The Preserve State Forest (TPSF)
Management Plan 2024-2034

CT DEEP, The Town of Old Saybrook, and the Nature Conservancy

Forest Health and Diversity

TPSF contains diverse ecosystems ranging from upland oak/hickory hardwood forest and mixed softwood and hardwood stands to forested wetlands, eastern redcedar/sedge knolls, and a large centrally located fen. This plan increases structural and age class forest diversity through stand specific silvicultural operations.

Climate Change Mitigation

The management of TPSF will promote carbon sequestration and storage. Designated old forestland management sites will serve as long term storage, and sustainable forest management in other areas can maintain or increase carbon storage through durable wood products. Sustainable forest management practices will also increase sequestration rates, enabling our forests to lock up additional carbon.

Economic Benefits

This plan outlines timber harvesting on 198 acres. These sustainably harvested forest products provide jobs and raw material for a locally sourced, forest-based, green economy.

"Growing What We Need, Where We Live".

Forest Protection

This plan addresses threats such as exotic invasive plants, insects, and pathogens, as well as unauthorized off-road vehicular use. It makes recommendations to mitigate these damaging agents, including 227.2 acres of invasive plant control. The plan recognizes that forests are dynamic and that weather events, insect or disease outbreaks, or other unforeseen conditions may require changes in the recommendations.

Wildlife Habitat

TPSF provides high quality forested habitat for many species of wildlife. This habitat is incredibly important considering the urban/suburban nature of the surrounding landscape. Undulating topography, wetlands, and multiple forest types all contribute to the habitat diversity essential for flourishing wildlife populations. Further forest diversification will increase opportunities for different wildlife species.

Recreational/Health Benefits

TPSF supports approximately 6 miles of an authorized interim trail system across its acreage. A sustainable trail plan will be developed to promote and expand multi-use recreation at a low to moderate density compatible with forestland management objectives.

Environmental Protection

This plan address threats to the forest such as wildfire, extreme weather events, invasive plants, pathogens, illegal recreational use, and deer browse. Management strategies and/or recommendations are outlined for each of these threats to protect our ecologically valuable public forestland.

FOREST MANAGEMENT PLAN
2024-2034
The Preserve State Forest
924 Acres
Old Saybrook & Westbrook, CT

The State of Connecticut
Dept. of Energy & Environmental Protection
Bureau of Natural Resources
Division of Forestry

The Town of Old Saybrook

And

The Nature Conservancy

Approvals:

