BioMap2

CONSERVING THE BIODIVERSITY OF MASSACHUSETTS IN A CHANGING WORLD

Clinton

Produced in 2012

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 <u>not</u> intended for use in state regulations.

Natural Heritage & Endangered Species Program
Massachusetts Division of Fisheries & Wildlife

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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 sites or have very few remaining acres in the state.
- Imperiled communities typically have 6-20 sites or few remaining acres in the state.
- Vulnerable communities typically have 21-100 sites or limited acreage across the state.
- Secure communities typically have over 100 sites or abundant acreage across the state; however, excellent examples are identified as Core Habit to ensure continued protection.

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

BioMap2: One Plan, Two Components

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

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

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

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

Components of Core Habitat

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

Rare Species

There are 432 native plant and animal species listed as Endangered, Threatened or Special Concern under the Massachusetts Endangered Species Act (MESA) based on their rarity, population trends, and threats to survival. For

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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*.

Taxonomic Group	MESA-listed Species	Non-listed Species of Conservation Concern
Mammals	4	5
Birds	27	23
Reptiles	10	5
Amphibians	4	3
Fish	10	17
Invertebrates	102	9
Plants	256	0
Total	**413**	**62**

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

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Town Overview

Clinton lies within the Southern New England Coastal Plains and Hills Ecoregion, an area comprised of plains with a few low hills. Forests are mainly central hardwoods with some transition hardwoods and some elm-ash-red maple and red and white pine. Many major rivers drain this area.

Clinton at a Glance

- Total Area: 4,647 acres (7.3 square miles)
- Human Population in 2010: 13,606
- Open space protected in perpetuity: 1,483 acres, or 31.9% percent of total area*
- *BioMap2* Core Habitat: 1,208 acres
- *BioMap2* Core Habitat Protected: 999 acres or 82.7%
- *BioMap2* Critical Natural Landscape: 996 acres
- *BioMap2* Critical Natural Landscape Protected: 992 acres or 99.6%.

BioMap2 Components

Core Habitats

- 2 Exemplary or Priority Natural Community Cores
- 2Aquatic Cores
- 6 Species of Conservation Concern Cores**
  - 3 birds, 2 amphibians, 2 plants

Critical Natural Landscape

- 1 Landscape Block
- 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.

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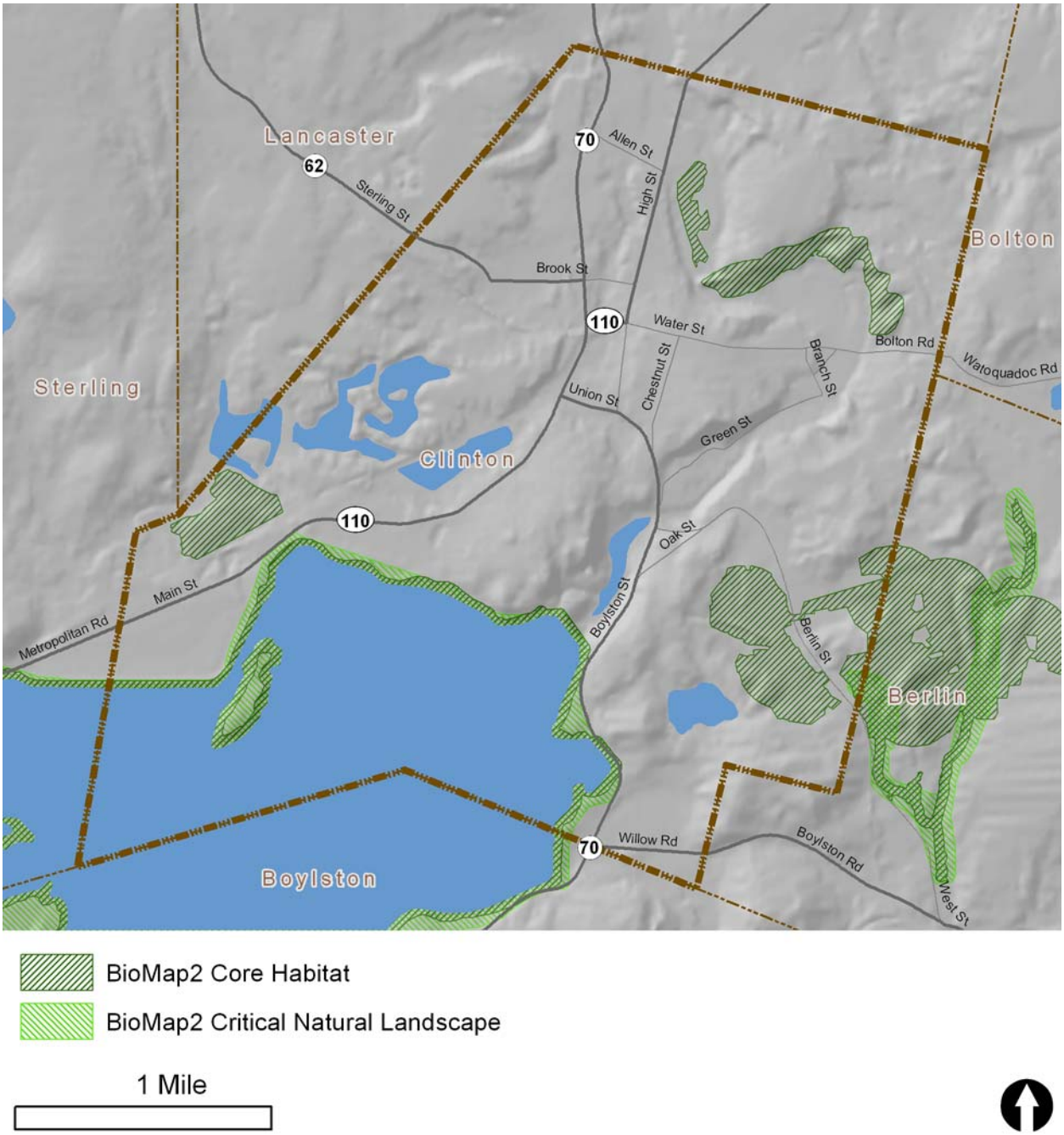
BioMap2 Core Habitat and Critical Natural Landscape in Clinton



