Bolton Heritage Farm

Bolton, Connecticut

Eastern Connecticut Environmental Review Team Report

Eastern Connecticut Resource Conservation and Development Area, Inc.

Bolton Heritage Farm

Bolton, Connecticut

Environmental Review Team Report

Prepared by the Eastern Connecticut Environmental Review Team

Of the
Eastern Connecticut
Resource Conservation and Development Area, Inc.

For the
Bolton Heritage Farm Commission
Bolton, Connecticut

October 2010

Report # 626

Acknowledgments

This report is an outgrowth of a request from the Bolton Heritage Farm Commission to the North Central Conservation District (NCCD) and the Eastern Connecticut Resource Conservation and Development Area (RC&D) Council for their consideration and approval. The request was approved and the measure reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The Eastern Connecticut Environmental Review Team Coordinator, Elaine Sych, would like to thank and gratefully acknowledge the following Team members whose professionalism and expertise were invaluable to the completion of this report.

The field reviews took place on Thursday, November 12, and Thursday November 19, 2009.

David Askew	District Manager North Central Conservation District (860) 875-3881
Nicholas Bellantoni	State Archaeologist UCONN – Office of State Archaeology (860) 486-5248
Daniel Forrest	Staff Archaeologist State Historical Preservation Office (860) 566-3005
Teresa Gagnon	Geologist DEP – CT Geological and Natural History Survey (860) 424-3680
Joseph Hickey	Recreation Planner CT Greenways Council (860) 529-4363
Lisa Krall	Soil Interpretation Specialist USDA – Natural Resources Conservation Service (860) 871-4051
Dawn McKay	Biologist/Environmental Analyst 3 DEP – Bureau of Natural Resources (860) 424-3592

Nancy Murray	Biologist, NDDB Program Coordinator DEP – Natural Diversity Data Base (860) 424-3589
Charlotte Pyle	Landscape Ecologist USDA – Natural Resources Conservation Service (860) 871-4066
Sherwood Raymond	Service Forester DEP – Division of Forestry Goodwin Conservation Center (860) 455-0699
Randolph Steinen	Geologist DEP – State Geological & Natural History Survey UCONN – Geology (emeritus) (860) 418-5931
Julie Victoria	Wildlife Biologist DEP – Franklin Wildlife Management Area (860) 642-7239
Lisa Wahle	Wildlife Resource Assistant DEP – Eastern District Headquarters (860) 295-9523
Joanna Winkler	Natural Resource Specialist North Central Conservation District (860) 875-3881

I would also like to thank Sandra Pierog and Larry Pesce, Bolton Heritage Farm Commission, Gwen Marrion and Richard Treat, Friends of Rose Farm, Susan DePold, Bolton Historical Society, Rod Parlee, Bolton Conservation and John Butrymovich, Town of Bolton for their cooperation and assistance during this environmental review.

Prior to the review days, each Team member received a summary of the proposed project with location and aerial photos. During the field reviews Team members received additional information, reports and maps. Following the reviews, reports from each Team member were submitted to the ERT coordinator for compilation and editing into this final report.

This report represents the Team's findings. It is not meant to compete with private consultants by providing site plans or detailed solutions to development problems. The Team does not recommend what final action should be taken on a proposed project - all final decisions rest with the Town. This report identifies the existing resource base and evaluates its significance to the proposed use, and also suggests considerations that should be of concern to the town. The results

of this Team action are oriented toward the development of better environmental quality and the long term economics of land use.

The Eastern Connecticut RC&D Executive Council hopes you will find this report of value and assistance in reviewing and developing short and long term plans for the Bolton Heritage Farm property.

If you require additional information please contact:

Elaine Sych, ERT Coordinator
CT ERT Program
P. O. Box 70
Haddam, CT 06438
Tel: (860) 345-3977 e-mail: connecticutert@aol.com

Table of Contents

Introduction

The Bolton Heritage Farm Commission has requested assistance from the Eastern Connecticut Environmental Review Team (ERT) in providing a natural resource and historic resource inventory for the Bolton Heritage Farm (aka Rose Farm).

The 102 acre town owned farm is located on Bolton Center Road just past the town hall. It was purchased in 2000. Eighty-eight (88) acres are under a conservation easement to the State of Connecticut and the other approximately 12 acres, which include the house, barn and upper hayfields, are not under a conservation easement but are restricted to "municipal purposes."

The farm is listed on the National Register of Historic Places and is a state archaeological preserve and it will become part of a National Historic Trail due of its use as a campsite in 1781 by French troops led by Comte de Rochambeau as they marched from Newport, Rhode Island to New York coming to the aid of General George Washington. The original farm setting and landscape of the property are very important to its historical integrity.

Approximately 20 acres of the property are enrolled in the USDA's Wildlife Incentive Program (WHIP) and a 10-year maintenance plan under that program was started in August 2008.

A structural analysis of the house and barn with recommendations for future uses was completed in September 2008 by Nelson Edwards Company Architects, LLC.

A loop hiking trail and a trail that connects to the Hop River State Park Linear Trail are also on the property.

Objectives

The Bolton Heritage Farm Commission was established in 2006 by the Bolton Board of Selectmen and is charged by town ordinance to "develop and submit for the Board of Selectmen's approval a written plan for the short and long term mixed use of the Bolton Heritage Farm which could include historical, agricultural, educational, and civic and tourist utilization." The Commission will use the ERT report to create a plan for the farm and to give informed advice to the Board of Selectmen about special opportunities and limitations presented by the natural and historic qualities of the site.

Specific areas of concern and information requested include: general soils mapping and interpretation, overview of surficial and bedrock conditions, wetlands, vernal pools, stone-lined spring, man-made pond; wildlife habitat management; general forestry inventory and forestry and vegetation management; agricultural use and farmland preservation; historical and archaeological significance as it relates to preservation, maintenance and education.

The ERT Process

Through the efforts of the Bolton Heritage Farm Commission this environmental review and report was prepared for the Town of Bolton.

This report provides a natural resource inventory and a series of recommendations and guidelines which cover the topics requested by the Commission. Team members were able to review maps, plans and supporting documentation provided by the town.

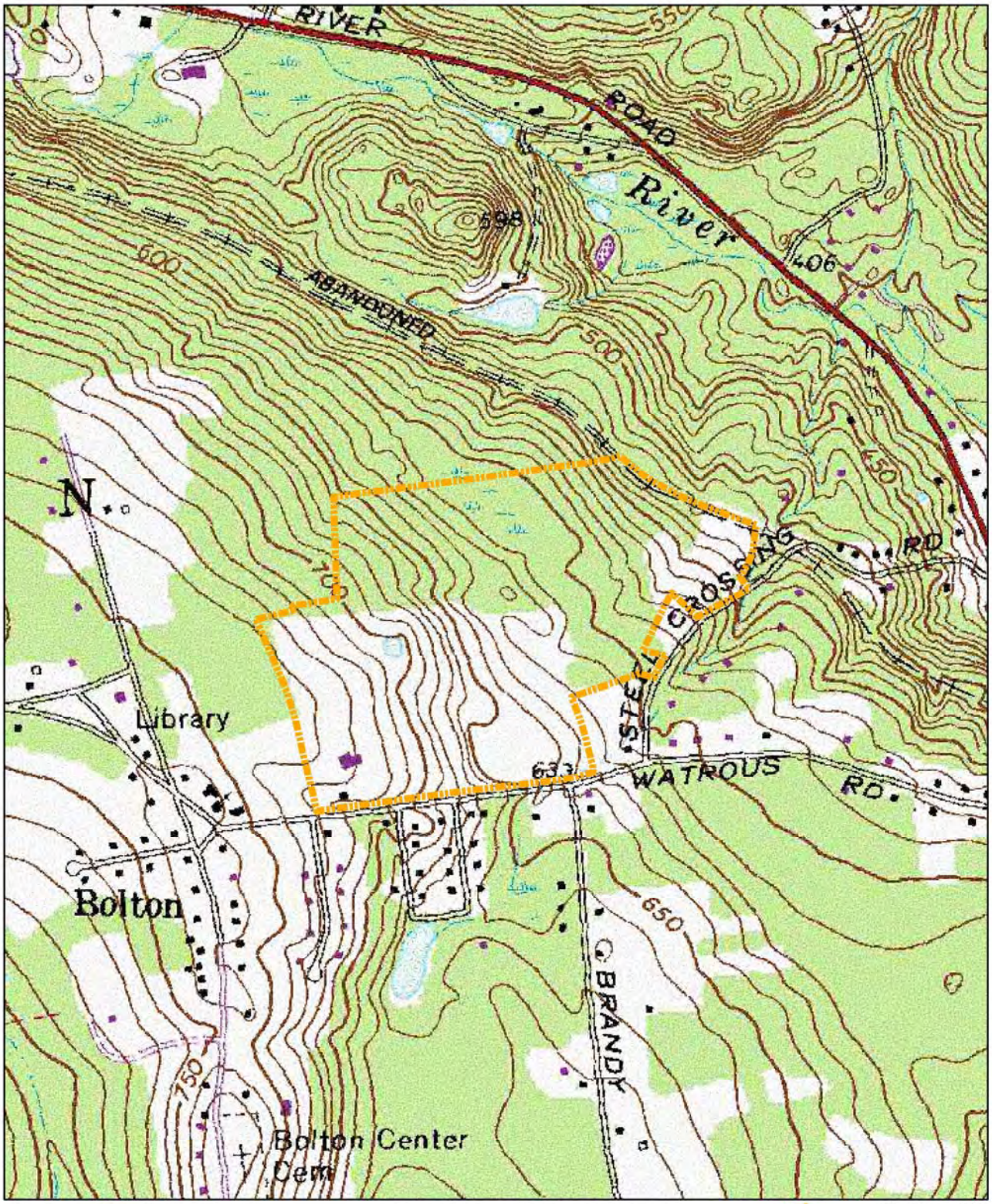
The review process consisted of four phases:

1. Inventory of the site's natural resources;
2. Assessment of these resources;
3. Identification of resource areas and review of plans; and
4. Presentation of education, management and land use guidelines.

The data collection phase involved both literature and field research. The field reviews was conducted on November 12 and November 19, 2009. Some Team members made additional field visits on their own. Some Team members made separate and/or additional site visits while others conducted a map review only. The field review allowed Team members to verify information and to identify other resources.

Once Team members had assimilated an adequate data base, they were able to analyze and interpret their findings. Individual Team members then prepared and submitted their reports to the ERT coordinator for compilation into this final ERT report.

Bolton Heritage Farm Site Map



The Connecticut Environmental Review Team

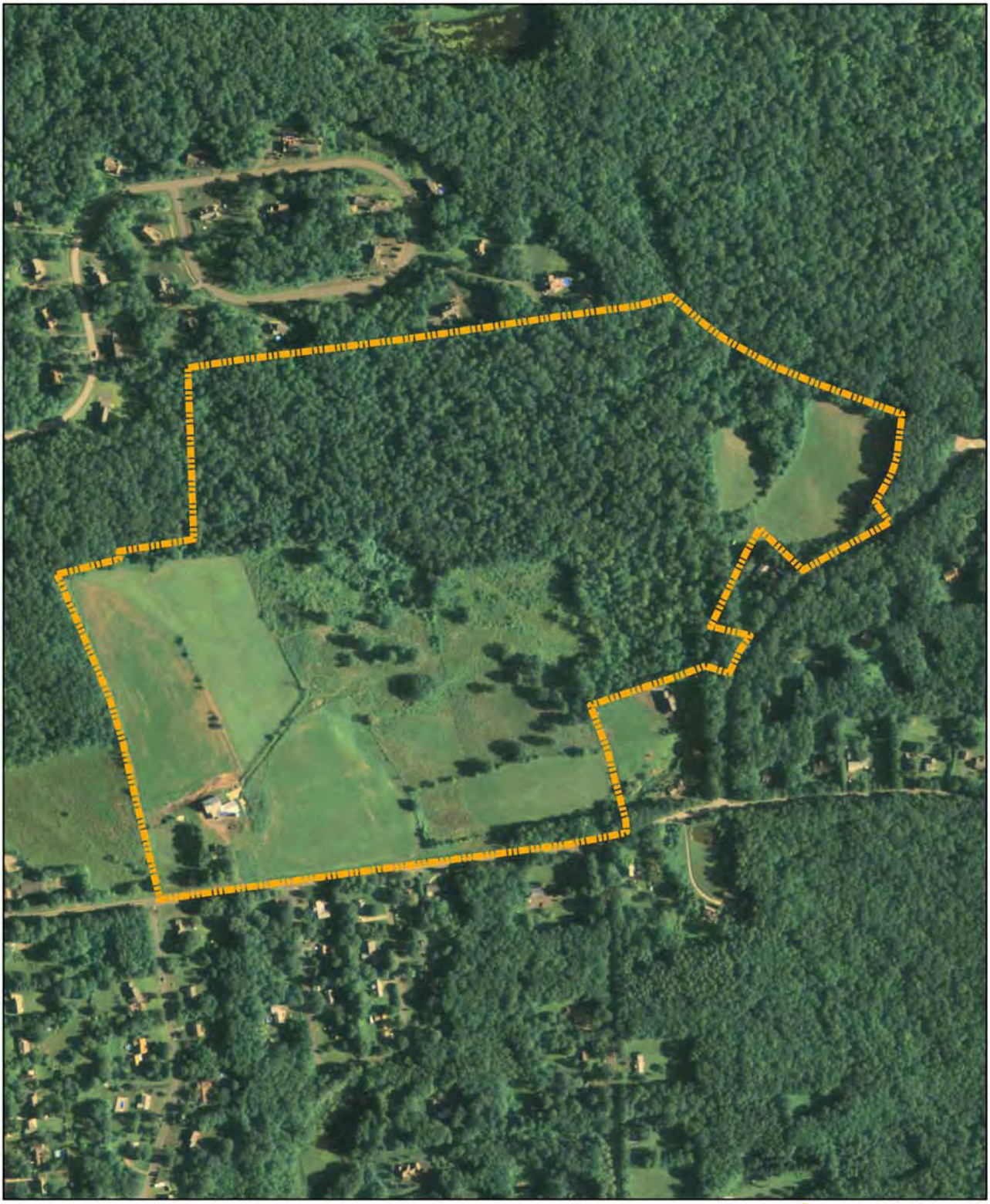
0 0.05 0.1 0.2 Miles

This map was prepared by Amanda Fargo-Johnson for the Connecticut Environmental Review Team.
This map is for educational use only.
It contains no authoritative data.
September 2009.

Approximate Site Boundary

Bolton, CT

Bolton Heritage Farm Site Color Aerial Map



The Connecticut Environmental Review Team

0 0.03 0.06 0.12 Miles

This map was prepared by Amanda Fargo-Johnson for the Connecticut Environmental Review Team.
This map is for educational use only.
It contains no authoritative data.
September 2009.

Approximate Site Boundary

Bolton, CT

Bolton Heritage Farm Site Aerial Map

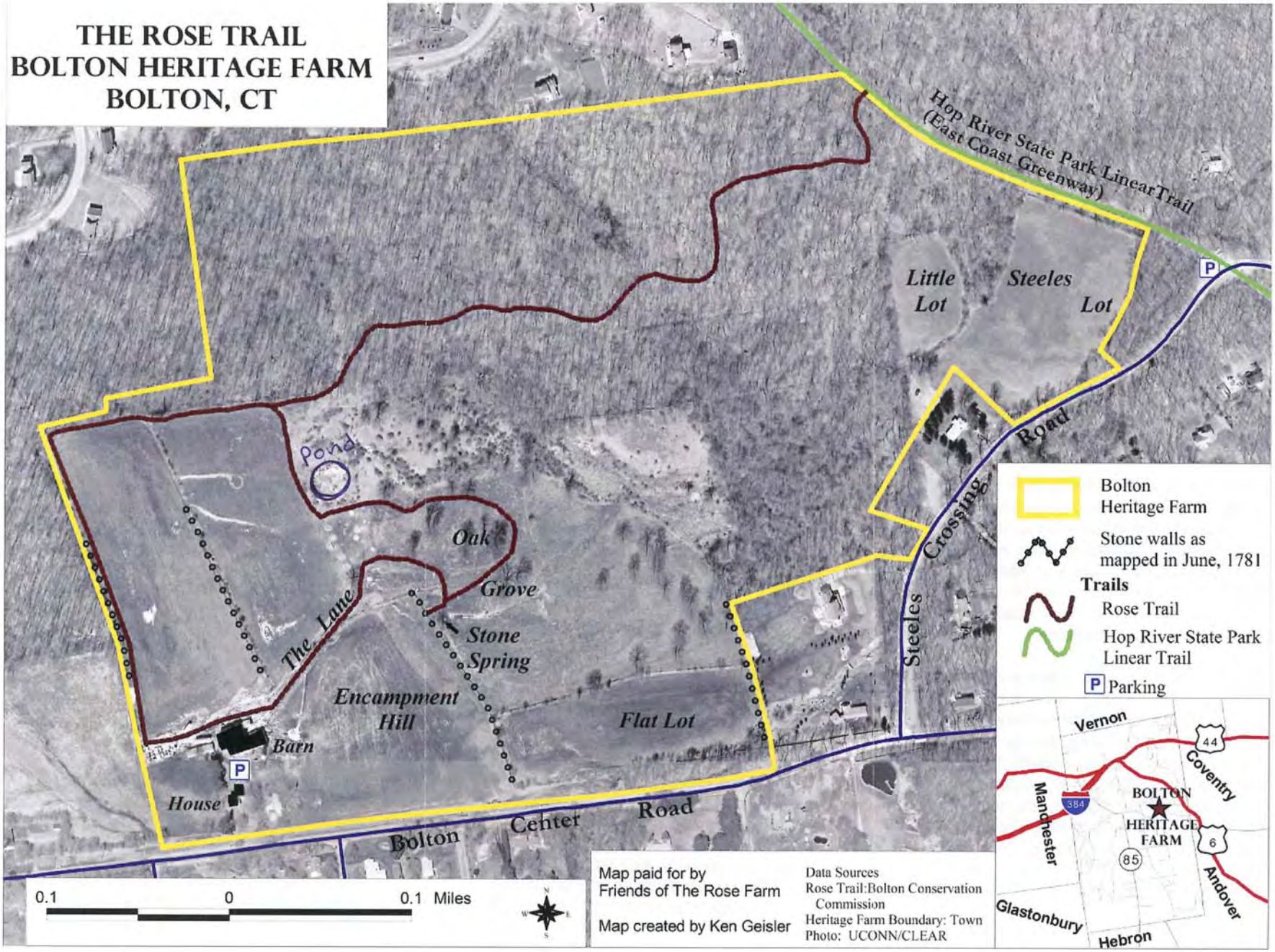
The Connecticut Environmental Review Team

0 0.05 0.1 0.2 Miles

This map was prepared by Amanda Fargo-Johnson for the Connecticut Environmental Review Team.
This map is for educational use only.
It contains no authoritative data.
September 2009.

