Commonwealth of Massachusetts

Division of Fisheries & Wildlife

Jack Buckley, *Director*

June 16, 2015

Eammon Coughlin, Planner
Berkshire Regional Planning Commission
1 Fenn Street, Suite 201
Pittsfield, MA 01201

Re: Open Space Plan; 98-3310 Town of Lee

Dear Mr. Coughlin:

Thank you for contacting the Natural Heritage and Endangered Species Program (NHESP) regarding the update for the Open Space and Recreation Plan for the Town of Lee. A letter was previously prepared for Lee in 1998 and this serves as an update to that letter. Enclosed is information on the rare species, priority natural communities, vernal pools, and other aspects of biodiversity that we have documented in Lee. The town is encouraged to include this letter, species list, appropriate maps, and the BioMap2 town report in the Open Space and Recreation Plan.

Based on the BioMap2 analysis and additional information discussed below, NHESP recommends land protection in the BioMap2 cores or protecting lands adjacent to existing conservation land – or, best, a combination of both when feasible. All of the areas discussed below are important for biodiversity protection in Lee. Land adjacent to the Cold Water Fisheries is also important

Enclosed is a list of rare species and natural communities known to occur or have occurred in Lee. This list and the list in BioMap2 differ because this list and discussion include all of the uncommon aspects of biodiversity in Lee that NHESP has documented and BioMap2 focused on occurrences with state-wide significance and included non-MESA listed species of conservation interest from the State Wildlife Action Plan. In addition, the NHESP database is constantly updated and the enclosed list may include species of conservation interest identified in town since BioMap2 was produced in 2010.

In early 2013 we sent each town copies of its *BioMap2* Town Report which were developed to provide local biodiversity information to assist in conservation efforts at the town or regional level. We encourage inclusion of the town BioMap2 report and fact sheets on its components in the OSRP: they are available from http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/land-protection-and-management/biomap2/biomap2-town-reports.html. The BioMap2 components relevant to Lee are BioMap2 Core Habitats for Species of Conservation Concern, and Forest, Wetland and Aquatic Cores, and, in Critical Natural Landscape (CNL), Landscape Block and Upland Buffers of Wetland and Aquatic Cores. The components are described in full in the BioMap2 summary report.

http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/land-protection-and-management/biomap2/biomap2-overview-and-summary.html

[Please note that all of NHESP's web addresses have changed; web addresses in publications from before June 2013, including inside the BioMap2 report, will not work properly.]

I encourage you to download species, natural community, and BioMap2 fact sheets from our website to include in the OSRP with the species list and BioMap2 discussion: http://www.mass.gov/dfwele/dfw/nhesp/species_info/fact_sheets.htm; for some delisted species: http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/species-information-and-conservation/mesa-

list/non-listed-species-of-conservation-interest.html
and for natural communities:
http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/natural-communities/

The uncommon species in Lee have a mix of habitat preferences, with many needing wetlands and the adjacent uplands, and a few being species of uplands. Many of the rivers in Lee have been classified as Cold-water Fisheries, which support numerous species beyond cold water fish.

Lee is one of the towns with town wide maps showing areas forested in the 1830s, areas of possible Primary Forest, most of which were untilled woodlots and wooded pastures (areas shown in transparent gray blue on the attached map). Such lands have greater biodiversity than areas that have been tilled. These are not Old Growth, they have been harvested and pastured, but the ground may not have been tilled. Harvard Forest digitized maps from the 1830s that the Massachusetts legislature mandated that the Towns make. Lee's map exists and shows areas that were forested in the 1830s. NHESP GIS staff took those data and combined them with information from MassGIS' landcover datalayer made from 1999 aerial photos. Although a great deal will have gone on in those areas in the time between the map dates, some areas that were forested in both times won't ever have been tilled. Surveys of the soil structure in the individual sites are necessary to determine whether those sites are Primary Forest. The importance of primary forest is that such sites retain more native biodiversity than sites that have been tilled: soil fauna and flora, microorganisms and plants that reproduce primarily vegetatively contribute to the higher biodiversity. In addition, a variety of species of wildflowers are more common in untilled forests than previously tilled lands. The areas of 1830s forest on private land would be good targets for conservation acquisition to maintain the biodiversity of the town and region. The Harvard Forest website contains information on the 1830s forest datalayer and copies of papers with discussion of the information. (See Harvard Forest. 2002. 1830 Map Project. Harvard Forest Archives, Petersham, MA and B. Hall, G. Motzkin, D. R. Foster, M. Syfert, and J. Burk. 2002. Three hundred years of forest and land-use change in Massachusetts, USA. Journal of Biogeography 129: 1319-1135.)

The rare birds known from Lee are all associated with wetlands. American Bitterns (E) are heron-like birds that nest primarily in large cattail, tussock or shrub marshes and are very sensitive to disturbance. Northern Harriers (T) are hawks that establish nesting and feeding territories in large shrublands with nearby wet meadows, grasslands and abandoned fields. Like American Bitterns, they are very sensitive to human disturbance and their nests are vulnerable to ground predators, including dogs. Common Moorhens (SC) are fowl-like marsh birds that typically nest in dense cattail beds adjacent to open water. Common Loons (SC) nest in large, clear, fish rich lakes with islands. Except for breeding and nesting, they are more water-dependent than any other inland bird. Bald Eagles (T) 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.

Two species of rare salamanders are known from Lee, Jefferson Salamander (SC) and Spring Salamander (SWAP species of conservation concern, delisted). Adult and juvenile Jefferson Salamanders inhabit upland forests during most of the year, where they reside in small-mammal burrows and other subsurface retreats. Adults migrate during late winter or early spring to breed in vernal pools and fish-free areas of swamps, marshes, or similar wetlands. Larvae metamorphose in late summer or early fall, whereupon they disperse into upland forest. Spring Salamander adults inhabit clean, cold, high-gradient brooks and headwater seeps in forest habitat, usually at elevation >100 m. Larvae are entirely aquatic and largely nocturnal, spending daylight hours buried below the streambed or hidden under stones. Adults are semi-aquatic and spend most of their time under cover of rocks and woody debris along the margins of brooks, springs, and seeps; however, they will venture into upland forest during rainy weather.

There are multiple records Wood Turtles (SC) in Lee, though the most recent sighting was in 1999. These turtles nest in sandy upland areas and are susceptible to becoming road kill when they move among parts of their habitats. Loss of only a few adults annually can cause populations to decline because of turtles having low replacement rates due to low nest and juvenile survivorship. Protecting unfragmented forests with imbedded wetlands enhances the habitats of all these species and others, as well as protecting water quality. Streams and rivers are habitat for Wood turtles, preferably with long corridors of undeveloped, connected uplands extending on both sides of the waterways.

Bridle Shiners (SC) are small (<5 cm) minnows that are found in schools swimming in and out of vegetation along the edges of open, clear water in lakes and ponds and slack areas of streams and rivers. They feed on small insects and other aquatic animals. Another rare fish species found in Lee is the Longnose Sucker (SC). In Massachusetts, this torpedo-shaped fish is found mainly in cool upper sections of streams and rivers with rocky to gravel substrates. These fish may swim miles to deposit their eggs on clean and well oxygenated gravel substrates. Both of these species rely on Lee's Cold Water Fisheries streams and rivers.

Three rare butterflies and moths occur in Lee. The Dion Skipper (T) butterflies inhabit sedge wetlands. Adults nectar in nearby upland fields. Mustard White (T) butterflies inhabit wet forest openings as well as wet meadows, field, and pastures. Ostrich Fern Borer Moth (SC) inhabits good floodplain forests that have the abundant Ostrich Fern needed to sustain the larvae.

Three uncommon dragonflies have been observed in Lee, all in association with the Cold Water Fisheries Rivers. Stygian Shadowdragons (SC) are dragonflies that are found on lakes with rocky shores and medium to large rivers that are relatively unvegetated. Zebra Clubtails (MESA Delisted, SWAP species) inhabit sand-bottomed streams and small rivers with riffles as larvae. Adults feed over the same streams. Surrounding upland forests provide protection while adults reach sexual maturity. The Arrow Clubtail (MESA Delisted, SWAP species) is a large dragonfly whose aquatic nymphs inhabit medium to large, swift-flowing, sandy-bottomed rivers and occasionally large lakes. The terrestrial adults inhabit riparian areas and the surrounding uplands, and return to the water body to mate and lay eggs. The one uncommon damselfly from Lee is the Tule Bluet (SC) whose nymphs are aquatic and live among aquatic vegetation and debris in a variety of wetland types including sluggish river sections and large lakes. The adults inhabit emergent vegetation along the shore and nearby uplands. Although the Tule Bluet has not been reported from Lee in over 25 years, it may still occur there.

Two uncommon freshwater mussels also occur in Lee. Creepers (SC) are freshwater mussels that inhabit low-gradient reaches of small to large rivers with sand or gravel substrates:, cool to warm-water streams and rivers with diverse fish assemblages best support Creepers. In Lee, this species occurs in Cold Water Fisheries rivers. Triangle floaters (MESA delisted/SWAP species) are freshwater mussels commonly found in low-gradient river reaches with sand and gravel substrates and low to moderate water velocities, although they are found in a wide range of substrate and flow conditions. In Lee, these also occur within the Cold Water Fisheries.

Lee also has the Boreal Marstonia (E); Boreal Marstonia are small snails that live on plants in hard-water lakes rich in calcium and magnesium that have an extensive vegetated shallow zone.

Lee's has 11 known state-listed plant species, and 15 plants that are on the Watch List (WL). Andrew's Bottle Gentian (E) is a tall perennial herbaceous plant with showy flowers found adjacent to wetlands in moist, but not inundated habitats. Hairy Honeysuckle (E) is a twining, high-climbing shrub of dry to mesic rocky woods on calcareous soils. Intermediate Spike-sedge (T) is a densely tufted grass-like annual found on muddy, alkaline river banks and pond shores, usually during periods of low water when mud is exposed. Labrador Bedstraw (T) is a perennial herbaceous plant of open to semi-open alkaline fens. Pale Green Orchid (T) is a perennial orchid which grows in a variety of mesic to wet habitats, usually near moving water. Frank's Lovegrass (SC) is an annual grass which grows in open sandy and silty riverbars and river shores. Bur Oak (SC) is a broadly distributed tree species that reaches its eastern limit of distribution in western Massachusetts, where it is restricted to wetlands near limestone hills or outcrops. Slender Blue-eyed Grass (E) is a grass-like perennial which occurs in calcareous fens, wet meadows, and other moist open habitats with nutrient-rich soils. Hemlock Parsley (SC) is a perennial herbaceous plant of forested swamps with sparse canopy on enriched soils overlying calcareous bedrock. Dwarf Scouring-rush (SC) is a perennial, evergreen fern-ally which grows in the herbaceous layer in a variety of cool, usually wet habitats, including hummocks in swamps, moist stream banks, and seepy areas under conifers. The last three species have not been reported to Natural Heritage and Endangered Species Program as occurring in Lee for over 25 years; NHESP would be very interested in any current populations of any of the above listed plants or animals.

Natural Communities are recurring assemblages of plants and animals in similar chemical, moisture, geological, and topographic environments. In Massachusetts, the types are defined in the *Classification of Natural Communities of Massachusetts*, available on the NHESP website http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/natural-communities/ . Occurrences of uncommon types – called Priority Natural Communities - are considered to be priority for conservation. All types of natural communities provide important habitat for common and uncommon species and support the biodiversity of the town. NHESP keeps track of documented occurrences of Priority Types of Natural Communities; a complete list of these is on the NHESP website. Exemplary examples of more common types of natural communities are also documented in the NHESP database.

Several Priority Natural Communities occur in Lee; most of these are associated with the outstanding river resources in town. The Priority Natural Communities are illustrated in purple on map. One, however, occurs in a completely upland area, a hickory-hop hornbeam forest/woodland. 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, and is imperiled in Massachusetts as there are so few of these communities left. It is mostly protected by the Bassett Farm CR.

Black Ash-Red Maple-Tamarack Calcareous Seepage Swamps are mixed deciduous-coniferous fairly open swamps occurring in areas where there is calcium-rich groundwater seepage. This nutrient enrichment supports many rare calcium-loving plant species. 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. 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. Deep Emergent Marshes are graminoid wetlands occurring on saturated soils that are seasonally flooded. They generally form in broad, flat areas bordering slow rivers or along pond margins, and often grade into shrub swamps. Calcareous Sloping Fens are open, sedge-dominated wetlands on slight to moderate slopes with calcareous groundwater seepage. They are often 'hot spots' for uncommon species. The above communities are imperiled natural communities in Massachusetts as very few of these natural communities remain.

Lee also has exemplary examples of Deep Emergent Marsh in the southern portion of the town, a more common natural community type. Deep Emergent Marshes are graminoid wetlands occurring on saturated soils that are seasonally flooded. They generally form in broad, flat areas bordering slow rivers or along pond margins, and often grade into shrub swamps.

DFW's Fisheries section has identified environmentally sensitive streams throughout Massachusetts that provide important habitat for native Cold Water Fisheries (CFR, Coldwater Fisheries Resources). Buffers along these streams that maintain shade and filter inflowing sediments are important for maintaining their water – and habitat – quality. Stream crossings should be evaluated for, and maintained to allow, movement of fish, turtles, and other aquatic species. Identification of CFRs is based on fish samples collected by staff biologists and technicians with new streams sampled and evaluated yearly. Lee has many stream segments that have been identified as CFRs, shown on the enclosed map. Many of Lee's CFR streams coincide with BioMap2 Cores and CNLs, emphasizing the importance of these areas for protecting all aspects of biodiversity. More information on describing the CFRs is available from http://www.mass.gov/eea/agencies/dfg/dfw/wildlife-habitat-conservation/coldwater-fish-resources-list.html. CFRs in Lee are illustrated as a bright blue lines on map.

Saris/Palis	Waterbody Name	Watershed	Towns
2103450	Housatonic River	Housatonic	Sheffield, Pittsfield, Stockbridge, Great Barrington, Lee, Lenox
2104550	Beartown Brook	Housatonic	Lee
2104575	West Brook	Housatonic	Great Barrington, Lee
2104625	Hop Brook	Housatonic	Lee, Tyringham, Otis
2104775	Goose Pond Brook	Housatonic	Lee, Tyringham
2104800	Greenwater Brook	Housatonic	Lee, Becket
2104825	Basin Pond Brook	Housatonic	Lee
2104950	Commons Brook	Housatonic	Lee
2104975	Washington Mt. Brook	Housatonic	Lee, Washington

Lee has 13 Certified Vernal Pools (CVPs) and 28 Potential Vernal Pools (PVPs) (identified from aerial photographs, needing verification on the ground; some of which have been certified). In addition, areas of swamps will provide habitat for vernal pool species. Lee's vernal pools are shown on the included map. Locations of PVPs are available as a datalayer from MassGIS at http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/pvp.html . Clusters of vernal pools provide particularly good habitat for species that depend on vernal pools for habitat.

