Coe Hill
Forest Stewardship Plan

Town of Middlefield

40 Acres in Middlefield CT
2026-2036

Connwood Foresters, Inc.

EXECUTIVE SUMMARY

Connwood Foresters, Inc. prepared this comprehensive Forest Stewardship Plan (FSP) for approximately 40 acres of town-owned properties in Middlefield, Connecticut. This plan is intended to guide the stewardship of Coe Hill, a town-owned property managed by the Town of Middlefield Conservation Commission for the period of 2026-2036. This plan provides detailed assessments of forest health, wildlife habitat, invasive species impacts, recreational potential, and boundary management. Connwood Foresters, Inc. conducted fieldwork during the summer and fall of 2025.

Middlefield's forested properties play a crucial role in the community by providing essential ecological services, including clean air and water, wildlife habitats, carbon sequestration, and recreational opportunities, all while enhancing regional resilience to climate change and environmental stressors.

This plan emphasizes sustainable stewardship practices designed to enhance forest ecosystem resilience, biodiversity, and the quality of wildlife habitats. Implementation of this plan will ensure the long-term ecological integrity, recreational accessibility, and educational potential of Middlefield's community forests.

Management over the next decade focuses on three intersecting goals: (1) restore long-term forest health and resilience, (2) expand safe, inclusive recreation and environmental education, and (3) foster community stewardship while protecting cultural and ecological heritage.

STEWARDSHIP OBJECTIVES

- Sustainably steward the preserve's natural resources.
- Maintain and improve forest ecosystem health and resilience
- Maintain and improve forest woody plant biodiversity
- Enhance forest resilience to pests and pathogens
- Improve wildlife habitat diversity
- Trail placement and maintenance
- Provide educational opportunities through signage and guided activities.
- Identify and address infrastructure and maintenance concerns
- Encourage more use by local community members

SUMMARY OF RECOMMENDATIONS

- Forest Health
  - Conduct aggressive invasive species control across all forest and shrubland acres.
  - Protect and release desirable native saplings and mast-producing trees (oak, hickory, walnut).
  - Conduct targeted thinning around healthy native trees.
- Wildlife Habitat
  - Expand and maintain early-successional shrubland and young forest habitat.
  - Retain snags, coarse woody debris, and cavity trees for nesting and foraging.
  - Preserve and release remaining apple and pear trees to enhance wildlife food sources.
- Recreation
  - Upgrade and Maintain Trail Blazes
  - Use interpretive signage to educate visitors on habitat restoration and climate resilience.
  - Repair Infrastructure such as Picnic Tables.
- Community Engagement
  - Collaborate with community leaders
  - Schedule annual community volunteer workdays for invasive removal
  - Encourage the creation of a Friends of Coe Hill community group
  - Clearly post all boundaries, especially near residential areas.

Table of Contents

GENERAL INFORMATION

Dates Prepared:

Data Collected: July, October, 2025
Submitted to the Town of Middlefield: November 2025

Prepared by:

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Edited by: Matt Gallagher (CT Forester #1242)

Property Owner:

Town of Middlefield
PO Box 179
Middlefield, CT 06455

Property Address:

School Street,
Middlefield, CT 06455

Latitude and Longitude:

41°32'30.8"N
72°42'50.4"W

Acreage:

41.24 Acres

Deed:

MBL: 5 // 74
MBL: 2 // 34
MBL: 2 // 31-4

INTRODUCTION

Upon Request by the Town of Middlefield, Connwood Foresters, Inc. has prepared a Forest Stewardship Plan for ten years (2026 – 2036) for the Coe Hill preserve in Middlefield, CT. An inventory of this property was conducted in July 2025, to determine how best to implement the natural resource stewardship objectives of the landowner.

The management plan is based on the environmental characteristics of the property and is used to determine appropriate conservation and use. This plan includes a property description, an analysis of the property's unique characteristics and management recommendation. While the Town of Middlefield is ultimately responsible for property management, implementing a management program will require the involvement of diverse stakeholders.

Stewardship Objectives

1. **Long term forest health including:**
    a. Maintain and improve forest ecosystem health and resilience
    b. Maintain and improve forest woody plant biodiversity
    c. Enhance forest resilience to pests and pathogens
    d. Improve wildlife habitat diversity
2. **Safe and responsible recreation opportunities**
    a. Trail placement and maintenance
    b. Educational opportunities
    c. Identify and address maintenance concerns
    d. Encourage thoughtful use by local community members

Why should we protect and steward our forests?

Forests purify our water and air, supply food and shelter for wildlife, protect our soil, and provide peace and tranquility for people who visit them. Forestry is the science and art of managing forests for healthy, productive, and diverse tree communities. Using silvicultural prescriptions, we can create desired aesthetic features, manage forests for timber production, restore wildlife habitat, recreation, or all of the above.

This forest stewardship plan will provide detailed and applicable recommendations for the long-term protection and use of the forest resources. The plan will describe the composition of the forest's age, size classes, species distribution, and data on avian species present or absent to gain perspective on how the forest functions as a wildlife habitat. The data from this plan will allow the landowner to realize the full potential of the forest, both ecologically and economically. The inventory data collected in July 2025 provides the basis for these recommendations. Implementing these recommendations can establish enduring forest improvements that will outlast our lifetime and benefit beyond the property's boundaries.

The recommendations within this plan are designed to cover a ten-year management period. As management progresses on this property, it may become apparent that some recommendations are no longer feasible or appropriate, and others will become critical. Please note that while these management activities are scheduled for specific periods over the next ten years, these are merely recommendations based on our knowledge at the given moment. The recommendations do not have to proceed in the order in which they are listed - or at all. Furthermore, they are just that: recommendations from professionals for the landowner to consider. Connwood Foresters Inc. is available to assist you with all the management recommendations outlined in this plan.

Please refer to the maps while reading the plan. Throughout the following narrative, the features described can be located on the maps. Using the maps will make the narrative much more meaningful. Please also refer to the Glossary section to explain any unfamiliar or confusing terms.

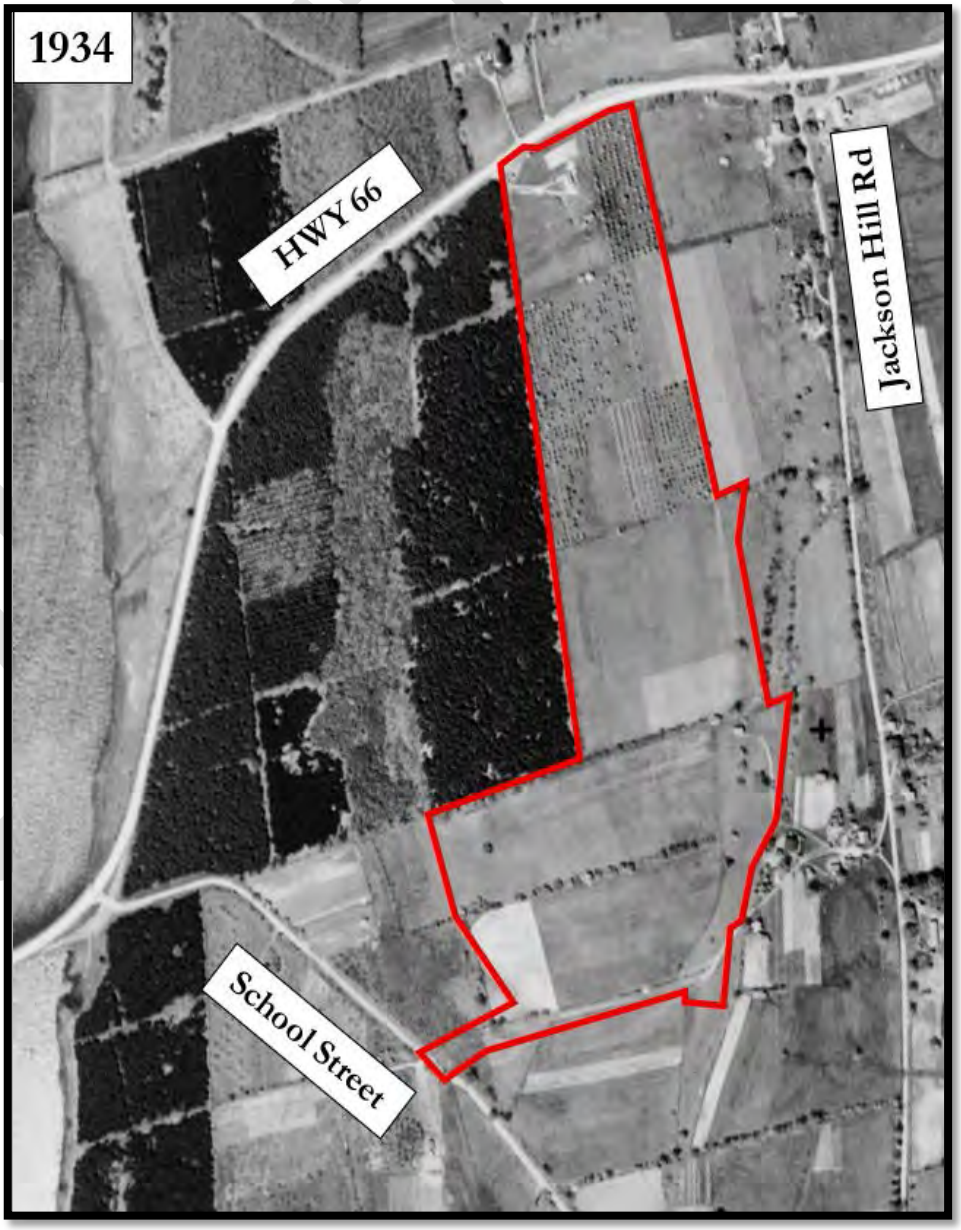
LAND USE HISTORY

The lands of what is today known as Connecticut have been occupied by humans, at least since the retreat of the Wisconsin glacier some 11,000 years ago. Agriculture in these areas dates back to the crop gardens of indigenous peoples who cultivated crops such as maize, beans, squash, sunflower, and Jerusalem artichokes.

Before English settlement, the land that became Middlefield was part of the territory of Sowheag, a powerful sachem of the Mattabesett people. Sowheag held sway over the Piquags of Wethersfield and other groups east of the Connecticut River. The area that is now Middlefield appears to have been used mainly as hunting grounds rather than for permanent villages, as arrowheads and tools are still found there. Around 1662, Sowheag's successor Sepunemo and other chiefs *sold* land to colonial agents, which included what later became Middlefield.

The first permanent English settlements began around 1700, with families named Allen, Miller, and Wetmore. Soon after, additional settlers arrived, including the Coe family from Durham.

"Coe Hill" refers to early ownership by an Alva B. Coe in the 19th Century. The Coe family can trace its roots to Robert Coe of Suffolk, England, who immigrated to Massachusetts in 1634 and helped establish several early New England towns, including Stamford, Hempstead (Long Island), and Newtown. Alva's father, Enoch Coe (1804–1833), was a schoolteacher, farmer, and captain of the local militia. He married Mary M. Birdsey (1805–1886) of Middlefield. They had three children: Alva Birdsey, Elmore Frank (who later became a wealthy fertilizer manufacturer in New York), and Selina (who died young).

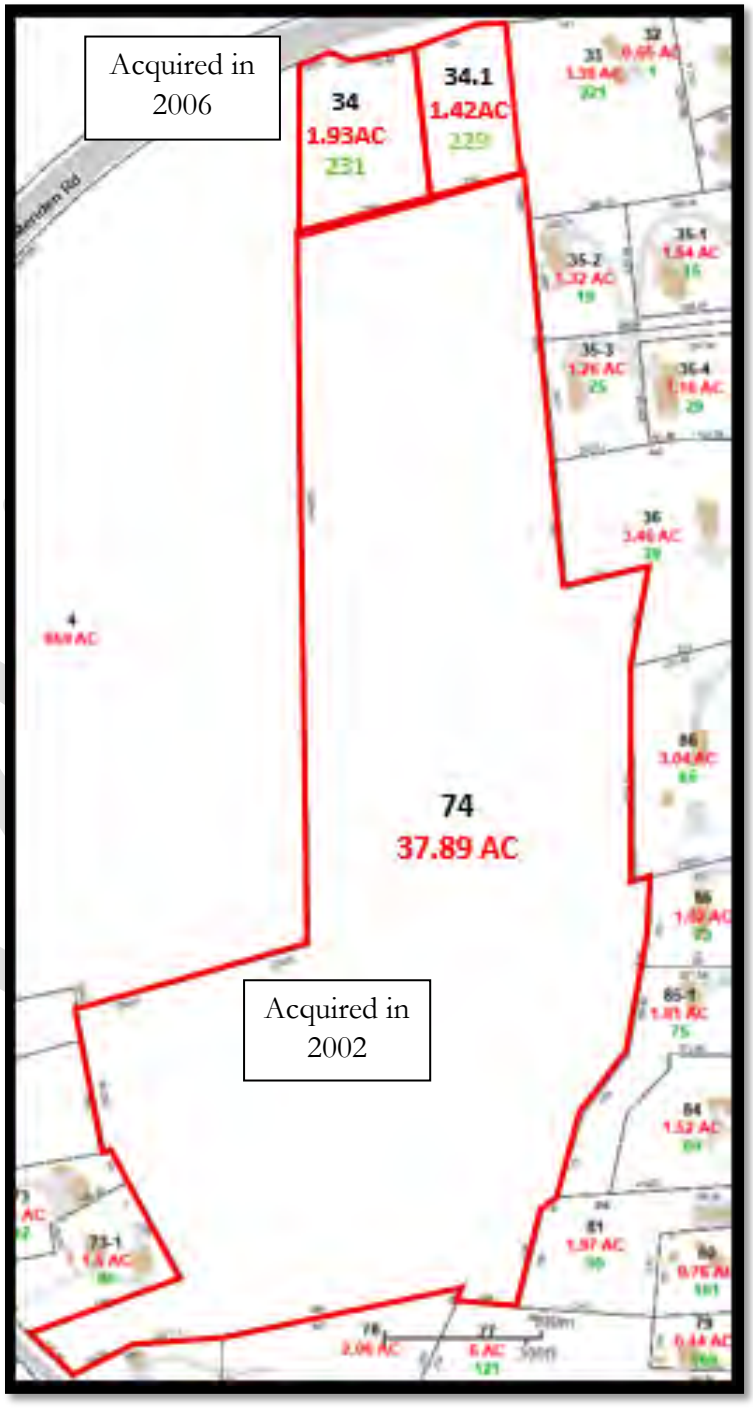


Map 1: Coe Hill Aerial 1934. The scale projection from 1934 does not match what we use today therefore, historic aerial photos never line up to features perfectly.

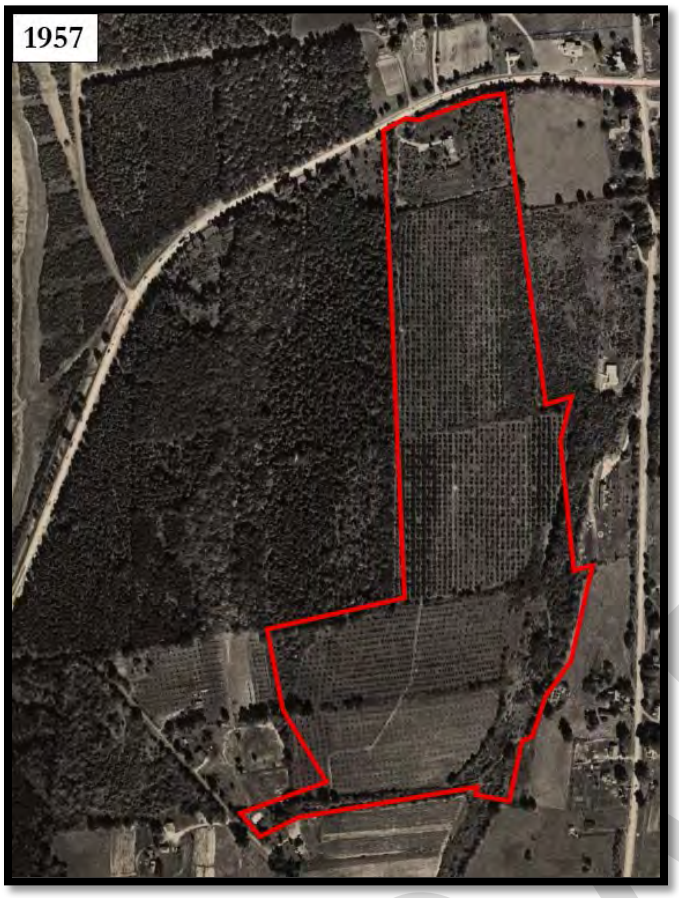
Alva Birdsey Coe (1826-1906) was born in Middlefield and educated in local schools and at Meriden Academy. He taught school for many years, including 25 consecutive winters at the Broad Street school, while farming in summers. After buying the family homestead, he expanded it to 120 acres, raising dairy cattle, poultry, and horses. Active in public affairs, Alva served as selectman of Middlefield and was elected to the Connecticut State Legislature in 1882, where he sat on the Committee on Humane Institutions. Known for his good health, sound business sense, and fair dealing, Alva earned a reputation as one of Middlefield's leading citizens. In 1899, the property was transferred to John Nettleton, the first selectman at the time, and served as a hay farm with open meadow for horses and sheep until the 1920s.

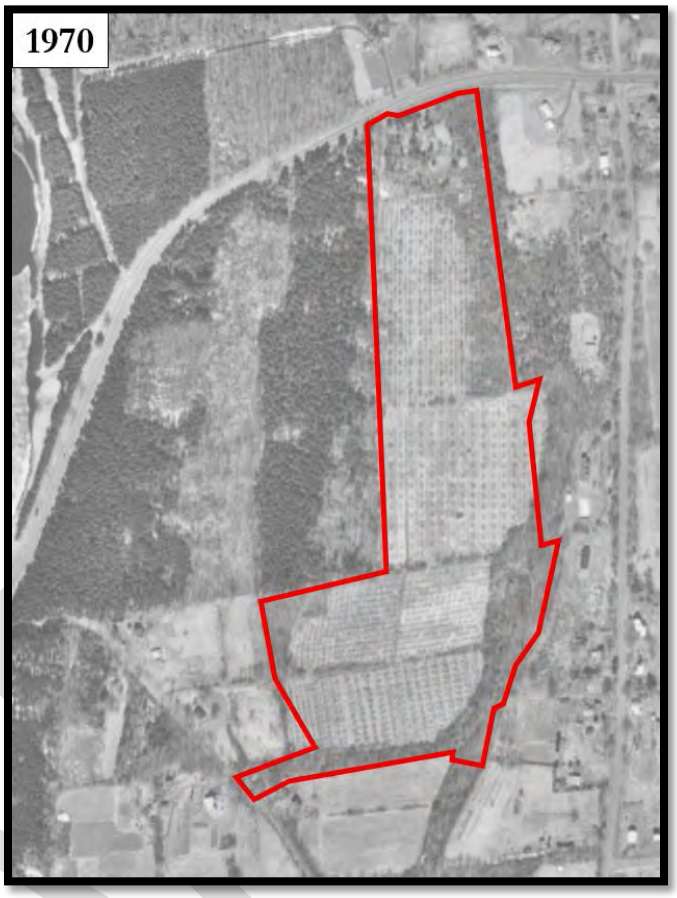
The property known today as Coe Hill represents only a portion of what was once Alva B. Coe's farm. In 1950, Albert and Vladimir Steucek acquired the property and planted an orchard of apple and pear trees. During their ownership, a 3.35-acre easement was transferred to the Connecticut Department of Transportation for the expansion of Route 66 (this land was later sold back to the Town of Middlefield in 2006). The Town formally purchased the Coe Hill parcel on School Street in 2002, which only covered ~37 acres. This management plan covers the combination of these parcels and represents ~41.24 acres.

The following aerial images demonstrate a transition from intensive agriculture to a more naturalized open space. In the 1930s, the land was actively cultivated, with orchards and open fields dominating the landscape. In 1957, the land had been transformed by extensive orchards planted by the Steuceks. By the 1995s, signs of orchard decline and abandonment are visible. During the 2000s, the property had shifted to a mix of meadow and encroaching woodland, with mowing patterns maintaining portions as open field.



Map 2: Map of lot lines taken from Middlefield Assessor GIS


1957


1970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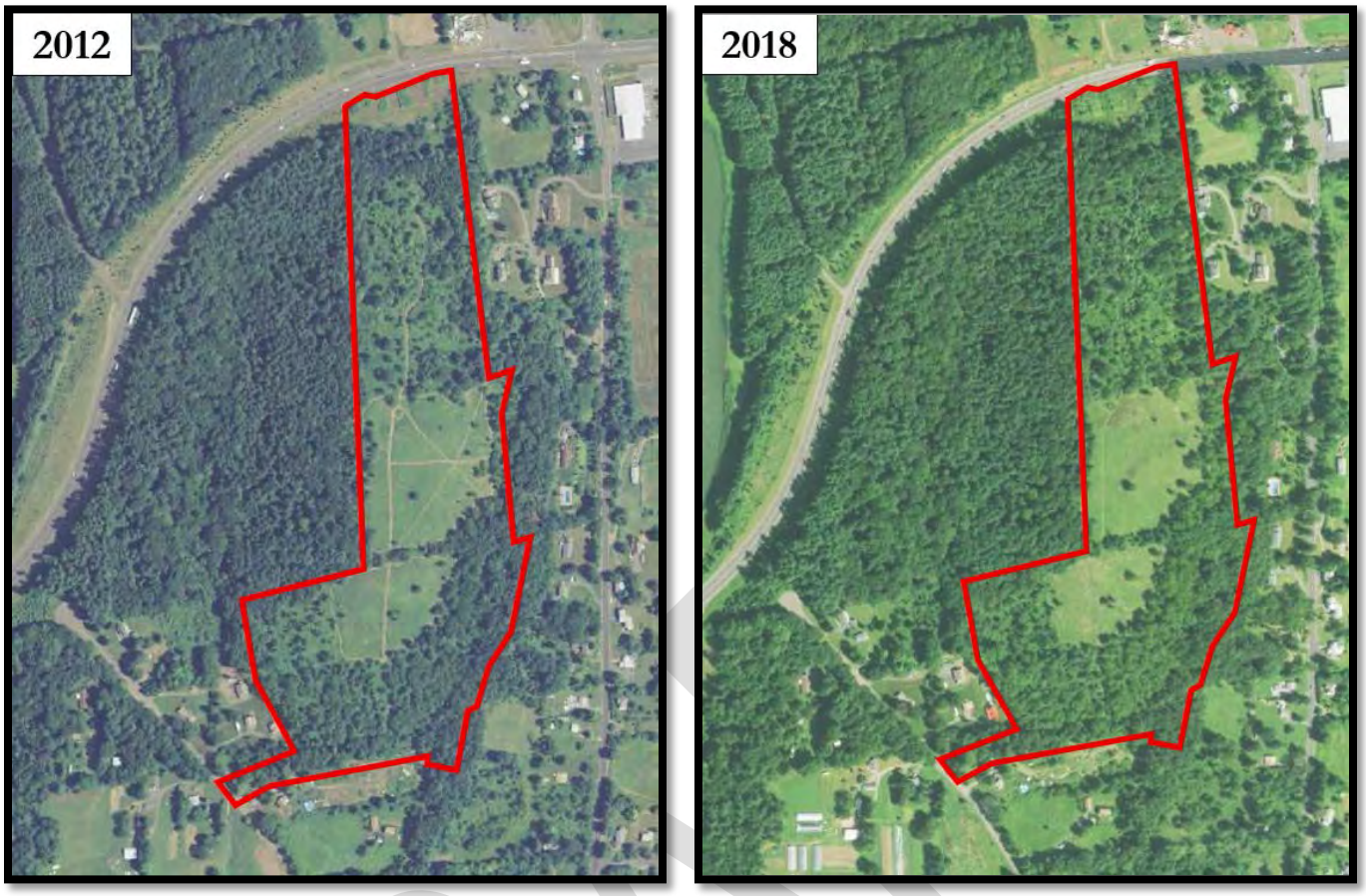
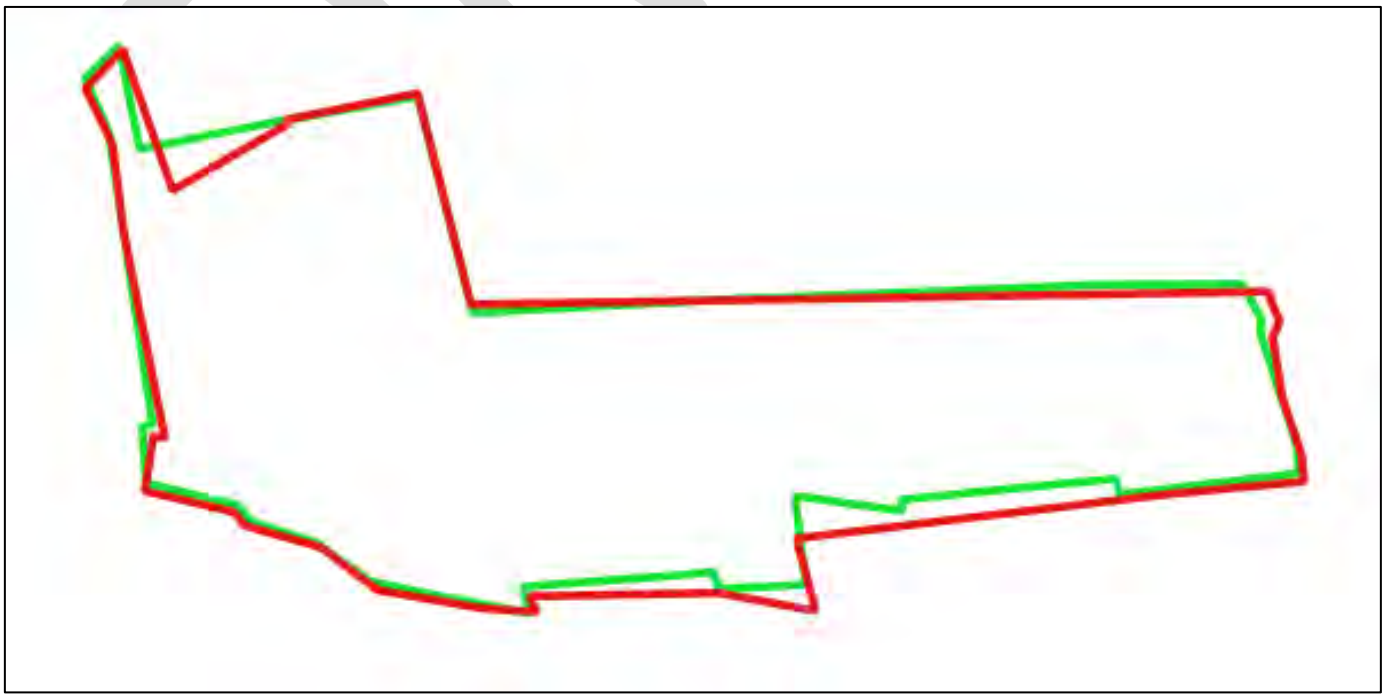


It also needs to be noted that while this parcel information was taking from the Middlefield assessor GIS database, the CT DEEP parcel data and Coe Hill Forest Report created by CT DEEP have different boundary lines. Below is a blank map showing the difference between the lines. The green line represents the CT DEEP Parcel Data while the Red shows the Middlefield Assessor GIS Data. This plan is based off the boundary lines found in the Middlefield Assessor GIS Data.

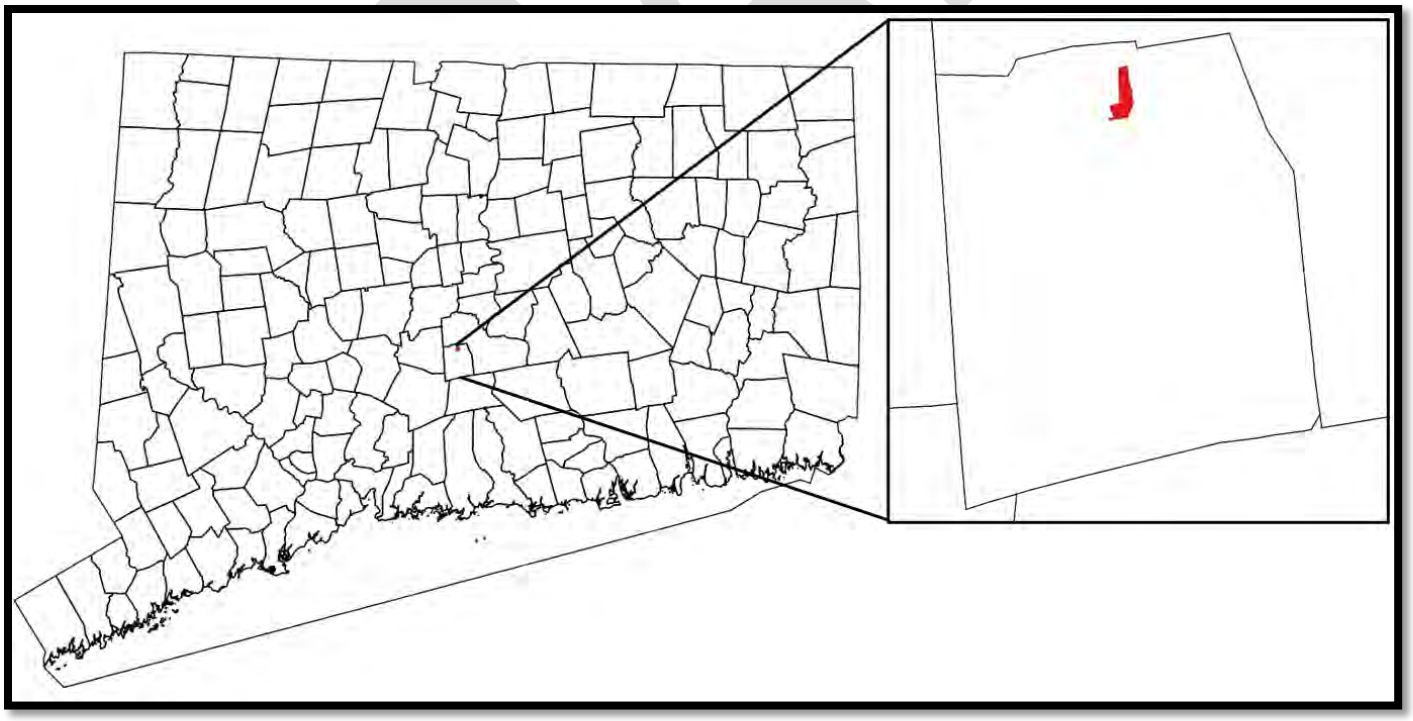


CURRENT USE

The Town of Middlefield conserves more than 250 acres of land for public use throughout Middlefield. These preserves are publicly accessible open spaces featuring trails and interpretive signage. The "Open Space" designation indicates that this area is not used for any single recreational activity and is not considered a managed park. Coe Hill sees light public use and informal recreation, with mowed trails crossing through the old fields and lower forested areas, and is occasionally accessed for bow hunting. Other than sporadic mowing, the property remains largely unmanaged.

