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.

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<th>Taxonomic Group</th>
<th>MESA-listed Species</th>
<th>Non-listed Species of Conservation Concern</th>
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</thead>
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<tr>
<td>Birds</td>
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<td>Reptiles</td>
<td>10</td>
<td>5</td>
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<td>Amphibians</td>
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<td>3</td>
</tr>
<tr>
<td>Fish</td>
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<td>9</td>
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<tr>
<td>Plants</td>
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<td>0</td>
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<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 ecosystems for fish species and other aquatic habitats, etc.) and are most likely to maintain these functions into the future.
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
Wellfleet 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.

Wellfleet at a Glance
- **Total Area:** 13,442 acres (21.0 square miles)
- **Human Population in 2010:** 2,750
- **Open space protected in perpetuity:** 8,476 acres, or 63.1% percent of total area*
- **BioMap2 Core Habitat:** 10,914 acres
- **BioMap2 Core Habitat Protected:** 8,303 acres or 76.1%
- **BioMap2 Critical Natural Landscape:** 9,708 acres
- **BioMap2 Critical Natural Landscape Protected:** 8,086 acres or 83.3%.

**BioMap2 Components**

**Core Habitat**
- 3 Exemplary or Priority Natural Community Cores
- 3 Forest Cores
- 7 Wetland Cores
- 6 Aquatic Cores
- 8 Species of Conservation Concern Cores**
  - 9 birds, 4 reptiles, 2 amphibians, 11 insects, 10 plants

**Critical Natural Landscape**
- 1 Landscape Block
- 3 Wetland Core Buffers
- 5 Aquatic Core Buffers
- 13 Coastal Adaptation Areas
- 3 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 Wellfleet

BioMap2 Core Habitat

BioMap2 Critical Natural Landscape

1 Mile

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).
Species of Conservation Concern, Priority and Exemplary Natural Communities, and Other Elements of Biodiversity in Wellfleet

Insects

Moths
- Coastal Heathland Cutworm, (Abagrotis nefascia), SC
- Gerhard’s Underwing, (Catocala herodias gerhardi), SC
- Melsheimer’s Sack Bearer, (Cicinnus melsheimeri), T
- Barrens Buckmoth, (Hemileuca maia), SC
- Water-willow Stem Borer, (Papaipema sulphurata), T
- Dune Noctuid Moth, (Symptis riparia), SC

Butterflies
- Oak Hairstreak, (Satyrium favonius), SC

Damselflies
- Attenuated Bluet, (Enallagma daeckii), T
- Pine Barrens Bluet, (Enallagma recurvatum), T
- New England Bluet, (Enallagma laterale), Non-listed SWAP
- Little Bluet, (Enallagma minusculum), Non-listed SWAP

Amphibians
- Eastern Spadefoot, (Scaphiopus holbrookii), T
- Four-toed Salamander, (Hemidactylium scutatum), Non-listed SWAP

Reptiles
- Diamond-backed Terrapin, (Malaclemys terrapin), T
- Eastern Box Turtle, (Terrapene carolina), SC
- Eastern Hognose Snake, (Heterodon platirhinos), Non-listed SWAP
- Northern Black Racer, (Coluber constrictor), Non-listed SWAP

Birds
- Sharp-shinned Hawk, (Accipiter striatus), SC
- Piping Plover, (Charadrius melodus), T
- Northern Harrier, (Circus cyaneus), T
- Common Tern, (Sterna hirundo), SC
- Vesper Sparrow, (Poecetes gramineus), T
- Roseate Tern, (Sterna dougallii), E
- Least Tern, (Sternula antillarum), SC
- Eastern Whip-poor-will, (Caprimulgus vociferus), SC
- Whimbrel, (Numenius phaeopus), Non-listed SWAP

Plants
- Walter’s Sedge, (Carex striata), E
- Bushy Rockrose, (Crocanthemum dumosum), SC
Commons's Panic-grass, \((Dichanthelium ovale \text{ ssp. pseudopubescens})\), SC

Ovate Spike-rush or Spike-sedge, \((Eleocharis ovata)\), E

Oysterleaf, \((Mertensia maritima)\), E

Subulate Bladderwort, \((Utricularia subulata)\), SC

Broom Crowberry, \((Corema conradiii)\), recently de-listed

Resupinate Bladderwort, \((Utricularia resupinata)\), T

Salt Reedgrass, \((Spartina cynosuroides)\), T

Swamp Oats, \((Sphenopholis pensylvanica)\), T

Priority Natural Communities

Coastal Atlantic White Cedar Swamp, S2

Estuarine Intertidal: Saline/Brackish Flats, S3

Sandplain Heathland, S1

Other BioMap2 Components

Forest Core

Aquatic Core

Wetland 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 Wellfleet

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 Wellfleet. The elements listed here may not occur within the bounds of Wellfleet.

