

FOREST STEWARDSHIP PLAN
FOR
HAILE FARM PRESERVE
WARREN LAND CONSERVATION TRUST
PO BOX 565
WARREN, RI 02885-3313

PREPARED BY:
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FOREST STEWARDSHIP PLAN
Title & Signature Page

Property Owner:

Warren Land Conservation Trust
PO Box 565
Warren, RI 02885-3313

Plan Date: November, 2019

Tree Farm #: N/A

Property Information:

Plat: 23, Lot: 14, 16, 17, & 18

Town: Warren

NRCS Farm # 176
NRCS Tract # 202

Total Acres: 61

Excluded Acres: 0


Program Acres: 61

Property Location: Westerly of Market Street & New Industrial Way, flanked to the north by the Swansea Country Club, surrounded to the east & south by both commercial and residential development, and abutting the Palmer River to the West.

Soils Map #: 54, Soils Survey of Rhode Island

Signatures:


I hereby approve this Forest Stewardship Management Plan/Resources Management Plan as a guide and reference tool for a period of ten years, or until a revised plan is submitted to the NRCS or RIDEM and approved.



Owner

Date: 12/18/19

I hereby pledge that this plan was prepared according to the owner's objectives and that all information is based on the evaluation of landowner's property and best forest management practices.



Plan Preparer (Maxson B Hence, 401-255-7192)

Date: 12/17/2019

RI Division of Forest Environment Representative

Date: _____

NRCS Representative

Date: _____

LANDOWNER OBJECTIVES / BACKGROUND / HISTORY

The primary objectives of the landowner are to manage the existing forestlands for salt marsh migration, water quality & protection, forest health, wildlife habitat, invasive species management, and management access (incl. foot bridges and elevated walkways across lowlands). Given the unique coastal nature of property and its public access, it is in the interest of landowner to use the Preserve for educational and research purposes that may entail outdoor kiosks and areas/plots for coastal habitat improvements.

Research on land history confirms that the Haile Farm Preserve has a long history of farming enduring at least 400 years dating back to 1627 and early English settlement; however, it is also known that land along the Palmer River was regularly occupied by the Wampanoag tribe who farmed it for their staples consisting of corn, beans, and squash (*interesting to note the primary ingredients in succotash, derived from an Indian word meaning corn and a favorite of many chefs today*) until they were displaced by the King Philip's war of 1676. The Bowen Family (Obadiah Bowen) was the earliest recorded landowner succeeded by the Haile Family (Richard Haile) of Swansea, MA. Studies of land history further indicate that land was well suited to and used predominantly for livestock farming due to the abundance of salt hay (as fodder) from the salt marshes and low-lying meadows; although livestock farming was the most profitable, records also show that some members of the Haile family followed the Wampanoag tradition of growing corn and other grains for local markets and supplementary feed.

Due to the 3-4 unique habitat types (salt marsh, freshwater wetlands, marsh islands, and upland/lowland forest types) in close proximity to one another, there are 2-3 "ecotones" (habitat transition zones) that support richer species diversity and are essential to protect and even enhance. For example, the removal and management of invasive species (e.g. phragmites) would help restore the marsh grasses that are integral to the survival of the Marsh Sparrow. And, the oxygenation and drainage of the holding pond (belonging to adjacent landowner but affecting subject property) would lend itself to revitalizing the ecotones between lowland forests and shrub swamp, which in turn, would help restore the natural hydrology of this coastal area.

And lastly, the subject property's proximity to Palmer River makes it particularly suitable for wildlife observation, salt marsh research & development, and recreational opportunities.

Table I – Summary of Client Objective:

| Client Objectives | Stand |
|--|------------|
| 1. Enhance the growth, form, health and long-term value of forest resources on the property in a manner that (a) maintains the aesthetics of the property, and (b) supports healthy wildlife habitat (deer, turkey, rabbits, squirrels, migratory & native birds, and other indigenous species, including predators like fox and raptors). | 1, 2, 3, 4 |
| 2. Improvement of the health of the forest by conducting forest stand improvements (improving tree vigor), removing/managing invasive species, and promoting an over-story and under-story of mast-bearing species and the natural regeneration of forest trees. | 1, 2, 3, 4 |

| Client Objectives | Stand |
|--|------------|
| 3. Protect water quality through the use of best management practices, to include the use of natural buffers around pond, wetlands, stream, and river by limiting harvesting of timber in these areas. Activities may also include facilitating the natural drainage of water that was previously impacted by development. | 1, 2, 3, 4 |
| 4. To maintain forest access for management with incidental recreational benefits. | 1, 2, 3, 4 |
| 5. Provide opportunities for education and research in the areas of ecology, environmental sciences, hydrology, and sea level rise. | 1, 2, 3, 4 |

INTRODUCTION TO STEWARDSHIP PLANNING ISSUES

(excerpted from MA Stewardship Program)

This is your Stewardship Plan. It is based on the goals that you have identified. The final success of your Stewardship Plan will be determined first, by how well you are able to identify and define your goals, and second, by the support you find and the resources you commit to implement each step.

It can be helpful and enjoyable to visit other properties to sample the range of management activities and see the accomplishments of others. This may help you visualize the outcome of alternative management decisions and can either stimulate new ideas or confirm your own personal philosophies. Don't hesitate to express your thoughts, concerns, and ideas. Keep asking questions! Please be involved and enjoy the fact that you are the steward of a very special place.

Biodiversity: Biological diversity is, in part, a measure of the variety of plants and animals, the communities they form, and the ecological processes (such as water and nutrient cycling) that sustain them. With the recognition that each species has value, individually and as part of its natural community, maintaining biodiversity has become an important resource management goal.

While the biggest threat to biodiversity in southern New England is the loss of habitat to development, another threat is the introduction and spread of invasive non-native plants. Nonnative invasives like European Buckthorn, Asiatic Bittersweet, and Japanese Honeysuckle spread quickly, crowding out or smothering native species and upsetting and dramatically altering ecosystem structure and function. Once established, invasives are difficult to control and even harder to eradicate. Therefore, vigilance and early intervention are paramount.

Another factor influencing biodiversity in southern New England concerns the amount and distribution of forest growth stages. Wildlife biologists have recommended that, for optimal wildlife habitat on a landscape scale, 5-15% of the forest should be in the seedling stage (less than 1' in diameter). Yet we currently have no more than 2-3% early successional stage seedling forest across the state. There is also a shortage of forest with large diameter trees (greater than 20').

Soil and Water Quality: Forests provide a very effective natural buffer that holds soil in place and protects the purity of our water. The trees, understory vegetation, and the organic material on the forest floor reduce the impact of falling rain, and help to ensure that soil will not be carried into our streams and waterways.

To maintain a supply of clean water, forests must be kept as healthy as possible. Forests with a diverse mixture of vigorous trees of different ages and species can better cope with periodic and unpredictable stress such as insect attacks or windstorms.

Timber harvesting must be conducted with the utmost care to ensure that erosion is minimized and that sediment does not enter streams or wetlands. Sediment causes turbidity, which degrades water quality and can harm fish and other aquatic life. As long as Best Management Practices (BMPs) are implemented correctly, it is possible to undertake active forest management without harming water quality.

Wildlife Management: Enhancing the wildlife potential of a forested property is a common and important goal for many woodland owners. Sometimes actions can be taken to benefit a particular species of interest (e.g., put up Wood Duck nest boxes). In most cases, recommended management practices can benefit many species, and fall into one of three broad strategies. These are managing for diversity, protecting existing habitat, and enhancing existing habitat.

- *Managing for Diversity:* Many species of wildlife need a variety of plant communities to meet their lifecycle requirements. In general, a property that contains a diversity of habitats will support a more varied wildlife population. A thick area of brush and young trees might provide food and cover for grouse and cedar waxwing; a mature stand of oaks provides acorns for foraging deer and turkey; while an open field provides the right food and cover for cottontail rabbits and red fox. It is often possible to create these different habitats on your property through active management. The appropriate mix of habitat types will primarily depend on the composition of the surrounding landscape and your objectives. It may be a good idea to create a brushy area where early successional habitats are rare, but the same practice may be inappropriate in the area's last block of mature forest.
- *Protecting Existing Habitat:* This strategy is commonly associated with managing for rare species or those species that require unique habitat features. These habitat features include vernal pools, springs and seeps, forested wetlands, rock outcrops, snags, den trees, and large blocks of unbroken forest. Some of these features are rare, and they provide the right mixes of food, water, and shelter for a particular species or specialized community of wildlife. It is important to recognize their value and protect their function. This usually means not altering the feature and buffering the resource area from potential impacts.
- *Enhancing Existing Habitat:* This strategy falls somewhere between the previous two. One way the wildlife value of a forest can be enhanced is by modifying its structure (number of canopy layers, average tree size, density). Thinning out undesirable trees from around large crowned mast (nut and fruit) trees will allow these trees to grow faster and produce more food. The faster growth will also accelerate the development of a more mature forest structure, which is important for some species. Creating small gaps or forest openings generates groups of seedlings and saplings that provide an additional layer of cover, food, and perch sites.

Each of these three strategies can be applied on a single property. For example, a landowner might want to increase the habitat diversity by reclaiming an old abandoned field. Elsewhere on the property, a stand of young hardwoods might be thinned to reduce competition while a 'no cut' buffer is set up around a vernal pool or other habitat feature. The overview, stand description and management practice sections of this plan will help you understand your woodland within the context of the surrounding landscape and the potential to diversify, protect or enhance wildlife habitat.

