

ECOSYSTEM SERVICES ASSESSMENT

CAPE COD SEA CAMPS LONG POND PARCEL

In

Brewster, Massachusetts



Prepared by Massachusetts Audubon
for Town of Brewster
December 2021

SUMMARY AND PURPOSE

Mass Audubon with support from the Brewster Conservation Trust has prepared this ecosystem services assessment for the 66-acre Long Pond parcel of the former Cape Cod Sea Camps holding in Brewster Massachusetts. This is a standard inventory that Mass Audubon undertakes. It is intended to serve as an objective accounting of the various benefits that the natural features of this property might provide, or continue to provide, to the community. The assessment includes discussions on drinking water supply, sensitive habitat, and basic facts on the ecology of the land.

To be clear, the report is merely intended to serve as an educational resource for the master planning committee. It is not intended to serve as a document in opposition to any other use of the property. The report is intended to help the committee make decisions on how to best accommodate multiple uses of the land, such as affordable housing or public recreational use, in a way that minimizes the impact on its natural qualities.

This property contains significant ecological value and is the adjacent 42.25-acre Long Pond Woodlands already protected by the Town of Brewster. The combined acreage will be more than 122 acres (plus 19.4 acres of adjacent land with conservation restriction protection and the nearby 5-acre Brewster Conservation Trust land) with mixed forest and Coastal Plain Pond shore habitats. The land contains land important for Brewster's public drinking water supply.

Sea Camps Long Pond



FIGURE 1 – CAPE COD SEA CAMPS: LONG POND - SOURCE MASSGIS

LAND ACKNOWLEDGEMENT

Land that is well managed sustains us in many ways. A few examples of what land provides when it is managed sustainably include:

- The air we breathe
- The water we drink
- The food we eat
- Sequestration of carbon
- Climate moderation
- Protection from flooding
- Recreation that renews our spirits

- Habitats for a diversity of plants and animals

The land at Long Pond is part of the ancestral territory of the Sauguatuckett and Nauset Nations. It helped sustain them for thousands of years before its occupation by Europeans. How we care for the land will determine how well it will sustain us and our descendants.

ECOLOGICAL SIGNIFICANCE SUMMARY

A primary focus of this report is to document the ecological values of this 66-acre parcel of land on Long Pond. The land abuts the 715-acre Long Pond which is the largest freshwater pond on Cape Cod. The parcel has roughly 1,020 feet of shoreline along Long Pond, a rare and significant habitat. The shoreline of this parcel is designated as Critical Natural Landscape and Core Habitat in BioMap2. This is part of a 2,403-acre Core Habitat featuring Wetland Core, Aquatic Core, and Species of Conservation Concern.¹ While the shoreline on Long Pond is its most significant natural community, the parcel also features upland deciduous and pitch pine oak forest, and freshwater wetlands. It is also adjacent to Brewster's Long Pond Woodlands (an area of about 42 acres protected in 2018) and is an expansion of that town-owned protected area resulting in a block of 120 acres of protected land.

In addition to its ecological features, the eastern half of the land is within a Zone II wellhead protection area for the Town of Brewster's drinking water supply.

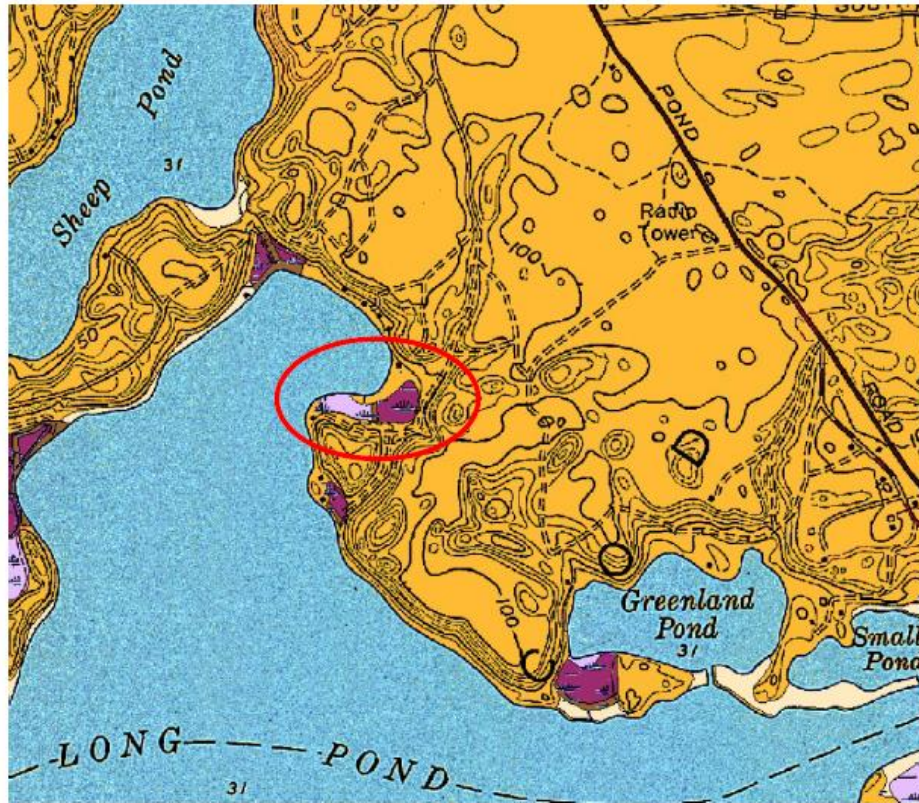
Protecting the Long Pond parcel in its natural state will help keep additional phosphorous, generally associated with development (i.e., septic systems and lawn fertilizers), from entering Long Pond and help prevent algal blooms and oxygen depletion. Keeping the area natural also helps protect Brewster's drinking water supply; the forest and its vegetated floor allow filtered precipitation to replenish the aquifer. Its forest also plays a role in absorbing carbon and combating climate change as the trees take in carbon dioxide and produce oxygen. The more than 60 acres of forest included in the Long Pond parcel will add to the 41-acre Long Pond Woodlands and other adjacent land with conservation restrictions and will result in well over 120 acres of protected forest. See Figure 1. Forest habitats with larger width and breadth to them are more valuable for feeding, sheltering and nesting wildlife than smaller, fragmented tracts of similar acreage.

HISTORY

Native Americans lived in the area now known as Brewster for thousands of years. They had villages along the shore, rivers, and ponds where they fished and hunted game in the rich floodplains and uplands, and they cleared extensive areas for agriculture. They practiced land management, sometimes including using fire to promote more open forests with an herbaceous understory that provided good habitat for game like deer and rabbits. Their land stewardship helped to sustain them.

¹ See description in Appendix A

It is unknown what the site was used for specifically following European settlement. Much of the Cape's interior forests were cut over for lumber, firewood, and fencing by the mid-1800s and the resulting clearings used for sheep pasture. Historic aerial photographs suggest that the site has been re-forested



OPEN-FILE REPORT 2006-1260-E
(SHEET 5 of 19)
HARWICH QUADRANGLE

Stone, B.D., and DiGiacomo-Cohen, M.L., compilers, 2009, Surficial geologic map of the Pocasset-Provincetown-Curryturk-Nantucket 24-quadrangle area of Cape Cod and Islands, southeast Massachusetts, U.S. Geological Survey Open-File Report 2006-1260-E. Available online at <http://pubs.usgs.gov/of/2006/1260E/>.