Approximate Site Boundary

Bolton, CT



April 20, 2007

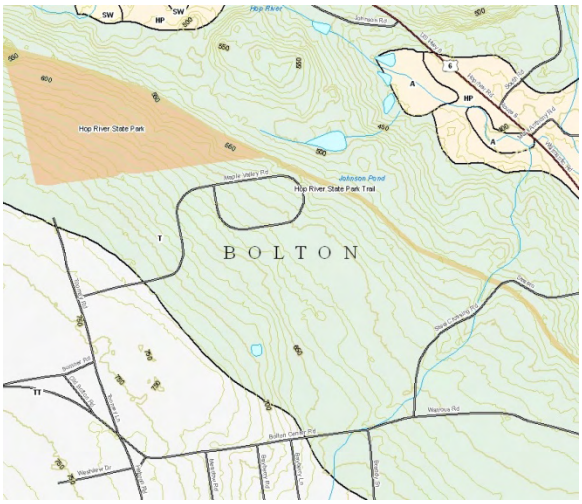
Topography and Geology

Topography. The Bolton Heritage Farm lies on an east-northeast facing slope of the upper reaches of the Hop River Valley near the top of the valley side. The valley bottom has an elevation near 400 feet above sea level in this area while the highest elevations on the valley side are 750-800 feet. The Farm extends down the side of the valley to approximately 520'; the upper fields have a maximum elevation of 740'. The Farm sits well up on the side of the valley. The topography is relatively smooth with rounded contours and gentle to moderate slopes (gradients) that vary between 40-70'/mile. A couple of bed-rock terraces are found about half way down the hill. The hill has the sculpted shape of an eastern Connecticut glacial upland.

A. **B.**

Figure 1. A. Rather gentle topography of site. This view looks down slope toward the east from the top of the hill. Hillside was smoothly sculptured by glaciers during the last Ice Age. B. A few outcrops are scattered on the portion of the hill that has a more moderate slope. Note that hill-slope retains its smooth, sculpted shape on the moderate slope areas.

Surficial Geology. Surface soils are glacially derived (glacial till). They cover most of the area of the Farm (bedrock only crops out on parts of the steeper slope north and east of the pond).



The till is thick on the eastern hilltop (see Figure 2) and thins eastward. It contains a plethora of stones, as indicated by the number of stone fences that have accumulated around the property (Figure 3a). Some large stones were let in place rather than cleared from the field (Figure 3b). Such is typical of glacial soils in New England.

Sand and gravel deposits (pale yellow on Figure 2) are found along the valley-bottom (not on the parcel).

Figure 2. Quaternary Map of the Farm Site and adjacent areas. Brownish-orange areas denote state park and trail lands. The western boundary of the site parallels Meadow Road; the eastern boundary extends to the state green-belt trail (brownish-orange strip); the northern boundary is just below the word BOLTON. The area is covered by glacial till (green colored) and thick glacial till (uncolored on map). After Stone and others, 2005.

A. **B.**

Figure 3. A. Abundance of stone fences and linear piles of stones attests to the rockiness of the soil. Note the variety of stones (light colored pegmatite, gray schist and gneiss, dark gray amphibolites). Most of the rocks are typical of Southbridge Gneiss, from which they were probably derived by glacial erosion. Note soil has been removed from down-hill side of fence, exposing soil. B. Some of the larger stones were left in the fields.

Bedrock Geology. Outcrops of bedrock (ledge) were found only on the moderate slopes north-northeast of the farm pond. The state geologic map (Rodgers, 1985) shows the Farm Site is underlain by Hebron Gneiss to the east and Brimfield Schist on the west. The Brimfield Schist is normally a rusty weathering schist and/or gneiss. It typically contains iron-bearing sulfide minerals (such as iron-pyrite – FeS_2) that easily weather, releasing the iron which forms rust as a by-product. Although some rusty weathering rocks are found in the area, they generally contain minor amounts of iron-bearing sulfide minerals. More recent mapping by Wintsch (1999) considers the bedrock in the area more typical of the Southbridge Formation, which is

A. B.

Figure 4. A. Low bedrock outcrop in wooded portion of Farm Site north of cleared area. Outcrops are typically low and rounded. The rock is gray pegmatitic gneiss. B. Typical pegmatite gneiss with spotty rusty weathered areas.

similar to the Hebron Gneiss. Typical Hebron Gneiss lacks iron-bearing sulfides. Wintsch therefore mapped the entire area as Southbridge Formation.

Outcrops visited during the field visit showed a rock dissimilar to Brimfield Schist as seen in other locations of the state. Rock crops out on the Farm site (Figure 4a) in the wooded area

north/northeast of the small pond. Outcrops typically are 5' or less in height and may extend several 10's of feet along the strike. The rock exposed is grey granitic gneiss that has large areas of pegmatite (pegmatite is an extremely coarse grained variety of igneous rock….the term is also used for some metamorphic rocks as in this case). The pegmatitic rocks may be interlayered with more easily weathered schistose rocks that contain more mica. Rocks of the same formation are exposed along Rte. 6 (see Figure 5) and contain more schist than is exposed on the Farm site. Pegmatite in these rocks formed as an accumulation of partly molten rock that cooled slowly forming coarse grains. The coarse-grained rock is more difficult to weather and erode than the finer-grained schist and hence, pegmatite forms the outcrops on the Farm site.

A. **B.**

Figure 5. A. Road cut of Southbridge Formation along Rte. 6 (Wintsch, 1999). This rock consists of gray and dark gray biotite schist and gneiss with "pods" of white pegmatite. In this example the pegmatite formed during the metamorphism when the rock temperature was so high that parts of the rock started to melt. The molten portion was squeezed so that it segregated in to the pods. Here the pods are not very large. Pods on the farm site are thicker and in more extensive layers. B. Rusty weathering layer in Southbridge Formation exposed along Rte. 6.

Groundwater. The area underlain by the Southbridge Formation is poorly drained. That may be because of the amount of schistose rocks in the formation. Schist does not fracture as well as gneiss and thus there is not as much fracture porosity into which water may seep. It tends then to saturate the lower portions of soil above the buried ledge. The water table is in the soil over large portions of the Farm Site. The water table generally follows the contour of the land but at the base of some steep slopes the water table comes to or close to the surface. If groundwater seeps out at the surface it is called a spring. A low volume spring (Figure 6) is found at the base of the steep slope shown in Figure 1A (spring is out of sight on the left side of the picture; see also Figure 6). At the time of our observation, spring discharge was low. During wet parts of the year the spring discharges enough that a ditch was dug (Figure 6B) to drain the outflow.

A.

B.

Figure 6. A. Spring at base of steep slope. Discharge of water at this time of year is just a trickle. Soils around the spring were removed possibly during dry seasons to encounter the water table when it is at its lowest, therefore keeping the spring flowing. Stone retaining walls surround the enhanced spring. The spring may have been used as a source of water for live-stock and maybe even for Rochambeau's troops. B. Ditch to drain spring outflow down-hill (south) during wet parts of the year.

Soil Disturbance. Considerable modification to the grade occurred in past farming operations. The volume of disturbed (both removed and filled) soil is difficult to estimate. Certainly fill has been placed around buildings to facilitate their use. Soil has also been dug and filled around many of the stone fences on the site. In some cases it appears to have been dug out to make travel lanes more level (Figure 3A, 7B-C). In other cases it seems to have been filled in, perhaps making fields more level to facilitate row-crop farming (Figure 7C-E).

A.

B.

C.

D.

E.

Figure 7. A. Small fenced area near spring (spring is located just to left of tree at base of hill) that has had fill placed on up-hill side of fence or removed from down-hill side for reasons not apparent during time of visit. B. Lane from which soil was removed (see figure 3A), possibly to make area more level for passage of hay wagons. C., D. Fence near top of hill; C looks north, D. looks south. Soil has been moved from down-hill side of fence and apparently placed on up-hill side of fence. The result makes the up-hill side more level, possibly to facilitate row-crop farming. E. Soil on up-hill side of fence has been recently placed there and has not completely washed into the rock interstices of the fence.

References.

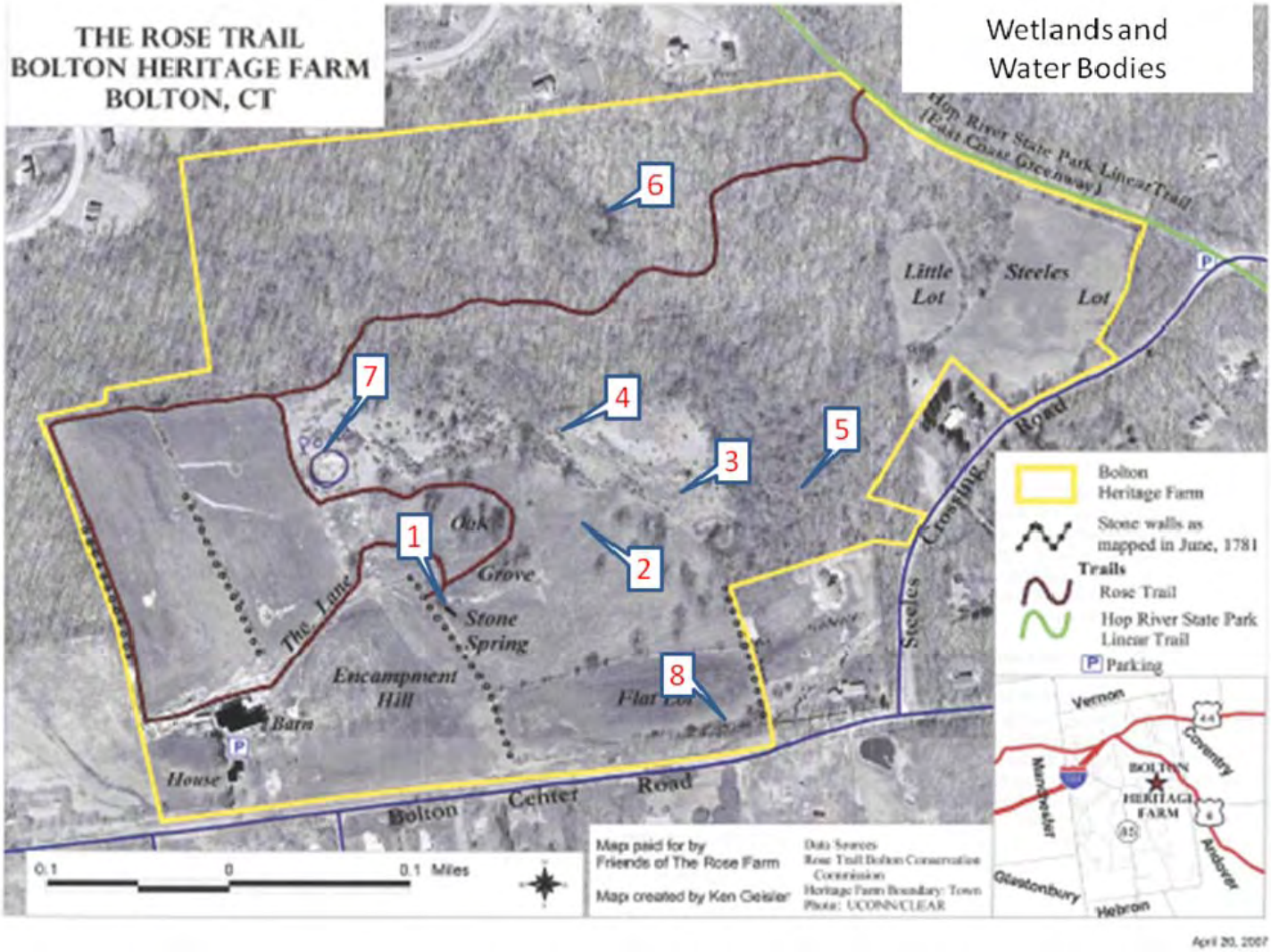
Rodgers, John, 1985, Bedrock Geological Map of Connecticut. State Geological and Natural History Survey of Connecticut, Natural Resource Atlas Series

Stone, J.R., Schafer, J.P., London, E.H., DiGiacomo-Cohen, M.L., Lewis, R.S., and Thompson, W.B., 2005, Quaternary Geologic Map of Connecticut and Long Island Sound Basin (1:125,000). U.S. Geol. Surv. Sci. Invest. Map # 2784.

Wintsch, R.P., 1999, Preliminary Bedrock Geologic Map of the Rockville Quadrangle. State Geologic and Natural History Survey Open File Report 99-1.

Soil, Wetland and Agricultural Resources

Team members from the North Central Conservation District (the District) and Natural Resource Conservation Service (NRCS) inspected the site on November 12 (with the ERT) and November 19, 2009, respectively. The following review is a collective effort between the District and the NRCS and focuses on existing soil and wetland resources, and agriculture. *



Wetlands and Associated Areas

Separate wetland types are shown on the above map. There are two main wetlands. The larger wetland (sections of which are numbered 1-5) is located in the approximate center of the parcel and varies in form based on slope and location in the landscape. The smaller wetland (wetland area 6) is located to the north and is predominantly wooded, with a sparse shrub understory. A portion of each wetland may support vernal pool habitat. The District will conduct a follow-up inspection in the spring to confirm if the pools support obligate vernal pool species, which may include wood frogs and mole salamanders. Vernal pools can only be confirmed during the spring when amphibian eggs can be directly observed.

Other wetlands include a dug pond (wetland area 7) just east of the large field behind the house and barn. In addition, a short segment of the Hop River crosses the southeast corner of property and there is a small wetland area in the field along Bolton Center Road (wetland area 8). The small wetland in the field is periodically cut for hay. This activity will not have any specific impact to the wetland and management of the field should be based on broader management issues (habitat, appropriate crops etc.). No special management strategies are required for the Hop River, provided that existing buffers are maintained.

Dug out pond (wetland area 7 on map)

Over time, the man-made pond on the property has filled in with sediment and dense vegetation. There is no obvious benefit in dredging the pond and restoring its former depth and open perimeter unless it is needed for irrigation. The pond itself is set far back on the parcel and is not a major landscape feature of the property. Removing invasive plants that currently surround the pond and replacing them with native species would be beneficial. It should be part of the overall invasive plant management strategy for the property. Invasive plant management is one goal of the Wildlife Habitat Incentive Program project that is being conducted on the land just east of the pond. Invasive plant control around the pond could be done in conjunction with the WHIP plan if the pond is incorporated into the managed area.

Central Wetland, Map Numbers 1-5

The large central wetland has a number of different areas with varied characteristics. The stone-lined spring (wetland area 1) located in the south central portion of the parcel drains into the wetland and provides hydrologic support. A drainage swale connects the spring to the large wetland areas. Parts of the swale itself are not wetlands based on soils, but function as intermittent drainage to the wetland.

Drainage Swale (wetland area 2 on map)

The boundary of the wetland soil, as mapped on the attached NRCS soil survey, is located approximately 150 feet east of the spring. This area of the wetland (wetland area 2) is predominantly wetland meadow habitat, dominated by grasses. Tussock sedge is dominant.

Area 3 consists of grasses and cattails. Area 4 is a potential vernal pool located at the transition between meadow wetland and wooded wetland.

Grasses and cattails in area 3, shown in the background.

The wetland mapped as area 5 on the attached map is a diverse wetland consisting of braided streams. This area has a diverse shrub layer and a wooded overstory. The wetland ultimately forms an intermittent stream that drains across the rail trail to the north.

Generally, the central wetland is a moderate to high value system with varied vegetation and hydrologic features. One section of the wetland may be a vernal pool. Historic aerial photographs indicate that much of the central area was previously cleared and probably supported some agricultural activity, perhaps pasture. It is also possible that gravel or topsoil was mined from some of the area (near the dug pond) based on the appearance of disturbance on the aerial photographs. More detailed soil examination would be required to try to determine past use. Past use has altered vegetative characteristics in the central portion of the wetland, contributing to the variety plants found in the area. Generally, use of the wetland should be limited to passive recreation, including cross-country skiing and walking trails.