Cultural Resources: Cultural resources are the places containing evidence of people who once lived in the area. Whether a Native American village from 1,700 years ago, or the remains of a farmstead from the 1800's, these features all tell important and interesting stories about the landscape, and should be protected from damage or loss.

Southern New England has a long and diverse history of human habitation and use. Native American tribes first took advantage of the natural bounty of this area over 10,000 years ago. Many of these villages were located along the coasts and rivers of the state. The interior woodlands were also used for hunting, traveling, and temporary camps. Signs of these activities are difficult to find in today's forests. They were obscured by the dramatic landscape impacts brought by European settlers as they swept over the area in the 17th and 18th centuries.

By the middle 1800's, more than 70% of the forests of Rhode Island had been cleared for crops and pastureland. Houses, barns, wells, fences, mills, and roads were all constructed as woodlands were converted for agricultural production. But when the Erie Canal connected the Midwest with the eastern cities, New England farms were abandoned for the more productive land in the Ohio River valley, and the landscape began to revert to forest. Many of the abandoned buildings were disassembled and moved, but the supporting stonework and other changes to the landscape can be easily seen today.

One particularly ubiquitous legacy of this period is stone walls. Most were constructed between 1810 and 1840 as stone fences (wooden fence rails had become scarce) to enclose sheep within pastures, or to exclude them from croplands and hayfields. Clues to their purpose are found in their construction. Walls that surrounded pasture areas were comprised mostly of large stones, while walls abutting former cropland accumulated many small stones as farmers cleared rocks turned up by their plows. Other cultural features to look for include cellar holes, wells, old roads and even old trash dumps.

Recreation and Aesthetic Considerations: Recreational opportunities and aesthetic quality are the most important values for many forest landowners, and represent valid goals in and of themselves. Removing interfering vegetation can open a vista or highlight a beautiful tree, for example. When a landowner's goals include timber, thoughtful forest management can be used to accomplish silvicultural objectives while also reaching recreational and/or aesthetic objectives. For example, logging trails might be designed to provide a network of cross-country ski trails that lead through a variety of habitats and reveal points of interest.

If aesthetics is a concern and you are planning a timber harvest, obtain a copy of this excellent booklet: *A Guide to Logging Aesthetics: Practical Tips for Loggers, Foresters & Landowners*, by Geoffrey T. Jones, 1993. (Available from the Northeast Regional Agricultural Engineering Service, (607) 255-7654, for \$7). Work closely with your consultant to make sure the aesthetic standards you want are included in the contract and that the logger selected to do the job executes it properly. The time you take to plan ahead of the job will reward you and your family many times over with a fuller enjoyment of your forest, now and well into the future.

REVIEW OF MANAGEMENT OBJECTIVES

Forest Health is one of several priorities among the landowner's objectives. It is important that forest health be maintained to provide for wildlife habitat, water quality, and plant vigor, most of which are express concerns of Warren Land Conservation Trust. Any selective thinning will be administered according to the practice schedule and best management practices to help ensure the long-term health of the forest.

Management Access has been identified as an objective and is integral to accomplishing other expressed objectives.

Water Quality is among landowner's objectives and considered part of over-all forest health. Best forest management practices will be followed and promoted to protect wetlands, and intervention may in some cases even enhance wetlands (brackish and fresh)

Soil Conservation itself has not been singled-out as an objective but considered part of over-all forest health.

Timber Production is not expressly an objective but may occur selectively to achieve forest health and wildlife habitat objectives.

Aesthetics itself has not been singled-out as an objective but is considered part of over-all forest health and integral to satisfying "the sense of place" being sought through public access.

Recreational Opportunities are important to landowner and available through forest trails and management activities; they may include – but are not limited to – bird watching, walking, and foraging.

Habitat and Wildlife Uses are expressly important to property owner. Timber stand improvement (TSI) and special wildlife cuts will be considered in a manner that enhances wildlife habitat by creating cover, species diversity, increased mast availability, edge habitat, and/or early-succession vegetation. The retention and promotion of dead standing wood as well as coarse woody debris on the forest floor will also contribute to this objective.

Riparian Areas are integral to protecting water quality and will be stringently observed and promoted in plan.

Invasive Species management has been expressed as an objective and is considered part of over-all forest health. Forest inventory (incl. Appendix A) will note any presence with warranted recommendations provided under "Table II" below.

Cultural and Archaeological Sites have not been singled-out as an objective but are consistent with the mission of the Land Trust and are an integral part of the existing landscape. Stone walls, foundations, wells, dams & divers, and any other historical features will be protected to the extent that they will not be manipulated for management purposes except under mitigating circumstances related to forest access and management.

Wildfire Risk and management has not been identified as an objective but is part and parcel with forest health. Much of the subject property is mesic and lowland forests, which mitigate overall fire risk. Local pond could provide critical water sources in the event of a fire event. Otherwise, due to a generally mesic (wet) environment and a modest under-story (which can act as a latter and connector for wildfire), wild fire risk is relatively low.

Carbon Management, like wildfire risk, has not been singled-out but is a salient and topical issue. A portion of the property (MU I) exemplifies retarded transitional forest conditions – the state between the older generation of forest trees and a burgeoning under-story – bespeaking a lack of robustness relative to the forest type; hence, given the site and species, the vigor and corresponding carbon sequestration are by and large NOT favorable for approximately half of the subject forestlands.

RESOURCE CONCERNS

Based on the resources assessment, four state resource concerns were identified for the property, together with the relevant state quality criteria.

Fish and Wildlife – Inadequate Food: Quantity and quality of food is unavailable to meet the life history requirements of the species or guild of species of concern (deer, turkey, squirrels and other rodents). This resource concern was identified throughout forested portions of property. A lack of herbs, forbs, brassicas, and shrubs with soft mast is affecting the diversity and availability of food particularly for migratory and native bird species. If unaddressed, wildlife habitat management goals will be difficult to attain now and in the future. Thus, the relevant state quality criterion for this resource concern – food availability meets the life history requirements of the species or guild of species of concern – is not met. ***See table II and individual Stand descriptions for recommendations addressing this concern.***

Forest (trees) Health Condition – Productivity, Health and Vigor: Plants do not produce the yields, quality, and soil cover to meet client objectives. This resource concern was identified throughout forested portions of property. The species composition and density of growing stock are collectively not conducive to vigorous growth of desirable, late seral species of oak in the dominant over-story, but particularly in the under-story, where advanced regeneration and new growth is languishing or non-existent. If timber stand improvement (TSI) is not administered in the near to mid-term, future forest health (measured by tree vigor and acceptable growing stock of the hardy mast-bearing hardwoods will decline, as will the availability of wildlife habitat (food – forage, browse), making both of these objectives difficult to achieve. It is also noteworthy that the few remaining pitch pines are mature and over-mature for the site and have not been able to reproduce due to site conditions and/or a lack of fire (cones are serotinous). Therefore, the state quality criterion for this resource concern – forests consist of healthy stands with vigorous growth having a stand density within 25% of optimum stocking on a stems/acre basis – is either not or in jeopardy of not being met. ***See table II and individual Stand Descriptions for recommendations addressing this concern.***

Fish and Wildlife – Inadequate Cover/Shelter: Cover/shelter for the species of concern is unavailable or inadequate. This resource concern was also identified across all forest stand(s). There is insufficient coarse wood debris and standing dead timber suitable for wildlife habitat (for vertebrates, invertebrates, and cavity dwelling mammals). The quantity, diversity, and health of understory is also impacting the availability of wildlife cover – there are few if any thickets of any kind (e.g. laurel, red maple, green briar, etc.). If these conditions go unaddressed, wildlife habitat management goals will be difficult to attain. Thus, relevant state quality criterion for this resource concern – the ecosystem or habitat types support the necessary plant species in the kinds, amounts, and physical structure; and the connectivity of fish and wildlife cover is

adequate to support, over time, the species of concern (e.g. Woodcock, NE Cottontail) – is not met. *See table II for recommendations addressing this concern.*

Plant Condition – Noxious and Invasive plants: This site contains noxious and invasive plants. Subject property has been partially surveyed for plants and plant communities, and report shows at least 50 “introduced” or invasive species (see Appendix A), some of which (e.g. Common Reed and Autumn Olive) are beginning to significantly impact indigenous communities and natural hydrology of property. Therefore, relevant state quality criterion for this resource concern – the site is managed to control noxious and invasive plants and to minimize their spread – is not met.

Fish and Wildlife – Threatened and Endangered Species wildlife populations: Wildlife and/or habitat quantity and quality have reached a level that one or more species are in danger of or threatened with extinction. This resource concern was identified throughout subject property for threatened and endangered species (e.g. NE cottontail, Woodcock, Marsh Sparrow), each having their own habitat requirements that were not prevalent across the three stands that these species may have historically occupied. Therefore, relevant state quality criterion for this resource concern – threatened and endangered fish and wildlife species and/or habitats they occupy are managed to avoid actions that would reduce their current population, health, or sustainability – is not met. *See table II for recommendations addressing this concern.*

PROPERTY DESCRIPTION

(biologically, physically, & geologically)

This property, with a total 61 acres, consists of a unique mixture of lowland hardwood forests, shrub marsh, salt marsh, and salt marsh islands. There is a narrow right-of-way (easement) for powerline between the lowland forest and freshwater wetlands that extends from south to north across property and contains numerous shrubs, grasses, and other vegetation.

