BioMap2

CONSERVING THE BIODIVERSITY OF MASSACHUSETTS IN A CHANGING WORLD

Brewster

Produced in 2012

This report and associated map provide information about important sites for biodiversity conservation in your area.

This information is intended for conservation planning, and is not intended for use in state regulations.
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Introduction

The Massachusetts Department of Fish & Game, through the Division of Fisheries and Wildlife’s Natural Heritage & Endangered Species Program (NHESP), and The Nature Conservancy’s Massachusetts Program developed BioMap2 to protect the state’s biodiversity in the context of climate change.

BioMap2 combines NHESP’s 30 years of rigorously documented rare species and natural community data with spatial data identifying wildlife species and habitats that were the focus of the Division of Fisheries and Wildlife’s 2005 State Wildlife Action Plan (SWAP). BioMap2 also integrates The Nature Conservancy’s assessment of large, well-connected, and intact ecosystems and landscapes across the Commonwealth, incorporating concepts of ecosystem resilience to address anticipated climate change impacts.

Protection and stewardship of BioMap2 Core Habitat and Critical Natural Landscape is essential to safeguard the diversity of species and their habitats, intact ecosystems, and resilient natural landscapes across Massachusetts.

What Does Status Mean?

The Division of Fisheries and Wildlife determines a status category for each rare species listed under the Massachusetts Endangered Species Act (MESA), M.G.L. c.131A, and its implementing regulations 321 CMR 10.00. Rare species are categorized as Endangered, Threatened or of Special Concern according to the following:

- **Endangered species** are in danger of extinction throughout all or a significant portion of their range or are in danger of extirpation from Massachusetts.
- **Threatened species** are likely to become Endangered in Massachusetts in the foreseeable future throughout all or a significant portion of their range.
- **Special Concern species** have suffered a decline that could threaten the species if allowed to continue unchecked or occur in such small numbers or with such restricted distribution or specialized habitat requirements that they could easily become Threatened in Massachusetts.

In addition NHESP maintains an unofficial watch list of plants that are tracked due to potential conservation interest or concern, but are not regulated under the Massachusetts Endangered Species Act or other laws or regulations. Likewise, described natural communities are not regulated by any law or regulations, but they can help to identify...
ecologically important areas that are worthy of protection. The status of natural communities reflects the documented number and acreages of each community type in the state:

- Critically Imperiled communities typically have 5 or fewer documented good sites or have very few remaining acres in the state.
- Imperiled communities typically have 6-20 good sites or few remaining acres in the state.
- Vulnerable communities typically have 21-100 good sites or limited acreage across the state.
- Secure communities typically have over 100 sites or abundant acreage across the state; however, excellent examples are identified as Core Habit to ensure continued protection.

In 2005 the Massachusetts Division of Fisheries and Wildlife completed a comprehensive State Wildlife Action Plan (SWAP) documenting the status of Massachusetts wildlife and providing recommendations to help guide wildlife conservation decision-making. SWAP includes all the wildlife species listed under the Massachusetts Endangered Species Act (MESA), as well as more than 80 species that need conservation attention but do not meet the requirements for inclusion under MESA. The SWAP document is organized around habitat types in need of conservation within the Commonwealth. While the original BioMap focused primarily on rare species protected under MESA, BioMap2 also addresses other Species of Conservation Concern, their habitats, and the ecosystems that support them to create a spatial representation of most of the elements of SWAP.

**BioMap2: One Plan, Two Components**

BioMap2 identifies two complementary spatial layers, Core Habitat and Critical Natural Landscape. Core Habitat identifies key areas that are critical for the long-term persistence of rare species and other Species of Conservation Concern, as well as a wide diversity of natural communities and intact ecosystems across the Commonwealth. Protection of Core Habitats will contribute to the conservation of specific elements of biodiversity.

Critical Natural Landscape identifies large natural Landscape Blocks that are minimally impacted by development. If protected, these areas will provide habitat for wide-ranging native species, support intact ecological processes, maintain connectivity among habitats, and enhance ecological resilience to natural and anthropogenic disturbances in a rapidly changing world. Areas delineated as Critical Natural Landscape also include buffering upland around wetland, coastal, and aquatic Core Habitats to help ensure their long-term integrity.

The long-term persistence of Massachusetts biological resources requires a determined commitment to land and water conservation. Protection and stewardship of both Critical Natural Landscapes and Core Habitats are needed to realize the biodiversity conservation vision of BioMap2.

**Components of Core Habitat**

Core Habitat identifies specific areas necessary to promote the long-term persistence of rare species, other Species of Conservation Concern, exemplary natural communities, and intact ecosystems.

**Rare Species**

There are 432 native plant and animal species listed as Endangered, Threatened or Special Concern under the Massachusetts Endangered Species Act (MESA) based on their rarity, population trends, and threats to survival. For
Table 1. Species of Conservation Concern described in the State Wildlife Action Plan and/or included on the MESA List and for which habitat was mapped in BioMap2. Note that plants are not included in SWAP, and that marine species such as whales and sea turtles are not included in BioMap2.

<table>
<thead>
<tr>
<th>Taxonomic Group</th>
<th>MESA-listed Species</th>
<th>Non-listed Species of Conservation Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammals</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Birds</td>
<td>27</td>
<td>23</td>
</tr>
<tr>
<td>Reptiles</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Amphibians</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Fish</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>Invertebrates</td>
<td>102</td>
<td>9</td>
</tr>
<tr>
<td>Plants</td>
<td>256</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>413</strong></td>
<td><strong>62</strong></td>
</tr>
</tbody>
</table>

BioMap2, NHESP staff identified the highest quality habitat sites for each non-marine species based on size, condition, and landscape context.