Explanatory pamphlet accompanies map

On this 1962 map, active, working cranberry bogs are shown in dark purple, while other wetlands are shown in light purple. The Sea Camps parcel included both at the pond edge. The bog is now a maple swamp and the wetland is a part tupelo grove, part mowed field.

FIGURE 2 - SURFICIAL GEOLOGY SHOWING HISTORIC CRANBERRY BOGS IN RED CIRCLE

since at least 1938. A small cranberry bog operated here, using Long Pond as a source of irrigation, presumably from the late 1800s to the 1960s (see Figure 2).

The property was purchased by Camp Wono, Inc., a part of Cape Cod Sea Camps in 1967 and had been used for camp activities until the camp closed in 2020.

PROPERTY DESCRIPTION

The property consists of a single parcel of land totaling about 66 acres (See Figure 1). Its address is 500 W. H. Besse Cartway.

ACCESS

Access to the property is primarily from Long Pond Road (Route 137) or through the town-owned Long Pond Woodlands via W.H. Besse Cartway, an unimproved dirt road. A graded but unsurfaced, road bisects the site and provides access to the camp facilities at the pond and some neighboring homes. Near the camp facilities there is also a driveway and drop-off area used by the camp operation for buses to drop off campers when it was being used by Cape Cod Sea Camps.



FIGURE 3 - ACCESS ROAD

REGIONAL SETTING AND LOCATION

The Long Pond site is in South Brewster near the intersection of Long Pond Road (Route 137) and Freemans Way. The site abuts the town-owned Long Pond Woodlands and is near other protected land owned by the Brewster Conservation Trust and lands with Conservation Restrictions (see Fig. 1). Brewster's main wellfield and Nickerson State Park (indicated in Figure 4) are both less than 4,500 feet away.



FIGURE 4 – SITE LOCATION - BREWSTER AND SURROUNDING TOWNS

This locale is sometimes referred to as part of Brewster's "Ring of Bright Waters," encircling the town from Quivett Creek in the northwest, up through the Stony Brook Valley to the chain of mill ponds, around through Seymours Pond to Long Pond and up through the ponds of Nickerson State Park to Namskaket Creek in the northeast corner. In his classic book *Cape Cod*, Thoreau referred to these as the "noble ponds of Brewster."

ECOLOGICAL FEATURES

The site includes a variety of significant ecological features, including physical features such as geology, topography, and soils, as well as natural habitats and wildlife. These are described in more detail below.

SURFICIAL GEOLOGY

Most of the surficial materials (geologic materials at or near Earth's surface) in Southeastern Massachusetts are deposits of the last two continental ice sheets that covered all New England in the latter part of the Pleistocene ice age. The glacial deposits are divided into two broad categories, glacial till and moraine deposits, and glacial stratified deposits. The surface features of the area around the Long Pond parcel are comprised primarily of sand and gravel with some floodplain alluvium deposits near the pond shore. Coarse sands and gravel transmit nutrients, such as nitrogen and phosphorus often associated with residential development, as well as viruses, rapidly into the water table without filtration.

SOILS AND TOPOGRAPHY

Soils on the site are generally typical of the Cape's interior and consist primarily of Carver coarse sands deposited by the glaciers. A small area (2.7 acres) of Freetown coarse sand is located near the pond and is now mostly covered in wetlands and a small area of mowed grass. There is some topographic variation on the site: the highest point near Long Pond Road to be about 100 feet above sea level and the lowest point at the pond shore to be about 39 feet. There are several small depressions and hills in the area in between these extremes, especially closer to the pond.

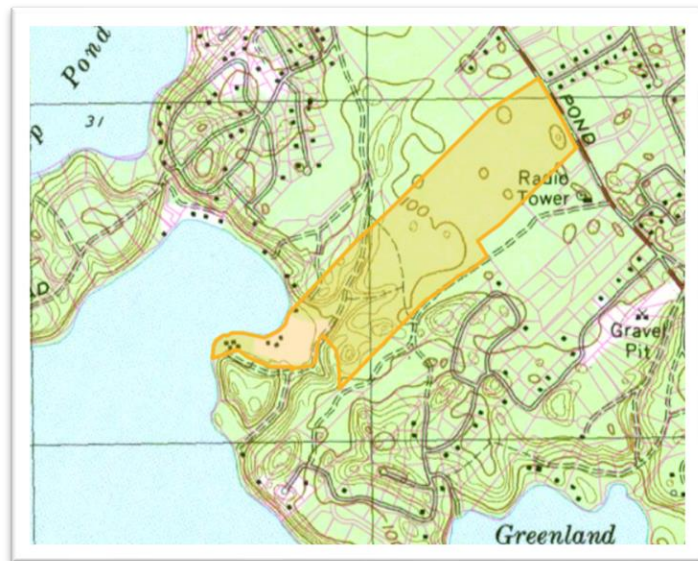


FIGURE 5 - USGS MAP WITH PROPERTY HIGHLIGHTED

REGIONAL SETTING

Cape Cod is located within the Atlantic Coastal Pine Barrens Eco-region of the northeastern United States. The sandy coastal environment supports many different habitat types, or natural communities, which thrive on the nutrient-poor, acidic, and droughty soils. The pitch pine-tree oak forest found here supports plant and animal species not found elsewhere in Massachusetts. The Atlantic coastal pine barrens stretch from Kingston and Carver throughout Cape Cod and to Martha's Vineyard and Nantucket. Three advances and retreats of the Wisconsin Ice Sheet formed the eco-region. The resulting terminal moraines, outwash plains, and coastal deposits characterize the area with their sandy beaches, grassy dunes, bays, marshes, and scrubby oak-pine forests. There are numerous kettle hole ponds, swamps, and bogs. Much of the surface water is highly acidic.

COASTAL PLAIN POND ECOSYSTEMS²

The property has 1,020± feet of shoreline along Long Pond, a large kettle hole pond. In fact, the 715-acre Great Pond is the largest freshwater pond on Cape Cod.

A portion of the Long Pond site has a history of use as a beach for the Cape Cod Sea Camps and about 300 feet of the shoreline has been disturbed with a cleared sandy beach and outbuildings (see Figure 7). Still the majority of the pond shore (the remaining 790 feet) are in a natural, largely undisturbed state and provides habitat for some of the typical coastal plain pond species.



FIGURE 6 - LONG POND

Long Pond is classified as a Coastal Plain Pond and its natural shoreline is a significant ecological feature. Coastal plain ponds are ecologically unique and a globally rare habitat that consist of certain kettle hole ponds and their pond shores that occur because of fluctuating water levels. The kettle hole ponds are bodies of freshwater found in lowland coastal areas of sand and gravels which were deposited as outwash when glaciers melted. These ponds are connected to groundwater, which is recharged only by the rain and snow that falls and soaks into the ground. Unlike other parts of the country where streams and rivers fill the ponds and lakes, it is precipitation that replenishes these waterbodies. When we experience less than normal precipitation, the groundwater lowers and so does the level of water in the ponds. It is this natural fluctuation of water levels that has created a special habitat niche for a remarkable and rare plant community associated with coastal plain ponds. Their naturally low nutrient levels, high acidity, and fluctuating water levels are important for these rare native shoreline vegetation communities that are adapted to these unique conditions and are a priority for conservation.

The annual high-water level, usually observed in the spring and year 'round in some wetter years, inundates the shore. This limits the common woody shrubs found around a pond to this elevation as they do not like to be in standing water on a regular basis. Typical shrubs include high bush blueberry, leatherleaf, and willow. Usually by late summer the water level in the pond drops and more of the shoreline is exposed and this is where the specialized plant community develops.