The terrain across the subject property is relatively flat with slopes up to 3% and drains from east to west. There is a perennial stream located in the northern half of property that is identified on conservation practices map.

Property has been divided up into four principal stand types that range from lowland mixed hardwood forest to salt marsh, all of which are discussed in more detail under management units below.

Terrain features five soil types ranging from those found in RI wetlands (fresh and brackish) to productive farm and forestlands.

1. Comprising the vast majority of forested area of property is the Walpole Sandy Loam (Wa). Derived from schist, gneiss, and granite, this poorly drained, hydric soil is often found in depressions and low terraces of outwash plains but also on slopes ranging up to 3%. Wa is well suited to wetland wildlife habitat and can support forest trees with limited growth potential.
2. Found along eastern perimeter of property are small areas of the Deerfield Loamy Fine Sand (Dc). Non-hydric in nature, this soil is derived of granite, gneiss, and quartzite and

moderately well drained. With slopes ranging from 0-3%, Dc is typically found in low-lying areas of outwash plains and terraces and is suitable for forest trees, upland wildlife habitat, and open land wildlife habitat. This loamy sand is also adequate as cropland but tends to drain more slowly, possibly affecting early crop cultivation.

3. Found in the northeastern corner of property is a small area of the Canton-Charlton Fine Sandy Loam (CdB). Non-hydric in nature, this gravelly, fine sandy loam is derived of schist and gneiss with slopes typically between 3-8%. This soil is well drained and typically found on crests and side slopes of glacial upland hills and ridges. CdB is suitable for upland woodland wildlife habitat, growing forest trees, open land habitat, and cultivating crops.
4. Occupying the far eastern part property is a small presence of the Sutton Fine Sandy Loam (StB). Non-hydric in nature, this soil is derived of schist, gneiss, and granite and well drained. With slopes ranging from 3-8%, StB is typically found on lower side slopes of glacial uplands. This loam is suitable for open land habitat, woodland wildlife habitat, or as a medium for growing forest trees. It is also adequate for cultivating crops, but its seasonal high-water table limits early cultivation of cold weather plants.
5. Comprising the fresh and tidal marshes of subject property is the Matunuck Mucky Peat (Mk). Hydric in nature, with slopes ranging from level to 2% and frequently flooded, Mk is a very poorly drained soil derived of schist, gneiss, and granite. This mucky peat provides good wetland wildlife habitat and is not suited to woodland or open land wildlife habitat; although, Red Maple and other wetland plant species do occupy sites, just at low densities and with limited growth potential. Wind throw is also a threat.

The under-story species currently found on property are diverse and include High Bush Blueberry, Princess Pine, Green briar, Wintergreen, Sweet Pepper Bush, Witch Hazel, Viburnum spp., Wild Sarsaparilla, Early Sedge, Green Briar, Spicebush, Elderberry, New York Fern, Cinnamon Fern, Jewel Weed, Solomon's Seal, Bayberry and an abundance of invasive species (see Appendix A). Scattered regeneration (young and advanced) includes beech, White Pine, Red Maple, oak spp., hickory spp., hornbeam, Sassafras, Black Gum, and birch spp.

FOREST STAND INFORMATION

The forest inventory methodology used in this plan integrates variable plot sampling with visual observation/qualification and to some extent quantification of various attributes measuring the healthfulness of wildlife habitat and other important components of the forest (e.g. natural regeneration, water quality concerns, species composition, tree density, under-story composition & density, etc.). Transects and other plot sampling designs were used to achieve representative data of each stand as well as any associated natural resource concerns reported below.

For stand descriptions throughout the body of this plan, please refer to the following key to roughly quantify levels of standing dead timber and coarse woody debris, two important components of wildlife habitat:

Low/light – 0 to 2 pieces/trees per plot area

Medium/moderate – 3 to 4 pieces/trees per plot area

High – 5 or more pieces/trees per plot area

MANAGEMENT UNIT: I

| | |
|----------------------|---|
| ACRES: | 13.75 |
| FOREST TYPE: | Uneven Age Lowland Mixed Hardwood with Minor Softwood Component (for more on forest classification, see stand description below) |
| OVER-STORY: | Uneven-age mixed hardwoods including White Oak, Black Oak, Scarlet Oak, Red Maple, Black Gum, Yellow Birch, Hickory, and a small copse of Pitch Pine |
| UNDER-STORY: | Princess Pine, warm weather sedges, Green Briar, Sweet Pepper Bush, Winterberry, High Bush Blueberry, Ferns (NY and Cinnamon), Spicebush, Princess Pine, Huckleberry, Elderberry, Jewel Weed, Witch Hazel and Viburnum. Scattered regeneration (young and advanced) includes beech, White Pine, Red Maple, oak spp., hickory spp., Hornbeam, Sassafras, Black Gum, and birch spp. |
| SOIL TYPES: | This stand comprises two soil types: The Walpole Sandy Loam (Wa) and the Deerfield Loamy Fine Sand (Dc). Both soils are found on relatively flat or gently sloping glaciated terrain, outwash plains, and/or river basins. |
| MANAG. OBJECTIVE(S): | Enhancement of wildlife habitat, improvement of forest health, invasive species management, water quality & protection, and management access. |
| STAND DENSITY: | 85 square feet BA/acre |
| # TREES/ACRE | 43 |
| AVERAGE DIAMETER: | 19" |
| STOCKING LEVEL: | Fully stocked (65%), B-level (Central Hardwood Stocking Guide) |
| SITE INDEX: | 67 (White Pine), 75 (Red Maple) |
| AVERAGE AGE: | N/A |
| GROWTH RATE: | N/A |

STAND DESCRIPTION:

Due to the lowland nature and associated soil types combined with the plant species found on site, this management unit is best characterized as a hybrid plant community with vegetation

typically present in variants of the Red Maple-Deciduous Shrub Swamp + the Oak-Heath Forest Type (as recognized by The Nature Conservancy and DEM, Natural Communities of RI).

The limited presence of natural regeneration is attributable to a relatively closed canopy with deer browse most likely also a factor. Most of the regeneration is advanced (saplings and poles) and does not include an ample population of hardy mast-bearing species (oaks); moreover, the oak seedling count was low and scattered and vulnerable to browse.

The terrain within MU I is comprised primarily of the Walpole Sandy Loam (Wa). Hydric in nature, this soil is a poorly drained fine sandy loam typical for lowland mixed hardwood forests in Rhode Island. In terms of timber, site productivity is relatively low with wind throw a significant threat. This MU supports both upland and wetland habitats.

A low to medium level of coarse woody debris (CWD) can be found on the forest floor. There is also a light to moderate prevalence of dead (or dying) standing wood (DSW); medium to high levels represent adequate habitat for invertebrate and vertebrate species with DSW being key for cavity dwelling wildlife like squirrels, birds, etc. CWD is also an important substrate aiding in biological decomposition as well as performing other functions like microsites for seedling establishment (e.g. obscuring from deer, nutrient reservoirs, & moisture retention) plus ground stability & erosion control on steeper slopes.

The resource concerns identified within Management Unit I are inadequate food and cover for wildlife as well as overall forest health related to plant vigor, species composition, and the presence of invasive species. Throughout stand, there is generally a lack of browsing/foraging usually afforded by soft mast-bearing trees and shrubs. Insufficient DSW and CWD (see above) are affecting quality and quantity of wildlife habitat (vertebrates and invertebrates alike). Prickly brambles and pockets of other under-story vegetation (e.g. Sweet Pepperbush) are offering some low cover but generally insufficient for non-migratory and migratory bird species like Woodcock. As noted above, the plant vigor as a function of species composition, density and age is lacking. And lastly, the presence of invasive species like Multiflora Rose and Asian Bittersweet are a concern with regard to future forest management activities and desirable conditions – if not managed, their proliferation could significantly impact natural ecology and forest health.

Desired future conditions include increasing quantity of standing dead timber and coarse woody debris across forest floor as well as an improvement in the health and vigor of dominant and intermediate forest trees. The natural regeneration of oaks (seedlings; saplings; and poles) should be prevalent and left in a condition for robust future growth (i.e. free to grow with sufficient light). The existence or expansion of natural openings (¼ acre or larger) in forest to promote thickets (early successional habitat) as wildlife cover for rabbits, squirrels, and birds alike. And lastly, invasive species ought to be managed so that when openings are made, they don't proliferate and further impact forest health and plant vigor.

RECOMMENDATIONS:

Cut-in additional forest trails a minimum of 6' wide as depicted on conservation activities map to provide for management access. Maintain existing trails for management access and tertiary benefits.

An attempt should be made to retain and promote as many mast-bearing trees and shrubs as possible for deer, wild turkey, squirrels and other wildlife. Where soils and micro-sites permit, selectively thin from above by removing Red Maple and other intermediate trees around existing oaks to improve residual growth of oaks, both mature specimens and natural regeneration. Doing so may include the removal of over-mature oak trees or the girdling of them for wildlife.

Create more wildlife trees (DSW) by girdling large defective oak trees (18" or wider). Retain tops or even whole trees on the ground from thinning operations in order to increase frequency of CWD as wildlife habitat and microsites for seedling establishment, and to obfuscate seedlings [from deer] – *goal should be medium to CWD high percentage of cover per plot area.*

Where natural openings already exist, expand and/or maintain their size to provide better grazing and foraging opportunities for deer, turkey, and other wildlife finding haven there. Consider creating new openings to promote early-successional habitat both as cover and new sources of soft mast as fodder.

