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 and stewardship.
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>
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<tr>
<td>Birds</td>
<td>27</td>
<td>23</td>
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<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>
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<td>17</td>
</tr>
<tr>
<td>Invertebrates</td>
<td>102</td>
<td>9</td>
</tr>
<tr>
<td>Plants</td>
<td>256</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>413</strong></td>
<td><strong>62</strong></td>
</tr>
</tbody>
</table>

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

Other Species of Conservation Concern

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

Priority Natural Communities

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

Vernal Pools

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

Forest Cores

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

Wetland Cores

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

Aquatic Cores

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

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

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

Upland Buffers of Wetland and Aquatic Cores
A variety of analyses were used to identify protective upland buffers around wetlands and rivers.

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

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

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

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

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

Additional Information

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

Contact the Natural Heritage & Endangered Species Program

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

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

Hadley lies within the Connecticut River Valley Ecoregion, the borders of which are primarily defined by the bedrock geology, has rich soils, a relatively mild climate and low rolling topography. The valley floor is primarily cropland and built land. Central hardwoods and transition hardwood forests cover the ridges.

Hadley at a Glance

- Total Area: 15,752 acres (24.6 square miles)
- Human Population in 2010: 5,250
- Open space protected in perpetuity: 4,533 acres, or 28.8% percent of total area*
- BioMap2 Core Habitat: 7,270 acres
- BioMap2 Core Habitat Protected: 2,539 acres or 34.9%
- BioMap2 Critical Natural Landscape: 3,727 acres
- BioMap2 Critical Natural Landscape Protected: 1,328 acres or 35.6%.

BioMap2 Components

Core Habitat
- 4 Exemplary or Priority Natural Community Cores
- 1 Forest Core
- 3 Aquatic Cores
- 3 Species of Conservation Concern Cores**
  - 3 birds, 1 reptile, 2 amphibians, 3 fishes, 9 insects, 5 mussels, 15 plants

Critical Natural Landscape
- 1 Landscape Block
- 4 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 Hadley

[Map showing BioMap2 Core Habitat and Critical Natural Landscape in Hadley with legend]

For more information on rare species and natural communities, please see our fact sheets online at www.mass.gov/nhesp.
Species of Conservation Concern, Priority and Exemplary Natural Communities, and Other Elements of Biodiversity in Hadley

Mussels
- Dwarf Wedgemussel, (Alasmidonta heterodon), E
- Yellow Lammasul, (Lampsilis cariosa), E
- Eastern Pondmussel, (Ligumia nasuta), SC
- Creeper, (Strophitus undulatus), SC
- Triangle Floater, (Alasmidonta undulata), Non-listed SWAP species

Insects
- Moths
  - Orange Sallow Moth, (Pyrrhia aurantiago), SC

- Dragonflies
  - Midland Clubtail, (Gomphus fraternus), E
  - Cobra Clubtail, (Gomphus vastus), SC
  - Skillet Clubtail, (Gomphus ventricosus), T
  - Stygian Shadowdragon, (Neurocordulia yamaskanensis), SC
  - Brook Snaketail, (Ophiogomphus aspersus), SC
  - Riverine Clubtail, (Stylurus amnicola), E
  - Arrow Clubtail, (Stylurus spiniceps), Non-listed SWAP species
  - Zebra Clubtail, (Stylurus scudderi), Non-listed SWAP species

Amphibians
- Eastern Spadefoot, (Scaphiopus holbrookii), T
- Northern Leopard Frog, (Rana pipiens), Non-listed SWAP

Fishes
- Shortnose Sturgeon, (Acipenser brevirostrum), E
- Eastern Silvery Minnow, (Hybognathus regius), SC
- Burbot, (Lota lota), SC

Reptiles
- Wood Turtle, (Glyptemys insculpta), SC

Birds
- Sedge Wren, (Cistothorus platensis), E
- Bald Eagle, (Haliaeetus leucocephalus), T
- Vesper Sparrow, (Poecetes gramineus), T

Plants
- Climbing Fumitory, (Adlumia fungosa), SC
- Green Dragon, (Arisaema dracontium), T
- Green Rock-cress, (Boechera missouriensis), T
- Glaucescent Sedge, (Carex glaucoidea), E

