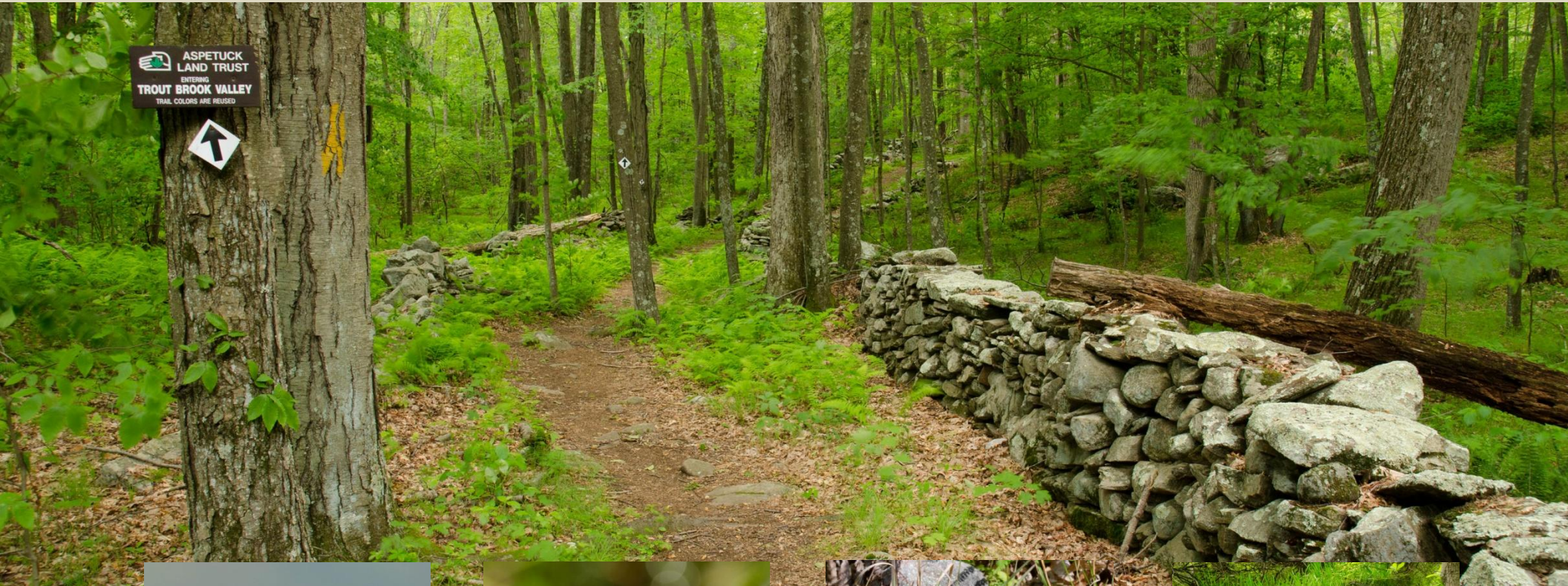


# Conservation & Management Plan

## Aspetuck Land Trust Trout Brook Valley Conservation Area



Connecticut Audubon Society | Science & Conservation Office | 2325 Burr Street | Fairfield, CT 06824





## Aspetuck Land Trust

Aspetuck Land Trust is a non-profit membership organization whose mission is the preservation and conservation of open space, including farm and forest land, and the natural resources located thereon, primarily in the towns of Easton, Weston, Fairfield and Westport, for the benefit and education of the public.

Since 1966, through generous gifts of land, continued efforts of volunteers, and cooperation from town agencies, Aspetuck Land Trust has preserved over 1,700 acres of land, which will be maintained in a natural state in perpetuity.

**We are Local. We are your Neighbors. We are your Land Trust.**



# Conservation & Management Plan

Aspetuck Land Trust Trout Brook Valley Conservation Area





## Index

<b>Chapter 1: Trout Brook Valley Preserve</b>	<b>6</b>
<b>1.1 Description of Trout Brook Valley Preserve</b>	<b>7</b>
<b>1.2 Area History</b>	<b>8</b>
<b>1.3 Land use history at Trout Brook Valley and Surrounding Areas</b>	<b>9</b>
<b>1.4 Purpose of the Conservation &amp; Management Plan</b>	<b>10</b>
<b>Chapter 2: Natural Resources</b>	<b>11</b>
<b>2.1 Ecological Region</b>	<b>12</b>
<b>2.2 Physical Characteristics</b>	<b>12</b>
2.2.1 Climate	13
2.2.2 Topography, Geology and Soils	13
2.2.3 Hydrology	14
<b>2.3 Habitat Characteristics</b>	<b>14</b>
2.3.1 Vegetation Cover Types	14
2.3.2 Wetlands	15
<b>2.4 Flora</b>	<b>21</b>
2.4.1 Non-native Invasive Plant Species	21
<b>2.5 Fauna</b>	<b>22</b>
2.5.1 Invertebrate Diversity	22
2.5.2 Butterfly Diversity	24
2.5.3 Fish Diversity	25
2.5.4 Amphibian Diversity	25
2.5.5 Reptile Diversity	27
2.5.6 Bird Diversity	28
2.5.7 Mammal Diversity	31
2.5.8 Other Organisms	32
<b>Chapter 3: Conservation &amp; Management</b>	<b>33</b>
<b>3.1 Why Manage Habitats?</b>	<b>34</b>



<b>3.2 Recent Management Activities</b>	<b>34</b>
<b>3.3 General Conservation &amp; Management Goals</b>	<b>35</b>
3.3.1 Conservation Priority Habitats	35
3.3.2 Conservation Priority Species	35
<b>3.4 Conservation and Management Challenges</b>	<b>37</b>
3.4.1 Invasive Species	37
3.4.2 Diseases and Pests	41
3.4.3 Anthropogenic Disturbance	43
3.4.4 Insufficient Scientific Knowledge / Data Gaps	44
<b>Chapter 4: Adaptive Conservation Plan</b>	<b>45</b>
<b>4.1 Trout Brook Valley Preserve Long-term Goals</b>	<b>46</b>
4.1.1 Habitat Management and Enhancement	46
4.1.2 Stewardship / Outreach	51
4.1.3 Addressing Data Gaps	52
<b>Chapter 5: Summary and Conclusions</b>	<b>53</b>
<b>5.1 Trout Brook Valley Preserve Summary and Conclusions</b>	<b>53</b>
<b>5.2 Benchmarks for Success</b>	<b>53</b>
<b>Chapter 6: Limitations</b>	<b>54</b>
<b>6.1 Limitations of the Trout Brook Valley Preserve natural resource survey</b>	<b>54</b>
<b>Chapter 7: References and Literature Cited</b>	<b>55</b>
<b>Appendices</b>	<b>57</b>
Appendix I: Trout Brook Valley Preserve Plant List	58
Appendix II: Trout Brook Valley Preserve Bird List	63
Appendix III: Forestry Management Plan	Attached



# Chapter 1: Trout Brook Valley

*Active vernal wetlands, rocky talus slopes, spring-fed headwater streams, mixed hardwoods, stands of dense hemlock, managed early successional 'old field' habitat and a functioning orchard are all found in Aspetuck Land Trust's Trout Brook Valley Preserve in Easton and Weston. The 1,009-acre preserve is surrounded by additional protected open space and forms the core of what can be considered the 'green heart' of Fairfield County. Aspetuck Land Trust strives to balance conservation and active wildlife habitat management with recreational and educational site uses and the preserve is open to the public year-round.*





## Chapter 1

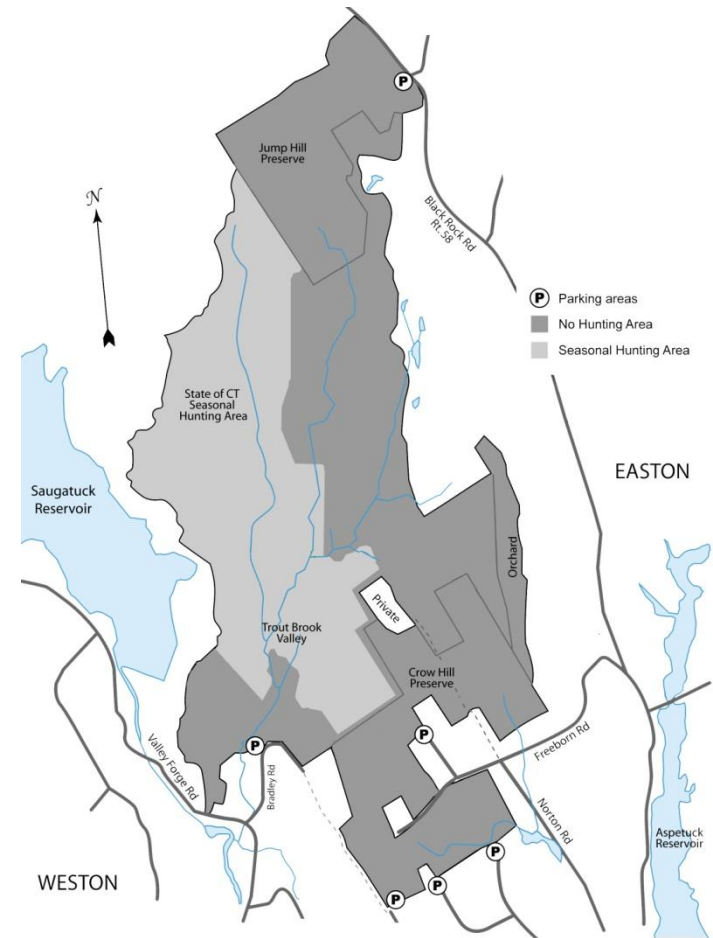
# Trout Brook Valley Preserve

### 1.1 Description of the Trout Brook Valley Conservation Area

The Trout Brook Valley Preserve as described in this report comprises 1,009 acres of open space that spans the border between Weston and Easton, Connecticut. The preserve consists of five parcels of different fee ownership but with mutually shared conservation easements, linking the management of the parcels and promoting the entire preserve's conservation and open space value. Because this report addresses primarily conservation, land use and habitat management recommendations that apply to the entire preserve, regardless of fee ownership, the terms 'Trout Brook Valley Preserve' or 'preserve' are meant to indicate the combined land holdings of the Aspetuck Land Trust, State of Connecticut and Town of Weston as indicated in Figure 1.

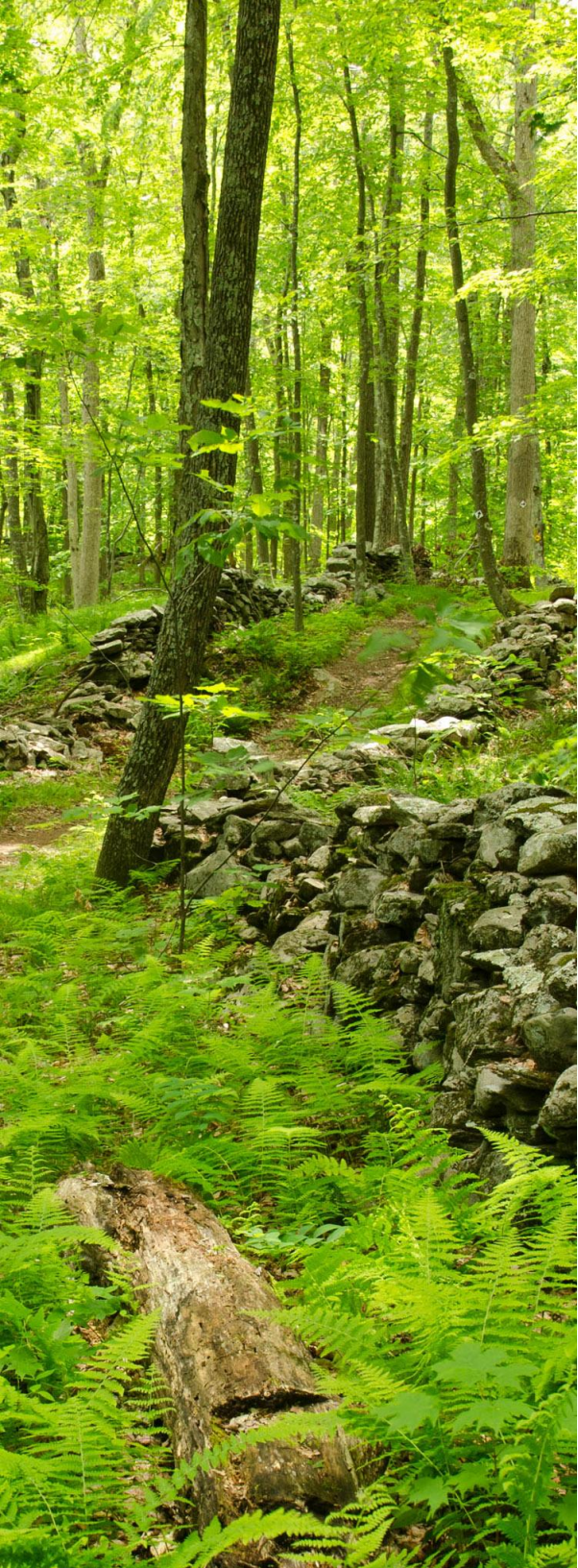
Ownership of the Trout Brook Valley Preserve is primarily shared between the Aspetuck Land Trust and the State of Connecticut, with some land held by the Town of Weston, as it owns 45 acres of Trout Brook Valley located in Weston. Aspetuck Land Trust (ALT) owns the Jump Hill Preserve on the north end of the study area and the Crow Hill Preserve on its southern end. Both parcels comprise 279 acres in total. The remaining 685 acres of the Trout Brook Valley Preserve are currently divided between two owners: the State of Connecticut and the Aspetuck Land Trust. Conservation easements have been exchanged between these two owners, the State of Connecticut, Department of Energy and Environmental Protection (DEEP) and the Aspetuck Land Trust. Aspetuck Land Trust manages the entire 1,009 acres of the Conservation Area.

In essence, the Trout Brook Valley Preserve protects the watershed of Hawley's Brook. Headwaters of this stream are located in the rugged northern section of the preserve and several tributaries empty into a wetland system and single outflow channel for Hawley's Brook on the south end of the preserve, near its Bradley Road entrance. Two significant ridge systems line the eastern and western boundaries of the preserve and the terrain within this enclosed valley contains considerable relief, in particular in its northern half. The Trout Brook Valley preserve is entirely forested, except for the managed orchard area on the eastern border. The combination of managed habitat, extensive forest, high quality wetlands and rocky outcrops and slopes contained within the preserve provides great potential for a wide variety of plant and animal species to occur in the area, while also offering many opportunities for the public to enjoy a variety of wildlife, landscapes and habitats in a recreational or educational context.



**Figure 1:** Trout Brook Valley Preserve is located between the Saugatuck and Aspetuck reservoirs in the towns of Easton and Weston. The area described as 'Trout Brook Valley' in this report includes the Aspetuck Land Trust's Jump Hill and Crow Hill Preserves, as well as the orchard area along the eastern edge of the property. The core area of Trout Brook Valley Preserve is partly owned by the Aspetuck Land Trust and partly by the State of Connecticut, but is maintained under shared conservation easements.





## 1.2 Area History

Historically, southwestern Connecticut was probably largely forested prior to the arrival of European settlers in the early 1700s. Until that time, the local landscape was mainly shaped by natural phenomena, weather events and the overall climate, with localized anthropogenic influences from Native Americans that inhabited the area. Expansion of the area's human populations gradually resulted in increased conversion of natural forest into agricultural land.

Signs of historic land use indicate that Trout Brook Valley Preserve and its surroundings did not always look the way they do now. An extensive network of old stone walls and abandoned cart trails indicate that the area was formerly in agricultural use. The rugged terrain of the region with its uneven topography and rocky outcrops is not very suited for extensive crop growing and much of the farming activity in the region likely involved raising livestock. Old field trees ("Wolf Trees") that once provided shade in areas where livestock was pastured are scattered throughout the preserve. In addition, localized stands of Red Cedar (*Juniperus virginiana*) and White Pine (*Pinus strobus*) indicate the location of old fields. Given the age of those trees (60-100 years) the once open areas that they mark were likely abandoned and allowed to grow in during the early 1900s.

The landscape in and around Trout Brook Valley Preserve also bears some signs of historic charcoaling and extensive charcoaling operations were documented from adjacent areas (e.g. Devil's Den Preserve). Between the mid 1800s and early 1900s, large amounts of charcoal were needed to operate Connecticut's brass and iron mills and other heavy industry that was thriving at the time. Charcoal was usually produced on-site in large smoldering pits and the operation involved cutting and burning large numbers of deciduous trees. Often forested areas were cut over several times during this period to harvest wood for charcoal production and occasionally forest fires flared up when charcoaling pits burned out of control. Some charcoal deposits were found in the steep sections of Trout Brook valley that were less suitable for agricultural purposes.

As a result of such intensive historic land use activities, much of the region's forest was reduced to burned-over scrubland. Forest tracts that were allowed to regenerate at this point were of a different species composition than those present historically because the prevailing open scrub habitat provided suitable conditions favorable to shade-intolerant tree species, rather than the shade-tolerant trees that previously replenished forest interiors. It was also during this period that the American Chestnut (*Castanea dentata*), once an important component of eastern forests, disappeared because of the accidental introduction of a fungal disease, the Chestnut Blight.

Charcoal became obsolete as a source of fuel for local smelters shortly after the end of World War I, and agriculture was undergoing a steady decline during the early 1900s. Throughout much of Connecticut, this led to the slow regrowth of forests as abandoned farm and forestry land were undergoing vegetational succession from scrubland through young forest. As a result, the preserve, like much of Connecticut, now supports a mostly single-age forest with some tree stands that are approaching 100 years in age.

Over a period of approximately 50 years, Bridgeport Hydraulic Company (BHC) acquired all of the parcels of land comprising what is now the Trout Book Valley Preserve with the intent of developing a water supply reservoir. BHC's acquisition efforts were completed around 1950. Although original construction plans called for large sections of the preserve to be included in the Saugatuck Reservoir, over time the project was scaled back and BHC (now called Aquarion) eventually abandoned the intent to flood Trout Brook Valley. In the mid-1990s, public sale of select former BHC properties was initiated and the area was under contract for development as a private golf course and 103 home sites.



In 1999, the Aspetuck Land Trust exercised a right of first refusal, as provided for in Connecticut General Statutes section 16-50c, and assumed a sales contract from the Bridgeport Hydraulic Company to purchase the Class III watershed land for \$12,390,502. (Class III land is off-watershed land that is not needed for the protection or supply of drinking water and may be sold to help fund water system improvements.) The State of Connecticut provided \$6,000,000 towards the purchase of the TBV.

A review of the property conducted by the Department of Energy and Environmental Protection indicated the property should be acquired because of its high value for recreation, forestry, fisheries, wildlife, and aesthetics. The review also determined that the acquisition of the land would be consistent with the State Plan for Conservation and Development. The property was subsequently acquired by the primary stakeholders with the following ownership structure:

- Aspetuck Land Trust - The Aspetuck Land Trust has fee ownership of 385.09 acres on the east side of the property and is the holder of a Conservation and Public Recreation Easement granted by the State of Connecticut for 300.01 acres on the west side of the property. ALT also owns the 279-acre Jump Hill and Crow Hill Preserves.
- State of Connecticut, Department of Energy and Environmental Protection - The State of Connecticut, DEEP has fee ownership of 300.01 acres on the west side of the property and is the holder of a Conservation and Public Recreation Easement granted by the Aspetuck Land Trust for 385.09 acres on the east side of the property.
- Town of Weston – The Town of Weston has formally granted a permanent easement across its lands at the Bradley Road entrance to ALT. ALT has, in turn, formally granted DEEP the use of that easement and access across ALT lands to reach DEEP lands.

### 1.3 Current and Historic Land use at Trout Brook Valley Preserve and Surrounding Areas

The 1,009-acre Trout Brook Valley Preserve lies at the center of a minimally developed forest block comprised of several larger parcels of protected open space. This conglomerate of open space forms the largest unfragmented natural area in Fairfield County, covering approximately 10 square miles. Other major holdings within this area include the protected watersheds for Aquarion’s Aspetuck, Saugatuck, and Hemlock Reservoirs, The Nature Conservancy’s Devil’s Den Preserve, state-owned conservation land and additional open space protected by the Towns of Weston, Easton and Redding, as well as the Aspetuck and Redding Land Trusts.

Much of the open space in the area is open for passive recreation although the specific activities that are allowed in each area vary by land owner. Aspetuck Land Trust allows passive enjoyment of the trails at Trout Brook Valley Preserve, although certain restrictions apply to specific trails during parts of the year. Most importantly, the state-owned area in the western section of the preserve (area shaded light gray in Figure 1) is open to seasonal hunting during the appropriate time of year. Access for hunting is limited through a special permit system regulated by the CT DEEP with oversight by the Aspetuck Land Trust. Only Archery Deer & Turkey, Fall Firearms Turkey, Muzzleloader Deer and Shotgun Deer hunting is permitted on site with proper permits and during the designated seasons.



**Figure 2:** Location of Trout Brook Valley Preserve (outlined in red) in a regional context. Note the large areas of undeveloped land surrounding the reservoirs. The preserve is located at the core of almost 10 square miles of protected open space in the heart of Fairfield County.



Trout Brook Valley Preserve's trails are open year-round to visitors travelling on foot. There is limited access for mountain bikes and horseback riders on marked trails only. Mountain bikes are not permitted in the preserve from January 1 – April 30; off-trail hiking or riding is not allowed. Currently, only on-leash dogs are allowed in the preserve. Hawley's Brook is a Wild Trout Management Area or "WTMA" (one of only nine in the state of Connecticut) and fishing is only allowed by permit. Aspetuck Land Trust, in cooperation with partner organizations, organizes educational walks and programs in the preserve throughout the year.

The woodland habitat in the Trout Brook Valley Preserve is primarily a single-age stand forest type that is the result of forest regeneration after historic agricultural practices in the area were abandoned. The old field area surrounding the fish passage on Hawley's Brook was the last area to be actively farmed and supported a fish pond and several plots of watermelon and potato crops until the late 1930s. When the area was acquired by BHC, some of the area's habitat was impacted by construction of the nearby Saugatuck Reservoir and the associated infrastructure, which includes an aqueduct that traverses the southern end of the preserve. It appears that BHC carried out limited selective timbering and harvested commercially viable timber from its properties. However, the currently standing forest stands appear to be at least 50 years old. Some salvage logging of mature Eastern Hemlock (*Tsuga canadensis*) took place in the 1980s on Popp Mountain prior to infection with the Hemlock Woolly Adelgid (Joe Haines, pers. comm.).

Habitat management of Trout Brook Valley is currently primarily focused on forest stewardship and trail maintenance. Many Aspetuck Land Trust members, staff and volunteers are involved in invasive removal, trail maintenance and maintenance of the orchard area. Mowing is planned carefully to benefit public site use while suppressing unwanted vegetation and supporting functional wildlife habitat use of the early successional habitat areas in the preserve. This is particularly true for the orchard area, which sees extensive traffic and requires a more involved maintenance regime than other early successional areas, such as the old field habitat near the monument/fish passage. The latter area was with funding provided by the Natural Resource Conservation Service of the U.S. Department of Agriculture (USDA-NRCS) through the Wildlife Habitat Incentive Program (WHIP). Additional WHIP funding has been applied to habitat management projects in the orchard area and to remove invasive non-native plant species throughout the preserve.

At the time of this writing, strategies need to be developed to determine the course of action to be followed to best preserve and improve the wildlife habitat value of the Trout Brook Valley Preserve while allowing for its continued use as public open space. This plan presents the natural resource data collected in the preserve between October 2011 and October 2012 and describes the proposed conservation and management strategy intended to best accomplish both of these goals.

## 1.4 Purpose of the Conservation & Management Plan

The purpose of this plan is to provide an overview of relevant data describing the physical and biological characteristics of the Trout Brook Valley Preserve, to identify threatened, endangered or otherwise at-risk species that occur in the Trout Brook Valley Preserve and to identify sensitive habitat areas contained within the preserve's forested uplands. In addition, this plan describes conservation strategies that can be applied to best protect these species and habitats and it provides a framework of adaptive management actions and monitoring steps to evaluate whether the proposed conservation strategy is successful. A carefully designed management and conservation plan based on relevant survey data will allow the Aspetuck Land Trust to carry out its stewardship goal of maintaining the Trout Brook Valley Preserve in a natural state in a way that balances the need for protection of the area's resources, plants and animals while simultaneously fulfilling its commitment to provide open space for passive recreational use and enjoyment on the property.

### The purpose of this Conservation & Management Plan is to:

1. Provide an inventory of the natural resources of the Trout Brook Valley Preserve
2. Identify priority habitats and species on the preserve that can guide habitat management and conservation actions
3. Identify management issues and opportunities, including human site use
4. Develop an adaptive management strategy that provides optimal protection and management of the Trout Brook Valley Preserve and its species while simultaneously providing recreational and educational opportunities for visitors to the preserve
5. Develop a series of success benchmarks that can be used to evaluate the effectiveness of the proposed management strategy





## Chapter 2: Natural Resources

*Openings in the forest canopy allow sunlight to reach the forest floor and provide conditions suitable for dense understory growth. Such early successional habitat patches provide critical habitat for a variety of conservation concern species ranging from shade-intolerant plants to box turtles and scrub-nesting birds. Maintaining a patchwork of different habitat types within the preserve is important to ensure the continued survival of the area's rich biodiversity.*





## Chapter 2

# Natural Resources

### 2.1 Ecological Region

Trout Brook Valley Preserve is located in the Northeastern Coastal Zone Ecoregion (EPA Level III; Ecoregion 59), subdivision Southern New England Coastal Plains and Hills (EPA Level IV; Ecoregion 59c). The Northeastern Coastal Zone covers most of southern New England and the coastal areas of New Hampshire and southern Maine, and is defined as follows (Griffith 2010):

**Climate:** This ecoregion has a severe mid-latitude humid continental climate, marked by warm summers and severe winters. The mean annual temperature ranges from approximately 8°C to 10°C (46 to 50 degrees F). The frost-free period ranges from 150 to 230 days. The mean annual precipitation is 1,181 mm, ranging from 890 to 1,250 mm, and is generally evenly distributed throughout the year.

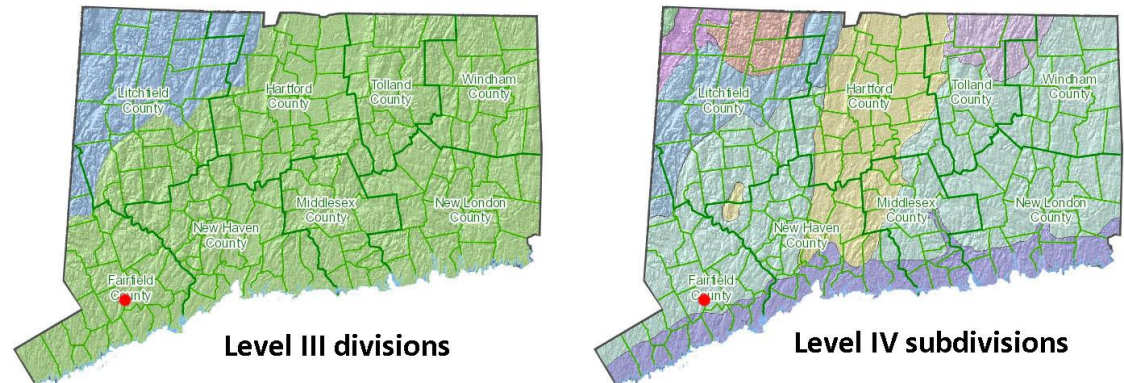
**Vegetation:** Appalachian oak forest and northeastern oak-pine forest are the natural vegetation types. These include white oak, red oak, hickories, white pine, and some maple, beech, birch, and hemlock in cooler or more mesic areas.

**Hydrology:** Abundant perennial streams, lakes, ponds, and wetlands. Stream networks have a variety of patterns due to geologic variety and complex geomorphic history, including dendritic, deranged, and trellis. Streams mostly moderate to low gradient. Some of the surface waters are sensitive to acidification.

**Terrain:** Landforms include irregular plains, plains with low to high hills, and open hills. Elevations range from sea level to over 300 m (984 ft). The Northeastern Coastal Zone contains fine to medium-textured, relatively nutrient poor soils with relatively little surface irregularity. Bedrock geology is complex and varied, with mostly igneous and metamorphic rocks, but some areas of sedimentary also occur.

**Land Use/Human Activities:** This region contains dense concentrations of human population. Although attempts were made to farm much of the Northeastern Coastal Zone after the region was settled by Europeans, land use now mainly consists of forests, woodlands, and urban/suburban development, with only some minor areas of pasture and cropland.

### North American Terrestrial Ecoregions



**Figure 3:** North American Terrestrial Ecoregions covering Connecticut at Level III (left) and Level IV (right). The location of Trout Brook Valley Preserve is indicated by the red dot. The preserve is located in the Northeastern Coastal Zone Ecoregion (EPA Level III; Ecoregion 59), subdivision Southern New England Coastal Plains and Hills (EPA Level IV; Ecoregion 59c).  
*Source:* U. S. Environmental Protection Agency (<http://www.epa.gov/wed/pages/ecoregions.htm>).





## 2.2 Physical Characteristics

### 2.2.1 Climate

Locally recorded climate data for Weston via The Weather Channel climatological database indicates that the annual mean temperature for the area surrounding the Trout Brook Valley Preserve is 52.3 °F (11.3°C) with an average of 32 °F (0 °C) in winter and 72.3 degrees F (22.4 °C) in summer. On average, the warmest month is July and the coolest month is January, with the highest average precipitation occurring in the month of September. The all-time record high was 104 °F in 2001 while the all-time record low was -18°F in 1982. The average last frost in the area generally occurs during the second week of April and the first frost starts around the last week of October. This results in a frost-free season of 180-210 days. The seasonal snowfall averages 35 inches, and the mean annual precipitation for Trout Brook Valley is approximately 53 inches.