Before and during forest management operations, remove invasive species as time and resources allow in order keep populations in check. Monitor spread of these plants to mitigate and preempt effects on forest health and the vigor of indigenous species.

Reduction of stand stocking during forest stand improvement operations should be limited to ~20 square feet of BA per acre in order to maintain adequate stocking. RI Best Management Practices to be followed during all harvesting operations.

MANAGEMENT UNIT: II

| | |
|--------------|--|
| ACRES: | 13.75 |
| FOREST TYPE: | Uneven Age Lowland Mixed Hardwood (for more on forest classification, see stand description below) |
| OVER-STORY: | Uneven-age mixed hardwoods including White Oak, Black Oak, Scarlet Oak, Red Maple, Black Gum, and Hickory |
| UNDER-STORY: | Princess Pine, warm weather sedges, Green Briar, Sweet Pepper Bush, Winterberry, High Bush Blueberry, Ferns (NY and Cinnamon), Spicebush, Princess Pine, Solomon's Seal, Huckleberry, Elderberry, Jewel Weed, Witch Hazel and Viburnum. Scattered regeneration (young and advanced) includes American Beech, White Pine, Red Maple, oak spp., Hornbeam, Sassafras, & Black Gum |

| | |
|----------------------|--|
| SOIL TYPES: | This stand comprises four soil types: The Walpole Sandy Loam (Wa) the Deerfield Loamy Fine Sand (Dc), the Canton-Charlton Fine Sandy Loam, and the Sutton Fine Sandy Loam (StB). All soils can be found on relatively flat or gently sloping glaciated terrain, outwash plains, and/or river basins. |
| MANAG. OBJECTIVE(S): | Enhancement of wildlife habitat, improvement of forest health, invasive species management, water quality & protection, and management access. |
| STAND DENSITY: | 48 square feet BA/acre |
| # TREES/ACRE | 87 |
| AVERAGE DIAMETER: | 12" |
| STOCKING LEVEL: | Over stocked (>110%), A-level (Upland Central Hardwood Stocking Guide) |
| SITE INDEX: | 67 (White Pine), 75 (Red Maple) |
| AVERAGE AGE: | N/A |
| GROWTH RATE: | N/A |

STAND DESCRIPTION:

Due to the lowland nature and associated soil types combined with the plant species found on site, this management unit is best characterized as a hybrid plant community with vegetation typically present in variants of the Red Maple-Deciduous Shrub Swamp + the Oak-Heath Forest Type (as recognized by The Nature Conservancy and DEM, Natural Communities of RI). Unlike MU I, the smaller diameter class and higher tree density resembles a younger, more robust forest.

Like in MU I, the low level of natural regeneration is attributable to a relatively closed canopy with deer browse likely also a factor. Most of the regeneration is advanced (saplings and poles) and lacks a sufficient population of hardy mast-bearing species (oaks).

The terrain within MU II is comprised primarily of the Walpole Sandy Loam (Wa). Hydric in nature, this soil is a poorly drained fine sandy loam typical for lowland mixed hardwood forests in Rhode Island. In terms of timber, site productivity is relatively low with wind throw a significant threat. This MU supports both upland and wetland habitats.

A low to medium level of coarse woody debris (CWD) can be found on the forest floor. There is also a light to moderate prevalence of dead (or dying) standing wood (DSW); medium to high levels represent adequate habitat for invertebrate and vertebrate species with DSW being key for cavity dwelling wildlife like squirrels, birds, etc. CWD is also an important substrate aiding in biological decomposition as well as performing other functions like microsites for seedling

establishment (e.g. obscuring from deer, nutrient reservoirs, & moisture retention) plus ground stability & erosion control on steeper slopes.

The resource concerns identified within Management Unit II are similar to MU I and include inadequate food and cover for wildlife as well as overall forest health – plant vigor as a function of tree density is beginning to lull. Throughout stand, there is generally a lack of browsing/foraging usually afforded by soft mast-bearing trees and shrubs. Insufficient DSW and CWD (see above) is affecting quality and quantity of wildlife habitat (vertebrates and invertebrates alike). Prickly brambles and pockets of other under-story vegetation (e.g. Sweet Pepperbush) are offering some low cover but generally insufficient for non-migratory and migratory bird species like Woodcock or mammalian species like the New England Cottontail. And lastly, the presence of invasive species like Multiflora Rose and Asian Bittersweet are a concern with regard to future forest management activities and desirable conditions – if not managed, their proliferation could significantly impact natural ecology and forest health.

Desired future conditions include increasing quantity of standing dead timber and coarse woody debris across forest floor as well as an improvement in the health and vigor of dominant and intermediate forest trees. The natural regeneration of oaks and hickories (seedlings; saplings; and poles) should be prevalent and left in a condition for robust future growth (i.e. free to grow with sufficient light). The existence or expansion of natural openings (¼ acre or larger) in forest to promote denser, more diverse thickets (early successional habitat) as wildlife cover for rabbits, squirrels, and birds alike – best to create in close proximity to existing fields or rights-of-way to enhance edge habitat. And lastly, invasive species ought to be managed so that when openings are made, they don't proliferate and substantially impact forest health and plant vigor.

RECOMMENDATIONS:

Cut-in additional forest trails a minimum of 6' wide as depicted on conservation activities map to provide for management access. Maintain existing trails for management access and tertiary benefits.

An attempt should be made to retain and promote as many mast-bearing trees and shrubs as possible for deer, wild turkey, squirrels and other wildlife. Where soils and micro-sites permit, selectively thin [from above and below] by removing Red Maple and other intermediate trees around existing oaks to improve residual growth of oaks, both mature specimens and natural regeneration. In some cases, diseased or defective oaks should also be removed as part of forest stand improvement activities.

Create more wildlife trees (DSW) by girdling large defective oak trees (18" or wider) – ***goal should be up to 7 wildlife trees per acre***. Retain tops or even whole trees on the ground from thinning operations in order to increase frequency of CWD as wildlife habitat, microsites for seedling establishment, and to obfuscate seedlings [from deer] – ***goal should be medium to CWD high percentage of cover per plot area***.

Where natural openings already exist, expand and/or maintain their size to provide better grazing and foraging opportunities for deer, turkey, and other wildlife finding haven there. Consider

creating new openings to promote thicker, more biologically diverse early-successional habitat both as cover for wildlife and new sources of soft mast as fodder.

Before and during forest management operations, remove invasive species as time and resources allow in order keep populations in check. Using annual plots, monitor spread of these plants to mitigate and preempt effects on forest health and the vigor of indigenous species.

Reduction of stand stocking during forest stand improvement operations should be limited to ~50 square feet of BA per acre in order to maintain adequate stocking. RI Best Management Practices to be followed during all harvesting operations.

MANAGEMENT UNIT: III

ACRES: 14.2

FOREST TYPE: Salt Marsh

SOIL TYPES: This stand comprises one soil type, the Matunuck Mucky Peat (Mk). Hydric in nature, Mk is frequently flooded and often found in swamps. This mucky peat is very poorly drained and well-suited to wetland wildlife habitat.

MANAG. OBJECTIVE(S): Enhancement of wildlife habitat, invasive species management, water quality & protection, and management access.

STAND DESCRIPTION:

Due to the estuarine (connected to the ocean and with tidal influence) nature and associated soil type together with the plant species found on site (see Appendix A), this management unit is best characterized as a hybrid plant community with vegetation typically present in the Brackish Marsh and High Salt Marsh (as recognized by The Nature Conservancy and DEM, Natural Communities of RI).

Salt marshes of this type are intermittently flooded and typically occur along the edges of rivers within tidal influence and where there is a regular influx of freshwater.

The principal resource concerns identified within Management Unit III are inadequate cover for wildlife and the presence of noxious and invasive species. For example, the proliferation of Phragmites is displacing marsh grasses of the *Spartina* genera, which are the sensitive breeding grounds of the marsh sparrow. If left unmanaged, there are other invasive (or introduced, see Appendix A) herbaceous, grass-like, & woody plants that will collectively continue to affect wildlife habitat and the natural hydrology of this MU.

The desired future conditions include the existence of healthy marsh grasses consistent with the life history of these plant species in salt marshes in order to support marsh sparrow habitat and other species finding haven there (e.g. the marsh wren, salt marsh snail). Furthermore, the plethora of introduced species will have been managed in such a manner to prevent their proliferation affecting indigenous wildlife habitat and the natural hydrology (e.g. excessive

evapotranspiration of water caused by noxious plants) of the salt marsh. And lastly, an expanded salt marsh inland (salt marsh migration) will counter any loss of same due to sea level rise.

RECOMMENDATIONS

Physically remove Phragmites and other invasive/introduced species as is feasible with tools & resources available and as prescribed by the NRCS and other experts. Avoid the use of chemicals for removal of plants and monitor effectiveness of management by taking annual plots and recording their densities (% coverage).

Install runnels as advised by NRCS and other experts to facilitate salt marsh migration and the establishment of associated indigenous plants.

MANAGEMENT UNIT: IV

ACRES: 16

FOREST TYPE: Freshwater Marshland

SOIL TYPES: This stand comprises one soil type, the Matunuck Mucky Peat (Mk). Hydric in nature, Mk is frequently flooded and often found in swamps. This mucky peat is very poorly drained and well-suited to wetland wildlife habitat.

