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

Other Species of Conservation Concern

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

Priority Natural Communities

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

Vernal Pools

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

Forest Cores

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

Wetland Cores

BioMap2 used an assessment of Ecological Integrity to identify the least disturbed wetlands in the state within undeveloped landscapes—those with intact buffers and little fragmentation or other stressors associated with development. These wetlands are most likely to support critical wetland functions (i.e., natural hydrologic conditions, diverse plant and animal habitats, etc.) and are most likely to maintain these functions into the future.

Aquatic Cores

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

Components of Critical Natural Landscape

Critical Natural Landscape identifies intact landscapes in Massachusetts that are better able to support ecological processes and disturbance regimes, and a wide array of species and habitats over long time frames.

Landscape Blocks

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

Upland Buffers of Wetland and Aquatic Cores

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

Upland Habitat to Support Coastal Adaptation

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

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

Legal Protection of Biodiversity

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

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

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

Additional Information

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

Contact the Natural Heritage & Endangered Species Program

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

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

Warren lies within the Lower Worcester Plateau Ecoregion, an area comprised of open hills and transition hardwood and central hardwood forests. Most parts drain to the Chicopee and Quinebaug Rivers.

Warren at a Glance

- Total Area: 17,685 acres (27.6 square miles)
- Human Population in 2010: 5,135
- Open space protected in perpetuity: 783 acres, or 4.4% percent of total area*
- BioMap2 Core Habitat: 1,291 acres
- BioMap2 Core Habitat Protected: 41 acres or 3.2%
- BioMap2 Critical Natural Landscape: 938 acres
- BioMap2 Critical Natural Landscape Protected: 168 acres or 17.9%.

BioMap2 Components

Core Habitat
- 6 Exemplary or Priority Natural Community Cores
- 5 Wetland Cores
- 2 Aquatic Cores
- 1 Vernal Pool Core
- 4 Species of Conservation Concern Cores**
  - 1 reptile, 3 insects, 1 mussel, 4 plants

Critical Natural Landscape
- 1 Landscape Block
- 5 Wetland Core Buffers
- 2 Aquatic Core Buffers

* 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 Warren

![Map of Warren with BioMap2 Core Habitat and Critical Natural Landscape indicated.](image)

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

1 Mile

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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 Warren

Mussels

Triangle Floater, \textit{(Alasmidonta undulata)}, Non-listed SWAP

Insects

Moths

Orange Sallow Moth, \textit{(Pyrrhia aurantiago)}, SC

Dragonflies

Spine-crowned Clubtail, \textit{(Gomphus abbreviatus)}, SC
Brook Snaketail, \textit{(Ophiogomphus aspersus)}, SC

Reptiles

Eastern Hognose Snake, \textit{(Heterodon platirhinos)}, Non-listed SWAP

Plants

Green Rock-cress, \textit{(Boechera missouriensis)}, T
Autumn Coralroot, \textit{(Corallorhiza odontorhiza)}, SC
Bristly Buttercup, \textit{(Ranunculus pensylvanicus)}, SC
New England Northern Reedgrass, \textit{(Calamagrostis stricta ssp. inexpansa)}, E

Priority Natural Communities

Ridgetop Pitch Pine - Scrub Oak Community, S2
Circumneutral Rocky Summit/Rock Outcrop Community, S2S3

Exemplary Natural Communities

Acidic Rocky Summit/Rock Outcrop Community
Mixed Oak Forest
Oak - Hickory Forest

Other BioMap2 Components

Aquatic Core
Wetland Core
Vernal Pool Core
Landscape Block
Aquatic Core Buffer
Wetland 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 Warren

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

**Core 1289**
- Wetland Core

**Core 1316**
- Vernal Pool Core

**Core 1373**
- Wetland Core

**Core 1375**
- Species of Conservation Concern
  - New England Northern Reed Grass *Calamagrostis stricta* ssp. *inexpansa* E