Some of these plants produce seeds and others will remain rooted, only to become submerged beneath the pond's water with the winter and spring precipitation. But they will patiently wait, dormant for a

² Natural communities' information from the Massachusetts Division of Fisheries and Wildlife Natural Heritage and Endangered Species Program (NHESP). <https://www.mass.gov/service-details/terrestrial-palustrine-and-estuarine-community-types> and from the State Wildlife Action Plan (SWAP) <https://www.mass.gov/service-details/state-wildlife-action-plan-swap#:~:text=State%20Wildlife%20Action%20Plan%20%28SWAP%29%20The%20Massachusetts%20State,to%20conserve%20them.%20Massachusetts%20State%20Wildlife%20Action%20Plan>

year or maybe several years before the next low water opportunity exposes the shoreline. Only then can the seeds germinate, and the plants grow and flower.

The plants that are characteristic of this specialized habitat include both commonly found species and globally restricted species, meaning they are found in very few locations worldwide. Coastal plain pond shores are known to have an abundance of state-protected and globally restricted rare plants. An example of this is the Plymouth gentian, which occurs in significant populations, but only in these limited coastal plain pond shorelines that have not been altered.

The coastal plain pond plant community is a gradation of plant species starting with a pitch pine-oak forest in the upland, followed by a shrub border dominated by highbush blueberry, sweet pepperbush, and green briar. The next area around the shore, when exposed with lower water levels, is dominated by the coastal plain flat-topped goldenrod, pond shore rush, pink tickseed, golden pert, and, hopefully, the Plymouth Gentian. Next, at a slightly lower elevation around the pond in the semi-permanently flooded zone, there will be pipewort. Easy to miss, the flower is a tiny white ball held above the water on a slender stem. In deeper water, yellow waterlily and the white waterlily may occur. Not every pond has every zone and zones vary in width and species composition from year to year.

These zones are evident along undisturbed sections of the Long Pond shore.



FIGURE 7 - BEACH AT FORMER CAPE COD SEA CAMPS SITE

The coastal plain pond shore is also important habitat for numerous animal species, some of which are protected by the state as species of special concern, threatened, or rare. The associated fauna includes over 45 species of dragonflies and damselflies and the painted, musk, spotted, and snapping turtles. Coastal plain ponds support warm-water fish and freshwater mussels. Migrating and wintering waterfowl use larger ponds like Long Pond. Bald eagles were documented at the pond in 2021.

Development pressure and human use may threaten the coastal pond habitat. Heavy human use, such as foot traffic, off road vehicles and creation or enhancement of beaches, severely impacts plant growth and can result in total decimation of this fragile irreplaceable ecosystem. It has been documented that even a few walking trips can create a dead zone where it can take decades for these distinctive plants to grow again.

POND WATER QUALITY

Protecting the site will help prevent degradation of the pond's water quality. Good water quality is important to preserve coastal plain pond habitat. Excess nutrients from fertilizer use, stormwater runoff, septic systems, and even large flocks of overwintering Canada geese (not a natural occurrence – they naturally migrate in winter to the Chesapeake area) serve to put a pond's chemistry off balance and cause accelerated eutrophication. The surplus of nutrients results in excessive growth of algae and encourages other pond vegetation to grow, which can crowd out the special coastal plain pond plants. And because the wells for drinking water are drawing from the same water table that creates these ponds, excessive drawdown for water consumption can influence the water levels. An unnatural fluctuation of water levels in the pond may result in upland habitat encroaching further into the shore, reducing the area of this specialized habitat. Invasive species, such as phragmites, can quickly take over and crowd out native plants. No invasive plant species were found at the pond shore in a 2021 visit.



FIGURE 8 - PANORAMIC VIEW OF LONG POND AT BEACH

Long Pond's average depth is 30 feet, and the maximum depth is 70 feet. Transparency is good, extending to 14 feet, and aquatic vegetation is scarce. The bottom is composed of sand and rubble. The pond's 6.4 miles of shoreline is moderately developed with houses, seasonal cottages, and beaches. Three small ponds are connected to the main pond by small channels: Black, Smalls and Greenland Ponds. The entire system drains into the Herring River. During the summer, dissolved oxygen levels drop below 2 ppm at depths great than 34 feet. Long Pond is classified as "impaired," meaning that it has levels of phosphorous that may provide nutrients for algal blooms. Algae-covered water is less attractive for swimming and other aquatic recreation — highly valued pastimes — and degrades the conditions that fish, bugs, insects like damselflies, other wildlife, and desired plants need to thrive. In addition, phosphorus can fuel toxic blue-green algal blooms, which are harmful to people and pets. In recent summers there have not been notable algal blooms at Long Pond.

Protecting the Long Pond parcel in its natural state will help keep additional phosphorous, generally associated with development (i.e., septic systems, storm run-off, and lawn fertilizers), from entering the water and help prevent algal blooms. If the beach is to be used for public swimming and boating this protection of the natural land may help maintain good and safe water quality.

PITCH PINE – OAK FOREST/WOODLANDS³

The upland forest (about 60 acres) is dominated by typical pitch pine and white and black oaks.⁴ Found only in scattered locations from New Jersey to Maine, pine-oak forests are characterized by sandy soils that are poor in nutrients and prone to drought. They have a long history of relatively frequent fire and harbor highly specialized plant and animal species, many of which are adapted to fire for their survival. No known forest fires have occurred on this parcel.

The Long Pond parcel has a dense understory and more American beech and American holly trees than is common in many other parts of the Cape. This area of forest is becoming a mixed forest with a dense, closed canopy with structural diversity in the form of well-developed understory, shrub, and small tree layers including pitch pine, beech, holly, white pine, maples, and a variety of oaks. Few invasive plant species were noted during the site visit. The exception was some Asiatic bittersweet seen near the entrance at Rt. 137. There are no significant patches of blow-downs or dead or blighted trees. All these factors indicate that the forest is in good condition and serving its ecological function for habitat and water filtration.

As this site visit was in winter, a visit during the growing season would be needed to more thoroughly document organisms present. Pine-oak woodlands typically provide habitat for many common and listed moths dependent on the oaks, pine, and heath shrubs. Box turtles use these forests as well as others in the southeastern part of the state. The bird fauna is like that of oak woodlands; Eastern Towhee and Pine Warbler are common. Most common species of mammals of Massachusetts have populations that make Pitch Pine – Oak Forests part of their habitat but none are particularly characteristic. Other similar large forests in West Brewster have been identified by Mass. Dept. of Fish and Game as focus areas for the rare New England cottontail.

According to the State Wildlife Action Plan, threats to this ecosystem include residential and commercial development, agriculture, energy production, mining of sand and gravel, transportation and utility corridors, some kinds of timber harvesting, human disturbance, water withdrawal, invasive plant and animal species, pollution, and climate change. Many acres have been lost resulting in fragmentation. The relevant threats that apply to this parcel are residential development and human disturbance (e.g., recreation development).

The more than 60 acres of forest included in the Long Pond parcel would add to the 41-acre Long Pond Woodlands and other adjacent land with conservation restrictions. If the entire area were protected it would result in over 120 acres of protected and mostly contiguous forest.