MANAG. OBJECTIVE(S): Enhancement of wildlife habitat, invasive species management, water quality & protection, and management access.

STAND DESCRIPTION:

Due to the palustrine nature (inland non-tidal wetland typically not associated with flowing water) and associated soil type together with the plant species found on site, this management unit is best characterized as a mosaic plant community with vegetation typically present in the Shrub Marsh + Wet Meadow + Red Maple – Deciduous Shrub Marsh (as recognized by The Nature Conservancy and DEM, Natural Communities of RI).

This freshwater marshland is an important transition zone between the brackish marsh to the west and forested lowlands to the east. This relatively narrow swath of land gets intermittently perturbed by the right-of-way powerline easement, so the plant species composition and densities are regularly (every 10-15 years) altered from their natural states and growth regimes. For mapping purposes, we have included the three marsh islands within this MU even though some of the species found there (e.g. Lowbush Blueberry, Red Cedar) are not typically present in marshlands.

Species found there include – but are not limited to – Phragmites, High Bush Blueberry, Red Maple, White Oak, Scarlet Oak, Red Cedar, Scrub Oak, alders, Gray Birch, Winterberry, Bayberry, Spicebush, Sweet Pepper Bush, Green Briar, Steeplebush, Elderberry, Huckleberry, and warm weather sedges & grasses (e.g. of the Carex, Juncus, and Andropogon genera).

The principal resource concerns identified within Management Unit IV are inadequate food & cover for wildlife AND the presence of noxious and invasive species, which are not mutually exclusive. For example, the proliferation – or potential thereof – of Phragmites, Autumn Olive, Morrow’s Honeysuckle is impacting the natural existence of marsh grasses and sedges (e.g. of the Carex, Scirpus, and Juncus genera), which are important breeding and predatory grounds for migratory, non-migratory birds, snails, snakes, amphibians, and other species finding haven there. If left unmanaged, essential wildlife habitat and the natural hydrology of this MU will be compromised.

A secondary but salient concern is the water being trapped in the holding pond (on adjacent property) and its eutrophication and deoxygenation. The manipulation and drainage of this pond downstream could positively affect the subject MU’s hydrology and consequently its ecology.

And lastly, the National Grid easement and its maintenance causes a regular perturbation to the vegetative community found there. While early successional habitat caused by openings represent good cover and an increased availability of forage, too frequent manipulation of such habitat could negate said benefits.

The desired future conditions include the existence of healthy marsh grasses and sedges consistent with the life history of these plant species in brackish and freshwater marshes in order to support key habitat for fauna finding haven there (e.g. the marsh wren, wood frog, peepers and a range of invertebrates). Furthermore, the plethora of introduced plant species will have been managed in such a manner to prevent their proliferation affecting indigenous wildlife habitat and the natural hydrology (e.g. excessive evapotranspiration of water caused by noxious plants) of this mosaic. And lastly, with anticipated sea level rise, this marshy transition zone can be partially transformed into new and important salt marsh habitat (salt marsh migration).

RECOMMENDATIONS

Physically remove Phragmites and other invasive/introduced species as is feasible with tools & resources available and as prescribed by the NRCS and other experts. Avoid the use of chemicals for removal of plants and monitor effectiveness of management by taking annual plots and recording their densities (% coverage).

Install runnels as advised by NRCS and other experts to facilitate salt marsh migration and the establishment of associated indigenous plants.

Consider negotiating with National Grid to reduce both the amount and frequency of manipulated vegetation within easement in order to enhance the invaluable “mosaic” qualities of this MU.

And, with regard to holding pond, strike an agreement with adjacent property owner to pool resources in order to manipulate (oxygenate and drain) this man-made body of water to help restore aquatic function and hydrology of abutting land (subject MU) to the west.

ACTIVITY SCHEDULE

General Recommendations:

Wildlife Habitat: Mast-producing hardwoods and open areas should be maintained at least at existing levels to provide food and edge habitat respectively, both contributing to the physical and ecological diversity of the property. Note that several small openings scattered throughout the property are more valuable than one large opening.

Away from trails, buildings and other frequented areas on property, manage for several larger diameter trees (>18")/acre as cavities and nesting sites for wildlife through the practice of girdling. In some cases, just maintaining current wildlife trees could be sufficient.

Whenever wind/insect/disease damage occurs or trees are removed for some management reason, create piles of slash in an effort to further enhance wildlife habitat. Rabbits and birds (migratory and native) are two examples of animals that will benefit from this practice.

Riparian and Wetlands: Well-placed and maintained forest management trails/spurs/ways will protect the biological and physical integrity of wetlands. Only selective removal of trees should occur being sure to maintain approximately at least 75.ft. BA/acre and no less than 60% stocking according to the northern hardwoods stocking guide.

Plant Diversity: Keep open and semi-open areas (only for promoting herbs, forbs, and brassicas) mowed in a manner that allows warm weather grasses, herbs, forbs and less aggressive under-story species to compete – be sure to do so in late summer, early fall to avoid disturbance to rabbits and birds' breeding grounds.

Agroforestry Considerations: Combining tree crops with understory and livestock production is an ancient practice that can be beneficial to the practitioner(s), domestic grazers & foragers, as well as nearby wildlife. This kind of system promotes biological diversity, fosters symbiotic relationships (e.g. attracting native pollinators), and has the potential of providing substantial economic gain through multi-use land management.

Logging and/or Fuel Wood Production: Removal of trees will take place on a limited basis as a result of culling, trail establishment, and TSI work. While the volume of stumpage is not expected to be large, RI Best Management Practices should be exercised, including the use of designated trails for log extraction.

Controllability in terms of sustainable forest product yield should be achieved using "area control". Accordingly, there is an assumed 30+- acres of treatable (accessible) forestlands. Barring any land use change, *if we assume a management interval of ten years and follow the recommendations provided (i.e. we enter some portion of property in order to achieve short and long-term objectives), then area treated should not exceed an average of ~ 6.0 acre per year over ten years.*

Table II – Specific Recommendations:

| Client Objectives | Activity | NRCS Practice | Practice Code | MU |
|--|--|--|---|-----------|
| Resource Concern – <i>Wildlife Habitat</i> | | | | |
| Enhance the long-term value of forest resources on the property in a manner that supports healthy wildlife habitat (deer, turkey, rabbits, migratory & native birds, and other indigenous species) | Retain or create “wildlife” trees at a rate of 5 – 7 per acre. Organize debris into brush piles for wildlife cover, particularly for rabbits, birds, squirrels, and chipmunks. Leave coarse woody debris on forest floor after harvesting operations. Make small openings (< ¼ acre) to promote thick and early succession-habitat for Woodcock, and other species (e.g. native birds, rabbits, etc.) finding haven there. In the case of MU I and MU II, consider creating larger opening of ~1 acre to accomplish said objective(s). | Wildlife Habitat Management | 645, 644, 314, 655 (trail creation and maintenance) | I, II |
| Resource Concern – <i>Inadequate Food for Wildlife</i> | | | | |
| Providing an abundance and diversity of food for wildlife, particularly through i) over-story trees and under-story producing mast and ii) more “edge” habitat (forage and browse). | Forest stand improvement (as discussed under forest health below) will contribute to foraging, grazing, and browsing opportunities. Creating and keeping natural forest openings will provide essential edge and early successional habitats. | Forest stand improvement & Wildlife Habitat Management | 666, 645, & 644, 655 (trail creation and maintenance) | I, II |

| Client Objectives | Activity | NRCS Practice | Practice Code | MU |
|--|---|---------------------------------------|---------------|----------------|
| Resource Concern – <i>Forest Health</i> | | | | |
| Enhance the growth, form, health and long-term value of forest resources in a manner that maintains the aesthetic and other intrinsic amenities of the property | Thin poorly formed or less desirable trees (e.g. Black Birch, Red Maple, and Black Gum) to enhance the growth and form of residual stand. Remove diseased and severely insect-infested trees. Depending on stand, reduce BA (up to 50 sq. ft./acre) with a focus on promoting late-successional, mast bearing species (Oaks, Hickory, & some Beech) and releasing advanced regeneration | Forest Stand Improvement | 666, 655 | I, II |
| Resource Concern – <i>Invasive Species</i> | | | | |
| Promote natural ecology | Remove invasive species along edges of fields and forests and in the interior to prevent proliferation | Invasive species and brush management | 314, 645, 644 | I, II, III, IV |
| Resource Concern – <i>Wildlife Habitat</i> | | | | |
| Enhance the long-term value of forest resources on the property in a manner that supports healthy wildlife habitat (deer, turkey, rabbits, migratory & native birds, and other indigenous species) | The removal and/or management of phragmites will help restore the marsh grasses of the Spartina genera that are critical to the nesting habitat of the Marsh Sparrow. The removal and management of other invasive species (e.g. autumn olive, morrow's honeysuckle, cow vetch et. al.) will also restore the natural ecology and hydrology of both MUs III and IV | Wildlife Habitat Management | 644, 314 | III, IV |

