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.
Table of Contents

Introduction

What is BioMap2 – Purpose and applications

One plan, two components

Understanding Core Habitat and its components

Understanding Critical Natural Landscape and its components

Understanding Core Habitat and Critical Natural Landscape Summaries

Sources of Additional Information

Ipswich Overview

Core Habitat and Critical Natural Landscape Summaries

Elements of BioMap2 Cores

Core Habitat Summaries

Elements of BioMap2 Critical Natural Landscapes

Critical Natural Landscape Summaries
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, 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

Get your copy of the BioMap2 report! Download from www.mass.gov/nhesp or contact Natural Heritage at 508-389-6360 or natural.heritage@state.ma.us.

For more information on rare species and natural communities, please see our fact sheets online at www.mass.gov/nhesp.
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 sites or have very few remaining acres in the state.
- Imperiled communities typically have 6-20 sites or few remaining acres in the state.
- Vulnerable communities typically have 21-100 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 Habitat 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

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, 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.

For more information on rare species and natural communities, please see our fact sheets online at www.mass.gov/nhesp.
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
Ipswich lies within the Southern New England Coastal Plains and Hills Ecoregion, an area comprised of plains with a few low hills. Forests are mainly central hardwoods with some transition hardwoods and some elm-ash-red maple and red and white pine. Many major rivers drain this area.

Ipswich at a Glance
- Total Area: 21,162 acres (33.1 square miles)
- Human Population in 2010: 13,175
- Open space protected in perpetuity: 9,526 acres, or 45.0% percent of total area*
- BioMap2 Core Habitat: 9,035 acres
- BioMap2 Core Habitat Protected: 5,636 acres or 62.4%
- BioMap2 Critical Natural Landscape: 10,615 acres
- BioMap2 Critical Natural Landscape Protected: 6,225 acres or 58.6%.

BioMap2 Components

Core Habitat
- 5 Exemplary or Priority Natural Community Cores
- 1 Forest Core
- 1 Wetland Core
- 8 Aquatic Cores
- 10 Species of Conservation Concern Cores**
  - 15 birds, 2 amphibians, 1 insect, 1 crustacean, 1 mussel, 1 snail, 1 plant

Critical Natural Landscape
- 4 Landscape Blocks
- 7 Wetland Core Buffers
- 5 Aquatic Core Buffers
- 14 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 Ipswich
Species of Conservation Concern, Priority and Exemplary Natural Communities, and Other Elements of Biodiversity in Ipswich

Mussels

Triangle Floater, (Alasmidonta undulata), Non-listed SWAP species

Snails

New England Siltsnail, (Floridobia winkleyi), SC

Crustaceans

Intricate Fairy Shrimp, (Eubranchipus intricatus), SC

Amphibians

Blue-spotted Salamander, (Ambystoma laterale), SC
Eastern Spadefoot, (Scaphiopus holbrookii), T

Birds

American Bittern, (Botaurus lentiginosus), E
Least Bittern, (Ixobrychus exilis), E
Pied-billed Grebe, (Podilymbus podiceps), E
Saltmarsh Sharp-tailed Sparrow, (Ammodramus caudactus), Non-listed SWAP
Sanderling, (Calidris alba), Non-listed SWAP
Seaside Sparrow, (Ammodramus maritimus), Non-listed SWAP
Short-billed Dowitcher, (Limnodromus griseus), Non-listed SWAP
Sora, (Porzana carolina), Non-listed SWAP
Sharp-shinned Hawk, (Accipiter striatus), SC
Common Tern, (Sterna hirundo), SC
Common Moorhen, (Gallinula chloropus), SC
Least Tern, (Sternula antillarum), SC
Eastern Whip-poor-will, (Caprimulgus vociferus), SC
Piping Plover, (Charadrius melodus), T
King Rail, (Rallus elegans), T

Plants

Seabeach Needlegrass, (Aristida tuberculosa), T

Priority Natural Communities

Coastal Interdunal Marsh/Swale, S1
Maritime Dune Community, S2
Maritime Beach Strand Community, S3
Estuarine Intertidal: Salt Marsh, S3
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 Ipswich

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

**Core 2674/2700/2702/2844/2849**
Wetland Core

**Core 2754/2759/2787/2827/2831/2898**
Priority & Exemplary Natural Communities
Estuarine Intertidal: Salt Marsh  S3

**Core 2784/2792**
Aquatic Core

**Core 2805**
Aquatic Core
Wetland Core
Species of Conservation Concern
Triangle Floater  *Alasmidonta undulata*  Non-listed SWAP
Blue-spotted Salamander  *Ambystoma laterale*  SC
Sharp-shinned Hawk  *Accipiter striatus*  SC

