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A FOREST OWNERS' COOPERATIVE ASSOCIATION ENGAGED SINCE 1945 IN THE STEWARDSHIP OF FORESTS FOR WOOD, WATER, WILDLIFE, RECREATION, AND AESTHETICS.

FOREST STEWARDSHIP PLAN:

MILL BROOK TRACT

0 KATE DOWNING CONSERVATION AREA & PARK

TOWN OF PLAINFIELD: RECREATION DEPARTEMNT

~162 ACRES IN PLAINFIELD, CT
2023 – 2033

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GENERAL INFORMATION

Date Prepared:

May 2022 (Fieldwork)

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Signatures:
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Nathaniel Gosselin, Connwood Foresters, Inc.

As the authorized signer for the Town of Plainfield, I have reviewed this management plan with my forester, and I understand the contents and agree that it reflects the Town of Plainfield's goals and intention for the management of this property.

Property Owner: _____ **Date:** 1-23-23
Authorized Signer, Town of Plainfield

INTRODUCTION

Upon request by the Town of Plainfield, Connwood Foresters Inc, has prepared a ten-year (2023-2033) forest stewardship plan for the conservation area/park at 0 Kate Downing Road in Plainfield, CT. An inventory of the 0 Kate Downing Conservation Area/Park (KDP) property was conducted in May of 2022 in order to determine what management objectives are feasible and how best to implement these objectives through a natural resource stewardship plan. We will outline in this document broad landscape features and how this property fits into the surroundings, and for specific management recommendations the property will be broken down into the stand scale.

THE STEWARDSHIP OBJECTIVES ARE (NOT IN ORDER OF IMPORTANCE**):**

1. Water Quality
2. Soil Protection and Erosion Control
3. Forest Resiliency Pertaining to Climate Change
4. Wetland Conservation and Protection
5. Protection of Cultural Features
6. Controlling and Management of Pests/Invasive Species
7. Forest Resiliency Pertaining to Forest Diversity
8. Forest Management for Fish and Wildlife
9. Recreational Development

Without management, forests provide significant public services by regulating flood waters, increasing the storage capacity of the watershed, filtering, and infiltrating runoff to the water table, storing atmospheric carbon, and producing oxygen. Regardless of forest size, position in the landscape, or community type, each forested tract impacts human health. Whether humans choose to identify themselves as part of the natural community surrounding them or as separate, a healthy forest provides goods and services to society. Forest management is grounded in science by identifying and quantifying forest community types. The forest as a community type provides habitat, wildlife food sources, nutrient cycling, and countless other services, not directly serving humans, but important none the less. After assessing forest community type and structures, silvicultural treatments can be applied to mimic natural disturbances. This "natural disturbance" based activity regime allows the landowner to establish, enhance, or maintain structures and characteristics that achieve the management objectives.

This forest stewardship plan provides an organized and effective approach for the long-term protection and use of the forest resources. The plan summarizes the major management themes, feasibility of objectives, and a full account of the resources used to develop these recommendations (appendices.) The inventory of the forest allows the forester to field verify conditions and document information regarding the objectives. This data provides the basis for the recommendations

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 valid and others become critical. Please note that while these management activities are spaced out over ten years, order and timing can be rearranged to facilitate need and forest conditions as they change.

Resource concerns observed are:

1) *Growth and establishment of non-native invasive vegetation*
2) *Lack of growing space for the most desirable trees*
3) *Lymantria (Spongey Moth) – Drought mortality in oak overstory*
4) *Significant area of uniform structure*
5) *Residential development, fragmentation, and loss of forest*
6) *Lack of forest management throughout the watershed*

REGIONAL CONTEXT

The Kate Downing Conservation Area/Park (KDP) consists of about 160 acres in eastern Connecticut. The property is located between Kate Downing Road, Governor John Davis Lodge Highway (I-395), and the Mill Brook in the town of Plainfield, Windham County. The property is about 2.2 miles south (driving) of the Plainfield Town Hall. This acreage again is quite small compared to the town or county, but it is clearly at the western boundary of the Mill Brook and eastern boundary of the Havey Brook Watershed. Since in a county made up of over 333,440 acres, this parcel is only 0.047% of that total area, we would like to propose the watershed scale, in this case two watersheds, to keep the property in context of about 2000 acres (please see the watershed/land use map). Watershed area and location was calculated using the StreamStats program available on the USGS website. The watershed area (that includes the entire property) is approximately 5,076 acres. This is defined by regional topography and originates just east of the northeastern edge of the property at Kate Downing Road. Additionally, to cover the western portion of the property and the drainage area which flows westerly to west of I-395, at a Havey Brook confluence, a starting point was determined. The watersheds are within the Town of Plainfield and south to Griswold. It is an important flood water area for the Mill Brook and Havey Brook, acting as a multi-layered, bottom land obstacle to channelization. The impact of precipitation interception and increased time of concentrations of this open space area makes this a very important open space parcels for protecting upgradient infrastructure.

Throughout Connecticut, as farmland gets abandoned and reforested, total area of forest versus forest lost to development tends to remain equal. Reforestation of farmland is a finite reservoir of future forestland, and development pressures will likely increase proportionately to increasing population. Windham County has experienced a very slow population decrease from 2012, after averaging 6,000-16,000 people growths per decade from 1960 on. In2021, 158 building permits were issued, and from 2019 data the county has a median age of 41.2 for residents and estimates around half the population being employed.

Area of Timberland by Forest-type Group and County
(in thousands of acres)

County	White and red pine	Oak and hickory	Elm, ash, red maple	Northern hardwood	Other types[1]	All types
Fairfield	6.9	49.0	11.1	25.2	0.0	92.2
Hartford	11.7	105.6	26.7	66.4	20.0	230.4
Litchfield	53.9	177.6	25.3	162.5	7.2	426.5
Middlesex	1.7	99.4	19.6	42.0	0.0	162.7
New Haven	9.8	67.1	14.5	52.4	0.0	143.8
New London	3.5	172.5	35.0	42.1	9.3	262.4
Tolland	14.1	84.5	11.8	62.8	5.6	178.9
Windham	12.0	120.2	15.5	31.3	20.1	199.0
Total, all counties	113.7	875.8	159.6	484.7	62.3	1,696.1

[1]Includes spruce/fir (7.0 thousand acres in Litchfield County), hard pine (5.9 thousand acres in New London County), oak/pine (24.2 thousand acres in Hartford, Litchfield, New London, and Windham Counties), and aspen and birch (25.2 thousand acres in Hartford, Tolland, and Windham Counties).

(Wharton et al, 2004)

Windham County contains forth most (of 8) of counties for forest area with a majority as Oak/Hickory. As with the entire state, Windham County has had a steady decline is forest land tract size, with an exponential increase in ownership. The main value of this property is as a large undeveloped tract (along with it's neighbors) which limits the contribution of "edge habitat," the diversity loss due to fragmentation, and invasive species mobility (Butler et al, 2007). The intermediate sized contiguous/abutting parcels like Pachaug Outdoor Club, Inc. and other private owners create a contiguous undeveloped corridor along the Mill Brook. The forested parcels are mostly surrounded by boxy one- and one-half acre residential properties with larger road frontage or two to four acres residential properties with minimal road frontage and long thin shapes. You can see this pattern of road development along Kate Downing Road and Lathrop Road. Both development patterns expand the edge created by roadways and increase fragmentation, force all forest to be contained within or behind private development making forest management near impossible, and are considered low density inefficient uses of land. Although development along roadways cannot be fixed, acquisition of larger tracts by the Town of Plainfield, State of Connecticut, and other outdoor organizations or institutions can yield a connected landscape. Public ownership of this property, either as working forest or a park, is one of the only known tools to maintain large tracts of forest.

The conservation of open space parcels, like this one, is essential for Plainfield and Windham County, to retain its character and appeal as a rural town in Connecticut. The potential for community maintained trail infrastructure, integrating long term active management with recreation, and protection from development makes this a high priority property.

Utilizing the Land Use and Land Cover data from NOAA Data Access viewer, the following table outlines KDP property relative to the watersheds:

LULC	LULC - Name	Watershed Area (ac)	Percent of Watershed (%)	Conservation Area (ac)	Percent of Watershed (%)
2	Impervious	129.79	3.42	0.05	0.04
5	Developed, Open Space	236.53	6.24	0.05	0.02
6	Cultivated Land	106.54	2.81	0.00	0.00
7	Pasture/Hay	43.02	1.13	0.00	0.00
8	Grassland/Herbaceous	104.56	2.76	1.45	1.39
11	Mixed Forest	2596.38	68.50	135.05	5.20
12	Scrub/Shrub	19.72	0.52	1.35	6.84
13	Palustrine Forested Wetlands	433.25	11.43	21.48	4.96
14	Palustrine Scrub/Shrub Wetland	8.60	0.23	0.46	5.37
15	Palustrine Emergent Wetland (Persistent)	61.48	1.62	1.84	3.00
20	Unconsolidated Shore	10.58	0.28	0.00	0.00
21	Open Water	39.45	1.04	0.00	0.00
22	Palustrine Aquatic Bed	0.61	0.02	0.00	0.00
	Total	3790.50			

From a land use perspective on the landscape/watershed scale, the property contributes significant acreage of Mixed Forest to the watershed. Additionally, even though the property is almost completely forest, it contributes around 5% of different forested wetland and scrub/shrub to the overall watershed. This forest has "headwater" characteristics because it is immediately adjacent to the watershed boundary. This contributes specifically to the filtering and storage capacity of freshwater, as well as the capacity to slow water from being channelized, reduces downstream flood potential and impact. The Town of Plainfield is contributing significantly to conservation goals by maintaining this, and other open space parcels especially around important surface water.

SITE DESCRIPTION

On KDP, the forest structure follows a very typical pattern observed in Connecticut forests. The forest types are very much a function of hydrology where on upper/dry areas, the forest is mostly oak or oak-hickory, containing red, black, scarlet and white oak species. As you progress down slope to flatter moister terrain, the trees are larger and contain a higher variety of northern hardwoods. The riparian buffer areas contain mostly red maple, birch, and ash with a large constituency of high bush blueberry, and in the wetlands/lowlands, the structure is a red maple swamp with a strong ground layer of skunk cabbage. There are remnants of old roads (which may connect Kate Downing to Roode Road, as well as east-west roads from I-395 to Mill Brook), but they also may just be old farm roads, construction roads from creation of the rail or highway or other remnants of past land use history. There are some interesting glacial erratic features and exposed bedrock. The outcroppings make quite an intricate network of dens, likely used by small mammals and other wildlife. There were significant past land use history features like stonewalls, cedar posts, and barbwire throughout the interior of the property. Some stonewalls were 4-5ft tall and very square, either for home parcels or containing livestock.

History:

The town purchased the large tract of property from the State of Connecticut in 2004. Additional adjacent parcels (Hall, Shippee, and Riley/Botello) were purchased from landowners to expand the area and access. After a brief check of Sanborn Maps and Historical Army Corp of Engineers/USGS Topographical maps, it appears that as of 1943 the property was forested. With the creation of I-395, it is clear that major hydrological changes were made to the area. The historical maps do not indicate houses or structures; therefore, this area was likely farmed as pastureland for livestock. Relative to Connecticut, this parcel was likely cleared (along with 75% of the State) around the mid 1800's. After a review of LiDAR data and available hillshade layers from CT ECO, there were not any charcoal mounds located, which means the area was cleared for farmland or for sand/minerals (or both.) There are many unknowns about how this land has been managed through history, and it would be interesting to see how frequent and severe disturbances were to yield the forest there today. There is very little known about oak-low bush blueberry disturbance regimes, but it is very likely that fire was used frequently both for hunting and farming.

Access/Infrastructure:

There are no "official" entrances to the property. There is one location with frontage. It appears one parcel may have a completed survey, but boundaries do not appear to be marked/maintained. This parcel is undeveloped except for unmaintained/abandoned road systems. Due to the road drainage, stonewalls, and elevated shoulders, there are very few places to expand access. There is an Eversource utility right-of-way between the property and I-395. Once access is created, a 270ft-300+ft wetland feature prevents all access, including by foot, from 100-+acres of the property.

Recreation:

The town does not have a trail system for KDP; though it does contain existing roads that have been maintained to some extent. Being adjacent to the Pachaug Outing Club, it is likely the area has been/is hunted annually. There were many signs of current hunting on the property in the form of a deer stand and reflective trail tacks. Currently, there is no clear understanding of any agreement between the Town of Plainfield and the outing club.

Topography:

The property's elevation changes roughly 100', from a low of about 157' near the southeastern corner of the property at the banks of Mill Brook to a high of about 257' just up hill from the stream on a shall soiled knoll covered in low bush blueberry. Although some tip-ups were observed on eastern facing slopes, there appeared to be minimal pit-mound microtopography. Across much of the upland area, the ground felt as though it was regraded and compacted. In the wetland areas, microtopography is readily observable with many tip ups and decomposing wood which gives the ground a "lumpy" appearance. Within the wetlands, these areas create a drier island or micro niche for a wide variant of plants. The moister retained here also plays a big role in preserving biomass (anaerobic digestion) and creating an expansive ground cover of skunk cabbage.

Aspect:

The property has two main valleys creating four distinct sections, with about half the area face north to east, and the other half faces south to southwest. As the property approaches Mill Brook the aspect is mostly eastern, perpendicular to the brook's flow.

Soils:

Soils provide nutrients, moisture, and support for trees and other plant life in forest ecosystems. Soils help determine the types of trees and how well they grow on any given site. Soil quality varies greatly with topographic position. Upper slopes are dry and have thin, coarse soils whose nutrients have been leached to lower slopes. As a result, upper slopes typically have shorter, slower growing trees. Mid-slopes are moderately moist and have moderate soil nutrition. Lower slopes are moist and nutrient rich and support the most vigorous tree growth. The bases of slopes hold moisture and even though they are nutrient rich, they often support poor tree growth due to the abundance of water and lack of oxygen. Species composition and growth reflect this topographic soil pattern.

Soil types for Forest: Please refer to the appendix for the soil map and web soil survey report.

Map Unit Symbol	Map Unit Soil Name	Soil Area (acres from town parcel)	Wetland Rating	Farmland
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	54.63	CT Wetland	Nonfarm
23A	Sudbury sandy loam, 0 to 5 percent slopes	3.25	CT Nonwetland	Prime
46B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	34.73	CT Nonwetland	Nonfarm
47C	Woodbridge fine sandy loam, 3 to 15 percent slopes, extremely stony	4.59	CT Nonwetland	Nonfarm
61B	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	28.06	CT Nonwetland	Nonfarm
61C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony	3.64	CT Nonwetland	Nonfarm
62D	Canton and Charlton fine sandy loams, 15 to 35 percent slopes, extremely stony	1.77	CT Nonwetland	Nonfarm
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	25.61	CT Nonwetland	Nonfarm
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	0.80	CT Nonwetland	Nonfarm
103	Rippowam fine sandy loam	4.65	CT Wetland	Statewide Importance

WATER RESOURCES

The property has had quite a few hydrological changes since settlement, and it appears the construction of I-395 caused the biggest. The current wetlands in the northern section of the property now appears to flow easterly while in historical maps it flows westerly. This change creates a significant low area that retains water in the form of a skunk cabbage/red maple swamp. Near the western edge of this wetland significant reddish-brown staining was observed. Another wetland complex exists near the southern edge of the property. To the west, the wetlands channelize and eventually discharges to what appears to be a sediment trap or farm pond prior to discharging to the right-of-way, I-395 corridor, and Havey Brook. This wetland complex does not appear to have a source up gradient or that source was redirected to flow easterly. Havey Brook apparently flows southerly to Clayville Pond and Aspinook Pond before discharging to the Quinebaug River. East of the previous mentioned wetland, there is another wetland complex that channelizes then disappears heading easterly to Mill Brook. The Mill Brook flows northerly and discharges north through Kate Downing Road just east of the KDP property. The Mill Brook eventually flows north to Packers Pond then into the Quinebaug River, then southerly into the Shetucket River and finally into the Thames River. Mill Brook and Havey Brook are not listed on the 303(d) List of Impaired Waters under any Category; Mill Brook is assessed under 305(b) and results are available online. Currently, a CT DEEP Watershed Management Plan does not exist for this area.

Since the inventory was completed in early spring, observable flow was noted for all wetland complexes. The forested area adjacent to Mill Brook was saturated. Areas which may be wetlands were not field delineated at the time of the site visit but were GPSed for planning purposes. The gradient of the forested wetlands in the north and south were both very low potential, and in many cases, a single channel was not observed. In these areas, the CWD and Skunk cabbage fragment water flow dissipating flow speed and volume. At the top of the slopes, near the middle of the property, there is a significant low

bush blueberry layer, yielding a large amount of leaf surface area and interception potential. This vegetation is likely the landscape's effort to restore then, eroded, and compacted soil. This area also contains patches of significant coarse woody debris (CWD) increasing storage capacity and creating habitat niches. In general, both upland and lowland microtopography captures and retains moisture throughout the growing season. Any significant ground or vegetation disturbance within 100 feet of wetland soils, watercourses, and waterbodies requires a permit from each town's Inland Wetlands Commission.

The wetlands and rolling hill topography prevent floods by slowing water runoff during storm periods, absorbing and storing sediment and nutrients that would otherwise harm downstream water bodies, storing and recharging groundwater during dry periods, and providing excellent wildlife habitat. Activities in or near wetlands should be limited to when the water table has receded or has frozen over.

Sustaining water quality requires preventing erosion to keep the soil and its nutrients in the forest and out of the wetlands and watercourses. This includes having different vertical and horizontal vegetative layers. A single aged forest tends to have a thick canopy which decreases the sunlight availability for the mid and understory level of the forest. A mid and understory layer can provide increased leaf surface area (potential interception during rain events). Increased leaf area also yields thicker organic soil layers (leaves create a wonderful barrier to erosion). A healthy and thick organic leaf litter layer also helps with natural sheet flow, moisture storage, and direct rainfall interception. Native species, herbaceous through canopy, tend to have significantly larger root systems which bind soil significantly. Erosion control methods on trails, adjacent to dirt roads, and as part of any forest activities can control the volume and velocity of water on unprotected soil. Such methods include installing water bars, spreading straw mulch, and spreading conservation seed mix. In addition, at least 50% of the tree canopy cover should be retained within 100 feet of wetlands and watercourses and no trees should be removed within 20 feet of wetlands and watercourses. Such measures provide a protective buffer that can filter out damaging pollutants, nutrients, and sediments before reaching water resources.

Please refer to 'Water Quality' section under General Recommendations, the Elevation/Contour Map, and the Stands Map which identifies approximate locations of waterbodies and watercourses.

CULTURAL RESOURCES

The property has many features of an agrarian past land use. Stonewalls are plentiful on the property and served many purposes: a depository for fieldstone removed for tilling the land, a boundary marker, and a barrier to keep livestock out of the crops. Additionally, there are remnants of wire fencing embedded in the trees or posts throughout the property. The stonewalls, posts, and wire fences are evidence of the decades of agricultural use throughout the property. Given the mill history, 30 miles from a major port, and the intersection of the Norwich to Worcester and Hartford to Providence rails, this property was likely used for both food and wool production to support Plainfield mills through the 1800s.

Since the history of Plainfield's establishment is well documented on plainfield.org, it makes sense to include the website for reference. After a brief search of documents, there does not appear to be a comprehensive outline of the many nations, tribes and groups which inhabited the area pre-settlement.

FOREST DEVELOPMENT

During forest development, the competition for water, nutrients, and sunlight drives a system of replacement. Once an agricultural field is abandoned, woody/tree species begin occupying this space. The first to establish abandoned agricultural land are known as early successional or "pioneer species." Trees can occupy a location at very high densities if germination and growing conditions support establishment. These conditions include varying degrees of moisture, temperature, exposure to mineral soils, and a vector/seed source to deposit them. As trees compete for sunlight, faster growing species and/or individuals tend to overtop intermediate or suppressed individuals. Typically, the pioneer species are short lived, but they create conditions for shade tolerant species to establish in the understory. Shade tolerant species can either establish or remain established falling behind in height as the young forest compete for sunlight.

There are a number of factors which cause variations of this process from forest to forest, but the competition for sunlight is always the same. As the codominant, intermediate, or suppressed trees succumb to lack of resources, disease, or natural disturbance, the trees are recycled back into the forest ecosystem utilized by a very complex range and scale of organisms (from mammals to bacteria). Once the mature trees die from old age, referred to as senescence, disease, natural disturbance, or are cut, the forest structure becomes more complex. The removal of an individual tree creates a gap in the

canopy, and the race for the sunlight begins all over again. This process has occurred yielding mid successional stands of oak and hickory, both moderately shade tolerant species. Hardwood and oak forests are changing as gaps are created when the ash die, or oak succumb to drought and Lymantria. In some cases, the forest floor is occupied by non-native invasive species. This halts the successional trend, and in some cases, can revert land back to dense primary succession.

When a forest reaches an equilibrium, also called late successional forest, each time an individual tree dies, a gap is created. Depending on the age, spacing of the trees, soil quality or site index, this gap causes surrounding tree crowns to expand to fill in the canopy opening. When multiple trees die or larger gaps are created, the understory trees will fill the gap. In some circumstances, the understory trees may have established during the original forestation, but gap creation can also create conditions for regeneration to establish.

Forest management can contribute to accelerating succession, reverting succession, or attempting to maintain a forests current composition by mimicking natural disturbance. Foresters can help identify the healthiest and most vigorous trees to remain, increase in volume or value, and produce seed for wildlife or the following cohort. These decisions are made based on landowner objectives and what currently exists on the property. Some objectives like management for oak species will not make sense in a white pine plantation. However, it is possible to manage for habitat in a pine plantation that might encourage residency of oak mast consuming wildlife. Theoretically, an oak individual may establish and respond to a canopy disturbance, reestablishing oak components in a forest. A forest can always be managed for age, species composition, and other values using different disturbance regimes. In scenarios where bird habitat is desired or regeneration only occurs during larger scale, more intense disturbances, a disturbance like a forest fire/flood/or tornado can create the competition scenario when a forest was first being established.

It is typical to use the "stand" scale as a management unit. The stand is typically delineated by overstory species composition. Although each management unit may need a different treatment or have a different recommendation, many management schemes can be applied across stand boundaries and can be scheduled based on priority.

FOREST HEALTH

Biodiversity:

Biodiversity is the foundation of a forest's ability to provide public services. It represents the complexity of the community type that exists within a forested stand. Tree species affect forest floor conditions, availability of food, occurrence of insects or wildlife, etc.; therefore, tree species diversity can be used to estimate the overall range of species present in a forest ecosystem. As diversity increases, overall forest resilience increases. Although large scale disturbances tend to remove an entire forest (in New England that is approximately every 200 years), having a balanced forest keeps unplanned disturbance like drought/Lymantria impacts to a minimum. The reason why drought and Lymantria have made such a big impact is because of a mostly homogenous age and species composition.

Non-Native Invasive Species:

Connwood performed an assessment of health on the oak trees, which have been severely impacted by drought/Lymantria, and it is clear that this event will impact Plainfield's forest for years to come. Lymantria has passed through the property, but the current presence appears limited with damage being complete. They have been found in almost every town in Connecticut. This is an introduced species that is like a tidal wave but fortunately does not often yield 100% mortality. The black/scarlet oak, once dead tend to decay quickly and lose their value, but white/red oak tend to take longer to deteriorate. **Oak is a major component in most Stands within this tract. It is not a significant component in the red maple forested wetlands portions of the property.**

Tree damage from windstorms or microbursts was present on the eastern side/aspects of the property. Trees were tipped over in areas where soils are thin, and the trees were not sufficiently anchored. Some older trees were also snapped in half. This is likely due to decreased strength above the stem where the crown is formed.

A concern for overall stand health is the presence of non-native invasive species. Berberis sp. (barberry), multiflora rose, honeysuckle, oriental bittersweet, and winged euonymus were present in some stands, very significant impact can be seen near the utility right-of-way. Species that are wind or bird disseminated were found in the wetter forests on the property. These invasive species did not have a significant presence in the portions of the forests where complexity was minimal (even aged with only a primary canopy layer).

WILDLIFE HABITAT

The wildlife habitat on the property provides the necessary food, shelter, and water for many types of animals found in this region. Habitat features include deciduous trees, coniferous trees, stream banks, vernal pools, brushy growth, fields, younger trees, older trees, large downed trees, small downed trees, thick understory within a forest, tip ups, microtopography and depressions, brush piles, tree cavities, boulder cavities, and the list goes on.

Overall, the forest is lacking diversity in both tree species and tree sizes, as well as, important habitat features. The large diversity of tree species ensures a greater variety of foods and therefore a larger diversity of animals. The diversity of tree sizes affords many different roosting, nesting, and feeding opportunities for birds. The wood thrush, for example, sings from the upper canopy, nests in the mid-story, and feeds on the ground.

Cover:

Cover may be a hemlock tree for a screech owl (sleeping cover), a stonewall for a chipmunk (escape cover), a depression from a tip-up adjacent to a swamp for an eastern box turtle (overwintering and reproduction), or a dense patch of brush for a deer (resting cover). An animal's cover requirements are variable. Deer and grouse generally feed in relatively open areas of forests, but during a winter snowstorm they may seek refuge in a dense stand of conifers.

Dead Wood/ Snags:

A critical part of the forest habitat is dead wood. Standing dead trees (snags) and dead wood on the ground serve important habitat benefits. Over one-quarter of the wildlife species that potentially inhabit this property require dead wood, hollow trees, or rotten wood for some part of their life cycle. Dead wood provides cover, moisture, nest sites, and den sites.

Snags are standing dead trees that provide food and cover for over eighty-five wildlife species. Snags are important foraging sites for many species of birds and often serve as cavity trees when primary excavators, such as woodpeckers, initiate cavity development. Snags, especially those with good vantage points in clearing or along edges, are also used as perching sites for raptors, phoebes and other birds. A greater number of wildlife species will benefit from large snags (greater than 18 inches diameter) as opposed to numerous small ones. Large snags generally last longer and can be used by both large and small birds and mammals.

On average, each acre of forest should have at least six snags per acre, half of which should have diameters over 16". As you can see by this table, the young forest, Stands 3 is low in snags and coarse woody debris, which is typical of early successional forest. Additionally, it is obvious that coarse woody debris is lacking across the entire property, but due to the mostly oak overstory and the Lymantria/drought of the past five years, there are significant snags (especially large diameters) which will eventually add to the coarse woody debris number. In New England, coarse woody debris is typically from the natural disturbance regime causing tip ups (~every 200 years windstorms would knock over and snap trees). It is unclear how a significant amount of large diameter standing dead wood will respond to a hurricane or windstorms when the soil is saturated. Obviously, there is reduced root anchoring, but also, without fine twigs and leaves, these trees are essentially masts without sails.

Stand	Snags/Ac	<16" /Ac	16" +/Ac
PS1	8.2	0.3	1.1
PS2	20.8	12.4	3.2
PS3	1.0	None Tallied	None Tallied
PS4	35.1	5.9	3.8
PS5	26.8	12.3	2.5

Cavity or Den Trees:

Den trees are trees having the trunk or large limbs hollowed out by rot, with an opening to the outside. Cavities in trees of all

sizes are essential to many species of birds and mammals. Blacked-capped chickadees and eastern bluebirds use cavities in stems less than 6 inches in diameter. Gray squirrels, screech owls, and various woodpeckers such as northern flickers use cavities in stems between 12 and 18 inches in diameter. Larger birds and mammals such as pileated woodpeckers, fishers, and raccoons require larger cavities in stems greater than 18 inches in diameter.

Brush Piles:

A small portion of brush should be piled wherever possible and practical to provide additional wildlife cover. Brush piles can be combined with efforts to move woody debris away from walking trails and wildlife openings. Small mammals and some birds (wrens) use such piles for cover and bears use them to den. Such piles are particularly desirable if located near water or the edge of forest openings. Large wood and rocks form the base, which are covered by progressively smaller branches to form a mound that is about 6 feet high and 15 feet across.

Conifers:

Some conifers (pine, hemlock, and cedar) should always be retained to provide mammals and birds protection from harsh winter weather. They provide food and cover for resting, roosting, and nesting. Forests that contain both conifer and deciduous trees generally contain more wildlife species that either one exclusively. Ruffed grouse, white-tailed deer, red and northern flying squirrels, red-breasted nuthatches, golden and ruby-crowned kinglets, solitary vireos, and bay-breasted warblers are examples of Connecticut wildlife species attracted to conifers.

Perches:

Perching sites are most often found in old fields, pastures, roadsides, riparian corridors, and in stands with an overstory tree that clearly towers above all other forest vegetation. Supracanopy white pines, hemlocks, yellow poplars, and large roadside sugar maples are examples of high exposed perching sites. The exposed nature of these high perches provides excellent hunting and nesting sites for various raptors such as osprey, red-tailed hawks and kestrels that forage in non-forest cover types and open forests. Fences, utility lines, isolated deciduous shrubs, and woody sprout clumps less than 10 feet high can serve as low perches.

Travel Lanes:

Fence rows, stonewalls, drainage ways surrounded by tall herbaceous vegetation and low woody growth make excellent travel lanes. Stonewalls provide structure to wildlife habitats and are especially valuable as travel lanes. For small mammals, such as chipmunks, stonewalls serve as an important cover for nearly all daily functions. For larger species, stonewalls provide protective cover along which to travel. Where stonewalls boarder fields or woodland roads lush herbaceous edges may be present.

Wildlife Food Sources

Food, a source of energy for growth, maintenance of good health, and reproduction is essential to all wildlife species. All animals must have an adequate seasonal supply of nutritious foods provided by a variety of habitat types. The seasons and weather can be an important factor in determining food availability. Insects, grasses, forbs, mast (nuts), and fruits as well as other animals are important food sources for wildlife in Connecticut. The following are two major sources of food for wildlife in the forest.

Hard Mast:

Hard mast is hard shelled seeds (nuts and acorns) that provide high caloric source of digestible lipids and carbohydrates needed by most resident and migratory wildlife species. Native hard mast-producing trees include the oaks, hickories, and beeches. A variety of hard mast producing tree species will ensure food all year and are insurance against seed failure of any one species. White oak acorns are particularly valuable because of their high protein content.

Fruit:

Fleshy (soft) fruits produced from a variety of native shrubs are an important food source for wildlife. Some common shrubs of high value are blueberry (highbush and lowbush), huckleberry, common juniper, serviceberry, spicebush, winterberry, dogwoods and sumac.

Rare Threatened and Endangered Species:

A request for further information was submitted and information regarding this occurrence is available in the appendix.

GENERAL RECOMMENDATIONS

SITE IMPROVEMENTS

Access:

There is one options that seem feasible to create public access to the property. Adjacent to I-395, the right-of-way could be developed, but use of the right-of-way and planning would need to be discussed with Eversource. Important considerations are sight line and position on the road, size of the parking area, and ease/cost of construction and maintenance. The entrances would need signage that indicates what property you are entering and the ownership. A split rail fence, gate, or kiosk would be needed to indicate "allowed" and "prohibited" uses, maps, and general rules regarding closing time. Trails would need to be clearly marked and maintained every five years. Vehicular access into the woods is limited to the road through the adjacent property and pull-off from I-395. These could serve as a good staging location for any firefighting activity and emergency vehicles. Please see appendix.

Infrastructure:

Maintaining good access roads/trails into the forest increases the value of the timber, aides in wildfire control, prevents trespass, aides in property maintenance, and improves forest recreation opportunities. There are old "wagon" roads throughout the property, potentially from previous forest management activities, construction of I-395 or the railway, or from farming. Currently, trail infrastructure like boardwalks is needed but do not exist. Upon creation of a trail system, erosion control features, rock work, and signage should be documented and assessed on an annual basis.

Since access beyond the red maple swamp is limited, a boardwalk would need to be created to cross the swamp. Due to the nature of water storage and depth to hard bottom, installing a posted boardwalk seems less feasible. The distance of approximately 300ft could be elevated using two-foot sections of 24"-36" corrugated HDP pipe. The planking or boardwalk could be bolted through the pipe making for easy replacement in the future. At the other end of the cost spectrum, pressure treated posts can be driven into the ground, post to post beam connections, joists, and decking could be installed drastically increasing the amount of wood and hardware needed for the project. Trails can be established using forestry equipment. Trails can be designed to maximize the area of the property and pass by ecological, educational, and aesthetic locations in the process. A trail system and some trail construction guidelines are provided within the appendix.

Additionally, Connwood was asked to identify an area for disk golf. Connwood is not a disc golf course designer, and does not have a full grasp on constraints, considerations, costs, or equipment and signage needed; however, we did assess available space of near the proposed parking and Kate Downing Roadside of the wetlands. A recreation map and potential layout can be found in the appendix.

WATER RESOURCES

Water Quality:

Water quality typically involves stream degradation, risk management and assessment, and what activities on or adjacent to the property could produce point and nonpoint source pollution. Forests shade streams, intercept and regulate precipitation, act as a storage area or filter for runoff, and produce a layer of organic material which protect against mobilization of sediment. From a management perspective, protecting water quality requires assessing erosion potential of the soil, what activities are planned on the property, and the activity's proximity to waterbodies. Not all activities require significant erosion control and sediment protection practices, but if an activity causes mineral soils to be exposed or compacted and runoff has a path to discharge to a waterbody, planning activities and controls can make a difference. Simple controls can yield long term results. Since the forested areas on the property are used for recreation, there are not many risk factors that can contribute pollution directly to a water resource. If a forestry equipment were to be used on site, it is important control the volume and velocity of water on unprotected soil. The Connecticut Forestry Best Management Practices Manual addresses preventative measures like installing water bars, spreading straw mulch, and applying conservation mix seed as needed.

Stream/Wetlands Protection:

Although management near wetlands or watercourses have "rules-of-thumb" that change frequently, the high gradient streams

found on the property should retain a minimum of 50% of the tree canopy cover within one hundred feet of watercourses. Additionally, trees should not be removed within twenty feet of watercourses. Depending on management goals and means and methods, these distances also can apply to wetlands. Protective buffer can filter out damaging pollutants, nutrients, and sediments before reaching water resources. Forested buffers also provide shade for cold-water streams. Buffers typically also provide a natural source of forest debris (logs, branches, leaves etc.) that is an integral part of maintaining the biological/ecological health of wetlands and watercourses. During the inventory, course woody debris in streams were not observed, which directly contribute to reducing flow velocity and increasing storage capacity.

CULTURAL RESOURCES

The widely agreed upon definition of cultural resources includes any site, building, structure, object, or area that has value in American history, archaeology, architecture, engineering, or culture, and is at least 50 years old. At the time of this Forest Stewardship Plan, this would include any feature from 1971 or earlier. The property has concrete and field stone foundations, stone walls, and barb wire present. Although it is unclear if any official residential structures are on the property, it is obvious farming and occupation by livestock was a use for the past 200+ years.

The details regarding farming and past land use history of this parcel are not known at this time. Regardless, what does exist provides the story for reading the forested landscape, a window into the historical use of the land, and a perspective into the relationship between people that have occupied the land and the land itself. What remains also contributes diversity to the forested landscape, the same way natural disturbances create diversity in stand composition and structure.

BOUNDARIES/ MAPS

Boundaries are well marked along shared lines with the Pachaug Outing Club, but appear to be not yet established along the southern line to I-395. In the northern section, there are residential lots which may have set pins during subdivisions, property transfers, or construction of the residences. Connwood recommends signs indicating that one is "leaving" the property in some locations. The lines should be traversed annually, and blazed/painted every five years to observe adjacent landowner encroachment or any potential concerns.

INCENTIVES

This plan can be used as a basis to apply for funding to implement practices that are recommended in this plan. Please see the 'Summary of Management Recommendations.'

INVASIVES/VINES

Control methods include mechanical and chemical treatment. In a forest, cutting a vine can produce the desired results. Typically, in a mature forest, light availability will inhibit any reestablishment of non-native invasive vines. Research indicates that it is within the historical range of variability to have between 20 and 40 stems per acre of grape vine. We recommend leaving grape when possible because it is a quality, native food source for a large variety of wildlife species. Invasive shrubs are more complicated, but cutting during the period when a plant transitions from growth to winter preparation may have good results. The stem will not be removed entirely with one treatment as the root system still exists, but this method may keep invasive species under control. If the invasives are mechanical treated prior to seed or berry establishment, it will not be transferred or mobilized, limiting future establishment. The most effective control method is to cut the invasive and follow with an herbicide treatment during the growing season. Due to the proximity of very important water resources, we do not recommend herbicide applications. For more information, visit the Invasive Plant Atlas of New England: invasives.ecb.uconn.edu/ipane. A more detailed treatment method is described in the stand recommendations.

AESTHETICS

There are many opportunities to improve the beauty or aesthetics of the property that fall outside of traditional landscaping. Two activities have already been mentioned and have benefits beyond aesthetics: vine and invasive species control. Most would agree that hanging vines and thorny invasive species have little beauty. Controlling vines and invasives creates a more park-like forest that appeals to most people because it is much easier to see through and walk through.

There are minimal opportunities for vista establishment on this property. Instead, we recommend focusing on the ecological aspects of beauty – the sight of flowering dogwoods in the spring, the sounds of life coming from the many wetlands, the smells of blueberry or Clethora flowers, and the chance sighting of finches along Mill Brook. The use of a observation platform or a simple bench in the right location is enough.

FOREST STAND DESCRIPTIONS AND RECOMMENDATIONS

Stands are separate natural communities that are distinct from each other. Dividing a property into stands makes it possible to logically describe the property. Keep in mind that while stands are distinct, stand boundaries are often indistinct, where one stand will transition into the next stand over the course of 100 to 200 feet. Even within a single stand, there is a tremendous amount of variation.

The following stand descriptions are based on over 160 measurement points (10 BAF) using stratified random distribution throughout the property. At each measurement point, we determined overstory species composition, identified mid and understory, measured ground cover and regeneration, and also calculated presence of coarse woody debris. The quantitative and qualitative data was recorded and will be summarized below.

Each description begins with two tables and one graph. The first table summarizes number of overstory trees present on the stand. Species composition is important consideration for recommendations and how mimicking natural disturbance can be used to steer the species composition. This data is used to understand what the forest was, the current stage of development, and what it's projection into the future. The graph illustrates diameter distribution, or the relative abundance of different tree sizes based on the diameter of the tree measured at 4.5 feet off the ground. Diameter distribution can be read to understand size, structure, and forest development. These numbers can be entered into a stocking table (found in the definitions section) to estimate optimal stocking for growth, stocking for establishment of new trees, the rate of carbon capture, the volume of carbon stored, habitat types (dense or open), and many other factors driving management. Lastly, a table summarizes important forest metrics and observations that drive recommendations.

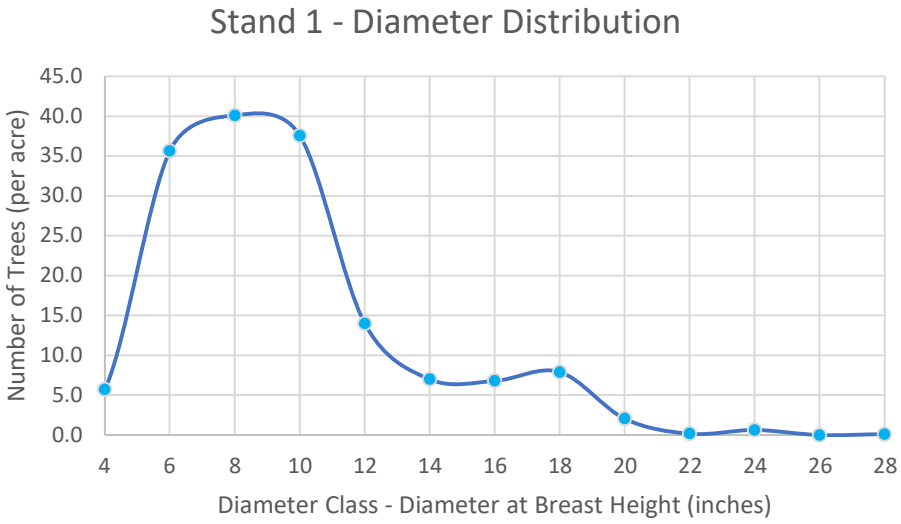
There are many goals for this forest mostly based on its potential use. Potential uses drive public engagement, value, and investment for an otherwise "forgotten" piece of property. The forest, as it is today, is in a restoration phase. Use throughout history has caused compaction, topsoil loss, and changes in hydrology. As part of the passive uses, we recommend active management which will help protect and develop a resilient forest for the future. Many goals/uses can be achieved simply by planning active forest management along those goals. Some examples are, but not limited to, hiking trails can be established on logging trails, patch cuts and regeneration harvests can be incorporated into opening for disc golf, and logging equipment can help place matting for observation decks. Since this property is conserved and will likely not be subject to development, a 200-year rotation seems feasible with timber harvests occurring approximately every 50 years or as needed. Since revenue generation is not the main goal, logging operators can be leveraged to provide recreational and ecological services.

KATE DOWNING STAND 1 (KDS1): RED MAPLE SWAMP (29.0 ACRES)

dbh	RM	HY	SB	YB	SWO	RO	BO	ASH	SE	SO	PO	Total
2"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
4"	0.0	0.0	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**5.7**
6"	17.8	5.1	2.5	7.6	0.0	0.0	2.5	0.0	0.0	0.0	0.0	**35.7**
8"	32.9	5.7	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**40.1**
10"	29.3	4.6	0.0	0.9	1.8	0.0	0.0	0.0	0.9	0.0	0.0	**37.6**
12"	8.9	3.2	0.0	0.0	0.6	0.6	0.0	0.6	0.0	0.0	0.0	**14.0**
14"	2.8	0.0	0.0	0.0	1.4	0.9	0.0	0.5	0.5	0.5	0.5	**7.0**
16"	2.5	1.1	0.0	0.4	0.7	2.1	0.0	0.0	0.0	0.0	0.0	**6.8**
18"	1.4	1.4	0.0	0.0	1.7	2.3	0.6	0.6	0.0	0.0	0.0	**7.9**
20"	0.5	0.7	0.0	0.0	0.7	0.0	0.2	0.0	0.0	0.0	0.0	**2.1**
22"	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.2**
24"	0.2	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.2	0.0	**0.6**
26"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
28"	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**
Total	**96.7**	**21.8**	**9.7**	**8.9**	**7.0**	**6.3**	**3.3**	**1.7**	**1.4**	**0.6**	**0.5**	**157.8**

Species List: RM (red maple), HY (hickory), SB (sweet birch), YB (yellow birch), SWO (swamp white oak), RO (northern red oak), BO (black oak), ASH (ash), SE (Slippery elm), SO (scarlet oak), PO (pin oak), WO (white oak), RC (eastern red cedar), AB (American beech), AE (American elm), WP (eastern white pine), BC (black cherry), BG (blackgum), SASS (sassafras), QA (quaking aspen), CW (cottonwood)

It is important to note above that red maple makes up almost 2/3rds of the species composition. The other species may or may not occur on little islands within the swamp. Large trees adjacent to the swamp also sometime get included in an inventory when plots are near the edge of the stand. Although scarlet oak was tallied, this may have also been a pin oak, because scarlet and pin oak have very similar branching, leaves, and bark.