The clusters mean that there are alternate habitats if something happens to one pool, and slightly different conditions in each may provide different habitats for pool dependent species.

The BioMap2 core areas and Contributing Natural Landscape are particularly valuable in ecological terms, and important to the conservation of a variety of species. Completing conservation protection of unprotected land in those areas would enhance the viability of these special areas - size and continuity of open space is particularly important for supporting wildlife populations. Preventing habitat fragmentation is vital in protecting the ecosystem, for the rare species on the enclosed list, as well as for additional common species. Some polygons of both aspects of BioMap2 extend into other municipalities which then provide opportunities to protect large unfragmented areas that will provide the best opportunities to limit further species loss from the Town and region. The BioMap2 Core and CNL polygons are available from MassGIS: http://www.mass.gov/mgis/biomap2.htm. There is also an interactive application to see the broad outlines of the polygons in each Town that is linked from the NHESP website. BioMap2 is more up to date than BioMap and Living Waters, which it replaces.

BioMap2 and the original BioMap and Living Waters projects are focused on conservation and intended to be planning tools. They include non-regulated components of biodiversity and include broader areas than do the regulatory maps that NHESP also produces.

Estimated Habitat maps are created for use under the Wetlands Protection Act and Priority Habitat maps for use under the Massachusetts Endangered Species Act. These two sets of maps are created for regulatory use, shown in the *Natural Heritage Atlas* (the 2008 Atlas, the 13th edition is the current version). Note that Estimated Habitat is a subset of Priority Habitat: that is, Estimated Habitat shows a subset of all the species' habitats shown in Priority Habitat. These data layers are available from MassGIS, requiring access to some form of GIS to view them, at http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/layerlist.html#ConservationRecreation

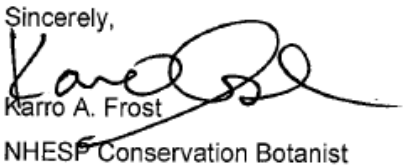
Town commissions and boards are encouraged to request the assistance of the Natural Heritage and Endangered Species Program in reviewing any project proposed in the habitat areas of the regulatory areas of the maps in the *Natural Heritage Atlas*.

Management and monitoring of conservation lands become important as acquisition and protection are accomplished. All wetlands particularly need to maintain their natural water regime, including normal fluctuations and connections with the uplands and other wetlands. Water quantity and quality are ongoing issues for wetlands. Another aspect of managing conservation lands that is important in many areas is controlling invasive non-native species that alter the habitat and occupy space that native species would otherwise use. We strongly recommend monitoring conservation land, and removing non-native species before they become a problem and impact native species.

Please note that this evaluation is based on the most recent information available in the Natural Heritage database, which is constantly being expanded and updated through ongoing research and inventory. Should new rare species information become available, this evaluation may need to be reconsidered.

Please do not hesitate to contact me at (508) 389-6390 or by email at karro.frost@state.ma.us if you have any questions.

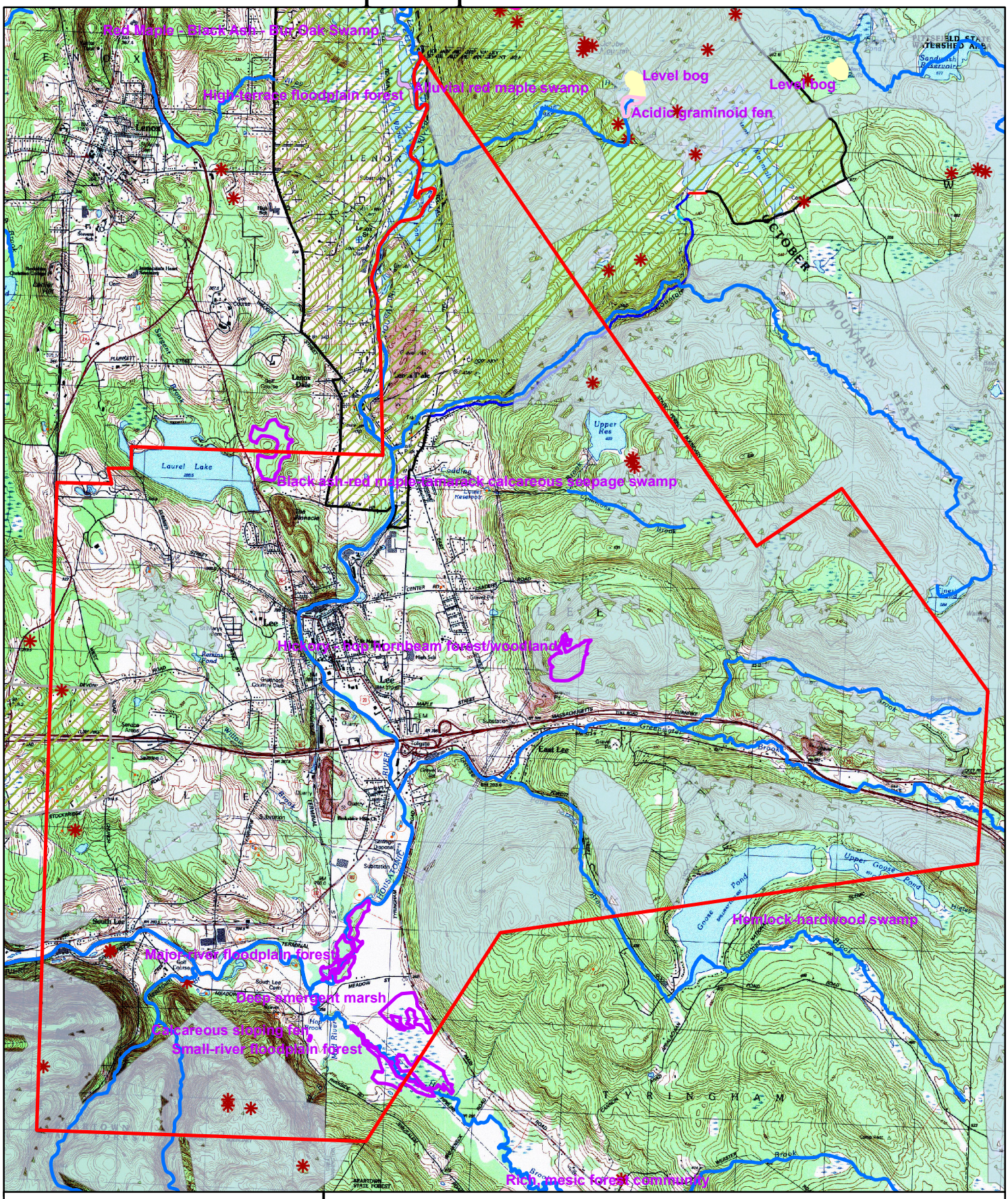
Sincerely,



Karro A. Frost
NHESP Conservation Botanist

cc: Melissa Cryan, EOEEA, DCS

Town of Lee Open Space and Recreation Plan



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

LEGEND

- 1830_1999forest
- Certified Vernal Pools
- Potential Vernal Pools
- Cold_Water_Fisheries

0 0.5 1 2 Kilometers

N

6/16/2015

Town of Lee List of Rare Species and Natural Communities

Amphibian	*Ambystoma jeffersonianum*	Jefferson Salamander	SC	2013
Amphibian	*Gyrinophilus porphyriticus*	Spring Salamander	MESA Delisted	2001
Beetle	*Cicindela duodecimguttata*	Twelve-spotted Tiger Beetle	SC	2013
Bird	*Botaurus lentiginosus*	American Bittern	E	2009
Bird	*Circus cyaneus*	Northern Harrier	T	1999
Bird	*Gallinula chloropus*	Common Moorhen	SC	1999
Bird	*Gavia immer*	Common Loon	SC	2013
Bird	*Haliaeetus leucocephalus*	Bald Eagle	T	2014
Butterfly/Moth	*Euphyes dion*	Dion Skipper	T	2009
Butterfly/Moth	*Papaipema* sp. 2 nr. *pterisii*	Ostrich Fern Borer Moth	SC	2009
Butterfly/Moth	*Pieris oleracea*	Mustard White	T	2009
Dragonfly/Damselfly	*Enallagma carunculatum*	Tule Bluet	SC	1976
Dragonfly/Damselfly	*Neurocordulia yamaskanensis*	Stygian Shadowdragon	SC	2008
Dragonfly/Damselfly	*Stylurus scudderi*	Zebra Clubtail	MESA Delisted	2008
Dragonfly/Damselfly	*Stylurus spiniceps*	Arrow Clubtail	MESA Delisted	2008
Fish	*Catostomus catostomus*	Longnose Sucker	SC	2010
Fish	*Notropis bifrenatus*	Bridle Shiner	SC	2010
Mussel	*Alasmidonta undulata*	Triangle Floater	Non-listed SWAP Species	2009
Mussel	*Strophitus undulatus*	Creeper	SC	2008
Reptile	*Glyptemys insculpta*	Wood Turtle	SC	1999
Snail	*Marstonia lustrica*	Boreal Marstonia	E	2012
Vascular Plant	*Carex tetanica*	Fen Sedge	SC	1999
Vascular Plant	*Conioselinum chinense*	Hemlock Parsley	SC	1982
Vascular Plant	*Eleocharis intermedia*	Intermediate Spike-sedge	T	2008
Vascular Plant	*Equisetum scirpoides*	Dwarf Scouring-rush	SC	1915
Vascular Plant	*Eragrostis frankii*	Frank's Lovegrass	SC	2008
Vascular Plant	*Galium labradoricum*	Labrador Bedstraw	T	1999
Vascular Plant	*Gentiana andrewsii*	Andrews' Bottle Gentian	E	2012
Vascular Plant	*Lonicera hirsuta*	Hairy Honeysuckle	E	2008
Vascular Plant	*Platanthera flava var. herbiola*	Pale Green Orchis	T	2013
Vascular Plant	*Quercus macrocarpa*	Bur Oak	SC	2008
Vascular Plant	*Sisyrinchium mucronatum*	Slender Blue-eyed Grass	E	1912
Vascular Plant	Acer nigrum	Black Maple	-WL (delisted)	2008
Vascular Plant	*Carex retrorsa*	Retrorse Sedge	-WL	1999
Vascular Plant	*Caulophyllum giganteum*	Giant Blue Cohosh	-WL	2000
Vascular Plant	*Equisetum variegatum var. variegatum*	Variegated Horsetail	-WL	1999
Vascular Plant	*Helenium autumnale*	Common Sneezeweed	-WL	1999
Vascular Plant	*Heteranthera dubia*	Grassleaf Mud-plantain	-WL	1999
Vascular Plant	*Juncus nodosus*	Knotted Rush	-WL	1999
Vascular Plant	*Pellaea atropurpurea*	Purple-stem Cliffbrake	-WL	1980s
Vascular Plant	*Populus balsamifera ssp. balsamifera*	Balsam Popular	-WL	1999
Vascular Plant	*Ribes americanum*	Wild Black Currant	-WL	2002
Vascular Plant	*Salix candida*	Hoary Willow	-WL	1999
Vascular Plant	*Salix pedicellaris*	Bog Willow	-WL	1999
Vascular Plant	*Salix serissima*	Autumn Willow	-WL	1999
Vascular Plant	Scirpus pendulus	Pendulous Bulrush	-WL (delisted)	1999
Vascular Plant	*Sparganium fluctuans*	Floating Bur-reed	-WL	ND

Other Ecological	Certfied Vernal Pools	13 pools	
Natural Community	Major-river Floodplain Forest		S2
Natural Community	Wet Meadow		S4
Natural Community	Black ash-Red maple-Tamarack Calcareous Seepage Swamp		S2
Natural Community	Small-river Floodplain Forest		S2
Natural Community	Hickory-Hop hornbeam Forest/Woodland		S2
Natural Community	Shrub Swamp		S5
Natural Community	Calcareous Sloping Fen		S2
Natural Community	Deep Emergent Marsh	Exemplary Natural Community	S4
Natural Community	Freshwater Mud Flat		S4

BioMap2

Guiding Land Conservation for Biodiversity in Massachusetts

Lee

This report and associated maps 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.

Produced by:
Natural Heritage & Endangered Species Program
Massachusetts Division of Fisheries and Wildlife

Commonwealth of Massachusetts

Produced in 2011

BioMap2:
Guiding Land Conservation for Biodiversity in Massachusetts

Preferred citation:
NHESP. 2011. BioMap2, Guiding Land Conservation for Biodiversity in Massachusetts: Lee. Natural Heritage & Endangered Species Program, Massachusetts Division of Fisheries and Wildlife. Westborough, MA.

The preferred citation for BioMap2 is:
Woolsey, H., A. Finton, J. DeNormandie. 2010. BioMap2: Conserving the Biodiversity of Massachusetts in a Changing World. MA Department of Fish and Game/Natural Heritage & Endangered Species Program and The Nature Conservancy/Massachusetts Program.
http://www.mass.gov/dfwele/dfw/nhesp/land_protection/biomap/biomap2_summary_report.pdf

Funding for this project was made available by the Massachusetts Sub-Council of the Housatonic River Trustee Council under the auspices of the Massachusetts and Department of the Interior (DOI) Natural Resource Damages Assessment and Restoration Programs and contributions to the Natural Heritage & Endangered Species Fund.

Natural Heritage & Endangered Species Program

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Tel: (508) 389-6360 Fax: (508) 389-7891
http://www.nhesp.org

For more information on rare species and natural communities, please see our fact sheets online at **www.nhesp.org**

BioMap2: Guiding Land Conservation for Biodiversity in Massachusetts

Lee

Lee is located in central Berkshire County. Eastern and southern portions of the town are situated within the highlands and hills of the Berkshires, while its western lowlands lie within the marble valleys of Massachusetts portion of the Housatonic River watershed. The Housatonic River flows through the center of Lee; it enters town from the north, flows along the boundary between Lee and Lenox in north Lee, then continues south through the town until it reaches Beartown Mountain and turns sharply to the west. Two sizable tributaries, Sargent Brook and Willow Brook, flow from the west through the marble valleys to meet the Housatonic River. Another tributary, Hop Brook, flows in a northwesterly direction into town from the hills and narrow central valley of Tyringham, joining the Housatonic River at its sharp westward turn by the northern base of Beartown Mountain.

Lee has historically been one of the most populated towns in Massachusetts' Housatonic watershed, and remains so today. Many industrial operations are tied to the Housatonic River. Paper milling, with operations powered by the river, was Lee's primary industry for many years. Lumbering, agriculture, and limestone mining have also been important economically. Many industrial operations, including several mills and a large limestone mine, are still located along the river today. Residential and commercially developed areas are distributed throughout the valley. The town's steep slopes and higher elevations are largely undeveloped, and more than 11,000 acres in these areas, or 64 percent of all land in town, is forested. Some agricultural lands are scattered throughout the valley, mostly either at the perimeters of more heavily developed areas along the river in the northern part of town, or further south along the south side of the Housatonic River near the Hop Brook confluence. Three moderate-sized lakes fall partly within Lee: Laurel Lake and Woods Pond in the north, and Goose Pond in the south.