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).
Gray’s Sedge, *Carex grayi*, T
Cat-tail Sedge, *Carex typhina*, T
Nodding Chickweed, *Cerastium nutans*, E
Large-bracted Tick-trefoil, *Desmodium cuspidatum*, T
Intermediate Spike-sedge, *Eleocharis intermedia*, T
Frank’s Lovegrass, *Eragrostis frankii*, SC
Climbing Fern, *Lygodium palmatum*, SC
Violet Wood-sorrel, *Oxalis violacea*, E
Sandbar Willow, *Salix exigua* ssp. interior, T
Lily-leaf Twayblade, *Liparis lilifolia*, T
Tufted Hairgrass, *Deschampsia cespitosa* ssp. glauca, E

Priority Natural Communities

Black Gum-Pin Oak-Swamp White Oak “Perched” Swamp, S2
Major-river Floodplain Forest, S2

Exemplary Natural Communities

Low-energy Riverbank

Other BioMap2 Components

Forest Core
Aquatic 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 Hadley

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

Core 1886

Species of Conservation Concern
Eastern Spadefoot *Scaphiopus holbrookii* T

Core 1908

Species of Conservation Concern
Sedge Wren *Cistothorus platensis* E

Core 1938

Priority & Exemplary Natural Communities
Black Gum-Pin Oak-Swamp White Oak “Perched” Swamp S2

Core 2943C

Forest Core
Aquatic Core
Vernal Pool Core
Priority & Exemplary Natural Communities
Black Ash Swamp S2
Black Gum-Pin Oak-Swamp White Oak “Perched” Swamp S2
Circumneutral Rocky Summit/Rock Outcrop Community S2S3
Circumneutral Talus Forest/Woodland S3
Hickory - Hop Hornbeam Forest/Woodland S2
Species of Conservation Concern
Climbing Fumitory *Adlumia fungosa* SC
False Hop-sedge *Carex lupuliformis* E
Glaucocent Sedge *Carex glaucodea* E
Green Rock-cress *Boechera missouriensis* T
Large-bracted Tick-trefoil *Desmodium cuspidatum* T
Linear-leaved Milkweed *Asclepias verticillata* T
Nodding Chickweed *Cerastium nutans* E
Philadelphia Panic-grass *Panicum philadelphicum ssp. philadelphicum* SC
Purple Clematis *Clematis occidentalis* SC
Red Mulberry *Morus rubra* E
Swamp Cottonwood *Populus heterophylla* E
Violet Wood-sorrel *Oxalis violacea* E
Orange Sallow Moth *Pyrrhia aurantiago* SC
### Core 2943D

**Forest Core**
- Blue-spotted Salamander (Ambystoma laterale) - SC
- Skillet Clubtail (Gomphus ventricosus) - T
- Midland Clubtail (Gomphus fraternus) - E
- Arrow Clubtail (Stylurus spiniceps) - Non-listed SWAP

**Wetland Core**
- Eastern Box Turtle (Terrapene carolina) - SC
- Eastern Silvery Minnow (Hybognathus regius) - SC
- Spotted Turtle (Clemmys guttata) - Non-listed SWAP
- Shortnose Sturgeon (Acipenser brevirostrum) - E
- Bald Eagle (Haliaeetus leucocephalus) - T
- American Bittern (Botaurus lentiginosus) - E
- Northern Black Racer (Coluber constrictor) - Non-listed SWAP
- Wood Turtle (Glyptemys insculpta) - SC
- Burbot (Lota lota) - SC

**Aquatic Core**
- Eastern Pondmussel (Ligumia nasuta) - SC
- Dwarf Wedgemussel (Alasmidonta heterodon) - E
- Triangle Floater (Alasmidonta undulata) - Non-listed SWAP
- Arrow Clubtail (Stylurus spiniceps) - Non-listed SWAP
- Brook Snaketail (Ophiogomphus aspersus) - SC
- Riverine Clubtail (Stylurus amnicola) - SC
- Zebra Clubtail (Stylurus scudderi) - Non-listed SWAP
- Four-toed Salamander (Hemidactylium scutatum) - Non-listed SWAP
- Marbled Salamander (Ambystoma opacum) - T
- Spring Salamander (Gyrinophilus porphyriticus) - Non-listed SWAP
- Eastern Box Turtle (Terrapene carolina) - SC
- Northern Black Racer (Coluber constrictor) - Non-listed SWAP