Other Species of Conservation Concern

In addition to species on the MESA List described previously, the State Wildlife Action Plan (SWAP) identifies 257 wildlife species and 22 natural habitats most in need of conservation within the Commonwealth. BioMap2 includes species-specific habitat areas for 45 of these species and habitat for 17 additional species which was mapped with other coarse-filter and fine-filter approaches.

Priority Natural Communities

Natural communities are assemblages of plant and animal species that share a common environment and occur together repeatedly on the landscape. BioMap2 gives conservation priority to natural communities with limited distribution and to the best examples of more common types.

Vernal Pools

Vernal pools are small, seasonal wetlands that provide important wildlife habitat, especially for amphibians and invertebrate animals that use them to breed. BioMap2 identifies the top 5 percent most interconnected clusters of Potential Vernal Pools in the state.

Forest Cores

In BioMap2, Core Habitat includes the best examples of large, intact forests that are least impacted by roads and development, providing critical habitat for numerous woodland species. For example, the interior forest habitat defined by Forest Cores supports many bird species sensitive to the impacts of roads and development, such as the Black-throated Green Warbler, and helps maintain ecological processes found only in unfragmented forest patches.

Wetland Cores

BioMap2 used an assessment of Ecological Integrity to identify 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.

Aquatic Cores

To delineate integrated and functional ecosystems for fish species and other aquatic
Species of Conservation Concern, beyond the species and exemplary habitats described above, BioMap2 identifies intact river corridors within which important physical and ecological processes of the river or stream occur.

**Components of Critical Natural Landscape**

Critical Natural Landscape identifies 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.

**Landscape Blocks**

BioMap2 identifies the most intact large areas of predominately natural vegetation, consisting of contiguous forests, wetlands, rivers, lakes, and ponds, as well as coastal habitats such as barrier beaches and salt marshes.

**Upland Buffers of Wetland and Aquatic Cores**

A variety of analyses were used to identify protective upland buffers around wetlands and rivers.

**Upland Habitat to Support Coastal Adaptation**

BioMap2 identifies undeveloped lands adjacent to and up to one and a half meters above existing salt marshes as Critical Natural Landscapes with high potential to support inland migration of salt marsh and other coastal habitats over the coming century.

The conservation areas identified by BioMap2 are based on breadth and depth of data, scientific expertise, and understanding of Massachusetts’ biodiversity. The numerous sources of information and analyses used to create Core Habitat and Critical Natural Landscape are complementary, and outline a comprehensive conservation vision for Massachusetts, from rare species to intact landscapes. In total, these robust analyses define a suite of priority lands and waters that, if permanently protected, will support Massachusetts’ natural systems for generations to come.

**Legal Protection of Biodiversity**

BioMap2 presents a powerful vision of what Massachusetts would look like with full protection of the land most important for supporting the Commonwealth’s biodiversity. While BioMap2 is a planning tool with no regulatory function, all state-listed species enjoy legal protection under the Massachusetts Endangered Species Act (M.G.L. c.131A) and its implementing regulations (321 CMR 10.00). Wetland habitat of state-listed wildlife is also protected under the Wetlands Protection Act Regulations (310 CMR 10.00). The Natural Heritage Atlas contains maps of Priority Habitats and Estimated Habitats, which are used, respectively, for regulation under the Massachusetts Endangered Species Act and the Wetlands Protection Act. For more information on rare species regulations, and to view Priority and Estimated Habitat maps, please see the Regulatory Review page at http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/regulatory-review/.

BioMap2 is a conservation planning tool that does not, in any way, supplant the Estimated and Priority Habitat Maps which have regulatory significance. Unless and until the BioMap2 vision is fully realized, we must continue to protect our most imperiled species and their habitats.
Understanding Core Habitat Summaries

Following the Town Overview, there is a descriptive summary of each Core Habitat and Critical Natural Landscape that occurs in your city or town. These summaries highlight some of the outstanding characteristics of each Core Habitat and Critical Natural Landscape, and will help you learn more about your city or town’s biodiversity. You can find out more information about many of these species and natural communities by looking at specific fact sheets at www.mass.gov/nhesp.

Additional Information

For copies of the full BioMap2 report, the Technical Report, and an interactive mapping tool, visit the BioMap2 website via the Land Protection and Planning tab at www.mass.gov/nhesp. If you have any questions about this report, or if you need help protecting land for biodiversity in your community, the Natural Heritage & Endangered Species Program staff looks forward to working with you.

Contact the Natural Heritage & Endangered Species Program

- By phone 508-389-6360
- By fax 508-389-7890
- By email natural.heritage@state.ma.us
- By Mail 100 Hartwell Street, Suite 230
  West Boylston, MA 01583

The GIS datalayers of BioMap2 are available for download from MassGIS at www.mass.gov/mgis.
Town Overview

Brewster lies within the Cape Cod and Islands Ecoregion, an area formed by three advances and retreats of the Wisconsin Ice Sheet. 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.

Brewster at a Glance

- **Total Area:** 16,331 acres (25.5 square miles)
- **Human Population in 2010:** 9,820
- **Open space protected in perpetuity:** 4,720 acres, or 28.9% percent of total area*
- **BioMap2 Core Habitat:** 5,598 acres
- **BioMap2 Core Habitat Protected:** 2,577 acres or 46.0%
- **BioMap2 Critical Natural Landscape:** 8,894 acres
- **BioMap2 Critical Natural Landscape Protected:** 4,105 acres or 46.2%.