This diameter distribution curve indicates both age of the stand and species composition. It appears that there are two peaks in the curve, indicating that the stand is two-aged, but also a distribution of species and site quality. Within the saturated zones of the red maple swamp, it is clear the cover is mostly 6"-12" red maples, in drier areas, the species composition resembles more of a northern red oak community type with large diameter trees.

This stand has about 40% unacceptable growing stock or "UGS" which means timber or quality is not worth long-term

management. Unfortunately, at this time there is not a designation for trees performing ecological services and an assessment of ecological services long term. Many of these UGS trees will play the exact role they are now, maybe adding to other ecological features like coarse woody debris or snags through the ecological management rotation of 200-years. This community type is defined by hydrology; therefore, ground conditions for operation are not feasible. Management should be limited to non-native invasive species control, development for passive recreation, and as an educational resource for the study of wetland species.

Other Species (not measured)	Clethora, witch hazel, high bush blueberry, skunk cabbage, jack-in-the-pulpit, sensitive fern, ostrich fern, wood anemone, different Sphagnum, spicebush, tussock sedge, lily of the valley, marsh marigold, American beech
Regeneration/Understory	Not observed
Coarse Woody Debris	Low
Insect/Disease/Disturbance	Emerald Ash Borer, Lymantria with occasional windthrow, nectria
Invasives/Vines	Low presence of barberry, multiflora rose, Phragmites, Japanese knotweed (ROW)
Canopy Closure	Average 61%
Basal Area per Acre	83.5
Trees per Acre	149.6
Volume per Acre	3500 BF
%UGS	43.2%
Mean Stand Diameter	9.4
Stocking Level	Fully Stocked
Site Index	66
History	Not known at this time.

This stand is fully stocked but should not be included in any active timber management. The section of this stand near Kate Downing Road acts as the major obstacle to access the rear of the property.

Recommendations

There are three main sections of this stand that are "areas of interest" both ecologically and for recreation. The area near Mill Brook overlooks the floodplain and shrubs of the Mill Brook. At the time of this inspection, numerous bird species were identified, and many calls went unidentified. This area could have a vista clearing to offer a more robust view from uphill. Additionally, a harvest may establish a young forest which is also very useful to migratory birds and birds using the Mill Brook corridor. With this area being in very close proximity to the Pachaug Outing Club, there may be concerns regarding proximity and time of hunting, but with a little coordination there would likely be no conflicts. The outing club also offers a unique shrubby/brushy habitat adjacent to Mill Brook that could be expanded to this stand. The forested swamp west of the Mill Brook buffer area is a forested clethora – red maple swamp and has significant wildlife activity during the spring. This habitat is not the most visually pleasing but has a forest wetland cacophony that all hikers would enjoy. The area discharging westerly to I-395 and the right-of-way was very similar to the main wetland near Kate Downing Road. These areas are skunk cabbage dominated and should only be disturbed or traversed with boardwalks. If there is no reason to cross them or if they can be avoided, they should remain undisturbed.

This stand can only be crossed by using alternative access or when fully frozen. If any forest management occurs on the property, this will likely be the main obstacle to a successful operation. Establishment of regeneration does not seem feasible. Mechanically removing barberry and multiflora rose are top priorities because even natural disturbance which creates gaps would cause invasive species to spread or take hold in these areas limiting/reducing natural habitat. Non-native invasive species tend to create monocultures limiting the diversity of food sources, pollen availability across the growing season, and available growing space for the existing natural community. Non-native invasives may have been planted on adjacent private properties; therefore, creating a community partnership is key to successful management. Additionally, sometimes seeds can travel in hay/straw bales and be deposited as part of right-of-way management, line construction, or highway and road work erosion control method (straw mulching for temporary cover.) It is important to engage these adjacent stakeholders regarding your concerns, they also prioritize invasive species management and will likely be an active partner.

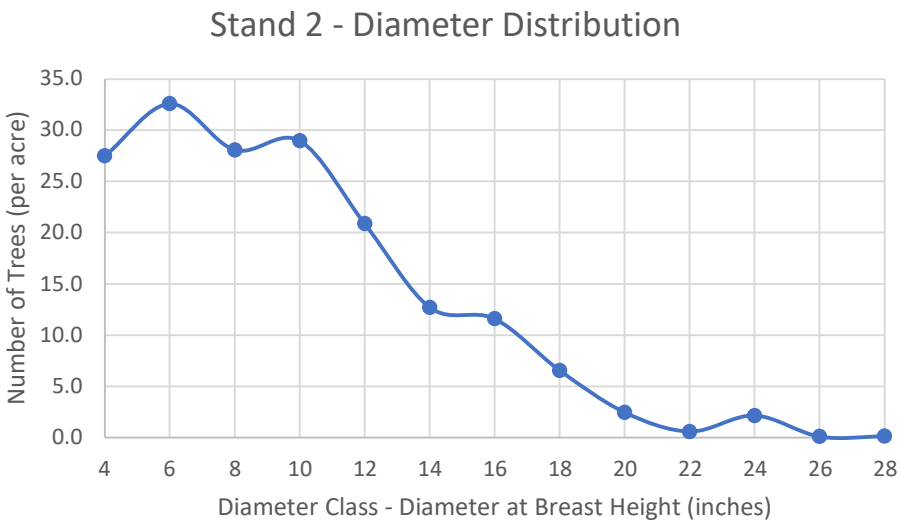
KATE DOWNING STAND 2 (KDS2): WHITE PINE – RED OAK – BLACK OAK FOREST WITH CHARACTERISTICS OF DRY OAK HICKORY HOPHORNBEAM FOREST (52.3 ACRES)

dbh	RM	HY	RO	WO	SO	YB	SB	BO
4"	13.8	6.9	0.0	0.0	0.0	4.6	0.0	0.0
6"	13.2	4.1	6.1	0.0	0.0	1.0	1.0	0.0
8"	10.3	4.0	2.9	2.9	0.6	1.7	2.3	0.0
10"	11.0	4.8	1.8	4.8	2.6	1.5	1.1	0.0
12"	8.7	3.3	1.5	2.3	3.1	0.8	0.3	0.5
14"	3.4	3.0	0.7	1.3	1.3	0.7	0.4	1.1
16"	2.6	2.0	1.7	1.6	2.6	0.0	0.0	1.1
18"	1.0	1.1	1.2	0.6	1.5	0.1	0.0	0.8
20"	0.5	0.1	0.7	0.6	0.5	0.0	0.0	0.1
22"	0.1	0.1	0.3	0.1	0.1	0.0	0.0	0.0
24"	0.0	0.1	1.1	0.4	0.3	0.0	0.0	0.2
26"	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
28"+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Total	**64.5**	**29.5**	**18.4**	**14.6**	**12.4**	**10.4**	**5.0**	**4.0**

dbh	RC	AB	AE	WP	BC	ASH	BG	SASS	Total
4"	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**27.5**
6"	0.0	3.1	1.0	1.0	1.0	0.0	1.0	0.0	**32.6**
8"	1.7	0.0	1.1	0.0	0.0	0.0	0.6	0.0	**28.1**
10"	0.0	0.0	0.0	0.4	0.4	0.4	0.4	0.0	**29.0**
12"	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	**20.9**
14"	0.0	0.0	0.2	0.0	0.0	0.4	0.2	0.0	**12.7**
16"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**11.6**
18"	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	**6.6**
20"	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	**2.5**
22"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.6**
24"	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	**2.2**
26"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**
28"+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.3**
Total	**4.0**	**3.1**	**2.4**	**1.7**	**1.4**	**1.1**	**0.8**	**0.3**	**174.7**

Species List: RM (red maple), HY (hickory), SB (sweet birch), YB (yellow birch), SWO (swamp white oak), RO (northern red oak), BO (black oak), ASH (ash), SE (Slippery elm), SO (scarlet oak), PO (pin oak), WO (white oak), RC (eastern red cedar), AB (American beech), AE (American elm), WP (eastern white pine), BC (black cherry), BG (blackgum), SASS (sassafras), QA (quaking aspen), CW (cottonwood)

It is important to note above that red maple makes up almost 2/3rds of the species composition just like the previous stand, but skunk cabbage and standing water were not present. Hickory and oak were also a major constituent throughout the stand, but red maple likely indicates a high groundwater table, adjacency to significant seed sources, and the ability to establish on the understory. Although many of the red maple stems are 4"-12", they may not respond to small scale disturbace. Unfortunately, what appears to be an Oak-Hickory community type may change as the overstory is removed. These numbers indicate to foresters that conditions are not conducive to oak or hickory regeneration. Large trees do occur within this stand, at an interval of about 1-2 trees per every 10 acres. These trees should remain as legacy trees and as seed sources, especially if they have weathered both drought and the Lymantria defoliation. Number of trees per acre, species, and size class are what give insight into what management is needed.



The above graph shows the beginning of a reverse-j shape with little bumps at 6, 10, 16, and 24 inches in diameter. These bumps may be indications size of disturbance, species regenerating, and existing growing conditions. Typically, unmanaged start to take this form because natural disturbances (wind, ice, drought, insect/disease) create canopy gaps. Due to the initial anthropogenic influence on this land (agriculture) and then removal of other natural disturbances (fire), we now see how globalization and global climate change are shaping our forests. The Oak-Hickory regime appears to be heading in the direction of an American beech, red maple, sweet birch complex.

Other Species (not measured)	Spicebush, sweet pepperbush, highbush blueberry, lowbush blueberry, American hornbeam, hophornbeam, autumn olive, witch hazel, gound cedar, princess pine, wood anemone, mayapple, flowering dogwood
Regeneration/Understory	Significant UGS
Coarse Woody Debris	Low
Insect/Disease/Disturbance	Some spongey moth – drought damage, nectria on birch
Invasives/Vines	Barberry, winged euonymus, grape, green briar, autumn olive,
Canopy Closure	Average 65%
Basal Area per Acre	85.6
Trees per Acre	191.6
Volume per Acre	5000 BF
%UGS	51%
Mean Stand Diameter	9.1
Stocking Level	Fully Stocked
Site Index	72
History	Not known at this time.

This stand is fully stocked and should be included in any active timber management. The stand lacks direct access, but due to the position between wet and dry soils, it contains the most manageable trees. There is also a significant understory inhibiting any establishment of oak-hickory regeneration.

Recommendations

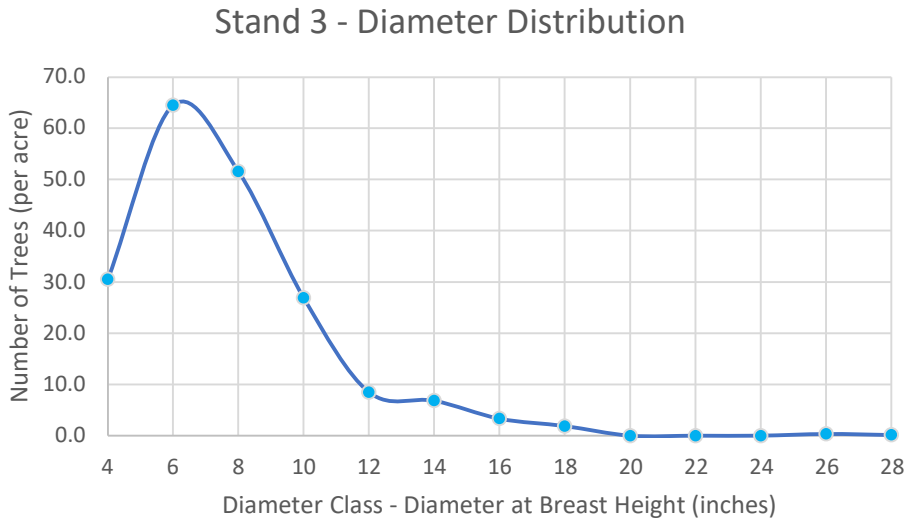
The stand should be treated with a site preparation, thinning, and/or irregular shelterwood. Part of management for oak-hickory is removing the stems that inhibit seedling establishment. This can be done using ESI (ecological stand improvement) technique where within five years prior to any overstory disturbance, red maple, sweet birch, and various shrubs are mechanically treated. A follow up treatment to create gaps, especially expanding upon gaps from Lymantria death, will yield something that looks like an irregular shelterwood. The BA can be reduced to approximately 60 and number of trees can be reduced to about 90 (that is including the work performed by the ESI). It is likely that within that 5 year period an oak-hickory bumper crop will occur and the forest can be maintained. One important aspect of an irregular sheltwood is "leave gaps" can be focused on known habitat features. If an active den is observed, leave trees can surround the den tree. This maintains and enhances habitat that has already been "chosen" within the forest. Girdling trees has been used in the past to creature features, but with the large number of standing dead, it is likely that trees have already become inhabited. The volume removed would be around 1500 per acre yielding 85,000 board feet. This is about half the volume needed for a commercial sale. This overstory should be on a 50-year rotation.

KATE DOWNING STAND 3 (KDS3): RED CEDAR WOODLAND (16.0 ACRES)

dbh	RM	RC	HY	RO	QA	WO	CW	BC	BO	SO	ASH	TOTAL
4"	15.3	0.0	15.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**30.6**
6"	17.0	23.8	13.6	3.4	0.0	3.4	0.0	3.4	0.0	0.0	0.0	**64.5**
8"	22.9	13.4	1.9	5.7	3.8	0.0	3.8	0.0	0.0	0.0	0.0	**51.6**
10"	12.2	2.4	2.4	0.0	1.2	1.2	2.4	0.0	2.4	2.4	0.0	**26.9**
12"	5.1	0.0	2.5	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	**8.5**
14"	3.7	0.0	0.0	0.0	1.2	0.6	0.6	0.0	0.6	0.0	0.0	**6.9**
16"	1.0	0.0	0.0	0.0	1.4	1.0	0.0	0.0	0.0	0.0	0.0	**3.3**
18"	1.1	0.0	0.0	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	**1.9**
20"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
22"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
24"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
26"	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	**0.4**
28"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	**0.2**
Total	**78.3**	**39.6**	**35.8**	**9.5**	**8.1**	**7.4**	**6.9**	**3.4**	**3.1**	**2.4**	**0.2**	**194.6**

Species List: RM (red maple), HY (hickory), SB (sweet birch), YB (yellow birch), SWO (swamp white oak), RO (northern red oak), BO (black oak), ASH (ash), SE (Slippery elm), SO (scarlet oak), PO (pin oak), WO (white oak), RC (eastern red cedar), AB (American beech), AE (American elm), WP (eastern white pine), BC (black cherry), BG (blackgum), SASS (sassafras), QA (quaking aspen), CW (cottonwood)

It is important to note above that red maple makes up almost 40%s of the species composition just like the previous two stands. Red maple is considered a generalist, which means it can survive almost any condition even though the site is completely different. This stand is unique for its significant presence of eastern red cedar and different aspen patches. Quaking aspen and cottonwood are both extremely important early successional tree species. They are clonal and tend to form dense patches when regenerated. This not only provides cover but also their seed is an important food source for many different bird species.



This chart illustrates that there are likely three age classes which include old field wolf trees, a younger oak forest, and a mature early successional forest. In some locations, trees have not or will not establish due to thin soils and exposure. This habitat may be an indication of deterioration from past land use, but it also provides a very unique eco-type within the forest. Eastern red cedar and aspen typically are early successional variations of a Dry Oak-Hickory Hophornbeam Forest, but occasionally, due to the bedrock and soil makeup and western facing aspect, red cedar woodlands exist.

Other Species (not measured)	Poverty grass, hairgrass, Pennsylvania sedge
Regeneration/Understory	No significant regeneration, low bush blueberry
Coarse Woody Debris	None tallied
Insect/Disease/Disturbance	Drought
Invasives/Vines	Autumn olive near I-395, barberry, multi flora rose
Canopy Closure	Average 54%
Basal Area per Acre	70.7
Trees per Acre	193.6
Volume per Acre	1400 BF
%UGS	66%
Mean Stand Diameter	7.6
Stocking Level	Adequately Stocked
Site Index	Varies with slope position ~47-52
History	Not known at this time.

This stand should be managed wildlife and as an early successional forest. There is minimal regeneration; therefore, site preparation and scarification would need to occur prior to overstory removal.

Recommendations

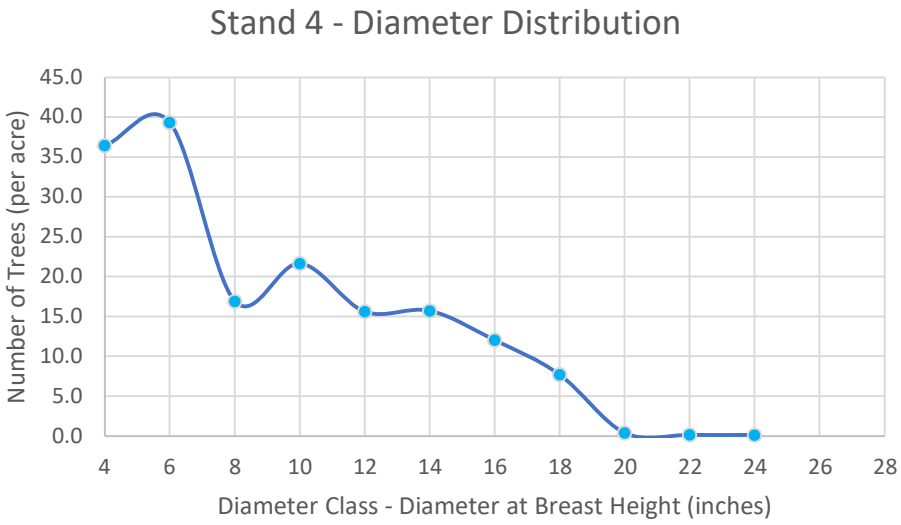
The timber has little to no value, so work would need to be completed as part of a larger sale. This area is a prime candidate to remain untouched, as well. It is likely that due to natural causes this stand will remain the same with a larger red maple constituency over time. The best management action could also be to introduce fire. Since the area is droughty without large fuel sources, a ground fire would likely prepare the forest floor for regeneration of poplar species creating the best possible early successional bird habiat..

KATE DOWNING STAND 4 (KDS4): DRY OAK FOREST (25.7 ACRES)

dbh	WO	SO	RM	SB	RO	BO	WP	Total
<1"	0.00	0.00	0.00	0.00	0.00	0	0	**0**
2"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
4"	20.8	0.0	10.4	5.2	0.0	0.0	0.0	**36.5**
6"	16.2	6.9	6.9	6.9	2.3	0.0	0.0	**39.4**
8"	3.9	3.9	6.5	2.6	0.0	0.0	0.0	**16.9**
10"	5.8	10.8	4.2	0.0	0.8	0.0	0.0	**21.7**
12"	3.5	8.1	0.6	1.2	1.7	0.6	0.0	**15.6**
14"	4.7	7.2	0.4	0.0	0.4	2.6	0.4	**15.7**
16"	2.3	7.8	0.0	0.0	1.3	0.7	0.0	**12.0**
18"	0.0	7.2	0.0	0.0	0.3	0.3	0.0	**7.7**
20"	0.2	0.0	0.0	0.0	0.2	0.0	0.0	**0.4**
22"	0.0	0.2	0.0	0.0	0.0	0.0	0.0	**0.2**
24"	0.0	0.0	0.0	0.0	0.1	0.0	0.0	**0.1**
Total	**57.4**	**52.2**	**29.0**	**15.9**	**7.2**	**4.0**	**0.4**	**166.3**

Species List: RM (red maple), HY (hickory), SB (sweet birch), YB (yellow birch), SWO (swamp white oak), RO (northern red oak), BO (black oak), ASH (ash), SE (Slippery elm), SO (scarlet oak), PO (pin oak), WO (white oak), RC (eastern red cedar), AB (American beech), AE (American elm), WP (eastern white pine), BC (black cherry), BG (blackgum), SASS (sassafras), QA (quaking aspen), CW (cottonwood)

This stand is comprised of about 60% oak with a much smaller red maple constituency. The red maple accounts for the trees largely in the 6-12 inch diameter class. It should also be noted that this stand has very little diversity and is mainly an oak ecosystem. There are no trees larger than 24 inches and trees larger than 18 inches only occur about once an acre. This yields insight into site quality constraints other site features that limit species and size.



The above chart shows there is an a very normal shaped curve almost centered on 14" diameter. It is likely that the smaller diameter trees were established during a disturbance, but the presence of smaller diameter oak trees may just indicate poor site quality. These trees may have been established at the same time as the others but never was able to reach the overstory. This stand has an eastern facing aspect, potentially some Formicidae damage, and shallow soils; therefore, the gap dynamics resemble single tree and group selection silvicultural techniques.

Other Species (not measured)	American chestnut, American beech, eastern white pine
Regeneration/Understory	90% low bush blueberry
Coarse Woody Debris	Adequate
Insect/Disease/Disturbance	Lymantria-drought dieback, nectria, wind
Invasives/Vines	None observed at the time of inspection
Canopy Closure	Average 53%
Basal Area per Acre	64.3
Trees per Acre	258.4
Volume per Acre	4000 BF
%UGS	60%
Mean Stand Diameter	8.4
Stocking Level	Poorly Stocked
Site Index	55
History	Not known at this time.

This stand has low diversity and few management options. It is quite common throughout Connecticut and severely impacted by Lymantria and drought. Fire may have played a role in the initial establishment of this, but little is known about the succession of this ecotype.

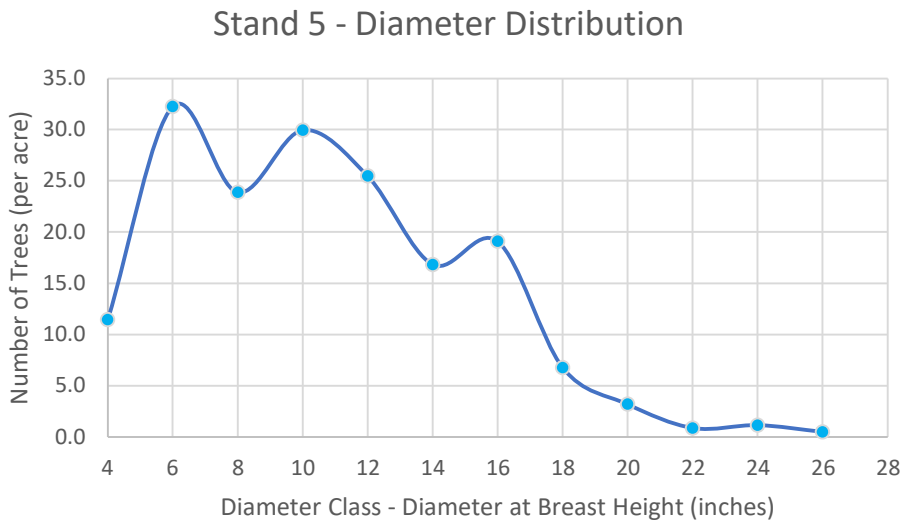
Recommendations
The overstory should remain as continuous as possible because tree regeneration is nearly absent. When gaps are created low bush blueberry expands and halts competition. If fire treatment were an option, that might be an interesting route to take to study this ecotype's response. Increasing diversity with American beech and eastern white pine could lead to increased shade and the possibility of low bush blueberry density decreasing. Currently, no activity option of management seems most feasible.

KATE DOWNING STAND 5 (KDS5): MESIC MAPLE-ASH-HICKORY-OAK FOREST (20.2 ACRES)

dbh	RM	SO	HY	RO	WO	BO	CW	YB	SB	ASH	Total
<1"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
2"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
4"	7.6	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**11.5**
6"	23.8	0.0	5.1	0.0	1.7	0.0	1.7	0.0	0.0	0.0	**32.3**
8"	9.5	1.0	3.8	1.9	2.9	2.9	1.0	1.0	0.0	0.0	**23.9**
10"	14.1	6.7	2.4	2.4	1.8	0.0	0.0	1.2	1.2	0.0	**29.9**
12"	10.6	5.5	3.0	2.1	3.0	0.0	0.4	0.8	0.0	0.0	**25.5**
14"	6.9	4.7	1.2	1.9	1.2	0.3	0.3	0.0	0.0	0.3	**16.8**
16"	5.7	6.7	0.5	3.3	1.4	0.5	0.5	0.0	0.0	0.5	**19.1**
18"	1.9	1.7	0.4	1.5	0.8	0.4	0.0	0.0	0.0	0.2	**6.8**
20"	0.8	0.5	0.3	1.2	0.5	0.0	0.0	0.0	0.0	0.0	**3.2**
22"	0.4	0.3	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	**0.9**
24"	0.0	0.1	0.1	0.8	0.0	0.0	0.0	0.0	0.0	0.1	**1.2**
26"+	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	**0.5**
Total	**81.2**	**27.1**	**20.7**	**15.9**	**13.4**	**4.0**	**3.9**	**3.0**	**1.2**	**1.1**	**171.5**

Species List: RM (red maple), HY (hickory), SB (sweet birch), YB (yellow birch), SWO (swamp white oak), RO (northern red oak), BO (black oak), ASH (ash), SE (Slippery elm), SO (scarlet oak), PO (pin oak), WO (white oak), RC (eastern red cedar), AB (American beech), AE (American elm), WP (eastern white pine), BC (black cherry), BG (blackgum), SASS (sassafras), QA (quaking aspen), CW (cottonwood)

This stand does not have significant components of cottonwood, yellow birch, sweet birch, or ash, but there are patches of local abundance. The overstory is dominated by oak hickory which led to an initial assessment of a typical oak-hickory natural community type. With the Mesic Maple-Ash-Hickory-Oak Forest community type, moister soils and corresponding species are present. We think that with the abundance of hophornbeam, American hornbeam, spicebush, and flowering dogwood are a clear indicator of this ecotype.



This stand appears to have three full curves before leveling off. Red oak, hickory, scarlet oak, and ash make up the largest diameters present in this stand. Oak, red maple, and ash make up the next with the last two curves likely being red maple regeneration. This curve indicates there is a high frequency low intensity disturbance regime at work. Due to the wide distribution of red maple, if an event occurred where the overstory was compromised, likely red maple would replace most species.

Other Species (not measured)	Flowering dogwood, American hornbeam, highbush blueberry, spicebush, American beech, lowbush blueberry, American chestnut, hophornbeam, witch hazel
Regeneration/Understory	None observed
Coarse Woody Debris	Less than average amount
Insect/Disease/Disturbance	Lymantria, windthrow
Invasives/Vines	barberry, multiflora rose, winged euonymus
Canopy Closure	69%
Basal Area per Acre	94.9
Trees per Acre	248.0
Volume per Acre	55000 BF
%UGS	52.2%
Mean Stand Diameter	10.1
Stocking Level	Fully Stocked
Site Index	Varies 65-72
History	Not known at this time.

This stand consists of high mortality from Lymantria in the southern section with less frequent occurrences near Kate Downing Road. The front area has large trees and open understory which could be expanded upon to create a forested disc golf area. Overlapping with Stand 3 to the east, it would be a course that passes in or around three very interesting ecotypes. An irregular shelterwood and a seed tree harvest in some locations may give the course enough openness. If done correctly, this could also act as a dynamic course that grows with the new forest. Invasive species are a concern.

Recommendations

This stand has the capacity to support a commercial operation but should undergo a mechanical treatment of non-native invasive species prior to any overstory disturbance. There are multiple intermittent drainage crossings that would likely be dry in the summer or frozen in the winter, operations should be completed at that time. As part of the landing area for this operation, a parking area can be laid out. Basal area should be reduced by 35 and trees per acre should be reduced to 120. The understory can be cleared as part of this operation (reducing the overall trees per acre from 248) to create enough growing space for regeneration.

SUMMARY OF MANAGEMENT RECOMMENDATIONS

The following table summarizes recommended forest management activities for the Mill Brook Tract in Plainfield for the management period 2023 to 2033. Active management is a dynamic process; therefore, adjustments, updates, and revisions may be necessary due to unforeseen changes in environmental conditions (disease, insects, fire, and storm damage) or changes in the stated objectives.

Stand	Acres	Recommendations	Priority	Timing
ALL	~160	Update Forest Management Plan	H	2032
ALL	~160	Boundary Location (Use existing deeds/surveys to determine if corners exist in field, determine if referenced lines exist in field, survey if necessary)	H	TBD – Needs to be completed before any active management.
ALL	~160	Boundary Refurbishment (mark at the time of survey)	M	5-year interval
ALL	~160	Determine parking location, hiking trail location, vista points, and disc course layout	H	2024
2, 5	92.3 ac	Irregular Shelterwood/Thinning (conduct shelterwood harvest to also create trails, openings, and vistas for future recreational use; remove standing dead trees from Lymantria adjacent to proposed hiking trail)	H	2025/2026
1, 2, 3,	10 ac	Invasive species management	L	2023 & 2028
1, 2, 3	10 ac	Invasive species management	M	2024 & 2029
1, 2, 3	10 ac	Invasive species management		2025 & 2030
2, 5	92.3 ac	Forest/Eco Stand Improvement (ECI) – Remove remaining understory shrubs and small diameter red maple trees inhibiting seedling establishment and growth (1 acre around seed trees)	H	Post irregular shelterwood; 2026/2027
2, 5	92.3 ac	Forest Stand Improvement (ECI) – crop tree release	L	2046/2047
2, 5	35 ac	Irregular Shelterwood/Thinning	L	2076/2077

ESTIMATION OF COST FOR MANAGEMENT RECOMMENDATIONS

Boundary Refurbishment Without Survey (assuming all corners exist):

Length: ~16,850ft
Paint Amount: 4 gallons yellow latex road marking paint ($200)
Signs (#): 350 signs ($500)
Labor: ($3000)

Total Cost For Initial Marking: ~$3700 *once boundary lines are established, labor costs will be ~$1500 every five years

CWD & ECI & Invasive Species Control:

Labor: $2000

Total Cost: ~$2000

Irregular Shelterwood/Thinning:

Marking Paint: $500
Labor: $8000
Marketing, Administration, Bidding: $1500
Potential Gross Revenue: $20000-25000

Net Revenue: ~$10,000+

APPENDIX A: LIMITATIONS

Use of Report:

1. Connwood Foresters, Inc. (CFI) prepared this report on behalf of the Town of Plainfield (Client) for the 0 Kate Downing Road Parcel of forestland, as outlined within the report and appendices, for the purposes outlined in the "Stewardship Objectives." Application of this report or findings outlined within this report to other forested properties may lead to inappropriate conclusions. CFI do not accept any responsibility for the consequences of such use(s). Reliance on this report by any party not identified within the agreement, shall be at that party's own risk and without any liability to CFI.

Standard of Care:

1. The findings and conclusions within this report are to be considered professional opinion and based on the limited data collected as part of accepted forest inventory methods. Conditions other that what has been described in this report may be found.
2. The services provided were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services at the same time and under similar ground conditions during a similar time of year. No warranty, expressed or implied, is made.

Forest Inventory Conditions:

1. The stand delineation and inventory data were based on field observations and documentation, as well as sample points collected at 2-acre intervals. The boundaries between forested stands or management units were assessed using 2019 USGS orthophotography and field verified during the inventory. The nature and extent of variation between and within stands may not be evident without further data collection and mapping. If variation is found from the data outlined within each stand, it may be necessary to reconsider recommendations of this report.
2. GPS data was collected using a smart phone's location function. This data is not to be considered survey grade. Additional spatial data collected was processed and compared with available online data using a mapping program. Field spatial data was found to be at a relevant scale, accuracy, and intensity for the planning purposes of a forest management plan.

General:

1. The Observations in this report were made under the conditions stated therein. The conclusions presented were solely based upon the services, as outlined within the contract, and do not go beyond the scope of said services.
2. CFI has relied on information available from CT ECO, USGS, USDA, NOAA, and other parties as referenced within the report. CFI has not attempted to independently review or verify the accuracy or completeness of information.
3. CFI has not analyzed data beyond outlining what is present and how forest management can impact the objectives outlined within this plan. There are numerous methods and applications to further assess impact of forest management on sediment transport and loading, infiltration and evapotranspiration relationships, carbon and nitrogen fixing/storage potential, storm/rainfall impacts to flooding and storage, etc. CFI recognizes these are important considerations when identifying watershed and conservation decisions, but these were not included in the scope or budgeted time.
4. It is important to note that this plan is a snapshot of a dynamic forest. It is incorrect to assume that the present conditions of the forest will continue to represent the condition of the forest at some point in the future. If a healthy forested ecosystem is the goal of the Town of Plainfield, continued inspection by a forester is warranted.
5. Parcel data (area) and area found within the assessors database (Vision Government Solutions) were not equivalent. The GIS area was used to calculate area of stands. If a surveyed shape becomes available, stand areas can be adjusted to actual area. Soils and Land Use/Land Cover data was adjusted to assessed area using area adjustments based on weighted values assuming area adjustments would be mainly around the perimeter of the property.

Additional Services:

1. CFI has the capacity to offer design and/or implementation services of the recommendations in this plan in the future. Connwood Foresters, Inc., if retained, can assist in damage from a natural disaster or a forest wide catastrophe, can reassess forest structures, damages, species composition, and existing or threatening insects or diseases, and can update objectives as resources or priorities change.

APPENDIX B: DEFINITIONS OF FORESTRY TERMS

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

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 Pole timber: Trees having a DBH of 6 to 12 inches

Regeneration: New young trees

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

STOCKING TABLE

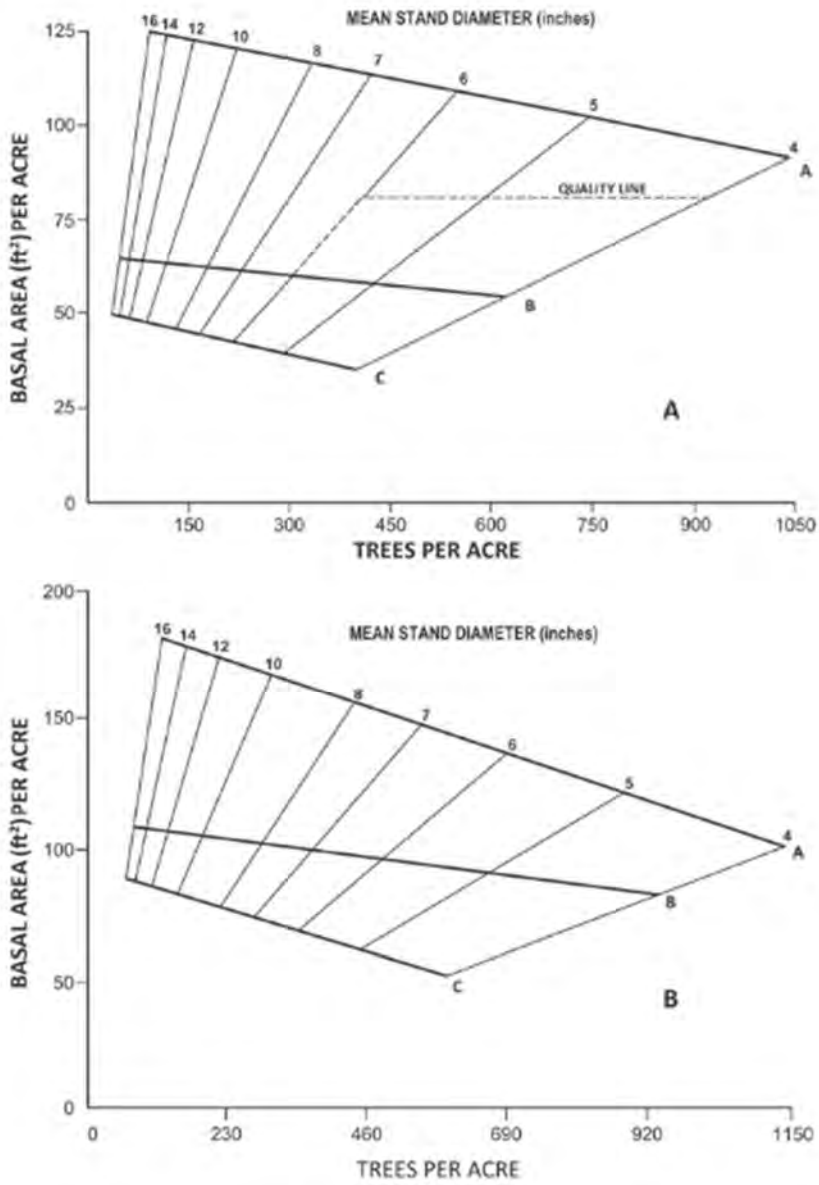


Figure 2.—Northern hardwood (A) and mixed-wood (B) stocking guides.

Source: Leak et al, 2014. USDA Publication: Silvicultural Guide to Northern Hardwoods in New England (p8 f-2.)

The diagram illustrates the relationship between basal area per acre, density (trees per acres), and the diameter of the tree of average basal area: • The A-line is based on a fully stocked stand that has never been thinned. Trees in stands above 100% are considered crowded, too slow growing for normal forest management, and overstocked. • The B-line is the point of full site occupancy with trees of maximum tree area. A stand on the B-line is thought to have trees with no competition, yet no space wasted. The area between the A-line and the B-line indicates the range of stocking where trees can fully utilize the site and should be considered fully stocked. The C-line is an estimate based on normal yield table of the lowest stocking that will grow to the B-line within ten years. This area of the chart is considered understocked.

Boardwalk Construction Guidelines

Acton Land Stewardship Committee
Acton, Massachusetts

NOTICE TO AGENCIES OUTSIDE THE ACTON LAND STEWARDSHIP COMMITTEE

THE *BOARDWALK CONSTRUCTION GUIDELINES* DOES NOT CONSTITUTE A SPECIFICATION AND IS INTENDED SOLELY AS A GUIDELINE. IT SHOULD NOT BE USED IN ANY MANNER WHICH REPRESENTS IT AS BEING A STANDARD OR POLICY OF THE ACTON LAND STEWARDSHIP COMMITTEE.

Boardwalk Construction Guidelines

Acton Land Stewardship Committee
Bob Guba – Construction Coordinator

The Land Stewardship Committee developed these guidelines for boardwalk construction after it was formed in 1996 to manage the conservation lands of the town of Acton, Massachusetts. Analysis of earlier constructed boardwalks led to corrective construction procedures that are presented here to assure the following qualities: level and stable deck surface, strength, ease of disassembly and/or repair, non-polluting, extended life, and less susceptibility to vandalism.

Site Survey – The first step is a careful survey of the site where a boardwalk is required, as this will govern its design, materials, and cost. Place stakes along the centerline of the trail in the wetland where the boardwalk is to be located at stringer length intervals, typically 8 feet when using 4”x4”s, 9 feet for 2”x6”s, or 10 feet for 4”x6”s or 2”x8”s. The first and last stakes are placed at elevated points at the edge of the wetland slightly above typical high water level. If there are no natural barriers such as large trees and rocks to force the boardwalk to meander then slight turns every 30 to 40 feet should be incorporated into the design for an esthetic experience.

A string is secured to the first stake at ground level and continued to the following stakes using a string level. The boardwalk sill height above ground is now measured at each stake (see Figure 1). This assures the step-up at the boardwalk ends of no greater than a plank thickness.

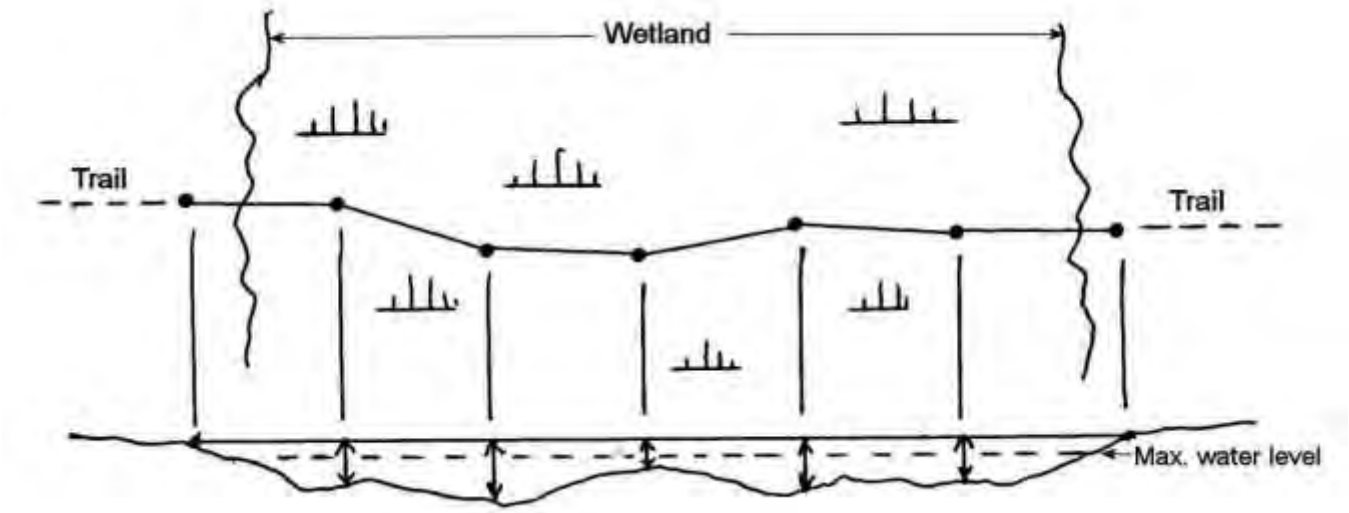


Figure 1 – Determining sill height and placement

Boardwalk Support – The boardwalk stringers are supported by laterally placed sills or steel pipe depending on wetland water depth. Material selection for the sills is an important phase of the boardwalk project. Earlier boardwalks relied on very heavy, polluting sections of utility poles or railroad ties for sills. Three sill materials that won’t harm the environment are ACQ (Alkaline-Copper-Quaternary) pressure treated lumber, FRP (Fiberglass Reinforced Plastic) lumber, and double-wall corrugated plastic pipe.