**Core 1425**
- Priority & Exemplary Natural Communities
  - Oak - Hickory Forest

**Core 1432**
- Priority & Exemplary Natural Communities
  - Ridgetop pitch pine - scrub oak community S2

**Core 1474**
- Wetland Core

**Core 1479**
- Wetland Core

**Core 1498**
- Wetland Core

**Core 1508**
- Aquatic Core
  - Species of Conservation Concern
    - Bristly Buttercup *Ranunculus pensylvanicus* SC
Core 1529

Aquatic Core
Priority & Exemplary Natural Communities
- Acidic Rocky Summit/Rock Outcrop Community
- Circumneutral Rocky Summit/Rock Outcrop Community S2S3
- Circumneutral Talus Forest/Woodland S3
- Hickory - Hop Hornbeam Forest/Woodland S2
- Mixed Oak Forest
- Oak - Hickory Forest
- Ridgetop Pitch Pine - Scrub Oak Community S2

Species of Conservation Concern
- Autumn Coralroot Corallorhiza odontorhiza SC
- Climbing Fumitory Adlumia fungosa SC
- Green Rock-cress Boechera missouriensis T
- Lion's Foot Nabalus serpentarius E
- Orange Sallow Moth Pyrrhia aurantiago SC
- Brook Snaketail Ophiogomphus aspersus SC
- Spine-crowned Clubtail Gomphus abbreviatus SC
- Blue-spotted Salamander Ambystoma laterale SC
- Spring Salamander Gyrinophilus porphyriticus Non-listed SWAP

Core 1595

Wetland Core
Aquatic Core
Priority & Exemplary Natural Communities
- Acidic Graminoid Fen S3
- Acidic Shrub Fen S3
- Circumneutral Talus Forest/Woodland S3
- Deep Emergent Marsh
- Shrub Swamp

Species of Conservation Concern
- Dwarf Bulrush Lipocarpha micrantha T
- Long's Bulrush Scirpus longii T
- Variable Sedge Carex polymorpha E
- Vasey’s Pondweed Potamogeton vaseyi E
- Triangle Floater Alasmidonta undulata Non-listed SWAP
- Blue-spotted Salamander Ambystoma laterale SC
- Four-toed Salamander Hemidactylium scutatum Non-listed SWAP
- Eastern Hognose Snake Heterodon platirhinos Non-listed SWAP
- Northern Black Racer Coluber constrictor Non-listed SWAP
- Spotted Turtle Clemmys guttata Non-listed SWAP
- Wood Turtle Glyptemys insculpta SC
- Bridle Shiner Notropis bifrenatus SC
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<th>Species</th>
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<td>Bald Eagle</td>
<td><em>Haliaeetus leucocephalus</em></td>
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<tr>
<td>King Rail</td>
<td><em>Rallus elegans</em></td>
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</tr>
<tr>
<td>Least Bittern</td>
<td><em>Ixobrychus exilis</em></td>
<td>E</td>
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<tr>
<td>Pied-billed Grebe</td>
<td><em>Podilymbus podiceps</em></td>
<td>E</td>
</tr>
<tr>
<td>Sedge Wren</td>
<td><em>Cistothorus platensis</em></td>
<td>E</td>
</tr>
<tr>
<td>Sora</td>
<td><em>Porzana carolina</em></td>
<td>Non-listed SWAP</td>
</tr>
</tbody>
</table>
Core Habitat Summaries

Core 1289
A 13-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 1316
An 87-acre Core Habitat featuring Vernal Pool Core.

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.

Core 1373
A 108-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 108-acre Wetland Core is among the largest 20% of Wetland Cores statewide and in this ecoregion.

Core 1375
An 8-acre Core Habitat featuring Species of Conservation Concern.

New England Northern Reed Grass is a perennial grass of stream beds, talus slopes, and alpine-like habitats. In Massachusetts, it is known from two rocky hill tops.

Core 1425
A 7-acre Core Habitat featuring a Priority 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 large example of Oak-Hickory Forest is in excellent condition, with no apparent threats, and is well buffered in a large naturally vegetated area.
Core 1432

A 7-acre Core Habitat featuring a Priority Natural Community.