WETLANDS

There are two small wetlands on the site near the camp facilities. A 1.2-acre wooded swamp between the two sections of the camp facilities and a 2-acre shrub swamp to the east of the camp facilities. The

³ Natural communities' information from the Massachusetts Division of Fisheries and Wildlife Natural Heritage and Endangered Species Program (NHESP). <https://www.mass.gov/service-details/terrestrial-palustrine-and-estuarine-community-types> and from the State Wildlife Action Plan (SWAP) <https://www.mass.gov/service-details/state-wildlife-action-plan-swap#:~:text=State%20Wildlife%20Action%20Plan%20%28SWAP%29%20The%20Massachusetts%20State,to%20conserve%20them.%20Massachusetts%20State%20Wildlife%20Action%20Plan>

⁴ See <https://www.mass.gov/doc/pitch-pine-oak-forestwoodland/download> and <https://www.mass.gov/doc/nature-conservancy-pine-barrens-of-se-mass-brochure/download>

east swamp has some ditching from a time when it was used for cranberry cultivation into the early 1960s. These two wetlands include red maples and black gum (tupelo) trees. The communities have a dense shrub layer with highbush blueberry, sweet pepperbush, and cat brier. There is some evidence that the parking area associated with the camp beach was filled wetland or at least hydric soil; it dries out only in high summer and soft rush is growing in it. While small, the wetlands contribute variety to the site provide different habitat for wildlife. The dense shrub layers provide cover and nesting locations for many species of birds and small mammals as well as a source of winter food. Reptiles and amphibians tend to use these wet areas for breeding and feeding.



FIGURE 9 - SHRUB SWAMP IN BLUE AND WOODED SWAMP IN GREEN

PRIORITY HABITAT AND BIOMAP2

Much of Long Pond is designated as Priority Habitat of Rare Species by the Massachusetts Natural Heritage and Endangered Species Program (NHESP). Priority Habitats represent the geographic extent of known state-listed rare species. Included in the designation are two non-listed species, five species of Special Concern; three Threatened species; and one Endangered species⁵. Interestingly, the subject parcel is on the only cove that is not part of the designated Priority Habitat. This cove is no more disturbed than other parts of the pond and less so than most (Figure 10).

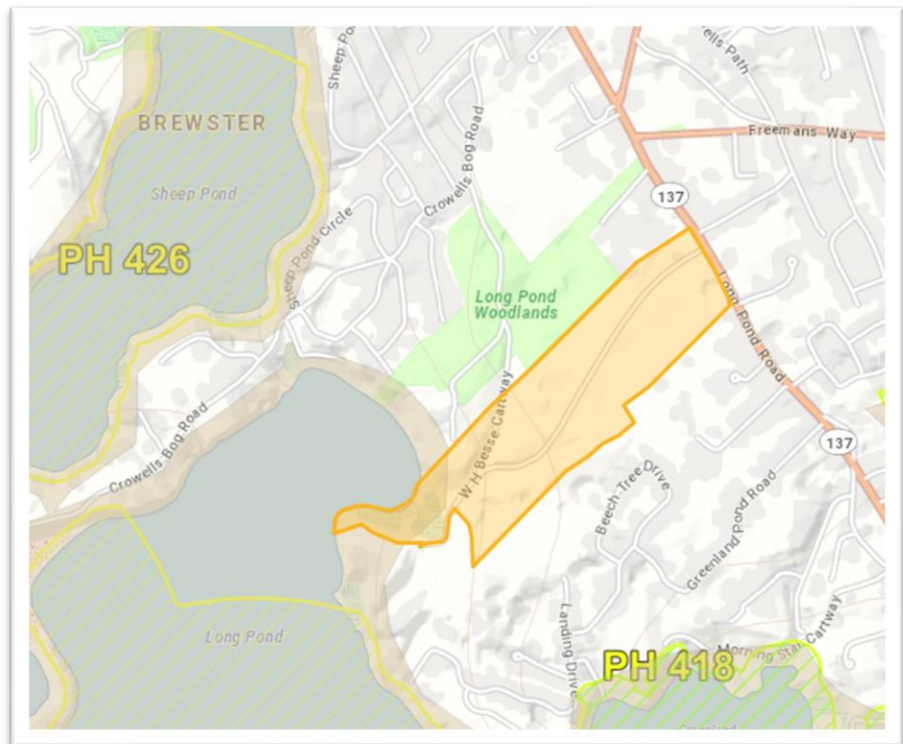


FIGURE 10 - PRIORITY HABITAT (YELLOW HATCH), BIOMAP2 NATURAL LANDSCAPE (TAN)

⁵ See Appendix A for a full listing of species.

The BioMap2 project has been designed by the Natural Heritage and Endangered Species Program and The Nature Conservancy to strategically guide conservation of biodiversity in Massachusetts over the next decade by focusing land protection and stewardship on the areas that are most critical for ensuring the long-term persistence of rare and other native species and their habitats, exemplary natural communities, and a diversity of ecosystems.

The entire pond, its shoreline, and a 250-foot buffer are also within BioMap2 Critical Natural Landscape. Critical Natural Landscape identifies and prioritizes intact landscapes in Massachusetts that are better able to support ecological processes and disturbance regimes, and a wide array of species and habitats over long time frames. Protecting land in BioMap2 Critical Landscape, including this property, is a State priority for conservation and informed stewardship.⁶

WATERSHED PROTECTION

Protection of the forest at this site will help maintain the quality of town’s drinking water supply. A large portion of the Long Pond site near Long Pond Road is in a Zone II Drinking Water Protection Area. A Zone II is a wellhead protection area that has been determined by hydro-geologic modeling and approved by the Department of Environmental Protection’s Drinking Water Program. Certain land uses that could adversely affect the public water supply may be either prohibited or restricted in this area.

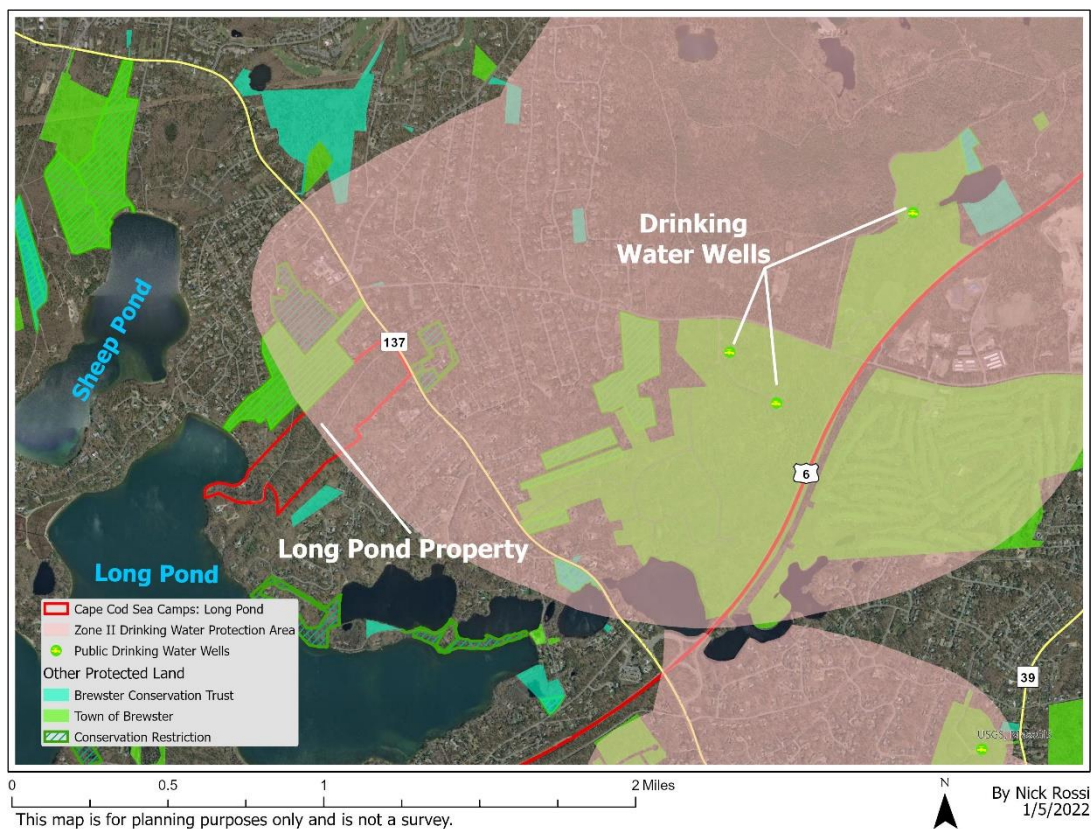


FIGURE 11 DRINKING WATER FEATURES

⁶ See Appendix A for description of BioMap2 Core 444.