Coe Hill rises to a height of 530 ft (the town's third-highest point), is part of the Mount Higby ridgeline, and borders Middletown's Higby Reservoir, with ~5.5 acres in its watershed. Residential development along Jackson Hill Road and nearby parcels borders the property to the southeast, south, and southwest, with Route 66 to the north and Middletown Water Company land to the northwest. The entrance with signage and parking is located on School Street – at the southwest tip of the property.

Coe Hill provides all the ecosystem services healthy forest lands offer in Connecticut, a state with highly fragmented forest lands. These ecosystem services include habitat for mammals such as deer, foxes, bobcats, rabbits, etc.; habitat for migrating and non-migrating birds; regional resilience to climate change; regional resilience to non-native pests and pathogens; regional resilience to non-native plant species; maintaining high-quality drinking water throughout the watershed, and more. Maintaining healthy forest land throughout Connecticut, a densely populated state, is critical for all these benefits.



Map 3: Coe Hill Open Space Middlefield, CT.

BIOPHYSICAL BACKGROUND

Geologic History

The supercontinent Pangea formed and broke apart between 500 million and 150 million years ago. Pangea was formed by the collision of many paleocontinents, such as the paleocontinents of Laurentia and Gondwana which collided and sandwiched the island chain of Avalonia. After they pulled apart, Gondwana became present-day Africa, Laurentia became North America, and Avalonia formed the upland area east of the Connecticut Rift Valley. This violent collision and subsequent break-up dramatically altered the topography, leaving evidence of this event across the landscape.

Figure 1: Break up of Pangaea note that the red star is not Connecticut but somewhere along the mid-Atlantic coast

The impact of the paleocontinents created the crumpled topography of the Appalachian Mountains as well as the ridge and valley topography in Connecticut. The heat produced by this impact transformed the existing sedimentary rock into metamorphic schist and gneiss, which now make up the bedrock in the upland regions. As Pangaea began to break apart, enormous forces stretched and pulled the land, producing many cracks in the crust without fully splitting the continents into new ocean basins. This process created rift valleys, and one of these formed the landscape that today includes Connecticut's Central Valley.

As Pangea pulled apart, the crust thinned and sagged downward in areas where the stretching was greatest, generating considerable heat and allowing magma to rise to the surface. This magma erupted as lava flows, which cooled and solidified into basalt. Over time, softer sedimentary rocks surrounding these basalt layers eroded, leaving the more resistant basalt behind. Today, these basalt ridges appear as steep, stair-like formations—hence the name "trap rock," derived from the Scandinavian word for "stairs." Landmarks like the Metacomet Ridge, Mount Higby, and East Rock are well-known examples of Connecticut's distinctive trap rock features.

Connecticut also has an underlying geology recently shaped by the advancing and receding of the Wisconsin Glacier during the most recent period of glaciation that ended around 15,000 years ago. The glacier was a mile thick and, as it advanced, scraped the surface of the ground. As it receded, meltwater and glacial debris—sand, gravel, and larger rocks—were deposited across the region, creating the basis for much of the soil and topography we see today. After the last period of glaciation, Glacial Lake Hitchcock was left, filling the Connecticut Rift Valley with a single lake as far north as present-day New Hampshire. The Traprock ridges near present-day Meriden, CT, directed the lake's outflow to eventually form the Connecticut River that travels east to empty into the Long Island Sound near Old Saybrook, CT, rather than traveling south to New Haven.

The Town of Middlefield sits within Connecticut's Central Valley, a landscape shaped by deep geologic forces and more recent glacial activity. Glaciers scoured the trap rock ridges, plucking and polishing the basalt, leaving behind steep faces and scattered boulders. As the ice receded, it left a blanket of glacial till across the uplands. It deposited

sands, gravels, and silts in the valley bottoms, creating fertile soils that supported later agriculture. Meltwater carved out valleys like the Coginchaug River corridor, forming features such as kettles, outwash plains, and wetlands that remain integral to Middlefield's ecology. Today, the sharp ridges of Higby and Besek, paired with the rolling till plains and fertile bottomlands, represent a classic glacially sculpted Central Valley landscape.

Hydrology

There are eight major watersheds in Connecticut. Coe Hill is located within the Connecticut River basin. The Connecticut River Basin, spanning 11,250 square miles from southern Quebec to Long Island Sound, comprises approximately 13 percent of its area in Connecticut, with the remainder spread across Vermont, New Hampshire, Massachusetts, and a small portion in Quebec. At 280 miles long and up to 60 miles wide, the Connecticut River Basin in CT covers much of Hartford and Middlesex Counties and parts of Tolland, Litchfield, New London, and New Haven Counties.

The Connecticut River basin comprises regional, subregional, and local basins, which correspond to varying levels of detail in terms of topography, aspect, and elevation. The Coe Hill Open Space sits within the Mettabasset Regional basin, with parts in the Coginchaug River and Sawmill Brook Subregional Basins.

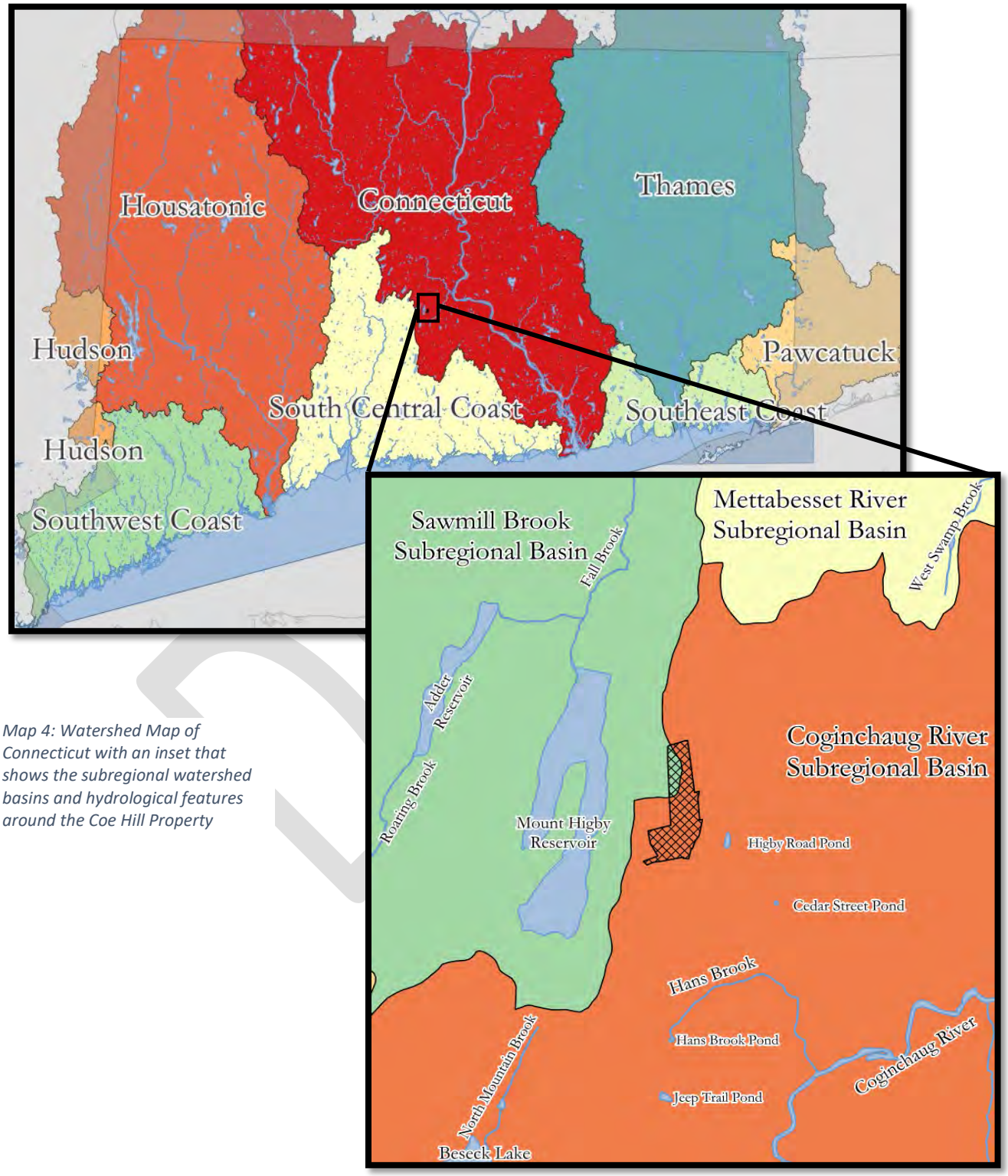
The Coginchaug River watershed covers about 39 square miles (24,928 acres) across eight towns, with the largest portions in Durham (49%) and Middlefield (29%). The full watershed includes Allyn Brook and Sawmill Brook as subregional basins of the regional Mattabesset River Basin, which is part of the major Connecticut River Basin. Unlike most rivers in Connecticut, the Coginchaug flows northward, beginning in Guilford and becoming progressively more developed downstream through Middletown before joining the Mattabesset River at Boggy Meadows—a unique and ecologically rich area, despite its proximity to a closed landfill.

Water quality designations vary. In 2008, the river was designated Class A from its headwaters to Allyn Brook in Durham, and Class B from there to the Mattabesset, with most tributaries rated Class A or AA. However, state monitoring identified the river for nonpoint source (NPS) pollution concerns linked to agriculture, development, and loss of riparian buffers. Testing revealed chronic E. coli contamination, exceeding state standards even during dry weather, suggesting a persistent local source of bacterial pollution beyond stormwater runoff.

A small pond near the parking area off School Street is the property's only hydrological feature. Formed within wetland soils, this pond collects runoff from surrounding impervious surfaces and adjacent properties, functioning as a stormwater catchment that slows and filters surface flow before it infiltrates. The pond is largely covered with common duckweed, a native plant which is commonly found in nutrient rich stagnant water and provides some

Picture 1: Small pond next to the entrance of the Coe Hill Property

benefit removing excess nutrients or toxic metals. However, duckweed can become a nuisance as its dense mats can completely carpet the water's surface, blocking sunlight, reducing oxygen levels, and negatively affecting submerged aquatic vegetation. Despite this, the pond was very active with frogs and other amphibians, demonstrating that even a small waterbody like this can offer valuable habitat and contribute meaningfully to the ecological diversity of the open space.



Map 4: Watershed Map of Connecticut with an inset that shows the subregional watershed basins and hydrological features around the Coe Hill Property

Soils

In Connecticut, more than 100 soil types have been categorized and named, each sharing the same wetness, age, parent materials, and climatic legacies. Each of the soil types found on the property is characterized below. Soils were identified and defined using the US Natural Resources Conservation Service (NRCS) soil survey tool.

The Coe Hill open space is dominated by well-structured Wethersfield loam soils that span a range of gentle to steep slopes (3–25%). These soils support a rich and resilient hardwood forest community characterized by oak-hickory dominance, interspersed with maple, cherry, beech, and black birch, depending on microtopography and disturbance history. The small inclusion of Wilbraham and Menlo soils represents minor wet depressions or seepage areas (the pond at the entrance), contributing additional structural and habitat diversity.

Wilbraham and Menlo soils, 0 to 8 % slopes (6)

Characteristics: Poorly to very poorly drained glacial till soils with a high percentage of surface stones and a dense substratum at shallow depth. Low permeability and seasonal saturation. Inland Wetland Soils.

Topography/Terrain: Found in shallow depressions and drainageways within upland landscapes.

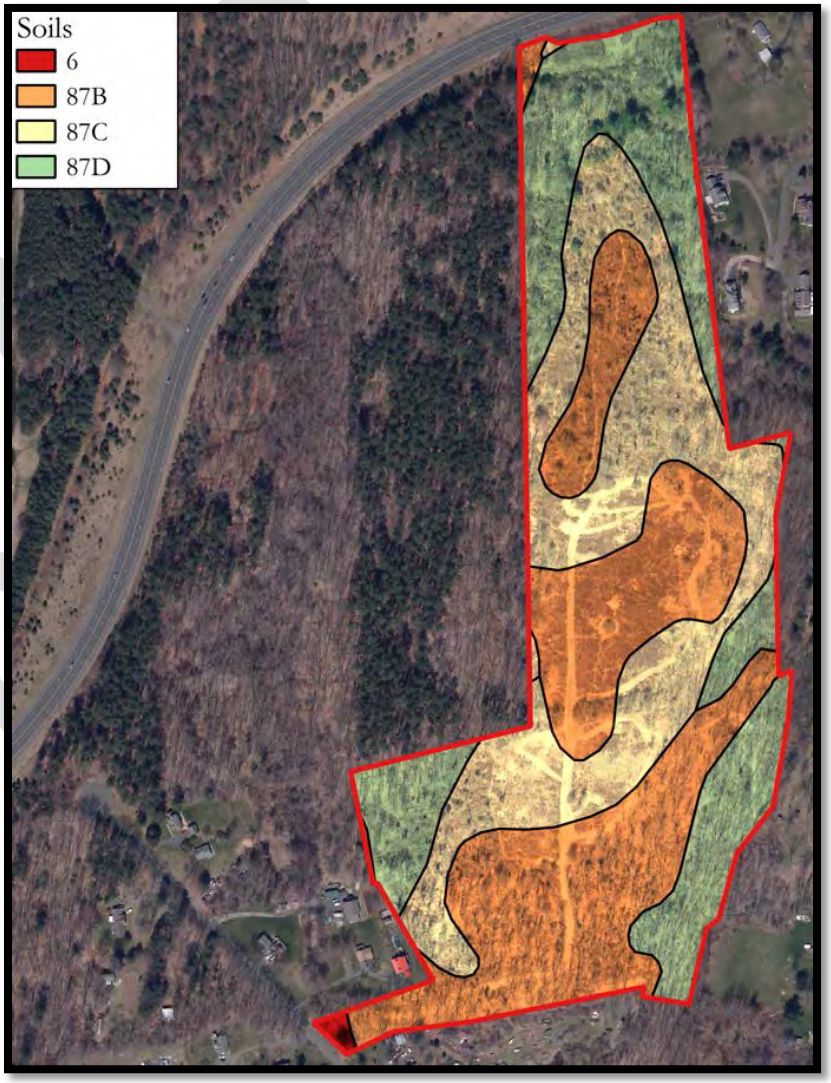
Typical Tree Species: Red maple, eastern hemlock, musclewood, spicebush, and swamp-associated oaks like pin oak, and swamp white oak.

Wethersfield loam, 3 to 8 % slopes (87B)

Characteristics: Well-drained, moderately fertile loam with a dense basal till layer (Cd) 20–40" below surface. Good available water capacity, slow internal drainage at depth.

Topography/Terrain: Gently sloping upland surfaces—ridgetops, terraces, and upper hill shoulders.

Typical Tree Species: Sugar maple, white oak, red oak, black cherry, and hickories, with American beech and eastern hophornbeam in mesic pockets.



Map 5: Soils Map of Coe Hill

Wethersfield loam, 8 to 15 % slopes (87C)

Characteristics: Same soil profile as 87B, but found on moderately sloping ground with increased erosion potential.

Topography/Terrain: Shoulder and midslope positions of hills and drumlins.

Typical Tree Species: Similar to 87B—oak-hickory hardwoods dominate, with some tulip poplar, white ash, and black birch in well-lit or disturbed gaps.

Wethersfield loam, 15 to 25 percent slopes (87D)

Characteristics: Identical in structure to 87B and 87C but steeper; more prone to runoff and sheet erosion.

Topography/Terrain: Moderately steep hillsides and ridge flanks, typically forested due to slope limitations for development or agriculture.

Typical Tree Species: Red and black oak, sugar maple, white ash, black birch, sassafras, and eastern hophornbeam on dry slopes.

Picture 2:Wall of trees that bisects the open field at Coe Hill

FOREST DEVELOPMENT

Forests are ecosystems constantly changing. Most of the forests of New England developed from pasture more than 100 years ago. Slowly, trees and other plants crept in and began the process known as succession. Some species of trees and plants are ecologically adapted to full sunlight and are referred to as "early successional" or "pioneer" species. Early-successional plants require full sunlight to grow and often are not as long-lived. As these pioneer species grow and develop, they create conditions better suited for more shade-tolerant species and species that cannot survive in full sun exposure. As the early successional species die off, more shade-tolerant species take their place. Forests do this outside human timescale; forests will take about 150 years or more to develop into "mature" forests. Even when forests reach these mature stages, they are still changing as adult trees die, creating gaps in resources for new growth.

Understory plants, trees, and wildlife are constantly undergoing competition for resources: water, sunlight, and nutrients. Trees are the largest component of a forest and have the most ecological value for flora and fauna and economically for timber. While trees have a tremendous amount of ecological value, creating gaps in forests via disturbances, either natural or human-caused, can create opportunities for less shade-tolerant species and understory vegetation to thrive.

As the forest ages, the trees grow to large sizes and, in that process, become fewer in number. A young forest of newly established seedlings may have more than 5,000 trees per acre. Twenty years later, there could be 500 trees per acre. After 50 years, there will be 200 to 300 trees per acre; in another 40 years, there will be 50 large trees per acre. After 100 years, approximately 97% of the original 5,000 seedlings per acre have died, leaving the remaining 3% of the trees to mature.

The exact number varies from forest to forest, but the process of forest maturation is the same. The other 4,850 trees have died and decomposed because they lost the competition for limited growing space. This process continues until the mature trees die from old age or disease, blow over, burn in a forest fire, or are cut. Each time a tree dies, the surrounding tree crowns expand to fill in the canopy opening. When a large tree or a group of trees dies, the opening is too large for the surrounding trees to fill. When this happens, the understory trees will fill the gap. Eventually, all the trees we see today on this property will die, and the trees growing in the understory will replace them. Therefore, some of the best predictors of the future composition of the forest are often indicated by what is growing in the understory, which changes based on the environmental conditions present.

Foresters can accelerate and improve forest development by selecting the trees that will dominate the stand. A forester may favor the healthiest and most vigorous trees. A forester may favor a tree for its value to wildlife, like the soft mast of a black cherry tree. A forester may favor a tree for its products like sugar maple for syrup. A forester may favor a tree for its longevity or aesthetics, like white oak. A forester can take much of the chance out of the development process by personally guiding how the forest develops based on the landowner's objectives. Favoring certain trees increases their survival and vigor by opening growing space around the crown. This allows the tree to expand its crown and receive more sunlight. In turn, this increases the tree's photosynthetic capability, making it more resistant to insects and disease problems and will help it grow faster.

In summary, forestry mimics and manipulates natural forest development to produce a healthier and more valuable forest. This scientific manipulation can produce quality wood products, improve wildlife habitat, create recreational opportunities, and form a more attractive forest.

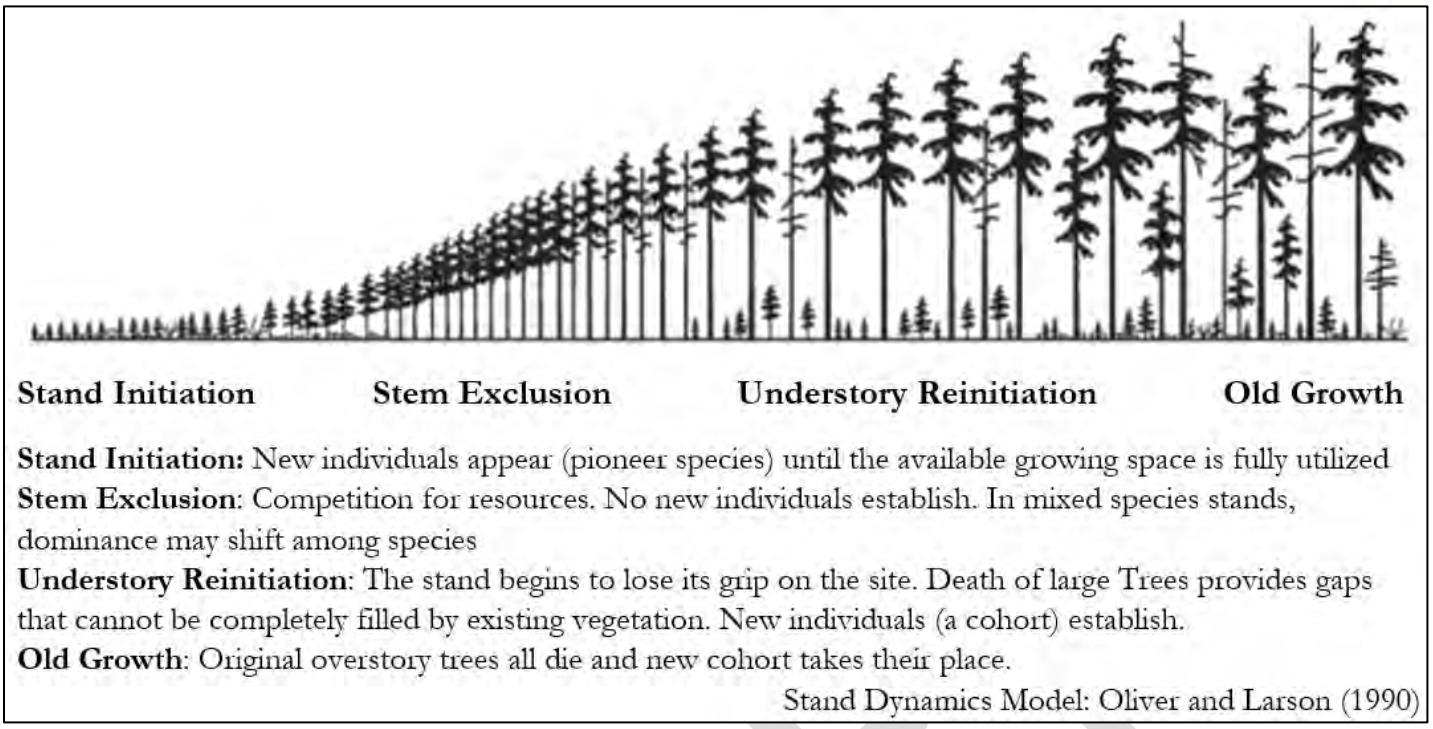


Figure 2: Oliver and Larson's (1990) Stand Dynamics Model

Oliver and Larson's (1990) Stand Dynamics Model, which describes how forest stands typically progress through four broad stages of development. **Stand Initiation** begins when pioneer species establish themselves in open growing space, eventually filling it to capacity. During **Stem Exclusion**, competition for light, nutrients, and water becomes intense, limiting the establishment of new trees and often shifting dominance among species. In **Understory Reinitiation**, the overstory begins to break up as larger trees die or are removed, creating gaps that allow younger cohorts to take hold. Finally, the **Old Growth** stage occurs once the original overstory fully recedes, and a new generation of trees, often of diverse age and species composition, becomes the dominant canopy.

Connecticut As an Urban Forest

Connecticut's forests can be best understood as part of a statewide urban forest. While forested land covers much of the state, nearly every patch is surrounded by residential neighborhoods, roads, and other development, creating a highly fragmented landscape. Despite this, Connecticut's forests continue to provide critical ecosystem services, including wildlife habitat, clean drinking water, carbon storage, and resilience to climate change.

Forests in this urbanized context also deliver essential community benefits: stormwater mitigation, improved air quality, reduced heat stress, recreational opportunities, and enhanced mental health and well-being. Yet these benefits come with unique challenges – urban and suburban forests are more vulnerable to altered climate patterns, invasive species, air pollutants, road salts, and compacted soils, all threatening long-term health and resilience.

Active management is essential to ensure these fragmented forests continue to provide their full range of ecological and community benefits. Without stewardship – such as invasive species control, regeneration planning, and habitat protection – Connecticut's forests risk declining in ecological integrity and their capacity to support surrounding communities. Sustaining healthy forests across the state requires recognizing that every patch, whether large or small, rural or suburban, plays a critical role in maintaining environmental and social well-being.

FOREST STAND DESCRIPTION

Stand Delineation

To best understand a forested area, it is important to divide the property into forest stands. While the forest type may be consistent across many stands, stand delineation is the primary tool for making management decisions. These delineations may be created based on prior natural disturbances (such as a fire or storm), prior forest management decisions like silvicultural treatments or timber harvesting, or land use decisions such as agriculture or livestock grazing. These stand delineations are the best method for planning specific future forest management goals and treatments.

The Coe Hill property encompasses approximately 41 acres, of which about 31 acres are forested and 10 acres are in open field/shrubland. Given the size of the parcel and the fact that management decisions for the property will be made for the entire property, I classified the property as having two stands, forested and open field/shrubland.

Coe Hill – 41 acres

The property occupies gently to moderately sloping drumlin landform (a smooth, elongated glacial hill) rising from about 410 feet in elevation at the School Street entrance to a high point of roughly 530 feet at the top of Coe Hill, before descending again to around 440 feet on the western side. This north–south oriented ridge drains toward all sides and features well-drained, loamy soils formed in glacial till, primarily Wethersfield loam with smaller pockets of Wilbraham and Menlo soils. These are classified as Prime or Statewide Important Farmland soils capable of supporting highly productive hardwood growth.

Map 6: Stand Map of Coe Hill

Coe Hill: Forested – 31 acres

The forest canopy ranges from scattered/understocked to fully stocked, reflecting past mortality – particularly from emerald ash borer and ongoing invasive pressure. Field data recorded an average of 148 trees per acre and a basal area of 95 ft² per acre, with a quadratic mean diameter of 10.8 inches – indicating a structure dominated by smaller diameter trees.

The species composition is diverse, dominated by black cherry (PRSE), red and sugar maple (ACRU, ACSA), and mixed oaks including red (QURU), white (QUAL), scarlet (QUCO), and black oak (QUVE). Secondary species include bitternut and shagbark hickory (CACO, CAOV), black birch (BELE), and tulip poplar (LITU), along with scattered pignut hickory (CAGL), black walnut (JUNI), and white pine (PIST). Basal area distribution by species shows black cherry as the single largest contributor (~20 ft²/ac), followed by white oak, sugar maple, red maple, and northern red oak.

Roughly eight acres exhibit a savanna-like condition, where scattered overstory trees stand above dense thickets of autumn olive (ELUM), multiflora rose, and Asiatic bittersweet. The remainder of the stand maintains a more closed canopy, which has helped suppress invasive growth but still shows limited regeneration and midstory development.

Autumn olive accounts for approximately 43 trees per acre, within the smaller pole and sapling size classes, artificially inflating stem density while contributing little to total basal area. Once excluded, the stand metrics were adjusted to 105 trees per acre, 91 ft² of basal area, and a quadratic mean diameter of 12.5 inches, giving a clearer representation of native forest structure and use of growing space.

Furthermore, within the forested area, there is a notable distinction between a more open canopy forest and a closed canopy forest. The closed canopy (~12 acres) has larger diameter oaks, hickories, and cherries, and less severe invasive pressure. The patchy canopy areas (~11 acres) have a declining canopy, higher mortality, smaller diameter trees, and significant pressure from multiflora rose and bittersweet. The forest cover can be traced back to land use history when compared to historical photos from above.

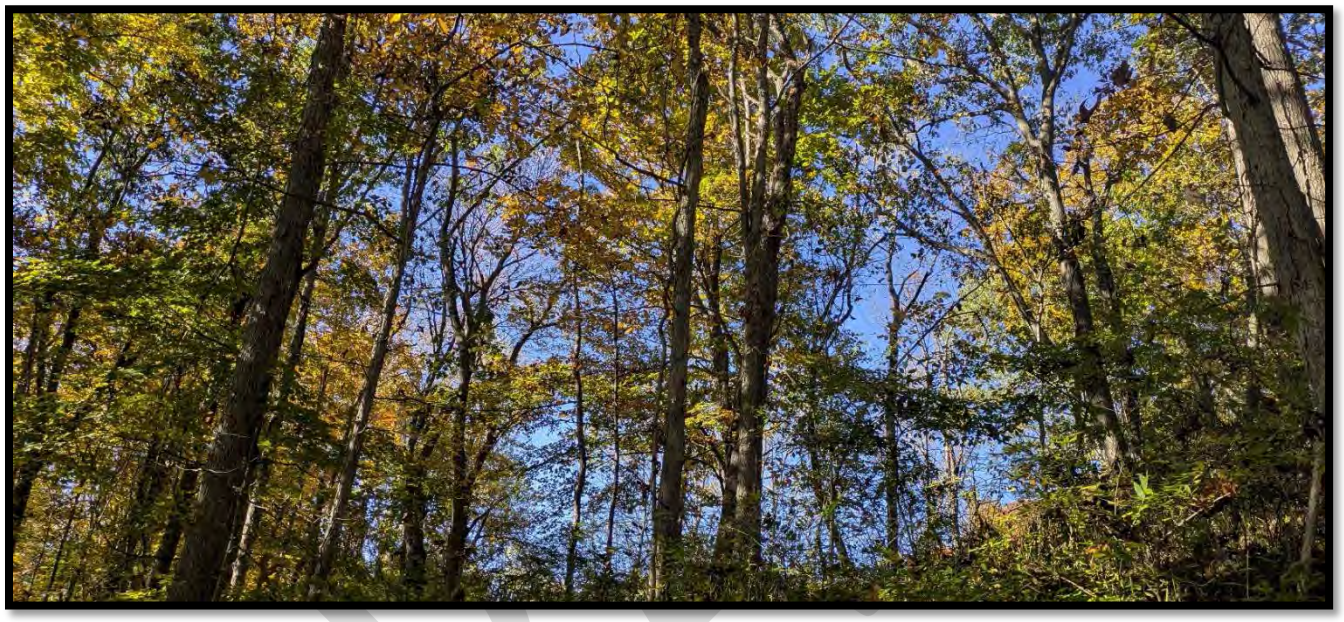
Map 7: Forest Cover Type at Coe Hill

The overall diameter class distribution (Figure 3) shows a strong representation in the 8–12-inch DBH range, tapering sharply above 16 inches. This pattern suggests uneven development with limited recruitment into larger size classes. Which makes sense considering there is only about ~12 of the 31 forested acres with a healthy mature canopy. The canopy primarily comprises mature oaks and cherries. At the same time, the subcanopy and midstory are mixed hardwoods, and smaller stems (inflated by autumn olive), reflecting disturbed and partially open conditions.