### 2.2.2 Topography, Geology and Soils

The topography of the Trout Brook Valley is characterized by a moderately hilly landscape with local areas of considerable relief. The terrain within the preserve is largely shaped by Hawley's Brook that exits near Bradley Road on the southern end of the property but traverses the length of the valley in a roughly north-south orientation. A network of interconnected tributary streams and wetland systems connects the brook with its headwaters near the northern end of the property where steep knolls and trellis intersperse the wetlands. A continuous ridge with steep cliffs and talus slopes separates the valley from the Saugatuck Reservoir on the west side of the property, while a similarly high, but more densely vegetated ridge lines the eastern side of the property. Elevations within Trout Brook Valley Preserve range from approximately 150 feet above sea level near the Bradley Road entrance to almost 450 feet above sea level at the northern end of the property.

The bedrock in the Trout Brook Valley is all Ordovician in age (between 510 and 440 million years old) and metamorphic. The following geological unit descriptions are derived from Rodgers (1985): The unit "Og" is a white, light-gray, buff, or pink, generally foliated granitic gneiss, composed of sodic plagioclase, quartz, microcline, muscovite, and biotite, and locally garnet or sillimanite. It commonly contains numerous inclusions or layers of mica schist and gneiss. The unit "Oh", the Harrison gneiss, is an interlayered dark- and light-gray, medium-grained, well-foliated gneiss, composed of andesine, quartz, hornblende, and biotite (also locally K-feldspar as megacrysts 1 to 5 cm long). The "Or" unit, while not well exposed, is thought to be the Ratlum Mountain schist, a gray, medium-grained, interlayered schist and granofels, composed of quartz, oligoclase, muscovite (in the schist), biotite and garnet, also staurolite and kyanite in the schist. It also contains numerous layers and lenses of amphibolite; also some of quartz-spessartine (coticule) and calc-silicate rock.

The surficial geology of Trout Brook Valley consist of post-glacial alluvium overlying glacial deposits of sand and gravel plus areas of glacial sand and gravel. These are stratified drift deposits, materials sorted by moving water as the glacier was melting. The till and thick till (till thicker than 10 to 15 feet) were directly melted out of the glaciers and consist of unsorted clay- to boulder-sized materials (Stone et al., 1992).



### 2.2.3 Hydrology

The central portion of Trout Brook Valley Preserve is dominated by Hawley's Brook, its four tributaries, and approximately 117 acres of wetlands. The brook's four tributaries converge just north of a large marsh near the mouth of the valley, adjacent to the Bradley Road entrance. This marsh was originally created by beavers and made permanent by a berm containing a Bridgeport Hydraulic Company (BHC) aqueduct. The headwater swamps and marshes within the north end of Trout Brook Valley and the Jump Hill Preserve feed the Hawley's Brook tributaries, although one of the tributaries drains runoff from a portion of the Connecticut Golf Club to the east. Hawley's Brook exits the south end of the property and flows into the east branch of the Saugatuck River, which in turn empties into Long Island Sound in Westport.

A separate, smaller drainage system is found along the western border of the orchard area. A series of intermittent streams, marshes and ponds drains into a stream that exits the preserve near the Norton Road entrance. Sections of this wetland system have been artificially routed or enlarged to form permanent ponds, such as the old farm ponds below the blueberry patches in the orchard.

In addition to these large wetlands systems, numerous ephemeral (vernal) pools are found throughout the property (see Chapter 2.3.2 for additional details).

## 2.3 Habitat Characteristics

### 2.3.1 Vegetation Cover Types

The Trout Brook Valley property was acquired by Bridgeport Hydraulic Company (BHC) approximately 50 years ago. Throughout BHC's term of ownership, the land remained in a natural state and was actively managed as watershed. The forest cover ranges in age from about 50 to 100 years old. A harvest of mature trees was conducted on a portion of the property in the 1980s.

The forest in the western portion of TBV has a significant Eastern Hemlock (*Tsuga canadensis*) component. Much of this hemlock is now declining in vigor due to an infestation of Hemlock Woolly Adelgid (*Adelges tsugae*). The remainder of the forest is upland central hardwood forest consisting of oaks, beech, birch, ash and maples. Mountain Laurel (*Kalmia latifolia*) is found in the understory throughout the preserve, with heavier concentrations towards the north end.

Approximately 12 acres of the easternmost portion of the Trout Brook Valley property was developed and maintained as part of a 30-acre BHC orchard. While BHC's orchard operation has been terminated, this portion of the property continues to be occupied by several hundred non-producing apple trees and a large area of productive blueberry bushes. Currently, a small portion of the 12 acres is under lease to a local farmer for the production of vine crops such as tomatoes and pumpkins.

### Which species are important?

The following sections of this plan describe the plant and animal diversity documented in Trout Brook Valley Preserve during recent surveys. Obviously, all species are an integral part of the preserve's biodiversity and functionality. However, Connecticut Audubon Society uses its Biological Conservation Unit concept to guide management and conservation strategies and uses specific indicator species to assess quality and functionality of habitats. Indicator species, generally animals or plants with relatively narrow habitat requirements, help our biologists to determine whether certain habitats are functional (provide the necessary resources for the species that rely on it) and whether habitat management practices deliver the desired results.

Connecticut Audubon Society's conservation and management practices benefit many species and are pro-active, designed to include species that may not have been recorded in the managed area yet. Since it is not practical to focus on every one of those species at the same time, certain conservation priority species are used as benchmarks. The exact species suite selected depends highly on the specific habitat being managed, but the selection is largely driven by the state and federal Endangered Species Acts (ESA) and by Connecticut's Comprehensive Wildlife Conservation Strategy (CWCS), which identifies species of Greatest Conservation Need (GCN). These lists are augmented by additional species considered by Connecticut Audubon Society to be good indicators of key habitats. These conservation priority species are important elements of Connecticut's biodiversity, they benefit from achievable conservation actions and their presence in an area can be a good indication of their preferred habitat's functionality.

More information on these indicator species and our conservation approach can be found in Connecticut Audubon Society's 2009 **Connecticut State of the Birds Report**, available for download at [www.ctaudubon.org/state-of-the-birds/](http://www.ctaudubon.org/state-of-the-birds/)



An additional area of early successional 'old field' habitat (approximately 6 acres) exists near the Bradley Road entrance in the southwestern quadrant of the preserve. This area is the remnant of the last farmed area within the preserve's boundaries and has been maintained as scrub habitat for some time now.

### 2.3.2 Wetlands

Trout Brook Valley Preserve supports a variety of wetlands within its boundaries. Wet seeps and headwater streams feed watercourses that drain into Hawley's Brook. Due to the steepness of the terrain and the underlying boulders and glacial till, some stream sections are quite rocky and fast-flowing, while other watercourses in the relatively flat parts of the preserve are relatively slow-moving and wide with dense emergent vegetation.

A densely vegetated cattail marsh measuring approximately 7.5 acres has formed upstream from the retaining dike that covers a BHC aqueduct that emerges from adjacent Popp Mountain, in the southwestern end of the preserve. This marsh forms the floodplain of Hawley's Brook just before it exits the preserve. Several other sizeable marsh systems have formed throughout the preserve in areas where relatively level and wide stream valleys allowed for water from Hawley's Brook and its tributaries to pool. These marsh systems range from herbaceous wetlands with coverings of predominantly low vegetation, such as Skunk Cabbage and False Hellebore, to impenetrable scrub swamps with dense Alder thickets, Blueberry bushes and other woody vegetation. Many of the preserve's wetlands are spring-fed or are bordered by seeps that provide clear, cold, oxygenated water. Such situations are conducive to growth of a variety of submerged aquatic vegetation and a variety of aquatic plant species can be found throughout Trout Brook Valley's wetlands and streams.

Submerged aquatic vegetation is particularly diverse and dense towards the northern end of the preserve where the headwaters of several of Hawley's Brook's tributaries are located. These headwater systems characteristically have deep stream channels, bordered by *Sphagnum* and moss-covered boulders, and small areas of pooled open water surrounded by dense herbaceous vegetation. In several sections of the preserve, these wetlands are abruptly bordered by steep talus or ledge with sparsely vegetated boulder fields and a canopy of Mountain Laurel. These high quality wetlands provide excellent habitat conditions for a wide variety of uncommon and vulnerable species.

Throughout Trout Brook Valley Preserve, scattered between stream valleys in isolated depressions in the forest floor, are numerous classic vernal pools formed by the pooling water that remains after the winter's snow cover melts off the surrounding uplands. In addition, several other ephemeral wetlands fed and/or drained by intermittent streams or seeps occur in the preserve. Such fishless temporary wetlands effectively function as vernal pools and are often home to obligate vernal pool breeding species.

During a series of site visits in spring 2012, 63 permanent and ephemeral wetlands within the preserve were surveyed, classified and assessed for potential vernal pool functions. These wetlands were surveyed in April-May for signs of amphibian reproduction, with special emphasis on obligate vernal pool breeding species and other early emerging amphibians.

Wetlands were assessed using the criteria and guidelines outlined in the certification of vernal pool habitat manual published by the Massachusetts Division of Fisheries and Wildlife's Natural Heritage and Endangered Species Program (2009). Physical criteria for potential vernal pool habitat included the absence of a permanently flowing outlet and a discontinuous hydroperiod. Direct biological criteria indicating a functional ephemeral vernal wetland included the absence of established,



reproducing fish populations and evidence of reproduction of one or more of the following obligate vernal pool breeding species:

Vertebrates: Amphibia:

- Wood Frog (*Rana sylvatica*)
- Spotted Salamander (*Ambystoma maculatum*)
- Blue-spotted Salamander (*Ambystoma laterale*)
- Jefferson's Salamander (*Ambystoma jeffersonianum*)
- Marbled Salamander (*Ambystoma opacum*)

Invertebrates: Anostraca:

- Fairy Shrimp (*Eubranchipus* sp.)

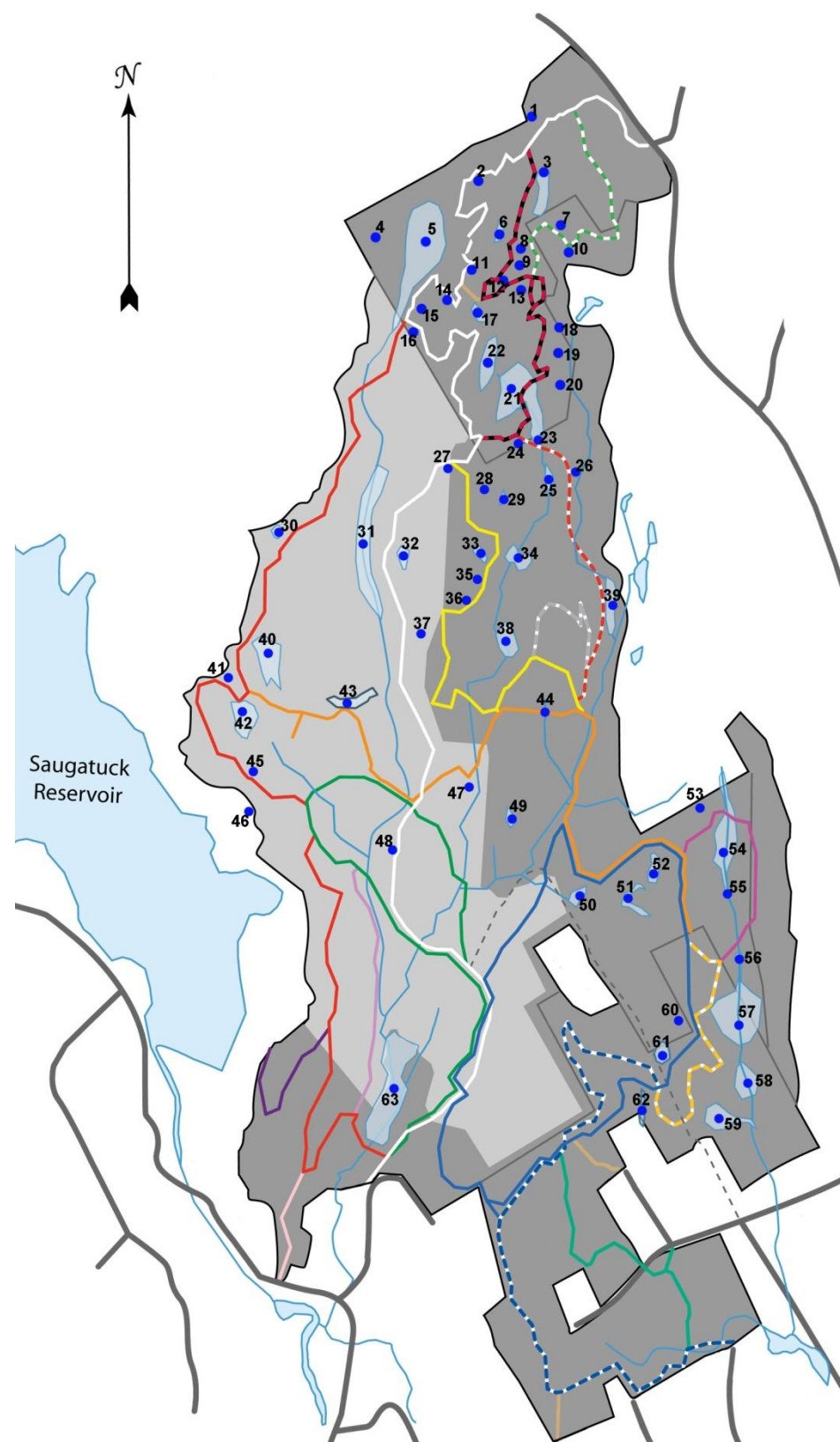
Evidence of reproduction was defined as follows:

- Presence of a chorus (Wood Frogs) or presence of multiple mated pairs (frogs and salamanders)
- Presence of spermatophores (salamanders), presence of multiple egg masses, adult salamander attending nest (Marbled Salamander in fall)
- Presence of larval amphibians (tadpoles or salamander larvae)
- Presence of adult Fairy Shrimp

In all wetlands visited after May, amphibian larval surveys were carried out to evaluate potential vernal pool functionality as well as to inventory late emerging amphibians and other wetland associated species. Figure 4 shows a map of the Trout Brook Valley wetlands that were surveyed during this study; descriptions of the findings in each wetland are presented below:

Wetland descriptions:

1. Ephemeral wetland located on edge of property, with some emergent herbaceous wetland vegetation; forested with one side exposed to field habitat (private property). Short hydroperiod in 2012; did not produce any obligate vernal pool breeding species, although the potential is certainly there.
2. Ephemeral stream/seep system with series of pools that hold water for a longer period of time. Some pools may be spring fed and of a more permanent nature. Herbaceous emergent vegetation and grassy tussocks present in otherwise forested valley system. Wood Frog metamorphs observed.



**Figure 4:** Wetland map of the Trout Brook Valley Preserve. Numbered blue dots indicate ephemeral or permanent wetlands assessed for potential vernal pool functioning during this study.

3. Extensive seepage-fed swamp system with dense Skunk Cabbage and other herbaceous emergents. No obligate vernal pool species detected, although facultative species such as Green Frog were present on all surveys. Potentially suitable habitat for Box Turtle and Spotted Turtle; obligate vernal pool species may breed in pools with a suitable hydroperiod.
4. Isolated vegetated vernal pool. Wood Frog and Spotted Salamander eggs and larvae detected.
5. Extensive headwater system feeding Hawley's Brook. Maple Swamp with emergent woody vegetation and extensive layer of herbaceous emergents; densely covered Sphagnum banks and tussock grass stands. High quality wetland containing a wide variety of micro-habitats. Spring Peeper, Pickerel Frog and Green Frog documented. Although no obligate vernal pool species were found during surveys, they are undoubtedly utilizing fishless sections of this large wetland system.
6. Densely vegetated headwater system with extensive herbaceous and woody vegetative cover. Wood Frog larvae, Spring Peeper and Green Frog detected.
7. Vegetated seepage swamp forming a headwater stream that feeds into wetland 10.
8. Ephemeral pool with considerable hydroperiod, located in seepage area connecting wetlands 8, 9 and 12. No obligate vernal pool species detected, but conditions are suitable.
9. Ephemeral pool draining into wetland 12; surrounded by steep talus. No obligate vernal pool species observed, but habitat potentially suitable for Spotted Salamander and even for habitat specialist like Jefferson's Salamander.
10. Headwater system draining into nearby golf course.
11. Isolated ephemeral vernal pool with Wood Frog larvae. Mountain bike tracks running through drying pool bed.
12. Ephemeral pool surrounded by steep talus. No obligate vernal pool species observed, but habitat potentially suitable for Spotted Salamander and even for habitat specialist like Jefferson's Salamander.
13. Seepage system with multiple deeper pools and surrounded by steep talus. May be suitable for obligate vernal pool species, including Jefferson's Salamander, during wetter years with more snowmelt than during the survey period.
14. Spring-fed isolated pool with ephemeral outflow. Several Red-spotted Newts observed, which might indicate that the wetland holds water year-round. High density of newts may have led to complete predation of eggs and larvae of any obligate vernal pool breeders that may have attempted to reproduce here.
15. Isolated ephemeral pool with small drainage into wetland 16 (both wetlands located on opposite sides of white trail). Pool surrounded by steep ridge line. Small number of Wood Frog larvae present in pool.
16. Isolated ephemeral pool, fed by outflow from wetland 15. No obligate vernal pool breeding species detected.
17. Large spring fed scrub swamp with locally deeper pool that may be of a semi-permanent nature. Green Frog observed, but no obligate vernal pool species.
18. Classic ephemeral vernal wetland on edge of preserve, close to golf course. Surrounded by steep, rocky ridges. Many Wood Frog and Spotted Salamander larvae present; good potential for additional obligate vernal pool breeding species.
19. Ephemeral vernal wetland adjacent to wetland 18, with similar characteristics and potential. Many Wood Frog and Spotted Salamander larvae present, potentially suitable habitat for Jefferson's Salamander.
20. Densely vegetated wetland with herbaceous and woody emergents, possibly of a permanent nature. Green Frogs calling from sections of open water.



21. Large high-quality headwater system that incorporates different aquatic microhabitats. Emergent woody vegetation present in dense stands locally although areas with open water exist also. Boggy Sphagnum-covered banks along much of the perimeter. Wood Frog and Spotted Salamander larvae and eggs observed, confirming vernal pool function, but also contains Green Frogs and Red-spotted Newts which could indicate that the system holds water year-round. Potential habitat for a variety of conservation priority species.
22. High-quality headwater system similar to wetland 21, Wood Frog and Green Frog detected.
23. Outflow of wetland 21, draining marshy headwater system into steadily flowing stream.
24. Seepage area with few larger pools of standing water and emergent woody vegetation. Pools showed a brief hydroperiod during the survey period that was not conducive to vernal pool functionality, but good potential exists during wetter years. Green Frog detected.
25. Stream/seepage fed vegetated swamp area in outflow channel of wetlands 21, 22, 23. Green Frog and Red-spotted Newt detected.
26. Spring-fed headwater with deeper pool, drains into golf course.
27. Isolated ephemeral pools with brief hydroperiod; many Wood Frog and Spotted Salamander eggs observed early in season, but most dried up before they hatched. During subsequent surveys, few Wood Frog larvae survived but were being predated by Red-spotted Newts.
28. Isolated ephemeral pool with Wood Frog and Spotted Salamander eggs; dried up before metamorphosis was completed.
29. Small stream/seepage fed vegetated swamp. No obligate vernal pool species detected.
30. Small vegetated headwater system draining into open pool. Wood Frog and Spotted Salamander larvae observed
31. Densely vegetated floodplain shrub swamp on level section of stream valley, isolated pools present in periphery of system that could support obligate vernal pool breeding species. Pickerel Frog and Green Frog detected.
32. Very high quality wetland system containing a wide variety of obligate and facultative vernal pool species: Spotted Salamander, Marbled Salamander, Jefferson's Salamander, Red-spotted Newt, Spring Peeper, Wood Frog, Green Frog and Bullfrog detected. Wetland is of a permanent nature but likely contains no fish. Dense scrub and herbaceous vegetative cover, emergent and submerged aquatic vegetation and dense Sphagnum mats.
33. High-quality scrub swamp containing Spotted Salamander and Wood Frog larvae, as well as Green Frogs and Red-spotted Newts later in the season. Drains into wetland 36.
34. Scrub swamp in floodplain section of Hawleys' Brook tributary. No obligate vernal pools species detected.
35. Deep pool, fed by outflow from wetland 34; algae-choked pool with no significant herbaceous or woody wetland vegetation. Considerable flow through wetland. Spotted Salamander, Wood Frog, Pickerel Frog and Green Frog detected.
36. Large classic vernal pool surrounded by trees and with substantial wetland-adapted herbaceous vegetation. Many (50+) Spotted Salamander egg masses and large number of spermatophores detected, as well as several Wood Frog egg masses.
37. Seepage area on edge of scrub swamp with a deeper pool that is potentially suitable for obligate vernal pool species, although water levels in the pool were low early in the season already. No amphibians were detected.
38. Fairly large scrub swamp in floodplain section of Hawleys' Brook tributary. No obligate vernal pools species detected.
39. Isolated wooded seepage area without significant pooling of water. Located on edge of preserve adjacent to golf course. No amphibians detected.

40. Scrub swamp with ephemeral or semi-permanent pool. Metamorph and larvae Wood Frogs found, as well as unidentifiable small mole salamander larvae (*Ambystoma* species, likely Spotted Salamander).
41. Wetland soil and indicators of ephemeral wetland found in boulder field at base of a talus slope. Area appears to hold water, but hydroperiod was too short this year. May have vernal pool potential in wetter years.
42. Isolated scrub swamp surrounded by steep talus slopes. Green Frog and many metamorph Wood Frogs found. May be (semi-) permanent in nature, but likely fishless. Potential exists for other obligate vernal pool species to breed here.
43. Scrub swamp in stream-fed basin. No obligate vernal pool species detected.
44. Small headwater stream with scrub-covered seepage area. No significant pools for vernal pool species available.
45. Dry ephemeral wetland at base of steep talus slope. Hydroperiod too short for vernal pool breeding amphibians during survey season, but good potential during wetter years.
46. High quality large vernal pool located on periphery of preserve. Spotted Salamander egg masses and Wood Frog eggs recorded, Green Frog and Spring Peeper present later in season.
47. Maple Swamp in stream floodplain; dense Skunk Cabbage ground cover. Isolated pools may be present in floodplain but were not documented. Green Frog observed. Excellent Box Turtle habitat.
48. Bog-like depression with extensive Sphagnum tussocks; Hemlock and Mountain Laurel stands provide canopy cover. No amphibians seen in wetland.
49. Isolated spring/seepage-fed vegetated swamp. No amphibians detected.
50. Small, seepage fed system without significant pools in closed canopy valley. Green Frog observed.
51. Small, seepage fed system without significant pools in closed canopy valley, connected to wetland 50 and 52.
52. Seepage area in closed canopy valley, small area of shallow, pooled water. Skunk Cabbage present. No obligate vernal pool species found. Located in same drainage system as wetlands 50 and 51.
53. Deep pool in stream valley on edge of Golf Course. No amphibians detected.
54. Headwater system with dense scrub cover. No significant pools present. Red-spotted Newt and Green Frog observed.
55. Small pool in same headwater system as wetland 54. Spotted Salamander, Redback Salamander, Four-toed Salamander, Red-spotted Newt, Pickerel Frog, Green Frog, Bullfrog and Wood Frog observed.
56. Invasives-choked headwater spring with small man-made reservoir. No amphibians found.
57. Stream-fed floodplain maple swamp system, originating from wetland 56. Spring Peeper and Pickerel Frog observed. Potential for several other amphibian species exists.
58. Stream-fed, man-made farm ponds. Steep-sided, deep pools surrounded by closed canopy forest. American Toad, Spring Peeper, Gray Treefrog, Bullfrog and Green Frog documented. Not particularly suitable for obligate vernal pool breeding amphibians.
59. High-quality maple swamp system fed by stream originating at wetland 56; contains areas of grassy tussocks and Sphagnum hummocks. Spotted Salamander and Wood Frog eggs observed. Good potential Box Turtle and Spotted Turtle habitat.



60. Closed canopy vernal pool with relatively small pools and short hydroperiod. Several Spotted Salamander and Jefferson's Salamander egg masses observed, but pools dried up before eggs could develop. Good potential for a variety of obligate vernal pool species during wetter years.

61. High-quality scrub swamp that harbors both obligate vernal pool species and permanent wetland-inhabiting species; likely a spring-fed, fishless system. Spotted Salamander, Spring Peeper, American Toad, Green Frog and Wood Frog recorded.

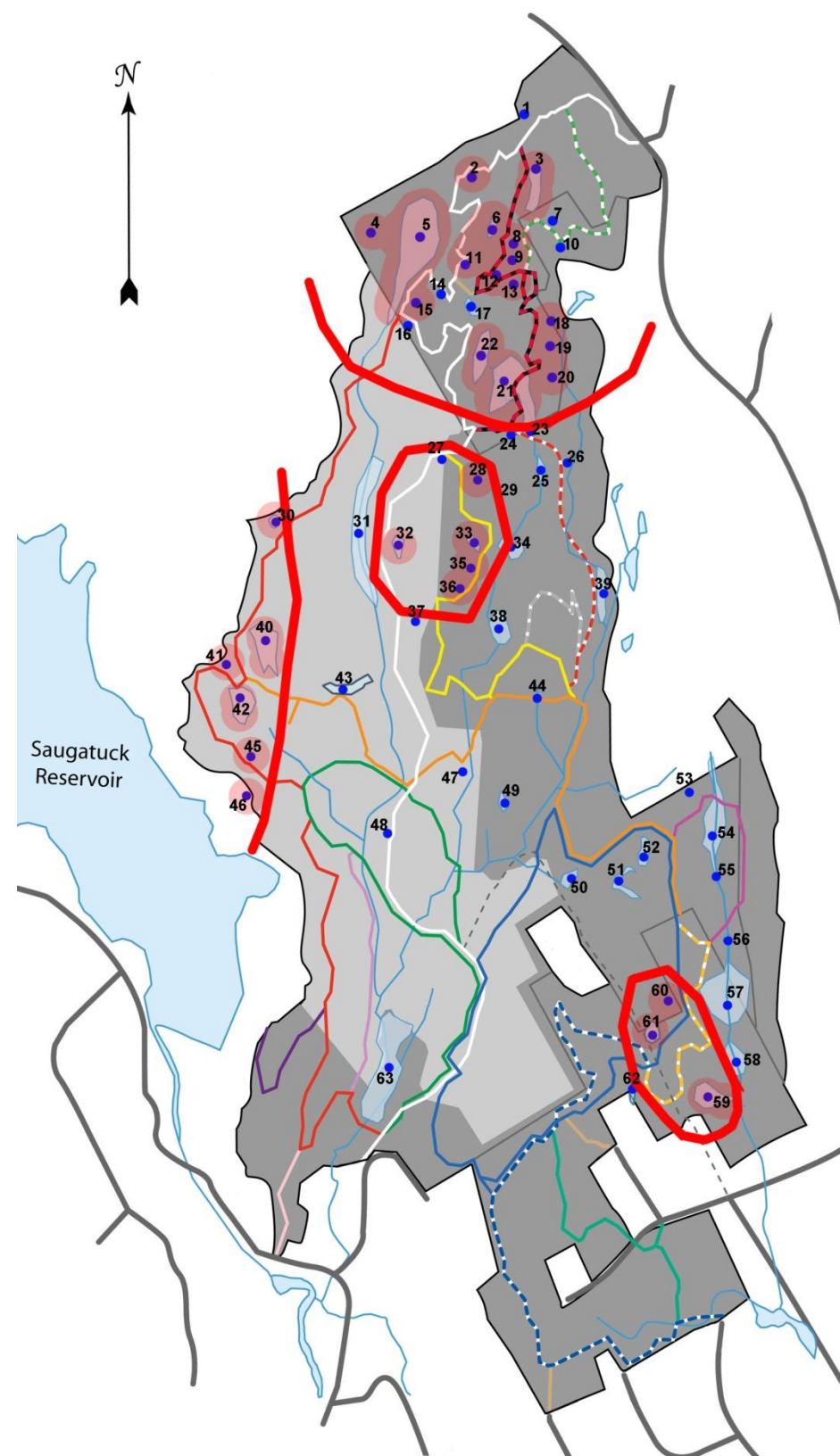
62. Scrub swamp on edge of preserve with small outflow channel. No amphibians detected.

63. Wet meadow/open scrub swamp formed in floodplain where several of Hawley's Brook tributaries converge. Not a suitable habitat for obligate vernal pool species. Red-spotted Newt, American Toad, Spring Peeper, Gray Treefrog, Green Frog and Bullfrog documented.

The relatively warm and snow-free winter of 2011-2012 resulted in a low water table across the northeast region. As a result, the region's vernal wetlands held little water at the start of the amphibian breeding season. This situation may have led to egg retention and delayed breeding activity in the earliest breeding amphibian species – generally those considered obligate vernal pool breeding species. In addition, lack of torrential spring rains to trigger amphibian reproduction at the appropriate time may have further inhibited activity. Low water tables and unseasonably warm spring temperatures also caused vernal wetlands to dry quickly and early in the season. Nevertheless, 22 of the 63 wetlands surveyed were found to be functional vernal pools, while several more provide suitable habitat that could be functional during wetter years.

All obligate vernal pool breeding amphibians that could potentially occur in the Trout Brook Valley region were indeed detected during this survey, in one occasion all in one single wetland (wetland 32)! Additional surveys over multiple breeding seasons will undoubtedly reveal similar diversity in other high quality wetlands identified during this study.

Subsequent sections of this report will discuss additional data on flora and fauna gathered during this study to further assess and evaluate the critical habitat identification derived from wetland surveys in the Trout Brook Valley Preserve.



**Figure 5:** Functional vernal wetlands and potentially suitable vernal pool habitat identified during this study indicated by red circles. Based on wetland functionality, high priority habitat is found in the northern headwaters section of the preserve, and in clusters of ephemeral wetlands located in the central uplands (yellow trail), at the base of talus slopes (red trail near reservoir) and in the eastern section of the Crow Hill Preserve.

## 2.4 Flora

A formal inventory of the preserve's plant species was initiated during the fall of 2011 and a growing list of wildflowers, shrubs, trees, ferns and non-vascular plants is forming. Appendix I provides an overview of the plant species identified to date. Currently, no state or federally listed plant species have been identified in the Trout Brook Valley Preserve but several microhabitats that may support unusual plant species do exist on the property.

