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

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**BioMap2**

**Conserving the Biodiversity of Massachusetts in a Changing World**

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

- 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

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**Natural Heritage & Endangered Species Program**

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).

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**Massachusetts Division of Fisheries and Wildlife**
1 Rabbit Hill Road, Westborough, MA 01581
phone: 508-389-6360  fax: 508-389-7890
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 Habitat to ensure continued protection.

In 2005 the Massachusetts Division of Fisheries and Wildlife completed a comprehensive State Wildlife Action Plan (SWAP) documenting the status of Massachusetts wildlife and providing recommendations to help guide wildlife conservation decision-making. SWAP includes all the wildlife species listed under the Massachusetts Endangered Species Act (MESA), as well as more than 80 species that need conservation attention but do not meet the requirements for inclusion under MESA. The SWAP document is organized around habitat types in need of conservation within the Commonwealth. While the original BioMap focused primarily on rare species protected under MESA, BioMap2 also addresses other Species of Conservation Concern, their habitats, and the ecosystems that support them to create a spatial representation of most of the elements of SWAP.

**BioMap2: One Plan, Two Components**

BioMap2 identifies two complementary spatial layers, Core Habitat and Critical Natural Landscape.

Core Habitat identifies key areas that are critical for the long-term persistence of rare species and other Species of Conservation Concern, as well as a wide diversity of natural communities and intact ecosystems across the Commonwealth. Protection of Core Habitats will contribute to the conservation of specific elements of biodiversity.

Critical Natural Landscape identifies large natural Landscape Blocks that are minimally impacted by development. If protected, these areas will provide habitat for wide-ranging native species, support intact ecological processes, maintain connectivity among habitats, and enhance ecological resilience to natural and anthropogenic disturbances in a rapidly changing world. Areas delineated as Critical Natural Landscape also include buffering upland around wetland, coastal, and aquatic Core Habitats to help ensure their long-term integrity.

The long-term persistence of Massachusetts biological resources requires a determined commitment to land and water conservation. Protection and stewardship of both Critical Natural Landscapes and Core Habitats are needed to realize the biodiversity conservation vision of BioMap2.

**Components of Core Habitat**

Core Habitat identifies specific areas necessary to promote the long-term persistence of rare species, other Species of Conservation Concern, exemplary natural communities, and intact ecosystems.

**Rare Species**

There are 432 native plant and animal species listed as Endangered, Threatened or Special Concern under the Massachusetts Endangered Species Act (MESA) based on their rarity, population trends, and threats to survival. For
BioMap2, NHESP staff identified the highest quality habitat sites for each non-marine species based on size, condition, and landscape context.

<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>
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<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>

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 theEstimated 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**

South 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.

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**South Hadley at a Glance**

- **Total Area:** 11,797 acres (18.4 square miles)
- **Human Population in 2010:** 17,514
- **Open space protected in perpetuity:** 2,952 acres, or 25.0% percent of total area*
- **BioMap2 Core Habitat:** 4,651 acres
- **BioMap2 Core Habitat Protected:** 2,280 acres or 49.0%
- **BioMap2 Critical Natural Landscape:** 4,113 acres
- **BioMap2 Critical Natural Landscape Protected:** 2,085 acres or 50.7%.

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**BioMap2 Components**

**Core Habitat**

- 9 Exemplary or Priority Natural Community Cores
- 1 Forest Core
- 13 Aquatic Cores
- 1 Vernal Pool Core
- 4 Species of Conservation Concern Cores**
  - 1 bird, 3 reptiles, 4 amphibians, 1 fish, 10 insects, 6 mussels, 27 plants

**Critical Natural Landscape**

- 2 Landscape Blocks
- 3 Wetland Core Buffers
- 6 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 South Hadley

![Map of South Hadley with BioMap2 Core Habitat and Critical Natural Landscape highlighted.]

