# Natural Resources

## Introduction

Mashpee is located along the southern coast of the Cape Cod peninsula. With over five miles of coastline along Nantucket Sound and Vineyard Sound, the Town of Mashpee manages large coastal embayments and four of the largest freshwater ponds on the Cape. These are critical components of the landscape and provide habitat for a variety of flora and fauna. Chapter 10, *Water and Coastal Resources,* provides additional information on FEMA flood hazards, shorelines, and surface and groundwater quality. Mashpee is also rich in cultural and historical resources and home to the federally recognized Mashpee Wampanoag Tribe, whose people have been living in Mashpee and the surrounding region for more than 12,000 years.

Mashpee’s natural resources have played a defining role in the Town’s development, settlement pattern, and character. Mashpee enjoys a variety of important natural features and open space resources, including the Mashpee National Wildlife Refuge and upland forests that support regional water resources and habitat. These natural resources in Mashpee play a role in tourism, recreation, economic health, and the scenic value of the Town. As described in the Cape Cod Regional Policy Plan:

Natural Areas are generally the region’s least developed and most sensitive areas. The vision for these areas is to minimize adverse development impacts to sensitive resource areas, to preserve lands that define Cape Cod’s natural landscape and contribute to its scenic character, and to improve the Cape’s resilience to severe storms and the effects of climate change. (Cape Cod Commission, 2018)

For all of these reasons, natural resource management is a critical component of this Comprehensive Plan and plays an important role in planning for Mashpee’s future. Because natural resources span so many topic areas, this common theme must be reflected in other elements of this plan. For example, land use and water supply are inextricably linked to natural resources, making them vital components of all focus areas of comprehensive planning.

## Existing Conditions

To establish effective policies to protect the Town’s natural resources, a thorough inventory of the Town’s natural resources is required. This section includes existing conditions of Mashpee’s natural resources under the following categories:

* Landscape and Scenic Resources
* Surficial Geology
* Soils and Vegetation
* Wildlife Habitat

This chapter also identifies threats to natural resources for the Town of Mashpee to consider future actions to mitigate and protect these important assets.

### Landscape and Scenic Resources

Mashpee has many scenic resources, including water views and conservation areas spanning the Mashpee River, Popponesset Spit, and Nantucket Sound (Mashpee Environmental Coalition, n.d.). Other areas of interest include:

* Alper Conservation Area
* Attaquin Park
* Child’s River Conservation Area
* Jehu Pond Park
* John’s Pond Park Conservation Area
* Lopez Conservation Area
* Lowell Holly Reservation
* Mashpee River Woodlands
* Mashpee Wildlife Refuge
* Santuit Preserve
* South Cape Beach Area
* South Cape Beach State Park
* South Cape Town Beach
* South Mashpee Pine Barrens

Mashpee also has numerous trails that provide opportunities for scenic viewing and is a significant resource of ecological assets (Mashpee Environmental Coalition, n.d.). The Waquoit Bay is designated as an Area of Critical Environmental Concern by the Massachusetts Secretary of Energy and Environmental Affairs (EEA) for having the quality, uniqueness, and significance of natural and cultural resources (MassGIS, 2009).

* + 1. *Surficial Geology*

The landscape of Barnstable County consists of glacial landforms from the last ice age. The ice scraped bedrock from southern New England and deposited it as glacial sediment in Cape Cod (General Geology of Barnstable County, Massachusetts). Kettle holes were formed from blocks of ice left behind by retreating glaciers (Town of Mashpee, 2008). As a result, steep slopes began to collapse around their edges and formed a gentler grade (Town of Mashpee, 2008). Sea level rise, due to gradually melting ice, resulted in freshwater reaching the ground into porous outwash sediments (Town of Mashpee, 2008). Mashpee consists of gravelly pebble to cobble-sized gravel typical of outwash plains (Town of Mashpee, 2008). In addition to sand and gravel, the New Seabury and Popponesset Beach areas consist of boulders and larger stones (Town of Mashpee, 2008).