Christopher Martin, Director — Date 12/8/2025
Division of Forestry

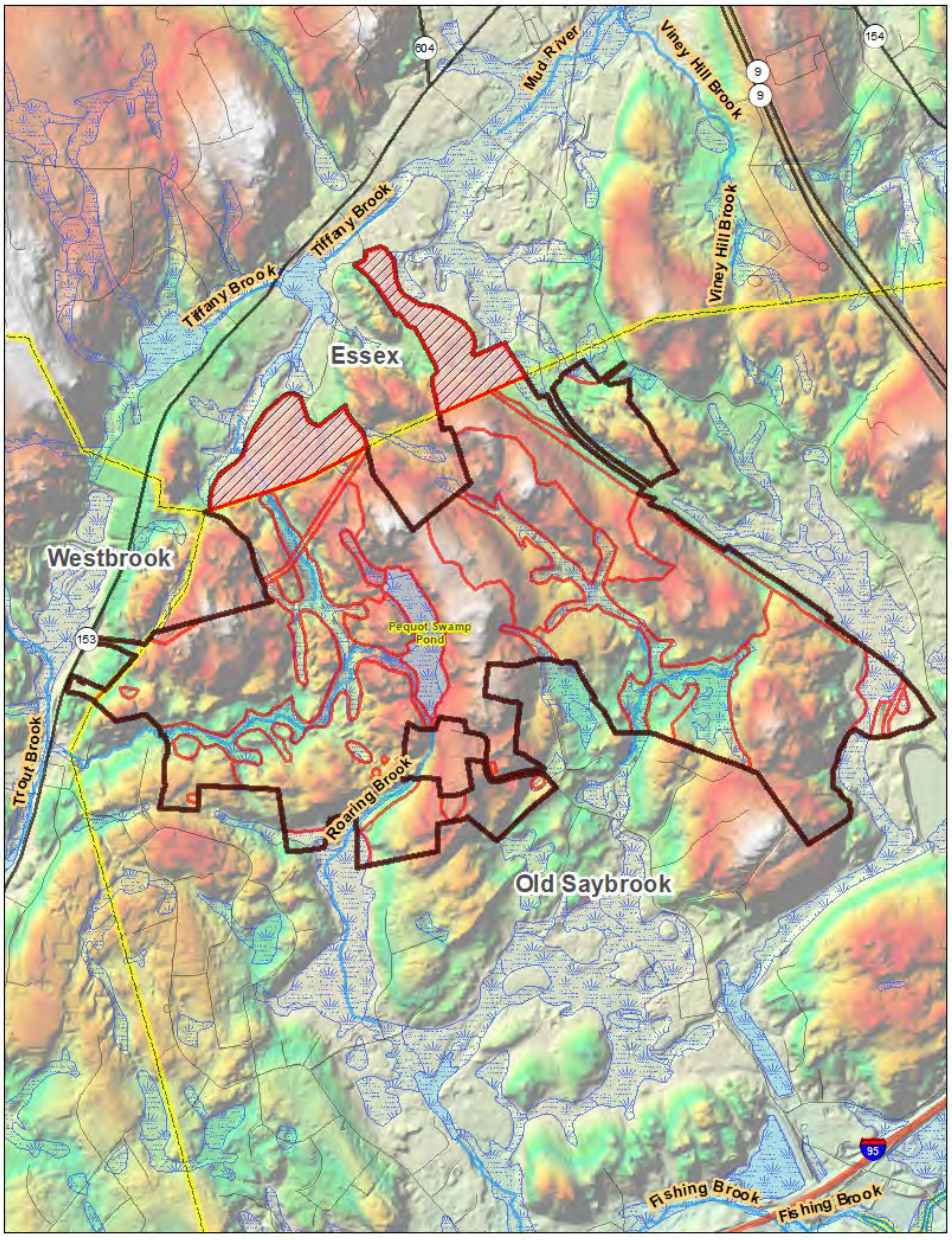
Justin Davis, Bureau Chief — Date 12/8/2025
Bureau of Natural Resources

Mason Trumble, Deputy Commissioner — Date
Outdoor Recreation and Natural Resources

Carl Fortuna, First Selectman — Date 12/5/2025
Old Saybrook, CT

Shelley Green, Director of Conservation Programs — Date 12/8/25
The Nature Conservancy in Connecticut

Forest Management Plan for
The Preserve State Forest (TPSF)
Old Saybrook and Westbrook, Connecticut
2024-2034



Prepared for:

The Trust for Public Land
The Town of Old Saybrook
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Contents

Above: The landform in the shape of a natural amphitheater is found in the southwestern portion of Stand 14. In the mid-ground at right is an example of Nectria canker on a black birch which is relatively common in parts of the property.

A. Executive Summary

This document is intended to act as a guide for the management of 924 mapped acres[1] within The Preserve State Forest (TPSF) from 2024-2034. The property was conserved with the signing of a conservation easement in 2015. The entire conserved property frequently referred to as "The Preserve" spans nearly 1,000 acres in the towns of Old Saybrook, Westbrook, and Essex, though the State Forest land is found only in Old Saybrook and Westbrook[2]. The State Forest is the focus of this management plan. The majority of the property is located in Old Saybrook (920 mapped acres) with some (approximately 4 mapped acres) in Westbrook. TPSF is jointly owned by the Town of Old Saybrook and the Connecticut Department of Energy and Environmental Protection (DEEP). Approximately 75 mapped acres of "The Preserve" (outside of the boundaries of TPSF) in Essex are owned by the Essex Land Trust.

