | |
| <i>Leucanthemum vulgare</i> | Oxeye daisy | Asteraceae | Herb | No | L & S | |
| <i>Liatris scariosa</i> var. <i>novae-angliae</i> | New England blazing star | Asteraceae | Herb | Yes | L & S | S2H - T |
| <i>Ligusticum scoticum</i> ssp. <i>scoticum</i> | Scottish licorice-root | Apiaceae | Herb | Yes | L & S | S1H - E |
| <i>Ligustrum vulgare</i> | European privet | Oleaceae | Shrub | No | L & S | |
| <i>Lilium superbum</i> | Turk's-cap lily | Liliaceae | Herb | Yes | L & S | |
| <i>Linaria vulgaris</i> | Butter-and-eggs | Plantaginaceae | Herb | No | L & S | |
| <i>Lindernia dubia</i> var. <i>dubia</i> | Yellow-seeded false pimpernel | Linderniaceae | Herb | Yes | L & S | |
| <i>Linum striatum</i> | Ridged yellow flax | Linaceae | Herb | Yes | L & S | |
| <i>Lobelia inflata</i> | Indian-tobacco | Campanulaceae | Herb | Yes | L & S | |
| <i>Lobelia siphilitica</i> | Great blue lobelia | Campanulaceae | Herb | Yes | L & S | |
| <i>Lobelia spicata</i> | Pale-spiked lobelia | Campanulaceae | Herb | Yes | L & S | |
| <i>Lolium multiflorum</i> | Italian ryegrass | Poaceae | Gram | No | L & S | |
| <i>Lolium perenne</i> | Perennial ryegrass | Poaceae | Gram | No | L & S | |
| <i>Lonicera japonica</i> | Japanese honeysuckle | Caprifoliaceae | Vine | Inv | L & S | |
| <i>Lonicera morrowii</i> | Morrow's honeysuckle | Caprifoliaceae | Shrub | Inv | L & S | |
| <i>Lotus corniculatus</i> | Bird's-foot trefoil | Fabaceae | Herb | No | L & S | |
| <i>Ludwigia palustris</i> | Marsh seedbox | Onagraceae | Herb | Yes | L & S | |
| <i>Lunaria annua</i> | Annual honesty | Brassicaceae | Herb | No | L & S | |
| <i>Lycopus americanus</i> | American bugleweed | Lamiaceae | Herb | Yes | L & S | |



Plum Island Biodiversity Inventory

| Scientific name | Common name | Family | Habit | Native ¹ | Source ² | S-rank and state listing ³ |
|--|--------------------------|----------------|-------|---------------------|---------------------|---------------------------------------|
| <i>Lycopus uniflorus</i> | Northern bugleweed | Lamiaceae | Herb | Yes | New | |
| <i>Lyonia ligustrina</i> | Maleberry | Ericaceae | Shrub | Yes | L & S | |
| <i>Lysimachia quadrifolia</i> | Whorled loosestrife | Primulaceae | Herb | Yes | L & S | |
| <i>Lysimachia terrestris</i> | Swamp loosestrife | Primulaceae | Herb | Yes | L & S | |
| <i>Lythrum salicaria</i> | Purple loosestrife | Lythraceae | Herb | Inv | L & S | |
| <i>Maianthemum racemosum</i> ssp. <i>racemosum</i> | False Solomon's-seal | Ruscaceae | Herb | Yes | L & S | |
| <i>Malus sieboldii</i> | Toringa crabapple | Rosaceae | Tree | No | L & S | |
| <i>Malva neglecta</i> | Common mallow | Malvaceae | Herb | No | L & S | |
| <i>Matricaria discoidea</i> | Pineapple-weed chamomile | Asteraceae | Herb | No | L & S | |
| <i>Medicago lupulina</i> | Black medick | Fabaceae | Herb | No | L & S | |
| <i>Medicago sativa</i> ssp. <i>sativa</i> | Alfalfa | Fabaceae | Herb | No | L & S | |