**Core 2837**
Forest Core
Aquatic Core
Wetland Core
Species of Conservation Concern
Blue-spotted Salamander  *Ambystoma laterale*  SC
Least Bittern  *Ixobrychus exilis*  E
Pied-billed Grebe  *Podilymbus podiceps*  E
Sharp-shinned Hawk  *Accipiter striatus*  SC

**Core 2888**
Aquatic Core
Species of Conservation Concern
Intricate Fairy Shrimp  *Eubranchipus intricatus*  SC

**Core 2894**
Aquatic Core
Species of Conservation Concern
Intricate Fairy Shrimp  *Eubranchipus intricatus*  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).
Core 3018B

Aquatic Core

Wetland Core

Priority & Exemplary Natural Communities

Black Oak - Scarlet Oak Forest/Woodland S3S4
Coastal Forest/Woodland S3
Coastal Interdunal Marsh/Swale S1
Estuarine intertidal: brackish tidal marsh S1
Estuarine intertidal: salt marsh S3
Marine subtidal: flats S2
Maritime beach strand community S3
Maritime dune community S2
Oak - hickory forest S4

Species of Conservation Concern

- Estuary Arrowhead: Sagittaria montevidensis ssp. spongiosa E
- Hemlock Parsley: Conioselinum chinense SC
- Long's Bulrush: Scirpus longii T
- Seabeach Dock: Rumex pallidus T
- Seabeach Needlegrass: Aristida tuberculosa T
- Silverling: Paronychia argyrocoma E
- Coastal Marsh Snail: Littoridinops tenuipes SC
- New England Siltsnail: Floridobia winkleyi SC
- Eastern Spadefoot: Scaphiopus holbrookii T
- Northern Leopard Frog: Rana pipiens Non-listed SWAP
- Atlantic Sturgeon: Acipenser oxyrinchus E
- Bridle Shiner: Notropis bifrenatus SC
- Shortnose Sturgeon: Acipenser brevirostrum E
- American Bittern: Botaurus lentiginosus E
- Bald Eagle: Haliaeetus leucocephalus T
- Barn Owl: Tyto alba SC
- Common Moorhen: Gallinula chloropus SC
- Common Tern: Sterna hirundo SC
- Eastern Whip-poor-will: Caprimulgus vociferus SC
- Grasshopper Sparrow: Ammodramus savannarum T
- King Rail: Rallus elegans T
- Least Bittern: Ixobrychus exilis E
- Least Tern: Sternula antillarum SC
- Northern Harrier: Circus cyaneus T
- Piping Plover: Charadrius melodus T
- Saltmarsh Sharp-tailed Sparrow: Ammodramus caudacatus Non-listed SWAP
- Sanderling: Calidris alba Non-listed SWAP
- Seaside Sparrow: Ammodramus maritimus Non-listed SWAP
- Sedge Wren: Cistothorus platensis E
- Sharp-shinned Hawk: Accipiter striatus 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>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-billed Dowitcher</td>
<td><em>Limnodromus griseus</em></td>
<td>Non-listed SWAP</td>
</tr>
<tr>
<td>Sora</td>
<td><em>Porzana carolina</em></td>
<td>Non-listed SWAP</td>
</tr>
<tr>
<td>Upland Sandpiper</td>
<td><em>Bartramia longicauda</em></td>
<td>E</td>
</tr>
</tbody>
</table>
Core Habitat Summaries

Core 2674
An 11-acre Core Habitat featuring Wetland Core.

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.

Core 2700
A 227-acre Core Habitat featuring Wetland Core.

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

Core 2702
An 85-acre Core Habitat featuring Wetland Core.

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 85-acre Wetland Core is among the largest 20% of Wetland Cores in this ecoregion. It occurs on very low elevation Granite, one of the least common ecological settings for Wetland Cores in the state.

Core 2754
A 34-acre Core Habitat featuring Priority Natural Communities.

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. At over 16,000 acres this example of Salt Marsh is the largest in New England. It is generally in good condition and largely under conservation ownership.

Core 2759
A 2-acre Core Habitat featuring Priority Natural Communities.