The lowlands of Lee, where the Housatonic River flows south and then west toward Stockbridge, are part of the Western New England Marble Valleys ecological region (see Figure 1). This is one of the most distinct and biologically rich ecoregions both in Massachusetts and throughout New England, stretching from northwest Connecticut up through sections of the Hudson River and Lake Champlain watersheds. This ecoregion supports an impressively high percentage of Massachusetts' state-listed species and Priority Natural Communities; some of these are restricted to the ecoregion, while others are

Lee at a Glance

- Total area: 17,289 acres (27.0 square miles)
- Human population in 2009: 5,738 people
- Open space protected in perpetuity: 5,329 acres, or 30.8% of total area*

BioMap2 Components

Core Habitat

- 9 Aquatic Cores: 1,304 acres
- 3 Forest Cores: 3,419 acres
- 9 Wetland Cores: 291 acres
- 5 Priority or Exemplary Natural Communities: 140 acres

Species of Conservation Concern**

- 11 plants, 3 freshwater molluscs, 6 insects, 2 fish, 1 salamander, 1 frog, 1 turtle, 3 birds, 1 mammal

Critical Natural Landscape

- 4 Upland Buffers of Aquatic Cores: 1,671 acres
- 5 Upland Buffers of Wetland Cores: 1,006 acres
- 2 Landscape Blocks: 6,101 acres

*calculated using MassGIS data layer "Protected and Recreational Open Space—November 2010"
**see next page for complete list of species, natural communities, and other biodiversity elements

Species of Conservation Concern, Priority and Exemplary Natural Communities, and Other Elements of Biodiversity in Lee

Invertebrates (non-insect)

Freshwater Molluscs

Creeper (*Strophitus undulatus*), Special Concern
Triangle Floater (*Alasmidonta undulata*), Special Concern
Boreal Marstonia (*Marstonia lustrica*), Endangered

Invertebrates (insect)

Dragonflies

Arrow Clubtail (*Stylurus spiniceps*), Threatened
Zebra Clubtail (*Stylurus scudderi*), Special Concern
Stygian Shadowdragon (*Neurocordulia yamaskanensis*), Special Concern

Butterflies

Dion Skipper (*Euphyes dion*), Threatened
Mustard White (*Pieris oleracea*), Threatened

Moths

Ostrich Fern Borer (*Papaipema* sp. 2 nr. *pterisii*), Special Concern

Fish

Bridle Shiner (*Notropis bifrenatus*), Special Concern
Longnose Sucker (*Catostomus catostomus*), Special Concern

Amphibians

Spring Salamander (*Gyrinophilus porphyriticus*), SWAP
Northern Leopard Frog (*Rana pipiens*), SWAP

Reptiles

Wood Turtle (*Glyptemys insculpta*), Special Concern

Birds

American Bittern (*Botaurus lentiginosus*), Endangered
Bald Eagle (*Haliaeetus leucocephalus*), Endangered
Common Moorhen (*Gallinula chloropus*), Special Concern

Mammals

Water Shrew (*Sorex palustris*), Special Concern

Plants

Andrew's Bottle Gentian (*Gentiana andrewsii*), Endangered
Bristly Buttercup (*Ranunculus pensylvanicus*), Special Concern
Bur Oak (*Quercus macrocarpa*), Special Concern
Fen Sedge (*Carex tetanica*), Special Concern
Frank's Lovegrass (*Eragrostis frankii*), Special Concern
Hairy Honeysuckle (*Lonicera hirsuta*), Endangered
Hemlock Parsley (*Conioselinum chinense*), Special Concern
Intermediate Spike-sedge (*Eleocharis intermedia*), Threatened
Labrador Bedstraw (*Galium labradoricum*), Threatened
Pale Green Orchis (*Platanthera flava* var. *herbiola*), Threatened
Wapato (*Sagittaria cuneata*), Threatened

Exemplary Natural Communities

Deep Emergent Marsh (Secure)

Priority Natural Communities

Black Ash – Red Maple – Tamarack Calcareous Seepage Swamp (Imperiled)
Calcareous Sloping Fen (Imperiled)
Hickory – Hop Hornbeam Forest/Woodland (Imperiled)
Major-river Floodplain Forest (Imperiled)

Other BioMap2 Components

Aquatic Cores
Forest Cores
Landscape Blocks
Upland Buffers of Aquatic Cores
Upland Buffers of Wetland Cores
Wetland Cores

more widespread. In Lee, marshlands of the marble valleys along Housatonic River and Hop Brook provide nesting habitat for the state-endangered American Bittern, a marsh bird of the heron family. Sensitive freshwater mussels called Creeper and Triangle Floater live along the river bottoms of the Housatonic River downstream of the Hop Brook confluence, and filter algae, nutrients, and bacteria from the water for food. The state-listed minnow Bridle Shiner occurs in open water habitats at Goose Pond, and Wood Turtles occupy the lower reaches and wetlands of Hop Brook. Since the focus of development in Lee has been in the valley lowlands, protection of remaining undeveloped lands and natural areas along the river is particularly important for conserving biodiversity.

Highland areas of Lee are less ecologically diverse than the valley; however these areas support their own suite of state-listed species, and contain tracts of forested habitat that are fragmented little by human development. They are also relatively well protected for conservation through various stewardships. Forested, high-gradient headwater streams are found here, and provide habitat for the uncommon Spring Salamander. Lower elevations of October Mountain in northeast Lee support Hickory-Hop Hornbeam Forest, a Priority Natural Community characterized by abundant hickory trees in the forest overstory and the presence of a diverse array of grasses and sedges on the forest floor.

BIODIVERSITY CONSERVATION TARGETS IN LEE: CORE HABITAT, CRITICAL NATURAL LANDSCAPE, AND PRIORITY CONSERVATION AREAS

In this section, we outline areas in Lee that warrant special focus of conservation efforts locally, regionally, and throughout the state. Components of the Natural Heritage & Endangered Species Program's (NHESP's) statewide BioMap2 project, which incorporates NHESP data and includes findings of studies funded by the Natural Resource Damages Assessment and Restoration Program

Biodiversity Studies in Massachusetts and the Housatonic River Watershed

BioMap2 is a statewide biodiversity conservation plan produced in 2010 by MassWildlife's Natural Heritage & Endangered Species Program and The Nature Conservancy. It is designed to guide strategic biodiversity conservation in Massachusetts over the next decade by focusing land protection and stewardship on the areas that are most critical for ensuring the long-term persistence of rare and other native species and their habitats, Priority Natural Communities, and a diversity of ecosystems. BioMap2 is also designed to include the habitats and Species of Conservation Concern identified in the State Wildlife Action Plan (SWAP).

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 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.

In 2008 and 2009, field surveys were carried out to improve knowledge of the region's biodiversity resources in towns in the Housatonic River watershed in western Massachusetts. During these surveys, coordinated by the Natural Heritage and Endangered Species Program (NHESP) with funds from the Natural Resources Damage Assessment and Restoration (NRD) Program, researchers collected important information about state-listed species and Priority Natural Communities of 19 towns in the region. Surveys were conducted by NHESP staff, expert consultants, academic researchers, and graduate students. Information on the surveys' findings was added to the NHESP database, combined with other NHESP data, and incorporated into Core Habitat of BioMap2. BioMap2 data layers, complete with these data and other information, are now available for use in conservation planning at the town, regional, and state levels.

(NRD) conducted in 2008 and 2009 as part of its Core Habitat and Critical Natural Landscape, were used to delineate and map these areas. The areas range in size from fewer than 10 acres to several thousand acres. Designated areas of Core Habitat, each called a BioMap2 Core (BC), and areas of Critical Natural Landscape (CNL), along with their associated components, are illustrated in Figure 2 and outlined in detail below. BioMap2 components described in this report are those that occur only in Lee, although a given area of Core Habitat or Critical Natural Landscape listed here may extend beyond town boundaries and contain additional components.

To facilitate land protection and stewardship, NHESP further prioritized areas in each of the towns in the watershed using habitat size, habitat conditions, and other biodiversity indicators. Priority Conservation Areas (PCAs) were considered to be of high biodiversity value if they contained concentrations of state-listed species or Priority Natural Communities, or large areas of intact habitat. In each town, up to six Town PCAs were identified. Each Town PCA contains part of at least one BioMap2 Core: in Lee, three Town PCAs were selected. Figure 3 illustrates how BioMap2 Core Habitat and Critical Natural Landscape relate to the distribution of Town PCAs in Lee.

A larger scale prioritization was also conducted to select the Regional PCAs of the highest conservation and stewardship value among all towns in the Massachusetts portion of the Housatonic River watershed. Regional PCAs often cross town boundaries and are quite large, ranging from 373 acres to more than 25,000 acres. Ecological connectivity within these Regional PCAs is important to biodiversity conservation; consequently these large units include select Town PCAs that are of particular biodiversity value to both the town and the region. In this way, biodiversity can be conserved at two scales: locally within each town and within a broader regional context. Parts of two Regional PCAs – Regional PCA 5 and Regional PCA 8 – fall within Lee and encompass Town PCA 1 and Town PCA 3.

All of the BCs in Lee are summarized here, as are their various components, which may include Species of Conservation Concern, Exemplary or Priority Natural Communities, or Aquatic, Forest, Vernal Pool, or Wetland Cores. Components of CNL associated with each BC are also provided. These include Upland Buffers of Aquatic and Wetland Cores, as well as Landscape Blocks.

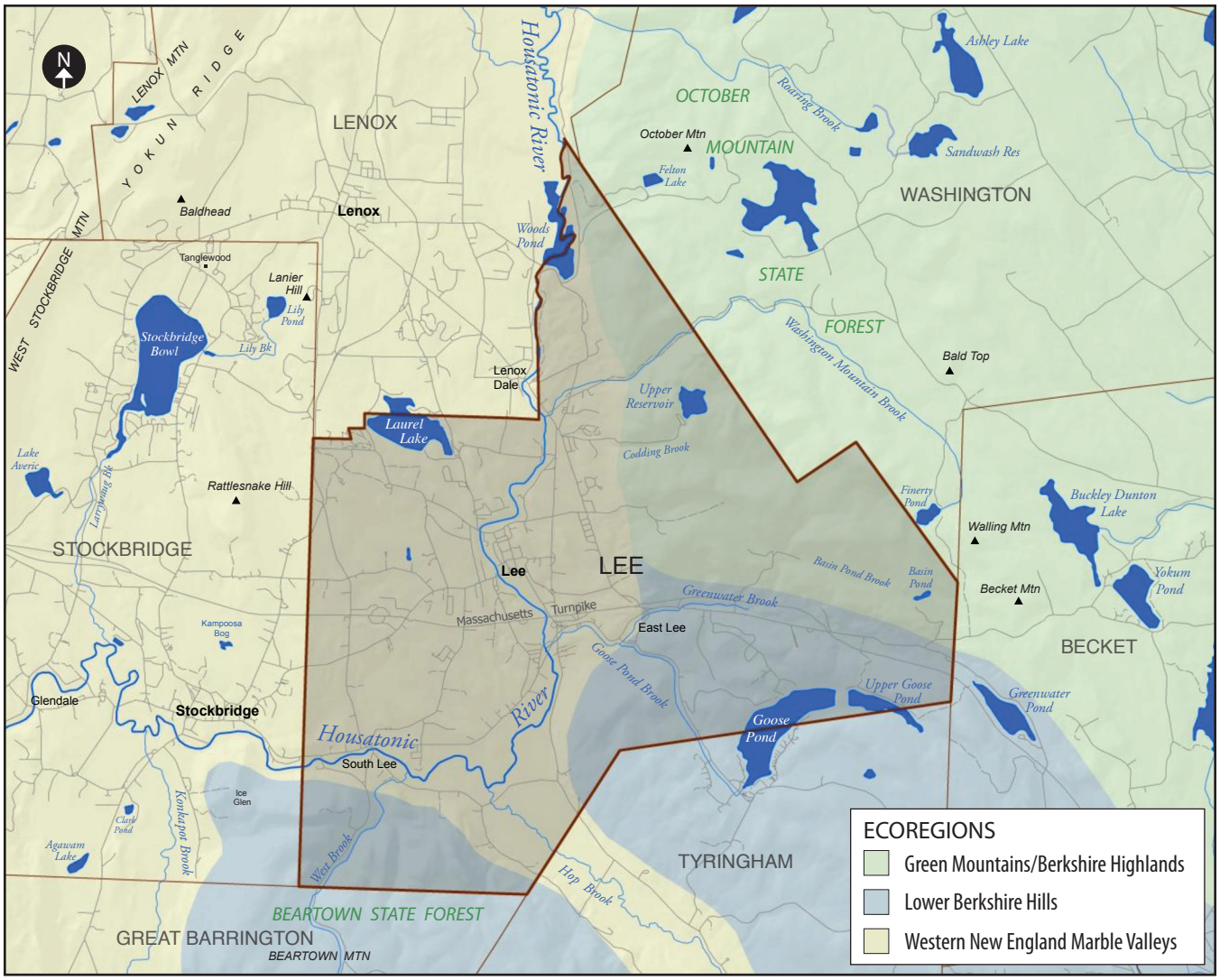


Figure 1. Town boundaries and ecoregions of Lee, Massachusetts.

Core Habitat and Critical Natural Landscape Components in Lee

Areas of Core Habitat in Lee, called BioMap2 Cores (BCs), are summarized here, as are the various components of each BC, which may include Species of Conservation Concern, Exemplary or Priority Natural Communities, and Aquatic, Forest, or Wetland Cores. Components of Critical Natural Landscape (CNL) associated with each BC are also described. These include Upland Buffers of Aquatic and Wetland Cores, as well as Landscape Blocks.

BC1658 and CNL883

This large BC lies mostly on Beartown Mountain and extends into Tyringham and Stockbridge. It contains large tracts of forested area, including two Forest Cores (one 167 acres and one 570 acres), and is part of a large Landscape Block in CNL 883. It also includes land along Beartown Brook, which flows north to the Housatonic River from the southwest corner of the town, and Mad River, a small tributary to Hop Brook. Both streams support an uncommon salamander species.

Spring Salamander (*Gyrinophilus porphyriticus*), SWAP: Spring Salamander adults inhabit clean, cold, high-gradient brooks and headwater seeps in forest habitat, usually at elevations above 300 feet. Larvae are entirely aquatic and largely nocturnal, spending daylight hours buried below the streambed or hidden under stones. Adults are semi-aquatic and spend most of their time under cover-objects along the margins of brooks, springs, and seeps; however, they will venture into upland forest during rainy weather. Spring Salamanders in BC1658 occur along Beartown Brook, Mad River, and smaller tributaries of these streams.