The understory and ground layer are dominated by invasive shrubs and vines, including autumn olive, multiflora rose, Asiatic bittersweet, burning bush, honeysuckle, Japanese stiltgrass, garlic mustard, and mugwort. Invasive

cover often exceeds 60%, particularly in canopy gaps and along old field edges. Patches of native regeneration—notably oak, hickory, walnut, black cherry, and maple seedlings—persist in some shaded interior and edge areas but are suppressed by competition and deer browse.

According to the Gingrich diagram (Appendix C), the stand uses ~70% of growing space, suggesting that growing space is efficiently utilized but not yet overcrowded. While total stand density appears adequate on paper, the structure and composition tell a different story. This forest is represented by uneven spatial distribution rather than a uniformly stocked forest. Some areas might reflect a more overstocked forest, while others are understocked and dominated by invasives.



Picture 3: Forest Canopy in the Fall

Canopy: Red and sugar maple, black cherry, black walnut, red, white, and black oak, and hickory
Midstory (Invasives): Hophornbeam, autumn olive, burning bush, honeysuckle,
Understory (Invasives): Japanese stiltgrass, garlic mustard, mugwort
Coarse Woody Debris: Some snags and broken branches from dead and dying trees,
Pest and Pathogens: Spotted lanternfly,
Other Invasives: Asiatic bittersweet, multiflora rose, J. honeysuckle,
Canopy Closure: 10-80%
Live Basal Area Per Acre: 95 sq. ft.,
Live Trees Per Acre: 148,
Quadratic Mean Diameter: 10.8

Stand Number	Size (acres)	Basal Area (sq. ft./acre)	Trees Per Acre	QMD	Dominant Canopy Species	Understory Structure
Forested	31	95 -or- 91*	148 -or- 105*	10.8 -or- 12.5	Walnut, Oak, Hickory, Maple, Cherry	Autumn olive, Burning Bush, Honeysuckle, J. Stiltgrass, Multiflora rose, Bittersweet.

Table 1: Stand Summary showing the impact of Autumn Olive has on the overall composition.
**When autumn olive is removed from the dataset, the stand adjusts to 105 TPA and 91 ft² BA, and an increased QMD of 12.5 inches*

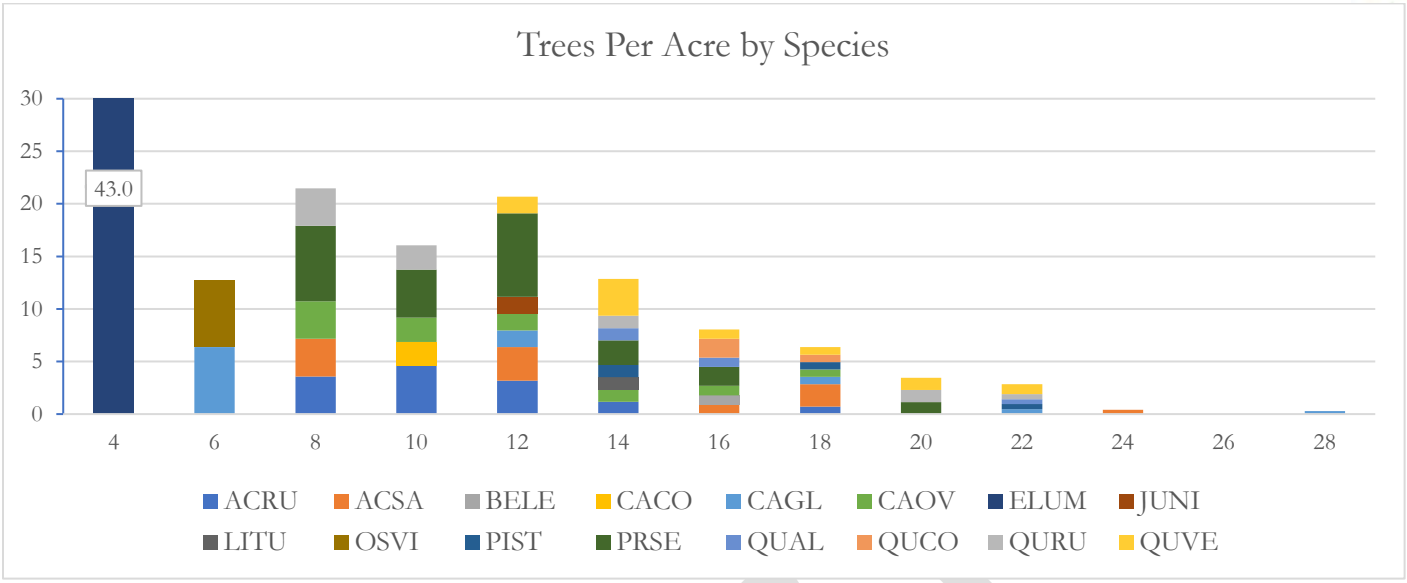


Figure 3: Trees Per Acre by Species – Shows the distribution of tree density by diameter class and species.

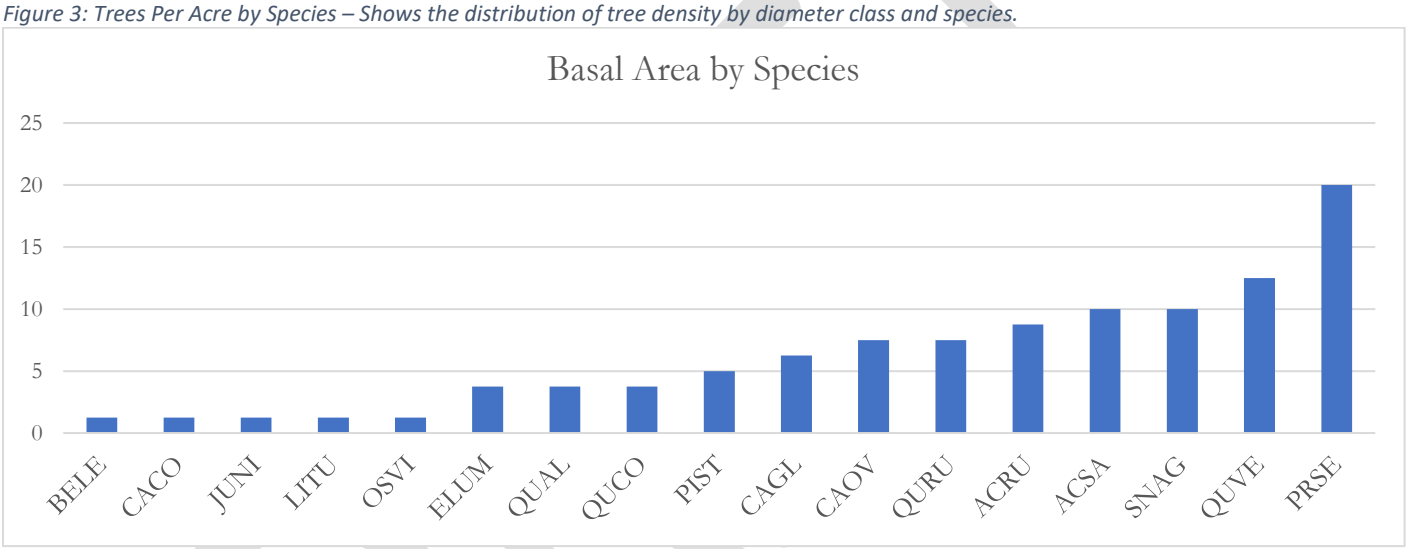


Figure 4: Basal Area by Species – Illustrates each species' contribution to total stand basal area.

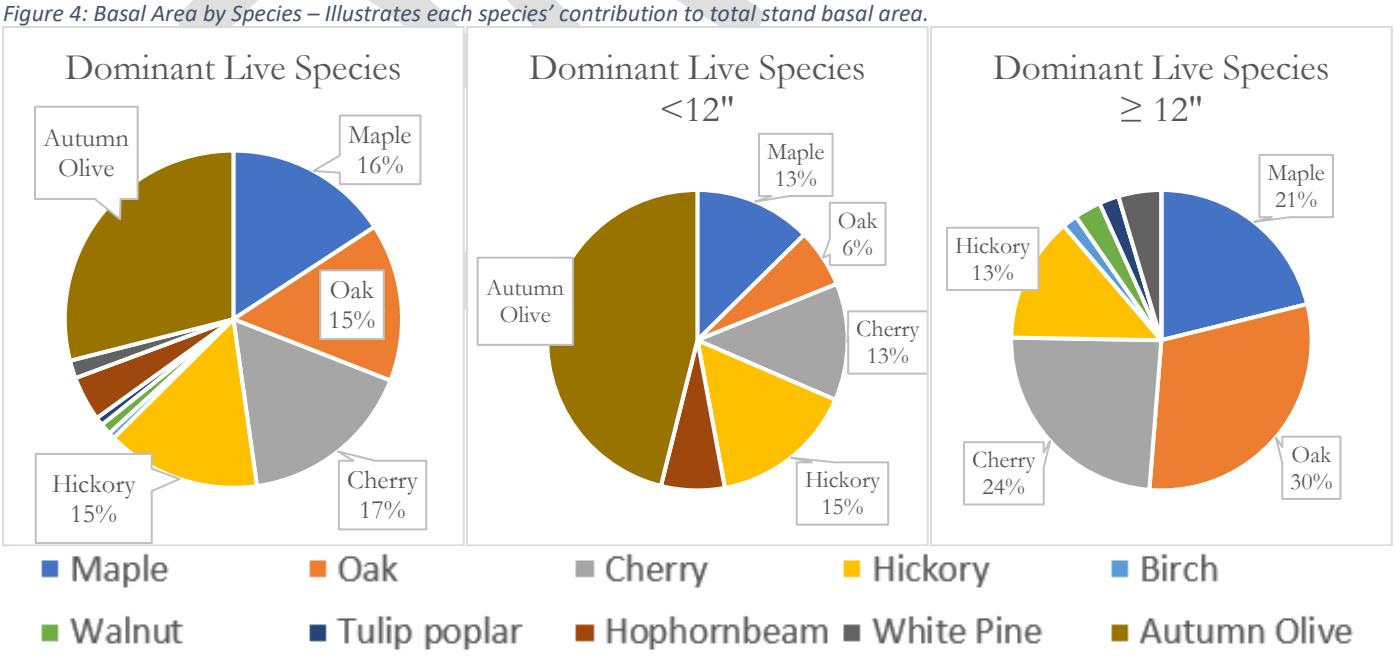


Figure 5: Dominant Live Species – Illustrates overall species composition across the stand and how it shifts by size class

The figures above illustrate the species composition, density, and structure of the Coe Hill forested stand. Figure 3, Trees Per Acre by Species, displays the number of stems per acre across diameter classes, showing species diversity and size distribution – smaller diameter trees are more numerous. At the same time, larger stems become progressively less common. Figure 4, Basal Area by Species, represents the total cross-sectional area of tree stems (in square feet per acre) contributed by each species, indicating their relative dominance in overall stand volume. Figure 5, Dominant Live Species pie charts show how species composition shifts between smaller trees (<12") and larger trees (≥12"), with autumn olive dominating the smaller size classes and native hardwoods such as oak, maple, cherry, and hickory comprising most of the canopy.

Coe Hill: Shrubland – 10 acres

Approximately 10 acres of the Coe Hill property consist of former orchard and open-field areas that have transitioned into dense shrubland dominated by invasive species. Historically, this area supported apple and pear trees planted by the Steucek family in the mid-20th century. Following the decline of orchard management, these open fields were colonized by invasive species like autumn olive, multiflora rose, Asiatic bittersweet, honeysuckle, and burning bush, forming impenetrable thickets that suppressed native regeneration and limited wildlife value.

These shrublands have begun to show remarkable ecological recovery following invasive mulching and mowing treatments. The removal of dense autumn olive released the native seedbank, allowing a strong flush of native grasses, wildflowers, and herbaceous plants such as goldenrod, milkweed, Rubus spp., and native asters. This new ground cover now supports a diverse assemblage of pollinators, including bees, butterflies, and notably monarch butterflies, which were observed in high numbers during the summer.

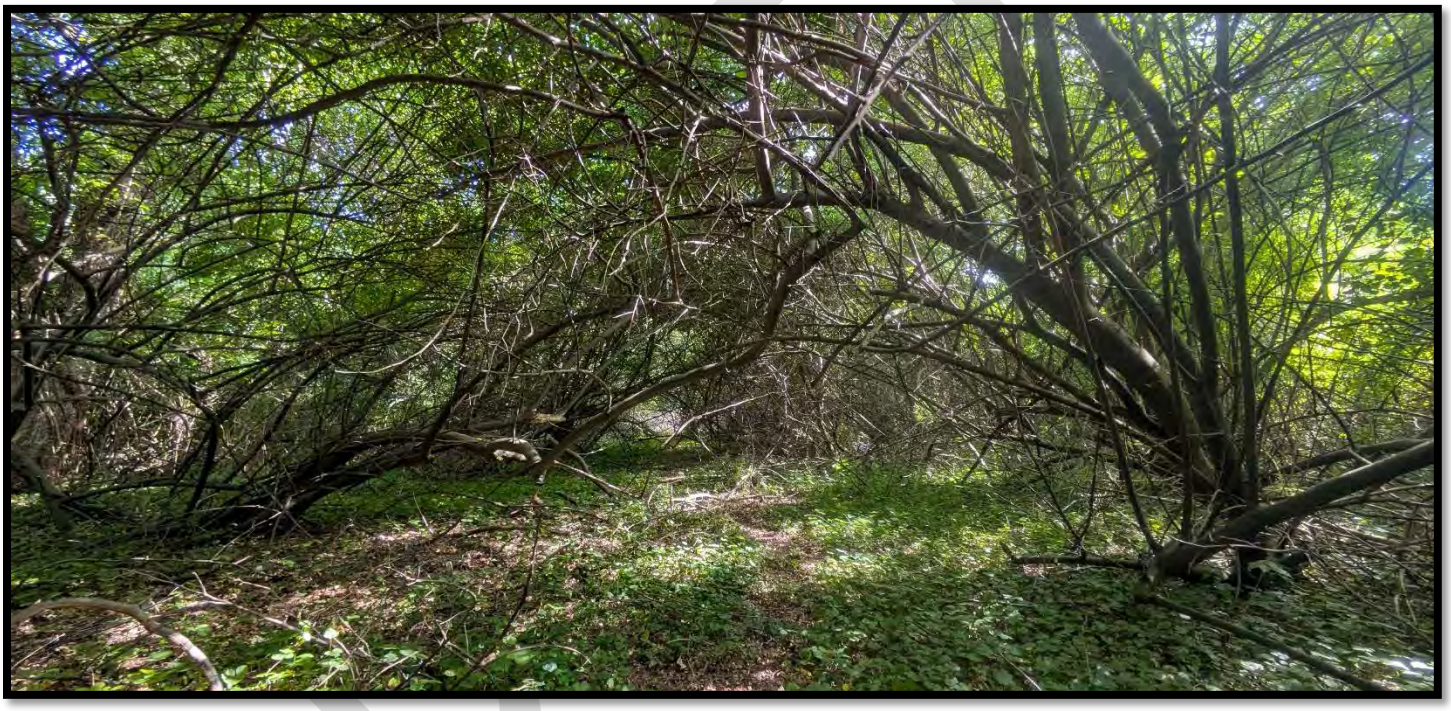
Several young black walnuts (2–4 inches DBH) were also retained throughout the site and will provide vertical structure, long-term mast production, and future seed sources. Retained walnut saplings should be monitored and released from competing growth as needed to ensure canopy development over time.

Picture 4: Pollinator activity following invasive mulching

FOREST HEALTH

Invasive Species

The forest at Coe Hill remains under high invasive species pressure, which continues to influence forest structure, regeneration, and habitat quality. Dense infestations of autumn olive, multiflora rose, Asiatic bittersweet, and winged euonymus dominate in open and edge areas, forming a persistent understory layer that suppresses native seedlings and limits forest regeneration. These thickets are particularly concentrated in canopy gaps throughout the former orchard and the field. Of emerging concern is the presence of mile-a-minute weed, primarily along edge habitats – this species spreads aggressively by seed and can quickly overtop young vegetation if not controlled. Additionally, a well-established patch of wisteria vine has been documented in the northwest corner; the vine has matured into the canopy and is causing damage to nearby trees. These invasives compete with native hardwoods for light and nutrients, reduce wildlife forage quality, and hinder the establishment of oak, hickory, and walnut regeneration. Continued mechanical and chemical control, coupled with regular monitoring, will be critical to restoring native forest composition and maintaining the ecological recovery observed in recently treated areas.



Picture 5: Autumn olive thickets

Autumn olive is a fast-growing Asian shrub that tops out around 20 feet, with silvery-backed leaves and fragrant spring flowers, and then carpets itself with bright-red berries that birds spread far and wide. As a nitrogen fixer, it leaps ahead of native plants on poor soils, forming dense thickets along roadsides, pastures, old fields, and any sunny disturbed ground, crowding out diverse shrub layers and altering soil chemistry. The quickest fix is early action: pull or dig seedlings and small plants when the ground is moist; on larger bushes, cut them to stumps and immediately paint herbicide on the fresh cuts, or use a basal-bark or girdling treatment and monitor for resprouts. Repeated mechanical removal alone tends to create tougher, multi-stemmed clones.

Asiatic Bittersweet is one of the most troublesome invasive species in our forests. Bittersweet can quickly overtake forest stands, smothering canopy trees and understory vegetation. Its girdling vines lower timber value and may grow much faster than many native tree sprouts, outcompeting them after disturbances. Bittersweet thrives along

forest edges, where increased light availability and frequent disturbances encourage rapid growth. Over time, dense tangles of bittersweet can dominate forest edges, creating a barrier for both wildlife movement and the natural regeneration of native plants. In Connecticut's fragmented forests, where edges are abundant, bittersweet can quickly spread and dominate.

Multiflora rose is a highly invasive, fast-growing shrub that forms dense, thorny thickets up to 15 feet tall and 13 feet wide, severely limiting native plant growth and wildlife movement. The plant reproduces both by seed—producing up to 500,000 annually with viability lasting 20 years—and vegetatively through layering and root sprouting. It thrives in sunny, well-drained soils but can also tolerate partial shade. Control requires a long-term strategy combining mechanical and chemical methods. Targeting plants before flowering is critical, and persistent follow-up is necessary to prevent reestablishment.

Burning bush is a fast-growing deciduous shrub native to Asia that was introduced to the U.S. in the 1800s as an ornamental for its bright red fall foliage. It grows 5–15 feet tall and can form dense thickets in forests and fields, shading out native plants and reducing habitat diversity. The shrub spreads rapidly by bird-dispersed seeds and rapid vegetative growth, thriving in both sun and shade across a wide range of soils. Control involves removing existing plants, either by hand-pulling small ones, cutting or digging out larger shrubs, or applying systemic herbicides like glyphosate to cut stems or foliage.

Japanese stiltgrass is an annual invasive grass native to Asia that can prevent understory growth and regeneration by forming dense carpets in forests, floodplains, and disturbed areas such as trails, lawns, and streambanks. Capable of growing 1–3 feet tall, flowers in late summer to early fall, and produces 100–1,000 seeds per plant that remain viable in the soil for five or more years. Small patches can be hand-pulled before flowering, while larger infestations may be mowed or tilled in late summer before seed set. Manage with mulching, flame weeding, or chemical control – in wetlands, only herbicides approved for aquatic use should be applied.

Picture 6: Japanese Stiltgrass at Coe Hill

Chinese and Japanese wisteria are long-lived, woody, deciduous vines capable of climbing 60–70 feet and reaching up to 15 inches in stem diameter, these vigorous vines form dense, tangled thickets that smother and outcompete native vegetation, preventing normal forest regeneration. Small infestations can be hand-pulled, ensuring roots are removed, while larger vines may be cut and treated with systemic herbicides. For heavy infestations, foliar spraying during dormancy (October–November) is most effective.

Mile-a-minute is a fast-growing, barbed annual vine native to Asia that invades wetlands, streambanks, and disturbed open areas. Spreading up to 20–30 feet in a single season, it forms dense mats that smother native vegetation. Each fruit holds a single seed that remains viable for up to six years and spreads easily through birds, animals, water, and soil movement. Control requires persistence and protective gear: small infestations can be hand-pulled before seed set and repeated for several years, while mowing or cutting reduces fruiting. Herbicides may be used for large infestations, and the *Rhinoncomimus latipes* weevil has been introduced in Connecticut as a biological control. Pulled plants should be bagged and destroyed once fruits appear, as seeds can continue to ripen after removal.

More information on these invasive plants can be found in Appendix G.

Picture 7: Mature wisteria vine surrounded by young wisteria at Coe Hill

Pest And Pathogens

Spotted lanternfly (SLF), *Lycorma delicatula*, were not sighted on the property during fieldwork however, though populations are likely to expand. SLF is an invasive insect that poses a significant threat to Connecticut's forests, agriculture, and urban landscapes. This pest, native to Asia, feeds on the sap of a wide range of trees and plants, including hardwoods, fruit trees, and vines. Approximately 47% of Connecticut's forest trees are considered susceptible, as are many agricultural crops like grapes, apples, cherries, and peaches. Both nymphs and adults damage trees by sucking sap, which weakens plants and reduces photosynthesis. While the tree of heaven (Ailanthus altissima) is its preferred host, the spotted lanternfly attacks over 60 genera of plants, including maples, birches, and oaks. Although it has not been observed to kill healthy, established trees, it can cause canopy dieback and decline in plant health. Saplings, grapevines, sumac, and tree of heaven are especially vulnerable. The broad host range and potential to harm both forests and agricultural industries make the spotted lanternfly a major ecological and economic concern for the state.

While SLF pose no health risk to people, they quickly become an everyday nuisance wherever large numbers settle. Adults congregate on trunks and overhead branches, suck sap, and excrete an abundance of sticky "honeydew." This sugary drizzle rains onto decks, patio furniture, cars, and walkways; it attracts swarms of wasps and flies and, within days, grows a black sooty mold that stains wood, paint, and upholstery and can be difficult to remove.

Life stage	When in Connecticut	Key features	Action item
Egg mass	Sept – May	Mud-like smear holding 30–50 eggs on trees, stone, vehicles, patio furniture	Scrape into alcohol or smash on sight
Nymphs	May – Jul	First three stages: black with white dots; fourth stage adds red	Circle-trap infested trees; use low-toxicity contact sprays if needed
Adults	Jul – frost	1 inch long; gray forewings with spots, hidden red hind-wings. Laying eggs in late fall.	Target host trees (tree-of-heaven, grapes, maples) with systemic or contact treatments

Map 8: Spotted Lanternfly life cycle

There is no easy fix for SLF, and it involves monitoring its activity, assessing plant vulnerability, and using tailored control methods. Begin with egg scraping, trunk traps, tree of heaven management, and good tree care; reserve insecticides for persistent, high-density outbreaks on valuable trees or vines, always following label and quarantine rules. See Appendix G for a fact sheet with management techniques and recommendations.

WILDLIFE HABITAT

The Coe Hill property provides a mosaic of wildlife habitats shaped by its agricultural history, forest succession, and ongoing natural disturbance. Approximately ten acres of the site consist of open field/shrubland, while roughly thirty acres are forested. Together, these habitats support a range of wildlife species associated with early-successional and mature forest conditions.

The open fields and regenerating shrublands on Coe Hill are among the most valuable wildlife habitats on the property. Early-successional habitats – grasslands, shrublands, and young forest – have declined by nearly 98% across the Northeast over the past century. Yet, they remain essential for many declining bird and mammal species, including American woodcock, field sparrow, and New England cottontail. These habitats provide dense cover for nesting, brood-rearing, and escape, as well as abundant insect prey and soft mast from native shrubs.

Though dominated by invasive species, the midstory and understory layers form dense thickets that currently provide nesting or cover for generalist bird species such as catbirds, cardinals, and robins. However, these same invasives suppress native herbaceous and shrub diversity, reducing the site's capacity to support a broader range of specialist pollinators, ground-nesting birds, and native herbivores. In the canopy, mature oaks, hickories, and black walnut produce hard mast critical to wildlife in fall and winter, supporting turkeys, deer, squirrels, and other mammals. A small pond near the entrance creates amphibian habitat and increases the property's overall ecological complexity.

Given the canopy and structural complexity of the site, migratory birds likely use this site. To enhance this function, minimize disturbance during migration seasons, and consider adding/maintaining bird boxes or nesting platforms. Open spaces within urban and suburban landscapes are particularly important for migrating bird species to have refuges during migration seasons. Eastern Towhee, American Goldfinch, Gray Catbird, Tufted Titmouse, Red-winged Blackbird, American Robin, and Red-Tailed Hawk are among the birds identified while visiting the site.

SNAGs

Snags, dead-standing trees, in a forest are a critical component of wildlife habitat for about 35 species of birds in the Northeast and a variety of amphibians, reptiles, and mammals. From the Connecticut Department of Energy and Environmental Protection: "Insectivorous birds such as woodpeckers and nuthatches depend heavily on snags as a source of food. These birds, in addition to being an integral part of our natural ecosystem, are very beneficial in helping to control unwanted insect pests. The importance and benefits derived from insectivorous birds as biological control agents are receiving more attention."

DEEP recommends that three snags of 12 inches in diameter or greater be present per acre, and at least one 15-inch snag (or larger) should be present per acre. The Connecticut Audubon Society recommends a minimum of 5 snags per acre, greater than 10 inches in diameter, and four cavity trees greater than 12 inches, of which one should be greater than 18 inches in diameter.

While Coe Hill achieves the DEEP recommendations for snags in the forest, it does not meet the recommended requirements of the CT Audubon Society. In time, snags will naturally occur; however, snags can also be created by girdling live trees (cutting rings around the base with a chainsaw at least deep enough to sever the cambium).

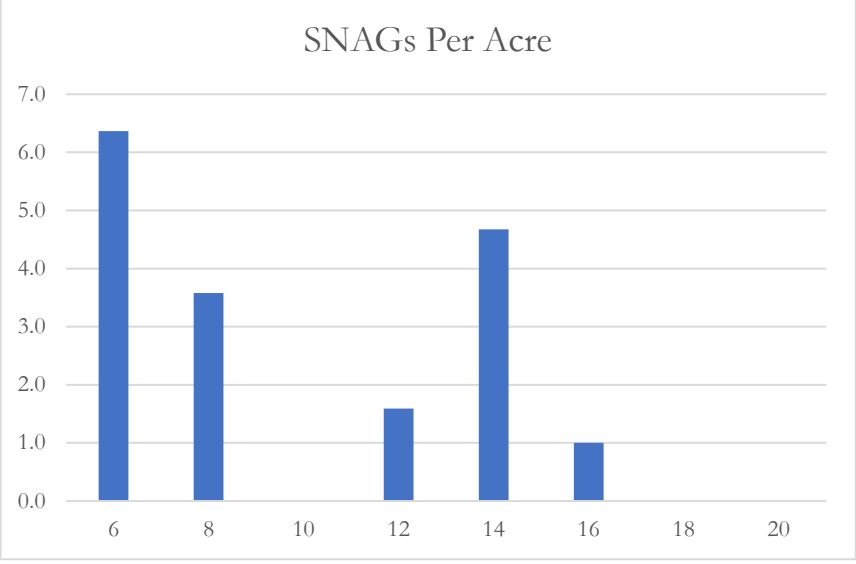


Figure 6: Snags Per acre by size class at Coe Hill

	+10"	+12"	+15"	+18"
CT DEEP		3	1	
AUDUBON	5	4		1
Coe Hill	7.2	7.2	1	

Table 2 CT DEEP/Audubon Society, Snag recommendations for bird habitat

Natural Diversity Data Base (NDDB)

The Natural Diversity Database (NDDB) Preliminary Site Assessment for the Coe Hill Forest Stewardship Plan, generated on October 15, 2025, indicates that no State Endangered, Threatened, or Special Concern species and no Critical Habitats have been documented within or near the project area in Middlefield. This assessment is preliminary and serves as a planning tool; it does not replace a formal NDDB determination. DEEP recommends that, if future permits or environmental authorizations are pursued, a full NDDB review and qualified field survey may be required to confirm species presence and habitat conditions in addition, projects utilizing federal funds may be subject to federal rules regarding Northern Long-Eared Bats. The full report is available in Appendix E.

BOUNDARIES

The Coe Hill property's boundaries are not currently marked, and there is a discrepancy between the parcel lines shown in the Connecticut DEEP parcel dataset and the Town of Middletown Assessor's data. Field observations noted several signs of potential boundary issues, including mowing beyond the apparent property line and informal access from adjacent residential parcels – see maps in Appendix A.

Clear and accurate boundary delineation is an essential component of responsible forest and open space management. Well-marked boundaries help prevent inadvertent trespass, dumping, timber theft, and encroachment while improving safety for recreational users and hunters. CT DEEP's stewardship guidelines recommend that boundary lines on municipal and conservation lands be "thorough and visible from within the property," especially where residential development is adjacent.

RECREATION

Recreation at Coe Hill should emphasize low-impact access and nature-based engagement, consistent with the town's goals of habitat restoration and invasive species control. Once vegetation management is underway, a modest trail network could be formalized to provide access for walking, birdwatching, and educational programs. Trails should be designed to avoid steep slopes, wet soils, or critical wildlife areas and should not exceed a minimal footprint necessary for safe passage.

Interpretive signage along the trail can highlight the property's ongoing restoration work, forest succession, and wildlife value, helping residents understand how active management benefits forest health, habitat, and climate resilience. A kiosk at the School Street entrance displaying a map and site history could also describe permitted uses and information on town open space regulations.

Hunting is currently limited to archery, but expanding opportunities for controlled shotgun hunting may help manage deer populations, reduce browse pressure, and strengthen local engagement with the land's stewardship objectives. Before any expansion, clear and consistent boundary marking is essential for public safety.