* + 1. *Soils and Vegetation*

The Town is surrounded by pines and oaks indigenous to the area. In addition to the pine trees and scrub oak, the Mashpee Pine Barrens, the Mashpee River Woodlands, and the Besse Bog consist of rare plant species. These areas are further detailed in Chapter 7, *Open Space and Recreation.* The Mashpee Pine Barrens have pockets of Atlantic white cedar swamps that grow in sandy glacial deposits with standing water (Town of Mashpee, n.d.). The Mashpee River Woodlands include pine and oak forest, an understory of huckleberry, inkberry, and sheep laurel (Town of Mashpee, n.d.). Eastern white pines are the most common trees found in this conservation area (Town of Mashpee, n.d.). The Besse Bog is home to the rare pink lady’s slipper, which is found on acidic soils, and made up of mixed forest and freshwater wetlands (Town of Mashpee, n.d.).

* + 1. *Wildlife Habitat*

An array of open waters, wetlands, rivers, and forests in the Town provide habitat for a variety of waterfowl and wildlife, while simultaneously supporting tourism, clean water, and outdoor activities. This section provides an overview of various wildlife habitats found within Mashpee.

**Wildlife Corridor and Habitat**

BioMap2 is a framework offered by the MassWildlife's Natural Heritage & Endangered Species Program and Division of Fisheries and Wildlife for protection and stewardship of lands and waters that are most important for conserving biological diversity in Massachusetts. Mashpee contains a Critical Natural Landscape identified by BioMap2. The designation of a Critical Natural Landscape identifies large natural landscape blocks that are minimally impacted by development, as well as buffers around some Core Habitats to enhance resilience (UMass Center for Agriculture, Food, and the Environment). BioMap2 is the preferred information source for conservation planning and action (UMass Center for Agriculture, Food, and the Environment). There are 9,642 acres of Critical Natural Landscape area within Mashpee (Massachusetts Division of Fisheries & Wildlife, 2012).

The Mashpee National Wildlife Refuge has a unique partnership with federal, state, and private conservation groups to preserve waterfowl and wildlife (U.S. Fish & Wildlife Service). The Mashpee National Wildlife Refuge was established in 1995 to protect and preserve natural resources associated with the Waquoit Bay area (U.S. Fish & Wildlife Service). Waquoit Bay supports one of the most diverse estuarine fish communities in the state (Waquoit Bay National Estuarine Research Reserve).

The wetlands, rivers, marshes, and upland forests throughout Mashpee provide habitat for regionally significant or rare birds, fish, reptiles, amphibians, and flora. The upland forests provide benefits to wildlife species, including marbled and Jefferson salamanders (U.S. Fish & Wildlife Service). The Mashpee River is an important habitat resources that is in high quality and notable for the rare sea-run brook trout (The Trustees of Reservations). The Quashnet River flows through mostly undeveloped land into Waquoit Bay (Division of Fisheries & Wildlife). The river has been the focus of several habitat improvement projects to improve trout habitat (Division of Fisheries & Wildlife). The Town also supports bird species of high conservation priority, including the Eastern Towhee in the Mashpee National Wildlife Refuge (Avibase - The World Bird Database).

**Species of Concern**

The Natural Heritage & Endangered Species Program (NHESP) Office lists species that are scarce in Massachusetts and considered to be endangered, threatened, or of special concern. This list includes several animals and plant species in Mashpee, which cover 3,992.75 acres of land within the Town (MassGIS, 2021). The Massachusetts Endangered Species Act (MESA) and its regulations protect rare species and their habitats (MassWildlife's Natural Heritage & Endangered Species Program). NHESP Priority Habitat areas determine whether or not a proposed project or activity must be reviewed by the NHESP for compliance with the (MESA) and its implementing regulations (MassGIS, 2021). Documented MESA-listed species observations are summarized in Table 4-1 below.