| <i>Melilotus albus</i> | White sweetclover | Fabaceae | Herb | No | L & S | |
| <i>Mentha spicata</i> | Spearmint | Lamiaceae | Herb | No | L & S | |
| <i>Mikania scandens</i> | Climbing hempweed | Asteraceae | Vine | Yes | L & S | |
| <i>Mollugo verticillata</i> | Green carpet-weed | Molluginaceae | Herb | No | L & S | |
| <i>Morella carolinensis</i> | Bayberry | Myricaceae | Shrub | Yes | L & S | |
| <i>Morus alba</i> | White mulberry | Moraceae | Tree | No | L & S | |
| <i>Muhlenbergia schreberi</i> | Schreber muhly | Poaceae | Gram | Yes | L & S | |
| <i>Myosotis scorpioides</i> | True forget-me-not | Boraginaceae | Herb | No | L & S | |
| <i>Myriophyllum humile</i> | Low water-milfoil | Haloragaceae | Herb | Yes | New | |
| <i>Myriophyllum pinnatum</i> | Cut-leaved water-milfoil | Haloragaceae | Herb | Yes | L & S | S1-E |
| <i>Nepeta cataria</i> | Catnip | Lamiaceae | Herb | No | L & S | |
| <i>Nipponanthemum nipponicum</i> | Montauk daisy | Asteraceae | Herb | No | New | |
| <i>Nuttallanthus canadensis</i> | Canada toadflax | Plantaginaceae | Herb | Yes | L & S | |
| <i>Nymphaea odorata</i> ssp. <i>odorata</i> | White water-lily | Nymphaeaceae | Herb | Yes | L & S | |
| <i>Nyssa sylvatica</i> | Blackgum | Nyssaceae | Tree | Yes | L & S | |
| <i>Oclemena acuminata</i> | Whorled aster | Asteraceae | Herb | Yes | L & S | |
| <i>Oenothera biennis</i> | Common evening-primrose | Onagraceae | Herb | Yes | L & S | |
| <i>Oenothera oakesiana</i> | Oakes' evening-primrose | Onagraceae | Herb | Yes | L & S | S2 - T |



Plum Island Biodiversity Inventory

| Scientific name | Common name | Family | Habit | Native ¹ | Source ² | S-rank and state listing ³ |
|--|----------------------------|----------------|-------|---------------------|---------------------|---------------------------------------|
| <i>Onoclea sensibilis</i> | Sensitive fern | Onocleaceae | F | Yes | L & S | |
| <i>Opuntia humifusa</i> | Prickly-pear Cactus | Cactaceae | Herb | Yes | New | |
| <i>Ornithogalum umbellatum</i> | Common star-of-Bethlehem | Hyacinthaceae | Herb | No | L & S | |
| <i>Osmunda regalis</i> var. <i>spectabilis</i> | Royal fern | Osmundaceae | F | Yes | L & S | |
| <i>Osmundastrum cinnamomea</i> | Cinnamon fern | Osmundaceae | F | Yes | L & S | |
| <i>Panicum amarum</i> ssp. <i>amarum</i> | Smaller seabeach grass | Poaceae | Gram | Yes | L & S | |
| <i>Panicum capillare</i> ssp. <i>capillare</i> | Old witch panic-grass | Poaceae | Gram | Yes | L & S | |
| <i>Panicum dichotomiflorum</i> var. <i>dichotomiflorum</i> | Fall panicgrass | Poaceae | Gram | Yes | L & S | |
| <i>Panicum virgatum</i> | Switchgrass | Poaceae | Gram | Yes | L & S | |
| <i>Parthenocissus quinquefolia</i> | Virginia creeper | Vitaceae | Vine | Yes | L & S | |
| <i>Paspalum setaceum</i> var. <i>muhlenbergii</i> | Thin paspalum | Poaceae | Gram | Yes | L & S | |
| <i>Paulownia tomentosa</i> | Royal paulownia | Paulowniaceae | Tree | No | L & S | |