In a few small sections of Trout Brook Valley, a dense canopy cover of pure Hemlock stands combined with the acidic conditions in the soil below these stands (created by the thick layer of its slowly decomposing needles) create conditions that are ill-suited for germination of seedlings or the growth of understory vegetation. These conditions generally result in relatively low plant diversity in these Hemlock-dominated stands. Throughout much of the preserve, the prevalent plant community is typical of Northeastern woodlands and rich forest. This is particularly true in the mixed hardwood sections of the preserve. Areas where sunlight reaches the forest floor provide the most diverse plant assemblages. Natural and man-made forest clearings, as well as the trails and interior service roads provide an interface with the adjacent woodland that supports a wide variety of plants. Unfortunately, much of this transitional ecotone in Trout Brook Valley suffers from edge effect and several species of non-native invasive plants dominate the understory. In addition, the native vegetation is greatly suppressed due to long-time overbrowsing by deer. The result is an impoverished woodland habitat with limited plant diversity and a proportionally high non-native floral component. Area wetlands provide habitat conditions that are very different from the surrounding woodland and range from fast-flowing rocky streams to large vegetated marsh systems, vernal pools and bogs. Each of these wetland types supports different plant communities.

### 2.4.1 Non-native Invasive Plant Species

Multiflora Rose is a thorny perennial shrub of medium height, with compound leaves that are divided into 5-11 oval toothed leaflets. It has arching stems that can root at the tip, allowing it to form dense thickets. A medium bush is capable of producing 500,000 to 1,000,000 seeds. The plant is very adaptable and able to grow in a wide range of soil, moisture, and light conditions. It is found in successional fields, forest edges, stream banks, and roadsides. It is generally not found in standing water or extremely dry habitats. Multiflora rose spreads quickly, forming impenetrable thickets that exclude native plant species. It invades areas that have been subjected to land disturbance, and impedes succession. Studies have shown that it is highly competitive for soil nutrients, and it has lowered crop yields in adjacent field plantings (IPCNY, 2002).

Japanese barberry is a shade tolerant, dense, thorny shrub with abundant red berries. The plant reproduces from prolific seeds, rhizomes and layering (branches root into new plants as a result of prolonged soil contact). Japanese barberry, once established, can grow to form large thickets that displace native wildflowers, shrubs and tree seedlings. Infestations of this plant have also been found to cause soil pH changes (IPCNY, 2002). The area of the Jump Hill Preserve has a particularly heavy infestation.

Common Reed is a perennial wetland grass that can grow up to 13 feet tall. It is characterized by a rhizomatic root system, which allows for aggressive reproduction. As a result, this species forms dense monospecific stands that displace native vegetative species (IPCNY, 2002). This highly invasive plant invades areas where the soil salinity drops below 18 ppt ([www.dep.state.ct.us/olisp](http://www.dep.state.ct.us/olisp)) displacing native marsh vegetation. Studies also show that fewer birds reside in marshes that are dominated by Common Reed compared to those with short-grass meadows (Benoit & Askins 1999; Shriver 2002).

Asiatic Bittersweet and Japanese Honeysuckle invade disturbed upland habitats. These vines typically colonize edge habitats, where they grow rapidly and cover nearby shrubs and/or trees, eventually shading them out (IPCNY, 2002). Introduced from Asia in the mid-1800s, these vines have become especially abundant in coastal locations in the Northeast and have infested thickets and woodlands of many formerly natural areas, changing the plant community structure. They are a particular problem in and around the orchard.





## 2.5 Fauna

### 2.5.1 Invertebrate Diversity

A survey of the preserve's damselflies and dragonflies was initiated during this study since the area's streams, ponds and marshes clearly support a rich and diverse odonate fauna. Odonate surveys addressed the species diversity of this group and investigate the potential presence of habitat specialists and/or state-listed species. The currently known odonate fauna of Trout Brook Valley Preserve includes one state-listed species: Tiger Spiketail (*Cordulegaster erronea*; CT-ESA 'Threatened'). A complete list of the 44 species documented is available in Table 1.

**Table 1: Damselflies and Dragonflies of Trout Brook Valley Preserve**

<i>Common Name</i>	<i>Scientific Name</i>	<i>Family</i>	<i>CT-ESA status</i>	<i>CWCS status</i>
<b>Damselflies (suborder Zygoptera)</b>				
River Jewelwing	<i>Calopteryx aequabilis</i>	Calopterygidae	-	-
Ebony Jewelwing	<i>Calopteryx maculata</i>	Calopterygidae	-	-
Eastern Red Damselfly	<i>Amphiagrion saucium</i>	Coenagrionidae	-	-
Violet Dancer	<i>Argia fumipennis violacea</i>	Coenagrionidae	-	-
Furtive Forktail	<i>Ischnura prognata</i>	Coenagrionidae	-	-
Tule Bluet	<i>Enallagma carunculatum</i>	Coenagrionidae	-	-
Fragile Forktail	<i>Ischnura posita</i>	Coenagrionidae	-	-
Eastern Forktail	<i>Ischnura verticalis</i>	Coenagrionidae	-	-
Northern Spreadwing	<i>Lestes disjunctus</i>	Lestidae	-	-
<b>Dragonflies (suborder Anisoptera)</b>				
Common Green Darner	<i>Anax junius</i>	Aeshnidae	-	-
Springtime Darner	<i>Basiaeschna janata</i>	Aeshnidae	-	-
Swamp Darner	<i>Epiaeschna heros</i>	Aeshnidae	-	-
Harlequin Darner	<i>Gomphaeschna furcillata</i>	Aeshnidae	-	-
Cyrano Darner	<i>Nasiaeschna pentacantha</i>	Aeshnidae	-	-
Spatterdock Darner	<i>Rhionaeschna mutata</i>	Aeshnidae	-	-
Tiger Spiketail	<i>Cordulegaster erronea</i>	Cordulegastridae	Threatened	Important
Delta-spotted Spiketail	<i>Cordulegaster diastatops</i>	Cordulegastridae	-	-
Twin-spotted Spiketail	<i>Cordulegaster maculata</i>	Cordulegastridae	-	-
Arrowhead Spiketail	<i>Cordulegaster obliqua</i>	Cordulegastridae	-	-
Spiny Baskettail	<i>Epithea spinigera</i>	Corduliidae	-	-
Common Baskettail	<i>Epithea cynosura</i>	Corduliidae	-	-
Prince Baskettail	<i>Epithea princeps</i>	Corduliidae	-	-
Lancet Clubtail	<i>Gomphus exilis</i>	Gomphidae	-	-
Dusky Clubtail	<i>Gomphus spicatus</i>	Gomphidae	-	-
Black-shouldered Spinyleg	<i>Dromogomphus spinosus</i>	Gomphidae	-	-

*Eastern Forktail (Ischnura verticalis) damselflies mating.*

**Table 1 (continued): Damselflies and Dragonflies of Trout Brook Valley Preserve**

<i>Common Name</i>	<i>Scientific Name</i>	<i>Family</i>	<i>CT-ESA status</i>	<i>CWCS status</i>
Dragonhunter	<i>Hagenius brevistylus</i>	Hagenius	-	-
Stream Cruiser	<i>Didymops transversa</i>	Macromiidae	-	-
Blue Dasher	<i>Pachydiplax longipennis</i>	Libellulidae	-	-
Spangled Skimmer	<i>Libellula cyanea</i>	Libellulidae	-	-
Widow Skimmer	<i>Libellula luctuosa</i>	Libellulidae	-	-
Twelve-spotted Skimmer	<i>Libellula pulchella</i>	Libellulidae	-	-
Great Blue Skimmer	<i>Libellula vibrans</i>	Libellulidae	-	-
Common Whitetail	<i>Plathemis lydia</i>	Libellulidae	-	-
Eastern Pondhawk	<i>Erythemis simplicicollis</i>	Libellulidae	-	-
Slaty Skimmer	<i>Libellula incesta</i>	Libellulidae	-	-
Great Blue Skimmer	<i>Libellula vibrans</i>	Libellulidae	-	-
Bar-winged Skimmer	<i>Libellula axilena</i>	Libellulidae	-	-
White-faced Meadowhawk	<i>Sympetrum obtrusum</i>	Libellulidae	-	-
Autumn Meadowhawk	<i>Sympetrum vicinum</i>	Libellulidae	-	-
Carolina Saddlebags	<i>Tamea carolina</i>	Libellulidae	-	-
Black Saddlebags	<i>Tamea lacerata</i>	Libellulidae	-	-
Halloween Pennant	<i>Celithemis eponina</i>	Celithemis	-	-
Spot-winged Glider	<i>Pantala hymenaea</i>	Pantala	-	-
Wandering Glider	<i>Pantala flavescens</i>	Pantala	-	-

Several species of damselfly and dragonfly have narrow biological requirements and are sensitive to habitat alteration. These animals can serve as useful indicators of habitat quality and functionality, and some of the species detected to date include bog and seep inhabiting species (e.g. Eastern Red Damselfly, Harlequin Darner, Dusky Clubtail, Delta-spotted Spiketail) which have a highly localized distribution in Connecticut. The presence of such a wide variety of different odonates is testament to the variety and quality of the wetland types found in the Trout Brook Valley Preserve and there is certainly potential for additional state-listed species to be found in the area.

Odonate surveys commenced in May and continued through October. While a multitude of species were recorded, from common and expected dragonflies to uncommon and vagrant damselflies to migrants and scarce breeding species, the success of these surveys was drastically reduced by the weather conditions. The early flight season, April through mid-June, progressed essentially as an average season for southwestern Connecticut would, with typical levels of emergence and most of the anticipated species. However, from mid-June through October nearly all odonate population levels were much lower than usual, with the exceptions being some species dispersing or moving through the state (Common Green Darner, Spot-winged Glider, etc.). This was due to extreme deviations in average snowfall, rainfall, and most significantly, temperature, in the previous several months. January, February, and March all saw above-average temperatures with below-average snowfall and rainfall, with March obliterating the climatological norms for the state as the temperature soared well above 70°F on multiple dates. These conditions accelerated the drying of vernal pools, streams, creeks, and ponds, and areas that would typically hold water in June would be noted as dry. While precipitation levels were a little above average in April through July, the constant positive temperature departure made it so that many damselflies and dragonflies did not hatch from then already dried waterways. Subsequent surveys during seasons with more typical winter and spring seasons in terms of temperature and precipitation may yield a number of additional species, especially those that appear only in the mid to late summer.



**Table 2: Butterflies of Trout Brook Valley Preserve**

### 2.5.2 Butterfly Diversity

In addition, a preliminary survey of the preserve's butterfly fauna was initiated during this study. These highly visible invertebrates are generally common and well represented throughout the broader Connecticut environment. However, several stenotypic taxa exist within these groups that thrive only under very narrow habitat conditions. Such sensitive species can be good indicators of habitat quality and can be used to guide and gauge habitat management practices. To date, no rare or state-listed butterfly species have been detected in Trout Brook Valley. A complete list of the taxa documented in the area is presented in Table 2 on the right.

The currently known butterfly fauna of Trout Brook Valley Preserve represents mostly widespread and common species along with a few unexpected vagrants. However, additional surveys targeting specific microhabitats are recommended to further investigate the potential presence of uncommon species. Butterfly diversity is largely determined by the availability of host plants and rarer species tend to be restricted to less common host plants. The impact of intense deer browsing and the spread of invasive non-native plants may negatively affect the butterfly diversity.

Additional monitoring of local moth populations may have potential for detecting unusual species in the preserve, but the lack of specific host plants may have a similar effect on the moth diversity as it does on butterflies.

<u>Common Name</u>	<u>Scientific Name</u>	<u>Family</u>	<u>CT-ESA status</u>	<u>CWCS</u>
Hoary Edge	<i>Achalarus lyciades</i>	Hesperiidae	-	-
Least Skipper	<i>Ancyloxypha numitor</i>	Hesperiidae	-	-
Silver-spotted Skipper	<i>Epargyreus clarus</i>	Hesperiidae	-	-
Dreamy Duskywing	<i>Erynnis icelus</i>	Hesperiidae	-	-
Juvenal's Duskywing	<i>Erynnis juvenalis</i>	Hesperiidae	-	-
Indian Skipper	<i>Hesperia sassacus</i>	Hesperiidae	-	-
Hobomok Skipper	<i>Poanes hobomok</i>	Hesperiidae	-	-
Zabulon Skipper	<i>Poanes zabulon</i>	Hesperiidae	-	-
Long Dash	<i>Polites mystic</i>	Hesperiidae	-	-
Peck's Skipper	<i>Polites peckius</i>	Hesperiidae	-	-
Tawny-edged Skipper	<i>Polites themistocles</i>	Hesperiidae	-	-
European Skipper	<i>Thymelicus lineola</i>	Hesperiidae	-	-
Little Glassywing	<i>Pompeius verna</i>	Hesperiidae	-	-
Spring Azure	<i>Celastrina ladon</i>	Lycaenidae	-	-
Eastern Tailed Blue	<i>Everes comyntas</i>	Lycaenidae	-	-
American Copper	<i>Lycaena phlaeas</i>	Lycaenidae	-	-
Monarch	<i>Danaus plexippus</i>	Nymphalidae	-	-
Viceroy	<i>Limnitis archippus</i>	Nymphalidae	-	-
White Admiral/Red-spotted Purple	<i>Limnitis arthemis</i>	Nymphalidae	-	-
Little Wood Satyr	<i>Megisto cymela</i>	Nymphalidae	-	-
Mourning Cloak	<i>Nymphalis antiopa</i>	Nymphalidae	-	-
Pearl Crescent	<i>Phyciodes tharos</i>	Nymphalidae	-	-
Eastern Comma	<i>Polygonia comma</i>	Nymphalidae	-	-
Question Mark	<i>Polygonia interrogationis</i>	Nymphalidae	-	-
Red Admiral	<i>Vanessa atalanta</i>	Nymphalidae	-	-
Painted Lady	<i>Vanessa cardui</i>	Nymphalidae	-	-
American Lady	<i>Vanessa virginiensis</i>	Nymphalidae	-	-
Appalachian Brown	<i>Satyrodes appalachia</i>	Nymphalidae	-	-
Eastern Tiger Swallowtail	<i>Papilio glaucus</i>	Papilionidae	-	-
Giant Swallowtail	<i>Papilio cresphontes</i>	Papilionidae	-	-
Black Swallowtail	<i>Papilio polyxenes</i>	Papilionidae	-	-
Spicebush Swallowtail	<i>Papilio troilus</i>	Papilionidae	-	-
Orange Sulphur	<i>Colias eurytheme</i>	Pieridae	-	-
Clouded Sulphur	<i>Colias philodice</i>	Pieridae	-	-
Cabbage White	<i>Pieris rapae</i>	Pieridae	-	-

### 2.5.3 Fish Diversity

Brook Trout (*Salvelinus fontinalis*), Blacknose Dace (*Rhinichthys atratulus*), Tessellated Darter (*Etheostoma holmstedii*) and American Eel (*Anguilla rostrata*) have been observed in the preserve's watercourses. Hawley's Brook is a Wild Trout Management Area (one of only nine in Connecticut) which means that the population of Brook Trout is not augmented by stocking. The brook provides exceptional habitat for Brook Trout due to its abundant spawning habitat (clean gravel substrate), cool water temperatures, and well-oxygenated water. Hawley's Brook contains the highest density of Brook Trout per linear meter of any stream sampled in CTDEEP's statewide stream survey. Results of fish sampling conducted by the CTDEEP from a site along a reach of Hawley's Brook are provided in Table 3. This site (Site No. 2102) is identified as "Hawley's Road off Redding Road, [southwest] of Saugatuck Reservoir" (Hagstrom et al., 1992).

**Table 3: Fish of Hawley's Brook**

<i>Common Name</i>	<i>Scientific Name</i>	<i>Family</i>	<i>Population no./ha (SE)</i>	<i>CT-ESA status</i>	<i>CWCS status</i>
Blacknose Dace	<i>Rhinichthys atratulus</i>	Cyprinidae	1176 (20.05)	-	Important
Tessellated Darter	<i>Etheostoma olmstedi</i>	Percidae	176 (35.29)	-	-
Chain Pickerel	<i>Esox niger</i>	Esocidae	58 (58.82)	-	Very Important
American Eel	<i>Anguilla rostrata</i>	Anguillidae	1058 (40.72)	-	Most Important
Brook Trout	<i>Salvelinus fontinalis</i>	Salmonidae	27,352 (25.21)	-	Most Important

### 2.5.4 Amphibian Diversity

Trout Brook Valley Preserve supports a diverse amphibian fauna and 14 species have been recorded there to date. Several of these are included as species of Greatest Conservation Need in Connecticut's Comprehensive Wildlife Conservation Strategy (CWCS). In addition, one state-listed species, Jefferson's Salamander (*Ambystoma jeffersonianum*; CT-ESA 'Special Concern') was documented during the surveys. See Table 4 for an overview of the amphibian species encountered in the sanctuary and their respective conservation status.

**Table 4: Amphibians of Trout Brook Valley Preserve**

<i>Common Name</i>	<i>Scientific Name</i>	<i>Family</i>	<i>CT-ESA status</i>	<i>CWCS status</i>
<b>Salamanders (order Caudata)</b>				
Jefferson's Salamander complex	<i>Ambystoma jeffersonianum</i>	Ambystomatidae	Special Concern	Very Important
Spotted Salamander	<i>Ambystoma maculatum</i>	Ambystomatidae	-	Important
Marbled Salamander	<i>Ambystoma opacum</i>	Ambystomatidae	-	Important
Four-toed Salamander	<i>Hemidactylium scutatum</i>	Plethodontidae	-	-
Redback Salamander	<i>Plethodon cinereus</i>	Plethodontidae	-	-
Northern Two-lined Salamander	<i>Eurycea bislineata</i>	Plethodontidae	-	-
Red-spotted Newt	<i>Notophthalmus viridescens</i>	Salamandridae	-	Important
<b>Frogs and Toads (order Anura)</b>				
American Toad	<i>Bufo americanus</i>	Bufonidae	-	-



Spring Peeper	<i>Pseudacris crucifer</i>	Hylidae	-	-
Gray Tree Frog	<i>Hyla versicolor</i>	Hylidae	-	Important
Bullfrog	<i>Rana catesbeiana</i>	Ranidae	-	-
Green Frog	<i>Rana clamitans</i>	Ranidae	-	-
Pickerel Frog	<i>Rana palustris</i>	Ranidae	-	-
Wood Frog	<i>Rana sylvatica</i>	Ranidae	-	Important

The preserve's variety of wetland habitats and extensive wooded uplands provide ideal conditions for many amphibians. High quality vernal wetlands in the preserve's woodland provide breeding habitat for Spotted Salamander, Marbled Salamander and Wood Frog, while those vernal pools situated at the base of a talus slope or rocky ledge are particularly suited for Jefferson's Salamanders. Four-toed Salamanders breed in vernal wetlands with dense *Sphagnum*-covered banks. All of these species are considered obligate vernal pool breeding amphibians that rely on ephemeral (non-permanent) wetland types. However, some (especially Spotted Salamander and Wood Frog) can on occasion be found to breed in fish-less wetlands of a more permanent nature such as spring-fed headwaters.

Larger ponds that hold water year-round harbor breeding populations of Red-spotted Newt, Spring Peeper, Green Frog and Bullfrog. Vegetated shallow marshes and other small ephemeral or permanent wetlands in the wooded uplands are used by American Toad, Gray Tree Frog and Pickerel Frog. Stream-breeding species, such as the Northern Two-lined Salamander occupy seeps, headwaters and streams. The coarse woody debris on the preserve's forest floor (logs, pieces of bark, etc.) provides suitable habitat for Redback Salamanders and several other amphibian species use these cover objects throughout the year.

Although the amphibian diversity in Trout Brook Valley is significant (14 of 22 species known to occur in Connecticut), a few additional species can still be expected. Northern Dusky Salamanders (*Desmognathus fuscus*) inhabit springs, seeps and streams with clean, cold water, preferably in areas with a rocky or ledge substrate. This species is uncommon in Connecticut's coastal plain but seemingly suitable habitat exists in the preserve. Another species that likely occurs in the area, but one that easily escapes detection is Fowler's Toad (*Bufo fowleri*). This is a species generally associated with well-drained, sandy soils often in flood plains. It is widespread in Connecticut and not uncommon in the Easton/Weston area, but is generally found in relatively low density and is easily mistaken for the ubiquitous American Toad (*Bufo americanus*).

It is also important to note that all of the wetlands surveyed were tremendously affected by the weather conditions in the winter and spring seasons. Vernal pools were noted to be evaporating at a much faster rate than usual because of decreased precipitation and increased temperatures in comparison to normal levels. With less than average rainfall and little to no snowmelt, water levels were already at a deficit before much warmer than usual temperatures worsened the dry conditions in February and March. Additionally, these warm temperatures accelerated the amphibian season, with Red-spotted Newt recorded weeks before it would normally be, and Bullfrog recorded in March, months before its typical emergence. Eggs were laid early in the season in response to this change in the weather, but even this was not sufficient for survival in many cases as some of the pools surveyed in March had water levels that would typically be noted in June or July. Dozens of egg masses of multiple species were exposed from the water before the official beginning of spring. Future surveys in more climate-typical seasons may reveal additional amphibians in terms of both quantity and species diversity across Trout Brook Valley.

### 2.5.5 Reptile Diversity

A significant number of reptile species occurs in the Trout Brook Valley Preserve, including several species of Greatest Conservation Need (GCN) and one state-listed species: Eastern Box Turtle (*Terrapene carolina*; CT-ESA ‘Special Concern’). The area’s known reptile fauna currently comprises four species of turtles and seven species of snakes (see Table 5).

**Table 5: Reptiles of Trout Brook Valley Preserve**

<i>Common Name</i>	<i>Scientific Name</i>	<i>Family</i>	<i>CT-ESA status</i>	<i>CWCS status</i>
<b>Turtles (order Testudines)</b>				
Common Snapping Turtle	<i>Chelydra serpentina</i>	Chelydridae	-	-
Eastern Painted Turtle	<i>Chrysemys picta</i>	Emydidae	-	-
Spotted Turtle	<i>Clemmys guttata</i>	Emydidae	-	Very Important
Eastern Box Turtle	<i>Terrapene carolina</i>	Emydidae	Special Concern	Very Important
<b>Lizards and snakes (order Squamata)</b>				
Northern Black Racer	<i>Coluber constrictor</i>	Colubridae	-	Important
Eastern Milk Snake	<i>Lampropeltis triangulum</i>	Colubridae	-	-
Northern Water Snake	<i>Nerodia sipedon</i>	Colubridae	-	-
Eastern Black Ratsnake	<i>Pantherophis alleganiensis</i>	Colubridae	-	-
Northern Brown Snake	<i>Storeria dekayi</i>	Colubridae	-	-
Eastern Garter Snake	<i>Thamnophis sirtalis</i>	Colubridae	-	-
Northern Copperhead	<i>Agkistrodon contortrix</i>	Viperidae	-	Important

Based on the geographic location of the preserve and the available habitats within its boundaries a few additional species can be expected to occur there. For instance, seemingly suitable habitat exists for Wood Turtle (*Glyptemys insculpta*) in the preserve and Northern Musk Turtle (*Sternotherus odoratus*). The former is a highly secretive, state-listed (CT-ESA ‘Special Concern’) species that prefers slow moving, clean streams with densely vegetated banks and open, sandy areas for basking and laying eggs. Sections of Hawley’s Brook near the fish passage and additional areas near its headwaters should be searched carefully for this species since it has become exceedingly rare in Fairfield County in recent years. Historic records exist for this species from the Weston area (Devil’s Den Preserve). Musk Turtles are more common in Connecticut but have a localized distribution. This species occurs in the nearby Saugatuck River and could occur in larger wetlands and stream sections within the preserve where sunlit areas of shallow water are found, especially in sections with dense vegetation or submerged deposits of leaf litter.

Only a single species of lizard occurs in Connecticut (Five-lined Skink), but no records for this species exist from the area and it is not expected to occur in Trout Brook Valley. However, a few additional snake species may still be found in the preserve. These likely include Eastern Worm Snake (*Carphophis amoenus*), Northern Ringneck Snake (*Diadophis punctatus*) and Eastern Hognose Snake (*Heterodon platirhinos*). All three species are cryptic and can be difficult to find.



Eastern Hognose Snakes are state-listed (CT-ESA ‘Special Concern’) and occur in areas with well-drained, sandy soils such as floodplains – in particular in areas with a large toad population since these amphibians make up a substantial portion of a hognose snake’s diet.

The already high number of reptile species found in Trout Brook Valley and the potential occurrence of several additional ones, including some state-listed species, is indicative of the habitat diversity and quality in the area. Trout Brook Valley Preserve and adjoining protected areas undoubtedly form the stronghold for several of these species in Fairfield County.

### 2.5.6 Bird Diversity

To date, 159 species of birds have been identified in the Trout Brook Valley Preserve, including 21 state-listed species (Common Loon, Great Egret, Bald Eagle, Northern Harrier, Sharp-shinned Hawk, Broad-winged Hawk, American Kestrel, Peregrine Falcon, Upland Sandpiper, Northern Saw-whet Owl, Common Nighthawk, Red-headed Woodpecker, Alder Flycatcher, Horned Lark, Brown Thrasher, Northern Parula, Vesper Sparrow, Savannah Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark) and one recently de-listed species (Common Raven). More than half of the preserve’s birds (87 species) are included in Connecticut’s Comprehensive Wildlife Conservation Strategy (CWCS) as species of Greatest Conservation Need. In addition, 10 species of Connecticut Audubon Society’s Conservation Priority Top 20 (CAS, 2008) have been found in the preserve: American Woodcock, Blue-winged Warbler, Bobolink, Brown Thrasher, Cerulean Warbler, Common Nighthawk, Eastern Meadowlark, Grasshopper Sparrow, Prairie Warbler, and Wood Thrush.

A breeding bird survey was carried out in the preserve in conjunction with the year-long survey during the 2012 nesting season. Breeding activity was recorded at three levels (Possible, Probable & Confirmed) using the criteria and codes indicated in Table 6. During this survey, 17 bird species could be confirmed as breeding in the preserve, 42 additional species classified as probable breeders and another 10 species possibly breed in the preserve. Broad-winged Hawk, a recently state-listed species of Special Concern added in 2010, was recorded as a ‘probable’ breeder. The presence of this species in an area with ample suitable habitat and during the appropriate time of year (May and June) could indicate that Broad-winged Hawks breed on or near the Trout Brook Valley Preserve. Adults were heard and seen around the Bradley Road entrance and just east during mid-June. Nests of these woodland raptors are notoriously difficult to locate and this species could easily be overlooked as a breeder. Paying additional attention to the presence and activity of Broad-winged Hawks in the preserve is warranted. For a complete overview of the birds documented in the Trout Brook Valley Preserve and their conservation and breeding status, see Appendix II.

The remaining 20 state-listed bird species that have been observed in the Trout Brook Valley Preserve primarily represent passage migrants. Bald Eagle is known to nest nearby along reservoirs. Sharp-shinned Hawk largely falls into the same category as the Broad-winged Hawk described above, though none were recorded during or around the spring or summer. Brown Thrasher should be monitored for during breeding season along with the American Kestrel, both in and along the orchard. With that said, Savannah Sparrow, Grasshopper Sparrow, Bobolink, and Eastern Meadowlark have the potential to nest in and around the orchard if disturbances are reduced to minimal levels and mowing regimes are undertaken in order to allow for the appropriate habitat to be maintained throughout the spring and summer for their attempted breeding.

**Table 6: Breeding Bird Survey Activity Criteria & Codes**

**Possible breeding**

- X Species observed in possible nesting habitat, but no other indication of breeding noted. Singing male(s) present (or breeding calls heard) in breeding season

**Probable Breeding**

- S Singing male(s) present (or breeding calls heard) on more than one date at least a week apart in the same place
- P Pair observed in suitable habitat in breeding season
- T Bird, or pair, apparently holding territory
- C Courtship display, copulation, agitated behavior or anxiety calls from adults observed, suggesting nearby presence of nest or young.
- N Visiting probably nest site
- B Nest building or excavation of nest cavity

**Confirmed Breeding**

- DD Distraction display or injury-feigning behavior observed
- UN Used nest found
- FE Female with egg in oviduct caught in mist net
- FL Recently fledged young present
- ON Adult(s) entering or leaving nest in circumstances indicating occupied nest
- FS Adult carrying fecal sac
- FY Adult(s) with food for young
- NE Identifiable nest and eggs, adult sitting on nest, identifiable egg shells found below nest, identifiable dead nestling found
- NY Nest with young

*Adapted from: McGowan & Corwin (2008)*

The 2010 revision of the CT-ESA removed the Special Concern status of the Common Raven due to its significant southward expansion into Connecticut in recent years. This species is frequently encountered in the preserve and was confirmed as breeding as fledglings were seen with a parent. A single male Cerulean Warbler was found singing and feeding in a forest opening on the white trail near the center of the property during the second quarter of May. A number of migrant warblers were in the vicinity also foraging and singing from time to time. This was likely a migrant bird, but its discovery in the appropriate breeding habitat leaves open the possibility that this conservation priority species may breed somewhere in or near the preserve. At the very least Cerulean Warblers are very rare even in migration at heavily-trafficked wood warbler stopover locations in Fairfield County, and even if Trout Brook Valley is nothing more than a stopover site for the species it is still a significant find.

Eighty-seven CWCS Greatest Conservation Need (GCN) species have been recorded in the Trout Brook Valley Preserve, including eight 'Most Important' species (Great Egret, Northern Harrier, Upland Sandpiper, Common Nighthawk, Red-headed Woodpecker, Horned Lark, Vesper Sparrow, and Grasshopper Sparrow). All eight of these species are known to be passage migrants that utilize a portion of the preserve, especially the orchard, farm fields, and grasslands, as a stopover and foraging site. Additionally, 34 species are considered 'Very Important'. These include the state-listed (CT-ESA) species already mentioned, as well as several others that appear to have healthy populations in the preserve. The most noteworthy of those include Yellow-billed Cuckoo, Black-billed Cuckoo, Chimney Swift, Acadian Flycatcher, Great Crested Flycatcher, Wood Thrush, Worm-eating Warbler, Blue-winged Warbler, Black-and-white Warbler, Chestnut-sided Warbler, Eastern Towhee, Field Sparrow, Rose-breasted Grosbeak, and Indigo Bunting. The populations of the secretive cuckoo species can be difficult to assess, but a few pairs of Yellow-billed Cuckoo likely breeds in the preserve ('Probable') and the Black-billed may as well ('Possible').