Within this area, there are three drinking water wells that supply east Brewster's drinking water supply (Figure 11).

RECREATION

The parcel offers an excellent opportunity to build new walking trails and integrate them with existing protected Town land to the north (Figure 1). New trails would provide additional opportunities for Brewster residents to recreate and exercise on public open space. The existing beach on the land would provide access to the largest freshwater pond on Cape Cod.

WILDLIFE

While no specific wildlife surveys are available, the parcel has two habitats identified in the Massachusetts State Wildlife Action Plan (SWAP) as essential components for 40 important species' life histories in Coastal Plain Ponds and 47 species in Pitch Pine-Oak Upland Forest⁷. It is also close to areas that have wildlife information including the Cornell Long Pond eBird hotspot, the Brewster Ponds and Woods Important Bird Area (IBA), MassWildlife fish surveys of Long Pond, and more general information on the wildlife found in these habitats.

BIRDS

Long Pond is identified as a Cornell University eBird hotspot, and the parcel provides important supporting habitat. Hotspots are shared locations where birders report their bird sightings to eBird. Hotspots provide information about birding locations where birds are seen. Ninety-five species have been observed at Long Pond.

Twenty-eight species have been observed during the breeding season, meaning that several of them are likely to nest nearby. See the Appendix for details.

Long Pond hosts a great diversity and abundance of ducks in winter, one of the best ponds on Cape Cod in this respect, presumably owing to its size and rare freeze-ups. Many of these species, like scaup, depend on the mussels, others on the herring. The combination of fish and waterfowl make it one of the easiest places on Cape Cod to see Bald Eagles.

The nearby Brewster Ponds and Woodlands IBA is a much larger and more diverse area that includes some of the same habitat types (45% pitch pine/scrub oak forest, 38% lake/pond, 10% oak-conifer

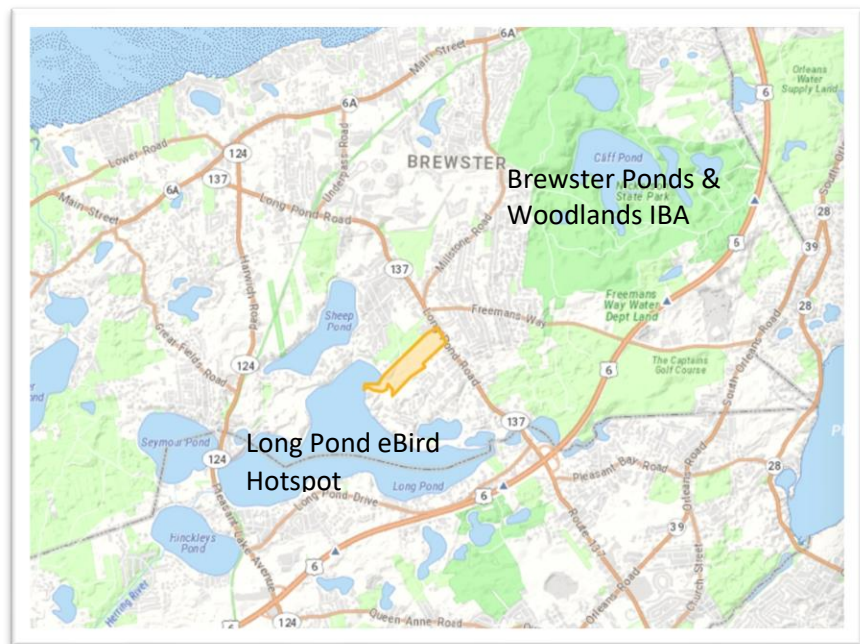


FIGURE 12 - LONG POND PARCEL (IN YELLOW) AND SURROUNDING AREA

⁷ See Appendix C and D for listings of species in each habitat.

transitional forest, 5% shrub-scrub wetland, 2% early successional shrubland). Point count surveys in the area indicate significant breeding populations of five, regional, high conservation priority species, and the presence of the Northern Parula, a state threatened species. Waterfowl surveys indicate that the ponds within the area host large numbers of migrant/wintering waterfowl. The site is the location for several long-term monitoring projects. Other important species include Common Merganser, American Black Duck, Baltimore Oriole, Eastern Towhee, Scarlet Tanager, Great-crested Flycatcher, and Eastern Wood Pewee.

Some of these species such as the Scarlet Tanager are forest interior birds and require large tracts of forest for habitat. Many of these interior forest species are threatened or in decline. Maintaining large block of forest such as this property and the abutting conservation land help retain this important habitat.

Given the proximity of the IBA, it is possible that Northern Parula is a breeder in the Long Pond parcel forest. Singing males have been reported in nearby forests. Other species in this IBA may also occur at Long Pond, and a site visit in spring or summer would be needed to determine this in more detail.

MAMMALS

The site may provide habitat for mammals typical of a pine-oak forest. Large mammals may include white-tailed deer, coyotes, and reclusive river otters. White-tailed deer are plant-eaters which have proliferated in the Pine Barrens (as elsewhere in the country) due to development pressure and the fragmentation of forests, which creates more edible plants at forest edges than does a continuous, mature forest. This site may provide habitat for red fox, mink, fisher, long-tailed weasel, southern bog lemming, several species of bats, as well as raccoon, muskrat, squirrels, chipmunks, voles, and mice.

FISH

The following fish species were found during MassWildlife surveys in Long Pond: Alewife (sea-run, a species of herring), Smallmouth Bass, Largemouth Bass, Yellow Perch, White Perch, Pumpkinseed, Tessellated Darter, Banded Killifish, Brown Bullhead, White Sucker, and American eel. Large schools of herring were observed along the beach during the 2021 site visit for this report.

AMPHIBIANS

Amphibians are dependent on high-quality aquatic habitat for breeding, and some are closely associated with uplands. Some of the more visible and well-known frog species of the Pine-Oak Forest habitat are the Green Frog and the Southern Leopard Frog. Other amphibians that may potentially occur are Eastern Spadefoot Toad, Northern Spring Peeper, Red-backed Salamander, and Spotted Salamander. No vernal pools are documented or suspected on this site.

REPTILES

The habitat diversity of this parcel suggest potential for a rich community of reptile species such as turtles and snakes. The most common snake may be the Northern Water Snake. Surely the most bizarre snake of the area is the Eastern Hognose, also known as the Puff Adder, since it often spreads its neck, cobra-like, when alarmed. Other potential snakes of this habitat type are Eastern Ribbon Snake, and Northern Black Racer. The Common Snapping Turtle, Eastern Box Turtle, and Eastern Painted Turtle are all likely to occur.