RECOMMENDATIONS

The following recommendations are intended to guide the long-term stewardship and management of the property to balance ecological health, public enjoyment, and the landowner's goals. They are based on observed site conditions, forest structure, and current land use. They are designed to improve forest resilience, enhance wildlife habitat, and reduce threats such as invasive species or overuse. Implementation should be adaptive—responding to changes in forest health, regeneration success, and community needs over time. Engaging support from local schools, universities, and park stewardship organizations remains vital to the success of these forest restoration projects. Such groups provide valuable volunteer labor and specialized expertise, fostering long-term community investment in the land.

Immediate Needs

Action Item	Why	Time Frame	Priority	Estimated Costs
Invasive Mulching	Reduce invasive shrub density and prepare site for native regeneration	2 weeks; Annual	High	$$
Follow-up hand-release and vine cutting	Prevent resprouting and release young native stems post-mulching.	Seasonal (multiple times per year)	High	$
Install boundary markers and signage	Clarify ownership, reduce encroachment, and prevent unauthorized use.	1-2 day every 5 years	Medium	$

$ = $0 to $5,000 $$ = $5,000 to $10,000 $$$ = $10,000 to $50,000 $$$$ = Greater than $50,000

Table 3: Immediate Action Items at Coe Hil

Grant Restrictions

As outlined in the Conservation Easement OSWA-208, Connwood Foresters understands that this property must be used in perpetuity for open space, passive recreation, and conservation purposes. All activities must be consistent with the preservation of natural resources, scenic values, and public enjoyment of open space.

> It is the purpose of this Conservation and Public Recreation Easement to assure that the Protected Property will be retained forever predominantly in its natural, scenic, forested, and/or open space condition, and to provide opportunities for public recreation on the Protected Property, while preventing any use of the Protected Property that will significantly impair or interfere with the conservation values or interests of the Protected Property, described above. It is the intent of this easement that any management activities or alterations of the natural landscape or provision for access or recreation shall be consistent with the conservation purposes above.

Furthermore, as Connwood Foresters understands the agreement, vegetation management in the form of silviculture is permitted in so far as it supports the conservation purposes.

> Grantor reserves the right to maintain existing unpaved driveways, footpaths and other minor surface alterations; to excavate and fill as necessary to accomplish permitted building, recreational and silvicultural activities, and to construct, maintain and reconstruct additional unpaved footpaths or minor, roofless rustic improvements necessary or appropriate to assure safe passage, prevent erosion, or to enhance or protect the natural habitat.

Through these two paragraphs, it is the opinion of Connwood Foresters Inc. that all activities (e.g., mowing, brush cutting, planting, invasive control, or tree cutting) are permissible as long as they are directly in support of habitat restoration or ecological enhancement, not land clearing or production forestry. Trails and signage are acceptable but must remain low-impact and unpaved.

No Commercial Harvesting or Resource Extraction - Timber or firewood sales are not allowed as revenue-generating activities and must have a documented ecological purpose (e.g., removing hazardous trees, restoring shrubland, managing invasives, forest health).

Actions like mowing the field, converting savanna to forest, or creating openings should be documented as part of a management plan focused on wildlife habitat diversity, invasive control, or ecological resilience, consistent with the grant's conservation objectives.

The Town should maintain records of stewardship activities, including invasive control, mowing schedules, habitat restoration, and any collaborative projects (e.g., with the Chestnut Foundation).

Forest Health

Coe Hill exhibits clear signs of structural stress and ecological imbalance. While the overstory is composed of a mix of native hardwoods, many are in decline. Combined with suppressed regeneration and extreme invasive plant pressure, seriously threatens long-term forest health and requires immediate and sustained intervention. Restoring structural diversity and native species composition requires releasing viable natives and eliminating invasive competition.

Restoring and maintaining forest health at Coe Hill will require a sustained, multi-year effort using a combination of mechanical treatment, manual/chemical follow-up, and collaborative stewardship. The mechanical mulching of the southern field completed last spring was highly successful, effectively reducing invasive shrub cover and allowing a strong native response of grasses, wildflowers, and young hardwoods. This approach should be expanded and applied systematically across the property over the next several years.

Throughout all phases of this work, care must be taken to identify, flag, and preserve native tree species that will serve as the future canopy. Any remnant fruit trees from the historic orchard should also be retained for their ecological and cultural value. Following each mechanical treatment, teams equipped with hand tools should enter treated areas to release native stems by cutting back competing shrubs and vines and clearing around their crowns to promote vigorous growth. During this process, it will be beneficial to map and document priority native species to guide future management and monitor recovery.

Mechanical mulching is only feasible in more open areas; in the closed canopy sections of the forest, tree density may limit machine access. These locations require a manual control approach focused on understory clearing and selective vine removal. Here, dense thickets of burning bush, multiflora rose, Asiatic bittersweet, and burning bush dominate the shrub layer, inhibiting native regeneration. Targeted removal using hand tools, brush saws, and follow-up treatments will be necessary to gradually restore structure and improve conditions for native regeneration.

Persistence will be essential for long-term success. Multiple treatments and ongoing site monitoring will be required to suppress resprouting and prevent reestablishment of invasive plants such as autumn olive, bittersweet, and multiflora rose. Coordinating efforts among neighbors, local schools, community groups, and conservation

organizations will not only increase capacity but also strengthen public engagement and shared stewardship of Coe Hill's recovering landscape.

The following management practice outlines a step-by-step approach for controlling invasive vines in canopy gaps and forest edge. These methods are intended for use during manual invasive removal efforts, particularly where bittersweet and other climbing vines threaten mature canopy trees. They emphasize low-impact, selective techniques that prioritize the protection of desirable native vegetation, reduce soil disturbance, and encourage natural regeneration. Asiatic bittersweet is a priority species due to its aggressive nature and damage caused to canopy trees. Urban Resources Initiative's Associate Director Chris Ozyck is a community leader in forest "de-vining" efforts in natural areas around New Haven. This guide can be used by professional crews, landowners, or trained volunteers working.

1. **Protect the Future Canopy First:** Identify and flag (e.g., with pink ribbon) beneficial native saplings and shrubs so they are not accidentally cut or pulled. This helps ensure you retain the young plants that will become your next generation of canopy trees and valuable native understory.
2. **Focus Efforts on Existing Canopy:** Focus on mature, high-value trees and remove any bittersweet vines choking or climbing them. Vines cause structural damage by adding weight, creating a "sail effect," and girdling branches. Removing them where they harm the canopy does the most immediate good.
3. **Use a "Clip High, Clip Low" Method:** Cut vines near the ground and again about shoulder height. This creates a "window" so the vine can't reconnect easily, effectively starving the root system over time. Leave the dead vine in the canopy rather than pulling it down to avoid damaging tree branches.
4. **Repeat Follow-Up Cuts:** Bittersweet resprouts vigorously from its root system, so cutting once is rarely enough. Revisit the site multiple times in the same season—especially in spring and mid-summer—to cut off new growth and further deplete the vine's energy reserves.
5. **Target Edges and Ladder Fuels:** Bittersweet thrives at forest edges where more light, water, and nutrients are available. Also remove any "ladder" shrubs or saplings that vines use to climb into the canopy (green briar, multiflora rose, burning bush). Keeping forest edges and understory clear of invasive vines helps protect the interior forest.
6. **Work in Winter (When Possible):** With leaves off, it's easier to see and identify vines, and you minimize disturbance to nesting birds. You also avoid heavy tick activity and can wear protective clothing for thorny plants more comfortably.
7. **Be Selective About Which Vines You Remove:** Tag or learn to identify beneficial native vines (like Virginia creeper) and avoid cutting them. Focus on known problem vines such as Asiatic bittersweet, multiflora rose, porcelain berry, and invasive honeysuckles.
8. **Use Low-Energy, Low-Disturbance Techniques:** Simply clipping and leaving cut vines on the ground helps maintain soil structure and minimizes erosion. Pulling out roots can disrupt the soil, encourage more sprouting, and damage nearby native plants.
9. **Engage Community Volunteers:** Removing invasive vines is labor-intensive but can be done with simple tools (loppers, hand saws, etc.). Training local groups or volunteers creates a sense of stewardship, expands the workforce, and provides ongoing monitoring and maintenance.

Wildlife Habitat

Bird Habitat

Connecticut's forests provide a critical breeding habitat for more than 175 species of birds. Many of these species are in decline due to habitat loss, especially those that rely on structurally complex forests or early successional habitats. Bird habitat quality can be enhanced with management by promoting layered vegetation, such as dense understory and midstory growth, which provides cover, nesting sites, and foraging opportunities. Many priority bird species rely on live woody vegetation between 0 and 30 feet tall, as well as leaf litter, snags, and coarse woody debris for nesting or feeding. Retaining or creating cavity trees and snags is valuable for woodpeckers, owls, and other secondary cavity-nesters. Oaks, birch, cherry, and native shrubs like blueberry and spicebush are important for birds, as they support a rich supply of caterpillars and soft mast, which serve as vital food sources during the breeding season.

Healthy forests feature a variety of living and standing dead trees. Where snags do not threaten human safety, they should remain standing to provide perches and nesting sites for woodpeckers, small owls, and other cavity-dependent wildlife. Over time, this structural diversity increases biodiversity and ecosystem stability.

Incorporating brush-pile construction into invasive removal offers an efficient, cost-effective disposal method that simultaneously enhances habitat quality. When stacked in shady locations away from main visitor corridors and planting zones, these piles furnish immediate shelter and overwintering sites for small mammals, ground-nesting birds, amphibians, and beneficial insects. Over time, the decaying woody material enriches soil organic matter and moderates moisture, thereby improving establishment conditions for newly planted native vegetation. For more information on constructing brush piles, see Appendix B.

To best protect the preserve's ecological value for wildlife, management should avoid the breeding season (mid-April to late August).

Features That Benefit Birds

- Dense understory & midstory: Provide nesting and foraging cover.
- Snags & cavity trees: Crucial for nesting and insect foraging.
- Coarse woody debris: Supports insects and cover;
- Leaf litter: Vital for ground nesters like Ovenbird and Veery.
- Tree species diversity: Oaks, birch, cherry, and native shrubs provide caterpillars and mast.

Habitat Plan

The Coe Hill property supports three habitat types: an open field, a savanna-like woodland, and a closed-canopy forest. Each provides valuable ecological functions and opportunities for wildlife enhancement. Management decisions should begin with clear long-term goals, and each scenario offers unique wildlife benefits and requires different levels of management input over time.

1. Maintain All Habitat Types as They Are

Maintaining the current mosaic (open field, savanna, and closed–canopy forest) will preserve the site's highest diversity of wildlife species. This approach supports grassland and shrubland birds, pollinators, and small mammals in the open field; woodcock, cottontails, and edge-nesting songbirds in the savanna; and cavity-nesting birds, bats, and forest mammals in the mature forest.

Wildlife Benefits:

Maintaining multiple successional stages simultaneously creates a patchwork of habitat niches. Early-successional habitats are among the rarest and most critical for declining species in the Northeast. The open areas provide nesting and foraging opportunities for grassland and shrubland birds, while the savanna and forest edges offer valuable cover and mast food sources.

2. Transition the Savanna Toward Closed-Canopy Forest

This option allows the savanna to gradually mature into a fully forested condition, while maintaining the open field as grassland/shrubland. This approach favors forest-interior wildlife and reduces long-term maintenance inputs.

Wildlife Benefits:

This transition enhances habitat for forest-interior birds (wood thrush, scarlet tanager, ovenbird) and mammals that rely on shaded conditions, while maintaining open field habitat for pollinators and grassland species.

3. Transition the Open Field Toward Shrubland and Young Forest

Because the open field already supports a strong cohort of walnut saplings, this option builds on existing regeneration to create a young forest and shrubland mosaic. The developing walnuts can serve as the basis for a structurally diverse early-successional stand.

Wildlife Benefits:

This scenario maximizes habitat value for shrubland and young-forest species such as American woodcock, indigo bunting, and New England cottontail. It provides dense cover, abundant insect prey, and developing mast sources from the walnuts. As the stand matures, it will transition naturally into a mixed hardwood forest with high ecological resilience and carbon value.

4. Convert The Savanna into Open Field/Shrubland and Maintain Current Open Field/Shrubland

If management objectives prioritize creating large open areas for pollinators, birds, or visual aesthetics, the savanna could be cleared and converted to open field. This would create roughly 18 acres of contiguous grassland that would provide excellent habitat for open-field bird species and pollinators while maintaining strong visual openness and simplicity of management through rotational mowing.

Wildlife Benefits:

Expanding the open field increases habitat for grassland-nesting species such as bobolink, savanna sparrow, field sparrow, pollinators, and small mammals. This option provides strong visual openness, seasonal floral display, and ease of long-term maintenance.

Each scenario requires intensive management during the first five years to control invasives, guide regeneration, and stabilize vegetation. After this establishment phase, adaptive management, guided by monitoring, should adjust mowing intervals, selective cutting, or planting to achieve and sustain the desired habitat condition.

The frequency of mowing will largely determine how the open field at Coe Hill develops over time and what type of vegetation it supports. Frequent mowing (annually or every other year) maintains a predominantly herbaceous community, dominated by grasses and forbs that provide excellent habitat for pollinators and grassland birds but limited woody structure for cover or mast production. If mowing occurs less frequently (every 3–5 years), the field will begin to transition toward a young early-successional condition, where scattered shrubs and sapling trees – such as black walnut, cherry, and dogwood – establish between mowing cycles. This moderate frequency creates a structurally diverse habitat that benefits a wider range of wildlife, including songbirds, small mammals, and

pollinators, while still preserving the open character of the site. If mowing is deferred beyond 5–7 years, natural succession will accelerate, leading to dominance by woody vegetation.

The open field's developing walnuts offer a natural starting point for either successional forest restoration or reset to open habitat. By adjusting the intensity and frequency of disturbance—mowing, clearing, and invasive management—the Town can maintain a balance between open-field habitat, early-successional woodland, and mature forest. The chosen management direction should align with both ecological objectives and available maintenance capacity, and conservation easement requirements.

Habitat Type	Primary Management Actions	Frequency / Timing	Primary Objectives
Closed-Canopy Forest	- Control invasive understory species (bittersweet, olive, rose) - Selective thinning or TSI to maintain healthy canopy - Retain snags and coarse woody debris - Monitor regeneration and deer browse	- Invasive control annually for first 5 years, then as needed - Annual walk-through monitoring	Maintain full canopy cover, promote native mast trees, support forest-interior wildlife
Open Field (Grassland / shrubland)	- Mow or brush-hog to maintain early successional habitat - Spot-treat invasive shrubs - Maintain edges and access routes - Optional seeding of native forbs/grasses	- Mowing every 2–5 years after August 1 - Invasive follow-up annually	Maintain open herbaceous conditions for pollinators, grassland birds, and scenic views
Savanna (Wooded Grassland)	- Maintain scattered overstory trees (10–40% canopy cover) - Remove excess saplings to preserve openness - Brush-cut and treat invasive shrubs - Periodic mowing or selective clearing under canopy - Encourage native grasses and forbs	- Light clearing or mowing every 3–5 years - Invasive management annually or biannually - Canopy thinning every 10–15 years to maintain openness	Preserve open woodland structure with mixed herbaceous and woody vegetation; provide habitat for shrubland and edge specie

Table 4: Management practices required to maintain different habitat types at Coe Hill

Recreation

Trail System and Infrastructure

Public recreation at Coe Hill should balance access, education, and ecological integrity. The property offers a unique opportunity to connect residents with forest restoration in progress — demonstrating the transformation a former orchard into overgrown invasive shrubland into an example of habitat restoration. While recreation is a desired use of the site, the primary goal is stewardship, and any future trails or features should support learning, observation, and quiet enjoyment rather than intensive use.

Develop a Defined Trail: Evaluate existing trails for potential incorporation, relocation, or closure. Trails that originate off-site or encroach on private lands should be formally addressed with abutting property owners, either through collaboration and permission agreements or, if necessary, a stop notice to prevent unauthorized use.

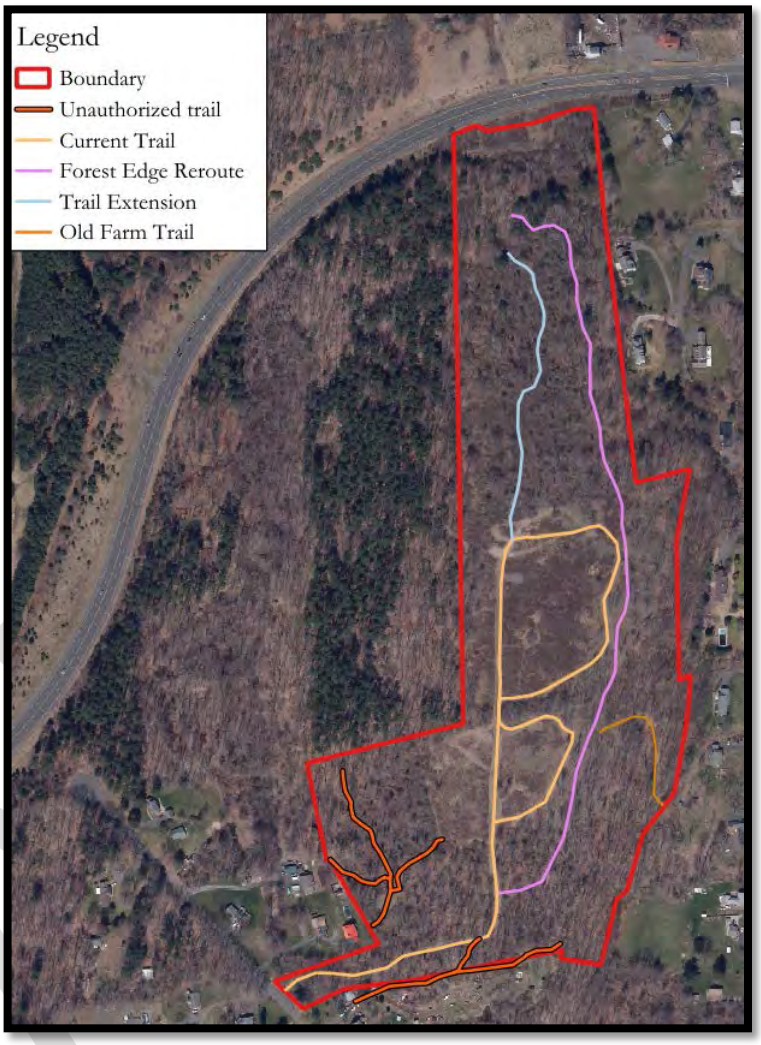
As vegetation management and restoration efforts progress, there are several possible approaches to formalizing a public trail system at Coe Hill. Each option varies in footprint, ecological impact, and alignment with long-term management goals. – Maps in Appendix A.

Maintain and Extend Existing Footprint
This option would retain much of the current network of mowed trails, with modest extensions northward into the forested portion of the property. It would provide a mix of open-field and woodland walking experiences while improving access and visibility. However, keeping multiple interior paths would maintain edge/habitat disturbance.

Straight-In/Straight-Out Alignment
A single linear trail extending from the main entrance toward the center or northern edge of the property would provide a simple and easily maintained access route. This option would reduce disturbance but still cuts through the habitat.

Single Loop Trail
This design would consolidate the current mowed network and expand the system north. It would offer a balanced visitor experience and provide opportunities for interpretive signage and educational stops.

Forest-Edge Reroute
The design would reconfigure the trail to follow the forest edge, avoiding cutting through the middle of the open fields targeted for early-successional habitat management. This layout would maintain public access while protecting sensitive restoration areas, minimizing the spread of invasive species, and providing shaded, durable footing. Access to the open fields could be retained through short, controlled spurs or viewing platforms.



Map 9: Trail system at Coe Hill

Picnic tables and benches can create a small gathering space for families, volunteers, and educational groups. This area could also serve as a hub for interpretive signage and community events.

Interpretive and Educational Opportunities: Install small, durable trailhead kiosks or signs to highlight topics such as forest regeneration, invasive species control, early successional habitat, and notable birds that utilize this site. This supports the Town's goals for public education and stewardship awareness.

Boy Scouts Camping: While this would provide valuable opportunities for outdoor learning, community stewardship, and overnight field experiences, the feasibility of such a use is limited by several environmental and logistical factors.

The property's compact size and ongoing habitat restoration goals make it poorly suited for sustained or frequent camping activity. Repeated group use could create informal paths and introduce litter or invasive seed material.

If the Town wishes to explore this further, any camping area should be:

- Very limited in footprint (e.g., space for a few small tents) and used only occasionally by permit;
- Located away from sensitive grasslands or regeneration areas;
- Managed under oversight to ensure low-impact use, waste removal, and fire safety compliance; and
- Designed to complement, the property's broader habitat restoration and educational goals.

At this time, the camping concept should be considered conditionally feasible only if implemented on special-event basis, and only after vegetation management, boundary marking, and access improvements are complete. Alternatively, there is an unauthorized maintained clearing in the south west corner of the property that could be a suitable location for camping.

Hunting Access: Continue to allow controlled archery hunting, and consider adding limited shotgun hunting during regulated seasons as part of a deer management strategy. Hunting zones should be clearly marked and posted to maintain safety for adjacent homeowners. Regarding the 500' rule where it is prohibited to hunt with, shoot, or carry a loaded firearm within 500' of any building occupied by people, there is a narrow strip that would permit shotgun hunting at Coe Hill.

The American Chestnut Foundation

Coe Hill presents a unique opportunity to collaborate with The American Chestnut Foundation (TACF) to support the reintroduction of blight-resistant American chestnuts. Underplanting with their specialized hybrids in the recently mulched areas could align with TACF's research objectives for testing and establishing chestnuts in natural forest conditions. Particularly where dense thickets of autumn olive and multiflora rose have been removed, such as in the savanna or patchy canopy areas. This partnership would enhance forest diversity and contribute to a regionally significant restoration effort to bring this iconic species back to the New England landscape.

Such a project would require close coordination and ongoing maintenance, including annual monitoring of seedling survival, control of competing vegetation, and periodic data sharing with TACF researchers. Engaging local volunteers, students, and community partners in planting and monitoring activities could transform this initiative into a scientific collaboration and an educational opportunity.

The American Chestnut Foundation (TACF) plantings must support the organization's mission, have suitable site conditions, and be hosted by an active TACF member. TACF works with each partner to identify the most appropriate planting type and support level based on site goals, resources, and conservation value. More information can be found at https://tacf.org/wp-content/uploads/2024/09/TACF-Planting-Type-Definitions-20240918-2.pdf or https://tacf.org/get-chestnuts/

Boundary Management

We recommend that the property boundaries be clearly marked with signs facing out to alert the public that they are crossing into privately owned public land. Good signage can prevent encroachment and deter dumping.

Community Engagement

Engaging organized volunteer groups – such as local schools, scout troops, university eco-clubs, and corporate give-back days – offers the preserve a practical way to expand on-the-ground capacity without straining its limited budget. Invest in loppers, folding saws, and work gloves for volunteer use and partnering with local community leaders. Schedule two public workdays a year (one spring, one fall). Give a 15-minute safety talk, demonstrate proper cutting, and set a realistic, visible goal – "clear the marked-out patch" or "liberate five tagged walnut trees." Volunteers maintain enthusiasm when they understand what "done" looks like. Volunteers pile cut material into wildlife brush piles just off-trail, eliminating hauling costs and adding habitat.

Herbicide Use Disclaimer

All chemical treatments described in this report are conceptual recommendations only. Any herbicide application at Coe Hill should be planned and executed by a pesticide applicator who is currently licensed and insured in the State of Connecticut and must follow all label directions, federal and state pesticide regulations, and CT-DEEP coastal-zone permit requirements.

Ongoing Support and Implementation

Connwood Foresters, Inc. remains available to assist the Town with all future aspects of land stewardship at Coe Hill. This plan is intended to serve as a living document – providing the framework and technical guidance needed to protect, restore, and enhance the property's natural resources over time. Connwood can help clarify objectives, plan operations, and facilitate implementation, aligning with the Town's goals and DEEP open space grant requirements as management priorities evolve.

Our team offers continued support for habitat maintenance, invasive species control, brush management, tree and shrub planting, and coordination with contractors, volunteers, and agency partners. Connwood Foresters is committed to ensuring that all future work on the property is ecologically sound, cost-effective, and consistent with long-term conservation intent. We look forward to continuing our partnership with the Town in caring for and sustaining the ecological, scenic, and educational value of the Coe Hill property.

COE HILL WORK SUMMARY

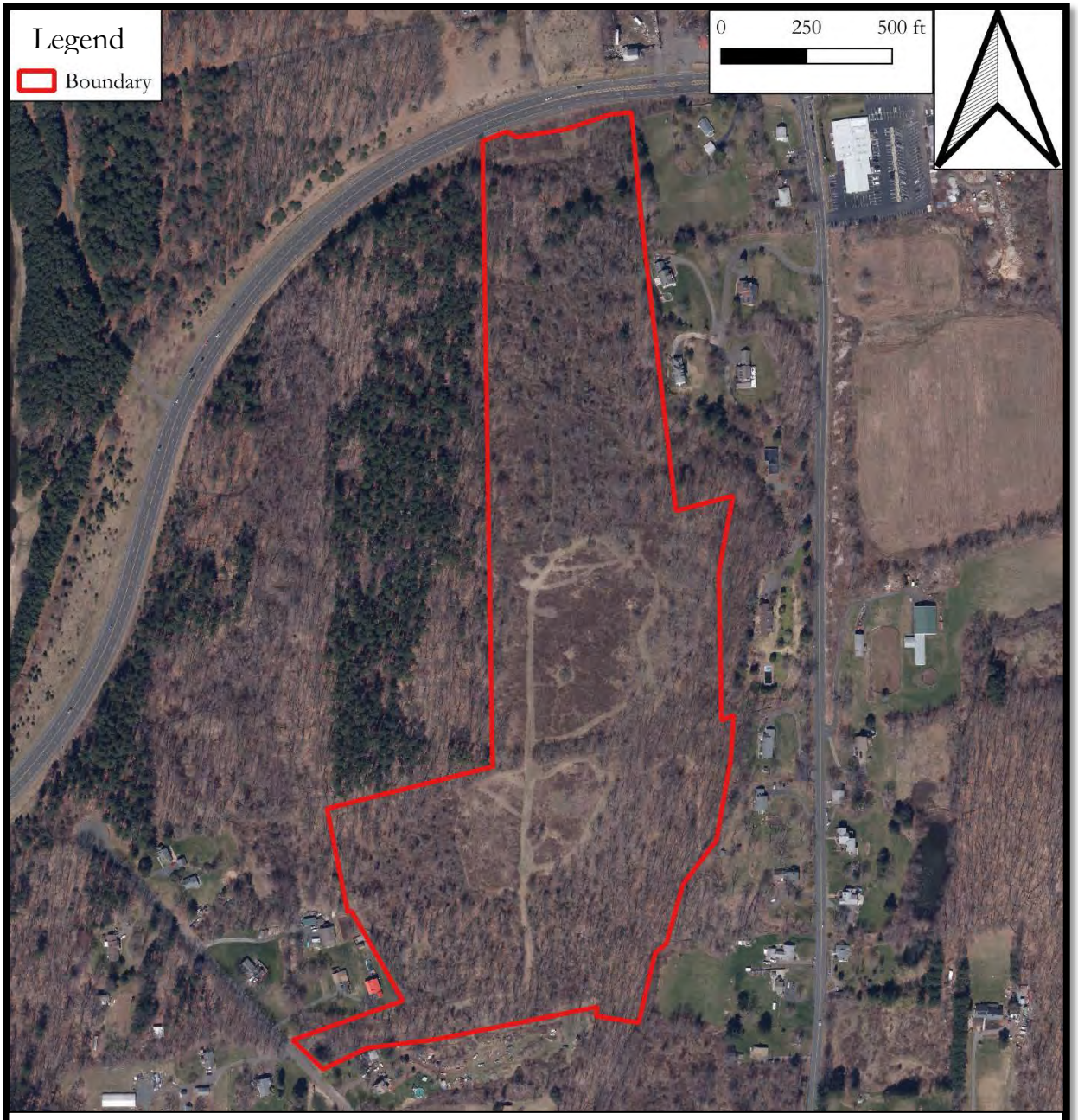
Coe Hill – Middlefield Connecticut

Scheduled Work Summary 2026-2036

Year	Action Item	Notes / Rationale
2026	Boundary marking/survey with high-visibility paint/tags.	Clarifies limits for management, hunting, and trail safety; (this might not be practical until management has cleared out invasive understory)
2026	Evaluate Long-Term Habitat Goals and Select a Management Strategy	Before implementing any large-scale management actions, determine which habitat trajectory best aligns with the towns vision for open space, wildlife, and community use.
2026	Invasive control, mow 5-10 acres of shrubland (post-nesting, Aug 1 onward).	Reduces autumn olive and multiflora rose canopy;
2026	Evaluate trail placement	Select a trail plan and evaluate unauthorized trails
2026-2027	Hand Release any canopy trees that were uncovered during mechanical operations	Removes vines and competing shrubs around desirable oaks, walnuts, and hickories to encourage crown recovery. Possible volunteer event
2027	Optional – Conduct herbicide follow-up for resprouts in mowed blocks	Apply selective foliar or cut-stump treatments; repeat late summer for effectiveness.
2027	Begin forest understory clearing in 3–4 acres of patchy forest	Brush saw or backpack sprayer – targets dense multiflora rose and burning bush; improves light to understory.
2027	Invasive control, mow 5-10 acres of shrubland (post-nesting, Aug 1 onward).	Reduces autumn olive and multiflora rose canopy; follow with spot herbicide treatment per licensed applicator.
2027-2028	Hand Release any canopy trees that were uncovered during mechanical operations	Removes vines and competing shrubs around desirable oaks, walnuts, and hickories to encourage crown recovery. Possible volunteer event
2028	Evaluate controlled hunting expansion (shotgun + bow).	Reduces browse pressure; coordinate safety with clear boundary marking.
2028	Optional – Conduct herbicide follow-up for resprouts in mowed blocks	Apply selective foliar or cut-stump treatments; repeat late summer for effectiveness.
2028	Forest understory clearing in 3–4 acres of patchy forest	Brush saw or backpack sprayer – targets dense multiflora rose and burning bush; improves light to understory.
2028	Bittersweet vine cutting on overstory trees in forested areas.	Prevents canopy mortality. Possible volunteer event
2028	Begin establishing primary trail corridor	Establish formal trail as vegetation management occurs
2029	Invasive control, mow 5-10 acres of shrubland (post-nesting, Aug 1 onward).	Reduces autumn olive and multiflora rose canopy; follow with spot herbicide treatment per licensed applicator.