Legend:
- BioMap2 Core Habitat
- BioMap2 Critical Natural Landscape

1 Mile scale bar is present.

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 South Hadley

Mussels
- **Brook Floater (Swollen Wedgemussel)**, (*Alasmidonta varicosa*), E
- **Yellow Lampmussel**, (*Lampsilis cariosa*), E
- **Tidewater Mucket**, (*Leptodea ochracea*), SC
- **Eastern Pondmussel**, (*Ligumia nasuta*), SC
- **Creep**, (*Strophitus undulatus*), SC
- **Triangle Floater**, (*Alasmidonta undulata*), Non-listed SWAP

Insects

Moths
- **Orange Sallow Moth**, (*Pyrrhia aurantiago*), SC
- **Pine Barrens Zanclognatha**, (*Zanclognatha martha*), T

Dragonflies
- **Spine-crowned Clubtail**, (*Gomphus abbreviatus*), SC
- **Midland Clubtail**, (*Gomphus fraternus*), E
- **Cobra Clubtail**, (*Gomphus vastus*), SC
- **Skillet Clubtail**, (*Gomphus ventricosus*), T
- **Stygian Shadowdragon**, (*Neurocordulia yamaskanensis*), SC
- **Riverine Clubtail**, (*Stylurus amnicola*), E
- **Arrow Clubtail**, (*Stylurus spiniceps*), Non-listed SWAP
- **Zebra Clubtail**, (*Stylurus scudderi*), Non-listed SWAP

Amphibians
- **Blue-spotted Salamander**, (*Ambystoma laterale*), SC
- **Marbled Salamander**, (*Ambystoma opacum*), T
- **Four-toed Salamander**, (*Hemidactylium scutatum*), Non-listed SWAP
- **Northern Leopard Frog**, (*Rana pipiens*), Non-listed SWAP

Fishes
- **Shortnose Sturgeon**, (*Acipenser brevirostrum*), E

Reptiles
- **Wood Turtle**, (*Glyptemys insculpta*), SC
- **Eastern Box Turtle**, (*Terrapene carolina*), SC
- **Northern Black Racer**, (*Coluber constrictor*), Non-listed SWAP

Birds
- **Bald Eagle**, (*Haliaeetus leucocephalus*), T

Plants
- **Climbing Fumitory**, (*Adlumia fungosa*), SC
- **Mountain Alder**, (*Alnus viridis ssp. crispa*), T
Green Dragon, (Arisaema dracontium), T
Linear-leaved Milkweed, (Asclepias verticillata), T
Green Rock-cress, (Boechera missouriensis), T
Glaucous-caned Sedge, (Carex glauca), E
Gray’s Sedge, (Carex grayi), T
False Hop-sedge, (Carex lupuliformis), E
Tuckerman’s Sedge, (Carex tuckermanii), E
Cat-tail Sedge, (Carex typhina), T
Nodding Chickweed, (Cerastium nutans), E
Purple Clematis, (Clematis occidentalis), SC
Large-bracted Tick-trefoil, (Desmodium cuspidatum), T
American Waterwort, (Elatine americana), E
Climbing Fern, (Lygodium palmatum), SC
Winged Monkey-flower, (Mimulus alatus), E
Red Mulberry, (Morus rubra), E
Tiny Cow-lily, (Nuphar microphylla), E
Upland White Aster, (Oligoneuron album), E
Violet Wood-sorrel, (Oxalis violacea), E
Philadelphia Panic-grass, (Panicum philadelphicum ssp. philadelphicum), SC
Swamp Cottonwood, (Populus heterophylla), E
Sandbar Cherry, (Prunus pumila var. depressa), T
Swamp Dock, (Rumex verticillatus), T
Sandbar Willow, (Salix exigua ssp. interior), T
Lily-leaf Twayblade, (Liparis liliifolia), T
Tufted Hairgrass, (Deschampsia cespitosa ssp. glauca), E

Priority Natural Communities
Small-river Floodplain Forest, S2
Black Ash Swamp, S2
Black Gum-Pin Oak-Swamp White Oak “Perched” Swamp, S2
Hickory - Hop Hornbeam Forest/Woodland, S2
Circumneutral Rocky Summit/Rock Outcrop Community, S2S3
Circumneutral Talus Forest/Woodland, S3

Exemplary Natural Communities
Wet Meadow

Other BioMap2 Components
Forest Core
Aquatic 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 South 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 South Hadley. The elements listed here may not occur within the bounds of South Hadley.

