
Myco and Phytoremediation Strategies for Watershed Restoration Research Pilot

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Project Design Goals

1. Establish two relatively identical (replicable for scientific research) native riparian vegetated buffers (one is *mycorrhizally inoculated) in natural community formation
2. Establish robust pollinator, edible, medicinal habitats
3. Establish hardy and resilient in stream plantings that can endure seasonal fluxes
4. Establish installations that reduce erosion, increase pollinator habitat and provide more information about phosphorus uptake potential
5. Effectively remove & replace glossy buckthorn populations minimizing soil disturbance
6. Provide appropriate mammal proofing with educational signs

Element: Vegetated Riparian Buffer (VRB) & Vegetated Filter Strip (VFS)

Goals: 1,2,4,5

Location: upper and lower sections* of the treatment area

Size: 40' long, 17' wide on east side (VRB) and 5' wide on west side (VFS)

Character: aesthetic, highly functional, resilient, regenerative, low maintenance

Site prep needed: remove whatever buckthorn we can (stumps already cut), plant Wet Meadow and Detention Basin seed mix*, lay down erosion control matt, plant trees, shrubs, herbaceous plants, monitor and water

Element: Instream wetland plantings

Goals: 2,3,4

Location: in the upper and lower sections*

Size: 40' long, 5' wide (note: not all bank widths are 5'; some are larger but planning for smallest to ensure plantings fit; in areas where width is larger can increase spacing)

Character: aesthetic, hardy, resilient, functional

Site prep needed: plant into the waterway when the water is low enough to do so; creating as little disturbance as possible to the wetted perimeter and bank edges

Element: Fence with informative signs

Goals: 6

Location: around the two planted areas on all four sides with doors facing north

Size: 40' long on each side (E & W) and 27' wide on top & bottom (N & S)

Character: effectively delineates area, contains educational posts, keeps mammals out

Site prep needed: lay out fence around entire area metal posts 5' apart, sink posts in 1', build simple gate/door for N end of each area, attach laminated info sign on path side

*Mycorrhizae is Mycorrhizal Applications' Ultrafine Endo/Eco Mix

Figure 1. Research Installation Plan.