2029	Hand Release any canopy trees that were uncovered during mechanical operations	Removes vines and competing shrubs around desirable oaks, walnuts, and hickories to encourage crown recovery.
2029	Identify, prune, and release remnant apple and pear trees.	Supports pollinators and wildlife;
2029	Trial underplanting of native hardwoods or hybrid chestnuts.	In former autumn-olive zones; monitor survival with deer protection. Possible volunteer event
2030	Forest understory clearing in 3–4 acres of patchy forest	Brush saw or backpack sprayer – targets dense multiflora rose and burning bush; improves light to understory.
2030	Create brush piles and install bird boxes	Enhance wildlife habitat
2030	Continue rotational mowing of shrubland blocks	Maintains early-successional habitat and suppresses woody regrowth. Follow 3–5-year retreatment cycles.
2031	Forest understory clearing in 3–4 acres of patchy forest	Brush saw or backpack sprayer – targets dense multiflora rose and burning bush; improves light to understory.
2031	Bittersweet vine cutting on overstory trees in forested areas.	Prevents canopy mortality. Possible volunteer event
2031	Assess regeneration success; replant or seed gaps with native shrubs (spicebush, dogwood, blueberry).	Builds diverse early-successional habitat.
2031	Finalize trail system and install interpretive signage	Include signage on invasive management, forest regeneration, and wildlife habitat;
2032	Implement new hunting policy (shotgun + bow) if appropriate.	Reduces browse pressure; coordinate safety with clear boundary marking.
2032	Forest understory clearing in 3–4 acres of patchy forest	Brush saw or backpack sprayer – targets dense multiflora rose and burning bush; improves light to understory.
2032	Bittersweet vine cutting on overstory trees in forested areas.	Prevents canopy mortality
2033	Continue rotational mowing of shrubland blocks	Maintains early-successional habitat and suppresses woody regrowth. Follow 3–5-year retreatment cycles.
2034	Forest understory clearing in 3–4 acres of patchy forest	Brush saw or backpack sprayer – targets dense multiflora rose and burning bush; improves light to understory.
2034	Bittersweet vine cutting on overstory trees in forested areas	Prevents canopy mortality. Possible volunteer event
2034	Refresh boundary markings and trail signage.	Ensure public safety and visibility; update maps as needed.
2035	Prepare *Next 10-Year Update* report and funding proposal.	Document outcomes, costs, and adaptive management needs for 2036–2045 cycle.

APPENDIX A – Maps



Property Boundary

Town of Middlefield: Coe Hill

School St,
Middlefield, CT 06455

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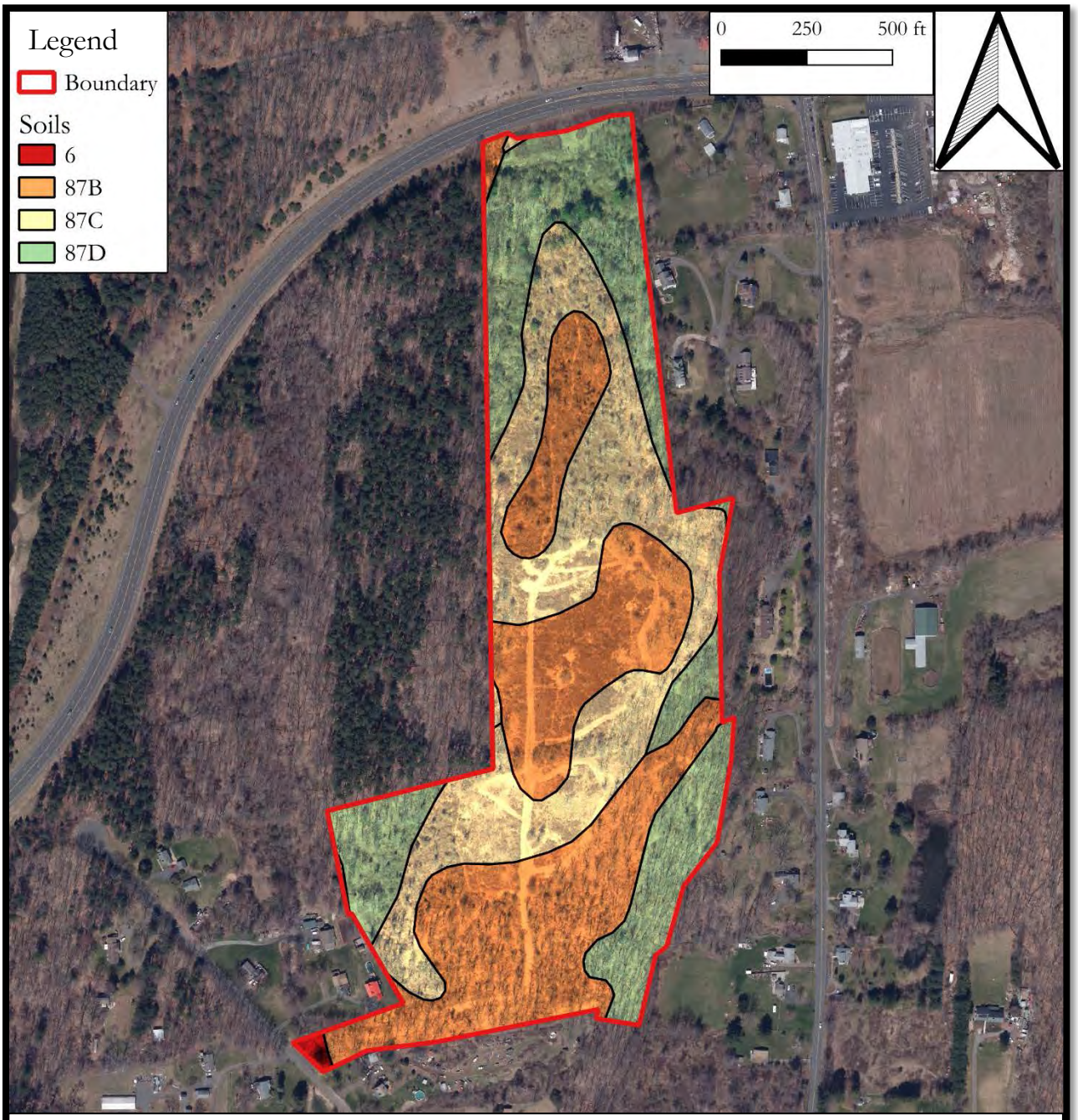

Soils Map

Town of Middlefield: Coe Hill

School St,
Middlefield, CT 06455

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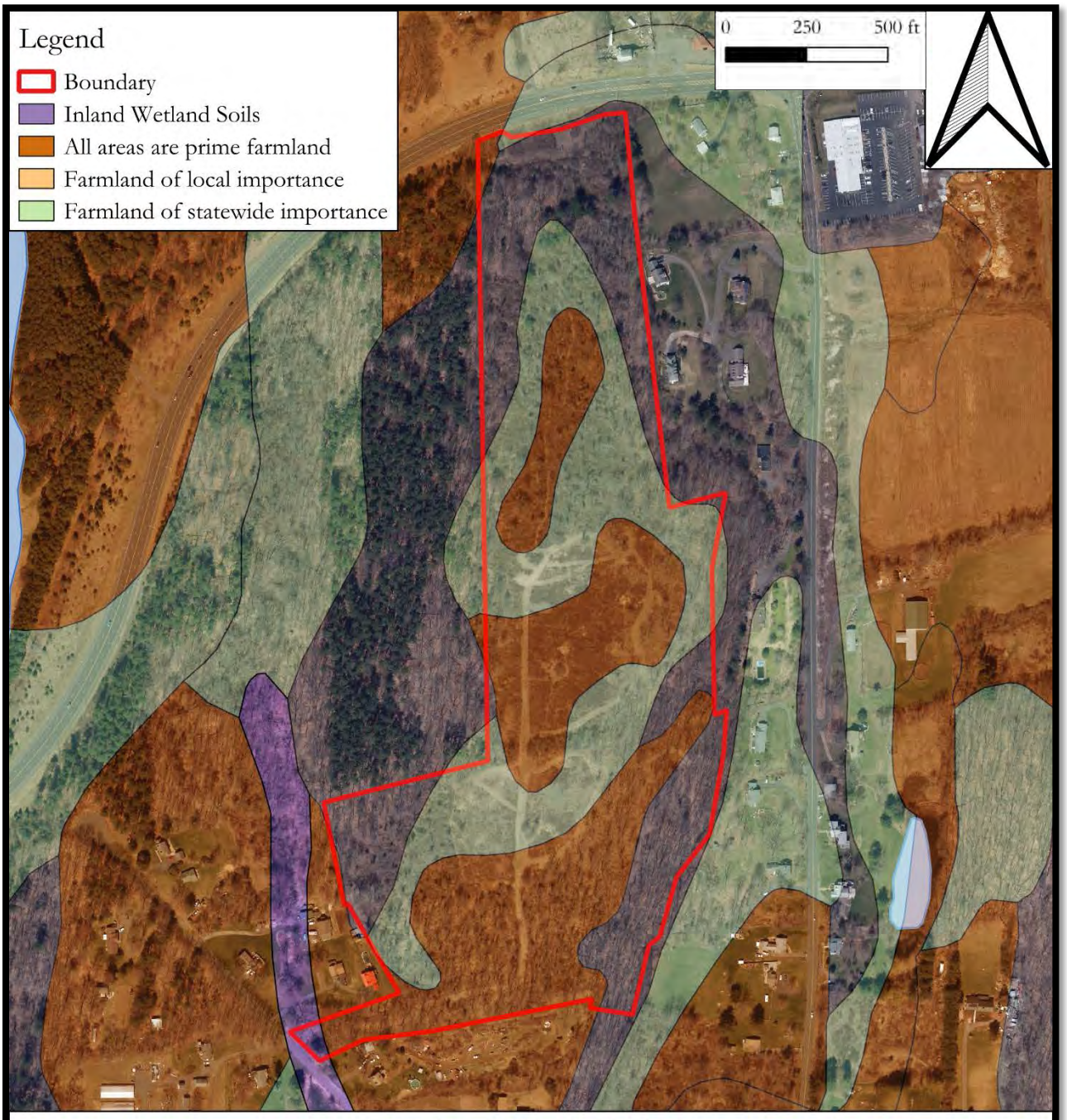

Farmland/Wetland Soils

Town of Middlefield: Coe Hill

School St,
Middlefield, CT 06455

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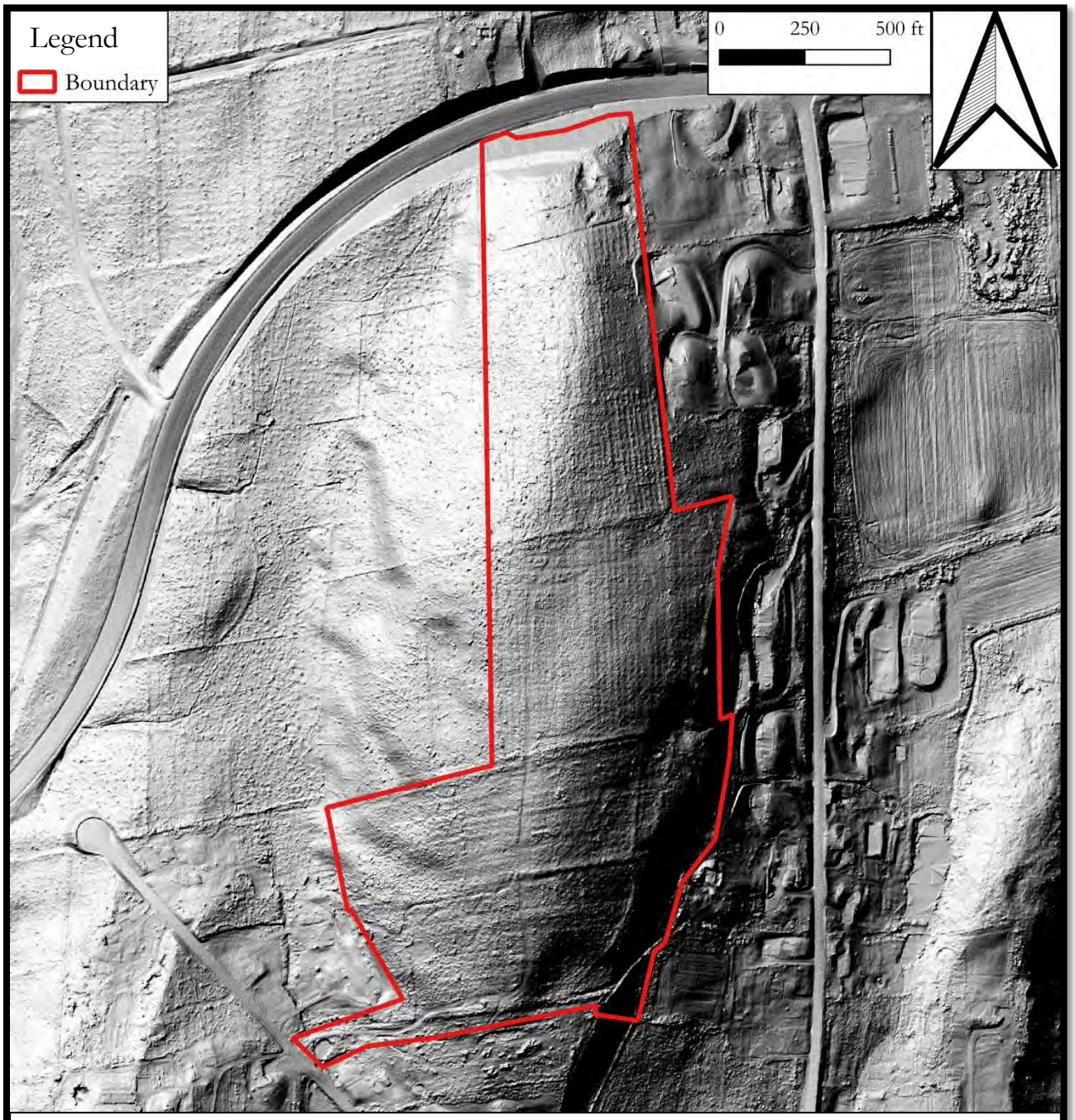

LiDAR Elevation Map

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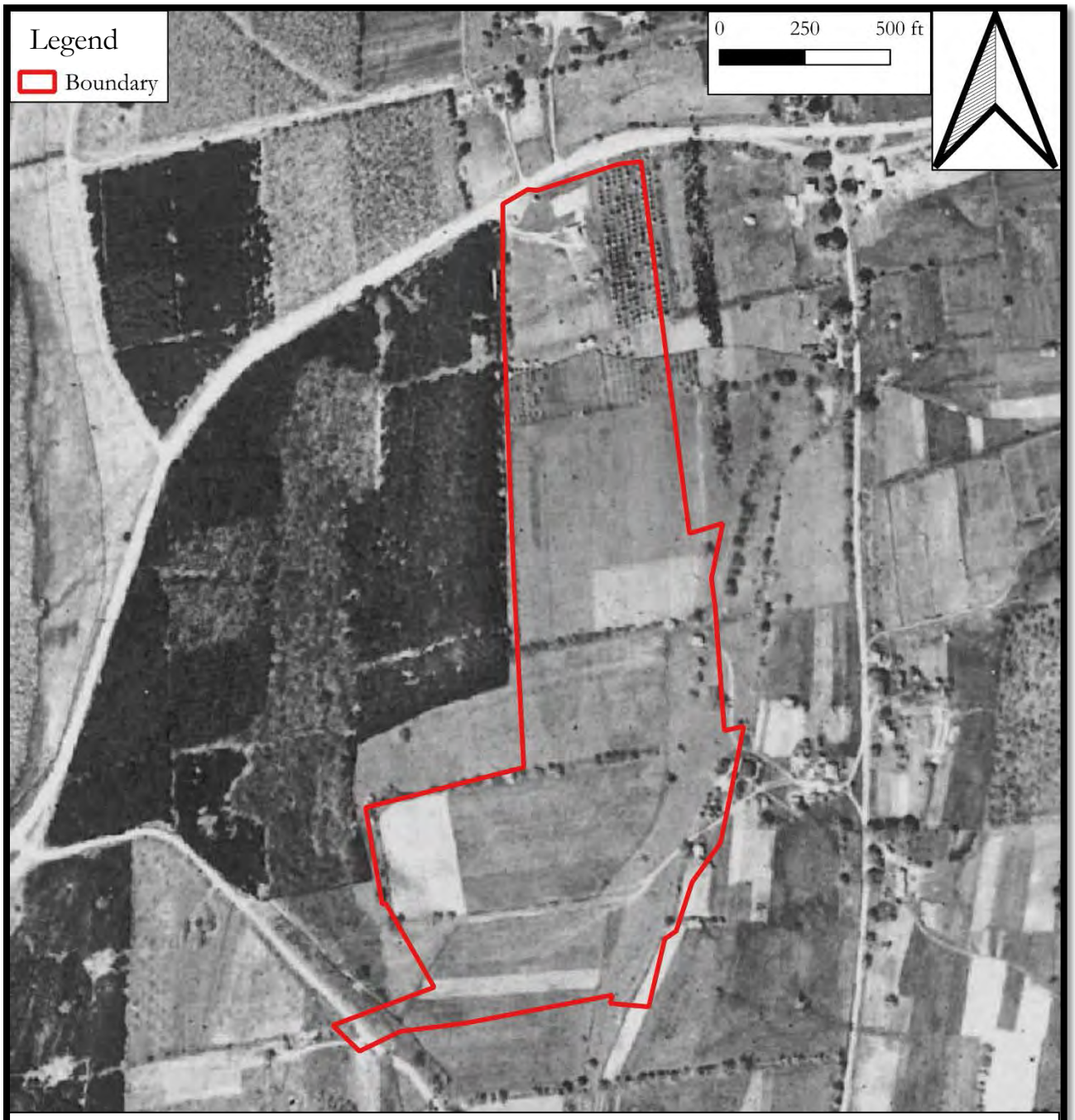

1934 Aerial Photo Map

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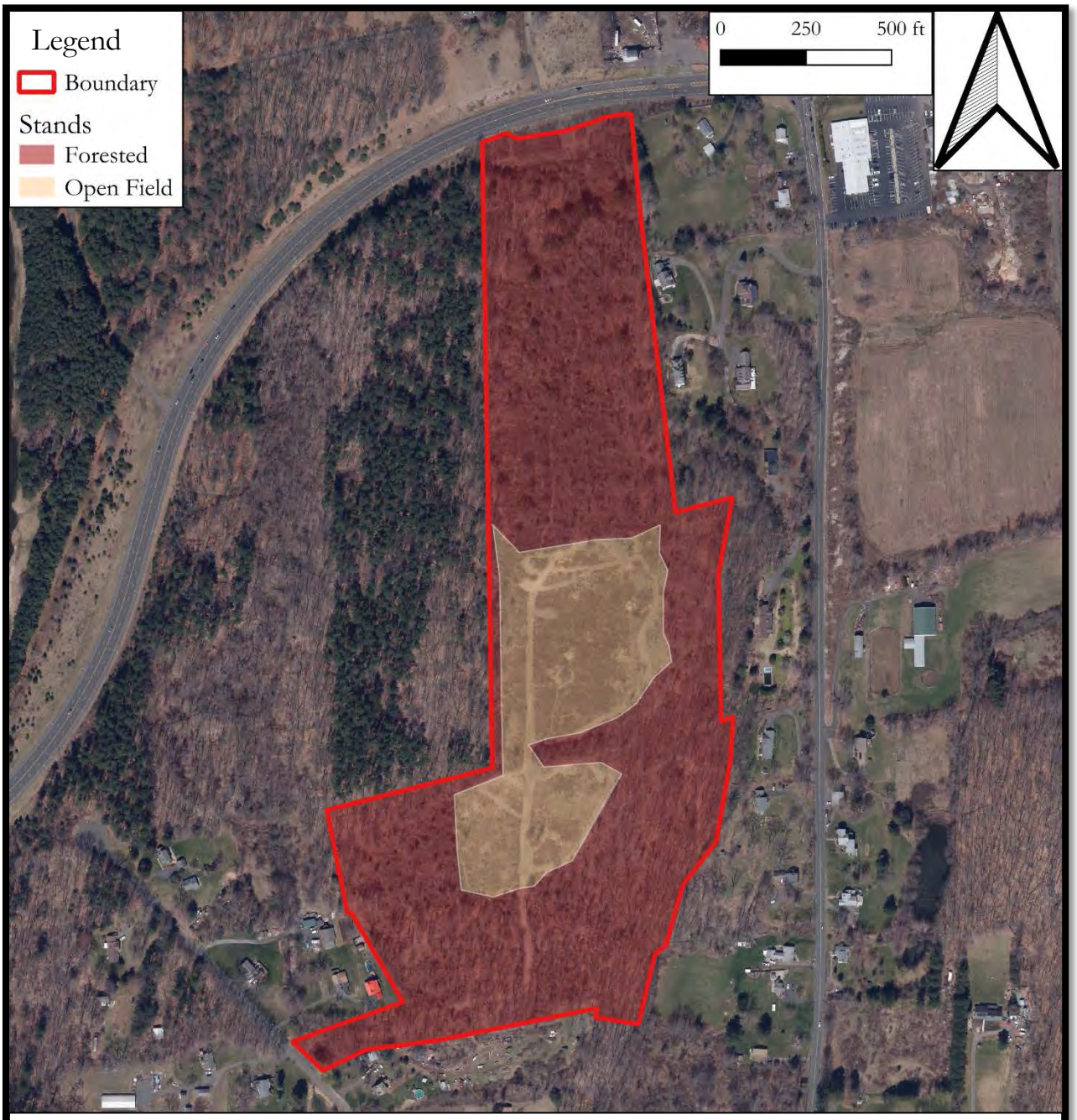

Stands Map

Town of Middlefield: Coe Hill

School St,
Middlefield, CT 06455

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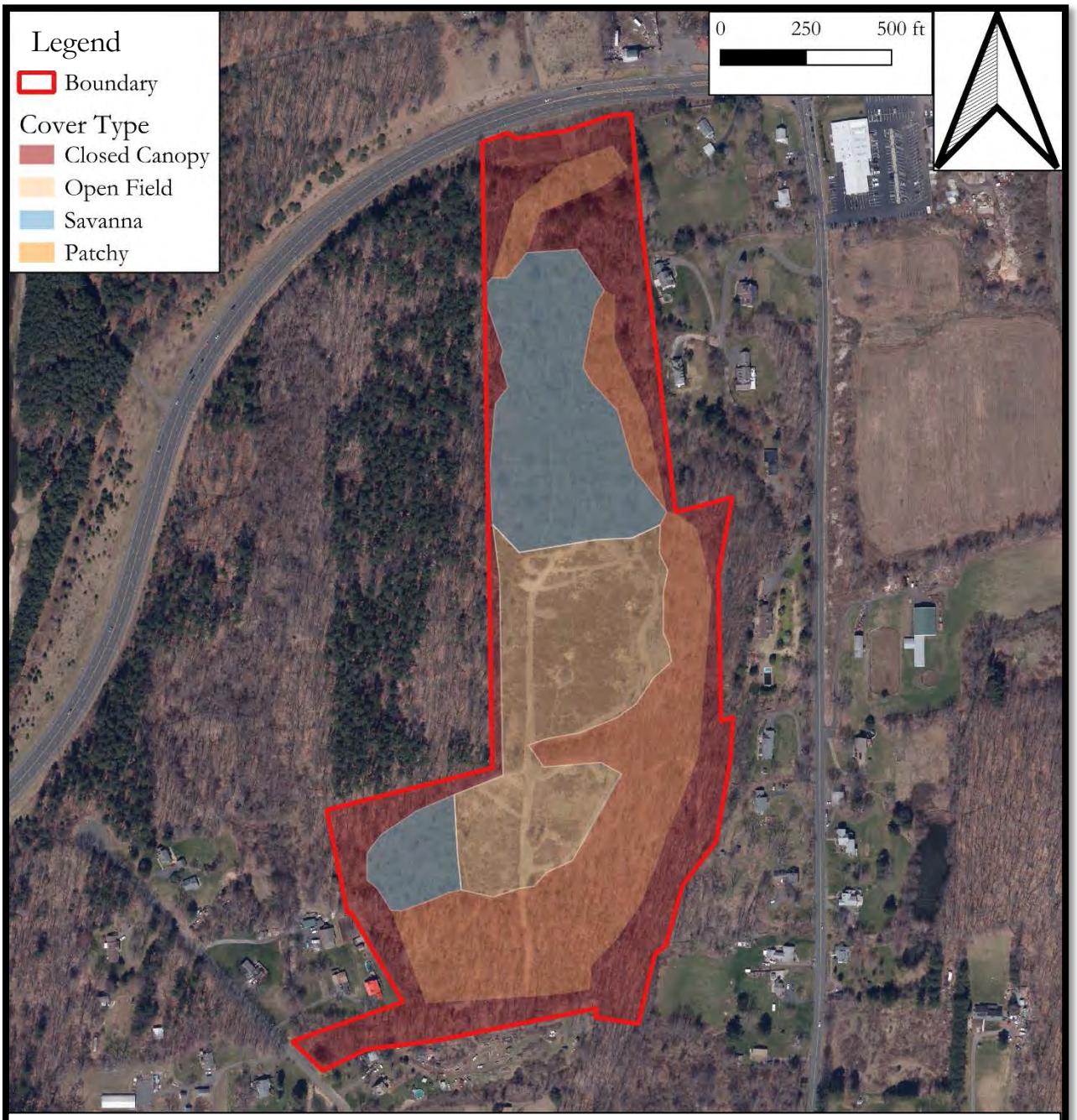

Cover Type

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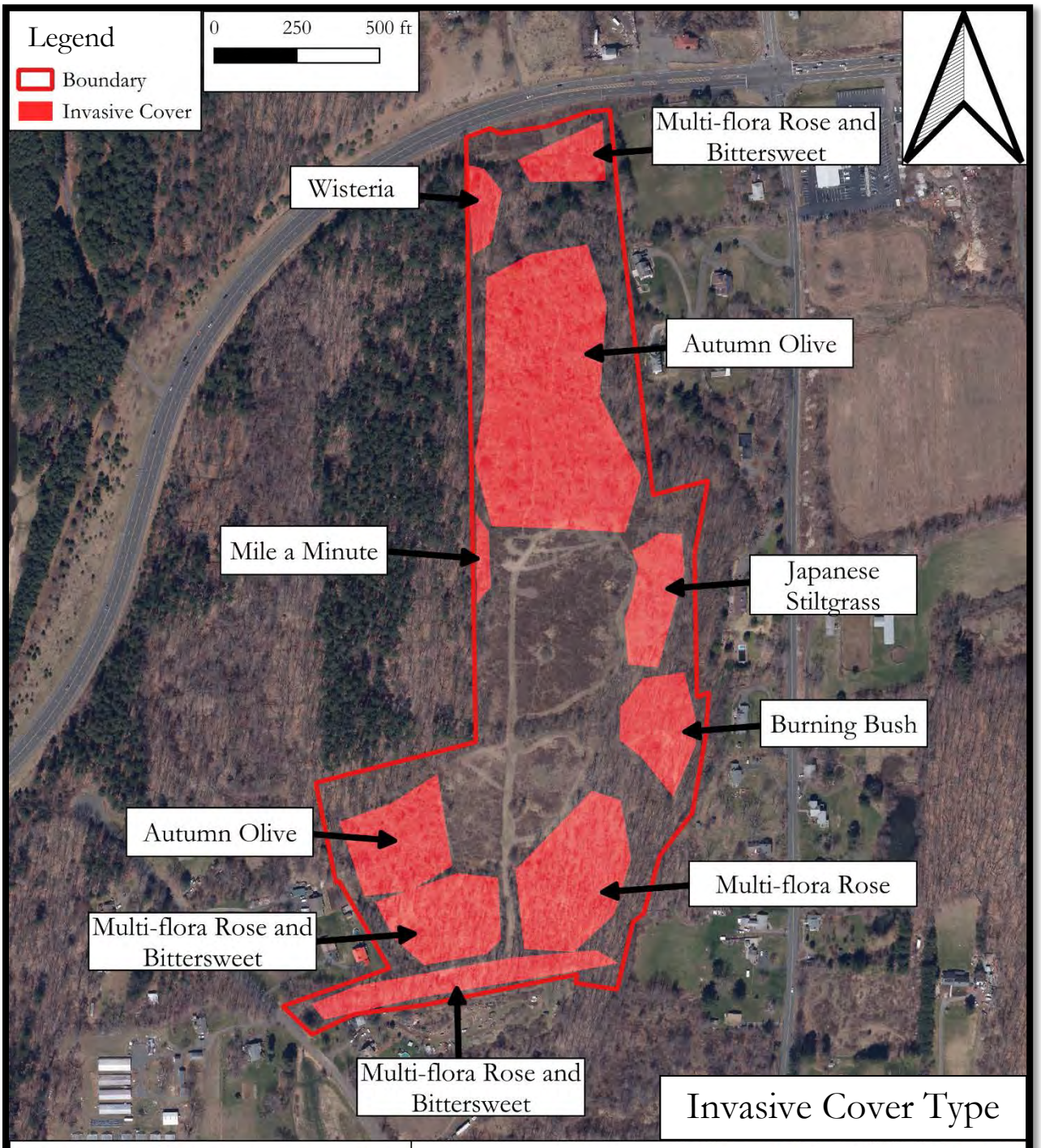