Northerly Wetland, Wetland #6

On the soil survey, wetland soils are shown extending northwesterly in two lobes. The more northerly lobe has a soil inclusion, too small to be identified at the soil survey scale, forming an upland saddle that separates the central wetland from the wetland to the north. The northerly wetland is a separate system and is numbered 6 on the attached map. It is a forested wetland with a sparse to moderately thick shrub layer. The upper (southerly) portion of this wetland may be vernal pool habitat and will be checked by District

staff in the spring for amphibian egg masses. During our inspection, standing water levels were relatively shallow, generally less than a foot. Therefore, we anticipate that vernal pool habitat is limited in the wetland. The wetland also has an outlet in the form of an unscoured channel. This wetland is wooded and shows no obvious indicators of past disturbance. It is protected within the surrounding forested area. Any proposed use of the area should maintain a buffer around the wetland. Some limited forestry could be done within 100' of the wetland, provided that an adequate vegetated buffer is maintained.

Wetland Soils

The soils mapped in the wetland areas on the farm are the poorly drained Leicester and Ridgebury, and the very poorly drained Whitman. These soils all formed in glacial till. Unless cleared, the map units are extremely stony. Some areas are underlain by dense till, which restricts downward water movement. Small areas of somewhat poorly or moderately well drained soils may be present in these units.

Very poorly drained Whitman soils found in the potential wooded vernal pool (area 6 on map) have a thick organic surface and a reduced mineral subsurface.

Prime Farmland Soils

Steeles Lot: 60C Canton and Charlton soils, 8 to 15 percent slopes Farmland of statewide importance

The majority of open land on the property is classified as either prime or important farmland. See attached map labeled “Farmland Soils”, updated to reflect additional clearing and slope corrections. The prime farmlands on the property are mapped 84B; gently sloping Paxton and Montauk soils, 45B; gently sloping Woodbridge soils, and 60B; gently sloping Canton and Charlton soils. Areas classified as important farmlands are 45C, strongly sloping Woodbridge soils, 60C; strongly sloping Canton and Charlton soils, and 84C; strongly sloping Paxton and Montauk soils. The important farmland areas are limited by slope. The Montauk, Paxton and Woodbridge soils have dense till, a layer that restricts root penetration and water movement, within 20 to 40 inches of the soil surface. Woodbridge is moderately well drained, with a seasonal high water table within about 18” from late fall to early spring. This restricts some agricultural uses where early or late field operations are required. It is a good soil for hay and pasture. The soils on the property that are not classified as prime or important have abundant surface stones and/or very poor drainage.

Soil Potential Specific to Items in the Rose Farm Natural Resource Management Plan:

Agriculture use: In general, the current use of the fields for hay is appropriate and protective of the site’s resources. More intensive agriculture, like row crops, is not appropriate for much of the property because of slopes.

Community garden: As suggested in the plan, the field directly to the north of the barn is the most suitable area for a community garden. Its soils are level and well drained and close to a water supply, parking, etc.

Native grasses: Warm season grasses will be difficult to establish in large areas due to the loamy soils on the farm. Where moisture is adequate, faster growing species will outgrow and shade them. A planting for demonstration purposes would be feasible incorporated into the community garden.

Christmas trees: Most of the cleared areas on the farm would be suitable for Christmas tree planting. Erosion hazard and equipment limitations are concerns on the steeper slopes.

View of the barn from the east. Soils in the foreground, Woodbridge on a B slope, have seasonal high water tables in the spring. In the background, Paxton and Montauk soils occupy a strongly sloping hillside.

Stormwater management

For the most part, the soils on the property are limited by restrictive layers and seasonal high water tables for practices that rely on infiltration of large amounts of stormwater runoff, such as infiltration trenches or pervious paving systems. According to the medium intensity soil survey, soils in the areas abutting the rail trail (mapped 60B, 61B, 61C) are more permeable in the substratum and are possible candidates for a pervious paving system of some kind. This should be verified before designing or sizing a parking area. In other areas of the property, stormwater basins and low impact development practices like rain gardens and swales are appropriate to handle runoff from additional impervious areas.

Note: Soil interpretations are based on the National Cooperative Soil Survey of Connecticut which is at a scale of 1:12000. Placement or design of any practice should be accompanied by an on-site soil investigation.

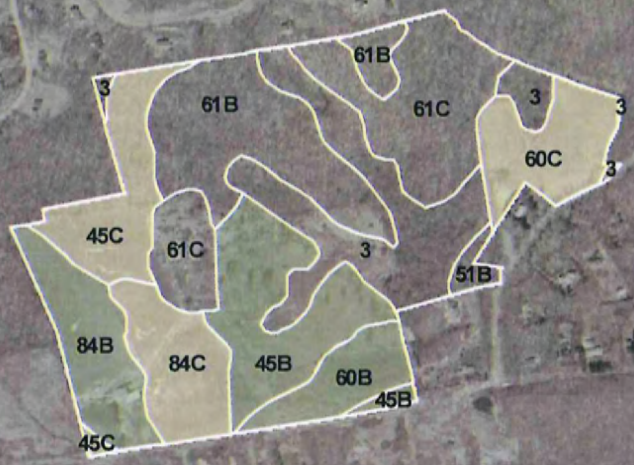
Under the Connecticut Inland Wetland and Watercourses act, Connecticut wetlands are identified by soils. If any work is to be undertaken in or near the wetland areas on the property, a detailed delineation of the wetland boundaries may be required.

*The District does not typically comment on “best use” scenarios but will address possible “appropriate uses” of on-site resources. The District defers to other Team members regarding long-term planning, best use, forest management, and the preservation of historical and archaeological resources.

Rose

Farmland Soils

Map Unit Symbol	Acres	Percent
Prime Farmland Soils	27	26 %
Important Farmland Soils	24	23 %
Locally Important Farmland Soils	0	0 %
Total		49%



Prime and Important farmland designation is based on field evaluation of the soil map from the Soil Survey of the State of Connecticut. his field evaluation was conducted by NRCS soil scientist Lisa Krall on November 19, 2009, and resulted in slight modifications of the soil map.

Farmland Soils

- Prime Farmland Soils
- Statewide Important Farmland Soils
- Locally Important Farmland Soils

1:12,000

U.S. Department of Agriculture
NRCS Natural Resources Conservation Service
The USDA is an equal opportunity provider and employer.

Map Unit Legend

State of Connecticut

Map symbol	Map unit name
3	Ridgebury, Leicester, and Whitman soils, extremely stony
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes
45C	Woodbridge fine sandy loam, 8 to 15 percent slopes
60B	Canton and Charlton soils, 3 to 8 percent slopes
60C	Canton and Charlton soils, 8 to 15 percent slopes
61B	Canton and Charlton soils, 3 to 8 percent slopes, very stony
61C	Canton and Charlton soils, 8 to 15 percent slopes, very stony
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes

Map Unit Description (Brief)

State of Connecticut

[Only those map units that have entries for the selected non-technical description categories are included in this report]

Map Unit: 3 - Ridgebury, Leicester, and Whitman soils, extremely stony

Description Category: SOI

Ridgebury, Leicester And Whitman Soils, Extremely Stony
This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 37 to 50 inches (940 to 1270 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 40 percent Ridgebury soils, 35 percent Leicester soils, 15 percent Whitman soils. 10 percent minor components.

Ridgebury soils
This component occurs on upland drainageway and depression landforms. The parent material consists of lodgement till derived from granite, schist, and gneiss. The slope ranges from 0 to 5 percent and the runoff class is very low. The depth to a restrictive feature is 20 to 30 inches to densic material. The drainage class is poorly drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 2.5 inches (low) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 3 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 7s
Typical Profile:
0 to 1 inches; slightly decomposed plant material
1 to 5 inches; fine sandy loam
5 to 14 inches; fine sandy loam
14 to 21 inches; fine sandy loam
21 to 60 inches; sandy loam

Leicester soils
This component occurs on upland drainageway and depression landforms. The parent material consists of melt-out till derived from granite, schist, and gneiss. The slope ranges from 0 to 5 percent and the runoff class is very low. The depth to a restrictive feature is greater than 60 inches. The drainage class is poorly drained. The slowest permeability within 60 inches is about 0.57 in/hr (moderate), with about 7.4 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 9 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 7s
Typical Profile:
0 to 1 inches; moderately decomposed plant material
1 to 7 inches; fine sandy loam
7 to 10 inches; fine sandy loam
10 to 18 inches; fine sandy loam
18 to 24 inches; fine sandy loam
24 to 43 inches; gravelly fine sandy loam
43 to 65 inches; gravelly fine sandy loam

Whitman soils
This component occurs on upland drainageway and depression landforms. The parent material consists of lodgement till derived from gneiss, schist, and granite. The slope ranges from 0 to 2 percent and the runoff class is very low. The depth to a restrictive feature is 12 to 20 inches to densic material. The drainage class is very poorly drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 1.9 inches (very low) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is occasional. The minimum depth to a seasonal water table, when present, is about 0 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 7s
Typical Profile:
0 to 1 inches; slightly decomposed plant material
1 to 9 inches; fine sandy loam
9 to 16 inches; fine sandy loam
16 to 22 inches; fine sandy loam
22 to 60 inches; fine sandy loam

Map Unit Description (Brief)

State of Connecticut

Map Unit: 45B - Woodbridge fine sandy loam, 3 to 8 percent slopes

Description Category: SOI

Woodbridge Fine Sandy Loam, 3 To 8 Percent Slopes
This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 37 to 49 inches (940 to 1244 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 80 percent Woodbridge soils. 20 percent minor components.

Woodbridge soils
This component occurs on upland drumlin and hill landforms. The parent material consists of lodgement till derived from schist, granite, and gneiss. The slope ranges from 3 to 8 percent and the runoff class is medium. The depth to a restrictive feature is 20 to 40 inches to densic material. The drainage class is moderately well drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 3.9 inches (moderate) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 24 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 2w
Typical Profile:
0 to 7 inches; fine sandy loam
7 to 18 inches; fine sandy loam
18 to 26 inches; fine sandy loam
26 to 30 inches; fine sandy loam
30 to 43 inches; gravelly fine sandy loam
43 to 65 inches; gravelly fine sandy loam

Map Unit: 45C - Woodbridge fine sandy loam, 8 to 15 percent slopes

Description Category: SOI

Woodbridge Fine Sandy Loam, 8 To 15 Percent Slopes
This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 37 to 49 inches (940 to 1244 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 80 percent Woodbridge soils. 20 percent minor components.

Woodbridge soils
This component occurs on upland drumlin and hill landforms. The parent material consists of lodgement till derived from schist, granite, and gneiss. The slope ranges from 8 to 15 percent and the runoff class is medium. The depth to a restrictive feature is 20 to 40 inches to densic material. The drainage class is moderately well drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 3.9 inches (moderate) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 24 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 3e
Typical Profile:
0 to 7 inches; fine sandy loam
7 to 18 inches; fine sandy loam
18 to 26 inches; fine sandy loam
26 to 30 inches; fine sandy loam
30 to 43 inches; gravelly fine sandy loam
43 to 65 inches; gravelly fine sandy loam

Map Unit Description (Brief)

State of Connecticut

Map Unit: 60B - Canton and Charlton soils, 3 to 8 percent slopes

Description Category: SOI

Canton And Charlton Soils, 3 To 8 Percent Slopes
This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 37 to 49 inches (940 to 1244 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 45 percent Canton soils, 35 percent Charlton soils. 20 percent minor components.

Canton soils
This component occurs on upland hill landforms. The parent material consists of melt-out till derived from schist, granite, and gneiss. The slope ranges from 3 to 8 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 1.98 in/hr (moderately rapid), with about 5.6 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is greater than 6 feet. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 2e
Typical Profile:
0 to 1 inches; moderately decomposed plant material
1 to 3 inches; gravelly fine sandy loam
3 to 15 inches; gravelly loam
15 to 24 inches; gravelly loam
24 to 30 inches; gravelly loam
30 to 60 inches; very gravelly loamy sand

Charlton soils
This component occurs on upland hill landforms. The parent material consists of melt-out till derived from granite, schist, and gneiss. The slope ranges from 3 to 8 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 in/hr (moderate), with about 6.4 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is greater than 6 feet. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 2e
Typical Profile:
0 to 4 inches; fine sandy loam
4 to 7 inches; fine sandy loam
7 to 19 inches; fine sandy loam
19 to 27 inches; gravelly fine sandy loam
27 to 65 inches; gravelly fine sandy loam

Map Unit Description (Brief)

State of Connecticut

Map Unit: 60C - Canton and Charlton soils, 8 to 15 percent slopes

Description Category: SOI

Canton And Charlton Soils, 8 To 15 Percent Slopes
This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 37 to 49 inches (940 to 1244 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 45 percent Canton soils, 35 percent Charlton soils. 20 percent minor components.

Canton soils
This component occurs on upland hill landforms. The parent material consists of melt-out till derived from schist, granite, and gneiss. The slope ranges from 8 to 15 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 1.98 in/hr (moderately rapid), with about 5.6 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is greater than 6 feet. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 3e
Typical Profile:
0 to 1 inches; moderately decomposed plant material
1 to 3 inches; gravelly fine sandy loam
3 to 15 inches; gravelly loam
15 to 24 inches; gravelly loam
24 to 30 inches; gravelly loam
30 to 60 inches; very gravelly loamy sand

Charlton soils
This component occurs on upland hill landforms. The parent material consists of melt-out till derived from granite, schist, and gneiss. The slope ranges from 8 to 15 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 in/hr (moderate), with about 6.4 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is greater than 6 feet. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 3e
Typical Profile:
0 to 4 inches; fine sandy loam
4 to 7 inches; fine sandy loam
7 to 19 inches; fine sandy loam
19 to 27 inches; gravelly fine sandy loam
27 to 65 inches; gravelly fine sandy loam

Map Unit Description (Brief)

State of Connecticut

Map Unit: 61B - Canton and Charlton soils, 3 to 8 percent slopes, very stony

Description Category: SOI

Canton And Charlton Soils, 3 To 8 Percent Slopes, Very Stony
This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 37 to 49 inches (940 to 1244 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 45 percent Canton soils, 35 percent Charlton soils. 20 percent minor components

Canton soils
This component occurs on upland hill landforms. The parent material consists of melt-out till derived from schist, granite, and gneiss. The slope ranges from 3 to 8 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 1.98 in/hr (moderately rapid), with about 5.6 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is greater than 6 feet. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 6s
Typical Profile:
0 to 1 inches; moderately decomposed plant material
1 to 3 inches; gravelly fine sandy loam
3 to 15 inches; gravelly loam
15 to 24 inches; gravelly loam
24 to 30 inches; gravelly loam
30 to 60 inches; very gravelly loamy sand

Charlton soils
This component occurs on upland hill landforms. The parent material consists of melt-out till derived from granite, schist, and gneiss. The slope ranges from 3 to 8 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 in/hr (moderate), with about 6.4 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is greater than 6 feet. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 6s
Typical Profile:
0 to 4 inches; fine sandy loam
4 to 7 inches; fine sandy loam
7 to 19 inches; fine sandy loam
19 to 27 inches; gravelly fine sandy loam
27 to 65 inches; gravelly fine sandy loam

Map Unit Description (Brief)

State of Connecticut

Map Unit: 61C - Canton and Charlton soils, 8 to 15 percent slopes, very stony

Description Category: SOI

Canton And Charlton Soils, 8 To 15 Percent Slopes, Very Stony
This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 37 to 49 inches (940 to 1244 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 45 percent Canton soils, 35 percent Charlton soils. 20 percent minor components

Canton soils
This component occurs on upland hill landforms. The parent material consists of melt-out till derived from schist, granite, and gneiss. The slope ranges from 8 to 15 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 1.98 in/hr (moderately rapid), with about 5.6 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is greater than 6 feet. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 6s
Typical Profile:
0 to 1 inches; moderately decomposed plant material
1 to 3 inches; gravelly fine sandy loam
3 to 15 inches; gravelly loam
15 to 24 inches; gravelly loam
24 to 30 inches; gravelly loam
30 to 60 inches; very gravelly loamy sand

Charlton soils
This component occurs on upland hill landforms. The parent material consists of melt-out till derived from granite, schist, and gneiss. The slope ranges from 8 to 15 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 in/hr (moderate), with about 6.4 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is greater than 6 feet. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 6s
Typical Profile:
0 to 4 inches; fine sandy loam
4 to 7 inches; fine sandy loam
7 to 19 inches; fine sandy loam
19 to 27 inches; gravelly fine sandy loam
27 to 65 inches; gravelly fine sandy loam

Map Unit Description (Brief)

State of Connecticut

Map Unit: 84B - Paxton and Montauk fine sandy loams, 3 to 8 percent slopes

Description Category: SOI

Paxton And Montauk Fine Sandy Loams, 3 To 8 Percent Slopes
This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 35 to 50 inches (889 to 1270 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 55 percent Paxton soils, 30 percent Montauk soils. 15 percent minor components.