Stewardship of TPSF is overseen by the Cooperative Management Committee (CMC), which has two voting members, a representative from the Town of Old Saybrook and a representative of DEEP. The third member of the committee is a representative of The Connecticut Chapter of The Nature Conservancy (TNC). An ad-hoc committee of volunteer members has been very helpful in documenting some of the important resources on the property, helping with trail maintenance, and a variety of other tasks. This property represents one of the largest remaining intact sections of coastal forestland that exists along New England's southern shorelines. Its conservation is a tremendous achievement and is the result of years of work of concerned citizens, town residents, leaders, and governmental and non-governmental staff and volunteers.

Though the name "The Preserve" may connote something slightly different to some people, The Preserve State Forest will be managed for multiple uses as a state forest under the guidance of the CMC. Goals for the management of this property are listed below. Management will continue to be conducted jointly, working closely when applicable with user groups, volunteers, and other interested organizations. This plan will act as a

[1] Deeded acreage according to the Conservation Easement Agreement is +/- 926.4 acres. Mapped acres differ slightly (+/- 924 acres including property in Old Saybrook and Westbrook). Mapped acres will be the acres referred to in this plan.

[2] For the purpose of this plan, whenever "the property" is mentioned, it applies to the portion of the property in Old Saybrook/Westbrook unless otherwise stated.

guide for management during this 10-year planning period, however, adaptive management principles will be utilized in the event that damage to the forest is caused by events that are unforeseen at this time, such as adverse weather and insect or disease infestations.

Management Goals at The Preserve include:

- Maintain and enhance forest health, resilience, productivity, complexity, and long-term sustainability
- Protect water quality and soil stability
- Protect and maintain sensitive/critical habitats, plants and wildlife species known to exist here
- Maintain and enhance wildlife habitat diversity and biodiversity
- Provide educational opportunities and diverse recreational experiences for the public

In spring, summer, and fall of 2018, foresters from Ferrucci & Walicki, LLC, and biologists from GEI Consultants, Inc. gathered field data at The Preserve using a variety of techniques for a wide range of features. The purpose of this data collection is to provide property owners, land managers, and interested members of the public a snapshot of current conditions on which management decisions for the short and long-term can be based. This forest stewardship plan combined with its companion Public Recreational Use Assessment Report prepared by GEI is intended to provide a baseline understanding of the existing natural resources within The Preserve and provide recommendations on how to best manage the use of The Preserve given multiple competing interests.

Ultimately, the final decisions on property use and management need to take a balanced approach and actions themselves should be balanced with conservation interests, habitat protection and enhancement, and long-term forest resilience. Decisions regarding management are the purview of the CMC.
2024 Addendum:

Originally prepared and presented to the CMC prior to 2024 by GEI Consultants Inc. the following Forest Management plan has been modified by CT DEEP in an effort to address ecological concerns from the Town of Old Saybrook. These modifications include the incorporation of the Dr. Klemens vernal pool report/addendum (Klemens 2023) and some of the recommendations therein regarding recreation and silviculture. Due to the lengthy nature of the studies undergone to produce this report, some of the scheduled dates for activities detailed herein have been modified to reflect the anticipated implementation timeframe of this plan. The Klemens report are cited in this management plan but will not be included to protect wildlife species' locations.

Additionally, it should be noted that all acreages and distance measurements in this plan are approximate and obtained through the use of Geographic information Software (GIS). Slight discrepancies between these measurements and survey-grade equipment may exist.

B. History

Reason for acquisition and funding sources
The Preserve was purchased using joint funding from the State of Connecticut, the Town of Old Saybrook, the Town of Essex, and the Trust for Public Lands (TPL) in 2015. The original agreement to purchase the property occurred in 2013 between the TPL and the previous owner, River Sound Development LLC (RSD), after RSD abandoned plans for developing the property into homes and a golf course. With many partners, TPL helped to raise over $10 million to secure the purchase and permanent conservation of the property. The Nature Conservancy holds a Conservation Easement on the property to ensure it will be protected from development and available as a managed natural resource area for public use. See Appendix B for the easement language.