The Ridgetop Pitch Pine-Scrub Oak community occurs on acidic bedrock along mountain ridges, often in a mosaic with one of the rocky summit communities. This fire-dependent community is tolerant of extremely severe growing conditions. This example of Ridgetop Pitch Pine-Scrub Oak Community is small but well developed, and is well buffered by naturally forested land. In the absence of fire suppression it will likely persist at this site.

Core 1474

A 14-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 1479

An 18-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 1498

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.

The Wetland Core occurs on mid elevation Mafic bedrock (rich in minerals like iron and magnesium), one of the least common ecological settings for Wetland Cores in the state.

Core 1508

A 12-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.
Bristly Buttercup is an annual or short-lived perennial herb with small, pale yellow flowers. A habitat generalist, Bristly Buttercup grows in a variety of areas that tend to have open to filtered light and that are wet to periodically flooded. It often inhabits areas with some disturbance.

**Core 1529**

A 3,001-acre Core Habitat featuring Aquatic Core, Priority Natural Communities, and Species of Conservation Concern.

Aquatic Cores are intact river corridors within which important physical and ecological processes of the river or stream occur. They delineate integrated and functional ecosystems for fish species and other aquatic Species of Conservation Concern.

Acidic Rocky Summits are open communities of shrubs, scattered grasses, mosses, lichens and occasional trees found on exposed rocky summits. These areas are dry with little soil, and can often be found as patches within other ridgetop communities. This example of Acidic Rocky Summit is large and diverse. It shows signs of human disturbance, but is in generally good condition and surrounded by other good community occurrences.

Circumneutral Rocky Summit/Rock Outcrops are small, open communities of grasses, sedges and herbaceous plants occurring on rocky summits, ridges or outcrops with exposed circumneutral (neither acidic nor calcareous) bedrock.

Two examples of Circumneutral Rocky Summit including one that is of very high quality, with good species diversity and natural disturbances such as windthrow that help this community persist. It is free of invasive species, and is well buffered by natural vegetation.

Circumneutral Talus Forest communities develop on boulder strewn slopes below slightly acidic cliffs or rock outcrops. There is often a gradient of vegetation density as the slope changes, with more trees on the lower slope.

Two examples of Circumneutral Talus Forest including on moderate-sized example that is in excellent condition, with tremendous floral diversity (over 200 species present), and is well buffered by naturally vegetated land.

Hickory-Hop Hornbeam Forests are open, hardwood forests dominated by various hickory species with significant hop hornbeam in the subcanopy. This community is characterized by a sparse shrub layer, and a nearly continuous cover of grasses and sedges. This large example of Hickory-Hop Hornbeam Forest occurs across a gradient of soil fertility which causes additional species diversity. It shows signs of past natural disturbance that has enhanced the species diversity found here.

Mixed Oak Forest is a broadly defined type of community dominated by tree oaks, that grades into other more narrowly defined communities. They often occur in areas that burn regularly, with dry soils and...
exposed slopes. This Mixed Oak Forest is the dominant community type in the area. This extensive occurrence has intact natural processes and widespread logging. There are few exotic species.

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 large example of Oak-Hickory Forest is in excellent condition, with no apparent threats, and is well buffered in a large naturally vegetated area.

The Ridgetop Pitch Pine-Scrub Oak community occurs on acidic bedrock along mountain ridges, often in a mosaic with one of the rocky summit communities. This fire-dependent community is tolerant of extremely severe growing conditions. This fair-sized Ridgetop Pitch Pine Scrub Oak community exhibits excellent structure and diversity, has no invasive species, is well-buffered by an unfragmented tract of 1000 acres of upland forest, and shows little sign of human disturbance.

Autumn Coralroot, a member of the Orchid family, is a brown-purple saprophyte, obtaining its nourishment from dead organic matter in the soil rather than from photosynthesis. It grows in either light soil or rich humus in open deciduous or mixed forests.

Climbing Fumitory is an herbaceous biennial vine that can reach lengths of 10 feet. It is usually found in the shade climbing over talus at the base of cliffs.

Green Rock-cress, a biennial mustard, inhabits non-acidic ledges in rocky woods and hills with full to filtered light exposure and mesic to dry soil.