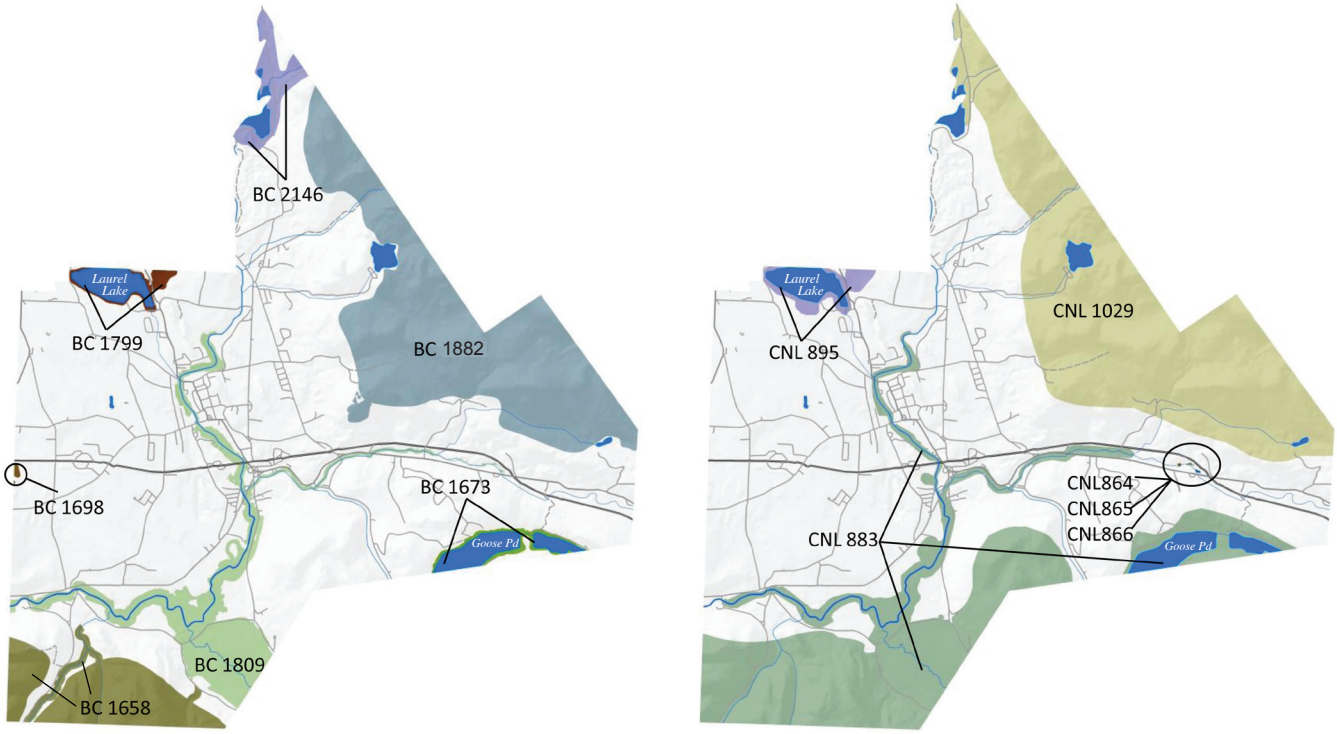


Figure 2. Lee includes a total of seven BioMap2 Cores (BC; left) and six areas of Critical Natural Landscape (CNL; right).

BC1673 and CNL883

This 235-acre core includes portions of Goose Pond (and Upper Goose Pond) as well as nearby uplands in southeast Lee, and is part of CNL883's very large Landscape Block. BC1673 is surrounded by Upland Buffer of CNL883. Goose Pond is a mountain lake managed as a wildlife area. It is just southwest of October Mountain State Forest, and its eastern extent is managed by the National Park Service as part of the Appalachian Trail Corridor. The pond itself extends into Tyringham and is a popular destination for boaters and other outdoor recreationists. It also includes habitat for a state-listed fish species.

Bridle Shiner (*Notropis bifrenatus*), Special Concern: The Bridle Shiner is a small, straw-colored minnow with a distinct dark lateral band that runs from the tip of the snout to the base of the tail. It is typically found in clear water in slack areas of streams and rivers, as well as in lakes and ponds, and is sensitive to turbidity, invasive plant species, and severe changes in flow regime. This fish is generally associated with submerged aquatic vegetation, but it also uses areas of open water to school.

BC1698 (no CNL)

BC1698 is a 17-acre area in eastern Stockbridge and western Lee known to contain a state-listed invertebrate species. Five acres of it fall within Lee.

BC1799 and CNL895

BC1799 includes 224 acres in northwest Lee and south Lenox, and is surrounded by Upland Buffers of CNL895. Laurel Lake constitutes most of BC1799, but the core also contains the lake's nearby uplands and a large wetland area to the east of the lake. State-listed plant and invertebrate species occur in this core; however, Zebra Mussels were recently discovered in Laurel Lake and may negatively impact future aquatic diversity in this BC, the stream outlet of Laurel Lake, and the Housatonic River downstream. Several state-listed plants, a state-listed snail, and one Priority Natural Community are documented in BC1799.

Plants

Hemlock Parsley (*Conioselinum chinense*), Special Concern: Hemlock Parsley is a perennial herbaceous plant of forested swamps that have a somewhat sparse tree canopy. It generally grows in enriched soils overlying calcareous bedrock.

Labrador Bedstraw (*Galium labradoricum*), Threatened: In Massachusetts, this slender perennial herbaceous plant of the madder family (Rubiaceae) is known to occur only in calcareous fens, wet meadows, and swamps of the upper Housatonic River watershed.

Hairy Honeysuckle (*Lonicera hirsuta*), Endangered: This plant is a high-climbing and shrubby vine of dry to mesic rocky woods, typically found in calcareous soils. It is

very rare in Massachusetts, and occurs only in the far western part of the state.

Freshwater Molluscs

Boreal Marstonia (*Marstonia lustrica*), Endangered: This is a small snail with a greenish or brownish translucent shell. They inhabit lakes that are well vegetated with submersed aquatic plants and rich in nutrients, especially calcium and magnesium. The species is only known from two lakes in Massachusetts.

Natural Community

Black Ash – Red Maple – Tamarack Calcareous Seepage Swamp (Imperiled): This Priority Natural Community type is a mixed deciduous-coniferous forested swamp that occurs in areas with calcium-rich groundwater seepage. Its characteristic nutrient enrichment supports many state-listed calcium-loving plants, including several sedge species. This moderately large (16 acre) example of a Black Ash – Red Maple – Tamarack Calcareous Seepage Swamp is in good condition despite the presence of some exotic invasive species.

BC1809 and CNL883; CNL864, CNL865, and CNL866

BC1809 is very large – more than 11,000 acres in total size – and stretches along the Housatonic River mainstem in Stockbridge and Lee, as well as along several tributaries, including Hop Brook in Tyringham, Mohawk Lake Brook in Stockbridge, and the Williams River in West Stockbridge. In Lee, this core occurs along the mainstem of the Housatonic River as well as its tributaries Greenwater Pond Brook and Hop Brook. It is surrounded by extensive Upland Buffers and falls within a Landscape Block of CNL883, as well as three small and discrete Upland Buffers of CNL864, CNL865, and CNL866 that lie along Greenwater Brook. It includes areas directly along the river that are used extensively by humans, yet still supports diverse biological resources associated with the river itself, including nearby wetlands and floodplains. Several small areas along Hop Brook and Greenwater Pond Brook, amounting to 13 acres, are designated as BioMap2 Aquatic Core. The lower reaches of Hop Brook include large areas of wet fields and marshes around the stream; these wetlands are more than half a mile wide in places. More than 200 acres of this area are designated as a Wetland Core. BioMap2 components described here include many state-listed plants and animals, Exemplary Natural Communities, and Priority Natural Communities that are part of BC1809 within the boundaries of Lee.

Plants

Andrew's Bottle Gentian (*Gentiana andrewsii*), Endangered: This tall perennial herb with showy flowers is typically found adjacent to wetlands in relatively moist habitats that are not entirely inundated by water. It is a member of the gentian family (Gentianaceae), and has vibrant blue-violet flowers that bloom in late summer to early autumn.

Fen Sedge (*Carex tetanica*), Special Concern: This narrow-leaved perennial is a grass-like sedge that grows in open calcareous meadows and fens. It is a slender plant and is between five inches and two feet in height. In Massachusetts, it occurs primarily in the calcareous areas of the marble valleys in the western part of the state.

Frank's Lovegrass (*Eragrostis frankii*), Special Concern: This annual grass grows in open, sandy and silty riverbars and rivershores. In Massachusetts, Frank's Lovegrass is found only along the Housatonic and Connecticut Rivers, typically near floodplain forests.

Intermediate Spike-sedge (*Eleocharis intermedia*), Threatened: This densely-tufted grass-like annual is found on muddy, alkaline river banks and pond shores, and is usually visible during periods of low water when mud is exposed.

Pale Green Orchis (*Platanthera flava* var. *herbiola*), Threatened: This perennial orchid grows in a variety of mesic to wet habitats, usually near moving water.

Insects

Arrow Clubtail (*Stylurus spiniceps*), Threatened: This dragonfly is part of the diverse Gomphidae family. Nymphs, or larvae, are aquatic and live on bottoms of swift-flowing, sandy rivers and some lakes, while adults are terrestrial and inhabit riparian and upland areas.

Dion Skipper (*Euphyes dion*), Threatened: This butterfly inhabits sedge wetlands, including calcareous fens, riparian marshes, wet meadows, and sedge areas of shrub swamps, where their larvae feed on various sedges (*Carex* species). Adults feed on the nectar of flowers of species such as Common Milkweed (*Asclepias syriaca*) in upland fields.

Ostrich Fern Borer (*Papaipema* sp. 2 nr. *pterisii*), Special Concern: This moth species has bright orange-yellow forewings overlaid with darker brownish-orange, and uniform pinkish-tan hindwings. It inhabits floodplain forests with abundant Ostrich Fern (*Matteucia struthiopteris*), which the moth larvae require as a food source. In Massachusetts, this species is found only in the western part of the state.

Stygian Shadowdragon (*Neurocordulia yamaskanensis*), Special Concern: This dragonfly species is part of a family known as emeralds (Corduliidae). It is a dull brown color, unlike most other emeralds, which are generally characterized by brilliant green eyes and metallic green highlights on the face, thorax, and abdomen. It is elusive, usually appearing only for a short time after sunset

and before dark. It occurs along lakes with rocky shores and medium to large rivers that are relatively unvegetated. Like other dragonflies, it has both an aquatic larval phase and a terrestrial adult phase.

Zebra Clubtail (*Stylurus scudderi*), Special Concern: This dragonfly species inhabits mid-size forest streams with intermittent rapids. Like other dragonflies, Zebra Clubtail larvae spend their lives buried in sandy substrates of the streams and rivers they inhabit; adults live in nearby upland areas, and typically breed from July to September.

Freshwater Molluscs

Creeper (*Strophitus undulatus*), Special Concern: Like most freshwater mussels, the Creeper burrows in stream bottoms, filters algae and bacteria from the water, and uses a fish host to transform from young larvae into juvenile mussels. This freshwater mussel occurs in various reaches of the Housatonic River mainstem. Most animals found here are older individuals whose reproduction may be limited.

Triangle Floater (*Alasmidonta undulata*), Special Concern: This species was recommended for delisting in 2011. This small freshwater mussel (generally no more than three inches in length) occupies low- to mid-gradient streams, or occasionally lakes, that contain sand and gravel substrates. Like other freshwater mussels, it lives on the streambottom, filters algae and bacteria for food, and its larvae require a fish host. Like the Creeper, this freshwater mussel species is found in various locations in the Housatonic River mainstem.

Fish

Longnose Sucker (*Catostomus catostomus*), Special Concern: This species is a torpedo-shaped fish with a snout extending beyond its downturned mouth. It is typically found in cool, lower order streams and rivers with rocky bottoms. These fish rely on clean and well-oxygenated gravel substrates to rear their eggs. In Massachusetts, they are found only in the western part of the state.

Birds

American Bittern (*Botaurus lentiginosus*), Endangered: This species is a mottled brown heron-like bird that feeds and nests primarily in large cattail, tussock, or shrub marshes, and is very sensitive to disturbance. Its coloring and unique behavior of pointing its bill skyward when threatened, sometimes swaying to mimic movement of grasses in the wind, make it well-camouflaged in marsh habitat.

Exemplary Natural Communities

Deep Emergent Marsh (Secure): This is a fairly common natural community that is broadly-defined as a grass, sedge and/or cattail wetland. It occurs in saturated and mucky mineral soils, and is inundated seasonally and retains standing water throughout the year. It generally forms in broad, flat areas bordering slow rivers, or along pond margins that grade into shrub swamps.

Priority Natural Communities

Calcareous Sloping Fen (Imperiled): This Priority Natural Community type is an open, sedge-dominated wetland that occurs on slight to moderate slopes with calcareous groundwater seepage. It tends to be a 'hot spot' for uncommon species, containing state-listed plants like fen sedge (*Carex tetanica*) and sweet coltsfoot (*Petasites frigidus* var. *palmatus*), as well as state-listed turtles and butterflies. The Calcareous Sloping Fen in BC1809 is less than one acre, but is part of a larger wetland complex.

Major-river Floodplain Forest (Imperiled): In Massachusetts, this Priority Natural Community type is known to occur along mainstem sections of large rivers, including the Connecticut and Housatonic. Flooding is frequent and soils are typically sandy loams with no organic material. Silver Maple (*Acer saccharinum*) is the dominant overstory tree species, and several species of elm (*Ulmus* species) also grow here. Shrubs are often lacking, but herbaceous plants and ferns are typical. In BC1809 in Lee, this community occurs as patches along the Housatonic River mainstem just upstream of its confluence with Hop Brook. The occurrence is of moderate size (33 acres), and contains many exotic invasive species.

Small-river Floodplain Forest (Imperiled): Small-river Floodplain Forests have tree canopies composed primarily of Silver Maples, often with Green Ash, and typically occur on alluvial soils of small rivers and streams. In Massachusetts, they are most often found along small tributaries of the Connecticut and Nashua Rivers as well as other small rivers in the eastern part of the state, though they are also less commonly found in the Housatonic River watershed. As with Major-river Floodplain Forests, Silver Maple (*Acer saccharinum*) is the dominant overstory tree along smaller rivers; however more shrubs are present in the understory, and herbaceous plants are very diverse. This example of Small-river Floodplain Forest along Hop Brook is small but in excellent condition, and is well buffered by natural vegetation.

BC1882 and CNL1029

BC1882 is defined by a large area of Forest Core. It lies along the northeast boundary of Lee, almost entirely within a large Landscape Block of CNL1029. It includes three areas of Wetland Core surrounded by Upland Buffer of CNL1029, and a Priority Natural Community:

Hickory – Hop Hornbeam Forest/Woodland (Imperiled): This Priority Natural Community type is an open, hardwood forest dominated by various hickory species with a significant number of Hop Hornbeam trees in the

subcanopy. They are characterized by a sparse shrub layer, and a nearly continuous cover of grasses and sedges on the forest floor. In Massachusetts, Hickory – Hop Hornbeam Forests are found throughout the state, usually in areas with non-acidic bedrock. This example of the community is large, and despite evidence of some human disturbance, is in very good condition and contains few exotic invasives.