CONCLUSION

At 66 acres in size, perhaps the largest undeveloped parcel on the Lower Cape, the Long Pond parcel contains valuable natural attributes and provides important services for the community. These fall into three main categories Coastal Plain Pond shore, a large tract of pine-oak forest, and water quality. The Coastal Plain Pond shoreline is a globally rare ecosystem and represents the most important location for rare or endangered organisms. The parcel's location abutting and near other large pine-oak forest parcels in conservation status indicates its strategic importance for multiple open space and wildlife habitat values. Fragmenting this large pine-oak woodland, for example, would reduce its value for feeding, sheltering and breeding wildlife. The natural land helps maintain good water quality both for Long Pond and for the three public drinking water wells to the east. Mostly seasonal use for passive recreation, including foot trails and recreational programs, can be accommodated without undue disruption of the habitat with thoughtful planning and oversight. The Town of Brewster owns a beautifully intact piece of natural land with numerous natural values, and careful consideration should be made to preserve these key values in the Town's planning process.

APPENDIX A - BIOMAP 2 INFORMATION⁸

The BioMap2 project has been designed by the Natural Heritage and Endangered Species Program and The Nature Conservancy to strategically guide conservation of biodiversity in Massachusetts over the next decade by focusing land protection and stewardship on the areas that are most critical for ensuring the long-term persistence of rare and other native species and their habitats, exemplary natural communities, and a diversity of ecosystems.

SPECIES OF CONSERVATION CONCERN, PRIORITY AND EXEMPLARY NATURAL COMMUNITIES, AND OTHER ELEMENTS OF BIODIVERSITY IN BREWSTER

Insects

Moths

Water-willow Stem Borer, (*Papaipema sulphurata*), T

Damselflies

Scarlet Bluet, (*Enallagma pictum*), T

Pine Barrens Bluet, (*Enallagma recurvatum*), T

New England Bluet, (*Enallagma laterale*), Non-listed SWAP species

Little Bluet, (*Enallagma minusculum*), Non-listed SWAP

Dragonflies

Comet Darner, (*Anax longipes*), SC

Reptiles

Diamond-backed Terrapin, (*Malaclemys terrapin*), T

Eastern Box Turtle, (*Terrapene carolina*), SC

Eastern Ribbon Snake, (*Thamnophis sauritus*), Non-listed SWAP

Birds

Piping Plover, (*Charadrius melodus*), T

Northern Parula, (*Parula americana*), T

Plants

Bushy Rockrose, (*Crocanthemum dumosum*), SC

Common's Panic-grass, (*Dichanthelium ovale* ssp. *pseudopubescens*), SC

Acadian Quillwort, (*Isoetes acadensis*), E

Redroot, (*Lachnanthes carolina*), SC

Dwarf Bulrush, (*Lipocarpa micrantha*), T

Oysterleaf, (*Mertensia maritima*), E

Adder's-tongue Fern, (*Ophioglossum pusillum*), T

Pondshore Knotweed, (*Persicaria puritanorum*), SC

Maryland Meadow Beauty, (*Rhexia mariana*), E

Seabeach Dock, (*Rumex pallidus*), T

Plymouth Gentian, (*Sabatia kennedyana*), SC

Terete Arrowhead, (*Sagittaria teres*), SC

Mitchell's Sedge, (*Carex mitchelliana*), T

Resupinate Bladderwort, (*Utricularia resupinata*), T

Salt Reedgrass, (*Spartina cynosuroides*), T

Priority Natural Communities

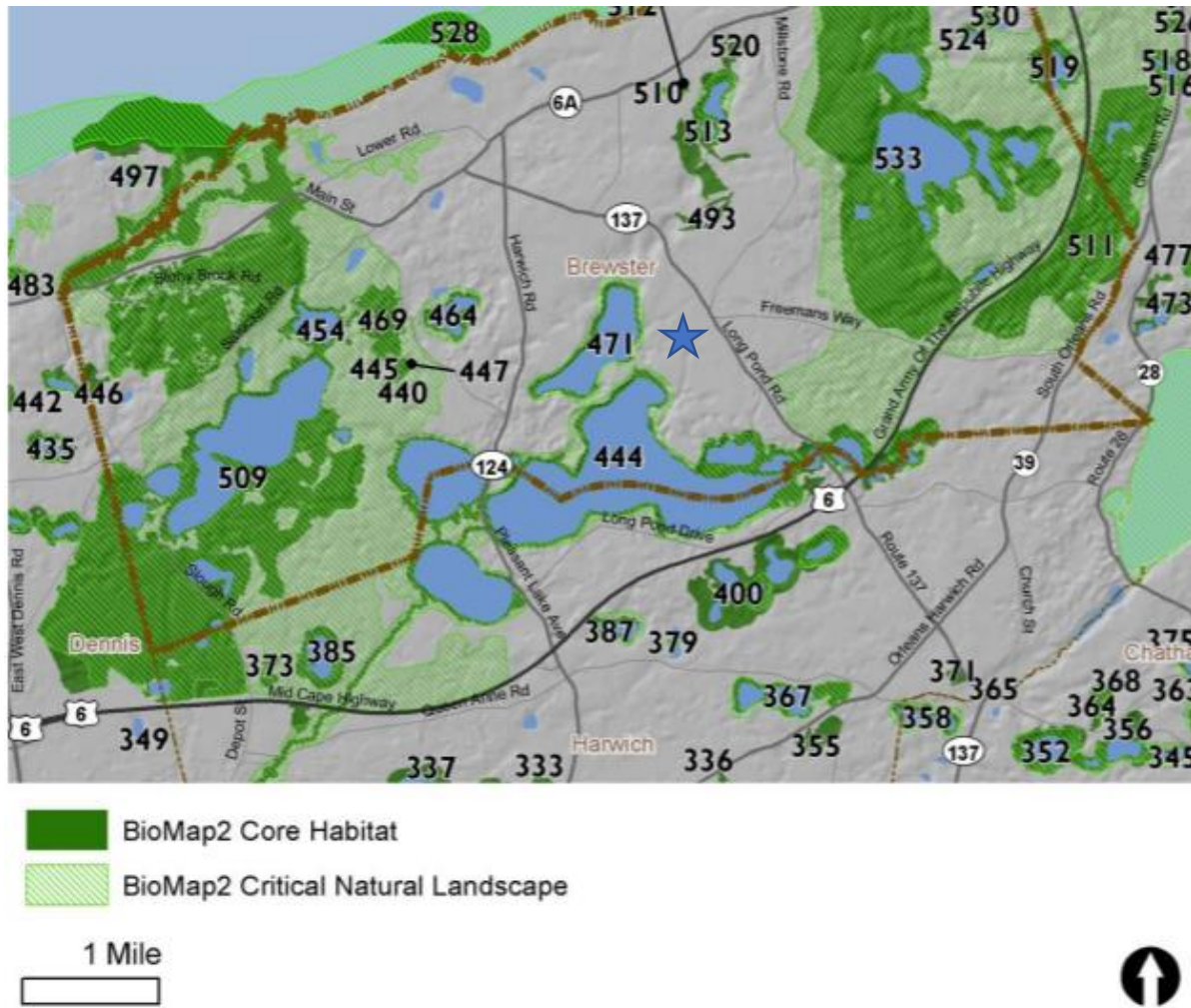
Coastal Plain Pondshore, S2

Marine Intertidal: Flats, S2

E = Endangered
T = Threatened
SC = Special Concern
S1 = Critically Imperiled communities, typically 5 or fewer documented sites or very few remaining acres in the state.
S2 = Imperiled communities, typically 6-20 sites or few remaining acres in the state.
S3 = Vulnerable communities, typically have 21-100 sites or limited acreage across the state.