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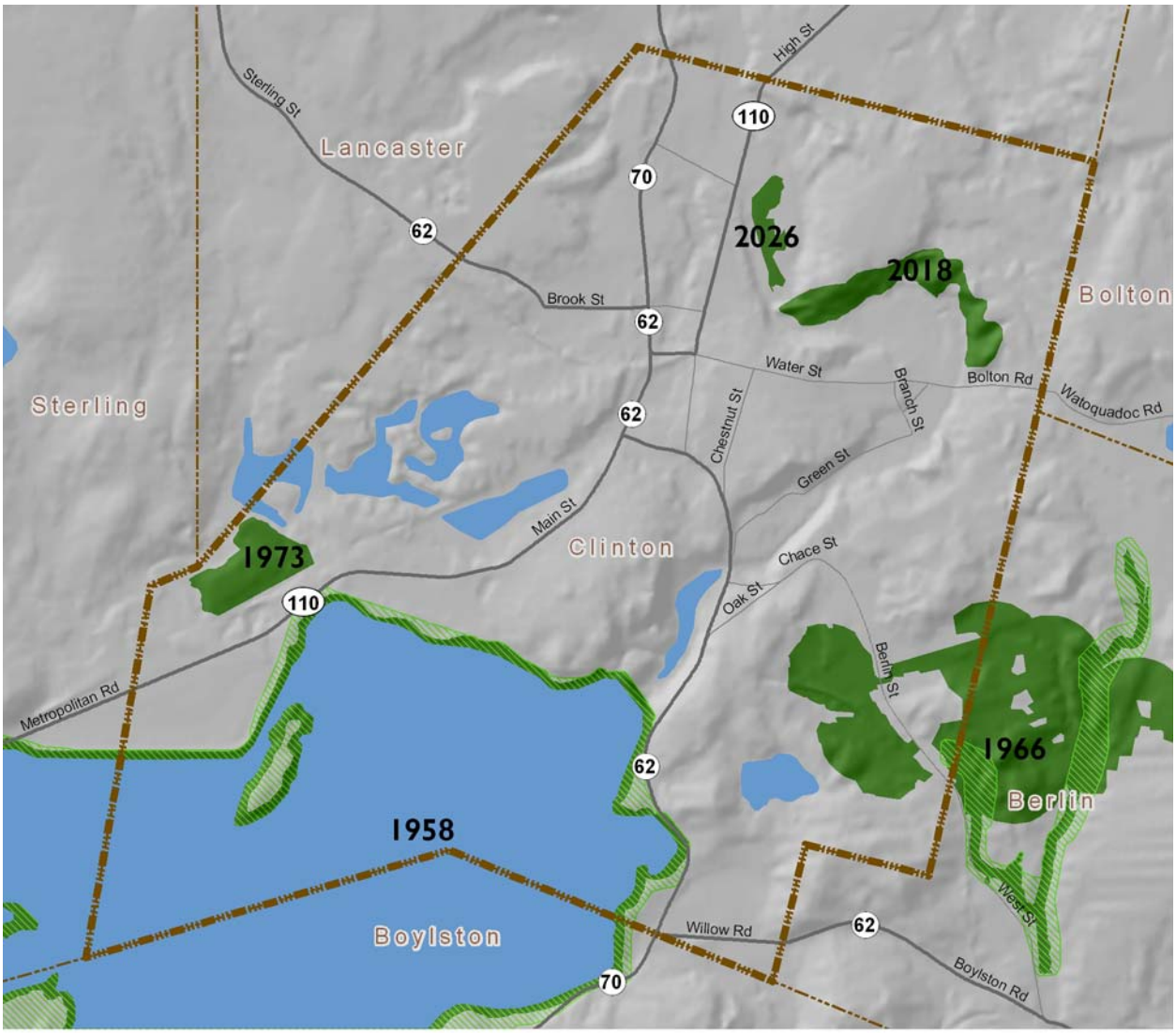
BioMap2 Core Habitat in Clinton