For locales where maximum water depth doesn’t exceed 6” inches, ground contact, pressure treated lumber can be used. For locales where maximum water depth

doesn't exceed 18 inches and the soil is fairly firm sills made with double-wall, annular ring, polyethylene pipe having the qualities of light weight and high strength is recommended. Plastic pipe diameters for boardwalk use range from 4" to 15". For stringer support in those areas where the soil is very soft and the water depth can exceed 18 inches use steel pipe with an attached dock fitting and auger that is rotated through the soft soil and peat to be securely embedded into the clay or gravel sub-soil. Figure 2 illustrates these methods.

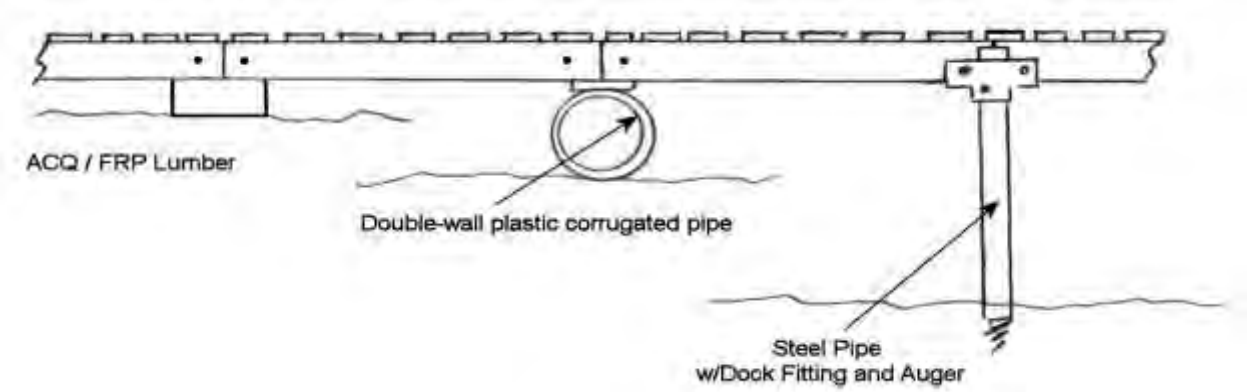


Figure 2 – Boardwalk support types

Sill Fabrication - Since most boardwalk locations are remote it helps to fabricate the sill assembly offsite where power tools are readily available. Lumber sills of 2"x6", 4"x6", or 6"x"6" stock and plastic pipe sills use a bent Simpson "T" strap (Figure 3) to secure the stringers to the sills. Plastic pipe sills also require a stringer support pad (Figure 4) to provide a flat support surface on the pipe.

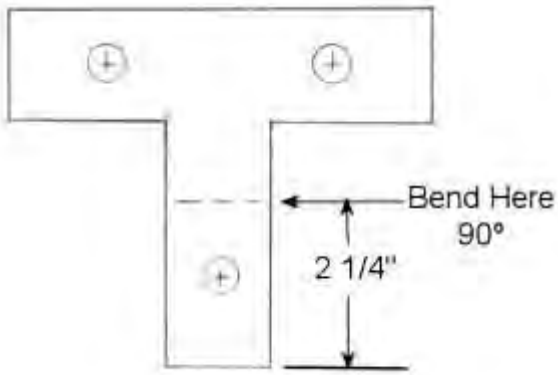


Figure 3 – Simpson T-Strap Tie

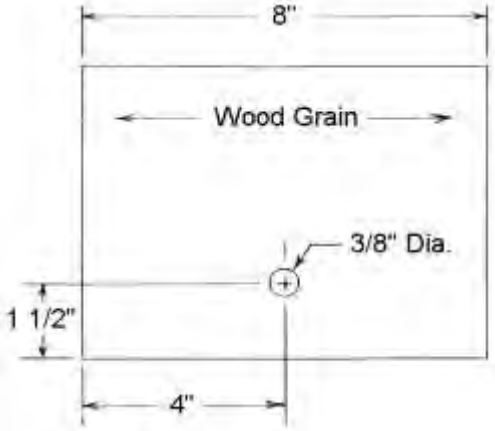


Figure 4 – Stringer Support Pad 2"x6" ACQ Pressure Treated

Lumber Sills - Experience has shown that nailing the end of the stringer to the sills, either by nail toeing or driving spikes vertically through the stringer, stresses the wood and may cause a cracked stringer at the time of assembly or later from the stress of use and environmental effects due to the rigidity of the attachment. Stringers bolted to a metal bracket provide a more flexible attachment for stringer deflection. Figure 5 shows an end view of the attachment of the boardwalk stringers to the lumber sill.

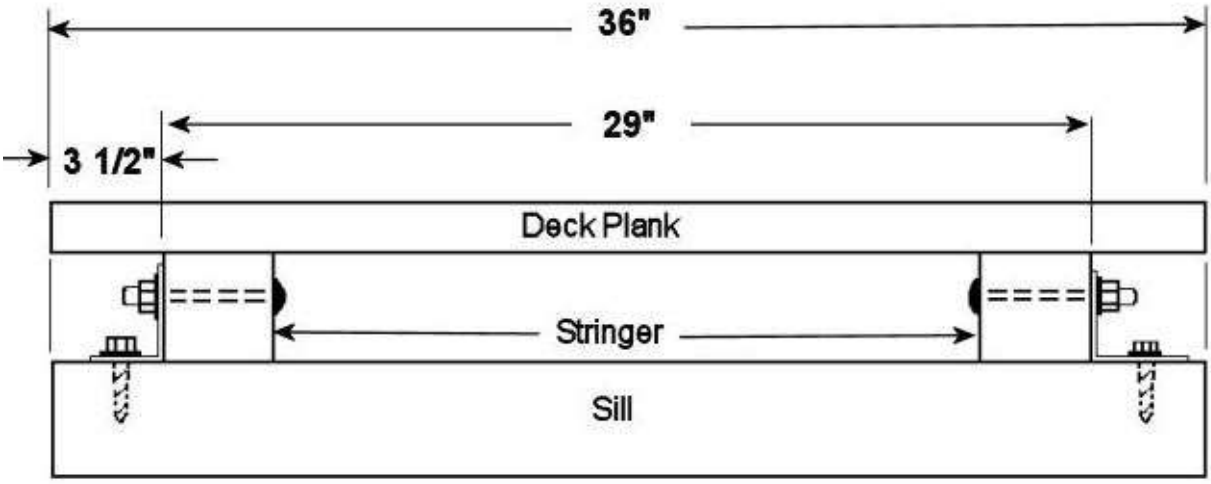


Figure 5 – ACQ Lumber Sill Assembly Detail

Plastic Pipe Sills – Figure 6 is an assembly drawing showing plastic pipe with an end view of stringer pads, brackets/hardware, stringer options and decking.

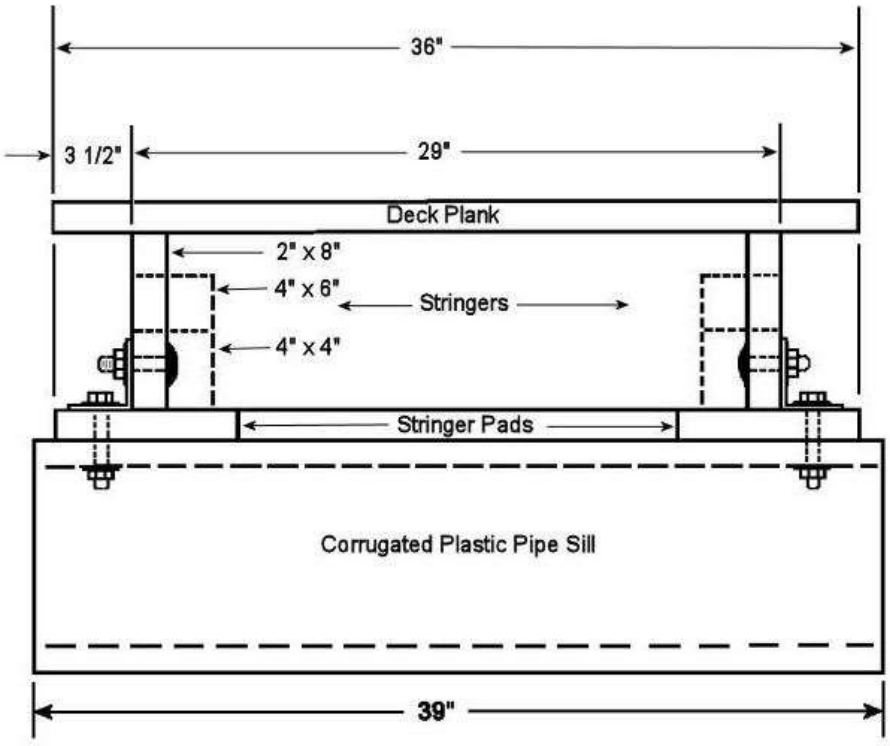


Figure 6 – Corrugated Plastic Pipe Sill Assembly Detail

Steel Pipes –An auger is permanently attached to 2” galvanized steel pipe that is rotated into the firm sub-soil with a pipe wrench. A dock fitting is then attached to support the stringer. This assembly is shown in Figure 7.

Figure 7 – Pipe with auger and dock fitting attached.

Frame Stringers – Frame stringers are used to obtain more deck height where considerable water depth can be expected. Another reason is to minimize the number of costly pipe and dock fittings by increasing the stringer span length. Figure 8 depicts the construction of a frame stringer using 2” lumber. This design can be assembled off site with three deck planks attached for strength in transport.

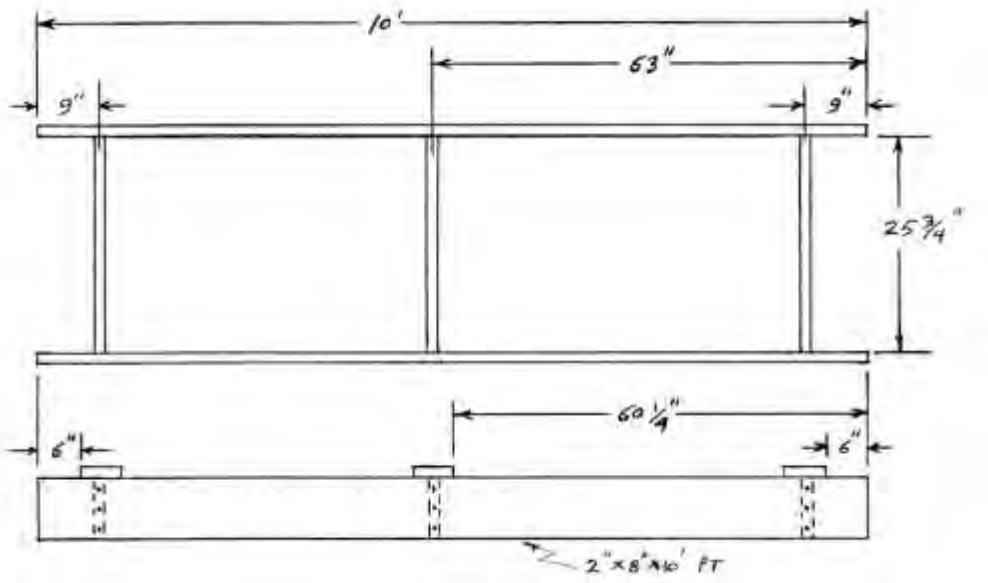


Figure 8 - Stringer Frame

Sill Placement – After the first sill is in place and level then the stringers can be placed across the span to the second sill and with the use of a carpenter level determine if the second sill has to be dug in more or shimmed up. Shimming is accomplished with an assortment of spacers made from 5/4" or 2" PT boards as depicted in Figure 4 that are placed between the "T" straps and the sill. Once the second sill is in place and leveled then the stringers can be bolted to the "T" straps. The use of bolts to secure the joint not only strengthens it but also facilitates removal of the boardwalk sections if damaged or needing relocation. Maintain a 3/8" gap between stringers at the junction point to allow for vertical flexing in case the ground is (or becomes) spongy. This process is repeated until the last sill is reached. If the wet area experiences high flooding, particularly near brooks, anchor the sills by using re-bar driven at an angle through the sills to prevent the boardwalk from shifting off its footprint. When using steel pipe for stringer support the path of the boardwalk must be probed at stringer-length intervals through the soft soil to the firm sub-soil with a thin, firm rod such as fiberglass wands or 3/8" dia. re-bar. This measurement is needed to calculate the required pipe lengths to support the boardwalk.

Decking – Planks for decking are 2"x 6"x3' PT boards Decking is screwed for ease of replacement at a typical spacing of 7/16". Due to slight plank width, using pairs of 3/8", 7/16", or ½" thick wood gauges for plank spacing along with a 3½" gauge for plank overhang from the stringer are helpful when screwing the planks to the stringers.

Note: * "A plank used for a deck often contains heartwood and sapwood. If the plank is placed with the heartwood face up, alternating moisture and drying—and the effects of freezing and thawing—will cause knots and some of the annual rings in the wood to lift. To reduce tripping hazards and future maintenance, deck plank should be placed "green side up" (the heart side face down and the bark side face up." See Figure 9).

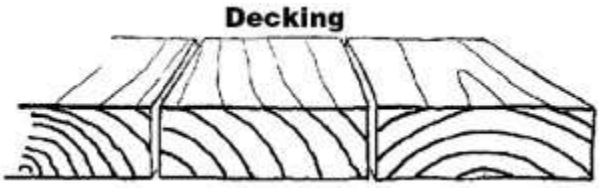


Figure 9—Place decking with the growth rings facing down to help prevent cupping. Cupping causes the wood to decay faster and creates a tripping hazard.

*This procedure and diagram was obtained from the US Forest Service "Wetland Trail Design & Construction" 2007 Edition, Steinholtz & Vachowski.

Figure 10 illustrates two methods for decking at bends in the boardwalk. Fanning the planks as shown in 10(a) is useful for shallow bends while sharper bends use tapered planks cut as shown in 10(b) with equal spacing. The detail for cutting these tapered planks is shown in Figure 10(c).

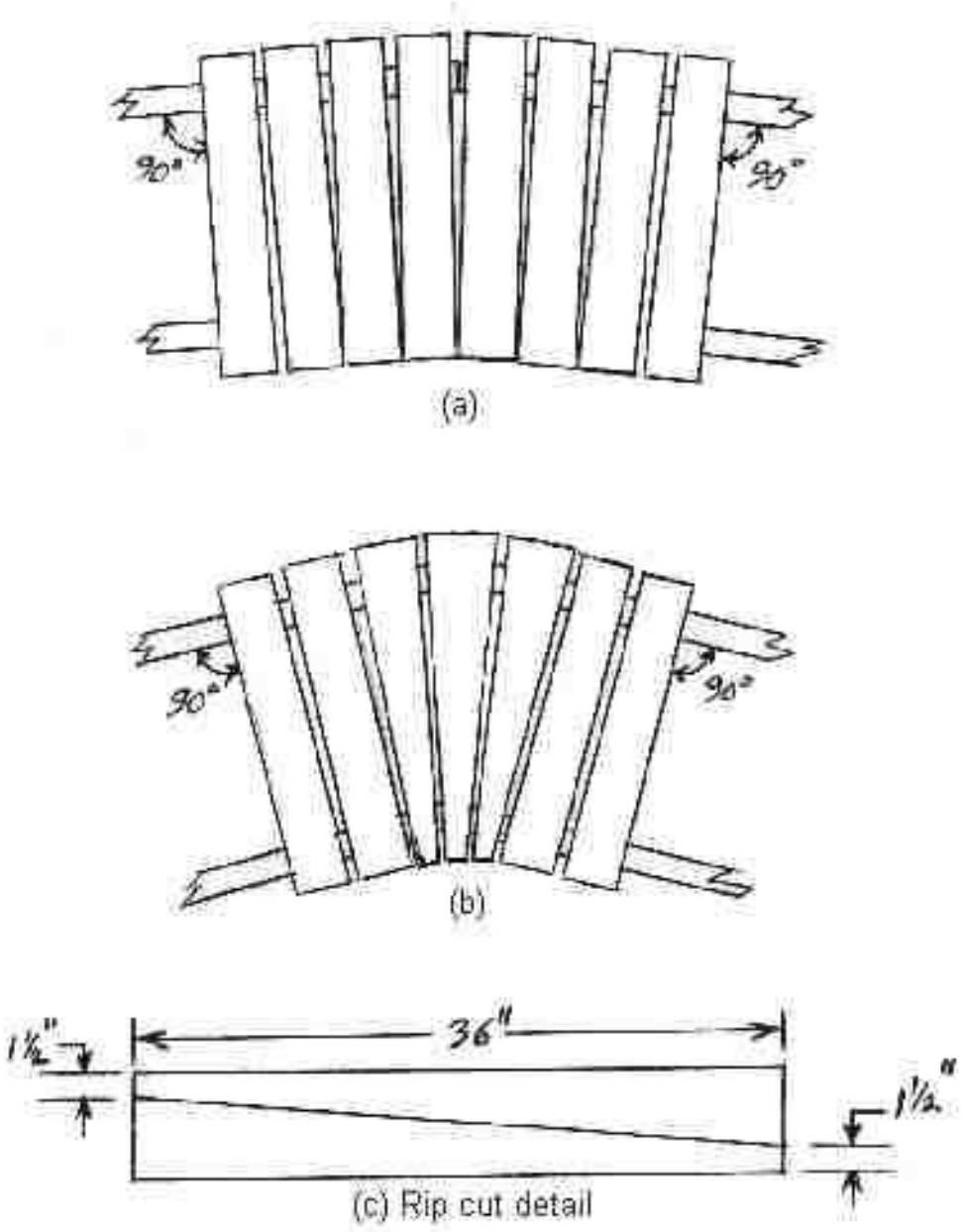


Figure 10 – Decking Detail at Bends

Materials List

Sills
2”x6”, 4”x6” or 6”x6” #2 ground contact, ACQ pressure treated southern pine.

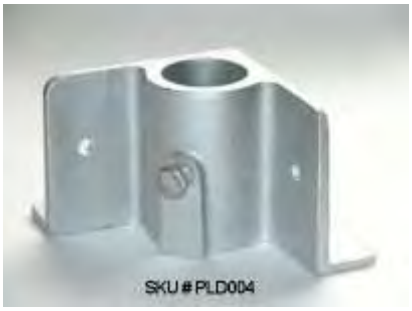
Polyethylene, dual wall, corrugated pipe Advanced Drainage Systems
N-12 Plain End Pipe

Stringers
4”x4”, 4”x6”, 2”x6”, 2”x8”, 2”x10” #1 ACQ pressure treated southern pine.

Planks
2”x6” #1 Ground contact, ACQ, pressure treated southern pine.

Hardware
Simpson Strong-Tie T Strap Model 66T

Dock hardware: RDS P.O. Box 298 West Franklin, NH 03235 1-800-934-1943
info@rdsdockhardware.com



2” galvanized steel pipe – schedule 40 *
3/8” lag screws, hot dipped galvanized *
3/8”-16 carriage bolts, hot dipped galvanized **
3/8”-16 hex head bolts, hot dipped galvanized **
3/8”-16 hex nuts, hot dipped galvanized
3/8” flat washers, hot dipped galvanized
3” x 9 - exterior screws, T-25 star drive-Type 17 point

* length TBD
** bolt threads must extend 1” minimum beyond bearing surface.

Access Control (472)
Forest Boundary Marking

Implementation Requirements *Lifespan – 10 Years*

Producer:				Contract #:	
Location					
Farm #:		Tract #:		Forest Stand(s):	
Planner:				Date:	

DEFINITION
The temporary or permanent exclusion of animals, people, vehicles and equipment from an area. These specific Implementation Requirements have been developed for implementation of forest boundary marking.

PURPOSE
To achieve and maintain desired resource conditions by monitoring and managing the intensity of use by animals, people, vehicles, and equipment in coordination with the application schedule of practices, measures, and activities specified in the conservation plan.

CRITERIA
The Criteria, Considerations, and Specifications for this practice shall be in concurrence with the CT Field Office Technical Guide and the CT Conservation Practice Standard for this practice. ***See Standard for all required Criteria.***

PRACTICE REQUIREMENTS
This practice is intended to identify and delineate the boundary line of the landowner to minimize trespass that may adversely affect the resources on the subject property. Identification and delineation of the forest ownership boundary also minimizes the risk of trespass of the landowner, or his/her agents on abutting properties during the implementation of conservation practices.

Forest boundary lines will be marked with both paint blazes using boundary marking paint as well as signs along all interior boundary lines. Boundary lines along roads or railroads need only be marked with signs.

Paint blazes will be hand-sized blazes painted on the bole of trees on or within close proximity to the boundary. Trees on either side of the boundary line will be blazed, with paint blazes facing toward the boundary line.

Trees located on the line will receive a paint blaze on both sides of the tree. Trees located on the abutting property are to receive paint blazes only, no bark blazing or scribing on an abutters trees is permissible, and only trees that are within 5 feet of the property line are to be blazed on the abutting property.

Trees located on the landowner's property may receive bark blazing or scribing before receiving a paint blaze if preferred by the forester or landowner. Blaze trees on the landowner's property within 15 feet of the boundary line, although blazing trees as close to the line as possible is preferred.

Blazes must be located a minimum of 4.5 feet from the ground surface. Blazes around 6 feet from the ground surface tend to be more visible and are preferred.

Trees located on a property corner should receive a complete single ring of paint, located a minimum of 4.5 feet from the ground surface.

Yellow or white boundary marking paint is to be used. For durability, paint blazes are to be brushed on, spray paint is not permissible. Blue, orange or red paint is **NOT** permissible, as they are often used in marking cut or save trees in silvicultural operations.

The spacing of blazes will be a function of the site conditions and need to be spaced so that the blazes are reasonably visible from one to another as an individual approaches the boundary line, either from the subject property or an abutting property. The standard spacing between blazes is 50 feet. Exceptions to this occur when there is a section of boundary line that has no trees suitable for blazing near the boundary line, such as an open or shrubby wetland area. Conversely, areas of extremely thick understory like mountain laurel, may require a shorter distance between blazes.

Boundary signs are to be located along each boundary line and at each point of entry to the forested property such as roads or trails that enter the subject property. The spacing of boundary signs will be a function of the site conditions and need to be spaced so that the signs can reasonably be visible as the boundary line is approached from an abutting property.

Maximum boundary sign spacing is presented in the table below:

Minimum Sign Dimensions	Distance from Property Corner	Interior Boundary Line Spacing	Road Frontage Boundary Line Spacing
11" x 11"	50 ft	100 ft	200 ft
3.5" x 3.5"	25 ft	50 ft	100 ft

Boundary signs are to be made of durable materials (i.e. plastic or aluminum) such as the standard boundary or posted signs commercially available. The use of Tyvek signs or the use of thin plastic signs is **NOT** permissible. If using plastic boundary signs, a minimum thickness of 0.023 gauge is required and the signs must be a durable ridged plastic such as polyethylene with UV stabilizers.

Signs will be fixed to a live tree or a post with fasteners suitable to adequately anchor the sign. A minimum of two fasteners is required for each sign. Signs fixed to trees shall be installed so that the head of the nail is not tight against the sign and allows the tree to grow and push the sign out towards the head of the nail. Consider, thickness of bark on targeted trees when selecting the length of nail for attaching signs. Nails should be embedded a minimum of 1" into solid wood, while the head of the nail should protrude 1" away from the bark surface. The use of aluminum nails is recommended as they last longer and protect chainsaw operators.

If "Posted, No Trespassing" signs are to be used as boundary signs, the name and address of the landowner needs to be included on the sign. This is a necessary requirement under U.S. common law, so that the landowner can be contacted to request access to the property.

All signs are to be located on trees or posts on the boundary or proximal to the boundary of the landowner who is implementing the conservation practice. No signs should be installed on trees or posts that are on an abutting property.

Consideration regarding the placement of paint blazes and boundary signs should be given to abutting property owners who have a residence close to the property boundary. Variations such as only blazing one side of the tree if proximal to a residence or varying the spacing of blazes or signs in the immediate vicinity of the abutting residence are permissible. Locating blazes at ground level is also permissible when proximal to a residence.

Connecticut General Statues (CGS) are not specific regarding separation distances between signs for boundary marking. CGS 53a-109 and 53a-110a speak to criminal trespass, and simple trespass respectively. CGS 53a-109 states "A person is guilty of criminal trespass in the third degree when, knowing that such person is not licensed or privileged to do so: (1) Such person enters or remains in premises which are posted in a manner prescribed by law or reasonably likely to come to the attention of intruders or are fenced or otherwise enclosed in a manner designed to exclude intruders….."

Connecticut General Statues further protects landowners from timber trespass in Sec. 52-560, which states "Any person who cuts, destroys or carries away any trees, timber or shrubbery, standing or lying on the land of another or on public land, except as land subject to the provisions of section 52-560a, without license of the owner, and any person who aids therein, shall pay to the party injured five times the reasonable value of any tree intended for sale or use as a Christmas tree and three times the reasonable value of any other tree, timber or shrubbery; but, when the court is satisfied that the defendant was guilty throughout mistake and believed that the tree, timber or shrubbery was growing on his land, or the land of the person for whom he cut the tree, timber, or shrubbery, it shall render judgment for no more than its reasonable value."

The Connecticut General Statue 52-560a speaks to the damages associated with encroachment on state, municipal or nonprofit land conservation organization open space land, and allows the courts to order additional damages associated with any encroachment and states "…the court may award damages of up to five times the cost of restoration or statutory damages of up to five thousand dollars."

The intention of this conservation practice standard is **NOT** to provide legal protection to the landowner, and the landowner should seek advice from a land use attorney. NRCS does not make any claim to the accuracy or applicability of the above sited statutes and/or legal references. They are provided purely for informational purposes.

All work shall be in compliance with NRCS program policy and rules, and local and state laws. This includes but is not limited to the Connecticut Forest Practices Act and state and local wetlands regulations.

All necessary federal, state and municipal permits, approvals or waivers must be obtained before work commences and are the responsibility of the landowner.

This practice may be associated with other conservation practices to ensure full functionality and that resource concerns are addressed. See Conservation Plan for additional practices. Additional practices may include CPS-655 Forest Trails and Landings which may include Temporary Stream Crossings, CPS-314 Brush Management, CPS-560 Access Road, and CPS-666 Forest Stand Improvement.

Implementation Requirement Sheet
472 Access Control – Forest Boundary Marking

GENERAL INFORMATION

Forest Management Plan By:			Date:
FMP Addendum By (if applicable):			Date:
Total Property Acres:		Total Forested Acres:	
Stand #s:			

FOREST BOUNDARY MARKING

Forest Stand(s):				
	Total Distance (ft)	Paint Blazes Required	Signs Required	Estimated minimum # of signs based on Max separation distance*
Interior Boundary Line		☐ Yes ☐ No	☐ Yes ☐ No	
Road Frontage Boundary Line		☐ Yes ☐ No	☐ Yes ☐ No	

*Maximum boundary sign spacing is presented in the table below:

Minimum Sign Dimensions	Distance from Property Corner	Interior Boundary Line Spacing	Road Frontage Boundary Line Spacing
11” x 11”	50 ft	100 ft	200 ft
3.5” x 3.5”	25 ft	50 ft	100 ft

Additional Information or Operation and Maintenance Requirements (O&M):

REQUIRED:

Landowner understands practice requirement per Practice Standard and Implementation Requirements Sheet.

Landowner Signature: _____ Date: _____

NRCS Planner has necessary Job Approval Authority and has consulted with NRCS forestry staff in the planning and development of this Implementation Requirements Sheet.

NRCS Planner:_____ Date:_____

RECORD OF COMPLETION AND CHECK OUT CERTIFICATION

472 Access Control – Forest Boundary Marking

Producer:				Contract #:	
Location					
Farm #:		Tract #:		Stand #:	

Attachments:

- ☐ Map attached with actual installed extent and practice components delineated and labeled.
- ☐ Photos of completed practice.

Requirements:

-Boundary Marking

- ☐ Boundary signs posted along all boundary lines
- ☐ Boundary signs have landowner name & address (if posted, no trespassing signs used)
- ☐ Paint blazes along all interior boundary lines

Total Boundary Length		Boundary Sign Size	
Paint Blaze Color		Boundary Sign Material	
		Boundary Sign Color	

-

NRCS Inspector:	Final Inspection Date:	Stand #:	Installed Practice Extent:
Additional Information or Operation and Maintenance Requirements (O&M)			

Practice Certification Statement:		
I have inspected the implementation of this practice, have appropriate Job Approval Authority, and certify that it has been implemented according to the practice standard and the specifications in this implementation requirements document.		
Certified by:	**Title:**	**Date**

NRCS Natural Resources Conservation Service

Creating Brush Piles for Upland Wildlife

New Hampshire Conservation Practice Job Sheet 645

Definition

A brush pile is built from excess forest slash or blow down to enhance or supplement wildlife cover.

Program Notes:

Limit of 4 piles per landowner 15 feet round by 6 feet high.

Purpose

- Provide supplemental dense cover for wildlife such as: Cottontail Rabbits, Bobwhite Quail, Pheasants, Turkeys, Thrashers, Skunks, Raccoons, Mockingbirds, and Sparrows.

- Provide a variety of cover needs for wildlife, including nesting in dense cover, escape from avian predators such as hawks and owls, and mammalian predators such as raccoons and coyotes; perching on brush pile tops; and thermal cover created by shading; and protection from wind and precipitation.

Where used

For edge habitats, such as along field borders, fence rows, or riparian areas, one brush pile every 200 - 300 feet will provide adequate cover and travel lanes between food sources for most species.

- In abandoned fields, on edges of working crop fields, harvested or thinned forests, and other early successional habitat where shrub recovery is expected, create 2 piles per acre.
- Along woods roads and used to deter ATV use from wetland sections of road.
- Avoid the bottoms of drainage ways and low spots where standing water or flooding will reduce the usefulness of brush pile for upland wildlife species.

PLANNING CONSIDERATIONS

- Conduct a habitat assessment to determine if cover is a limiting factor for the targeted species. If natural ground cover is insufficient, brush piles may be appropriate as a short-term solution.
- If state or federally listed species are in the landscape consider potential risks of adding brush piles as they may benefit predators such as Foxes, Coyotes, Owls and Hawks.
- Brush piles should be a by-product of storm events or other land treatments, such as, forest stand improvement, brush management, or agricultural land clearing, rather than a specific practice.
- Consider planning additional practices, such as, Tree & Shrub Establishment (612), Early Successional Habitat Development (647), and Riparian Forest Buffer (391) to accompany brush pile establishment to provide more valuable cover and food resources in the long-term.
- Brush piles are usually most effective when located in habitat edges, such as, along forest roads and edges, agricultural field borders and corners, and along riparian areas.
- Brush piles situated in close proximity to other habitat elements required by the targeted species will be more beneficial.
- Several strategically placed medium-size piles (roughly 15’ in diameter and 6’ high) are better than one large one. Isolated piles are not as beneficial, nor as likely to be used.
- Avoid placing brush piles in grasslands since the addition of vertical structure in these settings can be detrimental to many native grassland birds.
- Keep brush piles away from houses and lawns to avoid problems with nuisance wildlife.
- Brush piles are flammable. Keep them away from buildings.
- 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.

Operation and maintenance

This practice component will be inspected periodically and restored as needed to maintain the stated purpose. Additional operation and maintenance requirements will be developed on a site-specific basis to assure performance of the component as intended over time.

Specifications

Location

Brush piles should be constructed along edges of other cover types such as brush or

woodland. It is helpful if they are located near cultivated land or grassland since wildlife will need food and nesting cover close by. Spacing the brush piles at intervals of 100 to 200 feet will provide adequate cover as well as travel lanes.

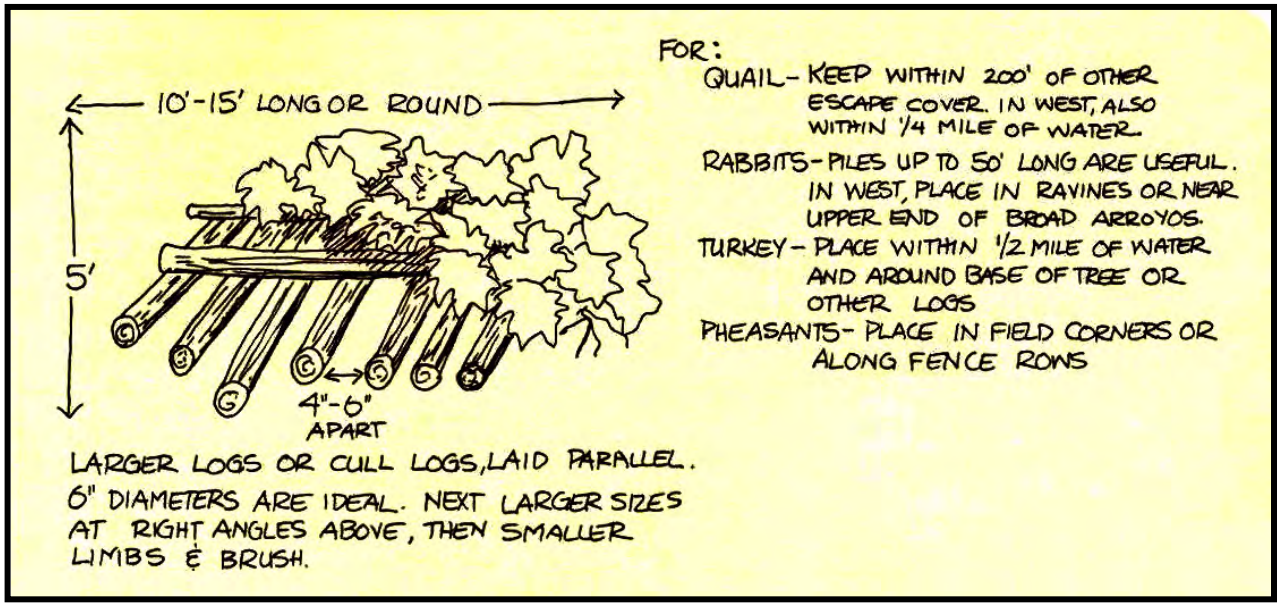
Construction

Properly constructed brush piles are more than just an armful of limbs in a pile. They will serve more wildlife, for a longer period of time, if they are carefully planned and constructed. The pile must be dense enough to constrain predators and provide shelter during bad weather and be loose enough around the edges to provide easy access.

The first step in brush pile construction is to build a base. Start with logs preferably, that are six to ten inches in diameter and six to eight feet long. Place four to ten poles on the ground parallel to each other, eight to twelve inches apart. Place more poles of the same size perpendicularly across the top of the first set of poles. Other materials can be used for the base such as large rocks or stumps or combinations of each. The large materials will serve to keep "tunnels" open under the pile after the brush is stacked on top.

After the base is constructed, pile limbs and brush on top until the brush pile is five feet high. Start with larger limbs first and gradually add smaller sized limbs. Make the pile denser in the middle and looser near the edge. It may be necessary to add more limbs in years to come as the pile decomposes and settles. Planting vines and shrubs near the edge will add years to the life of the brush pile.

Site-specific requirements are listed on the specifications sheet. Additional provisions are entered on the job sketch sheet. Specifications are prepared in accordance with the NRCS Field Office Technical Guide. See practice standard Upland Wildlife Habitat Management, Code 645.



Creating Brush piles for Upland Wildlife – Job Sheet

Landowner_____ Field number_____

Purpose (check all that apply)	
☐ Provide escape cover from mammalian predators such as raccoons and coyotes.	☐ Create thermal cover by creating shade.
☐ Provide escape cover from avian predators such as hawks and owls.	☐ Provide elevated resting sites.
☐ Provide a dense area of cover for wildlife.	☐ Provide wildlife cover for nesting and/or brood rearing.
☐ Create cover from precipitation	☐ Create cover from winds by creating a wind barrier

Layout		
Height (feet)	**Width (feet)**	**Length (feet)**
	Log Diameter (average)	**Log Diameter (average)**
	Log Length (average)	**Log Length (average)**
	Number of logs Used	**Number of logs Used**
Notes list any other materials used such as rocks or stumps.	Notes:	Notes :
Distance to nearest water source (ft):		
Distance to nearest brushpile or other source of cover (ft)		
Type of nearest cover		
☐ Check this box if tile is to be used to create burrows under the brushpile.		

Woody Plant Materials Information (If planted near brush pile to enhance use by wildlife)				
Species/cultivars:	Plants/acre:	Kind of stock[1]:	Planting dates:	Avg. Spacing[2]:
1				
2				
3				
4				

[1]BAreroot, COntainer, CUtting, Seed; include size, caliper, height, and age as applicable. [2]Spacing between plants to achieve plants/acre.

Temporary Storage Instructions (Refer to Practice Standard 612 Tree & Shrub Planting)

Planting stock that is dormant may be stored temporarily in a cooler or protected area. For stock that is expected to begin growth before planting, dig a V-shaped trench (heeling-in-bed) sufficiently deep and bury seedlings so that all roots are covered by soil. Pack the soil firmly and water thoroughly. Additional requirements:

Site Preparation (Refer to Practice Standard 612 Tree & Shrub Planting)

Remove debris and control competing vegetation to allow enough spots or sites for planting and planting equipment. Additional requirements:

Planting Methods (Refer to Practice Standard 612 Tree & Shrub Planting)

For container and bareroot stock, plant stock to a depth even with the root collar in holes deep and wide enough to fully extend the roots. Pack the soil firmly around each plant. Cuttings are inserted in moist soil with at least 2 to 3 buds showing above ground. Additional requirements:

Operation and Maintenance (Refer also to Practice Standard 612 Tree & Shrub Planting)

The brush pile must be inspected periodically and protected from damage so proper function is maintained. Replace or add material to compensate for decayed wood in the pile. Replace dead or dying tree/shrub stock and continue control of competing vegetation to allow proper establishment when planting is done near the brush pile.. Keep large dead and dying trees for cavity nesting birds and a source of large wood in upland habitats. Additional requirements:

APPENDIX C: FOREST INVENTORY SUMMARY DATA

File name: C:\Users\ngoss\Desktop\CONNWOOD FORESTERS_Projects_2022\Plainfield MP\Data\0downing_inventorydata.NED3
File version: 3.30.1
Last saved: 7/7/2022
Report generated: 07/08/2022 16:14

Overstory Vegetation Summary

Inventory, 2022

The values in this report are calculated from the overstory plot data only.

Characteristics by Stands

Stand	Stand area (ac.)	Land cover	Forest type	Size class	Over mean dbh (in.)	Canopy closure (%)	Ht. to canopy (ft)
Stand 1	36.0	Broadleaf forest	oak northern hardwoods	small sawtimber	9.4	61	
Stand 2	56.5	Broadleaf forest	oak northern hardwoods	small sawtimber	9.1	65	
Stand 3	19.8	Broadleaf forest	oak northern hardwoods	pole	7.6	54	
Stand 4	25.9	Broadleaf forest	oak	small sawtimber	8.4	53	
Stand 5	35.8	Broadleaf forest	oak northern hardwoods	small sawtimber	10.1	69	

Stand	Over basal area (sq.ft./ac.)	Over rel. density (%)	Decid. midstory (%)	Conif. midstory (%)	Mix. midstory (%)
Stand 1	83.5	61	0	0	0
Stand 2	85.2	66	0	0	0
Stand 3	70.7	54	0	0	0
Stand 4	63.6	53	0	0	0
Stand 5	94.3	70	0	0	0

Characteristics across Stands

Variable	Weighted mean	Minimum	Maximum
Overstory Basal Area (sq.ft./ac.)	81.9	63.6	94.3
Overstory Trees Per Unit Area (stems/ac.)	151.54	131.12	193.62
Overstory Medial DBH (in.)	12.8	10.3	13.6
Overstory Medial Merchantable DBH (in.)	13.0	10.5	13.8

Overstory Quadratic Mean DBH (in.)	10.0	8.2	10.9
Overstory Mean DBH (in.)	9.1	7.6	10.1
Overstory Quadratic Mean Merchantable DBH (in.)	10.7	8.7	11.3
Canopy Closure (%)	62	53	69
Deciduous Midstory (%)	0	0	0
Coniferous Midstory (%)	0	0	0
Mixed Midstory (%)	0	0	0

Area by forest type and size class

area in acres

Forest type	Regeneration	Sapling	Pole	Small sawtimber	Large sawtimber	Totals
oak northern hardwoods	0.0	0.0	19.8	128.3	0.0	148.1
oak	0.0	0.0	0.0	25.9	0.0	25.9
Totals	0.0	0.0	19.8	154.2	0.0	173.9

Report List

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Timber Tables

Stand 1, Inventory, 2022

Only observations that are greater than or equal to 1.0, and whose species growth form is "Tree" are used. Dead observations are not included when calculating values in this report.

There are no tree observations in any of the understory plots. Understory tables, and combined tables can not be generated.

Composition

Overstory only

	All species	red maple (*Acer rubrum*)	hickory (*Carya*)	white oak (*Quercus alba*)	northern red oak (*Quercus rubra*)	yellow birch (*Betula alleghaniensis*)	sweet birch (*Betula lenta*)	ash (*Fraxinus*)	American elm (*Ulmus americana*)	black oak (*Quercus velutina*)	pin oak (*Quercus palustris*)	scarlet oak (*Quercus coccinea*)
Basal area (sq.ft./ac.)	83.5	49.0	13.5	7.5	5.0	2.5	1.5	1.5	1.0	1.0	0.5	0.5
Percent of stand basal area (%)	100.0	58.7	16.2	9.0	6.0	3.0	1.8	1.8	1.2	1.2	0.6	0.6
Stems/area (stems/ac.)	149.6	96.2	21.8	6.1	3.2	8.9	9.7	1.2	1.4	0.6	0.5	0.2

Volumes

The boardfoot volumes were calculated using the 'Scrivani-Wiant' equation with the 'International 1/4 inch' log rule.