**Vernal Pool Core**
- Cat-tail Sedge (Carex typhina) - T
- Green Dragon (Arisaema dracontium) - SC
- Narrow-leaved Spring Beauty (Claytonia virginica) - E
- Creeper (Strophitus undulatus) - SC
- Adder’s-tongue Fern (Ophioglossum pusillum) - T
- Climbing Fern (Lygodium palmatum) - SC
- Common Duckweed (Lemna minor) - SC
- American Bittern (Botaurus lentiginosus) - E

**Priority & Exemplary Natural Communities**
- Black Gum-Pin Oak-Swamp White Oak “Perched” Swamp - S2

**Species of Conservation Concern**
- Burbot (Lota lota) - SC
- Eastern Silvery Minnow (Hybognathus regius) - SC
- Shortnose Sturgeon (Acipenser brevirostrum) - E
- American Bittern (Botaurus lentiginosus) - E
- Bald Eagle (Haliaeetus leucocephalus) - T
<table>
<thead>
<tr>
<th>Sedge Wren</th>
<th>Cistothorus platensis</th>
<th>E</th>
</tr>
</thead>
</table>

**Core 2943N**

Wetland Core
Aquatic Core

Priority & Exemplary Natural Communities
- Black Gum-Pin Oak-Swamp White Oak “Perched” Swamp S2
- Calcareous Rock Cliff Community S3
- Calcareous Talus Forest/Woodland S3
- Circumneutral Rock Cliff Community S3
- High-energy Riverbank S3
- High-Terrace Floodplain Forest S2
- Low-energy Riverbank
- Major-river Floodplain Forest S2
- Sandplain Grassland S1
- Small-river Floodplain Forest S2
- Transitional Floodplain Forest S2
- Wet Meadow

Species of Conservation Concern
- American Waterwort Elatine americana E
- Appalachian Bristle-fern Trichomanes intricatum E
- Cat-tail Sedge Carex typhina T
- Climbing Fern Lygodium palmatum SC
- False Pennyroyal Trichostema brachiatum E
- Frank’s Lovegrass Eragrostis frankii SC
- Gray’s Sedge Carex grayi T
- Green Dragon Arisaema dracontium T
- Green Rock-cress Boechera missouriensis T
- Intermediate Spike-sedge Eleocharis intermedia T
- Low Bindweed Calystegia spithamaea E
- Many-fruited False-loosestrife Ludwigia polycarpa E
- Michaux’s Sandwort Minuartia michauxii T
- Mountain Alder Alnus viridis ssp. crispa T
- Narrow-leaved Spring Beauty Claytonia virginica E
- Nodding Chickweed Cerastium nutans E
- Philadelphia Panic-grass Panicum philadelphicum ssp. philadelphicum SC
- Purple Clematis Clematis occidentalis SC
- Putty-root Aplectrum hyemale E
- Pygmyweed Crassula aquatica T
- Red Mulberry Morus rubra E
- Sand Violet Viola adunca SC
- Sandbar Cherry Prunus pumila var. depressa T
- Sandbar Willow Salix exigua ssp. interior T

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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).
### Sharon Sedge  
*Carex lenticularis*