Development of resource prior to and after acquisition
Aerial imagery from 1934 (Section N; Appendix A) shows this property as being mostly forested, though evidence on the ground in the form of stone walls, barways, and rock piles suggests this land was once used for agriculture. Most agriculture was abandoned prior to the image being taken. At the time the 1934 image was taken, the farm at the end of Ingham Hill Road still maintained operational fields to the north of the current boundary with that property, and it appears the field to the south was only just beginning to revert to forest. Elsewhere, two rights-of-way spanned sections of the property, one in the southeast and one in the west-central. Traces of both of these rights-of-way can be seen with 2019 aerial photography (Section N; Appendix C).

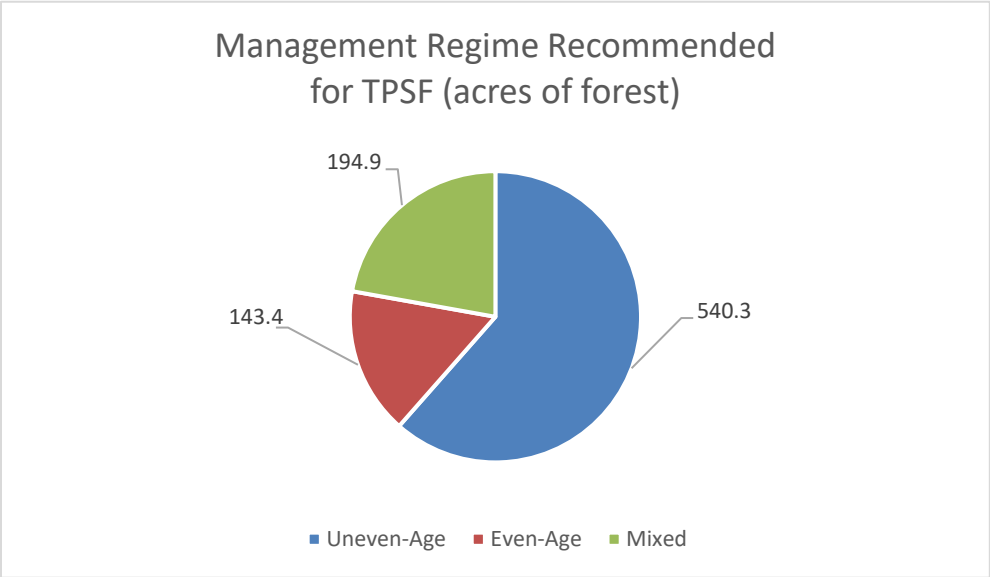
The Trust for Public Lands (TPL) initiated the conservation effort and purchased the entire property from private ownership. TPL, DEEP, the Town of Old Saybrook, and The Essex Land Trust all contributed to the final purchase. The goal of the TPL's efforts were to "Offer extensive green space to the community while protecting vital habitats and water sources. Active forest management has occurred at various times based on stump evidence that still exists (See the stump icon on the Historic Features map in Section N Appendix A (B) for some locations of stumps noted during recent inventory). The intent of the previous management is unclear, but many of the access roads and trails that are now used for recreational purposes were originally used for forest management. A new power line right-of-way has been created that spans the eastern boundary and turns west across the northern section of the property.

Changes in the last 10 years
The major change to land use in the last 10 years is the increase in public use as a recreation area. Recreation occurring here is primarily hiking, trail running, dog walking, wildlife viewing, nature study, and mountain biking. An online survey regarding property use was completed and is a part of the recreational review conducted by GEI Consultants Inc. as another part of the planning process for this property. In 2016-2017, TPL funded some invasive plant removal in the southcentral portion of the property just east of Pequot Swamp Pond. Additional invasive treatments were conducted in subsequent years. Following removal of invasive plants, they were piled to create brush piles. In addition, in September of 2018 the DEEP Wildlife Division's Wetland Habitat and Mosquito Management Program (WHAMM) also conducted an herbicide treatment to attempt to control phragmites in Pequot Swamp Pond.


Pequot Swamp Pond as shown from the north central edge looking south. The pockets of phragmites can't be seen in this photo.

