

Conservation & Management Plan

Randall's Farm – Easton, CT

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Chapter 1

Introduction: Randall's Farm

Fitzgerald and Halliday, Inc. has prepared a Conservation and Management Plan for the Aspetuck Land Trust's Randall's Farm Preserve, which is located at 675 Sport Hill Road in Easton, CT. This plan was written based upon a series of seasonal observations of the site's natural resource features including specific flora and fauna observations and interviews with people knowledgeable of the site's resources.

1.1 Site Location

Randall's Farm Preserve is located at 675 Sport Hill Road in Easton, Fairfield County, Connecticut. The property consists of approximately 35 acres. The Site location is depicted in **Figure 1-1**.

1.2 Purpose of the Conservation & Management Plan

The purpose of preparing this conservation and management plan (CMP) is to provide Aspetuck Land Trust (ALT) staff with a plan that they can use to achieve the desired conservation goals of enhancing the existing property with wildlife habitat while simultaneously fulfilling its mission of land stewardship for nature preservation and sound natural resource management. A complete overview and discussion of the major faunal groups observed or expected to occur on the property provides for a broad yet comprehensive assessment of potential conservation targets. Furthermore, data on other fauna and any discussion on any relevant flora will be added to this baseline assessment in order to document the current biological diversity and habitat functionality of the Site. This will provide the resources to develop achievable conservation goals.

In addition, this plan describes conservation strategies that can be applied to effectively protect these species and habitats based upon the regional ecological constraints to which the Site is subjected. Special attention is given to conservation priority species such as those protected species included in the Connecticut Endangered and Threatened Species Acts (CT-ESA) and those species of Greatest Conservation Need (GCN) as identified Connecticut's Wildlife Action Plan (CT DEEP 2015).

Steps to further enhance the habitat for native fauna and other wildlife while simultaneously preventing the proliferation of non-native invasive plant species are described, and specific trees and shrubs that could benefit bird life, from resident to migrant and breeding to wintering species, are described.

The purpose of this Conservation & Management Plan is to:


1. Provide a baseline inventory of the wildlife diversity of Randall's Farm
2. Identify priority species at the site that can guide habitat management and conservation actions
3. Identify management issues and opportunities, especially in regard to native fauna of conservation concern
4. Develop an adaptive management strategy that provides optimal protection and management of selected current and potential conservation priority species while simultaneously allowing the continuance of passive recreation on the property
5. Develop a series of success benchmarks that can be used to evaluate the effectiveness of the proposed management strategy

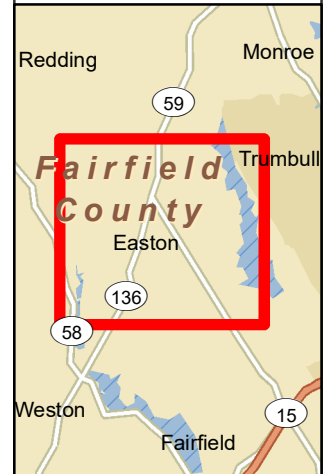
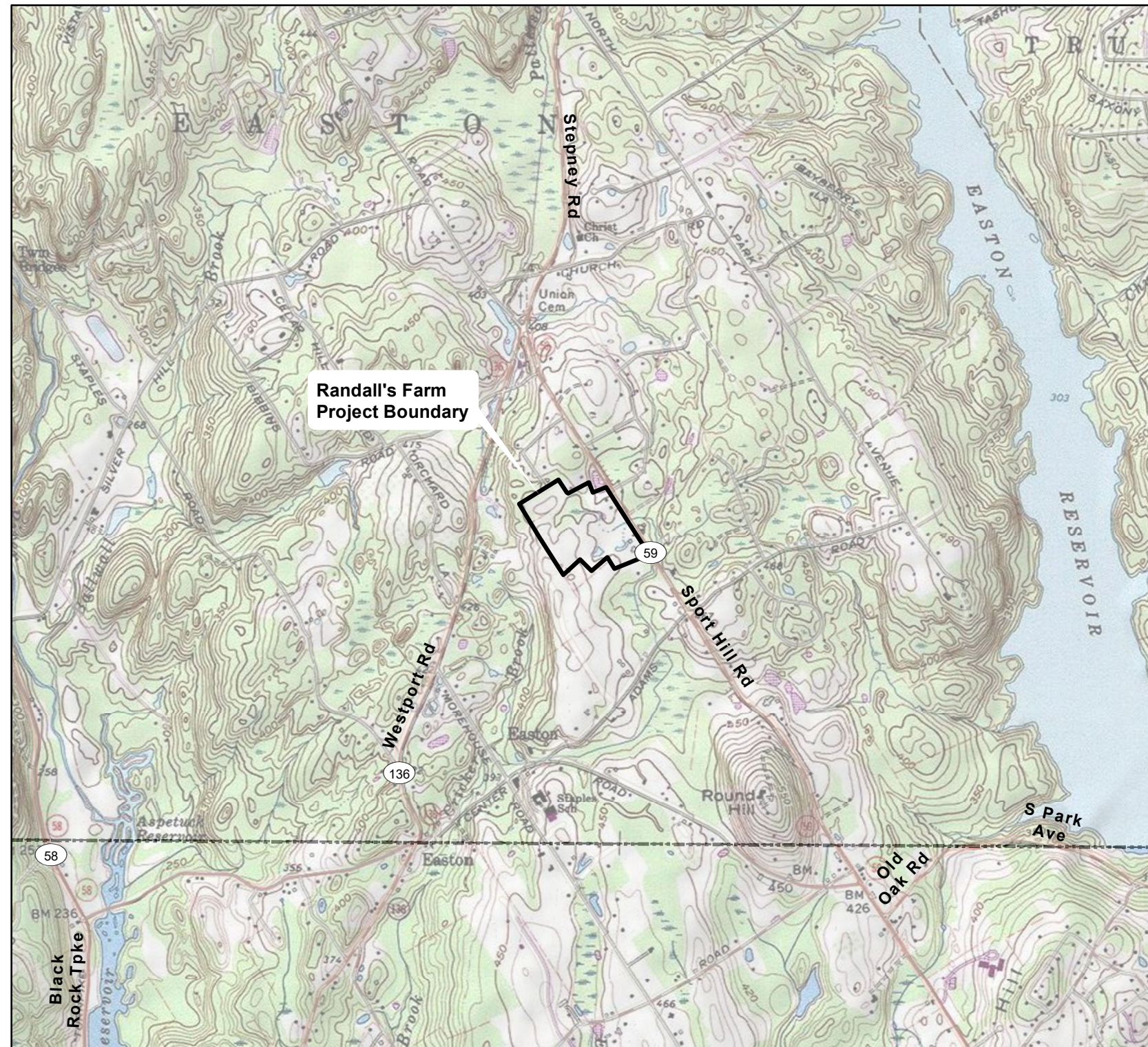
Randall's Farm Conservation and Management Plan

Easton, CT

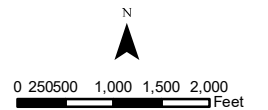
Figure 1

Legend

 Randall's Farm Project Boundary



USGS Quadrangle:
Botsford



Natural Resources of Randall's Farm

2.1 Ecoregional Setting and Site History

On a national scale, the site 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 et al., 2009):

Ecoregional 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.

Ecoregional 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.

Ecoregional 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.

Ecoregional 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 rock 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.

Based upon the most current ecoregion classification system for Connecticut, developed by Metzler and Barret (2006), the site lies within the Southern New England Coastal Lowland Subsection of the larger Eastern Broadleaf Forest Province. On a local scale the site lies within Dowhan and Craig’s (1976) Western Coastal Ecoregion of the Coastal Hardwoods Zone.

2.2 Local Site Physiographic Characteristics

2.2.1 Climate

Climatological data provided by Dowhan and Craig (1976) for the Western Coastal Ecoregion is provided in Table 2-1.

Mean annual temperature	50.5 ° F
Average winter temperature	31 ° F
Coldest month monthly mean minimum	23 ° F
Mean annual minimum temperature	5 ° F
Average seasonal snowfall accumulation	<30 in.
Frost free season	180 days
Average summer temperature	71 ° F
Warmest month monthly mean max. temp.	83 ° F
Annual precipitation	43 in.

2.2.2 Topography, Geology and Soils

The topography of the area is characterized by a moderately hilly landscape with local areas of notable relief. The terrain within the site was originally shaped by glacial processes, then by post glacial meteorological processes, followed by agricultural land uses, and finally via residential development of the surrounding areas. Elevations on Site range from approximately 470 to 435 feet above mean sea level (NGVD 1929).

The bedrock underlying the site is mapped by Rodgers (1985) as the “Og – Ordovician Granitic Gneiss” formation which is a light-colored, foliated granitic gneiss presumed to be of Ordovician age. Granitic gneiss is a “light-colored, medium- to coarse-grained, compositionally banded metamorphic rock of granite composition”.¹

¹ <http://mrdata.usgs.gov/geology/state/state.php?state=CT>

The surficial geology of the site consists predominantly of parent materials derived from melt-out till of varying depth (material laid down as glacial ice melted away underneath), and Lodgement Till (material deposited directly beneath the glacier and therefore subjected to enormous pressure). Parent material is one of the five soil forming factors that influences the composition of the soil profile. For instance, the soils that have formed from lodgement till have been compacted by the glacier and are composed of finer grained material. As a result, they have a lower hydraulic conductivity. This low permeability to water (in comparison to the adjoining formations) is responsible (in part) for the formation and persistence of the palustrine wetlands on the north side of the property. The persistence of ponded and slowly draining waters in the swamp has led to organic matter (e.g., leaf litter, wood, etc.) accumulation and the formation of organic muck soils within the swamp. Higher elevation areas on site are underlain by less consolidated melt-out till. The distribution of distinct soil units across the site is depicted in **Figure 2-1** and corresponding Natural Resource Conservation Service (NRCS) descriptions of the numbered soil units are provided below.

3 – Ridgebury, Leicester, and Whitman soils, extremely stony: Ridgebury soils are defined by NRCS as “very deep, somewhat poorly and poorly drained soils formed in till derived mainly from granite, gneiss and schist. They are commonly shallow to a densic contact. They are nearly level to gently sloping soils in low areas in uplands. Slope ranges from 0 to 15 percent. Saturated hydraulic conductivity ranges from moderately low to high in the upper portions of the soil profile, and very low to moderately low in the substratum”. Leicester soils are defined by the NRCS as “very deep, poorly drained loamy soils formed in friable till. They are nearly level or gently sloping soils in drainageways and low-lying positions on hills. Slope ranges from 0 to 8 percent. Permeability is moderate or moderately rapid in the surface layer and subsoil and moderate to rapid in the substratum”. Finally, Whitman soils are defined by NRCS as “very deep, very poorly drained soils formed in glacial till derived mainly from granite, gneiss, and schist. They are shallow to a densic contact. These soils are nearly level or gently sloping soils in depressions and drainageways on uplands. Permeability in the soil profile varies (decreases) with depth. These three soil types occur as a complex mosaic within this mapped unit.





60B – Canton and Charlton soils: This complex consists of gently sloping to moderately sloping, well drained loamy sand soils intermingled with areas of bare, hard exposed bedrock. The complex is on side slopes and crests of upland hills and ridges. Stones and boulders cover 10 to 35 percent of the surface. Areas are irregular in shape and mostly range from 5 to 40 acres. The complex is approximately 40 percent Canton soils, 20 percent Charlton soils, 20 percent rock outcrops, and 20 percent other soils. The soils and out crops are so intermingled that it was not practical to map them separately. Slope ranges from 3 to 8 percent (60B) or 8 to 15 percent (60C).

61B – Canton and Charlton soils, very stony: This complex consists of gently sloping to moderately sloping, well drained loamy sand soils intermingled with areas of bare, hard exposed bedrock. The complex is on side slopes and crests of upland hills and ridges. Stones and boulders cover 10 to 35 percent of the surface. Areas are irregular in shape and mostly range from 5 to 40 acres. The complex is approximately 40 percent Canton soils, 20 percent Charlton soils, 20 percent rock outcrops, and 20 percent other soils. The soils and out crops are so intermingled that it was not practical to map them separately. Slope ranges from 3 to 8 percent

45 - Woodbridge Fine Sandy Loam: The Woodbridge series consists of moderately well drained loamy soils formed in lodgement till. They are very deep to bedrock and moderately deep to a densic contact. They are nearly level to moderately steep soils on till plains, hills, and drumlins. The potential for surface runoff is moderate to very high. Slope ranges from 0 to 25 percent and they are moderately well drained.



Legend

-  Soils
-  Address
-  Property
-  Town Boundary
- High Resolution 60cm Imagery

1:3,407



567.8 0 283.90 567.8 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
Created by Greater Bridgeport Regional Council

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION



84 - Paxton and Montauk Fine Sandy Loam: The Paxton series consists of well drained loamy soils formed in lodgment till. The soils are very deep to bedrock and moderately deep to a densic contact. They are nearly level to steep soils on hills, drumlins, till plains, and ground moraines. Slope ranges from 0 to 45 percent. Saturated hydraulic conductivity is moderately high or high in the surface layer and subsoil and low or moderately low in the substratum. Depth to bedrock is commonly more than 1.5 meters. Rock fragments range from 5 through 35 percent by volume in the mineral soil. Except where the surface is stony, the fragments are mostly sub-rounded gravel and typically make up 60 percent or more of the total rock fragments.

The Montauk series consists of well drained soils formed in lodgment or flow till derived primarily from granitic materials with lesser amounts of gneiss and schist. The soils are very deep to bedrock and moderately deep to a densic contact. These soils are on upland hills and moraines. Slope ranges from 0 to 35 percent. Rock fragments range from 3 to 35 percent in the solum and 5 to 50 percent in the substratum.

2.2.3 Hydrology

However, portions of the site are subject to seasonal saturation from precipitation events and the site's physiographic attributes (toposequence, soil texture and hydraulic conductivity, etc.). Palustrine freshwater features can be found throughout the property (see Chapter 2.3.2 for additional details). The hydrology of these freshwater systems is sustained via groundwater discharge and precipitation events, and via various influences of the hydraulic conductivity of the surrounding surficial geology. Most of the wetlands areas on site (and therefore much of the site itself) drains to a central intermittent watercourse that flows eastward and offsite via a culvert under Sport Hill Road.

According to the CT DEEP Water Quality Standards for Inland Surface Waters, the stream that drains much of the preserve is designated as a Class A watercourse (CTDEEP, 2015). Surface waters with this designation are presumed suitable for their designated uses that include fish and wildlife habitat, among other legitimate designated uses. The water quality goal is to maintain the Class A designation and designated uses. Likewise, groundwater quality within the preserve is designated as Class GA. 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. 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 is 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.

According to the Federal Emergency Management Administration (FEMA) National Flood Insurance Program, no mapped areas on the site are subject to 100-year flood events.

2.3 Habitat Characteristics

A number of vegetation communities/associations/cover types occur on site. These vegetation assemblages provide a mosaic of habitat types on the property that in turn support various fauna - some of which are dependent upon these habitat types (specialists) and others that use the habitats opportunistically (generalists). The habitats types noted on the Randall's Farm property include the following and are discussed in greater detail in subsequent subsections of the plan. A comprehensive list of plants noted on site during our site visits is provided in **Appendix I**.

- Mixed hardwood stands
- Riverine watercourse
- Seasonal pools
- Seasonally flooded/saturated Palustrine Forested Wetlands
- Palustrine scrub/shrub wetlands
- Palustrine Emergent wetland
- Early successional ("old field") habitat

2.3.1 Uplands

Upland habitats that occur on the site reflect that of the ecoregion. On the site's well-drained soils (typically the higher topographic elevations of the site), meso-xeric species of an oak/hickory association predominate. On moderately well-drained soils (typically midslope positions), mesophytic forests have developed and support a variety of hardwoods such as Tulip, Black Birch, American Beech, and Sugar Maple. At lower topographic elevations, on poorly drained soils, Red Maple predominates (see 2.3.2 Wetlands below for forested wetlands characterizations).