### Smooth Rock-cress  
*Boechera laevigata*

### Swamp Dock  
*Rumex verticillatus*

### Tiny Cow-lily  
*Nuphar microphylla*

### Tradescant’s Aster  
*Symphyotrichum tradescantii*

### Tuckerman’s Sedge  
*Carex tuckermanii*

### Tufted Hairgrass  
*Deschampsia cespitosa ssp. glauca*

### Upland White Aster  
*Oligoneuron album*

### White Adder’s-mouth  
*Malaxis monophyllos var. brachypoda*

### Winged Monkey-flower  
*Mimulus alatus*

### Wright’s Spike-rush  
*Eleocharis diandra*

### Sunderland Spring Planarian  
*Polycelis remota*

### Brook Floater (Swollen Wedgemussel)  
*Alasmidonta varicosa*

### Creeper  
*Strophitus undulatus*

### Dwarf Wedgemussel  
*Alasmidonta heterodon*

### Eastern Pondmussel  
*Ligumia nasuta*

### Tidewater Mucket  
*Leptodea ochracea*

### Triangle Floater  
*Alasmidonta undulata*

### Yellow Lampmussel  
*Lampsilis cariosa*

### Barrens Buckmoth  
*Hemileuca maia*

### New Jersey Tea Inchworm  
*Apodrepanulatrix liberaria*

### Orange Sallow Moth  
*Pyrrhia aurantiago*

### Pine Barrens Speranza  
*Speranza exonerata*

### Pine Barrens Zale  
*Zale lunifera*

### Pine Barrens Zanclognatha  
*Zanclognatha martha*

### Pink Sallow  
*Psectraglaea carnosa*

### Sandplain Euchlaena  
*Euchlaena madusaria*

### Frosted Elfin  
*Callophrys irus*

### Cobblestone Tiger Beetle  
*Cicindela marginipennis*

### Twelve-spotted Tiger Beetle  
*Cicindela duodecimguttata*

### Tule Bluet  
*Enallagma carunculatum*

### Arrow Clubtail  
*Stylurus spiniceps*

### Brook Snaketail  
*Ophiogomphus aspersus*

### Cobra Clubtail  
*Gomphus vastus*

### Midland Clubtail  
*Gomphus fraternus*

### Rapids Clubtail  
*Gomphus quadricolor*

### Riverine Clubtail  
*Stylurus amnicola*

### Skillet Clubtail  
*Gomphus ventricosus*

### Spine-crowned Clubtail  
*Gomphus abbreviatus*

### Stygian Shadowdragon  
*Neurocordulia yamaskanensis*

### Zebra Clubtail  
*Stylurus scudder*

### Eastern Spadefoot  
*Scaphiopus holbrookii*

### Jefferson Salamander  
*Ambystoma jeffersonianum*

### Marbled Salamander  
*Ambystoma opacum*
<table>
<thead>
<tr>
<th>Species</th>
<th>Scientific Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Leopard Frog</td>
<td><em>Rana pipiens</em></td>
<td>Non-listed SWAP</td>
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<tr>
<td>Wood Turtle</td>
<td><em>Glyptemys insculpta</em></td>
<td>SC</td>
</tr>
<tr>
<td>Burbot</td>
<td><em>Lota lota</em></td>
<td>SC</td>
</tr>
<tr>
<td>Eastern Silvery Minnow</td>
<td><em>Hybognathus regius</em></td>
<td>SC</td>
</tr>
<tr>
<td>Longnose Sucker</td>
<td><em>Catostomus catostomus</em></td>
<td>SC</td>
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<tr>
<td>Shortnose Sturgeon</td>
<td><em>Acipenser brevirostrum</em></td>
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<td>Bald Eagle</td>
<td><em>Haliaeetus leucocephalus</em></td>
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<tr>
<td>Vesper Sparrow</td>
<td><em>Poecetes gramineus</em></td>
<td>T</td>
</tr>
</tbody>
</table>
Core Habitat Summaries

Core 1886
A 490-acre Core Habitat featuring a Species of Conservation Concern.
The Eastern Spadefoot is a short-legged, squat, big-headed toad with unmistakable cat-like, vertically elliptical pupils. This burrowing species requires dry, sand or sandy loam soils characteristic of Pitch Pine barrens, coastal oak woodlands or sparse shrub growth, interspersed with temporary ponds. It prefers areas with leaf litter, and may be found in farmland areas. In the warmer months, from April to September, the Spadefoot comes up to breed in vernal pools after prolonged warm and heavy rains.

Core 1908
A 330-acre Core Habitat featuring a Species of Conservation Concern.
Sedge Wrens nest in large wet meadows. They are sensitive to changes in hydrology and seral succession.

Core 1938
A 7-acre Core Habitat featuring a Priority Natural Community.
Black Gum-Pin Oak-White Oak “Perched” swamps are an unusual type of wetland found in Massachusetts in one area of the Connecticut River Valley. This community type is dominated by red maple, with black gum, pin oak, and swamp white oak. This example of Black Gum-Pin Oak-Swamp White Oak “Perched” Swamp is poorly buffered by its residential and agricultural setting, but maintains the species diversity and structure that is characteristic of this rare natural community.

Core 2943C
A 4,211-acre section of a larger 93,990-acre Core Habitat featuring Forest Core, Aquatic Core, Vernal Pool Core, Priority Natural Communities, and Species of Conservation Concern.
The western section of the Holyoke Range is part of the extensive Connecticut River Core Habitat. This circumneutral traprock ridge supports an extraordinary diversity of rare plants - at least 15 - including the only sites in the state for False Hop-sedge, Swamp Cottonwood, and Appalachian Fir-moss. In addition, this part of the Core hosts significant populations of Marbled and Blue-spotted Salamanders.
Black Ash Swamps are a variant of red maple swamps with black ash co-dominant in the canopy. The soils that support Black Ash Swamps are enriched with less acidic, more nutrient-rich groundwater seepage. This example of Black Ash Swamp is small, but with good species diversity and well-buffered by natural vegetation.