BioMap2 Components

Core Habitat
- 2 Exemplary or Priority Natural Community Cores
- 2 Wetland Cores
- 25 Aquatic Cores
- 1 Vernal Pool Core
- 33 Species of Conservation Concern Cores**
  - 2 birds, 3 reptiles, 6 insects, 15 plants

Critical Natural Landscape
- 3 Landscape Blocks
- 2 Wetland Core Buffers
- 18 Aquatic Core Buffers
- 10 Coastal Adaptation Areas
- 2 Tern Foraging Areas

* Calculated using MassGIS data layer “Protected and Recreational Open Space—March, 2012”.

** See next pages for complete list of species, natural communities and other biodiversity elements.
BioMap2 Core Habitat and Critical Natural Landscape in Brewster

![Map of Brewster showing BioMap2 Core Habitat and Critical Natural Landscape](image)

- **BioMap2 Core Habitat**
- **BioMap2 Critical Natural Landscape**

1 Mile
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

Damsselflies
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 acadiensis), E
Redroot, (Lachnanthes caroliana), SC
Dwarf Bulrush, (Lipocarpha micrantha), T
Oysterlea, (Mertensia maritima), E
Adder's-tongue Fern, (Ophioglossum pusillum), T
Fondshore Knotweed, (Persicaria purpureana), 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
Other BioMap2 Components

Aquatic Core
Wetland Core
Vernal Pool Core
Landscape Block
Aquatic Core Buffer
Wetland Core Buffer
Coastal Adaptation Area
Tern Foraging Area

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.
BioMap2 Core Habitat in Brewster

Core IDs correspond with the following element lists and summaries.
Elements of BioMap2 Cores

This section lists all elements of BioMap2 Cores that fall entirely or partially within Brewster. The elements listed here may not occur within the bounds of Brewster.

Core 440

Species of Conservation Concern
Water-willow Stem Borer  
Papaipema sulphurata  
T

Core 444

Wetland Core
Aquatic Core
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 caroliniana  
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

Core 445

Species of Conservation Concern
Water-willow Stem Borer  
Papaipema sulphurata  
T

Core 446

Priority & Exemplary Natural Communities
Coastal Plain Pondshore  
S2
Species of Conservation Concern
New England Bluet  
Enallagma laterale  
Non-listed SWAP
Scarlet Bluet  
Enallagma pictum  
T

Core 447

Species of Conservation Concern
Water-willow Stem Borer  
Papaipema sulphurata  
T
Core 453
Species of Conservation Concern
Water-willow Stem Borer  
*Papaipema sulphurata*  
T

Core 454
Species of Conservation Concern
Water-willow Stem Borer  
*Papaipema sulphurata*  
T

Core 464
Aquatic Core
Species of Conservation Concern
Plymouth Gentian  
*Sabatia kennedyana*  
SC
Terete Arrowhead  
*Sagittaria teres*  
SC

Core 469
Vernal Pool Core
Species of Conservation Concern
Water-willow Stem Borer  
*Papaipema sulphurata*  
T

Core 471
Aquatic Core
Species of Conservation Concern
Pondshore Knotweed  
*Persicaria puritanorum*  
SC
Terete Arrowhead  
*Sagittaria teres*  
SC

Core 493
Species of Conservation Concern
Bushy Rockrose  
*Crocanthemum dumosum*  
SC

Core 509
Wetland Core
Aquatic Core
Priority & Exemplary Natural Communities
Coastal Plain Pondshore  
S2
Species of Conservation Concern
Adder's-tongue Fern  
*Ophioglossum pusillum*  
T
Commons's Panic-grass  
*Dichanthelium ovale ssp. pseudopubescens*  
SC
Long-beaked Bald-sedge  
*Rhynchospora scirpoides*  
SC
Mitchell's Sedge  
*Carex mitchelliana*  
T
New England Blazing Star  
*Liatris scariosa var. novae-angliae*  
SC
Plymouth Gentian  
*Sabatia kennedyana*  
SC
Redroot  
*Lachnanthes carolina*  
SC

For more information on rare species and natural communities, please see our fact sheets online at [www.mass.gov/nhesp](http://www.mass.gov/nhesp).
<table>
<thead>
<tr>
<th>Species</th>
<th>Scientific Name</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resupinate Bladderwort</td>
<td>Utricularia resupinata</td>
<td>T</td>
</tr>
<tr>
<td>Salt Reedgrass</td>
<td>Spartina cynosuroides</td>
<td>T</td>
</tr>
<tr>
<td>Terete Arrowhead</td>
<td>Sagittaria teres</td>
<td>SC</td>
</tr>
<tr>
<td>Wright's Panic-grass</td>
<td>Dichanthelium wrightianum</td>
<td>SC</td>
</tr>
<tr>
<td>Water-willow Stem Borer</td>
<td>Papaipema sulphurata</td>
<td>T</td>
</tr>
<tr>
<td>Little Bluet</td>
<td>Enallagma minusculum</td>
<td>Non-listed SWAP</td>
</tr>
<tr>
<td>New England Bluet</td>
<td>Enallagma laterale</td>
<td>Non-listed SWAP</td>
</tr>
<tr>
<td>Pine Barrens Bluet</td>
<td>Enallagma recurvatum</td>
<td>T</td>
</tr>
<tr>
<td>Scarlet Bluet</td>
<td>Enallagma pictum</td>
<td>T</td>
</tr>
<tr>
<td>Comet Darner</td>
<td>Anax longipes</td>
<td>SC</td>
</tr>
<tr>
<td>Eastern Box Turtle</td>
<td>Terrapene carolina</td>
<td>SC</td>
</tr>
<tr>
<td>Common Tern</td>
<td>Sterna hirundo</td>
<td>SC</td>
</tr>
<tr>
<td>Northern Parula</td>
<td>Parula americana</td>
<td>T</td>
</tr>
<tr>
<td>Piping Plover</td>
<td>Charadrius melodus</td>
<td>T</td>
</tr>
<tr>
<td>Roseate Tern</td>
<td>Sterna dougallii</td>
<td>E</td>
</tr>
</tbody>
</table>