2.3.2 Wetlands

Using the Cowardin, et al. (1979) classification system two major wetlands / watercourse systems occur on the site – Palustrine and Riverine. According to the NWI, a Palustrine System is defined as follows:

"all non-tidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 ppt. Wetlands lacking such vegetation are also included if they exhibit all of the following characteristics:

- 1. are less than 8 hectares (20 acres);*
- 2. do not have an active wave-formed or bedrock shoreline feature;*
- 3. have at low water a depth less than 2 meters (6.6 feet) in the deepest part of the basin;*
- 4. have a salinity due to ocean-derived salts of less than 0.5 ppt".*

Palustrine forested wetlands occur in association with an intermittent drainage that flows through one of three ponds on site and along a shallow forested intermittent drainage that bisects the site. The small on-site pond provides the largest semi-permanent palustrine open water habitat on the property. The pond provides an attribute that is otherwise limited in the palustrine system (open water).

The intermittent watercourse is a prominent feature that bisects the site. According to the Cowardin Classification System, it is a riverine intermittent watercourse with an unconsolidated bottom. It is flanked on either side by bordering vegetated wetlands composed of Red Maple and Skunk Cabbage. The watercourse has a shallow gradient and low sinuosity. In some areas, the stream bed is dominated by fine sediment or organic matter, in others by coarser mineral sediment or cobble.

Seasonally saturated wetlands, some with vernal pool characteristics, were also noted in various locations on the site. Pool areas within the Palustrine forest on the north end of the site is of particular note. This pool appears to have the morphology and hydrology sufficient to support breeding obligate vernal pool species. Signs of breeding Spotted Salamander activity (spermatophores) were found on the bottom of submerged debris within the pool and adult Wood Frogs were observed mating in the pool in early spring. The other wetlands and pools on site were found to support breeding Wood Frog and Spring Peeper activity as well during a site visit conducted in March of 2016.

Table 2-2. The Major Upland Vegetation Associations that occur on Site, their Dominant Vegetation and the Indicator Fauna they Support

Major Community	Dominant vegetation	Other associated vegetation	Specialist Fauna Species
Oak – Hickory Meso-xeric Forest	Red Oak, Black Oak, several hickories	American Beech, Sassafras	Wild Turkey, Hairy Woodpecker, Tufted Titmouse
Mesic Forest	White Oak, Tuliptree, Sugar Maple, Black Cherry, Black Birch,	White Ash	Yellow-bellied Sapsucker, Wood Thrush, Black-capped Chickadee
Conifer Woodland Stand	Spruce, White Pine	Wineberry	Great-horned Owl, Pine Warbler
Old field Woodland	Red Cedar, Black Cherry	Multiflora Rose	Gray Catbird, Northern Cardinal
Old Field shrubland	Red Cedar, Multiflora Rose, Silky Dogwood	Goldenrods, Dogbane, dewberry	Red Fox, Eastern Cottontail, Common Yellowthroat, Indigo Bunting, Field Sparrow
Old Pasture Fields	Little Bluestem, Orchard Grass, Goldenrod, Asters	Heath Asters, a variety of graminoids	Wild Turkey (foraging), Tree Swallow, Ground Hog, Meadow Vole

Table 2-3. Wetland/Watercourse communities that occur on the Site			
Major Community	Dominant vegetation	Other associated vegetation	Specialist Fauna Species
Intermittent Watercourse	Sweet Pepperbush	Dogwood, Maleberry, various streamside forbs	Mayflies, Odonata
Palustrine Deciduous Forest	Red Maple, Sweet Pepperbush/Skunk Cabbage	Black Gum, American Elm, Pin Oak, Highbush Blueberry, Winterberry	Red-shouldered Hawk, Screech Owl, Red-bellied Woodpecker, Veery, Rusty Blackbird (winter), Spicebush Swallowtail butterfly
Ponds	N/A (open water)	Duckweeds, algae	Mallard, Wood Duck, Painted Turtle, Solitary Sandpiper
Palustrine Emergent Wetland	Burrweed, Tussock Sedge, Woolgrass	Meadowsweet, Beggar's Ticks, Sensitive Fern	Green Frog, Spring Peepers
Seasonal Pools	Red Maple, Highbush Blueberry	Sweet Pepperbush	Spotted Salamander, Wood Frog

2.4 Fauna

The following sections of this plan describe the animal diversity documented on site via direct observation, observation of animal signs, or are expected to occur due to on-site habitats present and the site's location within the known distributional ranges of Connecticut's fauna. Observations were conducted from September 2015 to May 2016. Major fauna groups observed or expected to occur on and adjacent to the site and associated species of conservation concern are discussed in the following subsections.

2.4.1 Lepidoptera

This highly visible invertebrate order is generally well-represented throughout the broader Connecticut environment, and many of Connecticut's representative species likely occur on site due to the presence of varied habitats, the presence of host plants, and the abundance of nectar sources. Several of CT's butterflies have very narrow habitat requirements. Such sensitive species can be good indicators of habitat quality and can be used to guide and gauge



Figure 2-1. An Eastern Tiger Swallowtail Nectars on Joe Pyeweed

habitat management practices. A full list of lepidoptera observations at Randall’s Farm should be developed through the spring, summer, and autumn seasons as it is always possible that rare or uncommon Lepidoptera may occur on site. The suite of Lepidoptera species in southern CT locations often include southern vagrants in late summer or migrant individuals passing through the area in early fall. Surveys targeting specific microhabitats are recommended to further investigate the potential presence of uncommon species, and to establish a baseline from which to compare to future findings. Butterfly diversity is largely determined by the availability of host plants. Therefore, rarer specialist species often tend to be restricted to less common host plants. The impact of potential deer over-browsing and the spread of invasive non-native plants may negatively affect the butterfly diversity. Randall’s Farm offers an excellent destination for a Connecticut Butterfly Association field trip. Findings of these field trips have potential for detecting unusual species on site. Researchers have advocated the benefit and importance of amateur insect collecting and the contributions it has made to understanding species’ distributions (Wagner, 2005).

2.4.2 Odonata

A number of factors combine to offer excellent dragonfly habitat at Randall’s Farm as well. They include but are not limited to the following: The large pond on site and the smaller freshwater pools, vegetation surrounding many of these pools, open fields, and riverine intermittent habitat. These various habitat attributes combine to provide areas used by odonata for resting, sunning, feeding, or breeding.

Several damselfly and dragonfly species have narrow biological requirements and can serve as useful indicators of habitat quality and functionality. Randall’s Farm may also serve to function as a migratory staging and stopover site for various odonata. Several species of dragonfly carry out a significant seasonal migration and tend to follow coastal migratory pathways. Several darner species, in particular Common Green Darner (*Anax junius*), skimmers, and both Carolina Saddlebags (*Tamea carolina*) and Black Saddlebags (*Tamea lacerata*) can be observed in very large numbers (hundreds of individuals at a time) on some fall days in southern Connecticut. The upland habitat at Randall’s Farm provides excellent stop-over habitat for odonates as they seek shelter during adverse weather conditions that may form off-shore and impact coastal locations along their migratory pathway.

2.4.3 Avifauna

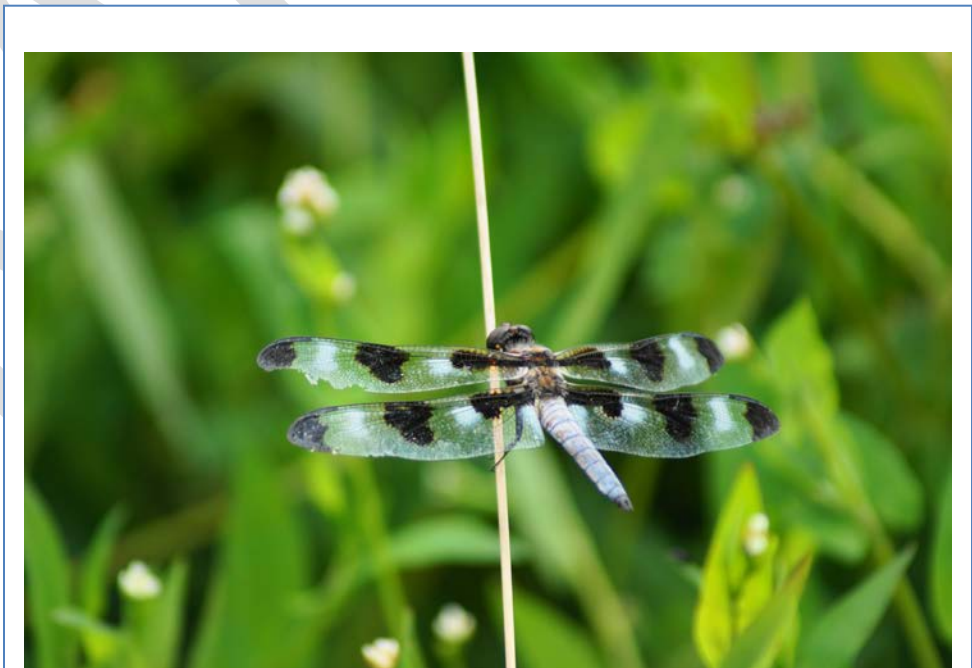


Figure 2-2. A Twelve-spotted Skimmer alights on wetland vegetation.

Observations of the vegetation structure and associations supplemented with on-site observations of avifauna made during natural resource assessment work from September 2015 to May 2016, provided the basis for characterization of the site's avifaunal community and was used to ascertain which avifauna of conservation concern may be resident at the site.

In general, the resident avifauna at Randall's Farm represents a suite of species characteristically found in early successional habitat management areas, woodland edges, interspersed wetlands, and smaller forest patches. Some of the resident species rely on a particular habitat, while others rely on a mosaic of habitat types. Field areas host feeding swallows, transient Chimney Swifts, and possibly migrating Common Nighthawks or American Kestrels. Gaps in the woodland areas or over water features are exploited by other aerial insectivores such as various swallow species, Eastern Kingbird, Eastern Phoebe, and Cedar Waxwings. Edge habitat provides cover for warblers (e.g., Common Yellowthroat, Yellow Warbler), mimic thrushes (e.g., Northern Mockingbird, and Gray Catbird), Eastern Bluebird, Northern Cardinals, and various sparrow species, the latter depending upon the season.

The variety of wetland habitats and associated wetland vegetation at the preserve provides additional habitat for a number of bird species with specific resource requirements. The small pond and wooded swamps served as a foraging site for a multitude of birds like the Wood Duck, Belted Kingfisher, several swallow species, House Wren, Red-eyed Vireo, Common Yellowthroat, American Redstart, Yellow Warbler, Baltimore Oriole, and more. Wetlands with dense shrub cover adjacent to open fields are likely used by American Woodcock as breeding cover while the open fields are used for courtship displays.

A number of Connecticut's Wildlife Action Plan "Greatest Conservation Need (GCN) Species" have been observed or are expected to occur at Randall's Farm. These include passage migrants that utilize a portion of the preserve as a stopover and foraging site (e.g., various wood warblers, thrushes, flycatchers, vireos, kinglets, and other songbirds). Examples of such species include Field Sparrow, Blue-winged Warbler, Chestnut-sided Warbler, and Indigo Bunting. All of these species are considered species of Greatest Conservation Need in Connecticut (CTDEEP, 2015).



Figure 2-3. Eastern Bluebirds are frequently seen along the field/woodland ecotone

2.4.4 Herpetofauna

Randall's Farm supports a diverse amphibian fauna. The wetland habitats and extensive wooded uplands provide ideal conditions for many amphibians. The pond on site that holds water into the early summer harbors breeding populations of Green Frog, Bullfrog and Painted Turtles. Vegetated shallows and other small ephemeral or permanent wetlands in the wooded uplands are used by American Toad, Gray Tree Frog, Northern Spring Peeper (Figure 2-4), Pickerel Frog and Green Frogs. The coarse woody debris on the forest floor (logs, pieces of bark, etc.) provides suitable habitat for Red-backed Salamanders and adult Spotted Salamanders which use these cover objects throughout the year. Gray Tree frogs were heard calling from the forest patches. High quality vernal pool wetlands in the preserve's woodland provide breeding habitat for Spotted Salamander and Wood Frog (Figure 2-5). These latter two species are considered obligate vernal pool breeding amphibians that rely on ephemeral (non-permanent) wetland types. They are listed as species of Greatest Conservation Need in Connecticut's Wildlife Action Plan.

The area's reptile fauna expected to occur on the site include one or more species of turtles and a variety of snake species observed or expected to occur on the site. Common Garter Snake (*Thamnophis sirtalis*) and Dekay's Brown Snake (*Storeria dekayi*) were observed on the site. Other expected snake species include the Northern Watersnake (*Nerodia sipedon*), Northern Black Racer (*Coluber constrictor*), Eastern Milksnake (*Lampropeltis triangulum*), and Northern Ring-necked Snake (*Diadophis punctatus*). The State Special Concern Smooth Green Snake (*Opheodrys vernalis*) has been reported from adjacent towns to the east and west of the site (Klemens, 1993) and there is apparently suitable habitat on site for this species.

2.4.5 Mammals

The most visible mammals observed on site included Gray Squirrel and Eastern Chipmunk. Neither species is of conservation concern (as defined herein previously), and as expected, both were seen mostly in woodland habitats on the property. Also frequently encountered were signs of White-tailed Deer (beddings in tall grass), Raccoon (tracks in mud), and Red Squirrel (cone midden piles). Short-tailed Shrews and Meadow Voles are likely abundant in the field areas. A number of additional mammal species are expected to occur in the varied habitats on site as well including White-footed Mouse, Virginia Opossum, Raccoon, Mink, Red Fox, and Striped Skunk. Coyote is expected to occur on site from time to time as well. Relevant mammal species of conservation concern in the area include Red Bat ('Special Concern' CT-ESA) and potentially other resident breeding season bats. These woodland species require forested habitat (used for roosting cover and maternity cover) adjacent to open areas (used for foraging) and would therefore more likely utilize portions of the Randall's Farm Property to roost or forage. Migratory bat species also likely pass through the area during annual migratory movements, as they would benefit from suitable stop-over habitat.



Figure 2-4. A Spring Peeper (*Pseudacris crucifer*) blends in with the woody and leafy debris that has collected within this seasonally saturated wetland.



Figure 2-5. Wood Frogs (*Rana sylvatica*) were easy to find after the first warm rains of the season.

2.4.6 Fisheries

We found no evidence of a fishery on site. It is possible the larger pond has been stocked with various warm-water fish species.

Conservation & Management Status

3.1 Why Manage Habitats?

With proper maintenance and the implementation of management techniques across the site, the varied habitats that occur on site could be maintained in order to sustain the species of conservation concern that depend on those habitats. Additional species are likely to be discovered in time due to many variables including weather conditions, continued survey efforts, and random chance, but modifications to and improvement of habitat can sustain the biota and improve diversity with time. As discussed more specifically in other chapters, the planting of recommended shrub species can improve the diversity of avifauna. Removing non-native invasive plants and being vigilant and mindful in disallowing the spread of additional invasives will permit more of our native fauna to flourish. Quelling disturbances and removing anthropogenic threats can allow more bird species to nest on and around the property.

Most importantly, a number of conservation concern species identified thus far at Randall's Farm are indicative of specific habitats or habitat attributes, such as the following: early successional habitat, seasonal pools, palustrine wetlands, and intermittent watercourse. In the spring, migrant birds pass through our state during northbound migration as insects emerge from hibernation or hatch from eggs. Maintaining high value migratory stopover habitat is essential to the health of these birds. Geographically, as more surrounding lands are developed for residential use and thus become more ruderal landscapes in Fairfield County, the natural habitat settings of undeveloped open space lands and parcels such as Randall's Farm become even more valuable as wildlife habitat - especially avian migratory stopover habitat - if managed appropriately.

Portions of the habitats on the property have been impacted by non-native invasive species of plants. For instance, the dense tangles of non-native shrubs and vines do provide cover for avifauna and other wildlife, but by comparison to native species, their value as direct and indirect food sources is poor. On certain portions of the property, invasive species removal and control offer opportunity for habitat enhancement.