There are sizable breeding populations of Great Crested Flycatcher throughout the property, with smaller numbers of Wood Thrush and Worm-eating Warbler scattered in distinct pockets of the forest, their actual nesting pairs greatly reduced after an abundance of each species poured through during spring migration. Chimney Swift and Acadian Flycatcher each have several likely breeding pairs, with the Acadians being recorded anecdotally over time as vacillating from one or two to several pairs each season (Charles Barnard Jr., pers. comm.). Black-and-white Warblers are almost certainly nesting in the woodlands as well with Chestnut-sided Warblers likely utilizing the western edges of the orchard and the area surrounding the Bradley Rd. entrance. Blue-winged Warblers can reliably be found throughout the breeding season in the orchard as well the sizable forest interior opening on the white trail just before Hawley's Brook. Eastern Towhee was seen in only May and August, though it seems probable that at least a pair or two would attempt to nest in or around the intersection of a wooded area and early successional habitat. Field Sparrow, Rose-breasted Grosbeak, and Indigo Bunting were all recorded singing and in pairs in June. The Field Sparrow has several pairs that inhabit the orchard and grasslands, while the Rose-breasted Grosbeak and Indigo Bunting both favored the woodlands and wetlands surrounding the Bradley Road entrance as well as the open space of the orchard.

In general, the avian fauna represented in the Trout Brook Valley Preserve represents a suite of species characteristically found in large near-coastal forest blocks as well as early successional, grassland and open field habitats. Species such as Broad-winged Hawk, Pileated Woodpecker, Eastern Wood-Pewee, Wood Thrush, Scarlet Tanager, and several other interior forest species reach their highest densities in large, mature forest stands. The presence of these avian species, in particular those breeding in the preserve, attests to the functionality of the mature woodland areas in the preserve. A different suite of birds is more commonly encountered in the preserve's early successional habitat management areas and includes species that rely on a mosaic of different-aged forest stands, young forest or open scrub habitat. Examples of such species include American Woodcock, Yellow-throated Vireo, Blue-winged Warbler, Chestnut-sided Warbler and Eastern Towhee. All of these species are considered species of Greatest Conservation Need in Connecticut (CWCS, 2005), and most would not occur in the preserve if managed early successional habitat areas did not exist there. Although the current size of the early successional habitat areas is small in relative terms to the hundreds of acres of woodlands Trout Brook Valley features, future management activities on the property will attempt to incorporate the additional creation of suitable habitat for the present suite of scrubland birds and other early successional habitat species (see Chapter 3 for additional management discussions) while simultaneously preserving and enhancing wetlands and woodlands.



The orchard and grasslands contained Tree Swallow and Eastern Bluebird as confirmed breeding species as they utilized erected nest boxes. The Purple Martin (CT-ESA Threatened) would likely nest in the orchard considering the proximity to waterways in the preserve and site line to Long Island Sound were a gourd tree to be placed and maintained at an appropriate site. The abundance of odonate and lepidoptera species would serve the state-listed species well. The variety of wetland habitats and associated wetland vegetation in the Trout Brook Valley Preserve provide additional habitat for a number of bird species with specific resource requirements. Sections of streamside habitat bisecting mature forest stands harbor nesting habitat for the Louisiana Waterthrush and Acadian Flycatcher. The wet meadow/open scrub swamp near the Bradley Road entrance served as a foraging site for a multitude of birds like the Wood Duck, Cooper's Hawk, Yellow-billed Cuckoo, Chimney Swift, Belted Kingfisher, several swallow species, House Wren, Blue-gray Gnatcatcher, Red-eyed Vireo, Black-and-white Warbler, Common Yellowthroat, American Redstart, Yellow Warbler, Black-throated Blue Warbler, Prairie Warbler, Black-throated Green Warbler, Canada Warbler, Baltimore Oriole, and more.

Scrub swamps on the western edge of the property held birds like Wild Turkey, Golden-crowned Kinglet, Winter Wren, Yellow-rumped Warbler, and Blackpoll Warbler. Areas near pools and swamps in the Jump Hill section contained Hairy Woodpecker, Eastern Wood-Pewee, Eastern Phoebe, Black-capped Chickadee, Tufted Titmouse, White-breasted Nuthatch, and Eastern Bluebird. Additionally, the headwater system and stream-fed floodplain maple swamp system that are directly west of the orchard and farm fields help enhance already favorable habitat for birds such as the American Woodcock and Rusty Blackbird, the former a potential breeding species and the latter, a migrant and winterer in Connecticut and one of the fastest declining songbirds in North America, and both were recorded during the month of October 2011.

Additionally notable finds apart from the species noted previously included a few irruptive birds, namely Red-breasted Nuthatch, Pine Siskin, and Purple Finch, which were frequently found in the orchard and its surrounding woodlands. While the weather during the observations from October 2011 to October 2012 influenced many aspects of life in Trout Brook Valley, birds were largely unaffected. However, the very mild winter and warm temperatures after the October snowstorm combined with a very light flight in terms of irruptive species meant that fewer birds and species were driven south for a variety of reasons. It is likely that more birds in terms of individuals as well as species would be recorded if the survey period continued through the 2012-2013 fall and winter season or others like it. In general, potentially tens or hundreds of more bird species could be added to the list during a survey period over a number of years due to the varied nature of Trout Brook Valley's habitats, its size, and its function as a migration corridor, though the vast majority of the expected species for the property have been recorded.

### 2.5.7 Mammal Diversity

Mammal data from the Trout Brook Valley Preserve is predominantly based on sight records and track surveys. No state Endangered, Threatened or Special Concern mammals have been observed in Trout Brook Valley, although a few species of Greatest Conservation Need occur there (see Table 7 for a complete list). The resulting mammal list is under representing several groups. For example, no bat species have been positively identified in the preserve yet even though suitable habitat for several species exists, including some state-listed forms. Systematic surveys for small insectivores and rodents likely will reveal the presence of many additional species in the preserve. In fact, approximately forty mammal species are expected to occur within many of the habitats of the preserve and adjacent lands. They include various species in the mammalian order Insectivora (shrews and moles); Chiroptera (bats); Lagomorpha (rabbits and hares); Rodentia (e.g., squirrels, mice, rats, voles, beaver, and jumping mice); Carnivora (canids, bear, Raccoon, mustelids, Striped Skunk, and Bobcat), White-tailed Deer and others.

**Table 7: Mammals of Trout Brook Valley Preserve**

<i>Common Name</i>	<i>Scientific Name</i>	<i>Family</i>	<i>CT-ESA status</i>	<i>CWCS status</i>
<b>Shrews (order Soricomorpha)</b>				
Short-tailed Shrew	<i>Blarina brevicauda</i>	Soricidae	-	-
<b>Rabbits (order Lagomorpha)</b>				
Eastern Cottontail	<i>Sylvilagus floridanus</i>	Leporidae	-	-
<b>Rodents (order Rodentia)</b>				
White-footed Mouse	<i>Peromyscus leucopus</i>	Cricetidae	-	-
Muskrat	<i>Ondatra zibethicus</i>	Cricetidae	-	Important
Woodchuck	<i>Marmota monax</i>	Sciuridae	-	-
Gray Squirrel	<i>Sciurus carolinensis</i>	Sciuridae	-	-
Eastern Chipmunk	<i>Tamias striatus</i>	Sciuridae	-	-
American Red Squirrel	<i>Tamiasciurus hudsonicus</i>	Sciuridae	-	-
<b>Opossums (order Didelphimorphia)</b>				
Virginia Opossum	<i>Didelphis virginiana</i>	Didelphidae	-	-
<b>Carnivores (order Carnivora)</b>				
Coyote	<i>Canis latrans</i>	Canidae	-	-
Bobcat	<i>Lynx rufus</i>	Felidae	-	Very Important
Striped Skunk	<i>Mephitis mephitis</i>	Mephitidae	-	-
Raccoon	<i>Procyon lotor</i>	Procyonidae	-	-
American Black Bear	<i>Ursus americanus</i>	Ursidae	-	Important
<b>Even-toed Ungulates (order Artiodactyla)</b>				
White-tailed Deer	<i>Odocoileus virginianus</i>	Cervidae	-	-



### *2.5.8 Other Organisms*

The diversity observed in groups described previously is primarily driven by the availability of various pockets of high quality habitat within the Trout Brook Valley Preserve, and by the large scale of the woodland habitat in the area. Although other organisms present in the preserve have received little or no attention, undoubtedly additional rare and unusual species remain to be found. Targeted surveys for species groups such as moths, spiders or other invertebrates can be very rewarding. A wide variety of mushrooms has been observed during site visits, but no organized inventory of the local species has been attempted. In addition, the aquatic habitat variety and quality in the preserve would warrant a detailed survey for crayfish and freshwater mussels, several of which are excellent habitat quality indicators and include state-listed species. In short, the Trout Brook Valley Preserve offers tremendous potential for future biological inventories.





## Chapter 3: Conservation & Management

*One of the biggest conservation and management challenges for most of Connecticut's woodlands is clearly illustrated during early spring emergence, when the first wildflowers of the season sprout and color the landscape. Due to intense overbrowsing by White-tailed Deer, native wildflower populations have been decimated and the first and often most abundant species to provide herbaceous ground cover are non-native invasive species such as Garlic Mustard, illustrated here. Chemical defenses in these plants make them resistant to deer-browse but also cause pervasive changes to the local ecosystem that have a far-reaching and long-term impact. Battling these invasives and restoring healthy forest habitat requires persistence, commitment and substantial resources.*





## Chapter 3

# Conservation & Management

### 3.1 Why Manage Habitats?

Healthy old growth forests consist of a patchwork of different-aged stands of trees. Natural processes such as storms or fire will irregularly remove varying numbers of trees from the forest, creating openings where sunlight can reach the forest floor. Seeds, left dormant in the shaded understory, will germinate and fast-growing species of grasses, wildflowers and shrubs will rapidly colonize the newly formed 'light-gap'. Over time, other plant species that grow more slowly and/or are prefer more shaded conditions will grow in and replace the initial crop of colonists. Tree saplings of light-tolerant species, such as American Beech (*Fagus grandifolia*) will emerge above the ground-covering shrub layer and will start to shade the undergrowth. At this point, the early successional habitat, consisting of herbaceous plants and woody shrub, gradually reverts to young forest. Over time, slow-growing shade-tolerant hardwoods like oaks will infiltrate the closed-canopy young forest and the area once devoid of trees will gradually mature into a diverse old-growth forest, like its surrounding habitat.

At various times during this process of forest regeneration, suitable habitat conditions exist for different species (grassland species, scrub-inhabiting species, young forest specialists, etc.). The transitional nature of these early successional habitats causes species to abandon an area once their specific preferred habitat conditions no longer exist there. Historically, sufficiently large forest blocks would be uneven-aged and contain enough of a habitat mosaic to allow species to move into other suitable habitat patches when vegetative succession caused their previous habitat to become unsuited.

Several factors now hinder this natural process, causing species that rely on early successional habitats as well as species that inhabit forest interiors to suffer. First, almost all of Connecticut's forest has been cut in the past 100 years. As a result, current forest cover consists of even-aged stands where almost all trees have grown in since the last cutting. Not enough time has passed yet to allow natural processes to create the diverse habitat mosaic, described earlier, in our forests. Secondly, one of the most important driving forces in the creation of forest openings and young growth is fire, and the successful suppression of forest fires over the past century has effectively removed our forest's ability to rejuvenate itself. Blowdowns during storms are now the primary creators of natural forest clearings, but such occurrences are rare. Thirdly, loss of habitat and forest fragmentation have reduced the overall size of continuous forest blocks throughout the state, making it more difficult for species that rely on ephemeral habitat parcels to reach additional areas of suitable habitat.

### 3.2 Recent Management Activities

Recent management activities that have taken place at Trout Brook Valley included primarily trail maintenance, systematic mowing and maintenance of the orchard area, limited non-native invasive species removal (e.g. Japanese Barberry), especially in the Jump Hill section, and general forest and wildlife stewardship. Mowing and trail maintenance has been primarily focused on allowing passive human recreation and access in the preserve to benefit overall public site use while suppressing unwanted vegetation. This has simultaneously supported functional wildlife habitat use. Signage has been erected to notify visitors about sensitive areas of the TBV (e.g., the orchard, the Bradley Rd. swamp, other wetlands) and trail stewards have assisted in managing the property.

## The Biological Conservation Unit Concept

### 3.3 General Conservation & Management Goals

#### 3.3.1 Conservation Priority Habitats

The Trout Brook Valley Preserve contains several high-quality habitat types. The following habitats are recognized as vital components of the preserve and prioritized for conservation and management action (in order of decreasing acreage):

- Mixed hardwood stands
- Riverine upper perennial watercourses
- Seasonal pools
- Early succesional habitats
- Palustrine forested wetlands
- Palustrine scrub/shrub wetlands
- Grasslands and Orchard
- Talus slopes

In general, future conservation and management actions will involve strict protection of the preserve's wetlands and their respective critical upland buffer zones. Mixed hardwood and evergreen stands will be preserved and monitored using relevant indicator species to assess their biological functionality. Habitat management areas will be maintained in an open, early successional state and may be expanded to improve their wildlife habitat value in the future. Detailed conservation and management goals are described in Chapters 3 and 4.

#### 3.3.2 Conservation Priority Species

Several state-listed and other conservation priority species have been recorded in the Trout Brook Valley Preserve. Future conservation and management strategies will carefully weigh the habitat and resource requirements for the following species:

- Native Brook Trout and American Eel
- Tiger Spiketail
- Blue-spotted/Jefferson's Salamander complex & other obligate vernal pool-breeding amphibians (e.g. Spotted Salamander & Wood Frog)
- Eastern Box Turtle
- Grassland Birds
- Neotropical Migrant Passerines



*Example of a BCU: Bobolink (*Dolichonyx oryzivorus*) is a state-listed species (Special Concern, CT-ESA) indicative of quality grassland habitat. Their presence in an area indicates that the habitat can provide these birds with the food, shelter and other resources they need. Areas that support a healthy Bobolink population are more likely to be suitable for other grassland-specific plants and animals than habitats that do not.*

Connecticut Audubon Society focuses its conservation and management activities on the preferred habitats of a select number of biological indicator species. These species are carefully picked because: a) they are at risk, b) they are relevant to Connecticut's natural diversity, c) they can be helped by achievable conservation actions, and d) they are indicative of specific key habitats that may support additional at-risk species. As a result, acquisition, conservation, creation or maintenance of the habitats inhabited by these indicator species will likely confer benefits to many additional plant and animal species.

Habitat-focused conservation is pro-active and more cost-efficient than species-focused conservation. Habitat conservation guided by select indicator species provides a handle for selecting the best quality habitats and benefits more than just the targeted species. Creation of suitable habitat may even benefit species that were not detected or present at the time habitat conservation and/or management is initiated.

Additional information on the three particularly significant and imperiled Connecticut species is as follows:

Tiger Spiketail (*Cordulegaster erronea*)

This species of spiketail dragonfly reaches the northeastern limit of its range in Connecticut where it breeds in surface springs, seeps, and cold rivulets that form the headwaters of the larger perennial streams in the area such as Hawley Brook. In Connecticut, adults are observed flying from mid-June through the end of July. Adults are elusive but with patience can be sought out in appropriate habitats often observed during daytime perusing the channel or vicinity of springs and seeps especially those drainages vegetated with skunk cabbage.

Larvae can be found in shallow waters of the drainage buried in fine sand deposits that accumulate in quiescent portions of the stream, or concealed beneath accumulated organic debris, especially at the downstream edges of in-channel pools. This species is an indicator of drainages that have a hydrology supported by groundwater discharge, especially streams with sustained flows throughout summer months.

Jefferson Salamander (*Ambystoma jeffersonianum*)

The Jefferson Salamander ranges from western New England to west-central Indiana, south to central Kentucky to western Virginia and northern New Jersey. In New England, this salamander ranges from west of the Connecticut River in Vermont, Massachusetts, and Connecticut east of the Connecticut River in parts of Massachusetts and New Hampshire (DeGraff and Yamasaki, 2001). Specifically, in Connecticut, this species is locally common west of the Connecticut River, where it generally favors upland sites (Klemens, 1993). Individuals were collected by Klemens in 1990 between elevations of 300-1,300 feet in CT. The Jefferson Salamander was found at Talcott Mountain and the Hanging Hills of the Central Connecticut Lowlands by Klemens (1993), both areas are characterized by traprock ridge geology.

The adults are terrestrial, frequenting steep rocky areas with logs and heavy duff areas. This salamander hides under the leaf litter, in small mammal burrows, under stones, or in decomposing stumps or logs. They are found primarily in shaded, undisturbed, steep rock areas of deciduous woodlands, but also in mixed woodlands. A special habitat requirement is the presence of temporary ponds with deep leaf litter, however, older manmade ponds are also used (DeGraff and Yamasaki, 2001). Most adults are found in or near deciduous forest, however some may also be found in pools located in hemlock groves. Adults were also reported to breed in grassy pasture ponds, impoundments, and vernal shrub swamps. However, the majority were found in discrete vernal pools filled with rain water (Klemens 1993).

Kenney and Burne (2000) state: "they are secretive, living underground in the forest up to one-half mile from their breeding pool". Klemens (2000) stated that this species is undergoing a range-wide decline. He further noted that the most vulnerable populations are those associated with the trap rock ridge system in Connecticut.

Eastern Box Turtle (*Terrapene c. carolina*)

The Eastern Box Turtle reaches the northeastern part of its range in southern New England. Eastern Box Turtle is reported to have a low reproductive rate and to require ten years to reach sexual maturity (Klemens, 2000). Due to its reproductive biology, its conservation status is of concern because populations experiencing increased mortality rates due to direct human impact (e.g., roadkill) or indirect human impact (e.g., habitat loss) may not be compensated by the species' natural reproductive rate.



## 3.4 Conservation & Management Challenges

Several large-scale challenges to the protection of conservation priority species and their specific habitats exist in the region that affects the Trout Brook Valley Preserve to varying degrees. Three of the biggest challenges and proposed strategies to counteract the potential negative effects of each are briefly discussed below.

### 3.4.1 *Invasive species*

Introduction and proliferation of non-native organisms are of management concern because the introduced species have potential to affect the biotic interactions of the native flora and fauna communities. Biotic interactions such as competition, predation, disease, parasitism, and mutualism may be altered to the detriment of native species. Resultant effects on communities may be manifested in the increased frequency of disease, altered primary and secondary production, altered trophic structure, altered decomposition rates and timing, disruption of seasonal rhythms, shifts in species composition and relative abundance, shifts in invertebrate functional groups (e.g. food for secondary consumers); shifts in trophic guilds (e.g., increased omnivores); and increased frequency of hybridization.

#### Non-native and Invasive Plants

The preserve contains approximately 14 species of non-native invasive plants. The elimination of all these species from the preserve's habitats would be labor intensive, therefore short-term control efforts should be focused on containment, while the various long-term control methods can be adequately assessed. For instance, herbicide application can be an effective control tool if applied in a proper manner, but in order to protect groundwater, surface water, drinking water supplies, and other sensitive environmental receptors, the application of herbicides should be avoided whenever alternative control measures are effective and feasible. Even pesticides in use and approved for use today for controlling invasive species may have insufficient toxicological studies supporting their safe use in certain habitats. Safe use is often a matter of proper application and dosage. Recent scientific evidence associates various potential teratogenic, carcinogenic, and mutagenic effects and various toxicities with pesticides in use today. If nothing else, use of supposedly "safe" herbicides is still dependent upon proper application, handling, storage, and use.

Apparently feasible control methods are provided by the literature but selection of the controls is based upon cost, available labor, effectiveness, limitations, response of the target plant species and availability of follow-up monitoring, control, and replacement with native shrub species – all factors influenced by site-specific conditions (e.g., soil type, accessibility, proximity to sensitive environmental receptors, etc).

In recognition of the impact of non-native plants on our floristic composition in the state, Connecticut recently enacted legislation barring the sale, use, and cultivation of specific non-native plants species that are known to be particularly widespread and invasive and are causing impact to native habitats (Public Act No. 03-136). Additional legislation allows for enforcement against the ban on the importation, movement, sale, purchase, transplantation, cultivation, or distribution of these plants (Public Act No. 04-203).

Non-native invasive plants are prolific within portions of the preserve. They include herbaceous, liana, shrub, and tree species. Some representative non-native invasive plant species noted during our field inspections of the preserve include those listed in Table 8. More species may exist. Despite known impact to the native floristic composition of the state, some non-native plant species still provide important habitat function to certain bird species. For instance, Multiflora Rose provides suitable nesting cover for shrubland birds at the site. Therefore, care must be taken not to impact species of conservation concern that utilize this special habitat coverage during removal or control projects.

<b>TABLE 8. NON-NATIVE INVASIVE PLANT SPECIES NOTED ON-SITE</b>			
<b>Common Name/ Scientific Name</b>	<b>Location(s) on site</b>	<b>Potential Control<sup>1</sup></b>	<b>Reference for Further Control Details/Information</b>
<b>SHRUBS</b>			
Multiflora rose <i>Rosa multiflora</i>	Woodland edges esp. between the orchard and Crow Hill Preserves	Mechanical and chemical methods Frequent repeated cutting or mowing (3-6 x per year) for two to four years; herbicide application <sup>2</sup>  Control via conservation grazing with Exmoor Ponies	<a href="http://www.nps.gov/plants/alien/fact/romu1.htm">http://www.nps.gov/plants/alien/fact/romu1.htm</a>
Japanese barberry <i>Berberis thunbergii</i>	Jump Hill preserve and at various woodland edges throughout	Mechanical control (removal of individual shrubs) in early spring <sup>2</sup>  Cutting with Triclopyr applied to cut-stump  Control via conservation grazing with Exmoor Ponies	<a href="http://www.dnr.state.wi.us/org/land/er/invasive/factsheets/b...">http://www.dnr.state.wi.us/org/land/er/invasive/factsheets/b...</a> , <a href="http://plants.usda.gov/">http://plants.usda.gov/</a>  <a href="http://webapps.lib.uconn.edu/ipane/browsing.cfm?descriptionid=26">http://webapps.lib.uconn.edu/ipane/browsing.cfm?descriptionid=26</a>
Autumn Olive <i>Elaeagnus umbellata</i>	Woodland edges esp. between the orchard and Crow Hill Preserves	Sprouts vigorously after cutting, so effective management requires removal of roots or cutting/girdling the stem and then application of an herbicide like triclopyr	<a href="http://www.hort.uconn.edu/cipwg/art_pubs/Guide/x12autumn.html">http://www.hort.uconn.edu/cipwg/art_pubs/Guide/x12autumn.html</a>
Winged Euonymous <i>Euonymous alatum</i>	Entrance areas at Bradley Hill Road, and Jump Hill Preserve	Sprouting vigorously after cutting or burning. Therefore, effective management via stem cutting requires subsequent application of an herbicide like glyphosate.	<a href="http://www.klines.org/joanne/Archive/Plant_Pages/plant_pages_30.html">http://www.klines.org/joanne/Archive/Plant_Pages/plant_pages_30.html</a>

<sup>1</sup> <http://www.ocfp.on.ca/local/files/Communications/Current%20Issues/Pesticides/Final%20Paper%2023APR2004.pdf>

<sup>2</sup> Be sure to heed all health and safety warnings, permitting requirements, and environmental/ecological recommendations associated with any chemical control method. Information for herbicides can be found at [http://www.pesticideinfo.org/Search\\_Chemicals.jsp](http://www.pesticideinfo.org/Search_Chemicals.jsp)

**TABLE 8. NON-NATIVE INVASIVE PLANT SPECIES NOTED ON-SITE**

Common Name/ Scientific Name	Location(s) on site	Potential Control <sup>1</sup>	Reference for Further Control Details/Information
		Toxic to some animals – protect conservation grazers against poisoning by installing barriers	
<b>LIANAS</b>			
<i>Porcelainberry</i> <i>Ampelopsis</i> <i>brevipedunculata</i>	Old field and forest borders around SBMNWR headquarters	Mechanical and chemical methods have been used successfully to control porcelainberry infestations. Hand pruning in the fall or spring helps to prevent flowering and thus seed formation the following season. Vines can be cut to prevent seed formation and further damage to trees. Systemic herbicides (Triclopyr [e.g., Garlon 3A and Garlon 4] and glyphosate [e.g., Roundup and Rodeo]) are also effective <sup>1</sup> . Both methods together likely most effective and likely required for large infestations. Large stems cut low should be treated with a systemic herbicide to prevent re-sprouting <sup>2</sup>	<sup>1</sup> <a href="http://www.nps.gov/plants/alien/pubs/midatlantic/ambr.htm">http://www.nps.gov/plants/alien/pubs/midatlantic/ambr.htm</a> <sup>2</sup> <a href="http://www.dcnr.state.pa.us/forestry/invasivetutorial/Porcelainberry_M_C.htm">http://www.dcnr.state.pa.us/forestry/invasivetutorial/Porcelainberry_M_C.htm</a>
<i>Asiatic or Oriental Bittersweet</i> <i>Celastrus orbiculatus</i>	Woodland edges esp. between the orchard and Crow Hill Preserves	Hand removal where practical; cut vines and spot treatment with herbicide (100% Roundup)	<a href="http://www.inhs.uiuc.edu/chf/outreach/VMG/rlbitter.html">http://www.inhs.uiuc.edu/chf/outreach/VMG/rlbitter.html</a>
<i>Japanese Honeysuckle</i> <i>Lonicera japonica</i>	A couple very isolated locations near the boundaries of the preserve	Herbicide application only effective control but necessitates attention to proper timing. Some herbicides ineffective	<a href="http://tncweeds.ucdavis.edu/esadocs/documents/lonijap.html">http://tncweeds.ucdavis.edu/esadocs/documents/lonijap.html</a>
<b>HERBS</b>			
<i>Garlic Mustard</i> <i>Allaria officinalis</i>	A number of locations throughout the preserve	Spraying soil around satellite invasion areas with vinegar to change the soil pH should be tried as a pilot project; In areas of large infestations, systemic herbicide application (glyphosate, triclopyr) may be necessary prior to seed set	
<i>Japanese knotweed</i> <i>Polygonum cuspidatum</i>	Roadside at Jump Hill Preserve	The best control strategy is a combined integrated strategy with mowing or cutting:	<a href="http://www.cdfa.ca.gov/phpps/ipc/weedinfo/polygonum-knotweeds.htm">http://www.cdfa.ca.gov/phpps/ipc/weedinfo/polygonum-knotweeds.htm</a>



<b>TABLE 8. NON-NATIVE INVASIVE PLANT SPECIES NOTED ON-SITE</b>			
<b>Common Name/ Scientific Name</b>	<b>Location(s) on site</b>	<b>Potential Control<sup>1</sup></b>	<b>Reference for Further Control Details/Information</b>
		1) Cut stalks down to 2" and immediately apply a 25% solution of glyphosate or triclopyr to the cross section of the stems. 2) Cut or mow infestations when the plants reach early bud stage (late spring or summer), treat re-growth in the fall with glyphosate or triclopyr.	
Common reed <i>Phragmites australis</i>	Isolated near Bradley Rd. entrance and north part of swamp	Glyphosate application and removal of dead plants	<a href="http://www.nap.usace.army.mil/Projects/LCM%20M/Summary%20of%20Common%20Questions%20Concerning%20Phragmites%20Control.pdf#search=phragmites%20control">http://www.nap.usace.army.mil/Projects/LCM M/Summary%20of%20Common%20Questions%20Concerning%20Phragmites%20Control.pdf#search=phragmites%20control'</a>

#### Non-native Animals

Introduced animals have had a detriment to our native fauna, especially domestic house cats, dogs, and rats. Dr. David Pimental and his colleagues of Cornell University calculated the economic valuation of impact from non-indigenous animals including domestic cats. For instance, his research estimated there to be 63 million domestic cats in the United States of which approximately 30 million are considered allowed to roam loose or are feral. These feral cats are estimated to capture approximately 570 million birds each year at an estimated value of 17 billion dollars (Pimental et al., 2000). Loose and/or feral cats can have an even greater impact on local populations of small mammals (Hammerson, 2004).

Local residents should be educated of the following truthful facts about cats and wildlife:

- Cats with bells on their collars still capture and kill wild birds and animals
- Even well-fed cats kill wildlife
- Wildlife injured by cats rarely survive, even if they escape; and
- Outdoor cats are at risk of exposure to many hazards including disease, parasites, and vehicles ([www.nj Audubon.org](http://www.nj Audubon.org)).

Outdoor cats should at least be spayed or neutered. Rats should be discouraged from congregating within sensitive areas of the preserve by keeping these areas clear of human food wastes and by denying picnicking and general access to these areas.

Pets should be discouraged from entering the sensitive habitats within the preserve such as wetlands, grasslands, and early successional shrubland. Control measures could include a combination of fencing (effective at excluding free-roaming dogs), signage, education and via a voluntary program of keeping cats indoors modeled after the one sponsored by the New Jersey Audubon Society.

Likewise, Beans and Niles (2003) identified Dogs as a threat to the biodiversity (including rare species) in New Jersey. Dogs should be kept on leashes under the control of their owners at all times throughout the preserve, and should be kept on the trails as they risk impact to the biodiversity of the preserve via the following:

- They may spread invasive species propagules deeper into native vegetation associations
- They may seek out and find and kill ground nesting birds, and waterfowl young and their eggs
- They pose a predatory threat to young wildlife that may not have the ability to escape predation including species of conservation concern detected in the preserve such as juvenile Box Turtles (Dodd, Jr., 2001)
- They may impact sensitive seasonal pool communities
- They may trample and destroy rare plants
- They may foul high surface water quality watercourses, and
- They may harass large mammals posing a threat of injury to those species and to themselves.

In addition, dog owners allowing their dogs to roam off-leash risk injury to their dogs from the following:

- Venomous snakes
- Disease-carrying and sickly organisms
- Territorial animals
- Conflicts with other off-leash dogs

For a discussion regarding unleashed dogs harassing wildlife in rural environments see Lowry and McArthur (1978) and Hammerson (2004). We recognize that this constraint placed on dog owners may be unpopular with dog-owners, but the disparity in the behavior exhibited among breeds and individual dogs warrants regulation of ALL dogs regardless of their breed and level of training.