| **Table 4-1. MESA-listed Species Observations** | | | |
| --- | --- | --- | --- |
| **Common Name** | **Taxonomic Group** | **MESA Status** | **Most Recent Observation** |
| American bittern | Bird | Endangered | 2006 |
| American brook lamprey | Fish | Threatened | 2014 |
| Barn owl | Bird | Special Concern | 1991 |
| Buck moth | Butterfly/Moth | Special Concern | 2013 |
| Coastal heathland cutworm | Butterfly/Moth | Special Concern | 2019 |
| Common tern | Bird | Special Concern | 2008 |
| Commons' rosette-grass | Vascular Plant | Special Concern | 1968 |
| Dune sympistis | Butterfly/Moth | Special Concern | 2019 |
| Dwarf bulrush | Vascular Plant | Threatened | 1990 |
| Eastern box turtle | Reptile | Special Concern | 2019 |
| Eastern meadowlark | Bird | Special Concern | 2019 |
| Eastern pondmussel | Mussel | Special Concern | 2014 |
| Eastern whip-poor-will | Bird | Special Concern | 2013 |
| Grasshopper sparrow | Bird | Threatened | 2017 |
| Inundated beaksedge | Vascular Plant | Threatened | 1926 |
| Least tern | Bird | Special Concern | 2017 |
| Little brown bat | Mammal | Endangered | 2018 |
| Mattamuskeet rosette-grass | Vascular Plant | Endangered | 2007 |
| Northern diamond-backed terrapin | Reptile | Threatened | 1971 |
| Northern harrier | Bird | Threatened | 2003 |
| Northern long-eared bat | Mammal | Endangered | 2016 |
| Northern parula | Bird | Threatened | 2011 |
| Pine barrens bluet | Dragonfly/Damselfly | Threatened | 1996 |
| Piping plover | Bird | Threatened | 2019 |
| Pondshore smartweed | Vascular Plant | Special Concern | 2003 |
| Redroot | Vascular Plant | Special Concern | 2021 |
| Roseate tern | Bird | Endangered | 2005 |
| Scarlet bluet | Dragonfly/Damselfly | Threatened | 1999 |
| Slender bladderwort | Vascular Plant | Special Concern | 1931 |
| Terete arrowhead | Vascular Plant | Special Concern | 1997 |
| Tidewater mucket | Mussel | Special Concern | 2015 |
| Upland sandpiper | Bird | Endangered | 2019 |
| Vesper sparrow | Bird | Threatened | 2018 |
| Water-willow borer moth | Butterfly/Moth | Threatened | 2015 |
| Wright's rosette-grass | Vascular Plant | Special Concern | 1926 |

*Source: MassWildlife's Natural Heritage & Endangered Species Program Rare Species Viewer, 2022*

Additionally, contaminants, dams, and turbines of hydropower plants affect eels during migration, which no longer have access to their historical habitat (U.S. Fish and Wildlife Service). High amounts of phytoplankton are adding to oxygen depletion and loss of fish, shellfish, and bottom-dwelling animals and organisms (Howes, Samimy, & Horvet, 2021). New England cottontails have faced an extreme decline in Massachusetts and are being tracked on Cape Cod (Town of Mashpee). Prescribed burns have been carried out on conservation land to remove mature trees and allow regrowth of low shrubs, which are preferred habitat by cottontails (Town of Mashpee). The Town also supports bird species of high conservation priority, including the endangered saltmarsh sparrow, and several near-threatened species in the Mashpee National Wildlife Refuge (Avibase - The World Bird Database).

## Challenges & Opportunities

### Challenges

A variety of land uses, and human activities pose a threat to the Town’s natural resources. This section presents the most notable threats to the natural resources in Mashpee.

**Uncontrolled Erosion and Sediment**

Land development, when not properly managed, can have a detrimental effect on surrounding infrastructure and the function of the natural environment. When proper site preparation and maintenance do not occur during development, excessive quantities of soil can erode from the site. This situation can result in costly repairs and damage to the environment. The sediment can clog stormwater infrastructure, muddy streams, and leave deposits of silt in ponds and reservoirs and is considered a major water pollutant. Improperly managed construction projects can negatively impact aquatic habitat through erosion and sedimentation from construction sites (Town of Mashpee).

**Hazardous and Landfill Areas**

Landfills and hazardous waste can pollute water and air. Landfills also release methane gas, which is a potent greenhouse gas that contributes to climate change. Mashpee has a capped sanitary landfill located at Ashers Path (Town of Mashpee). The operation and maintenance of the landfill are overseen by the Board of Health (Town of Mashpee).

Diesel fuel and other chemicals are stored at local businesses. These chemicals are considered dangerous and require proper storage and disposal to avoid contamination of groundwater supplies. MCP/Chapter 21E Tier Classification sites are approximate locations of oil and/or hazardous material disposal sites that have been (1) reported and (2) Tier Classified under M.G.L. Chapter 21E and the Massachusetts Contingency Plan (MCP) (MassGIS, 2021). All MCP/Chapter 21E Tier Classification sites in Mashpee are summarized in Table 4-2 below.

| **Table 4-2.** **MCP/Chapter 21E Tier Classification** | | |
| --- | --- | --- |
| **Site Name** | **Address** | **Tier Classification** |
| Otis Air National Guard Base at South Outer Road | South Outer Road | Tier 1D |
| Mashpee Shell Station | Mashpee Shell Station | Tier I |
| Augat Inc. | Falmouth Road | Tier II |
| Lakeside Estates | 300 Nathan Ellis Highway | Tier 1D |