**Core 510**

**Aquatic Core**

Species of Conservation Concern

| Maryland Meadow Beauty                       | Rhexia mariana                | E        |

**Core 511**

Species of Conservation Concern

| Eastern Box Turtle                           | Terrapene carolina            | SC       |
| Eastern Ribbon Snake                         | Thamnophis sauritus           | Non-listed SWAP |

**Core 512**

Aquatic Core

Species of Conservation Concern

| Maryland Meadow Beauty                       | Rhexia mariana                | E        |

**Core 513**

Aquatic Core

Species of Conservation Concern

| Bushy Rockrose                               | Crocanthemum dumosum          | SC       |
| Maryland Meadow Beauty                       | Rhexia mariana                | E        |
| Plymouth Gentian                             | Sabatia kennedyana            | SC       |
| Pondshore Knotweed                           | Persicaria puritanorum        | SC       |
| Terete Arrowhead                             | Sagittaria teres              | SC       |
| New England Bluet                            | Enallagma laterale            | Non-listed SWAP |
Core 519

Aquatic Core
Priority & Exemplary Natural Communities

Coastal Plain Pondshore

Species of Conservation Concern

Dwarf Bulrush          Lipocarpha micrantha          T
Plymouth Gentian       Sabatia kennedyana          SC
Pondshore Knotweed     Persicaria puritanorum        SC
Terete Arrowhead       Sagittaria teres              SC
Little Bluet           Enallagma minusculum         Non-listed SWAP

Core 520

Species of Conservation Concern

New England Bluet       Enallagma laterale       Non-listed SWAP

Core 524

Aquatic Core

Species of Conservation Concern

Maryland Meadow Beauty Rhexia mariana          E
Plymouth Gentian       Sabatia kennedyana          SC

Core 530

Aquatic Core

Species of Conservation Concern

Maryland Meadow Beauty Rhexia mariana          E
Plymouth Gentian       Sabatia kennedyana          SC
Redroot               Lachnanthes carolina        SC

Core 533

Aquatic Core

Species of Conservation Concern

Acadian Quillwort      Isoetes acadiensis          E
Commons's Panic-grass  Dichanthelium ovale ssp. pseudopubescens        SC
Dwarf Bulrush          Lipocarpha micrantha          T
Maryland Meadow Beauty Rhexia mariana          E
Plymouth Gentian       Sabatia kennedyana          SC
Pondshore Knotweed     Persicaria puritanorum        SC
Water-willow Stem Borer Papaipema sulphurata     T
Little Bluet           Enallagma minusculum         Non-listed SWAP
Pine Barrens Bluet     Enallagma recurvatum         T
Scarlet Bluet          Enallagma pictum             T
Eastern Box Turtle     Terrapene carolina          SC

For more information on rare species and natural communities, please see our fact sheets online at www.mass.gov/nhesp.
Core 600

Aquatic Core
Priority & Exemplary Natural Communities

Marine Intertidal: Flats

Species of Conservation Concern

<table>
<thead>
<tr>
<th>Species</th>
<th>Scientific Name</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commons’s Panic-grass</td>
<td>Dichanthelium ovale ssp. pseudopubescens</td>
<td>SC</td>
</tr>
<tr>
<td>Mitchell’s Sedge</td>
<td>Carex mitchelliana</td>
<td>T</td>
</tr>
<tr>
<td>Oysterleaf</td>
<td>Mertensia maritima</td>
<td>E</td>
</tr>
<tr>
<td>Salt Reedgrass</td>
<td>Spartina cynosuroides</td>
<td>T</td>
</tr>
<tr>
<td>Seabeach Dock</td>
<td>Rumex pallidus</td>
<td>T</td>
</tr>
<tr>
<td>Diamond-backed Terrapin</td>
<td>Malaclemys terrapin</td>
<td>T</td>
</tr>
<tr>
<td>Piping Plover</td>
<td>Charadrius melodus</td>
<td>T</td>
</tr>
<tr>
<td>Saltmarsh Sharp-tailed Sparrow</td>
<td>Ammodramus caudactus</td>
<td>Non-listed SWAP</td>
</tr>
</tbody>
</table>

For more information on rare species and natural communities, please see our fact sheets online at [www.mass.gov/nhesp](http://www.mass.gov/nhesp).
Core Habitat Summaries

Core 440
A 2-acre Core Habitat featuring a Species of Conservation Concern.

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.

Core 444
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 199-acre 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 Bluet, 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.

**Core 445**

A <1-acre Core Habitat featuring a Species of Conservation Concern.

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.

**Core 446**

A 40-acre Core Habitat featuring Priority Natural Communities and Species of Conservation Concern.

Coastal Plain Pondshores are globally rare herbaceous communities of exposed pondshores with a distinct coastal plain flora. Water levels change with the water table, typically leaving an exposed shoreline in late summer where many rare species grow. This example of Coastal Plain Pondshore is in fair condition and is degraded by relatively dense development.

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.

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

**Core 447**

A 10-acre Core Habitat featuring a Species of Conservation Concern.
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.

Core 453
A <1-acre Core Habitat featuring a Species of Conservation Concern.

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.

Core 454
A 1-acre Core Habitat featuring a Species of Conservation Concern.