By contrast, the palustrine forested swamp wetland system is composed of predominantly native woody species of trees and shrubs with a number of hard and soft mast-producing species offering excellent cover and food sources for native fauna, especially birds. This wetland community provides many of the 13 functions and values known to potentially occur in wetlands and watercourses (ACOE-NED, 1995), and include the following:

- Sediment/Toxicant/Pathogen Retention
- Nutrient Removal/Retention/Transformation
- Production Export
- Wildlife Habitat
- Educational/Scientific Value
- Visual Quality/Aesthetics
- Groundwater Discharge
- Floodflow alteration

Likewise, of the 13 functions and values known to potentially occur in wetlands and watercourses, the collective wetland systems bisecting the site provide the following:

- Sediment/Toxicant/Pathogen Retention
- Nutrient Removal/Retention/Transformation
- Production Export
- Sediment/Shoreline Stabilization
- Wildlife Habitat
- Educational/Scientific Value
- Visual Quality/Aesthetics

3.2 Current Management Activities

3.2.1 Mowing

The old field areas at Randall's Farm are mowed annually using a brush hog mower. This management alternative to maintaining early successional habitat has kept the site from reverting to young woodland and forest. In the absence of grazing or fire management, it is likely the most feasible alternative to maintaining the open field habitat at Randall's Farm.

3.2.2 Trail maintenance

Trails are maintained as needed, the frequency of work being dictated by site-specific conditions. Trails through the fields are maintained by mowing the herbaceous vegetation. Trails through wooded and forested areas are maintained by the hand removal of fallen woody debris and by light chainsaw work as the need arises.

3.2.3 Nest boxes

Nest boxes for Wood Ducks have been erected on site within the wetland areas, but appear to not have been maintained for some time.

3.2.5 Invasive species control

To date, no comprehensive invasive species control projects have been completed on the property. Portions of the property are subjected to annual mowing to maintain open fields and is likely necessary to keep the fields from being overrun with Multiflora Rose and Autumn Olive which can form dense hedgerows and thickets within areas allowed to revert to old field and mid-successional habitats. Barberry has invaded portions of the wooded upland as well.

3.3 General Conservation & Management Goals

3.3.1 Conservation Priority Habitats

Randall's Farm contains several 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):

- Early successional habitat
- Seasonally flooded/saturated Palustrine Forested Wetlands
- Mixed hardwood woodland/forest stands
- Dense conifer stands
- Palustrine Open Water and Emergent Wetlands
- Seasonal pools

Mixed hardwood and evergreen stands should be preserved and monitored for the use of indicator species to assess their biological functionality. Management of various units within the preserve offers opportunity to expand and improve their wildlife habitat value in the future.

3.3.2 Conservation Priority Species

Several state-listed and other conservation priority species have been recorded at Randall's Farm. Future conservation and management strategies should carefully weigh the habitat and resource requirements for the following species:

- Obligate vernal pool-breeding amphibians (e.g. Spotted Salamander & Wood Frog)
- Neotropical migrant passerines (e.g., especially shrubland/early successional species and aerial insectivores, etc.)
- Cavity nesting avifauna (House Wren, Tree Swallow, Eastern Bluebird)
- "Game" species (Wild Turkey, Wood Duck, American Woodcock)
- Bats
- Native pollinators (esp. hymenoptera, coleoptera, and lepidoptera), and
- Aquatic Invertebrates (e.g., Odonata, Ephemeroptera).

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 site. For instance, the 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 movements, 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. These challenges and proposed strategies to counteract the potential negative effects of each are briefly discussed below.

3.4.1 Non-native and Invasive Plants

The preserve contains approximately nine non-native invasive plants that appear to be well-established on site and thus could pose a threat to biodiversity. They include herbaceous, liana, and shrub species. Representative non-native invasive plant species noted during our field inspections of the preserve include those listed in **Table 3-1**. The elimination of all non-native plant species and individuals from the preserve's habitats would be labor intensive and likely is not necessary given the abundance of seed sources expected to occur on off-site parcels proximal to Randall's Farm. Therefore, removal efforts should focus on the removal of small-scale ("satellite") invasion areas and containment of large-scale invasion areas. The various long-term control methods can be adequately assessed based upon site-specific conditions. 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 available, 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, and avoidance of exposure to non-target organisms. Recent scientific evidence associates various potential teratogenic, carcinogenic, and mutagenic effects associated with pesticides in use today. If nothing else, use of supposedly "safe" herbicides is still dependent upon proper application, handling, storage, and use.

Feasible control methods are a factor of cost, available labor, effectiveness, limitations, response of the target plant species and availability of follow-up monitoring, control, and replacement with native plant 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 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). 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 shrub for cover should control efforts result in the loss or significant reduction in overall shrub coverage. To address this, one should replace the lost function soon after control efforts by re-planting native shrub species.

TABLE 3-1. INVASIVE PLANT SPECIES NOTED ON SITE			
Common Name/ Scientific Name	Location(s) on site	Potential Control Alternatives ²	Reference for Further Control Details/Information
SHRUBS			
Multiflora Rose <i>Rosa multiflora</i>	Woodland edges esp. between the old field and forest, and within some forest gaps.	Mechanical and chemical methods Frequent repeated cutting or mowing (3-6 x per year) for two to four years; herbicide application to cut stem anytime in August through October ² Conservation grazing (Exmoor Ponies or goats)	http://www.nps.gov/plants/alien/fact/romu1.htm
Japanese Barberry <i>Berberis thunbergii</i>	Diffuse and sporadic at some locations throughout the preserve; more frequent at other locations	Mechanical control (removal of individual shrubs) in early spring ² Cutting with triclopyr (25%) or glyphosate (20%) applied to cut-stem anytime between August to October Control via conservation grazing with Exmoor Ponies (only if NOT treated with herbicide) Burning stems with propane torch in early spring right after leaf out and immediately following significant rainfall event so that surrounding areas are wetted (likely will require a permit)	http://www.dnr.state.wi.us/org/land/er/invasive/factsheets/b... , http://plants.usda.gov/ http://webapps.lib.uconn.edu/ipane/browsing.cfm?descriptionid=26 Kaufman and Kaufman, 2012
Autumn Olive <i>Elaeagnus umbellata</i>	Woodland edges esp. between the old field and forest	Sprouts vigorously after cutting, so effective management requires removal of roots or cutting/girdling the stem and then application of an herbicide like triclopyr. Treatment most effective in late summer.	http://www.hort.uconn.edu/cipwg/art_pubs/Guide/x12autumn.html Kaufman and Kaufman, 2012.
Invasive Shrub Honeysuckles <i>Lonicera</i> spp. (<i>L. morrow</i> , <i>L. tartarica</i>)		Pull or dig shrubs out of ground – follow up required to remove seedling invasives that may sprout from disturbed soils; Cut repeatedly in spring and fall when shrub is trying to translocate nutrients and carbohydrates (may take	Kaufman and Kaufman, 2012

² <http://www.ocfp.on.ca/local/files/Communications/Current%20Issues/Pesticides/Final%20Paper%2023APR2004.pdf>

² 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

TABLE 3-1. INVASIVE PLANT SPECIES NOTED ON SITE			
Common Name/ Scientific Name	Location(s) on site	Potential Control Alternatives²	Reference for Further Control Details/Information
		<p>several years in succession); spray foliage with herbicide late in growing season, or paint herbicide onto cut stumps from summer into winter.</p> <p>Control via conservation grazing with goats (only if NOT treated with herbicide).</p> <p>Also, deer browse honeysuckle, perhaps already limiting its spread and biomass on-site</p>	
Wineberry <i>Rubus phoenicolasius</i>		Treat with a systemic herbicide such as glyphosate or triclopyr. Apply to foliage before seeds have matured or to canes after cutting/mowing.	http://www.nps.gov/plants/alien/public/midatlantic/ruph.htm
LIANAS			
Bittersweet Nightshade <i>Solanum dulcamara</i>	Between fields 1 and 5	Small colony. Hand pull vines to remove from the system and monitor any regrowth/resprout	
Oriental Bittersweet <i>Celastrus orbiculatus</i>	Woodland edges esp. between the old field and the forested areas of the Preserve	Hand removal where practical; cut vines at ground level and again at 4 to 5 feet above ground surface. Roots will re-sprout so subsequent treatment with herbicide (glyphosate or triclopyr will be required)	http://www.inhs.uiuc.edu/chf/outreach/VMG/rlbitter.html
Japanese Honeysuckle <i>Lonicera japonica</i>	A few locations near the entrance of the preserve, and within certain gaps	Herbicide application only effective control but necessitates attention to proper timing. Some herbicides ineffective. Apply glyphosate late in the season when most other vegetation is dormant but honeysuckle vines still have leaves	http://tncweeds.ucdavis.edu/esadocs/documnts/lonijap.html Kaufman and Kaufman, 2012
HERBS			
Garlic Mustard <i>Allaria officinalis</i>	A number of locations throughout the preserve, heavy infestation along trails and on the west side of the site between the woodland and playground areas	<p>Spraying soil around satellite invasion areas with vinegar to change the soil pH should be tried as a pilot project</p> <p>In areas of large infestations, systemic herbicide application (glyphosate, triclopyr) may be necessary prior to seed set Hand pulling and proper disposal may be effective for smaller infestations when soils are moist</p>	Kaufman and Kaufman, 2012

TABLE 3-1. INVASIVE PLANT SPECIES NOTED ON SITE

Common Name/ Scientific Name	Location(s) on site	Potential Control Alternatives ²	Reference for Further Control Details/Information
		Cutting to ground level in spring can prevent formation of flowers and seeds, but should be followed up with application of glyphosate to prevent development of new flowering shoots	
Japanese Stiltgrass <i>Microstegium viminium</i>	Trails	Manual Control: Plants can be pulled by hand before they set seed, but it may take several years of pulling for it to be an effective control measure (in order to exhaust the seed bank). Mechanical Control: Weed-whacking late in the season before seeds are set can be an effective control Chemical Control: Imazemeth, fluazifop, & sethoxydim-based herbicides can be an effective selective control when stiltgrass is growing among forbs and non-target graminoids such as sedges, and rushes.	Kaufman and Kaufman, 2012
Mugwort <i>Artemisia vulgaris</i>	Entrance fields	Repeated monthly mowings for several years to halt spread of monocultures Directed applications of clopyralid and glyphosate several times during the growing season	Kaufman and Kaufman, 2012
Purple Loosestrife <i>Lythrum salicaria</i>	Detention Basin	Biological control: Controls with <i>Galerucella</i> beetles has been effective on sites that are not inundated in the spring for long durations since the larvae emerge from the soil.	Donna Ellis, personal communication
Reed Canarygrass <i>Phalaris arundinacea</i>	Fields 1 and 5 Wetlands	Difficult to eradicate due to extensive underground root system. Mechanical: Small patches can be controlled with repeated cutting during the growing season. Fire: Control via the use of fire will only be effective in areas with fire-adapted species Flooding: Prolonged inundation may be an option on sites where water level can be controlled and property damage from flooding will not occur. Chemical: Glyphosate and fluazifop applied while plants are actively growing may be effective but require repeated treatments	Kaufman and Kaufman, 2012

TABLE 3-1. INVASIVE PLANT SPECIES NOTED ON SITE			
Common Name/ Scientific Name	Location(s) on site	Potential Control Alternatives ²	Reference for Further Control Details/Information
Sheep Sorrel <i>Rumex acetosella</i>	Lawn areas	Note: Toxic to sheep so may be a concern to conservation grazing	Uva et al., 1997

3.4.2 Non-native Invasive 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). Feral cats were not frequently encountered in the preserve's interior, but since much of the preserve is surrounded by residential property, they are expected to occur. 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).

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. Signs requesting that public remove what they brought in while picnicking should be posted.

Pets should be discouraged from entering the sensitive habitats within the preserve such as wetland or grassland centers, and early successional shrubland. Control measures could include a combination of enclosure 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, dogs pose a threat to the biodiversity - including rare species (Beans and Niles, 2003). It is recommended that dogs 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 kill ground-nesting birds, young, and eggs
- They pose a predatory threat to young wildlife that may not have the ability to escape predation including species of conservation concern
- They may impact sensitive seasonal pool communities
- They may trample and destroy rare plants
- They may foul good surface water quality of 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:

- Disease-carrying and sickly organisms
- Conflicts with territorial wildlife, and
- Conflicts with other off-leash dogs

Dogs are notorious for harassing wildlife in suburban environments (Hammerson, 2004), and thus their unrestricted movements through the grounds of Randall's Farm should be restricted. 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.

White-tailed Deer

Although native to our eastern forests, White-tailed Deer are a concern to the health and vigor within many of our natural areas, especially in southwestern Connecticut. Once almost extirpated from the state, the White-tailed Deer has made an amazing population recovery and now Fairfield County CT has some of the highest deer densities in CT. In local municipalities that do not allow hunting as a means of population management, local population densities can rise even higher. The abnormally high densities have resulted in over-browsing of native herbaceous plants, seedling trees, and even ground-nesting bird eggs. High-density deer populations also help spread the distribution of deer ticks (see below) and other disease-carrying vectors, increase the rate of deer vs. automobile collisions, and reduce the overall habitat quality of forest and woodland habitats. Deer have been identified as the third most serious threat to butterflies in Connecticut since they eat and sometimes kill the host plants of lepidoptera, they inadvertently consume eggs and larvae on the plants, they consume nectar flowers, and they alter the vegetative structure of the forest community by consuming shrubs, herbaceous plants, and tree seedlings (Schweitzer et al, 2011).

3.4.3 Diseases / Pests

West Nile Virus/Eastern Equine Encephalitis

West Nile Virus (WNV) and other mosquito transmitted pathogens are of paramount environmental health concern in recent years as it can have lethal effects on various bird species, and significant impact to human health. Since mosquitoes are the vectors of human parasites, they are of management concern. Larval and pupae mosquitoes may occur in seasonal or temporary pools of water on site 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 (EEE) - 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 and other pathogens. This network of monitoring stations includes one station on Sport Hill Road, and stations in towns adjacent to Easton. The results of monitoring the Sport Hill site and the three next closest monitoring locations relative to the site are provided in Table 3-2. Summary results for these stations showed no confirmation of West Nile Virus, Eastern Equine Encephalitis, or Jamestown Canyon Virus out of a total of 2,344 mosquitoes trapped and tested for pathogens.

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 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. Site users should be warned via signage of the potential for ticks in the vegetated areas off-trail. Signs posting the warning of tick borne illness may also help to deter people from entering closed areas and perhaps may help to keep their pets out of closed areas as well.

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.

Table 3-2. Mosquito Trapping and Testing Cumulative Results for Nearest Trap Locations Proximal to Randall's Farm
From Summary Results of 2015

Town	Trap Site	Number of Mosquitoes	Pos. or Neg.	WNV, EEE, JC	Mosquito Species (No.)
Easton	Sport Hill Road	353	Neg.	-	-
Fairfield	Catamount Road	456	Neg.	-	-
Trumbull	Cranbury Drive	1,103	Neg.	-	-
Weston	Devil's Den	432	Neg.	-	-

WNV = West Nile Virus, EEE = Eastern Equine Encephalitis, JC = Jamestown Canyon Virus

Source: CT Agricultural Research Station <http://www.ct.gov/caes/cwp/view.asp?a=2819&q=546798>

3.4.4 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. Impact associated with direct and indirect human activity could cause a significant threat to the ecology within and adjacent to the preserve. The continued introduction, proliferation, and spread of non-native invasive plant and animal species, over-collection/harvest of plants and animals, over-population and the associated demand on natural resources, and the loss or alteration of habitat due to development, habitat fragmentation, or impact from deer browse, are often cited as the major factors leading to the loss of biodiversity. More often than not, the cumulative effect of one or more of these factors is responsible for dramatic negative impacts to biodiversity in a given area.

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 Randall's Farm also has potential to impact biodiversity and other sensitive environmental receptors of the preserve unless activity is restricted to passive outdoor uses such as hiking, walking, nature interpretation, photography, and bird-watching. Heavy trail use by mountain bikers, horseback riding, joggers, can pose management challenges associated with soil compaction or erosion, the latter a concern due to resultant sedimentation of downgradient wetlands and watercourses. Repeated off-trail use could potentially do one or more of the following:

- Trample plants of conservation concern
- Introduce non-native plant propagules
- Disturb 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 breeding or rearing young. 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 and stinging insects, stinging plants, and aggressive wildlife that may be defending young, a den site, or other resource.