*Source: MassGIS MassDEP Tier Classified Oil and/or Hazardous Material Sites, 2021*

**Invasive Species**

Invasive species can alter habitat and threaten or eradicate native plants and animals. A variety of invasive, non-native plant species occurs in Mashpee. These include koi fish, variable milfoil, oriental bittersweet, autumn olive, morrow honeysuckle, Japanese knotweed, and multiflora rose (Spencer, 2021) (Houghton, Invasive Fish Spotted In Johns Pond, 2016) (Houghton, Prescribed Burning in Mashpee, MA, To Improve New England Cottontail Habitat, 2018) (Town of Mashpee). Millfoil are present in both Satuit and Johns Pond.

* + 1. *Opportunities*

Mashpee has many options for improving its erosion, hazardous waste, and invasive species problems. The Erosion and Sedimentation Control section in the Town Bylaw ensures the prevention or reduction of soil erosion and sedimentation before, during, and after development or redevelopment of a site by requiring an Erosion and Sedimentation Control Plan to be submitted to the Town for approval before any construction takes place, except for some activities which are exempt from the requirement (Town of Mashpee, 2019). To help prevent soil erosion, Chapter 82 – Earth Removal under §82-3 Sand and Gravel Pits of the Town General Bylaw requires sand and gravel pit owners to replant trees or shrubs in areas larger than 5,000 square feet. Additional restrictions on development and promotion of erosion-preventing measures will help to mitigate this problem. There has been a significant push by local residents to clean up hazardous sites around Mashpee. Many people are eager to return the natural landscape to a far less polluted version of its current state. There are simultaneously ongoing efforts to prevent invasive species from harming the environment and native species. Treatment in Johns Pond has been conducted and the Harbor Management Plan will help address the issues posed by invasive species. Monitoring for new invasives can help ensure early control measures to forestall major impacts on the environment.

* + 1. *Current Measures*

A variety of bylaw changes and updates have been adopted in recent years to ensure the prosperity of natural resources throughout the Town. The Conservation Bylaw Review Committee has been reviewing changes to bylaws to ensure natural resources are better protected for future years. The Town’s General Bylaw currently requires that development cannot occur within 100 feet of a wetland. However, the Town is in the process of voting on whether to increase this buffer to 150 feet.

## Goals & Policies

*Goals*

1. Ensure that all residents have access to high quality drinking water, surface water bodies, estuaries, wetlands, air and land.
2. Protect and improve terrestrial and aquatic habitats for long-term environmental and social benefits as well as Mashpee’s woodlands, trees, and tree canopy.
3. Protect the health, safety, and welfare of residents who use and enjoy Mashpee’s waterways.
4. Return Mashpee’s water bodies to pristine condition,
5. Protect the aboriginal rights of the Wampanoag Native People for fishing, hunting and gathering in and on clean water and lands.
6. Enhance the resiliency of low-lying areas and land subject to coastal storm.
7. Develop a robust Blue Economy and satisfy Eco-Tourism demand.

Policies

1. Return Mashpee’s water quality to within normal parameters.
2. Identify areas for coastal and habitat restoration to enhance water quality.
3. Identify, preserve, and enhance ancient ways to water with a particular focus on those areas identified in the Coastal Resources Element of the 1998 Comprehensive Plan.
4. Limit construction in land under ocean to maintain and restore habitat vital to our fisheries.
5. Maintain and enhance cross-sector collaborations such as with educational institutions and research organizations to bolster water quality sampling programs and reporting.
6. Identify the most appropriate sites to establish Aquaculture Development Zones consistent with the Department of Natural Resources Harbor Management Plan.
7. Promote shell fishing and aquaculture, especially in areas with impacted water quality
8. Maintain navigational channels for not only navigation but for adequate stream and tidal flow.
9. Minimize and mitigate the impacts of development and climate change on all natural systems.
10. Reduce pollutant and nutrient loads into Mashpee’s natural systems.
11. Coordinate with officials at Joint Base Cape Cod to determine strategies and funding sources to address the pollutants, such as PFAS, negatively impacting Mashpee residents quality.
12. Appropriately manage stormwater as to reduce the loading of petroleum products and nutrients into Mashpee waters and sensitive natural systems.
13. Strengthen and enforce laws, rules and regulations which protect natural systems.