Core 1527

**Wetland Core**

**Aquatic Core**

**Species of Conservation Concern**

<table>
<thead>
<tr>
<th>Element</th>
<th>Scientific Name</th>
<th>Conservation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climbing Fern</td>
<td>Lygodium palmatum</td>
<td>SC</td>
</tr>
<tr>
<td>Philadelphia Panic-grass</td>
<td>Panicum philadelphicum ssp. philadelphicum</td>
<td>SC</td>
</tr>
<tr>
<td>Phyllira Tiger Moth</td>
<td>Grammia phyllira</td>
<td>E</td>
</tr>
<tr>
<td>Pine Barrens Zanclognatha</td>
<td>Zanclognatha martha</td>
<td>T</td>
</tr>
<tr>
<td>Sandplain Euchlaena</td>
<td>Euchlaena madusaria</td>
<td>SC</td>
</tr>
<tr>
<td>Blue-spotted Salamander</td>
<td>Ambystoma laterale</td>
<td>SC</td>
</tr>
<tr>
<td>Four-toed Salamander</td>
<td>Hemidactylus scutatum</td>
<td>Non-listed SWAP</td>
</tr>
<tr>
<td>Northern Leopard Frog</td>
<td>Rana pipiens</td>
<td>Non-listed SWAP</td>
</tr>
<tr>
<td>Eastern Ribbon Snake</td>
<td>Thamnophis sauritus</td>
<td>Non-listed SWAP</td>
</tr>
<tr>
<td>Northern Black Racer</td>
<td>Coluber constrictor</td>
<td>Non-listed SWAP</td>
</tr>
<tr>
<td>Grasshopper Sparrow</td>
<td>Ammodramus savannarum</td>
<td>T</td>
</tr>
<tr>
<td>Upland Sandpiper</td>
<td>Bartramia longicauda</td>
<td>E</td>
</tr>
<tr>
<td>Vesper Sparrow</td>
<td>Poecetes gramineus</td>
<td>T</td>
</tr>
</tbody>
</table>

Core 1739

**Forest Core**

**Wetland Core**

**Aquatic Core**

**Vernal Pool Core**

**Priority & Exemplary Natural Communities**

<table>
<thead>
<tr>
<th>Community</th>
<th>Conservation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Ash Swamp</td>
<td>S2</td>
</tr>
<tr>
<td>Circumneutral Rocky Summit/Rock Outcrop Community</td>
<td>S2S3</td>
</tr>
<tr>
<td>Hickory - Hop Hornbeam Forest/Woodland</td>
<td>S2</td>
</tr>
</tbody>
</table>

**Species of Conservation Concern**

<table>
<thead>
<tr>
<th>Element</th>
<th>Scientific Name</th>
<th>Conservation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back's Sedge</td>
<td>Carex backii</td>
<td>E</td>
</tr>
<tr>
<td>Drooping Speargrass</td>
<td>Poa saltuensis ssp. languida</td>
<td>E</td>
</tr>
<tr>
<td>False Hop-sedge</td>
<td>Carex lupuliformis</td>
<td>E</td>
</tr>
<tr>
<td>Green Rock-cress</td>
<td>Boechera missouriensis</td>
<td>T</td>
</tr>
<tr>
<td>Hairy Agrimony</td>
<td>Agrimonia pubescens</td>
<td>T</td>
</tr>
<tr>
<td>Large-bracted Tick-trefoil</td>
<td>Desmodium cuspidatum</td>
<td>T</td>
</tr>
<tr>
<td>Linear-leaved Milkweed</td>
<td>Asclepias verticillata</td>
<td>T</td>
</tr>
<tr>
<td>Narrow-leaved Vervain</td>
<td>Verbena simplex</td>
<td>E</td>
</tr>
<tr>
<td>Purple Clematis</td>
<td>Clematis occidentalis</td>
<td>SC</td>
</tr>
<tr>
<td>Species</td>
<td>Scientific Name</td>
<td>Status</td>
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<tr>
<td>------------------------------------------</td>
<td>----------------------------------</td>
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</tr>
<tr>
<td>Purple Milkweed</td>
<td>Asclepias purpurascens</td>
<td>E</td>
</tr>
<tr>
<td>Putty-root</td>
<td>Aplocrum hyemale</td>
<td>E</td>
</tr>
<tr>
<td>Red Mulberry</td>
<td>Morus rubra</td>
<td>E</td>
</tr>
<tr>
<td>Shining Wedgegrass</td>
<td>Sphenopholis nitida</td>
<td>T</td>
</tr>
<tr>
<td>Violet Wood-sorrel</td>
<td>Oxalis violacea</td>
<td>E</td>
</tr>
<tr>
<td>Marbled Salamander</td>
<td>Ambystoma opacum</td>
<td>T</td>
</tr>
<tr>
<td>Eastern Box Turtle</td>
<td>Terrapene carolina</td>
<td>SC</td>
</tr>
<tr>
<td>Northern Black Racer</td>
<td>Coluber constrictor</td>
<td>Non-listed SWAP</td>
</tr>
</tbody>
</table>