Rotations and cutting cycles used (acres of each)
Evidence observed during the 2018 forest inventory suggests past harvests occurred while the property was privately owned. The harvests appear to have been partial cuttings, creating gaps in the canopy within which regeneration could potentially become established. This suggests a broader goal of achieving uneven aged forest

stand conditions in at least the areas in which the harvests occurred. Based on stump evidenced noted throughout the property, the most recent entry was perhaps +/- 25 years ago.



Based on the findings of the forest inventory, there are approximately 879 forested acres (including forested wetlands) within TPSF. The recommendations in this plan call for approximately 143 acres to be managed using even-aged management techniques, on a +/- 120 year rotation. Approximately 540 acres will be managed using uneven-aged management techniques, on a 25-30 year cutting cycle, though this number also includes areas where no planned active management is to occur. Approximately 195 acres are to be managed using a mixture of even and uneven-age management techniques within a mapped stand in order to fully work with the strengths and challenges of the individual sites.

As per the results of the Klemens Report (2023), although these stand-wide recommendations remain true, any mechanized silvicultural activity (even or uneven-aged) will be subject to the restrictions of the Core Protected Area (CPA, see map Q). Functionally, the recommendations will remain the same, and the work plan will proceed as designed. The only change will be acreage reductions in areas considered part of the CPA.

Currently, as the stands are broken down each stand is considered to be even-aged. This means that the trees in the stand are either about the same age (within +/- 25 years of each other when they became established) or are two-aged. Two-aged stands are those that have a mostly even-aged overstory and midstory canopy with a second age class (usually of shade tolerant tree species) in the understory and lower portions of the midstory. Uneven-aged stands are those that contain at least three distinct age classes (a.k.a. cohorts). Shade intolerant or mid-tolerant species are typically managed using even-aged forest management techniques and shade tolerant species are managed for using uneven-age management techniques. As forest stands grow and mature, without major disturbances, they typically trend toward becoming uneven-age which again favors more shade tolerant species.

Both the rotation ages and cutting cycles are longer than commonly found in actively managed forests in Connecticut. The extension of each is designed to provide longer amounts of time between entries during which existing trees can continue to sequester and store carbon. This property is in part being managed to produce forest products, though this is not a primary driver of the recommendations provided in this document. Higher quality forest products can be manufactured into durable, long-lived wood products including flooring, cabinets,

furniture and other materials which continue to store carbon in their fibers. Lower quality forest products will primarily consist of firewood. Economics of firewood result in relatively local use, which offsets the use of fossil fuel based heating sources.

C. Acres and Access

Total Acres for The Preserve: 999.7 mapped (920.2 in Old Saybrook, 75.6 in Essex, and 3.9 in Westbrook)
Total Acres for The Preserve State Forest: 924.1 mapped (920.2 in Old Saybrook and 3.9 in Westbrook) (926.4 deeded acres total)

Maps showing various features can be found in Section N Appendix A. These include a base map (D), stand map (E), and a topographic map (F).

There are several categories in which land is characterized the State Forest management system. These include:

- Active;
- Old forest;
- Inactive;
- Inaccessible;
- Inoperable.

"Active" forestland denotes areas which are currently or have the capacity to be actively managed for forest resources. "Old forest" are areas intended to be left alone as long-term forest reserves. "Inactive" areas are currently non-forested and not intended to be managed for forest products or wildlife habitat. "Inaccessible" areas cannot be physically accessed by equipment necessary for forest management operations. "Inoperable" areas may be accessible, but are limited in their management potential due to physical site limitations such as wetlands, steep slopes, or abundant surface stones.

Most of the property has been determined to be eligible for some kind of active management, though there is one section that for the purposes of this plan has been placed in the "Old Forest" category. That is approximately 30 acres in the far northeastern portion of the property along Bokum Road. 'Old forest growth' is an important ecological component of Connecticut's State Forests. In the state forest systems, the forested areas selected to grow and evolve naturally without active management are designated under the old forest management site designation (OFMS). The intent of this management regime is to allow the forest to develop naturally in an attempt to reach advanced stages of vegetative succession and develop as forests subject to the forces of nature with minimal or no human intervention. The goal is to establish or promote areas of advanced successional stages of forest growth comprising approximately ten (10) percent of the State Forest System, in aggregate, not necessarily in each state forest block or property.