### *3.4.2 Diseases & Pests*

Disease concerns include those potentially impacting floral and faunal species and those that may affect humans while visiting the preserve.

#### West Nile Virus/Eastern Equine Encephalitis

West Nile Virus (WNV), spread by mosquito vectors is of paramount concern in recent years as it can have acute (lethal), effects on various bird taxa. Since mosquitoes are the vectors of human parasites, they are of management concern. Larval and pupae mosquitoes may occur in seasonal or temporary pools within the preserve and surrounding areas. Since 1999, the Connecticut Agricultural Experiment Station has established permanent mosquito monitoring stations within various communities to monitor for WNV and Eastern Equine Encephalitis (among other arboviruses) from June to October. Mosquitoes are collected from traps set at these monitoring stations, identified to species level, and then sent to a virology laboratory to test for WNV. This network of monitoring stations includes one in Weston where a trap is located on Pent Road in Devil's Den, and in Easton where a trap is monitored on Sport Hill Road. Results of monitoring are available through the Connecticut Agricultural Experiment Station. At the former, 1,337 mosquitoes were collected from the trap in

2012 and one was found to be positive for carrying WNV. The trap in Easton produced 1,239 mosquitoes all of which were negative for WNV, EEE, and other arboviruses<sup>3</sup>.

#### Tick-borne Illness

Ticks are also vectors of parasites that cause disease in humans such as Rocky Mountain spotted fever, rickettsiae, monocytic and granulocytic ehrlichiosis, babesiosis, Lyme disease, and approximately six other diseases for which pathogens or other causative agents have been identified. Tick associations with other pathogens are not yet clearly understood or defined. The most common carriers of tick-borne diseases in the northeast are the Black-legged Ticks (*Ixodes scapularis* and *I. pacificus*) two species responsible for transmission of Lyme disease, granulocytic ehrlichiosis, and babesiosis (Stafford, 2004). However, other species of ticks may also act as vectors. The White-footed Mouse (*Peromyscus leucopus*) and White-tailed Deer are considered major reservoir hosts for Lyme disease. Visitors to the preserve should be warned via signage of the potential for ticks in the woodland, grassland, shrubland, and other heavily vegetated areas of the preserve. Signs posting the warning of tick borne illness may also help to deter people from entering closed areas.

#### Rabies

The occurrence of rabies in wildlife, especially raccoons and foxes, is a potential management concern. The public should be informed that any wild animals encountered within the preserve should not be fed, touched, or harassed. Additionally, human food wastes should not be discarded in the preserve to prevent attracting opportunistic scavengers that may also carry rabies.

#### Forest Tree Diseases

There are a number of diseases currently plaguing or threatening to plague the health and composition of our forests in the Northeast. The cause of these diseases can be classified into four major groups: abiotic stressors, air pollutants, pathogens, and forest insect pests. Abiotic stressors include temperature and moisture injury, winter injury, frost, high temperatures, drought, and excessive water (prolonged inundation). These stressors, if initiated by natural processes, are an integral part of forest ecology and thus management to control or mitigate their effects is rarely warranted. Air pollutants known to impact tree health include ozone, sulfur dioxide, and hydrogen fluoride. Many of the significant impacts to forest tree health due to air pollution have been mitigated by State implementation plans to meet National Ambient Air Quality Standards, and thus site-specific actions are not warranted unless a discrete point source has been identified within or proximal to a natural area (and none such point sources were identified in or proximal to Trout Brook Valley). Thus tree diseases caused by tree pathogens and forest tree insects are the major causes of concern for protecting tree health within the preserve.

Tree pathogens can be further categorized into diseases of hardwoods versus diseases of conifers. Hardwood diseases include dieback and decline syndromes (e.g., Sapstreak Disease of Sugar Maple, Beech Bark Disease, Oak Decline), wilt diseases (e.g., Oak Wilt), leaf diseases (e.g., Anthracnose, leaf blisters, leaf rusts, Powdery Mildew, Phyllosticta Leaf Spot, Tobacco Ringspot Virus of Ash, Ash Yellow, etc.), and root diseases (e.g., Armillaria Root-rot). Conifer diseases include various needle afflictions (rusts, blights, Needlecasts, etc.) and twig/stem diseases (e.g., White Pine Blister Rust, Pine – Oak Rust, etc.). (USDA/AIS, No Date) Pathogens may be host-specific, or may be inter-specific. Crown dieback in Ash – presumably from Anthracnose but may be from some other pathogen – was noted within the preserve near Jump Hill.

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<sup>3</sup> <http://www.ct.gov/caes/cwp/view.asp?a=2819&q=505498>



Forest tree insect pests are also divided broadly into two main categories: those that afflict hardwoods and those that afflict Conifers. Hardwood insect pests include leaf-eating insects (e.g., Gypsy Moth, Oak Leafroller, Forest Tent Caterpillar, etc.), sucking insects (such as Pear Thrip and Periodical Cicada), and meristematic Insects such as the Emerald Ash Borer that only recently has been documented in Connecticut (Naugatuck River Valley area) but has major potential to afflict wide-scale damage to many of our dominant and economically viable eastern forest trees. Conifer insect pests include defoliators such as Hemlock Loopers and the introduced pine sawfly, sucking insects such as various aphids, adelgids, spider mites, thrips, etc., and meristematic insects such as various pine and spruce weevils and beetles. The Eastern Hemlock Woolly Adelgid is a significant pest inflicting hemlocks in Southern New England. It has caused wide-scale mortality of hemlock stands in parts of Connecticut, especially stands growing on shallow to bedrock soils. The hemlocks growing within the preserve did not appear to exhibit large scale die-back, but should be monitored closely for signs of Adelgid infestation.

### *3.4.3 Anthropogenic Disturbance*

Natural, biotic (predation, disease, parasitism, competition, succession) and abiotic (hydrologic changes, storms, seasonal extremes in temperatures, etc.) factors that may negatively impact plant and animal populations are part of the natural processes in which these organisms have evolved. Robust populations can usually recover from these natural, temporary impacts. Clearly the greatest threats to the ecology within and adjacent to the preserve is the cumulative impact associated with human activity. The continued introduction, proliferation, and spread of non-native invasive plant and animal species, over-collection/harvest of plants and animals, pollution, over-population and the associated demand on natural resources, and the loss or alteration of habitat due to development or fragmentation are often cited as the major factors leading to the loss of biodiversity. More often than not, the cumulative effect of one of more of these factors is responsible for negative impacts to biodiversity in a given area.

Since Trout Brook Valley is a protected preserve, and lies adjacent to other protected lands in a larger, forested landscape matrix, threats to biodiversity from development and pollution are not significant factors on a local scale. By far the greatest threat to biodiversity within the preserve is the spread and proliferation of non-native invasive plant species that can alter floristic composition, introduce disease, change soil chemistry, and out-compete native food-producing plants for which animal species have evolved.

Human presence within Trout Brook Valley also has potential to impact biodiversity and other sensitive environmental receptors of the preserve. Heavy trail use by hikers, horseback riders, and mountain bikers pose management challenges associated with soil erosion and the resultant sedimentation of downgradient wetlands and watercourses. Hikers, horses/horseback riders, mountain bikers, dogs, and others that deviate from the trail system could potentially do one or more of the following:

- Trample rare plants
- Introduce non-native plant species propagules
- Trample or kill ground-nesting birds their nests, eggs, or young
- Initiate or exacerbate soil erosion problems, and
- Disturb various roosting birds of conservation concern, especially raptors.

Predators often track the scent of humans and pets within natural areas, therefore humans and pets wandering off-trail can lead predators into different parts of the preserve where sensitive species of conservation concern may be nesting. People and pets deviating from the trail system are also at greater risk of encountering known and potential biological hazards within the preserve such as poisonous plants, biting, stinging, and venomous animals, biting and stinging insects, stinging plants, and aggressive wildlife that may be defending young, a den site, or other resource.

#### 3.4.4. *Insufficient Scientific Knowledge / Data Gaps*

Insufficient scientific knowledge regarding wildlife species distribution, abundance, and condition is a concern identified for a variety of habitats of greatest conservation concern, in Connecticut (CT DEEP, 2005). The lack of representation of certain insect orders from inclusion on Connecticut's Endangered, Threatened and Special Concern Species list (CT DEEP, 2010) is likely not due to the secure conservation status of those groups but rather a reflection of the lack of understanding of the distribution, abundance, and condition of species within the unrepresented orders.

Additional focused and more in-depth invertebrate surveys would likely yield additional listed species among various taxa including the insect orders Diptera (e.g., perhaps *Leptophlebia*, *Paraleptophlebia*, or other Mayfly genera and Tabanid flies), Lepidoptera (especially rare moths), and perhaps various ground beetle species.

The status of the mammalian order Chiroptera (bats) remains a data gap in the status of the biodiversity within the preserve. The status of bat species within the preserve is best determined by specialized survey methods consisting of bioacoustical monitoring perhaps augmented by trapping methods (mist-netting, harp traps, etc.). Due to the extensive forested habitat, the preserve has high potential to support rare arboreal roosting bats included on the CT list of rare species and the CT DEEP Endangered Species Act.

The preserve lies within one of the focal areas mapped in the state by the Connecticut DEEP for potentially supporting the New England Cottontail. Connecticut's only native lagomorphs, the New England Cottontail is currently under petition to the United States Fish and Wildlife Service to consider its designation as a Federally protected species under the Endangered Species Act. There is potential for apparently suitable habitat to occur within the Palustrine wetlands associated with Hawley's Brook.

Additional information regarding the potential presence of other small mammalian species within the preserve could be obtained via a trap and release survey deploying a combination of trapping techniques and arrays within various habitats of the preserve.





## Chapter 4: Adaptive Conservation Plan

*Trout Brook Valley Preserve's wildlife and habitats are best served with a balanced combination of management and conservation. Certain habitat types within the preserve, such as the headwater swamp shown here, form a unique ecosystem within the forest and benefit most from measures that keep disturbance and other adverse impacts to a minimum. However, other habitat types require intensive management to keep them functional and a higher level of disturbance can be tolerated. In both cases, monitoring habitat quality using carefully selected indicator species can provide the information needed to assess whether specific management practices provide the desired results.*





## Chapter 4

# Adaptive Conservation Plan

### 4.1 Trout Brook Valley Preserve Long-term Goals

#### 4.1.1 *Habitat Management and Enhancement*

##### General Habitat Matrices Improvement

Through coordinated efforts between stakeholders, stewards and maintenance staff, existing habitats within the preserve could be improved or enhanced, to benefit avifauna either in conjunction with timber harvest, or as separate conservation measures. Various management measures can be implemented to increase habitat value without affecting existing uses of Trout Brook Valley. Planting native shrubs that bear fruit and mast beneficial to avifauna is one such way. Selecting for timber with high wildlife value during forest management is another. An important aspect of matrix improvement is to assure that not only is food available for the species of conservation concern but also that the following is considered:

- A variety of food types are present supplying all feeding guilds (e.g., insectivores, granivores, frugivores, nectarivores, carnivores, etc.) with sustenance
- Food items such as fruits and mast are available at varying times throughout the seasons
- Food items present a variety of nutritional options for consumers, and
- Food plants are located in areas where they are able to maximize their production without being outcompeted by low value invasive competitors.

The relative nutritional content of food-producing plants beneficial to avifauna that occur within TBV and some examples of flora within TBV that provide food high in this nutritional category are presented in Table 4-1, and they important to note for conservation and assessment of impact from forest treatments. Examples of shrub species with high value to avifauna that thrive in the ecoregions of southern New England, and the species to which they are beneficial are provided in Table 4-2. Areas where invasive shrubs are removed should be replanted with one or more of these species in order to prevent the re-colonization of the removed invasive plants.

##### Wetland Protection

Local drainage basins 1700-17 and 1700-18 that discharge to the Sagatuck Reservoir. Two other local drainage basins – 1700-19 and 1700-20 – discharge to Hawley’s Brook that eventually discharges to the Saugatuck River and eventually to Long Island Sound. The streams that bisect the preserve are of stellar water quality. According to the CT DEEP Water Quality Standards for Inland Surface Waters, the streams that drain the preserve are designated as a Class A watercourses (Murphy, 1987). Surface waters with this designation are presumed suitable for their designated uses that include fish and wildlife habitat, among other legitimate designated uses. Such streams are important to maintaining our native populations of cold water fishery finfish species. The water quality goal is to maintain the Class A designation and designated uses. Likewise, groundwater quality within the preserve designated as Class GA within the local basins 1700-19 and 1700-20. Groundwater with this classification is within the influence of private drinking water wells. The aquifer beneath the site and vicinity is an important resource upon which residential properties rely to recharge private drinking water wells. Groundwater within local basins 1700-17 and 1700-18 have a Class GAA designation, which means they are within the area of influence of direct discharge to a public water supply. Protection of headwater streams and high-quality ephemeral wetlands to maintain water quality and habitat functionality should be a priority conservation goal for the preserve. This

best done by implementing best management practices to prevent erosion and sedimentation, keeping pollutants, toxicants and nutrient sources from entering the wetlands and watercourses, retaining forest canopy cover over the first order streams and palustrine wetlands and maintaining adequate buffer zones around these resources.

Nutrition Category	Some Examples of Flora within TBV that Provide Food High in this Nutritional Category	Avifauna benefited
High lipid content	Flowering Dogwood, Spicebush, Sassafras, Northern Arrowwood, Virginia Creeper	Thrushes (except American Robin), Gray Catbird Yellow-rumped Warbler, American Tree Swallow (Place and Stiles, 1992)
High protein content	Solomon's seal, Spicebush	American Robin (Witmer, 1996), Eastern Kingbird, Great Crested Flycatcher
High carbohydrate content	Black Cherry, Highbush Blueberry, Pokeweed, Spicebush, and grapes	Cedar Waxwing (Witmer, 1996)
Emergency sustenance foods (Low nutrient or less palatable foods that are retained on the stem late into winter when other food is scarce)	Maple-leaved Viburnum, Green Briar, Winterberry, sumacs, Bayberry, Eastern Red Cedar	Winter residents, wintering individuals of normally migratory species, early returning spring migrants

Recommended Species	Avifauna benefitted	Comment
Highbush Blueberry ( <i>Vaccinium corymbosum</i> )	34 spp. of birds including Gray Catbird, American Robin, Eastern Bluebird, Orchard Oriole	Requires well-drained sunlit sites
Canadian Serviceberry ( <i>Amelanchier canadensis</i> )	Downy Woodpecker, Hairy Woodpecker, Gray Catbird, Eastern Bluebird, Northern Cardinal, American Robin, Brown Thrasher, Swainson's Thrush, Veery, Wood Thrush, Eastern Towhee, Cedar Waxwing, Baltimore Oriole and other songbirds	Grows in a variety of habitats from swamps to rocky dry hillsides. Early spring blooms attract insects and pollinators and thus are important to insectivores
Sumacs ( <i>Rhus glabra</i> , <i>R. copallina</i> , <i>R. typhina</i> )	Ruffed Grouse, Ring-necked Pheasant, Wild Turkey, Eastern Bluebird, Northern Cardinal, Gray Catbird, Purple Finch, Northern Flicker, Northern Mockingbird, Eastern Phoebe, American Robin, Brown Thrasher, Hermit Thrush, various other songbirds	Not a preferred food but an important winter sustenance especially later in the winter season when other foods have been depleted

Shrub Species	Importance to Avifauna	Notes
Dogwoods ( <i>Cornus stolonifera</i> , <i>C. florida</i> and <i>C. ammomum</i> )	Ruffed Grouse, Wild Turkey, Eastern Bluebird, Northern Cardinal, Gray Catbird, Purple Finch, Northern Flicker, Yellow-breasted Chat, American Robin, Brown Thrasher, Hermit Thrush, Gray-cheeked Thrush, Cedar Waxwing, Red-eyed Vireo, Warbling Vireo, Pine Warbler various other songbirds	Fruits are highly valuable to avifauna including Neotropical migrant passerines. Some of the fruits may persist into winter
Hawthorns ( <i>Crataegus</i> spp.)	18 spp. including American Robin, Northern Cardinal, Blue Jay, and other songbirds especially Fox Sparrows and Cedar Waxwings	The dense thorny branches of this shrub make it an exceptional coverage for nesting birds
Brambles ( <i>Rubus allegheniensis</i> ; <i>R. hispidus</i> , et al. spp.)	49 spp., esp. Wild Turkey, Ruffed Grouse, Gray Catbird, Cedar Waxwing, Veery, Orchard and Baltimore Orioles, Yellow-breasted Chat	Exceptional coverage for nesting ( <i>R. allegheniensis</i> );
Bayberry ( <i>Morella [Myrica] pensylvanica</i> )	Eastern Bluebird, Gray Catbird, Brown Thrasher, White-eyed Vireo, Red-bellied Woodpecker, Tree Swallow, Yellow-rumped Warbler	Especially important component in the diets of Tree Swallows and Yellow-rumped Warbler
Viburnums ( <i>Viburnum acerifolium</i> , <i>V. dentatum</i> )	Ruffed Grouse, Wild Turkey, Pileated Woodpecker, American Robin, Brown Thrasher, Great Crested Flycatcher, Cedar Waxwing, Gray-cheeked and Hermit Thrush	Fruits available during fall migration

### Forestry Management

Timber harvest is recommended by the Forestry Management Plan (Appendix III). Forestry management techniques directly affect avifaunal composition. For instance, research conducted by Dr. Eben Goodale (Presented at the Yale Forest in July, 2008) addressed the effect of shelterwood and thinning treatments on bird diversity and abundance in the Yale Forest. His preliminary conclusions presented then (which by now may be published) suggest that undisturbed forests tend to have higher avian species diversity when compared to shelterwood stands and stands subject to thinning. He attributed this to the fact that undisturbed stands tended to have a greater density of snags and conifers, and also had a more developed shrub layer (predominantly *Kalmia* in the Yale Forest). Forests managed as undisturbed treatments, favored forest interior species such as Scarlet Tanager (in deciduous forests) and Black-throated Green Warbler (in conifers). Undisturbed forests were often found in hard to log areas, such as saturated wetland soils, boulder fields, or steep hillsides. Undisturbed forests in these areas were often the preferred habitat of Northern and Louisiana Waterthrush. Ground nesters, such as Ovenbirds, and species that favor forests with a dense shrub layer such as the Black-throated Blue Warbler preferred undisturbed forests and stands subjected to thinning over shelterwood stands. Downy Woodpeckers were an example of a species that prefers thinned stands over shelterwood and undisturbed stands. In stands managed via thinning, more early successional species were encountered, while the species composition of shelterwood-managed stands tended to be more dynamic.

Opportunities to conduct forestry management in a way that is beneficial to wildlife should be explored within the preserve. A harvest technique should be selected that provides both economic and wildlife benefits. For instance, both clear-cutting and shelterwood cuts are techniques used by the CT DEEP in the past. Clear cutting has had negative connotations associated with it among “environmentalists” in the past due to the drastic change in landscape cover that



were produced by commercial loggers and, when conducted improperly, often resulted in negative impacts to downgradient water quality (flashy flows from stormwater runoff, sedimentation, increased water temperatures, etc.). Yet, if done as smaller management units it may produce the following benefits:

- It may regenerate trees and other vegetation of high wildlife value (e.g., esp. shade intolerant species)
- It frees growing space, nutrient and mineral resources so that they are available for the next generation of timberwood
- It offers a potentially high financial benefit from generation of even-aged trees which contributes to increased marketability, facilitates their harvest, and can result in higher economic benefit, thus perhaps generating a source of revenue for other conservation actions, and
- Clearcuts tend to mimic natural disturbance (e.g., fire, hurricane damage, etc.), thereby resulting in the attraction of those avian species that seek out such disturbed habitat.

Shelterwood cutting leaves a number of trees within the management unit uncut. It can be thought of as a very heavy form of thinning, with the trees left uncut serving as sources of seed for the future generation of trees in the stand and as "shelter" for young trees on the forest floor (protecting those seedlings from direct sunlight and wind). The trees to be left in a shelterwood cut are selected not only for their seed producing ability, but also for their potential economic value. Therefore, trees that may be good seed producers but will not increase in size and value are typically harvested while trees that are both good seed producers and also have good growth potential are retained for the next harvest interval.

Thus, with forest management using a shelterwood technique, there are usually several cuttings. The first removes the undesirable trees thereby creating the gaps for regeneration to take place and freeing up energy and nutrient resources for the remaining trees increasing their health and vigor and providing dominant trees that shelter the regeneration. Eventually, however, these dominant trees begin to impede the growth of the regenerating trees and so the original shelter trees are then harvested to make room for the next generation. Since shelterwood typically requires several cuttings, it often has increased management costs and labor, but it can potentially be used to select for trees with high wildlife value (e.g., White Oak, or aspens) while removing those with less wildlife value. Both clear-cutting and shelterwood treatments result in even-aged management units (Bolen and Robinson, 2003). Even-aged units lack the vertical structural diversity of many natural forests. Since bird diversity is directly related to foliage height diversity (Morrison, 2002), these treatment areas would be expected to have less avian diversity than the natural areas of the forest. From a landscape ecology perspective, however, the treatment areas are small fractions of the total forested land cover of the preserve. In that regard, there is opportunity to improve upon the forested habitat structure so important to Neotropical migrant bird species since the treatments used in the small management units can add special habitat attributes required by some forest specialists.

For instance, after clear cuts, stands of regenerating young trees and coppices from cut stumps often produce the dense vertical structure sought out by Ruffed Grouse (a species that has seemingly disappeared from many areas of Connecticut), a variety of Neotropical migrant passerines (migratory songbirds), and New England Cottontail. In areas where the regenerating clear cuts are colonized by aspen and birch, there is the added value to Ruffed Grouse of not only the vertical stem density they seek for protection from raptors, but also an ample supply of young tree buds which supplies them with an abundant source of preferred food. The various forest treatments should be conducted in such a way as to add vegetation structural diversity to the landscape in a mosaic across the landscape. Included in this mosaic should be fairly large units of "Natural Areas".

The forestry methods discussed above may not necessarily maximize economic gains for timber harvest but likely would strike a balance between market value and wildlife habitat creation/enhancement. A tentative schedule of forest management practices for a seven year planning period is provided in the Forestry Management Plan (FMP in Appendix III) prepared by Benchmark Forest and Land Management LLC. General wildlife recommendations were identified in the FMP. Those general recommendations are consistent with state and regional conservation plans. Any forest management using clear cut treatments should also consider the following recommendations of Hassenger et al. (1981) in order to further benefit wildlife:

- The cut area should be gated from access roads to keep out off-road vehicles
- A barrier of forest vegetation should separate the clear cut stand from access roads
- The haul road should penetrate this forest barrier from the access road into the management unit at a curve angle to eliminate lines of sight from the access road into the center of the clear cut
- Big “wolf” trees of oak and hickory should be retained in the clearcut to provide mast
- The boundaries of the clearcut should not be straight and abrupt but irregular and diffuse adding structural diversity to the ecotone,
- Dead snags should be left standing
- Log-loading areas should be enlarged and seeded for wildlife
- Fruit bearing shrubs should be retained especially along the boundary, and
- Tall trees should be left along streams to shade the water, and drainages should be crossed using bridges or culverts.

When assessing the various silviculture treatments, consideration should be given to both structure and composition to protect other species of conservation concern that do or may occur within the preserve. For instance, the “natural areas” mentioned above should be designated as such in the Forest Management Plan. Permanent interior forest zones should be established to allow the formation of climax forest, a rare habitat type in Connecticut (Dowhan and Craig, 1976). Maintaining the integrity of forest interiors will benefit a number of forest interior bird species identified by Askins et al. (1987) that are priority species of conservation in Connecticut and the region, including keystone species such as Broad-winged Hawk (CT-ESA ‘Special Concern’) and Barred Owl. Timber harvest outside of the natural areas can be conducted in such a way as to benefit what Askins et al. (1987) identifies as “interior-edge species” – species that require or prefer the vegetation structural and foliage height diversity of natural edges and developed ecotones. Examples of these species include Ruffed Grouse, Yellow-billed Cuckoo, Wood Thrush, Eastern Wood Pewee, and Eastern Towhee.

Furthermore, in order to implement a low-impact forestry management program, logging or crossing areas of the forest that may be constrained by soils that are either highly erodible or susceptible to impact from logging equipment should be avoided. These areas primarily include the following:

- Wetland area dominated by organic soils (areas mapped by the NRCS as the Catden and Freetown, Natchaug, or Timakwa series)
- Wetland areas with mineral wetland soils (areas mapped by the NRCS as the Leicester, Raypol, Ridgebury, Walpole, and Whitman series), if the mapped unit lies at the upper end of its slope range
- Upland areas mapped by the NRCS as underlain by highly erodible soil units such as the Tisbury eolian deposits, or soils with finer textured layers within their profile)
- Soils with steep slopes (e.g., certain Hollis or Sutton deposits), and
- Areas of high boulder or talus coverage (Canton – Charlton, and Charlton – Chatfield units).

Once the presence/absence of conservation concern species, wetland soils, highly erodible soils, steep slopes, and other constraints of forestry practice (e.g., accessibility, stocking, handling, etc.) are considered, the following discrete areas of the preserve were identified as recommended priority forestry management sites:

- Eastern facing slope of the Jump hill Preserve - Maintenance of existing early successional habitat areas & creation of additional wildlife clearings with concurrent treatment of non-native invasive plant infestations using a planned systematic approach
- Ridgetop outcrops – Open up the canopy in order to promote more robust shrub layer development (except along areas proximal to the Yellow Trail)
- Old growth cedar stand - Restoration by selective removal of shade trees and additional planting of young cedars

- Area underlain by Hinkley soils – Affect small patch cuts to create ESH.

#### Invasive Species Control

The primary goal over-arching goal in invasive species management for the preserve should be that advocated by the Invasive Plant Atlas of New England (IPANE) assessment group (Mehrhoff et al., 2003). That is: “No New Invasions” either for new invasive species in the region (e.g., Black Swallow-wort [*Cynanchum louiseae*], Mile-A-Minute weed [*Polygonum perfoliatum*], etc.) and for new satellite invasion areas of existing invasive species (e.g., Garlic Mustard, Japanese Barberry, etc.). Stewards should be vigilant to colonization by additional non-native invasive species. If new colonizations are discovered, a rapid response eradication team could be dispatched to dispense with the newly discovered invasives while their populations are still manageable.

The secondary focus of control efforts (after rapid response action to prevent new invasions) should be to focus control efforts along the invasion front of existing infestations within the preserve to halt their spread and to contain the invasion. Efforts could then expand inward from there toward the invasion center as resources allow. Care should also be taken not to affect the habitat of species of conservation concern during control or removal projects. For instance, removal of invasive shrubs could impact shrubland birds via removal of suitable nesting habitat and cover, and so, at the very least should not be conducted during nesting season. It would be prudent to inventory all non-native invasive plant species, assess their extent, coverage, and possible impact; to prioritize species based on the urgency and need for control; and to find suitable native or non-invasive analogs that will replace the habitat functions lost upon the removal of the target invasive species. Delineation of invasive plant infestations will establish a baseline that will be useful in calculating potential rates of spread and resultant impact to habitat.

### 4.1.2 Stewardship / Outreach

#### Stewardship

In order to assess the efficiency and effectiveness of management activities within the preserve, it is recommended that the Aspetuck Land Trust (ALT) continue monitoring efforts as part of an adaptive management programs. Adaptive management occurs when data is collected concurrently with management activities. The collected data is used as feedback to adjust and fine tune the management efforts. This approach to management can be highly beneficial in evaluating the success of pilot scale programs that can then be scaled up to affect change in larger areas. For instance, the success of treatment methods for controlling invasive species is typically dependent upon the time of year the control is implemented, the growth habit of the target species, the presence absence of other non-target vegetation, etc. Treatments should be implemented on small satellite invasions first to determine the factors necessary for success upon which larger areas could be then be treated with a higher likelihood for success.

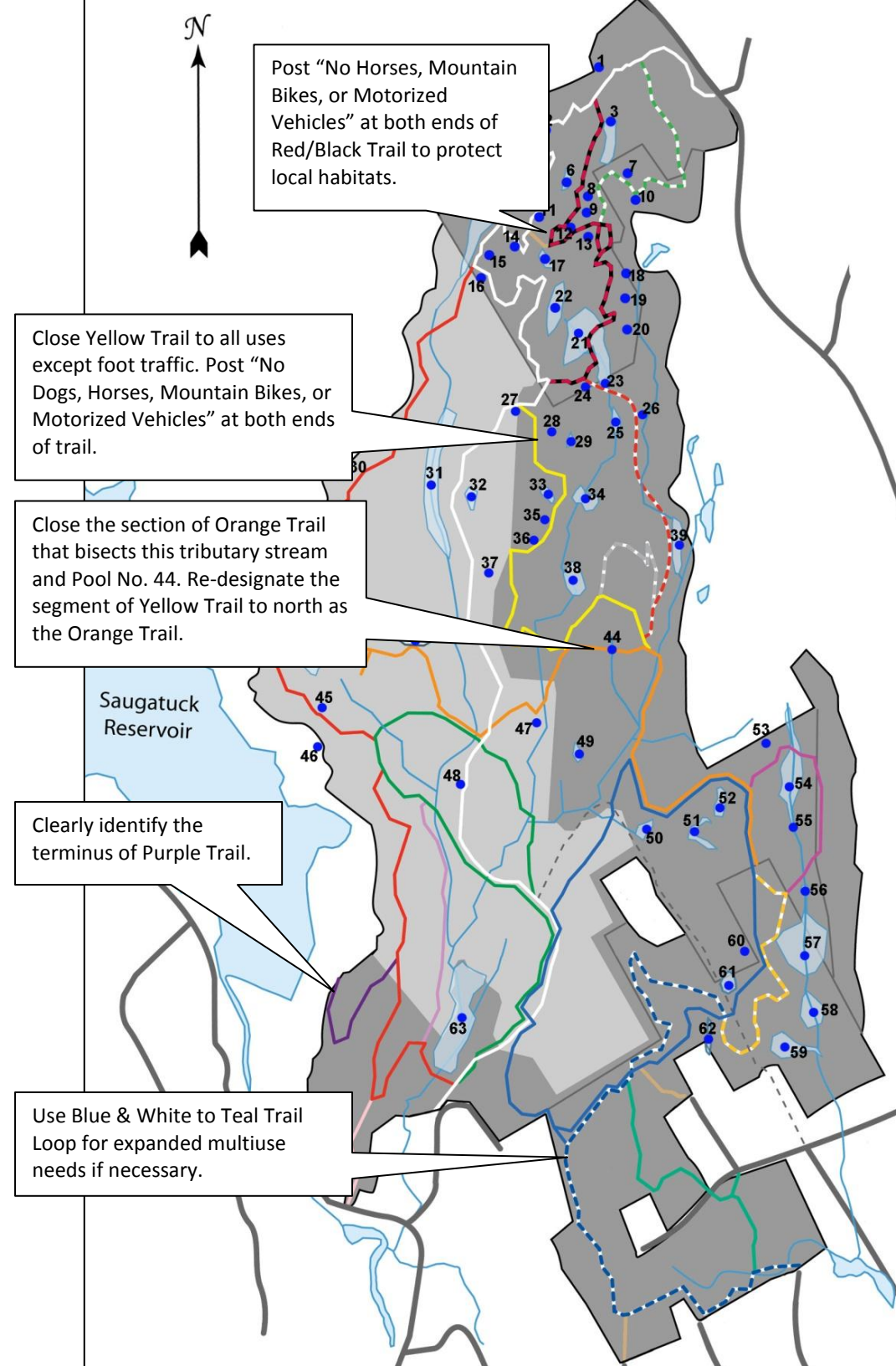
The ALT stewards have done an excellent job maintaining the preserve, especially the trail system. Trails are well marked and guide maps appear at most trail junctions so that people within the preserve without a map can get re-oriented and find their way back to their point of origin with relative ease. However, in order to protect many of the sensitive environmental receptors discovered in the preserve as a result of this study and otherwise a few recommendations to the trail system are warranted and are noted in Figure 4-1 on the following page. It is understood that the preserve is visited by a number of people pursuing various interests and recreational usages. It is our opinion that due to the wealth of sensitive environmental receptors within the various habitats of the preserve, recreational usage should be limited to passive recreation such as hiking, birding, photography, and nature interpretation. Horseback riding and mountain biking should continue to be allowed on a limited basis. It is also understood that there are many visitors to the preserve that allow their dogs to run free and off their leash, contrary to the established rules. Due to the potential for property trespass, dog v. dog and dog v. people conflicts, and potential impact to rare flora and fauna, it is recommended that this rule be ardently enforced and addressed via an expanded outreach program.