Black Gum-Pin Oak-White Oak “Perched” swamps are an unusual type of wetland found in Massachusetts in one area of the Connecticut River Valley. This community type is dominated by red maple, with black gum, pin oak, and swamp white oak. This small community occurrence is part of a larger wetland system within a large roadless block. There is good diversity with no exotics.

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

[For more information on rare species and natural communities, please see our fact sheets online at www.mass.gov/nhesp.]
acidic nor calcareous) bedrock. This Core has two examples of Circumneutral Rocky Summit in very good condition and well buffered within a naturally vegetated landscape.

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 and very steep, has excellent biodiversity, including one of the few known locations of a state Endangered plant species. It has no sign of human disturbance and no exotic invasive species.

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 good sized Hickory - Hop Hornbeam Forest/Woodland is in a large protected open space. It is on a steep slope with Hickories dominating the canopy and abundant hop hornbeams in the subcanopy.

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.

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.

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 2943D**

A 7,350-acre section of a larger 93,990-acre Core Habitat featuring Forest Core, Wetland Core, Aquatic Core, Vernal Pool Core, Priority Natural Communities, and Species of Conservation Concern.

The Fort River and its tributaries are part of the extensive Connecticut River Core Habitat. Twenty-three rare and uncommon plants and animals are found here. The rarest of these is the federally Endangered and globally very rare Dwarf Wedgemussel.

Black Gum-Pin Oak-White Oak "Perched" swamps are an unusual type of wetland found in Massachusetts in one area of the Connecticut River Valley. This community type is dominated by red maple, with black gum, pin oak, and swamp white oak. This example of Black Gum-Pin Oak-Swamp White Oak "Perched" Swamp is moderately disturbed and has an exotic invasive species present.

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

Wetlands Cores are the least disturbed wetlands in the state within undeveloped landscapes—those with intact buffers and little fragmentation or other stressors associated with development. These wetlands are most likely to support critical wetland functions (i.e., natural hydrologic conditions, diverse plant and animal habitats, etc.) and are most likely to maintain these functions into the future.
Aquatic Cores are intact river corridors within which important physical and ecological processes of the river or stream occur. They delineate integrated and functional ecosystems for fish species and other aquatic Species of Conservation Concern.

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 2943N**

A 27,102-acre section of a larger 93,990-acre Core Habitat featuring Wetland Core, Aquatic Core, Priority Natural Communities, and Species of Conservation Concern.

The mainstem of the Connecticut River is the spine of a much more extensive Core Habitat that connects many of the most biologically important sites in the river valley. Just in the mainstem and adjacent uplands, 91 rare and uncommon species have been found. This large, meandering river hosts seven species of rare dragonflies, including the globally rare Skillet Clubtail and the Midland Clubtail, which is found nowhere else in the state. Below the Turners Dam, the river supports the federally Endangered Shortnose Sturgeon, the state’s only population of Burbot, and Eastern Silvery Minnows. High above the river Bald Eagles soar; this river is a key breeding and wintering site for this bird in Massachusetts. On the Connecticut border, the extensive floodplain forests of the Fanny Stebbins Wildlife Refuge are home to seven rare and uncommon plants, including the Endangered Winged Monkey-flower.

Black Gum-Pin Oak-White Oak “Perched” swamps are an unusual type of wetland found in Massachusetts in one area of the Connecticut River Valley. This community type is dominated by red maple, with black gum, pin oak, and swamp white oak. This moderate-sized example of Black Gum-Pin Oak- Swamp White Oak “Perched” Swamp is of high-quality and is surrounded by both forested upland and agricultural fields.

Calcareous Rock Cliffs are sparsely vegetated cliff communities. Unusual, highly specialized plants and ferns grow in cracks and ledges in the calcium-rich cliff face. This type of cliff community has more species diversity than Acidic Rock Cliffs. This Core has two small examples of Calcareous Rock Cliff in good condition, largely free of exotic invasive species and with several unusual plant species present. One is well buffered by natural vegetation, the other has a minimal buffer to human disturbances.