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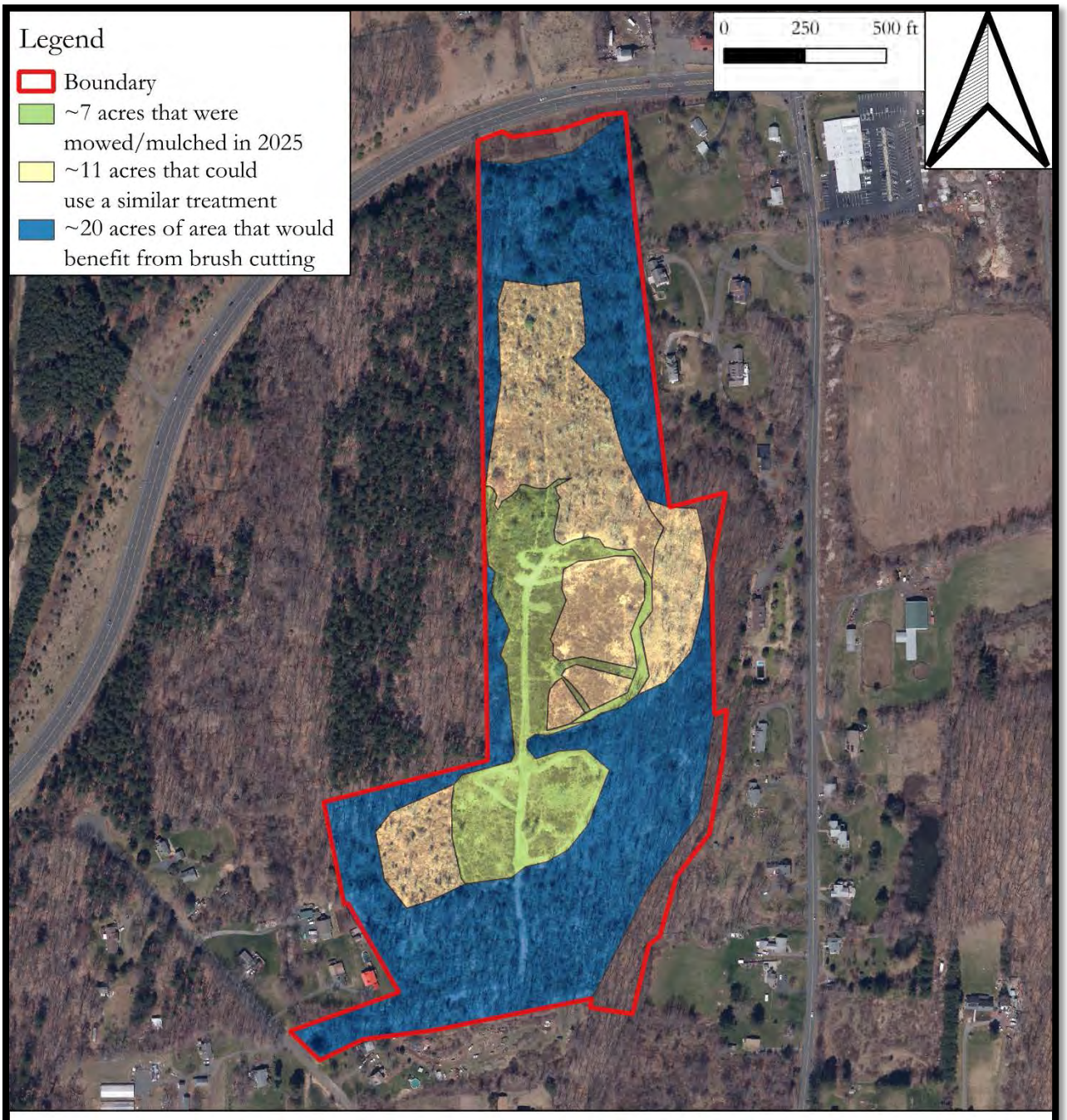

Mowing/Mulching/Brush Cutting

Town of Middlefield: Coe Hill

School St,
Middlefield, CT 06455

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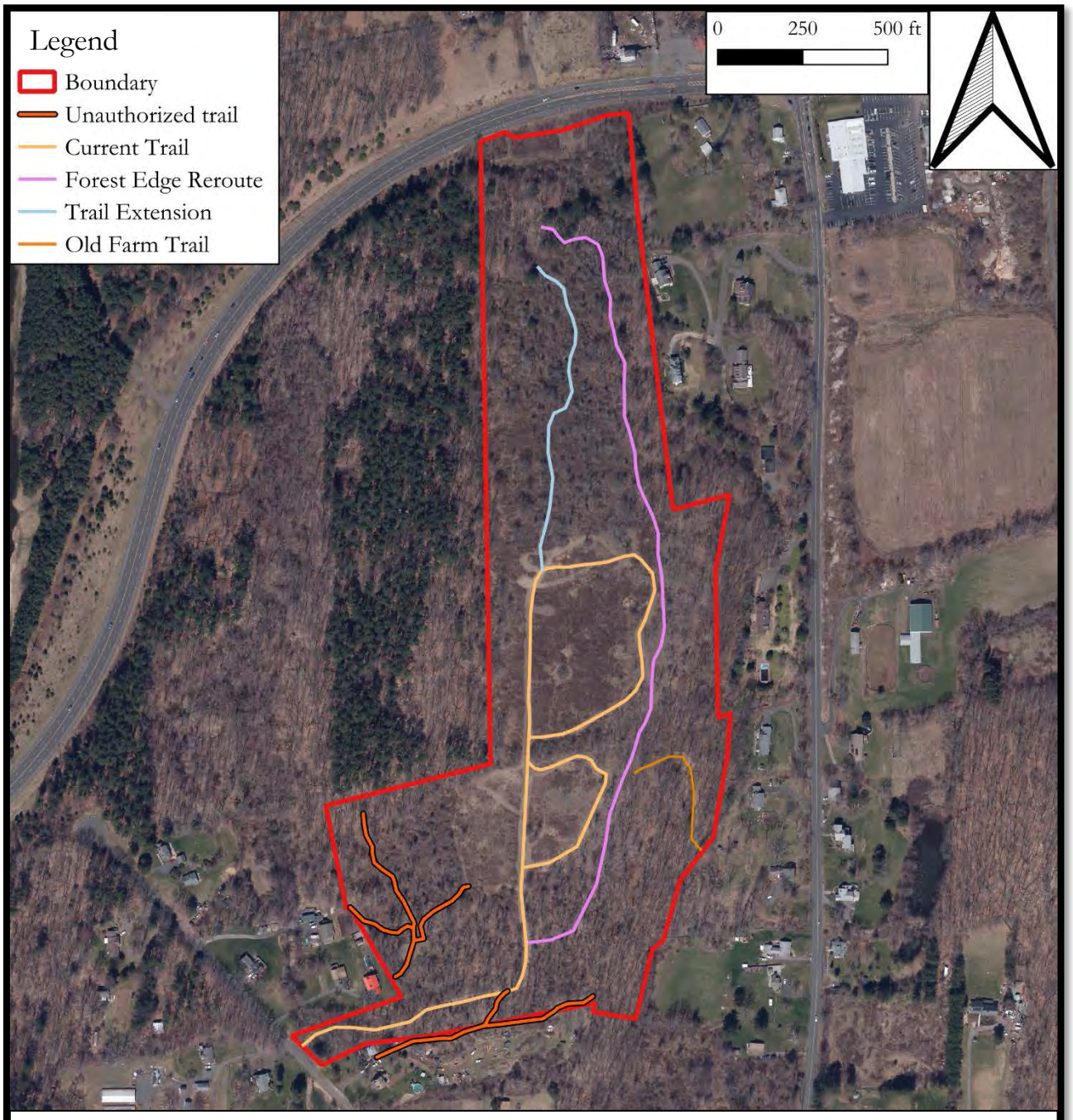

Trail System

Town of Middlefield: Coe Hill

School St,
Middlefield, CT 06455

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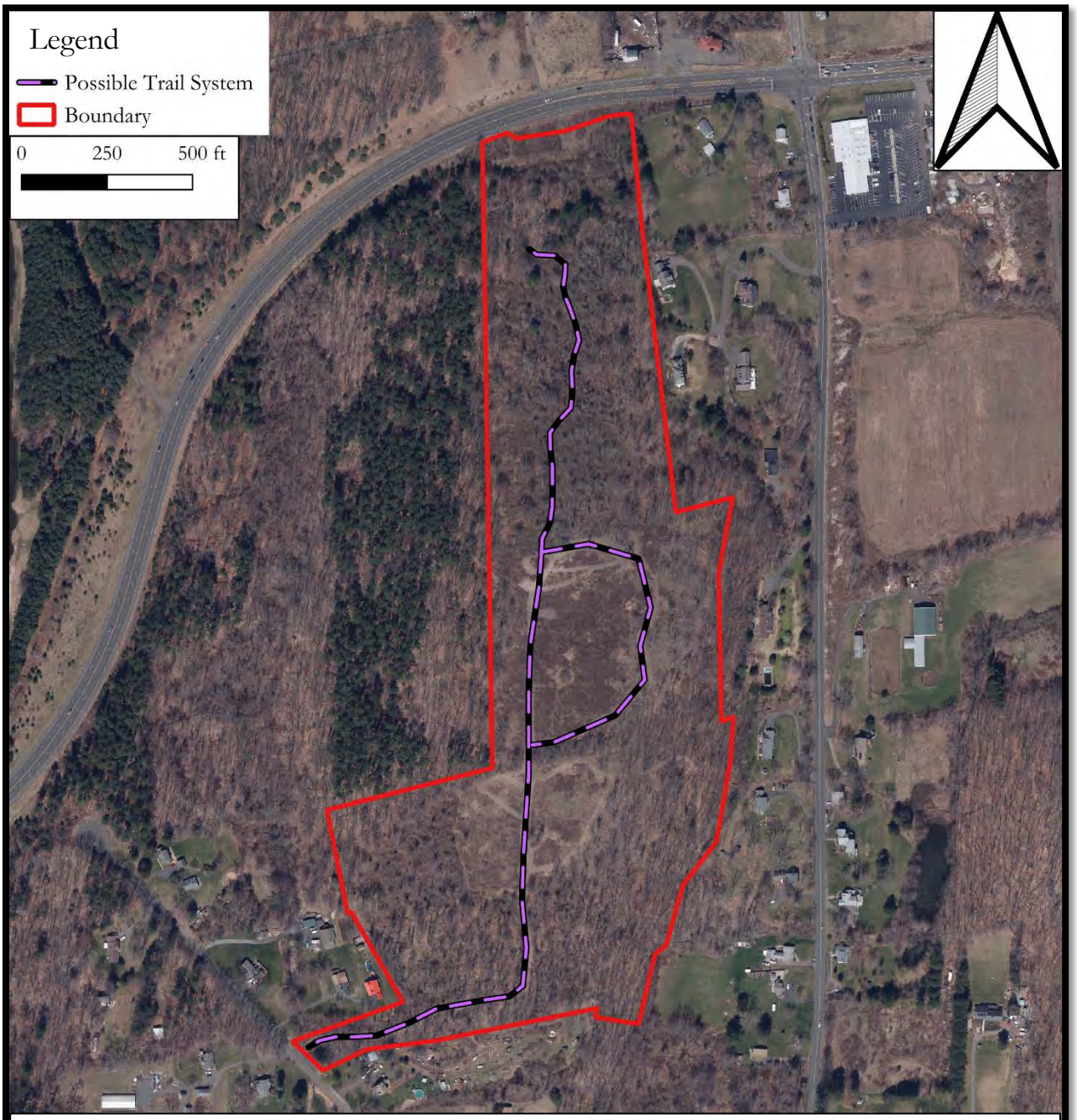

Trail System: Single Loop Trail

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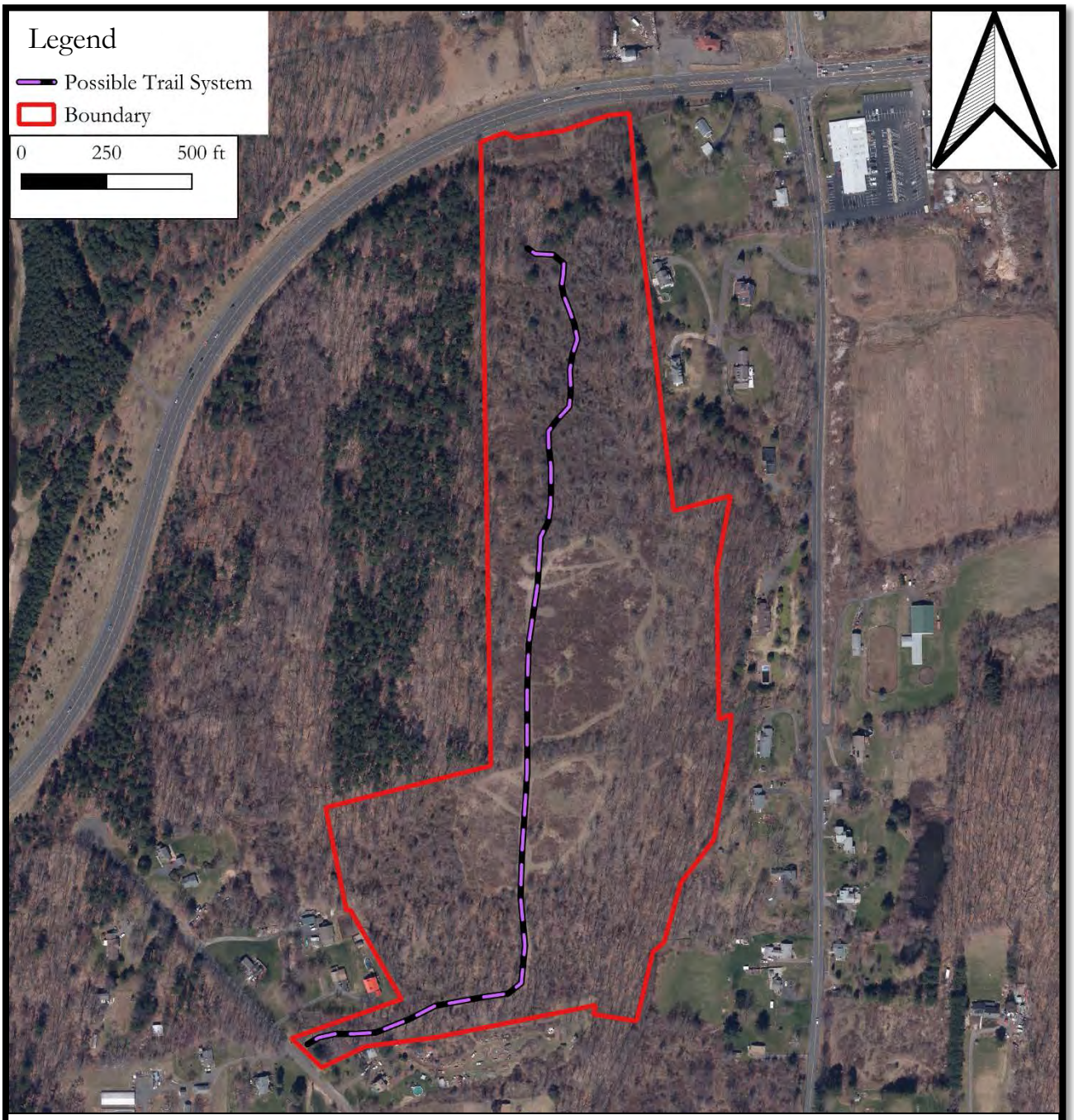
Town of Middlefield: Coe Hill

School St,
Middlefield, CT 06455

CONNWOOD FORESTERS, INC.



Trail System: Straight-In/Straight-Out

Town of Middlefield: Coe Hill

School St,
Middlefield, CT 06455

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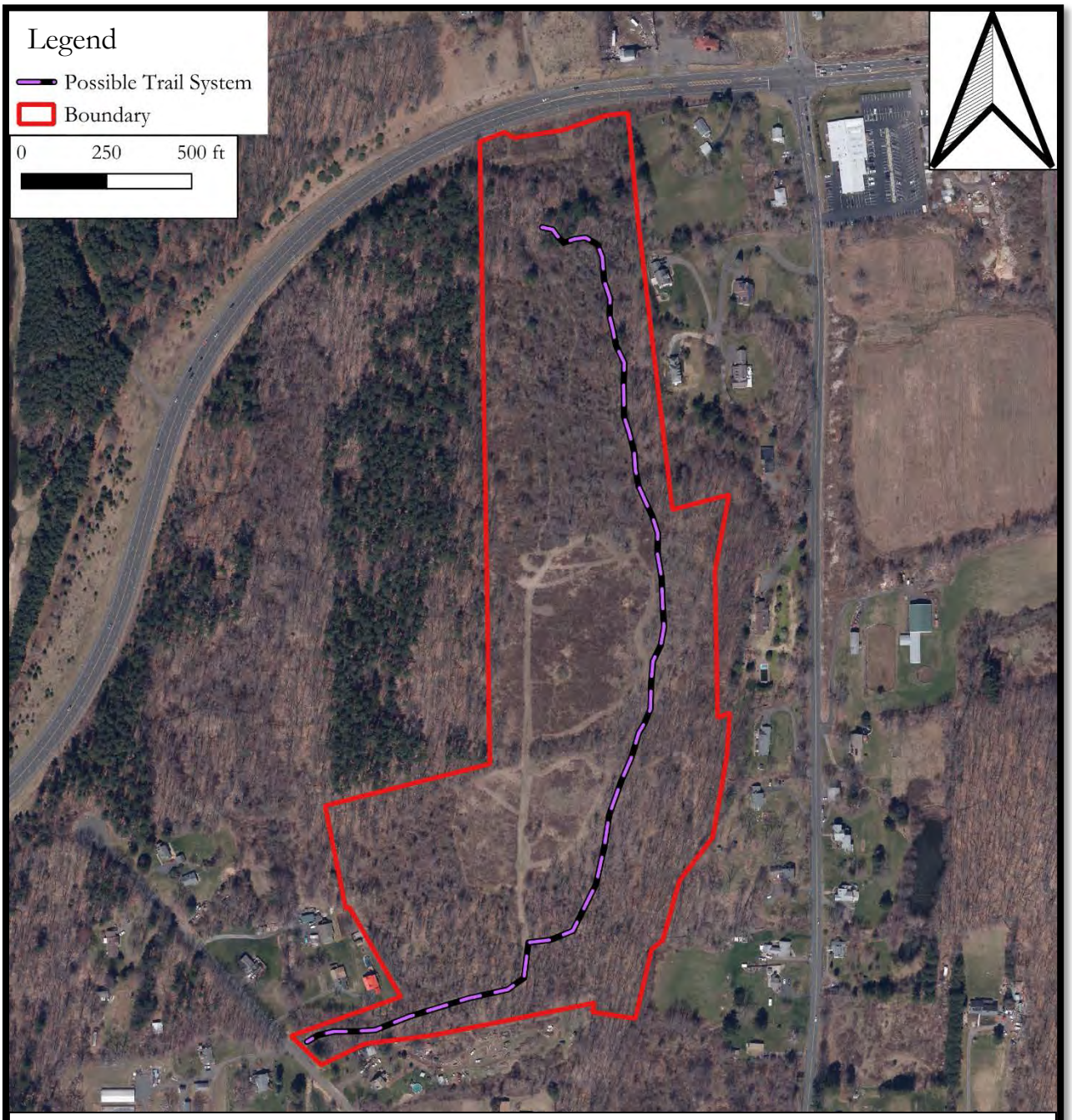

Trail System: Forest-Edge Reroute

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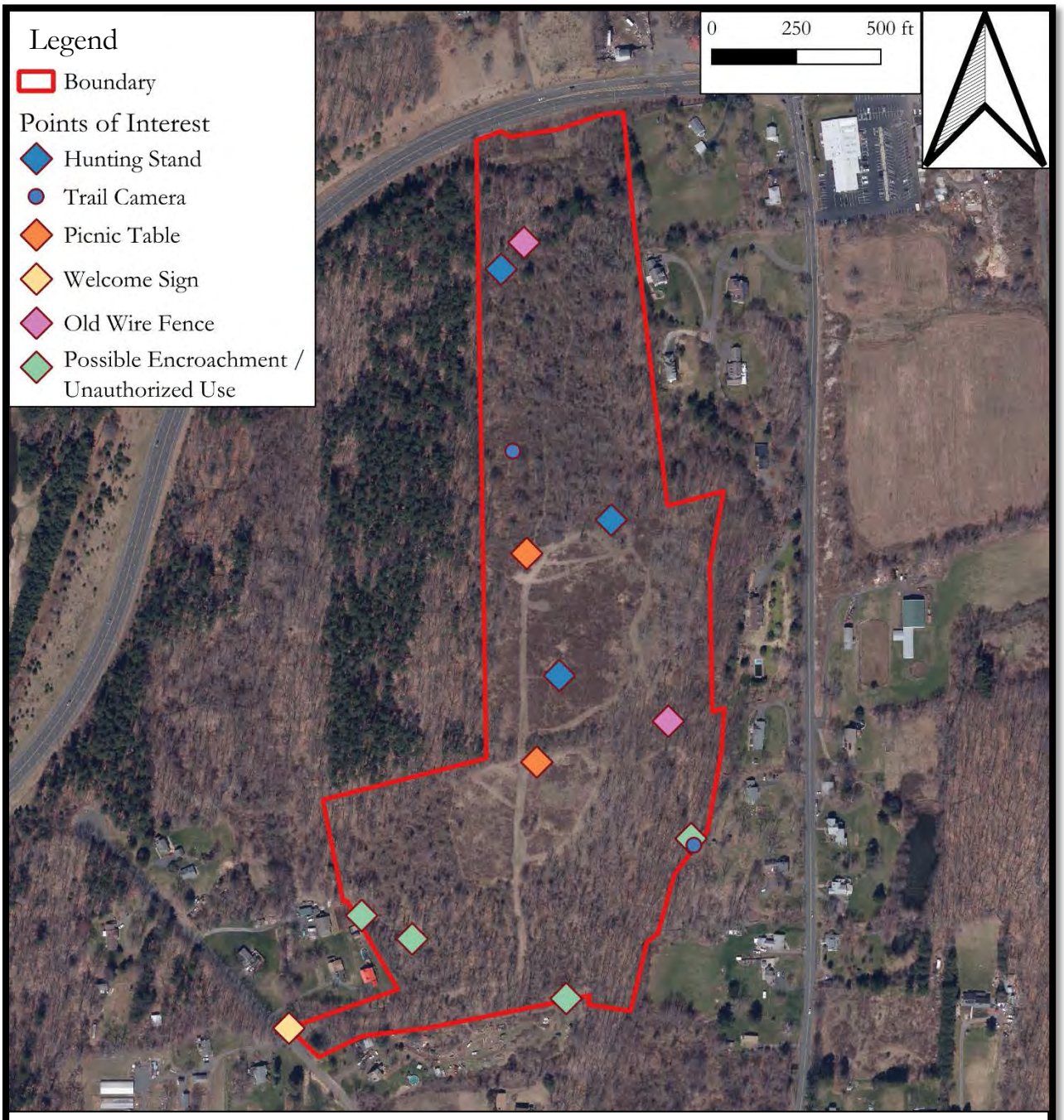

Points of Interest

Town of Middlefield: Coe Hill

School St,
Middlefield, CT 06455

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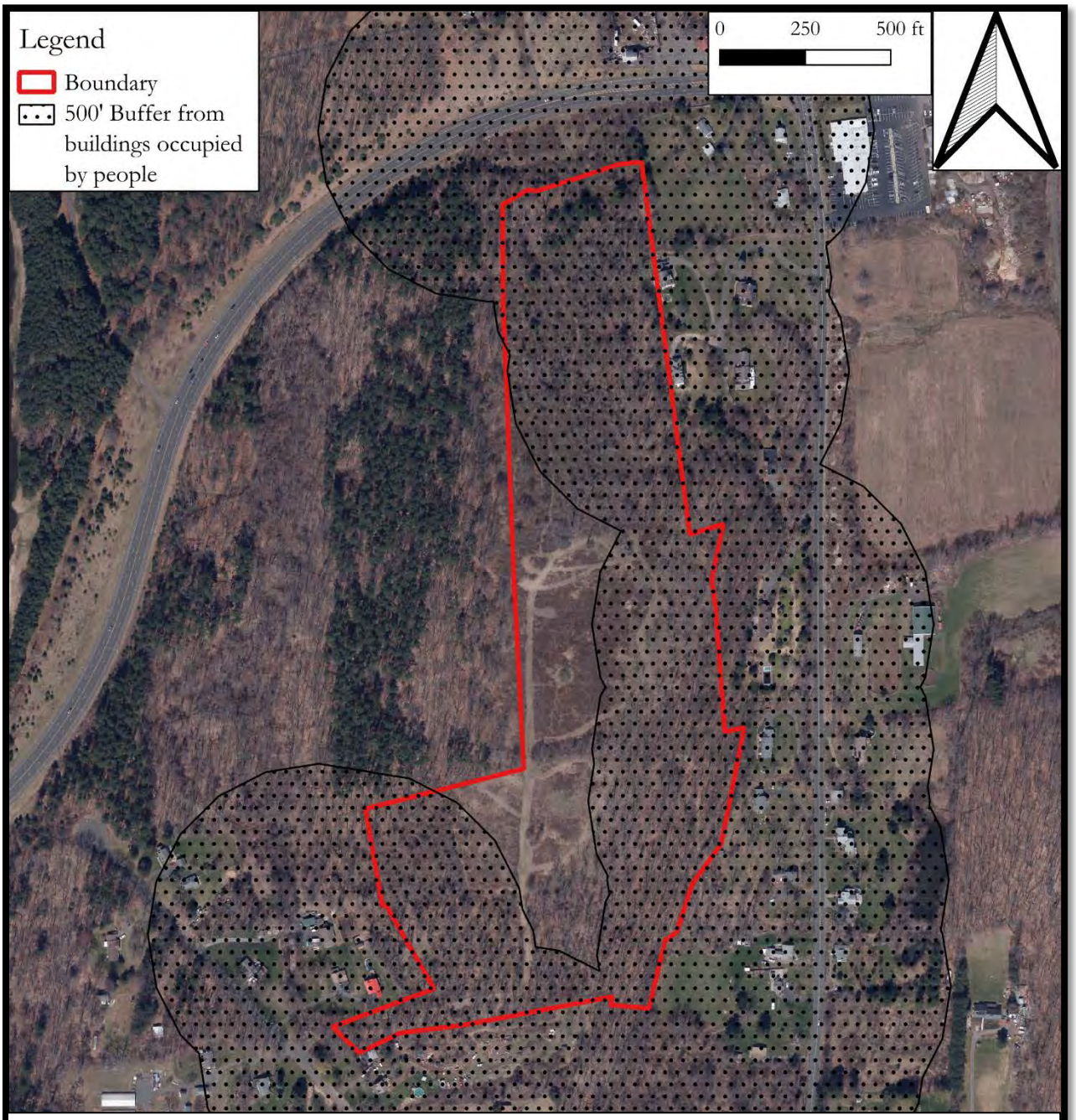

Loaded Firearm Hunting Buffer

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Town of Middlefield: Coe Hill

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CONNWOOD FORESTERS, INC.

APPENDIX B – SPECIES LIST

Tree Species

Common Name	*Scientific Name*	Symbol
Norway Maple	*Acer platanoides*	ACPL
Red Maple	*Acer rubrum*	ACRU
Sugar Maple	*Acer saccharum*	ACSA
Yellow Birch	*Betula alleghaniensis*	BEAL
Black Birch	*Betula lenta*	BELE
Paper Birch	*Betula papyrifera*	BEPA
Musclewood	*Carpinus caroliniana*	CACA
Bitternut Hickory	*Carya cordiformis*	CACO
American Chestnut	*Castanea dentata*	CADE
Pignut Hickory	*Carya glabra*	CAGL
Shagbark Hickory	*Carya ovata*	CAOV
Catalpa	*Catalpa speciosa*	CASP8
Mockernut Hickory	*Carya tomentosa*	CATO
Hackberry	*celtis L*	CEOC
American Beech	*Fagus Grandifolia*	FAGR
White Ash	*Fraxinus americana*	FRAM
Eastern Red Cedar	*Juniperus virginiana*	JUVI
Tulip Poplar	*Liriodendron tulipifera*	LITU
Nyssa	*Nyssa sylvatica*	NYSY
Hophornbeam	*Ostrya virginiana*	OSVI
Red Pine	*Pinus resinosa*	PIRE
Eastern White Pine	*Pinus strobus*	PIST
Eastern Cottonwood	*Populus deltoides*	PODE
Bigtooth Aspen	*Populus grandidentata*	POGR
Black Cherry	*Prunus serotina*	PRSE
White Oak	*Quercus alba*	QUAL
Scarlett Oak	*Quercus coccinea*	QUCO
Chestnut Oak	*Quercus montana*	QUMO
Pin Oak	*Quercus palustris*	QUPA
Red Oak	*Quercus rubra*	QURU
Black Oak	*Quercus velutina*	QUVE
Staghorn Sumac	*Rhus typhina*	RHTY
Black Locust	*Robinia pseudoacacia*	ROPS
Sassafras	*Sassafras albidum*	SAAL
Willow Species	*Salix Spp*	Salix spp
Basswood	*tilia americana*	TIAM
Little Leaf Linden	*Tilia cordata*	TICO
Eastern Hemlock	*Tsuga canadensis*	TSCA
American Elm	*Ulmus Americana*	ULAM

Invasive Species

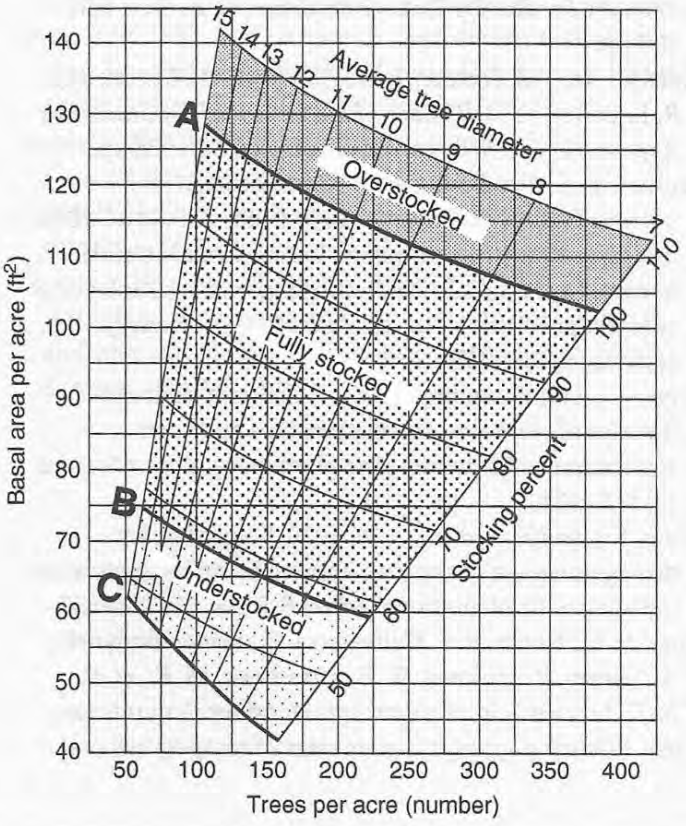
Common Name	*Scientific Name*	USDA Symbol
Norway Maple	*Acer platanoides*	ACPL
Tree of Heaven	*Ailanthus altissima*	AIAL
Japanese Barberry	*Berberis thunbergii*	BETH
Asiatic Bittersweet	*Celastrus orbiculatus*	CEOR
Autumn Olive	*Elaeagnus umbellata*	ELUM
Burning Bush	*Euonymus alatus*	EUAL13
Japanese honeysuckle	*Lonicera japonica*	LOJA
Amur Honeysuckle	*Lonicera maackii*	LOMA
Japanese Knotweed	*Fallopia japonica*	POCU6
Callery pear	*Pyrus calleryana*	PYCA
Pear	*Pyrus Spp*	Pyrus Spp
Multiflora Rose	*Rosa multiflora*	ROMU
Black Locust	*Robinia pseudoacacia*	ROPS

APPENDIX C – Stocking Guide

Box 22.3 The Gingrich Stocking Diagram (this example is in English units only).