| <i>Persicaria extremiorientalis</i> | Far Eastern smartweed | Polygonaceae | Herb | Inv | New | |
| <i>Persicaria hydropiperoides</i> | Swamp smartweed | Polygonaceae | Herb | Yes | L & S | |
| <i>Persicaria pensylvanica</i> | Pennsylvania smartweed | Polygonaceae | Herb | Yes | L & S | |
| <i>Persicaria punctata</i> | Dotted smartweed | Polygonaceae | Herb | Yes | L & S | |
| <i>Phleum pratense</i> ssp. <i>pratense</i> | Meadow timothy | Poaceae | Gram | No | L & S | |
| <i>Phragmites australis</i> | Old World common reed | Poaceae | Gram | Inv | L & S | |
| <i>Phytolacca americana</i> var. <i>americana</i> | Common pokeweed | Phytolaccaceae | Herb | Yes | L & S | |
| <i>Pilosella caespitosa</i> | Meadow hawkweed | Asteraceae | Herb | No | L & S | |
| <i>Pinus rigida</i> | Pitch pine | Pinaceae | Tree | Yes | L & S | |
| <i>Pinus sylvestris</i> var. <i>sylvestris</i> | Scotch pine | Pinaceae | Tree | No | L & S | |
| <i>Pinus thunbergiana</i> | Japanese black pine | Pinaceae | Tree | Inv | L & S | |
| <i>Pityopsis falcata</i> | Sickle-leaved golden-aster | Asteraceae | Herb | Yes | L & S | |
| <i>Plantago aristata</i> | Largebracted plantain | Plantaginaceae | Herb | No | L & S | |
| <i>Plantago lanceolata</i> | Narrow-leaved plantain | Plantaginaceae | Herb | No | L & S | |
| <i>Plantago major</i> | Nipple-seeded plantain | Plantaginaceae | Herb | No | L & S | |
| <i>Plantago rugelii</i> | Black-seeded plantain | Plantaginaceae | Herb | Yes | L & S | |
| <i>Platanthera lacera</i> | Green fringed orchis | Orchidaceae | Herb | Yes | L & S | |



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| Scientific name | Common name | Family | Habit | Native ¹ | Source ² | S-rank and state listing ³ |
|---|-----------------------|------------------|-------|---------------------|---------------------|---------------------------------------|
| <i>Pluchea odorata</i> var. <i>succulenta</i> | Saltmarsh fleabane | Asteraceae | Herb | Yes | L & S | |
| <i>Poa annua</i> | Annual bluegrass | Poaceae | Gram | No | L & S | |
| <i>Poa compressa</i> | Canada bluegrass | Poaceae | Gram | No | L & S | |
| <i>Poa pratensis</i> ssp. <i>pratensis</i> | Kentucky bluegrass | Poaceae | Gram | No | L & S | |
| <i>Polygala cruciata</i> var. <i>aquilonia</i> | Cross-leaved milkwort | Polygalaceae | Herb | Yes | L & S | S3? - R |
| <i>Polygonella articulata</i> | Coastal jointweed | Polygonaceae | Herb | Yes | L & S | |
| <i>Polygonum aviculare</i> ssp. <i>aviculare</i> | Common knotweed | Polygonaceae | Herb | No | L & S | |
| <i>Polygonum aviculare</i> ssp. <i>depressum</i> | Common knotweed | Polygonaceae | Herb | No | L & S | |
| <i>Polygonum glaucum</i> | Seabeach knotweed | Polygonaceae | Herb | Yes | L & S | S3? - R |
| <i>Populus alba</i> | White poplar | Salicaceae | Tree | No | L & S | |
| <i>Populus deltoides</i> | Eastern cottonwood | Salicaceae | Tree | Yes | L & S | |