3.4.5 Data Gaps

Insufficient scientific knowledge regarding wildlife species distribution, abundance, and condition is a concern identified for a variety of habitats of greatest conservation need, in Connecticut (CT DEEP, 2015a). The lack of representation of certain insect orders from inclusion on Connecticut's Endangered, Threatened and Special Concern Species list (CT DEEP, 2015b) 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 status of species within the unrepresented orders. Additional focused and more in-depth invertebrate surveys would likely yield additional listed species among various taxa.

Since a full inventory of plants and animals was not conducted on the property, the status and distribution of some animal species expected to occur in the region was not confirmed on site. For instance, the status of the mammalian order Chiroptera (bats) remains a data gap in the status of the biodiversity on site. The status of bat species at Randall's Farm is best determined by specialized survey methods consisting of bioacoustical monitoring perhaps augmented by trapping methods (mist-netting, harp traps, etc.). Various site attributes conducive to bat usage suggests that the preserve has potential to support rare arboreal roosting bats included on the CT list of rare species under the CT DEEP Endangered Species Act.

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, but requires a scientific collection permit from the CTDEEP.

The extensive meadows across the site could be a significant source of natural pollen and nectar for area pollinators, especially if the fields are allowed to mature a bit by implementing a conservation mowing regime (See inset box in Section 4.1.5 below). Monitoring for pollinator usage (species richness in particular) in fields with varying mowing treatments may help provide data useful in refining conservation mowing programs.



Figure 3-1. Flowering plant species such as goldenrods and these asters bloom late in the growing season at Randal’s Farm offering extended pollen and nectar sources for late-season pollinators

Chapter 4

Conservation/Management Goals & Recommendations

4.1 Recommended Short-term Conservation Goals for Randall's Farm

Detailed conservation and management goals are described below and individual management measures recommended for each management unit is provided on a map figure in Appendix III.

4.1.1 Invasive Plant Management

The removal of various invasive plants from the site would enhance the wildlife habitat value by preserving the remaining floristic diversity. Some of the invasive plants on the Site form dense monospecific stands that likely displace native vegetative species. Table 3-1 (Section 3) provided recommended control measures for the non-native invasive plant species on site.

Staff 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 to halt their spread and to contain the invasion. Care should also be taken not to affect the habitat used by species of conservation concern during control or removal projects. For instance, removal of invasive shrubs could impact 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.

Conservation grazing as an invasive plant control strategy appears to be a feasible strategy at Randall's Farm. Fields could be leased as pasture areas for keeping livestock that are typically used for conservation grazing for invasive control (e.g., exmoor ponies and goats). Conservation grazing has the advantage of controlling invasive plants without the use of chemical herbicides, replacing the man hours needed for invasive plant removal, and raising public interest in the stewardship activities advocated and implemented by Randall's Farm. However, a number of plants

reported to be toxic to goats³ occur on the property and thus care would need to be taken in order to prevent accidental poisoning of the animals. Examples include the following:

- Alkaloid-containing plants (e.g., False Hellebore)
- Cyanogenic plants (e.g., Wild Cherry, dogbane, milkweed, etc.), and
- other toxic plants (e.g., Pokeweed, pine, buttercups).

Another concern would be the potential impact that off-leash dogs could have on the livestock. Portable game fencing would likely need to be used to protect the livestock from rogue dogs. A feasibility study would need to be conducted as a step-down plan to address the cost-benefit and risk of using conservation grazing as an effective invasive plant control strategy.

4.1.2 Tree Care

Ideally, tree care across the site should be conducted in such a way as to retain as many of the special habitat attributes and microhabitat elements as possible. Hollow snags, standing dead wood and large pieces of exfoliating bark from mature trees are important microhabitat requirements of fauna, especially birds, bats, and squirrels, and should be retained on site as safety permits. Dead lower branches are often used as “hawking sites” by aerial insectivores that sally out from these preferred perches to snatch insects from the air. Supracanopy trees are often favored by raptors for nesting and as vantage perches during hunting. Rotted centers and knotholes and abandoned woodpecker holes are valued by other cavity nesting species for cover and breeding sites. However, some large shade trees with rotted centers may be susceptible to blow-down during high winds. An arborist or tree care expert with knowledge of wildlife habitat attributes could help the maintenance staff determine which trees do not pose safety hazards to visitors and thus can be retained for their wildlife value. Artificial nesting structures can also be added to existing trees on the property that lack cavities. Fallen twigs and branches can be cleared off from trails and stacked on-site by stewards where they can be used by wildlife. Downed trunks and large diameter branches can be cut and stacked away from trailsides to provide alternative cover for small mammals and to rot and return nutrients back into the soil and detrital energy pathways. Large branching arrays can be piled askew to deter deer from grazing seedlings and herbaceous ground cover, so that patches of understory develop in what may be forest fragments that are subject to intense grazing pressure from White-tailed Deer.

4.1.3 Maintaining and Enhancing Ecotones

It is recommended that vegetation buffers be preserved adjacent to wetlands, and watercourses (**Figure 4-1**). Recommendations for buffer widths typically vary as a function of the type of wetland or watercourse resource, the resident biota within the resource, slope steepness and other factors. Additionally, the Town of Easton Inland Wetland Regulations have jurisdiction over activities that may disturb vegetation within the upland review area of a wetland. Generally speaking for wildlife management and water quality benefit, the wider the buffer, the better.

³ <http://www.ansci.cornell.edu/plants/goatlist.html>

In areas of the site where the ecotone is abrupt, increasing the vegetation structural diversity is recommended. This can be done by judicious pruning of existing trees to allow sunlight to reach lower vegetation layers, plantings to establish a shrub layer, increasing the height of the mower deck at the field/forest interface, or via the erection of deer exclosures.

4.1.4 Green Waste Management

Groundskeeping and general maintenance often results in the generation of surplus green wastes such as leaf litter, vegetation clippings and trimmings, surplus soil and rock materials, and surplus wood. It is recommended that when feasible, rocks, wood, brush, and leaves be retained on site. Rock piles and wood piles offer superb hiding structures for small mammals and herpetofauna. Grass trimmings should be left in the fields where they were cut or composted on site. Leaf litter should be composted separately as it can turn compost material too acidic. Care should be taken to prevent the deposition of surplus green wastes into wetland systems.



Figure 4-1. Vegetation should be retained around wetlands and watercourses to protect water quality, provide wildlife habitat, and prevent soil erosion.

4.1.5 Conservation Mowing

Since the fields on the site support species of conservation concern, it is recommended that the field areas be retained as early successional habitats. In the absence of fire, grazing, or some other disturbance mechanism, mowing appears to be the most feasible way of maintaining these management units as early successional stages. However, conservation mowing measures should be implemented for these management units. Delaying mowing until well after the growing season reduces the likelihood of directly impacting animals using the fields for foraging or concealment. Delaying mowing until late in the year and even to the end of winter avoids the elimination of persistent herbaceous plants that may retain seeds on the stem well into winter months thereby providing sustenance for foraging winter resident birds (**Figure 4-2**) and small mammals. Stands of grass may also contain a variety of dormant insect life that may be hibernating inside hollow stems, offering yet another source of sustenance to winter resident insectivores.

By mowing as late in the season as possible, one can avoid accidentally mowing over some small animals that may not be able to get out of the way of the mower, such as some small mammals, turtles, and insects, which may by then be hibernating underground or in other safe hibernacula.



Figure 4-2. A Downy Woodpecker foraging for dormant winter insects from hollow plant stems in northwestern CT.
Photo © Alex Kearney

General conservation mowing recommendations for the site (applicable to the collective early successional habitat management units) are as follows:

- ◆ Implement rotational mowing on select areas so that the different fields are mowed in different years.
- ◆ Defer some mowing on well-drained fields until late winter (March)
- ◆ Set cutter at a height of 6 inches or higher to avoid mowing the basal rosettes of perennial forbs.
- ◆ Mow from interior of the field outward to allow animals to escape to adjacent refugia
- ◆ Refrain from mowing at night or late evenings when birds are less reluctant to flee from path of mower
- ◆ Leave un-mowed strips or patches of older more mature grassland with forb composition periodically throughout the fields to provide greater plant diversity and hence a broader food base, and
- ◆ Control invading autumn olive, multiflora rose, and other invasives from field edges

Setting the mower height high avoids mowing the basal rosettes of perennial plants, allowing them to flower and seed the following year, and helps to avoid directly impacting small animals that may be present.

It is best to rotate mowing schedules so that all fields are not mowed at the same time, thereby allowing the various management units to have different vegetative coverage characteristics. A summary list of recommended conservation mowing measures (in general order of preference) is provided in the inset.

4.1.6 Artificial Structures for Wildlife

Eastern Bluebirds and Tree Swallows would benefit from appropriate nest boxes placed strategically within the open areas of the site. Eastern Bluebird houses are readily used by Tree Swallows which may competitively exclude bluebirds from nesting in boxes erected for them. Having pairs of bluebird boxes at each nest box location may reduce competition between the two species which may occur if only one box was erected. Once a Tree Swallow pair is established in a nest box, it will exclude other Tree Swallows from the territory, freeing the second box for use by Eastern Bluebirds. These boxes should be placed out in the open and mounted atop poles fitted with predator baffles.

Purple Martins ('Threatened' CT-ESA) nest in colonies at nearby locations (Greenwich Point, Westport, Milford, etc.). This aerial insectivore was historically more abundant in the state and likely fared well when the landscape surrounding the site was primarily agricultural. However as farms were abandoned and fields succeeded to forest, the once formerly extensive network of open farmland adjacent and proximal to the site slowly disappeared. The fields at Randall's farm maintained as early successional habitats and proximal to an open water feature appear to offer suitable habitat for Purple Martins, therefore the installation of a Purple Martin house appears to be a conservation measure that is appropriate for the site.

At night, bat species become the predominant aerial insectivores replacing swifts, swallows, martins and flycatchers in this feeding guild. Properly designed, built, placed, and maintained bat boxes could be established to provide supplemental roosting sites, maternity sites, and hibernacula for arboreal species. Hollow snags, standing dead wood and large pieces of exfoliating bark from mature trees are important microhabitat requirements of bats and should be retained on site as safety permits. Bat houses (**Figure 4-2**) can provide additional roosting and maternity sites for the various bat species expected to occur on site.

4.1.7 Pesticide and Fertilizer Management

The most commonly used pesticides in landscaping applications are herbicides used for weed control. Given the potential impacts to human health and the environment, it is important to understand the fate of these chemicals in the environment once they are released, either through prescribed application, disposal, spillage, or other uncontrolled loss. If applied properly (i.e., by a licensed applicator and in accordance with manufacturer recommendations and at the proper concentrations) insecticides and herbicides typically adhere to the intended leaf surface targets and may safely be used for the application they were intended. However, because of the potential impacts associated with improper use and resultant dangers to human health and the environment, other alternatives should be considered before resorting to synthetic chemical pesticide application. An Integrated pest management approach allows managers to explore a variety of options for pest control.

Integrated Pest Management is defined by the University of Connecticut as “a sustainable approach to managing pests” where “practitioners base decisions on information that is collected systematically as they integrate economic, environmental, and social goals”⁴. As part of an IPM program, a number of alternatives are assessed to control the pest in an effective manner given site specific constraints, attributes, goals, objectives, and concerns. Alternatives that could be selected include one or more techniques of biological, cultural, mechanical, physical, genetic, or chemical control measures acting singularly or collectively.

Appropriate precautions are recommended for all chemical use. These precautions include both general usage and site-specific measures, collectively referred to as best management practices for pesticide use. Best Management Practices include but are not necessarily limited to such measures as the following:

- Proper storage of the chemicals in a manner that is compliant with local, state, and federal regulations. This typically means but is not necessarily limited to storage in manufacturer-approved vessels, in a secure location with appropriate placards, and with accompanying spill containment kits
- Compliance with other regulatory controls such as supplying maintenance staff with proper training and certification for application/usage, or contracting professional applicators that are fully licensed and permitted
- Compliance with label directions (e.g., treatments applied in the correct doses and during the recommended conditions), to ensure effectiveness, and efficiency in application, and
- Proper notification to the public as required by law.

4.1.7 Stewardship / Outreach

Public outreach and education measures for which Randall’s Farm could be the venue include the following:

- Community service projects conducted by volunteers (e.g., invasive species control and trail maintenance days, etc.)
- Community educational signage explaining the importance of ecosystem services, and
- Bird/nature walks led by local naturalists.



Figure 4-2. Bat houses can provide roosting and maternity sites for various arboreal bat species expected to occur on site.

⁴ <http://www.hort.uconn.edu/ipm/>

Educational signage could be erected across the grounds of Randall's Farm at various points of interest. Some signage topics could be resource-specific (such as the identification of a plant community type or typical resident bird species), while other signs could offer more system-wide information (such as explanations of hydrologic cycles, nutrient flow, productivity, and various other biotic and abiotic processes in the eastern woodlands environment). Still other signage could provide information regarding the habitat management techniques conducted on site at Randall's Farm to date.

Randall's Farm could become the site of a citizen's science project. Various Public Participation in Scientific Research (PPSR) projects – often called “citizen science” projects – have contributed greatly toward a number of scientific endeavors such as distributional studies, baseline documentation, presence/absence level monitoring, etc. PPSR has the social advantage of involving people of all ages, skills, backgrounds, and interests directly in these various scientific endeavors. Therefore, anyone can participate and become involved in advancing our understanding of nature and natural systems. The information shared by citizens taken collectively, are valid, meaningful contributions to science. All that is required is a desire to learn and a willingness to participate in a scientific endeavor. In fact, the number of published scientific papers based on citizen-collected data is increasing each year. The benefits of instituting or expanding PPSR projects at Randall's Farm include the following:

- Creating public awareness and understanding of scientific concepts
- Fostering scientific skills including observation, recording, measuring, and analysis
- Expanding publicity of Randall's Farm in order to attract additional potential ALT members
- Raising the public perception of Randall's Farm's role in the community and
- Generating real and meaningful contributions to scientific research thereby benefiting both the scientific community and society (Bonney et al. 2009) http://eol.org/info/contribute_research

A number of novel programming ideas could be developed toward some of the above goals whether they are part of a PPSR project or not. Examples of novel programming ideas that may increase the visibility of Randall's Farm include or center on the following:

- Bat detection using echolocation monitoring equipment (No permit required)
- Game camera deployment to monitor nest boxes, wildlife corridors, or other resource areas
- Moth trapping and subsequent specimen identification to develop a baseline inventory
- Bird-banding Demonstrations
- Star-gazing nights
- Photography contest, and
- Bioblitzing

4.2 Recommended Long-term Goals for Randall’s Farm

4.2.1 General Habitat Matrices Improvement

Through efforts by volunteers and stewards, existing habitats within the property could be improved or enhanced to benefit avifauna. Various management measures can be implemented to increase habitat value without affecting existing human usage areas. Planting native shrubs that bear fruit (soft mast) and nuts (hard mast) beneficial to avifauna is one such way. 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, etc.) with sustenance
- Food items - especially hard and soft mast - are available continuously 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.

Supplemental Plantings

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 4-1**. Areas where invasive vegetation is removed should be replanted with one or more of these species in order to prevent the re-colonization of the removed invasive plants while simultaneously providing a source of nutrition for many types of bird life.

Table 4-1. Recommended Shrub Species for Southern New England Birdscaping (from Kress 2006)		
Recommended Species	Avifauna benefitted	Comment / Considerations
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

Dogwoods (<i>Cornus sericea</i> , <i>C. alterniflora</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 and various other songbirds	Fruits are highly valuable to avifauna including Neotropical migrant songbirds. 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, however identification of native species is difficult, and many native varieties are susceptible to diseases
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 birds and small mammals (<i>R. allegheniensis</i>); fruits are also edible for humans
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

To ensure success of any plantings added to the site for wildlife benefit, care must be taken to choose the proper plant for the proper place considering soil texture, drainage class, percent organic matter, slope aspect, sun and shade regimes, and hydrologic conditions.

Restoration and management of specific habitat types will be considered successful if the habitat is functional and can support relevant life-stages of carefully selected conservation priority species. These indicator species can be plants or animals and the life-stages considered relevant for each differ by habitat types (e.g. for some species a management goal may be that the habitat supports a breeding pair or breeding population, while for other species providing critical resources during a migratory stop-over may be a goal). For instance, planned enhancement of the existing early successional vegetation with additional woody scrub can benefit species such as Eastern Towhee and Brown Thrasher ('Special Concern' CT-ESA). Both species pass through the area in small numbers during migration. Further, additional planting of evergreen stands (Red Cedar) in the upland can provide suitable roosting sites for Long-eared Owl ('Endangered' CT-ESA), Northern Saw-whet Owl ('Special Concern' CT-ESA), as well as stop-over potential for migrating Red Bats ('Special Concern' CT-ESA), and cedar berries provide an important food source for wintering resident avifauna. Table 4-2 describes species or species suites proposed as targets for restoration, conservation and management activities.