**Core 727**
Species of Conservation Concern  
**Eastern Spadefoot**  
*Scaphiopus holbrookii*  
T

**Core 752**
Species of Conservation Concern  
**Water-willow Stem Borer**  
*Papaipema sulphurata*  
T

**Core 783**
Species of Conservation Concern  
**Water-willow Stem Borer**  
*Papaipema sulphurata*  
T

**Core 787**
Species of Conservation Concern  
**Water-willow Stem Borer**  
*Papaipema sulphurata*  
T

**Core 788**
Species of Conservation Concern  
**Water-willow Stem Borer**  
*Papaipema sulphurata*  
T

**Core 789**
Species of Conservation Concern  
**Water-willow Stem Borer**  
*Papaipema sulphurata*  
T

**Core 791**
Species of Conservation Concern  
**Water-willow Stem Borer**  
*Papaipema sulphurata*  
T

**Core 1043**
Forest Core  
Wetland Core  
Aquatic Core  
Priority & Exemplary Natural Communities  
Atlantic White Cedar Bog  
S2  
Coastal Atlantic White Cedar Swamp  
S2  
Estuarine Intertidal: Saline/Brackish Flats  
S3
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<tr>
<th>Natural Heritage &amp; Endangered Species Program</th>
<th>Massachusetts Division of Fisheries and Wildlife</th>
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<td>1 Rabbit Hill Road, Westborough, MA 01581</td>
<td>phone: 508-389-6360  fax: 508-389-7890</td>
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<td>BioMap2 Conserving the Biodiversity of Massachusetts in a Changing World</td>
<td>For more information on rare species and natural communities, please see our fact sheets online at <a href="http://www.mass.gov/nhesp">www.mass.gov/nhesp</a>.</td>
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<td>Level Bog</td>
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<td>Marine Subtidal: Flats</td>
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<td>Maritime Beach Strand Community</td>
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<td>Maritime Dune Community</td>
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<td><strong>Species of Conservation Concern</strong></td>
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<td>American Sea-blite</td>
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<td>Bushy Rockrose</td>
<td><em>Crocanthemum dumosum</em></td>
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Core Habitat Summaries

Core 727

A 181-acre Core Habitat featuring a Species of Conservation Concern.

The Eastern Spadefoot is a short-legged, squat, big-headed toad with unmistakable cat-like, vertically elliptical pupils. This burrowing species requires dry, sand or sandy loam soils characteristic of Pitch Pine barrens, coastal oak woodlands or sparse shrub growth, interspersed with temporary ponds. It prefers areas with leaf litter, and may be found in farmland areas. In the warmer months, from April to September, the Spadefoot comes up to breed in vernal pools after prolonged warm and heavy rains.

Core 752

A 3-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 783

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 787

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 788

A 9-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 789
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 791
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 1043
A 51,336-acre Core Habitat featuring Forest Core, Wetland Core, Aquatic Core, Priority Natural Communities, and Species of Conservation Concern.

The entire ocean-side shoreline of the outer Cape is one long Core Habitat, home to an astonishing 48 rare and uncommon plants and animals. Hatches Harbor and Race Point in Provincetown are important nesting areas for Piping Plovers (globally rare and federally Threatened) and Least Terns, as well as one of the most important pre-migration staging areas on the Atlantic Coast for Common and Roseate Terns (Roseates are globally rare and federally Endangered). Just inland, the Provincetown dunes are of statewide importance for the Threatened Eastern Spadefoot toads. Halfway down the Cape, Nauset Beach and Nauset Harbor are, like Hatches Harbor and Race Point, important for nesting Piping Plovers and Least Terns, and for staging for the Atlantic Coast populations of Common and Roseate Terns. At the southern tip of the outer Cape, the long barrier beach of South Beach and South Monomoy hosts an exceptional diversity of nesting and migrating coastal waterbirds and shorebirds. Large numbers of Piping Plovers and American Oystercatchers nest there, as well as one of the largest colonies of Common Terns on the Atlantic seaboard. It is one of the very few sites in the state where Roseate Terns and Laughing Gulls nest, and as with other sites along the outer Cape, one of the most important pre-migration staging areas on the Atlantic Coast for Common and Roseate Terns. It hosts the largest Herring and Great Black-backed gull colony in the state, and Snowy Egrets and Black-crowned Night-herons also nest here in good numbers.