| <i>Populus tremuloides</i> | Quaking aspen | Salicaceae | Tree | Yes | New | |
| <i>Portulaca oleracea</i> | Common purslane | Portulacaceae | Herb | No | L & S | |
| <i>Potamogeton bicupulatus</i> | Snail-seeded pondweed | Potamogetonaceae | Herb | Yes | New | |
| <i>Potentilla argentea</i> | Silvery cinquefoil | Rosaceae | Herb | No | L & S | |
| <i>Potentilla canadensis</i> | Canada cinquefoil | Rosaceae | Herb | Yes | L & S | |
| <i>Potentilla norvegica</i> ssp. <i>monspeliensis</i> | Norwegian cinquefoil | Rosaceae | Herb | No | L & S | |
| <i>Potentilla recta</i> | Sulphur cinquefoil | Rosaceae | Herb | No | L & S | |
| <i>Prenanthes altissima</i> | Tall rattlesnake-root | Asteraceae | Herb | Yes | L & S | |
| <i>Proserpinaca palustris</i> var. <i>palustris</i> | Marsh mermaidweed | Haloragaceae | Herb | Yes | L & S | |
| <i>Prunella vulgaris</i> var. <i>vulgaris</i> | Eurasian self-heal | Lamiaceae | Herb | No | L & S | |
| <i>Prunus maritima</i> | Beach plum | Rosaceae | Shrub | Yes | L & S | |
| <i>Prunus serotina</i> var. <i>serotina</i> | Wild black cherry | Rosaceae | Tree | Yes | L & S | |
| <i>Pseudognaphalium obtusifolium</i> | Fragrant cudweed | Asteraceae | Herb | Yes | L & S | |
| <i>Pteridium aquilinum</i> var. <i>latiusculum</i> | Bracken fern | Dennstaedtiaceae | F | Yes | L & S | |
| <i>Ptilimnium capillaceum</i> | Mock bishop-weed | Apiaceae | Herb | Yes | L & S | S3?H - R |
| <i>Pyrus communis</i> | Common pear | Rosaceae | Tree | No | L & S | |
| <i>Quercus alba</i> | White oak | Fagaceae | Tree | Yes | L & S | |
| <i>Quercus palustris</i> | Pin oak | Fagaceae | Tree | Yes | L & S | |



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| Scientific name | Common name | Family | Habit | Native ¹ | Source ² | S-rank and state listing ³ |
|--|------------------------|----------------|-------|---------------------|---------------------|---------------------------------------|
| <i>Quercus prinoides</i> | Scrub chestnut oak | Fagaceae | Tree | Yes | L & S | |
| <i>Quercus velutina</i> | Black oak | Fagaceae | Tree | Yes | L & S | |
| <i>Quercus</i> × <i>faxonii</i> | Hybrid oak | Fagaceae | Tree | Yes | L & S | |
| <i>Ranunculus abortivus</i> | Kidney-leaved crowfoot | Ranunculaceae | Herb | Yes | L & S | |
| <i>Raphanus raphanistrum</i> | Wild radish | Brassicaceae | Herb | No | L & S | |
| <i>Rhododendron viscosum</i> | Swamp azalea | Ericaceae | Shrub | Yes | L & S | |
| <i>Rhus copallinum</i> | Winged sumac | Anacardiaceae | Shrub | Yes | L & S | |
| <i>Rhus glabra</i> | Smooth sumac | Anacardiaceae | Shrub | Yes | L & S | |
| <i>Rhus typhina</i> | Staghorn sumac | Anacardiaceae | Shrub | Yes | L & S | |
| <i>Rhynchospora capitellata</i> | Brownish beak-rush | Cyperaceae | Gram | Yes | L & S | |
| <i>Robinia hispida</i> var. <i>hispida</i> | Bristly locust | Fabaceae | Shrub | Inv | L & S | |
| <i>Robinia pseudoacacia</i> | Black locust | Fabaceae | Tree | Inv | L & S | |