**Table 4-2
Conservation, Restoration & Management Action Matrix
Randall's Farm Conservation Priority Species / Species Groups**

Conservation Priority Species/Group	Habitat	Goal	Proposed Action	Success Benchmark
Keystone herbaceous pollinator plants (e.g., <i>Asclepias spp.</i> , <i>Achillea millefolia</i> , <i>Spiraea alba</i> , etc.)	Old Fields	Allow fields to mature where possible Cut trail “shelves” along existing paths for lower growing plants such as <i>Trifolium</i> , etc.	Implement conservation mowing regime, avoid annual mowing of fields that are not invaded by woody upland invasives	Increase in stem abundance
Key flowering and fruiting shrubs (e.g., Silky Dogwood and Highbush Blueberry)	Wetlands	Release individual shrubs from invasive competition	Inspect specimen shrubs yearly and clear any competing invasive lianas or shrubs from perimeter	Health and vigor of individual shrubs maintained or improving
Evergreen cover (e.g., Red Cedar and Spruce)	Existing upland stands	Maintain health and vigor or existing specimens (Red Cedar) Increase age class diversity (Spruce)	<ul style="list-style-type: none"> ▪ Release from invasive competition; protect young stems from deer browse (Cedars) ▪ Consider planting additional younger specimens (Spruce and Cedar) or transplanting existing young specimens (Spruce) 	<p>Health and vigor of individual trees maintained or improving, esp. sapling cedars</p> <p>Number of new young sapling spruce and cedar</p>
Monarch Butterfly	Mature fields with milkweed	Allow open field areas to mature so that milkweed flowers go to seed and disperse	<ul style="list-style-type: none"> ▪ Refrain from mowing until milkweed seed is set 	Increase in Milkweed coverage
Other Native Pollinators	Flowering plants	Maintain a diversity of flowering plants throughout the site. Offer multiple nectar and pollen sources (both herbaceous and woody) throughout the growing season.	<ul style="list-style-type: none"> ▪ Implement conservation mowing regime ▪ retain standing and downed dead wood on site where feasible ▪ Construct wood piles, leaf piles, and brush piles for pollinator hibernation 	Number and diversity of native pollinators visiting nectar sites throughout the growing seasons.

**Table 4-2
Conservation, Restoration & Management Action Matrix
Randall's Farm Conservation Priority Species / Species Groups**

Conservation Priority Species/Group	Habitat	Goal	Proposed Action	Success Benchmark
			<ul style="list-style-type: none"> ▪ Limit the use of broadcast pesticides and herbicides on site ▪ Cut trailside "shelves" so lower growing flowering plants can add to the floristic structure on site 	
Bats	Large diameter trees; trees with exfoliating bark, natural cavities and crevices, bunches of old dried leaves, etc.	Provide suitable migratory stop-over habitat for these species (e.g., dense tree foliage, bat boxes) Retain standing dead snags esp. those with exfoliating bark and natural cavities	Plant additional conifer groves in the upland as cover during migratory stopover	Habitat use by these species during breeding and migration seasons
Field Sparrow	Old field	Provide suitable migratory stop-over and breeding habitat for this species	Manage field areas in an old field/early shrubland successional state	Continued presence of Field Sparrow during breeding season (June and July)
Indigo Bunting	Old Field	Provide suitable migratory stop-over and breeding habitat for this species	Manage field areas in an old field/early shrubland successional state	Continued presence of Indigo Bunting during breeding season (June and July)
Brown Thrasher	Old field grassland, interspersed with dense stands of trees & shrubs	Provide suitable migratory stop-over habitat	Plant additional dense woody shrubs in the upland section and let dense shrubby borders develop along field and forest ecotones	Habitat use by this species during migration
Vernal pool species (e.g., Spotted Salamander, Wood Frog)	Seasonal pools for breeding, forested upland buffer for non-breeding periods, abundant coarse woody debris for cover	Protect existing vernal pool and maintain forested upland buffer surrounding the pool	Retain large pieces of coarse woody debris on the upland forest floor; maintain a wide forested buffer around the pool edges	Numbers of Spotted Salamander and Wood Frog egg masses inventoried each Spring

4.2.2 Consider Additional Habitat/Microhabitat Creation

ALT could explore the feasibility of creating additional microhabitats on the property that would not only benefit wildlife but also offer ecosystem benefits to the site thereby adding financial return to the investment of habitat creation. Potential recreated or restored habitats that would be fitting for the site include dry shrubland, pollinator meadow, and younger age-class forest stands.

Pollinator Zones

Seed beds could easily be prepared by a landscaping contractor and the mix seeded in by hand or by seed spreader to the supplier's specification. There are specific mixes for detention basin or pond shores, steep slopes, upland areas, and wetland areas. These mixes include an assortment of grasses and forbs that add structural diversity to herbaceous vegetation zones, nectar sources, aesthetics, slope stability, and general food and cover for avifauna and other wildlife.

Conifer Groves

New conifer groves could be established at some of the quieter areas of the property add age class diversity to the existing conifer stands on site. Newly established groves should be protected from deer browse and be maintained so as not to become overgrown by invasive plants.

Dry Shrubland

The trees within the adjacent forested portions of the site have arched out into the field in some areas seeking the available light, but also impacting the formation of a well-developed "ecotone" (edge habitat). Ecotone development can be enhanced by "elevating" adjacent shade trees (removing lower limbs to allow deeper light penetration), selective removal of invasive species, the erection of deer exclosures at the field edge, and the addition of supplemental plantings such as dogwoods, sumacs, blueberry, American Hazelnut, Northern Bush Honeysuckle, or blackberry species. Supplemental planting along the edge is very important after elevating the trees in the adjacent woodland so that the newly created light space does not encourage invasive plant seedling growth on site. This is known as "edge sealing" and the practice could be used elsewhere on the site where field/forest edge is overrun by non-native invasive plants.

Examples of appropriate seed mixes that can be used to enhance habitat and aesthetics on the site are provided in Appendix IV. One mix – the conservation seed mix – is appropriate for upland herbaceous zones. This mix includes grasses and forbs that will serve as seed nectar food sources to migrant birds and insects, as well as add an aesthetic component to the site.

Forest Development

Since most of the upland woodlands and forest patches on the property lack well-developed native understory layers, measures that would encourage seedling generation and the development of a dense herbaceous layers would likely improve these habitats. Deer could be excluded using fencing or via the strategic placement of tree limbs downed from storms. The limbs, placed askew in loosely scattered piles, may prevent deer from accessing the ground where the re-generation was scheduled, but still allow light to reach portions of the ground to sustain sprouting plants. Due to the small size of the woodland patches on site, the high edge to volume ratio, and the propensity of Red Maples growing in hydric

soil to topple in wind storms, gap cuts and other forest treatments do not appear to be necessary at this time, especially in light of other pressing management concerns on the portfolio of ALT’s preserves.

Pond Enhancement

Establishment of a wider vegetated buffer around the ponds on site would benefit wildlife. A densely vegetated shoreline would benefit nesting waterfowl and other wildlife using the ponds on site. Additional plantings do not appear to be needed at this time. Instead, the establishment of a wider no-mow zone within the fringing vegetated wetlands and adjacent upland areas should be delineated so that no mowing occurs in this area. Should additional supplemental plantings be desired, one or more of the plants in Table 4-3 would likely be suitable.

The various aquatic invertebrate species (food for higher life-forms) partition their niche via substrate type, feeding guild, or both. Therefore, the pond shore should be augmented with areas characterized by a variety of substrates ranging from dense gramminoids, boulders, logs, cobble, mud, leaf litter, stumps, and vertically and horizontally protruding sticks. This variety of substrates will serve the widest range of pond life. For instance, dragonflies will perch on protruding stems and their larvae will emerge from the aquatic stage by climbing vertical structure. Amphipods will seek cover in dense algae, isopods in leaf litter, etc.

Table 4-3. Recommended Plantings for Pond Enhancement			
Common Name (Scientific Name)	Adaptive Mode	Wetland Zonation	Notes
Buttonbush <i>Cephalanthus occidentalis</i>	Emergent Woody	Short term saturated to Permanently flooded	Shrub produces aromatic flowers in the summer that are beneficial pollinator attractants. Also provides nesting cover for a number of songbirds that occur in wetlands.
Sweet Pepperbush <i>Clethra alnifolia</i>	Woody	Short term saturated to Permanently flooded	Shrub produces aromatic flowers in the summer that are beneficial pollinator attractants. Also provides nesting cover for a number of songbirds that occur in wetlands.
Alder <i>Alnus incana, A. rugosa</i>	Woody	Short term saturated to Permanently flooded	Shrub provides food and cover for songbirds, and bank stabilization.
Winterberry <i>Ilex verticillata</i>	Woody	Short term saturated to Permanently flooded	Shrub produces fruits that persist into winter making them an importance source of sustenance for wintering frugivorous songbirds
Swamp Rose <i>Rosa palustris</i>	Woody	Short term saturated to Permanently flooded	Provides cover for songbirds and is a source of nectar and pollen for pollinators
Pussy Willow <i>Salix discolor</i>	Woody		Provides cover for songbirds and is an important source of nectar and pollen in the early spring for early emerging pollinators before most flowering plants have bloomed

4.3 Addressing Data Gaps & Additional Monitoring

It is recommended that future studies assess the use of the site by bats during all seasons. None were identified during the assessment period as proper monitoring requires use of specialized protocols and equipment. Bat species presence determinations can easily be conducted by the use of ultrasonic sensor detection of their vocalizations. This method has the advantage over trapping in that it is non-invasive and more comprehensive method of identifying mixed species congregations of foraging bats. Trapping allows for the conduct of health assessments of individuals caught and the collection of other biometrics. Both approaches require qualified personnel, and trapping has the added requirement of securing a CT DEEP Wildlife Division collection permit prior to implementation.

Natural plant communities often have the potential to contain rare Lepidoptera (butterflies and moths) dependent on certain species of host plants. Since these habitat types occur at Randall's Farm and nearby areas, they could be further examined for rare Lepidoptera using an array of light traps.

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, 2015a). The lack of representation of certain insect orders from inclusion on Connecticut's Endangered, Threatened and Special Concern Species list (CT DEEP, 2015b) 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 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 site. Deployment of self-activating game cameras can monitor for larger mammals.

4.4 Benchmarks for Success

Management success could be gauged from both a social and ecological 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 site management decisions might be another measure of success. Hard data collected as a result of any monitoring efforts that may be implemented on site 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 habitat improvement or enhancement actions completed
- Number of populations of priority species documented to be stable or increasing
- Area impacted by invasive plants decreasing
- Areal coverage of newly established native plant species
- 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.

Bird sightings data reported to eBird⁵ 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 seasonal or other temporal changes.

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⁵ Launched in 2002 by the Cornell Lab of Ornithology and National Audubon Society, eBird is an online checklist program, available to the birding community. It is used to store reports and accesses information about bird abundance and distribution at a variety of spatial and temporal scales. Additional details can be found at <http://ebird.org/content/ebird/about>

Summary and Conclusions

The results of the habitat assessments and observations conducted at Randall's Farm revealed that the study area hosts an interesting array of species across multiple taxa, including some species identified by the CTDEEP as Species of Greatest Conservation Need. The total species richness of the area is expected to be even greater than what was detected during the 2015-2016 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 2015-2016 survey succeeded in identifying key species of conservation concern among the habitats represented on site, and a number of sensitive environmental receptors.

Priority habitats identified on site and adjacent lands include mixed hardwood woodlands, seasonal pools, riverine intermittent watercourse and associated riparian and palustrine forested wetland, and the multiple open field areas.

Conservation, restoration, and management actions were identified for the site to address these issues and other threats and to conserve Randall's Farm's Conservation Priority Species. Implementation of a conservation mowing regime strategy is the single most important management recommendation applicable to Randall's Farm Preserve in order to improve upon the site's value to biodiversity. The current mowing regime should be altered in order to benefit local pollinators and the biota that depend on them directly and indirectly. The recommendations made herein to that effect will achieve greater floristic composition, greater seasonal floristic structural diversity, and will benefit a variety of taxa throughout the year. These conservation mowing recommendations can also be implemented in a way that honors the commitments written in the deed.

The Implementation of conservation mowing and the enhancement of existing ecotones via judicial pruning and selective plantings are two major short-term management goals identified to improve the habitats on site. Overbrowsing by White-tailed Deer and the proliferation of non-native invasive plant species were identified as two other potentially significant threats to ecosystem health that may require comparatively longer-term commitment of resources to address.

No conflicts between the implementation of these measures and maintaining the grounds for current uses were noted, and the recommendations can be implemented as time and funding allows. It would be reasonable to think that implementation of many of these measures would be conducted as part of a multi-year framework. This framework, when integrated with the recommendations provided in Chapters 3 and 4, will allow for continued stewardship of the site in such a way as to sustain the biodiversity and to maintain and benefit from associated ecosystem services.

CT avifauna of conservation concern use the site during both spring (northbound) and autumn (southbound) migration, and some species of conservation concern are breeding residents. Disturbance to these species in and adjacent to the site and adjoining habitats should be minimized, and the value of the site as an important migratory stopover site for birds and bats in an increasingly developed landscape setting should be

emphasized. The site would likely serve as a suitable location for a variety of educational outreach measures, such as signage identifying the habitats/vegetation communities, the typical species that one could expect to find there, and most importantly, the ecosystem services they provide.

This plan has identified measures that ALT can take to protect and enhance sensitive environmental receptors at Randall's Farm. Further details regarding implementation and logistics of affecting specific management techniques (e.g., invasive species control programs, artificial nesting structure maintenance program, best management practices for invasive species control, etc.) could be further outlined and detailed in project-specific step-down plans as needed.

The personnel at ALT have already implemented wildlife stewardship actions on the property as noted herein. These actions, their commitment to implement this study, and their contributions toward the completion of this plan are commendable steps toward ecological stewardship and sustainability. ALT's efforts toward this end should serve as an example to other institutions and large land holders in the region.

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Limitations

FHI's ecological assessments were performed in accordance with generally accepted practices of other consulting natural resource specialists providing similar services during similar temporal conditions and in similar geographical settings. FHI personnel observed the degree of care and skill generally exercised by other consulting natural resource specialists under similar circumstances and conditions. FHI's 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 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. Our goal was to identify the biological indicators of diversity and ecosystem health, so that we could make appropriate recommendations for ecological stewardship.

The observations described in this report were made on the dates referenced and under the conditions stated therein. Conditions observed and reported by FHI 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 FHI. There may be variations between the results of this assessment(s) and other past or future assessments due to these inherent environmental factors.