The Gingrich diagram was first published in 1967 (see Fig. 1). It is a nomogram illustrating the relationship between basal area per acre, trees per acre as a measure of density, and quadratic mean diameter. The C-line demarcates the lowest stocking that a stand can be at (understocked) and still grow to attain the B-line within 10 years assuming average site quality. The B-line is an estimated point at which the stand can be at full occupancy of growing space. The A-line is the minimum tree area line for a stand considered to be at full stocking that has never been thinned. A stand that is above the A-line is considered overstocked, where tree growth is slow and mortality is high. The area between the A- and B-lines is the range of stocking where trees can fully utilize the site.

Box 22.3 Figure 1 A stocking diagram for central hardwoods (Gingrich, 1967). To use the stocking diagram, plots need to be placed in the stand to estimate basal area and number of stems over 2 in DBH. It is best to use fixed-area plots of sufficient size and number to account for stand heterogeneity. Then knowing the basal area and tree density, and positioning this point on the diagram, the average tree diameter and stocking level can be interpreted. If the point is above the B-line, then follow the average tree diameter for your stand down to the B-line, and then follow the horizontal line across to read the basal area for the B-line for that diameter. Subtracting the basal area recorded for the stand from the basal area at the B-line for the stand at that diameter, gives the user an estimate of the allowable amount of basal area that can be cut in a thinning. *Source:* US Forest Service.



This stocking guide for upland central hardwoods is read by locating the intersection of trees per acre and basal area for a stand in question and determining which area it falls into. The C-line represents stocking that will reach the B-line in 10 years. The B-line will reach the A-line within 5-8 years on the best sites and 12-15 years on poorer sites. Image from The Practice of Silviculture: Applied Forest Ecology (tenth edition).

APPENDIX D – Glossary

AGS: Acceptable Growing Stock: Trees desirable for long-term growth/**UGS**: Undesirable Growing Stock

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

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

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

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

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

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

Gingrich Stocking Diagram: Used to evaluate how fully a stand occupies its growing space based on basal area, trees per acre, and average diameter.

Habitat: The foods, water, cover, and living space wildlife needs for survival

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

Intermittent Stream: A small stream that usually does not flow all year

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

Overstory: Upper canopy of treetops

Pole or Poletimber: Trees having a DBH of 6 to 12 inches

Quadratic Mean Diameter (QMD): Expresses the "average" tree size weighted by basal area rather than simple count. It emphasizes the influence of larger trees on overall stand structure.

Regeneration: New young trees

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

Sapling: Trees having a DBH of 1 to 6 inches

Sawtimber or Sawlog: Trees having a DBH greater than 12 inches

Seedling: Trees having a DBH less than 1 inch

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

Snag: A dead standing tree

Stand: Separate and distinct natural community

Understory: Vegetation layer below the upper canopy of treetops

TSI: Precommercial thinning where trees that have little or no value are killed or removed

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

APPENDIX E– Natural Diversity Data Base

Connecticut Department of
ENERGY & ENVIRONMENTAL PROTECTION

79 Elm Street • Hartford, CT 06106-5127 www.ct.gov/deep Affirmative Action/Equal Opportunity Employer

Generated by eNDDB on:
10/15/2025

Michael Freiburger
Towns: Middlefield
Preliminary Site Assessment: 1711244522

Subject: Coe Hill FSP

Current data maintained by the Natural Diversity Database (NDDB) and housed in the DEEP ezFile portal, indicates that no populations of State Endangered, Threatened, or Special Concern species (RCA Sec. 26-306), and no Critical Habitats have been documented within or in close proximity to the area delineated.

Please be advised that this is a preliminary assessment and not a Natural Diversity Database determination. The purpose of this information is to provide a general planning tool which identifies those species that have been reported and may occur on or near the mapped area. A more detailed application and review will be necessary to move forward with any environmental authorization, permit, license, or registration applications submitted to DEEP. If such review is required, please return to the DEEP's ezFile Portal and select Natural Diversity Database Review to begin the review process.

This Preliminary Site Assessment does not preclude the possibility that species not previously reported to the Natural Diversity Database may be encountered on the site. You are encouraged to report incidental observations to the Natural Diversity Database using the appropriate survey form and follow the instructions for submittal. We recommend field surveys be conducted in order to evaluate potential habitat and species presence. Field surveys should be performed by a qualified biologist with the appropriate scientific collecting permits at a time when these target species are identifiable. A report summarizing the results of such surveys should include:

1. Survey date(s) and duration
2. Site descriptions and photographs
3. List of component vascular plant and animal species within the survey area (including scientific binomials)
4. Data regarding population numbers and/or area occupied by State-listed species
5. Detailed maps of the area surveyed including the survey route and locations of State listed species
6. Statement/résumé indicating the biologist's qualifications

The site surveys report should be sent to the CT DEEP-NDDB Program (deep.nddbrequest@ct.gov) for further review by program biologists.

Natural Diversity Database information includes all information regarding listed species available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units

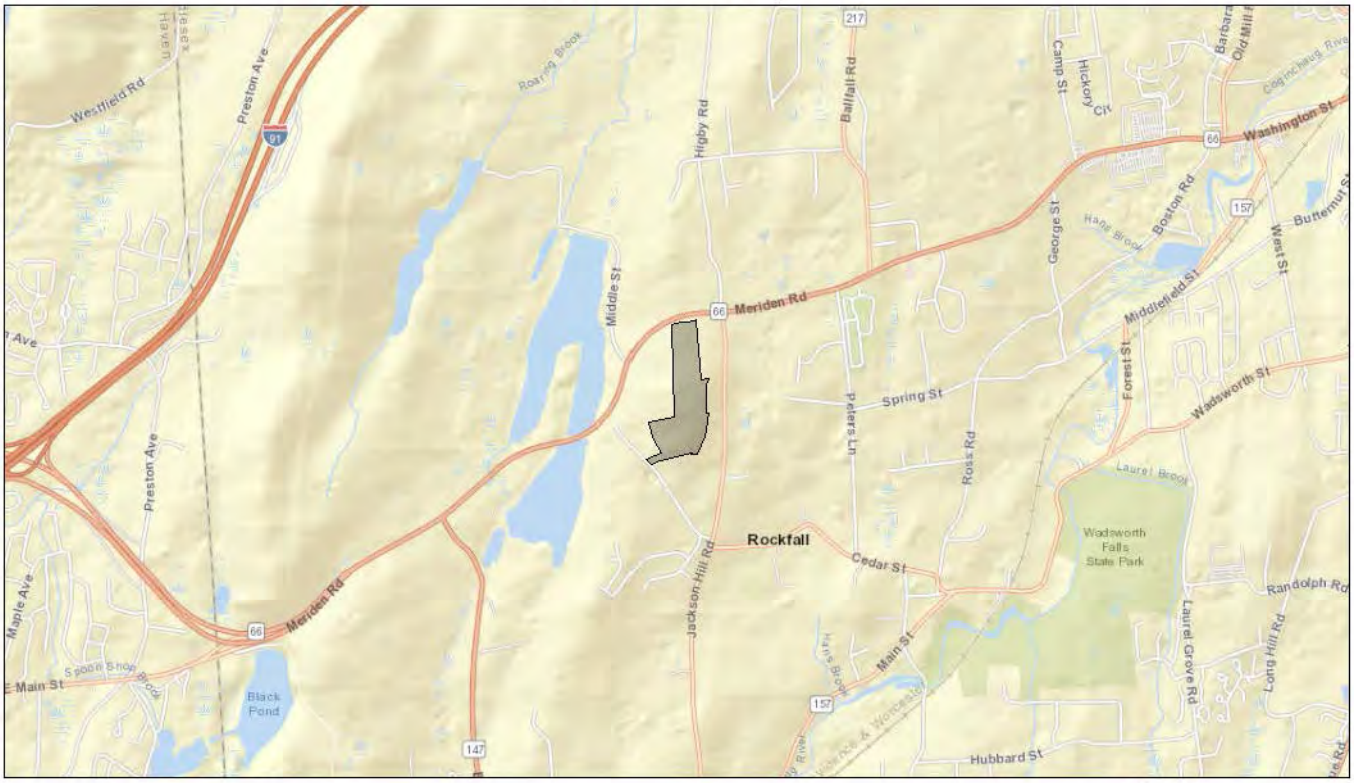
of DEEP, land owners, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Database and accessed through the ezFile portal as it becomes available.

This letter is computer generated from our existing records and carries no signature. If however, any clarification/error is noted, or, if you have further questions, please contact the following:

CT DEEP Bureau of Natural Resources
Wildlife Division
Natural Diversity Database
79 Elm Street
Hartford, CT 06106-5127
(860) 424-3011
deep.nddbrequest@ct.gov

Please include a snapshot of the map, your last name, and the subject area town when you e-mail or write. Thank you for consulting the Natural Diversity Data Base.

Coe Hill FSP Map



October 15, 2025

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Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Filing #0 ezFile NDDB System

WILDLIFE IN CONNECTICUT

HABITAT FACT SHEET

Brush Piles

Definition

A brush pile is a mound or pile of appropriate woody material fashioned by piling brush and loose branches on top of a base comprised of larger logs or other natural materials.

Purpose

This practice is used to create cover for many songbirds, small mammals, reptiles, and amphibians when natural cover is limited, such as after clear-cutting. Brush piles provide areas for nesting, resting, escape from predators, and protection from harsh weather conditions.

Criteria, Considerations, and Specifications

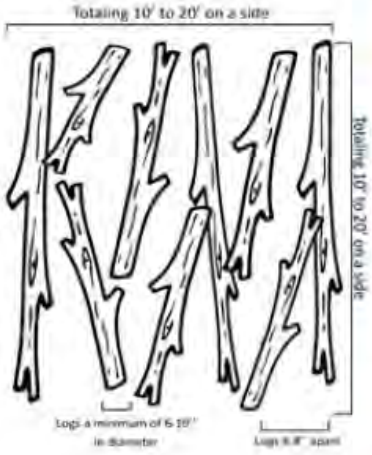
Brush piles may be built to various dimensions based on the size of available material. However, the size should range between 10 to 20 feet on a side and 4 to 8 feet high.

Materials

Brush piles can be constructed using a variety of materials. Commonly, materials left from timber harvesting or any tree-cutting activity are used. Natural features, such as rocks, boulders, and stumps, may also be incorporated.

Construction

1. Base layer:
   a. Logs at a minimum of 6 to 10 inches in diameter are laid at various angles, leaving small openings (6 to 8 inches wide) between base logs for easy wildlife access. Alternate logs to create varying heights and avoid creating parallel runways through the base layer.
   b. Logs of various lengths (that add up to 10 to 20 feet on a side) can be staggered throughout the foundation, with breaks, creating a maze-like environment.
   c. Outer logs should be closer to 20 feet in length to provide stability for the brush pile.
2. A second layer of smaller diameter logs should be laid on top and roughly perpendicular to the first base layer, in the same fashion, and repeated with increasingly smaller logs, building 1 to 3 additional layers.
3. The foundation should be covered with 3 to 6 feet of brush, using small limbs, saplings, loose brush, and pine boughs. Larger branches should cover the foundation, with smaller branches placed on top.



A second layer of logs is laid on top of and roughly perpendicular to the first layer.

CONNECTICUT DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION • WILDLIFE DIVISION

4. Brush should loosely drape over the edges, with openings (6 to 8 inches in diameter) left on the sides in several places for easy wildlife access and escape. Brush should cover the pile sufficiently so that the base is mostly covered. If available on site, add pine boughs, as the needles will persist after deciduous leaves fall off. You should not be able to see through the brush pile even after leaves have dropped from the branches.

NOTE: When constructing brush piles using mechanized forestry equipment, it is not possible to construct piles exactly as described. It is suitable if larger logs are crisscrossed on the base and covered with increasingly smaller logs and finally brush, so long as adequate spaces are left for wildlife to enter and exit the pile.

The foundation should be covered with brush, using increasingly smaller branches on top.

Placement

Several considerations should be made when placing brush piles:

- Multiple brush piles are better than one large pile, providing more opportunities for cover and escape from predators.
- Good locations include adjacent to forest openings, pastures or hay fields; within shrub thickets or fencerows; in field corners; and near stonewalls and wetlands.
- On lands with little natural cover, such as recently cleared areas, begin brush piles within 25 feet of woodland edges and build in towards the center of the habitat patch, resulting in 1 to 3 brush piles per acre, evenly distributed across the project site.
- Place near wildlife food sources, such as mast and fruit trees.
- Avoid placing brush piles on existing high quality food or cover sources.
- Avoid placing brush piles near homes, lawns, or gardens to prevent situations where wildlife could become a nuisance.
- Keep away from buildings due to flammability.
- Cultural resources, such as stone walls, can be incorporated into a brush pile; however, stones should not be moved.

Variations of Brush Pile Base

- Tree stumps still in place can be incorporated into your brush pile base. Several logs (6 to 10 inches in diameter and 5 to 6 feet long) are placed on top of and around the stump.
- Small rock piles should be staggered about 12 inches apart with each pile about 10

Add leafy crowns or pine boughs to the top of the pile.

inches high and 12 inches across to support the next layer of limbs. Existing boulders and rocks on the landscape can be piled together to provide additional den sites. Start with the largest rocks on the bottom of the stack to create hiding places between the rocks, and stack brush on top for additional cover.

Other Types of Cover

(These do not meet criteria for reimbursement through the Natural Resource Conservation Service Program.)

- Living brush pile – in a cluster of small diameter trees, cut each tree half way through at a height of 12 to 18 inches above the ground; fold treetops inwards towards other trees in groups so they rest on the ground or on top of the other half-cut trees.
- Stonewalls – may be incorporated into the brush piles base; brush should be placed against the wall with similar dimensions and distribution to brush piles created in an open space.
- When harvesting trees, leave the crowns of the largest trees (e.g. an oak treetop) for wildlife cover.
- Windrowed brush piles – typically these linear brush piles can best be created after a forestry or tree removal operation. As with other brush pile creation, larger materials should be placed on the bottom at various angles with subsequently smaller material on top. Avoid packing the logs tightly, as this will eliminate any openings for wildlife to enter and exit the linear pile. Windrows should range from 10 to 20 feet on a side and 6 to 8 feet high. Windrows should have breaks built into them every 50 to 100 feet to provide travel lanes for wildlife.

Construction of a brush pile using mechanized forestry equipment.

Operation and Maintenance

- Monitor condition and/or usage of the structure.
- Conduct needed maintenance of the structure, such as periodically adding new material to the top of the pile.

Additional Notes

Brush piles are not permanent. New brush needs to be added over time or new piles may need to be constructed. Rot and decay are natural processes and may attract more insects, providing additional food sources.

Do not use materials that contain toxic substances (i.e. pressure treated lumber/posts, creosote railroad ties, lead painted surfaces, tires, etc.). These substances can cause wildlife mortality either through contact, consumption, or inhalation.

State of Connecticut
Department of Energy & Environmental Protection
Bureau of Natural Resources
Wildlife Division
www.ct.gov/deep/wildlife

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

7/2016

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

Dr. Victoria Lynn Smith, State Entomologist
Department of Entomology
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Spotted Lanternfly (*Lycorma delicatula*)

The Spotted Lanternfly (*Lycorma delicatula)* is an invasive planthopper that is native to China, India, and Vietnam. This insect was first detected in the United States in Pennsylvania in 2014. Since this initial detection, the Spotted Lanternfly has spread and established in multiple surrounding states, including Connecticut. This insect is a nuisance pest for homeowners and poses a threat to Connecticut's grape industry.

Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org

Description:

Spotted Lanternfly (SLF) nymphs have four instar (developmental) stages and can usually be seen between April and October. The first through third instar nymphs are black with white spots; in the fourth instar stage nymphs are red (pictured right).

Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org

Adults can be seen July through November and are generally about an inch long and half as wide when their wings are closed. Their forewings are a tan/grey color with black spots. Their hind wings are bright red with the same black spots, though the hind wings are usually not visible when the insect is feeding or at rest. Spotted Lanternflies have yellow abdomens with black banding.

Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org

Spotted lanternflies lay their eggs between October and December, and the egg

masses can be found through late spring when the eggs start to hatch into nymphs. The egg masses are a discreet gray/brown color and are typically covered in a waxy coating that looks similar to clay or mud.

Emelie Swackhamer, Penn State University, Bugwood.org

Hosts:

The primary host for SLF is the Tree-of-Heaven (*Ailanthus altissima).* SLFs have a number of other host plants including, but not limited to, grape, hops, apple, maple, walnut, and willow. SLF nymphs are more likely to feed on a wide variety of host plants, whereas adults tend to be more selective and will usually feed only from *A. altissima.*

Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org

Damage:

SLF is considered a nuisance pest for homeowners and residents in areas of infestation. The insects stress plants they feed from by sucking sap through their piercing-sucking mouthparts. They also excrete honeydew which encourages the growth of sooty mold and attracts other insects. We encourage Connecticut residents who see SLF to report their findings at Connecticut Spotted Lantern Fly (SLF) Reporting (arcgis.com).

Richard Gardner, Bugwood.org

Information Sources:
Spotted Lanternfly, *Lycorma delicatula*
https://www.invasive.org/browse/subinfo.cfm?sub=77293

https://www.aphis.usda.gov/publications/plant_health/alert-spotted-lanternfly.pdf

November 2024

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Control:

Tree-of-heaven *(Ailanthus altissima)*

MECHANICAL CONTROL: Due to its extensive root system and the ability to aggressively sucker and resprout, eradication of tree-of-heaven is extremely difficult. **The correct timing of the treatment, and follow-up maintenance during subsequent years, are critical to eradication success.**

- **Young seedlings** can be pulled by hand, most effectively when the soil is moist. Care must be taken to remove as much of the entire root system as possible, as broken root fragments will re-sprout. Once plants develop a significant taproot, which can occur within 3 months, they become very difficult to remove. Seedlings can be easily confused with root suckers, which are nearly impossible to pull by hand.
- **Larger trees** may be cut at ground level with power or manual saws. Cutting is most effective when trees have begun to flower (June-early July). A cut or injured tree-of-heaven may send up dozens of root sprouts. At least two cuttings per year may be necessary (one early in the growing season and one late in the growing season) to significantly weaken the plant. Although plants may not be killed after cutting, seed production will be inhibited and vigor will be reduced. **If the cutting process is repeated for many years,** plants will be severely stressed and will likely eventually die.
- **Girdling of the tree trunk** may also be an effective method to reduce vigor or kill large trees. A cut through the bark, approximately 6" above the ground, and cut completely around the trunk, will kill the top of the tree. However, re-sprouts are common, and may require follow-up treatments for several years.

CHEMICAL CONTROL: F ollow label directions when using all chemical treatments. **Below recommendations may require the procurement of a professionally licensed applicator.**

- A foliar spray of glyphosate (after mid-August) or a basal bark application of triclopyr (year-round; best in summer) may be effective. Systemic herbicides are most effectively applied in mid- to late summer (until the onset of fall color), when the tree is moving carbohydrates to the roots. Herbicide applications made outside this late growing season window will only injure above-ground growth. Following treatment, repeated site monitoring and treatment of signs of regrowth is critical to prevent reinfestation.
- **Herbicides applied to foliage, bark, or frill girdles are effective** at controlling tree-of-heaven. Note that cut stump herbicide applications encourage root suckering and are not generally recommended without repeated follow up treatments. Apply all herbicide treatments after July 1, up until the tree begins to show fall color.
- **Tree-of-heaven tends to be more susceptible to triclopyr** than to glyphosate, especially prior to late summer. Where permitted, foliar sprays are effective once the leaves are fully expanded. For larger trees, three approaches are possible: 1) Girdle the tree (see description above), and apply triclopyr in the cut around the trunk; 2) Cut down tree and apply triclopyr into the freshly cut surfaces of the stump; or 3) Cut down tree and spray re-sprouts before they get too tall to correctly spray the top surface. **Extension.UMD.edu has more in-depth chemical control information.**

Well-established tree-of-heaven stands are only eliminated through repeated monitoring and control efforts. Initial treatments often only reduce the root systems, making follow-up measures necessary. **Persistence is the key to success.**

Distribution:

Tree-of-heaven is very common in the Midwest, lower northeast, as well as the west and southwest coast. The plant's ability to thrive in poor soils has allowed for it to spread throughout much of the US.

EDDMaps. 2020. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org.

Other Facts and Background:

Tree-of-heaven is native to China; it was first introduced into the U.S. in the Philadelphia area in 1784. Spotted Lanternfly, an invasive pest, is particularly attracted to tree-of-heaven, making this plant a concern for multiple reasons.

Funds to support the creation of this document were provided by the Crop Protection and Pest Management Extension Implementation Program [grant no. 2017-70006-27201/ project accession no. 1013777] from the USDA National Institute of Food and Agriculture.

USDA NIFA
United States Department of Agriculture
National Institute of Food and Agriculture

SOURCES: cipwg.uconn.edu; extension.psu.edu; cce.cornell.edu; Maryland DNR; nature.org

For more information: ipm.uconn.edu and cipwg.uconn.edu or contact: Victoria Wallace, victoria.wallace@uconn.edu, (860) 885-2826

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Tree-of-heaven *(Ailanthus altissima)*

By Victoria Wallace, Alyssa Siegel-Miles, and Klaudia Sowizral
UConn Extension

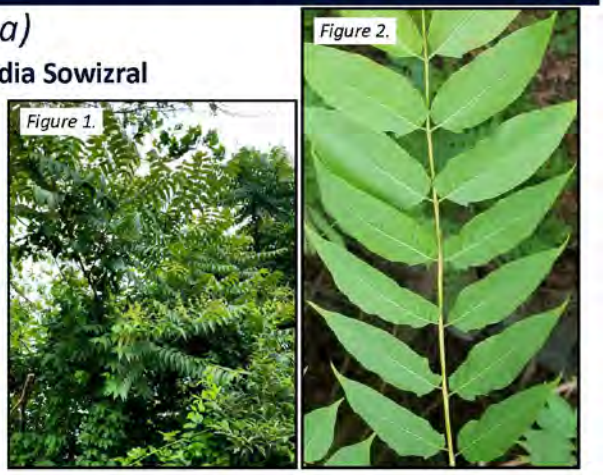
Figure 1.

Figure 2.


Figure 3.


Figure 4.


Figure 5.


Figure 6.

From top: 1) Mature tree of heaven; 2) close up of leaves; 3) spongy brown pith (Photo by Dave Jackson, Penn State Extension) 4) bark (Photo by Ryan Davis, Alliance for the Chesapeake Bay 5) fruit - samaras (photo by Chuck Bargeron, University of Georgia, Bugwood.org); 6) infestation of young plants. Photos by Alyssa Siegel-Miles except where noted.

Identifying Features:

- **OVERVIEW:** Tree-of-heaven grows quickly and can ultimately **reach up to 80-100'** in height (*Figure 1*). **Allelopathic** - chemicals in plant leaves, roots, and bark can limit or prevent the establishment of other plants.
- **LEAVES:** Pinnately compound (central stem with leaflets attached on each side). Overall leaf ranges in size from 1-4' in length. Each leaf has 11-41 lance-shaped leaflets, with **smooth margins (edges)** (*Figure 2*). One to two protruding bumps, called **glandular teeth**, are at the base of each leaflet. When crushed, the leaves and all plant parts give off a **strong, offensive odor**.
- **STEMS:** Alternate on the tree, stout, greenish to brown, and lacking a terminal bud. Stems have **large V- or heart-shaped leaf scars**. **Fuzzy, reddish-brown twigs**, which easily break to expose the large, **spongy, brown center**, or pith (*Figure 3*).
- **BARK:** Smooth and green when young, eventually turning light brown to gray, resembling the skin of a cantaloupe (*Figure 4*).
- **FLOWERS/FRUIT:** Flowering occurs in late May through early June. **Fruits (samaras**, *Figure 5*) **hang in clusters**, turn from green to dull orange/brown color, and are wind dispersed. Trees are either male or female (dioecious).
- **REPRODUCTION/SPREAD:** Female trees are prolific seeders, with the potential to produce more than 300,000 seeds annually. Sprouts as young as two years of age are capable of producing seed. **Aggressive root suckers** also extend the spread as far as 50' from the parent tree, creating **dense colonies** (*Figure 6*) of established trees.
- **Correct identification is critical**; some native trees look similar, including staghorn sumac and walnuts. Staghorn sumac is distinguished by its *size* (10-20'), *serrated* leaf edges, and upright clusters of small fuzzy fruits. Walnuts produce large nuts and leaves lack glands and foul odor.

Habitat:

Tree-of-heaven is not shade tolerant. It is particularly invasive in urban landscapes, right of ways, roadsides, and woodland edges. It establishes quickly, colonizing *primarily* disturbed and neglected areas. The plant is resistant to pollution, can tolerate very poor soils, and can even grow in cracks in pavement, building foundations, and other human-created habitats.

For more information: ipm.uconn.edu and cipwg.uconn.edu or contact: Victoria Wallace, victoria.wallace@uconn.edu, (860) 885-2826

Glossy buckthorn

Rhamnus frangula / Frangula alnus

Fact Sheet

NH Department of Agriculture, Markets & Food, Division of Plant Industry, 29 Hazen Dr, Concord, NH 03301
(603) 271-3488

Common Name: **Glossy buckthorn** Latin Name: ***Rhamnus frangula / Frangula alnus***
New Hampshire Invasive Species Status: **Prohibited** (*Agr 3800*) Native to: **Japan**


leaves (spring)


Glossy buckthorn invasion


Sapling (summer)


Flowers (spring)


Roadside invasion of saplings


Fleshy fruits (fall)


Gray bark w/ lenticels (Summer)


Emodin in berries - effects to birds


Fall foliage (Autumn)

Description: Deciduous shrub or small tree measuring 20' by 15'. **Bark**: Grayish to brown with raised lenticels. **Stems**: Cinnamon colored with light gray lenticels. **Leaves**: Alternate, simple and broadly ovate. **Flowers**: Inconspicuous, 4-petaled, greenish-yellow, mid-May. **Fruit**: Fleshy, 1/4" diameter turning black in the fall. **Zone**: 3-7. **Habitat**: Adapts to most conditions including pH, heavy shade to full sun. **Spread**: Seeds are bird dispersed. **Comments**: Highly Aggressive, fast growing, outcompetes native species. **Controls**: Remove seedlings and saplings by hand. Larger trees can be cut or plants can be treated with an herbicide.

General Considerations

Glossy buckthorn can either grow as a multi-stemmed shrub or single-stemmed tree up to 23' (7 m) tall. Leaves are deciduous, simple, and generally arranged alternately. Leaves are dark-green and glossy above while dull-green below. The leaf margins are smooth/entire and tend to be slightly wavy. Flowers are small, about ¼" and somewhat inconspicuous forming in May to June. They develop and in small clusters of 2-8. Fruits form in mid to late summer and contain 2-3 seeds per berry. In the fall the foliage turns a pale yellow and persists long after most native plants have dropped their foliage.

It is also an alternative host to alfalfa mosaic virus; and crown rust (*Puccinia coronata*) fungi that causes oat rust disease. It has also been linked as a host for the soybean aphid.

Glossy buckthorn is becoming more widespread throughout New Hampshire being spread mainly by frugivorous birds and small mammals. The greatest negative affect of both glossy and common buckthorns is their production anthroquinone, a metabolite occurring in the fruit, bark, and roots. Since berries are essentially the only portion of the plant utilized for food, wildlife foraging in the fall can be exposed to high doses of anthroquinone. Anthroquinone, once ingested, is metabolized into emodin, a laxative. Emodin can have paradoxical effects: in high doses it acts as a cathartic (resulting in moderate to severe diarrhea), whereas at low concentrations/doses it causes retention of stomach/gut contents, both of which cause nutritional deficiencies.

Glossy buckthorn is also one of the first species to invade a forested site where tree and shrub layers have been removed or altered allowing greater levels of light to penetrate to the forest floor. When wildlife that has been feeding on buckthorn fruits seek cover in natural woodland habitats they can create an immense seed bank that lays dormant awaiting for optimum conditions to allow the seeds to germinate. Once they sprout, they grow rapidly and outcompete the desirable forest species allowing it to becoming dominant. Fortunately, Glossy buckthorn seed germination rate is very high and most seeds (in the seed bank) will germinate the first year whereas the second year seedling establishment is significantly diminished.

Control Options

See the following control guides: Integrated Pest Management (IPM) for Woody Plants or the Control of Invasive Species by Numbers

Cutting mature Glossy buckthorn plants down without treating or removing the rooting system will not kill the plant, it will just promote extensive sucker sprouts to develop, which can make the plant stronger.