Plant Palette for Mycorrhizal Plant Associations Research Pilot Project At Shelburne Farms																	
Flora	Scientific Name	Common Name	# plot	Native	Sun/shade	Height	Space	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Hosts
Trees																	
	<i>Acer rubrum</i>	Red Maple	1	Yes	sun/shade	50-100'	10-15'	█									Native & honey bees, Cecropia moths, other moth larvae, birds
	<i>Acer saccharum</i>	Silver Maple	1	Yes	sun/shade	72-100'	10-15'	█									Birds, Cecropia moth
	<i>Alnus incana</i>	Speckled Alder	10	Yes	sun/shade	12-36'	10-15'	█									Songbirds, waterbirds, mammals
	<i>Sida sericea</i>	Red Osier Dogwood	19	Yes	part shade	6-12'	10-15'		█								Waterfowl, marsh & shore birds, butterflies, Spring Azure
	<i>Quercus bicolor</i>	Swamp White Oak	1	Yes	part shade	72-100'	10-15'		█								Songbirds, ground birds, water birds, mammals
	<i>Salix nigra</i>	Black Willow	1	Yes	sun/shade	36-72'	10-15'		█								Songbirds, water fowl, Mourning Cloak, Viceroy, Red Spotted Purple, Tiger Swallowtail
	<i>Salix petiolaris</i>	Meadow Willow	8	Yes	sun/shade	12-36'	10-15'		█								Native bees, bumblebees, honeybees, Mourning Cloak, Viceroy
	<i>Tilia americana</i>	Basswood	1	Yes	sun/shade	100->	10-15'		█								Native & honey bees, birds
	<i>Ulmus americana</i>	American Elm	10	Yes	sun/shade	72-100'	10-15'		█								Birds, Mourning Cloak, Columbia Silkmoth, Question Mark, Painted Lady, Comma Butterfly
Shrubs																	
	<i>Cephalanthus occidentalis</i>	Buttonbush	9	Yes	part shade	6-12'	3-5'				█						Native bumblebees, honey bees, birds, butterflies, Titan Sphinx, Hydrangea Sphinx
	<i>Ilex verticillata</i>	Winterberry	4	Yes	sun/shade	6-12'	3-5'	█	█	█							Honey bees, birds, butterflies, Elf larvae host
	<i>Sambucus nigra</i>	Elderberry	8	Yes	part shade	6-12'	3-5'							█			Native, bumble and honey bees, birds, butterflies, Titan Sphinx, Hydrangea Sphinx
	<i>Viburnum dentatum</i>	Arrowwood	4	Yes	sun/shade	6-12'	3-5'							█			Native bees, bumblebees, birds, butterflies, Spring Azure
	<i>Viburnum lentago</i>	Nannyberry	4	Yes	sun/shade	12-36'	3-5'							█			Birds, butterflies, Spring Azure
Perennials																	
	<i>Asarum canadense</i>	Wild Ginger	9	Yes	part shade	3-5'	2'		█								Butterflies, Pipeline Swallowtail
	<i>Carex comosa</i>	Longhair Sedge	18	Yes	part shade	1-3'	2'		█								Nesting for insects and birds
	<i>Chelone glabra</i>	Turtlehead	20	Yes	sun/shade	3-6'	2'							█			Hummingbirds, butterflies, Baltimore Checkerspot
	<i>Eupatorium perfoliatum</i>	Boneset	14	Yes	sun/shade	3-6'	2'							█			Native bees, birds, butterflies
	<i>Eutrochium purpureum</i>	Joe Pye Weed	21	Yes	sun/shade	3-6'	2'							█			Native bees, birds, butterflies
	<i>Iris versicolor</i>	Blue Flag Iris	18	Yes	part shade	1-3'	2'							█			Birds, hummingbirds
	<i>Symphoricarum novae-angliae</i>	NE Aster	9	Yes	part shade	1-3'	2'							█			Birds, butterflies
Wet Meadow & Detention Basin Seed Mix																	
	<i>Panicum virgatum</i>	Switch Grass	seed mix	Naturalized	sun, shade	3-6'	2-4'								█		Birds, butterflies, Delaware & Dotted Skipper
	<i>Elymus virginicus</i>	Virginia Wild Rye	seed mix	Yes	part shade	3-6'	2-4'		█								Birds, butterflies, Branded Skippers and Satyr Larval Hosts
	<i>Festuca rubra</i>	Red Fescue	seed mix	Yes	sun, shade	3-6'	2-4'		█								Birds
	<i>Carex vulpinoidea</i>	Fox Sedge	seed mix	Yes	sun, part sl	1-3'+	4'			█							Birds
	<i>Scirpus cyperinus</i>	Wool Grass	seed mix	Yes	sun	3-5'	3-6'			█							Birds, Dion Skipper
	<i>Scirpus atrovirens</i>	Green Bulgrass	seed mix	Yes	sun	3-6'	3-6'			█							Birds, waterfowl, songbirds, shorebirds
	<i>Bidens cernua</i>	Nodding Bur-Mangol	seed mix	Yes	part shade	1-3'	3-6'							█			Birds, native bees
	<i>Eupatorium perfoliatum</i>	Common Boneset	seed mix	Yes	sun, shade	3-6'	2'							█			Native bees, butterflies, moths, birds
	<i>Eupatoriadelphus maculatus</i>	Joe Pye Weed	seed mix	Yes	sun, shade	4-6'	2'							█			Butterflies, Moth caterpillars, deer, rabbit
	<i>Juncus effusus</i>	Soft Rush	seed mix	Yes	sun	3'	2-4'							█			Birds
	<i>Onoclea sensibilis</i>	Sensitive Fern	seed mix	Yes	part shade	1-3'	2-4'							█			Birds, salamanders, frogs
	<i>Verbena hastata</i>	Blue Vervain	seed mix	Yes	sun, shade	3-6'	2-4'							█			Native Bees
	<i>Symphoricarum novae-angliae</i>	NE Aster	seed mix	Yes	part shade	3-6'	2'							█			Native bees, bumblebees, honey bees, Pearl Crescent larval host