BC2146 and CNL1029

BC2146 is a very large core (more than 7,000 acres) that includes areas along the Housatonic River and its tributaries in Pittsfield, Washington, Lenox, and Lee. 251 acres of it occur in Lee, along the Housatonic River mainstem just upstream of the lime quarry around Woods Pond. The eastern part of the core falls within a Landscape Block of CNL1029, but areas along Woods Pond are not part of any CNL. This area also contains Wetland and Aquatic Cores and their Upland Buffers and provides habitat for a variety of species of conservation concern, including plants, insects, amphibians, and birds.

Plants

Bur Oak (*Quercus macrocarpa*), Special Concern: Bur Oak is a broadly distributed tree species that reaches the eastern limit of its distribution in western Massachusetts, where it is restricted to wetlands near limestone hills or outcrops.

Bristly Buttercup (*Ranunculus pensylvanicus*), Special Concern: This is an herbaceous wetland plant that grows in sunny to partly-shaded edges and openings in floodplains.

Wapato (*Sagittaria cuneata*), Threatened: In Massachusetts, Wapato is found primarily in riverine floodplain habitat settings such as alkaline backwaters, oxbow ponds, and small shallow depressions with muddy substrates. Wapato particularly favors stagnant or very slow-moving water.

Insects

Arrow Clubtail (*Stylurus spiniceps*), Threatened: This dragonfly is part of the diverse family Gomphidae. Nymphs, or larvae, are aquatic and live on bottoms of swift-flowing, sandy rivers and some lakes, while adults are terrestrial and inhabit riparian and upland areas.

Zebra Clubtail (*Stylurus scudderi*), Special Concern: This dragonfly inhabits mid-sized, forested streams with intermittent rapids. Like other dragonflies, Zebra Clubtail nymphs, or larvae, spend their lives buried in sandy substrates of streams; adults live in nearby upland areas, and typically breed from July to September.

Mustard White (*Pieris oleracea*), Threatened: This butterfly, whose larvae feed on plants of the mustard family, inhabits wet forest openings as well as wet meadows, fields, and pastures. In Massachusetts, it only occurs in central Berkshire County near the southern extent of its natural range.

Amphibians

Northern Leopard Frog (*Rana pipiens*), SWAP: Adult Northern Leopard Frogs are found in marshes, wet meadows, and peatlands in the narrow band between open water and uplands; they retreat to the water of ponds and small streams when threatened. The herbivorous tadpoles require open water habitat for development. Many observations have been made of this species in the Housatonic River watershed, including areas in BC2146.

Birds

American Bittern (*Botaurus lentiginosus*), Endangered: This species is a mottled brown heron-like bird that feeds and nests primarily in large cattail, tussock, or shrub marshes, and is very sensitive to disturbance. Its coloring and unique behavior of pointing its bill skyward when threatened, sometimes swaying to mimic movement of grasses in the wind, make it well-camouflaged in marsh habitat.

Bald Eagle (*Haliaeetus leucocephalus*), Endangered: These well-known eagles nest in tall trees along large lakes and rivers. The bulk of their diet consists of fish. Large lakes and rivers like the Housatonic also support important winter congregations of Bald Eagles.

Common Moorhen (*Gallinula chloropus*), Special Concern: This species is a duck-like marshbird that inhabits shallow freshwater marshes and typically nests in dense cattail beds adjacent to open water.

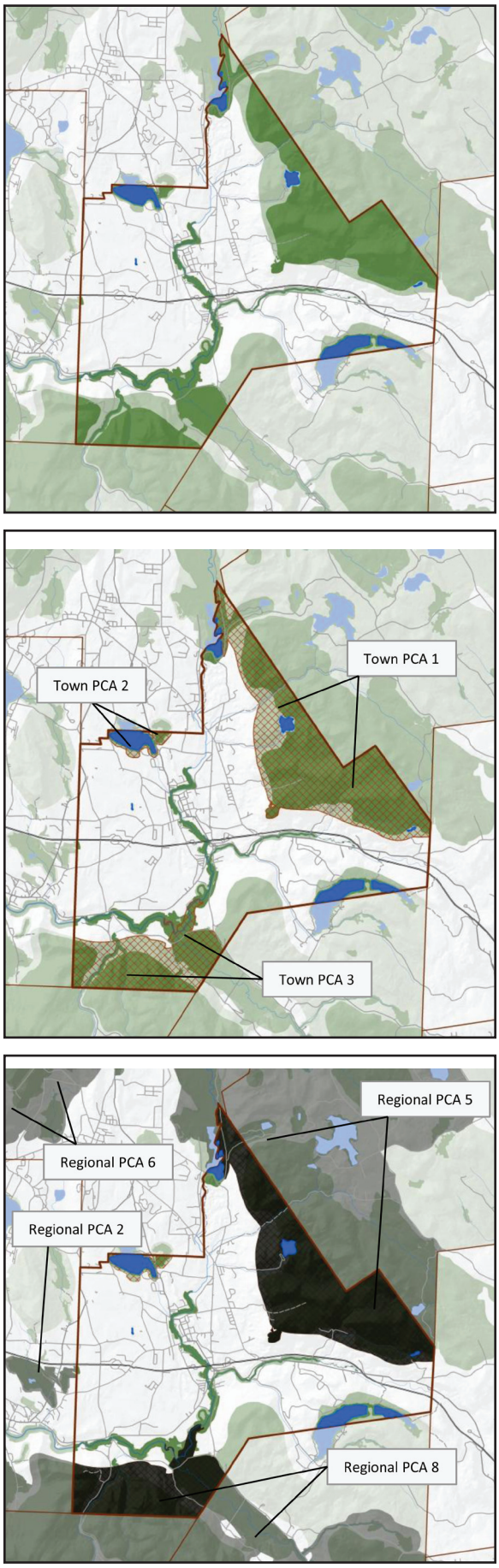
Mammals

Water Shrew (*Sorex palustris*), Special Concern: This semi-aquatic shrew commonly inhabits banks of swift, rocky-bedded streams in dense conifer or mixed forests.

Priority Conservation Areas in Lee

The town of Lee contains three areas identified as Town Priority Conservation Areas by NHESP. Two of these three Town PCAs are each part of larger Regional PCAs:

Town PCA 1/Regional PCA 5: Town PCA 1 is part of the larger Regional PCA 5 that incorporates much of western Washington, southeast Pittsfield, northeast Lenox, and northeast Lee. Within Regional PCA 5 are many mountains and headwater streams that lie east of the Housatonic River in these towns, including Roaring and Mill Brooks in Washington and Lenox, and Mountain and Commons Brooks, which flow from October Mountain in Washington and Lee. This Regional PCA also contains a stretch of the Housatonic River from central Pittsfield in the north



to Woods Pond in the northern part of Lee. Within Lee, Regional PCA 5 and Town PCA 1 overlap and both contain all of BC1882 and other areas of October Mountain in CNL1029's Landscape Block, totaling 3,693 acres. The area includes a large Forest Core, a Wetland Core and, in lower elevations, an occurrence of Hickory-Hop Hornbeam Forest/ Woodland, Priority Natural Community.

Town PCA 2: Town PCA 2 consists of a 244-acre area around Laurel Lake in northwest Lee. It supports several state-listed upland plant species, and includes a 16-acre section of Black Ash-Red Maple-Tamarack Calcareous Seepage Swamp. It also supports the Boreal Marstonia, a state-Endangered freshwater snail. Several aquatic components of BioMap2 are associated with this PCA, which contains part of CNL895. Invasive Zebra Mussels were recently discovered in this PCA, and may threaten future aquatic biodiversity within the PCA and in areas downstream.

Town PCA 3/Regional PCA 8: Town PCA 3 is part of Regional PCA 8, which encompasses nearly 20,000 acres in parts of Pittsfield, Washington, Lee, and Lenox including highland areas and headwater streams of the Housatonic River mainstem in this region. In Lee, Regional PCA 8 and Town PCA 3 together comprise 2,216 acres in the southern part of town. Within Lee's boundaries, these PCAs incorporate parts of both BC1658 (in and near Beartown State Forest) and BC1809 (near the mouth of Hop Brook). This area supports numerous state-listed species, including the Wood Turtle, which inhabits floodplains of lower Hop Brook, and the American Bittern, which breeds and nests in emergent marshes in the same area. It also contains, embedded in CNL883's Landscape Block, large tracts of forested land in Beartown State Forest, including a 570-acre Forest Core, and surrounds the headwaters of Beartown Brook, which joins the Housatonic River mainstem just downstream of the Hop Brook confluence.

Figure 3. Core Habitat (dark green), Critical Natural Landscape (light green), Town Priority Conservation Areas (PCAs; reddish-brown grid), and Regional Priority Conservation Areas (black) in Lee. Town PCAs make up 5,650 acres, or 32.7 percent of the town's total area. Regional PCAs make up 5,419 acres, or 31.3 percent of the town's total area.

Glossary

Aquatic Cores (in BioMap2, a component of Core Habitat) include intact river corridors within which important physical and ecological processes of the river or stream occur, delineated using integrated and functional ecosystems for fish species and other aquatic Species of Conservation Concern. To identify those areas integrally connected to each river and stream, each river segment was buffered 30 meters. All wetlands wholly or partially contained within this buffer were then included, and the combination of the river channel, the adjacent buffer, and the connected wetlands make up this riverine Core Habitat.

BioMap2 Cores (BCs) (called Core Habitats in BioMap2) identify 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.

Certified Vernal Pools are temporary ponds or other fishless wetlands that meet certain biological and physical criteria to be classified as essential breeding habitat for a number of amphibian and invertebrate species, such as Wood Frog, Spotted Salamander, Blue-spotted Salamander, Jefferson Salamander, Marbled Salamander, and Intricate Fairy Shrimp. The certification of vernal pool habitat in The Commonwealth is administered by the Natural Heritage & Endangered Species Program. A number of regulations incorporate protections for certified vernal pools (please see http://www.mass.gov/dfwele/dfw/nhesp/vernal_pools/pdf/vpcert.pdf for more information).

Critical Natural Landscape (CNL) (part of BioMap2) identifies large natural landscape areas 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.

Cobbles are small hills or rocky knolls made of marble and quartzite. The alkaline soils derived from the calcareous rocks support a distinct and diverse flora. Examples include Bartholomew's Cobble in southern Sheffield and Tyringham Cobble in Tyringham.

Critically Imperiled natural communities typically have five or fewer documented sites or have very few remaining acres in the state. Natural Community types ranked as Critically Imperiled are in the Priority Natural Communities category.

Disturbance, in an ecological sense, is an event that disrupts the normal structure and function of an ecosystem. Disturbances often produce bare soil and openings in forests where rapidly growing, sun-loving species, including invasive exotic species, can grow. Human activities have accelerated the number and types of disturbances in many ecosystems.

Ecoregions are areas of relatively homogeneous ecological systems, including vegetation, soils, climate, geology, and patterns of human uses.

Endangered species are in danger of extinction throughout all or a significant portion of their range or are in danger of extirpation from Massachusetts. Endangered is a category of state-listed species defined in the Massachusetts Endangered Species Act (M.G.L. c.131A) and listed in its regulations (321 CMR 10.00).

Exemplary Natural Communities are the best examples documented of relatively common (Secure) types of natural communities.

Forest Cores (in BioMap2, a component of Core Habitat) identify the best examples of large, intact forests that are least impacted by roads and development, providing critical "forest interior" habitat for numerous woodland species.

Fragmented Landscape, in ecological and conservation terms, refers to the idea that a large spatial area (the landscape) that in the past might have had connected habitats (for example, unbroken forest, continuous river, or undisrupted grasslands) have become interspersed with artifacts of human development that alter habitat and ecological processes – or that the human influence has come to dominate the land leaving patches, or fragments, of natural habitat surrounded by development.

Imperiled communities typically have 6-20 sites or few remaining acres in the state. Natural Community types ranked as Imperiled are included in the Priority Natural Communities category.

Landscape Blocks (component of BioMap2 Critical Natural Landscape), the primary component of Critical Natural Landscape, are large areas of intact and predominately natural vegetation, consisting of contiguous forests, wetland, rivers, lakes, and ponds, as well as coastal habitats such as

barrier beaches and salt marshes. Pastures and power-line right-of-way, which are less intensively altered than most developed areas, were also included since they provide habitat and connectivity for many species.

Landscape Context refers to taking the broadest view of the ability of ecosystems or species populations to maintain themselves where they are by considering the siting within the larger area. For example, a wooded area within a city park has a very different, urban context than a wooded area on a farm.

MESA (Massachusetts Endangered Species Act) (M.G.L. c.131A) and its implementing regulations (321 CMR 10.00) provide regulatory protection of rare species and their habitats. MESA protects rare species and their habitats by prohibiting the "Take" of any plant or animal species listed as Endangered, Threatened, or Special Concern by the MA Division of Fisheries & Wildlife.

Natural Communities are assemblages of species that occur together in space and time. These groups of plants and animals are found in recurring patterns that are classified and described by their dominant biological and physical features.

Nymphs, sometimes informally referred to as larvae, are the young, immature form of dragonflies and some other invertebrates. Dragonfly nymphs are aquatic. On maturing, they change into the flying terrestrial adults that are seen along rivers and lakes, and nearby uplands.

Priority Natural Communities include types of natural communities with limited distribution, or relatively few occurrences, and/or low acreages in Massachusetts.

Protected in Perpetuity refers to land owned as conservation land by a public entity in Massachusetts whose lands come under the authority of Massachusetts Constitution Article 97, or federal land owned by a federal conservation agency, or by a non-profit dedicated to land conservation; or for which the conservation values have been protected by legal restrictions on the deed or by a conservation easement (conservation restriction).

Secure types of natural communities typically have over 100 sites or abundant acreage across the state; excellent examples are identified as Core Habitat to ensure continued protection and are referred to as Exemplary Natural Communities.

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. Special Concern is a category of state-listed species defined in the Massachusetts Endangered Species Act (M.G.L. c.131A) and listed in its regulations (321 CMR 10.00).

Species of Conservation Concern (in BioMap2, a component of Core Habitat) include those species that meet the criteria for listing under the Massachusetts Endangered Species Act, as well as a number of species that do not meet these criteria for listing, but are considered to be of conservation concern within Massachusetts, such as inclusion in the State Wildlife Action Plan (SWAP).

State-listed Species are species listed under the Massachusetts Endangered Species Act (M.G.L. c.131A) and its regulations (321 CMR 10.00). – that is, Endangered, Threatened, or Special Concern species.

SWAP (State Wildlife Action Plan), approved in 2006, the Massachusetts Division of Fisheries and Wildlife's State Wildlife Conservation Strategy, most often referred to as the State Wildlife Action Plan (SWAP), is a comprehensive document to help guide wildlife conservation decision making for Massachusetts' wildlife for many years.

SWAP Species were identified as being those in greatest need of conservation in the Massachusetts Division of Fisheries and Wildlife' State Wildlife Conservation Strategy, most often referred to as the State Wildlife Action Plan (SWAP).