Overstory only

	All species	red maple (*Acer rubrum*)	hickory (*Carya*)	white oak (*Quercus alba*)	northern red oak (*Quercus rubra*)	yellow birch (*Betula alleghaniensis*)	sweet birch (*Betula lenta*)	ash (*Fraxinus*)	American elm (*Ulmus americana*)	black oak (*Quercus velutina*)	pin oak (*Quercus palustris*)	scarlet oak (*Quercus coccinea*)
Gross sawtimber volume (bd.ft.)	129,841	38,784	29,153	22,910	23,500	881	0	5,710	1,478	5,822	0	1,603
Net sawtimber volume (bd.ft.)	129,841	38,784	29,153	22,910	23,500	881	0	5,710	1,478	5,822	0	1,603
Gross pulpwood volume (cu.ft.)	0	0	0	0	0	0	0	0	0	0	0	0
Net pulpwood volume (cu.ft.)	0	0	0	0	0	0	0	0	0	0	0	0
Gross total volume (cu.ft.)	19,794	5,921	4,586	3,621	3,473	137	0	801	218	817	0	222
Net total volume (cu.ft.)	15,835	4,736	3,669	2,897	2,779	110	0	640	174	653	0	177

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Plant Species Composition and Diversity

Stand 1, Inventory, 2022

This report is from overstory data. Only live observations are included in the analysis. There are twenty plot clusters in this stand.

Species Occurrence and Abundance

This table combines all height classes (if applicable) into a statistical summary for the overstory, sorted by importance value.

Occurrence and Abundance

	Density	Rel Density	Frequency	Rel Frequency	Dominance	Rel Dominance	Importance Value
red maple	96.2	64.31	100.00	35.09	49.0	58.68	52.69
hickory	21.8	14.55	45.00	15.79	13.5	16.17	15.50
white oak	6.1	4.05	40.00	14.04	7.5	8.98	9.02
northern red oak	3.2	2.11	25.00	8.77	5.0	5.99	5.62
yellow birch	8.9	5.96	20.00	7.02	2.5	2.99	5.32
sweet birch	9.7	6.49	10.00	3.51	1.5	1.80	3.93
ash	1.2	0.80	15.00	5.26	1.5	1.80	2.62
American elm	1.4	0.93	10.00	3.51	1.0	1.20	1.88
black oak	0.6	0.38	10.00	3.51	1.0	1.20	1.69
pin oak	0.5	0.31	5.00	1.75	0.5	0.60	0.89

scarlet oak	0.2	0.11	5.00	1.75	0.5	0.60	0.82
Totals	149.59	100.00	285.00	100.00	83.50	100.00	100.00

Description of Table Items:

- **Density** = Mean number of stems per acre, based on stems counted in each plot cluster.
- **Relative (Rel) Density** = Mean relative proportion or abundance of stems per acre by species. The mean number of stems of a particular species divided by total number of stems.
- **Frequency** = The percentage of plot clusters where this species was observed, based on the number of plot clusters where species occurred divided by total number of plot clusters.
- **Relative (Rel) Frequency** = Relative frequency of occurrence, based on individual species frequency divided by the total of all species frequencies.
- **Dominance** = Mean basal area in square feet. The basal area of all stems or individuals of a given species.
- **Relative (Rel) Dominance** = Relative dominance, based on individual species dominance divided by the total of all species dominances.
- **Importance Value** = A value computed by arbitrarily adding together the relative values and dividing by the number of non-zero relative values.

Species Diversity

Measures of diversity are important in management and in environmental monitoring. Diversity relates to the variety and abundance of species in different areas, and most measures of diversity are related to species richness, species evenness (pattern of distribution of species), or heterogeneity. Hence, there are a variety of ways to measure and interpret diversity. The selection of a particular measure of diversity depends on sample size, availability of abundance data, and whether one is interested in species richness, evenness, or both.

Species Observed in the Stand

There were twelve species observed, based on a sample of twenty clusters with a total of twenty prism points using a 10 square feet per acre factor prism.

Core Flora

The core flora are those species common to every plot cluster. For this stand, none of the species are found in all plot clusters.

Measures of Similarity (Beta-diversity)

These measures provide an idea of stand-level diversity by indicating how the set of samples vary in terms of the variety and/or abundance of species found among them. With the exception of Whittaker's measure, each sample is compared with all other samples, one at a time, until all possible sample-pairs are computed. The stand level value is the mean of all sample-pairs.

The following table shows each measure with sample mean and range.

Similarity Indexes

Measure	Index	Range
Sørensen's Similarity Coefficient	0.5561	0.2000 - 1.0000
Jaccard's Similarity Coefficient	0.4278	0.1111 - 1.0000
Whittaker's Similarity Coefficient	2.8596	N/A*
Renkonen's (Percent Similarity)	54.8365	3.0891 - 100.0000
Morisita-Horn Similarity Index	0.6745	0.0058 - 1.0000

*Whittaker's measure is computed on multiple samples simultaneously, and therefore no individual sample pair values are computed.

- **Sørensen's Similarity Coefficient** - Based on presence-absence of species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. This measure gives more weight to species that occur in both samples.
- **Jaccard's Similarity Coefficient** - Based on presence-absence of species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. This measure gives more weight to species that are unique to each sample.
- **Whittaker's Similarity Coefficient** - Based on presence-absence of species. Low values indicate stronger similarity, and higher values indicate little or no similarity. The fewer species that samples share, the higher the value of Whittaker's measure (higher diversity or conversely, lower similarity).
- **Renkonen's Index (Percent Similarity)** - Based on abundance data, specifically, the relative abundance of species. Values range from 0-100, where low values indicate little or no similarity, and higher values indicate stronger similarity. The variable 'Basal Area' was used in the calculation.
- **Morisita-Horn Similarity Index** - Based on abundance data and somewhat sensitive to the most highly abundant species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. The variable 'Basal Area' was used in the calculation.

Vegetation and Site Quality

Vegetation is often used as an indicator of site quality. Some tree species have relatively narrow requirements and their presence is indicative of a particular site. Many tree species can occur on a wide variety of sites. Their presence offers little indicator value, but their relative abundance and size may be important. Herbaceous species often are more restricted in their requirements, and may be more useful than tree species as plant indicators. Care must be taken to account for factors that are unrelated to site quality, such as plant competition, herbivory, and past events in the history of a stand such as drought, insects, and human disturbance. Also, species may be absent purely by chance. In highly disturbed, well-lighted conditions, interpretation of ground-cover species can be problematic, as they may only indicate high light intensity. Furthermore, the indicator value of species can change regionally with changes in climate and physiography.

Suggested Reading

- *Barnes, B.V., Zak, D.R., Denton, S.R., and Spurr, S.H. 1998. Forest Ecology, ed. 4. John Wiley and Sons, Inc., New York. 774 pp.*
- *Carmean, W. H. 1996. Site-quality evaluation, site-quality maintenance, and site-specific management for forest land in northwest Ontario. Ontario Ministry Nat. Res., Northwest Sci. and Technology Unit, NWST Tech. Report TR-105, Thunder Bay, ON. 121 pp.*
- *Coile, T.S. 1938. Forest classification: classification of forest types with special reference to ground vegetation. J. For. 36:1062-1066.*
- *Daubenmire, R. F. 1976. The use of vegetation in assessing the productivity of forest lands. Bot. Rev. 42:115-143.*
- *Monserud, R.A. 1984. Problems with site index: an opinionated review. p. 167-190 in Bockheim, J.G, Ed. Proc. Symposium: Forest Land Classification: Experience, Problems, Perspectives. NCR-102 North Central For. Soils Comm., Soc. Am. For., USDA For. Serv. And USDA Conserv. Serv., Madison, Wisc.*
- *Kotar, J. and Coffman, M. 1984. Habitat-type classification system in Michigan and Wisconsin. p. 100-113 in Bockheim, J.G, Ed. Proc. Symposium: Forest Land Classification: Experience, Problems, Perspectives. NCR-102 North Central For. Soils Comm., Soc. Am. For., USDA For. Serv. And USDA Conserv. Serv., Madison, Wisc.*
- *Kuchler, A.W. 1964. The potential natural vegetation of the conterminous United States. Am Geogr. Soc., Spec. Publ. No. 36. 154 pp.*
- *Rowe, J. S. 1969. Plant community as a landscape feature. In Greenidge, K.N.H., Ed. Essays in Plant Geography and Ecology. Nova Scotia Museum, Halifax.*
- *Spies, T.A., and Barnes, B.V. 1985. Ecological species groups of upland northern hardwood-hemlock forest ecoystems of the Sylvania Recreation Area, Upper Peninsula of Michigan. Can. J. For. Res. 15:961-972.*

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Timber Narrative

Stand 1, Inventory, 2022

Dead observations were ignored when calculating values in this report.

Physiography

The stand contains a wetland area.

Composition

The total basal area of the overstory and understory combined is 83.5 square feet per acre. For the overstory only, acceptable growing stock for timber (AGS) is 52.0 square feet per acre and the basal area of unacceptable growing stock for timber (UGS) is 31.5 square feet per acre.

Relative Dominance

Species	Basal Area (sq.ft./ac.)	Relative Dominance (%)
red maple	49.0	58.68
hickory	13.5	16.17
white oak	7.5	8.98
northern red oak	5.0	5.99
yellow birch	2.5	2.99
ash	1.5	1.80
sweet birch	1.5	1.80
American elm	1.0	1.20
black oak	1.0	1.20
pin oak	0.5	0.60

scarlet oak	0.5	0.60

This is a small sawtimber stand, with the following diameters:

Average diameters values (in.)

Species	Mean	Medial	Merchantable	Quadratic	Merchantable Quadratic
scarlet oak	24.0	24.0	24.0	24.0	24.0
black oak	18.0	18.0	18.0	18.0	18.0
northern red oak	16.7	18.0	18.0	17.0	17.0
ash	14.8	16.0	16.0	15.1	15.1
white oak	14.6	16.3	16.3	15.1	15.1
pin oak	14.0	14.0	14.0	14.0	14.0
American elm	11.4	12.0	12.0	11.5	11.5
hickory	10.0	13.0	13.0	10.7	10.7
red maple	9.2	11.2	11.2	9.7	9.7
yellow birch	6.8	8.8	8.8	7.2	7.2
sweet birch	5.1	6.0	7.0	5.3	6.8
All species	9.4	12.5	12.5	10.1	10.3

Structure

The stand relative density is 61 of the average maximum stocking expected in undisturbed stands of similar size and species. This density is within the range for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low.

Relative density is a measure of tree crowding that accounts for both the size of the tree and the amount of space typically occupied by a tree of that size and species, so it is an especially useful measure in mixed species stands. A relative density of 100 percent implies that the growing space is fully occupied and trees must either slow their growth to survive or some trees will be crowded out and die, making room for more vigorous ones. On most stocking charts, 100% relative density is represented as the A-line. If relative density is at least 60% and below 100%, trees can fully occupy the growing site. Maximum stand growth occurs near 60% (the B-line), and enough trees occupy the site to discourage detrimental effects on growth form. The lower limit of stocking necessary to reach 60% (B-line) stocking in ten years on average sites is centrally represented as the C-line and corresponds roughly to 40% relative density.

Species	Relative density	Q-factor	AGS relative density
red maple	33	1.34	3
hickory	11	1.17	3
white oak	6	1.09	3
northern red oak	4	1.07	3
yellow birch	2	1.34	3
sweet birch	1	1.41	3
American elm	1	1.18	3
ash	1	1.02	3
black oak	1	0.00	3
pin oak	0	0.00	3
scarlet oak	0	0.00	3

If this stand is managed under an even-age silvicultural system, the several species groups will mature more than 30 years apart. The estimated year of maturity is 2050. The effective stand age is about 71 years.

If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade tolerant species would make it difficult to apply selection cutting.

The shape of an uneven sized forest can be described with a measure called a q-factor. The q-factor defines the change of tree numbers across diameter classes. Q-factor typically range from 1.1 to 1.9, with the lower numbers typically applying to stands with shade tolerant species. The q-factor for this stand is 1.25. The table above lists the q-factor for each tree species. The q-factor could not be calculated for species displaying a value of zero. One inch size classes were used to compute the q-factor values.

Trees of acceptable quality for future growing stock provide enough stocking by themselves to warrant stand management (38 % of AGS relative density).

Timber volume

The trees included in these figures include live trees of acceptable and unacceptable growing stock.

Timber volume is a good estimate of the productivity of forested sites. These figures refer to net volume which is calculated or estimated by deducting from gross volume the loss of sound wood to insects, diseases, or other damage. If the field inventory for this stand did not specifically record timber defects on trees, a default of 0

percent was used. The boardfoot volumes were calculated using the 'Scrivani-Wiant' equation with the 'International 1/4 inch' log rule. Total timber volume on this 36.0 acres stand is approximately 15,835 cubic feet of sawtimber plus 0 cubic feet of pulpwood for a total of 15,835 cubic feet. The net boardfoot volume averages 3,610.7 board feet per acre. The net pulpwood volume averages 0.0 cubic feet per acre. The net cubic volume averages 440.4 cubic feet per acre. Gross volume estimates are made using the Scrivani-Wiant log rule. Total volumes by species are presented in the following table, sorted by net board foot volume.

Species	Total Net Board-foot Volume (bd.ft.)	% total	Total Net Pulpwood Cubic Volume (cu.ft.)	% total	Total Net Cubic Volume (cu.ft.)	% total
black oak	5,822	4.5	0	0.0	653	4.1
ash	5,710	4.4	0	0.0	640	4.0
red maple	38,784	29.9	0	0.0	4,736	29.9
hickory	29,153	22.5	0	0.0	3,669	23.2
northern red oak	23,500	18.1	0	0.0	2,779	17.5
white oak	22,910	17.6	0	0.0	2,897	18.3
scarlet oak	1,603	1.2	0	0.0	177	1.1
American elm	1,478	1.1	0	0.0	174	1.1
yellow birch	881	0.7	0	0.0	110	0.7
pin oak	0	0.0	0	0.0	0	0.0
sweet birch	0	0.0	0	0.0	0	0.0
	129,841		0		15,835	

Timber value

Timber value is an estimate of the total dollar value of the wood products currently in the trees. It includes the prices of the trees where they are standing, before they are cut and transported to market, based on the prices the user has entered. If specific product codes were entered during inventory, values are determined using those products and prices, otherwise a default product mix is used in calculations. These figures include all live trees of acceptable and unacceptable growing stock.

Timber values

Species	Total Board-foot Value ($)	% total	Total Pulpwood Value ($)	% total	Total Timber Value ($)	% total
northern red oak	0.00	40.3	0.00	0.0	7,050.12	40.3
white oak	0.00	39.3	0.00	0.0	6,872.93	39.3
hickory	0.00	2.0	0.00	0.0	349.84	2.0
red maple	0.00	16.6	0.00	0.0	2,908.80	16.6
black oak	0.00	1.0	0.00	0.0	174.66	1.0
ash	0.00	0.4	0.00	0.0	68.52	0.4
yellow birch	0.00	0.2	0.00	0.0	31.71	0.2
American elm	0.00	0.1	0.00	0.0	17.74	0.1
scarlet oak	0.00	0.1	0.00	0.0	19.23	0.1
pin oak	0.00	0.0	0.00	0.0	0.00	0.0
sweet birch	0.00	0.0	0.00	0.0	0.00	0.0
	17,493.55		0.00		17,493.55	

Regeneration Assessment

The deer impact as observed in the inventory is unknown. Because browse pressure is unknown, establishment of the new stand may or may not be limited by deer.

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Timber Tables

Stand 2, Inventory, 2022

Only observations that are greater than or equal to 1.0, and whose species growth form is "Tree" are used. Dead observations are not included when calculating values in this report.

Composition

Overstory only

	All species	red maple (*Acer rubrum*)	hickory (*Carya*)	northern red oak (*Quercus rubra*)	white oak (*Quercus alba*)	scarlet oak (*Quercus coccinea*)	black oak (*Quercus velutina*)	yellow birch (*Betula alleghaniensis*)	sweet birch (*Betula lenta*)	eastern white pine (*Pinus strobus*)	red cedar (*Thuja*)	American elm (*Ulmus americana*)	ash (*Fraxinus*)	American beech (*Fagus grandifolia*)
Basal area (sq.ft./ac.)	85.2	26.2	16.8	10.8	10.2	5.8	4.8	3.6	2.2	1.0	0.8	0.8	0.8	0.6
Percent of stand basal area (%)	100.0	30.8	19.7	12.7	12.0	6.8	5.6	4.2	2.6	1.2	0.9	0.9	0.9	0.7
Stems/area (stems/ac.)	151.8	59.6	29.5	14.1	11.6	5.4	2.9	10.4	5.0	1.7	4.0	2.4	0.7	3.1

Volumes

The boardfoot volumes were calculated using the 'Scrivani-Wiant' equation with the 'International 1/4 inch' log rule.

Overstory only

	All species	red maple (*Acer rubrum*)	hickory (*Carya*)	northern red oak (*Quercus rubra*)	white oak (*Quercus alba*)	scarlet oak (*Quercus coccinea*)	black oak (*Quercus velutina*)	yellow birch (*Betula alleghaniensis*)	sweet birch (*Betula lenta*)	eastern white pine (*Pinus strobus*)	red cedar (*Thuja*)	American elm (*Ulmus americana*)	ash (*Fraxinus*)	American beech (*Fagus grandifolia*)
Gross sawtimber volume (bd.ft.)	284,375	45,677	62,041	58,474	37,760	30,342	32,161	5,762	2,185	5,786	0	606	2,748	0
Net sawtimber volume (bd.ft.)	284,375	45,677	62,041	58,474	37,760	30,342	32,161	5,762	2,185	5,786	0	606	2,748	0
Gross pulpwood volume (cu.ft.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net pulpwood volume (cu.ft.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gross total volume (cu.ft.)	42,874	7,042	9,959	8,496	5,907	4,281	4,459	929	355	836	0	84	390	0
Net total volume (cu.ft.)	34,299	5,633	7,967	6,797	4,725	3,425	3,567	744	284	669	0	67	312	0

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Plant Species Composition and Diversity

Stand 2, Inventory, 2022

This report is from overstory data. Only live observations are included in the analysis. There are fifty plot clusters in this stand.

Species Occurrence and Abundance

This table combines all height classes (if applicable) into a statistical summary for the overstory, sorted by importance value.

Occurrence and Abundance

	Density	Rel Density	Frequency	Rel Frequency	Dominance	Rel Dominance	Importance Value
red maple	59.6	38.94	86.00	23.37	26.2	30.75	31.02
hickory	29.5	19.24	58.00	15.76	16.8	19.72	18.24
northern red oak	14.1	9.20	42.00	11.41	10.8	12.68	11.10
white oak	11.6	7.58	48.00	13.04	10.2	11.97	10.86
scarlet oak	5.4	3.52	30.00	8.15	5.8	6.81	6.16
black oak	2.9	1.91	36.00	9.78	4.8	5.63	5.78
yellow birch	10.4	6.80	18.00	4.89	3.6	4.23	5.31
sweet birch	5.0	3.29	10.00	2.72	2.2	2.58	2.86
red cedar	4.0	2.62	8.00	2.17	0.8	0.94	1.91
American beech	3.1	2.00	6.00	1.63	0.6	0.70	1.44
eastern white pine	1.7	1.08	6.00	1.63	1.0	1.17	1.29
American elm	2.4	1.54	4.00	1.09	0.8	0.94	1.19
ash	0.7	0.48	6.00	1.63	0.8	0.94	1.02
unidentified species	1.4	0.90	4.00	1.09	0.0	0.00	0.66
blackgum	0.8	0.50	2.00	0.54	0.4	0.47	0.50
black cherry	0.4	0.24	2.00	0.54	0.2	0.23	0.34
sassafras	0.3	0.17	2.00	0.54	0.2	0.23	0.31
Totals	153.14	100.00	368.00	100.00	85.20	100.00	100.00

Description of Table Items:

- **Density** = Mean number of stems per acre, based on stems counted in each plot cluster.
- **Relative (Rel) Density** = Mean relative proportion or abundance of stems per acre by species. The mean number of stems of a particular species divided by total number of stems.
- **Frequency** = The percentage of plot clusters where this species was observed, based on the number of plot clusters where species occurred divided by total number of plot clusters.
- **Relative (Rel) Frequency** = Relative frequency of occurrence, based on individual species frequency divided by the total of all species frequencies.
- **Dominance** = Mean basal area in square feet. The basal area of all stems or individuals of a given species.
- **Relative (Rel) Dominance** = Relative dominance, based on individual species dominance divided by the total of all species dominances.
- **Importance Value** = A value computed by arbitrarily adding together the relative values and dividing by the number of non-zero relative values.

Species Diversity

Measures of diversity are important in management and in environmental monitoring. Diversity relates to the variety and abundance of species in different areas, and most measures of diversity are related to species richness, species evenness (pattern of distribution of species), or heterogeneity. Hence, there are a variety of ways to measure and interpret diversity. The selection of a particular measure of diversity depends on sample size, availability of abundance data, and whether one is interested in species richness, evenness, or both.

Species Observed in the Stand

There were eighteen species observed, based on a sample of fifty clusters with a total of fifty prism points using a 10 square feet per acre factor prism.

Core Flora

The core flora are those species common to every plot cluster. For this stand, none of the species are found in all plot clusters.

Measures of Similarity (Beta-diversity)

These measures provide an idea of stand-level diversity by indicating how the set of samples vary in terms of the variety and/or abundance of species found among them. With the exception of Whittaker's measure, each sample is compared with all other samples, one at a time, until all possible sample-pairs are computed. The stand level value is the mean of all sample-pairs.

The following table shows each measure with sample mean and range.

Similarity Indexes

Measure	Index	Range
Sørensen's Similarity Coefficient	0.4557	0.2000 - 1.0000
Jaccard's Similarity Coefficient	0.3201	0.1111 - 1.0000
Whittaker's Similarity Coefficient	3.6196	N/A*
Renkonen's (Percent Similarity)	34.9823	11.7089 - 100.0000
Morisita-Horn Similarity Index	0.4346	0.1263 - 1.0000

*Whittaker's measure is computed on multiple samples simultaneously, and therefore no individual sample pair values are computed.

- **Sørensen's Similarity Coefficient** - Based on presence-absence of species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. This measure gives more weight to species that occur in both samples.
- **Jaccard's Similarity Coefficient** - Based on presence-absence of species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. This measure gives more weight to species that are unique to each sample.
- **Whittaker's Similarity Coefficient** - Based on presence-absence of species. Low values indicate stronger similarity, and higher values indicate little or no similarity. The fewer species that samples share, the higher the value of Whittaker's measure (higher diversity or conversely, lower similarity).
- **Renkonen's Index (Percent Similarity)** - Based on abundance data, specifically, the relative abundance of species. Values range from 0-100, where low values indicate little or no similarity, and higher values indicate stronger similarity. The variable 'Basal Area' was used in the calculation.
- **Morisita-Horn Similarity Index** - Based on abundance data and somewhat sensitive to the most highly abundant species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. The variable 'Basal Area' was used in the calculation.

Vegetation and Site Quality

Vegetation is often used as an indicator of site quality. Some tree species have relatively narrow requirements and their presence is indicative of a particular site. Many tree species can occur on a wide variety of sites. Their presence offers little indicator value, but their relative abundance and size may be important. Herbaceous species often are more restricted in their requirements, and may be more useful than tree species as plant indicators. Care must be taken to account for factors that are unrelated to site quality, such as plant competition, herbivory, and past events in the history of a stand such as drought, insects, and human disturbance. Also, species may be absent purely by chance. In highly disturbed, well-lighted conditions, interpretation of ground-cover species can be problematic, as they may only indicate high light intensity. Furthermore, the indicator value of species can change regionally with changes in climate and physiography.

Suggested Reading

- *Barnes, B.V., Zak, D.R., Denton, S.R., and Spurr, S.H. 1998. Forest Ecology, ed. 4. John Wiley and Sons, Inc., New York. 774 pp.*
- *Carmean, W. H. 1996. Site-quality evaluation, site-quality maintenance, and site-specific management for forest land in northwest Ontario. Ontario Ministry Nat. Res., Northwest Sci. and Technology Unit, NWST Tech. Report TR-105, Thunder Bay, ON. 121 pp.*
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- *Daubenmire, R. F. 1976. The use of vegetation in assessing the productivity of forest lands. Bot. Rev. 42:115-143.*
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- *Rowe, J. S. 1969. Plant community as a landscape feature. In Greenidge, K.N.H., Ed. Essays in Plant Geography and Ecology. Nova Scotia Museum, Halifax.*
- *Spies, T.A., and Barnes, B.V. 1985. Ecological species groups of upland northern hardwood-hemlock forest ecoystems of the Sylvania Recreation Area, Upper Peninsula of Michigan. Can. J. For. Res. 15:961-972.*

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Timber Narrative

Stand 2, Inventory, 2022

Dead observations were ignored when calculating values in this report.

Physiography

The stand contains a wetland area.

Composition

The total basal area of the overstory and understory combined is 85.6 square feet per acre. For the overstory only, acceptable growing stock for timber (AGS) is 52.2 square feet per acre and the basal area of unacceptable growing stock for timber (UGS) is 33.4 square feet per acre.

Relative Dominance

Species	Basal Area (sq.ft./ac.)	Relative Dominance (%)
red maple	26.2	30.60
hickory	16.8	19.62
northern red oak	10.9	12.69
white oak	10.3	12.00
scarlet oak	5.8	6.77
black oak	4.8	5.61
yellow birch	3.6	4.20
sweet birch	2.2	2.57
eastern white pine	1.0	1.17
ash	0.8	0.93
red cedar	0.8	0.93
American elm	0.8	0.93
American beech	0.6	0.70
blackgum	0.4	0.47
flowering dogwood	0.3	0.31
black cherry	0.2	0.25
sassafras	0.2	0.23

This is a small sawtimber stand, with the following diameters:

Average diameters values (in.)

Species	Mean	Medial	Merchantable	Quadratic	Merchantable Quadratic
black oak	16.7	20.1	20.1	17.3	17.3
ash	13.9	14.5	14.5	14.1	14.1
scarlet oak	13.6	15.4	15.4	14.0	14.0
sassafras	12.0	12.0	12.0	12.0	12.0
blackgum	9.5	11.0	11.0	9.8	9.8
hickory	9.2	13.0	13.4	10.2	11.5
eastern white pine	9.2	15.6	15.6	10.5	10.5
sweet birch	8.7	9.8	9.8	8.9	8.9
red maple	8.2	11.3	11.7	9.0	10.0
American elm	7.6	9.0	9.0	7.9	7.9
yellow birch	7.2	10.4	11.3	8.0	10.0
northern red oak	6.1	16.7	16.8	8.7	11.9
white oak	6.0	15.0	15.1	8.6	12.7
American beech	6.0	6.0	6.0	6.0	6.0
red cedar	5.7	7.0	8.0	6.0	8.0
black cherry	2.4	9.5	10.0	4.0	10.0
flowering dogwood	2.0	2.0	0.0	2.0	0.0
All species	7.5	13.4	13.8	9.0	11.1

Structure

The stand relative density is 67 of the average maximum stocking expected in undisturbed stands of similar size and species. This density is within the range for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low.

Relative density is a measure of tree crowding that accounts for both the size of the tree and the amount of space typically occupied by a tree of that size and species, so it is an especially useful measure in mixed species stands. A relative density of 100 percent implies that the growing space is fully occupied and trees must either slow their growth to survive or some trees will be crowded out and die, making room for more vigorous ones. On most stocking charts, 100% relative density is represented as the A-line. If relative density is at least 60% and below 100%, trees can fully occupy the growing site. Maximum stand growth occurs near 60% (the B-line), and enough trees occupy the site to discourage detrimental effects on growth form. The lower limit of stocking necessary to reach 60% (B-line) stocking in ten years on average sites is centrally represented as the C-line and corresponds roughly to 40% relative density.

Species	Relative density	Q-factor	AGS relative density
red maple	18	1.32	3
hickory	14	1.26	3
northern red oak	10	1.16	3
white oak	9	1.21	3
scarlet oak	5	1.21	3
black oak	4	1.08	3
yellow birch	3	1.23	3
sweet birch	2	1.23	3
American elm	1	1.26	3
red cedar	1	1.07	3
American beech	1	0.00	3
ash	0	1.17	3
eastern white pine	0	1.16	3
flowering dogwood	0	0.00	3
blackgum	0	1.21	3
black cherry	0	1.21	3
sassafras	0	0.00	3

If this stand is managed under an even-age silvicultural system, the several species groups will mature more than 30 years apart. The estimated year of maturity is 2042. The effective stand age is about 82 years.

If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade tolerant species would make it difficult to apply selection cutting.

The shape of an uneven sized forest can be described with a measure called a q-factor. The q-factor defines the change of tree numbers across diameter classes. Q-factor typically range from 1.1 to 1.9, with the lower numbers typically applying to stands with shade tolerant species. The q-factor for this stand is 1.22. The table above lists the q-factor for each tree species. The q-factor could not be calculated for species displaying a value of zero. One inch size classes were used to compute the q-factor values.

Trees of acceptable quality for future growing stock provide enough stocking by themselves to warrant stand management (40 % of AGS relative density).

Timber volume

The trees included in these figures include live trees of acceptable and unacceptable growing stock.

Timber volume is a good estimate of the productivity of forested sites. These figures refer to net volume which is calculated or estimated by deducting from gross volume the loss of sound wood to insects, diseases, or other damage. If the field inventory for this stand did not specifically record timber defects on trees, a default of 0 percent was used. The boardfoot volumes were calculated using the 'Scrivani-Wiant' equation with the 'International 1/4 inch' log rule. Total timber volume on this 56.5 acres stand is approximately 34,299 cubic feet of sawtimber plus 0 cubic feet of pulpwood for a total of 34,299 cubic feet. The net boardfoot volume averages 5,031.4 board feet per acre. The net pulpwood volume averages 0.0 cubic feet per acre. The net cubic volume averages 606.9 cubic feet per acre. Gross volume estimates are made using the Scrivani-Wiant log rule. Total volumes by species are presented in the following table, sorted by net board foot volume.

Species	Total Net Board-foot Volume (bd.ft.)	% total	Total Net Pulpwood Cubic Volume (cu.ft.)	% total	Total Net Cubic Volume (cu.ft.)	% total
hickory	62,041	21.8	0	0.0	7,967	23.2
northern red oak	58,474	20.6	0	0.0	6,797	19.8
eastern white pine	5,786	2.0	0	0.0	669	1.9

yellow birch	5,762	2.0	0	0.0	744	2.2
red maple	45,677	16.1	0	0.0	5,633	16.4
white oak	37,760	13.3	0	0.0	4,725	13.8
black oak	32,161	11.3	0	0.0	3,567	10.4
scarlet oak	30,342	10.7	0	0.0	3,425	10.0
ash	2,748	1.0	0	0.0	312	0.9
sweet birch	2,185	0.8	0	0.0	284	0.8
blackgum	832	0.3	0	0.0	110	0.3
American elm	606	0.2	0	0.0	67	0.2
black cherry	0	0.0	0	0.0	0	0.0
red cedar	0	0.0	0	0.0	0	0.0
sassafras	0	0.0	0	0.0	0	0.0
American beech	0	0.0	0	0.0	0	0.0
flowering dogwood	0	0.0	0	0.0	0	0.0
	284,375		0		34,299	

Timber value

Timber value is an estimate of the total dollar value of the wood products currently in the trees. It includes the prices of the trees where they are standing, before they are cut and transported to market, based on the prices the user has entered. If specific product codes were entered during inventory, values are determined using those products and prices, otherwise a default product mix is used in calculations. These figures include all live trees of acceptable and unacceptable growing stock.

Timber values

Species	Total Board-foot Value ($)	% total	Total Pulpwood Value ($)	% total	Total Timber Value ($)	% total
red maple	0.00	9.9	0.00	0.0	3,425.80	9.9
northern red oak	0.00	50.5	0.00	0.0	17,542.29	50.5
white oak	0.00	32.6	0.00	0.0	11,328.07	32.6
black oak	0.00	2.8	0.00	0.0	964.82	2.8
hickory	0.00	2.1	0.00	0.0	744.49	2.1
scarlet oak	0.00	1.0	0.00	0.0	364.11	1.0
yellow birch	0.00	0.6	0.00	0.0	207.44	0.6
eastern white pine	0.00	0.2	0.00	0.0	69.43	0.2
sweet birch	0.00	0.1	0.00	0.0	26.22	0.1
ash	0.00	0.1	0.00	0.0	32.97	0.1
blackgum	0.00	0.0	0.00	0.0	9.98	0.0
American elm	0.00	0.0	0.00	0.0	7.28	0.0
American beech	0.00	0.0	0.00	0.0	0.00	0.0
black cherry	0.00	0.0	0.00	0.0	0.00	0.0
sassafras	0.00	0.0	0.00	0.0	0.00	0.0
red cedar	0.00	0.0	0.00	0.0	0.00	0.0
flowering dogwood	0.00	0.0	0.00	0.0	0.00	0.0
	34,722.92		0.00		34,722.92	

Regeneration Assessment

The deer impact as observed in the inventory is unknown. Because browse pressure is unknown, establishment of the new stand may or may not be limited by deer.

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Timber Tables

Stand 3, Inventory, 2022

Only observations that are greater than or equal to 1.0, and whose species growth form is "Tree" are used. Dead observations are not included when calculating values in this report.

There are no tree observations in any of the understory plots. Understory tables, and combined tables can not be generated.

Composition

Overstory only

	All species	red maple (*Acer rubrum*)	red cedar (*Thuja*)	hickory (*Carya*)	quaking aspen (*Populus tremuloides*)	white oak (*Quercus alba*)	northern red oak (*Quercus rubra*)	cottonwood (*Populus*)	black oak (*Quercus velutina*)	scarlet oak (*Quercus coccinea*)	black cherry (*Prunus serotina var. rufula*)	ash (*Fraxinus*)
Basal area (sq.ft./ac.)	70.7	30.7	10.7	8.0	6.0	5.3	2.7	2.7	2.0	1.3	0.7	0.7
Percent of stand basal area (%)	100.0	43.4	15.1	11.3	8.5	7.5	3.8	3.8	2.8	1.9	0.9	0.9
Stems/area (stems/ac.)	193.6	78.3	39.6	35.8	8.1	7.4	9.1	6.3	3.1	2.4	3.4	0.2

Volumes

The boardfoot volumes were calculated using the 'Scrivani-Wiant' equation with the 'International 1/4 inch' log rule.

Overstory only

	All species	red maple (*Acer rubrum*)	red cedar (*Thuja*)	hickory (*Carya*)	quaking aspen (*Populus tremuloides*)	white oak (*Quercus alba*)	northern red oak (*Quercus rubra*)	cottonwood (*Populus*)	black oak (*Quercus velutina*)	scarlet oak (*Quercus coccinea*)	black cherry (*Prunus serotina var. rufula*)	ash (*Fraxinus*)
Gross sawtimber volume (bd.ft.)	27,522	11,479	0	1,821	7,846	4,009	0	0	707	0	0	1,661
Net sawtimber volume (bd.ft.)	27,522	11,479	0	1,821	7,846	4,009	0	0	707	0	0	1,661
Gross pulpwood volume (cu.ft.)	0	0	0	0	0	0	0	0	0	0	0	0
Net pulpwood volume (cu.ft.)	0	0	0	0	0	0	0	0	0	0	0	0
Gross total volume (cu.ft.)	4,081	1,737	0	283	1,117	627	0	0	98	0	0	219
Net total volume (cu.ft.)	3,265	1,389	0	227	894	501	0	0	79	0	0	175

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Plant Species Composition and Diversity

Stand 3, Inventory, 2022

This report is from overstory data. Only live observations are included in the analysis. There are fifteen plot clusters in this stand.

Species Occurrence and Abundance

This table combines all height classes (if applicable) into a statistical summary for the overstory, sorted by importance value.

Occurrence and Abundance

	Density	Rel Density	Frequency	Rel Frequency	Dominance	Rel Dominance	Importance Value
red maple	78.3	40.45	80.00	26.09	30.7	43.40	36.64
red cedar	39.6	20.44	53.33	17.39	10.7	15.09	17.64
hickory	35.8	18.47	26.67	8.70	8.0	11.32	12.83
white oak	7.4	3.83	40.00	13.04	5.3	7.55	8.14
quaking aspen	8.1	4.18	33.33	10.87	6.0	8.49	7.85
northern red oak	9.1	4.71	20.00	6.52	2.7	3.77	5.00
cottonwood	6.3	3.24	13.33	4.35	2.7	3.77	3.79
black oak	3.1	1.58	13.33	4.35	2.0	2.83	2.92
scarlet oak	2.4	1.26	13.33	4.35	1.3	1.89	2.50
black cherry	3.4	1.75	6.67	2.17	0.7	0.94	1.62
ash	0.2	0.08	6.67	2.17	0.7	0.94	1.07
Totals	193.62	100.00	306.67	100.00	70.67	100.00	100.00

Description of Table Items:

- **Density** = Mean number of stems per acre, based on stems counted in each plot cluster.
- **Relative (Rel) Density** = Mean relative proportion or abundance of stems per acre by species. The mean number of stems of a particular species divided by total number of stems.
- **Frequency** = The percentage of plot clusters where this species was observed, based on the number of plot clusters where species occurred divided by total number of plot clusters.
- **Relative (Rel) Frequency** = Relative frequency of occurrence, based on individual species frequency divided by the total of all species frequencies.
- **Dominance** = Mean basal area in square feet. The basal area of all stems or individuals of a given species.
- **Relative (Rel) Dominance** = Relative dominance, based on individual species dominance divided by the total of all species dominances.
- **Importance Value** = A value computed by arbitrarily adding together the relative values and dividing by the number of non-zero relative values.

Species Diversity

Measures of diversity are important in management and in environmental monitoring. Diversity relates to the variety and abundance of species in different areas, and most measures of diversity are related to species richness, species evenness (pattern of distribution of species), or heterogeneity. Hence, there are a variety of ways to measure and interpret diversity. The selection of a particular measure of diversity depends on sample size, availability of abundance data, and whether one is interested in species richness, evenness, or both.

Species Observed in the Stand

There were twelve species observed, based on a sample of fifteen clusters with a total of fifteen prism points using a 10 square feet per acre factor prism.

Core Flora

The core flora are those species common to every plot cluster. For this stand, none of the species are found in all plot clusters.

Measures of Similarity (Beta-diversity)

These measures provide an idea of stand-level diversity by indicating how the set of samples vary in terms of the variety and/or abundance of species found among them. With the exception of Whittaker's measure, each sample is compared with all other samples, one at a time, until all possible sample-pairs are computed. The stand level value is the mean of all sample-pairs.

The following table shows each measure with sample mean and range.

Similarity Indexes

Measure	Index	Range
Sørensen's Similarity Coefficient	0.3830	0.4000 - 1.0000
Jaccard's Similarity Coefficient	0.2662	0.2500 - 1.0000
Whittaker's Similarity Coefficient	2.5870	N/A*
Renkonen's (Percent Similarity)	30.2958	38.8571 - 100.0000
Morisita-Horn Similarity Index	0.3709	0.5426 - 1.0000

*Whittaker's measure is computed on multiple samples simultaneously, and therefore no individual sample pair values are computed.

- **Sørensen's Similarity Coefficient** - Based on presence-absence of species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. This measure gives more weight to species that occur in both samples.
- **Jaccard's Similarity Coefficient** - Based on presence-absence of species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. This measure gives more weight to species that are unique to each sample.
- **Whittaker's Similarity Coefficient** - Based on presence-absence of species. Low values indicate stronger similarity, and higher values indicate little or no similarity. The fewer species that samples share, the higher the value of Whittaker's measure (higher diversity or conversely, lower similarity).
- **Renkonen's Index (Percent Similarity)** - Based on abundance data, specifically, the relative abundance of species. Values range from 0-100, where low values indicate little or no similarity, and higher values indicate stronger similarity. The variable 'Basal Area' was used in the calculation.
- **Morisita-Horn Similarity Index** - Based on abundance data and somewhat sensitive to the most highly abundant species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. The variable 'Basal Area' was used in the calculation.

Vegetation and Site Quality

Vegetation is often used as an indicator of site quality. Some tree species have relatively narrow requirements and their presence is indicative of a particular site. Many tree species can occur on a wide variety of sites. Their presence offers little indicator value, but their relative abundance and size may be important. Herbaceous species often are more restricted in their requirements, and may be more useful than tree species as plant indicators. Care must be taken to account for factors that are unrelated to site quality, such as plant competition, herbivory, and past events in the history of a stand such as drought, insects, and human disturbance. Also, species may be absent purely by chance. In highly disturbed, well-lighted conditions, interpretation of ground-cover species can be problematic, as they may only indicate high light intensity. Furthermore, the indicator value of species can change regionally with changes in climate and physiography.

Suggested Reading

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- *Spies, T.A., and Barnes, B.V. 1985. Ecological species groups of upland northern hardwood-hemlock forest ecoystems of the Sylvania Recreation Area, Upper Peninsula of Michigan. Can. J. For. Res. 15:961-972.*

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Timber Narrative

Stand 3, Inventory, 2022

Dead observations were ignored when calculating values in this report.

Physiography

Composition

The total basal area of the overstory and understory combined is 70.7 square feet per acre. For the overstory only, acceptable growing stock for timber (AGS) is 24.7 square feet per acre and the basal area of unacceptable growing stock for timber (UGS) is 46.0 square feet per acre.

Relative Dominance

Species	Basal Area (sq.ft./ac.)	Relative Dominance (%)
red maple	30.7	43.40
red cedar	10.7	15.09
hickory	8.0	11.32
quaking aspen	6.0	8.49
white oak	5.3	7.55
northern red oak	2.7	3.77
cottonwood	2.7	3.77
black oak	2.0	2.83
scarlet oak	1.3	1.89
ash	0.7	0.94
black cherry	0.7	0.94

This is a pole stand, with the following diameters:

Average diameters values (in.)

Species	Mean	Medial	Merchantable	Quadratic	Merchantable Quadratic
ash	28.0	28.0	28.0	28.0	28.0
quaking aspen	11.1	13.3	13.3	11.7	11.7
black oak	10.8	11.3	11.3	10.9	10.9
white oak	10.3	15.8	15.8	11.5	11.5
scarlet oak	10.0	10.0	10.0	10.0	10.0
cottonwood	8.8	9.0	9.0	8.8	8.8
red maple	7.9	10.3	10.6	8.5	9.2
northern red oak	7.3	7.5	7.5	7.3	7.3
red cedar	6.9	7.4	7.4	7.0	7.0
black cherry	6.0	6.0	6.0	6.0	6.0
hickory	6.0	8.0	8.8	6.4	7.7
All species	7.6	10.3	10.5	8.2	8.7

Structure

The stand relative density is 54 of the average maximum stocking expected in undisturbed stands of similar size and species. This density is within the range for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low.