Figure 2. Research Installation Plant Palette

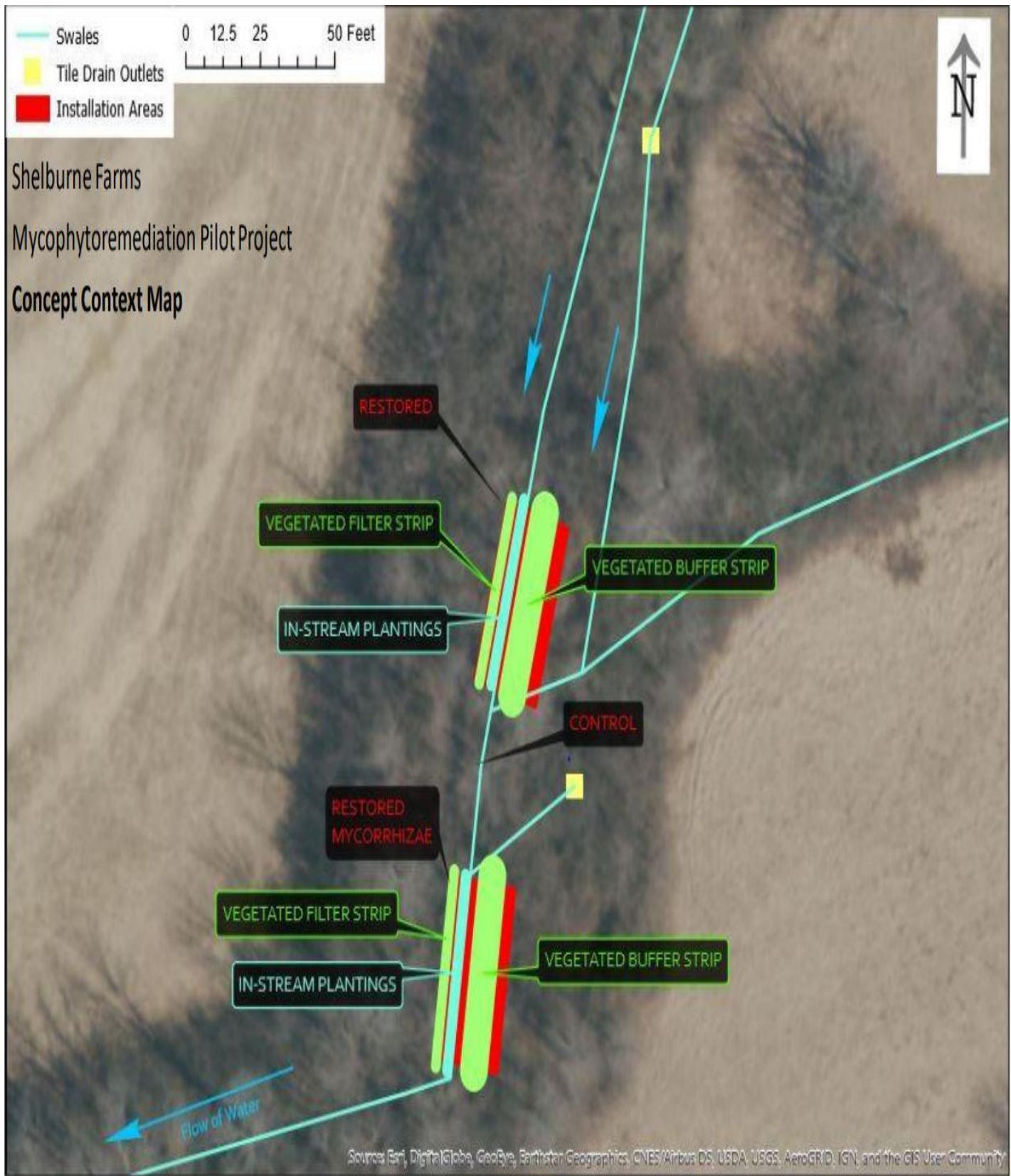


Figure 3. Concept Map of Research Installation

Shelburne Farms Mycophytoremediation Pilot Project Schematic Map 1: Seeds, Erosion Control, Stumps, Fence

Designer: Jess Rubin 4/29/2020

Key:



Fence & Door to enter plot



Seeds Under Jute
Erosion Control Matt



Buckthorn Stumps



Waterway

SCALE: 1" = 2'