Threatened species are likely to become Endangered in Massachusetts in the foreseeable future throughout all or a significant portion of their range. Threatened is a category of state-listed species defined in the Massachusetts Endangered Species Act (M.G.L. c.131A) and listed in its regulations (321 CMR 10.00).

Upland Buffers of Aquatic Cores (component of BioMap2's Critical Natural Landscape) identify protective upland areas adjacent to all Aquatic Cores. A variable width buffer, that extends deeper into surrounding unfragmented habitats than into developed areas, was used to include the most intact areas around Aquatic Cores. The conservation of wetland buffers will support habitats and functionality of each aquatic area, and also include adjacent uplands that are important for many species that move between habitat types.

Upland Buffer of Wetland Cores (component of BioMap2's Critical Natural Landscape) identify protective upland areas adjacent to all Wetland Cores. A variable-width buffer, that extends deeper into surrounding unfragmented habitats than into developed areas, was used to include the most intact areas around the Wetland Cores. The conservation of wetland buffers will support habitats and functionality of each wetland, and also include adjacent uplands that are important for many species that move between habitat types.

Variant of a natural community refers to a named subtype of a more broadly defined type of community. In Massachusetts the term is not a formal designation, but rather is intended as an aid for understanding community relationships.

Vernal Pools, also known as ephemeral pools, autumnal pools, and temporary woodland ponds, typically fill with water in the autumn or winter due to rainfall and rising groundwater and remain ponded through the spring and into summer. They usually dry completely by the middle or end of summer each year. Vernal pools are unique wildlife habitats best known for the amphibians and invertebrate animals that use them to breed.

Vernal Pool Cores (BioMap2, component of Core Habitat) identify, based on a GIS model, the highest quality most interconnected clusters of Potential Vernal Pools (a dataset of likely vernal pools identified from interpretation of aerial photographs) and the habitat between them.

Vulnerable communities typically have 21-100 sites or limited acreage across the state. Natural Community types ranked as Vulnerable are in the Priority Natural Communities category.

Wetland Cores (BioMap2, component of Core Habitat) identify, based on a GIS model, the least disturbed wetlands within undeveloped landscapes—those with intact buffers and little fragmentation or other stressors associated 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.

Help Save Endangered Wildlife!

Please contribute on your Massachusetts income tax form or directly to the

Natural Heritage &
Endangered Species Fund

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

BioMap2

CONSERVING THE BIODIVERSITY OF MASSACHUSETTS IN A CHANGING WORLD

Lee

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.

Commonwealth of Massachusetts Department of Fish & Game

Commonwealth of Massachusetts Division of Fisheries & Wildlife

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

The Nature Conservancy
Protecting nature. Preserving life.™

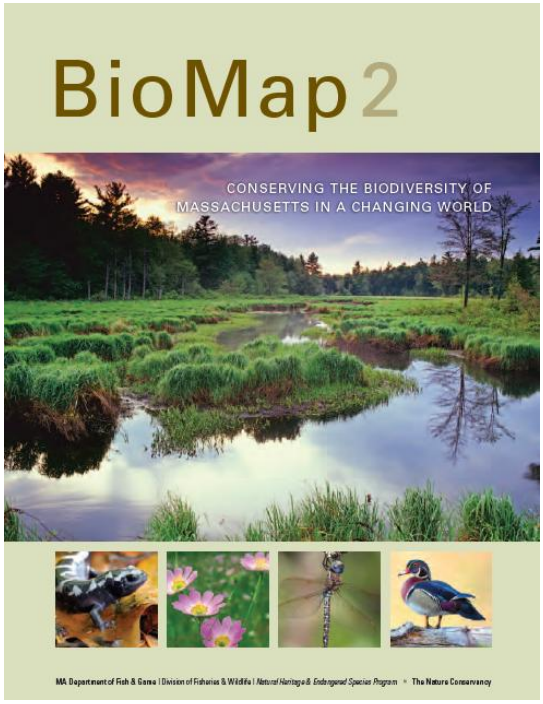
Table of Contents

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.



Get your copy of the *BioMap2* report! Download from www.mass.gov/nhesp or contact Natural Heritage at 508-389-6360 or natural.heritage@state.ma.us.

What Does Status Mean?

The Division of Fisheries and Wildlife determines a status category for each rare species listed under the Massachusetts Endangered Species Act (MESA), M.G.L. c.131A, and its implementing regulations 321 CMR 10.00. Rare species are categorized as Endangered, Threatened or of Special Concern according to the following:

- Endangered species are in danger of extinction throughout all or a significant portion of their range or are in danger of extirpation from Massachusetts.
- Threatened species are likely to become Endangered in Massachusetts in the foreseeable future throughout all or a significant portion of their range.
- Special Concern species have suffered a decline that could threaten the species if allowed to continue unchecked or occur in such small numbers or with such restricted distribution or specialized habitat requirements that they could easily become Threatened in Massachusetts.

In addition NHESP maintains an unofficial watch list of plants that are tracked due to potential conservation interest or concern, but are not regulated under the Massachusetts Endangered Species Act or other laws or regulations. Likewise, described natural communities are not regulated by any law or regulations, but they can help to identify ecologically important areas that are worthy of protection. The status of natural communities

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reflects the documented number and acreages of each community type in the state:

- Critically Imperiled communities typically have 5 or fewer documented good sites or have very few remaining acres in the state.
- Imperiled communities typically have 6-20 good sites or few remaining acres in the state.
- Vulnerable communities typically have 21-100 good sites or limited acreage across the state.
- Secure communities typically have over 100 sites or abundant acreage across the state; however, excellent examples are identified as Core Habit to ensure continued protection.

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

BioMap2: One Plan, Two Components

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

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

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

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

Components of Core Habitat

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

Rare Species

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

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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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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

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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

Lee lies on the border of the Berkshire Highlands/Southern Green Mountains, the Lower Berkshire Hills, and the Western New England Marble Valleys/Berkshire Valley/Housatonic and Hoosic Valley Ecoregions. The Berkshire Highlands Ecoregion is an area drained by the Deerfield, upper Westfield, Hoosic, and Housatonic Rivers. Lakes and ponds are relatively abundant. This ecoregion has deep soils that support northern hardwoods and spruce-fir forests. The Lower Berkshire Hills Ecoregion is similar to the Berkshire Highlands Ecoregion, with its common northern hardwoods, but lacks spruce-fir and harbors transition hardwoods. Lakes and ponds are relatively abundant. The Western New England Marble Valleys Ecoregion is an area drained by the Hoosic and Housatonic Rivers. This ecoregion harbors farms, evergreen forests, transition and northern hardwood forests, and calcareous fens. The limestone-rich bedrock in the area creates alkaline lakes and streams.

Lee at a Glance

- Total Area: 17,288 acres (27.0 square miles)
- Human Population in 2010: 5,943
- Open space protected in perpetuity: 5,185 acres, or 30.0% percent of total area*
- *BioMap2* Core Habitat: 5,253 acres
- *BioMap2* Core Habitat Protected: 3,316 acres or 63.1%
- *BioMap2* Critical Natural Landscape: 7,075 acres
- *BioMap2* Critical Natural Landscape Protected: 4,075 acres or 57.6%.

BioMap2 Components

Core Habitat

- 6 Exemplary or Priority Natural Community Cores
- 3 Forest Cores
- 5 Wetland Cores
- 9 Aquatic Cores
- 9 Species of Conservation Concern Cores**
  - 1 mammal, 3 birds, 1 reptile, 2 amphibians, 2 fishes, 6 insects, 2 mussels, 1 snail, 10 plants

Critical Natural Landscape

- 2 Landscape Blocks
- 5 Wetland Core Buffers
- 7 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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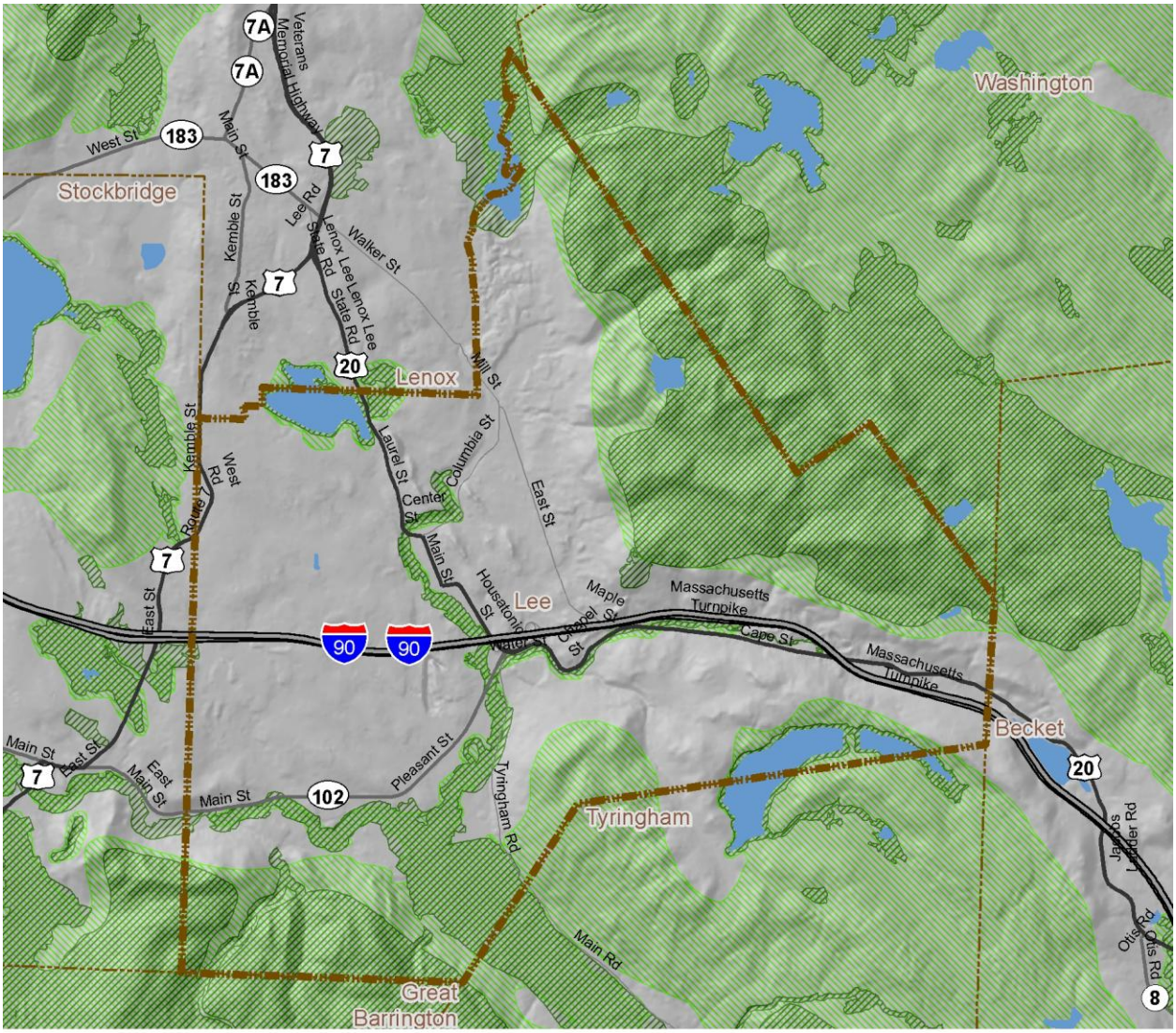
BioMap2 Core Habitat and Critical Natural Landscape in Lee



BioMap2 Core Habitat

BioMap2 Critical Natural Landscape

1 Mile

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Species of Conservation Concern, Priority and Exemplary Natural Communities, and Other Elements of Biodiversity in Lee

Mussels

Creeper, (*Strophitus undulatus*), SC
Triangle Floater, (*Alasmidonta undulata*), Non-listed SWAP species

Snails

Boreal Marstonia, (*Marstonia lustrica*), E

Insects

Moths

Ostrich Fern Borer, (*Papaipema* sp. 2 nr. *pterisii*), SC

Butterflies

Dion Skipper, (*Euphyes dion*), T
Mustard White, (*Pieris oleracea*), T

Dragonflies

Stygian Shadowdragon, (*Neurocordulia yamaskanensis*), SC
Arrow Clubtail, (*Stylurus spiniceps*), Non-listed SWAP species
Zebra Clubtail, (*Stylurus scudderi*), Non-listed SWAP species

Amphibians

Northern Leopard Frog, (*Rana pipiens*), Non-listed SWAP
Spring Salamander, (*Gyrinophilus porphyriticus*), Non-listed SWAP

Fishes

Longnose Sucker, (*Catostomus catostomus*), SC
Bridle Shiner, (*Notropis bifrenatus*), SC

Reptiles

Wood Turtle, (*Glyptemys insculpta*), SC

Birds

American Bittern, (*Botaurus lentiginosus*), E
Common Moorhen, (*Gallinula chloropus*), SC
Bald Eagle, (*Haliaeetus leucocephalus*), T

Mammals

Water Shrew, (*Sorex palustris*), SC

Plants

Fen Sedge, (*Carex tetanica*), SC
Intermediate Spike-sedge, (*Eleocharis intermedia*), T
Frank's Lovegrass, (*Eragrostis frankii*), SC
Labrador Bedstraw, (*Galium labradoricum*), T
Andrews' Bottle Gentian, (*Gentiana andrewsii*), E

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Hairy Honeysuckle, (*Lonicera hirsuta*), E
Pale Green Orchis, (*Platanthera flava* var. *herbiola*), T
Bur Oak, (*Quercus macrocarpa*), SC
Bristly Buttercup, (*Ranunculus pensylvanicus*), SC
Wapato, (*Sagittaria cuneata*), T

Priority Natural Communities

Small-river Floodplain Forest, S2
Black Ash-Red Maple-Tamarack Calcareous Seepage Swamp, S2
Calcareous Sloping Fen, S2
Major-river Floodplain Forest, S2
Hickory - Hop Hornbeam Forest/Woodland, S2

Exemplary Natural Communities

Deep Emergent Marsh

Other *BioMap2* Components

Forest Core
Aquatic Core
Wetland 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.

