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.

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.

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](http://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](http://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](mailto: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](http://www.mass.gov/mgis).
**Town Overview**

Worcester lies on the border of the Lower Worcester Plateau, the Southern New England Coastal Plains and Hills, and the Worcester Plateau Ecoregions. The Lower Worcester Plateau Ecoregion is comprised of open hills and transition hardwood and central hardwood forests. Most parts drain to the Chicopee and Quinebaug Rivers. The Southern New England Coastal Plains and Hills Ecoregion is 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. The Worcester Plateau Ecoregion is an area that includes the most hilly areas of the central upland of Massachusetts with a few high monadnocks and mountains. The dominant forest types present are transition hardwoods and some northern hardwoods. Forested wetlands are common. Surface waters are acidic. Many major rivers drain this area.

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**Worcester at a Glance**

- **Total Area:** 24,602 acres (38.4 square miles)
- **Human Population in 2010:** 181,045
- **Open space protected in perpetuity:** 2,022 acres, or 8.2% percent of total area*
- **BioMap2 Core Habitat:** 1,481 acres
- **BioMap2 Core Habitat Protected:** 552 acres or 37.3%
- **BioMap2 Critical Natural Landscape:** 16 acres
- **BioMap2 Critical Natural Landscape Protected:** - acres or 0.0%

**BioMap2 Components**

**Core Habitat**

- 1 Aquatic Core
- 12 Species of Conservation Concern Cores**
  - 2 birds, 2 amphibians, 1 insect, 3 plants

**Critical Natural Landscape**

- 1 Aquatic Core Buffer

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* 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 Worcester

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BioMap2 Core Habitat

BioMap2 Critical Natural Landscape

1 Mile

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Natural Heritage & Endangered Species Program

Massachusetts Division of Fisheries and Wildlife
1 Rabbit Hill Road, Westborough, MA 01581
phone: 508-389-6360  fax: 508-389-7890

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 Worcester

Insects

Moths
Orange Sallow Moth, (Pyrrhia aurantiago), SC

Amphibians
Marbled Salamander, (Ambystoma opacum), T
Four-toed Salamander, (Hemidactylium scutatum), Non-listed SWAP

Birds
Grasshopper Sparrow, (Ammodramus savannarum), T
Eastern Whip-poor-will, (Caprimulgus vociferus), SC

Plants
Smooth Rock-cress, (Boechera laevigata), SC
Hairy Wild Rye, (Elymus villosus), E
Vasey’s Pondweed, (Potamogeton vaseyi), E

Other BioMap2 Components
Aquatic Core
Aquatic Core Buffer

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 Worcester

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

**Core 1459**

Species of Conservation Concern  
Grasshopper Sparrow  
*Ammodramus savannarum*  
T

**Core 1516**

Species of Conservation Concern  
Orange Sallow Moth  
*Pyrrhia aurantiago*  
SC  
Four-toed Salamander  
*Hemidactylium scutatum*  
Non-listed SWAP

**Core 1565**

Aquatic Core  
Species of Conservation Concern  
Vasey’s Pondweed  
*Potamogeton vaseyi*  
E

**Core 1592**

Species of Conservation Concern  
Marbled Salamander  
*Ambystoma opacum*  
T

**Core 1597**

Species of Conservation Concern  
Orange Sallow Moth  
*Pyrrhia aurantiago*  
SC

**Core 1606**

Species of Conservation Concern  
Orange Sallow Moth  
*Pyrrhia aurantiago*  
SC

**Core 1625**

Species of Conservation Concern  
Eastern Whip-poor-will  
*Caprimulgus vociferus*  
SC  
Grasshopper Sparrow  
*Ammodramus savannarum*  
T

**Core 1630**

Species of Conservation Concern  
Orange Sallow Moth  
*Pyrrhia aurantiago*  
SC
### Core 1641

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<th>Scientific Name</th>
<th>Category</th>
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<tr>
<td>Orange Sallow Moth</td>
<td><em>Pyrrhia aurantiago</em></td>
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### Core 1660

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<th>Scientific Name</th>
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<tr>
<td>Hairy Wild Rye</td>
<td><em>Elymus villosus</em></td>
<td>E</td>
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</table>

### Core 1696

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<tbody>
<tr>
<td>Four-toed Salamander</td>
<td><em>Hemidactylion scutatum</em></td>
<td>Non-listed SWAP</td>
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</table>

### Core 1718

<table>
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<th>Species of Conservation Concern</th>
<th>Scientific Name</th>
<th>Category</th>
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<tbody>
<tr>
<td>Smooth Rock-cress</td>
<td><em>Boechera laevigata</em></td>
<td>SC</td>
</tr>
</tbody>
</table>
Core Habitat Summaries

Core 1459

An 83-acre Core Habitat featuring a Species of Conservation Concern.