## Outreach

It is recommended that Trout Brook Valley expand its outreach and education program to improve communication of TBV conservation and management goals to its membership. An expanded outreach program should use a combination of approaches to reach the widest audiences. For instance, notices or articles regarding the goals of habitat management can be communicated to members using an integrated approach of social media, blog posts, newsletters, list serves, direct mailings, trail side signage, and lecture series. Once the membership begins to fully understand the value of ecosystem services and the threats to these services, the more they are likely to contribute to its preservation, or at least to respect the natural resources rather than exploit them. Some examples of trailside signage that could be developed include the following:

1. The 13 Functions and Values of Wetlands
2. Vernal Pool Denizens
3. An Invasive Plant Control Project in Process
4. Identifying Non-native, Invasive Plants
5. Alien Invasive Insects
6. Stream Invertebrates as Indicators of Water Quality
7. The Flora and Fauna of Talus Slopes
8. Grassland Birds of Conservation Concern
9. Herpetofauna of Trout Brook Valley Conservation Area
10. Northern Copperhead Habitat Warning
11. The Fish of Hawley's Brook
12. Neotropical Songbirds of Forest Gaps
13. Spring Ephemeral Wildflowers
14. Recognizing Poison Ivy
15. Deer Tick Area Warning
16. The Geologic History of Trout Brook Valley
17. Woodland Raptors
18. Woodland Carnivores
19. Aerial Insectivores
20. Causes of Forest Tree Injury



### 4.1.3 Addressing Data Gaps

It is recommended that future studies assess the conservation status of rare Lepidoptera, the use of the preserve by bats, and to assess presence/absence of New England Cottontail. The dry oak and lowbush blueberry ridgetop communities, rocky outcrops, and certain lush, forb-vegetated Palustrine wetland systems all have potential to contain rare Lepidoptera (Schweitzer et al., 2011). Since these habitat types occur in the preserve, they should be further examined for rare Lepidoptera using an array of light traps.

Few bats species were detected during the biological inventory, and none could accurately be identified to species by visual observation alone. Bat species determinations can be conducted by trapping (e.g., mist-netting, harp traps, etc.) or preferably via ultrasonic sensor detection of their calls. Trapping has the advantage of assessing the health of the individuals caught, but risks injury or stress to them. Ultrasonic detection is non-invasive and more comprehensive method of identifying mixed species congregations of foraging bats. Both approaches require qualified personnel and trapping has the added requirement of a CT DEEP permit acquisition.

Likewise, the presence of New England Cottontails (NECs) should be assessed as the preserve lies within a focal area of a state-federal partnership for planning and management of NEC, and historically this species was known to occur within suitable habitat elsewhere in the region. The dense shrub component of the Palustrine wetlands associated with Hawley's Brook may still provide suitable habitat for this native New England species. NECs are best detected using forensic methods such as mitochondrial (mt-)DNA testing of fecal pellets, blood, or tissue. If (mt-)DNA testing of fecal pellets is the chosen method, then permits are likely not necessary as it does not involve the trapping or capture of animals.

# Summary and Conclusions

## 5.1 Trout Brook Valley Preserve Summary and Conclusions

The results of the year-long biodiversity survey of the Trout Brook Valley Preserve and adjacent landscape revealed that the study area hosts a remarkable array of species across multiple taxa, especially among the avifaunal and herpetofaunal groups. The total species richness of the area is expected to be even greater than what was detected during the 2012 survey, as some species and faunal groups are cryptic, nocturnal, fossorial, ephemeral, or exhibit a combination of these behaviors and thus pose species-specific detection and identification challenges. Nevertheless, the 2012 survey succeeded in identifying key species of conservation concern among all the habitats represented in the preserve, and a number of sensitive environmental receptors.

Priority habitats identified within TBV and adjacent lands include mixed hardwood forest interiors, riverine upper perennial watercourses, seasonal pools, talus slopes, palustrine forested wetlands, palustrine scrub/shrub wetlands, the Orchard, and early successional habitats. One or more of these habitats host rare species (e.g., State or Federally designated Endangered, Threatened, or Special Concern species) and additional species of conservation concern that have been identified in state, federal, or regional conservation plans. The presence of some of these species with specific state or federal designation may qualify the ALT for habitat enhancement or improvement funding.

The Forestry Management Plan (Appendix III) provides a long-term, multi-year framework for management, as time and resources allow. This framework, when integrated with the recommendations provided in Chapters 3 and 4, will allow for effective stewardship of the preserve in such a way as to sustain the biodiversity and to maintain associated ecosystem services.

The Orchard and adjacent grasslands support CT listed species. The Connecticut Special Concern Box Turtle uses the edge habitat adjacent to the Orchard whereas CT listed avifauna use the Orchard during spring (northbound) and autumn (southbound) migration. Disturbance to these species in and adjacent to the Orchard and adjoining habitats should be minimized.

The preserve would likely serve as a suitable location for a variety of university research programs that could be mutually beneficial to both the educational institution(s) and the ALT. This partnership allows stewards to implement effective adaptive management to address the various threats imposed upon the site's ecological communities.

Further details regarding implementation and logistics of affecting specific management techniques (e.g., timber harvest, invasive species control programs, etc., rare plant population protection) should be outlined and identified in project-specific step-down plans.

## 5.2 Benchmarks for Success

Managers of the preserve should gauge the effectiveness of management activities, from both a social and science aspect. Feedback from the public could be one measure of success. Feedback can be solicited through response forms attached to or incorporated in newsletters, brochures, or e-mailings. Reduction in the number of complaints issued by stakeholders in response to preserve management decisions might be another measure of success.



Hard data collected as a result of any monitoring efforts that may be implemented within the preserve could demonstrate and quantify the degree of success obtained from restoration efforts. Surveys could be generated and circulated to stakeholders to solicit feedback on restoration efforts completed. Measures of success that can be quantified include but are not limited to the following:

- Number of people involved as volunteers for stewardship
- Number of stewardship actions completed
- Populations of priority species stable or increasing
- Area impacted by invasive plants decreasing
- Additional acres protected
- Native species richness, abundance, or diversity stable or increasing, and
- Number of successful nests, fledged young, plant stems, catch per unit effort, etc. of priority species produced each year.

Sightings data collected from birders using the bird sanctuary and reporting their sightings to eBird could also be used as a measure of success. The data entered could be monitored over time to determine species richness trends across or within seasons, document occurrences (frequency and duration) within the preserve and to illustrate trends. The names and contact information of people entering their sightings could help document tourism usage.

## Chapter 6

# Limitations

### 6.1 Limitations of the Trout Brook Valley Preserve natural resource survey

Connecticut Audubon Society's (CAS) natural resource survey was performed in accordance with generally accepted practices of other consulting natural resource specialists providing similar services during similar temporal and geographical conditions. CAS personnel observed the degree of care and skill generally exercised by other consulting natural resource specialists under similar circumstances and conditions. CAS findings and conclusions must be considered not as scientific certainties, but rather as our professional opinion based upon the interpreted significance of the data gathered during the course of the this assessment which was subject to the financial and temporal limitations specified in our proposal. No other warranty, expressed or implied, is made.

The purpose of this study was to assess the biological site conditions, subject to the terms and limitations of the contractual agreement as well as seasonal conditions that may affect the detection and prevalence of biological diversity during the time of observation.

The observations described in this report were made on the dates referenced and under the conditions stated therein. Conditions observed and reported by CAS are based upon the visual inspections of surface conditions at the site during the specific date and time of observation. Such conditions are subject to change due to various environmental and circumstantial factors beyond the control of CAS. There may be variations between the results of this survey(s) and other past or future surveys due to these inherent environmental factors.

## Chapter 7

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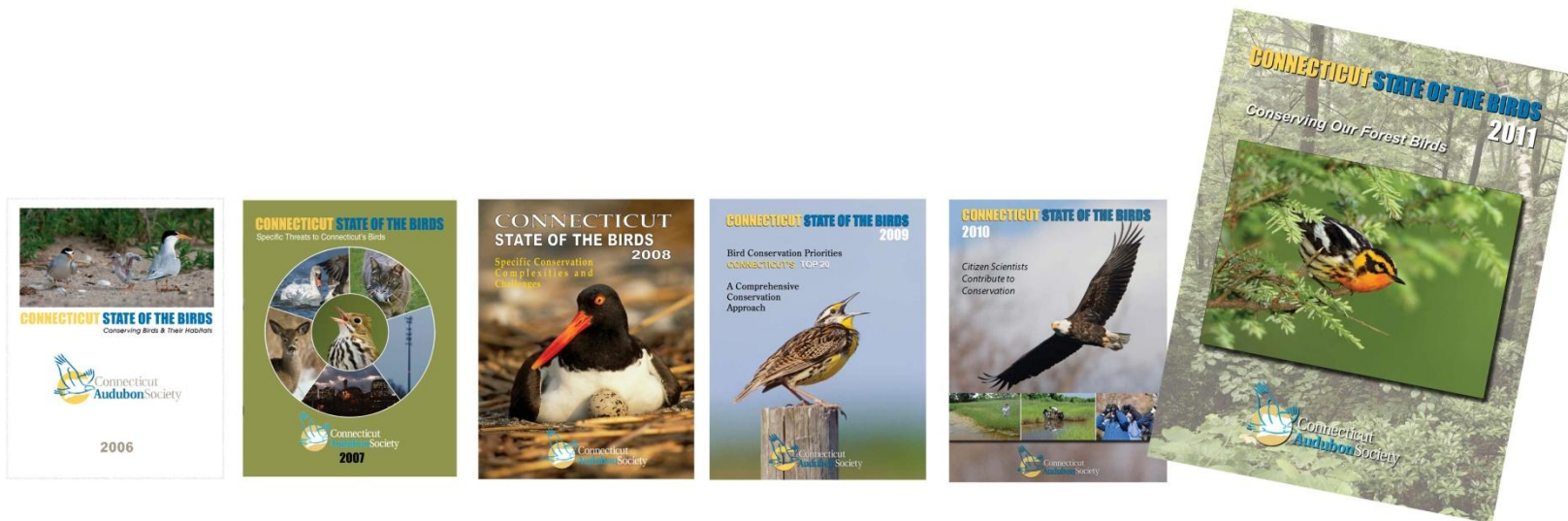
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<http://soildatamart.nrcs.usda.gov/manuscripts/CT600/0/connecticut.pdf>

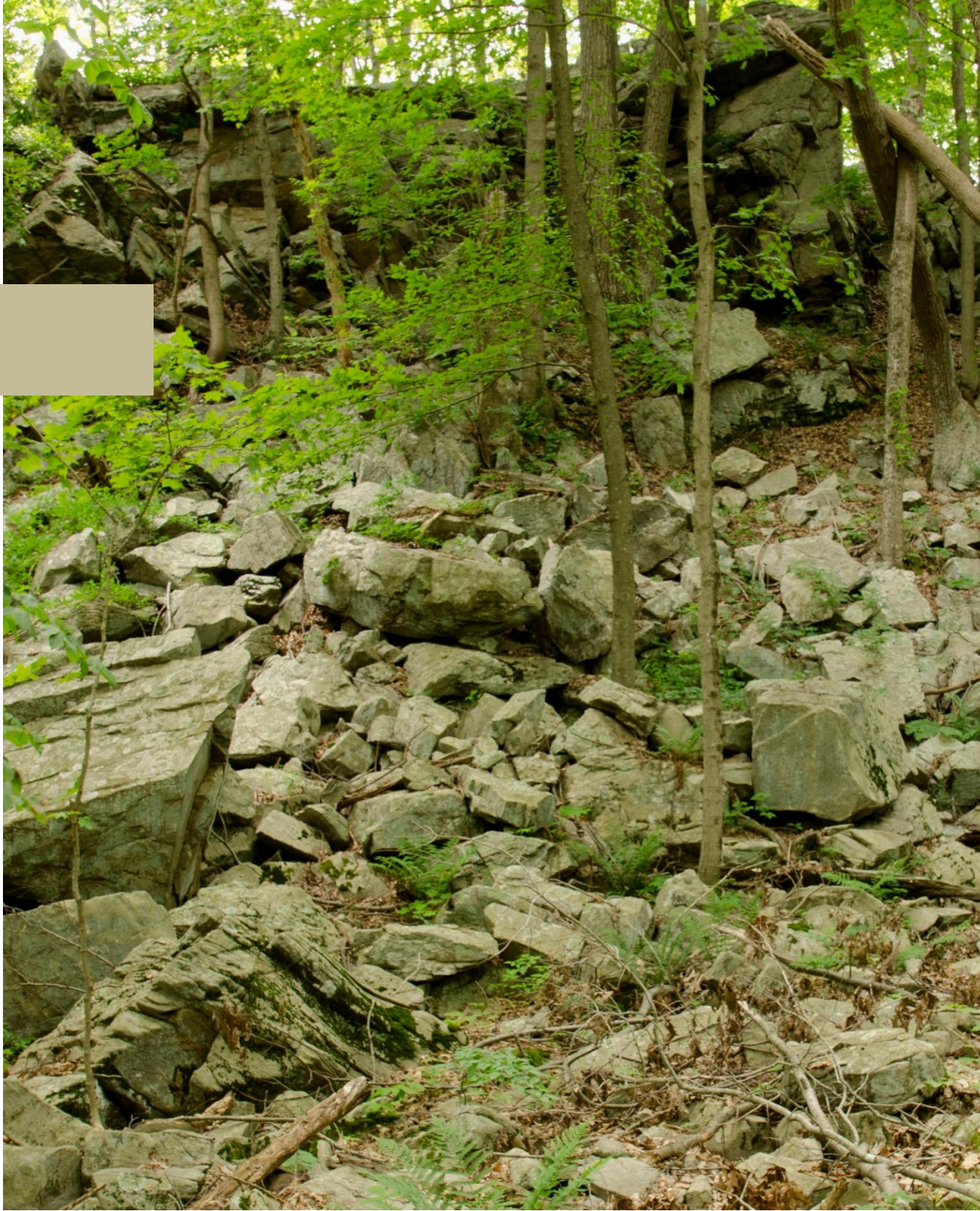
Connecticut Audubon Society's annual Connecticut State of the Birds Reports (2006-present) describe Connecticut's environmental challenges, the Biological Conservation Unit (BCU) concept, the use of Conservation Priority species as biological indicators and recent issues surrounding Connecticut's forests and the species that depend on them. All issues are available for download at:  
[www.ctaudubon.org/state-of-the-birds](http://www.ctaudubon.org/state-of-the-birds)





# Appendices

*Much of the terrain in Trout Brook Valley Preserve is too steep and boulder-strewn to have been of agricultural use in historic times. However, logging for production of charcoal was widespread in the region, the preserve's forested ridges, balds, and talus slopes were likely devoid of trees about a century ago.*





## Appendix I

# Trout Brook Valley Preserve Plant List

This list is comprised of plant species documented opportunistically during site visits carried out from December 2011–October 2012 and should be considered an overview of regularly encountered species rather than a complete inventory of the Trout Brook Valley Preserve flora.

Common Name	Scientific Name	Family	
Winged Sumac	<i>Rhus copallinum</i>	Anacardiaceae	
Staghorn Sumac	<i>Rhus typhina</i>	Anacardiaceae	
Poison Ivy	<i>Toxicodendron radicans</i>	Anacardiaceae	
Queen Anne's Lace	<i>Daucus carota</i>	Apiaceae	
Filed Milkweed	<i>Asclepias syriaca</i>	Apocynaceae	
Dogbane sp.	<i>Apocynum</i> sp.	Apocynaceae	
Jack-in-the-Pulpit	<i>Arisaema triphyllum</i>	Araceae	
Duckweed	<i>Lemna</i> sp.	Araceae	
Skunk-cabbage	<i>Symplocarpus foetidus</i>	Araceae	
Wild Sarsaparilla	<i>Aralia nudicaulis</i>	Araliaceae	
Dwarf Ginseng	<i>Panax trifolius</i>	Araliaceae	
Dandelion	<i>Taraxacum officinale</i>	Asteraceae	
Yarrow	<i>Achillea millefolium</i>	Asteraceae	
Common Ragweed	<i>Ambrosia artemisiifolia</i>	Asteraceae	
Pussy's Toes	<i>Antennaria neglecta</i>	Asteraceae	
Common Burdock	<i>Arctium minus</i>	Asteraceae	
Aster sp	<i>Aster</i> sp	Asteraceae	
Flat-topped White Aster	<i>Aster umbellatus</i>	Asteraceae	
Cichory	<i>Cichorium intybus</i>	Asteraceae	
Bull Thistle	<i>Cirsium vulgare</i>	Asteraceae	
Boneset	<i>Eupatorium perfoliatum</i>	Asteraceae	
Joe-pye-weed	<i>Eupatorium purpureum</i>	Asteraceae	
White Wood Aster	<i>Eurybia divaricatus</i>	Asteraceae	
Common Flat-topped Goldenrod	<i>Euthamia graminifolia</i>	Asteraceae	
Orange Hawkweed	<i>Hieracium aurantiacum</i>	Asteraceae	
Sweet Everlasting	<i>Pseudognaphalium obtusifolium</i>	Asteraceae	
Black-eyed Susan	<i>Rudbeckia hirta</i>	Asteraceae	
Golden Ragwort	<i>Senecio aureus</i>	Asteraceae	
Canada Goldenrod	<i>Solidago canadensis</i>	Asteraceae	
Awl Aster	<i>Symphyotrichum pilosum</i>	Asteraceae	
Spotted Jewelweed	<i>Impatiens capensis</i>	Balsaminaceae	
*Japanese Barberry	<i>Berberis thunbergii</i>	Berberidaceae	
Blue Cohosh	<i>Caulophyllum thalictroides</i>	Berberidaceae	
May-apple	<i>Podophyllum peltatum</i>	Berberidaceae	
Alder	<i>Alnus incana</i> ssp. <i>rugosa</i>	Betulaceae	
Yellow Birch	<i>Betula lutea</i>	Betulaceae	
Gray Birch	<i>Betula populifolia</i>	Betulaceae	

\*Indicates Invasive non-native species

Black Birch	<i>Betula lenta</i>	Betulaceae
American Hornbeam	<i>Carpinus caroliniana</i>	Betulaceae
Eastern Hophornbeam	<i>Ostrya virginiana</i>	Betulaceae
*Garlic Mustard	<i>Alliaria petiolata</i>	Brassicaceae
*Dame's Rocket	<i>Hesperis matronalis</i>	Brassicaceae
Hobblebush	<i>Viburnum lantanoides</i>	Caprifoliaceae
Northern Arrowwood	<i>Viburnum dentatum</i>	Caprifoliaceae
Maple Leaved Viburnum	<i>Viburnum acerifolium</i>	Caprifoliaceae
Mouse-ear Chickweed	<i>Cerastium fontanum</i>	Caryophyllaceae
Maiden Pink	<i>Dianthus deltoides</i>	Caryophyllaceae
Ragged-robin	<i>Lychnis flos-cuculi</i>	Caryophyllaceae
White Champion	<i>Silene latifolia</i>	Caryophyllaceae
Bladder Campion	<i>Silene vulgaris</i>	Caryophyllaceae
*Burning Bush	<i>Euonymus alatus</i>	Celastraceae
*Oriental Bittersweet	<i>Celastrus orbiculatus</i>	Celastraceae
Sweet Pepperbush	<i>Clethra alnifolia</i>	Clethraceae
St. John's-wort	<i>Hypericum perforatum</i>	Clusiaceae
Fringed Loosestrife	<i>Lysimachia ciliata</i>	Clusiaceae
Common Dayflower	<i>Commelina communis</i>	Commelinaceae
Bunchberry	<i>Cornus canadensis</i>	Cornaceae
Flowering Dogwood	<i>Cornus florida</i>	Cornaceae
Roundleaf Dogwood	<i>Cornus rugosa</i>	Cornaceae
Eastern Red Cedar	<i>Juniperus virginiana</i>	Cupressaceae
Hedge False Bindweed	<i>Calystegia sepium</i>	Convolvulaceae
Silky Dogwood	<i>Cornus ammomum</i>	Cornaceae
Pennsylvania Sedge	<i>Carex pensylvanica</i>	Cyperaceae
tussock-forming sedge sp.	<i>Carex c.f. stricta</i>	Cyperaceae
Sedge sp.	<i>Carex sp. 1</i>	Cyperaceae
Sedge sp.	<i>Carex sp. 2</i>	Cyperaceae
Sedge sp.	<i>Carex sp. 3</i>	Cyperaceae
Umbrella Sedge sp.	<i>Cyperus sp.</i>	Cyperaceae
spikerush sp.	<i>Eleocharis sp.</i>	Cyperaceae
bullrush sp.	<i>Scirpus c.f. cyperinus.</i>	Cyperaceae
Christmas Fern	<i>Polystichum acrosticoides</i>	Dryopteridaceae
Sensitive Fern	<i>Onoclea sensibilis</i>	Dryopteridaceae
*Autumn Olive	<i>Eleagnus umbellatus</i>	Eleagnaceae
Field Horsetail	<i>Equisetum arvense</i>	Equisetaceae
Mountain Laurel	<i>Kalmia latifolia</i>	Ericaceae
Round-leaf Pyrola	<i>Pyrola americana</i>	Ericaceae
Black Huckleberry	<i>Gaylussacia baccata</i>	Ericaceae
Highbush Blueberry	<i>Vaccinium corymbosum</i>	Ericaceae
Lowbush Blueberry	<i>Vaccinium angustifolia</i>	Ericaceae
Spotted Wintergreen	<i>Chimaphila maculata</i>	Ericaceae
Hog Peanut	<i>Amphicarpa bracteata</i>	Fabaceae
Showy Tick-trefoil	<i>Desmodium canadense</i>	Fabaceae
Low Hop Clover	<i>Trifolium campestre</i>	Fabaceae
Red Clover	<i>Trifolium pratense</i>	Fabaceae
White Clover	<i>Trifolium repens</i>	Fabaceae
Round-headed Bush-Clover	<i>Lespedeza capitata</i>	Fabaceae
*Wisteria	<i>Wisteria sp.</i>	Fabaceae

American Beech	<i>Fagus grandifolia</i>	Fagaceae
Black Oak	<i>Quercus velutina</i>	Fagaceae
Chestnut Oak	<i>Quercus (prinus) montana</i>	Fagaceae
Red Oak	<i>Quercus rubrum</i>	Fagaceae
Scarlet Oak	<i>Quercus coccinea</i>	Fagaceae (Reported by others) <sup>1</sup>
White Oak	<i>Quercus alba</i>	Fagaceae
Dutchman's Breeches	<i>Dicentra cucullaria</i>	Fumariaceae
Wild Geranium	<i>Geranium maculatum</i>	Geraniaceae
Witchhazel	<i>Hamamelis virginiana</i>	Hamamelidaceae
Yellow Iris	<i>Iris pseudacoris</i>	Iridaceae
Blue Flag	<i>Iris versicolor</i>	Iridaceae
Blue-eyed Grass	<i>Sisyrinchium angustifolium</i>	Iridaceae
Shagbark Hickory	<i>Carya ovata</i>	Juglandaceae
Ground Ivy	<i>Glechoma hederacea</i>	Lamiaceae
Mountain-mint	<i>Pycnanthemum</i> sp.	Lamiaceae
Self-heal	<i>Prunella vulgaris</i>	Lamiaceae
Sassafras	<i>Sassafras albidum</i>	Lauraceae
Spicebush	<i>Lindera benzoin</i>	Lauraceae
Woodlily	<i>Clintonia borealis</i>	Liliaceae
Troutlily	<i>Erythronium americanum</i>	Liliaceae
Canada Lily	<i>Lilium canadense</i>	Liliaceae
Canadian Mayflower	<i>Maianthemum canadense</i>	Liliaceae
False Hellebore	<i>Veratrum viride</i>	Liliaceae
Twisted Stalk	<i>Streptopus amplexifolius</i>	Liliaceae
False Solomon's Seal	<i>Maianthemum racemosum</i>	Liliaceae
Smooth Solomon's Seal	<i>Polygonatum biflorum</i>	Liliaceae
Purple Trillium	<i>Trillium erectum</i>	Liliaceae
Sessile Bellwort	<i>Uvularia sessifolia</i>	Liliaceae
Clubmoss	<i>Lycopodium dendroideum</i>	Lycopodiaceae
Clubmoss	<i>Lycopodium</i> sp. 2	Lycopodiaceae
Tulip Poplar	<i>Liriodendron tulipifera</i>	Magnoliceae
Indian Pipe	<i>Monotropa uniflora</i>	Monotropaceae
Black Gum	<i>Nyssa sylvatica</i>	Nyssaceae
Pink Lady's Slipper	<i>Cypripedium acaule</i>	Orchidaceae
Helleborine Orchid	<i>Epipactis helleborine</i>	Orchidaceae
Downy Rattlesnake-Plantain	<i>Goodyera pubescens</i>	Orchidaceae
Ragged Fringed Orchid	<i>Platanthera lacera</i>	Orchidaceae
Beech-drops	<i>Epifagus virginiana</i>	Orobanchaceae
Cinnamon Fern	<i>Osmunda cinnamomea</i>	Osmundaceae
Royal Fern	<i>Osmunda regalis</i>	Osmundaceae
Common Wood-sorrel	<i>Oxalis acetosella</i>	Oxalidaceae
Yellow Wood-sorrel	<i>Oxalis stricta</i>	Oxalidaceae
Bloodroot	<i>Sanguinaria canadensis</i>	Papaveraceae
Pokeweed	<i>Phytolacca americana</i>	Phytolaccaceae
White Pine	<i>Pinus strobus</i>	Pinaceae
Eastern Hemlock	<i>Tsuga canadensis</i>	Pinaceae
Narrow-leaf Plantain	<i>Plantago lanceolata</i>	Plantaginaceae
American Plantain	<i>Plantago rugelii</i>	Plantaginaceae

<sup>1</sup> Benchmark Forest and Land Management, LLC



Sycamore	<i>Platanus occidentalis</i>	Platanaceae
*Common Reed	<i>Phragmites australis</i>	Poaceae
Deertongue Grass	<i>Dichanthelium clandestinum</i>	Poaceae
Reed-grass	<i>Cinna</i> sp.	Poaceae
Orchard Grass	<i>Dactylis glomerata</i>	Poaceae
Yellow Foxtail	<i>Setaria glauca</i>	Poaceae
Arrow-leaved Tearthumb	<i>Persicaria sagittata</i>	Polygonaceae
Halberd-leaved Tearthumb	<i>Persicaria arifolium</i>	Polygonaceae
Virginia Jumpseed	<i>Persecaria virginiana</i>	Polygonaceae
Fringed Bindweed	<i>Polygonum cilinode</i>	Polygonaceae
Smartweed	<i>Polygonum</i> sp.	Polygonaceae
Common Polypody	<i>Polypodium vulgare</i>	Polypodiaceae
Hay-scented Fern	<i>Dennstaetia punctilobula</i>	Polypodiaceae
Marginal Woodfern	<i>Dryopteris marginalis</i>	Polypodiaceae
New York Fern	<i>Thelypteris noveboracensis</i>	Polypodiaceae
Carolina Spring Beauty	<i>Claytonia caroliniana</i>	Portulacaceae
Starflower	<i>Trientalis borealis</i>	Primulaceae
Whorled Loosestrife	<i>Lysimachia quadrifolia</i>	Primulaceae
Maidenhair Fern	<i>Adiantum pedatum</i>	Pteridaceae
Hepatica	<i>Hepatica nobilis</i>	Ranunculaceae
Marsh Marigold	<i>Caltha palustris</i>	Ranunculaceae
Tall Anemone	<i>Ranunculus virginiana</i>	Ranunculaceae
Tall Meadow-rue	<i>Thalictrum pubescens</i>	Ranunculaceae
White Baneberry	<i>Actaea pachypoda</i>	Ranunculaceae
Black Cherry	<i>Prunus serotina</i>	Rosaceae
Canada Serviceberry	<i>Amelanchier Canadensis</i>	Rosaceae
Common Blackberry	<i>Rubus allegheniensis</i>	Rosaceae
Common Cinquefoil	<i>Potentilla simplex</i>	Rosaceae
Downy Cinquefoil	<i>Potentilla intermedia</i>	Rosaceae
Hardhack	<i>Spirea tomentosa</i>	Rosaceae
Meadowsweet	<i>Spirea latifolia</i>	Rosaceae
*Multiflora Rose	<i>Rosa multiflora</i>	Rosaceae
Wineberry	<i>Rhus phoenicolasius</i>	Rosaceae
Woodland Strawberry	<i>Fragaria vesca</i>	Rosaceae
Rough Bedstraw	<i>Galium asprellum</i>	Rubiaceae
Bluets	<i>Houstonia caerulea</i>	Rubiaceae
Partridge-berry	<i>Mitchella repens</i>	Rubiaceae
White Poplar	<i>Populus alba</i>	Salicaceae
Red Maple	<i>Acer rubrum</i>	Sapindaceae
Sugar Maple	<i>Acer saccharum</i>	Sapindaceae
Butter-and-eggs	<i>Linaria vulgaris</i>	Scrophulariaceae
Monkey Flower	<i>Mimulus ringens</i>	Scrophulariaceae
Common Mullein	<i>Verbascum thapsus</i>	Scrophulariaceae
Greenbrier	<i>Smilax rotundifolia</i>	Smilacaceae
Nightshade	<i>Solanum dulcamare</i>	Solanaceae
Marsh Fern	<i>Thelypteris palustris</i>	Thelypteridaceae
New York Fern	<i>Thelypteris noveboracensis</i>	Thelypteridaceae
Narrow-leaved Cat-tail	<i>Typha angustifolia</i>	Typhaceae
Common Cat-tail	<i>Typha latifolia</i>	Typhaceae
Stinging Nettle	<i>Urtica dioica</i>	Urticaceae
False Nettle	<i>Boehmeria cylindrica</i>	Urticaceae

Blue Vervain	<i>Verbena hastata</i>	Verbenaceae
American Dog Violet	<i>Viola conspersa</i>	Violaceae
Sweet White Violet	<i>Viola mackloskeyi</i>	Violaceae
Yellow Violet	<i>Viola pubescens</i>	Violaceae
Great Spurred Violet	<i>Viola selkirkii</i>	Violaceae
*Porcelainberry	<i>Ampelopsis brevipedunculata</i>	Vitaceae
Virginia Creeper	<i>Parthenocissus quinquefolia</i>	Vitaceae
Summer grape	<i>Vitis aestivalis</i>	Vitaceae
Wild grape	<i>Vitis vinifera sylvestris</i>	Vitaceae

## Appendix II

# Trout Brook Valley Preserve Bird List

The following list represents an overview of the bird species observed in Trout Brook Valley Preserve during different times of the year. The protected status of species included in the Connecticut Endangered and Threatened Species Acts is included in the CT-ESA column ('E' = Endangered, 'T'=Threatened and 'SC'=Special Concern). Species of Greatest Conservation Need (GCN) as identified in the Connecticut Comprehensive Wildlife Conservation Strategy (CWCS) are included in that column ('MI'=Most Important, 'VI'=Very Important and 'I'=Important). The breeding status of possible, probable and confirmed breeders occurring in Trout Brook Valley Preserve is indicated in the BBS column ('C' = Confirmed, 'Pr' = Probable and 'Po' = Possible).