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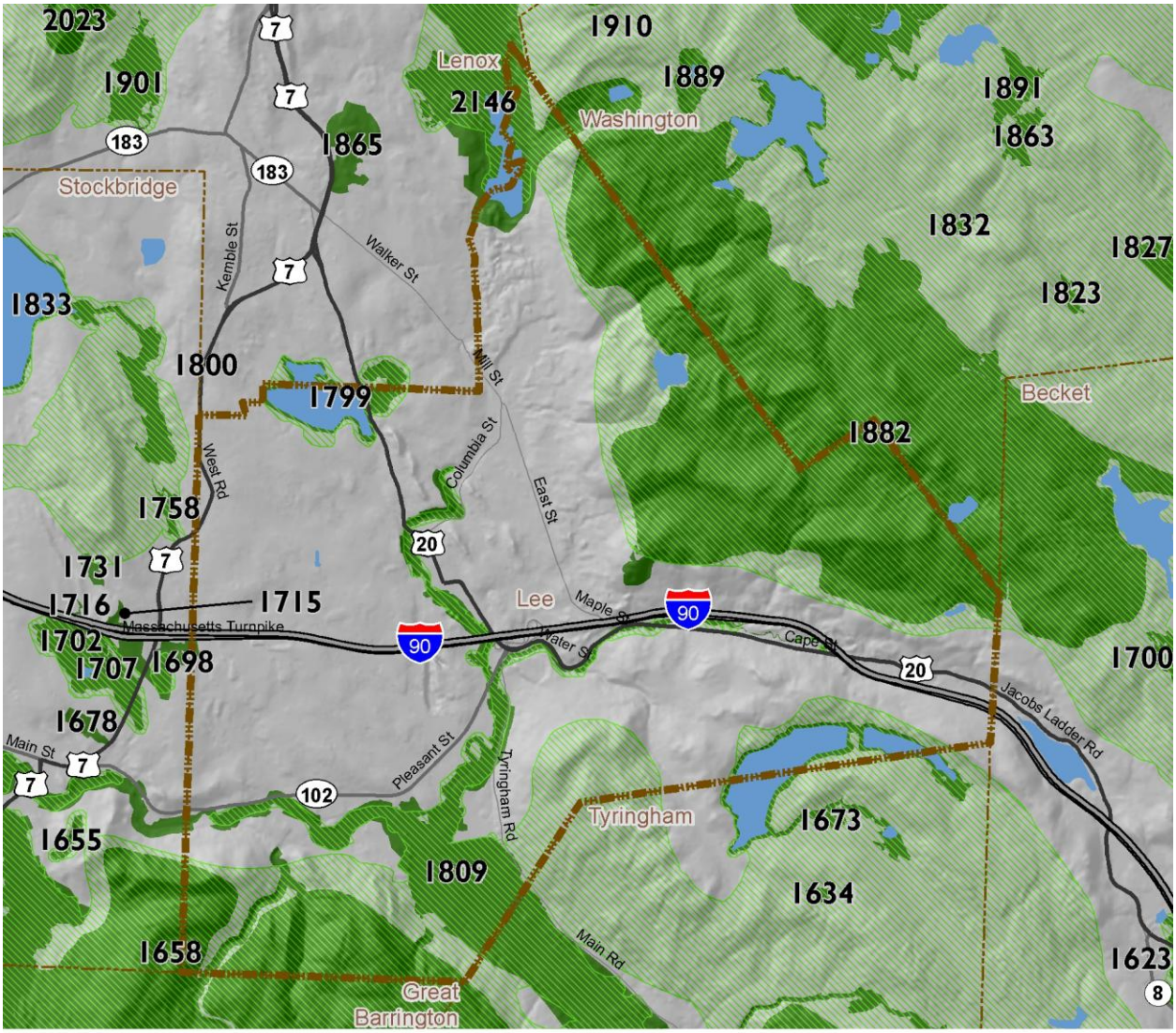
BioMap2 Core Habitat in Lee

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

Core 1658

Forest Core		
Wetland Core		
Aquatic Core		
Priority & Exemplary Natural Communities		
Black Ash-Red Maple-Tamarack Calcareous Seepage Swamp		S2
Calcareous Basin Fen		S1
Circumneutral Talus Forest/Woodland		S3
Deep Emergent Marsh		
Hemlock-Hardwood Swamp		
Ridgetop Pitch Pine - Scrub Oak Community		S2
Species of Conservation Concern		
Bur Oak	*Quercus macrocarpa*	SC
Climbing Fumitory	*Adlumia fungosa*	SC
Dwarf Scouring-rush	*Equisetum scirpoides*	SC
Hemlock Parsley	*Conioselinum chinense*	SC
Mountain Spleenwort	*Asplenium montanum*	E
Ogden's Pondweed	*Potamogeton ogdenii*	E
Purple Clematis	*Clematis occidentalis*	SC
Swamp Birch	*Betula pumila*	E
Dion Skipper	*Euphyes dion*	T
Spring Salamander	*Gyrinophilus porphyriticus*	Non-listed SWAP
Eastern Ribbon Snake	*Thamnophis sauritus*	Non-listed SWAP
American Bittern	*Botaurus lentiginosus*	E
Common Moorhen	*Gallinula chloropus*	SC
Sedge Wren	*Cistothorus platensis*	E

Core 1673

Wetland Core		
Aquatic Core		
Priority & Exemplary Natural Communities		
Hemlock-Hardwood Swamp		
Species of Conservation Concern		
Bridle Shiner	*Notropis bifrenatus*	SC

Core 1698

Aquatic Core		
Species of Conservation Concern		
Dion Skipper	*Euphyes dion*	T
Common Moorhen	*Gallinula chloropus*	SC

Core 1799

Aquatic Core		
Priority & Exemplary Natural Communities		
Black Ash-Red Maple-Tamarack Calcareous Seepage Swamp		S2
Species of Conservation Concern		
Hairy Honeysuckle	*Lonicera hirsuta*	E
Labrador Bedstraw	*Galium labradoricum*	T
Boreal Marstonia	*Marstonia lustrica*	E

Core 1809

Forest Core		
Wetland Core		
Aquatic Core		
Vernal Pool Core		
Priority & Exemplary Natural Communities		
Calcareous Forest Seep Community		S2
Calcareous Sloping Fen		S2
Deep Emergent Marsh		
Level Bog		S3
Major-river Floodplain Forest		S2
Rich, Mesic Forest Community		S3
Small-river Floodplain Forest		S2
Species of Conservation Concern		
Andrews' Bottle Gentian	*Gentiana andrewsii*	E
Bristly Black Currant	*Ribes lacustre*	SC
Bur Oak	*Quercus macrocarpa*	SC
Downy Wood-mint	*Blephilia ciliata*	E
Dwarf Scouring-rush	*Equisetum scirpoides*	SC
Fen Sedge	*Carex tetanica*	SC
Frank's Lovegrass	*Eragrostis frankii*	SC
Great Blue Lobelia	*Lobelia siphilitica*	E
Hairy Wood-mint	*Blephilia hirsuta*	E
Hitchcock's Sedge	*Carex hitchcockiana*	SC
Intermediate Spike-sedge	*Eleocharis intermedia*	T
Long-leaved Bluet	*Houstonia longifolia*	E
Long-styled Sanicle	*Sanicula odorata*	T
Pale Green Orchis	*Platanthera flava* var. *herbiola*	T
Purple Clematis	*Clematis occidentalis*	SC
Smooth Rock-cress	*Boechera laevigata*	SC

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Tuckerman's Sedge	*Carex tuckermanii*	E
Woodland Millet	*Milium effusum*	T
Creeper	*Strophitus undulatus*	SC
Triangle Floater	*Alasmidonta undulata*	Non-listed SWAP
Ostrich Fern Borer Moth	*Papaipema* sp. 2 nr. *pterisii*	SC
Dion Skipper	*Euphyes dion*	T
Arrow Clubtail	*Stylurus spiniceps*	Non-listed SWAP
Brook Snaketail	*Ophiogomphus aspersus*	SC
Skillet Clubtail	*Gomphus ventricosus*	T
Stygian Shadowdragon	*Neurocordulia yamaskanensis*	SC
Zebra Clubtail	*Stylurus scudderi*	Non-listed SWAP
Jefferson Salamander	*Ambystoma jeffersonianum*	SC
Marbled Salamander	*Ambystoma opacum*	T
Northern Leopard Frog	*Rana pipiens*	Non-listed SWAP
Wood Turtle	*Glyptemys insculpta*	SC
Bridle Shiner	*Notropis bifrenatus*	SC
Longnose Sucker	*Catostomus catostomus*	SC
American Bittern	*Botaurus lentiginosus*	E
King Rail	*Rallus elegans*	T
Sedge Wren	*Cistothorus platensis*	E
Sora	*Porzana carolina*	Non-listed SWAP

Core 1882

Forest Core
Wetland Core
Aquatic Core
Priority & Exemplary Natural Communities

Hickory - Hop Hornbeam Forest/Woodland		S2

Species of Conservation Concern

Jefferson Salamander	*Ambystoma jeffersonianum*	SC
Spring Salamander	*Gyrinophilus porphyriticus*	Non-listed SWAP
American Bittern	*Botaurus lentiginosus*	E
Common Moorhen	*Gallinula chloropus*	SC
Least Bittern	*Ixobrychus exilis*	E

Core 2146

Forest Core
Wetland Core
Aquatic Core
Vernal Pool Core
Priority & Exemplary Natural Communities

Alluvial Red Maple Swamp	S3
Hemlock-Hardwood Swamp	
High-terrace Floodplain Forest	S2

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Level Bog		S3
Major-river Floodplain Forest		S2
Red Maple - Black Ash - Bur Oak Swamp		
Transitional Floodplain Forest		S2
Species of Conservation Concern		
Barren Strawberry	*Geum fragarioides*	SC
Bristly Buttercup	*Ranunculus pensylvanicus*	SC
Bur Oak	*Quercus macrocarpa*	SC
Crooked-stem Aster	*Symphyotrichum prenanthoides*	SC
Culver's-root	*Veronicastrum virginicum*	T
Fen Cuckoo Flower	*Cardamine dentata*	T
Foxtail Sedge	*Carex alopecoidea*	T
Gray's Sedge	*Carex grayi*	T
Hairy Wild Rye	*Elymus villosus*	E
Hemlock Parsley	*Conioselinum chinense*	SC
Intermediate Spike-sedge	*Eleocharis intermedia*	T
Long-styled Sanicle	*Sanicula odorata*	T
Narrow-leaved Spring Beauty	*Claytonia virginica*	E
Straight-leaved Pondweed	*Potamogeton strictifolius*	E
Tuckerman's Sedge	*Carex tuckermanii*	E
Wapato	*Sagittaria cuneata*	T
White Adder's-mouth	*Malaxis monophyllos* var. *brachypoda*	E
Triangle Floater	*Alasmidonta undulata*	Non-listed SWAP
Ostrich Fern Borer Moth	*Papaipema* sp. 2 nr. *pterisii*	SC
Mustard White	*Pieris oleracea*	T
Tule Bluet	*Enallagma carunculatum*	SC
Arrow Clubtail	*Stylurus spiniceps*	Non-listed SWAP
Brook Snaketail	*Ophiogomphus aspersus*	SC
Ocellated Darner	*Boyeria grafiana*	SC
Rapids Clubtail	*Gomphus quadricolor*	E
Riffle Snaketail	*Ophiogomphus carolus*	T
Spine-crowned Clubtail	*Gomphus abbreviatus*	SC
Zebra Clubtail	*Stylurus scudderi*	Non-listed SWAP
Four-toed Salamander	*Hemidactylium scutatum*	Non-listed SWAP
Jefferson Salamander	*Ambystoma jeffersonianum*	SC
Northern Leopard Frog	*Rana pipiens*	Non-listed SWAP
Spring Salamander	*Gyrinophilus porphyriticus*	Non-listed SWAP
Wood Turtle	*Glyptemys insculpta*	SC
American Bittern	*Botaurus lentiginosus*	E
Bald Eagle	*Haliaeetus leucocephalus*	T
Common Moorhen	*Gallinula chloropus*	SC
Sora	*Porzana carolina*	Non-listed SWAP
Water Shrew	*Sorex palustris*	SC

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Core Habitat Summaries

Core 1658

A 9,052-acre Core Habitat featuring Forest Core, Wetland Core, Aquatic Core, Priority Natural Communities, and Species of Conservation Concern.

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.

Here, a 3,512-acre Forest Core and a separate 3,021-acre Forest Core are among the largest 20% of Forest Cores in the state and provide important forest interior habitat. Each is partially protected, primarily through Beartown State Forest. A separate 916-acre Forest Core, though small from a statewide perspective, is the fourth largest in the ecoregion. It provides important habitat in the otherwise fragmented Berkshire Valleys ecoregion.

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.

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.

Black Ash-Red Maple-Tamarack Calcareous Seepage Swamps are mixed deciduous-coniferous forested swamps occurring in areas where there is calcium-rich groundwater seepage. This nutrient enrichment supports many rare calcium-loving plant species. This example of Black Ash-Red Maple-Tamarack Calcareous Seepage Swamp is the largest in the state, and is part of a larger complex of enriched wetland types.

Calcareous Basin Fens are sedge-shrub peatlands occurring in well-defined basins that have calcareous water inputs. These uncommon communities are the least rich of the three types of calcareous fen communities described in Massachusetts. This example of Calcareous Basin Fen occurs as a ring around Lake Agawam, and has very good species and habitat diversity.

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 moderate sized example of Circumneutral Talus Forest is in excellent condition, with a nice diversity of both species and habitats, and little signs of human disturbance.

Deep Emergent Marshes are graminoid wetlands occurring on saturated soils that are seasonally flooded. They generally form in broad, flat areas bordering slow rivers or along pond margins, and often grade into shrub swamps. This Deep Emergent Marsh has areas of high quality habitat, but they are interspersed with large patches of Phragmites.

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Hemlock-Hardwood Swamps are acidic forested swamps that have hemlock as the dominant canopy species. These forested wetlands occur on saturated soils in poorly drained basins throughout the state. This large Hemlock-Hardwood Swamp is unusual for the type because it has some species usually found in areas of enriched conditions. Despite some invasive species, it is in very good condition in a good landscape.

The Ridgetop Pitch Pine-Scrub Oak community occurs on acidic bedrock along mountain ridges, often in a mosaic with one of the rocky summit communities. This fire-dependent community is tolerant of extremely severe growing conditions. This example of Ridgetop Pitch Pine-Scrub Oak community is small and has been degraded by trampling from intensive recreational use, but will likely persist at this site.

Bur Oak is widespread and common in some parts of North America, where it is found in bottomlands, on well-watered sites, and on less wet upland sites. In Massachusetts, it is most often found in wet locations, and often in calcareous or limestone-influenced soils. Such locations include fen-like seepage swamps; forested swamps, floodplains, and seepage slopes; and wet meadows and moist uplands.

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

Dwarf Scouring-rush, a member of the Horsetail family, is 4-8 inches tall, evergreen, and grows as a dark green tuft of wiry stems. Dwarf Scouring-rush is found on moist banks and seepy wooded slopes and hillsides with springs and streams, often in ecotones between upland and wetland sites.

In Massachusetts, Hemlock Parsley is usually found in swamps, wet meadows, bogs or fens, and marshy forests. It can tolerate shady environments and wet, acidic soils, although it is usually found in less acidic (circumneutral to limy) wetlands.

Mountain Spleenwort is a tiny, delicate, evergreen fern that grows in drooping tufts in dry to moist rock crevices. This species prefers acidic conditions. It can be found in association with both hemlock and upland oak communities and favors dense to medium shade.

In Massachusetts, Ogden's Pondweed, a globally rare, submersed aquatic plant, is found in shallow, alkaline, still or very slow-moving waters.