Relative density is a measure of tree crowding that accounts for both the size of the tree and the amount of space typically occupied by a tree of that size and species, so it is an especially useful measure in mixed species stands. A relative density of 100 percent implies that the growing space is fully occupied and trees must either slow their growth to survive or some trees will be crowded out and die, making room for more vigorous ones. On most stocking charts, 100% relative density is represented as the A-line. If relative density is at least 60% and below 100%, trees can fully occupy the growing site. Maximum stand growth occurs near 60% (the B-line), and enough trees occupy the site to discourage detrimental effects on growth form. The lower limit of stocking necessary to reach 60% (B-line) stocking in ten years on average sites is centrally represented as the C-line and corresponds roughly to 40% relative density.

Species	Relative density	Q-factor	AGS relative density
red maple	21	1.26	3

red cedar	9	1.77	3
hickory	8	1.30	3
white oak	4	1.10	3
quaking aspen	4	1.18	3
northern red oak	3	0.77	3
cottonwood	2	1.25	3
black oak	2	1.41	3
scarlet oak	1	0.00	3
black cherry	1	0.00	3
ash	0	0.00	3

If this stand is managed under an even-age silvicultural system, the several species groups will mature more than 30 years apart. The estimated year of maturity is 2064. The effective stand age is about 62 years.

If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade tolerant species would make it difficult to apply selection cutting.

The shape of an uneven sized forest can be described with a measure called a q-factor. The q-factor defines the change of tree numbers across diameter classes. Q-factor typically range from 1.1 to 1.9, with the lower numbers typically applying to stands with shade tolerant species. The q-factor for this stand is 1.29. The table above lists the q-factor for each tree species. The q-factor could not be calculated for species displaying a value of zero. One inch size classes were used to compute the q-factor values.

Trees of acceptable quality for future growing stock are inadequate to provide a fully stocked stand in themselves (17 % of AGS relative density).

Timber volume

The trees included in these figures include live trees of acceptable and unacceptable growing stock.

Timber volume is a good estimate of the productivity of forested sites. These figures refer to net volume which is calculated or estimated by deducting from gross volume the loss of sound wood to insects, diseases, or other damage. If the field inventory for this stand did not specifically record timber defects on trees, a default of 0 percent was used. The boardfoot volumes were calculated using the 'Scrivani-Wiant' equation with the 'International 1/4 inch' log rule. Total timber volume on this 19.8 acres stand is approximately 3,265 cubic feet of sawtimber plus 0 cubic feet of pulpwood for a total of 3,265 cubic feet. The net boardfoot volume averages 1,392.1 board feet per acre. The net pulpwood volume averages 0.0 cubic feet per acre. The net cubic volume averages 165.1 cubic feet per acre. Gross volume estimates are made using the Scrivani-Wiant log rule. Total volumes by species are presented in the following table, sorted by net board foot volume.

Species	Total Net Board-foot Volume (bd.ft.)	% total	Total Net Pulpwood Cubic Volume (cu.ft.)	% total	Total Net Cubic Volume (cu.ft.)	% total
hickory	1,821	6.6	0	0.0	227	6.9
ash	1,661	6.0	0	0.0	175	5.4
red maple	11,479	41.7	0	0.0	1,389	42.6
quaking aspen	7,846	28.5	0	0.0	894	27.4
black oak	707	2.6	0	0.0	79	2.4
white oak	4,009	14.6	0	0.0	501	15.4
red cedar	0	0.0	0	0.0	0	0.0
cottonwood	0	0.0	0	0.0	0	0.0
northern red oak	0	0.0	0	0.0	0	0.0
scarlet oak	0	0.0	0	0.0	0	0.0
black cherry	0	0.0	0	0.0	0	0.0
	27,522		0		3,265	

Timber value

Timber value is an estimate of the total dollar value of the wood products currently in the trees. It includes the prices of the trees where they are standing, before they are cut and transported to market, based on the prices the user has entered. If specific product codes were entered during inventory, values are determined using those products and prices, otherwise a default product mix is used in calculations. These figures include all live trees of acceptable and unacceptable growing stock.

Timber values

Species	Total Board-foot Value ($)	% total	Total Pulpwood Value ($)	% total	Total Timber Value ($)	% total
white oak	0.00	54.2	0.00	0.0	1,202.57	54.2
quaking aspen	0.00	4.2	0.00	0.0	94.15	4.2
red maple	0.00	38.8	0.00	0.0	860.95	38.8
hickory	0.00	1.0	0.00	0.0	21.86	1.0

black oak	0.00	1.0	0.00	0.0	21.21	1.0
ash	0.00	0.9	0.00	0.0	19.93	0.9
northern red oak	0.00	0.0	0.00	0.0	0.00	0.0
cottonwood	0.00	0.0	0.00	0.0	0.00	0.0
red cedar	0.00	0.0	0.00	0.0	0.00	0.0
scarlet oak	0.00	0.0	0.00	0.0	0.00	0.0
black cherry	0.00	0.0	0.00	0.0	0.00	0.0
	2,220.66		0.00		2,220.66	

Regeneration Assessment

The deer impact as observed in the inventory is unknown. Because browse pressure is unknown, establishment of the new stand may or may not be limited by deer.

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Timber Tables

Stand 4, Inventory, 2022

Only observations that are greater than or equal to 1.0, and whose species growth form is "Tree" are used. Dead observations are not included when calculating values in this report.

Composition

Overstory only

	All species	scarlet oak (*Quercus coccinea*)	white oak (*Quercus alba*)	red maple (*Acer rubrum*)	northern red oak (*Quercus rubra*)	sweet birch (*Betula lenta*)	black oak (*Quercus velutina*)
Basal area (sq.ft./ac.)	63.6	29.1	16.4	7.3	4.5	3.6	2.7
Percent of stand basal area (%)	100.0	45.7	25.7	11.4	7.1	5.7	4.3
Stems/area (stems/ac.)	131.1	27.7	52.1	26.7	6.2	15.9	2.5

Volumes

The boardfoot volumes were calculated using the 'Scrivani-Wiant' equation with the 'International 1/4 inch' log rule.

Overstory only

	All species	scarlet oak (*Quercus coccinea*)	white oak (*Quercus alba*)	red maple (*Acer rubrum*)	northern red oak (*Quercus rubra*)	sweet birch (*Betula lenta*)	black oak (*Quercus velutina*)
Gross sawtimber volume (bd.ft.)	103,515	73,537	13,566	558	8,594	1,083	6,177
Net sawtimber volume (bd.ft.)	103,515	73,537	13,566	558	8,594	1,083	6,177
Gross pulpwood volume (cu.ft.)	0	0	0	0	0	0	0
Net pulpwood volume (cu.ft.)	0	0	0	0	0	0	0
Gross total volume (cu.ft.)	15,257	10,441	2,184	84	1,471	169	908
Net total volume (cu.ft.)	12,205	8,353	1,747	67	1,177	135	726

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Plant Species Composition and Diversity

Stand 4, Inventory, 2022

This report is from overstory data. Only live observations are included in the analysis. There are twenty two plot clusters in this stand.

Species Occurrence and Abundance

This table combines all height classes (if applicable) into a statistical summary for the overstory, sorted by importance value.

Occurrence and Abundance

	Density	Rel Density	Frequency	Rel Frequency	Dominance	Rel Dominance	Importance Value
scarlet oak	27.7	21.14	90.91	32.79	29.1	45.71	33.22
white oak	52.1	39.75	72.73	26.23	16.4	25.71	30.57
red maple	26.7	20.39	36.36	13.11	7.3	11.43	14.98
sweet birch	15.9	12.14	18.18	6.56	3.6	5.71	8.14
northern red oak	6.2	4.71	31.82	11.48	4.5	7.14	7.78
black oak	2.5	1.87	27.27	9.84	2.7	4.29	5.33
Totals	131.12	100.00	277.27	100.00	63.64	100.00	100.00

Description of Table Items:

- **Density** = Mean number of stems per acre, based on stems counted in each plot cluster.
- **Relative (Rel) Density** = Mean relative proportion or abundance of stems per acre by species. The mean number of stems of a particular species divided by total number of stems.
- **Frequency** = The percentage of plot clusters where this species was observed, based on the number of plot clusters where species occurred divided by total number of plot clusters.
- **Relative (Rel) Frequency** = Relative frequency of occurrence, based on individual species frequency divided by the total of all species frequencies.
- **Dominance** = Mean basal area in square feet. The basal area of all stems or individuals of a given species.
- **Relative (Rel) Dominance** = Relative dominance, based on individual species dominance divided by the total of all species dominances.
- **Importance Value** = A value computed by arbitrarily adding together the relative values and dividing by the number of non-zero relative values.

Species Diversity

Measures of diversity are important in management and in environmental monitoring. Diversity relates to the variety and abundance of species in different areas, and most measures of diversity are related to species richness, species evenness (pattern of distribution of species), or heterogeneity. Hence, there are a variety of ways to measure and interpret diversity. The selection of a particular measure of diversity depends on sample size, availability of abundance data, and whether one is interested in species richness, evenness, or both.

Species Observed in the Stand

There were seven species observed, based on a sample of twenty two clusters with a total of twenty two prism points using a 10 square feet per acre factor prism.

Core Flora

The core flora are those species common to every plot cluster. For this stand, none of the species are found in all plot clusters.

Measures of Similarity (Beta-diversity)

These measures provide an idea of stand-level diversity by indicating how the set of samples vary in terms of the variety and/or abundance of species found among them. With the exception of Whittaker's measure, each sample is compared with all other samples, one at a time, until all possible sample-pairs are computed. The stand level value is the mean of all sample-pairs.

The following table shows each measure with sample mean and range.

Similarity Indexes

Measure	Index	Range
Sørensen's Similarity Coefficient	0.5869	0.2857 - 1.0000
Jaccard's Similarity Coefficient	0.4492	0.1667 - 1.0000
Whittaker's Similarity Coefficient	1.1639	N/A*
Renkonen's (Percent Similarity)	40.5654	5.2233 - 100.0000
Morisita-Horn Similarity Index	0.4832	0.0229 - 1.0000

*Whittaker's measure is computed on multiple samples simultaneously, and therefore no individual sample pair values are computed.

- **Sørensen's Similarity Coefficient** - Based on presence-absence of species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. This measure gives more weight to species that occur in both samples.
- **Jaccard's Similarity Coefficient** - Based on presence-absence of species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. This measure gives more weight to species that are unique to each sample.
- **Whittaker's Similarity Coefficient** - Based on presence-absence of species. Low values indicate stronger similarity, and higher values indicate little or no similarity. The fewer species that samples share, the higher the value of Whittaker's measure (higher diversity or conversely, lower similarity).
- **Renkonen's Index (Percent Similarity)** - Based on abundance data, specifically, the relative abundance of species. Values range from 0-100, where low values indicate little or no similarity, and higher values indicate stronger similarity. The variable 'Basal Area' was used in the calculation.
- **Morisita-Horn Similarity Index** - Based on abundance data and somewhat sensitive to the most highly abundant species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. The variable 'Basal Area' was used in the calculation.

Vegetation and Site Quality

Vegetation is often used as an indicator of site quality. Some tree species have relatively narrow requirements and their presence is indicative of a particular site. Many tree species can occur on a wide variety of sites. Their presence offers little indicator value, but their relative abundance and size may be important. Herbaceous species often are more restricted in their requirements, and may be more useful than tree species as plant indicators. Care must be taken to account for factors that are unrelated to site quality, such as plant competition, herbivory, and past events in the history of a stand such as drought, insects, and human disturbance. Also, species may be absent purely by chance. In highly disturbed, well-lighted conditions, interpretation of ground-cover species can be problematic, as they may only indicate high light intensity. Furthermore, the indicator value of species can change regionally with changes in climate and physiography.

Suggested Reading

- *Barnes, B.V., Zak, D.R., Denton, S.R., and Spurr, S.H. 1998. Forest Ecology, ed. 4. John Wiley and Sons, Inc., New York. 774 pp.*
- *Carmean, W. H. 1996. Site-quality evaluation, site-quality maintenance, and site-specific management for forest land in northwest Ontario. Ontario Ministry Nat. Res., Northwest Sci. and Technology Unit, NWST Tech. Report TR-105, Thunder Bay, ON. 121 pp.*
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- *Daubenmire, R. F. 1976. The use of vegetation in assessing the productivity of forest lands. Bot. Rev. 42:115-143.*
- *Monserud, R.A. 1984. Problems with site index: an opinionated review. p. 167-190 in Bockheim, J.G, Ed. Proc. Symposium: Forest Land Classification: Experience, Problems, Perspectives. NCR-102 North Central For. Soils Comm., Soc. Am. For., USDA For. Serv. And USDA Conserv. Serv., Madison, Wisc.*
- *Kotar, J. and Coffman, M. 1984. Habitat-type classification system in Michigan and Wisconsin. p. 100-113 in Bockheim, J.G, Ed. Proc. Symposium: Forest Land Classification: Experience, Problems, Perspectives. NCR-102 North Central For. Soils Comm., Soc. Am. For., USDA For. Serv. And USDA Conserv. Serv., Madison, Wisc.*
- *Kuchler, A.W. 1964. The potential natural vegetation of the conterminous United States. Am Geogr. Soc., Spec. Publ. No. 36. 154 pp.*
- *Rowe, J. S. 1969. Plant community as a landscape feature. In Greenidge, K.N.H., Ed. Essays in Plant Geography and Ecology. Nova Scotia Museum, Halifax.*
- *Spies, T.A., and Barnes, B.V. 1985. Ecological species groups of upland northern hardwood-hemlock forest ecoystems of the Sylvania Recreation Area, Upper Peninsula of Michigan. Can. J. For. Res. 15:961-972.*

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Timber Narrative

Stand 4, Inventory, 2022

Dead observations were ignored when calculating values in this report.

Physiography

Composition

The total basal area of the overstory and understory combined is 64.3 square feet per acre. For the overstory only, acceptable growing stock for timber (AGS) is 37.5 square feet per acre and the basal area of unacceptable growing stock for timber (UGS) is 26.8 square feet per acre.

Relative Dominance

Species	Basal Area (sq.ft./ac.)	Relative Dominance (%)
scarlet oak	29.1	45.22
white oak	17.0	26.44
red maple	7.3	11.31
northern red oak	4.5	7.07
sweet birch	3.6	5.65
black oak	2.7	4.24
black cherry	0.0	0.04
eastern white pine	0.0	0.04

This is a small sawtimber stand, with the following diameters:

Average diameters values (in.)

Species	Mean	Medial	Merchantable	Quadratic	Merchantable Quadratic
black oak	14.3	14.3	14.3	14.3	14.3
scarlet oak	13.5	14.9	14.9	13.9	13.9
northern red oak	10.8	14.0	14.0	11.6	11.6
red maple	6.6	8.5	9.1	7.1	8.5
sweet birch	6.1	7.8	8.3	6.5	7.4
white oak	2.8	10.0	11.2	4.3	9.2
black cherry	1.0	1.0	0.0	1.0	0.0
eastern white pine	1.0	1.0	0.0	1.0	0.0
All species	4.8	12.4	13.0	6.8	10.8

Structure

The stand relative density is 55 of the average maximum stocking expected in undisturbed stands of similar size and species. This density is within the range for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low.

Relative density is a measure of tree crowding that accounts for both the size of the tree and the amount of space typically occupied by a tree of that size and species, so it is an especially useful measure in mixed species stands. A relative density of 100 percent implies that the growing space is fully occupied and trees must either slow their growth to survive or some trees will be crowded out and die, making room for more vigorous ones. On most stocking charts, 100% relative density is represented as the A-line. If relative density is at least 60% and below 100%, trees can fully occupy the growing site. Maximum stand growth occurs near 60% (the B-line), and enough trees occupy the site to discourage detrimental effects on growth form. The lower limit of stocking necessary to reach 60% (B-line) stocking in ten years on average sites is centrally represented as the C-line and corresponds roughly to 40% relative density.

Species	Relative density	Q-factor	AGS relative density
scarlet oak	23	0.92	3
white oak	17	1.33	3
red maple	6	1.38	3
northern red oak	4	1.17	3
sweet birch	3	1.24	3
black oak	2	2.56	3
eastern white pine	0	0.00	3

black cherry	0	0.00	3

If this stand is managed under an even-age silvicultural system, the several species groups will mature more than 30 years apart. The estimated year of maturity is 2052. The effective stand age is about 83 years.

If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade tolerant species would make it difficult to apply selection cutting.

The shape of an uneven sized forest can be described with a measure called a q-factor. The q-factor defines the change of tree numbers across diameter classes. Q-factor typically range from 1.1 to 1.9, with the lower numbers typically applying to stands with shade tolerant species. The q-factor for this stand is 1.23. The table above lists the q-factor for each tree species. The q-factor could not be calculated for species displaying a value of zero. One inch size classes were used to compute the q-factor values.

Trees of acceptable quality for future growing stock are inadequate to provide a fully stocked stand in themselves (32 % of AGS relative density).

Timber volume

The trees included in these figures include live trees of acceptable and unacceptable growing stock.

Timber volume is a good estimate of the productivity of forested sites. These figures refer to net volume which is calculated or estimated by deducting from gross volume the loss of sound wood to insects, diseases, or other damage. If the field inventory for this stand did not specifically record timber defects on trees, a default of 0 percent was used. The boardfoot volumes were calculated using the 'Scrivani-Wiant' equation with the 'International 1/4 inch' log rule. Total timber volume on this 25.9 acres stand is approximately 12,205 cubic feet of sawtimber plus 0 cubic feet of pulpwood for a total of 12,205 cubic feet. The net boardfoot volume averages 4,001.4 board feet per acre. The net pulpwood volume averages 0.0 cubic feet per acre. The net cubic volume averages 471.8 cubic feet per acre. Gross volume estimates are made using the Scrivani-Wiant log rule. Total volumes by species are presented in the following table, sorted by net board foot volume.

Species	Total Net Board-foot Volume (bd.ft.)	% total	Total Net Pulpwood Cubic Volume (cu.ft.)	% total	Total Net Cubic Volume (cu.ft.)	% total
northern red oak	8,594	8.3	0	0.0	1,177	9.6
scarlet oak	73,537	71.0	0	0.0	8,353	68.4
black oak	6,177	6.0	0	0.0	726	5.9
white oak	13,566	13.1	0	0.0	1,747	14.3
sweet birch	1,083	1.0	0	0.0	135	1.1
red maple	558	0.5	0	0.0	67	0.6
black cherry	0	0.0	0	0.0	0	0.0
eastern white pine	0	0.0	0	0.0	0	0.0
	103,515		0		12,205	

Timber value

Timber value is an estimate of the total dollar value of the wood products currently in the trees. It includes the prices of the trees where they are standing, before they are cut and transported to market, based on the prices the user has entered. If specific product codes were entered during inventory, values are determined using those products and prices, otherwise a default product mix is used in calculations. These figures include all live trees of acceptable and unacceptable growing stock.

Timber values

Species	Total Board-foot Value ($)	% total	Total Pulpwood Value ($)	% total	Total Timber Value ($)	% total
white oak	0.00	49.5	0.00	0.0	4,069.68	49.5
northern red oak	0.00	36.8	0.00	0.0	3,025.15	36.8
black oak	0.00	2.3	0.00	0.0	185.32	2.3
scarlet oak	0.00	10.7	0.00	0.0	882.44	10.7
red maple	0.00	0.5	0.00	0.0	41.85	0.5
sweet birch	0.00	0.2	0.00	0.0	13.00	0.2
black cherry	0.00	0.0	0.00	0.0	0.00	0.0
eastern white pine	0.00	0.0	0.00	0.0	0.00	0.0
	8,217.44		0.00		8,217.44	

Regeneration Assessment

The deer impact as observed in the inventory is unknown. Because browse pressure is unknown, establishment of the new stand may or may not be limited by deer.

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Timber Tables

Stand 5, Inventory, 2022

Only observations that are greater than or equal to 1.0, and whose species growth form is "Tree" are used. Dead observations are not included when calculating values in this report.

Composition

Overstory only

	All species	red maple (*Acer rubrum*)	scarlet oak (*Quercus coccinea*)	northern red oak (*Quercus rubra*)	hickory (*Carya*)	white oak (*Quercus alba*)	cottonwood (*Populus*)	black oak (*Quercus velutina*)	yellow birch (*Betula alleghaniensis*)	ash (*Fraxinus*)	sweet birch (*Betula lenta*)
Basal area (sq.ft./ac.)	94.3	43.7	14.0	11.0	10.0	8.0	2.0	2.0	1.7	1.3	0.7
Percent of stand basal area (%)	100.0	46.3	14.8	11.7	10.6	8.5	2.1	2.1	1.8	1.4	0.7
Stems/area (stems/ac.)	144.7	77.9	13.9	9.4	20.7	10.3	3.9	3.6	3.0	0.8	1.2

Volumes

The boardfoot volumes were calculated using the 'Scrivani-Wiant' equation with the 'International 1/4 inch' log rule.

Overstory only

	All species	red maple (*Acer rubrum*)	scarlet oak (*Quercus coccinea*)	northern red oak (*Quercus rubra*)	hickory (*Carya*)	white oak (*Quercus alba*)	cottonwood (*Populus*)	black oak (*Quercus velutina*)	yellow birch (*Betula alleghaniensis*)	ash (*Fraxinus*)	sweet birch (*Betula lenta*)
Gross sawtimber volume (bd.ft.)	197,554	68,186	41,108	37,512	17,566	18,433	2,961	4,847	550	5,593	798
Net sawtimber volume (bd.ft.)	197,554	68,186	41,108	37,512	17,566	18,433	2,961	4,847	550	5,593	798
Gross pulpwood volume (cu.ft.)	0	0	0	0	0	0	0	0	0	0	0
Net pulpwood volume (cu.ft.)	0	0	0	0	0	0	0	0	0	0	0
Gross total volume (cu.ft.)	29,831	10,587	5,872	5,482	2,810	2,950	428	687	86	789	140
Net total volume (cu.ft.)	23,865	8,470	4,698	4,386	2,248	2,360	343	549	68	631	112

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Plant Species Composition and Diversity

Stand 5, Inventory, 2022

This report is from overstory data. Only live observations are included in the analysis. There are thirty plot clusters in this stand.

Species Occurrence and Abundance

This table combines all height classes (if applicable) into a statistical summary for the overstory, sorted by importance value.

Occurrence and Abundance

	Density	Rel Density	Frequency	Rel Frequency	Dominance	Rel Dominance	Importance Value
red maple	77.9	53.84	80.00	27.59	43.7	46.29	42.57
scarlet oak	13.9	9.62	40.00	13.79	14.0	14.84	12.75
hickory	20.7	14.28	36.67	12.64	10.0	10.60	12.51
white oak	10.3	7.09	50.00	17.24	8.0	8.48	10.94
northern red oak	9.4	6.53	40.00	13.79	11.0	11.66	10.66
cottonwood	3.9	2.67	10.00	3.45	2.0	2.12	2.75
black oak	3.6	2.46	10.00	3.45	2.0	2.12	2.67
yellow birch	3.0	2.09	10.00	3.45	1.7	1.77	2.44
ash	0.8	0.58	10.00	3.45	1.3	1.41	1.82
sweet birch	1.2	0.84	3.33	1.15	0.7	0.71	0.90
Totals	144.70	100.00	290.00	100.00	94.33	100.00	100.00

Description of Table Items:

- **Density** = Mean number of stems per acre, based on stems counted in each plot cluster.
- **Relative (Rel) Density** = Mean relative proportion or abundance of stems per acre by species. The mean number of stems of a particular species divided by total number of stems.
- **Frequency** = The percentage of plot clusters where this species was observed, based on the number of plot clusters where species occurred divided by total number of plot clusters.
- **Relative (Rel) Frequency** = Relative frequency of occurrence, based on individual species frequency divided by the total of all species frequencies.
- **Dominance** = Mean basal area in square feet. The basal area of all stems or individuals of a given species.
- **Relative (Rel) Dominance** = Relative dominance, based on individual species dominance divided by the total of all species dominances.
- **Importance Value** = A value computed by arbitrarily adding together the relative values and dividing by the number of non-zero relative values.

Species Diversity

Measures of diversity are important in management and in environmental monitoring. Diversity relates to the variety and abundance of species in different areas, and most measures of diversity are related to species richness, species evenness (pattern of distribution of species), or heterogeneity. Hence, there are a variety of ways to measure and interpret diversity. The selection of a particular measure of diversity depends on sample size, availability of abundance data, and whether one is interested in species richness, evenness, or both.

Species Observed in the Stand

There were eleven species observed, based on a sample of thirty clusters with a total of thirty prism points using a 10 square feet per acre factor prism.

Core Flora

The core flora are those species common to every plot cluster. For this stand, none of the species are found in all plot clusters.

Measures of Similarity (Beta-diversity)

These measures provide an idea of stand-level diversity by indicating how the set of samples vary in terms of the variety and/or abundance of species found among them. With the exception of Whittaker's measure, each sample is compared with all other samples, one at a time, until all possible sample-pairs are computed. The stand level value is the mean of all sample-pairs.

The following table shows each measure with sample mean and range.

Similarity Indexes

Measure	Index	Range
Sørensen's Similarity Coefficient	0.4440	0.3333 - 1.0000
Jaccard's Similarity Coefficient	0.3210	0.2000 - 1.0000
Whittaker's Similarity Coefficient	2.4483	N/A*
Renkonen's (Percent Similarity)	37.5468	17.5815 - 100.0000
Morisita-Horn Similarity Index	0.4621	0.1020 - 1.0000

*Whittaker's measure is computed on multiple samples simultaneously, and therefore no individual sample pair values are computed.

- **Sørensen's Similarity Coefficient** - Based on presence-absence of species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. This measure gives more weight to species that occur in both samples.
- **Jaccard's Similarity Coefficient** - Based on presence-absence of species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. This measure gives more weight to species that are unique to each sample.
- **Whittaker's Similarity Coefficient** - Based on presence-absence of species. Low values indicate stronger similarity, and higher values indicate little or no similarity. The fewer species that samples share, the higher the value of Whittaker's measure (higher diversity or conversely, lower similarity).
- **Renkonen's Index (Percent Similarity)** - Based on abundance data, specifically, the relative abundance of species. Values range from 0-100, where low values indicate little or no similarity, and higher values indicate stronger similarity. The variable 'Basal Area' was used in the calculation.
- **Morisita-Horn Similarity Index** - Based on abundance data and somewhat sensitive to the most highly abundant species. Values range from 0-1, where low values indicate little or no similarity, and higher values indicate stronger similarity. The variable 'Basal Area' was used in the calculation.

Vegetation and Site Quality

Vegetation is often used as an indicator of site quality. Some tree species have relatively narrow requirements and their presence is indicative of a particular site. Many tree species can occur on a wide variety of sites. Their presence offers little indicator value, but their relative abundance and size may be important. Herbaceous species often are more restricted in their requirements, and may be more useful than tree species as plant indicators. Care must be taken to account for factors that are unrelated to site quality, such as plant competition, herbivory, and past events in the history of a stand such as drought, insects, and human disturbance. Also, species may be absent purely by chance. In highly disturbed, well-lighted conditions, interpretation of ground-cover species can be problematic, as they may only indicate high light intensity. Furthermore, the indicator value of species can change regionally with changes in climate and physiography.

Suggested Reading

- *Barnes, B.V., Zak, D.R., Denton, S.R., and Spurr, S.H. 1998. Forest Ecology, ed. 4. John Wiley and Sons, Inc., New York. 774 pp.*
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- *Rowe, J. S. 1969. Plant community as a landscape feature. In Greenidge, K.N.H., Ed. Essays in Plant Geography and Ecology. Nova Scotia Museum, Halifax.*
- *Spies, T.A., and Barnes, B.V. 1985. Ecological species groups of upland northern hardwood-hemlock forest ecoystems of the Sylvania Recreation Area, Upper Peninsula of Michigan. Can. J. For. Res. 15:961-972.*

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Timber Narrative

Stand 5, Inventory, 2022

Dead observations were ignored when calculating values in this report.

Physiography

The stand contains a wetland area.

Composition

The total basal area of the overstory and understory combined is 94.9 square feet per acre. For the overstory only, acceptable growing stock for timber (AGS) is 59.9 square feet per acre and the basal area of unacceptable growing stock for timber (UGS) is 35.0 square feet per acre.

Relative Dominance

Species	Basal Area (sq.ft./ac.)	Relative Dominance (%)
red maple	43.7	46.01
scarlet oak	14.0	14.75
northern red oak	11.0	11.59
hickory	10.0	10.54
white oak	8.0	8.43
cottonwood	2.0	2.11
black oak	2.0	2.11
yellow birch	1.7	1.76
ash	1.3	1.41
sweet birch	0.7	0.70
black cherry	0.6	0.59

This is a small sawtimber stand, with the following diameters:

Average diameters values (in.)

Species	Mean	Medial	Merchantable	Quadratic	Merchantable Quadratic
ash	16.7	18.0	18.0	17.0	17.0
northern red oak	13.7	18.1	18.1	14.6	14.6
scarlet oak	13.2	14.6	14.6	13.6	13.6
white oak	11.2	14.1	14.1	12.0	12.0
sweet birch	10.0	10.0	10.0	10.0	10.0
yellow birch	9.9	10.4	10.4	10.0	10.0
black oak	9.6	12.3	12.3	10.2	10.2
red maple	9.3	12.6	12.7	10.1	10.6
cottonwood	9.0	12.0	12.0	9.7	9.7
hickory	8.6	12.2	12.5	9.4	10.3
black cherry	1.0	1.0	0.0	1.0	0.0
All species	6.3	13.6	13.7	8.4	11.3

Structure

The stand relative density is 70 of the average maximum stocking expected in undisturbed stands of similar size and species. This density is within the range for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low.

Relative density is a measure of tree crowding that accounts for both the size of the tree and the amount of space typically occupied by a tree of that size and species, so it is an especially useful measure in mixed species stands. A relative density of 100 percent implies that the growing space is fully occupied and trees must either slow their growth to survive or some trees will be crowded out and die, making room for more vigorous ones. On most stocking charts, 100% relative density is represented as the A-line. If relative density is at least 60% and below 100%, trees can fully occupy the growing site. Maximum stand growth occurs near 60% (the B-line), and enough trees occupy the site to discourage detrimental effects on growth form. The lower limit of stocking necessary to reach 60% (B-line) stocking in ten years on average sites is centrally represented as the C-line and corresponds roughly to 40% relative density.

Species	Relative density	Q-factor	AGS relative density
red maple	28	1.21	3
scarlet oak	11	1.21	3

northern red oak	10	1.15	3
hickory	9	1.22	3
white oak	7	1.17	3
black oak	2	1.24	3
yellow birch	1	1.03	3
cottonwood	1	1.16	3
ash	1	1.11	3
sweet birch	0	0.00	3
black cherry	0	0.00	3

If this stand is managed under an even-age silvicultural system, the several species groups will mature more than 30 years apart. The estimated year of maturity is 2043. The effective stand age is about 78 years.

If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade tolerant species would make it difficult to apply selection cutting.

The shape of an uneven sized forest can be described with a measure called a q-factor. The q-factor defines the change of tree numbers across diameter classes. Q-factor typically range from 1.1 to 1.9, with the lower numbers typically applying to stands with shade tolerant species. The q-factor for this stand is 1.25. The table above lists the q-factor for each tree species. The q-factor could not be calculated for species displaying a value of zero. One inch size classes were used to compute the q-factor values.

Trees of acceptable quality for future growing stock provide enough stocking by themselves to warrant stand management (43 % of AGS relative density).

Timber volume

The trees included in these figures include live trees of acceptable and unacceptable growing stock.

Timber volume is a good estimate of the productivity of forested sites. These figures refer to net volume which is calculated or estimated by deducting from gross volume the loss of sound wood to insects, diseases, or other damage. If the field inventory for this stand did not specifically record timber defects on trees, a default of 0 percent was used. The boardfoot volumes were calculated using the 'Scrivani-Wiant' equation with the 'International 1/4 inch' log rule. Total timber volume on this 35.8 acres stand is approximately 23,865 cubic feet of sawtimber plus 0 cubic feet of pulpwood for a total of 23,865 cubic feet. The net boardfoot volume averages 5,516.7 board feet per acre. The net pulpwood volume averages 0.0 cubic feet per acre. The net cubic volume averages 666.4 cubic feet per acre. Gross volume estimates are made using the Scrivani-Wiant log rule. Total volumes by species are presented in the following table, sorted by net board foot volume.

Species	Total Net Board-foot Volume (bd.ft.)	% total	Total Net Pulpwood Cubic Volume (cu.ft.)	% total	Total Net Cubic Volume (cu.ft.)	% total
white oak	18,433	9.3	0	0.0	2,360	9.9
hickory	17,566	8.9	0	0.0	2,248	9.4
red maple	68,186	34.5	0	0.0	8,470	35.5
scarlet oak	41,108	20.8	0	0.0	4,698	19.7
ash	5,593	2.8	0	0.0	631	2.6
black oak	4,847	2.5	0	0.0	549	2.3
northern red oak	37,512	19.0	0	0.0	4,386	18.4
cottonwood	2,961	1.5	0	0.0	343	1.4
sweet birch	798	0.4	0	0.0	112	0.5
yellow birch	550	0.3	0	0.0	68	0.3
black cherry	0	0.0	0	0.0	0	0.0
	197,554		0		23,865	

Timber value

Timber value is an estimate of the total dollar value of the wood products currently in the trees. It includes the prices of the trees where they are standing, before they are cut and transported to market, based on the prices the user has entered. If specific product codes were entered during inventory, values are determined using those products and prices, otherwise a default product mix is used in calculations. These figures include all live trees of acceptable and unacceptable growing stock.

Timber values

Species	Total Board-foot Value ($)	% total	Total Pulpwood Value ($)	% total	Total Timber Value ($)	% total
northern red oak	0.00	49.2	0.00	0.0	11,253.52	49.2
white oak	0.00	24.2	0.00	0.0	5,529.80	24.2
red maple	0.00	22.4	0.00	0.0	5,113.98	22.4
scarlet oak	0.00	2.2	0.00	0.0	493.30	2.2

hickory	0.00	0.9	0.00	0.0	210.79	0.9
black oak	0.00	0.6	0.00	0.0	145.40	0.6
ash	0.00	0.3	0.00	0.0	67.11	0.3
cottonwood	0.00	0.2	0.00	0.0	35.53	0.2
yellow birch	0.00	0.1	0.00	0.0	19.80	0.1
black cherry	0.00	0.0	0.00	0.0	0.00	0.0
sweet birch	0.00	0.0	0.00	0.0	9.58	0.0
	22,878.81		0.00		22,878.81	

Regeneration Assessment

The deer impact as observed in the inventory is unknown. Because browse pressure is unknown, establishment of the new stand may or may not be limited by deer.

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Understory Vegetation Summary

Inventory, 2022

The values in this report are calculated from the understory plot data only.

Characteristics across Stands

Variable	Weighted mean	Minimum	Maximum
Understory Basal Area (sq.ft./ac.)	0.4	0.0	0.7
Understory Stems Per Unit Area (stems/ac.)	218.05	0.00	300.00
Understory Trees Per Unit Area (stems/ac.)	53.20	0.00	127.27
Understory Medial DBH (in.)	0.9	0.0	1.6
Understory Medial Merchantable DBH (in.)	0.0	0.0	0.0
Understory Quadratic Mean DBH (in.)	0.8	0.0	1.4
Understory Mean DBH (in.)	0.8	0.0	1.3
Understory Quadratic Mean Merchantable DBH (in.)	0.0	0.0	0.0
Understory Percent Plot Clusters with Interesting Trees (%)	0	0	0
Understory Sapling Stems Per Unit Area (stems/ac.)	118.74	0.00	186.36
Understory Percent Plot Clusters with Residual Trees (%)	0	0	0
Understory Percent Sprout Regeneration (% stems)	0	0	0
Percent Plot Clusters Stocked with Commercial Regeneration (%)	1	0	5
Percent Plot Clusters Stocked with High Value Regeneration (%)	1	0	5
Percent Cover (%)	40	0	52
Shrub layer cover (% cover)	12.4	0.0	17.4
Shrub layer average height (ft)	5.8	0.0	6.5
Shrub layer ericaceous species (%)	0.0	0.0	0.0
Shrub layer coniferous species (%)	0.0	0.0	0.0
Shrub layer deciduous species (%)	47.3	0.0	60.0

APPENDIX D: FOREST SOILS REPORT

Hazard of Erosion and Suitability for Roads on Forestland

State of Connecticut

[The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The columns that identify the rating class and limiting features show no more than five limitations for any given soil. The soil may have additional limitations. This report shows only the major soils in each map unit]

Map symbol and soil name	Pct. of map unit	Hazard of off-road or off-trail erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
3:							
Ridgebury, Extremely Stony	40	Not rated		Slight		Poorly suited	
		Not rated; Kfact				Wetness	1.00
						Rock fragments	0.50
						Dusty	0.00
Leicester, Extremely Stony	35	Not rated		Slight		Poorly suited	
		Not rated; Kfact				Wetness	1.00
						Rock fragments	0.50
						Dusty	0.00
Whitman, Extremely Stony	17	Not rated		Slight		Poorly suited	
		Not rated; Kfact				Ponding	1.00
						Wetness	1.00
						Rock fragments	0.50
						Dusty	0.00
23A:							
Sudbury	80	Not rated		Moderate		Well suited	
		Not rated; Kfact		Slope/erodibility	0.50	Dusty	0.00
46B:							
Woodbridge, Very Stony	82	Not rated		Moderate		Moderately suited	
		Not rated; Kfact		Slope/erodibility	0.50	Wetness	0.50
						Dusty	0.00
47C:							
Woodbridge, Extremely Stony	83	Not rated		Severe		Moderately suited	
		Not rated; Kfact		Slope/erodibility	0.95	Slope	0.50
						Rock fragments	0.50
						Wetness	0.50
						Dusty	0.00
61B:							
Canton, Very Stony	50	Not rated		Moderate		Moderately suited	
		Not rated; Kfact		Slope/erodibility	0.50	Slope	0.50
						Dusty	0.00
Charlton, Very Stony	35	Not rated		Moderate		Moderately suited	
		Not rated; Kfact		Slope/erodibility	0.50	Slope	0.50
						Dusty	0.00

Hazard of Erosion and Suitability for Roads on Forestland

State of Connecticut

Map symbol and soil name	Pct. of map unit	Hazard of off-road or off-trail erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
61C:							
Canton, Very Stony	50	Not rated		Severe		Moderately suited	
		Not rated; Kfact		Slope/erodibility	0.95	Slope	0.50
						Dusty	0.00
Charlton, Very Stony	35	Not rated		Severe		Moderately suited	
		Not rated; Kfact		Slope/erodibility	0.95	Slope	0.50
						Dusty	0.00
62D:							
Canton, Extremely Stony	55	Not rated		Severe		Poorly suited	
		Not rated; Kfact		Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
						Dusty	0.00
Charlton, Extremely Stony	30	Not rated		Severe		Poorly suited	
		Not rated; Kfact		Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
						Dusty	0.00
73C:							
Charlton, Very Stony	50	Not rated		Severe		Moderately suited	
		Not rated; Kfact		Slope/erodibility	0.95	Slope	0.50
						Dusty	0.00
Chatfield, Very Stony	30	Not rated		Severe		Moderately suited	
		Not rated; Kfact		Slope/erodibility	0.95	Slope	0.50
						Dusty	0.00
75E:							
Hollis	35	Not rated		Severe		Poorly suited	
		Not rated; Kfact		Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
						Dusty	0.00
Chatfield	30	Not rated		Severe		Poorly suited	
		Not rated; Kfact		Slope/erodibility	0.95	Slope	1.00
						Dusty	0.00
Rock Outcrop	15	Not rated		Not rated		Not rated	

Hazard of Erosion and Suitability for Roads on Forestland

State of Connecticut

Map symbol and soil name	Pct. of map unit	Hazard of off-road or off-trail erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
103:							
Rippowam	80	Not rated		Slight		Poorly suited	
		Not rated; Kfact				Flooding	1.00
						Wetness	1.00
						Dusty	0.00

Hydric Soils

State of Connecticut

[This report lists only those map unit components that are rated as hydric. Dashes (---) in any column indicate that the data were not included in the database. Definitions of hydric criteria codes are included at the end of the report]

Map symbol and map unit name	Component	Percent of map unit	Landform	Hydric rating	Hydric criteria
3:					
Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	Ridgebury, extremely stony	40	Depressions	Yes	2
	Leicester, extremely stony	35	Depressions	Yes	2
	Whitman, extremely stony	17	Depressions	Yes	2, 3
	Swansea	2	Swamps	Yes	1, 3
23A:					
Sudbury sandy loam, 0 to 5 percent slopes	Walpole	2	Depressions, Drainageways, Terraces	Yes	2
46B:					
Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	Ridgebury, very stony	8	Depressions	Yes	2
47C:					
Woodbridge fine sandy loam, 3 to 15 percent slopes, extremely stony	Ridgebury, extremely stony	5	Depressions	Yes	2
	Whitman, extremely stony	1	Depressions	Yes	2
61B:					
Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	Leicester, very stony	5	Depressions	Yes	2
61C:					
Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony	Leicester, very stony	5	Depressions	Yes	2
73C:					
Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	Leicester, very stony	5	Depressions	Yes	2
75E:					
Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	Leicester	5	Depressions, Drainageways	Yes	2
103:					
Rippowam fine sandy loam	Rippowam	80	Flood plains	Yes	2
	Lim	3	Flood plains	Yes	2
	Limerick	2	Flood plains	Yes	2
	Saco	2	Flood plains	Yes	2

Hydric Soils

This table lists the map unit components that are rated as hydric soils in the survey area. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; Hurt and others, 2002).

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for all of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2003) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and others, 2002).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

Map units that are dominantly made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units dominantly made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The criteria for hydric soils are represented by codes in the table (for example, 2B3). Definitions for the codes are as follows:

1. All Histels except for Folistels, and Histosols except for Folists.
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Pachic subgroups, or Cumulic subgroups that:
   A. are somewhat poorly drained and have a water table at the surface (0.0 feet) during the growing season, or
   B. are poorly drained or very poorly drained and have either:
      1) a water table at the surface (0.0 feet) during the growing season if textures are coarse sand, sand, or fine sand in all layers within a depth of 20 inches, or
      2) a water table at a depth of 0.5 foot or less during the growing season if permeability is equal to or greater than 6.0 in/hr in all layers within a depth of 20 inches, or
      3) a water table at a depth of 1.0 foot or less during the growing season if permeability is less than 6.0 in/hr in any layer within a depth of 20 inches.
3. Soils that are frequently ponded for long or very long duration during the growing season.
4. Soils that are frequently flooded for long or very long duration during the growing season.