| <i>Rosa carolina</i> var. <i>carolina</i> | Carolina rose | Rosaceae | Shrub | Yes | L & S | |
| <i>Rosa luciae</i> | Memorial rose | Rosaceae | Shrub | Inv | New | |
| <i>Rosa multiflora</i> | Multiflora rose | Rosaceae | Shrub | Inv | L & S | |
| <i>Rosa palustris</i> | Swamp rose | Rosaceae | Shrub | Yes | L & S | |
| <i>Rosa rugosa</i> | Rugosa rose | Rosaceae | Shrub | Inv | L & S | |
| <i>Rubus allegheniensis</i> | Allegheny blackberry | Rosaceae | Shrub | Yes | L & S | |
| <i>Rubus flagellaris</i> | Northern dewberry | Rosaceae | Vine | Yes | L & S | |
| <i>Rubus hispida</i> | Bristly dewberry | Rosaceae | Vine | Yes | L & S | |
| <i>Rubus phoenocolasius</i> | Wineberry | Rosaceae | Shrub | Inv | New | |
| <i>Rudbeckia hirta</i> var. <i>pulcherrima</i> | Black-eyed Susan | Asteraceae | Herb | No | L & S | |
| <i>Rumex acetosella</i> ssp. <i>pyrenaicus</i> | Sheep sorrel | Polygonaceae | Herb | No | L & S | |
| <i>Rumex crispus</i> ssp. <i>crispus</i> | Curly dock | Polygonaceae | Herb | No | L & S | |
| <i>Ruppia maritima</i> | Widgeon-grass | Ruppiales | Herb | Yes | New | |
| <i>Sagittaria latifolia</i> | Broad-leaved arrowhead | Alismataceae | Herb | Yes | L & S | |
| <i>Salix humilis</i> var. <i>humilis</i> | Tall prairie willow | Salicaceae | Shrub | Yes | L & S | |
| <i>Salix nigra</i> | Black willow | Salicaceae | Tree | Yes | L & S | |
| <i>Salsola kali</i> ssp. <i>kali</i> | Russian thistle | Chenopodiaceae | Herb | No | L & S | |



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| Scientific name | Common name | Family | Habit | Native ¹ | Source ² | S-rank and state listing ³ |
|--|-------------------------|-----------------|-------|---------------------|---------------------|---------------------------------------|
| <i>Sambucus nigra</i> ssp. <i>canadensis</i> | Common elderberry | Adoxaceae | Shrub | Yes | L & S | |
| <i>Saponaria officinalis</i> | Bouncing-bet | Caryophyllaceae | Herb | No | L & S | |
| <i>Sassafras albidum</i> | Sassafras | Lauraceae | Tree | Yes | L & S | |
| <i>Schedonorus arundinaceus</i> | Tall fescue | Poaceae | Gram | No | L & S | |
| <i>Schizachyrium littorale</i> | Shore bluestem | Poaceae | Gram | Yes | L & S | |
| <i>Schizachyrium scoparium</i> var. <i>scoparium</i> | Little bluestem | Poaceae | Gram | Yes | L & S | |
| <i>Schoenoplectiella mucronata</i> | Bog bulrush | Cyperaceae | Gram | Inv | New | |
| <i>Schoenoplectus americanus</i> | Three-square bulrush | Cyperaceae | Gram | Yes | New | |
| <i>Schoenoplectus pungens</i> | Three-square bulrush | Cyperaceae | Gram | Yes | L & S | |
| <i>Schoenoplectus tabernaemontani</i> | Soft-stemmed bulrush | Cyperaceae | Gram | Yes | L & S | |
| <i>Scirpus cyperinus</i> | Woolgrass | Cyperaceae | Gram | Yes | New | |
| <i>Scleranthus annuus</i> ssp. <i>annuus</i> | Annual knawel | Caryophyllaceae | Herb | No | L & S | |
| <i>Scutellaria galericulata</i> | Hooded skullcap | Lamiaceae | Herb | Yes | L & S | |