Table III –Recommended Practice Schedule

| MU | Code | Practice | Extent | Unit | Year |
|-----------|----------------------|--|---|-------------|-------------|
| I | 666, 655 | Forest Stand Improvement | 1⅓ (or treat entire area in 1 year during next decade) | Acre/year | 2020 – 2029 |
| II | 666, 655 | Forest Stand Improvement | 1⅓ (or treat entire area in 1 year during next decade) | Acre/year | 2020 – 2029 |
| I | 645, 644 314, 655 | Wildlife Habitat Management (incl. invasive species) | ~1⅓ (or treat entire area in 1 year during next decade) | Acre/year | 2020 – 2029 |
| II | 645, 644 314, 655 | Wildlife Habitat Management (incl. invasive species) | ~1⅓ (or treat entire area in 1 year during next decade) | Acre/year | 2020 – 2029 |
| III | 644, 314 | Wildlife Habitat Management (incl. invasive species) | Monitor and treat as necessary entire area (14) | Acre/year | 2020 – 2029 |
| IV | 644, 314 | Wildlife Habitat Management (incl. invasive species) | Monitor and treat as necessary entire area (16) | Acre/year | 2020 – 2029 |
| I, II, IV | 655 | Management Access & Maintenance | 3,160 | feet | 2020 – 2021 |

APPENDIX A
MARSH PLANT SPECIES

| Scientific Name | Common Name | RI Status 2016 | CT Status 2015 | MA Status 2015 |
|--------------------------------|-----------------------------------|----------------------|----------------------|----------------------|
| Herbs | | | | |
| <i>Achillea millefolium</i> | Common Yarrow | | | |
| <i>Ambrosia artemisiifolia</i> | Common Ragweed | | | |
| <i>Amphicarpaea bracteata</i> | American Hog Peanut | | | |
| <i>Anemone quinquefolia</i> | Wood Anemone | | | |
| <i>Apios americana</i> | Common Ground-nut | | | |
| <i>Aralia nudicaulis</i> | Wild Sarsaparilla | | | |
| <i>Arisaema triphyllum</i> | Jack-in-the-pulpit | | | |
| <i>Artemisia vulgaris</i> | Common Wormwood/Mugwort | I | I | I |
| <i>Asclepias incarnata</i> | Swamp Milkweed | | | |
| <i>Asclepias syriaca</i> | Common Milkweed | | | |
| <i>Asparagus officinalis</i> | Asparagus | I | I | I |
| <i>Baptisia tinctoria</i> | Wild Indigo | | | |
| <i>Bidens</i> sp. | Tickseed | | | |
| <i>Brassica juncea</i> | Chinese mustard | I | I | I |
| <i>Cakile edentula</i> | American Sea-rocket | | | |
| <i>Calystegia sepium</i> | Hedge False Bindweed | | | |
| <i>Chenopodium album</i> | Lambsquarters, White Goosefoot | I | I | I |
| <i>Chimaphila maculata</i> | Striped Wintergreen | | | |
| <i>Cichorium intybus</i> | Chicory | I | I | I |
| <i>Cicuta maculata</i> | Spotted Water Hemlock | | | |
| <i>Cirsium horridulum</i> | Yellow Thistle | ST | E | |
| <i>Comandra umbellata</i> | Bastard-toadflax | | | |
| <i>Crocanthemum canadense</i> | Canada Frostweed | | | |
| <i>Cypripedium acaule</i> | Pink Ladyslipper | | | |
| <i>Daucus carota</i> | Wild Carrot/Queen Anne's Lace | I | I | I |
| <i>Dianthus armeria</i> | Deptford Pink | I | I | I |
| <i>Drosera intermedia</i> | Spatulate-leaved Sundew | | | |
| <i>Drosera rotundifolia</i> | Round-leaved Sundew | | | |
| <i>Erigeron philadelphicus</i> | Philadelphia fleabane | | | |
| <i>Eupatorium perfoliatum</i> | Boneset Thoroughwort | | | |
| <i>Eupatorium pilosum</i> | Rough Boneset/Ragged Thoroughwort | | | |
| <i>Euphorbia maculata</i> | Spotted Sandmat | | | |
| <i>Eurybia divaricata</i> | White Wood Aster | | | |
| <i>Euthamia graminifolia</i> | Common Grass-leaved-goldenrod | | | |
| <i>Eutrochium dubium</i> | Coastal Plain Joe-Pye Weed | | | |
| <i>Eutrochium maculatum</i> | Spotted Joe-Pye-weed | | | |
| <i>Galium aparine</i> | Cleavers, Scratch Bedstraw | | | |
| <i>Galium palustre</i> | Marsh Bedstraw | | | |
| <i>Hieracium venosum</i> | Rattlesnake Hawkweed | | | |
| <i>Houstonia caerulea</i> | Bluets | | | |
| <i>Hypericum gentianoides</i> | Orange-grass St. John's-wort | | | |
| <i>Hypericum perforatum</i> | Common St. Johnswort | I | I | I |
| <i>Hypoxis hirsuta</i> | Yellow Star-grass | | | |
| <i>Impatiens capensis</i> | Jewelweed, Spotted Touch-me-not | | | |
| <i>Iris prismatica</i> | Slender Blue Flag | | | |
| <i>Iris versicolor</i> | Blue Flag | | | |
| <i>Krigia virginica</i> | Dwarf-dandelion | | | |
| <i>Lathyrus latifolius</i> | Everlasting Vetchling | I | I | I |
| <i>Lepidium virginicum</i> | Poor-man's Pepperweed | | | |
| <i>Lespedeza hirta</i> | Hairy Bush-clover | | | |
| <i>Leucanthemum vulgare</i> | Ox-eye Daisy | I | I | I |
| <i>Lilium superbum</i> | Turk's-cap Lily | | | |
| <i>Limonium carolinianum</i> | Carolina sea-lavender | | | |
| <i>Lobelia cardinalis</i> | Cardinal-flower, Red Lobelia | | | |
| <i>Lotus corniculatus</i> | Bird-foot Trefoil | I | I | I |
| <i>Lysimachia quadrifolia</i> | Whorled Loosestrife | | | |
| <i>Lysimachia terrestris</i> | Swamp Candles | | | |
| <i>Lythrum salicaria</i> | Purple Loosestrife | I | I | I |
| <i>Maianthemum canadense</i> | Canada Mayflower | | | |

| Scientific Name | Common Name | RI Status 2016 | CT Status 2015 | MA Status 2015 |
|--------------------------------|-----------------------------------|----------------------|----------------------|----------------------|
| Herbs | | | | |
| <i>Achillea millefolium</i> | Common Yarrow | | | |
| <i>Ambrosia artemisiifolia</i> | Common Ragweed | | | |
| <i>Amphicarpaea bracteata</i> | American Hog Peanut | | | |
| <i>Anemone quinquefolia</i> | Wood Anemone | | | |
| <i>Apios americana</i> | Common Ground-nut | | | |
| <i>Aralia nudicaulis</i> | Wild Sarsaparilla | | | |
| <i>Arisaema triphyllum</i> | Jack-in-the-pulpit | | | |
| <i>Artemisia vulgaris</i> | Common Wormwood/Mugwort | I | I | I |
| <i>Asclepias incarnata</i> | Swamp Milkweed | | | |
| <i>Asclepias syriaca</i> | Common Milkweed | | | |
| <i>Asparagus officinalis</i> | Asparagus | I | I | I |
| <i>Baptisia tinctoria</i> | Wild Indigo | | | |
| <i>Bidens</i> sp. | Tickseed | | | |
| <i>Brassica juncea</i> | Chinese mustard | I | I | I |
| <i>Cakile edentula</i> | American Sea-rocket | | | |
| <i>Calystegia sepium</i> | Hedge False Bindweed | | | |
| <i>Chenopodium album</i> | Lambsquarters, White Goosefoot | I | I | I |
| <i>Chimaphila maculata</i> | Striped Wintergreen | | | |
| <i>Cichorium intybus</i> | Chicory | I | I | I |
| <i>Cicuta maculata</i> | Spotted Water Hemlock | | | |
| <i>Cirsium horridulum</i> | Yellow Thistle | ST | E | |
| <i>Comandra umbellata</i> | Bastard-toadflax | | | |
| <i>Crocanthemum canadense</i> | Canada Frostweed | | | |
| <i>Cypripedium acaule</i> | Pink Ladyslipper | | | |
| <i>Daucus carota</i> | Wild Carrot/Queen Anne's Lace | I | I | I |
| <i>Dianthus armeria</i> | Deptford Pink | I | I | I |
| <i>Drosera intermedia</i> | Spatulate-leaved Sundew | | | |
| <i>Drosera rotundifolia</i> | Round-leaved Sundew | | | |
| <i>Erigeron philadelphicus</i> | Philadelphia fleabane | | | |
| <i>Eupatorium perfoliatum</i> | Boneset Thoroughwort | | | |
| <i>Eupatorium pilosum</i> | Rough Boneset/Ragged Thoroughwort | | | |
| <i>Euphorbia maculata</i> | Spotted Sandmat | | | |
| <i>Eurybia divaricata</i> | White Wood Aster | | | |
| <i>Euthamia graminifolia</i> | Common Grass-leaved-goldenrod | | | |
| <i>Eutrochium dubium</i> | Coastal Plain Joe-Pye Weed | | | |
| <i>Eutrochium maculatum</i> | Spotted Joe-Pye-weed | | | |
| <i>Galium aparine</i> | Cleavers, Scratch Bedstraw | | | |
| <i>Galium palustre</i> | Marsh Bedstraw | | | |
| <i>Hieracium venosum</i> | Rattlesnake Hawkweed | | | |
| <i>Houstonia caerulea</i> | Bluets | | | |
| <i>Hypericum gentianoides</i> | Orange-grass St. John's-wort | | | |
| <i>Hypericum perforatum</i> | Common St. Johnswort | I | I | I |
| <i>Hypoxis hirsuta</i> | Yellow Star-grass | | | |
| <i>Impatiens capensis</i> | Jewelweed, Spotted Touch-me-not | | | |
| <i>Iris prismatica</i> | Slender Blue Flag | | | |
| <i>Iris versicolor</i> | Blue Flag | | | |
| <i>Krigia virginica</i> | Dwarf-dandelion | | | |
| <i>Lathyrus latifolius</i> | Everlasting Vetchling | I | I | I |
| <i>Lepidium virginicum</i> | Poor-man's Pepperweed | | | |
| <i>Lespedeza hirta</i> | Hairy Bush-clover | | | |
| <i>Leucanthemum vulgare</i> | Ox-eye Daisy | I | I | I |
| <i>Lilium superbum</i> | Turk's-cap Lily | | | |
| <i>Limonium carolinianum</i> | Carolina sea-lavender | | | |
| <i>Lobelia cardinalis</i> | Cardinal-flower, Red Lobelia | | | |
| <i>Lotus corniculatus</i> | Bird-foot Trefoil | I | I | I |
| <i>Lysimachia quadrifolia</i> | Whorled Loosestrife | | | |
| <i>Lysimachia terrestris</i> | Swamp Candles | | | |
| <i>Lythrum salicaria</i> | Purple Loosestrife | I | I | I |
| <i>Maianthemum canadense</i> | Canada Mayflower | | | |