Core 2943C

Forest Core
Aquatic Core
Vernal Pool Core

Priority & Exemplary Natural Communities

<table>
<thead>
<tr>
<th>Community</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Ash Swamp</td>
<td>S2</td>
</tr>
<tr>
<td>Black Gum-Pin Oak-Swamp White Oak “Perched” Swamp</td>
<td>S2</td>
</tr>
<tr>
<td>Circumneutral Rocky Summit/Rock Outcrop Community</td>
<td>S2S3</td>
</tr>
<tr>
<td>Circumneutral Talus Forest/Woodland</td>
<td>S3</td>
</tr>
<tr>
<td>Hickory - Hop Hornbeam Forest/Woodland</td>
<td>S2</td>
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</table>

Species of Conservation Concern

<table>
<thead>
<tr>
<th>Species</th>
<th>Scientific Name</th>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>Climbing Fumitory</td>
<td>Adlumia fungosa</td>
<td>SC</td>
</tr>
<tr>
<td>False Hop-sedge</td>
<td>Carex lupuliformis</td>
<td>E</td>
</tr>
<tr>
<td>Glaucocent Sedge</td>
<td>Carex glaucoidea</td>
<td>E</td>
</tr>
<tr>
<td>Green Rock-cress</td>
<td>Boechera missouriensis</td>
<td>T</td>
</tr>
<tr>
<td>Large-bracted Tick-trefoil</td>
<td>Desmodium cuspisatum</td>
<td>T</td>
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<tr>
<td>Linear-leaved Milkweed</td>
<td>Asclepias verticillata</td>
<td>T</td>
</tr>
<tr>
<td>Nodding Chickweed</td>
<td>Cerastium nutans</td>
<td>E</td>
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<tr>
<td>Philadelphia Panic-grass</td>
<td>Panicum philadelphicum ssp. philadelphicum</td>
<td>SC</td>
</tr>
<tr>
<td>Purple Clematis</td>
<td>Clematis occidentalis</td>
<td>SC</td>
</tr>
<tr>
<td>Red Mulberry</td>
<td>Morus rubra</td>
<td>E</td>
</tr>
<tr>
<td>Swamp Cottonwood</td>
<td>Populus heterophylla</td>
<td>E</td>
</tr>
<tr>
<td>Violet Wood-sorrel</td>
<td>Oxalis violacea</td>
<td>E</td>
</tr>
<tr>
<td>Orange Sallow Moth</td>
<td>Pyrrhia aurantiago</td>
<td>SC</td>
</tr>
<tr>
<td>Arrow Clubtail</td>
<td>Stylurus spiniceps</td>
<td>Non-listed SWAP</td>
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<tr>
<td>Midland Clubtail</td>
<td>Gomphus fraternus</td>
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<tr>
<td>Riverine Clubtail</td>
<td>Stylurus annicola</td>
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<td>Skillet Clubtail</td>
<td>Gomphus ventricosus</td>
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<td>Blue-spotted Salamander</td>
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<td>Four-toed Salamander</td>
<td>Hemidactylum scutatum</td>
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<td>Marbled Salamander</td>
<td>Ambystoma opacum</td>
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<td>Eastern Box Turtle</td>
<td>Terrapene carolina</td>
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<tr>
<td>Wood Turtle</td>
<td>Glyptemys insculpta</td>
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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 bractiatum  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
  Shore Sedge  Carex lenticularis  T
  Smooth Rock-cress  Boechera laevigata  SC
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<tr>
<th>Species Program</th>
<th>Scientific Name</th>
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<tr>
<td>Swamp Dock</td>
<td>Rumex verticillatus</td>
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<td>Tiny Cow-lily</td>
<td>Nuphar microphylla</td>
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<td>Symphyotrichum tradescantii</td>
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<td>Tuckerman’s Sedge</td>
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<td>Tufted Hairgrass</td>
<td>Deschampsia cespitosa ssp. glauca</td>
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<td>Upland White Aster</td>
<td>Oligoneuron album</td>
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<td>White Adder’s-mouth</td>
<td>Malaxis monophyllus var. brachypoda</td>
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<td>Winged Monkey-flower</td>
<td>Mimulus alatus</td>
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<tr>
<td>Wright’s Spike-rush</td>
<td>Eleocharis diandra</td>
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<tr>
<td>Sunderland Spring Planarian</td>
<td>Polycelis remotas</td>
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<tr>
<td>Brook Floater (Swollen Wedgemussel)</td>
<td>Alasmidonta varicosa</td>
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<td>Creeper</td>
<td>Strophitus undulatus</td>