| <i>Scutellaria lateriflora</i> | Mad-dog skullcap | Lamiaceae | Herb | Yes | L & S | |
| <i>Sedum acre</i> | Gold-moss | Crassulaceae | Herb | No | L & S | |
| <i>Senecio vulgaris</i> | Common groundsel | Asteraceae | Herb | No | L & S | |
| <i>Setaria faberi</i> | Giant foxtail | Poaceae | Gram | No | L & S | |
| <i>Setaria parviflora</i> | Bristly foxtail | Poaceae | Gram | Yes | L & S | |
| <i>Setaria pumila</i> ssp. <i>pumila</i> | Yellow bristlegrass | Poaceae | Gram | No | L & S | |
| <i>Silene caroliniana</i> ssp. <i>pensylvanica</i> | Pennsylvania catchfly | Caryophyllaceae | Herb | Yes | L & S | S2 - T |
| <i>Silene latifolia</i> | Bladder campion | Caryophyllaceae | Herb | No | L & S | |
| <i>Silene vulgaris</i> | Bladder campion | Caryophyllaceae | Herb | No | L & S | |
| <i>Sisyrinchium atlanticum</i> | Eastern blue-eyed grass | Iridaceae | Herb | Yes | L & S | |
| <i>Sium suave</i> | Hemlock water-parsnip | Apiaceae | Herb | Yes | L & S | |
| <i>Smilax glauca</i> | Wild sarsaparilla | Smilacaceae | Vine | Yes | L & S | |
| <i>Smilax rotundifolia</i> | Round-leaved greenbrier | Smilacaceae | Vine | Yes | L & S | |
| <i>Solanum carolinense</i> var. <i>carolinense</i> | Carolina horsenettle | Solanaceae | Herb | Yes | L & S | |
| <i>Solanum dulcamara</i> var. <i>dulcamara</i> | Climbing nightshade | Solanaceae | Herb | No | L & S | |
| <i>Solanum nigrum</i> | Black nightshade | Solanaceae | Herb | No | L & S | |



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|---|----------------------------------|------------------|-------|---------------------|---------------------|---------------------------------------|
| <i>Solidago altissima</i> ssp. <i>altissima</i> | Tall goldenrod | Asteraceae | Herb | Yes | L & S | |
| <i>Solidago juncea</i> | Early goldenrod | Asteraceae | Herb | Yes | L & S | |
| <i>Solidago nemoralis</i> ssp. <i>nemoralis</i> | Gray goldenrod | Asteraceae | Herb | Yes | L & S | |
| <i>Solidago odora</i> ssp. <i>odora</i> | Sweet goldenrod | Asteraceae | Herb | Yes | L & S | |
| <i>Solidago rugosa</i> var. <i>rugosa</i> | Wrinkle-leaved goldenrod | Asteraceae | Herb | Yes | L & S | |
| <i>Solidago sempervirens</i> var. <i>sempervirens</i> | Seaside goldenrod | Asteraceae | Herb | Yes | L & S | |
| <i>Sonchus asper</i> | Spiny-leaved sowthistle | Asteraceae | Herb | No | L & S | |
| <i>Sonchus oleraceus</i> | Common sowthistle | Asteraceae | Herb | No | L & S | |
| <i>Spartina patens</i> | Saltmeadow cordgrass | Poaceae | Gram | Yes | L & S | |
| <i>Spartina pectinata</i> | Fresh water cordgrass | Poaceae | Gram | Yes | L & S | |
| <i>Spiraea alba</i> var. <i>latifolia</i> | Northern meadow-sweet | Rosaceae | Shrub | Yes | L & S | |
| <i>Spiraea tomentosa</i> var. <i>tomentosa</i> | Hardhack spiraea | Rosaceae | Shrub | Yes | L & S | |
| <i>Spiranthes cernua</i> | Nodding ladies'-tresses | Orchidaceae | Herb | Yes | L & S | |