Lion's Foot is a short-lived perennial plant of the Aster family. It is associated with dry rocky summits or sand plains and heathlands.

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.

Brook Snaketails are dragonflies whose nymphs can be found in clear, sand-bottomed streams with intermittent rapids, often flowing through dense woodland.

Larvae of Spine-crowned Clubtail dragonflies are aquatic and burrow just under the top of silty to sandy bottom sediments in medium to large rivers.

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.

Spring Salamander adults inhabit clean, cold, high-gradient brooks and headwater seeps in forest habitat, usually at elevation >100 m. Larvae are entirely aquatic and largely nocturnal, spending daylight hours buried below the streambed or hidden under stones. Adults are semi-aquatic and spend most of their
time under cover objects along the margins of brooks, springs, and seeps; however, they will venture into upland forest during rainy weather.

Core 1595

A 4,335-acre Core Habitat featuring Wetland Core, Aquatic Core, Priority Natural Communities, and Species of Conservation Concern.

In southwestern Worcester County, the Quaboag River and its tributaries, the Sevenmile River, the Brookfield River, and Coys Brook, wind slowly through four miles of peatlands and marshes, as well as two lakes, Quaboag Pond and Quacumquasit Pond. This watery landscape supports one of southern New England’s largest and most stable populations of the Endangered American Bittern, as well as nesting Sedge Wrens, Least Bitterns, Pied-billed Grebes, and King Rails in smaller numbers. The marshes are also home to one of the world’s largest populations of the globally rare Long’s Bulrush.

Acidic Graminoid Fens are sedge- and sphagnum-dominated acidic peatlands that experience some groundwater and/or surface water flow but no calcareous seepage. Standing water is often present throughout much of the growing season. This extraordinarily large and pristine example of Acidic Graminoid Fen is sedge dominated with scattered shrubs. It is within a 1117 acre roadless block and invasive species are not present and it has an intact hydrological system.

Acidic Shrub Fens are shrub-dominated acidic peatlands found primarily along pond margins in the eastern and central part of the state. These wetland communities experience some groundwater and/or surface water inputs, but no calcareous seepage. This is a large and pristine example of Acidic Shrub Fen that is part of a larger mosaic of acidic wetland ecosystems. Despite the presence of some exotic invasive species, it is in very good condition.

Circumneutral Talus Forest communities develop on boulder strewn slopes below slightly acidic cliffs or rock outcrops. There is often a gradient of vegetation density as the slope changes, with more trees on the lower slope. This example of Circumneutral Talus Forest, though small, is in excellent condition, with good species diversity. It occurs adjacent to several other interesting natural communities, including a Circumneutral Cliff and a cold swamp.

Deep Emergent Marshes are graminoid wetlands occurring on saturated soils that are seasonally flooded. They generally form in broad, flat areas bordering slow rivers or along pond margins, and often grade into shrub swamps. This Core has two examples of Deep Emergent Marsh incouding one that is of exemplary species diversity, size, and quality, and is home to both state-listed rare plants and animals.

Shrub Swamp communities are a common and variable type of wetlands occurring on seasonally or temporarily flooded soils. They are often found in the transition zone between emergent marshes and swamp forests. This example of Shrub Swamp is in excellent condition, and is an unusual and large variant enriched by groundwater seepage and dominated by Canadian Burnet.

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 Warren**

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

CNL 648
Wetland Core Buffer

CNL 691
Wetland Core Buffer

CNL 735
Wetland Core Buffer

CNL 758
Aquatic Core Buffer

CNL 764
Aquatic Core Buffer
Landscape Block
Wetland Core Buffer

CNL 775
Landscape Block
Wetland Core Buffer
Critical Natural Landscape Summaries

CNL 648
A 58-acre Critical Natural Landscape featuring 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 691
A 230-acre Critical Natural Landscape featuring 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 735
A 54-acre Critical Natural Landscape featuring 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 758
A 27-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.
A 6,123-acre Critical Natural Landscape featuring Aquatic Core Buffer, Wetland Core Buffer and Landscape Block.

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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.

A 1,441-acre Critical Natural Landscape featuring 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.

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Natural Heritage &
Endangered Species Fund

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