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Plants Identified at Randall's Farm

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Column4	Column1	Column2	Column3
Comprehensive List of Plants Tentatively Identified at Randall's Farm 2016			
Scientific name	Common Name	Growth form	Notes
Acer rubrum	Red Maple	Tree	Seeds eaten by Evening Grosbeaks, Seedlings grazed by deer; Host plant of Eastern Spring Azure
Acer saccharinum	Sugar Maple	Tree	CT GCN sp. - Important
Achillea millefolium	yarrow	Forb	CT GCN sp. - Important; Host plant of Painted Lady
Acorus calamus	Sweetflag	Forb	
Agalinus tenuifolius	Slender gerardia		
Alisma plantago-aquatica	Water plantain	Forb	
Alliaria petiolata	Garlic mustard	Forb	Non-native Invasive
Anemone quinquefolia	Wood Anemone	Forb	Source of nectar in early spring
Apios americana	Groundnut	Gramminoid	Host plant to Silver-spotted Skipper (<i>Eparqyreus clarus</i>)
Apocynum cannabinum	Dogbane	Forb	
Arisaema triphyllum	Jack In the Pulpit	Forb	Fruit sometimes eaten by Wood Thrush
Artemesia vulgaris	Common Mugwort	Forb	
Asclepias incarnata	Swamp Milkweed	Forb	Nectar attracts almost every butterfly spp. Host plant for Monarch Butterfly and Milkweed Tussock Moth. A. syriaca = CT GCN sp. - Important
Asclepias syriaca	Field Milkweed	Forb	Nectar attracts almost every butterfly spp. Larval food for Monarch
Asclepias tuberosa	Butterfly Milkweed	Forb	Nectar attracts almost every butterfly spp. Larval food for
Aster vimineus		Forb	
Aster pillosus		Forb	
Athyrium felix-femina	Lady Fern	Fern	
Berberis thunbergii	Japanese Barberry	Shrub	Non-native Invasive
Betula allegheniensis	Yellow Birch	Tree	
Betula lenta	Black Birch	Tree	Host plant for Red-spotted Purple, Viceroy, and Mourning Cloak
Betula populifolia	Gray Birch	Tree	
Bidens frondosa	Beggar's ticks	Forb	Seeds eaten by sparrows and finches
Boehmeria cylindrica	Small-spike False Nettle	Forb	Host plant for Red Admiral and Eastern Comma
Bromus inermis		Gramminoid	
Calystegia sepium	Hedge bindweed	Liana	
Carex crinita	Fringed Sedge	Sedge	Seeds eaten by waterfowl and sparrows
Carex hystericina	Porcupine Sedge	Sedge	Seeds eaten by waterfowl and sparrows
Carex intumescens	Shining Bur Sedge	Sedge	Seeds eaten by waterfowl and sparrows
Carex lacustris			Muskrats eat culms (bases) and roots, and tips of young leaves
Carex scoparia	Broom Sedge	Sedge	Seeds eaten by waterfowl and sparrows
Carex stricta	Tussock Sedge	Sedge	Potential hostplant for Dun Skipper (<i>Euphyes vestris</i>)?

Carex pensylvanica	Pennsylvania Sedge	Sedge	
Carpinus caroliniana	American Hornbeam	Subcanopy tree	Host plant for Red-spotted Purple; Deer browse twigs and foliage;
Carya ovata	Shagbark Hickory	Tree	Host plant for Banded Hairstreak; Arboreal bat spp. roost under
Celastrus orbiculatus	Oriental Bittersweet	Liana	Non-native Invasive
Centaurea sp.	Knapweed	Forb	
Cephalanthus occidentalis	Buttonbush	Shrub	Excellent native hydrophyte for pollinators and songbird cover
Chelone glabra	Turtlehead	Forb	Host plant for Baltimore checkerspot (Euphydryas phaeton)
Cichorium intybus	Chicory	Forb	
Cinna sp.	Wood Reedgrass	Gramminoid	
Cirsium canadense	Canada Thistle	Forb	Non-native Invasive; seeds eaten by American Goldfinch
Clethra alnifolia	Sweet Pepperbush	Shrub	Excellent shrub for songbird cover and pollinatr source
Cornus ammomum	Silky Dogwood	Shrub	Fruits eaten by Wild Turkey, Wood Duck, and various songbirds, wood and foliage browsed by cottontail rabbits
Cornus florida	Flowering Dogwood	Tree	Fruits provide food for 36 bird species
Coronilla varia	Crown Vetch	Forb	
Creatagus sp.	Hawthorn	Shrub	Spring blooms provide nectar and pollen source for pollinators; Fruits consumed by approx. 18 bird spp.
Cyperus esculentus	Yellow nutsedge	Gramminoid	
Dactylus glomerata	Orchard Grass	Grass	
Daucus carota	Queen Anne's lace	Forb	Hostplant to Black Swallowtail (<i>Papilio polyxenes</i>)
Desmodium sp.	Tick Trefoil	Forb	Legume = Nitrogen fixer that naturally increases soil fertility; Host
Dianthus armeria	Deptford pink	Forb	
Dichantheium clandestinum	Deer tongue Grass	Gramminoid	
Digitaria sanguinalis	Crab Grass	Forb	
Echinochloa crus-gali	Barnyard Grass	Gramminoid	Seeds eaten by Waterfowl, Sora, Red-winged Blackbird, and Savannah Sparrow
Elaeagnus umbellata	Autumn olive	Shrub	Non-native Invasive
Eleocharis sp.	Spike Rush	Gramminoid	
Elytrigia repens	Quackgrass	Grass	Seeds eaten by Snow Buntings
Epilobium		Forb	
Eragrostis spectabilis	Purple Lovegrass	Grass	Hostplant for the Zabulon Skipper (<i>Poanes zabulon</i>)
Erechtites hieraciifolia	Pile wort, Burnweed	Forb	
Erigeron annuis	Daisy Fleabane	Forb	
Equisetum arvense	Field horsetail	Forb	
Euonymus alatum	Winged Euonymus	Bush	Non-native Invasive
Eupatorium perfoliatum	Boneset	Forb	Flowers used by dozens of pollinators
Eupatorium fistulosum		Forb	Flowers used by dozens of pollinators
Eurybia divaricata	White Wood Aster	Forb	
Euthamia graminifolia	Grass-leaved goldenrod	Forb	Flowers used by dozens of pollinators

Fagus grandifolia	American Beech	Tree	Host plant to Red-spotted Purple; Excellent fall food source: Fruits
Fallopia scandens	Wild Buckwheat	Liana	
Forsythia sp.		Shrub	
Fraxinus sp.	Ash	Tree	Seeds eaten by Wood Duck, Purple Finch; saplings used by Beaver
Galium mullogo	Bedstraw	Forb	
Geum sp.	Avens	Forb	
Glyceria sp.			
Gnaphalium macounii	Clammy everlasting	Forb	
Hypericum perforatum	Saint John's wort	Forb	flowers used by pollinators
Ilex verticillata	Winterberry	Shrub	Fruits eaten by Cedar Waxwing, American Robin, No. Mockingbird, Brown Thrasher, and Gray Catbird
Impatiens capensis	Jewelweed; Spotted Touch-me-not	Forb	Seeds eaten by White-footed Mouse and other small rodents
Iris versicolor	Blue flag	Forb	
Juncus canadensis		Gramminoid	
Juncus effuses	Soft Rush	Forb	
Juniperus virginiana	Red Cedar	Tree	CT GCN sp. - Important. Host plant to Juniper Hairstreak; retains fruits into the winter - eaten by Cedar Waxwings and over 50 other species
Lactuca sp.	Wild Lettuce	Forb	
Leersia virginica	White Grass	Grass	
Leersia oryzoides	Rice cutgrass	Grass	Host plant to Peck's Skipper
Lespedeza capitata	Round-headed Bush-clover	Forb	Hostplant to Eastern Tailed Blue (<i>Everes comyntas</i>); and Northern Cloudywing
Linaria vulgaris	Butter-and-eggs	Forb	Non-native; but may bloom late into the early winter season
Lindera benzoin	Spicebush	Shrub	Hostplant to Spicebush Swallowtail (<i>Papilio troilus</i>), Cynthia Moth, Imperial Moth, Promethea Moth, and Tulip Tree Beauty; Fruits eaten by Thrushes and other songbirds
Liriodendron tulipifera	Tuliptree	Tree	Important to native pollinators as a mid-spring food source; folowers attract various bees; samaras eaten by Purple Finch
Lonicera japonica	Japanese Honeysuckle	Liana	non-native invasive
Lonicera morrowii	Morrow's honeysuckle	Shrub	non-native invasive
Lotus corniculatus	Birds' foot Trefoil	Forb	
Lycopus uniflorus	Northern Bugelweed	Forb	
Lyonia ligustrina	Maleberry	Shrub	Provides cover for nesting songbirds
Lysimachia quadrifolia	Whorled Loosestrife	Forb	Flowers used by pollinators
Lythrum salicaria	Purple loosestrife	Forb	non-native invasive
Maianthemum canadense	Canada Mayflower	Forb	Important Spring Ephemeral
Mentha arvensis	Field Mint	Forb	

Microstegium viminium	Japanese Stiltgrass	Gramminoid	non-native invasive
Morus alba	White Mulberry	Tree	non-native invasive
Nyssa sylvatica		Tree	Important to native pollinators as a mid-spring food source; used by various bees and flies; Fruits eaten by songbirds and woodpeckers
Onoclea sensibilis	Sensitive Fern	Fern	
Oenothera biennis	Evening Primrose	Forb	Flowers preferred by <i>Diadasia</i> bees; host plant to Primrose moth and White-lined Sphinx
Osmunda cinnamomea	Cinnamon Fern	Fern	
Osmunda regalis	Royal Fern	Fern	
Oxalis corniculatus	Creeping Wood Sorrel	Forb	
Parthenocissus quinquefolia	Woodbine; Virginia Creeper	Liana	fruits provide food for at least 35 bird species, esp. Mockingbird and Yellow-bellied Sapsucker
Penthorum sedoides	Ditch Stonecrop	Forb	
Phalaris arundinacea	Reed Canary Grass	Gramminoid	Invasive
Phleum pratensis	Timothy	Gramminoid	
Phytolacca americana	Pokeweed	Forb	Fruits eaten by Mourning Dove, Catbird, Mockingbird, Cedar Waxwing, Hermit Thrush, Eastern Bluebird, and Raccoons
Picea abies	Norway spruce	Tree	Cover for roosting owls, songbirds, and arboreal bats; cones eaten by Red Squirrel and Crossbills
Picea pungens	Blue Spruce	Tree	Cover for roosting owls, songbirds, and arboreal bats; cones eaten by Red Squirrel and Crossbills
Pilea sp.	Clearweed	Forb	
Pinus strobus	White Pine	Tree	Cover for roosting owls, cones eaten by Red Squirrel and Crossbills and a number of other bird species
Plantago lanceolata	English plantain	Forb	Host plant for Baltimore checkerspot (<i>Euphydryas phaeton</i>)
Plantago major	Common plantain	Forb	Alternate host plant for Baltimore checkerspot (<i>Euphydryas phaeton</i>), and Common Buckeye; cottontail rabbits browse the
Polygonum c.f. hydropiperoides	Swamp smartweed	Forb	Seeds are eaten by waterfowl, Wilson's Snipe, Northern Cardinal,
Polygonum sagittatum	Arrow-leaved tearthumb	Forb	
Polystichium achrosticoides	Xmas fern	Fern	
Pontedaria cordata	Pickerelweed	Emergent Forb	
Potentilla sp.	Cinquefoil	Forb	
Prunella vulgaris	Heal-all	Forb	hardy flower of understories that provides nectar to variety of pollinators
Prunus pensylvanica	Pin Cherry	Tree	GCN - Important
Prunus serotina	Black Cherry	Tree	At least 47 bird species consume the fruit. Hostplant of Eastern Tiger Swallowtail (<i>Papilio glaucus</i>); Eastern Spring Azure, and Red-spotted Purple

Pycnanthemum	Mountain Mint	Forb	Flowers are used by pollinators
Pyrola americana	Round-leaved Pyrola	Forb	Early spring source of pollen and nectar for pollinators
Quercus alba	White Oak	Tree	Preferred hostplant to Juvenal's Duskywing (<i>Erynnis juvenalis</i>), Banded Hairstreak (<i>Satyrium calanus</i>); at least 28 species of wildlife in the northeast consume the acorns
Quercus bicolor	Swamp White Oak	Tree	Acorns are eaten by Wild Turkey, woodpeckers, Blue Jays, Raccoon, Gray Squirrel, Eastern Chipmunk, Black Bear, and White-tailed Deer; Hostplant to Juvenal's Duskywing (<i>Erynnis juvenalis</i>)
Quercus palustris	Pin Oak	Tree	Various oaks are host to larval moth species such as Imperial Moth, Rosy Maple Moth, Waved Sphinx, etc.
Quercus rubra	Red Oak	Tree	
Rhus glabra	Smooth Sumac	Shrub	winter-persistent fruits eaten by at least 21 bird species
Robinia pseudoacacia	Black Locust	Tree	Invasive
Rosa multiflora	Multiflora Rose	Shrub	Non-native Invasive
Rosa palustris	Swamp Rose	Shrub	
Rubus allegheniensis	Allegheny blackberry	Shrub	Rubus fruits provide food for at least 49 bird species; Host plants for Eastern Spring Azure, Mourning Cloak; Flowers provide nectar to pollinators (esp. Xylocopa bees)
Rubus hispidus	Swamp Dewberry	Trailing Forb	
Rubus flagellaris	Dewberry	Trailing Forb	
Rubus occidentalis	Black Raspberry	Shrub	
Rubus pheonicolasius	Wineberry	Shrub	Non-native Invasive
Rudbeckia hirta	Black-eyed Susan	Forb	Excellent nectar source for Pearl Crescent, Monarch, and Fritillaries
Rumex acetosella	Red Sorrel	Forb	Non-native Invasive
Rumex crispus	Curly Dock	Forb	Hostplant to American Copper (<i>Lycaena phlaeas</i>)
Salix cinerea ssp. cinerea	Gray Willow	Tree	Willows are an important pollen source for early emerging pollinators such as <i>Bombus</i> bees; Host plant to Mourning Clock, Viceroy, Red-spotted Purple, and various species of hairstreaks, skippers, and sphinx moths
Sambucus nigra	Elderberry	Shrub	Fruits provide food for at least 33 bird species
Sassafras albidum	Sassafras	Tree	Fruits eaten by 22 bird species; Host plant to Spicebush Swallowtail
Schizachyrium scoparium	Little bluestem	Gramminoid	Hostplant for various <i>Hesperiids</i> (Skippers)
Scirpus c.f. cyperinus	woolgrass	Gramminoid	Potential hostplant for Dun Skipper (<i>Euphyes vestris</i>)?

Setaria glauca	Yellow Foxtail	Gramminoid	Seeds are relished by Red Winged Blackbird, Cardinal, Junco, Horned Lark, Chipping Sparrow, Field Sparrow, Fox Sparrow, Lincolns Sparrow, Savannah Sparrow, Tree Sparrow, Vesper Sparrow, White-crowned Sparrow
Silene latifolia	White Campion	Forb	
Smilax rotundifolia	Roundleaved Green brier	Liana	Fruits eaten by Ruffed Grouse and Wild Turkey, Gray Catbird, Fish Crow, Northern Mockingbird, Swainson's Thrush
Solanum carolinense	Horse Nettle	Forb	
Solanum dulcamara	nightshade	Liana	
Solidago canadensis	Canada Goldenrod	Forb	Excellent late season nectar plants for American Lady, fritillaries,
Solidago rugosa	Rough Stemmed Goldenrod	Forb	Nectar source for a variety of bees and other pollinators
Sonchus arvensis	Field Sow Thistle	Forb	
Sparganium sp.	Burrweed		Seeds eaten by waterfowl, stems and foliage eaten by Muskrat
Sphagnum sp.	Sphagum Moss	Moss	
Spirea latifolia (alba)	Meadowsweet	Forb	CT GCN Sp. - Important; Flowers used by many small bees, butterflies, and flies; host plants to azure butterflies and Mourning Cloak
Spirea tomentosa	Steeple bush	Shrub	Flowers used by many small bees, butterflies, and flies; host plants to azure butterflies
Symphotrichum c.f. novae-anglii	New England Aster	Forb	Hostplant to Pearl Crescent (<i>Phyciodes tharos</i>)?
Symphotrichum novi-belgii	New York Aster	Forb	Important food source for bees active in late fall including new bumble bee queens trying to build up energy reserves prior to winter dormancy
Symphotrichum lateriflorum	Small white Aster	Forb	Important food sources for specialist bees in the following genera: <i>Andrena</i> , <i>Colletes</i> , <i>Melissodes</i> ; also plants in this genus are host
Symplocarpus feotidus	Skunk Cabbage	Forb	seeds sometimes eaten by Wood Duck, Ruffed Grouse, and Ring-necked Pheasant
Taraxicum officinale	Dandelion	Forb	Seeds eaten by goldfinch;
Thelypteris noveboracensis	New York Fern	Fern	
Thelypteris palustris	Marsh Fern	Fern	
Toxicodendron radicans	Poison Ivy	Liana	Skin irritant but has wildlife value (berries)
Triadenum virginicum	Marsh Saint John'swort	Forb	
Tridens flavens	Purpletop	Gramminoid	
Trifolium campestre	Yellow Hopclover	Forb	Clovers are high-value bee plants, and are the hostplants to Eastern Tailed Blue (<i>Everes comyntas</i>)
Trifolium pratense	Red Clover	Forb	
Trifolium repens	White Clover	Forb	
Typha latifolia	Cattail	Forb	Roostocks eaten by Muskrat