| <i>Spiranthes lacera</i> var. <i>gracilis</i> | Southern slender ladies'-tresses | Orchidaceae | Herb | Yes | L & S | |
| <i>Spiranthes vernalis</i> | Twisted ladies'-tresses | Orchidaceae | Herb | Yes | L & S | S1 - E |
| <i>Sporobolus compositus</i> var. <i>compositus</i> | Composite dropseed | Poaceae | Gram | Yes | L & S | |
| <i>Stellaria media</i> ssp. <i>media</i> | Common chickweed | Caryophyllaceae | Herb | No | L & S | |
| <i>Strophostyles helvula</i> | Trailing fuzzybean | Fabaceae | Vine | Yes | L & S | |
| <i>Symphiotrichum dumosum</i> | Bushy aster | Asteraceae | Herb | Yes | L & S | |
| <i>Symphiotrichum ericoides</i> | White heath aster | Asteraceae | Herb | Yes | New | |
| <i>Symphiotrichum lanceolatum</i> var. <i>lanceolatum</i> | White panicle aster | Asteraceae | Herb | Yes | L & S | |
| <i>Symphiotrichum novi-belgii</i> var. <i>novi-belgii</i> | New York aster | Asteraceae | Herb | Yes | L & S | |
| <i>Symphiotrichum patens</i> | Late purple aster | Asteraceae | Herb | Yes | New | |
| <i>Symphiotrichum pilosum</i> var. <i>pilosum</i> | Hairy white old-field aster | Asteraceae | Herb | Yes | L & S | |
| <i>Symphiotrichum subulatum</i> | Saltmarsh aster | Asteraceae | Herb | Yes | New | S2 - T |
| <i>Taraxacum laevigatum</i> | Red-seeded dandelion | Asteraceae | Herb | No | L & S | |
| <i>Taraxacum officinale</i> | Common dandelion | Asteraceae | Herb | No | L & S | |
| <i>Teucrium canadense</i> | Canada germander | Lamiaceae | Herb | No | New | |
| <i>Thelypteris noveboracensis</i> | New York fern | Thelypteridaceae | F | Yes | L & S | |



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|---|--------------------------------------|------------------|-------|---------------------|---------------------|---------------------------------------|
| <i>Thelypteris palustris</i> var. <i>pubescens</i> | Marsh fern | Thelypteridaceae | F | Yes | L & S | |
| <i>Thlaspi arvense</i> | Field penny-cress | Brassicaceae | Herb | No | L & S | |
| <i>Toxicodendron radicans</i> ssp. <i>radicans</i> | Eastern poison ivy | Anacardiaceae | Shrub | Yes | L & S | |
| <i>Tragopogon dubius</i> | Yellow salsify | Asteraceae | Herb | No | L & S | |
| <i>Triadenum virginicum</i> | Marsh St. John's-wort | Hypericaceae | Herb | Yes | L & S | |
| <i>Tribulus terrestris</i> | Puncture-vine | Zygophyllaceae | Herb | Inv | L & S | |
| <i>Trichostema dichotomum</i> | Forked bluecurls | Lamiaceae | Herb | Yes | L & S | |
| <i>Tridens flavus</i> var. <i>flavus</i> | Tall purple-topped fluffgrass | Poaceae | Gram | Yes | L & S | |
| <i>Trifolium arvense</i> | Rabbit-foot clover | Fabaceae | Herb | No | L & S | |
| <i>Trifolium aureum</i> | Golden clover | Fabaceae | Herb | No | New | |
| <i>Trifolium hybridum</i> | Alsike clover | Fabaceae | Herb | No | L & S | |
| <i>Trifolium pratense</i> | Red clover | Fabaceae | Herb | No | L & S | |