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.
Core 2784
A <1-acre Core Habitat featuring Aquatic Core.  
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 2787
A 16-acre Core Habitat featuring a Priority Natural Community.  
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. At over 16,000 acres this example of Salt Marsh is the largest in New England. It is generally in good condition and largely under conservation ownership.

Core 2792
A <1-acre Core Habitat featuring Aquatic Core.  
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 2805
An 842-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.  
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.  
Triangle Floaters are freshwater mussels commonly found in low-gradient river reaches with sand and gravel substrates and low to moderate water velocities, although they are found in a wide range of substrate and flow conditions.  
Adult and juvenile Blue-spotted Salamanders inhabit upland forests during most of the year, where they reside in small-mammal burrows and other subsurface retreats. Adults migrate during late winter or early spring to breed in vernal pools and fish-free areas of swamps, marshes, or similar wetlands. Larvae metamorphose in late summer or early fall, whereupon they disperse into upland forest.
Sharp-shinned Hawks nest in mixed woodlands and coniferous forests, often with nearby open areas. They are sensitive to disturbance around the nest, but they do occasionally nest near human development.

**Core 2827**

A <1-acre Core Habitat featuring a Priority Natural Community.

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. At over 16,000 acres this example of Salt Marsh is the largest in New England. It is generally in good condition and largely under conservation ownership.

**Core 2831**

A <1-acre Core Habitat featuring a Priority Natural Community.

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. At over 16,000 acres this example of Salt Marsh is the largest in New England. It is generally in good condition and largely under conservation ownership.

**Core 2837**

A 2,461-acre Core Habitat featuring Forest Core, Wetland Core, Aquatic Core, and Species of Conservation Concern.

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.

This 1,318-acre Forest Core is among the largest 20% of Forest Cores in the ecoregion, provides important and relatively large forest interior habitat in highly developed eastern Massachusetts, and is almost completely protected through Willowdale State Forest.

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.

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.

Adult and juvenile Blue-spotted Salamanders inhabit upland forests during most of the year, where they reside in small-mammal burrows and other subsurface retreats. Adults migrate during late winter or early spring to breed in vernal pools and fish-free areas of swamps, marshes, or similar wetlands. Larvae metamorphose in late summer or early fall, whereupon they disperse into upland forest.

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

Pied-billed Grebes are secretive marshbirds that typically nest in dense cattail beds adjacent to open water. They are very sensitive to disturbance and changes in water levels.

Sharp-shinned Hawks nest in mixed woodlands and coniferous forests, often with nearby open areas. They are sensitive to disturbance around the nest, but they do occasionally nest near human development.

Core 2844
A 73-acre Core Habitat featuring Wetland Core.

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.

Core 2849
An 87-acre Core Habitat featuring Wetland Core.

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 87-acre Wetland Core is among the largest 20% of Wetland Cores in this ecoregion.

Core 2888
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.

The Intricate Fairy Shrimp is a small, elongated crustacean that inhabits vernal pools.

Core 2894
A 4-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.

The Intricate Fairy Shrimp is a small, elongated crustacean that inhabits vernal pools.

For more information on rare species and natural communities, please see our fact sheets online at www.mass.gov/nhesp.
Core 2898

A 5-acre Core Habitat featuring a Priority Natural Community.

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. At over 16,000 acres this example of Salt Marsh is the largest in New England. It is generally in good condition and largely under conservation ownership.

Core 3018B

A 28,895-acre section of a larger 35,194-acre Core Habitat featuring Wetland Core, Aquatic Core, Priority Natural Communities, and Species of Conservation Concern.

All along the North Shore, from the mouth of the Merrimack River to the north shore of Cape Ann, stretches the Great Marsh, an extraordinary expanse of salt marsh. This marsh and its attendant barrier islands, such as Plum Island, support 25 MESA-listed rare species of birds, fish, snails, plants, and even the Eastern Spadefoot toad. The mouth of the Merrimack is home to a few federally Endangered Atlantic and Shortnose Sturgeons, as well as nesting and over-wintering Bald Eagles. On Plum Island, the North Pool, a freshwater impoundment in the salt marsh, is considered one of the most productive marsh bird sites in southern New England, supporting the entire suite of MESA-listed rare marsh birds, along with significant populations of Sora and Marsh Wren. A little to the south, the long barrier beach at Crane Beach is one of Massachusetts’ major nesting sites for the federally Threatened Piping Plover, as well as strong numbers of Least Terns.