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.

Core 464
A 52-acre Core Habitat featuring Aquatic Core and Species of Conservation Concern.

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.

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.

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.

Core 469
A 79-acre Core Habitat featuring Vernal Pool Core and a Species of Conservation Concern.

Vernal pools are small, seasonal wetlands that provide important wildlife habitat, especially for amphibians and invertebrate animals that use them to breed. BioMap2 identifies the top 5 percent most interconnected clusters of Potential Vernal Pools in the state.

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.
Core 471

A 134-acre Core Habitat featuring Aquatic Core and Species of Conservation Concern.

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.

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.

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.

Core 493

An 18-acre Core Habitat featuring a Species of Conservation Concern.

Bushy Rockrose is a globally rare, bright yellow, perennial wildflower of coastal herbaceous grasslands and heathlands.

Core 509

A 3,260-acre Core Habitat featuring Wetland Core, Aquatic Core, Priority Natural Communities, and Species of Conservation Concern.

A large Core Habitat in western Brewster and neighboring towns stretches from the Millponds and other nearby ponds northward to the mouth of Quivett Creek. This complex landscape is home to 20 rare and uncommon species, including the globally rare Scarlet Bluet, Pine Barrens Bluet, New England Bluet, New England Blazing Star, Water-willow Borer Moth, Plymouth Gentian, and Terete Arrowhead. Many of these globally rare species inhabit the scattered Coastal Plain Ponds in this Core. An occasional pair of the federally Threatened Piping Plover has been known to nest on the bay shore, while federally Endangered Roseate Terns forage and stage for migration along the bay.

Coastal Plain Pondshores are globally rare herbaceous communities of exposed pondshores with a distinct coastal plain flora. Water levels change with the water table, typically leaving an exposed shoreline in late summer where many rare species grow. This Core has two examples of Coastal Plain Pondshore including one that is in excellent condition and has a large naturally vegetated buffer, but is threatened by municipal water withdrawals from the groundwater.

Wetlands 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.

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.

Core 510
A 2-acre Core Habitat featuring Aquatic Core and a Species of Conservation Concern.

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.

Maryland Meadow Beauty is a regionally rare showy perennial wildflower, found at moist, open, peaty or sandy sites, usually associated with coastal plain ponds. The species is dependent on fluctuating water levels and may not appear every year.

Core 511
A 559-acre Core Habitat featuring Species of Conservation Concern.

The Eastern Box Turtle is a terrestrial turtle, inhabiting many dry and moist woodland and early successional habitat. Development, roads, collection, and disease are the primary conservation concerns.

Eastern Ribbon Snakes are a medium-sized, very thin snake ranging from 7 to 34 inches long at maturity. They are active during the day and live in wetlands and edges of open water being comfortable in water and on land, eating amphibians, insects, and occasional fish. This species hibernates in ant mounds, rodent burrows, crayfish burrows, and bank burrows.

Core 512
A 2-acre Core Habitat featuring Aquatic Core and a Species of Conservation Concern.

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.

Maryland Meadow Beauty is a regionally rare showy perennial wildflower, found at moist, open, peaty or sandy sites, usually associated with coastal plain ponds. The species is dependent on fluctuating water levels and may not appear every year.

Core 513
A 127-acre Core Habitat featuring Aquatic Core and Species of Conservation Concern.
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.

Bushy Rockrose is a globally rare, bright yellow, perennial wildflower of coastal herbaceous grasslands and heathlands.

Maryland Meadow Beauty is a regionally rare showy perennial wildflower, found at moist, open, peaty or sandy sites, usually associated with coastal plain ponds. The species is dependent on fluctuating water levels and may not appear every year.

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.

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.

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.

Core 519

A 71-acre Core Habitat featuring Aquatic Core, Priority Natural Communities, and Species of Conservation Concern.

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.

Coastal Plain Pondshores are globally rare herbaceous communities of exposed pondshores with a distinct coastal plain flora. Water levels change with the water table, typically leaving an exposed shoreline in late summer where many rare species grow. This example of Coastal Plain Pondshore is in very good condition with minimal recreational use, despite some water withdrawal.

Dwarf Bulrush is a tiny, wiry, annual sedge, which inhabits sandy to peaty shores of low-nutrient ponds and lakes.
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.

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

**Core 520**

A 14-acre Core Habitat featuring a Species of Conservation Concern.

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.

**Core 524**

An 8-acre Core Habitat featuring Aquatic Core and Species of Conservation Concern.

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.

Maryland Meadow Beauty is a regionally rare showy perennial wildflower, found at moist, open, peaty or sandy sites, usually associated with coastal plain ponds. The species is dependent on fluctuating water levels and may not appear every year.

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.

**Core 530**

A 9-acre Core Habitat featuring Aquatic Core and Species of Conservation Concern.
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.

Maryland Meadow Beauty is a regionally rare showy perennial wildflower, found at moist, open, peaty or sandy sites, usually associated with coastal plain ponds. The species is dependent on fluctuating water levels and may not appear every year.

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.

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.

**Core 533**

A 1,504-acre Core Habitat featuring Aquatic Core and Species of Conservation Concern.

Acadian Quillwort occurs in shallow water along the borders of acidic, low-nutrient ponds and lakes. In Massachusetts, it inhabits sandy to gravelly soils in the shallow inundated edges of coastal plain ponds.

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.

Dwarf Bulrush is a tiny, wiry, annual sedge, which inhabits sandy to peaty shores of low-nutrient ponds and lakes.

Maryland Meadow Beauty is a regionally rare showy perennial wildflower, found at moist, open, peaty or sandy sites, usually associated with coastal plain ponds. The species is dependent on fluctuating water levels and may not appear every year.