	CT-ESA	CWCS	BBS	January	February	March	April	May	June	July	August	September	October	November	December
Canada Goose				X	-	-	X	X	-	-	X	-	-	-	-
Mute Swan				-	-	-	-	-	-	-	-	-	-	-	-
Snow Goose				-	-	-	-	-	-	-	-	-	-	-	-
Wood Duck			Po	-	-	-	X	X	-	-	-	-	-	-	-
Mallard				-	-	X	-	-	X	-	-	-	-	-	-
Common Merganser		I		-	-	-	-	-	-	-	-	-	-	-	-
Wild Turkey			Pr	-	-	-	X	-	X	X	X	-	X	-	-
Common Loon	SC	VI		-	-	-	-	-	-	-	-	-	-	X	-
Double-crested Cormorant				-	-	-	-	X	-	-	-	X	X	-	-
Great Blue Heron		I		-	-	-	X	-	-	-	-	-	-	-	-
Great Egret	T	MI		-	-	-	-	X	-	-	-	-	-	-	-
Black Vulture				-	-	X	-	-	-	-	-	X	X	X	-
Turkey Vulture			Po	X	-	X	X	X	X	X	X	X	X	X	X
Osprey		I		-	-	-	-	X	-	-	-	X	X	X	X
Mississippi Kite				-	-	-	-	-	-	-	-	-	-	-	-
Bald Eagle	T	VI		-	-	-	-	-	-	-	-	X	X	X	X
Golden Eagle				-	-	-	-	-	-	-	-	X	X	X	-
Northern Harrier	E	MI		-	-	-	-	-	-	-	X	X	X	X	X
Sharp-shinned Hawk	E	VI		-	-	X	-	-	-	-	-	X	X	X	X
Cooper's Hawk		I	Pr	-	-	-	-	X	-	-	-	X	X	X	X
Northern Goshawk		I		-	-	-	-	-	-	-	-	-	X	X	X
Red-shouldered Hawk		I	Pr	-	-	X	X	-	X	X	-	X	X	X	X
Broad-winged Hawk	SC	I	Pr	-	-	-	X	X	-	X	-	X	X	X	-
Red-tailed Hawk			Pr	-	X	X	X	X	X	X	X	X	X	X	X
Rough-legged Hawk				-	-	-	-	-	-	-	-	-	X	X	-
American Kestrel	T	VI		-	-	-	X	-	-	-	-	X	X	X	X
Merlin				-	-	-	-	-	-	-	-	X	X	X	X
Peregrine Falcon	T	VI		-	-	-	-	-	-	-	-	X	-	X	X
Killdeer				-	X	X	-	-	-	-	-	-	-	X	-
Upland Sandpiper	E	MI		-	-	-	-	-	-	-	-	-	-	-	-
Wilson's Snipe				-	-	X	-	-	-	-	-	-	-	X	-
American Woodcock		VI		-	-	-	-	-	-	-	-	-	-	X	-
Ring-billed Gull				-	-	X	-	-	-	-	-	-	-	-	-
Herring Gull				-	-	-	-	-	-	-	-	X	-	-	-
Yellow-billed Cuckoo		VI	Pr	-	-	-	-	-	-	X	-	-	-	-	-
Black-billed Cuckoo		VI	Po	-	-	-	-	X	X	-	-	-	-	-	-
Mourning Dove			Pr	X	-	X	X	X	X	X	X	-	X	X	-
Barred Owl		I	Pr	-	X	-	-	-	X	X	X	-	-	-	-



	CT-ESA	CWCS	BBS	January	February	March	April	May	June	July	August	September	October	November	December
Eastern Screech Owl		I													
Great Horned Owl		I													
Northern Saw-whet Owl	SC	VI													
Common Nighthawk	E	MI										X	X		
Chimney Swift		VI	Pr					X	X	X	X				
Ruby-throated Hummingbird		I	Po					X	X	X	X	X	X		
Belted Kingfisher		I				X	X								
Red-headed Woodpecker	E	MI													
Red-bellied Woodpecker			Pr	X	X	X	X	X	X	X	X	X	X	X	X
Yellow-bellied Sapsucker						X	X						X	X	
Downy Woodpecker			C		X	X	X	X	X	X	X	X	X	X	
Hairy Woodpecker			C	X	X	X	X	X	X	X	X	X	X	X	
Northern Flicker		I	Po			X	X	X	X	X	X	X	X	X	X
Pileated Woodpecker		I	Po		X	X	X	X	X	X	X	X	X	X	
Eastern Wood-Pewee		I	Pr					X	X	X	X	X	X	X	
Acadian Flycatcher		VI	Pr					X	X	X	X	X	X	X	
Willow Flycatcher		I						X	X	X	X	X	X	X	
Alder Flycatcher	SC	VI						X	X	X	X	X	X	X	
Least Flycatcher		VI						X	X	X	X	X	X	X	
Eastern Phoebe			C		X	X	X	X	X	X	X	X	X	X	
Great Crested Flycatcher		VI	Pr				X	X	X	X	X	X	X	X	
Eastern Kingbird		I	Po					X	X	X	X	X	X	X	
Scissor-tailed Flycatcher									X	X	X	X	X	X	
Yellow-throated Vireo		I	Pr					X	X	X	X	X	X	X	
Blue-headed Vireo		VI					X	X	X	X	X	X	X	X	
Warbling Vireo		I	Po					X	X	X	X	X	X	X	
Red-eyed Vireo			Pr					X	X	X	X	X	X	X	
Blue Jay			Pr		X	X	X	X	X	X	X	X	X	X	
American Crow			Po	X	X	X	X	X	X	X	X	X	X	X	
Fish Crow								X	X	X	X	X	X	X	
Common Raven		VI	C					X	X	X	X	X	X	X	X
Horned Lark	E	MI												X	
Northern Rough-winged Swallow		I	Pr				X	X	X	X	X	X	X	X	
Tree Swallow			C			X	X	X	X	X	X	X	X	X	
Barn Swallow			Pr				X	X	X	X	X	X	X	X	
Cliff Swallow		I													
Black-capped Chickadee			Pr	X	X	X	X	X	X	X	X	X	X	X	
Tufted Titmouse			C		X	X	X	X	X	X	X	X	X	X	
Red-breasted Nuthatch		I											X	X	
White-breasted Nuthatch			Pr	X	X	X	X	X	X	X	X	X	X	X	
Brown Creeper		I					X	X	X	X	X	X	X	X	
Carolina Wren								X	X	X	X	X	X	X	
House Wren			Pr					X	X	X	X	X	X	X	
Winter Wren		I												X	
Blue-gray Gnatcatcher		I	C				X	X	X	X	X	X	X	X	
Golden-crowned Kinglet		VI				X	X	X	X	X	X	X	X	X	
Ruby-crowned Kinglet								X	X	X	X	X	X	X	
Eastern Bluebird			C		X	X	X	X	X	X	X	X	X	X	
Veery		I	Pr					X	X	X	X	X	X	X	
Swainson's Thrush		I						X	X	X	X	X	X	X	
Hermit Thrush		VI					X	X	X	X	X	X	X	X	
Wood Thrush		VI	C					X	X	X	X	X	X	X	

	CT-ESA	CWCS	BBS	January	February	March	April	May	June	July	August	September	October	November	December
American Robin			C	-	-	X	X	X	X	X	X	X	X	X	X
Gray Catbird		I	C	-	-	-	-	X	X	X	X	X	X	X	X
Northern Mockingbird				-	-	X	-	X	X	X	X	X	X	X	X
Brown Thrasher	SC	VI		-	-	-	X	-	-	-	-	-	-	-	-
European Starling			Pr	-	-	X	X	-	X	X	X	-	X	X	X
American Pipit				-	-	-	-	-	-	-	-	-	X	X	X
Cedar Waxwing			Pr	-	-	-	-	X	X	X	X	X	X	X	X
Snow Bunting				-	-	-	-	-	-	-	-	-	-	X	-
Ovenbird		I	C	-	-	-	-	X	X	X	X	-	X	X	X
Worm-eating Warbler		VI	Pr	-	-	-	-	X	X	X	X	-	X	X	X
Louisiana Waterthrush		I	Pr	-	-	-	X	X	X	X	X	-	X	X	X
Northern Waterthrush		I		-	-	-	-	X	-	-	-	-	-	-	-
Blue-winged Warbler		VI	Pr	-	-	-	-	X	X	X	X	-	X	-	X
Black-and-white Warbler		VI	Pr	-	-	-	X	X	X	X	X	-	X	X	-
Orange-crowned Warbler				-	-	-	-	-	-	-	-	-	X	-	-
Nashville Warbler				-	-	-	-	X	-	-	-	-	-	X	X
Tennessee Warbler				-	-	-	-	-	X	-	-	-	-	-	-
Common Yellowthroat			C	-	-	-	-	X	X	X	X	X	X	X	X
American Redstart		I	Pr	-	-	-	-	X	X	X	X	X	-	X	-
Cerulean Warbler		VI		-	-	-	-	X	X	-	-	-	-	-	-
Northern Parula	SC	I		-	-	-	-	X	X	-	-	-	-	-	-
Magnolia Warbler		I		-	-	-	-	X	X	-	-	-	-	-	-
Blackburnian Warbler		I		-	-	-	-	X	-	-	-	-	-	-	-
Bay-breasted Warbler		I		-	-	-	-	-	X	-	-	-	-	-	-
Yellow Warbler			Pr	-	-	-	-	X	X	X	X	-	X	X	X
Chestnut-sided Warbler		VI	Pr	-	-	-	-	X	X	-	X	-	-	-	-
Blackpoll Warbler				-	-	-	-	X	X	-	-	-	-	X	-
Black-throated Blue Warbler		VI		-	-	-	-	X	X	-	-	-	-	-	-
Palm Warbler				-	-	-	X	-	-	-	-	-	X	X	X
Pine Warbler			Pr	-	-	-	X	X	X	X	-	X	X	-	-
Yellow-rumped Warbler		I		-	-	-	X	X	X	X	-	-	-	X	X
Prairie Warbler		VI		-	-	-	-	X	X	-	-	-	-	X	X
Black-throated Green Warbler		I		-	-	-	-	X	X	-	-	-	-	-	-
Canada Warbler		VI		-	-	-	-	X	X	X	-	-	-	-	-
Hooded Warbler		I	Po	-	-	-	-	-	X	-	-	-	-	-	-
Wilson's Warbler				-	-	-	-	X	-	-	-	-	-	-	-
Eastern Towhee		VI	Pr	-	-	-	X	X	X	X	-	-	X	X	X
American Tree Sparrow				-	-	-	-	-	-	-	-	-	-	-	-
Chipping Sparrow			C	-	-	-	X	X	X	X	X	X	X	X	X
Clay-colored Sparrow				-	-	-	-	-	-	-	-	-	X	X	X
Field Sparrow		VI	Pr	-	-	X	-	X	X	X	-	X	X	X	-
Vesper Sparrow	E	MI		-	-	-	-	-	-	-	-	-	X	X	X
Savannah Sparrow	SC	VI		-	-	X	-	X	-	-	-	X	-	X	X
Grasshopper Sparrow	E	MI		-	-	-	-	-	-	-	-	-	X	X	X
Song Sparrow			C	-	X	X	X	X	X	X	X	X	X	X	X
Lincoln's Sparrow				-	-	-	-	-	-	-	-	-	X	X	X
Swamp Sparrow				-	-	-	X	X	X	X	-	-	X	X	X
White-throated Sparrow				-	X	X	-	X	X	X	-	-	X	X	X
White-crowned Sparrow				-	-	-	-	-	-	-	-	-	X	X	X
Dark-eyed Junco		I		X	-	X	-	-	-	-	-	-	X	X	X
Scarlet Tanager		I	Pr	-	-	-	I	X	X	X	X	X	X	X	X
Northern Cardinal			C	-	-	X	-	X	X	X	X	X	X	X	X

	CT-ESA	CWCS	BBS	January	February	March	April	May	June	July	August	September	October	November	December
Rose-breasted Grosbeak		VI	Pr	-	-	-	-	X	X	X	X	X	-	X	-
Blue Grosbeak				-	-	-	-	-	-	-	-	-	-	-	-
Indigo Bunting		VI	Pr	-	-	-	-	-	X	X	X	-	X	X	X
Dicksissel				-	-	-	-	-	-	-	-	-	-	-	-
Bobolink	SC	VI		-	-	-	-	-	-	-	-	-	X	X	X
Red-winged Blackbird			Pr	-	-	-	-	X	X	X	X	-	X	X	X
Eastern Meadowlark	SC	VI		-	-	-	-	-	-	-	-	-	-	X	X
Rusty Blackbird				-	-	-	-	-	-	-	-	-	-	-	-
Common Grackle			Pr	-	-	X	-	X	X	X	X	-	X	-	X
Brown-headed Cowbird			C	-	-	-	-	X	X	X	X	-	X	X	X
Orchard Oriole		I		-	-	-	-	-	-	-	-	-	-	-	-
Baltimore Oriole		I	Pr	-	-	-	-	-	X	X	X	X	X	X	X
Purple Finch		I		-	-	-	-	-	-	-	-	-	-	-	-
House Finch			Pr	-	-	X	-	X	X	X	X	-	X	-	X
Pine Siskin				-	-	-	-	-	-	-	-	-	-	-	-
American Goldfinch			Pr	-	-	X	-	X	X	X	X	-	X	X	X
House Sparrow				-	-	-	-	X	-	X	X	-	X	-	-

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**BENCHMARK FOREST & LAND MANAGEMENT, LLC**

41 ACORN AVE CLIFTON PARK, NY 12065

518-538-3373

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FOREST  
STEWARDSHIP PLAN

Property of

The Aspetuck Land Trust

Jump Hill, Trout Brook Valley & Crow Hill Preserves

1009 Stewardship Acres

2013-2022



# BENCHMARK FOREST & LAND MANAGEMENT, LLC

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## TABLE OF CONTENTS

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<b>TABLE OF CONTENTS .....</b>	<b>2</b>
<b>GENERAL INFORMATION.....</b>	<b>3</b>
<b>INTRODUCTION .....</b>	<b>4</b>
<b>RESOURCE CONCERNS.....</b>	<b>4</b>
<b>EXISTING PRACTICES.....</b>	<b>4</b>
<b>HISTORY.....</b>	<b>4</b>
<b>DESIRED FUTURE CONDITIONS .....</b>	<b>5</b>
<b>WATERS, WETLANDS &amp; THREATENED &amp; ENDANGERED SPECIES .....</b>	<b>5</b>
<b>SOILS DESCRIPTION.....</b>	<b>5</b>
<b>BOUNDARIES .....</b>	<b>5</b>
<b>FOREST STAND/MANAGEMENT UNIT TYPE DESCRIPTION .....</b>	<b>6</b>
<b>COVER TYPE 1: UPLAND OAK (481 ACRES) .....</b>	<b>6</b>
<b>COVER TYPE 2: LOWER SLOPE/DRAINAGE/WETLAND (367.1 ACRES) .....</b>	<b>8</b>
<b>COVER TYPE 3: HEMLOCK MIXED HARDWOOD (152.6 ACRES) .....</b>	<b>9</b>
<b>MANAGEMENT SUMMARY.....</b>	<b>10</b>
<b>NRCS FOREST MANAGEMENT ACTIVITIES.....</b>	<b>11</b>
<b>DEFINITIONS OF FORESTRY TERMS.....</b>	<b>12</b>
<b>APPENDIX A: LOCATION MAP.....</b>	<b>13</b>
<b>APPENDIX B: AIR PHOTO&amp;TOPOGRAPHIC STAND MAP .....</b>	<b>14</b>
<b>APPENDIX C: SOILS MAP &amp; DATA .....</b>	<b>15</b>
<b>APPENDIX D: CONSERVATION ACTIVITY MAP .....</b>	<b>16</b>
<b>APPENDIX E: CT DEEP NBBB LETTER .....</b>	<b>17</b>

# BENCHMARK FOREST & LAND MANAGEMENT, LLC

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## GENERAL INFORMATION

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Date Prepared: Field work in June & July 2012

Prepared By: BENCHMARK FOREST & LAND MANAGEMENT, LLC  
41 ACORN AVE

CLIFTON PARK, NY 12065  
(518) 538-3373

Forester: John J. O'Donnell, CF

SAF Certified Forester #3860

CT Forester #603

MA Forester #382

NRCS TSP #09-6266

Tree Farm Inspector #96619

Property Owner: Aspetuck Land Trust

Mailing Address: PO Box 444 Westport, CT 06881

Contact: David Brant-Executive Director (203) 331-1906 dbrant@aspetucklandtrust.org

E-mail: dbrant@aspetucklandtrust.org

Property Address: Black Rock Turnpike, Bradley Rd & Elm Dr, Easton, CT

Total Acreage: 1019

Signatures:

Preparer: \_\_\_\_\_ Date: \_\_\_\_\_

BENCHMARK FOREST & LAND MANAGEMENT, LLC

Property Owner(s): \_\_\_\_\_ Date: \_\_\_\_\_

# BENCHMARK FOREST & LAND MANAGEMENT, LLC

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## INTRODUCTION

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Upon request by the Aspetuck Land Trust, John J. O'Donnell, Principal Forester of Benchmark Forest & Land Management, LLC has prepared a ten-year (2013-2022) NRCS Forest Stewardship Plan for the property in Easton, CT. An inventory of this property was conducted in June & July 2012 in order to determine how to best implement the natural resource stewardship objectives of the landowner.

The primary objective of this forest management plan regarding this property is to improve and protect wildlife habitat through:

- 1) Active management that includes the manipulation of vegetation, cover and food source for the benefit of wildlife.
- 2) Control of Non Native-Invasive Plants (NNIP).
- 3) Minimal management that allows the forest to progress to an old growth state.

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## RESOURCE CONCERNS

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Resource concerns as identified by the landowner and forester are:

- 1) Lack of low ground cover, browse and wildlife habitat (woods are generally open)
- 2) Lack of Young Forest and or early Successional Habitat
- 3) Presence and proliferation of Non Native Invasive Plants (NNIP)
- 4) Potential for insect infestation (emerald ash borer, asian long horned beetle, hemlock wooly adelgid)

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## EXISTING PRACTICES

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Most recently, ALT has invested in a wildlife study prepared by the Connecticut Audubon Society, has performed some invasive species control measures which includes vine cutting and uprooting of NNIP, as well as maintaining trails which includes moving and restricting their use to protect the trails and surrounding areas.

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## HISTORY

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The three properties were acquired over time with much of it being owned by the Aquarion Water Company. Under the AWC ownership the property was managed primarily for water quality with active forest management as a means to protect and maintain quality, generate revenue and improve wildlife habitat.

There has been no commercial timber harvesting on the property for approximately 25-30 years.

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## DESIRED FUTURE CONDITIONS

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The desired future conditions of this property are to maintain a healthy forest cover, increase habitat diversity, maintain recreational opportunities and reduce the presence of NNIP.

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## WATERS, WETLANDS & THREATENED & ENDANGERED SPECIES

---

There are many wetlands, vernal pools and water course both perennial and intermittent throughout the property. The water bodies determine the type of vegetation that grows within and immediately adjacent to them. For example, many of the water courses and rocky drainages provide ample water and nutrients for tulip poplar, white ash, sugar & red maple. The vernal pools and wetlands are where swamp white oak, pin oak and red maple are found

According to DEEP Natural Diversity Data Base (NDDB) as of June 2012, there are portions of the property that may have federally and State listed species and Significant Natural Communities. A request for further information was sent and a response has been received (see Appendix E). The information provided by the DEEP will reference precautions and management strategies related to the species and natural communities.

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## SOILS DESCRIPTION

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The description below is of a representation of the soils on the property. This is not a full accounting of the soils, but a description of the dominant types and their attributes.

The dominant soils on the property are:

- Canton-Charlton; Charlton-Chatfield type-50%
- Hollis-Chatfield Rock Outcrop-40%
- Ridgebury-Leicester-Whitman- 10%

Canton-Charlton-Chatfield types are upland, well drained soils, stony with varying slopes and topographical positions. These types of soils are best suited to growing upland-central hardwoods, especially oaks.

The Hollis-Chatfield type is ridge top soils on which chestnut and scarlet oak grow, as well as low bush blueberry.

Ridgebury soils are drainage and wetland soils which grow wetland vegetation as well as sugar maple, ash and tulip poplar.

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## BOUNDARIES

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During the forest inventory property boundaries were not easily detected. Since this is a large parcel as well as abutting another large forested parcel it would be wise to paint the property lines so that they are easily distinguishable when approaching from all directions.

Well marked property lines are most important for hunters who will mostly spend time wandering off the trail



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network to prevent trespass off the property. Furthermore, where the property abuts other lands such as residential properties and the golf course, well marked property lines will prevent or discourage trespass, dumping and taking of vegetation.

The most permanent method of marking property lines is by first blazing the line (scuffing line trees, corner trees and trees facing the property line with an axe or machete. This creates a permanent scar which will be visible for many years. Each blaze should then be marked with a durable paint.

It is recommended that a boundary color be selected that cannot be mistaken for trail markers. It is also recommended that the property lines be painted every 5 years

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## FOREST STAND/MANAGEMENT UNIT TYPE DESCRIPTION

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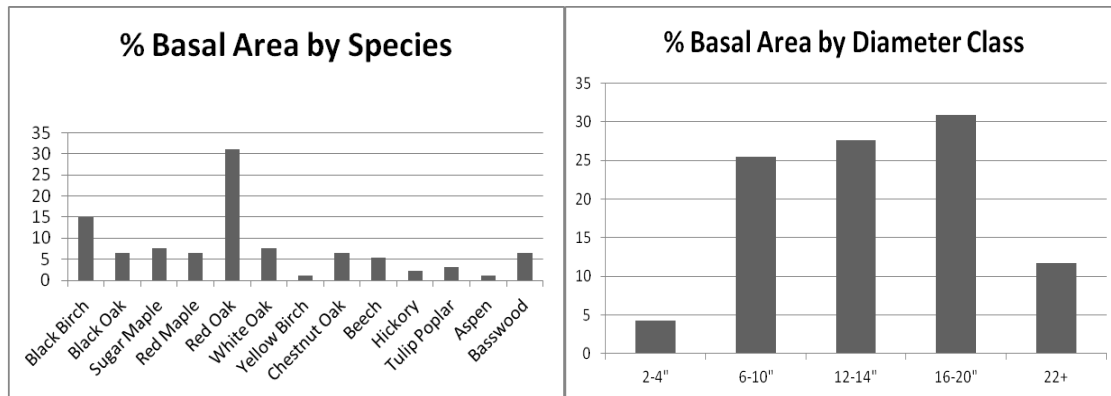
Three different forested cover types were identified. A total of 164 point sample plots were taken using a 10-factor cruise-all. Anywhere from 5-15 trees with diameters starting at 2" DBH class were sampled at each point with each tree species recorded including diameter. Furthermore, trees were recorded as Acceptable Growing Stock (AGS) or Unacceptable Growing Stock (UGS) as related to an individual tree health.

Forested cover types were delineated based upon the dominant tree species recorded at each plot and location factors such as topographic position, soil characteristics, drainage, past land-use history as well as cutting history.

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### COVER TYPE 1: UPLAND OAK (481 ACRES)

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### Description:

Cover Type 1 is an upland oak cover type accounting for 481 acres. Terrain is sloping to steep in some areas with well drained, to excessively well drained soil types that support mixed oak. Red oak is generally located mid and lower slopes with an increase of black oak, scarlet oak and chestnut oak as the terrain rises. Rock outcrops characterize the ridgelines which are dominated by chestnut oak and an understory of blueberry and mountain laurel.

26% of the sawtimber (DBH of 12" +) basal area is considered UGS while 72% of the sawtimber is AGS (trees that are of good sawtimber quality and or potential).

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2% additional basal area is occupied by snags, or standing dead trees suitable for wildlife requirements.

45% of the poletimber, (DBH of 6-10") is considered UGS while 55% is AGS.

This stand is well stocked, between the A & B-Line based on the USFS Stocking Guide for Upland Hardwoods (Oak/Hickory) in the Northeast.

## **Stand Technical Data:**

Trees/Ac: 185

Basal Area/Ac (Sq/Ft): 96

AGS BA/Ac: 63

UGS BA/Ac: 32

Snag BA/Ac: 1

## **Wildlife Management Recommendations:**

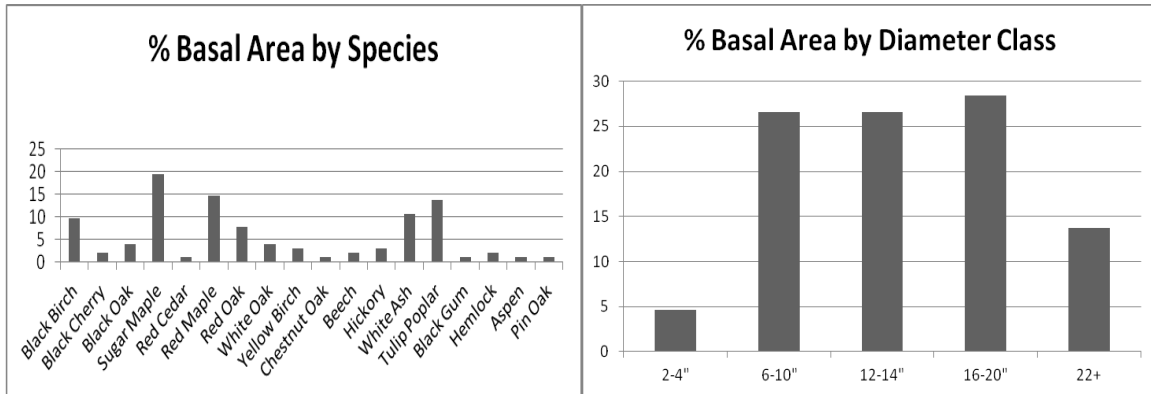
There are critical areas of this cover type that would benefit from active forest/wildlife management. The upland, ridge portions of Cover Type 1 are dominated by chestnut and scarlet oak. The under story contains blueberry and mountain laurel which could expand and produce more fruit if the over story was thinned.

It is recommended that these areas be "daylighted" by felling and girdling over story trees. Trees selected for removal should be the poorer growing trees, such as those showing signs of decline or of little wildlife value such as red maple. Trees to be retained are the dominant seed producers such as mixed oak, especially white oak, as well as fruit bearing trees such as service berry. Girdling of trees should take place well away from trails. The CAP map in Appendix D provides a general location of these ridge top sites. Each ridge type site on the CAP map is approximately 2 acres in area. This will certainly vary as each site is field checked prior to carrying out projects to evaluate any impacts with wetlands or vernal pools or the projects compatibility with recreation.

There are 5 sites (Appendix D) located during the inventory where aspen trees were sampled. Aspen is an important component of early successional habitats. When cut, aspen will root sucker. Aspen is shade intolerant so it will best respond to cutting when incorporated in a patch-cut of approximately 8-10 acres. It is recommended that these areas be created through felling of competing trees as well as cutting the aspen to stimulate root suckering. Clear-cuts should generally be created so that they are bell shaped with the large end facing the southerly direction.