Glossy buckthorn Rhamnus frangula/Frangula alnus	
Plant Type	Shrub
Habitat Type	Forests, fields, roadsides, wetlands
USDA Hardiness Zone	3-7
Rooting Structure	Fibrous, shallow and extensive
Environmental Impacts	Contains levels of anthroquinone, which when ingested is metabolized into emodin, a laxative.
Wildlife Impacts	Nutritional deficiencies in birds and small mammals
Leaf arrangement	Alternate
NWI Ranking	FAC
Soil Type	
Soil pH Range	?
Light Requirements	Prefers partial to full sun, shade
Growing Season	
Growth Rate	2 to 4 feet (0.6-1.2 m) per year
Mature Height	10 ft. (3m)
Life Span	Moderate
Reproductive Age	2 years
Flowering Period	April-June
Flower Type	Dioecious
Pollination	Insects
Seed Set	July - August
Seed Per Plant	15,000 -54,000
Scarification Required	No
Cold Stratification	Yes
Seed Longevity	2-6 years
Seed Germination Rate	91%
Seedling Density	?
Other Propagules	Layering, suckering
Dispersal Vectors	Wildlife, water

Sources

Mehrhoff, L., 2001. Invasive Plant Atlas of New England, Catalog of Species, http://www.eddmaps.org/ipane/ipanespecies/shrubs/frangula_alnus.htm

USDA Forest Service invasive species website: http://www.fs.fed.us/database/feis/plants/shrub/fraaln/all.html

Invasives.org: http://www.invasive.org/browse/subinfo.cfm?sub=5649&desc=17

Bugwood: http://wiki.bugwood.org/Frangula_alnus

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INVASIVE PLANT FACTSHEET

Asiatic bittersweet *(Celastrus orbiculatus)*

By Victoria Wallace, Alyssa Siegel-Miles and Klaudia Sowizral
UConn Extension

Identifying Features:

- **OVERVIEW:** Deciduous woody vine that climbs, suffocates and strangles other plants. Vines can grow up to 60 ft tall and 4 in. in diameter (Figure 1). Also known as Oriental bittersweet.
- **LEAVES:** Alternate, 1-4 in. long, elliptical to circular (Figure 2). Pointed or round tip, bluntly toothed margins, glossy (not hairy). Yellow in autumn.
- **STEMS: Green when young** (Figure 3), maturing to tan. Climb for support, lack tendrils, and have obvious **lenticels** (raised pores). Bark is tannish and furrowed.
- **FLOWERS:** Small and greenish (Figure 3), blooms in May-June. Male and female flowers usually occur on separate plants. Flowers grow among the leaves at leaf axils (in contrast to native bittersweet's flowers/fruit, which are found only at twig tips).
- **SEED/FRUIT:** Small, globose, with a green casing that matures to yellow; casing splits open to reveal red berry-like fruit (Figure 4). Fruit is poisonous to humans, but eaten and dispersed by birds. Fruit persists through winter.
- **ROOTS:** Orange roots that sucker aggressively, especially when the plant is cut at the soil line or pulled without removal of all roots.
- **REPRODUCTION**: By seed. Also spreads vegetatively by spreading underground roots that form new stems.

Habitat:

Asiatic bittersweet grows in a wide variety of habitats, including rocky slopes, grasslands, beaches, and flood plain forests. Although it thrives in full sun locations, seedlings are extremely shade-tolerant. It is most commonly found in open woodlands, abandoned fields, forest and woodland edges, and roadsides, where Asiatic bittersweet can outcompete other vegetation, twining around and strangling trees (Figure 5).


Figure 1.


Figure 2.


Figure 3.


Figure 4.


Figure 5.

From top: 1) mature twining vines; 2) unripe fruit and foliage; 3) foliage and stems close up with emerging inconspicuous flowers; 4) mature, split open fruit; 5) bittersweet has overwhelmed and strangled these trees. Photos by Alyssa Siegel-Miles.

For more information: ipm.cahnr.uconn.edu and cipwg.uconn.edu or contact: Victoria Wallace; victoria.wallace@uconn.edu; (860) 885-2826

Control:

MECHANICAL CONTROL:

- Seedlings/very young plants can be pulled or removed. **Routine monitoring for seedling emergence** is critical. Seedlings are easiest to remove when the soil is moist and the population is small. Pull steadily and slowly to minimize soil disturbance. Tamp down the soil after plants are removed.
- **Bittersweet's deep root system** often makes pulling or torching impractical for any plant larger than a seedling. It is not recommended to pull established plants or cut them at the soil line, as this action stimulates the roots to resprout, forming new (clonal) plants and intensifying the infestation.
- **Repeated cutting of bittersweet at 1-2 ft.** above the soil line exhausts the plant's energy reserves. Plants will resprout from the nodes below the cut rather than from the soil line. Cut at 2 ft for the first cut; subsequent cuts may be at 1 ft. Repeated cutting (at least 1-3x/year, for multiple years, depending on the size of the plant) at the 1-2 ft. line weakens the plant to the point that a small to medium sized plant may be easily pulled from the soil. This cutting process also **reduces the vine's ability to climb and wrap itself around trees and shrubs.** Cut vines that are left hanging in the canopy will eventually deteriorate. Commitment and follow through are required to achieve control. Mechanical control may need to be combined with chemical controls for larger plants or larger populations.

Figure 6. This bittersweet has resprouted after it was cut at the two-foot line. Cutting at this height prevents the plants from forming suckers from the roots and weakens the plant over time.

CHEMICAL CONTROL: Follow label direction when using all chemical treatments.

- Glyphosate or triclopyr can be **painted on cut stems in late summer or applied as foliar sprays**. Glyphosate is most effective for cut surface treatment while plants are fully leafed and actively growing. When using a non-selective foliar spray, care must be taken to avoid injury to neighboring plants. Visit Michigan Dept. of Natural Resources for more details.

DISPOSAL OF REMOVED PLANTS: Plant material with fruit present should be burned or bagged and disposed of in municipal waste. Plant parts without fruit should be placed in the sun to dry and may be put in a compost or mulch pile, provided that care is taken to ensure that all removed plant parts are dead and no fruit is present.

Distribution:

Asiatic bittersweet is found mostly in the northeast regions of the U.S., including all the New England states. Outbreaks are found as far west as Minnesota and in some southern states.

EDDMapS. 2024. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org/; last accessed June 7, 2024.

Other Facts and Background:

Asiatic bittersweet is native to Eastern Asia, including Japan, China, and Korea. It was originally introduced to the U.S. as an ornamental and for erosion control. In CT, its movement as well as its sale is prohibited. **Do not buy or make wreaths of the fruit of these vines.**

SOURCES: Connecticut Invasive Plants Council. (2018, October). *Connecticut Invasive Plant List*. https://cipwg.uconn.edu/wp-content/uploads/sites/244/2023/04/CT-Invasive-Plant-List-2018_Scientific-Name.pdf.

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Japanese knotweed *(Fallopia japonica, syn. Polygonum cuspidatum)*

By Victoria Wallace, Alyssa Siegel-Miles, and Klaudia Sowizral, UConn Extension

Identifying Features:

- **OVERVIEW:** Perennial, herbaceous. Shrubby in appearance (Figure 1). Height 6-15 ft, with a deep taproot. **Allelopathic** (releases chemicals that can inhibit the growth of neighboring plant species).
- **LEAVES:** Simple, alternate; 4-6 in long, 3-5 in wide. **Broadly ovate** (broad and rounded or squared at the base); come abruptly to a point (Figure 2). **Emerges in early spring**, initially appearing visually similar to rhubarb or bamboo, then **unfurls with distinctly triangular**, bright red-purple leaves that turn green over time.
- **STEMS:** Smooth, **noticeably jointed and with reddish-purple mottling at nodes** (Figure 3). **Ocrea** (thin sheath) present at nodes, where the stem is swollen. **Hollow between nodes**. Covered in a fine whitish coating that easily rubs off.
- **FLOWERS:** Small white/cream colored flowers occur in **lacey, 3-4 in long clusters** at the upper leaf axils along the length of the stem in late August-Sept. (Figure 4).
- **SEED/FRUIT:** Dark brown, glossy, tiny seeds are enclosed in 8-9 mm long, three-winged achenes (papery fruits). Can be dispersed by wind, water, transported soil, birds, or insects. Dioecious.
- **ROOTS:** Deep taproot and extensive rhizomes (underground stems). Up to two-thirds of the plant's biomass exists underground (fs.fed.us).
- **REPRODUCTION/SPREAD:** Primarily vegetative by rhizomes, and, to a lesser extent, by seed. Extensive network of rhizomes quickly crowds out surrounding vegetation. Easily regenerates/forms clonal shoots from small pieces of rhizome or root tissue.


Figure 1.


Figure 2.


Figure 3.


Figure 4.

From top: 1) An infestation of Japanese knotweed along a roadside. 2) Close up of foliage. 3) Juvenile stems. 4) Close up of flowers. 5) Arrows indicate the ideal location to cut stems multiple times during the growing season for mechanical control. Photo by Petie Reed, Source: Kathy Connolly. Photos by Alyssa Siegel-Miles except where noted.

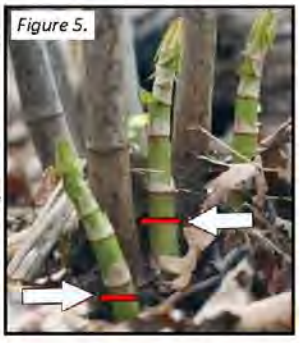
Figure 5.

Habitat:

Japanese knotweed thrives in disturbed areas, along roadsides, and on stream or river banks, forming dense thickets that pose a significant ecological threat to riparian areas. Its ability to rapidly colonize an area threatens native vegetation and can greatly alter natural ecosystems. It can grow well in full sun, deep shade, soils of high salinity, and extreme drought. It can also survive severe floods. Its extensive root system has been known to penetrate asphalt and cracks in concrete.

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Control:

Prevention is key: early detection and rapid response are the most effective means of Japanese knotweed management.

MECHANICAL CONTROL:

- **Cut plants with pruners or loppers three times per year**, in May or early June, mid-July, and late August before flowers appear. **The third cut should be completed before fall** (by August 31 is recommended) to prevent the movement of the plants' energy from its leaves to its rhizomes. **Each stem should be cut below the lowest node** (refer to Figure 5, page 1). **Repeat this process for a minimum of three years.**
- Place all removed plant material in heavy duty contractor bags and dispose of in regular trash. **Do not place any cut plant material in a compost pile or leave on site. Rhizome fragments left on the ground can easily resprout.**
- **Follow-up maintenance for multiple years is critical to eradication success and to eliminate sprouting from all rhizomes,** which may produce new shoots for three years. Refer to Nip the Knotweed for more details.
- **Digging and hand-pulling of established plants are NOT recommended** as new shoots can easily form on root and rhizome fragments. (Hand-pulling is recommended for very young plants only.)
- Stem cutting efforts can be combined with shading (black or clear plastic) or a chemical application.

CHEMICAL CONTROL: *Follow label instructions for any chemical application.*

- Herbicides (e.g., glyphosate with a surfactant or triclopyr) **can be applied on leaf surfaces with sprayers, painted on cut stems, or administered via stem injection.**
- **Applications are recommended in late summer before flowering or just after flowering up until the first killing frost** (September-November). **Do not spray when plants are flowering**; many pollinators feed on the flowers.
- **Recommended protocol:** Cut or mow the plant to 2-3 in during mid-late spring (May-June) to prepare for a planned foliar treatment in late summer or fall. Cutting the plant in spring reduces plant height at the time of spraying, enabling better control of the spray, decreases the amount of product needed, and delays flowering so that plants can be sprayed in August without risk of harm to pollinators.
- **Follow-up treatments, the following year, are essential** to managing populations of Japanese knotweed, and should be timed after July 1st, similar to the initial treatment. Following year two, chemical treatments may be repeated every two years.
- Refer to New Hampshire Department of Agriculture or Michigan Extension for more details.

After cutting or chemical control (year two), replant with native species to minimize knotweed re-establishment.

Distribution:

Japanese knotweed is found throughout much of the U.S., especially in the Northwest, the Northeast, and the Northern Midwest.

EDDMapS. 2024. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org/; last accessed June 7, 2024.

Other Facts and Background:

Japanese Knotweed is native to Eastern Asia, including China, Japan and Korea. It was introduced to the U.S. as an ornamental in the late 1800s and was initially used for erosion control. Its population spread rapidly and was noted as a problematic species by 1930. The plant is reported to have medicinal applications.

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United States Department of Agriculture National Institute of Food and Agriculture

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Multiflora rose *(Rosa multiflora)*

By Victoria Wallace, Alyssa Siegel-Miles, and Klaudia Sowizral, UConn Extension


Figure 1.

Identifying Features:

- **OVERVIEW:** Multiflora rose is an invasive shrub that grows to 10-15 ft tall and 9-13 ft wide (Figure 1), forming impenetrable thickets.
- **LEAVES:** Compound, with 5-11 (usually 7-9) leaflets (Figure 2). Leaflets are dark green and smooth on the upper surface; paler with short hairs on the underside. The **base of each leaf stalk bears a pair of fringed stipules** (Figure 3), which distinguish multiflora rose from native rose species.
- **STEMS:** Juvenile stems are green with red thorns, which mature to brown (Figure 4). Arching branch habit allows tips of stems to bend to the soil surface, where they can take root and form new (clonal) plants.
- **FLOWERS: White to pinkish five-petaled flowers, which open in May and June**; 0.5 to 1.5 in. in diameter (Figure 5). **Occur in branched clusters.**
- **SEEDS:** Tan to yellow; up to .16 in. **Seed germination rates are high** - up to 90% in the absence of drought and stress. Seed remains **viable for up to 20 years.**
- **FRUITS:** Bright red, smooth hips (Figure 6). Fruits form in clusters after flower blooms during the summer and persist on plant through the winter.
- **REPRODUCTION/SPREAD:** Plants can produce up to 500,000 seeds per year, which are eaten and spread by birds. Can also reproduce vegetatively from the canes (layering) and root sprouts.


Figure 2.


Figure 3.


Figure 4.


Figure 5.


Figure 6.

From top: 1) mature plant; 2) young compound leaves; 3) stipules; 4) juvenile vs. mature stems (photo by James H. Miller, USDA Forest Service, Bugwood.org); 5) flowers (photo source: Penn State Extension; 6) mature fruit. Photos by Alyssa Siegel-Miles except where noted.

Habitat:

Multiflora rose thrives in full sun and well-drained, infertile soils. It is known to proliferate in pastures, field edges, and along roadsides. Multiflora rose can also persist in part shade, although flower and fruit production is less abundant.

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Control:

A combination of control tactics is necessary to manage this plant. The optimal time for eradication success is right before the plant flowers. **A long-term management plan, including continued follow-up maintenance, is critical to prevent reinfestation or new establishment by seed.**

MECHANICAL CONTROL:

- Pulling, digging, cutting, and mowing may be viable components of a control strategy. **Seedlings may be hand pulled**. Small plants may be removed by digging, **ensuring that the entire root crown is extracted to prevent regrowth**. Cut back top growth of established plants to enable easier removal of the root crown (e.g., with a brush mower). Utilize tools (e.g., Weed Wrench, Extractigator) to facilitate the removal of larger specimens.
- Cutting should be done monthly, beginning early in the season. Repeated mowing, with **six or more cuts per year near the ground for two to four years**, will weaken the plant, inhibit flower and fruit production, and may eventually kill small infestations. Cutting is usually performed in combination with another form of control (e.g., chemical) for greater efficacy.

CHEMICAL CONTROL: ***Follow label instructions for any chemical application.***

Cutting or mowing large infestations before any herbicide applications is recommended: it will stress the plants, which will increase herbicide effectiveness.

- **Cut stump:** Immediately after cutting, apply a systemic herbicide (e.g., glyphosate or triclopyr) to freshly cut stems or stumps with a paint brush or sponge applicator. Treatment can be applied anytime during the year when the plant is actively growing; greatest effectiveness will occur in July to mid-September. For best results, cut plants to 6-12 in. in March-June and allow them to resprout. Cut them again to 1 in. and apply herbicide to the cut stumps in July to mid-September.
- **Foliar:** A systemic herbicide can be applied directly to foliage from July to September. After initial mowing, allow the plant to regrow; apply foliar treatment once regrowth has reached 2-3 ft.
- Refer to Penn State Extension for more details.

Distribution:

Multiflora rose is widespread in the northeast United States, the Midwest, and southeastern states, with scattered infestations in California and Oregon.

EDDMapS. 2024. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at www.eddmaps.org/; last accessed June 7, 2024.

Other Facts and Background:

Multiflora rose is native to China, Japan, and Korea. The plant was introduced to the United States in the 1860s for its ornamental value, was routinely used as root stock for rose breeding programs, and was promoted by the USDA Soil Conservation Service for erosion control. It was frequently used as a 'living fence' and touted as a food and cover source for wildlife. By the 1960s, the invasive properties of the plant were well established and the overall effect of the plant on habitat value was determined to be negative.

Sources: Connecticut Invasive Plants Council. (2024, October). *Connecticut Invasive Plant List*. https://cipwg.uconn.edu/invasive_plant_list

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INVASIVE PLANT FACTSHEET

Japanese honeysuckle *(Lonicera japonica)*

By Victoria Wallace, Alyssa Siegel-Miles, and Klaudia Sowizral, UConn Extension

Identifying Features:

- **OVERVIEW:** Japanese honeysuckle is an aggressive invasive woody vine that climbs, suffocates, and strangles other plants (*Figure 1*). Vines can grow 80-120 ft. Deciduous in colder climates; evergreen in moderate to warmer areas.
- **LEAVES: Opposite**, ovate, 1.5-3 in long (*Figure 2*). Slightly glossy on upper sides of leaf, slightly hairy on underside. Margins are untoothed. Juvenile leaves may be lobed. **Paired leaves are not fused at the stem.**
- **STEMS:** Juvenile stems are reddish. Stems and petioles are variably pubescent (fuzzy). Older stems are hollow and brown, with bark that peels in strips. Stems can grow up to 2 in thick.
- **FLOWERS: Tubular and bi-lobed** (4 of the 5 petals are joined for most of their length above the flower tube). Occur in June-July. **Flowers are fragrant, white, fading to yellow** (*Figure 3*), and **paired at the leaf axis** (where leaf stem attaches to vine). Each pair of leaves has 2 flower stems, with 2 flowers each.
- **SEEDS:** Germinate after soil disturbance.
- **FRUITS: Berries are dark purple to black** (*Figure 4*). Fruiting occurs in September through November; fruits can persist through the winter. Each fruit is 2-3 mm wide and contains 2-3 seeds.
- **REPRODUCTION/SPREAD:** By seed, which are eaten and dispersed by birds and small mammals. Vines also reproduce vegetatively via underground shoots (rhizomes), sprouts from the root crown, and aboveground runners that root at the nodes and can grow more than 10 ft/year.

From top: 1) Japanese honeysuckle infestation smothering a tree; 2) foliage; 3) mature flowers; 4) leaves and fruit. Photos by Alyssa Siegel-Miles.

Native Alternatives and Look-Alikes:

Coral honeysuckle (*Lonicera sempervirens*) is an excellent native alternative. Japanese honeysuckle has many look-alikes, which makes proper identification crucial. Common vining plants in the *Lonicera* genus, which can be mistaken for Japanese honeysuckle, include grape honeysuckle (*L. reticulata*), yellow honeysuckle (*L. flava*), hairy honeysuckle (*L. hirsuta*) and red honeysuckle (*L. dioica*). **The common look-alikes feature clusters of many flowers, paired leaves fused at the stem, and bright red and orange fruit. Japanese honeysuckle can be differentiated by its dark colored fruits and the absence of any pairs of fused leaves**.

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CONNECTICUT INVASIVE PLANT WORKING GROUP

INVASIVE PLANT FACTSHEET

Japanese Honeysuckle

(Lonicera japonica)

Control:

MECHANICAL CONTROL:

- **Seedlings and small infestations may be hand-pulled. The entire root system must be removed** to prevent regrowth. Pulling and digging are preferable prior to fruit production. Digging is most effective when the soil is moist. **Frequent monitoring and repeated removal** are necessary to prevent reestablishment. Note that pulling or digging plants causes soil disturbance, which can stimulate germination of the seed bank.
- **Periodic mowing** (at least twice a year, in mid-July and mid-September) may slow the plant's spread. **Vines can be cut** to prevent climbing, girdling, and killing of any plants in which they are established. Avoid pulling cut vines if entangled in fine twigs. Note that cut plants will resprout; cutting or mowing may increase plant density if not supplemented with another form of control.
- For effective control, **mechanical treatments should be supplemented with chemical control**. Follow up treatments may be required for several years.

CHEMICAL CONTROL: *Follow label instructions for any chemical application.*

- **A foliar spray** of glyphosate or triclopyr can be applied from spring through fall. **Repeat applications are often required**. Treatment in the fall, after the first frost, when many non-target plants are dormant, is recommended.
- **Cut stem treatment**: A 25% glyphosate or triclopyr solution can be applied to cut stem surfaces any time of year as long as the ground is not frozen.
- Where foliage is evergreen in moderate and warm climates, **there may be opportunity to apply herbicides in late fall or winter**, when many native species are dormant. For effective herbicide control, healthy green leaves must be present at application time and temperatures must be sufficient for plant activity. Refer to Plant Conservation Alliance's Alien Plant Working Group for more details.

Distribution and Background:

Japanese honeysuckle is widespread in the Eastern United States from Maine to Florida, as well as the Midwest, Southeast U.S., California, and Nevada. It was first introduced to the U.S. in Long Island, New York, in 1806, for its perceived ornamental, erosion control, and wildlife value.

EDDMapS. 2020. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org.

Habitat:

Japanese honeysuckle grows in a variety of soil conditions. It thrives in full sun and is also shade tolerant. It proliferates in disturbed areas, including fields, forests openings, and woodland edges. The fast-growing vine climbs surrounding trees and other vegetation, killing plants by girdling, smothering, or causing them to collapse under their weight. Japanese honeysuckle is sensitive to dry conditions and low temperatures, which may limit northern and westward spread.

Funds to support the creation of this document were provided by the Crop Protection and Pest Management Extension Implementation Program [grant no. 2017-70006-27201/project accession no. 1013777] from the USDA National Institute of Food and Agriculture.

USDA NIFA
United States Department of Agriculture
National Institute of Food and Agriculture

SOURCES: cipwg.uconn.edu; nrcs.usda.gov; plants.ifas.ufl.edu; invasive.org; extension.psu.edu

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INVASIVE PLANT FACTSHEET

Common mugwort *(Artemisia vulgaris)*

By Victoria Wallace, Alyssa Siegel-Miles, and Klaudia Sowizral
UConn Extension

Identifying Features:

- **OVERVIEW:** Perennial. Height 2-5 ft. tall. Aggressive establishment and colonization in roadsides, right-of-way areas, and disturbed and uncultivated areas (Figure 1). Laboratory studies have found the presence of chemicals that could potentially suppress the growth of nearby plants.
- **LEAVES:** Alternate, papery, with large pinnate lobes (Figure 2). **Green on upper surface (Figure 3), while undersides are covered with dense white to gray hairs.** Foliage is **aromatic**, with a chrysanthemum or sage-like odor. Leaves emerging from ground have shallower and broader lobes, whereas leaves on mid and upper portion of the plant have lobes that are more linear and deeper.
- **STEMS:** Purplish-brown, branched, and covered with short hairs.
- **FLOWERS:** Inconspicuous flowers that lack petals. Occur in small terminal clusters (at the tops of stems). Yellowish, 2.5-3 mm long; composed of many disk flowers clustered onto a flat head (Figure 4).
- **FRUIT:** Single seed enclosed in a brown achene. Oblong with a narrow base, with small bristles at the tip.
- **REPRODUCTION/SPREAD:** Spread primarily by **aggressive rhizomes** (horizontal underground stems) (Figure 5), which form large, fast-spreading patches. Can also reproduce by seed. Some seeds will sprout when bare, disturbed ground is available to form new colonies.


Figure 1. Roadside colonization in spring


Figure 2. Growth habit


Figure 3. Foliage


Figure 4. Flowers

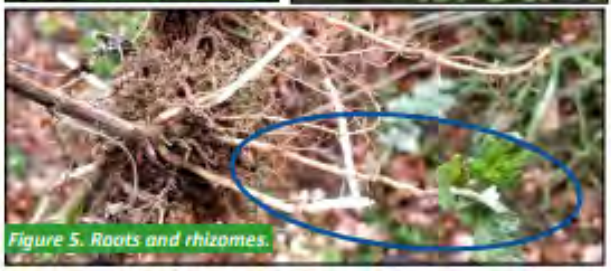
Figure 5. Roots and rhizomes.

Figures 1-3 and 5-6 by Alyssa Siegel-Miles; Figure 4 by Radio Tonreg, North Carolina Extension.

Habitat:

Mugwort does well in partial to full sun and moderately dry to mid-moisture soils. It does not persist in wet soils, as it is susceptible to root rot. The plant is frequently found in high elevation areas, disturbed habitats, meadows, valleys, and roadsides.

Control:


Figure 6.

MECHANICAL CONTROL:

- To prevent seed dispersal, **mow from early summer to mid-September**, before seedhead production or before seed has matured. The first two weeks of September are the best time to mow. Cut immature seeds will not mature into viable seed. Mowing after seed has matured, from mid-fall through winter, is not recommended, as it would disperse mature, viable seed. If mowing after the second week in September, collect and bag mugwort cuttings, if possible.
- When possible, **hand pulling very young plants** in spring or early summer, before formation of rhizomes, may keep spread of populations in check and prevent establishment of new colonies. Scouting and prompt removal is essential.
- A heavy-duty landscape fabric or other impenetrable mulch can be used to smother mugwort. May require combination with other control methods to be successful.
- Since mugwort seeds sprout wherever there is exposed bare ground, **stabilization and re-seeding of bare soil on roadsides** with a grass cover will reduce establishment of mugwort populations.

CHEMICAL CONTROL: Follow label direction when using all chemical treatments.

- **Timing of any chemical control is critical. Follow label instructions.** The dense hairs on the mugwort leaf (Figure 6) make herbicide penetration difficult. A surfactant may be needed.
- **Foliar spray** of glyphosate applied in late summer or early fall will suppress mugwort the following year, but not necessarily eradicate it. More selective herbicides, such as triclopyr and clopyralid, effectively control mugwort.
- Consulting with or hiring a licensed pesticide applicator is recommended.

Refer to CIPWG's Invasive Plant Management Calendar

Distribution:

Common mugwort is found throughout much of the northeast, extending west to Minnesota and south to scattered areas in Florida. Many counties in Oregon and Washington have also reported large populations.

EDDMapS. 2024. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org/; last accessed June 7, 2024.

Other Facts and Background:

Common mugwort is native to Europe and Eastern Asia. Mugwort was brought into North America as early as the 1600's for medicinal purposes. It spread throughout the Northeastern U.S. as a contaminant on ships and nurseries. Mugwort pollen is a common cause of allergies and hay fever, wherever abundant. The plant is a common ingredient in many products, including insect repellents.

SOURCES: Chandran, R. (Reviewed 2019, June). *Mugwort*. West Virginia University Extension. https://extension.wvu.edu/lawn-gardening-pests/weeds/mugwort

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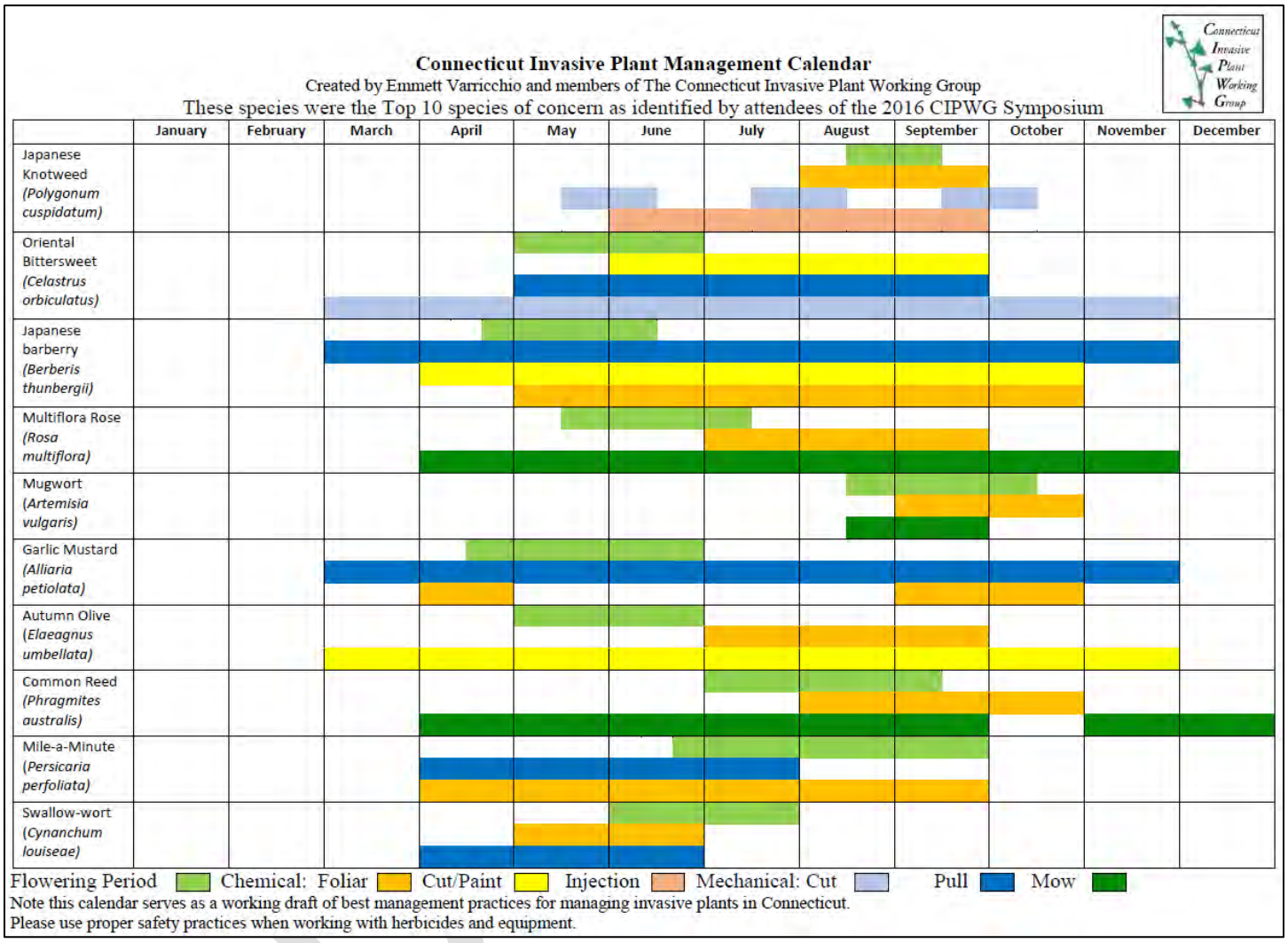
APPENDIX H – Connecticut's Invasive Plant Management Calendar



This was an abridge presentation, the full presentation can be found here:

https://cipwg.uconn.edu/wp-content/uploads/sites/244/2018/10/Invasive-Plant-Management-Calendar.pdf

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