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.

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

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.

The Eastern Box Turtle is a terrestrial turtle, inhabiting many dry and moist woodland and early successional habitat. Development, roads, collection, and disease are the primary conservation concerns.

Core 600

A 1,890-acre Core Habitat featuring Aquatic Core, Priority Natural Communities, and Species of Conservation Concern.

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.

The Marine Intertidal Flat community is found in areas protected from intense wave action. Although many have little to no vegetation, they are physically and biologically linked to other coastal marine systems. This example of Marine Intertidal Flat is in good condition and is fairly well-buffered against development in the surrounding landscape.

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.

Mitchell’s Sedge is a wetland species of the Massachusetts coastal plain. It inhabits forested swamps and occasionally wet meadows. It occurs on poorly drained organic and silty loam soils of level ground, stream banks, ditches, and levees that experience seasonal high water tables. It is often found within small canopy openings inside of forested swamps. It typically occurs in areas where fresh groundwater seepage reaches the soil surface, and is often associated with freshwater swamps adjacent to salt marshes.

Oysterleaf, a sprawling perennial herb in the forget-me-not family, inhabits sparsely vegetated sandy coastal habitats, such as the upper reaches of beaches, sand spits, and foredunes. It is found above the wrack line but often within the reach of the highest tides. Because Oysterleaf grows in dynamic, high-
stress habitats with shifting substrate, it requires large contiguous expanses of habitat to re-establish in the inevitable event of destruction by physical forces of nature.

Salt Reedgrass is a large perennial species of salt marshes that can grow up to 10 feet tall.

Seabeach Dock, a medium-sized, herbaceous perennial, is a plant of beaches and coastal swamps. Its habitats in Massachusetts include upper beaches with cobble, cobble and gravel, shale and shell, or gravelly sand substrates.

The Diamond-backed Terrapin, a medium-sized turtle, inhabits salt marshes which border quiet salt or brackish tidal waters. They can also be found in mud flats, shallow bays, coves, tidal estuaries and rivers mouths adjacent to salt water. Adjacent sandy dry upland areas are required for nesting.

Piping Plovers on the East Coast nest on sandy coastal beaches and relatively flat dunes with sparse vegetation. They typically lay their eggs in the narrow area of land between the high tide line and the foot of the coastal dunes. They can be particularly sensitive to anthropogenic disturbance, but the state's population has responded very well to coordinated management.

As its name suggests, the Saltmarsh Sharp-tailed Sparrow is a strictly coastal species, breeding from southern Maine to North Carolina, and wintering from Maryland to the Atlantic coast of Florida. It depends upon saltmarshes for both breeding and wintering habitat, building its nests in Spartina flats above the mean high tide line. The large coastal marshes of Massachusetts support some of the largest populations of Saltmarsh Sharp-tailed Sparrows in its range, especially the Great Marsh of Essex County.
**BioMap2 Critical Natural Landscape in Brewster**

Critical Natural Landscape IDs correspond with the following element lists and summaries.
Elements of BioMap2 Critical Natural Landscapes

This section lists all elements of BioMap2 Critical Natural Landscapes that fall *entirely or partially* within Brewster. The elements listed here may not occur within the bounds of Brewster.

CNL 275
Aquatic Core Buffer

CNL 309
Aquatic Core Buffer

CNL 329
Coastal Adaptation Area

CNL 330
Coastal Adaptation Area

CNL 332
Coastal Adaptation Area

CNL 334
Coastal Adaptation Area

CNL 339
Aquatic Core Buffer

CNL 341
Aquatic Core Buffer

CNL 344
Aquatic Core Buffer

CNL 349
Aquatic Core Buffer
  Landscape Block

CNL 350
Aquatic Core Buffer
  Landscape Block
  Wetland Core Buffer

CNL 360
Aquatic Core Buffer
  Coastal Adaptation Area

CNL 558
Aquatic Core Buffer
  Coastal Adaptation Area
  Landscape Block
  Tern Foraging Area
Critical Natural Landscape Summaries

CNL 275
A 51-acre Critical Natural Landscape featuring Aquatic Core Buffer.

A variety of analyses were used to identify protective upland buffers around wetlands and rivers. One, the variable width buffers methodology, included the most intact areas around each wetland and river, by extending deeper into surrounding unfragmented habitats than into developed areas adjacent to each wetland. Other upland buffers were identified through the rare species habitat analysis. In this way, the conservation of wetland buffers will support the habitats and functionality of each wetland, and also include adjacent uplands that are important for many species that move between habitat types.

CNL 309
An 80-acre Critical Natural Landscape featuring Aquatic Core Buffer.

A variety of analyses were used to identify protective upland buffers around wetlands and rivers. One, the variable width buffers methodology, included the most intact areas around each wetland and river, by extending deeper into surrounding unfragmented habitats than into developed areas adjacent to each wetland. Other upland buffers were identified through the rare species habitat analysis. In this way, the conservation of wetland buffers will support the habitats and functionality of each wetland, and also include adjacent uplands that are important for many species that move between habitat types.

CNL 329
A 8-acre Critical Natural Landscape featuring Coastal Adaptation Area.

The coastal habitats of Massachusetts are particularly vulnerable to potential sea-level rise in the next century, which many estimates suggest is likely to exceed one meter. Therefore, in addition to prioritizing current coastal habitats, the creators of BioMap2 examined the landward side of salt marshes to determine where these habitats might move to as sea levels rise. Undeveloped lands adjacent to and up to one and a half meters above existing salt marshes were identified, and included as Critical Natural Landscapes with high potential to support inland migration of salt marsh and other coastal habitats over the coming century.