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## COVER TYPE 2: LOWER SLOPE/DRAINAGE/WETLAND (367.1 ACRES)



### Description:

Cover Type 2 is a mixed hardwood cover type dominated by sugar and red maple, tulip poplar and white ash accounting for 481 acres. This cover type is mainly found within and along the drainages up to mid slope where it transitions into the upland oak cover type. Also included within this cover type are wetlands and vernal pools where red maple, black gum and pin oak dominate.

Understory vegetation includes winterberry, spice bush, skunk cabbage, false hellbore in and along wetlands and drainages. Viburnum species, witch hazel and blueberries can be found in the upland portions

31% of the sawtimber (DBH of 12" +) basal area is considered UGS while 67% of the sawtimber is AGS (trees that are of good sawtimber quality and or potential).

2% additional basal area is occupied by snags, or standing dead trees suitable for wildlife requirements.

35% of the poletimber, (DBH of 6-10") is considered UGS while 63% is AGS with 2% in snags.

This stand is well stocked, between the A & B-Line based on the USFS Hardwood Stocking Chart in the Northeast.

NNIP's are generally heaviest along roadside, property lines and areas with much side lighting (see Appendix D). However, there are clusters that have become established in the interior of the property, generally along water ways. Some of these clusters can be removed by mechanical means (pulling/uprooting) while in some cases chemical means would be most effective.

### Stand Technical Data:

Trees/Ac: 228

Basal Area/Ac (Sq/Ft): 105

AGS BA/Ac: 72

UGS BA/Ac: 34

Snag BA/Ac: 2

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## Wildlife Management Recommendations:

- Chemical and or mechanical control of NNIP prior to patch-cut, several years of chemical may be required
- Create a early successional/young forest cover type of approximately 10 acres
- NNIP control maintenance. Chemical spot treatments.
- NNIP satellite cluster control on interior/drainages

NNIP's are generally heaviest along roadside, property lines and areas with much side lighting (see Appendix D). However, there are clusters that have become established in the interior of the property, generally along water ways. Some of these clusters can be removed by mechanical means (pulling/uprooting) while in some cases chemical means would be most effective.

## Special Concerns:

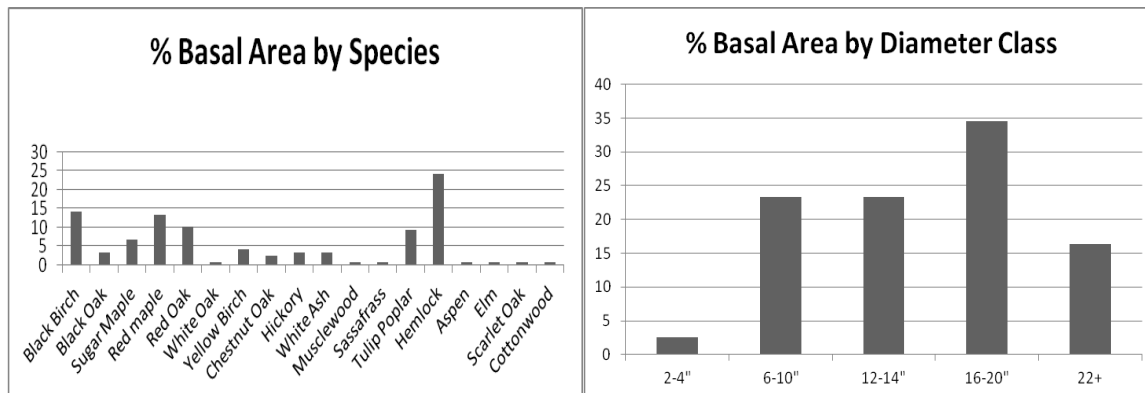
Prior to carrying out any operation related to the 10 acre patch-cut (invasive control or harvesting trees), special consideration is necessary to minimize effects of the operation related to Threatened and Endangered Species, soil conditions as well as to minimize recreational impacts.

Working closely with an Audubon biologist and a professional forester a checklist and prior inspection should be carried out which includes evaluation alternatives to invasive control, the logistics of tree removal and impacts of operation to recreational users.

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### COVER TYPE 3: HEMLOCK MIXED HARDWOOD (152.6 ACRES)

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## Description:

Cover Type 3 is a hemlock-mixed hardwood cover type with hardwood species dominated by birch, red maple and red oak on 152 acres. This cover type is located in one contiguous area where in the southwestern portion of the property. The terrain ranges from wetland and drainage to ridge top. Aspect is both east and west surrounding drainages

Understory vegetation includes spice bush, skunk cabbage, false hellbore in and along wetlands and drainages. Viburnum species, witch hazel and blueberries can be found in the upland portions and Christmas fern especially along the rocky slopes of the western portion of this cover type.



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28% of the sawtimber (DBH of 12" +) basal area is considered UGS while 70% of the sawtimber is AGS (trees that are of good sawtimber quality and or potential).

2% additional basal area is occupied by snags, or standing dead trees suitable for wildlife requirements.

58% of the poletimber, (DBH of 6-10") is considered UGS while 38% is AGS with 4% in snags.

This stand is well stocked, between the A & B-Line based on the USFS Hardwood Stocking Chart in the Northeast.

NNIP's are generally heaviest along roadside, property lines and areas with much side lighting (see Appendix D). However, there are clusters that have become established in the interior of the property, generally along water ways. Some of these clusters can be removed by mechanical means (pulling/uprooting) while in some cases chemical means would be most effective.

## Stand Technical Data:

Trees/Ac: 182

Basal Area/Ac (Sq/Ft): 115

AGS BA/Ac: 72

UGS BA/Ac: 40

Snag BA/Ac: 3

## Wildlife Management Recommendations:

- Scout for invasive clusters in and around wetlands and watercourses in the spring when native plants have not yet leafed out.
- Monitor hemlock for hemlock wooly adelgid and hemlock scale. Consider a conifer planting program to replace/compliment hemlock.

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## MANAGEMENT SUMMARY

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This forest management plan is drafted as a general guide for the property, assembling objectives and goals and sound recommendations into a broad, user friendly guide. This plan is subject to change in the event of insect, disease or weather related incidents which may alter the current state of the property and call for alternatives to be considered.

It is recommended that each project be further evaluated as to actual location, size and timing to minimize impacts to both wildlife, especially T&S species as well as recreational users. Each project should also be evaluated for its feasibility related to available financial and volunteer resources. An advantage of this property is that it has many recreational users which could be leveraged into creating a volunteer work force. A volunteer work force could carry out such projects as trail maintenance, mechanical invasive control, chainsaw use, and wildlife monitoring.

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## NRCS FOREST MANAGEMENT ACTIVITIES

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Year	Location	Acreage	Practice	Practice Code
2013	2A	25	Mechanical/Chemical control of invasives	645-upland wildlife habitat management
2014	2A	25	Chemical control of invasives	645-upland wildlife habitat management
2015	2A	25	Chemical control of invasives	645-upland wildlife habitat management
2016	2A	10	Create early successional/young forest	645-upland wildlife habitat management
2017	2A	25	Chemical control of invasives	645-upland wildlife habitat management
2018	2B & C	12 & 6	Mechanical/Chemical control of invasives	645-upland wildlife habitat management
2019	2B, C, D	12, 6 & 3	Chemical control of invasives	645-upland wildlife habitat management
2020	2B, C, D	12, 6 & 3	Chemical control of invasives	645-upland wildlife habitat management
2014	Aspen 1	10	Early successional forest creation	645-upland wildlife habitat management
2015	Aspen 2	10	Early successional forest creation	645-upland wildlife habitat management
2016	Aspen 3	10	Early successional forest creation	645-upland wildlife habitat management
2017	Aspen 4	10	Early successional forest creation	645-upland wildlife habitat management
2018	Aspen 5	10	Early successional forest creation	645-upland wildlife habitat management
2014	Ridge A-D	8	Daylight ridge top to stimulate blueberry crop	645-upland wildlife habitat management
2015	Ridge E-I	10	Daylight ridge top to stimulate blueberry crop	645-upland wildlife habitat management
2016	Ridge J-L	6	Daylight ridge top to stimulate blueberry crop	645-upland wildlife habitat management
2014	Red Cedar Stand	3	Release red cedar from competition	666-forest stand improvement
			Plant understory with red cedar	645-upland wildlife habitat management
2015	Mowed Meadow	9	Expand area, remove trees	645-upland wildlife habitat management

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## DEFINITIONS OF FORESTRY TERMS

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**Acceptable Growing Stock (AGS):** Trees considered acceptable, free of major defect, will increase in volume and value over time.

**Basal Area:** The area in square feet of the cross section of a tree at DBH

**Board foot:** Wood used for lumber that measures 1”x 12”x 12” (**MBF** = 1000 board feet)

**Canopy:** Where the leaves and upper branches in a tree are located

**CTT:** Crop Tree Thinning: Culturing individual trees with the greatest potential to produce specific benefits

**DBH:** Diameter at Breast Height: diameter of a tree at 4.5’ above the ground

**Girdling:** Creates a cut area around the circumference of the tree that blocks the flow of food

**Hardwood:** Broad-leaved trees that usually shed their leaves in the fall

**Mast:** Tree seeds that supply valuable wildlife nutrition; Hard: acorns, nuts; Soft: berries

**Overstory:** Upper canopy of treetops

**Pole or Poletimber:** Trees having a DBH of 6 to 11 inches

**Regeneration:** New young trees

**Release:** Remove competition such that the released tree has more sunlight and growing space

**Sapling:** Trees having a DBH of 1 to 5 inches

**Sawtimber or Sawlog:** Trees having a DBH 12 inches and greater

**Seedling:** Trees having a DBH less than 1 inch

**Silviculture:** The art, science, and practice of producing and tending a forest

**Stand:** Separate and distinct natural community

**Unacceptable Growing Stock (UGS):** Trees considered a high risk. Trees with rot and decay or are losing volume and value. Not expected to survive until the next cutting cycle

**TSI/FSI:** Pre-commercial thinning where trees that have little or no value are killed or removed

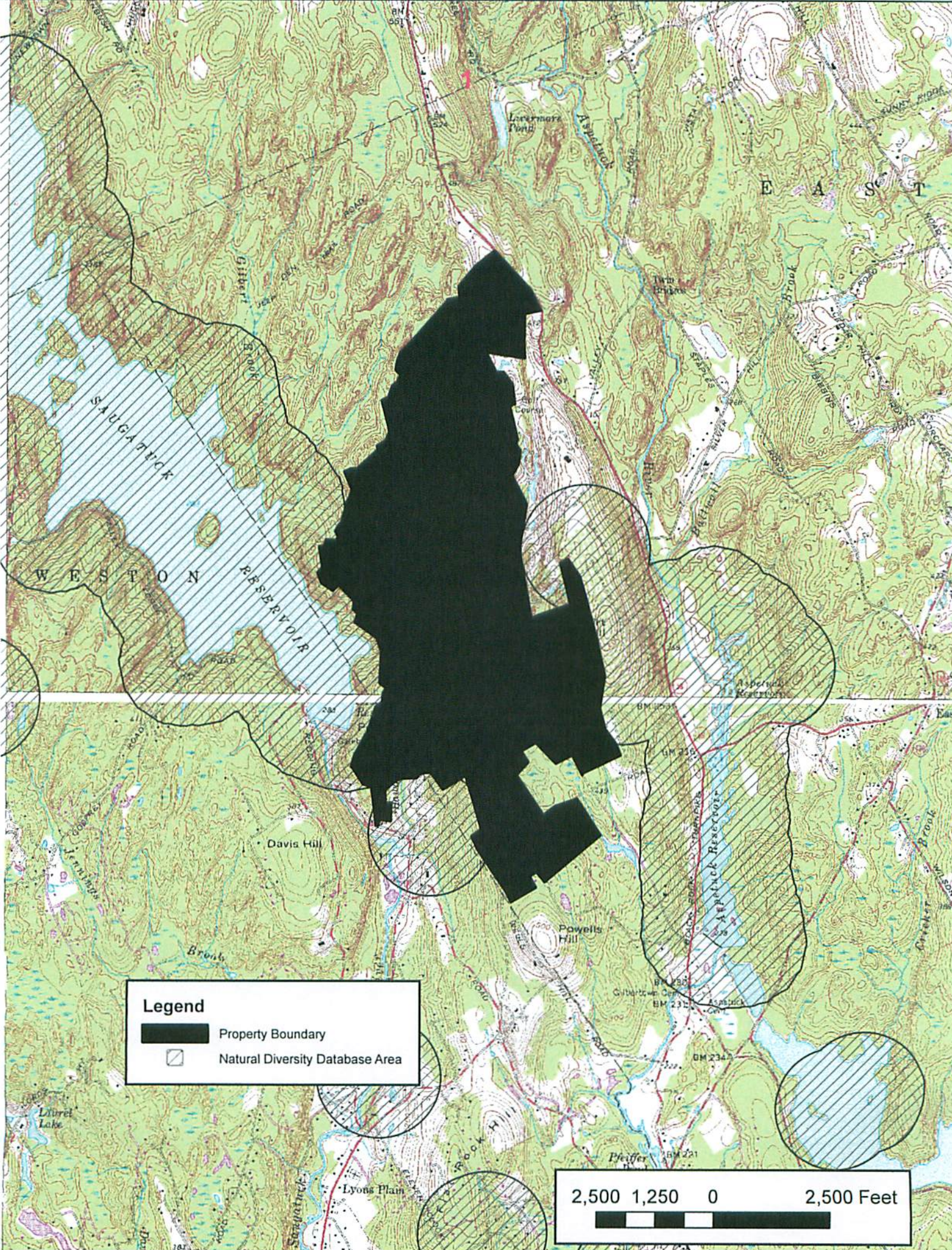
**Water Bar:** Ditches or logs placed at an angle to the slope to divert water from its downhill path

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**APPENDIX A: LOCATION MAP**

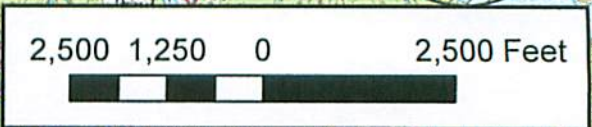
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**Legend**

-  Property Boundary
-  Natural Diversity Database Area

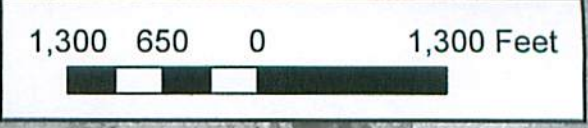




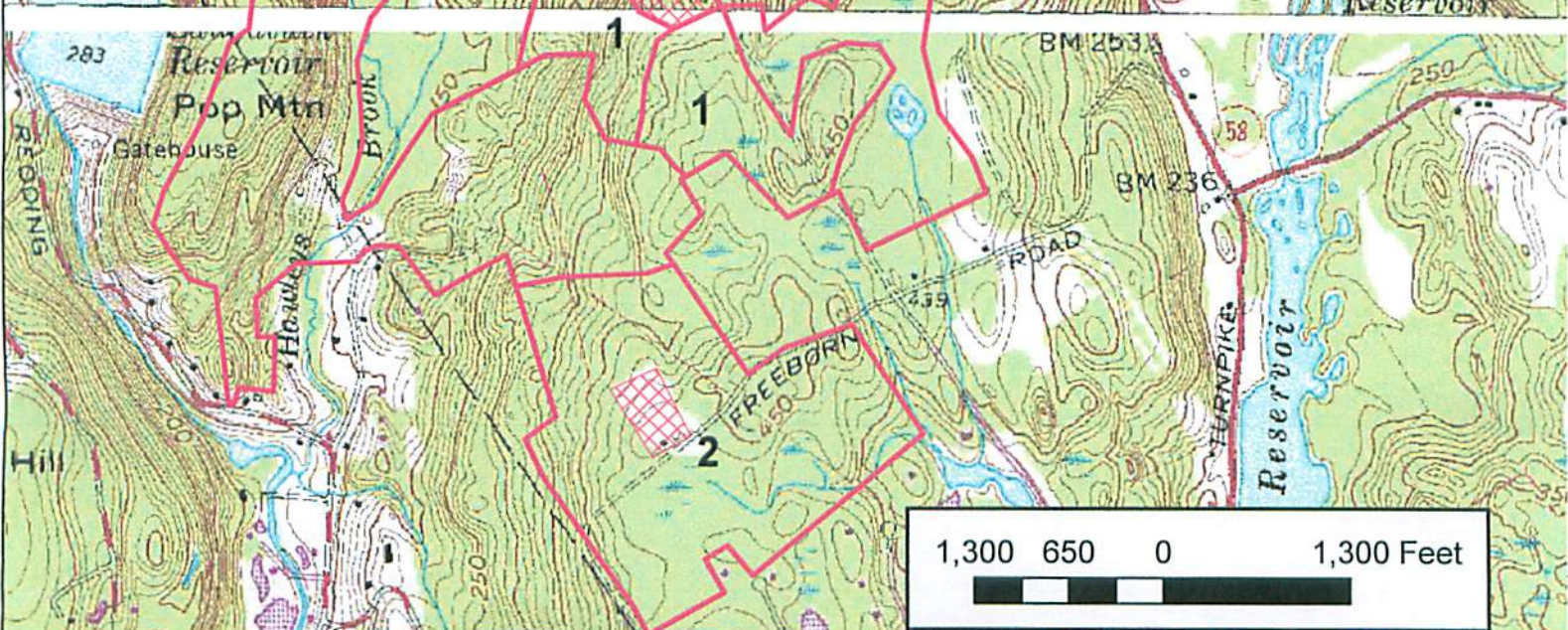
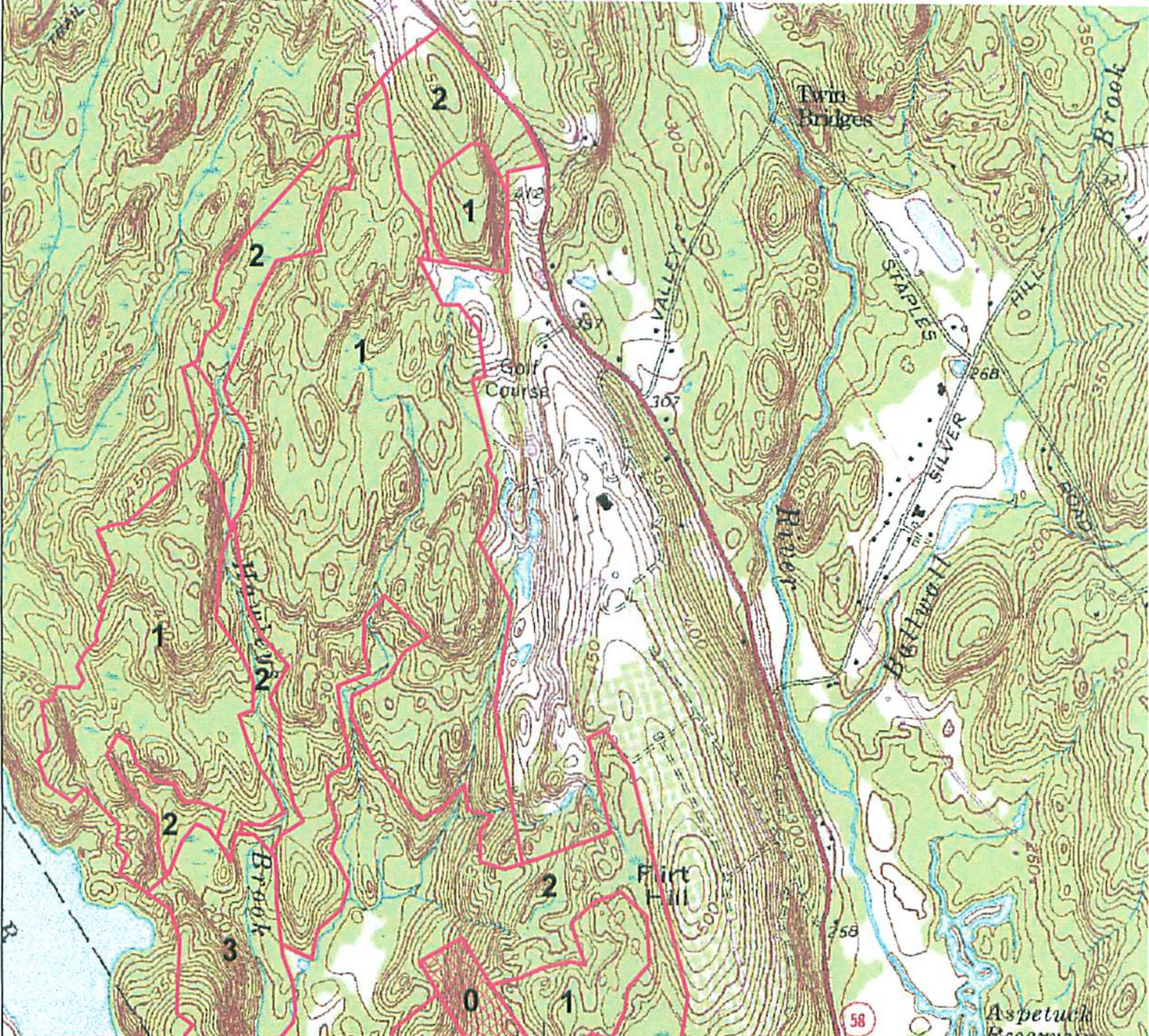
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**APPENDIX B: AIR PHOTO&TOPOGRAPHIC STAND MAP**

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# BENCHMARK FOREST & LAND MANAGEMENT, LLC

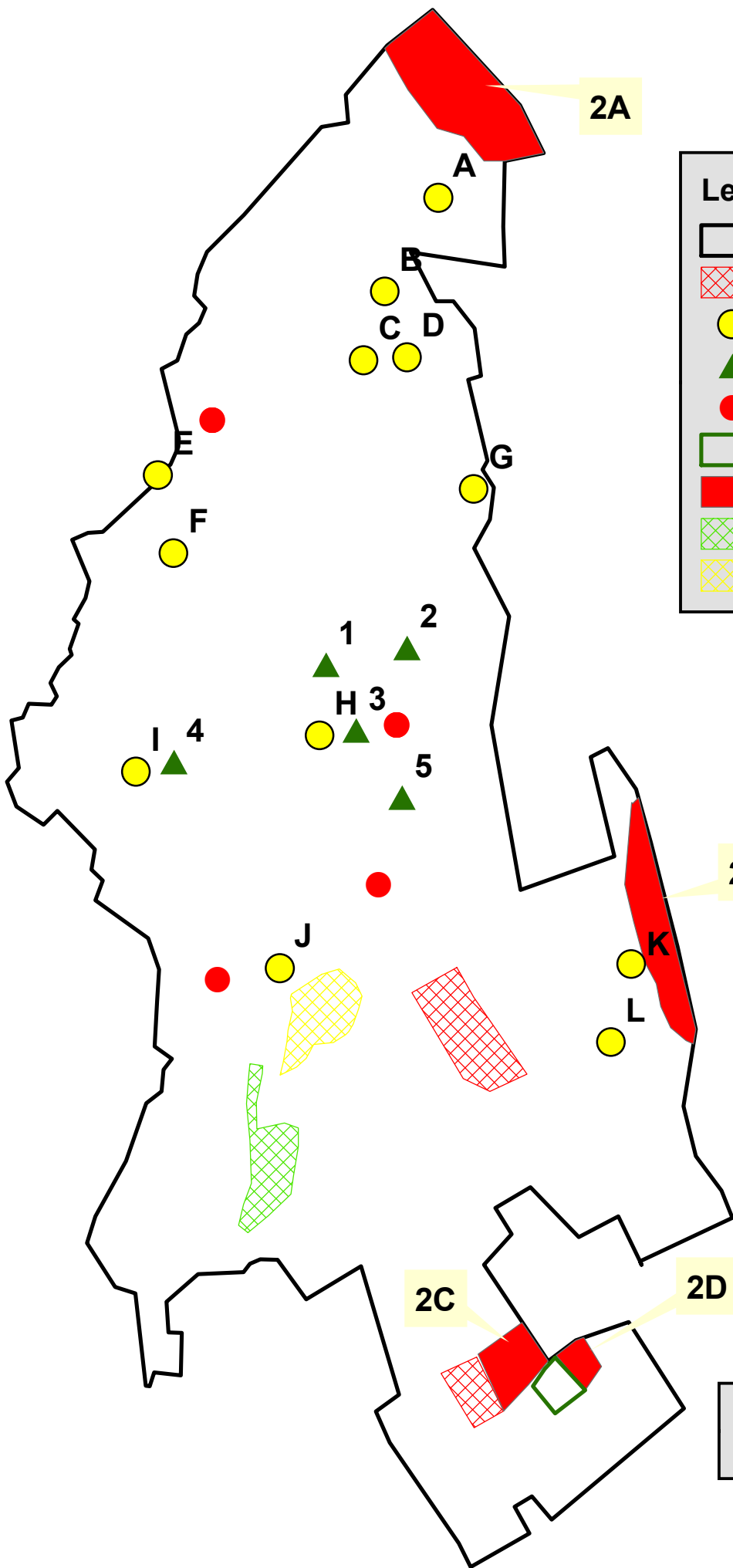
## APPENDIX C: SOILS MAP & DATA

2	Ridgebury fine sandy loam	1.6	0.2%
3	Ridgebury, Leicester, and Whitman soils, extremely stony	92.3	9.1%
4	Leicester fine sandy loam	3.0	0.3%
12	Raypol silt loam	17.0	1.7%
13	Walpole sandy loam	18.0	1.8%
17	Timakwa and Natchaug soils	26.1	2.6%
18	Catden and Freetown soils	0.2	0.0%
21A	Ninigret and Tisbury soils, 0 to 5 percent slopes	3.9	0.4%
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	30.4	3.0%
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	2.8	0.3%
46B	Woodbridge fine sandy loam, 2 to 8 percent slopes, very stony	9.9	1.0%
47C	Woodbridge fine sandy loam, 2 to 15 percent slopes, extremely stony	5.4	0.5%
51B	Sutton fine sandy loam, 2 to 8 percent slopes, very stony	9.5	0.9%
52C	Sutton fine sandy loam, 2 to 15 percent slopes, extremely stony	17.0	1.7%
60B	Canton and Charlton soils, 3 to 8 percent slopes	8.5	0.8%
60D	Canton and Charlton soils, 15 to 25 percent slopes	1.9	0.2%
61B	Canton and Charlton soils, 3 to 8 percent slopes, very stony	20.1	2.0%
61C	Canton and Charlton soils, 8 to 15 percent slopes, very stony	26.1	2.6%
62C	Canton and Charlton soils, 3 to 15 percent slopes, extremely stony	7.9	0.8%
62D	Canton and Charlton soils, 15 to 35 percent slopes, extremely stony	28.1	2.8%
73C	Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	80.9	8.0%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	107.9	10.7%
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	233.4	23.0%
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	167.1	16.5%
76E	Rock outcrop-Hollis complex, 3 to 45 percent slopes	63.6	6.3%
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	0.5	0.1%
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	4.2	0.4%
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	9.6	0.9%
86C	Paxton and Montauk fine sandy loams, 3 to 15 percent slopes, extremely stony	3.2	0.3%
86D	Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony	5.4	0.5%
306	Udorthents-Urban land complex	2.2	0.2%
308	Udorthents, smoothed	2.4	0.2%
W	Water	1.5	0.1%










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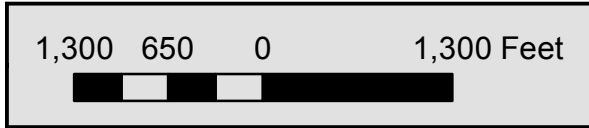
**APPENDIX D: CONSERVATION ACTIVITY MAP**

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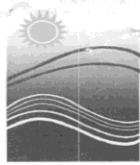


**Legend**

-  Property Boundary
-  Private In-Holding
-  Chestnut/Scarlet OakRidge Type
-  Aspen Cluster
-  Invasive Cluster
-  Red Cedar
-  Heavy Invasives
-  Open wet-Meadow
-  Mowed Field-Young Forest Cover



APPENDIX E: CT DEEP NBBB LETTER



Connecticut Department of  
ENERGY &  
ENVIRONMENTAL  
PROTECTION

July 30, 2012

Mr. David Brant  
Aspetuck Land Trust  
P.O. Box 444  
Westport, CT 06881

Project: Forest Management Plan and Invasive Species Control at for Aspetuck Land Trust Orchard Site/Trout Brook Valley Property in Easton, Connecticut

Request No.: 201205687

Dear Mr. Brant,

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map you provided for the forest management and invasive species control for the Aspetuck land Trust and Trout Brook Valley Property in Easton, Connecticut. According to our records there are State Threatened *Falco sparverius* (American kestrel) and Special Concern *Dolichonyx oryzivorus* (bobolink) from the Flirt Hill area and *Terrapene carolina carolina* (eastern box turtle) and State Threatened *Cordulegaster erronea* (tiger spiketail) from the Hawleys Brook area

Bobolinks nest in grasslands May through August and it is during this period that this species is most susceptible to disturbances in its habitat. Minimizing impacts to open fields, meadows and other grassy areas during this time period will likewise minimize impacts to this species.

American kestrels nest in late March and April in open areas like woodland edges, parks, and open field habitat. They are cavity nesters and seek out abandoned woodpecker or flicker holes to nest. They catch and eat mice, voles, shrews and insects. I recommend that work not be done near the nest during the nesting season (February - July) and that a sufficient buffer zone be left around the nest to minimize disturbance. This buffer should be determined after a nest is located. Forest practices that maintain high densities of nesting and roosting cavities in trees with a minimum diameter of 30.5 cm will benefit this species

Eastern box turtles require old field and deciduous forest habitats, which can include power lines and logged woodlands and orchards. They are often found near small streams and ponds, the adults are completely terrestrial but the young may be semi-aquatic. Box turtles hibernate on land by digging down in the soil from October to April. They have an extremely small home range and can usually be found in the same area year after year. This species is dormant from November 1 to April 1. It has been negatively impacted by the loss of suitable habitat.

The Tiger Spiketail dragonfly is associated with small cold springs, small seeps and streams in densely forested ravines. Activities that alter the physical or chemical nature of the aquatic habitat, cause siltation or any source of pollution will be detrimental. Forest management practices should include leaving buffers and trees in aquatic area of this property.

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