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Forestland Productivity

State of Connecticut

[This report shows only the major soils in each map unit]

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			Cu ft/ac	
3:				
Ridgebury, extremely stony	Eastern white pine	63	114	American elm, Blackgum, Green ash, Pin oak, Red maple, Swamp white oak, Yellow birch
	Northern red oak	66	43	
	Red maple	62	---	
	Sugar maple	56	29	
	White ash	60	---	
Leicester, extremely stony	Eastern white pine	69	129	Green ash, Red maple, Tuliptree
	Northern red oak	56	43	
	Red maple	70	43	
	Yellow birch	---	---	
Whitman, extremely stony	Blackgum	52	---	---
	Eastern white pine	56	100	
	Northern red oak	70	---	
	Red maple	60	29	
	Red spruce	44	86	
	White oak	57	---	
23A:				
Sudbury	Eastern white pine	60	100	Eastern white pine, Northern red oak, White oak
	Northern red oak	45	29	
	White oak	---	---	
46B:				
Woodbridge, very stony	Black oak	77	---	Ash, Northern red oak, Sugar maple, Tuliptree, White oak
	Eastern white pine	67	114	
	Northern red oak	72	57	
	Red pine	65	114	
	Red spruce	50	114	
	Sugar maple	65	43	
	Yellow poplar	84	---	
47C:				
Woodbridge, extremely stony	Black oak	77	---	Ash, Northern red oak, Sugar maple, Tuliptree, White oak
	Eastern white pine	67	114	
	Northern red oak	72	57	
	Red pine	65	114	
	Red spruce	50	114	
	Sugar maple	65	43	
	White oak	---	---	
	Yellow poplar	84	---	

Forestland Productivity

State of Connecticut

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			Cu ft/ac	
61B:				
Canton, very stony	Eastern hemlock	---	---	Beech, Bitternut hickory, Black oak, Eastern hemlock, Eastern white pine, Gray birch, Mockernut hickory, Northern red oak, Pignut hickory, Red maple, Shagbark hickory, Sugar maple, White ash, White oak, Yellow birch
	Eastern white pine	58	100	
	Northern red oak	52	29	
	Red maple	55	29	
	Shagbark hickory	---	0	
	Sugar maple	55	29	
	White oak	---	---	
Charlton, very stony	Eastern hemlock	---	---	Eastern white pine, European larch, Northern red oak, Norway spruce, Red pine, Scarlet oak, Sugar maple, Tuliptree, White ash, White oak
	Eastern white pine	65	114	
	Northern red oak	65	43	
	Red maple	55	29	
	Red pine	70	129	
	Red spruce	50	114	
	Shagbark hickory	---	0	
	Sugar maple	55	29	
	White oak	---	---	
61C:				
Canton, very stony	Eastern hemlock	---	---	Beech, Bitternut hickory, Black oak, Eastern hemlock, Eastern white pine, Gray birch, Mockernut hickory, Northern red oak, Pignut hickory, Red maple, Shagbark hickory, Sugar maple, White ash, White oak, Yellow birch
	Eastern white pine	58	100	
	Northern red oak	52	29	
	Red maple	55	29	
	Shagbark hickory	---	0	
	Sugar maple	55	29	
	White oak	---	---	
Charlton, very stony	Eastern hemlock	---	---	Eastern white pine, European larch, Northern red oak, Norway spruce, Red pine, Scarlet oak, Sugar maple, Tuliptree, White ash, White oak
	Eastern white pine	65	114	
	Northern red oak	65	43	
	Red maple	55	29	
	Red pine	70	129	
	Red spruce	50	114	
	Shagbark hickory	---	0	
	Sugar maple	55	29	
	White oak	---	---	

Forestland Productivity

State of Connecticut

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			Cu ft/ac	
62D:				
Canton, extremely stony	Eastern hemlock	---	---	Beech, Bitternut hickory, Black oak, Eastern hemlock, Eastern white pine, Gray birch, Mockernut hickory, Northern red oak, Pignut hickory, Red maple, Shagbark hickory, Sugar maple, White ash, White oak, Yellow birch
	Eastern white pine	58	100	
	Northern red oak	52	29	
	Red maple	55	29	
	Shagbark hickory	---	0	
	Sugar maple	55	29	
	White oak	---	---	
Charlton, extremely stony	Eastern hemlock	---	---	Eastern white pine, European larch, Northern red oak, Norway spruce, Red pine, Scarlet oak, Sugar maple, Tuliptree, White ash, White oak
	Eastern white pine	65	114	
	Northern red oak	65	43	
	Red maple	55	29	
	Red pine	70	129	
	Red spruce	50	114	
	Shagbark hickory	---	0	
	Sugar maple	55	29	
	White oak	---	---	
73C:				
Charlton, very stony	Eastern hemlock	---	---	Eastern white pine, European larch, Northern red oak, Norway spruce, Red pine, Scarlet oak, Sugar maple, Tuliptree, White ash, White oak
	Eastern white pine	65	114	
	Northern red oak	65	43	
	Red maple	55	29	
	Red pine	70	129	
	Red spruce	50	114	
	Shagbark hickory	---	0	
	Sugar maple	55	29	
	White oak	---	---	
Chatfield, very stony	Eastern hemlock	---	---	Eastern hemlock, Eastern white pine, European larch, Northern red oak, Norway spruce, Red pine, White oak
	Northern red oak	70	57	
	Sugar maple	65	43	
	White ash	75	43	
	White oak	---	---	
75E:				
Hollis	Chestnut oak	---	---	Chestnut oak, Eastern white pine
	Eastern hemlock	---	---	
	Eastern white pine	55	86	
	Northern red oak	47	29	
	Sugar maple	56	29	

Forestland Productivity

State of Connecticut

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			Cu ft/ac	
75E:				
Chatfield	Eastern hemlock	---	---	Eastern hemlock, Eastern white pine, Northern red oak, White oak
	Northern red oak	70	57	
	Sugar maple	65	43	
	White ash	75	43	
	White oak	---	---	
Rock outcrop	---	---	---	---
103:				
Rippowam	Eastern white pine	65	114	---
	Pin oak	---	---	
	Red maple	75	43	

Physical Soil Properties

State of Connecticut

[Entries under "Erosion Factors--T" apply to the entire profile. Entries under "Wind Erodibility Group" and "Wind Erodibility Index" apply only to the surface layer. Absence of an entry indicates that data were not estimated. This report shows only the major soils in each map unit]

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors			Wind erodi-bility group	Wind erodi-bility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
3:														
Ridgebury, extremely stony	0-1	---	---	---	0.20-0.60	10.00-705.00	0.17-0.30	---	75-100	---	---	2	3	86
	1-6	35-71	23-50	0-17	0.60-1.20	1.00-100.00	0.11-0.25	0.0-1.3	5.0-15	.37	.37			
	6-10	35-71	23-50	0-17	1.20-1.70	1.00-100.00	0.10-0.20	0.0-1.3	0.1-4.0	.43	.43			
	10-19	35-71	23-50	0-17	1.50-1.80	1.00-100.00	0.10-0.18	0.0-1.2	0.1-1.5	.32	.49			
	19-66	35-71	23-50	0-17	1.80-2.00	0.00-1.00	0.05-0.16	0.0-1.2	0.0-0.4	.32	.49			
Leicester, extremely stony	0-1	---	---	---	0.20-0.60	10.00-705.00	0.15-0.30	---	75-100	---	---	5	3	86
	1-7	39-63	27-49	4-17	0.89-0.99	1.00-100.00	0.13-0.29	0.0-1.3	5.0-24	.24	.24			
	7-18	34-71	22-49	2-17	1.15-1.64	1.00-100.00	0.11-0.20	0.0-0.9	0.8-6.0	.37	.37			
	18-24	34-71	22-49	2-17	1.67-1.86	1.00-100.00	0.11-0.20	0.0-1.0	0.5-5.1	.43	.43			
	24-39	50-72	24-46	2-10	1.67-1.86	1.00-100.00	0.11-0.16	0.1-0.6	0.1-1.1	.32	.43			
	39-65	50-72	24-46	2-10	1.67-1.86	1.00-100.00	0.08-0.16	0.0-0.6	0.1-0.3	.32	.43			
Whitman, extremely stony	0-1	---	---	---	0.16-0.35	10.00-705.00	0.03-0.63	---	75-100	---	---	2	3	86
	1-10	31-72	22-58	0-17	0.62-1.22	1.00-100.00	0.04-0.30	0.0-1.2	5.2-24	.37	.37			
	10-17	34-72	22-50	0-17	1.30-1.73	1.00-100.00	0.04-0.21	0.0-1.3	0.3-5.3	.32	.49			
	17-61	34-72	22-50	0-17	1.69-2.07	0.00-1.00	0.03-0.13	0.0-1.7	0.0-0.4	.49	.49			
23A:														
Sudbury	0-1	0	0	0	0.30-0.55	42.00-141.00	0.08-0.40	---	45-95	---	---	3	3	86
	1-5	46-68	30-48	2-6	1.10-1.40	14.00-42.00	0.10-0.13	0.0-2.9	2.0-6.0	.28	.28			
	5-17	63-73	20-35	2-7	1.15-1.45	14.00-42.00	0.07-0.15	0.0-2.9	0.5-2.0	.24	.43			
	17-25	63-73	20-35	2-7	1.15-1.45	14.00-42.00	0.07-0.15	0.0-2.9	0.0-0.5	.43	.43			
	25-60	79-98	2-8	0-3	1.30-1.45	42.00-703.00	0.01-0.06	0.0-2.9	0.0-0.5	.05	.15			

Physical Soil Properties

State of Connecticut

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors			Wind erodi-bility group	Wind erodi-bility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
46B:														
Woodbridge, very stony	0-2	---	---	---	0.20-0.60	10.00-705.00	0.17-0.30	---	75-100	---	---	3	3	86
	2-9	44-71	25-50	0-17	0.91-1.22	1.00-100.00	0.12-0.21	0.0-1.5	3.3-9.7	.28	.28			
	9-20	44-71	25-50	0-17	1.05-1.60	1.00-100.00	0.09-0.20	0.0-1.4	0.6-3.5	.43	.43			
	20-32	44-71	25-50	0-17	1.20-1.60	1.00-100.00	0.09-0.18	0.0-1.4	0.2-1.5	.49	.49			
	32-67	44-71	25-50	0-17	1.70-2.04	0.01-1.00	0.09-0.17	0.0-1.2	0.0-0.2	.28	.49			
47C:														
Woodbridge, extremely stony	0-2	---	---	---	0.20-0.60	10.00-705.00	0.17-0.30	---	75-100	---	---	3	3	86
	2-9	44-71	25-50	0-17	0.84-1.05	1.00-100.00	0.12-0.26	0.0-1.6	2.0-15	.28	.28			
	9-20	44-71	25-50	0-17	1.05-1.60	1.00-100.00	0.10-0.20	0.0-1.4	0.6-3.5	.43	.43			
	20-32	44-71	25-50	0-17	1.20-1.60	1.00-100.00	0.10-0.19	0.0-1.4	0.2-1.5	.49	.49			
	32-67	44-71	25-50	0-17	1.70-2.04	0.01-1.00	0.09-0.18	0.0-1.2	0.0-0.2	.28	.49			
61B:														
Canton, very stony	0-2	---	---	---	0.20-0.60	10.00-705.00	0.17-0.30	---	75-100	---	---	3	3	86
	2-5	42-69	25-50	1-10	1.12-1.48	1.00-100.00	0.10-0.22	0.0-1.1	2.0-12	.24	.24			
	5-16	42-69	25-50	1-10	1.46-1.59	1.00-100.00	0.10-0.20	0.1-0.8	0.3-2.8	.43	.43			
	16-22	42-69	25-50	1-10	1.46-1.59	1.00-100.00	0.10-0.20	0.1-0.8	0.2-2.8	.28	.43			
	22-67	75-95	4-24	0-5	1.60-1.64	10.00-705.00	0.03-0.13	0.0-0.3	0.0-0.5	.15	.28			
Charlton, very stony	0-2	---	---	---	0.22-0.32	10.00-705.00	0.12-0.45	---	75-100	---	---	5	3	86
	2-4	39-68	23-50	2-15	0.67-1.24	1.00-100.00	0.10-0.30	0.0-1.2	4.0-25	.24	.24			
	4-27	34-71	23-50	3-18	1.31-1.66	1.00-100.00	0.09-0.22	0.1-1.1	0.1-6.0	.28	.43			
	27-65	45-72	24-50	4-11	1.41-1.60	1.00-100.00	0.08-0.18	0.1-0.6	0.1-1.2	.20	.43			
61C:														
Canton, very stony	0-2	---	---	---	0.20-0.60	10.00-705.00	0.17-0.30	---	75-100	---	---	3	3	86
	2-5	42-69	25-50	1-10	1.12-1.48	1.00-100.00	0.10-0.22	0.0-1.1	2.0-12	.24	.24			
	5-16	42-69	25-50	1-10	1.46-1.59	1.00-100.00	0.10-0.20	0.1-0.8	0.3-2.8	.43	.43			
	16-22	42-69	25-50	1-10	1.46-1.59	1.00-100.00	0.10-0.20	0.1-0.8	0.2-2.8	.28	.43			
	22-67	75-95	4-24	0-5	1.60-1.64	10.00-705.00	0.03-0.13	0.0-0.3	0.0-0.5	.15	.28			

Physical Soil Properties

State of Connecticut

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors			Wind erodi-bility group	Wind erodi-bility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
61C:														
Charlton, very stony	0-2	---	---	---	0.22-0.32	10.00-705.00	0.12-0.45	---	75-100	---	---	5	3	86
	2-4	39-68	23-50	2-15	0.67-1.24	1.00-100.00	0.10-0.30	0.0-1.2	4.0-25	.24	.24			
	4-27	34-71	23-50	3-18	1.31-1.66	1.00-100.00	0.09-0.22	0.1-1.1	0.1-6.0	.28	.43			
	27-65	45-72	24-50	4-11	1.41-1.60	1.00-100.00	0.08-0.18	0.1-0.6	0.1-1.2	.20	.43			
62D:														
Canton, extremely stony	0-2	---	---	---	0.20-0.60	10.00-705.00	0.17-0.30	---	75-100	---	---	3	3	86
	2-5	42-69	25-50	1-10	1.12-1.48	1.00-100.00	0.10-0.22	0.0-1.1	2.0-12	.24	.24			
	5-16	42-69	25-50	1-10	1.46-1.59	1.00-100.00	0.10-0.20	0.1-0.8	0.3-2.8	.43	.43			
	16-22	42-69	25-50	1-10	1.46-1.59	1.00-100.00	0.10-0.20	0.1-0.8	0.2-2.8	.28	.43			
	22-67	75-95	4-24	0-5	1.60-1.64	10.00-705.00	0.03-0.13	0.0-0.3	0.0-0.5	.15	.28			
Charlton, extremely stony	0-2	---	---	---	0.22-0.32	10.00-705.00	0.12-0.45	---	75-100	---	---	5	3	86
	2-4	39-68	23-50	2-15	0.67-1.24	1.00-100.00	0.10-0.30	0.0-1.2	4.0-25	.24	.24			
	4-27	34-71	23-50	3-18	1.31-1.66	1.00-100.00	0.09-0.22	0.1-1.1	0.1-6.0	.28	.43			
	27-65	45-72	24-50	4-11	1.41-1.60	1.00-100.00	0.08-0.18	0.1-0.6	0.1-1.2	.20	.43			
73C:														
Charlton, very stony	0-2	---	---	---	0.22-0.32	10.00-705.00	0.12-0.45	---	75-100	---	---	5	3	86
	2-4	39-68	23-50	2-15	0.67-1.24	1.00-100.00	0.10-0.30	0.0-1.2	4.0-25	.24	.24			
	4-27	34-71	23-50	3-18	1.31-1.66	1.00-100.00	0.09-0.22	0.1-1.1	0.1-6.0	.28	.43			
	27-65	45-72	24-50	4-11	1.41-1.60	1.00-100.00	0.08-0.18	0.1-0.6	0.1-1.2	.20	.43			
Chatfield, very stony	0-1	---	---	---	0.20-0.60	10.00-705.00	0.16-0.30	---	75-100	---	---	2	3	86
	1-2	35-68	23-53	2-15	0.73-1.32	1.00-100.00	0.09-0.34	0.0-1.2	4.0-25	.28	.28			
	2-30	34-71	25-57	0-18	1.10-1.66	1.00-100.00	0.10-0.25	0.0-1.2	0.1-6.0	.24	.37			
	30-40	---	---	---	---	0.00-0.01	0.00	---	---	---	---			

Physical Soil Properties

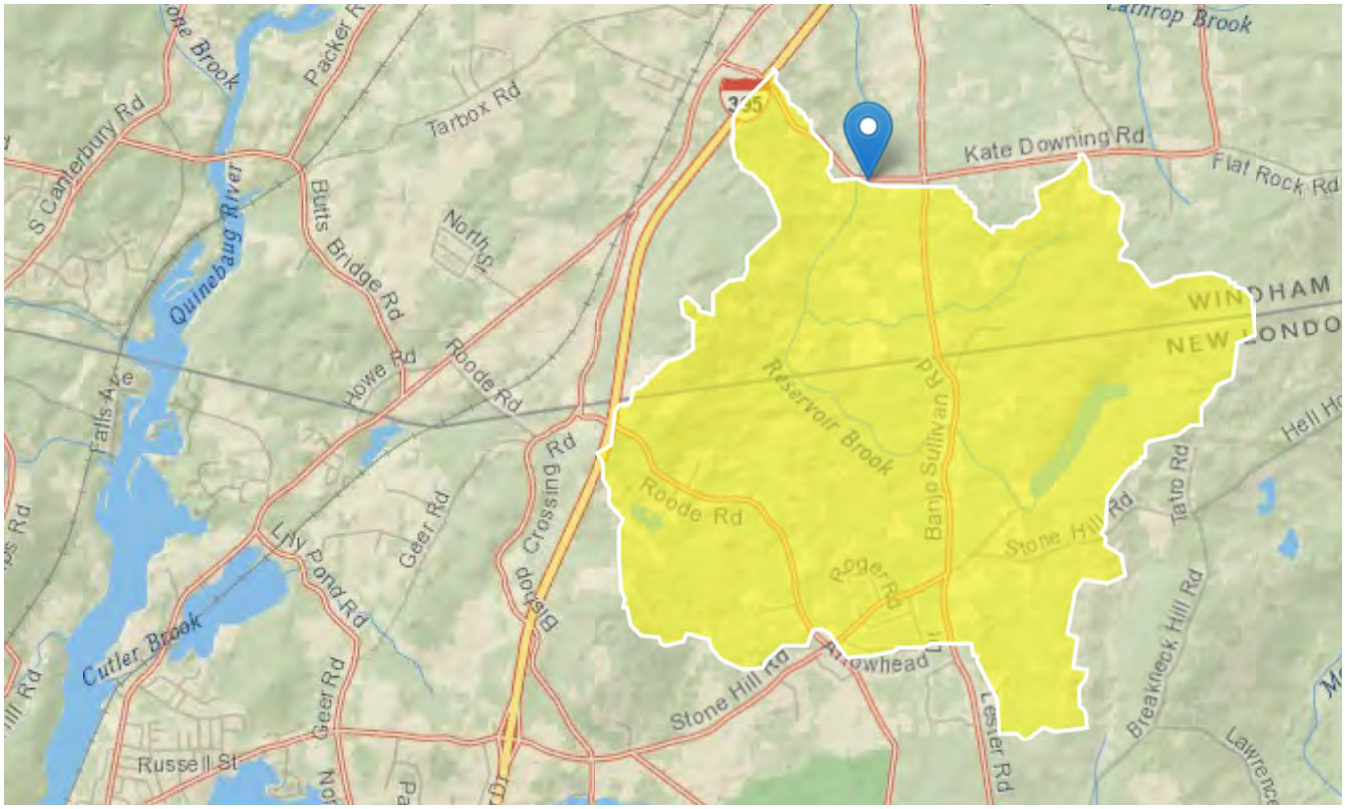
State of Connecticut

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors			Wind erodi-bility group	Wind erodi-bility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
75E:														
Hollis	0-1	0	0	0	0.30-0.55	14.00-42.00	0.08-0.40	---	20-60	---	---	1	5	56
	1-6	54-70	27-36	3-10	1.10-1.40	4.00-42.00	0.08-0.17	0.0-2.9	2.0-6.0	.17	.32			
	6-9	53-69	30-39	1-8	1.30-1.55	4.00-42.00	0.08-0.14	0.0-2.9	0.5-2.0	.24	.49			
	9-15	53-69	30-39	1-8	1.30-1.55	4.00-42.00	0.06-0.18	0.0-2.9	0.0-0.5	.28	.49			
	15-80	---	---	---	---	0.07-141.00	---	---	---	---	---			
Chatfield	0-1	0	0	0	0.30-0.55	14.00-42.00	0.08-0.40	---	50-95	---	---	2	5	56
	1-6	52-83	10-30	7-18	1.25-1.45	4.00-42.00	0.09-0.13	0.0-2.9	2.0-6.0	.05	.15			
	6-15	37-83	10-45	7-18	1.30-1.45	4.00-42.00	0.08-0.17	0.0-2.9	0.5-2.0	.15	.32			
	15-29	50-83	10-28	7-18	1.35-1.50	4.00-42.00	0.08-0.13	0.0-2.9	0.0-0.5	.20	.37			
	29-80	---	---	---	---	0.07-141.00	---	---	---	---	---			
Rock outcrop	>0	---	---	---	---	---	---	---	---	---	---	---	---	---
103:														
Rippowam	0-5	49-68	30-45	2-6	1.10-1.35	4.00-42.00	0.11-0.21	0.0-2.9	3.0-8.0	.28	.28	3	3	86
	5-12	49-69	30-45	1-6	1.20-1.45	4.00-42.00	0.09-0.18	0.0-2.9	1.0-3.0	.37	.37			
	12-19	49-69	30-45	1-6	1.20-1.45	4.00-42.00	0.09-0.18	0.0-2.9	0.5-1.0	.43	.43			
	19-24	49-84	15-45	1-6	1.20-1.45	4.00-42.00	0.09-0.18	0.0-2.9	0.0-1.0	.37	.37			
	24-27	49-84	15-45	1-6	1.20-1.45	4.00-42.00	0.09-0.18	0.0-2.9	0.0-0.5	.37	.37			
	27-31	73-100	0-25	0-2	1.25-1.50	42.00-703.00	0.01-0.10	0.0-2.9	0.0-0.5	.05	.05			
	31-65	73-100	0-25	0-2	1.25-1.50	42.00-703.00	0.01-0.10	0.0-2.9	0.0-0.5	.02	.02			

APPENDIX E: WETLANDS & WILDLIFE RESOURCES

Mill & Reservoir Brook To Kate Downing Road

Region ID: CT
Workspace ID: CT20220624200348023000
Clicked Point (Latitude, Longitude): 41.64973, -71.91513
Time: 2022-06-24 16:04:10 -0400



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CAT1ROADS	Length of interstates lmtd access highways and ramps for lmtd access highways, includes cloverleaf interchanges (USGS Ntl Transp Dataset)	0.31	miles
CAT2ROADS	Length of sec hwy or maj connecting roads; main arteries & hwys not lmtd access, usually in the US Hwy or State Hwy systems (USGS Ntl Transp Dataset)	0	miles

Parameter Code	Parameter Description	Value	Unit
CAT3ROADS	Length of local connecting roads; roads that collect traffic from local roads & connect towns, subdivisions & neighborhoods (USGS Nat Transp Dataset)	0	miles
CAT4ROADS	Length of local roads; generally paved street, road, or byway that usually have single lane of traffic in each direction (USGS Ntnl Transp Dataset)	11.7	miles
CROSCOUNT1	Number of intersections between streams and roads, where the roads are interstate, limited access highway, or ramp (CAT1ROADS)	0	dimensionless
CROSCOUNT2	Number of intersections between streams and roads, where the roads are secondary highway or major connecting road (CAT2ROADS)	0	dimensionless
CROSCOUNT3	Number of intersections between streams and roads, where roads are local conecting roads (CAT3ROADS)	0	dimensionless
CROSCOUNT4	Number of intersections between streams and roads, where roads are local roads (CAT4ROADS)	20	dimensionless
CRSDFT	Percentage of area of coarse-grained stratified drift	15	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	99.1	feet per mi
DRNAREA	Area that drains to a point on a stream	4.69	square miles
ELEV	Mean Basin Elevation	320	feet
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	7.69	inches
I24H10Y	Maximum 24-hour precipitation that occurs on average once in 10 years	4.98	inches
I24H200Y	Maximum 24-hour precipitation that occurs on average once in 200 years	8.75	inches
I24H25Y	Maximum 24-hour precipitation that occurs on average once in 25 years	6.06	inches

Parameter Code	Parameter Description	Value	Unit
I24H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	3.08	inches
I24H500Y	Maximum 24-hour precipitation that occurs on average once in 500 years	10.15	inches
I24H50Y	Maximum 24-hour precipitation that occurs on average once in 50 years	6.88	inches
I24H5Y	Maximum 24-hour precipitation that occurs on average once in 5 years	4.16	inches
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	4.75	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	1.07	percent
LFPLENGTH	Length of longest flow path	4.41	miles
MAPM	Mean Annual Precip Basin Average	48.166	inches
NOVAVPRE	Mean November Precipitation	4.5	inches
PRCWINTER	Mean annual precipitation for December through February	4	inches
SGSL	Total stream length intersecting sand and gravel deposits (in miles)	2.82	miles
SOILPERM	Average Soil Permeability	5.361	inches per hour
SSURGOCCDD	Percentage of area with hydrologic soil types C, D, or C/D from SSURGO	0.3796	percent
STRMTOT	total length of all mapped streams (1:24,000-scale) in the basin	16.9	miles
WETLAND	Percentage of Wetlands	4.78	percent

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Statewide DA only SIR 2020 5054]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4.69	square miles	0.69	325

Peak-Flow Statistics Parameters [Statewide Multiparameter SIR 2020 5054]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4.69	square miles	0.69	325
I24H2Y	24 Hour 2 Year Precipitation	3.08	inches	2.77	3.32
SSURGOCCDD	Percent soil type C or D from SSURGO	0.3796	percent	0.118	0.945
I24H5Y	24 Hour 5 Year Precipitation	4.16	inches	4	4.7
I24H10Y	24 Hour 10 Year Precipitation	4.98	inches	4.86	5.79
I24H25Y	24 Hour 25 Year Precipitation	6.06	inches	5.99	7.22
I24H50Y	24 Hour 50 Year Precipitation	6.88	inches	6.81	8.3
I24H100Y	24 Hour 100 Year Precipitation	7.69	inches	7.62	9.38
I24H200Y	24 Hour 200 YearPrecipitation	8.75	inches	8.7	11.22
I24H500Y	24 Hour 500 Year Precipitation	10.15	inches	10.1	13.64

Peak-Flow Statistics Flow Report [Statewide DA only SIR 2020 5054]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	ASEp
Drainage Area Only 50-percent AEP flood	213	ft^3/s	35
Drainage Area Only 20-percent AEP flood	370	ft^3/s	35
Drainage Area Only 10-percent AEP flood	501	ft^3/s	36.3
Drainage Area Only 4-percent AEP flood	696	ft^3/s	37.8
Drainage Area Only 2-percent AEP flood	861	ft^3/s	39.8
Drainage Area Only 1-percent AEP flood	1050	ft^3/s	42.4
Drainage Area Only 0.5-percent AEP flood	1250	ft^3/s	44.4
Drainage Area Only 0.2-percent AEP flood	1560	ft^3/s	48

Peak-Flow Statistics Flow Report [Statewide Multiparameter SIR 2020 5054]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	PIu	ASEp
50-percent AEP flood	176	ft^3/s	43	720	26.5
20-percent AEP flood	264	ft^3/s	58.5	1190	26.3
10-percent AEP flood	338	ft^3/s	69.1	1650	28.4
4-percent AEP flood	456	ft^3/s	84	2480	31.5
2-percent AEP flood	559	ft^3/s	93.8	3330	34.3
1-percent AEP flood	669	ft^3/s	102	4380	37.1
0.5-percent AEP flood	791	ft^3/s	136	4620	40.6
0.2-percent AEP flood	988	ft^3/s	180	5410	45

Peak-Flow Statistics Flow Report [Area-Averaged]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	ASEp		
Drainage Area Only 50-percent AEP flood	213	ft^3/s	35		
Drainage Area Only 20-percent AEP flood	370	ft^3/s	35		
Drainage Area Only 10-percent AEP flood	501	ft^3/s	36.3		
Drainage Area Only 4-percent AEP flood	696	ft^3/s	37.8		
Drainage Area Only 2-percent AEP flood	861	ft^3/s	39.8		
Drainage Area Only 1-percent AEP flood	1050	ft^3/s	42.4		
Drainage Area Only 0.5-percent AEP flood	1250	ft^3/s	44.4		
Drainage Area Only 0.2-percent AEP flood	1560	ft^3/s	48		
50-percent AEP flood	176	ft^3/s	43	720	26.5
20-percent AEP flood	264	ft^3/s	58.5	1190	26.3
10-percent AEP flood	338	ft^3/s	69.1	1650	28.4
4-percent AEP flood	456	ft^3/s	84	2480	31.5
2-percent AEP flood	559	ft^3/s	93.8	3330	34.3
1-percent AEP flood	669	ft^3/s	102	4380	37.1
0.5-percent AEP flood	791	ft^3/s	136	4620	40.6
0.2-percent AEP flood	988	ft^3/s	180	5410	45

Peak-Flow Statistics Citations

Ahearn, E.A., and Hodgkins, G.A.,2020, Estimating flood magnitude and frequency on streams and rivers in Connecticut, based on data through water year 2015: U.S. Geological Survey Scientific Investigations Report 2020–5054, 42 p. (https://doi.org/10.3133/sir20205054)

Flow-Duration Statistics

Flow-Duration Statistics Parameters [Duration Flow 2010 5052]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4.69	square miles	0.92	150
ELEV	Mean Basin Elevation	320	feet	168	1287
CRSDFT	Percent Coarse Stratified Drift	15	percent	0.1	55.1

Flow-Duration Statistics Flow Report [Duration Flow 2010 5052]

Statistic	Value	Unit
25 Percent Duration	11.8	ft^3/s
99 Percent Duration	0.224	ft^3/s

Flow-Duration Statistics Citations

Ahearn, E.A.,2010, Regional regression equations to estimate flow-duration statistics in Connecticut: U. S. Geological Survey Scientific Investigations Report 2010-5052, 45 p. (http://pubs.usgs.gov/sir/2010/5052/)

Seasonal Flow Statistics

Seasonal Flow Statistics Parameters [Duration Flow 2010 5052]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4.69	square miles	0.92	150
PRCWINTER	Mean Annual Winter Precipitation	4	inches	3.19	4.4
CRSDFT	Percent Coarse Stratified Drift	15	percent	0.1	55.1

Seasonal Flow Statistics Flow Report [Duration Flow 2010 5052]

Statistic	Value	Unit
25 Percent Duration December to February	12.7	ft^3/s
50 Percent Duration December to February	7.57	ft^3/s
75 Percent Duration December to February	4.55	ft^3/s
95 Percent Duration DEC FEB	2.09	ft^3/s
99 Percent Duration December to February	1.13	ft^3/s
25 Percent Duration March to April	19.8	ft^3/s
50 Percent Duration March to April	12.6	ft^3/s
75 Percent Duration March to April	8.94	ft^3/s
95 Percent Duration March to April	5.38	ft^3/s
99 Percent Duration March to April	3.87	ft^3/s
25 Percent Duration July to October	3.21	ft^3/s
50 Percent Duration July to October	1.48	ft^3/s
75 Percent Duration July to October	0.732	ft^3/s
80 Percent Duration July to October	0.615	ft^3/s
99 Percent Duration July to October	0.109	ft^3/s

Seasonal Flow Statistics Citations

Ahearn, E.A.,2010, Regional regression equations to estimate flow-duration statistics in Connecticut: U. S. Geological Survey Scientific Investigations Report 2010-5052, 45 p. (http://pubs.usgs.gov/sir/2010/5052/)

May Flow-Duration Statistics

May Flow-Duration Statistics Parameters [Duration Flow 2010 5052]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4.69	square miles	0.92	150
CRSDFT	Percent Coarse Stratified Drift	15	percent	0.1	55.1

May Flow-Duration Statistics Flow Report [Duration Flow 2010 5052]

Statistic	Value	Unit
May 25 Percent Duration	13.1	ft^3/s
May 50 Percent Duration	8.85	ft^3/s
May 75 Percent Duration	6.15	ft^3/s
May 95 Percent Duration	3.49	ft^3/s
May 99 Percent Duration	2.38	ft^3/s

May Flow-Duration Statistics Citations

Ahearn, E.A.,2010, Regional regression equations to estimate flow-duration statistics in Connecticut: U. S. Geological Survey Scientific Investigations Report 2010-5052, 45 p. (http://pubs.usgs.gov/sir/2010/5052/)

June Flow-Duration Statistics

June Flow-Duration Statistics Parameters [Duration Flow 2010 5052]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4.69	square miles	0.92	150
CRSDFT	Percent Coarse Stratified Drift	15	percent	0.1	55.1
WETLAND	Percent Wetlands	4.78	percent	0.3	18.1

June Flow-Duration Statistics Flow Report [Duration Flow 2010 5052]

Statistic	Value	Unit
June 25 Percent Duration	8.86	ft^3/s
June 50 Percent Duration	4.8	ft^3/s
June 75 Percent Duration	2.9	ft^3/s
June 90 Percent Duration	1.57	ft^3/s
June 99 Percent Duration	0.736	ft^3/s

June Flow-Duration Statistics Citations

Ahearn, E.A.,2010, Regional regression equations to estimate flow-duration statistics in Connecticut: U. S. Geological Survey Scientific Investigations Report 2010-5052, 45 p. (http://pubs.usgs.gov/sir/2010/5052/)

November Flow-Duration Statistics

November Flow-Duration Statistics Parameters [Duration Flow 2010 5052]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4.69	square miles	0.92	150
NOVAVPRE	Mean November Precipitation	4.5	inches	3.48	4.93
CRSDFT	Percent Coarse Stratified Drift	15	percent	0.1	55.1

November Flow-Duration Statistics Flow Report [Duration Flow 2010 5052]

Statistic	Value	Unit
November 25 Percent Duration	9.79	ft^3/s
November 50 Percent Duration	5.28	ft^3/s
November 75 Percent Duration	2.51	ft^3/s
November 90 Percent Duration	1.32	ft^3/s
November 99 Percent Duration	0.529	ft^3/s

November Flow-Duration Statistics Citations

Ahearn, E.A.,2010, Regional regression equations to estimate flow-duration statistics in Connecticut: U. S. Geological Survey Scientific Investigations Report 2010-5052, 45 p. (http://pubs.usgs.gov/sir/2010/5052/)

Bankfull Statistics

Bankfull Statistics Parameters [Appalachian Highlands D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4.69	square miles	0.07722	940.1535

Bankfull Statistics Parameters [New England P Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4.69	square miles	3.799224	138.999861

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4.69	square miles	0.07722	59927.7393

Bankfull Statistics Flow Report [Appalachian Highlands D Bieger 2015]

Statistic	Value	Unit
Bieger_D_channel_width	28.9	ft
Bieger_D_channel_depth	1.75	ft
Bieger_D_channel_cross_sectional_area	51.2	ft^2

Bankfull Statistics Flow Report [New England P Bieger 2015]

Statistic	Value	Unit
Bieger_P_channel_width	39	ft
Bieger_P_channel_depth	1.93	ft
Bieger_P_channel_cross_sectional_area	76.1	ft^2

Bankfull Statistics Flow Report [USA Bieger 2015]

Statistic	Value	Unit
Bieger_USA_channel_width	21.3	ft
Bieger_USA_channel_depth	1.68	ft
Bieger_USA_channel_cross_sectional_area	39.4	ft^2

Bankfull Statistics Flow Report [Area-Averaged]

Statistic	Value	Unit
Bieger_D_channel_width	28.9	ft
Bieger_D_channel_depth	1.75	ft
Bieger_D_channel_cross_sectional_area	51.2	ft^2
Bieger_P_channel_width	39	ft
Bieger_P_channel_depth	1.93	ft
Bieger_P_channel_cross_sectional_area	76.1	ft^2
Bieger_USA_channel_width	21.3	ft
Bieger_USA_channel_depth	1.68	ft
Bieger_USA_channel_cross_sectional_area	39.4	ft^2

Bankfull Statistics Citations

Bieger, Katrin; Rathjens, Hendrik; Allen, Peter M.; and Arnold, Jeffrey G.,2015, Development and Evaluation of Bankfull Hydraulic Geometry Relationships for the Physiographic Regions of the United States, Publications from USDA-ARS / UNL Faculty, 17p. (https://digitalcommons.unl.edu/usdaarsfacpub /1515?utm_source=digitalcommons.unl.edu%2Fusdaarsfacpub%2F1515& utm_medium=PDF&utm_campaign=PDFCoverPages)

shall be held liable for any damages resulting from its authorized or unauthorized use.