Present access (roads for public and truck roads) (gates)

The parking area east of Route 153 in Westbrook, and the old parking area along Ingham Hill Road in Old Saybrook will serve as the primary points of entry for State Forest planned management activities. There are four public parking areas that provide access to various portions of the property: two in the north that provide access to the portion of The Preserve owned by Essex Land Trust, one in Westbrook (along Route 153), and a newly created 12 vehicle parking area in Old Saybrook adjacent to Ingham Hill Road. The latter two can be used to gain immediate access to TPSF. There are a series of woods roads that provide access for a variety of purposes throughout TPSF. These woods roads provide the backbone of portions of the interim trail system for TPSF. The

existing road and trail system provides good access throughout the property (see the Interim Trail map in Section N Appendix A (G). Other infrastructure-related features can be found in Section N Appendix A (H).

Parking area in the southwestern portion of the property adjacent to Route 153 in Westbrook

Portions of the existing road and trail network (both authorized interim trails and unauthorized trails) are actively eroding. Some of these trouble areas and other sections may need to be eliminated, rerouted, or require new surface material and/or erosion controls to reduce the likelihood of further erosion and to support future use. Recommendations for specific sections of trails have been included in the recreational plan for this property prepared by GEI Consultants, Inc.

Currently, the only road that grants access to the far eastern part of the property is located in the transmission corridor that abuts the eastern boundary.

Inaccessible areas (acres) and access potential

Five distinct areas have been identified in this plan as being inoperable for active management with equipment due to their topography, though likely more exist. The inoperable areas total 33.9 mapped acres. These are in addition to forested wetlands, open water, and riparian corridors which can be found throughout the property. The mapped areas of active, inoperable, and old forest can be found in Section N Appendix A (I).

Rights-of-Way

There is one power line right-of-way that spans the eastern boundary of the property before turning west along the northern end of the property. Another corridor for electricity or communication infrastructure at one time existed in the southeastern portion of the property primarily in Stands 12, 13, 14 and 20. That has been abandoned and has revegetated to the point where it is difficult to determine in the field. See the Stand Map in Section N Appendix A (E) for more detail.

Densely growing huckleberry along the transmission corridor in the southeastern portion of the property. Where feasible, keeping populations of dense huckleberry with open overstory conditions can help maintain flowering and fruit production.

Boundary Conditions, total miles of boundary, and potential issues

There are 12.08 total miles of boundary. Most of the boundary has not been maintained and will require paint and signs to identify it. Some corner markers were found, but again, much of the boundary is currently not identified. No significant encroachment or trespass activities were noted near boundaries during the 2018 inventory, though two small abandoned camp areas are present in the southwestern portions of the property. Also, in the southeastern portion of the property there is some mountain bike infrastructure and other unauthorized structures none of which is approved and will be addressed in the work plan. Boundary marking work is scheduled to be completed with custom State of CT/Town of Old Saybrook signage in 2024.

D. Special Use Areas

Lakes, ponds, and other water features

Pequot Swamp Pond, a 20-acre semi-open pond, is located in the center of the property. Based on the 1934 aerial photo of this area, the pond had been created prior to that time. There is a dam on the western bank and a levee or causeway on the southern bank. Portions of the pond contain open water and portions are partially vegetated. This includes a patch of common reed grass (*Phragmites australis*), a non-native invasive plant, in the southcentral part of the pond[3]. Other sections are primarily native shrubby vegetation with occasional trees. Evidence of recent beaver activity was noted along the northern shore, but they've been active elsewhere along shorelines in previous years as well.