⁸ http://maps.massgis.state.ma.us/dfg/biomap/pdf/town_core/Brewster.pdf

DESCRIPTION OF BIOMAP2 COREHABITAT AND CRITICAL NATRUAL LANDSCAPE AT LONG POND



Blue star indicates approximate location of Long Pond parcel.

Species of Conservation Concern

Commons's Panic-grass (*Dichanthelium ovale* ssp. *Pseudopubescens*) SC
Plymouth Gentian (*Sabatia kennedyana*) SC
Pondshore Knotweed (*Persicaria puritanorum*) SC
Redroot (*Lachnanthes caroliana*) SC
Terete Arrowhead (*Sagittaria teres*) SC
Water-willow Stem Borer (*Papaipema sulphurata*) T
Little Bluet (*Enallagma minusculum*) Non-listed SWAP
New England Bluet (*Enallagma laterale*) Non-listed SWAP
Pine Barrens Bluet (*Enallagma recurvatum*) T
Scarlet Bluet (*Enallagma pictum*) T
Least Bittern (*Ixobrychus exilis*) E

Property is adjacent to a 2,403-acre Core Habitat featuring Wetland Core, Aquatic Core, and Species of Conservation Concern.

Wetland Cores are the least disturbed wetlands in the state within undeveloped landscapes—those with intact buffers and little fragmentation or other stressors associated with development. These wetlands are most likely to support critical wetland functions (i.e., natural hydrologic conditions, diverse plant and animal habitats, etc.) and are most likely to maintain these functions into the future.

The Wetland Core is among the largest 20% of Wetland Cores statewide and in this ecoregion.

Aquatic Cores are intact river corridors within which important physical and ecological processes of the river or stream occur. They delineate integrated and functional ecosystems for fish species and other aquatic Species of Conservation Concern.

Commons's Panic-grass grows in dry, sandy fields and barrens on the coastal plain. It is also found in dry pitch pine-oak woods, colonizing openings and disturbed soil where there is little or no leaf litter.

Plymouth Gentian is a globally rare, showy perennial herb of the gentian family, with striking pink and yellow flowers and opposite lance-shaped leaves. It inhabits the sandy and peaty shorelines of coastal plain ponds.

Pondshore Knotweed is a globally rare, trailing, annual wildflower of the Buckwheat family, found on the upper shores of coastal plain ponds in the Northeast. In Massachusetts, Pondshore Knotweed inhabits the sandy, peaty, or cobble upper shores of acidic, low-nutrient, coastal plain ponds. It requires pronounced water level fluctuation, acidic, nutrient-poor water, and substrate, and an open, exposed shoreline, free from major soil disturbance.

Redroot, a slender, erect perennial in the bloodroot family, inhabits the exposed sandy to peaty shores of Coastal Plain ponds. It is usually found in linear bands along the middle to upper margins of the shore or in coves.

Terete Arrowhead is a perennial emergent aquatic plant of the water-plantain family, which grows in shallow water along the muddy, sandy, or peaty margins of coastal plain ponds.

The Water-willow Stem Borer is a yellowish moth with purple-brown shading that inhabits shallow portions of coastal plain wetlands where water-willow grows. It is endemic to southeastern Massachusetts.

The Little Bluets, a very small damselfly, inhabits ponds with sparse emergent or aquatic vegetation and a sandy substrate.

New England Bluets are damselflies whose habitat includes coastal plain ponds, open water in swamps, and other ponds and lakes. It occurs only in the northeastern United States and is most common from eastern Massachusetts into Connecticut.

Pine Barrens Bluets, small damselflies, are restricted to coastal plain ponds and similar wetlands.

Scarlet Bluets are small (just over an inch long) damselflies with red eyes and orange bodies. They inhabit acidic sandy ponds with floating vegetation.

Least Bitterns are heron-like birds that typically nest in cattail marshes interspersed with open water and are very sensitive to disturbance.

APPENDIX B - LONG POND HOTSPOT EBIRD LIST (OBSERVED AT LONG POND)⁹

Waterfowl	
Snow Goose	Mallard x American Black Duck (hybrid)
Greater White-fronted Goose	Northern Pintail
Canada Goose*	Green-winged Teal
Mute Swan	Canvasback
Wood Duck	Redhead
American Wigeon	Ring-necked Duck
Mallard*	Tufted Duck
Lesser Scaup	Greater Scaup
Waterfowl (cont.)	
Surf Scoter	Barrow's Goldeneye
White-winged Scoter	Hooded Merganser
Black Scoter	Common Merganser
Long-tailed Duck	Red-breasted Merganser*
Bufflehead	Ruddy Duck
Common Goldeneye	
Grebes	Shorebirds
Pied-billed Grebe	Spotted Sandpiper*
Horned Grebe	Alcids
Red-necked Grebe	Dovekie
Pigeons and Doves	Gulls, Terns, and Skimmers
Mourning Dove*	Laughing Gull*
Swifts	Ring-billed Gull
Chimney Swift*	Herring Gull*
Rails, Gallinules, and Allies	Great Black-backed Gull
American Coot	Loons
Cormorants and Anhingas	Red-throated Loon
Great Cormorant	Common Loon
Double-crested Cormorant*	Tits, Chickadees, and Titmice
Hérons, Ibis, and Allies	Black-capped Chickadee*
Great Blue Heron	Tufted Titmouse*
Black-crowned Night-Heron*	Martins and Swallows
Vultures, Hawks, and Allies	Barn Swallow*
Turkey Vulture	Kinglets
Osprey*	Golden-crowned Kinglet
Cooper's Hawk	Nuthatches
Bald Eagle	Red-breasted Nuthatch
Red-tailed Hawk	White-breasted Nuthatch
Owls	Treecreepers
Great Horned Owl	Brown Creeper
Kingfishers	Wrens
Belted Kingfisher*	Carolina Wren
Woodpeckers	Starlings and Mynas

⁹ <https://ebird.org/barchart?byr=1900&eyr=2021&bmo=1&emo=12&r=L5278254>

Red-bellied Woodpecker	European Starling
Downy Woodpecker*	Catbirds, Mockingbirds, and Thrashers
Hairy Woodpecker	Gray Catbird*
Northern Flicker*	Thrushes
Falcons and Caracaras	Eastern Bluebird
Peregrine Falcon	American Robin*
Tyrant Flycatchers: Pewees, Kingbirds, and Allies	Waxwings
Eastern Phoebe*	Cedar Waxwing
Great Crested Flycatcher*	Old World Sparrows
Eastern Kingbird*	House Sparrow
<hr/>	
Jays, Magpies, Crows, and Ravens	Finches, Euphonias, and Allies
Blue Jay	House Finch
American Crow	Red Crossbill
Common Raven	Pine Siskin
New World Sparrows	American Goldfinch*
Chipping Sparrow*	Wood-Warblers
White-throated Sparrow	Ovenbird
Song Sparrow*	Magnolia Warbler
Eastern Towhee	Yellow Warbler
Blackbirds	Pine Warbler
Baltimore Oriole*	Yellow-rumped Warbler
Red-winged Blackbird*	Cardinals, Grosbeaks, and Allies
Brown-headed Cowbird	Northern Cardinal
Common Grackle*	