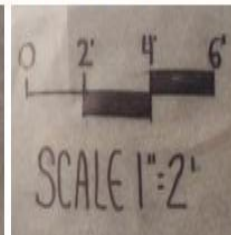


Figure 4. Schematic Map of Base Layer

Shelburne Farms
Mycophytoremediation Pilot Project
Schematic Map 2
Herbaceous Species over Map 1
Designer: Jess Rubin
4/30/2020

Symphotrichum novae-angliae
Chelone glabra
SCALE: 1" = 2'

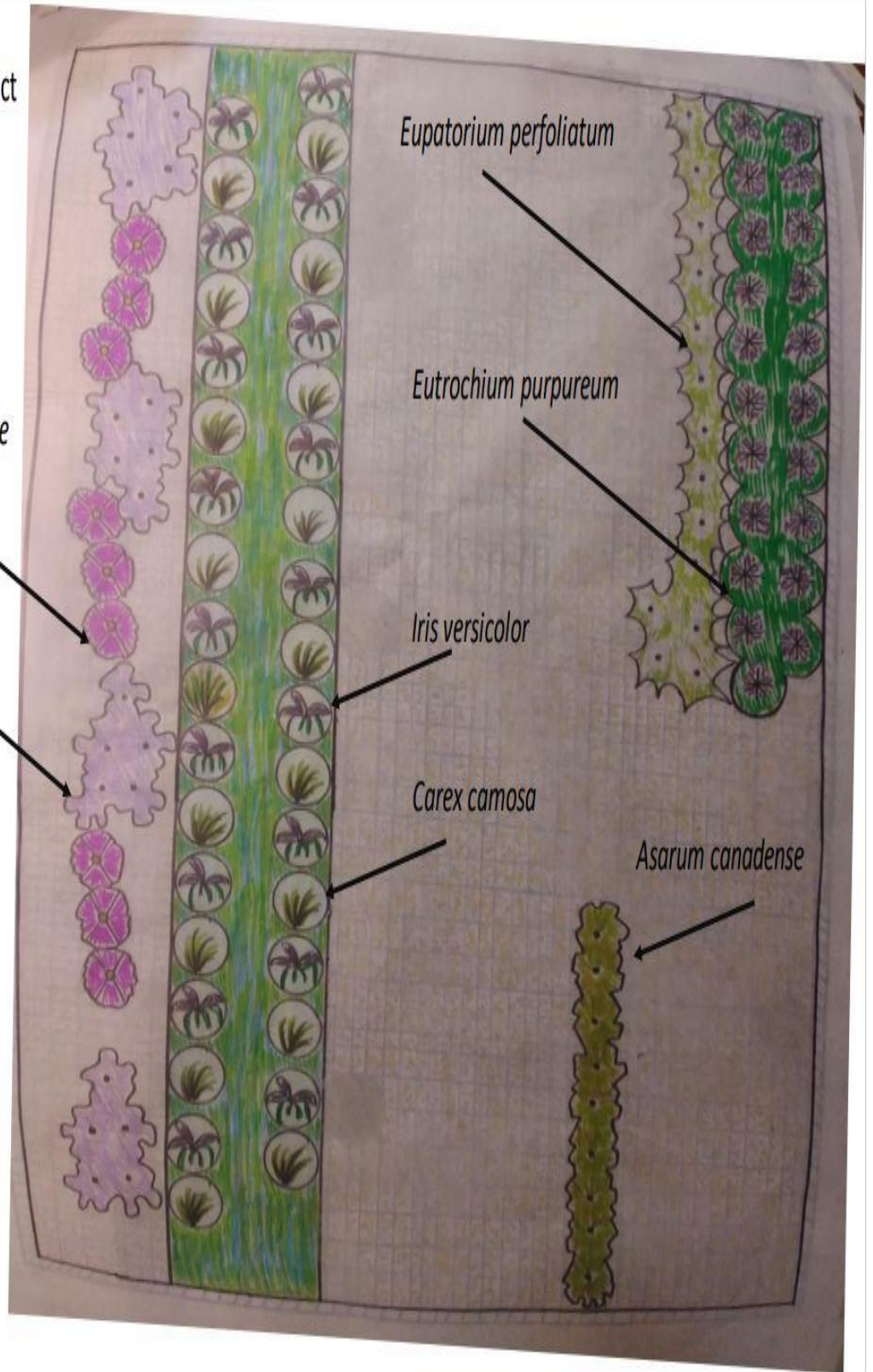


Figure 5. Schematic Map of Herbaceous Layer.