| Scientific Name | Common Name | RI Status 2016 | CT Status 2015 | MA Status 2015 |
|---------------------------------------|---|----------------------|----------------------|----------------------|
| <i>Dryopteris carthusiana</i> | Spinulose Wood fern | | | |
| <i>Equisetum arvense</i> | Field Horsetail | | | |
| <i>Lycopodiella appressa</i> | Appressed Bog-clubmoss | | | |
| <i>Onoclea sensibilis</i> | Sensitive Fern | | | |
| <i>Osmunda claytoniana</i> | Interrupted Fern | | | |
| <i>Osmunda regalis</i> | Royal Fern | | | |
| <i>Osmundastrum cinnamomea</i> | Cinnamon Fern | | | |
| <i>Pteridium aquilinum</i> | Bracken Fern | | | |
| <i>Parathelypteris noveboracensis</i> | New York Fern | | | |
| <i>Thelypteris palustris</i> | Marsh Fern | | | |
| <i>Woodwardia areolata</i> | Netted Chain Fern | | | |
| Grass-like Plants | | | | |
| <i>Andropogon glomeratus</i> | Bushy Bluestem | | | |
| <i>Andropogon virginicus</i> | Broomsedge Bluestem | | | |
| <i>Anthoxanthum nitens</i> | Sweetgrass, Vanilla Sweet Grass | | | |
| <i>Anthoxanthum odoratum</i> | Sweet Vernalgrass | I | I | I |
| <i>Bolboschoenus robustus</i> | Sea-coast Tuber-bulrush | | | |
| <i>Carex abscondita</i> | Thicket Sedge | | | S2? |
| <i>Carex argyrantha</i> | Silvery-flowered Sedge | | | |
| <i>Carex crinita</i> | Fringed Sedge | | | |
| <i>Carex debilis</i> | White-edged Sedge | | | |
| <i>Carex echinata</i> | Star Sedge | | | |
| <i>Carex folliculata</i> | Northern Long Sedge | | | |
| <i>Carex lurida</i> | Sallow Sedge | | | |
| <i>Carex seorsa</i> | Weak Stellate Sedge | | | |
| <i>Carex swanii</i> | Swan's Sedge | | | |
| <i>Carex vestita</i> | Velvet Sedge | | | |
| <i>Cyperus lupulinus</i> | Great Plains Flatsedge | | | |
| <i>Dactylis glomerata</i> | Orchard Grass | I | I | I |
| <i>Dichanthelium clandestinum</i> | Deer-tongue Rosette-panicgrass | | | |
| <i>Distichlis spicata</i> | Saltgrass | | | |
| <i>Eleocharis elliptica</i> | Elliptic Spikesedge | | | |
| <i>Elymus repens</i> | Creeping Wild-rye | I | I | I |
| <i>Festuca ovina</i> | Sheep Fescue | | | |
| <i>Glyceria canadensis</i> | Rattlesnake Manna Grass | | | |
| <i>Glyceria striata</i> | Fowl Manna Grass | | | |
| <i>Holcus lanatus</i> | Common Velvet Grass | I | I | I |
| <i>Juncus balticus</i> | Baltic Rush | R | NA | |
| <i>Juncus canadensis</i> | Canada Rush | | | |
| <i>Juncus effusus</i> | Common Soft Rush | | | |
| <i>Juncus gerardii</i> | Saltmarsh Rush, Black Rush | | | |
| <i>Juncus greenii</i> | Greene's Rush | | | |
| <i>Juncus tenuis</i> | Path Rush | | | |
| <i>Luzula multiflora</i> | Common Wood Rush | | | |
| <i>Panicum virgatum</i> | Switch Panicgrass | | | |
| <i>Phleum pratense</i> | Common Timothy | I | I | I |
| <i>Phragmites australis</i> | Common Reed | I | I | I |
| <i>Schizachyrium scoparium</i> | Little Bluestem | | | |
| <i>Schoenoplectus pungens</i> | Three-square Bulrush | | | |
| <i>Scirpus cyperinus</i> | Woolledge | | | |
| <i>Sorghastrum nutans</i> | Indian Grass | C | | |
| <i>Spartina alterniflora</i> | Smooth Cordgrass | | | |
| <i>Spartina patens</i> | Saltmeadow Cordgrass | | | |
| <i>Spartina pectinata</i> | Prairie Cordgrass | | | |
| Shrubs & Woody Vines | | | | |
| <i>Amelanchier canadensis</i> | Canadian Serviceberry, Eastern Shadbush | | | |
| <i>Clethra alnifolia</i> | Sweet Pepperbush | | | |
| <i>Comptonia peregrina</i> | Sweet Fern | | | |
| <i>Corylus americana</i> | American Hazelnut | | | |
| <i>Corylus cornuta</i> | Beaked Hazelnut | | | |

| Scientific Name | Common Name | RI Status 2016 | CT Status 2015 | MA Status 2015 |
|------------------------------------|--|----------------------|----------------------|----------------------|
| <i>Elaeagnus umbellata</i> | Autumn Olive | I | I | I |
| <i>Frangula alnus</i> | Glossy Buckthorn | I | I | I |
| <i>Gaylussacia baccata</i> | Black Huckleberry | | | |
| <i>Gaylussacia frondosa</i> | Blue Huckleberry/Dangleberry | | | |
| <i>Hamamelis virginiana</i> | Witch-hazel | | | |
| <i>Ilex verticillata</i> | Common Winterberry | | | |
| <i>Iva frutescens</i> | Maritime Marsh-elder | | | |
| <i>Kalmia angustifolia</i> | Sheep Laurel | | | |
| <i>Lonicera morrowii</i> | Morrow's Honeysuckle | I | I | I |
| <i>Lyonia ligustrina</i> | Maleberry | | | |
| <i>Mitchella repens</i> | Partridgeberry | | | |
| <i>Parthenocissus quinquefolia</i> | Virginia Creeper | | | |
| <i>Quercus ilicifolia</i> | Scrub Oak | | | |
| <i>Rhus copallinum</i> | Winged Sumac | | | |
| <i>Rosa multiflora</i> | Multiflora Rose | I | I | I |
| <i>Rosa virginiana</i> | Virginia Rose | | | |
| <i>Rubus hispidus</i> | Swamp Dewberry | | | |
| <i>Rubus pensilvanicus</i> | Pennsylvania Blackberry | | | |
| <i>Salix cinerea</i> | Gray Willow | I | I | I |
| <i>Salix</i> sp. | Willow | | | |
| <i>Sambucus nigra</i> | Black Elderberry | | | |
| <i>Smilax glauca</i> | Catbriar | | | |
| <i>Smilax rotundifolia</i> | Greenbriar | | | |
| <i>Spiraea tomentosa</i> | Steeplebush | | | |
| <i>Swida alternifolia</i> | Alternate-leaved Dogwood, Pagoda Dogwood | | | |
| <i>Toxicodendron rydbergii</i> | Western Poison-ivy | | | |
| <i>Vaccinium corymbosum</i> | Highbush Blueberry | | | |
| <i>Vaccinium fuscum</i> | Black Highbush Blueberry | | | |
| <i>Vaccinium macrocarpon</i> | Large Cranberry | | | |
| <i>Vaccinium pallidum</i> | Late/Hillside Blueberry | | | |
| <i>Viburnum dentatum</i> | Smooth Arrow-wood | | | |
| <i>Viburnum lentago</i> | Nannyberry | | | |
| <i>Vitis labrusca</i> | Fox Grape | | | |
| Trees | | | | |
| <i>Acer negundo</i> | Ash-leaved Maple, Boxelder | I | | |
| <i>Acer rubrum</i> | Red Maple | | | |
| <i>Betula alleghaniensis</i> | Yellow Birch | | | |
| <i>Betula populifolia</i> | Gray Birch | | | |
| <i>Carpinus caroliniana</i> | American Hornbeam, Blue Beech, Ironwood | | | |
| <i>Carya glabra</i> | Pignut Hickory | | | |
| <i>Carya tomentosa</i> | Mockernut Hickory | | | |
| <i>Fagus grandifolia</i> | American Beech | | | |
| <i>Juglans nigra</i> | Black Walnut | I | I | I |
| <i>Juniperus virginiana</i> | Eastern Red Cedar | | | |
| <i>Nyssa sylvatica</i> | Tupelo/Blackgum | | | |
| <i>Pinus rigida</i> | Pitch Pine | | | |
| <i>Pinus strobus</i> | White Pine | | | |
| <i>Populus deltoides</i> | Cottonwood | | | |
| <i>Quercus alba</i> | White Oak | | | |
| <i>Quercus bicolor</i> | Swamp White Oak | | | |
| <i>Quercus coccinea</i> | Scarlet Oak | | | |
| <i>Quercus velutina</i> | Black Oak | | | |
| <i>Sassafras albidum</i> | Sassafras | | | |