Core IDs correspond with the following element lists and summaries.



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Elements of *BioMap2* Cores

This section lists all elements of *BioMap2* Cores that fall *entirely or partially* within Clinton. The elements listed here may not occur within the bounds of Clinton.

Core 1958

Aquatic Core

Species of Conservation Concern

Dwarf Bulrush	*Lipocarpha micrantha*	T
Orange Sallow Moth	*Pyrrhia aurantiago*	SC
Eastern Hognose Snake	*Heterodon platirhinos*	Non-listed SWAP
Bald Eagle	*Haliaeetus leucocephalus*	T
Common Loon	*Gavia immer*	SC

Core 1966

Aquatic Core

Species of Conservation Concern

Four-toed Salamander	*Hemidactylium scutatum*	Non-listed SWAP
Marbled Salamander	*Ambystoma opacum*	T

Core 1973

Species of Conservation Concern

Grasshopper Sparrow	*Ammodramus savannarum*	T

Core 2018

Priority & Exemplary Natural Communities

Black Oak - Scarlet Oak Forest/Woodland		S3S4
Dry riverside bluff		S2

Species of Conservation Concern

Papillose Nut Sedge	*Scleria pauciflora*	E

Core 2026

Species of Conservation Concern

Grass-leaved Ladies'-tresses	*Spiranthes vernalis*	T

Core Habitat Summaries

Core 1958

A 5,214-acre Core Habitat featuring Aquatic Core and Species of Conservation Concern.

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

Dwarf Bulrush is a tiny, wiry, annual sedge, which inhabits sandy to peaty shores of low-nutrient ponds and lakes.

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

Eastern Hognose Snakes are shy, slow-moving, thick-bodied snakes that specialize in feeding on toads, although they eat other amphibians or other small animals as well. They require sandy soils in their habitat; both wooded and open habitats are known.

Bald Eagles nest in tall trees along large lakes and rivers. The bulk of their diet consists of fish. Large lakes and rivers also support important winter congregations of Bald Eagles.

Common Loons rely upon large, clear lakes as breeding habitat. They only leave the water to tend to their nests, which are either placed in shoreline vegetation, or upon specially designed nesting platforms built for them by conservationists. Their diet consists primarily of fish, and Common Loons have been shown to be particular vulnerable to human disturbance and toxins, especially mercury.

Core 1966

A 428-acre Core Habitat featuring Aquatic Core and Species of Conservation Concern.

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

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

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

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Core 1973

A 47-acre Core Habitat featuring a Species of Conservation Concern.

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

Core 2018

A 60-acre Core Habitat featuring Priority Natural Communities and a Species of Conservation Concern.

Black Oak-Scarlet Oak Forest is a fairly open oak/heath community maintained by regular fire. Often occurring on dry slopes, this community grades into Mixed Oak and Pine-Oak Forests. The subcanopy is sparse, and the shrub layer dense. This example of Black Oak-Scarlet Oak Forest is in good condition, with very high species diversity.

Dry Riverside Bluff communities are found on sandy steep areas next to rivers, and support species of dry habitats in predominantly open conditions. Some examples have been heavily influenced by historical fires. This is a very good example of the globally rare Dry Riverside Bluff community. Although this site is next to railroad tracks, it is somewhat buffered within a small but good quality Black Oak - Scarlet Oak Forest.

Papillose Nut Sedge is 8 to 19 inches tall with stems that arise from hard knotty rhizomes. The leaves are narrow, 1-3 mm wide. In Massachusetts, it occurs in dry, open, grassy areas surrounded by scrub oak barrens or oak-pitch pine woods.

Core 2026

A 17-acre Core Habitat featuring a Species of Conservation Concern.

Grass-leaved Ladies'-tresses is a slender, erect orchid of dry sandy habitats.