Paxton soils
This component occurs on upland hill and drumlin landforms. The parent material consists of lodgement till derived from granite, gneiss, and schist. The slope ranges from 3 to 8 percent and the runoff class is medium. The depth to a restrictive feature is 20 to 40 inches to densic material. The drainage class is well drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 3.4 inches (moderate) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 24 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 2e
Typical Profile:
0 to 8 inches; fine sandy loam
8 to 15 inches; fine sandy loam
15 to 26 inches; fine sandy loam
26 to 65 inches; gravelly fine sandy loam

Montauk soils
This component occurs on upland hill and drumlin landforms. The parent material consists of sandy lodgement till derived from granite and gneiss. The slope ranges from 3 to 8 percent and the runoff class is low. The depth to a restrictive feature is 20 to 38 inches to densic material. The drainage class is well drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 3.3 inches (moderate) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 27 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 2e
Typical Profile:
0 to 4 inches; fine sandy loam
4 to 14 inches; fine sandy loam
14 to 25 inches; sandy loam
25 to 39 inches; gravelly loamy coarse sand
39 to 60 inches; gravelly sandy loam

Map Unit Description (Brief)

State of Connecticut

Map Unit: 84C - Paxton and Montauk fine sandy loams, 8 to 15 percent slopes

Description Category: SOI

Paxton And Montauk Fine Sandy Loams, 8 To 15 Percent Slopes
This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 35 to 50 inches (889 to 1270 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 55 percent Paxton soils, 30 percent Montauk soils. 15 percent minor components.

Paxton soils
This component occurs on upland hill and drumlin landforms. The parent material consists of lodgement till derived from granite, gneiss, and schist. The slope ranges from 8 to 15 percent and the runoff class is medium. The depth to a restrictive feature is 20 to 40 inches to densic material. The drainage class is well drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 3.4 inches (moderate) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 24 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 3e
Typical Profile:
0 to 8 inches; fine sandy loam
8 to 15 inches; fine sandy loam
15 to 26 inches; fine sandy loam
26 to 65 inches; gravelly fine sandy loam

Montauk soils
This component occurs on upland hill and drumlin landforms. The parent material consists of sandy lodgement till derived from granite and gneiss. The slope ranges from 8 to 15 percent and the runoff class is low. The depth to a restrictive feature is 20 to 38 inches to densic material. The drainage class is well drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 3.3 inches (moderate) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 27 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 3e
Typical Profile:
0 to 4 inches; fine sandy loam
4 to 14 inches; fine sandy loam
14 to 25 inches; sandy loam
25 to 39 inches; gravelly loamy coarse sand
39 to 60 inches; gravelly sandy loam

Landscape Ecology Review

Vernal Pools

Large Pool in the Woods Needs to Be Checked for Obligate Species

The pool in the woods appears to be a likely candidate for a functioning vernal pool in that it appears to hold water in a basin and lack fish. Note that although the classical vernal pool is a small depression that holds water for at least two months and dries up during some portion of the year, a wooded swamp also can be treated as a vernal pool if it provides habitat for vernal pool obligate species. Note also that not all wetlands that function as vernal pools dry up every year.

In order to determine if a likely candidate pool actually functions as a vernal pool, one needs to find out if it supports the breeding of species that are considered vernal pool obligates (*i.e.*, species whose populations depend on breeding habitat wherein they are protected from predation by fish due to the pond's drying yet the duration of water is normally enough to allow completion of the aquatic life stage). Vernal pool obligate species are:

- Wood Frog*
- Fairy Shrimp
- Mole Salamanders; including, in Connecticut:
  - -- Spotted Salamander*
  - -- Marbled Salamander
  - -- Blue-spotted (and associated hybrids with Jefferson) Salamander
  - -- Jefferson (and associated hybrids with Blue-spotted) Salamander
  - -- Spadefoot Toad

*The most likely amphibians to be found in the Town of Bolton are Wood Frogs and Spotted Salamanders, the two reported for Bolton in Michael Klemens' 1993 book, *Amphibians and Reptiles of Connecticut and Adjacent Regions*. Early Spring after the first warm rain is the time to search for egg masses of these species. Also listen for the sound of calling Wood Frogs (sounds like a dog barking or quacking).

The likelihood of the other vernal pool obligates being present is less in that they have not been reported for Bolton or they are very rare.

Eggs of Marbled Salamanders are deposited in the fall. Their larvae will be on the order of 1" long when Spotted Salamanders have not yet hatched. Marbled Salamanders have been reported in Ellington, Andover, and Hebron.

Blue-spotted Salamanders are quite rare. They have been reported in Ellington.

Jefferson Salamanders are rare and only reported west of the Connecticut River.

Spadefoot Toads are quite rare in Connecticut. Their breeding pools typically are very temporary (e.g., a flooded field or extensive puddle) and often are in sandy soil or river floodplains. Klemens reports a sighting in Manchester in 1982.
Fairy Shrimp are vulnerable to being eaten by Salamander larvae and predacious insects. Thus, pools should be inspected for their presence just as soon as the ice begins to open up.

Photos and additional information at http://www.vernalpool.org/vpinfo_1.htm

Reed Canarygrass Wetland = Possible Vernal Pool?

The landscape ecologist wonders if the open, Reed Canarygrass wetland that the Team went through (after cutting through the woods southwest of the Little Lot) is a place that should be inspected in the Spring for vernal pool obligates? Although Reed Canarygrass is considered an invasive plant in Connecticut and such a situation would not be the natural condition of a vernal pool, there are Reed Canarygrass infested wetlands which function as vernal pools (*i.e.*, serve as breeding grounds for vernal pool obligate species).

Protecting the Terrestrial Habitat of Obligate Vernal Pool Species

Although Wood Frogs and Mole Salamanders require vernal pool habitat for reproduction, they spend their adult lives outside the pools. This means that protection of adult habitat is essential to a population's survival. The regulated area required by inland wetlands law addresses only water quality (*i.e.*, is applicable only to the egg and larval stages). As the CT Department of Environmental Protection's vernal pool webpage notes, "A buffer of at least 100 feet will help maintain water quality, but will do little to protect amphibians living around the pool. Vernal pool breeders require large areas of natural habitat around their pools in order to survive." http://www.ct.gov/dep/cwp/view.asp?A=2720&Q=325676

A wide variety of pool buffer distances have been proposed, some based on species-specific biology and some not. In addition, it is recognized that different kinds of land uses vary by species in the in the severity of impacts -- both direct impacts (*e.g.*, mortality) and indirect impacts (*e.g.*, loss of habitat). And, these impacts may be short-term or long-term depending on things like how long it takes the habitat to recover and the ability of the vernal pool obligates to re-populate the site following disturbance.

A good reference for understanding vernal pool habitat and considering logging impacts in areas with vernal pools is *Forest Habitat Management Guidelines for Vernal Pool Wildlife, MCA Technical Paper Series: No. 6* by Aram J.K. Calhoun and Phillip deMaynadier (2004) available at http://www.maine.gov/doc/mfs/pubs/pdf/vernal_pool_hmg.pdf . The guidelines are applicable to places where forest habitat will be allowed to regenerate. The authors suggest a vernal pool protection zone of 100 feet past the pool's high water mark for protecting both water quality and recently-transformed (easily dried-out) salamanders. For adult habitat, they give suggestions for how to minimize impacts in an amphibian life zone of an additional 300 feet. Although the managed amphibian life zone ends at 400 feet from the pool, the authors also note that as much as half the populations of spotted salamanders may disperse more than 386 feet.

The New Jersey Highlands Council Draft Ecosystem Management Technical Report Addendum of October 2007 gives additional information on the appropriate resource protection area for vernal pools, including a discussion of the differences in the appropriate sizes of protection zones on conservation land versus working land as well as species-specific data on the distances adults have been found to move from pools.
http://www.state.nj.us/njhighlands/about/calend/2007_meetings/technical_report_addendum_vernal_pool.pdf

Control of Vegetation In and Around Stone Spring

- The vegetation could be controlled by a combination of hand control and mowing.
- The Duckweed in the pond is a native plant, *Lemna minor* (Lesser Duckweed). Its presence is not considered harmful. And, in fact, if there are excess nutrients in the water that would lead to algal blooms, the presence of Duckweed results in some nutrient uptake, and, more importantly, shades the water column so excessive algae cannot grow.
- if it is aesthetically objectionable, it could be removed with a net as it is not rooted;
- removal also would remove nutrients from the water (relevant issue in larger pool)

Dug Pond

The thick growth of cattails suggests (A) the possibility of an excess of nutrients in the water (from agricultural run-off), (B) altered hydrology (less water than previously coming in to a pond), and/or (C) the presence of an aggressive type of cattail. This reviewer was not able to positively identify the species of cattail.

Regardless of species, the cat-tails are spreading. If nothing is done to the pond vegetation, it is likely that the cattails will continue to increase in both number and density. This is undesirable for bird diversity.

Cattail eradication is not easy. A discussion of possible methods is available at: http://www.dnr.state.wi.us/invasives/fact/com_cattail.htm . If chemicals are used in an aquatic situation in Connecticut, a state permit must be obtained. Note that rather than eradication (complete removal of the population), a possible management strategy might be reduction in (A) the number of stems or (B) the overall size of the cattail patch.

Whether or not to reclaim the edge of the dug pond depends on what the desired use is. The presence of Multiflora Rose (a non-native invasive plant) around the edge helps barricade the pond from possibly undesired entry of small children.

Forestry/ Vegetation

A. Note on Forest Management Plan Concept

Although the term "forest management" often has been used to mean "activities related to managing a forest to produce *timber products*", the concept of forest management actually can be directed at other goals (for example,

(i) creation or enhancement of wildlife habitat;
(ii) improvement or protection of passive recreation opportunities;
(iii) promotion of old growth forest characteristics;

(iv) provision of a site on which the undisturbed unfolding of natural processes may be observed and studied or enjoyed over time).

Further, in addition to activities involving the removal or the introduction of trees or other plants, a management plan may include the "activity" of *non-interference* in selected areas. Planned non-interference is different than unplanned neglect; one presumes that there is some level of observation/monitoring of results with planned non-interference.

B. Invasive Organisms

Identification guides at http://www.ct.nrcs.usda.gov/invas-factsheets.html and http://www.ct.nrcs.usda.gov/invasive_insects.html . Updates on current issues, management information, etc. at www.hort.uconn.edu/cipwg

1. Early Detection and Rapid Response (EDRR) Protocol is Recommended

An early detection and rapid response protocol for invasive plants is recommended for the forested area where there appeared (in winter visit) to currently be few invasive plants except near the field edges. EDRR involves (a) learning species identification, (b) being on the lookout for invasive species (particularly in the vicinity of the fields, trails, or other disturbed areas) so as to find them before they have large populations, and (c) dealing with invasives before they get out of control.

Oriental Bittersweet at the egde of field on Steeles Lot.

a. Shrubs

- Fall is a good time to look for Winged Euonymus (aka Burning Bush – *Euonymus alatus*)
- Spring is a good time to watch for Japanese Barberry (*Berberis thunbergii*) and Multiflora Rose (*Rosa multiflora*)

b. Herbaceous Plants whose seeds are easily carried by hikers or equipment

- Spring and early Summer are good times to look for Garlic Mustard (*Alliaria petiolata*)
- Summer and Fall are good times to look for Japanese Stilt Grass (*Microstegium vimineum*)

c. Mile-a-minute Vine (*Persicaria perfoliata* {aka *Polygonum perfoliatum*})

Mile-a-minute Vine is of particular concern in Connecticut because it is now only in a few towns. (There is no reason to expect that it is in Bolton, but it should be on people's radar, particularly in sunny areas.)

d. Learn to identify Asian Longhorned Beetle and Emerald Ash Borer

2. When heavy machinery is brought to the site, protocols to prevent the introduction of invasive plant seeds should be followed.

a. Stipulate that the equipment (including tires, undercarriage, moving parts, etc.) is free of mud and clinging vegetation prior to it coming onto the site.

b. Plan for movement of the equipment through the site on a route that does not take it though places where it will pick up seeds and bring them to uninfested soil.

Farmland Preservation

The State of Connecticut's Farm Link Program provides the opportunity for farm land owners to find interested young farmers (and vice versa). http://www.farmlink.uconn.edu/

Vegetation and Forest Management

Vegetation

The vegetation of the 102 acre Bolton Heritage Farm property can be separated into five (5) Areas or vegetation cover types (see Vegetation Map). Acreages were scaled from aerial photographs and are approximates only.

Non-native plant species considered to be invasive are italicized.

According to the DEP Natural Diversity Database, there are no known extant populations of Federal or State Endangered, Threatened, or Special Concern Plant Species on or near this property.

Area #1 – Mixed Hardwoods – 30.4 acres

This mixed hardwood stand has an overstory of pole to sawtimber-sized Hickory, Sugar maple, Black oak, Black birch, White oak, and Red maple. Sapling to pole-sized Sugar maple, Red maple, Black birch, Hickory, American beech, and American elm comprise the understory. Sapling, pole and small sawtimber-sized *Norway maple* and *Tree-of -Heaven* are found within this stand near its border with the agricultural fields. Advanced tree regeneration of Sugar maple, Black birch, Red maple, Black oak, Sassafras, and American beech was found. Sprouts of American chestnut were also noted. This regeneration averages four to six feet tall and is most common and numerous in openings created by the last timber harvest.

A shrub layer of Highbush blueberry, Maple-leaf viburnum, Spicebush, Witch hazel, *Oriental bittersweet*, *Multiflora rose*, and *Japanese barberry* exists. This shrub layer is light and very patchy. Ground cover consists of ferns, lilies, poison ivy, violets, grape, jack-in-the-pulpit, trillium, and various native grasses.

At the vernal pool, an overstory of pole to sawtimber-sized Red maple, Black gum, Scarlet oak, White ash, and Black oak with an understory of sapling to pole-sized Red maple, Yellow birch, and White ash is found. The shrub layer of Spicebush, Sweet pepperbush, Highbush blueberry, Swamp azalea, Shadbush (Serviceberry), and various Viburnums is moderately dense and fairly continuous, especially on the pool's edge. Skunk cabbage, Poison ivy, and various sedges form the ground cover.

This stand is fully stocked (97% stocked) with fair to good quality trees. The average tree diameter is 9.5 inches. Volumes per acre are approximately 8500 board feet and 2.3 cords.

Access to this stand is through the fields. Operability is good to fair due to the sloping terrain, pockets of wet soils, and numerous seasonal drainages. Harvesting and other operations may be seasonally restricted due to wet ground conditions.

Area #2 – Mixed Hardwoods – 9.4 acres

Large pole to sawtimber-sized Black oak, Scarlet oak, Hickory, Red maple, and Red oak make up the overstory. The understory consists of sapling to pole-sized Hickory, Red maple, Sugar maple, Black birch, American hornbeam, Hophornbeam, Yellow birch, and American elm. Advanced tree regeneration of Red maple, Black birch, Cherry, Hickory, and Black oak was noted. This regeneration averages four to six feet tall and is most common and numerous in openings created by the last timber harvest.

The shrub layer is comprised of Spicebush, American hawthorn, Mapleleaf viburnum, Shadbush (Serviceberry), *Winged euonymus (Burning bush)*, *Japanese barberry*, *Multiflora rose*, and *Oriental bittersweet*. This shrub layer is light to moderately dense and patchy. A light ground cover of ferns, native grasses, and Poison ivy exists.

This stand is fully stocked (100% stocked) with fair to good quality trees. The average tree diameter is 9 inches. Volumes per acre are approximately 7700 board feet and 5.4 cords.

Access to this stand is through the fields. Operability is fair to good due to the sloping terrain, pockets of wet soils, and numerous seasonal drainages. Harvesting and other operations may be seasonally restricted due to wet ground conditions.

Area #3 – Hardwood Wetlands – 5.9 acres

The overstory is formed by pole to sawtimber-sized Red maple, Yellow birch, and White ash. Sapling-sized Red maple, White ash, Yellow birch, and American elm comprise the understory. Tree regeneration is very sparse and is composed mostly of Red maple.

The shrub layer of Spicebush, Sweet pepperbush, *Japanese barberry*, and various Viburnums is light and patchy. A moderately dense ground cover of Skunk cabbage, Bracken fern, Solomon seal, and various sedges exists.

This stand is non-commercial and is variably but lightly stocked with fair to poor quality trees.

Access to this stand is also through the fields. The high water table and saturated soils cause this stand to be inoperable with harvesting equipment.

Area #4 – Agricultural Fields – 36.3 acres

This Area includes the farmstead and the fields that are being actively used and maintained as hayfields at the present time. These fields contain a mix of cultivated grasses.

Surrounding these fields are hedgerows or borders of trees and shrubs. Between adjacent fields, these borders may simply be single widely scattered trees. Trees present include Hickory, Red maple, Black oak, White ash, Cherry, Flowering dogwood, Apple, and American hornbeam. Shrubs include Spicebush, Highbush blueberry, Raspberry, Grape, *Multiflora rose*, *Autumn olive*, and *Oriental bittersweet*. Poison ivy, Goldenrod, ferns and other herbaceous plants are also found within these borders.

Area #5 – Old Fields – 20.0 acres

Including the area surrounding the small pond, these old fields were once used as pastures and/or hayfields when the property was an active dairy farm. Now abandoned from agricultural use, a mix of native and non-native trees and shrubs are becoming established.

Seedling, sapling and pole-sized Red maple, Cherry, Willow, White ash, Hickory, and *Tree-of-Heaven* are the tree species present. Several sawtimber-sized Hickories and remnant Apple trees were also noted within this Area. A light and moderately patchy shrub layer of *Multiflora rose, Autumn olive, Oriental bittersweet,* Raspberry, Blackberry, Elderberry, and Viburnums is present and expanding. Ground cover consists of Goldenrod, Poison ivy, and various native and cultivated grasses and forbs. Cattails cover much of the pond's surface area.

At present, this Area varies from being non-stocked to understocked with desirable trees. Given the site conditions of this Area and the aggressive nature of the non-native invasive plant species already established, it is likely that these invasive species, unless controlled, will fully occupy the site within a few years.

This Area is under a Wildlife Habitat Improvement Project (WHIP) agreement and as such, all management activities will be governed by the terms and conditions of the agreement.