APPENDIX B

MAPS


Locus map

Haile Farm Preserve, Warren, RI

Prepared Oct-2019 by E. Jenny K.
Flanagan for the Warren Land
Conservation Trust



Legend

 Approximate preserve boundaries

1 mi

Google Earth

Forest Management Units

Haile Farm Preserve
 AML 23/14, 16, 17 & 18
 off New Industrial Way, Warren, RI
 Overlaid on Google Maps' Feb- 2018 satellite
 imagery
 Prepared Dec-2019 for the Warren Land
 Conservation Trust by E. Jenny K. Flanagan

Legend

- MU I - 13.75 ac.
- MU II - 13.75 ac.
- MU III - 14.2 ac.
- MU IV - 16.0 ac.
- Existing trails (~1.25 mile)
- Proposed trails (~0.75 mile)

MU III
 > Wildlife Habitat Management
 644, 314 = 14.2 ac.

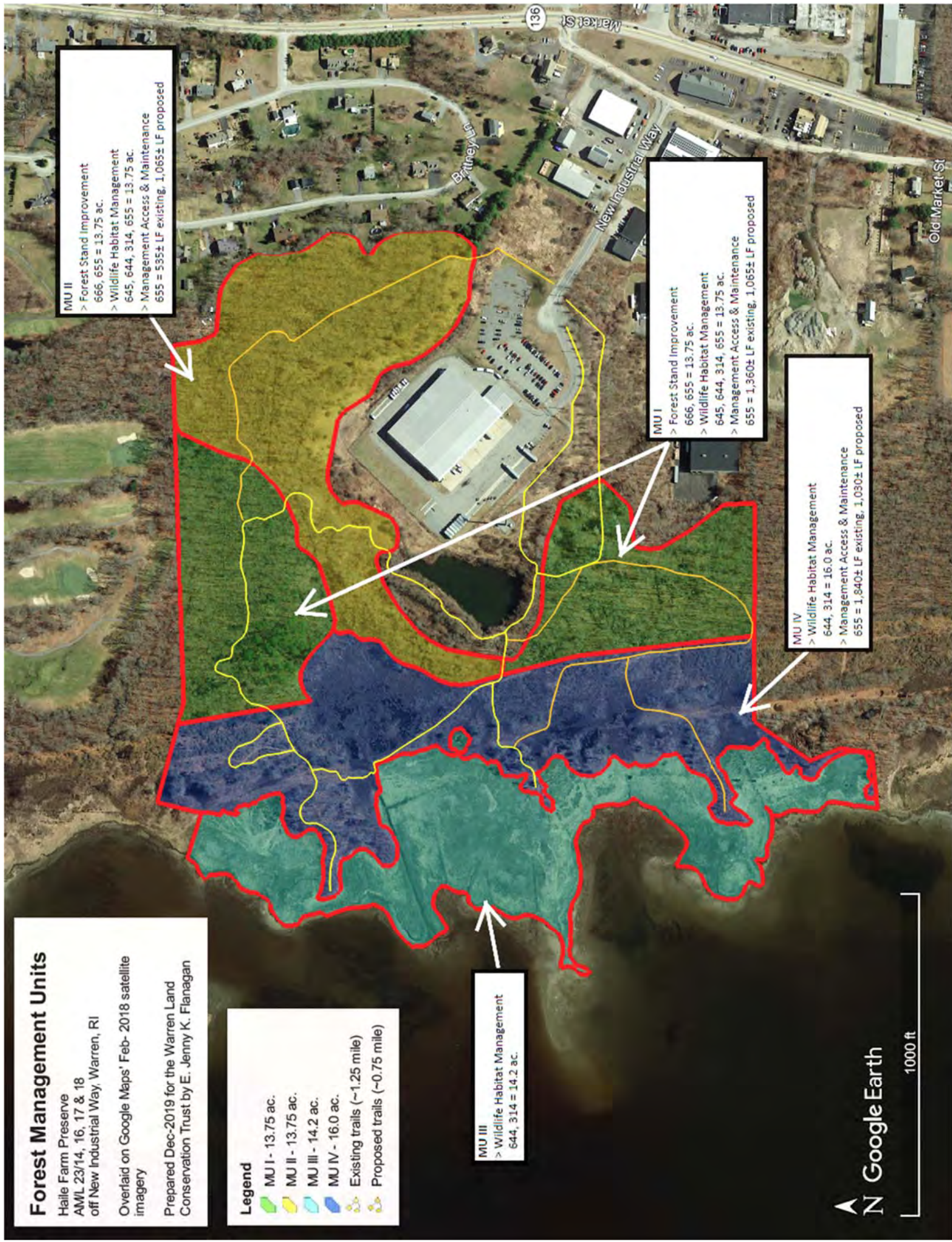
MU II
 > Forest Stand Improvement
 666, 655 = 13.75 ac.
 > Wildlife Habitat Management
 645, 644, 314, 655 = 13.75 ac.
 > Management Access & Maintenance
 655 = 535± LF existing, 1,065± LF proposed

MU I
 > Forest Stand Improvement
 666, 655 = 13.75 ac.
 > Wildlife Habitat Management
 645, 644, 314, 655 = 13.75 ac.
 > Management Access & Maintenance
 655 = 1,360± LF existing, 1,065± LF proposed

MU IV
 > Wildlife Habitat Management
 644, 314 = 16.0 ac.
 > Management Access & Maintenance
 655 = 1,840± LF existing, 1,030± LF proposed

↑ N Google Earth

1000 ft



Soil Map—State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties
(Haile Farm - Web Soil Survey map)



MAP LEGEND

| | |
|--|--|
|  Area of Interest (AOI) |  Area of Interest (AOI) |
|  Soils |  Spoil Area |
|  Soil Map Unit Polygons |  Stony Spot |
|  Soil Map Unit Lines |  Very Stony Spot |
|  Soil Map Unit Points |  Wet Spot |
|  Special Point Features |  Other |
|  Blowout |  Special Line Features |
|  Borrow Pit |  Streams and Canals |
|  Clay Spot |  Transportation |
|  Closed Depression |  Rails |
|  Gravel Pit |  Interstate Highways |
|  Gravelly Spot |  US Routes |
|  Landfill |  Major Roads |
|  Lava Flow |  Local Roads |
|  Marsh or swamp |  Background |
|  Mine or Quarry |  Aerial Photography |
|  Miscellaneous Water | |
|  Perennial Water | |
|  Rock Outcrop | |
|  Saline Spot | |
|  Sandy Spot | |
|  Severely Eroded Spot | |
|  Sinkhole | |
|  Slide or Slip | |
|  Sodic Spot | |

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties
Survey Area Data: Version 18, Dec 6, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 14, 2010—Apr 1, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|------------------------------------|---|--------------|----------------|
| CdB | Canton and Charlton fine sandy loams, 3 to 8 percent slopes | 0.0 | 0.0% |
| Dc | Deerfield loamy fine sand, 0 to 3 percent slopes | 3.5 | 6.0% |
| Mk | Matunuck mucky peat, 0 to 2 percent slopes, very frequently flooded | 17.8 | 30.8% |
| StB | Sutton fine sandy loam, 3 to 8 percent slopes | 2.4 | 4.1% |
| Wa | Walpole sandy loam, 0 to 3 percent slopes | 33.5 | 58.0% |
| Ws | Water, saline | 0.6 | 1.0% |
| Totals for Area of Interest | | 57.7 | 100.0% |

Wetlands map

Haile Farm Preserve, Warren, RI

Overlaid on Google Maps' Feb-2018
orthoimagery.

Prepared Oct-2019 by E. Jenny K.
Flanagan for the Warren Land
Conservation Trust.

Legend

- Approximate preserve boundaries
- Low and high marsh ~14.0 ac.
- Phragmites marsh ~7.5 ac.
- Open low-lying areas ~2.8 ac.
- Forested wetland, based on 1988 flagging ~21.6 ac.

Google Earth

Topographic map

Haile Farm Preserve, Warren, RI

Overlaid on Google Maps' Feb-2018 orthoimagery.

Prepared Dec-2019 by E. Jenny K. Flanagan for the Warren Land Conservation Trust.

Legend

- Approximate preserve boundaries
- Town owned parcels
- Entrance/information kiosk
- Parking area
- Benches
- Osprey nesting platforms
- Existing trails
- Proposed trails
- RIGIS 2-foot contours
- 4 feet above sea level (RIGIS)