Shelburne Farms
 Mycophytoremediation Pilot Project
Schematic Map 3
Shrub and Tree Species
 Designer: Jess Rubin
 5/1/2020

SCALE: 1" = 2'

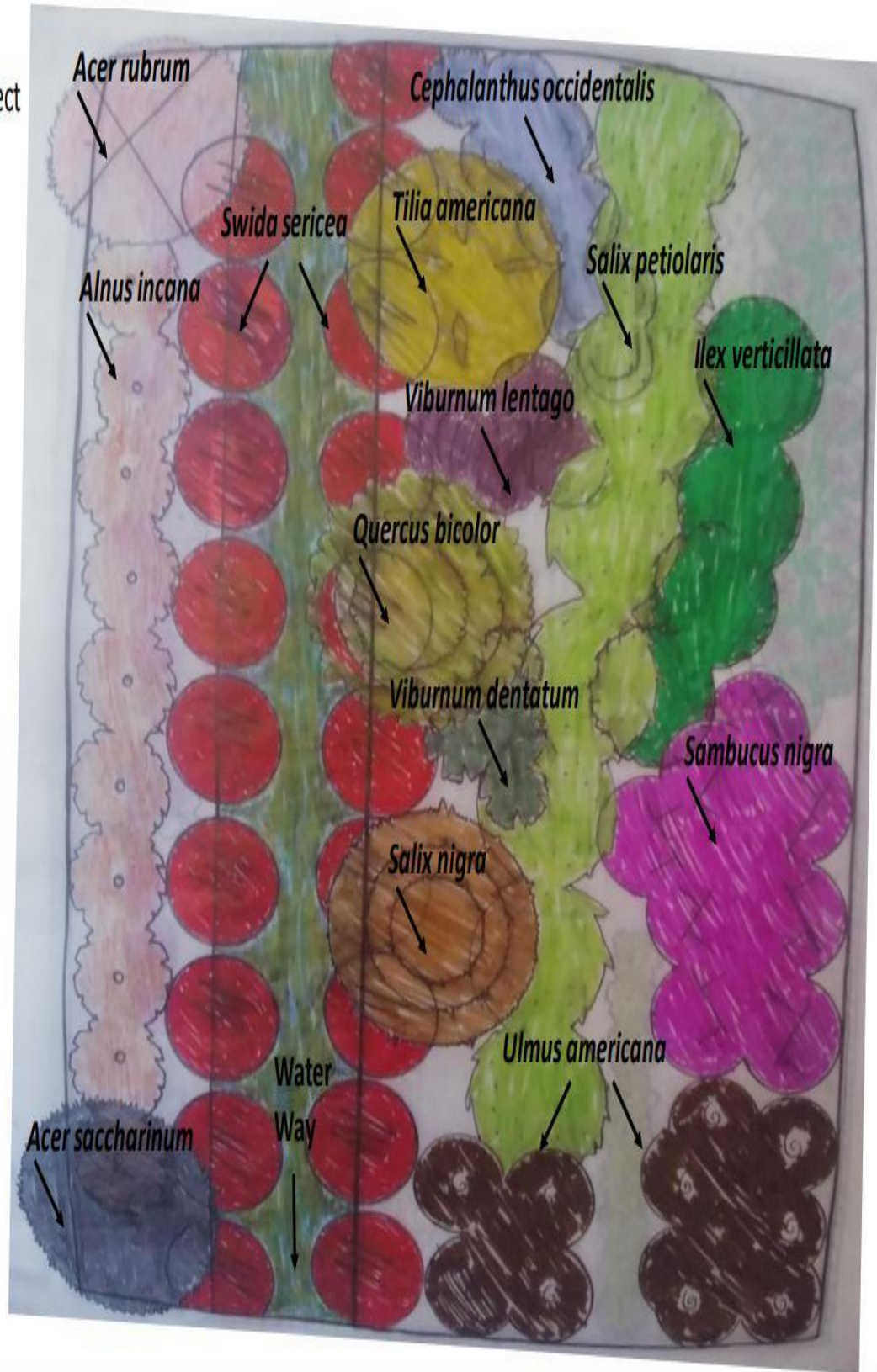


Figure 6. Schematic Map of Shrubs and Trees

Shelburne Farms
 Mycophytoremediation Pilot Project
Map 4: Section Elevation A->A'
 Northwest to Southeast
 Designer: Jess Rubin
 5/3/020