Management Recommendations

The boundaries of the property should be clearly marked with painted blazes and/or signs. This is helpful to prevent timber trespass or encroachment of any type. Annual inspection or monitoring of the bounds is necessary.

A hazard tree survey should be conducted around all public access areas and trails. A hazard tree is a tree with structural defects likely to cause failure of all or part of the tree, which could strike a target. A target is a vehicle, building or other improvement, or a place where people gather. These surveys of all trees, within a distance equal to twice the tree height of a target, should be completed at least annually and after each significant storm/wind event. All trees determined to be hazardous should be removed if any potential target/risk cannot be moved. Trails can be relocated if needed and practical.

The next priority is to control the non-native invasive plant species. The largest threat to forest and ecosystem health of this property at present is the abundance and widespread distribution of these non-native invasive plants. These invasives can displace and replace desirable native vegetation and alter ecological processes. With their rapid growth, efficient dispersal of abundant

seed, and tolerance of a wide range of environmental conditions, they will outcompete the native vegetation for sunlight, nutrients, soil moisture, and space. Insects and diseases which controlled their populations in their native habitats are lacking.

Areas #1, 2, and 5, as well as the edges of the agricultural fields have significant populations of a number of different invasive plant species. Efforts should be undertaken to reduce and/or control these populations in these Areas and prevent further spread. *Oriental bittersweet, Autumn olive, and Tree-of –Heaven* are among the most aggressive and most difficult to control of the invasives. Various mechanical and chemical controls are available to target the individual invasive species for control. See the Invasive Plant Atlas of New England Project website http://invasives.eeb.uconn.edu/ipane for more details. Person applying pesticides must be licensed and all pesticide applications documented. Permanent eradication will be time consuming and possibly expensive. Efforts to control these invasives will take many years of dedicated work to achieve eradication or even reduction in numbers of plants.

Conducting a harvest of forest products at this time would only create the most favorable conditions for further establishment and development of the non-native invasive plants. Following control of the invasives, a harvest might be undertaken in Areas #1 and 2 to improve the health of the woodlands and to improve the species composition or mix. An up-to-date forest inventory should be undertaken to allow proper planning of the harvest.

Managing a portion of the woodlands as old growth (or as a woodland with old growth characteristics) might be considered but only after the invasives have been controlled. As these woodlands developed following their abandonment from agricultural use and then repeated harvested for forest products of one type or another, it will take many years to develop the old growth characteristics and species mix.

A professional forester certified by the Connecticut Department of Environmental Protection should be consulted prior to undertaking the harvesting of forest products or other forest management activities on this property. The Connecticut Forest Practices Act requires that anyone who advertises, solicits, contracts, or engages in commercial forest practices within the state at any time must be certified in accordance with the law. Additional information concerning the Forest Practices Act (CGS Sec. 23-65f – o) and the Directory of Certified Forest Practitioners is available on-line at www.ct.gov/dep/forestry .

Maintain native tree, shrub and ground cover in the wetlands wherever possible. The 2007 Connecticut Field Guide - Best Management Practices for water quality while harvesting forest products, available on the Connecticut DEP website, should be followed when conducting harvesting activities on the property. Recommendations from the Field Guide for protecting the vernal pool include:

- Prohibit equipment from entering the pool or operating on the pool walls at any time during the year.
- Keep tree tops and logging slash out of the pool depression.
- Maintain an undisturbed 50 foot vegetated buffer around the pool.
- Maintain a minimum of 50% canopy cover within the buffer.

Locate landings and major skid trails outside the buffer. Keep sediment from entering the pool and buffer.
Smooth out all ruts and implement proper best management practices (BMP) for road and trail closures.

Maintain Area #4 as open agricultural fields by leasing to a local farmer or other means. Conversion of even a small portion to the production of Christmas trees is not warranted at present. There are already a number of established Christmas tree farms in and around Bolton. Christmas trees are a relatively long-term crop that is fairly labor intensive and the work must be accomplished during limited time periods, such as planting in April and shaping/shearing from mid-June through mid-July. Christmas trees will require 8 – 12 years in the field, each acre will require approximately 40 hours per year for care and maintenance, and pesticides whose application times might be critical, are commonly applied to control weeds and also insects and diseases. A Christmas tree plantation would likely require a long-term lease to an experienced producer.

Maintain Area #5 as old field habitat as per the WHIP agreement. Retain the apple trees, large hickories and desirable native fruiting shrubs while eradicating the non-native invasive plants.

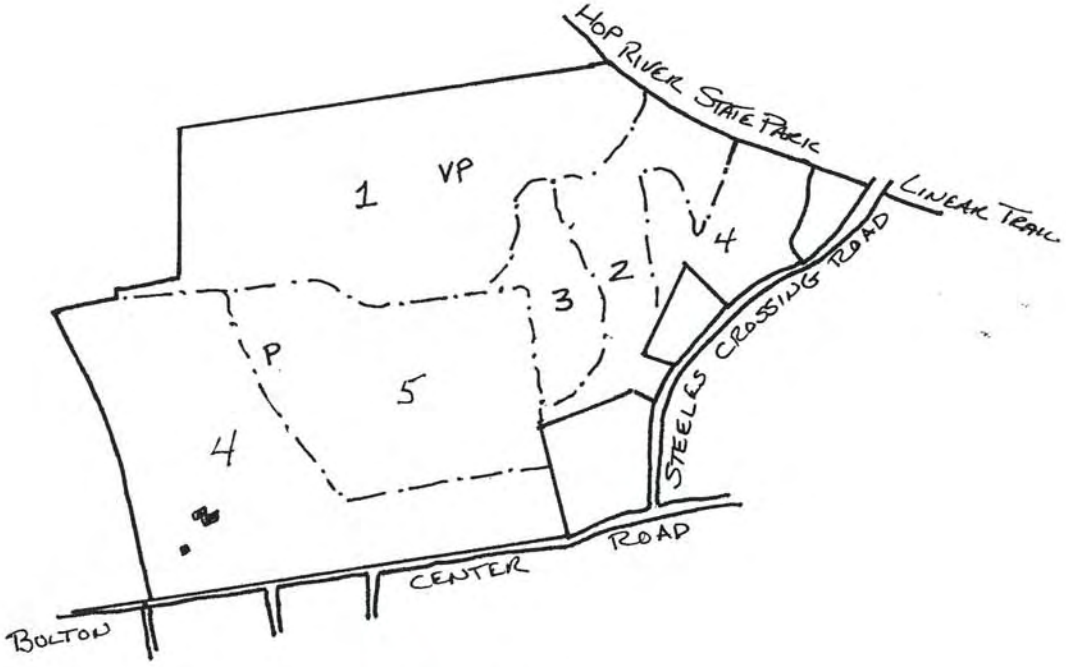
Definitions

Tree size classes:

Seedling – up to 1” diameter at breast height (DBH – measured 4-1/2 feet above the ground)
Sapling – 1.1” to 4.9” DBH
Pole – 5” to 10.9” DBH
Sawtimber - 11” DBH and larger

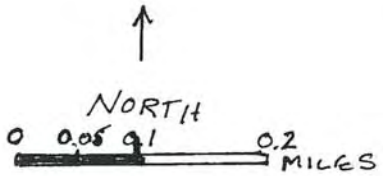
VEGETATION MAP
BOLTON HERITAGE FARM
BOLTON, CONNECTICUT
APRIL 2010

From Bolton Heritage Farm Site Aerial Map by Amanda Fargo-Johnson, Connecticut Environmental Review Team, September 2009
Vegetation mapping by Sherwood R. Raymond, Jr. CT DEP Division of Forestry, April 2010



LEGEND

———	PROPERTY BOUNDARY
▬	STRUCTURE
— · —	AREA (VEGETATION TYPE) BOUNDARY
1 - 5	AREA (VEGETATION TYPE) – SEE TEXT
VP	VERNAL POOL
P	POND



The Natural Diversity Data Base

The Natural Diversity Data Base maps and files regarding the project area have been reviewed. According to our information, there are records for State Special Concern *Terrapene carolina carolina* (Eastern box turtle) and State Special Concern *Clemmys insculpta* (wood turtle) from the vicinity of this project site.

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

Wood turtles require riparian habitats bordered by floodplain, woodland or meadows. Their summer habitat includes pastures, old fields, woodlands, powerline cuts and railroad beds bordering or adjacent to streams and rivers. This species has also been negatively impacted by the loss of suitable habitat.

If any work will be conducted in any Eastern box turtle or wood turtle habitat, the Wildlife Division recommends that a herpetologist familiar with the habitat requirements of these reptiles conduct surveys. A report summarizing the results of such surveys should include habitat descriptions, reptile species list and a statement/resume giving the herpetologist' qualifications. The DEP doesn't maintain a list of qualified herpetologists. The results of this investigation can be forwarded to the Wildlife Division and, after evaluation, recommendations for additional surveys, if any, will be made.

Please be advised that the Wildlife Division has not made a field inspection of the project nor have we seen detailed timetables for work to be done. Consultation with the Wildlife Division should not be substituted for site-specific surveys that may be required for environmental assessments. The time of year when this work will take place will affect these species if they are present on the site when the work is scheduled. Please be advised that should state permits be required or should state involvement occur in some other fashion, specific restrictions or conditions relating to the species discussed above may apply. In this situation, additional evaluation of the proposal by the DEP Wildlife Division should be requested. If the proposed project has not been initiated within 6 months of this review, contact the NDDB for an updated review. If you have any additional questions, please feel free to contact Julie.Victoria@ct.qov , please reference the NDDB #17245.

Natural Diversity Data Base information includes all information regarding critical biologic resources available to us at the time of the request. This information is a compilation of data collected over the years by the Environmental and Geographic Information Center's Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substituted for on-site surveys required for environmental assessments. Current research projects and new

contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available.

Connecticut Department of Environmental Protection

Eastern Box Turtle

Terrapene carolina carolina

State Species of Special Concern

Description
The eastern box turtle is probably the most familiar of the 8 species of turtles found in Connecticut's landscape. It is known for its high-domed carapace (top shell). The carapace has irregular yellow or orange blotches on a brown to black background that mimic sunlight dappling on the forest floor. The plastron (under shell) may be brown or black and may have an irregular pattern of cream or yellow. The length of the carapace usually ranges from 4.5 to 6.5 inches, but can measure up to 8 inches long. The shell is made up of a combination of scales and bones, and it includes the ribs and much of the backbone.

Each individual turtle has distinctive head markings. Males usually have red eyes and a concave plastron, while females have brown eyes and a flat plastron. Box turtles also have a horny beak, stout limbs, and feet that are webbed at the base. This turtle gets its name from its ability to completely withdraw into its shell, closing itself in with a hinged plastron. Box turtles are the only Connecticut turtle with this ability.

Range
Eastern box turtles are found throughout Connecticut, except at the highest elevations. They range from southeastern Maine to southeastern New York, west to central Illinois, and south to northern Florida.

Habitat and Diet
In Connecticut, this terrestrial turtle inhabits a variety of habitats, including woodlands, field edges, thickets, marshes, bogs, and stream banks. Typically, however, box turtles are found in well-drained forest bottomlands and open deciduous forests. They will use wetland areas at various times during the season. During the hottest part of a summer day, they will wander to find springs and seepages where they can burrow into the moist soil. Activity is restricted to mornings and evenings during summer, with little to no nighttime activity, except for egg-laying females. Box turtles have a limited home range where they spend their entire life, ranging from 0.5 to 10 acres (usually less than 2 acres).

Box turtles are omnivorous and will feed on a variety of food items, including earthworms, slugs, snails, insects, frogs, toads, small snakes, carrion, leaves, grass, berries, fruits, and fungi.

Life History
From October to April, box turtles hibernate by burrowing into loose soil, decaying vegetation, and mud. They tend to hibernate in woodlands, on the edge of woodlands, and sometimes near closed canopy wetlands in the forest. Box turtles may return to the same place to hibernate year after year. As soon as they come out of hibernation, box turtles begin feeding and searching for mates.

The breeding season begins in April and may continue through fall. Box turtles usually do not breed until they are about 10 years old. This late maturity is a result of their long lifespan, which can range up to 50 to even over 100 years of age. The females do not have to mate every year to lay eggs as they can store sperm for up to 4 years. In mid-May to late June, the females will travel from a few feet to more than a mile within their home range to find a location to dig a nest and lay their eggs. The 3 to 8 eggs are covered with dirt and left to be warmed by the sun. During this vulnerable time, skunks, foxes, snakes, crows, and raccoons often raid nests. Sometimes, entire nests are destroyed. If the eggs survive, they will hatch in late summer to early fall (about 2 months after being laid). If they hatch in the fall, the young turtles may spend the winter in the nest and come out the following spring.

As soon as the young turtles hatch, they are on their own and receive no care from the adults. This is a dangerous time for young box turtles because they do not develop the hinge for closing into their shell until they are about 4 to 5 years old. Until then, they cannot entirely retreat into their shells. Raccoons, skunks, foxes, dogs, and some birds will prey on young turtles.

Conservation Concerns
The eastern box turtle was once common throughout the state, mostly in the central Connecticut lowlands. However, its distribution is now spotty, although where found, turtles may be locally abundant. Because of the population decline in Connecticut, the box turtle was added to the state's List of Endangered, Threatened, and Special Concern Species when it was revised in 1998. It is currently listed as a species of special concern. The box turtle also is protected from international trade by the 1994 CITES treaty. It is of conservation concern in all the states where it occurs at its northeastern range limit, which includes southern New England and southeastern New York.

Many states have laws that protect box turtles and prohibit their collection. In Connecticut, eastern box turtles cannot be collected from the wild (DEP regulations 26-66-14A). Another regulation (DEP regulations 26-55-3D) "grandfathers" those who have a box turtle collected before 1998. This regulation limits possession to a single turtle collected before 1998. These regulations provide some protection for the turtles, but not enough to combat some of the even bigger threats these animals face. The main threats in Connecticut (and other states) are loss and fragmentation of habitat due to deforestation and spreading suburban development; vehicle strikes on the busy roads that bisect the landscape; and indiscriminate (and now illegal) collection of individuals for pets.

Loss of habitat is probably the greatest threat to turtles. Some turtles may be killed directly by construction activities, but many more are lost when important habitat areas for shelter, feeding, hibernation, or nesting are destroyed. As remaining habitat is fragmented into smaller pieces, turtle populations can become small and isolated.

Adult box turtles are relatively free from predators due to their unique shells. The shell of a box turtle is extremely hard. However, the shell is not hard enough to survive being run over by a vehicle. Roads bisecting turtle habitat can seriously deplete the local population. Most vehicle fatalities are pregnant females searching for a nest site.

How You Can Help

- Leave turtles in the wild. They should never be kept as pets. Whether collected singly or for the pet trade, turtles that are removed from the wild are no longer able to be a reproducing member of a population. Every turtle removed reduces the ability of the population to maintain itself.
- Never release a captive turtle into the wild. It probably would not survive, may not be native to the area, and could introduce diseases to wild populations.
- Do not disturb turtles nesting in yards or gardens.
- As you drive, watch out for turtles crossing the road. Turtles found crossing roads in June and July are often pregnant females and they should be helped on their way and not collected. Without creating a traffic hazard or compromising safety, drivers are encouraged to avoid running over turtles that are crossing roads. Also, still keeping safety precautions in mind, you may elect to pick up turtles from the road and move them onto the side they are headed. Never relocate a turtle to another area that is far from where you found it.
- Learn more about turtles and their conservation concerns. Spread the word to others on how they can help Connecticut's box turtle population.

The production of this Endangered and Threatened Species Fact Sheet Series is made possible by donations to the Endangered Species-Wildlife Income Tax Checkoff Fund.
(5/08)

Connecticut Department of Environmental Protection
Wood Turtle

(Clemmys insculpta)

IDENTIFICATION: A medium-sized turtle, readily distinguished by its sculptured, rough, moderately-domed carapace, black head, orange-red wash on its under limbs, and a yellow plastron with black squares along the edges. Adults 150-200 mm carapace length.

In contrast to Connecticut's other turtle species, the wood turtle is an animal of the northern forest biome, from the Great Lakes eastward through New England and northeastern Canada. Its southern range limit lies near Washington, DC. In Connecticut, the strongholds of wood turtle distribution are the eastern and western uplands. Although once quite common in the Central Connecticut Lowland, many populations have been reduced or even eliminated by habitat fragmentation. This species was never common in the coastal zone of the state. Wood turtles have extensive landscape-scale habitat requirements, requiring clean rivers and large streams with deeply undercut banks for hibernation, as well as extensive areas of floodplain, forest, and fields for summer foraging. Because of their extensive overland movements, they are very susceptible to road mortality. They take over a decade to reach sexual maturity, and have a low egg output, and limited juvenile survivorship. Loss of adults from breeding populations, whether from increased road mortality or by collection for the wildlife trade, is a major problem affecting the sustainability of wood turtle populations in Connecticut. Possession of any wood turtle is prohibited (Conn. Code Sec. 26-55-3-C) in Connecticut without regard to its origin, and collection within Connecticut is prohibited (Conn. Code Sec. 26-66-14-A). The wood turtle is a "Special Concern" species in Connecticut. International commerce in wood turtles posed such a threat that in 1992 this species was placed under international trade regulatory protection administered by CITES (Convention on International Trade in Endangered Species of Flora and Fauna). The wood turtle is of conservation concern throughout most of its range. Most states and provinces where it occurs afford it special status and/or some form of statutory protection.