CNL 330
A 12-acre Critical Natural Landscape featuring Coastal Adaptation Area.

The coastal habitats of Massachusetts are particularly vulnerable to potential sea-level rise in the next century, which many estimates suggest is likely to exceed one meter. Therefore, in addition to prioritizing current coastal habitats, the creators of BioMap2 examined the landward side of salt marshes to determine where these habitats might move to as sea levels rise. Undeveloped lands adjacent to and up to one and a half meters above existing salt marshes were identified, and included as Critical Natural Landscapes with high potential to support inland migration of salt marsh and other coastal habitats over the coming century.
CNL 332
A 15-acre Critical Natural Landscape featuring Coastal Adaptation Area.
The coastal habitats of Massachusetts are particularly vulnerable to potential sea-level rise in the next century, which many estimates suggest is likely to exceed one meter. Therefore, in addition to prioritizing current coastal habitats, the creators of BioMap2 examined the landward side of salt marshes to determine where these habitats might move to as sea levels rise. Undeveloped lands adjacent to and up to one and a half meters above existing salt marshes were identified, and included as Critical Natural Landscapes with high potential to support inland migration of salt marsh and other coastal habitats over the coming century.

CNL 334
A 9-acre Critical Natural Landscape featuring Coastal Adaptation Area.
The coastal habitats of Massachusetts are particularly vulnerable to potential sea-level rise in the next century, which many estimates suggest is likely to exceed one meter. Therefore, in addition to prioritizing current coastal habitats, the creators of BioMap2 examined the landward side of salt marshes to determine where these habitats might move to as sea levels rise. Undeveloped lands adjacent to and up to one and a half meters above existing salt marshes were identified, and included as Critical Natural Landscapes with high potential to support inland migration of salt marsh and other coastal habitats over the coming century.

CNL 339
A 2-acre Critical Natural Landscape featuring Aquatic Core Buffer.
A variety of analyses were used to identify protective upland buffers around wetlands and rivers. One, the variable width buffers methodology, included the most intact areas around each wetland and river, by extending deeper into surrounding unfragmented habitats than into developed areas adjacent to each wetland. Other upland buffers were identified through the rare species habitat analysis. In this way, the conservation of wetland buffers will support the habitats and functionality of each wetland, and also include adjacent uplands that are important for many species that move between habitat types.

CNL 341
A 2-acre Critical Natural Landscape featuring Aquatic Core Buffer.
A variety of analyses were used to identify protective upland buffers around wetlands and rivers. One, the variable width buffers methodology, included the most intact areas around each wetland and river, by extending deeper into surrounding unfragmented habitats than into developed areas adjacent to each wetland. Other upland buffers were identified through the rare species habitat analysis. In this way, the conservation of wetland buffers will support the habitats and functionality of each wetland, and also include adjacent uplands that are important for many species that move between habitat types.

CNL 344
A 63-acre Critical Natural Landscape featuring Aquatic Core Buffer.
A variety of analyses were used to identify protective upland buffers around wetlands and rivers. One, the variable width buffers methodology, included the most intact areas around each wetland and river, by extending deeper into surrounding unfragmented habitats than into developed areas adjacent to each wetland. Other upland buffers were identified through the rare species habitat analysis. In this way, the conservation of wetland buffers will support the habitats and functionality of each wetland, and also include adjacent uplands that are important for many species that move between habitat types.

**CNL 349**

A 1,040-acre Critical Natural Landscape featuring Aquatic Core Buffer and Landscape Block.

A variety of analyses were used to identify protective upland buffers around wetlands and rivers. One, the variable width buffers methodology, included the most intact areas around each wetland and river, by extending deeper into surrounding unfragmented habitats than into developed areas adjacent to each wetland. Other upland buffers were identified through the rare species habitat analysis. In this way, the conservation of wetland buffers will support the habitats and functionality of each wetland, and also include adjacent uplands that are important for many species that move between habitat types.

Landscape Blocks, the primary component of Critical Natural Landscapes, are large areas of intact predominately natural vegetation, consisting of contiguous forests, wetlands, rivers, lakes, and ponds, as well as coastal habitats such as barrier beaches and salt marshes. Pastures and power-line rights-of-way, which are less intensively altered than most developed areas, were also included since they provide habitat and connectivity for many species. Collectively, these natural cover types total 3.6 million acres across the state. An Ecological Integrity assessment was used to identify the most intact and least fragmented areas. These large Landscape Blocks are most likely to maintain dynamic ecological processes such as buffering, connectivity, natural disturbance, and hydrological regimes, all of which help to support wide-ranging wildlife species and many other elements of biodiversity.

In order to identify critical Landscape Blocks in each ecoregion, different Ecological Integrity thresholds were used to select the largest intact landscape patches in each ecoregion while avoiding altered habitat as much as possible. This ecoregional representation accomplishes a key goal of *BioMap2* to protect the ecological stages that support a broad suite of biodiversity in the context of climate change. Blocks were defined by major roads, and minimum size thresholds differed among ecoregions to ensure that *BioMap2* includes the best of the best in each ecoregion.

**CNL 350**

A 3,146-acre Critical Natural Landscape featuring Aquatic Core Buffer, Wetland Core Buffer and Landscape Block.

A variety of analyses were used to identify protective upland buffers around wetlands and rivers. One, the variable width buffers methodology, included the most intact areas around each wetland and river, by extending deeper into surrounding unfragmented habitats than into developed areas adjacent to each wetland. Other upland buffers were identified through the rare species habitat analysis. In this way, the conservation of wetland buffers will support the habitats and functionality of each wetland, and also include adjacent uplands that are important for many species that move between habitat types.