Atlantic White Cedar Bogs are characterized by a nearly continuous heath shrub layer and an open canopy dominated by Atlantic white cedar. This community type occurs in kettlehole depressions overlain with waterlogged peat soils and sphagnum moss. This example of Atlantic White Cedar Bog consists of several small patches, but is in good condition and is an unusual occurrence for Cape Cod.
Coastal Atlantic White Cedar Swamps are acidic, low-nutrient basin swamps dominated by Atlantic white cedar in the overstory and a mixture of species in the understory. This community type typically occurs in basins on the Atlantic Coastal Plain. This example of Coastal Atlantic White Cedar Swamp, though moderate-sized, is in excellent condition and has well developed structural diversity and intact hydrology.

The Saline/Brackish Flats community is a sparsely vegetated community found on non-organic substrates exposed between tides. Flats develop in areas sufficiently quiet for sediments to accumulate. This Core has two examples of Saline/Brackish Flats including one that is in excellent condition, and harbors an excellent diversity of marine fauna and algae in a variety of microhabitats. Horseshoe crabs are abundant here, as are shorebirds during migration.

The Salt Marsh community type is a graminoid-dominated, tidally flooded coastal community with several vegetative zones. Salt Marshes form in areas subject to oceanic tides, but sheltered from wave energy. This excellent example of a Salt Marsh is large and intact with little evidence of degradation. It is mostly on protected land.

Level Bogs are dwarf-shrub peatlands, generally with pronounced hummocks and hollows in sphagnum moss. These wetland communities are very acidic and nutrient-poor because the peat isolates them from nutrients in groundwater and streams. Despite the presence of an exotic invasive species, this example of Level Bog is the best and largest example of its type on Cape Cod.

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. These excellent Intertidal Flats have scattered patches of marine algae with a wide variety of marine invertebrates that burrow in the sandy substrate and attract shorebirds, particularly during migration. Ocean currents and storms move these intertidal flats around.

Marine Subtidal Flats, often called eelgrass beds, are offshore communities dominated by eelgrass (Zostera marina) that occur in shallow water. They provide important habitat for juvenile fish and invertebrates, and feeding grounds for shorebirds. This example of Marine Subtidal Flats is the largest and most pristine in Massachusetts.

Maritime Beach Strand communities are sparsely vegetated, narrow, wrack-strewn areas between the line of high tide and the foredunes. They are usually part of barrier beach systems and are found seaward of any dunes, but above daily high tides. This large example of Maritime Beach Strand is in excellent condition due to the lack of human access. There is good species composition, natural processes are intact, and there is very little human disturbance.

The Maritime Dune Community consists of patches of herbaceous plants interspersed with areas of bare sand and shrubs. It occurs on windswept dunes within the salt spray zone, and often grades into shrubland or woodlands on more sheltered back dunes. This Core has two very large examples of
Maritime Dunes. One stretches over 2000 windswept acres. Lack of human and vehicular access has left it in excellent condition, and it is very well buffered by a mosaic of coastal natural communities. The other may be the largest example of Maritime Dunes in New England. Limited human and vehicular access have left much of it in excellent condition, with concentrated areas degraded by use and invasive exotic species.

Sandplain Heathlands are open, shrub dominated, coastal communities. They share many species with Sandplain Grasslands, but also have many plants from the Heath family. They often have sparse clumps of plants with bare soil or lichen between them. This example of Sandplain Heathland is recovering from years of disturbance associated with past military use. It is in fair condition.

Forest Cores are the best examples of large, intact forests that are least impacted by roads and development. Forest Cores support many bird species sensitive to the impacts of roads and development and help maintain ecological processes found only in unfragmented forest patches.

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.
BioMap2 Critical Natural Landscape in Wellfleet

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 Wellfleet. The elements listed here may not occur within the bounds of Wellfleet.

CNL 407
Coastal Adaptation Area

CNL 443
Coastal Adaptation Area

CNL 449
Coastal Adaptation Area

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

CNL 407
A <1-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 443
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 449
A 19-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 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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