Ulmus americana	American Elm	Tree	Hostplant to the Morning Cloak (<i>Nymphalis antiopa</i>), and Question Mark (<i>Polygonia interrogationis</i>), and Eastern Comma (<i>Polygonia comma</i>)
Vaccinium corymbosum	Highbush Blueberry	Shrub	CT GCN Sp. - Important; fruits relished by songbirds
Verbascum thapsus	Common Mullein	Forb	
Verbena hastata	Blue Vervain	Forb	Hostplant of Common Buckeye (<i>Junonia coenia</i>); Seeds eaten by
Verbena urticifolia	White vervain	Forb	
Vernonia noveboracensis	New York Ironweed	Forb	Nectar attracts Great Spangled Fritillary, American Lady, Spicebush and Eastern Tiger Swallowtails, and Fiery and Silver-spotted Skippers; important plant for specialist <i>Melissodes</i> bees
Viburnum dentatum	Northern Arrowwood	Shrub	Alternate hostplant of Eastern Spring Azure (<i>Celastrina lucio</i>)
Vicia cracca	Cow Vetch	Forb	Hostplant to Eastern Tailed Blue (<i>Everes comyntas</i>); attracts a variety of bees (Bumble, honey, and leaf cutter bees)
Vitis labrusca	Foxgrape	Liana	Fruits provide food for at least 52 bird species

Appendix II

Randall's Farm Bird List

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SPECIES	SP	SU	EF	LF	W
Warblers					
<input type="checkbox"/> Pine Warbler	U	U	U	O	
<input type="checkbox"/> Prairie Warbler*	O	R	O	R	
<input type="checkbox"/> Palm Warbler	C		O	U	
<input type="checkbox"/> Bay-breasted Warbler	O		U		
<input type="checkbox"/> Blackpoll Warbler	U		C	U	
<input type="checkbox"/> Cerulean Warbler	R				
<input type="checkbox"/> Black & White Warbler	C	U	C	R	
<input type="checkbox"/> American Redstart*	C	U	C	R	
<input type="checkbox"/> Prothonotary Warbler	R	R			
<input type="checkbox"/> Worm-eating Warbler	U				
<input type="checkbox"/> Ovenbird	C	O	O		
<input type="checkbox"/> Northern Waterthrush	O		O	R	
<input type="checkbox"/> Louisiana Waterthrush*	O	O	R		
<input type="checkbox"/> Kentucky Warbler	R	R	R		
<input type="checkbox"/> Connecticut Warbler			R	R	
<input type="checkbox"/> Hooded Warbler	R	R	R		
<input type="checkbox"/> Wilson's Warbler	O		O		
<input type="checkbox"/> Canada Warbler	U	R	U		
<input type="checkbox"/> Yellow-breasted Chat	R	R	R	R	R
Tanagers					
<input type="checkbox"/> Scarlet Tanager	C	U	U	R	
Grosbeaks & Kin					
<input type="checkbox"/> Northern Cardinal*	A	A	A	A	A
<input type="checkbox"/> Rose-breasted Grosbeak*	C	O	C	R	
<input type="checkbox"/> Indigo Bunting*	O	C	U		
Towhees, Sparrows & Juncos					
<input type="checkbox"/> Eastern Towhee*	C	U	C	C	O
<input type="checkbox"/> American Tree Sparrow	U		R	O	R
<input type="checkbox"/> Chipping Sparrow*	C	C	C	O	
<input type="checkbox"/> Field Sparrow*	U	O	O	U	R
<input type="checkbox"/> Vesper Sparrow	R		R	R	
<input type="checkbox"/> Savannah Sparrow	O		O	O	
<input type="checkbox"/> Fox Sparrow	U		O	U	R
<input type="checkbox"/> Song Sparrow*	A	A	A	A	A
<input type="checkbox"/> Lincoln's Sparrow	O		O	O	
<input type="checkbox"/> Swamp Sparrow	C	O	U	U	O
<input type="checkbox"/> White-throated Sparrow	C		O	A	U
<input type="checkbox"/> White-crowned Sparrow	O	R	R	O	R
<input type="checkbox"/> Dark-eyed Junco	C		U	C	C
<input type="checkbox"/> Snow Bunting	R			R	
Blackbirds, Orioles & Kin					
<input type="checkbox"/> Bobolink	O		U	R	
<input type="checkbox"/> Red-winged Blackbird*	A	C	A	A	R
<input type="checkbox"/> Eastern Meadowlark	R		R	R	
<input type="checkbox"/> Rusty Blackbird	R		O	R	R
<input type="checkbox"/> Common Grackle*	A	C	C	A	O
<input type="checkbox"/> Brown-headed Cowbird*	A	U	C	A	O
<input type="checkbox"/> Baltimore Oriole*	C	C	C	O	R

SPECIES	SP	SU	EF	LF	W
Finches					
<input type="checkbox"/> Purple Finch	O	R		O	U
<input type="checkbox"/> House Finch*	A	A	A	A	A
<input type="checkbox"/> Red Crossbill	R		R	R	R
<input type="checkbox"/> White-winged Crossbill	R		R	R	R
<input type="checkbox"/> Common Redpoll	R		R	R	O
<input type="checkbox"/> Pine Siskin	U		O	U	U
<input type="checkbox"/> American Goldfinch*	A	C	A	A	U
<input type="checkbox"/> Evening Grosbeak	R			R	R
<input type="checkbox"/> House Sparrow*	A	A	A	A	A

Other Species:

Seasonal Status

- S** Spring: March - May
- SU** Summer: June & July
- EF** Early Fall: August - September
- LF** Late Fall: October & November
- W** Winter: December - February

Abundance

- A** (Abundant) Often seen in large numbers
- C** (Common) Often see in moderate numbers
- U** (Uncommon) Usually seen, but may be missed
- O** (Occasional) Infrequently seen
- R** (Rare) Very few seen
- F** (Fly-over)
- * Observed or suspected of nesting in recent years

Aspetuck Land Trust
 PO Box 444
 Westport, CT 06881
 203-331-1906
www.aspetucklandtrust.org



Checklist of Birds of the Randall's Farm



Eastern Bluebird

Anthony Zemba

A former dairy farm operated by the Randall family, Randall's Farm preserve is a scenic 34-acre expanse of meadows, fields, forested wetlands and hardwood forest. There are also small ponds and snapping turtles. Generously donated by Mrs. Henry B. DuPont III who acquired the property in 1983, the preserve officially opened in June 2012.

Enjoy this beautiful preserve with open meadows, stone walls, a pond and groomed trails through high grassy wildflower meadows. It is one of the last great old farm fields and area's few remaining historic long lots.

SPECIES	SP	SU	EF	LF	W
Loons & Grebes					
<input type="checkbox"/> Common Loon F	U		R	O	
<input type="checkbox"/> Pied-billed Grebe	R		R	R	
Cormorants					
<input type="checkbox"/> Double-crested Cormorant	O	R	U	O	
Hérons					
<input type="checkbox"/> Great Blue Heron	O	O	O	O	
<input type="checkbox"/> Great Egret	R		R	R	
<input type="checkbox"/> Green Heron*	U	U	U	O	
<input type="checkbox"/> Black-crowned Night-Heron	R		R	R	
Swans, Geese & Ducks					
<input type="checkbox"/> Mute Swan	R		R		
<input type="checkbox"/> Snow Goose F	R		R		
<input type="checkbox"/> Brant F	U		C		
<input type="checkbox"/> Canada Goose*	A	U	C	A	A
<input type="checkbox"/> Mallard*	C	C	C	C	O
<input type="checkbox"/> Wood Duck*	C	U	C	R	
<input type="checkbox"/> Green-winged Teal	R		R	R	
<input type="checkbox"/> American Black Duck	U	R	O	O	
<input type="checkbox"/> Northern Pintail	R	R	R	R	
<input type="checkbox"/> Blue-winged Teal	R		R	R	
<input type="checkbox"/> Gadwall			R		
<input type="checkbox"/> Bufflehead	O		O	R	
<input type="checkbox"/> Hooded Merganser	R		R		
<input type="checkbox"/> Common Merganser	R			R	R
Vultures					
<input type="checkbox"/> Black Vulture	R	U	R		
<input type="checkbox"/> Turkey Vulture	U	C	C	A	O
Raptors					
<input type="checkbox"/> Osprey	U	R	A	C	
<input type="checkbox"/> Bald Eagle	R		U	O	R
<input type="checkbox"/> Northern Harrier	O		U	U	
<input type="checkbox"/> Cooper's Hawk*	O	O	U	C	O
<input type="checkbox"/> Sharp-shinned Hawk	R	R	A	A	O
<input type="checkbox"/> Northern Goshawk	R		R	O	R
<input type="checkbox"/> Red-shouldered Hawk*	O		O	C	O
<input type="checkbox"/> Broad-winged Hawk	U	U	A	O	
<input type="checkbox"/> Red-tailed Hawk*	C	U	C	A	C
<input type="checkbox"/> Rough-legged Hawk					R
<input type="checkbox"/> Golden Eagle F			R	O	
<input type="checkbox"/> American Kestrel	U	R	C	U	R
<input type="checkbox"/> Merlin	O		U	O	
<input type="checkbox"/> Peregrine Falcon	O		O	O	
Pheasants & Turkey					
<input type="checkbox"/> Ring-necked Pheasant	R	R	R	R	R
<input type="checkbox"/> Wild Turkey*	U	U	U	U	U
Rails & Cranes					
<input type="checkbox"/> Virginia Rail	R			R	
Shorebirds					
<input type="checkbox"/> Killdeer	O	R	U	O	R
<input type="checkbox"/> Solitary Sandpiper	O		O	R	
<input type="checkbox"/> Spotted Sandpiper	O	R	O	R	
<input type="checkbox"/> Wilson's Snipe	R		R		
<input type="checkbox"/> American Woodcock*	U	O	U	O	

SPECIES	SP	SU	EF	LF	W
Gulls & Terns					
<input type="checkbox"/> Ring-billed Gull	R	R	O	O	R
<input type="checkbox"/> Herring Gull	O	O	O	O	O
<input type="checkbox"/> Great Black-backed Gull	R	R	R	R	R
Pigeons & Doves					
<input type="checkbox"/> Rock Pigeon	C	C	C	C	C
<input type="checkbox"/> Mourning Dove*	C	C	C	C	U
Cuckoos					
<input type="checkbox"/> Black-billed Cuckoo	R	R	R		
<input type="checkbox"/> Yellow-billed Cuckoo	O	R	O	R	
Owls					
<input type="checkbox"/> Eastern Screech-Owl*	U	U	U	U	U
<input type="checkbox"/> Great Horned Owl	U	U	U	U	U
<input type="checkbox"/> Barred Owl	R	R	R	R	R
<input type="checkbox"/> Northern Saw-whet Owl	R			O	R
Goatsuckers					
<input type="checkbox"/> Common Nighthawk	O	R	A	O	
<input type="checkbox"/> Whip-poor-will	R		R		
Swifts					
<input type="checkbox"/> Chimney Swift	C	O	A	O	
Hummingbirds					
<input type="checkbox"/> Ruby-throated Hummingbird*	U	O	C	R	
Kingfisher					
<input type="checkbox"/> Belted Kingfisher	O	U	O	U	R
Woodpeckers					
<input type="checkbox"/> Red-bellied Woodpecker*	C	C	C	C	C
<input type="checkbox"/> Yellow-bellied Sapsucker	O		O	O	R
<input type="checkbox"/> Downy Woodpecker*	C	C	C	C	C
<input type="checkbox"/> Hairy Woodpecker*	O	O	O	O	O
<input type="checkbox"/> Northern Flicker*	C	C	A	C	R
<input type="checkbox"/> Pileated Woodpecker*	O	O	O	O	O
Flycatchers					
<input type="checkbox"/> Olive-sided Flycatcher	R		R		
<input type="checkbox"/> Eastern Wood-Pewee	C	C	C	R	
<input type="checkbox"/> Yellow-bellied Flycatcher	R		O	R	
<input type="checkbox"/> Acadian Flycatcher	R	O	R		
<input type="checkbox"/> Alder Flycatcher	R	R	O		
<input type="checkbox"/> Willow Flycatcher	O	O	O		
<input type="checkbox"/> Least Flycatcher	C	R	U		
<input type="checkbox"/> Eastern Phoebe*	C	C	C	U	
<input type="checkbox"/> Great Crested Flycatcher	C	O	C		
<input type="checkbox"/> Eastern Kingbird*	C	U	C		
Swallows					
<input type="checkbox"/> Purple Martin	R		R		
<input type="checkbox"/> Tree Swallow*	C	O	C	O	
<input type="checkbox"/> No. Rough-winged Swallow	O	R	U	U	
<input type="checkbox"/> Bank Swallow	R		O		
<input type="checkbox"/> Cliff Swallow	R		O		
<input type="checkbox"/> Barn Swallow*	C	O	C	U	
Crows & Jays					
<input type="checkbox"/> Common Raven	O	O	O	O	O
<input type="checkbox"/> American Crow*	A	A	A	A	A
<input type="checkbox"/> Fish Crow	U	U	U	O	
<input type="checkbox"/> Blue Jay*	C	C	C	C	C

SPECIES	SP	SU	EF	LF	W
Chickadees & Titmice					
<input type="checkbox"/> Black-capped Chickadee*	A	A	A	A	A
<input type="checkbox"/> Tufted Titmouse*	A	A	A	A	A
<input type="checkbox"/> Red-breasted Nuthatch	O	R	O	U	U
<input type="checkbox"/> White-breasted Nuthatch*	C	C	C	C	C
Creepers					
<input type="checkbox"/> Brown Creeper	O	R	R	U	O
Wrens					
<input type="checkbox"/> Carolina Wren*	U	U	U	U	U
<input type="checkbox"/> House Wren*	C	C	C	U	
<input type="checkbox"/> Winter Wren	O	O	O	U	O
Kinglets & Gnatcatchers					
<input type="checkbox"/> Golden-crowned Kinglet	C		O	C	R
<input type="checkbox"/> Ruby-crowned Kinglet	C		O	O	R
<input type="checkbox"/> Blue-gray Gnatcatcher	U	O	O		
Thrushes					
<input type="checkbox"/> Eastern Bluebird*	C	C	C	C	O
<input type="checkbox"/> Veery*	C	O	C	R	
<input type="checkbox"/> Bicknell's Thrush	R		R		
<input type="checkbox"/> Gray-cheeked Thrush	R		R	R	
<input type="checkbox"/> Swainson's Thrush	O		U	O	
<input type="checkbox"/> Hermit Thrush	U		U	O	R
<input type="checkbox"/> Wood Thrush	C	O	U	R	
<input type="checkbox"/> American Robin*	A	A	A	A	O
Mockingbirds & Thrashers					
<input type="checkbox"/> Gray Catbird*	A	A	A	C	R
<input type="checkbox"/> Northern Mockingbird*	C	U	C	C	U
<input type="checkbox"/> Brown Thrasher	O	R	O	O	
Starlings					
<input type="checkbox"/> European Starling*	C	C	C	C	C
Larks & Pipits					
<input type="checkbox"/> American Pipit	R			R	R
Waxwings					
<input type="checkbox"/> Cedar Waxwing	U	O	C	C	O
Vireos					
<input type="checkbox"/> White-eyed Vireo	U	O	U		
<input type="checkbox"/> Blue-headed Vireo	U		U	C	
<input type="checkbox"/> Yellow-throated Vireo	U	O	U		
<input type="checkbox"/> Warbling Vireo*	C	C	C		
<input type="checkbox"/> Philadelphia Vireo	R		O	R	
<input type="checkbox"/> Red-eyed Vireo*	C	U	C	O	
Warblers					
<input type="checkbox"/> Blue-winged Warbler*	C	U	C		
<input type="checkbox"/> Tennessee Warbler	U		U	U	
<input type="checkbox"/> Orange-crowned Warbler	R		R	R	
<input type="checkbox"/> Nashville Warbler	O		U	R	
<input type="checkbox"/> Northern Parula	U		U	O	
<input type="checkbox"/> Yellow Warbler*	C	C	C		
<input type="checkbox"/> Chestnut-sided Warbler*	U	O	C	U	
<input type="checkbox"/> Magnolia Warbler	C		C	R	
<input type="checkbox"/> Cape May Warbler	O		U	R	
<input type="checkbox"/> Black-throated Blue Warbler	O		U	R	
<input type="checkbox"/> Yellow-rumped Warbler	C		O	C	R
<input type="checkbox"/> Black-throated Green Warbler	U	R	U	O	
<input type="checkbox"/> Blackburnian Warbler	U		O	R	