*= species observed during the breeding season

APPENDIX C – STATE WILDLIFE ACTION PLAN (SWAP)- COASTAL PLAIN POND ECOSYSTEM¹⁰

SPECIES OF GREATEST CONSERVATION NEED IN COASTAL PLAIN PONDS

Taxon Grouping	Scientific Name	Common Name
Reptiles	<i>Pseudemys rubriventris</i>	Northern Red-bellied Cooter
Mussels	<i>Alasmidonta undulata</i>	Triangle Floater
	<i>Anodonta implicata</i>	Alewife Floater
	<i>Lampsilis radiata</i>	Eastern Lampmussel
	<i>Leptodea ochracea</i>	Tidewater Mucket
	<i>Ligumia nasuta</i>	Eastern Pondmussel
Odonates	<i>Rhionaeschna mutata</i>	Spatterdock Darner
	<i>Anax longipes</i>	Comet Darner
	<i>Enallagma pictum</i>	Scarlet Bluet
	<i>Enallagma recurvatum</i>	Pine Barrens Bluet
Plants	<i>Amphicarpum amphicarpon</i>	Annual Peanutgrass
	<i>Carex striata</i>	Walter's Sedge
	<i>Coleataenia longifolia ssp. longifolia</i>	Long-leaved Panic-grass
	<i>Coreopsis rosea</i>	Rose Coreopsis
	<i>Dichanthelium dichotomum ssp. mattamuskeetense</i>	Mattamuskeet Panic-grass
	<i>Dichanthelium wrightianum</i>	Wright's Panic-grass
	<i>Eleocharis microcarpa var. filiculmis</i>	Tiny-fruited Spike-sedge
	<i>Eleocharis tricostata</i>	Three-angled Spike-sedge
	<i>Eupatorium novae-angliae</i>	New England Boneset
	<i>Hypericum adpressum</i>	Creeping St. John's-wort
	<i>Isoetes acadensis</i>	Acadian Quillwort
	<i>Isoetes lacustris</i>	Lake Quillwort
	<i>Juncus debilis</i>	Weak Rush
	<i>Lachnanthes caroliniana</i>	Redroot
	<i>Lipocarpa micrantha</i>	Dwarf Bulrush
	<i>Ludwigia sphaerocarpa</i>	Round-fruited Seedbox
	<i>Panicum philadelphicum ssp. philadelphicum</i>	Philadelphia Panic-grass
	<i>Persicaria puritanorum</i>	Pondshore Smartweed
	<i>Persicaria setacea</i>	Swamp Smartweed
	<i>Rhexia mariana</i>	Maryland Meadow-beauty
	<i>Rhynchospora inundata</i>	Inundated Horned-sedge
	<i>Rhynchospora nitens</i>	Short-beaked Bald-sedge
	<i>Rhynchospora scirpoides</i>	Long-beaked Bald-sedge
	<i>Rhynchospora torreyana</i>	Torrey's Beak-sedge
	<i>Rotala ramosior</i>	Toothcup
	<i>Sabatia campanulata</i>	Slender Marsh Pink
	<i>Sabatia kennedyana</i>	Plymouth Gentian
<i>Sabatia stellaris</i>	Sea Pink	

¹⁰ <https://www.mass.gov/files/documents/2016/12/wh/ma-swap-public-draft-26june2015-chapter4.pdf>

	Scientific Name	Common Name
	<i>Sagittaria teres</i>	Terete Arrowhead
	<i>Utricularia subulata</i>	Subulate Bladderwort

APPENDIX D – STATE WILDLIFE ACTION PLAN (SWAP)- PITCH PINE – OAK FOREST WOODLAND ECOSYSTEM¹¹

SPECIES OF GREATEST CONSERVATION NEED IN PITCH PINE – OAK WOODLAND

Taxon Grouping	Scientific Name	Common Name
Amphibians	<i>Scaphiopus holbrookii</i>	Eastern Spadefoot
Reptiles	<i>Coluber constrictor</i>	North American Racer
	<i>Heterodon platirhinos</i>	Eastern Hog-nosed Snake
	<i>Terrapene carolina</i>	Eastern Box Turtle
Birds	<i>Antrastomus vociferus</i>	Whip-poor-will
	<i>Asio otus</i>	Long-eared Owl
	<i>Circus cyaneus</i>	Northern Harrier
	<i>Colinus virginianus</i>	Northern Bobwhite
	<i>Pipilo erythrophthalmus</i>	Eastern Towhee
	<i>Poocetes gramineus</i>	Vesper Sparrow
	<i>Setophaga americana</i>	Northern Parula
	<i>Setophaga discolor</i>	Prairie Warbler
	<i>Toxostoma rufum</i>	Brown Thrasher
Mammals	<i>Sylvilagus transitionalis</i>	New England Cottontail
Beetles	<i>Cicindela patruela</i>	Barrens Tiger Beetle
	<i>Nicrophorus americanus</i>	American Burying Beetle
Lepidoptera	<i>Abagrotis nefascia</i>	Coastal Heathland Cutworm
	<i>Acronicta albarufa</i>	Barrens Dagger Moth
	<i>Apodrepanulatrix liberaria</i>	New Jersey Tea Inchworm
	<i>Callophrys irus</i>	Frosted Elf
	<i>Catocala herodias gerhardi</i>	Herodias Underwing
	<i>Chaetagnela cerata</i>	Waxed Sallow
	<i>Cicinnus melsheimeri</i>	Melsheimer's Sack-bearer
	<i>Cingilia catenaria</i>	Chain-dotted Geometer
	<i>Eacles imperialis</i>	Imperial Moth
	<i>Erynnis persius persius</i>	Persius Duskywing
	<i>Euchlaena madusaria</i>	Scrub Euchlaena
	<i>Hemaris gracilis</i>	Slender Clearwing
	<i>Hemileuca maia</i>	Buck Moth
	<i>Heterocampa varia</i>	Sandplain Heterocampa
	<i>Hypomecis buchholzaria</i>	Buchholz's Gray
	<i>Lycia rachelae</i>	Twilight Moth
	<i>Lycia ypsilon</i>	Woolly Gray
	<i>Metarranthis apiciaria</i>	Barrens Metarranthis
	<i>Psectraglaea carnosia</i>	Pink Sallow
	<i>Ptichodis bistrigata</i>	Southern Ptichodis
	<i>Speranza exonerata</i>	Pine Barrens Speranza
<i>Stenoporpia polygrammaria</i>	Faded Gray	
<i>Zale lunifera</i>	Pine Barrens Zale	

¹¹<https://www.mass.gov/files/documents/2016/12/wh/ma-swap-public-draft-26june2015-chapter4.pdf>

	Scientific Name	Common Name
	<i>Zanclognatha martha</i>	Pine Barrens Zanclognatha
Taxon Grouping	Scientific Name	Common Name
Plants	<i>Aristida purpurascens</i>	Purple Needlegrass
	<i>Calamagrostis pickeringii</i>	Pickering's Reedgrass
	<i>Corema conradii</i>	Broom Crowberry
	<i>Crocانthemum dumosum</i>	Bushy Rockrose
	<i>Cyperus houghtonii</i>	Houghton's Flatsedge
	<i>Dichantheium ovale ssp. pseudopubescens</i>	Commons' Panic-grass
	<i>Malaxis bayardii</i>	Bayard's Adder's Mouth