Turtles | Amphibians and Reptiles in Connecticut

Wildlife Habitat and Resources

Background

The Bolton Heritage Farm is a town-owned property consisting of 102 acres, 88 of which are under a conservation agreement with the State of Connecticut. The remaining acreage, which includes a house, cow barn, driveway, limited parking and portions of hayfields is not under the conservation agreement but restricted to "municipal uses." Much of this portion and the adjacent hillsides to the east and south are historically significant in being the site of an encampment of Rochambeau's Infantry in 1781. Twenty of the acres that are under the State conservation agreement are also under a management agreement with the Natural Resources Conservation Service through the Wildlife Habitat Incentives Program (WHIP).

The request for an environmental review came from the Bolton Heritage Farm Commission, which was established in 2006 and tasked with developing a written plan for use of the property to be submitted to the Board of Selectmen. The Commission requested from the ERT information about opportunities and limitations presented by the natural and historic resources on the farm. Regarding wildlife and wildlife habitat, the Commission specifically posed questions about: the function and quality of a wetland area; verification of two vernal pools; recommendations for an old farm pond that has filled in; a description of the types of wildlife, of special concern and otherwise, that utilize the farm; and recommendations for habitat enhancement.

A site walk was conducted on the Bolton Heritage Farm on Thursday, November 12, 2009 following a short meeting of ERT participants and representatives from the town of Bolton and the Farm Commission. This reviewer returned on December 7th to view a wetland area that she had not seen on the first visit. Also, Jane Seymour, a CT DEP wildlife biologist who had previously visited the property, shared her insights and observations.

A complete inventory of wildlife species on the property is beyond the scope of this report as it would require observations throughout the year with a focus on the spring nesting season. However, a reasonable assessment of the kinds of wildlife that may be expected is possible, as well as recommendations for enhancement of available habitats. When considering wildlife habitat, there are four components that are essential: food, water, cover and adequate space. The required types and amounts of these components vary by wildlife species. Please note that although a number of plant and animal species are named in this report, it does not represent a thorough survey.

Excluding the three-plus acres that contain the house, yard, barn, driveway, and parking area, the property is approximately half hardwood forest and half early successional (open) habitat. Within the open habitat there is about four acres of cattail-bulrush marsh, an old farm pond now grown in with cattails, an intermittent stream and a surface spring enhanced by a stone enclosure. Within the forested sections there are several acres of seepage wetland, at least one vernal pool, and another surface spring that may receive drainage from fields at higher elevation. Adjacent to the farm to the west is approximately 20 acres of town-owned old field and forest. The Hop

River State Park Linear Trail runs along the northeast border. There is more privately owned forest to the east and northeast of the Trail. Lands to the north and south are lightly to moderately developed.

Early Successional (Open) Habitats

Succession is the natural process by which one plant community replaces another over time. Early successional plant communities include grasslands, old fields, young forest and shrub thickets. These areas are critical to a number of wildlife species, many of which are listed as endangered, threatened or of special concern in Connecticut. They are rare and declining in Connecticut and throughout the Northeast due to the development for human use, natural succession into mature forest, and overgrowth with invasive species.

Historically, this type of habitat was created and maintained by fire, beaver work, intense weather events and agricultural activities. It was present in a small but critical amount prior to European colonization and reached a maximum during the 19th century. Until the mid 20th century, small family farms still provided diverse wildlife habitats including hayfields and pasture, abandoned old fields, shrublands and woodlots. Farming practices allowed for wildlife use as fields were mowed less frequently and often some fields were left fallow. Following World War II, the rapid loss of wildlife-friendly early successional habitat began with the development of suburbia, the abandonment of many farms that returned to forest, and the concentration and intensification of farming activities on less land.

Open habitats, such as those present on the Bolton Heritage Farm, are considered highly valuable. Because most of the acreage of the Farm is under a conservation agreement with the State of Connecticut to "be preserved in perpetuity predominantly in their natural and scenic and open condition for the protection of natural resources" (Conservation and Public Recreation Easement and Agreement 2001), there is a unique opportunity and responsibility to manage this area to optimize its habitat value. As for any habitat, larger patch size allows for greater wildlife diversity and a higher survivorship. Because the old field, tussock marsh and shrub thicket areas abut hayfields, the net area of early successional habitat is more than 45 contiguous acres.

Hayfields

Hayfields are generally composed of a group of grasses referred to as "cool-season" because they grow best during the spring and fall when soil and air temperatures are cool. Most cool-season grasses are non-native and may include timothy, Kentucky bluegrass, fescues, smooth brome grass, and orchard grass. The legumes alfalfa and clover are often part of the hayfield composition. These plant species were introduced because they become green earlier in the season than native warm-season grasses.

Although cool-season grasses may not provide as great a habitat value as native warm-season grasses, agricultural hayfields can be essential habitat to a number of grassland wildlife species.

Bobolinks and eastern meadowlarks, both species of special concern in Connecticut, utilize these sites for nesting, brood rearing, and foraging in spring and summer. In the fall, these areas provide feeding sites for migrating larks, sparrows and warblers. Hawks and owls including American kestrels (Connecticut threatened), northern harriers (Connecticut endangered), and short-eared owls (Connecticut threatened) may forage in these fields for small mammals and insects. Managed cool-season grasslands are identified as a key habitat for wildlife species of greatest conservation need in the Connecticut Wildlife Conservation Strategy (CT DEP 2005).

A significant impact of modern agricultural practices on wildlife is caused by the timing and frequency of hayfield mowing. As is presently practiced on the Bolton Heritage Farm, fields are mowed in May or June to produce a high quality crop and allow for a second or third mowing during the growing season. Unfortunately, the timing of the first mowing is well before grassland-nesting birds have fledged their young, and birds and nests are likely destroyed by this practice.

Bobolinks have been reported displaying in spring in the hayfield northeast of the barn adjacent to the WHIP fields (Jane Seymour CT DEP, personal communication). There is sufficient acreage in these fields to allow for successful reproduction for bobolinks and, combined with adjacent old field open habitats, possibly for eastern meadowlarks. Bobolinks require fields 5 to 10 acres in size in which to breed, and meadowlarks need at least 15 to 20 acres of field or grassland habitat. In addition to being species of special concern, Connecticut Audubon lists bobolinks and eastern meadowlarks in their "top 20 conservation priority species" (CT Audubon 2009). For a species to be included in this list, it must be a key indicator for a specific habitat type, Connecticut must be part of the species' core geographic range, and there must be practical conservation measures that can be undertaken to improve the species status.

clear.uconn.edu. Photo courtesy of Tom Pavlik

Probably the **single most important change in land management on the Bolton Heritage Farm** that could be made to benefit wildlife species of concern **would be to establish a mowing agreement that delays the first mowing of hayfields (most importantly the fields north of the barn) until after August 1st** to allow for successful reproduction of field nesting birds.

Old Field and Shrub Thicket

There are approximately 20 acres of old field, shrubland and open wetland located centrally on the farm, all being managed under the WHIP agreement. The 16-17 acres of upland are dominated by goldenrods and other forbs, mixed with grasses and patches of shrub-vine thicket. The woody species are mostly non-native and invasive (*e.g.*, multiflora rose, autumn olive,

Oriental bittersweet and tree-of-heaven). The area called the Oak Grove, which contains about a dozen scattered mature oaks and hickories, is part of this complex. The approximately four acres of designated wetland soil includes a cattail tussock marsh, as well as an old farm pond.

The complex of old field, shrub and wetland provide the habitat components for successful breeding of a number of birds of greatest conservation need (CT DEP 2005) including American woodcock, blue-winged, golden-winged, prairie and chestnut-sided warbler. The first three are also listed in Connecticut Audubon's conservation priority top 20 (CT Audubon 2008). Additionally, these areas provide critical foraging areas for wintering and migratory birds, which make use of the seed heads of the variety of wildflowers.

The diverse plants in these communities also host a highly diverse insect assemblage that in turn provides food for a wide variety of vertebrates. Several species of bats utilize such areas for hunting insects at night. The wildflowers of the old field host a myriad of butterflies and bees, while shrubland habitats contain a high proportion of state-listed butterflies and moths. At least 139 species of reptiles, amphibians, birds, and mammals either prefer or utilize shrub and old-field habitats. Of 40 bird species associated with shrubland habitats, 22 are undergoing significant population declines in eastern North America (Oehler et al. 2006).

The WHIP management agreement indicates control of invasive plant species and annual mowing of several of the fields to maintain the early successional plant community. Additionally, there will be a tree/shrub planting in two of the fields, one of which is adjacent to the marsh area. The annual mowing will be conducted after August 1st to allow for completion of the nesting cycle for any ground-nesting birds. The shrubs to be replanted should be a mix of high value cover and forage shrubs including viburnums, winterberry, blueberries, alders and dogwoods. Any natural thicket-forming species, such as blackberry or raspberry would provide good quality food and cover for birds and mammals such as cottontail rabbit, and be an excellent replacement for the widespread multiflora rose. Alders near the wetlands would be a good plant to encourage American woodcock.

The mature oaks and hickories that form the area called the Oak Grove are scattered and do not diminish the open nature of the old field–shrub habitat. They are also excellent mast–producing trees for many types of wildlife (see Forest discussion below). Because the trail winds through this area, it is unlikely that ground nesting birds will utilize it for breeding, though it likely supports a number of tree nesting birds and provides good foraging opportunities for many species.

The reference Managing Grasslands, Shrublands and Young Forests for Wildlife A Guide for the Northeast, is available on line on the DEP website www.ct.gov/dep or in the DEP bookstore http://www.ctdepstore.com/main.sc and may be helpful in providing more information on habitat management.

Forest Habitat

There are approximately 45 acres of mixed species – mixed age deciduous forest. The area that this reviewer observed, generally near the trail, was composed of mostly of oaks and hickories.

Also present were red and sugar maple, yellow and black birch, and several smaller tree species including hop-hornbeam, American hornbeam and American chestnut sapling stump-sprouts. Decaying stumps indicated a selective tree harvest about 15-20 years ago, per comments from Sherwood Raymond, CT DEP forester. The forest is relatively open with little understory except in the wet areas, where there is abundant spicebush. Several invasive shrub species were observed along the trail, including Japanese barberry, burning bush, and multiflora rose.

The forest provides food, cover and potential nesting or den sites for various wildlife species. Acorns and hickory nuts are especially important for gray squirrel, chipmunk, white-tailed deer, red and gray foxes, wild turkey, blue jays and a number of other birds. Native maples seeds, buds, flowers twigs and foliage also provide nutritious food a number of species. Also important to wildlife is the insect community supported by native plant species. Most birds, even seed-eaters, switch to an insect diet during the nesting season.

The major wildlife issues to consider in the forested landscape mostly pertain to potential logging operations. Should a timber harvest be conducted, the following management practices should be observed. Tops of trees should remain on the ground, scattered or in brush piles, to provide cover for small mammals, birds, amphibians and reptiles. Up to 30% of all small mammals and 50% of amphibians and reptiles use such coarse woody material for some or all of their life cycle. These materials also return essential nutrients to the soil upon decomposition. Unless posing a hazard near a trail, snags (standing dead trees), and standing or downed hollow trees should be left in place to provide essential insect food sources and potential den sites for wildlife. Live trees greater than 15 inches in diameter at breast height (dbh) are potential den trees, and should be left at least one per acre.

Also, removal or treatment of the few invasive plants along the trail could be conducted with minimal effort at this time since these plants are small and few.

Wetland and Watercourse Habitat

Several distinct wetlands and waterbodies were observed on the property: a cattail-bulrush tussock marsh; an old farm pond that has grown in with cattails; at least one vernal pool; a small stream, and a stone enclosed surface spring with some marshy vegetation.

Tussock Marsh

Within the open old field–shrub habitat is about four acres of mapped wetland soil. In December of 2009, a small area of open water within a cattail-bulrush tussock marsh was observed. A number of red maple saplings occurred on the western edge. The upland area to the east was heavily colonized by invasive multiflora rose and autumn olive.

The tussock marsh with its shrubland border provide excellent potential nesting habitat for a number of songbirds including red-winged blackbird, song sparrow, common yellowthroat and marsh wren. This area may also support use by larger wading birds and waterfowl, as well as a variety of mammals, reptiles, amphibians and invertebrates.

The marsh and adjacent old field-shrub habitat are included in the WHIP management plan. Adjacent to the marsh, native shrubs will replace the important structure and function now provided by the multiflora rose and autumn olive. There is potential for degradation of the marsh itself by the invasive common reed, *Phragmites*, or purple loosestrife. These species were not observed, but should be watched for to allow early intervention and removal should they appear.

Old Farm Pond

The old farm pond is small and now filled in with cattail. There is a single willow standing in the middle surrounded by a small moat of water. In its present state, this wetland probably has limited wildlife value given its small size and vegetation. In response to the question raised by the Bolton Heritage Farm Commission, a limited dredging to increase the area of open water and provide a variety of depths would offer additional habitat for reptiles and amphibians, a water source for birds and mammals and possibly a small dabbling area for waterfowl. The willow tree provides cover and some structural diversity, and would be beneficial to retain. A "rough" shrub and tall grass border should be maintained around most of the pond for cover and songbird nesting (see species discussed for tussock marsh). Given the small size of the pond, its ability to support fish is limited unless enlarged.

If any changes are considered for the pond, as with any wetland or watercourse, it will be necessary to consult with the Bolton Wetlands Agency for necessary permits and/or exemptions. Useful references for pond creation and maintenance are: Ponds in Connecticut, DEP Bulletin #23, and Small Ponds in Connecticut. Both publications are available from the DEP Store http://www.ctdepstore.com/main.sc

Vernal Pool(s)

A vernal pool is a temporary shallow pond within a confined basin having no outlet stream. These pools hold water in spring and sometimes fall but dry out completely during summer in most years. They lack fish populations and are characterized by indicator amphibian and invertebrate species that breed nowhere else. These "obligate" species may include wood frogs, mole salamanders (spotted, blue-spotted and Jefferson), the endangered spadefoot toad, fairy shrimp, as well as a plant called featherfoil. A number of other reptiles and amphibians, including several species listed as special concern, may forage and breed in vernal pools although they are not exclusively dependent upon them.

On the November 2009 site walk, a potential vernal pool was observed north of the woods trail. It was noted by the Farm Commission chairman that this pond dries in the summer and the obligate wood frog had been observed there, indicating that it is actually a vernal pool. This pool would be considered ecologically significant in that is it surrounded by protected forest, and is part of a greater wetland complex. Intact protected upland habitat adjacent to a vernal pool is critical because the amphibian species that use the pool for spring breeding spend the remainder of the year burrowed in the moist forest floor.

Management recommendations for this pool pertain mostly to considerations during a timber harvest. A 100-foot undisturbed area around the pool is recommended, and heavy logging

equipment should be kept as far away as possible. It would be beneficial to conduct a spring survey at the pool to document all breeding species.

There was discussion of a second potential vernal pool south of the trail, which this reviewer looked for on a subsequent visit in December. She was unable to locate an isolated vernal pool, but did find a wooded pool south of the trail that was connected hydraulically with the open water of the tussock marsh, though separated from the marsh by a stone wall. Although the wetland observed is likely not a vernal pool, its proximity to the vernal pool north of the trail and the tussock marsh enhances the value of all wetlands on the property as clusters of wetlands protect a wider diversity of organisms. Another interesting feature of this second woodland pond is that it appears to originate from a small stone-lined spring, much smaller than the "stone spring" located at the base of Encampment Hill (see below). This area is densely vegetated and aside from management of invasives should be left as is.

Stone Spring

The "stone spring" located at the base of Encampment Hill along the hiking trail was once used for farm animals. A small pool and marshy area extend beyond the stone structure. Vegetation is beginning to conceal the stonework, and the Commission would like to control the vegetation while conserving the wetland value. The woody vegetation and vines observed around the stonework were mostly invasive species and could be removed without compromising the habitat value of the spring. As with any wetland or watercourse however, a vegetated buffer is beneficial to wildlife and water quality. The Commission might consider replanting with low-growing native plants that provide a buffer without hiding the stonework. As with the tussock marsh, property managers should watch for invasive *Phragmites* or purple loosestrife for early eradication should they appear.

Stream

There is a small stream that appears to originate in the tussock marsh and runs between the Little Lot and Steele's Lot. The stream is protected by a shrubby border composed primarily of invasive species. Undisturbed vegetated riparian (streamside) borders are important for the protection of water quality, aquatic life and for travel, cover and use by wildlife. While it would be desirable to control the invasives species along this stream, it would be equally important to replace the habitat structure with native species.

Other considerations: Nest boxes, Trails, Education

Nest boxes suitable for bluebirds or tree swallows have been erected along some of the field borders, in addition to an American kestrel box on a knoll near the old farm pond. While nest boxes can provide critical nesting and even winter roosting sites for birds, they can also increase vulnerability to predation or competition by nuisance species if not designed and maintained properly. Boxes should be inspected

regularly for damage, insect infestations and habitation by nuisance species. European house sparrows are common nest competitors for bluebird boxes, and European starlings may occupy kestrel boxes. These species are considered a nuisance and should be discouraged. Predator guards on nest box mounting posts are important to prevent predation by raccoons, snakes or domestic cats. The CT DEP Wildlife Division at Sessions Woods in Burlington has information on nest box design and maintenance for various species. Also see http://www.nabluebirdsociety.org/nestboxspecs.htm for bluebird nest boxes, and http://www.dnr.state.md.us/wildlife/wakestrelboxplan.html for kestrel boxes.