There are a couple of bogs within TPSF. Bogs often contain unique combinations of vegetation, insects, fungi and wildlife that are rarely seen elsewhere. There are also numerous vernal pools scattered throughout the property. Most of these were confirmed by Michael Klemens as functioning vernal pools (Klemens 2004 and 2005). In addition to the pools confirmed by Klemens, William Moorhead identified several more potential vernal pools during surveys conducted from 2017 to 2020 to document rare plants, Critical Habitats and other

[3] The Phragmites was treated by WMAMM in 2018, and is scheduled for treatment in future years to reduce its population and limit its potential for spreading into other parts of the pond or elsewhere on the property.

significant natural communities (Moorhead 2021). These additional pools were found to not be true vernal pools, merely wet "decoy" pools (Klemens 2023) Forested wetlands are relatively abundant and are found throughout the property. For a spatial representation of where all these features are located, see the Water Features map in Section N Appendix A (J).

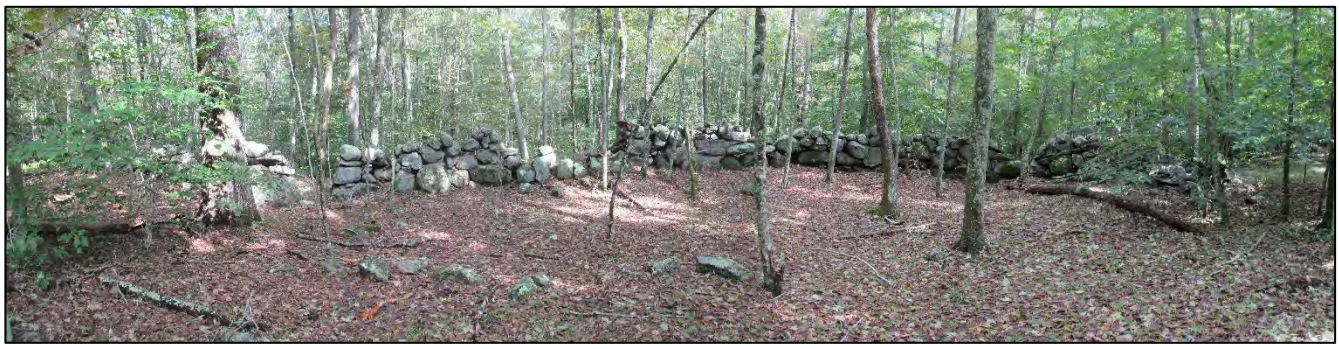
In an effort to ensure the protection of the ecological integrity of the vernal pools present in The Preserve, CT DEEP and the Town of Old Saybrook funded a season-long vernal pool productivity study (2023), which resulted in the Klemens report of 2023. CT DEEP concurrently conducted a radio telemetry study of turtles. This data also became part of the same report. Vernal pool productivity and turtle telemetry data were then utilized to create the Core Protected Area (CPA) map of the preserve. This includes weighted wetland buffers based on an individual pool's productivity and/or usage by turtles. Within these buffered areas, recommendations regarding mechanized silviculture and recreation differ from the rest of The Preserve (Klemens 2023).

Rivers and streams

The only named, perennial watercourse on the property is Roaring Brook, which flows from the southern end of Pequot Swamp Pond and terminates about ¾ of a mile south of the pond in a semi-open wetland. In addition to Roaring Brook, there are several small drainages within forested wetland and riparian areas throughout the property. See the Water Features map in Section N Appendix AN (J) for locations of these features.

Cultural sites

This property contains a variety of known cultural sites as well as regionally important cultural features. One of the major known sites is the Ingham Home Foundation as noted on the Interim Trail Map for the property (See Interim Trail Map in Section N Appendix A (G). This is located in the southcentral portion of the property just northeast of a section of the red trail. The foundation itself is in fairly good condition, but like many foundations and previously inhabited areas is overrun with invasive plants – in this case principally Japanese barberry (*Berberis thunbergii*).



A unique stone wall feature in the central portion of the property

In addition to the foundation there are stonewalls and some stone piles that are found throughout the property that provide a link to the previous land uses and inhabitants of the past.