| <i>Triodanis perfoliata</i> var. <i>perfoliata</i> | Clasping-leaved Venus' looking-glass | Campanulaceae | Herb | Yes | L & S | |
| <i>Triplasis purpurea</i> var. <i>purpurea</i> | Purple sandgrass | Poaceae | Gram | Yes | L & S | |
| <i>Typha angustifolia</i> | Narrow-leaved cattail | Typhaceae | Herb | Yes | L & S | |
| <i>Ulmus americana</i> | American elm | Ulmaceae | Tree | Yes | L & S | |
| <i>Vaccinium corymbosum</i> | Highbush blueberry | Ericaceae | Shrub | Yes | L & S | |
| <i>Vaccinium macrocarpon</i> | Large cranberry | Ericaceae | Herb | Yes | L & S | |
| <i>Vaccinium pallidum</i> | Early lowbush blueberry | Ericaceae | Shrub | Yes | L & S | |
| <i>Verbascum blattaria</i> | White moth mullein | Scrophulariaceae | Herb | No | L & S | |
| <i>Verbascum thapsus</i> | Mullein | Scrophulariaceae | Herb | No | New | |
| <i>Verbena bracteata</i> | Prostrate vervain | Verbenaceae | Herb | No | L & S | |
| <i>Verbena urticifolia</i> var. <i>urticifolia</i> | White vervain | Verbenaceae | Herb | Yes | L & S | |
| <i>Veronica arvensis</i> | Corn speedwell | Plantaginaceae | Herb | No | L & S | |
| <i>Veronica officinalis</i> | Common speedwell | Plantaginaceae | Herb | No | L & S | |
| <i>Veronica serpyllifolia</i> ssp. <i>serpyllifolia</i> | Thyme-leaved speedwell | Plantaginaceae | Herb | No | L & S | |
| <i>Viburnum dentatum</i> var. <i>lucidum</i> | Northern arrowwood | Adoxaceae | Shrub | Yes | L & S | |
| <i>Vicia cracca</i> | Cow vetch | Fabaceae | Herb | No | New | |
| <i>Vicia sativa</i> ssp. <i>nigra</i> | Narrow-leaved vetch | Fabaceae | Herb | No | L & S | |



Plum Island Biodiversity Inventory

| Scientific name | Common name | Family | Habit | Native ¹ | Source ² | S-rank and state listing ³ |
|--|----------------------------|-------------|-------|---------------------|---------------------|---------------------------------------|
| <i>Vinca minor</i> | Periwinkle | Apocynaceae | Herb | No | L & S | |
| <i>Viola lanceolata</i> ssp. <i>lanceolata</i> | Lance-leaved violet | Violaceae | Herb | Yes | L & S | |
| <i>Viola lanceolata</i> × <i>primulifolia</i> | Hybrid violet | Violaceae | Herb | Yes | New | |
| <i>Viola sororia</i> | Common violet | Violaceae | Herb | Yes | L & S | |
| <i>Vitis labrusca</i> | Northern fox grape | Vitaceae | Vine | Yes | L & S | |
| <i>Vulpia myuros</i> | Rat's-tail six-weeks grass | Poaceae | Gram | No | L & S | |
| <i>Vulpia octoflora</i> var. <i>tenella</i> | Slender 8-flowered fescue | Poaceae | Gram | Yes | L & S | |
| <i>Wolffia brasiliensis</i> | Brazilian watermeal | Araceae | Herb | Yes | L & S | |
| <i>Xanthium strumarium</i> var. <i>canadense</i> | Canada cockle-bur | Asteraceae | Herb | Yes | L & S | |
| <i>Yucca filamentosa</i> | Yucca | Agavaceae | Herb | No | L & S | |
| <i>Zostera marina</i> | Sea-wrack | Zosteraceae | Herb | Yes | L & S | |

¹ Inv = Invasive

² L & S = Lamont and Stalter (2013)

³ For S-rank definitions, see Appendix A. E = Endangered; T = Threatened, R = Rare