Appendix III

Map Figure of Recommended Management Measures for Each Management Unit

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MANAGEMENT UNIT RECOMMENDATIONS

Management Unit 1:

- Implement conservation mowing regime
- Delineate wetland borders
- Avoid mowing within the wetland limits
- Rotate mowing fields with Management Units 1,4,7,8
- Implement conservation mowing measures
- Install Tree Swallow / Eastern Bluebird Boxes
- Control Common Mugwort at entrance trail as indicated
- Address Purple Loosetrife invasion in detention basin as indicated

Management Unit 2:

- Repair/maintain Wood Duck box
- Maintain as old field/ early successional/ woodland glade mosaic
- Control Autumn Olive and Multiflora Rose as necessary / able
- Delineate wetland border
- Release Red Cedar as indicated
- Avoid mowing in wetland limits
- Install bat box

Management Unit 3:

- Rotate mowing field with fields in Management Unit 4,5
- Implement conservation mowing measures
- Retain Sassafras stands in field corner as indicated
- Install Tree Swallow / Eastern Bluebird Boxes

Management Unit 4:

- Rotate mowing field in Management Unit 1,3,5
- Delineate wetland border
- Avoid mowing within the wetland border
- Implement conservation mowing measures
- Expand conifer grove adjacent to east as indicated
- Maintain Wood Duck box
- Install Tree Swallow / Eastern Bluebird Boxes
- Install bat box

Management Unit 5:

- Rotate mowing field with Management Unit 3 and 4
- Control Autumn Olive and other invasives throughout
- Implement conservation mowing measures
- Create a conifer grove at north corner of field
- Install Tree Swallow / Eastern Bluebird Boxes

Management Unit 6:

- Elevate trees at forest block edges, as indicated, to allow light penetration to encourage understory growth
- Retain standing deadwood that does not pose a hazard to walking trails
- Control Japanese Barberry invasion on western end of MU as indicated
- Install chickadee boxes

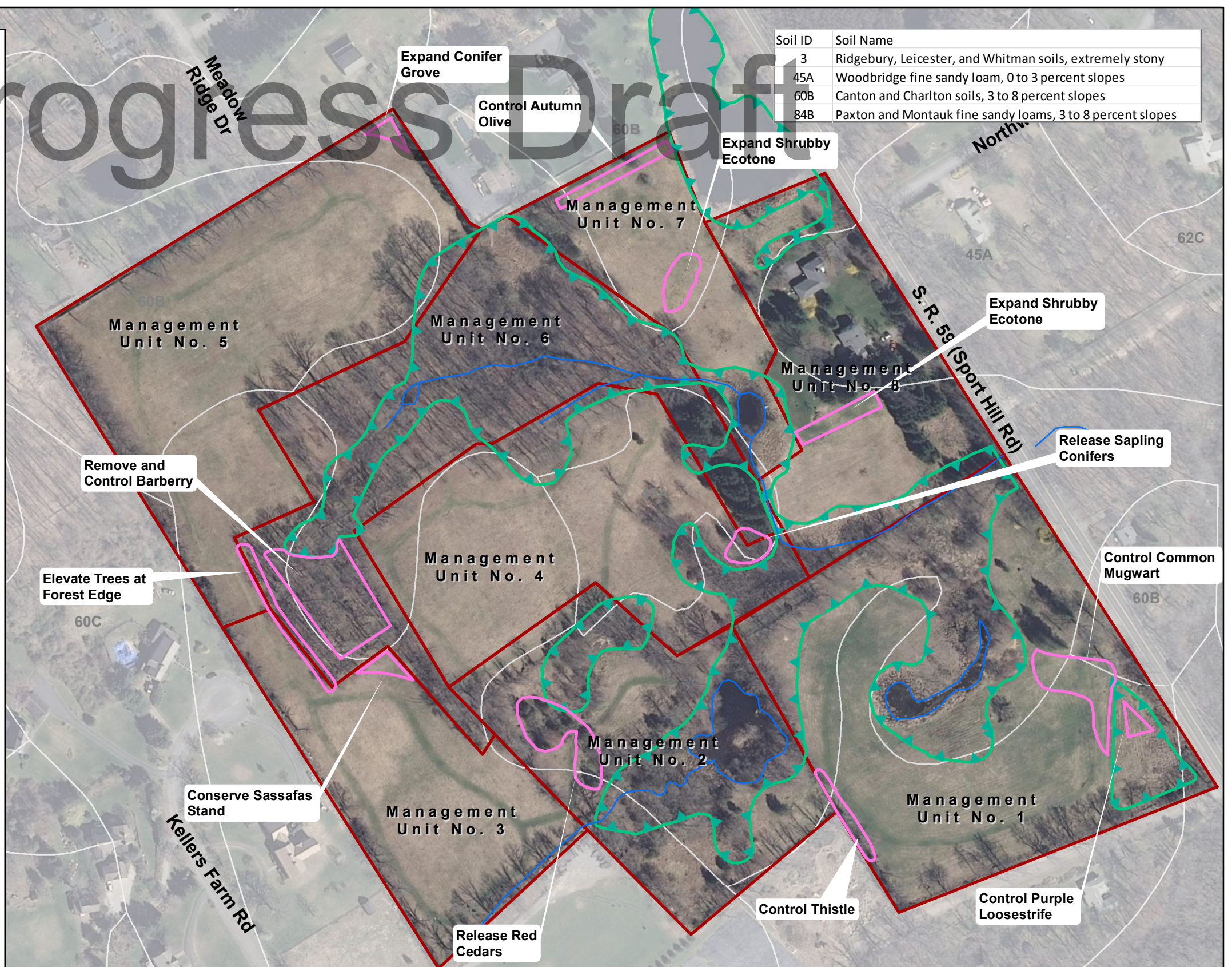
Management Unit 7:

- Delineate wetland borders
- Avoid mowing within the wetland limits
- Rotate mowing fields with Management Units 1,4, and 8
- Implement conservation mowing measures
- Install Purple Martin house
- Expand shrubland ecotone as indicated

Management Unit 8:

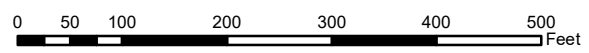
- Delineate wetland borders
- Avoid mowing within the wetland limits
- Address environmental concerns in renters lease agreement
 - No hazmat
 - No invasives
 - No pesticides on lawns / limited fertilizer treatment
- Expand shrubland ecotone as indicated

Soil ID	Soil Name
3	Ridgebury, Leicester, and Whitman soils, extremely stony
45A	Woodbridge fine sandy loam, 0 to 3 percent slopes
60B	Canton and Charlton soils, 3 to 8 percent slopes
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes



Randall's Farm - Conservation and Management Plan
Management Units and Recommendations
Figure 1

Recommended Actions	NRCS Soils
Management Unit	Watercourse
Estimated Wetland Limits*	*Wetland limits are estimated, not formally delineated



Appendix IV

Recommended Seed Mixes to Enhance Wildlife Habitat on Site

DRAFT



NEW ENGLAND WETLAND PLANTS, INC

820 WEST STREET
AMHERST, MA 01002

PHONE: 413.548.8000
FAX: 413.549.4000
EMAIL: INFO@NEWP.COM
WEB ADDRESS: WWW.NEWP.COM

New England Conservation/Wildlife Mix

BOTANICAL NAME	COMMON NAME	IND.
<i>Elymus virginicus</i>	Virginia Wild Rye	FACW-
<i>Schizachyrium scoparium</i>	Little Bluestem	FACU
<i>Festuca rubra</i>	Creeping Red Fescue	FACU
<i>Andropogon gerardii</i>	Big Bluestem	FAC
<i>Chamaecrista fasciculata</i>	Partridge Pea	FACU
<i>Panicum clandestinum</i>	Deer Tongue	FAC+
<i>Panicum virgatum</i>	Switch Grass	FAC
<i>Sorghastrum nutans</i>	Indian Grass	UPL
<i>Helenium autumnale</i>	Common Sneezeweed	FACW+
<i>Heliopsis helianthoides</i>	Ox Eye Sunflower	UPL
<i>Verbena hastata</i>	Blue Vervain	FACW
<i>Asclepias syriaca</i>	Common Milkweed	FACU-
<i>Aster umbellatus</i>	Flat Topped/Umbrella Aster	FACW
<i>Eupatorium purpureum</i>	Purple Joe Pye Weed	FAC
<i>Solidago juncea</i>	Early Goldenrod	
<i>Zizia aurea</i>	Golden Alexanders	FAC

PRICE PER LB. \$36.50

MIN. QUANTITY: 2 LBS.

TOTAL \$73.00

APPLY: 25 LBS/ACRE

1LB/1750 SQ FT

MINIMUM QUANTITY: 2 LBS

The New England Conservation/Wildlife Mix provides a permanent cover of grasses, wildflowers and legumes to provide both good erosion control and wildlife habitat value. This mix is designed to be a no maintenance seeding, and it is appropriate to cut and fill slopes, detention basin slopes, and disturbed areas adjacent to commercial and residential projects. Always apply on clean bare soil.

The mix may be applied by hydro-seeding, by mechanical spreader, or on small sites it can be spread by hand. Lightly rake, or roll to ensure proper seed to soil contact. Best results are obtained with a Spring seeding. Late Spring through early Summer seeding will benefit with a light mulching of weed-free straw to conserve moisture. If conditions are drier than usual, watering will be required. Late Fall and Winter dormant seeding require an increase in the seeding rate. Fertilization is not required unless the soils are particularly infertile. Preparation of a clean weed free soil surface is necessary for optimal results.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged.

Price is \$/bulk pound. FOB warehouse, plus S&H and applicable taxes.



NEW ENGLAND WETLAND PLANTS, INC

820 WEST STREET, AMHERST, MA 01002
PHONE: 413-548-8000 FAX 413-549-4000
EMAIL: INFO@NEWP.COM WEB ADDRESS: WWW.NEWP.COM

New England Roadside Matrix Upland Seed Mix

Botanical name	Common name	Indicator
<i>Elymus canadensis</i>	Canada Wild Rye	FACU+
<i>Schizachyrium scoparium</i>	Little Bluestem	FACU
<i>Festuca rubra</i>	Creeping Red Fescue	FACU
<i>Andropogon gerardii</i>	Big Bluestem	FAC
<i>Sorghastrum nutans</i>	Indian Grass	UPL
<i>Chamaecrista fasciculata</i>	Partridge Pea	FACU
<i>Panicum virgatum</i>	Switch Grass	FAC
<i>Rhus typhina</i>	Staghorn Sumac	
<i>Cornus amomum</i>	Silky Dogwood	FACW
<i>Cornus racemosa</i>	Grey Dogwood	FAC
<i>Asclepias syriaca</i>	Common Milkweed	FACU-
<i>Zizia aurea</i>	Golden Alexanders	FAC
<i>Desmodium canadense</i>	Showy Tick Trefoil	FAC
<i>Lespedeza capitata</i>	Bush Clover/Roundhead Lespedeza	FACU-
<i>Heliopsis helianthoides</i>	Ox Eye Sunflower	UPL
<i>Monarda fistulosa</i>	Wild Bergamot	UPL
<i>Rudbeckia hirta</i>	Black Eyed Susan	FACU-
<i>Aster laevis</i>	Smooth Blue Aster	UPL
<i>Euthamia graminifolia</i>	Grass Leaved Goldenrod	FAC
<i>Solidago juncea</i>	Early Goldenrod	

PRICE PER LB. \$65.00
 REQ. QUANTITY: 1 LBS.
TOTAL \$65.00

APPLY: 35 LBS/ACRE
 1 LB/1250 SQ FT

MINIMUM QUANTITY: 1 LBS

The New England Roadside Matrix Upland mix is designed for use along roads and highways. The mix is unusual in that it contains native grasses, wildflowers, and shrubs that are blended together as a native matrix seed mix. In areas that receive frequent mowing, the grasses will dominate such as those closest to the roadway

shoulder. In areas farther from the road, which may be mown only once each year, or in hard to mow areas, such as around sign posts, the wildflower component will become dominant. Along cuts and side slopes which may never be mown, the shrub component will add diversity, beauty and wildlife habitat to the roadside plantings. It is a particularly appropriate seed mix for roadsides, industrial sites, or cut and fill slopes. The mix may be applied by hydro-seeding, by mechanical spreader, or on small sites it can be spread by hand. Lightly rake, or roll to ensure proper seed to soil contact. Best results are obtained with a Spring seeding. Late Spring and early Summer seeding will benefit with a light mulching of weed-free straw to conserve moisture. If conditions are drier than usual, watering may be required. Preparation of a clean weed free seed bed is necessary for optimal results.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged.
 Price is \$/bulk pound, FOB warehouse, plus S&H and applicable taxes.



NEW ENGLAND WETLAND PLANTS, INC

820 WEST STREET, AMHERST, MA 01002
PHONE: 413-548-8000 FAX 413-549-4000
EMAIL: INFO@NEWP.COM WEB ADDRESS: WWW.NEWP.COM

New England Roadside Matrix Wet Meadow Seed Mix

Botanical Name	Common Name	Indicator
Elymus riparius	Riverbank Wild Rye	FACW
Festuca rubra	Creeping Red Fescue	FACU
Elymus virginicus	Virginia Wild Rye	FACW-
Bidens aristosa	Tickseed Sunflower/Bur Marigold	FACW
Panicum dichotomiflorum	Smooth Panic Grass	FACW-
Panicum virgatum	Switch Grass	FAC
Cornus amomum	Silky Dogwood	FACW
Verbena hastata	Blue Vervain	FACW
Carex lurida	Lurid Sedge	OBL
Carex scoparia	Blunt Broom Sedge	FACW
Helenium autumnale	Common Sneezeweed	FACW+
Viburnum dentatum	Arrow Wood Viburnum	FAC
Asclepias incarnata	Swamp Milkweed	OBL
Aster novae-angliae	New England Aster	FACW-
Eupatorium maculatum (Eutrochium maculatum)	Spotted Joe Pye Weed	FACW
Eupatorium perfoliatum	Boneset	FACW
Agrostis scabra	Rough Bentgrass/Ticklegrass	FAC
Scirpus atrovirens	Green Bulrush	OBL
Sambucus canadensis	Elderberry	FACW-

PRICE PER LB. \$57.00
 REQ. QUANTITY: 1 LBS.
TOTAL \$57.00

APPLY: 35 LBS/ACRE
 1 LB/1250 SQ FT
 MINIMUM QUANTITY: 1 LBS

The New England Roadside Matrix Wet Meadow Mix is a specialty mix designed for use along roads and highways. The mix is unusual in that it contains native grasses, wildflowers and shrubs that are blended together as a native matrix seed mix. In areas that receive frequent mowing, the grasses will dominate, such as those areas

closest to the roadway shoulder. In areas farther from the road, which may be mown only once each year, or in hard to mow areas, such as around sign posts, the wildflower component will become dominant, along cuts and side slopes which may never be mown, the shrub component will add diversity, beauty, and wildlife habitat to the roadside plantings. The mix may be applied by hydro-seeding, by mechanical spreader, or on small sites it can be spread by hand. Lightly rake, or roll to ensure proper seed to soil contact. Best results are obtained with a Spring seeding. Late Spring and early Summer seeding will benefit with a light mulching of weed-free straw to conserve moisture. If conditions are drier than usual, watering may be required. Late Fall and Winter dormant seeding require an increase in the seeding rate. Fertilization is not required unless the soils are particularly infertile. Preparation of a clean weed free seed bed is necessary for optimal results.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged.
 Price is \$/bulk pound, FOB warehouse, plus S&H and applicable taxes.

Fitzgerald and Halliday, Inc. | Ecological Planning Services | 416 Asylum Avenue | Hartford, CT 06473