Notes:

- All 3 areas section are 40' long
- Slope of waterway = @ 1:1
- Mycorrhizal Mycelium throughout root systems

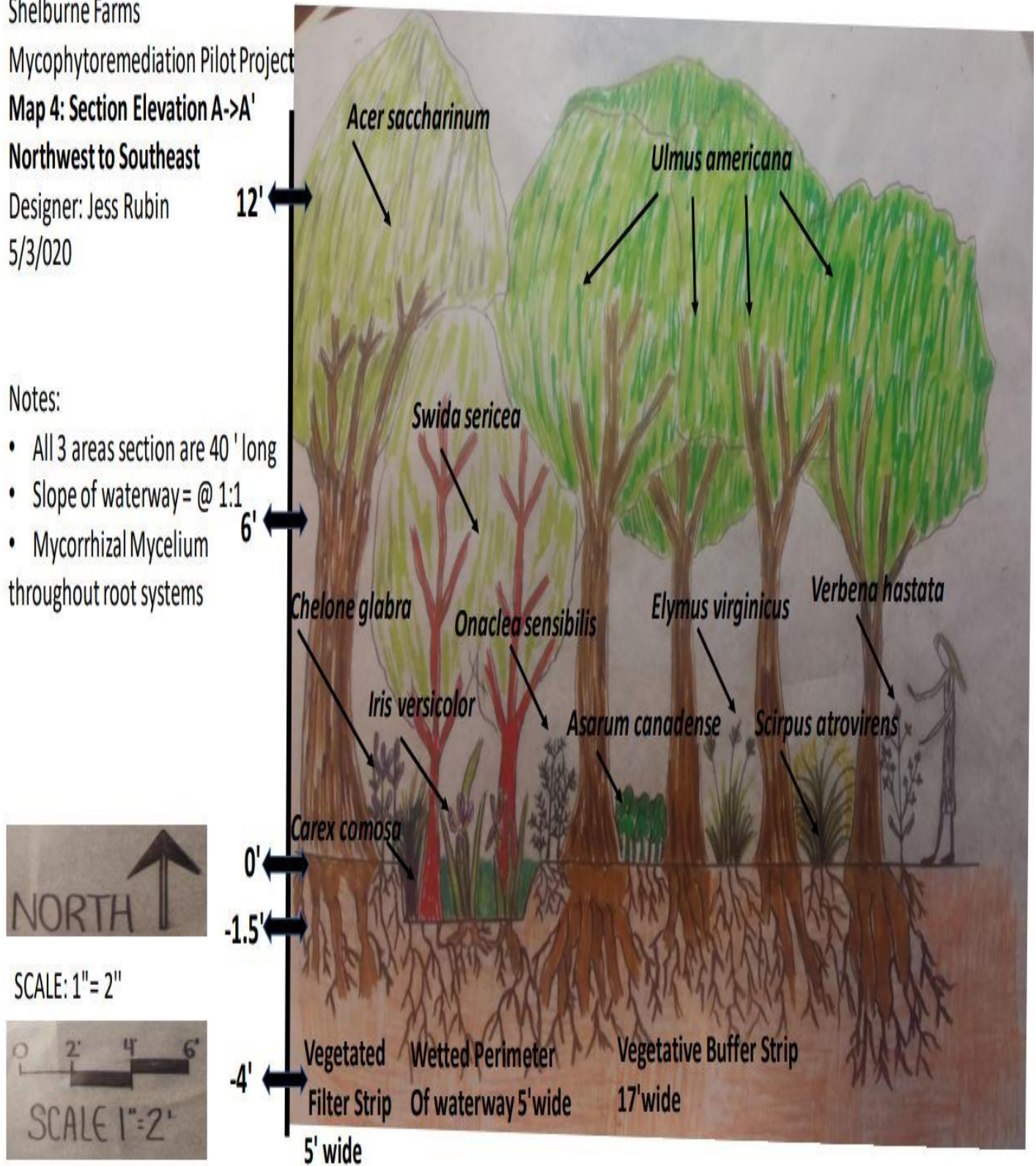


Figure 7. Section elevation map of one restored plot