The existing trail winds through the Oak Grove in the old field habitat, around the pond and then through the woods. Because small mammals and ground nesting birds are easily disturbed and sometimes killed by domestic dogs, it is advisable to require that walkers keep their dogs on leash at all times. At a minimum, dogs should be leashed during the entire nesting season.

Finally, since there is a wealth of wildlife and wildlife habitat on this property, it would be worth considering the erection of some interpretive signage to explain the importance of various habitats, the wildlife that use them and management practices in place. Both the nest box maintenance and signs may be a good project for a youth or scout group.

Summary of Recommendations

The Bolton Heritage Farm is a unique and highly valuable property for wildlife. Without an exhaustive plant and animal inventory of the property, primary recommendations for managing this land for the benefit of wildlife are:

1. Delay mowing of the hayfields until after August 1st to allow completion of the nesting cycle for ground-nesting grassland birds.
2. Continue with the WHIP management plan to maintain and enhance the old field and shrubland habitats by eliminating invasive species.
3. Insure that all nest boxes have predator guards. Inspect, repair, and clean nest boxes regularly to prevent parasites and discourage use by non-native species.
4. Conduct a full inventory of plant and animal species using the property at different times of the year to refine management objectives.
5. Implement a “no dogs off leash” policy. If this cannot be done year round, it should at least be implemented during the nesting season (March- August).
6. Should a timber harvest be conducted, leave adequate undisturbed area around wetlands, as well as snags, den trees and downed tree tops for wildlife cover throughout the forest.
7. Consider a shallow dredging of the old farm pond to provide various depths of water that may support a greater variety of amphibians and birds. Maintain a grassy and shrub border around the pond for wildlife cover.
8. Remove invasive plant species from forest understory and hayfield borders, and replant with native species (note these areas are not covered by the WHIP contract).
9. Consider interpretive signage explaining the various habitats on the property, their importance to wildlife, and management practices in place.

References

Calhoun, A.J.K. and M.W. Klemens. 2002. MCA Technical Paper No. 5. Best Development Practices (BDPs): Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States. Metropolitan Conservation Alliance, Wildlife Conservation Society. Bronx, New York. 2002.

Comins, P., G. Hanisek, S. Oresman. 2003 (revised 2005). Protecting Connecticut's grassland heritage: a report from the Connecticut Grasslands Working Group. Audubon Connecticut. http://www.audubonct.org/PDFs/CT_GrasslandHeritage.pdf

Connecticut Audubon Society. 2008. Connecticut state of the birds 2008. Connecticut Audubon Society, Fairfield, CT. http://www.ctaudubon.org/SOTB/documents/SOTB-2008.pdf

Connecticut Audubon Society. 2009. Connecticut state of the birds 2008. Connecticut Audubon Society, Fairfield, CT. http://www.ctaudubon.org/SOTB/documents/CTSOTB%202009%20report.pdf.

Connecticut's Endangered, Threatened and Special Concern Species 2004. State of Connecticut. Department of Environmental Protection.

CT DEP. 2005. Connecticut's comprehensive wildlife conservation strategy. Wildlife Division, Bureau of Natural Resources, Connecticut Department of Environmental Protection in consultation with Terwilliger Consulting, Inc. http://www.ct.gov/dep/cwp/view.asp?a=2723&q=329520&depNav_GID=1719

DeGraaf, R.M. and D.D. Rudis. 1983. New England wildlife: habitat, natural history, and distribution. General Technical Report NE-108, Northeast Forest Experiment Station, US Department of Agriculture, Broomall, PA.

Donahue, D.F. 1997. A guide to the identification and protection of vernal pool wetlands of Connecticut. University of Connecticut Cooperative Extension System, Storrs, CT.

Hammerson, G.A. 2004. Connecticut wildlife: biodiversity, natural history, and conservation. University Press of New England, Hanover.

Martin, A.C., H.S. Zim and A.L. Nelson. 1951. American wildlife and plants: a guide to wildlife food habits. Dover Publications, NY.

Oehler, J.D., D.F. Covell, S. Capel, B. Long (eds). 2006. Managing grasslands, shrublands, and young forest habitats for wildlife: a guide for the Northeast. The Northeast Uplands Habitat Technical Committee, Massachusetts Division of Fisheries & Wildlife. http://www.wildlife.state.nh.us/Wildlife/Northeast_Hab_Mgt_Guide.htm

Pedevillano, C. 1995. Habitat values of New England wetlands. US Army Corps of Engineers, Waltham, MA.

WILDLIFE IN CONNECTICUT

STATE ENDANGERED SPECIES

Northern Harrier

Circus cyaneus

Background

There is very little historical documentation of northern harriers in Connecticut. The species was considered common in the 1800s. Little additional information is available about population changes in the state through the early 1900s. A dozen or so pairs have been observed in Connecticut during the breeding season in recent years, but only one successful nesting pair has been confirmed by the DEP Wildlife Division. Northern harriers are found in Connecticut during winter, and observations have been reported up until March or April.

Northern harrier populations declined throughout their North American range in the 20th century due to the loss and degradation of marshlands and changes in farming practices. In addition, past use of the pesticide DDT added to the reduction in the harrier's population. The population is currently either stable or slightly declining throughout most of its range. The habitat requirements of the northern harrier are a limiting factor in the Northeast because of the loss of open habitat through the destruction of wetlands and the reforestation of agricultural lands. The northern harrier is an endangered species on Connecticut's List of Endangered, Threatened, and Special Concern Species because it occurs in such small numbers in the state. It is also protected by the federal Migratory Bird Treat Act of 1918.

Range

The northern harrier occurs throughout the United States, Canada, and north to Alaska. It is also found in Europe and Asia. The species spends the winter in parts of its nesting range, but is more commonly found wintering south through Mexico, Central America, northwestern South America, and the West Indies.

Description

The slender-bodied northern harrier has a long tail and wings, yellow legs, owl-like facial discs, a conspicuous white rump patch, and yellow eyes. Adult males have blue-gray upperparts and white underparts. The females are brown above and buffy below, with brown streaking down the sides of the chest and flanks. Juvenile harriers of both sexes have dark brown backs with rusty overtones and cinnamon underparts, with no streaking. The northern harrier is a medium-sized raptor. The female is typically larger than the male.

Habitat and Diet

Northern harriers inhabit open marshland, meadows, pastures, cropland, grasslands, and riparian woodlands. They hunt for small mammals (especially meadow voles), frogs, snakes, crayfish, and small birds while flying low over open habitats.

Life History

Northern harriers usually return to the same area to nest. They nest on the ground in well-concealed locations, often near low shrubs or in tall clumps of vegetation. Nesting locations are usually in abandoned fields, wet meadows, and coastal and inland marshes. The species is not monogamous; a male may have two or more mates, but usually only one female is able to successfully produce young because the male typically favors one mate and her nestlings with food.

The 4 to 9 (commonly 5) eggs are laid from March

through July. The eggs are pale blue when first laid but then turn to dull white. They are usually unmarked, although some may be spotted with brown. Incubation, which is done by the female, begins with the second to fourth egg and lasts for 31 to 32 days. The young are brooded by the female, with the male bringing food and passing it to the female in mid-air. Young harriers can fly about 30 to 35 days after hatching.

The eggs and young are vulnerable to predation by mammals, human disturbance, and destruction due to agricultural activities (mowing and plowing).

In years when prey is abundant, harriers are more likely to raise young to the fledgling stage. Unless prey is unusually abundant, the birds do not breed until they are 2 years old.

Interesting Facts

The northern harrier has a remarkable sense of hearing. Like owls, it has a curved, sound-reflecting facial ruff which, when combined with characteristic low flight, enables the bird to locate prey by sound.

The species is often called the marsh hawk because it inhabits open marshlands and wet meadows. It got the name "harrier" due to its habit of raiding or harrying its prey.

A female, after receiving prey in flight from the male, will not return directly to the nest but will make several false landings to confuse predators.

Female harriers will repeatedly attack other hawks that soar over the nesting territory; they will even drive away crows and eagles. Humans that approach too close to a nest are often dived at by the protective female.

How You Can Help

The recovery of the northern harrier in Connecticut depends on the conservation and protection of large areas of inland and coastal marshes, wet meadows, upland heaths, and grasslands through land acquisition or landowner agreements. Supporting measures to protect and enhance wintering habitats in Central and South America is also important.

The nesting activities of the northern harrier are often difficult to survey and monitor. Therefore, any confirmed nests should be reported to the Wildlife Division (860-675-8130) to help increase our knowledge of the activities of these birds in Connecticut.

State of Connecticut
Department of Environmental Protection
Bureau of Natural Resources
Wildlife Division
www.ct.gov/dep

This publication is partially funded by the Federal Aid to Wildlife Restoration Program. Funds are provided through an excise tax on the sale of sporting firearms, ammunition, and archery equipment.

11/2008

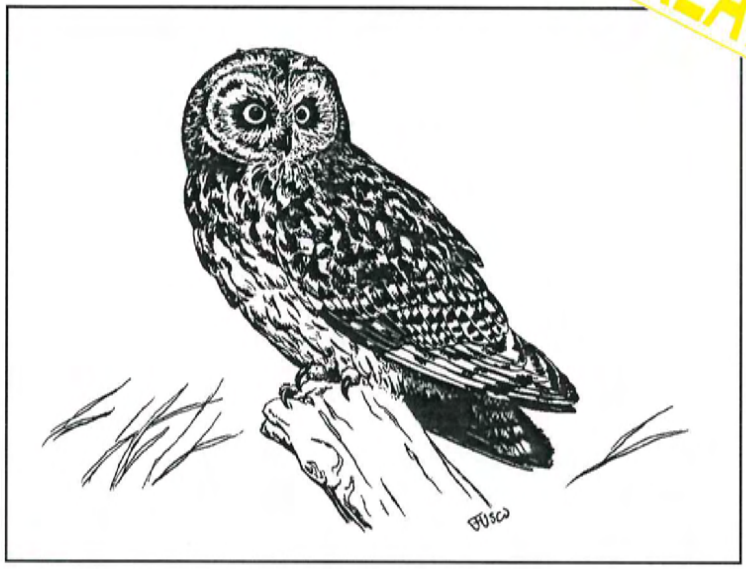
WILDLIFE IN CONNECTICUT

ENDANGERED AND THREATENED SPECIES SERIES

SHORT-EARED OWL

Asio flammeus

THREATENED



Habitat: Open country, such as grasslands, marshes or meadows.

Weight: Females, 13.4 ounces; males, 11.1 ounces.

Length: 13-17 inches.

Wingspan: 38-44 inches.

Life Expectancy: Short-eared owls have lived more than 12 years in the wild.

Food: Mice, voles, shrews, rabbits, bats, grasshoppers, beetles, cutworms and small birds, such as field sparrows.

Status: State threatened (wintering populations).

Identification: The short-eared owl is tawny, with bold streaks on the breast, and a pale, lightly streaked belly. Its ear tufts are barely visible. In flight, the long wings show a buffy patch above and a black wrist mark below. The short-eared owl appears big-headed and neckless in its buoyant, moth-like flight. Its voice can be compared to the nasal bark of a dog, "wak, wak."

Range: The short-eared owl is found on every continent except Australia. Its population is declining throughout most of its range.

Reproduction: The breeding season for the short-eared owl usually begins in late April. The shallow, unlined nest is built on the ground and sheltered by tall grass, reeds or bushes. The 4 to 8 eggs are short, oval, smooth and non-glossy. They are laid at 2-day intervals. The female incubates the eggs, beginning with the first egg, for 24 to 28 days. After hatching, the female tends the young while the male brings food. The young owls leave the nest 12 to 17 days after hatching, but they do not fly until 10 days later.

Reason for Decline: The loss of inland marshes, meadows and coastal wetlands to human development has contributed to the decline of this species.

History in Connecticut: There are accounts of short-eared owls nesting in Connecticut in the 1800s. This species bred north of Hartford in the Connecticut River Valley before the 1860s and was considered a resident. Presently, Connecticut has no confirmed breeding populations of short-eared owls. The small wintering population is considered threatened.

Interesting Facts: Although short-eared owls mainly hunt at dawn and dusk, they are also observed hunting during the daytime. When hunting for prey, the owls circle and glide close to the ground. These birds usually roost on low perches or on the ground.

During courtship, male short-eared owls will fly high over the nest, calling, flapping, soaring and occasionally swooping while clapping the wings below the body.

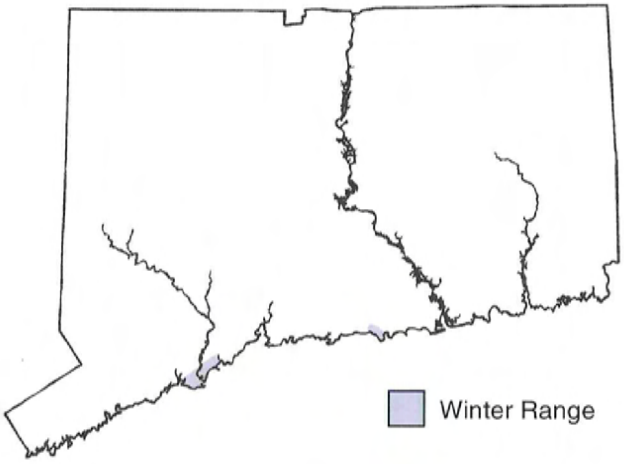
While caring for its young, a short-eared owl will perform an "injured bird" act to lead away intruders.

Short-eared owls are somewhat nomadic, often moving to areas with high rodent populations to settle and breed.

Protective Legislation: *Federal* - Migratory Bird Treaty Act of 1918. *State* - Connecticut General Statutes Sec. 26-311.

What You Can Do: Learn more about owls by consulting references at your local library. Enjoy owls from a distance. Most importantly, encourage the protection of large, open, grassy areas (at least 24-105 acres) for use as foraging (hunting) and nesting sites by short-eared owls.

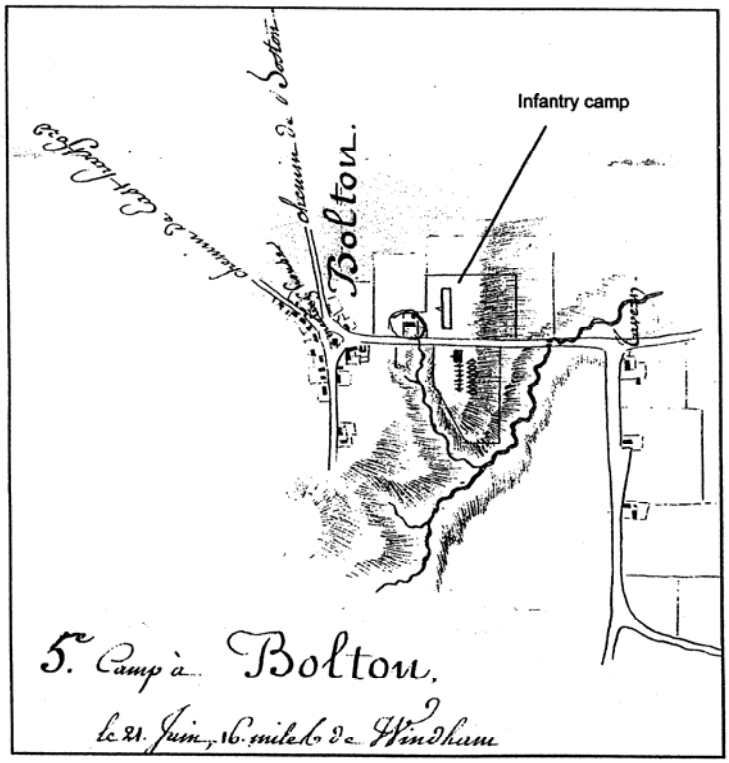
CONNECTICUT RANGE



Archaeological and Historical Significance

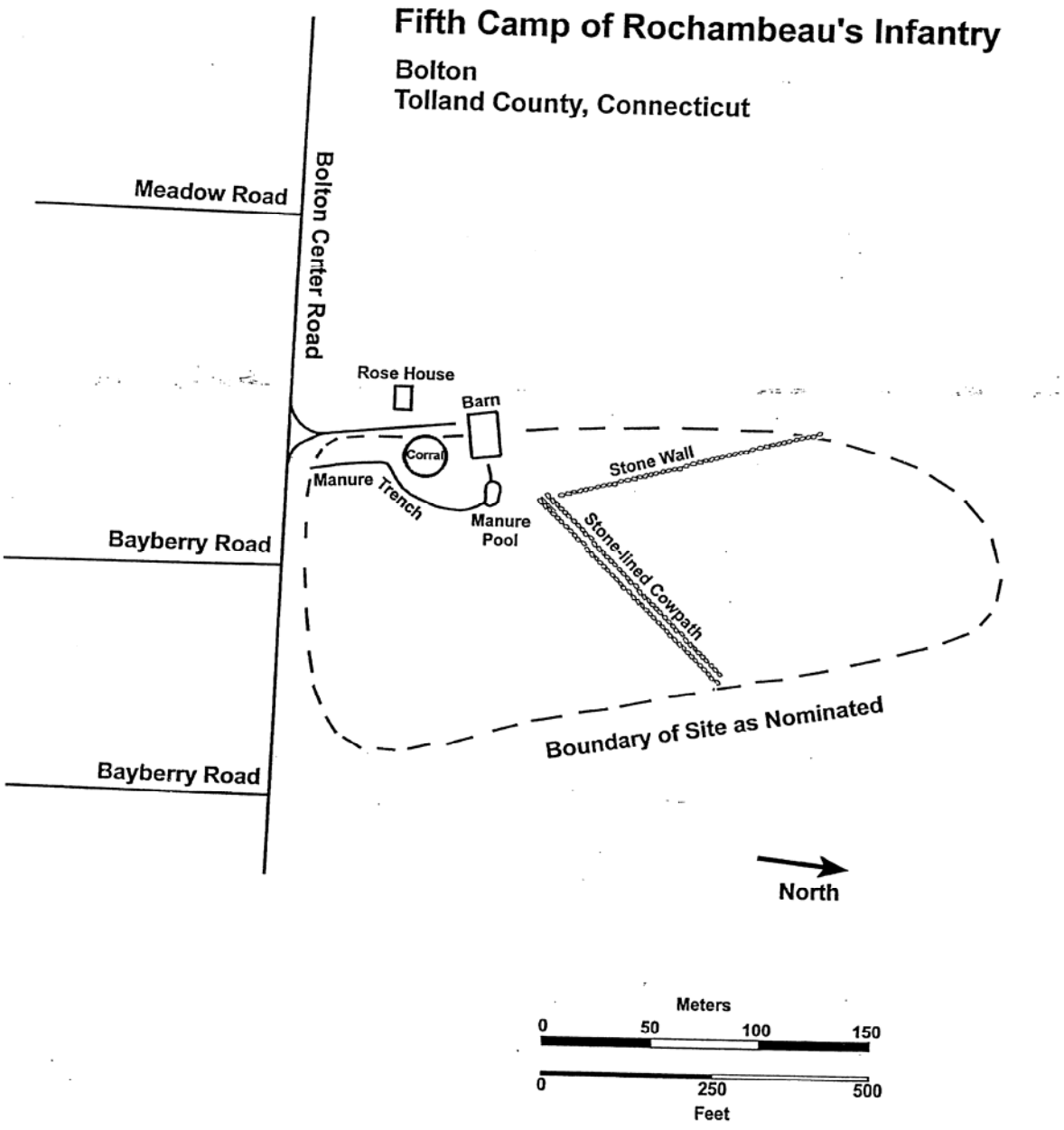
The Office of State Archaeology (OSA) and the State Historic Preservation Office (SHPO) note that the Bolton Heritage Farm possesses one of the most significant archaeological sites in the State of Connecticut. In 1781, French General Rochambeau's troops camped on the property on their way to meet up with George Washington in New York. In 1998, the state provided the initial funding for research that would identify the route and campsites of the French army throughout their journey through Connecticut. A segment of that funding was for archaeological investigations to confirm, define and evaluate the integrity of eight campsites.