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BioMap2 Critical Natural Landscape in Clinton

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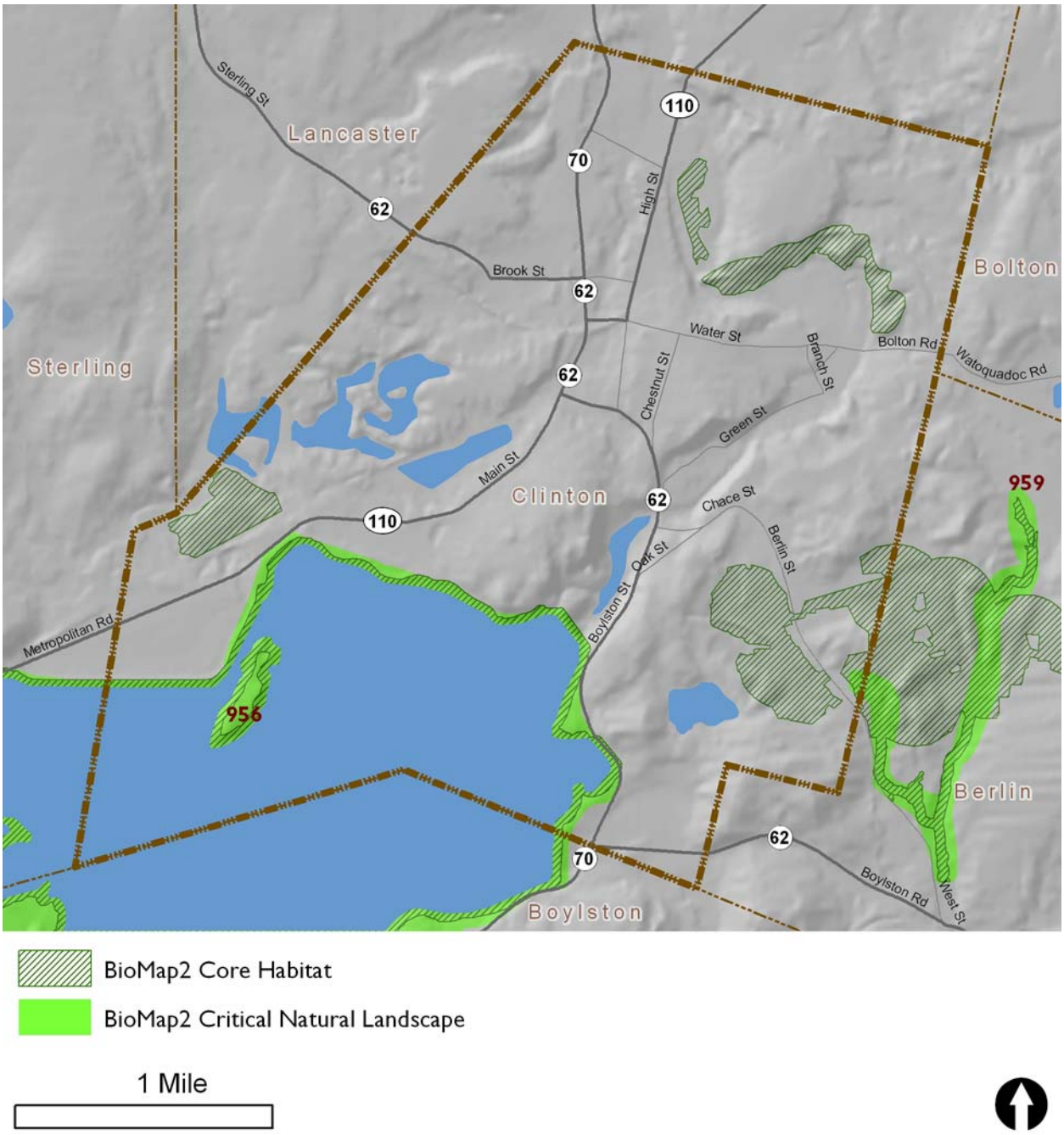

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Elements of *BioMap2* Critical Natural Landscapes

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CNL 956

Aquatic Core Buffer
Landscape Block

CNL 959

Aquatic Core Buffer

Critical Natural Landscape Summaries

CNL 956

A 6,156-acre Critical Natural Landscape featuring Aquatic 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 5,949-acre Landscape Block is the seventh largest of 62 Blocks in the ecoregion. Unlike Landscape Blocks in much of the state that are dominated by upland forests, the upland forest in this Block is complemented by the vast expanse of open water of the Wachusett Reservoir.

CNL 959

A 149-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.

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Help Save Endangered Wildlife!

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Natural Heritage & Endangered Species Fund

To learn more about the Natural Heritage & Endangered Species Program and the Commonwealth's rare species, visit our web site at www.mass.gov/nhesp.