Grasshopper Sparrows nest in dry grasslands. Natural situations include sandplain grasslands, but they have adapted well to anthropogenic habitats such as airports and landfills. They are very sensitive to changes in plant composition and respond well to the effects of fire management.

Core 1516

A 505-acre Core Habitat featuring Species of Conservation Concern.

Orange Sallow Moths inhabit dry, open oak woodlands on rocky uplands. Their eggs are laid on false foxgloves (Aureolaria spp.) where the larvae feed on the flowers and developing seeds.

Four-toed Salamanders live in forested habitats surrounding swamps, bogs, marshes, vernal pools, and other fish-free waters that are used as breeding sites. Most breeding sites in MA are characterized by pit-and-mound topography with significant sphagnum-moss cover. Eggs are typically laid in mounds or patches of sphagnum moss that overhang water. Upon hatching, the larvae wriggle through the moss and drop into the water, where they will develop for several weeks prior to metamorphosis.

Core 1565

A 143-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.

Vasey's Pondweed is a rare aquatic plant of shallow, slow, open water. This species has floating leaves present when in flower or fruit.

Core 1592

A 167-acre Core Habitat featuring a Species of Conservation Concern.

Adult and juvenile Marbled Salamanders inhabit upland forests during most of the year, where they reside in small-mammal burrows and other subsurface retreats. Adults migrate during late summer or early fall to breed in dried portions of vernal pools, swamps, marshes, and other predominantly fish-free wetlands. Eggs are deposited under logs, leaf-litter, or grass tussocks and hatch after being inundated by fall rains. Larvae metamorphose during late spring, whereupon they disperse into upland forest.
Core 1597

A 244-acre Core Habitat featuring a Species of Conservation Concern.

Orange Sallow Moths inhabit dry, open oak woodlands on rocky uplands. Their eggs are laid on false foxgloves (*Aureolaria* spp.) where the larvae feed on the flowers and developing seeds.

Core 1606

A 45-acre Core Habitat featuring a Species of Conservation Concern.

Orange Sallow Moths inhabit dry, open oak woodlands on rocky uplands. Their eggs are laid on false foxgloves (*Aureolaria* spp.) where the larvae feed on the flowers and developing seeds.

Core 1625

A 1,061-acre Core Habitat featuring Species of Conservation Concern.

Eastern Whip-poor-wills are nocturnal, ground-nesting birds of open dry oak woodlands and pine barrens. Their diet consists primarily of moths taken on the wing. Though seldom seen, their call was once a common nighttime sound of summer nights across Massachusetts. Whip-poor-wills have experienced a dramatic range contraction in Massachusetts over the past few decades, and are now mostly relegated to a handful of large pine barrens. This range contraction is believed to the result of development and the habitat succession caused fire suppression. Whip-poor-wills often reclaim their former haunts following active habitat management, such as prescribed fire and targeted logging.

Grasshopper Sparrows nest in dry grasslands. Natural situations include sandplain grasslands, but they have adapted well to anthropogenic habitats such as airports and landfills. They are very sensitive to changes in plant composition and respond well to the effects of fire management.

Core 1630

A 13-acre Core Habitat featuring a Species of Conservation Concern.

Orange Sallow Moths inhabit dry, open oak woodlands on rocky uplands. Their eggs are laid on false foxgloves (*Aureolaria* spp.) where the larvae feed on the flowers and developing seeds.

Core 1641

A 112-acre Core Habitat featuring a Species of Conservation Concern.

Orange Sallow Moths inhabit dry, open oak woodlands on rocky uplands. Their eggs are laid on false foxgloves (*Aureolaria* spp.) where the larvae feed on the flowers and developing seeds.
Core 1660

A 12-acre Core Habitat featuring a Species of Conservation Concern.

In Massachusetts, Hairy Wild Rye inhabits high terrace floodplain forests with moist alluvial soils and moist to dry, rich, rocky, open woods and thickets.

Core 1696

A 34-acre Core Habitat featuring a Species of Conservation Concern.

Four-toed Salamanders live in forested habitats surrounding swamps, bogs, marshes, vernal pools, and other fish-free waters that are used as breeding sites. Most breeding sites in MA are characterized by pit-and-mound topography with significant sphagnum-moss cover. Eggs are typically laid in mounds or patches of sphagnum moss that overhang water. Upon hatching, the larvae wriggle through the moss and drop into the water, where they will develop for several weeks prior to metamorphosis.

Core 1718

A 6-acre Core Habitat featuring a Species of Conservation Concern.

In Massachusetts, Smooth Rock-cress, a biennial mustard, inhabits rich, rocky deciduous woods, rich rocky hillsides, ledges, talus slopes, and floodplain thickets and woodlands. It occupies open to shaded sites on dry to mesic soils.
BioMap2 Critical Natural Landscape in Worcester

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

**CNL 790**

Aquatic Core Buffer
Critical Natural Landscape Summaries

CNL 790

A 186-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.
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.