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<td>Dwarf Wedgemussel</td>
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<td>Ligumia nasuta</td>
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<td>Triangle Floater</td>
<td>Alasmidonta undulata</td>
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<td>Yellow Lampmussel</td>
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<td>Barrens Buckmoth</td>
<td>Hemileuca maia</td>
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<td>New Jersey Tea Inchworm</td>
<td>Apodrepanulatrix liberaria</td>
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<td>Orange Sallow Moth</td>
<td>Pyrrhia aurantiago</td>
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<td>Pine Barrens Speranza</td>
<td>Speranza exonerata</td>
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<td>Pine Barrens Zale</td>
<td>Zale lunifera</td>
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<td>Pink Barrens Zanclognatha</td>
<td>Zanclognatha martha</td>
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<td>Pink Sallow</td>
<td>Psectraglaea carnosa</td>
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<td>Sandplain Euchlaena</td>
<td>Euchlaena madusaria</td>
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<td>Frosted Elfin</td>
<td>Callophrys irus</td>
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<td>Cobbblestone Tiger Beetle</td>
<td>Cicindela marginipennis</td>
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<td>Twelve-spotted Tiger Beetle</td>
<td>Cicindela duodecimguttata</td>
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<td>Tule Bluet</td>
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<td>Spine-crowned Clubtail</td>
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<td>Stygian Shadowdragon</td>
<td>Neurocordulia yamaskanensis</td>
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<td>Zebra Clubtail</td>
<td>Stylurus scudder</td>
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<td>Eastern Spadefoot</td>
<td>Scaphiopus holbrookii</td>
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<td>Jefferson Salamander</td>
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<td>Marbled Salamander</td>
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<td>Northern Leopard Frog</td>
<td>Rana pipiens</td>
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<td>Burbot</td>
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<td>Longnose Sucker</td>
<td>Catostomus catostomus</td>
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<tr>
<td>Shortnose Sturgeon</td>
<td>Acipenser brevirostrum</td>
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<tr>
<td>American Bittern</td>
<td>Botaurus lentiginosus</td>
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<td>Bald Eagle</td>
<td>Haliaeetus leucocephalus</td>
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<td>Grasshopper Sparrow</td>
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<td>Least Bittern</td>
<td>Ixobrychus exilis</td>
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<tr>
<td>Vesper Sparrow</td>
<td>Pooecetes gramineus</td>
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Core Habitat Summaries

Core 1527

A 4,355-acre Core Habitat featuring Wetland Core, Aquatic Core, and Species of Conservation Concern. Wetland Cores are the least disturbed wetlands in the state within undeveloped landscapes—those with intact buffers and little fragmentation or other stressors associated with development. These wetlands are most likely to support critical wetland functions (i.e., natural hydrologic conditions, diverse plant and animal habitats, etc.) and are most likely to maintain these functions into the future.

The 112-acre Wetland Core is among the largest 20% of Wetland Cores statewide.

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.

Climbing Fern does not have the characteristic overall shape of most ferns. Instead, it is an evergreen, ivy-like plant which sprawls over the ground or climbs clockwise short distances up shrubs and coarse herbs. Climbing Fern grows in moist pine-oak-maple woods with an open understory, in moist thickets, and along stream margins. This plant prefers acidic soils that are sandy and rich in humus, but nutrient-poor.

Philadelphia Panic-grass, a member of the Grass family, is a slender, hairy, herbaceous, annual grass with yellow-green leaves. Philadelphia Panic-grass subspecies philadelphicum grows primarily on sandy shores of lakes and streams.