Landscape Blocks, the primary component of Critical Natural Landscapes, are large areas of intact predominately natural vegetation, consisting of contiguous forests, wetlands, rivers, lakes, and ponds, as
well as coastal habitats such as barrier beaches and salt marshes. Pastures and power-line rights-of-way, which are less intensively altered than most developed areas, were also included since they provide habitat and connectivity for many species. Collectively, these natural cover types total 3.6 million acres across the state. An Ecological Integrity assessment was used to identify the most intact and least fragmented areas. These large Landscape Blocks are most likely to maintain dynamic ecological processes such as buffering, connectivity, natural disturbance, and hydrological regimes, all of which help to support wide-ranging wildlife species and many other elements of biodiversity.

In order to identify critical Landscape Blocks in each ecoregion, different Ecological Integrity thresholds were used to select the largest intact landscape patches in each ecoregion while avoiding altered habitat as much as possible. This ecoregional representation accomplishes a key goal of BioMap2 to protect the ecological stages that support a broad suite of biodiversity in the context of climate change. Blocks were defined by major roads, and minimum size thresholds differed among ecoregions to ensure that BioMap2 includes the best of the best in each ecoregion.

**CNL 360**

A 410-acre Critical Natural Landscape featuring Aquatic Core Buffer and Coastal Adaptation Area.

A variety of analyses were used to identify protective upland buffers around wetlands and rivers. One, the variable width buffers methodology, included the most intact areas around each wetland and river, by extending deeper into surrounding unfragmented habitats than into developed areas adjacent to each wetland. Other upland buffers were identified through the rare species habitat analysis. In this way, the conservation of wetland buffers will support the habitats and functionality of each wetland, and also include adjacent uplands that are important for many species that move between habitat types.

The coastal habitats of Massachusetts are particularly vulnerable to potential sea-level rise in the next century, which many estimates suggest is likely to exceed one meter. Therefore, in addition to prioritizing current coastal habitats, the creators of BioMap2 examined the landward side of salt marshes to determine where these habitats might move to as sea levels rise. Undeveloped lands adjacent to and up to one and a half meters above existing salt marshes were identified, and included as Critical Natural Landscapes with high potential to support inland migration of salt marsh and other coastal habitats over the coming century.

**CNL 558**

A 97,955-acre Critical Natural Landscape featuring Aquatic Core Buffer, Landscape Block, Coastal Adaptation Area, and Tern Foraging Area.

A variety of analyses were used to identify protective upland buffers around wetlands and rivers. One, the variable width buffers methodology, included the most intact areas around each wetland and river, by extending deeper into surrounding unfragmented habitats than into developed areas adjacent to each wetland. Other upland buffers were identified through the rare species habitat analysis. In this way, the conservation of wetland buffers will support the habitats and functionality of each wetland, and also include adjacent uplands that are important for many species that move between habitat types.

Landscape Blocks, the primary component of Critical Natural Landscapes, are large areas of intact predominately natural vegetation, consisting of contiguous forests, wetlands, rivers, lakes, and ponds, as well as coastal habitats such as barrier beaches and salt marshes. Pastures and power-line rights-of-way,
which are less intensively altered than most developed areas, were also included since they provide habitat and connectivity for many species. Collectively, these natural cover types total 3.6 million acres across the state. An Ecological Integrity assessment was used to identify the most intact and least fragmented areas. These large Landscape Blocks are most likely to maintain dynamic ecological processes such as buffering, connectivity, natural disturbance, and hydrological regimes, all of which help to support wide-ranging wildlife species and many other elements of biodiversity.

In order to identify critical Landscape Blocks in each ecoregion, different Ecological Integrity thresholds were used to select the largest intact landscape patches in each ecoregion while avoiding altered habitat as much as possible. This ecoregional representation accomplishes a key goal of BioMap2 to protect the ecological stages that support a broad suite of biodiversity in the context of climate change. Blocks were defined by major roads, and minimum size thresholds differed among ecoregions to ensure that BioMap2 includes the best of the best in each ecoregion.

At 6,182 acres, this Landscape Block is the sixth largest in the ecoregion and is especially important in the fragmented landscapes of Cape Cod. Unlike Landscape Blocks in much of the state that are dominated by upland forests, this coastal Landscape Block is dominated by unique and important salt marsh and barrier beach habitats, much of which is protected by the town of Barnstable.

The coastal habitats of Massachusetts are particularly vulnerable to potential sea-level rise in the next century, which many estimates suggest is likely to exceed one meter. Therefore, in addition to prioritizing current coastal habitats, the creators of BioMap2 examined the landward side of salt marshes to determine where these habitats might move to as sea levels rise. Undeveloped lands adjacent to and up to one and a half meters above existing salt marshes were identified, and included as Critical Natural Landscapes with high potential to support inland migration of salt marsh and other coastal habitats over the coming century.

Terns range widely from their breeding colonies to forage. While the breeding and staging areas for Roseate, Arctic, Common, and Least Terns were included in the Species of Conservation Concern Core Habitat for BioMap2, tern foraging areas were included in BioMap2 as part of Critical Natural Landscape. The extent of foraging habitat for Arctic, Common, and Roseate Terns depends on the size of the breeding colony. For Least Tern, all shallow marine and estuarine waters within 2 miles of recent colony sites and up to 1 mile offshore were mapped as foraging habitat.
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Natural Heritage & Endangered Species Fund

To learn more about the Natural Heritage & Endangered Species Program and the Commonwealth’s rare species, visit our web site at www.mass.gov/nhesp.