Calcareous Talus Forest communities develop on loose rocky slopes below calcareous cliffs or rock outcrops. The soil between the boulders is usually moist and loamy. Trees are usually best established on lower slopes. This example of Calcareous Talus Forest is in good condition, despite its proximity to development. It is of moderate size and an invasive exotic species is present.

Circumneutral Rock Cliff communities consist of extremely sparse plants growing on small ledges and in crevices on a circumneutral cliff face. These communities tend to support a greater diversity of species than do Acidic Rock Cliff communities. This example of Circumneutral Rock Cliff is open, dry, and west-facing, with many associated rare plants. Although these popular cliffs are somewhat disturbed by trampling, they remain a good-quality natural community.

High-Energy Riverbank communities are sparse, open graminoid communities found on cobble and sand deposits along fast-flowing rivers that experience severe flooding and ice scour. This Core has four small
examples and one large example of High-Energy Riverbank. Each is pristine with good species diversity and two in particular are well-buffered and influenced by intact natural processes that perpetuate them.

High-Terrace Floodplain Forests are deciduous hardwood forests that occur along riverbanks, above the zone of annual flooding. Although they do not flood annually, they flood often enough for the soil to be moderately enriched. This Core has two examples of High-Terrace Floodplain Forest. A moderate-sized example is well-developed, with good structure and diversity and moderate levels of disturbance. The other is quite small and in somewhat degraded condition.

Low-Energy Riverbanks are open herbaceous communities occurring on sandy or silty mineral soils of river and streambanks that do not experience severe flooding or ice scour. One example is a high-quality, species-rich Low-energy Riverbank community, a different community with more grasses than is found on more northern islands in the Connecticut River. Another example is moderate-sized and is an unusual variant of this community type that experiences periodic flooding, resulting in an unusual species composition.

Major-River Floodplain Forests are dominated by silver maple. This community is found along the floodplains of large rivers. The soils here are enriched with nutrients brought by annual floods, resulting in a diversity of plants and insects. Seven examples of Major-River Floodplain Forest ranging from an extremely small remnant of a once larger forest, somewhat degraded by exotic invasive species, to a large example in excellent condition with good floral diversity, with the exception of some recreational use areas that have been trampled and are being invaded by exotic species. This Core includes the largest and highest-quality examples of Major-River Floodplain Forest currently known in Massachusetts.

Sandplain Grasslands are open, essentially treeless, grass-dominated communities that generally occur on sand or other dry, poor soils. Occurrences are maintained by fire, salt spray, and, now, mowing. This Sandplain Grassland is an unusual Connecticut River Valley variant of this community, which is found primarily in the Cape and Islands. It is succeeding to forest and is threatened by human disturbances including ORV use.

Small-River Floodplain Forests are silver maple/green ash forests occurring on alluvial soils of small rivers and streams. They occur on small tributaries of the Connecticut and Nashua Rivers and along some small rivers of eastern Massachusetts. This Core includes three of the top four examples of Small-River Floodplain Forest in Massachusetts. They are in excellent condition, with good structure and diversity.

Transitional Floodplain Forests are riverside silver maple-green ash-American elm forests that experience annual floods. Of the three floodplain forest community types, these communities are intermediate in vegetation and soils. This Core has three examples of Transitional Floodplain Forest including the largest and best quality of its kind in Massachusetts. There are only five locations of this community type known in Massachusetts.

Wet Meadows are graminoid communities similar to Deep and Shallow Emergent Marshes except that they are temporarily rather than seasonally flooded. They occur in lake basins, wet depressions, along streams, and in sloughs along rivers. This small wet meadow is in very good condition, with high floristic diversity.

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 Hadley

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

**CNL 880**
- Aquatic Core Buffer
- Landscape Block
- Wetland Core Buffer

**CNL 932**
- Aquatic Core Buffer
- Landscape Block
- Wetland Core Buffer

**CNL 954**
- Wetland Core Buffer

**CNL 971**
- Wetland Core Buffer

**CNL 1322**
- Aquatic Core Buffer
- Landscape Block
- Wetland Core Buffer
Critical Natural Landscape Summaries

**CNL 880**
A 4,153-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 4,153-acre Landscape Block is the third largest in the ecoregion and is one of few intact Landscape Blocks in the otherwise fragmented Connecticut River Valley.

**CNL 932**
A 15,327-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.
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**CNL 954**

A 20-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 971**

A 103-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 1322**

A 288,370-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.
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