The Phyllira Tiger Moth is a prairie species that inhabits xeric sandplain grasslands in the northeastern U.S. Larvae are polyphagous on low-growing herbaceous plants.


Sandplain Euchlaena moths inhabit heathlands and other disturbance-dependent habitats. The primary larval host plants are heaths such as lowbush blueberry (Vaccinium spp.).

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.

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 Massachusetts 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.

Adult Northern Leopard Frogs are found in marshes, wet meadows, and peatlands in the narrow transition zone between open water and uplands; they retreat to the water of ponds and small streams.
when threatened. The herbivorous tadpoles require open water of sufficient permanence for their
development.

Eastern Ribbon Snakes are a medium-sized, very thin snake ranging from 7 to 34 inches long at maturity. They are active during the day and live in wetlands and edges of open water being comfortable in water and on land, eating amphibians, insects, and occasional fish. This species hibernates in ant mounds, rodent burrows, crayfish burrows, and bank burrows.

The Northern Black Racer is a snake of young upland forests, shrublands such as pitch pine/scrub oak communities and rock cliffs. Although relatively common, its range appears to be constricting and its abundance has been declining.

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.

Upland Sandpipers require very large, unbroken tracts of grassland, and in Massachusetts are now relegated mostly to anthropogenic habitats such as airports. They are very sensitive to changes in plant composition and respond well to the effects of well-planned fire management and thoughtful mowing regimes.

Vesper Sparrows typically nest in large open, dry sites with a mixture of short herbaceous vegetation and bare ground. They have become rare breeders in Massachusetts despite being attracted to anthropogenic landscapes for breeding, such as potato fields, abandoned sandpits, and the disturbed margins of airports.

**Core 1739**

A 3,830-acre Core Habitat featuring Forest Core, Wetland Core, Aquatic Core, Vernal Pool Core, Priority Natural Communities, and Species of Conservation Concern.

The eastern portion of the Holyoke Range, like the western section that is part of the extensive Connecticut River Core Habitat, is rich in rare and uncommon species - 19 in this Core - largely because of the circumneutral soils derived from the traprock bedrock. Eight Endangered plants, including Purple Milkweed and Violet Wood-sorrel, survive on this unusual bedrock. In addition, this Core hosts significant populations of two rare salamanders, Marbled and Blue-spotted.

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 has good structural and floristic diversity, and is well buffered in a naturally vegetated landscape.

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. This example of Circumneutral Rocky Summit is in excellent condition, and is very well buffered within a naturally vegetated landscape.

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 example of Hickory-Hop Hornbeam Forest is in very good condition, and is well buffered by naturally vegetated land.

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 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 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 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. Two small examples of Calcareous Rock Cliff including one that is in good condition, despite its minimal buffer to human disturbances. It is free of exotic invasive species and has several unusual plant species present.

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 includes 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.

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

CNL 737
   Aquatic Core Buffer

CNL 836
   Aquatic Core Buffer

CNL 880
   Aquatic Core Buffer
   Landscape Block
   Wetland Core Buffer

CNL 932
   Aquatic Core Buffer
   Landscape Block
   Wetland Core Buffer

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

CNL 737
A 49-acre Critical Natural Landscape featuring Aquatic Core Buffer.
A variety of analyses were used to identify protective upland buffers around wetlands and rivers. One, the variable width buffers methodology, included the most intact areas around each wetland and river, by extending deeper into surrounding unfragmented habitats than into developed areas adjacent to each wetland. Other upland buffers were identified through the rare species habitat analysis. In this way, the conservation of wetland buffers will support the habitats and functionality of each wetland, and also include adjacent uplands that are important for many species that move between habitat types.

CNL 836
A 160-acre Critical Natural Landscape featuring Aquatic Core Buffer.
A variety of analyses were used to identify protective upland buffers around wetlands and rivers. One, the variable width buffers methodology, included the most intact areas around each wetland and river, by extending deeper into surrounding unfragmented habitats than into developed areas adjacent to each wetland. Other upland buffers were identified through the rare species habitat analysis. In this way, the conservation of wetland buffers will support the habitats and functionality of each wetland, and also include adjacent uplands that are important for many species that move between habitat types.

CNL 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.

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.

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**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.

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.
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