USGS Product Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

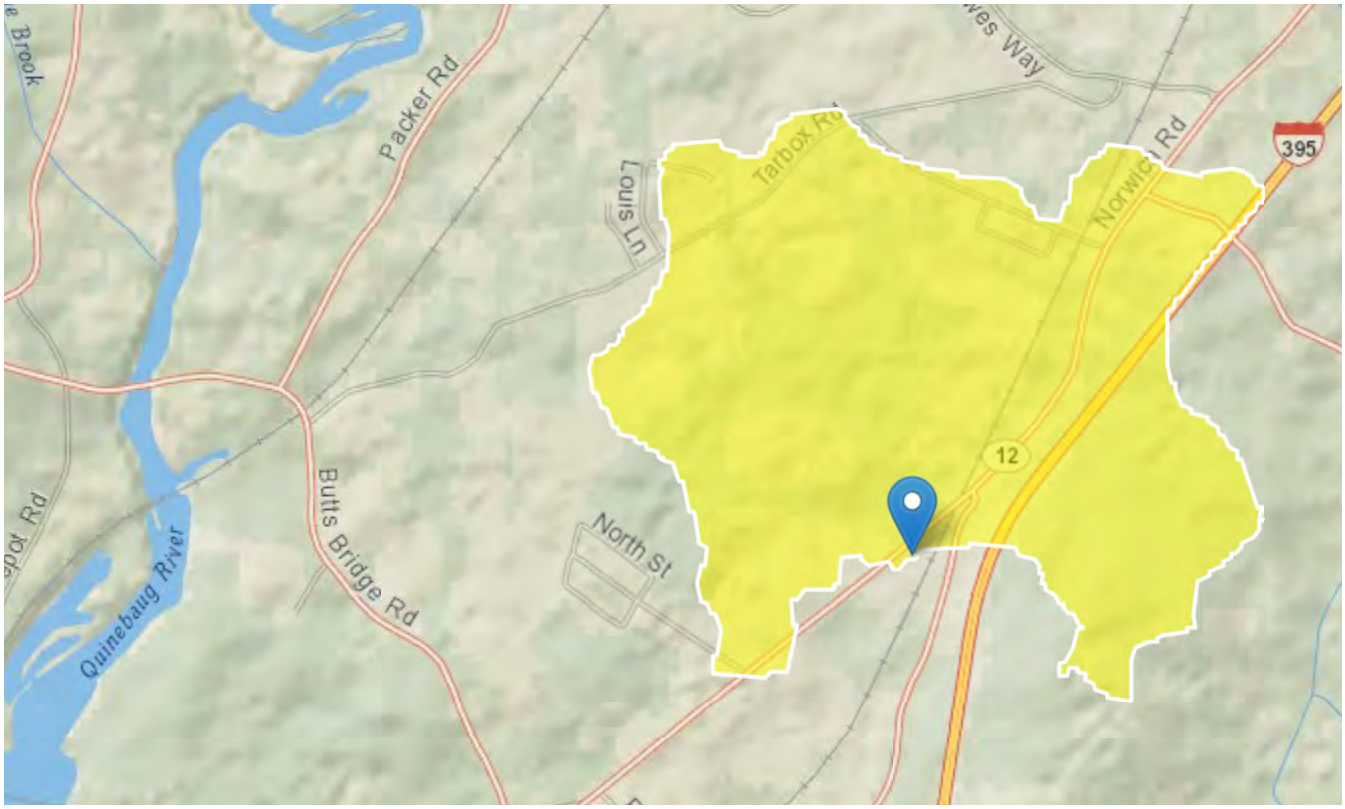
Application Version: 4.10.0

StreamStats Services Version: 1.2.22

NSS Services Version: 2.2.1

West of 395

Region ID: CT
Workspace ID: CT20220624200920057000
Clicked Point (Latitude, Longitude): 41.64587, -71.93773
Time: 2022-06-24 16:09:39 -0400



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CAT1ROADS	Length of interstates lmtd access highways and ramps for lmtd access highways, includes cloverleaf interchanges (USGS Ntl Transp Dataset)	1.75	miles
CAT2ROADS	Length of sec hwy or maj connecting roads; main arteries & hwys not lmtd access, usually in the US Hwy or State Hwy systems (USGS Ntl Transp Dataset)	0	miles

Parameter Code	Parameter Description	Value	Unit
CAT3ROADS	Length of local connecting roads; roads that collect traffic from local roads & connect towns, subdivisions & neighborhoods (USGS Nat Transp Dataset)	1.24	miles
CAT4ROADS	Length of local roads; generally paved street, road, or byway that usually have single lane of traffic in each direction (USGS Ntnl Transp Dataset)	2.06	miles
CROSCOUNT1	Number of intersections between streams and roads, where the roads are interstate, limited access highway, or ramp (CAT1ROADS)	2	dimensionless
CROSCOUNT2	Number of intersections between streams and roads, where the roads are secondary highway or major connecting road (CAT2ROADS)	0	dimensionless
CROSCOUNT3	Number of intersections between streams and roads, where roads are local conecting roads (CAT3ROADS)	3	dimensionless
CROSCOUNT4	Number of intersections between streams and roads, where roads are local roads (CAT4ROADS)	0	dimensionless
CRSDFT	Percentage of area of coarse-grained stratified drift	57.6	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	115	feet per mi
DRNAREA	Area that drains to a point on a stream	1.23	square miles
ELEV	Mean Basin Elevation	188	feet
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	7.66	inches
I24H10Y	Maximum 24-hour precipitation that occurs on average once in 10 years	4.96	inches
I24H200Y	Maximum 24-hour precipitation that occurs on average once in 200 years	8.72	inches
I24H25Y	Maximum 24-hour precipitation that occurs on average once in 25 years	6.04	inches

Parameter Code	Parameter Description	Value	Unit
I24H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	3.08	inches
I24H500Y	Maximum 24-hour precipitation that occurs on average once in 500 years	10.12	inches
I24H50Y	Maximum 24-hour precipitation that occurs on average once in 50 years	6.85	inches
I24H5Y	Maximum 24-hour precipitation that occurs on average once in 5 years	4.15	inches
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	17.7	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	5.95	percent
LFPLENGTH	Length of longest flow path	1.58	miles
MAPM	Mean Annual Precip Basin Average	48.267	inches
NOVAVPRE	Mean November Precipitation	4.5	inches
PRCWINTER	Mean annual precipitation for December through February	4	inches
SGSL	Total stream length intersecting sand and gravel deposits (in miles)	1.99	miles
SOILPERM	Average Soil Permeability	8.031	inches per hour
SSURGOCCDD	Percentage of area with hydrologic soil types C, D, or C/D from SSURGO	0.1688	percent
STRMTOT	total length of all mapped streams (1:24,000-scale) in the basin	2.5	miles
WETLAND	Percentage of Wetlands	10.5	percent

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Statewide DA only SIR 2020 5054]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.23	square miles	0.69	325

Peak-Flow Statistics Parameters [Statewide Multiparameter SIR 2020 5054]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.23	square miles	0.69	325
I24H2Y	24 Hour 2 Year Precipitation	3.08	inches	2.77	3.32
SSURGOCCDD	Percent soil type C or D from SSURGO	0.1688	percent	0.118	0.945
I24H5Y	24 Hour 5 Year Precipitation	4.15	inches	4	4.7
I24H10Y	24 Hour 10 Year Precipitation	4.96	inches	4.86	5.79
I24H25Y	24 Hour 25 Year Precipitation	6.04	inches	5.99	7.22
I24H50Y	24 Hour 50 Year Precipitation	6.85	inches	6.81	8.3
I24H100Y	24 Hour 100 Year Precipitation	7.66	inches	7.62	9.38
I24H200Y	24 Hour 200 YearPrecipitation	8.72	inches	8.7	11.22
I24H500Y	24 Hour 500 Year Precipitation	10.12	inches	10.1	13.64

Peak-Flow Statistics Flow Report [Statewide DA only SIR 2020 5054]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	ASEp
Drainage Area Only 50-percent AEP flood	75.3	ft^3/s	35
Drainage Area Only 20-percent AEP flood	132	ft^3/s	35
Drainage Area Only 10-percent AEP flood	180	ft^3/s	36.3
Drainage Area Only 4-percent AEP flood	251	ft^3/s	37.8
Drainage Area Only 2-percent AEP flood	311	ft^3/s	39.8
Drainage Area Only 1-percent AEP flood	377	ft^3/s	42.4
Drainage Area Only 0.5-percent AEP flood	451	ft^3/s	44.4
Drainage Area Only 0.2-percent AEP flood	562	ft^3/s	48

Peak-Flow Statistics Flow Report [Statewide Multiparameter SIR 2020 5054]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	PIu	ASEp
50-percent AEP flood	44.4	ft^3/s	10.4	190	26.5
20-percent AEP flood	69.8	ft^3/s	14.9	326	26.3
10-percent AEP flood	90.9	ft^3/s	18	458	28.4
4-percent AEP flood	126	ft^3/s	22.6	703	31.5
2-percent AEP flood	155	ft^3/s	25.3	948	34.3
1-percent AEP flood	187	ft^3/s	27.8	1260	37.1
0.5-percent AEP flood	226	ft^3/s	37.9	1350	40.6
0.2-percent AEP flood	287	ft^3/s	51.4	1600	45

Peak-Flow Statistics Flow Report [Area-Averaged]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	ASEp		
Drainage Area Only 50-percent AEP flood	75.3	ft^3/s	35		
Drainage Area Only 20-percent AEP flood	132	ft^3/s	35		
Drainage Area Only 10-percent AEP flood	180	ft^3/s	36.3		
Drainage Area Only 4-percent AEP flood	251	ft^3/s	37.8		
Drainage Area Only 2-percent AEP flood	311	ft^3/s	39.8		
Drainage Area Only 1-percent AEP flood	377	ft^3/s	42.4		
Drainage Area Only 0.5-percent AEP flood	451	ft^3/s	44.4		
Drainage Area Only 0.2-percent AEP flood	562	ft^3/s	48		
50-percent AEP flood	44.4	ft^3/s	10.4	190	26.5
20-percent AEP flood	69.8	ft^3/s	14.9	326	26.3
10-percent AEP flood	90.9	ft^3/s	18	458	28.4
4-percent AEP flood	126	ft^3/s	22.6	703	31.5
2-percent AEP flood	155	ft^3/s	25.3	948	34.3
1-percent AEP flood	187	ft^3/s	27.8	1260	37.1
0.5-percent AEP flood	226	ft^3/s	37.9	1350	40.6
0.2-percent AEP flood	287	ft^3/s	51.4	1600	45

Peak-Flow Statistics Citations

Ahearn, E.A., and Hodgkins, G.A.,2020, Estimating flood magnitude and frequency on streams and rivers in Connecticut, based on data through water year 2015: U.S. Geological Survey Scientific Investigations Report 2020–5054, 42 p. (https://doi.org/10.3133/sir20205054)

Flow-Duration Statistics

Flow-Duration Statistics Parameters [Duration Flow 2010 5052]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.23	square miles	0.92	150
ELEV	Mean Basin Elevation	188	feet	168	1287
CRSDFT	Percent Coarse Stratified Drift	57.6	percent	0.1	55.1

Flow-Duration Statistics Disclaimers [Duration Flow 2010 5052]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Flow-Duration Statistics Flow Report [Duration Flow 2010 5052]

Statistic	Value	Unit
25 Percent Duration	3.31	ft^3/s
99 Percent Duration	0.0869	ft^3/s

Flow-Duration Statistics Citations

Ahearn, E.A.,2010, Regional regression equations to estimate flow-duration statistics in Connecticut: U. S. Geological Survey Scientific Investigations Report 2010-5052, 45 p. (http://pubs.usgs.gov/sir/2010/5052/)

Seasonal Flow Statistics

Seasonal Flow Statistics Parameters [Duration Flow 2010 5052]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.23	square miles	0.92	150
PRCWINTER	Mean Annual Winter Precipitation	4	inches	3.19	4.4
CRSDFT	Percent Coarse Stratified Drift	57.6	percent	0.1	55.1

Seasonal Flow Statistics Disclaimers [Duration Flow 2010 5052]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Seasonal Flow Statistics Flow Report [Duration Flow 2010 5052]

Statistic	Value	Unit
25 Percent Duration December to February	3.29	ft^3/s
50 Percent Duration December to February	1.93	ft^3/s
75 Percent Duration December to February	1.14	ft^3/s
95 Percent Duration DEC FEB	0.518	ft^3/s
99 Percent Duration December to February	0.27	ft^3/s
25 Percent Duration March to April	5.16	ft^3/s
50 Percent Duration March to April	3.23	ft^3/s
75 Percent Duration March to April	2.53	ft^3/s
95 Percent Duration March to April	1.62	ft^3/s
99 Percent Duration March to April	1.19	ft^3/s
25 Percent Duration July to October	0.918	ft^3/s
50 Percent Duration July to October	0.454	ft^3/s
75 Percent Duration July to October	0.233	ft^3/s
80 Percent Duration July to October	0.195	ft^3/s
99 Percent Duration July to October	0.0327	ft^3/s

Seasonal Flow Statistics Citations

Ahearn, E.A.,2010, Regional regression equations to estimate flow-duration statistics in Connecticut: U. S. Geological Survey Scientific Investigations Report 2010-5052, 45 p. (http://pubs.usgs.gov/sir/2010/5052/)

May Flow-Duration Statistics

May Flow-Duration Statistics Parameters [Duration Flow 2010 5052]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.23	square miles	0.92	150
CRSDFT	Percent Coarse Stratified Drift	57.6	percent	0.1	55.1

May Flow-Duration Statistics Disclaimers [Duration Flow 2010 5052]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

May Flow-Duration Statistics Flow Report [Duration Flow 2010 5052]

Statistic	Value	Unit
May 25 Percent Duration	3.69	ft^3/s
May 50 Percent Duration	2.63	ft^3/s
May 75 Percent Duration	1.91	ft^3/s
May 95 Percent Duration	1.18	ft^3/s
May 99 Percent Duration	0.839	ft^3/s

May Flow-Duration Statistics Citations

Ahearn, E.A.,2010, Regional regression equations to estimate flow-duration statistics in Connecticut: U. S. Geological Survey Scientific Investigations Report 2010-5052, 45 p. (http://pubs.usgs.gov/sir/2010/5052/)

June Flow-Duration Statistics

June Flow-Duration Statistics Parameters [Duration Flow 2010 5052]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.23	square miles	0.92	150
CRSDFT	Percent Coarse Stratified Drift	57.6	percent	0.1	55.1
WETLAND	Percent Wetlands	10.5	percent	0.3	18.1

June Flow-Duration Statistics Disclaimers [Duration Flow 2010 5052]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

June Flow-Duration Statistics Flow Report [Duration Flow 2010 5052]

Statistic	Value	Unit
June 25 Percent Duration	3.07	ft^3/s
June 50 Percent Duration	1.78	ft^3/s
June 75 Percent Duration	1.18	ft^3/s
June 90 Percent Duration	0.565	ft^3/s
June 99 Percent Duration	0.276	ft^3/s

June Flow-Duration Statistics Citations

Ahearn, E.A.,2010, Regional regression equations to estimate flow-duration statistics in Connecticut: U. S. Geological Survey Scientific Investigations Report 2010-5052, 45 p. (http://pubs.usgs.gov/sir/2010/5052/)

November Flow-Duration Statistics

November Flow-Duration Statistics Parameters [Duration Flow 2010 5052]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.23	square miles	0.92	150
NOVAVPRE	Mean November Precipitation	4.5	inches	3.48	4.93
CRSDFT	Percent Coarse Stratified Drift	57.6	percent	0.1	55.1

November Flow-Duration Statistics Disclaimers [Duration Flow 2010 5052]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

November Flow-Duration Statistics Flow Report [Duration Flow 2010 5052]

Statistic	Value	Unit
November 25 Percent Duration	2.63	ft^3/s
November 50 Percent Duration	1.43	ft^3/s
November 75 Percent Duration	0.643	ft^3/s
November 90 Percent Duration	0.386	ft^3/s
November 99 Percent Duration	0.166	ft^3/s

November Flow-Duration Statistics Citations

Ahearn, E.A.,2010, Regional regression equations to estimate flow-duration statistics in Connecticut: U. S. Geological Survey Scientific Investigations Report 2010-5052, 45 p. (http://pubs.usgs.gov/sir/2010/5052/)

Bankfull Statistics

Bankfull Statistics Parameters [Appalachian Highlands D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.23	square miles	0.07722	940.1535

Bankfull Statistics Parameters [New England P Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.23	square miles	3.799224	138.999861

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.23	square miles	0.07722	59927.7393

Bankfull Statistics Flow Report [Appalachian Highlands D Bieger 2015]

Statistic	Value	Unit
Bieger_D_channel_width	16.6	ft
Bieger_D_channel_depth	1.19	ft
Bieger_D_channel_cross_sectional_area	19.9	ft^2

Bankfull Statistics Disclaimers [New England P Bieger 2015]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Bankfull Statistics Flow Report [New England P Bieger 2015]

Statistic	Value	Unit
Bieger_P_channel_width	26.8	ft
Bieger_P_channel_depth	1.44	ft
Bieger_P_channel_cross_sectional_area	38.5	ft^2

Bankfull Statistics Flow Report [USA Bieger 2015]

Statistic	Value	Unit
Bieger_USA_channel_width	13.3	ft
Bieger_USA_channel_depth	1.26	ft
Bieger_USA_channel_cross_sectional_area	19.1	ft^2

Bankfull Statistics Flow Report [Area-Averaged]

Statistic	Value	Unit

Statistic	Value	Unit
Bieger_D_channel_width	16.6	ft
Bieger_D_channel_depth	1.19	ft
Bieger_D_channel_cross_sectional_area	19.9	ft^2
Bieger_P_channel_width	26.8	ft
Bieger_P_channel_depth	1.44	ft
Bieger_P_channel_cross_sectional_area	38.5	ft^2
Bieger_USA_channel_width	13.3	ft
Bieger_USA_channel_depth	1.26	ft
Bieger_USA_channel_cross_sectional_area	19.1	ft^2

Bankfull Statistics Citations

Bieger, Katrin; Rathjens, Hendrik; Allen, Peter M.; and Arnold, Jeffrey G.,2015, Development and Evaluation of Bankfull Hydraulic Geometry Relationships for the Physiographic Regions of the United States, Publications from USDA-ARS / UNL Faculty, 17p. (https://digitalcommons.unl.edu/usdaarsfacpub /1515?utm_source=digitalcommons.unl.edu%2Fusdaarsfacpub%2F1515& utm_medium=PDF&utm_campaign=PDFCoverPages)

Application Version: 4.10.0

StreamStats Services Version: 1.2.22

NSS Services Version: 2.2.1

Connecticut Inland Wetlands (CT)

State of Connecticut

[The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The State of Connecticut recognizes all poorly and very poorly drained soils, alluvial soils, and soils on flood plains as wetlands. This report shows only the major soils in each map unit. Run this report and include minor components]

Map symbol and soil name	Pct. of map unit	Inland wetlands (CT)
		Rating
3:		
Ridgebury, extremely stony	40	CT wetland
Leicester, extremely stony	35	CT wetland
Whitman, extremely stony	17	CT wetland
23A:		
Sudbury	80	CT nonwetland
46B:		
Woodbridge, very stony	82	CT nonwetland
47C:		
Woodbridge, extremely stony	83	CT nonwetland
61B:		
Canton, very stony	50	CT nonwetland
Charlton, very stony	35	CT nonwetland
61C:		
Canton, very stony	50	CT nonwetland
Charlton, very stony	35	CT nonwetland
62D:		
Canton, extremely stony	55	CT nonwetland
Charlton, extremely stony	30	CT nonwetland
73C:		
Charlton, very stony	50	CT nonwetland
Chatfield, very stony	30	CT nonwetland
75E:		
Hollis	35	CT nonwetland
Chatfield	30	CT nonwetland
Rock outcrop	15	CT nonwetland
103:		
Rippowam	80	CT wetland

Report List

File name: C:\Users\ngoss\Desktop\CONNWOOD FORESTERS_Projects_2022\Plainfield MP\Data\0downing_inventorydata.NED3
File version: 3.30.1
Last saved: 7/7/2022
Report generated: 07/08/2022 16:20

Wildlife Species Potential

Stand 1, Inventory, 2022

NEWILD: New England Wildlife

Species List:

- Red-spotted Newt (*Notophthalmus viridescens*)
- Four-toed Salamander (*Hemidactylium scutatum*)
- Gray Treefrog (*Hyla versicolor*)
- Bullfrog (*Lithobates catesbeianus*)
- Pickerel Frog (*Lithobates palustris*)
- Wood Turtle (*Glyptemys insculpta*)
- Eastern Hognose Snake (*Heterodon platirhinos*)
- Eastern Worm Snake (*Carphophis amoenus*)
- Black Rat Snake (*Pantherophis alleghaniensis*)
- Eastern Milk Snake (*Lampropeltis triangulum*)
- Northern Copperhead (*Agkistrodon contortrix mokasen*)
- Timber Rattlesnake (*Crotalus horridus*)
- Common Goldeneye (*Bucephala clangula*)
- Cooper's Hawk (*Accipiter cooperii*)
- Northern Goshawk (*Accipiter gentilis*)
- Peregrine Falcon (*Falco peregrinus*)
- Ruffed Grouse (*Bonasa umbellus*)
- Eastern Screech-Owl (*Megascops asio*)
- Great Horned Owl (*Bubo virginianus*)
- Barred Owl (*Strix varia*)
- Long-eared Owl (*Asio otus*)
- Common Nighthawk (*Chordeiles minor*)
- Whip-poor-will (*Antrostomus vociferus*)
- Red-bellied Woodpecker (*Melanerpes carolinus*)

- Yellow-bellied Sapsucker (*Sphyrapicus varius*)
- Hairy Woodpecker (*Picoides villosus*)
- Great Crested Flycatcher (*Myiarchus crinitus*)
- Blue Jay (*Cyanocitta cristata*)
- American Crow (*Corvus brachyrhynchos*)
- Black-capped Chickadee (*Poecile atricapillus*)
- Tufted Titmouse (*Baeolophus bicolor*)
- White-breasted Nuthatch (*Sitta carolinensis*)
- Brown Creeper (*Certhia americana*)
- Carolina Wren (*Thryothorus ludovicianus*)
- Blue-gray Gnatcatcher (*Polioptila caerulea*)
- Yellow-throated Vireo (*Vireo flavifrons*)
- White-throated Sparrow (*Zonotrichia albicollis*)
- Dark-eyed Junco (*Junco hyemalis*)
- Purple Finch (*Haemorhous purpureus*)
- Little Brown Myotis (*Myotis lucifugus*)
- Keen's Myotis (*Myotis keenii*)
- Indiana Myotis (*Myotis sodalis*)
- Silver-haired Bat (*Lasionycteris noctivagans*)
- Eastern Pipistrelle (*Perimyotis subflavus*)
- Big Brown Bat (*Eptesicus fuscus*)
- Eastern Chipmunk (*Tamias striatus*)
- Southern Flying Squirrel (*Glaucomys volans*)
- Beaver (*Castor canadensis*)
- Porcupine (*Erethizon dorsatum*)
- Coyote (*Canis latrans*)
- Raccoon (*Procyon lotor*)
- Fisher (*Martes pennanti*)
- Mink (*Neovison vison*)
- Striped Skunk (*Mephitis mephitis*)
- River Otter (*Lutra canadensis*)

Habitats and features used in species rules:

Habitats and features

NEWILD feature	NED variable	value
Habitat Type	**NEWILD Habitat type** **NED Cover type** **NED Forest type**	Northern red oak Broadleaf forest oak northern hardwoods
Size Class	**Size class**	small sawtimber
High perch	**High Perches Present**	absent
Low perch	**Low Perches Present**	absent
Canopy < 15%	**Canopy Closure**	61 (%)
Canopy 16 - 30%	**Canopy Closure**	61 (%)
Canopy 31 - 70%	**Canopy Closure**	61 (%)
Canopy > 70%	**Canopy Closure**	61 (%)
Waterside tree bole, Dead, at least 6" dbh	**none**	ignored
Waterside tree bole, Live, at least 12" dbh	**none**	ignored
Waterside tree bole, Live, at least 16" dbh	**none**	ignored
Non-Waterside tree bole, Dead and soft, less then 6"	**none**	ignored
Non-Waterside tree bole, Dead and hard, 6-12"	**none**	ignored
Non-Waterside tree bole, Dead and hard, 12-18"	**none**	ignored
Non-Waterside tree bole, Live, columnar decay, 8-12"	**none**	ignored

Non-Waterside tree bole, Live, broken top, 12-18"	**none**	ignored
Non-Waterside tree bole, Live, broken top or large limb >18"	**none**	ignored
Non-Waterside tree bole, Live, hollow >24"	**none**	ignored
Deciduous Midstory 10-30' zone	**Deciduous Midstory**	0 (%)
Coniferous Midstory 10-30' zone	**Coniferous Midstory**	0 (%)
Mixed Midstory 10-30' zone	**Mixed Midstory**	0 (%)
Deciduous seedlings, saplings, shrubs in 2-10' zone	**Shrub layer deciduous species**	45.0 (%)
Coniferous seedlings, saplings, shrubs in 2-10' zone	**Shrub layer coniferous species**	0.0 (%)
Mixed deciduous, coniferous vegetation in 2-10' zone	**Shrub layer deciduous species**	45.0 (%)
Mixed deciduous, coniferous vegetation in 2-10' zone	**Shrub layer coniferous species**	0.0 (%)
Ericaceous in 2-10' zone	**Shrub layer ericaceous species**	0.0 (%)
Wetland shrubs in 2-10' zone	**none**	ignored
Ground vegetation <30% coverage in 0-2' zone	**Ground layer cover**	29.5 (% cover)
Ground vegetation 30-75% coverage in 0-2' zone	**Ground layer cover**	29.5 (% cover)
Ground vegetation >75% coverage in 0-2' zone	**Ground layer cover**	29.5 (% cover)
Wetland vegetation and temporary pools	**Temporary Ponds**	absent
Waterside decaying logs	**none**	ignored
Rocky floor	**Percent Cover Rock**	0.0 (% cover)
Dead and down material	**Coarse Woody Debris**	671.7 (cu.ft./ac.)
Forest litter and moss	**Leaf litter cover**	0.0 (% cover)
Subterranean	**Caves**	absent
Subterranean	**Rock Crevices**	absent
Deciduous overstory inclusions	**none**	ignored
Coniferous overstory inclusions	**none**	ignored
Seeps	**Seeps**	absent
Gravel and soil	**none**	ignored
Woods road	**Roaded**	absent
Slash piles	**Percent Plot Clusters with High Slash**	0 (% plots)
Slash piles	**Percent Plot Clusters with Low Slash**	0 (% plots)
Mast and fruit	**Percent Plot Clusters with Soft Mast**	60 (%)
Mast and fruit	**Percent Plot Clusters with Hard Mast**	100 (%)

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File version: 3.30.1
Last saved: 7/7/2022
Report generated: 07/08/2022 16:20

Wildlife Species Potential

Stand 2, Inventory, 2022

NEWILD: New England Wildlife

Species List:

- Red-spotted Newt (*Notophthalmus viridescens*)
- Four-toed Salamander (*Hemidactylium scutatum*)
- Gray Treefrog (*Hyla versicolor*)
- Bullfrog (*Lithobates catesbeianus*)
- Pickerel Frog (*Lithobates palustris*)
- Wood Turtle (*Glyptemys insculpta*)
- Eastern Hognose Snake (*Heterodon platirhinos*)
- Eastern Worm Snake (*Carphophis amoenus*)
- Black Rat Snake (*Pantherophis alleghaniensis*)
- Eastern Milk Snake (*Lampropeltis triangulum*)
- Northern Copperhead (*Agkistrodon contortrix mokasen*)
- Timber Rattlesnake (*Crotalus horridus*)
- Common Goldeneye (*Bucephala clangula*)
- Cooper's Hawk (*Accipiter cooperii*)
- Northern Goshawk (*Accipiter gentilis*)
- Peregrine Falcon (*Falco peregrinus*)
- Ruffed Grouse (*Bonasa umbellus*)
- Eastern Screech-Owl (*Megascops asio*)
- Great Horned Owl (*Bubo virginianus*)
- Barred Owl (*Strix varia*)
- Long-eared Owl (*Asio otus*)
- Common Nighthawk (*Chordeiles minor*)
- Whip-poor-will (*Antrostomus vociferus*)
- Red-bellied Woodpecker (*Melanerpes carolinus*)
- Yellow-bellied Sapsucker (*Sphyrapicus varius*)
- Hairy Woodpecker (*Picoides villosus*)
- Great Crested Flycatcher (*Myiarchus crinitus*)
- Blue Jay (*Cyanocitta cristata*)
- American Crow (*Corvus brachyrhynchos*)
- Black-capped Chickadee (*Poecile atricapillus*)
- Tufted Titmouse (*Baeolophus bicolor*)
- White-breasted Nuthatch (*Sitta carolinensis*)
- Brown Creeper (*Certhia americana*)
- Carolina Wren (*Thryothorus ludovicianus*)
- Blue-gray Gnatcatcher (*Polioptila caerulea*)
- Yellow-throated Vireo (*Vireo flavifrons*)
- White-throated Sparrow (*Zonotrichia albicollis*)
- Dark-eyed Junco (*Junco hyemalis*)
- Purple Finch (*Haemorhous purpureus*)
- Little Brown Myotis (*Myotis lucifugus*)
- Keen's Myotis (*Myotis keenii*)
- Indiana Myotis (*Myotis sodalis*)
- Silver-haired Bat (*Lasionycteris noctivagans*)
- Eastern Pipistrelle (*Perimyotis subflavus*)
- Big Brown Bat (*Eptesicus fuscus*)
- Eastern Chipmunk (*Tamias striatus*)

- Southern Flying Squirrel (*Glaucomys volans*)
- Beaver (*Castor canadensis*)
- Porcupine (*Erethizon dorsatum*)
- Coyote (*Canis latrans*)
- Raccoon (*Procyon lotor*)
- Fisher (*Martes pennanti*)
- Mink (*Neovison vison*)
- Striped Skunk (*Mephitis mephitis*)
- River Otter (*Lutra canadensis*)

Habitats and features used in species rules:

Habitats and features

NEWILD feature	NED variable	value
Habitat Type	**NEWILD Habitat type** **NED Cover type** **NED Forest type**	Northern red oak Broadleaf forest oak northern hardwoods
Size Class	**Size class**	small sawtimber
High perch	**High Perches Present**	absent
Low perch	**Low Perches Present**	absent
Canopy < 15%	**Canopy Closure**	65 (%)
Canopy 16 - 30%	**Canopy Closure**	65 (%)
Canopy 31 - 70%	**Canopy Closure**	65 (%)
Canopy > 70%	**Canopy Closure**	65 (%)
Waterside tree bole, Dead, at least 6" dbh	**none**	ignored
Waterside tree bole, Live, at least 12" dbh	**none**	ignored
Waterside tree bole, Live, at least 16" dbh	**none**	ignored
Non-Waterside tree bole, Dead and soft, less then 6"	**none**	ignored
Non-Waterside tree bole, Dead and hard, 6-12"	**none**	ignored
Non-Waterside tree bole, Dead and hard, 12-18"	**none**	ignored
Non-Waterside tree bole, Live, columnar decay, 8-12"	**none**	ignored
Non-Waterside tree bole, Live, broken top, 12-18"	**none**	ignored
Non-Waterside tree bole, Live, broken top or large limb >18"	**none**	ignored
Non-Waterside tree bole, Live, hollow >24"	**none**	ignored
Deciduous Midstory 10-30' zone	**Deciduous Midstory**	0 (%)
Coniferous Midstory 10-30' zone	**Coniferous Midstory**	0 (%)
Mixed Midstory 10-30' zone	**Mixed Midstory**	0 (%)
Deciduous seedlings, saplings, shrubs in 2-10' zone	**Shrub layer deciduous species**	58.0 (%)
Coniferous seedlings, saplings, shrubs in 2-10' zone	**Shrub layer coniferous species**	0.0 (%)
Mixed deciduous, coniferous vegetation in 2-10' zone	**Shrub layer deciduous species**	58.0 (%)
Mixed deciduous, coniferous vegetation in 2-10' zone	**Shrub layer coniferous species**	0.0 (%)
Ericaceous in 2-10' zone	**Shrub layer ericaceous species**	0.0 (%)
Wetland shrubs in 2-10' zone	**none**	ignored
Ground vegetation <30% coverage in 0-2' zone	**Ground layer cover**	24.9 (% cover)
Ground vegetation 30-75% coverage in 0-2' zone	**Ground layer cover**	24.9 (% cover)

Ground vegetation >75% coverage in 0-2' zone	**Ground layer cover**	24.9 (% cover)
Wetland vegetation and temporary pools	**Temporary Ponds**	absent
Waterside decaying logs	**none**	ignored
Rocky floor	**Percent Cover Rock**	0.0 (% cover)
Dead and down material	**Coarse Woody Debris**	2257.8 (cu.ft./ac.)
Forest litter and moss	**Leaf litter cover**	0.0 (% cover)
Subterranean	**Caves**	absent
Subterranean	**Rock Crevices**	absent
Deciduous overstory inclusions	**none**	ignored
Coniferous overstory inclusions	**none**	ignored
Seeps	**Seeps**	absent
Gravel and soil	**none**	ignored
Woods road	**Roaded**	absent
Slash piles	**Percent Plot Clusters with High Slash**	0 (% plots)
Slash piles	**Percent Plot Clusters with Low Slash**	0 (% plots)
Mast and fruit	**Percent Plot Clusters with Soft Mast**	72 (%)
Mast and fruit	**Percent Plot Clusters with Hard Mast**	100 (%)

return to top

File name: C:\Users\ngoss\Desktop\CONNWOOD FORESTERS_Projects_2022\Plainfield MP\Data\0downing_inventorydata.NED3
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Last saved: 7/7/2022
Report generated: 07/08/2022 16:20

Wildlife Species Potential

Stand 3, Inventory, 2022

NEWILD: New England Wildlife

Species List:

- Gray Treefrog (*Hyla versicolor*)
- Bullfrog (*Lithobates catesbeianus*)
- Pickerel Frog (*Lithobates palustris*)
- Wood Turtle (*Glyptemys insculpta*)
- Eastern Hognose Snake (*Heterodon platirhinos*)
- Eastern Worm Snake (*Carphophis amoenus*)
- Timber Rattlesnake (*Crotalus horridus*)
- Cooper's Hawk (*Accipiter cooperii*)
- Northern Goshawk (*Accipiter gentilis*)

- Peregrine Falcon (*Falco peregrinus*)
- Ruffed Grouse (*Bonasa umbellus*)
- Eastern Screech-Owl (*Megascops asio*)
- Great Horned Owl (*Bubo virginianus*)
- Long-eared Owl (*Asio otus*)
- Common Nighthawk (*Chordeiles minor*)
- Yellow-bellied Sapsucker (*Sphyrapicus varius*)
- Blue Jay (*Cyanocitta cristata*)
- Black-capped Chickadee (*Poecile atricapillus*)
- Tufted Titmouse (*Baeolophus bicolor*)
- White-breasted Nuthatch (*Sitta carolinensis*)
- Blue-gray Gnatcatcher (*Polioptila caerulea*)
- Dark-eyed Junco (*Junco hyemalis*)
- Purple Finch (*Haemorhous purpureus*)
- Beaver (*Castor canadensis*)
- Coyote (*Canis latrans*)
- Raccoon (*Procyon lotor*)
- River Otter (*Lutra canadensis*)

Habitats and features used in species rules:

Habitats and features

NEWILD feature	NED variable	value
Habitat Type	**NEWILD Habitat type** **NED Cover type** **NED Forest type**	Northern red oak Broadleaf forest oak northern hardwoods
Size Class	**Size class**	pole
High perch	**High Perches Present**	absent
Low perch	**Low Perches Present**	absent
Canopy < 15%	**Canopy Closure**	54 (%)
Canopy 16 - 30%	**Canopy Closure**	54 (%)
Canopy 31 - 70%	**Canopy Closure**	54 (%)
Canopy > 70%	**Canopy Closure**	54 (%)
Waterside tree bole, Dead, at least 6" dbh	**none**	ignored
Waterside tree bole, Live, at least 12" dbh	**none**	ignored
Waterside tree bole, Live, at least 16" dbh	**none**	ignored
Non-Waterside tree bole, Dead and soft, less then 6"	**none**	ignored
Non-Waterside tree bole, Dead and hard, 6-12"	**none**	ignored
Non-Waterside tree bole, Dead and hard, 12-18"	**none**	ignored
Non-Waterside tree bole, Live, columnar decay, 8-12"	**none**	ignored
Non-Waterside tree bole, Live, broken top, 12-18"	**none**	ignored
Non-Waterside tree bole, Live, broken top or large limb >18"	**none**	ignored
Non-Waterside tree bole, Live, hollow >24"	**none**	ignored
Deciduous Midstory 10-30' zone	**Deciduous Midstory**	0 (%)
Coniferous Midstory 10-30' zone	**Coniferous Midstory**	0 (%)
Mixed Midstory 10-30' zone	**Mixed Midstory**	0 (%)
Deciduous seedlings, saplings, shrubs in 2-10' zone	**Shrub layer deciduous species**	0.0 (%)
Coniferous seedlings, saplings, shrubs in 2-10' zone	**Shrub layer coniferous species**	0.0 (%)

Mixed deciduous, coniferous vegetation in 2-10' zone	**Shrub layer deciduous species**	0.0 (%)
Mixed deciduous, coniferous vegetation in 2-10' zone	**Shrub layer coniferous species**	0.0 (%)
Ericaceous in 2-10' zone	**Shrub layer ericaceous species**	0.0 (%)
Wetland shrubs in 2-10' zone	**none**	ignored
Ground vegetation <30% coverage in 0-2' zone	**Ground layer cover**	0.0 (% cover)
Ground vegetation 30-75% coverage in 0-2' zone	**Ground layer cover**	0.0 (% cover)
Ground vegetation >75% coverage in 0-2' zone	**Ground layer cover**	0.0 (% cover)
Wetland vegetation and temporary pools	**Temporary Ponds**	absent
Waterside decaying logs	**none**	ignored
Rocky floor	**Percent Cover Rock**	0.0 (% cover)
Dead and down material	**Coarse Woody Debris**	0.0 (cu.ft./ac.)
Forest litter and moss	**Leaf litter cover**	0.0 (% cover)
Subterranean	**Caves**	absent
Subterranean	**Rock Crevices**	absent
Deciduous overstory inclusions	**none**	ignored
Coniferous overstory inclusions	**none**	ignored
Seeps	**Seeps**	absent
Gravel and soil	**none**	ignored
Woods road	**Roaded**	absent
Slash piles	**Percent Plot Clusters with High Slash**	0 (% plots)
Slash piles	**Percent Plot Clusters with Low Slash**	0 (% plots)
Mast and fruit	**Percent Plot Clusters with Soft Mast**	7 (%)
Mast and fruit	**Percent Plot Clusters with Hard Mast**	100 (%)

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Wildlife Species Potential

Stand 4, Inventory, 2022

NEWILD: New England Wildlife

Species List:

- Red-spotted Newt (*Notophthalmus viridescens*)

- Four-toed Salamander (*Hemidactylium scutatum*)
- Gray Treefrog (*Hyla versicolor*)
- Bullfrog (*Lithobates catesbeianus*)
- Pickerel Frog (*Lithobates palustris*)
- Wood Turtle (*Glyptemys insculpta*)
- Eastern Hognose Snake (*Heterodon platirhinos*)
- Eastern Worm Snake (*Carphophis amoenus*)
- Black Rat Snake (*Pantherophis alleghaniensis*)
- Eastern Milk Snake (*Lampropeltis triangulum*)
- Northern Copperhead (*Agkistrodon contortrix mokasen*)
- Timber Rattlesnake (*Crotalus horridus*)
- Common Goldeneye (*Bucephala clangula*)
- Cooper's Hawk (*Accipiter cooperii*)
- Northern Goshawk (*Accipiter gentilis*)
- Peregrine Falcon (*Falco peregrinus*)
- Ruffed Grouse (*Bonasa umbellus*)
- Eastern Screech-Owl (*Megascops asio*)
- Great Horned Owl (*Bubo virginianus*)
- Barred Owl (*Strix varia*)
- Long-eared Owl (*Asio otus*)
- Common Nighthawk (*Chordeiles minor*)
- Whip-poor-will (*Antrostomus vociferus*)
- Red-bellied Woodpecker (*Melanerpes carolinus*)
- Yellow-bellied Sapsucker (*Sphyrapicus varius*)
- Hairy Woodpecker (*Picoides villosus*)
- Great Crested Flycatcher (*Myiarchus crinitus*)
- Blue Jay (*Cyanocitta cristata*)
- American Crow (*Corvus brachyrhynchos*)
- Black-capped Chickadee (*Poecile atricapillus*)
- Tufted Titmouse (*Baeolophus bicolor*)
- White-breasted Nuthatch (*Sitta carolinensis*)
- Brown Creeper (*Certhia americana*)
- Carolina Wren (*Thryothorus ludovicianus*)
- Blue-gray Gnatcatcher (*Polioptila caerulea*)
- Yellow-throated Vireo (*Vireo flavifrons*)
- White-throated Sparrow (*Zonotrichia albicollis*)
- Dark-eyed Junco (*Junco hyemalis*)
- Purple Finch (*Haemorhous purpureus*)
- Little Brown Myotis (*Myotis lucifugus*)
- Keen's Myotis (*Myotis keenii*)
- Indiana Myotis (*Myotis sodalis*)
- Silver-haired Bat (*Lasionycteris noctivagans*)
- Eastern Pipistrelle (*Perimyotis subflavus*)
- Big Brown Bat (*Eptesicus fuscus*)
- Eastern Chipmunk (*Tamias striatus*)
- Southern Flying Squirrel (*Glaucomys volans*)
- Beaver (*Castor canadensis*)
- Porcupine (*Erethizon dorsatum*)
- Coyote (*Canis latrans*)
- Raccoon (*Procyon lotor*)
- Fisher (*Martes pennanti*)
- Mink (*Neovison vison*)
- Striped Skunk (*Mephitis mephitis*)
- River Otter (*Lutra canadensis*)

Habitats and features used in species rules:

Habitats and features

NEWILD feature	NED variable	value
Habitat Type		

	NEWILD Habitat type **NED Cover type** **NED Forest type**	Northern red oak Broadleaf forest oak
Size Class	**Size class**	small sawtimber
High perch	**High Perches Present**	absent
Low perch	**Low Perches Present**	absent
Canopy < 15%	**Canopy Closure**	53 (%)
Canopy 16 - 30%	**Canopy Closure**	53 (%)
Canopy 31 - 70%	**Canopy Closure**	53 (%)
Canopy > 70%	**Canopy Closure**	53 (%)
Waterside tree bole, Dead, at least 6" dbh	**none**	ignored
Waterside tree bole, Live, at least 12" dbh	**none**	ignored
Waterside tree bole, Live, at least 16" dbh	**none**	ignored
Non-Waterside tree bole, Dead and soft, less then 6"	**none**	ignored
Non-Waterside tree bole, Dead and hard, 6-12"	**none**	ignored
Non-Waterside tree bole, Dead and hard, 12-18"	**none**	ignored
Non-Waterside tree bole, Live, columnar decay, 8-12"	**none**	ignored
Non-Waterside tree bole, Live, broken top, 12-18"	**none**	ignored
Non-Waterside tree bole, Live, broken top or large limb >18"	**none**	ignored
Non-Waterside tree bole, Live, hollow >24"	**none**	ignored
Deciduous Midstory 10-30' zone	**Deciduous Midstory**	0 (%)
Coniferous Midstory 10-30' zone	**Coniferous Midstory**	0 (%)
Mixed Midstory 10-30' zone	**Mixed Midstory**	0 (%)
Deciduous seedlings, saplings, shrubs in 2-10' zone	**Shrub layer deciduous species**	45.5 (%)
Coniferous seedlings, saplings, shrubs in 2-10' zone	**Shrub layer coniferous species**	0.0 (%)
Mixed deciduous, coniferous vegetation in 2-10' zone	**Shrub layer deciduous species**	45.5 (%)
Mixed deciduous, coniferous vegetation in 2-10' zone	**Shrub layer coniferous species**	0.0 (%)
Ericaceous in 2-10' zone	**Shrub layer ericaceous species**	0.0 (%)
Wetland shrubs in 2-10' zone	**none**	ignored
Ground vegetation <30% coverage in 0-2' zone	**Ground layer cover**	36.4 (% cover)
Ground vegetation 30-75% coverage in 0-2' zone	**Ground layer cover**	36.4 (% cover)
Ground vegetation >75% coverage in 0-2' zone	**Ground layer cover**	36.4 (% cover)
Wetland vegetation and temporary pools	**Temporary Ponds**	absent
Waterside decaying logs	**none**	ignored
Rocky floor	**Percent Cover Rock**	0.0 (% cover)
Dead and down material	**Coarse Woody Debris**	1962.5 (cu.ft./ac.)
Forest litter and moss	**Leaf litter cover**	0.0 (% cover)
Subterranean	**Caves**	absent
Subterranean	**Rock Crevices**	absent
Deciduous overstory inclusions	**none**	ignored
Coniferous overstory inclusions	**none**	ignored

Seeps	**Seeps**	absent
Gravel and soil	**none**	ignored
Woods road	**Roaded**	absent
Slash piles	**Percent Plot Clusters with High Slash**	0 (% plots)
Slash piles	**Percent Plot Clusters with Low Slash**	0 (% plots)
Mast and fruit	**Percent Plot Clusters with Soft Mast**	64 (%)
Mast and fruit	**Percent Plot Clusters with Hard Mast**	100 (%)

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Wildlife Species Potential

Stand 5, Inventory, 2022

NEWILD: New England Wildlife

Species List:

- Red-spotted Newt (*Notophthalmus viridescens*)
- Four-toed Salamander (*Hemidactylium scutatum*)
- Gray Treefrog (*Hyla versicolor*)
- Bullfrog (*Lithobates catesbeianus*)
- Pickerel Frog (*Lithobates palustris*)
- Wood Turtle (*Glyptemys insculpta*)
- Eastern Hognose Snake (*Heterodon platirhinos*)
- Eastern Worm Snake (*Carphophis amoenus*)
- Black Rat Snake (*Pantherophis alleghaniensis*)
- Eastern Milk Snake (*Lampropeltis triangulum*)
- Northern Copperhead (*Agkistrodon contortrix mokasen*)
- Timber Rattlesnake (*Crotalus horridus*)
- Common Goldeneye (*Bucephala clangula*)
- Cooper's Hawk (*Accipiter cooperii*)
- Northern Goshawk (*Accipiter gentilis*)
- Peregrine Falcon (*Falco peregrinus*)
- Ruffed Grouse (*Bonasa umbellus*)
- Eastern Screech-Owl (*Megascops asio*)
- Great Horned Owl (*Bubo virginianus*)
- Barred Owl (*Strix varia*)
- Long-eared Owl (*Asio otus*)
- Common Nighthawk (*Chordeiles minor*)
- Whip-poor-will (*Antrostomus vociferus*)
- Red-bellied Woodpecker (*Melanerpes carolinus*)

- Yellow-bellied Sapsucker (*Sphyrapicus varius*)
- Hairy Woodpecker (*Picoides villosus*)
- Great Crested Flycatcher (*Myiarchus crinitus*)
- Blue Jay (*Cyanocitta cristata*)
- American Crow (*Corvus brachyrhynchos*)
- Black-capped Chickadee (*Poecile atricapillus*)
- Tufted Titmouse (*Baeolophus bicolor*)
- White-breasted Nuthatch (*Sitta carolinensis*)
- Brown Creeper (*Certhia americana*)
- Carolina Wren (*Thryothorus ludovicianus*)
- Blue-gray Gnatcatcher (*Polioptila caerulea*)
- Yellow-throated Vireo (*Vireo flavifrons*)
- White-throated Sparrow (*Zonotrichia albicollis*)
- Dark-eyed Junco (*Junco hyemalis*)
- Purple Finch (*Haemorhous purpureus*)
- Little Brown Myotis (*Myotis lucifugus*)
- Keen's Myotis (*Myotis keenii*)
- Indiana Myotis (*Myotis sodalis*)
- Silver-haired Bat (*Lasionycteris noctivagans*)
- Eastern Pipistrelle (*Perimyotis subflavus*)
- Big Brown Bat (*Eptesicus fuscus*)
- Eastern Chipmunk (*Tamias striatus*)
- Southern Flying Squirrel (*Glaucomys volans*)
- Beaver (*Castor canadensis*)
- Porcupine (*Erethizon dorsatum*)
- Coyote (*Canis latrans*)
- Raccoon (*Procyon lotor*)
- Fisher (*Martes pennanti*)
- Mink (*Neovison vison*)
- Striped Skunk (*Mephitis mephitis*)
- River Otter (*Lutra canadensis*)

Habitats and features used in species rules:

Habitats and features

NEWILD feature	NED variable	value
Habitat Type	**NEWILD Habitat type** **NED Cover type** **NED Forest type**	Northern red oak Broadleaf forest oak northern hardwoods
Size Class	**Size class**	small sawtimber
High perch	**High Perches Present**	absent
Low perch	**Low Perches Present**	absent
Canopy < 15%	**Canopy Closure**	69 (%)
Canopy 16 - 30%	**Canopy Closure**	69 (%)
Canopy 31 - 70%	**Canopy Closure**	69 (%)
Canopy > 70%	**Canopy Closure**	69 (%)
Waterside tree bole, Dead, at least 6" dbh	**none**	ignored
Waterside tree bole, Live, at least 12" dbh	**none**	ignored
Waterside tree bole, Live, at least 16" dbh	**none**	ignored
Non-Waterside tree bole, Dead and soft, less then 6"	**none**	ignored
Non-Waterside tree bole, Dead and hard, 6-12"	**none**	ignored
Non-Waterside tree bole, Dead and hard, 12-18"	**none**	ignored
Non-Waterside tree bole, Live, columnar decay, 8-12"	**none**	ignored

Non-Waterside tree bole, Live, broken top, 12-18"	**none**	ignored
Non-Waterside tree bole, Live, broken top or large limb >18"	**none**	ignored
Non-Waterside tree bole, Live, hollow >24"	**none**	ignored
Deciduous Midstory 10-30' zone	**Deciduous Midstory**	0 (%)
Coniferous Midstory 10-30' zone	**Coniferous Midstory**	0 (%)
Mixed Midstory 10-30' zone	**Mixed Midstory**	0 (%)
Deciduous seedlings, saplings, shrubs in 2-10' zone	**Shrub layer deciduous species**	60.0 (%)
Coniferous seedlings, saplings, shrubs in 2-10' zone	**Shrub layer coniferous species**	0.0 (%)
Mixed deciduous, coniferous vegetation in 2-10' zone	**Shrub layer deciduous species**	60.0 (%)
Mixed deciduous, coniferous vegetation in 2-10' zone	**Shrub layer coniferous species**	0.0 (%)
Ericaceous in 2-10' zone	**Shrub layer ericaceous species**	0.0 (%)
Wetland shrubs in 2-10' zone	**none**	ignored
Ground vegetation <30% coverage in 0-2' zone	**Ground layer cover**	36.0 (% cover)
Ground vegetation 30-75% coverage in 0-2' zone	**Ground layer cover**	36.0 (% cover)
Ground vegetation >75% coverage in 0-2' zone	**Ground layer cover**	36.0 (% cover)
Wetland vegetation and temporary pools	**Temporary Ponds**	absent
Waterside decaying logs	**none**	ignored
Rocky floor	**Percent Cover Rock**	0.0 (% cover)
Dead and down material	**Coarse Woody Debris**	2290.8 (cu.ft./ac.)
Forest litter and moss	**Leaf litter cover**	0.0 (% cover)
Subterranean	**Caves**	absent
Subterranean	**Rock Crevices**	absent
Deciduous overstory inclusions	**none**	ignored
Coniferous overstory inclusions	**none**	ignored
Seeps	**Seeps**	absent
Gravel and soil	**none**	ignored
Woods road	**Roaded**	absent
Slash piles	**Percent Plot Clusters with High Slash**	0 (% plots)
Slash piles	**Percent Plot Clusters with Low Slash**	0 (% plots)
Mast and fruit	**Percent Plot Clusters with Soft Mast**	77 (%)
Mast and fruit	**Percent Plot Clusters with Hard Mast**	100 (%)

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Connecticut Department of

ENERGY &
ENVIRONMENTAL
PROTECTION

July 12, 2022

Mr. Nathaniel Gosselin
Connwood Foresters, Inc.
P.O. Box 150
Rockfall, CT 06481
Nate@connwood.com

Project: Forest Stewardship Plan, Town of Plainfield, Park and Conservation Area, 0 Kate Downing Rd, Plainfield, Connecticut
NDDB Preliminary Assessment No.: 202207338
Expiration Date: July 12, 2023

Dear Nathaniel Gosselin,

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map provided for the forest stewardship plan for the Town of Plainfield as a park and conservation area, 0 Kate Downing Rd, Plainfield, Connecticut. According to our information, there are current extant records for State Endangered *Scaphiopus holbrookii* (Eastern spadefoot), and State Special Concern *Terrapene c. carolina* (Eastern box turtle) *Glyptemys inscuplta* (Wood turtle), *Clemmys guttata* (spotted turtle) and *Enneacanthus obesus* (Banded sunfish) in the vicinity of this project.