Black Oak-Scarlet Oak Forest is a fairly open oak/heath community maintained by regular fire. Often occurring on dry slopes, this community grades into Mixed Oak and Pine-Oak Forests. The subcanopy is sparse, and the shrub layer dense. This young occurrence of Black Oak - Scarlet Oak Woodland is on two upland islands in the Merrimack River with few exotics and good natural diversity.

Coastal Forests are mixed deciduous communities, and are often shorter than forests further inland, but taller than maritime forests. They may have dense shrubs and vines. This community is found in sheltered areas along the coast. These patchy occurrences of Coastal Forest are on marsh island uplands on conservation land succeeding from past agricultural use.

The Coastal Interdunal Marsh/Swale community is a graminoid- or shrub-dominated coastal community that occurs in shallow depressions between sand dunes. They occur as part of a dune system, and the best examples are complexes of numerous swales. This example of the Coastal/Interdunal Marsh/Swale community is in good condition, and is well buffered within a naturally vegetated landscape.

The Brackish Tidal Marsh community is often found in stretches of coastal rivers where salt and fresh water mix, and consists of mixed herbaceous vegetation that is flooded by daily tides. This Core includes three examples of Brackish Tidal Marsh including the largest in Massachusetts, which is well buffered in the landscape, although exotic invasive species are present.

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. At over 16,000 acres this example of Salt Marsh is the largest in New England. It is generally in good condition and largely under conservation ownership.
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 extremely sparsely vegetated but has a rich diversity of invertebrate fauna that provide forage for many species of birds.

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 important example of Maritime Beach Strand extends over 2 miles. It is in very good condition despite heavy recreational use in some areas, provides important shorebird nesting habitat, and is well buffered by other coastal natural communities.

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 examples of Maritime Dunes, one covering 600 windswept acres and the other 900 acres. The larger is poorly buffered from development and is heavily disturbed by human impacts and invasive plant species. At the smaller site, there are over a dozen Coastal Interdunal Marsh/Swales of various sizes and composition, another type of uncommon natural community.

Oak-Hickory Forests are dominated by a variety of oak species, with hickories present in lower densities. They generally occupy upper slopes or ridgetops. A subcanopy commonly present includes hop hornbeam, flowering dogwood, and shadbush. This Oak - Hickory Forest occurs as many small pockets in the upland edges around a large salt marsh. The salt marsh, brooks, other wetlands, and roads separate the patches. Old mining depressions occur throughout.
**BioMap2 Critical Natural Landscape in Ipswich**

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

**CNL 1254**  
- Coastal Adaptation Area  
- Landscape Block  
- Wetland Core Buffer

**CNL 1262**  
- Coastal Adaptation Area

**CNL 1264**  
- Coastal Adaptation Area

**CNL 1266**  
- Aquatic Core Buffer  
- Wetland Core Buffer

**CNL 1272**  
- Coastal Adaptation Area

**CNL 1284**  
- Coastal Adaptation Area

**CNL 1287**  
- Aquatic Core Buffer  
- Landscape Block  
- Wetland Core Buffer

**CNL 1293**  
- Aquatic Core Buffer  
- Wetland Core Buffer

**CNL 1306**  
- Aquatic Core Buffer

**CNL 1307**  
- Coastal Adaptation Area

**CNL 1362**  
- Aquatic Core Buffer  
- Coastal Adaptation Area  
- Landscape Block  
- Tern Foraging Area
Critical Natural Landscape Summaries

**CNL 1254**

A 1,735-acre Critical Natural Landscape featuring Wetland Core Buffer, Landscape Block 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.

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.

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 1262**

A 94-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 1264**

A 2-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 1266**

A 366-acre Critical Natural Landscape featuring Aquatic Core Buffer and Wetland 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 1272**

A 75-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 1284**

An 11-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 1287
A 5,713-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.

This 4,878-acre Landscape Block is the ninth largest of 62 Blocks in the ecoregion. Unlike Landscape Blocks in much of the state that are dominated by upland forests, over 45% of this Landscape Block is made up of important wetland habitats. This Block is relatively well protected by public and private entities.

CNL 1293
A 593-acre Critical Natural Landscape featuring Aquatic Core Buffer and Wetland 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 1306
A 20-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 1307
A 5-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 1362
A 50,627-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.
This 8,989-acre Landscape Block is the fourth largest of 62 Blocks in the ecoregion. 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, barrier beach, and estuary habitats.

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.
Help Save Endangered Wildlife!

Please contribute on your Massachusetts income tax form or directly to the

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.