Fifth camp of Rochambeau's Infantry, Bolton, Tolland County, CT, as drawn by Louis-Alexandre Berthier, military engineer for the French army. The artillery was parked across the road (present-day Bolton Center Road) from the infantry encampment *(from Rice and Brown 1976)*



Revolutionary War artifacts had been collected from the campsite by members of the Rose family through the years. A systematic metal detecting survey was conducted by the Public Archaeology Survey Team, Inc. within and beyond the site limits as indicated on the French maps. While initial expectations were not high, within two days of testing over 50 diagnostic artifacts were uncovered, including musket balls, halfpennies, buttons, buckles, numerous aspects of material culture associated with the French encampment. The artifacts were recovered from a well-defined area within the camp boundaries indicated in the French maps. A portion of the site has been previously disturbed by construction of a manure ditch, driveway and barn structure.

Nonetheless, significant portions of the site exist and warrant preservation. In acknowledgement of the site's significance, it has been placed on the National Register of Historic Places and designated as a State Archaeological Preserve.



In response to the requests of the Bolton Heritage Farm Commission as to historic and archaeological concerns, the following comments are offered.

Historic Significance

a) *The Commission requests recommendations about how the farm can be used to teach about the Revolutionary War and Bolton's role while being sensitive to the farm's historic resources, including advice on the stone wall and stone-enclosed animal impoundment near the stone spring.*

The Commission is in an enviable position to promote national and local Revolutionary War history from town preserved land. The Department of Environmental Protection's State Park system has important Revolutionary War sites at Putnam's Camps in Redding, and Fort Griswold in Groton, but it is rare that a municipality has a significant site in their backyard. Because the archaeological components of the site are below-ground, the Commission can be creative in its educational opportunities. However, the basic caution is not to conduct any activities that will involve sub-surface disturbances. Trail tours and passive use of the land (re-enactments, etc.) should have no adverse effect on the historic integrity of the farm, as long as there are no soil moving activities. Rule of thumb should be that any proposals for subsurface disturbances should be thought out fully as to the proposal's necessity knowing that it will require a complete archaeological survey conducted prior to any land use activities.

Any educational components should include a "preservation" ethic. Students and visitors should be taught that an important ingredient to the story of the Bolton Heritage Farm is the historic preservation efforts to maintain the integrity of the landscape and archaeological resources. Educational materials and discussions should include notice that metal detecting or any ground disturbing activities is prohibited and anyone caught will be prosecuted. This should not be presented as a threat, so much as to have people better have them understand the importance of the site and the measures put into place to ensure the long-term preservation of archaeological resources. Teach them not only why the farm is important, but, why it needs to be preserved for present and future generations. Create stewards and pride in the Bolton community.

So, think creatively for educational opportunities.

The stone walls on the property are extensive and some are the same walls that were mapped by French engineers. The OSA and SHPO are in full agreement with Dr. Robert Thorson that the walls have cultural and historic value. They add immeasurably to the historic landscape and require preservation. Such stone walls are a tangible connection between the historic landscape and the Rose Farm of today. While little is known about the history of the stone-enclosed impoundment area, it, too, should be considered historically sensitive.

In regards to the preservation of the stone walls, we would recommend some common sense suggestions. No one should be allowed to climb onto or remove stones for any reason. Replacement of fallen stones from the wall should be considered if you are very sure as to where the stone toppled from. Do not build new walls where you think former walls may be located. Patterns of farming land use and pastures change over time, so even if a portion of former wall can be identified, tell the story, but, don't "recreate." The stone walls correlate well to the French maps. What a wonderful way to imagine what the French soldiers saw when they came to Bolton and show that it is in part what the visitor is seeing today.

The stone impoundment area is a bit tricky. The OSA and SHPO would recommend no sediment removal until the area has been tested archaeologically. Shovel test pits would be helpful in determining if any artifacts are within the enclosure. Be sure not to assume that due to the function of the enclosure and the nature of the sediment that no artifacts are present. Based on the historic significance of the property, treat all below-ground aspects of the property as capable of yielding important information about the past. The enclosure, as other areas of the property, can be easily tested to determine significance.

In fact, the significant nature of the historic resources should always be considered for any proposed land use. The best course of action is simply not to do anything that will affect the ground and what lies below the surface. In this regard, due to the site's sensitivity and listing on the National Register and as an Archaeological Preserve, any proposed below-ground activity must be approved by the State Historic Preservation Office in consultation with the Office of State Archaeology. Rule number one – don't do any educational activities, if the activity will disturb the ground in the area of the encampments.

b) *The Commission understands that there are restrictions on activities within the boundaries of the archaeological preserve area. However, the barn foundation is deteriorating and septic work is needed for the house. Can the exact boundaries of the preserve be identified and how can we address maintenance issues within those boundaries?*

The boundaries of the encampments have been delineated by the field work conducted by the Public Archaeology Survey Team, Inc. in their report based on a metal detecting survey. However, more archaeological work can be done to provide a more precise delineation. In lieu of funds for additional archaeological fieldwork, it is recommended that the Commission treat the entire southwestern portion of the farm, from Waltrous Road to the south, north through the open fields and east to the extensive slope and west to the property boundary.

The OSA and SHPO understand that this is an extensive area, however, it is best to treat as historically and archaeological sensitive until we have further field information available. They would encourage the Commission to seek grants to fund further archaeological studies to best define the site's boundaries. Simply put – it will take more archaeology to identify the boundaries more specifically than was accomplished with the initial survey.

The 1908 barn may have been built over a portion of the camp area. As a result, proposed maintenance issues associated with the barn's foundation should be archaeological tested prior to construction activities. This includes any below-ground disturbances due to drainage. The State Historic Preservation Office has made this recommendation as part of available restoration funds. The OSA and SHPO understand the necessity of these maintenance projects. Archaeological survey can provide more specific recommendations on how to mitigate or minimize the impact of these construction activities. Likewise, the presence of any proposed septic work should be subjected to an archaeological survey before the construction proceeds. If percolation tests are required, the location of the perc tests should be checked for archaeological resources before they are excavated. This will ensure that any significant elements of the archaeological deposits present in the area to be effected by the septic system can be identified and evaluated.

c) *The Minister's House, also known as the Reverend Dr. Colton House: Position and Dating*

French maps of the encampments show a house on the property that is assumed to be the Reverend Dr. Colton residence. Today, in the same area is the main house of the farm property. However, the report issued by the Public Archaeology Survey Team, Inc. on the historical background and architectural analysis of the house strongly suggests an early 19th century origin of the existing structure based upon surface examination. Furthermore, overlay and re-scaling of the French maps with a current Bolton Assessor map, suggests that the original Colton House may have been to the west of the existing house. Another suggestion is that the existing house had bee renovated in the 19th- and 20th-centuries to the extent that 18th-century components have been lost. Future restoration work of uncovering walls, floor boards, etc., may provide more specific dating information.

Nonetheless, archaeological field techniques can assist. For example, the OSA and SHPO can provide the Commission, as a public service, the use of ground-penetrating radar and electro-magnetic imaging surveys in an attempt to locate the house. For example, a survey can be conducted around the house to provide information about below-ground foundations that may indicate the original structure. GPE and EMI surveys in the field to the west may locate the foundation if the house was located there. In addition, we know that a barn occupied the western portion of the property. The radar might pick up signals of the barn and any large trash dumps that might yield artifacts and information concerning the historic land use of the property.

These geo-physical techniques are non-intrusive. No digging required; no below-ground disturbances; yet, they have the capabilities of assisting in a better understanding of the historic below-ground aspects of the property. We do not think that the radar will be effective in delineating the boundaries of the French camps since the features associated with campfires will be relatively small and discrete, unlike a house foundation or trash dump. Nonetheless, we may be able to sweep the campsite area to see what signals do/do not appear.

The OSA and SHPO offices are available to provide technical assistance in the identification and evaluation of cultural resources to the Bolton Heritage Farm Commission. They would welcome the opportunity to work with you in the task of preservation and promotion of a unique and significant cultural resource. When archaeological surveys are required, they should be conducted in accordance with the State Historic Preservation Office's *Environmental Review Primer for Connecticut's Archaeological Resources*.

Both the Office of State Archaeology and the State Historic Preservation Office look forward to working with the Bolton Heritage Farm Commission.

Recreation Planner Review

Although the purpose of the Bolton Heritage Farm (aka Rose Farm) ERT review is to provide information to the Town of Bolton for the future management of this significant public property, this reviewer sees an opportunity to expand the scope of the discussion . Based upon a post-inspection walk and discussion with Richard Treat of the Friends of Rose Farm, this reviewer sees the potential for developing a more extensive and integrated civic complex. As Bolton now owns the intervening parcel between the town hall and the Rose Farm, the desirability of physically linking the various neighboring town-owned and other institutional parcels such as the church adjoining town hall should be explored. Indeed the town library also lies within a short walking distance along a quiet side road.

View from rear of Bolton Town Hall.

Reportedly an expansion of town hall is proposed, action which would also address the current shortage of parking and presumably utilizing part of the adjoining tract as well as locating needed septic facilities. The former farmland on this site already provides visual linkage to the Rose Farm and to the hills beyond, offering opportunity for a physical linkage via trail to the Rose Farm farmstead complex. Also this reviewer would recommend locating any community gardens here, rather than at the farmstead complex to minimize impact on that area. Furthermore the presence of some good agricultural soils here makes it appropriate for such potential use.

The future use of the Rose Farm proper must be based upon a number of considerations with historic significance the most important objective. Other factors to weigh include the desirability of farmland preservation, natural resource management for various and sometimes conflicting purposes, civic needs and desires and recreational possibilities including trails.

Future management must consider the farm's special features and assets. One is the historical significance of the 10-12 acres surrounding the farmstead, which contains the Rochambeau Encampment site. Another includes its physical character as a former upland dairy farm, including the typical mix of improved farmland, rough and/or reverting pasture and woodlot.

Being included in the National Register of Historic Places and now a key site along a National Historic Trail, the paramount management objective for the Rose Farm must be to protect and where possible restore the visual ambience of the revolutionary war era involved, thus the pastoral landscape with existing stone walls in the vicinity of the farmstead should be maintained (see discussion of agriculture below), including suitable interpretation. In addition the farmstead complex although postdating said era is still historically significant. Thus reuse of the house as a museum or interpretive facility would be desirable, if fiscally and structurally feasible, similarly the barn complex should receive a similar analysis to determine the feasibility of preservation in whole or part. This reviewer personally opposes community gardens at this location and also recommends limiting development of parking here to minimize visual impact.

The desirability of preserving agricultural land is a secondary goal. Continuing the present management of the farmland areas for hay production would also be compatible with protecting the visual character of the historic site, but it will require a long-term commitment by Bolton. Although the current farmer is performing this role satisfactorily, eventually either another farmer may need to be found, or the Town will have to assume the responsibility for mowing.

Excluding the improved farmland discussed above, the remainder of the farm could be enhanced with active management, most significantly on the reverting pasture land east of the acreage including the historic site and actively managed hayland. Restoring this area through regular mowing and brush/briar removal could result in an attractive savanna-like landscape of grassland interrupted by occasional trees or cope such as the Oak Grove. Initial mowing activity already shows the potential of such action, mowing should be scheduled to enhance the area's potential as grassland bird habitat, indicating a post -July date. (Refer to Wildlife Habitat and Resources) This reviewer also wonders whether such primary management goals could not be combined with combined use as a pasture if deemed desirable by a future farmer. Specific recommendations include removing brush and briars around the spring and the former cattle pond as points of interest.

The pond appears to be silted in and/or with a broken dam (briars block ready access for evaluation). The comparative costs and benefits of pond dredging or restoration will determine future action by the Town. However, maintaining a shallow, marshy pond could be desirable at a reasonable cost while avoiding any serious liability to the Town.

The woodlot occupying the northern portion of the property offers no immediate management issues requiring short term action. One option obviously would be to mange it actively as a tree farm. Another would be to emphasize environmental education. Personally this reviewer likes the proposal to manage it to develop an "old growth" forest. (Refer to Vegetation and Forest Management)

Although development of public recreation facilities at the Rose farm does not seem necessary or appropriate, the existing trails are a low impact asset, especially in connecting the Rose Farm to the Hop River State Park Linear Trail. Also as stated above, this reviewer recommends a trail directly connected to the town hall area and the Rose Farm. Perhaps a stone dust handicapped access trail. A further foot trail through the town-owned woodland northeast of town hall to the Rose Farm as proposed is also endorsed.

About the Team

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a variety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, foresters, soil specialists, engineers and planners. The ERT operates with state funding under the supervision of the Eastern Connecticut Resource Conservation and Development (RC&D) Area — an 86 town region.*

The services of the Team are available as a public service at no cost to Connecticut towns.

Purpose of the Team
The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activities. To date, the ERT has been involved in reviewing a wide range of projects including subdivisions, landfills, commercial and industrial developments, sand and gravel excavations, active adult, recreation/open space projects, watershed studies and resource inventories.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision-making. This is done through identifying the natural resource base of the project site and highlighting opportunities and limitations for the proposed land use.

Requesting a Review
Environmental reviews may be requested by the chief elected official of a municipality and/or the chairman of town commissions such as planning and zoning, conservation, inland wetlands, parks and recreation or economic development. Requests should be directed to the chairman of your local Conservation District and the ERT Coordinator. A request form should be completely filled out and should include the required materials. When this request is reviewed by the local Conservation District and approved by the ERT Subcommittee, the Team will undertake the review on a priority basis.

For additional information and request forms regarding the Environmental Review Team please contact the ERT Coordinator: 860-345-3977, Eastern Connecticut RC&D Area, P.O. Box 70, Haddam, Connecticut 06438, e-mail: connecticutert@aol.com.

About the Eastern Connecticut RC&D Area

Resource Conservation and Development (RC&D) is a program of the United States Department of Agriculture (USDA). The Secretary of Agriculture gave the Natural Resources Conservation Service (NRCS) [formerly the Soil Conservation Service] responsibility for administering the program. RC&D is unique because it is led by local volunteer councils that help people care for and protect their natural resources in a way that improves the local economy, environment, and living standards. RC&D is a way for people to work together to plan and carry out activities that will make their area a better place in which to live.

Interest in creating the Eastern Connecticut RC&D Area first started in 1965. An application for assistance was prepared and submitted in June 1967 to the Secretary of Agriculture for planning authorization. This authorization was received in August 1968. In 1983, an application by the Eastern Connecticut RC&D's Executive Council was approved by USDA and NRCS to enlarge the area to an 86 town region.

The focus of the Eastern Connecticut RC&D Program is to help people care for and protect their natural resources, improve local economies, and sustain a high quality of life. The program derives its success from its ability to connect individuals, communities, government entities, and grassroots organizations. These connections and partnerships enable the development of shared visions and resource networks that work toward a healthy future for Connecticut. Current members on the RC&D Council represent the Working Lands Alliance, the Essex Land Trust, The Last Green Valley, the Green Valley Institute, the Thames River Basin Partnership, WINCOG, SECCCOG, NECCOG, CRERPA, NorthCentral Conservation District, Eastern Conservation District and the CT River and Estuary Conservation District. For more information please visit their website at: www.easternrcd-ct.org.