This letter is a preliminary assessment and not a final determination. This letter cannot be submitted with any CT DEEP permit or registration.

Eastern Spadefoot: Limited information is known about the state endangered eastern spadefoot toad. It is a very secretive species and has irregular breeding periods. It is most active from June through August. It is an expert burrower, reaching depths of 6-feet in sandy well-drained soil. They are very rarely observed outside of the breeding period. Its habitat is described as arid to semi-arid areas, such as fields, farmland, dunes and woodlands with sandy or loose soils. This toad breeds in temporary bodies of water, flooded fields and forested wetlands. The conservation strategies for this toad is to protect and conserve their habitat.

I have determined that this project may have a direct negative impact on the populations of the state endangered eastern spadefoot. This project may also have adverse impacts on the state special concern turtles.

You will need to work with the CTDEEP-NDDB Program to determine if there are protection and mitigation measures to avoid direct adverse impacts to the state endangered eastern spadefoot (S*caphiopus holbrookii*). Mitigation and protection strategies to avoid having project activities directly impact the endangered eastern spadefoot are required before a final determination of no adverse impacts is provided by the NDDB program to use with CT State Permits or Registrations. Species surveys to assess the impacts of this project on the state endangered eastern spadefoot and state special concern wood turtle, eastern box turtle and spotted turtle will be required.

To prevent impacts to State-listed species, field surveys of the site should be performed by a qualified herpetologist **with experience with these specific Connecticut reptiles and amphibians** and 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. Include special plant and/or animal forms found at: https://www.ct.gov/deep/cwp/view.asp?a=2702&q=323460&deepNav_GID=1628
5. Detailed maps of the area surveyed including the survey route and locations of State listed species.
6. Conservation strategies or protection plans that indicate how impacts may be avoided for all state listed species present on the site.
7. Statement/résumé indicating the biologist's qualifications. Please be sure when you hire a consulting qualified biologist to help conduct this site survey that they have the proper experience with target taxon and have a CT scientific collectors permit to work with state listed species for this specific project.

The site surveys report should be sent to our CT DEEP-NDDB Program (deep.nddbrequest@ct.gov) for further review by our program biologists **along with an updated request** for another NDDB review. Incomplete reports may not be accepted.

If you do not intend to do site surveys to determine the presence or absence of state-listed species, then you should presume species are present and let us know how you will protect the state-listed species from being impacted by this project. The protection plans **must be developed by taxonomic experts with direct experience with the specific taxon (eastern spadefoot) in Connecticut**. You may submit these best management practices or protection plans with your new request for an NDDB review. **Please be sure these protection plans are developed by a taxonomic expert (herpetologist) familiar with and with experience with these specific Connecticut amphibian and reptiles.** After reviewing your new NDDB request form and the documents describing how you will protect these species from project impacts we will make a final determination and provide you with a letter from our program to use with DEEP-Permits.

Please be advised that a DEEP Fisheries Biologist will review the permit applications you may submit to DEEP regulatory programs to determine if your project could adversely affect list fish species. DEEP Fisheries Biologists are routinely involved in pre-application consultations with regulatory staff and applicants in order to identify potential fisheries issues and work with applicants to mitigate negative effects, including to endangered species. If you have not already talked with a Fisheries Biologist about your project, you may contact the Permit Analyst assigned to process your application for further information, including the contact information for the Fisheries Biologist assigned to review your application.

This letter is a preliminary assessment and not a final determination. This letter cannot be submitted with any CT DEEP permit or registration. A final determination cannot be provided without discussing protection or other conservation strategies that will prevent negative impacts to the endangered eastern spadefoot. This preliminary assessment is valid for one year from the date on this letter.

Natural Diversity Data Base information includes all information regarding critical biological resources 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, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substitutes for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available. The result of this review does not preclude the possibility that listed species may be encountered on site and that additional action may be necessary to remain in compliance with certain state permits.

Please contact me at your earliest convenience (860) 424-3592, or dawn.mckay@ct.gov . Thank you for consulting the Natural Diversity Data Base.

Sincerely,

Dawn M. McKay

Dawn M. McKay
Environmental Analyst 3

APPENDIX F: CARBON, CLIMATE, AND RESILIENCY

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Carbon Storage

Inventory, 2022

Total Live Carbon (tons)

Stand	Area (ac.)	Foliage	Stem	Branch	Bark	Total Aboveground	Root	Total Biomass
Stand 1	36.0	22	650	254	134	1,060	201	1,261
Stand 2	56.5	37	1,110	415	226	1,788	339	2,127
Stand 3	19.8	8	223	98	47	376	72	448
Stand 4	25.9	13	383	151	79	626	119	745
Stand 5	35.8	26	782	288	159	1,255	237	1,492
Totals	173.9	106	3,149	1,206	645	5,106	968	6,074

Total Dead Carbon (tons)

Stand	Area (ac.)	Foliage	Stem	Branch	Bark	Total Aboveground	Root	Total Biomass
Stand 1	36.0	2	76	26	15	119	22	142
Stand 2	56.5	11	367	118	73	569	107	676
Stand 3	19.8	0	6	2	1	10	2	12
Stand 4	25.9	6	171	62	35	273	52	325
Stand 5	35.8	9	289	96	58	451	85	536
Totals	173.9	28	910	303	182	1,422	268	1,690

Total Live and Dead Carbon (tons)

Stand	Area (ac.)	Foliage	Stem	Branch	Bark	Total Aboveground	Root	Total Biomass
Stand 1	36.0	24	727	280	149	1,180	223	1,403
Stand 2	56.5	48	1,476	533	299	2,357	446	2,803
Stand 3	19.8	8	230	100	48	386	74	460
Stand 4	25.9	19	555	212	114	900	171	1,070
Stand 5	35.8	34	1,071	384	217	1,706	322	2,029
Totals	173.9	134	4,059	1,509	827	6,529	1,235	7,764

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Climate change report

Inventory, 2022

Climate Informed Metrics

Climate Informed Metric Summary

Stand	Area (ac.)	Relative Density	Richness	Overstory Evenness	Understory Evenness	Woody Debris	Seedlings	Saplings
Stand 1	36.0	61	11	0.577	0.884	671.7	60.0	5.7
Stand 2	56.5	67	17	0.727	0.834	2257.8	90.0	67.5
Stand 3	19.8	54	11	0.718	0.000		0.0	30.6
Stand 4	25.9	55	7	0.772	0.681	1962.5	59.1	163.7
Stand 5	35.8	70	10	0.709	0.815	2290.8	73.3	114.8

- **Relative Density**= Relative density (stocking) provides information about the area within a stand that is occupied by trees. Ideal stocking levels will varying based on forest type, species composition, and management objectives. Information about stocking levels may help to identify whether stands are having a reduced or increased growth response under a changing climate. Further, there is some evidence that maintaining stands at somewhat lower densities may increase their resistance and resilience to droughty conditions (http://www.nrs.fs.fed.us/pubs/46366), which are expected to increase in some areas.
- **Tree Species Diversity (Richness and Evenness)**= Climate change is expected to have substantial effects on forest ecosystems, with many forest types having species that are expected to decline. In general, species-rich communities have exhibited greater resilience to extreme environmental conditions and greater potential to recover from disturbance than less diverse ecosystems. Less diverse ecosystems are generally considered to be more vulnerable to climate change and associated stressors. Species richness is the number of species that are present and provides a very simple measure of diversity. Species evenness integrates information about the relative abundance of individual species to assess whether a stand is dominated by one or a few species or if stand composition is relatively even across many species. Together, these metrics can help managers evaluate whether their "eggs are all in one basket".
- **Large Coarse Woody Debris**= Course woody debris, especially large wood that takes longer to decompose important to nutrient cycling and helps maintain biodiversity by providing habitat for a wide range of species, including birds, mammals, reptiles, amphibians, insects, and invertebrates. Where conditions become warmer and drier, coarse woody debris may also help to retain moisture in soils and near the soil surface. This can help to create microclimates beneficial to plants, particularly during germination, and animals. At the same time, course woody debris can serve as fuel in fire-dependent forests or in forests that experience droughty conditions, potentially increasing fire risk.
- **Seedlings and Saplings**= Changes in climate may affect plant germination in various ways. Warmer temperatures and altered precipitation and moisture may affect the maturation and dispersal of seeds, seed persistence in soils, germination rates, or germinant success. For these reasons, the seedlings may provide

an early warning system for greater changes that may occur in the future. The abundance and composition of seedlings (< 1 inch DBH) and saplings (1-4 inches DBH) can provide valuable information about the future forest.

Climate Risk Metrics

Many forests are already responding to changing conditions, and climate change is anticipated to have a pervasive influence on forests over the coming decades. Many changes are expected to influence the habitat of tree species- warmer temperatures, altered precipitation, and increased stressors may decrease the ability for certain species to persist in some areas, while increasing the potential habitat available for others.

This report provides information for natural resource managers to assess some of the potential risks of climate change on the areas that they manage by showing anticipated changes in tree species' habitats at a regional scale. Importantly, local site conditions and past and current management ultimately determine how a forest will respond to climate change- thus, it is up to the manager to consider how regional climate impacts pertain to a particular location and set of management objectives. For more information on incorporating climate change into management, view the *Forest Adaptation Resources* www.forestadaptation.org/far.

The following tables help to identify the proportion of a stand that may be at risk of decline as a result of climate change. These data are based on modeled changes in habitat suitability using the Climate Change Tree Atlas (www.nrs.fs.fed.us/atlas/tree). Data are presented under two climate change scenarios- a low climate change scenario (PCM B1) and a high climate change scenario (GFDL A1FI)- in order to demonstration a potential *range* of change that may be expected by the end of the century (2070-2100). Details on this approach are available at www.nrs.fs.fed.us/pubs/54364.

Species identified as being at risk are projected to have 20% or greater decrease in suitable habitat in the region that was selected for analysis. Species that are projected to have a large decrease in suitable habitat (suitable habitat is expected to decrease 50% or more) may be at an even greater risk. **This does not mean that the species are projected to die or disappear- rather, this indicates that habitat suitability is expected to be lower, making conditions less suitable for the particular species across the region.**

At a stand level, a species is likely to be at greatest risk when a species is projected to decrease under both climate change scenarios *and* when local conditions and expertise suggest that the species is vulnerable to anticipated changes in the region. Published regional assessments provide valuable information about regional climate change impacts on forests, including additional information on how individual species may respond. These can be accessed online at www.forestadaptation.org/vulnerability-assessment. The data used for this risk assessment are from the **New England: Southern New England** assessment area.

Overstory (> 4.5 inch DBH)

Overstory (> 4.5 inch DBH)

Stand	Area (ac.)	Basal Area	Stems Per Area	At Risk Percent Under Low Emissions	At Risk Percent Under High Emissions
Stand 1	36.0	91.0	152.1	0.0	65.8
Stand 2	56.5	106.4	145.9	1.1	52.5
Stand 3	19.8	69.3	164.1	8.0	49.6
Stand 4	25.9	86.8	129.8	1.3	26.4
Stand 5	35.8	123.0	160.0	0.0	53.5

Established Regeneration(1-4.5 inch DBH)

Established Regeneration(1-4.5 inch DBH)

Stand	Area (ac.)	Basal Area	Stems Per Area	At Risk Percent Under Low Emissions	At Risk Percent Under High Emissions
Stand 1	36.0	0.5	5.7	0.0	100.0
Stand 2	56.5	2.8	67.5	0.0	54.2
Stand 3	19.8	2.7	30.6	0.0	58.3
Stand 4	25.9	3.9	163.7	3.2	30.6
Stand 5	35.8	1.6	114.8	0.0	38.1

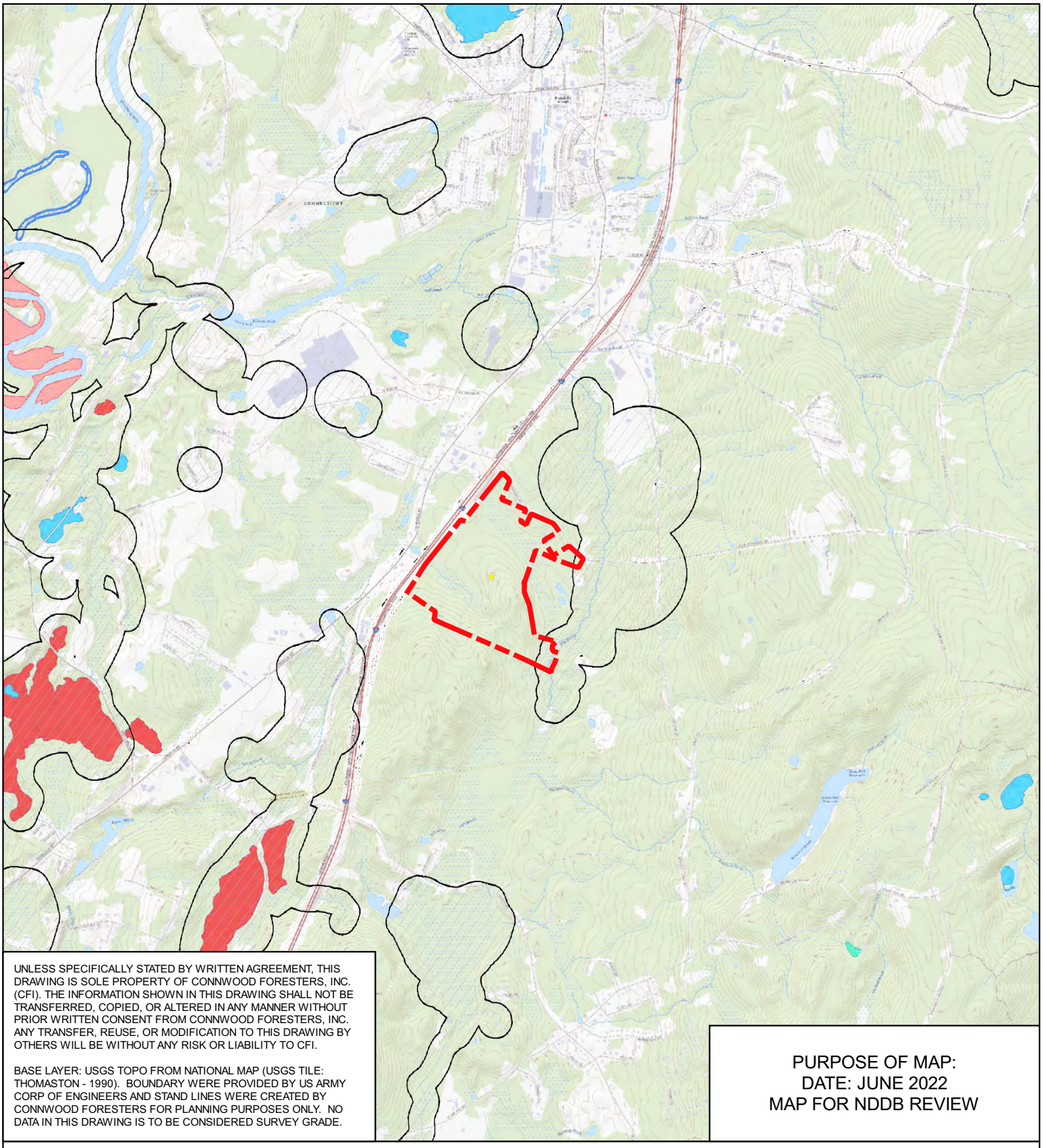
Seedlings (<1 inch DBH)

Seedlings (<1 inch DBH)

Stand	Area (ac.)	Basal Area	Stems Per Area	At Risk Percent Under Low Emissions	At Risk Percent Under High Emissions
Stand 1	36.0	0.0	60.0	0.0	8.3
Stand 2	56.5	0.0	90.0	0.0	25.3
Stand 3	19.8	0.0	0.0	-1.$	-1.$
Stand 4	25.9	0.0	59.1	0.0	72.1
Stand 5	35.8	0.0	73.3	0.0	18.2

- **Basal Area**= The basal area (square feet) of the stand.
- **Stems Per Acre**= The mean stems per acre, based on stems counted in each stand.
- **At Risk Percent Under Low Emissions**= The percentage of the stand at risk based upon the Importance Values for species considered to be potentially at risk from climate change (change class is Decrease or Large Decrease) under a less harsh climate scenario (PCM B1)
- **At Risk Percent Under High Emissions**= The percentage of the stand at risk based upon the Importance Values for species considered to be potentially at risk from climate change (change class is Decrease or Large Decrease) under a harsh climate scenario (GFDL A1FI)

APPENDIX G: MAPS



BASE LAYER: USGS TOPO FROM NATIONAL MAP (USGS TILE: THOMASTON - 1990). BOUNDARY WERE PROVIDED BY US ARMY CORP OF ENGINEERS AND STAND LINES WERE CREATED BY CONNWOOD FORESTERS FOR PLANNING PURPOSES ONLY. NO DATA IN THIS DRAWING IS TO BE CONSIDERED SURVEY GRADE.

PURPOSE OF MAP:
DATE: JUNE 2022
MAP FOR NDDB REVIEW

LOCUS MAP

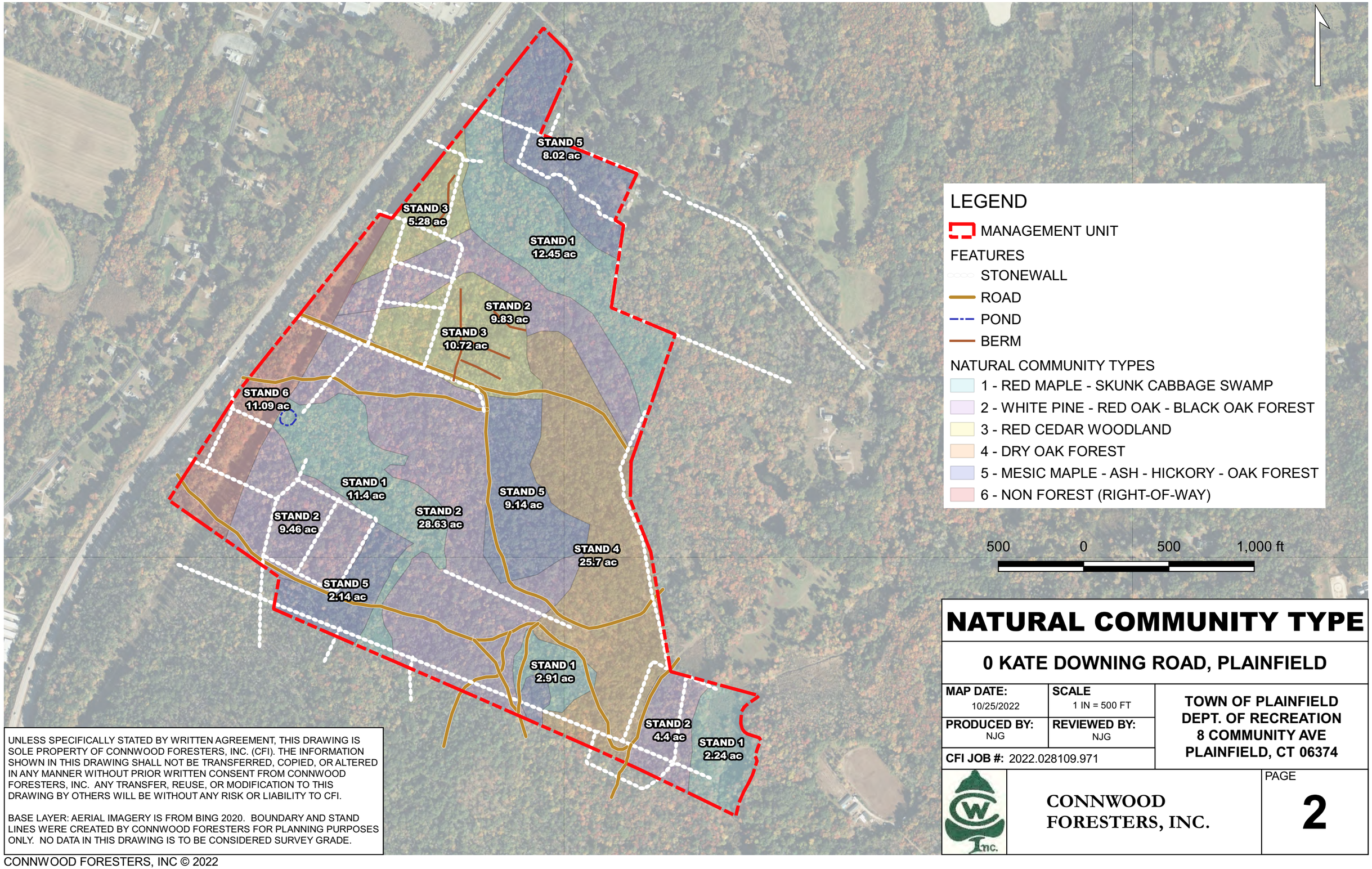
CONNWOOD FORESTERS, INC
39 CHERRY HILL ROAD, PO BOX 150
ROCKFALL, CT 06481
PH: 860-349-9910
WWW.CONNWOOD.COM

PREPARED FOR:

TOWN OF PLAINFIELD

8 COMMUNITY AVE.
PLAINFIELD, CT 06374

DES. BY: NJG
SCALE: 1" = 3000'
DATE: 6/24/22



NATURAL COMMUNITY TYPE

0 KATE DOWNING ROAD, PLAINFIELD

MAP DATE: 10/25/2022	**SCALE** 1 IN = 500 FT	**TOWN OF PLAINFIELD** **DEPT. OF RECREATION** **8 COMMUNITY AVE** **PLAINFIELD, CT 06374**
PRODUCED BY: NJG	**REVIEWED BY:** NJG	
CFI JOB #: 2022.028109.971		

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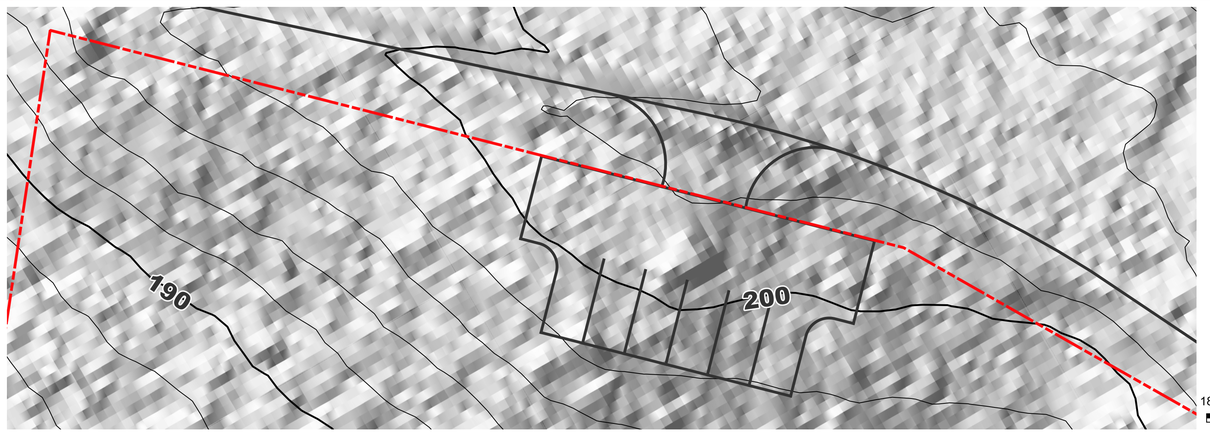
PAGE **2**

BASE LAYER: AERIAL IMAGERY IS FROM BING 2020. BOUNDARY AND STAND LINES WERE CREATED BY CONNWOOD FORESTERS FOR PLANNING PURPOSES ONLY. NO DATA IN THIS DRAWING IS TO BE CONSIDERED SURVEY GRADE.



LEGEND

- MANAGEMENT UNIT
- CLEARED AREA FOR DISC GOLF
  - NON-HARVEST AREA
  - OPEN AREA
- HYDRIC SOILS
- DISC GOLF FEATURES
  - GOAL
  - TEE BOX
- MAJOR CONTOUR (10FT)
- MINOR CONTOUR (2FT)

60 0 60 120 ft

18 0 18 36 ft

BASE LAYER: BING ORTHOPHOTOGRAPHY 2022, HILLSHADE FROM CT ECO. BOUNDARY WERE PROVIDED BY US ARMY CORP OF ENGINEERS AND STAND LINES WERE CREATED BY CONNWOOD FORESTERS FOR PLANNING PURPOSES ONLY. NO DATA IN THIS DRAWING IS TO BE CONSIDERED SURVEY GRADE.

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39 CHERRY HILL ROAD, PO BOX 150
ROCKFALL, CT 06481
PH: 860-349-9910
WWW.CONNWOOD.COM

PURPOSE OF MAP:
DATE: JULY 2022
MAP FOR
MANAGEMENT PLAN

FOREST MANAGEMENT PLAN

PLAINFIELD, CT

PREPARED FOR:
TOWN OF PLAINFIELD
8 COMMUNITY AVE
PLAINFIELD, CT 06374

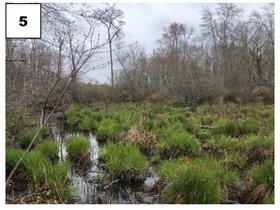
RECREATION MAP

DES. BY	NJG
DWN. BY	NJG
CHKD. BY	NJG
SCALE	VARIES
DATE	10/25/22
CSI PRJ NUM:	2022.028109.971

PAGE

3A

SHEET 03 OF 06



LEGEND

MANAGEMENT UNIT

HYDRIC SOILS

POINT FEATURES

INTERESTING FEATURE/WILDLIFE VIEWING

POTENTIAL ACCESS

LINE FEATURES

STONEWALL

EXISTING TRAILS

POND

BERM

PROPOSED TRAILS

BASE LAYER: BING ORTHOPHOTOGRAPHY. BOUNDARY WERE PROVIDED BY US ARMY CORP OF ENGINEERS AND STAND LINES WERE CREATED BY CONNWOOD FORESTERS FOR PLANNING PURPOSES ONLY. NO DATA IN THIS DRAWING IS TO BE CONSIDERED SURVEY GRADE.

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PH: 860-349-9910
WWW.CONNWOOD.COM

PURPOSE OF MAP:
DATE: JULY 2022
MAP FOR
MANAGEMENT PLAN

FOREST MANAGEMENT PLAN

PLAINFIELD, CT

PREPARED FOR:
TOWN OF PLAINFIELD
8 COMMUNITY AVE
PLAINFIELD, CT 06374

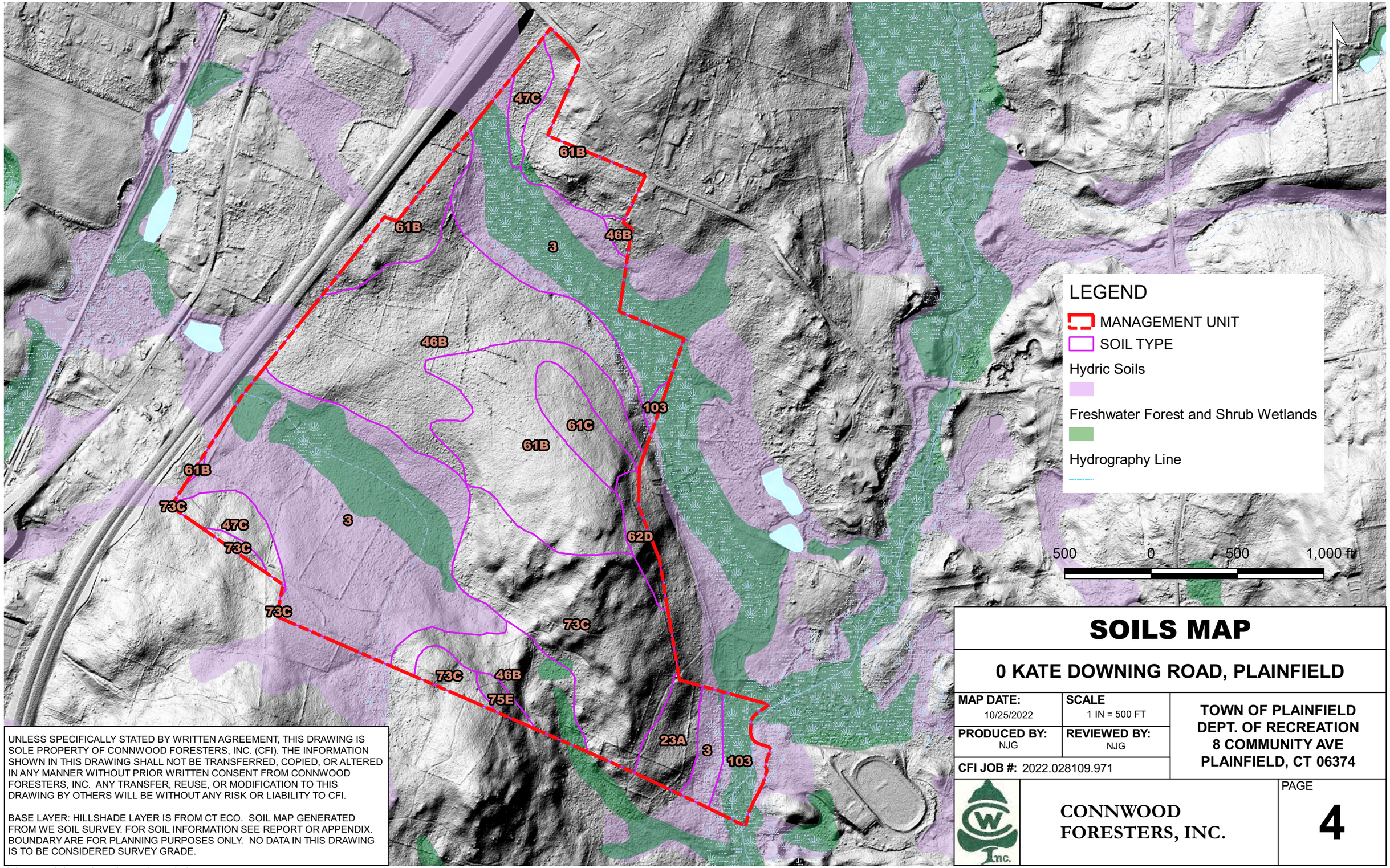
RECREATION MAP

DES. BY	NJG
DWN. BY	NJG
CHKD. BY	NJG
SCALE	VARIES
DATE	10/25/22
CSI PRJ NUM:	2022.028109.971

PAGE

3B

SHEET 03 OF 06



SOILS MAP

0 KATE DOWNING ROAD, PLAINFIELD

MAP DATE:	SCALE	
10/25/2022	1 IN = 500 FT	TOWN OF PLAINFIELD DEPT. OF RECREATION 8 COMMUNITY AVE PLAINFIELD, CT 06374
PRODUCED BY: NJG	**REVIEWED BY:** NJG	
CFI JOB #: 2022.028109.971		

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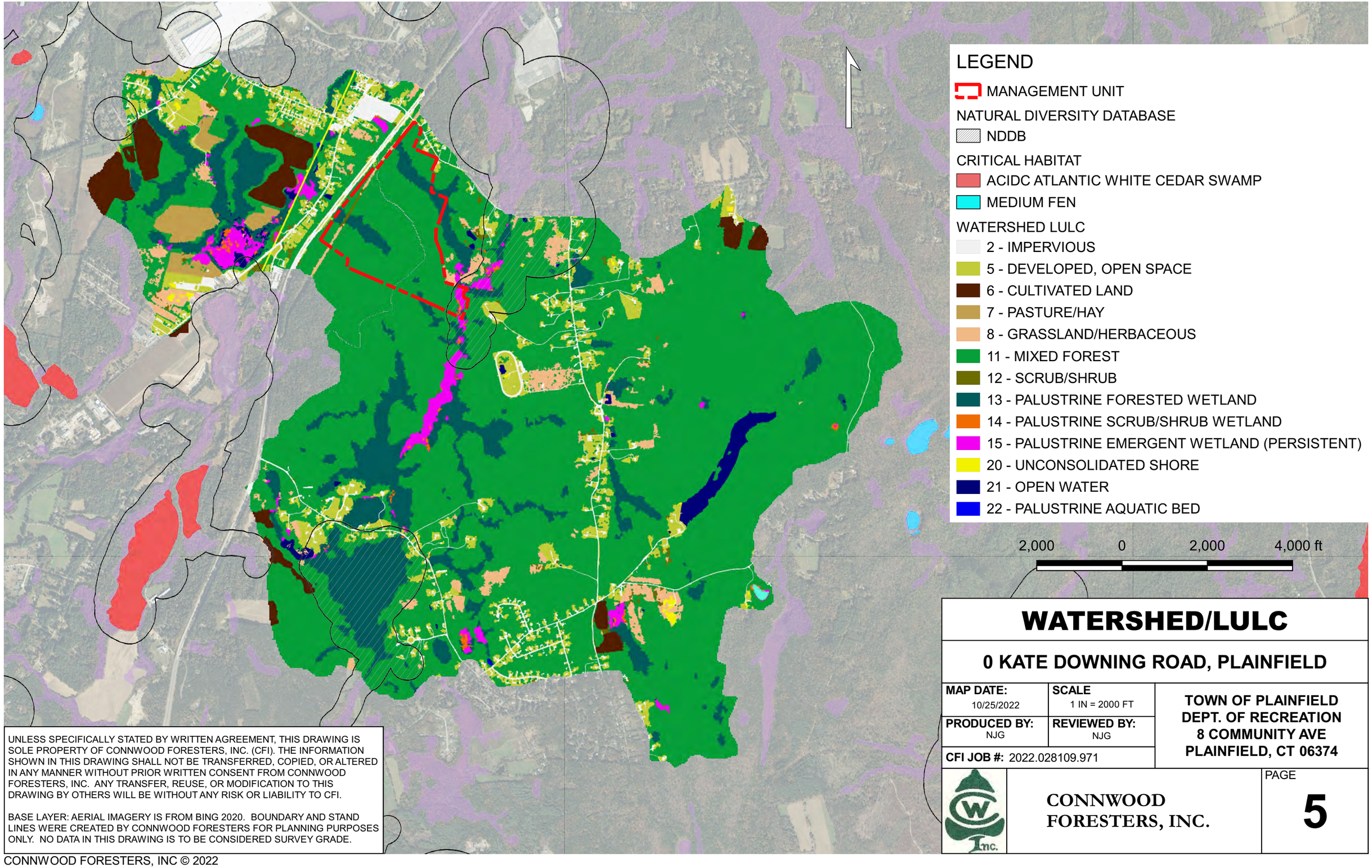
PAGE 4

BASE LAYER: HILLSHADE LAYER IS FROM CT ECO. SOIL MAP GENERATED FROM WE SOIL SURVEY. FOR SOIL INFORMATION SEE REPORT OR APPENDIX. BOUNDARY ARE FOR PLANNING PURPOSES ONLY. NO DATA IN THIS DRAWING IS TO BE CONSIDERED SURVEY GRADE.



WATERSHED/LULC

0 KATE DOWNING ROAD, PLAINFIELD

MAP DATE: 10/25/2022	**SCALE** 1 IN = 2000 FT	**TOWN OF PLAINFIELD** **DEPT. OF RECREATION** **8 COMMUNITY AVE** **PLAINFIELD, CT 06374**
PRODUCED BY: NJG	**REVIEWED BY:** NJG	
CFI JOB #: 2022.028109.971		

CONNWOOD FORESTERS, INC.

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BASE LAYER: AERIAL IMAGERY IS FROM BING 2020. BOUNDARY AND STAND LINES WERE CREATED BY CONNWOOD FORESTERS FOR PLANNING PURPOSES ONLY. NO DATA IN THIS DRAWING IS TO BE CONSIDERED SURVEY GRADE.

LEGEND

MANAGEMENT UNIT

HARVEST AREA LAYOUT

MECHANICALLY CONTROL INVASIVES

HYDRIC SOILS

0KateDowning_LineFeat copy

EXISTING ROAD

PROPOSED TRAILS

500 0 500 1,000 ft

MANAGEMENT ACTIVITY

0 KATE DOWNING ROAD, PLAINFIELD

MAP DATE: 10/25/2022	**SCALE** 1 IN = 500 FT	**TOWN OF PLAINFIELD** **DEPT. OF RECREATION** **8 COMMUNITY AVE** **PLAINFIELD, CT 06374**
PRODUCED BY: NJG	**REVIEWED BY:** NJG	
CFI JOB #: 2022.028109.971		

CONNWOOD FORESTERS, INC.

PAGE **6**

BASE LAYER: AERIAL IMAGERY IS FROM BING 2020. BOUNDARY AND STAND LINES WERE CREATED BY CONNWOOD FORESTERS FOR PLANNING PURPOSES ONLY. NO DATA IN THIS DRAWING IS TO BE CONSIDERED SURVEY GRADE.