Purple Clematis is a graceful, woody vine of sub-acid rocky slopes and outcrops. A member of the buttercup family, it has opposite or whorled leaves and pendant bluish or purple flowers that bloom from May to June.

Swamp Birch is a medium-sized, bushy shrub. It is found in open and forested wetlands influenced by calcareous groundwater seepage.

Dion Skipper butterflies inhabit sedge wetlands. Adults nectar in nearby upland fields.

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

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Eastern Ribbon Snakes are medium-sized, very thin snakes 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.

American Bitterns are heron-like birds that nest primarily in large cattail, tussock or shrub marshes and are very sensitive to disturbance.

Common Moorhens are fowl-like marshbirds that typically nest in dense cattail beds adjacent to open water.

Sedge Wrens nest in large wet meadows. They are sensitive to changes in hydrology and seral succession.

Core 1673

A 490-acre Core Habitat featuring Wetland Core, Aquatic Core, Priority Natural Communities, and a 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.

This 62-acre Wetland Core is among the largest 20% of Wetland Cores in this ecoregion.

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.

Hemlock-Hardwood Swamps are acidic forested swamps that have hemlock as the dominant canopy species. These forested wetlands occur on saturated soils in poorly drained basins throughout the state. This species-diverse and disturbance-free Hemlock-Hardwood Swamp is of small size, but it is well buffered within a large area of natural vegetation.

Bridle Shiners are small (<5 cm) minnows that are found in clear water in slack areas of streams and rivers and are also found in lakes and ponds.

Core 1698

A 66-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.

Dion Skipper butterflies inhabit sedge wetlands. Adults nectar in nearby upland fields.

Common Moorhens are fowl-like marshbirds that typically nest in dense cattail beds adjacent to open water.

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Core 1799

A 270-acre Core Habitat featuring Aquatic Core, Priority Natural Communities, and Species of Conservation Concern.

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

Black Ash-Red Maple-Tamarack Calcareous Seepage Swamps are mixed deciduous-coniferous forested swamps occurring in areas where there is calcium-rich groundwater seepage. This nutrient enrichment supports many rare calcium-loving plant species. This moderately large example of a Black Ash-Red Maple-Tamarack Calcareous Seepage Swamp is in good condition, despite the presence of some exotic invasive species.

Hairy Honeysuckle, a twining and climbing, somewhat shrubby vine, is found in open to lightly shaded exposures on calcareous rocky slopes or acidic slopes with calcareous till.

Labrador Bedstraw, a slender perennial herb of the madder family, inhabits calcareous fens, wet meadows, and swamps, often on hummocks or tussocks in full or filtered sunlight.

Boreal Marstonia are small snails that live on plants in lakes rich in calcium and magnesium with a well vegetated vegetated shallow zone.

Core 1809

An 11,464-acre Core Habitat featuring Forest Core, Wetland Core, Aquatic Core, Vernal Pool Core, Priority Natural Communities, and Species of Conservation Concern.

The middle reach of the Housatonic River runs through a large *BioMap2* Core Habitat that stretches east-west from West Stockbridge to Otis. Forty species of rare and uncommon plants and animals inhabit this Core Habitat, including the globally rare Skillet Clubtail dragonfly and Ostrich Fern Borer Moth. The Housatonic here supports four more rare and uncommon species of dragonflies (a hotspot for riverine dragonflies state-wide), as well as Longnose Suckers, Triangle Floater and Creeper freshwater mussels, and several rare plants. An important tributary to the Housatonic in this Core Habitat, Hop Brook, with its adjacent calcareous marshes, supports a diverse array of rare and specialized plants, as well as the Endangered American Bittern. At the upstream end of Hop Brook in this Core is a Forest Core, covering much of Long Mountain. Further downstream on the Housatonic, the Core stretches along part of Mohawk Brook, a Forest Core, and a stretch of the Williams River, to reach another Forest Core on Maple Hill. The part of the Core in the vicinity of Mohawk Brook and Glendale is home to one of the best populations of Jefferson Salamander in the state. Wood Turtles live along the slow stretch of the Williams River below Maple Hill. The rich, calcareous bedrock of Maple Hill itelf supports the state's only known population of the Endangered Downy Wood-mint, along with five other rare plants.

Calcareous Forest Seeps are found on wet slopes, where calcium-rich groundwater seeps out of the earth. The overstory here is similar to the surrounding forest, but many typical calcareous wetland ferns, shrubs, and other plants occur as well. This large example of Calcareous Forest Seep is very significant, and has great species diversity as well as a rare plant species. It is threatened by trampling from a nearby hiking trail, as well as by an exotic species.

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Calcareous Sloping Fens are open, sedge-dominated wetlands occurring on slight to moderate slopes where there is calcareous groundwater seepage. They tend to be "hot spots" for uncommon species, often containing multiple state-listed species. This small example of a Calcareous Sloping Fen is recovering well from past human disturbances, and is associated with a larger complex of calcareous wetlands.

Deep Emergent Marshes are graminoid wetlands occurring on saturated soils that are seasonally flooded. They generally form in broad, flat areas bordering slow rivers or along pond margins, and often grade into shrub swamps. Despite the presence of invasive exotic species, this extensive example of Deep Emergent Marsh is in excellent condition with high plant species diversity, and is an important area for several of Massachusetts' rare birds.

Level Bogs are dwarf-shrub peatlands, generally with pronounced hummocks and hollows in sphagnum moss. These wetland communities are very acidic and nutrient-poor because the peat isolates them from nutrients in groundwater and streams. This example of Level Bog is of moderate quality, and is found within a beautiful, isolated pond with high scenic value.

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. This example of Major-River Floodplain Forest is of moderate size but is in poor condition, with many exotic invasive species present.

Rich, Mesic Forests are a variant of northern hardwood forests, dominated by sugar maple with a diverse herbaceous layer that includes many spring wild flowers, in a moist, nutrient-rich environment. This Core has two examples of Rich, Mesic Forest in good condition, with exceptional species diversity. One is threatened by trampling from hikers, as well as by several exotic invasive species that have taken hold.

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 example of Small-River Floodplain Forest, though small, is in excellent condition and is well buffered by natural vegetation.

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.

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Core 1882

A 7,189-acre Core Habitat featuring Forest Core, Wetland Core, Aquatic Core, Priority Natural Communities, and Species of Conservation Concern.

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.

This 6,756 acre Forest Core is the fifth largest in the state, the second largest in the ecoregion, and is almost completely protected, primarily situated in October Mountain State Forest.

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.

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.

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 large, and despite evidence of some human disturbance, is in very good condition, with few exotic invasives, and good species diversity.

Adult and juvenile Jefferson Salamanders inhabit upland forests during most of the year, where they reside in small-mammal burrows and other subsurface retreats. Adults migrate during late winter or early spring to breed in vernal pools and fish-free areas of swamps, marshes, or similar wetlands. Larvae metamorphose in late summer or early fall, whereupon they disperse into upland forest.

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

American Bitterns are heron-like birds that nest primarily in large cattail, tussock or shrub marshes and are very sensitive to disturbance.

Common Moorhens are fowl-like marshbirds that typically nest in dense cattail beds adjacent to open water.

Least Bitterns are heron-like birds that typically nest in cattail marshes interspersed with open water and are very sensitive to disturbance.

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Core 2146

A 7,293-acre Core Habitat featuring Forest Core, Wetland Core, Aquatic Core, Vernal Pool Core, Priority Natural Communities, and Species of Conservation Concern.

The Housatonic River, from Pittsfield south to Lee, flows through rich lowland marshes and forests, including very good examples of Major-river Floodplain Forest, Transitional Floodplain Forest, and High-terrace Floodplain Forest natural communities. Thirty-four rare and uncommon species are found in this Core Habitat, including 17 plants and eight dragonflies and damselflies (three of which are globally rare). The state's best population of the Mustard White butterfly is here, and the floodplain forests host the globally rare Ostrich Fern Borer Moth.

Alluvial Red Maple Swamps are a type of red maple swamp that occurs in low areas along rivers and streams. Regular flooding enriches the soil with nutrients, resulting in an unusual set of associated trees and plants. These good patches of Alluvial Red Maple Swamp occur in a mosaic with other floodplain and wetland communities on protected land. The canopy and subcanopy have good species representation, but diversity in the shrub layer is limited by invasives.

Hemlock-Hardwood Swamps are acidic forested swamps that have hemlock as the dominant canopy species. These forested wetlands occur on saturated soils in poorly drained basins throughout the state. This moderately small Hemlock-Hardwood Swamp is in a large mosaic along the floodplain of the Housatonic with several types of priority natural communities. It has species reflecting more nutrient availability and less acidity than are usual for the community type.

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. These patches combine to make a very good, large example of High-terrace Floodplain Forest along the river with other floodplain and wetland forests. There are few invasives.

Level Bogs are dwarf-shrub peatlands, generally with pronounced hummocks and hollows in sphagnum moss. These wetland communities are very acidic and nutrient-poor because the peat isolates them from nutrients in groundwater and streams. This example of Level Bog is small and in fair condition, but is well buffered by extensive natural vegetation.

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. This Core has two examples of Major-River Floodplain Forest including patches with structural and species diversity with areas of a shrubby community variant. Flooding occurs and there are few invasives.

Red Maple-Black Ash-Bur Oak Swamps are mostly deciduous forests of calcium-enriched (circumneutral) wetlands. The trees growing on hummocks form an almost continuous canopy over variable shrub and dense and diverse herbaceous layers. This moderate sized Red Maple-Black Ash-Bur Oak Swamp is our only known example in a floodplain where it is in a mosaic with other priority and more common types of natural communities. The adjacent railroad and scattered exotics detract from the good surroundings.

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 two moderate-sized Transitional Floodplain Forest examples. One has

good diversity of native species, but abundant invasives. Portions of what may have been floodplain forest were lost in construction of a powerline right of way.

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.

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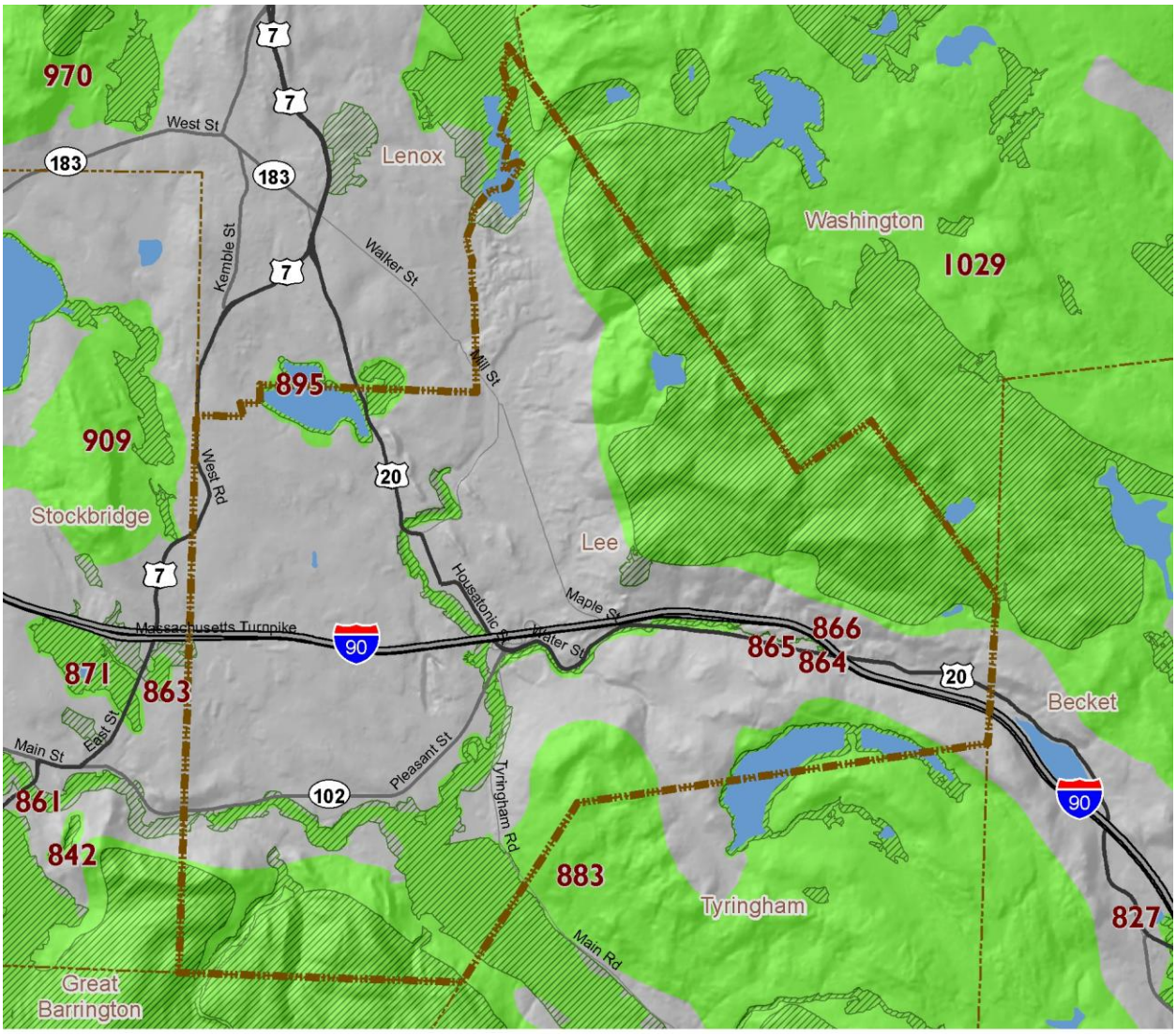
BioMap2 Critical Natural Landscape in Lee

Critical Natural Landscape IDs correspond with the following element lists and summaries.



Natural Heritage & Endangered Species Program

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Elements of *BioMap2* Critical Natural Landscapes

This section lists all elements of *BioMap2* Critical Natural Landscapes that fall *entirely or partially* within Lee. The elements listed here may not occur within the bounds of Lee.

CNL 864

Aquatic Core Buffer

CNL 865

Aquatic Core Buffer

CNL 866

Aquatic Core Buffer

CNL 883

Aquatic Core Buffer
Landscape Block
Wetland Core Buffer

CNL 895

Aquatic Core Buffer
Wetland Core Buffer

CNL 1029

Aquatic Core Buffer
Landscape Block
Wetland Core Buffer

Critical Natural Landscape Summaries

CNL 864

A <1-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 865

A <1-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 866

A <1-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 883

A 179,293-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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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.

CNL 895

A 366-acre Critical Natural Landscape featuring Aquatic Core Buffer and 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 1029

A 38,996-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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At 37,639 acres, this mostly forested Landscape Block is the fourth largest in the Berkshire Plateau Ecoregion and the sixth largest in the state. These large forested landscapes provide invaluable wildlife habitat and other ecosystem values such as clean drinking water and absorbing carbon from the atmosphere. Much, but not all, of this Block is protected, largely through October Mountain State Forest and water supply lands.

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