Recreation and scenic sites – trails and signs

There is a robust network of multiuse trails on this property, though not all of them are mapped and marked. Several Interim Trail Maps are posted on the property both at trailheads and some trail intersections in the interior that guide users along marked trails. Public input and field evidence identifies a broad range of trail users on the property, including hikers, mountain bikers and equestrian users. The total length of existing trails (combined in both TPSF and the portion of The Preserve owned by Essex Land Trust) exceeds 23 miles, most of

which are unmarked and unauthorized[4] as they are not part of the Interim Trail System recognized by the CMC and marked for public use. The Interim Trail Map is in Section N Appendix A (G).

Pequot Swamp Pond in Fall

Views of Pequot Swamp Pond can be gained from several vantage points along existing trails providing visitors to the site a variety of areas from which the pond can be observed. In addition to the pond, there are several other sites with features that may prove to be scenic for property users. Areas with exposed ledge, hilltops with unique vegetative communities such as short-bodied oak trees, huckleberry, and blueberry, the bogs, fens, and other features that make this property unique. Many of these features are sensitive, and therefore should be avoided by the final trail system that is adopted for the property.

Critical Habitat and Natural Diversity Data Base species

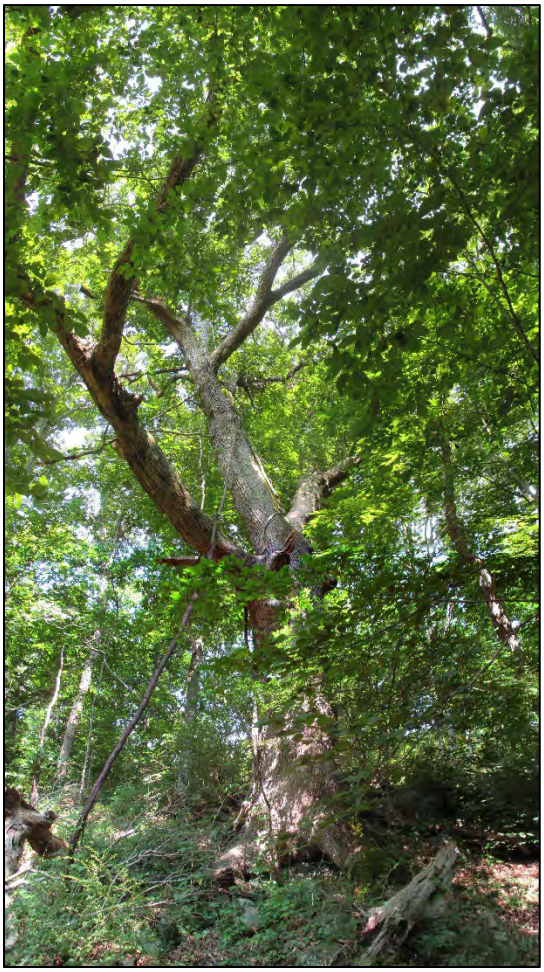
There are a wide variety of plant and animal species that have been noted on this property. Some of these are listed in Connecticut's Natural Diversity Data Base (NDDB) as Threatened, Endangered, or of Special Concern in the state, including three State Endangered plants, nine State Special Concern plants, two State Endangered mammals (one of which is also listed as Federal Endangered), and two State Special Concern reptiles. Three additional species of plants found on the property are proposed for State Special Concern listing in 2024 . All but one of the 15 listed plants was documented to be extant at The Preserve as of 2019 or 2020. In addition, there are several Critical Habitats and other Significant Natural Communities scattered throughout the property including those listed in Table 1[5] below. All of the listed plant species, except for some populations of one of them, occur in one or more of these important habitats. The updated mapping for NDDB species is in Section N Appendix A (K).

[4] Approximately 7.5 miles of trails are part of the Interim Trail System; the rest of the trails are unauthorized.

[5] This is labeled as Table 2 and is taken from the NDDB report for The Preserve to David Terry from GEI Consultants, Inc. dated August 20, 2021. The table can be found on pages 2-3 of the document from NDDB.

Property managers will work collaboratively with biologists and botanists/plant community ecologists from DEEP Wildlife Division's Ecological Services (NDDB) and Wildlife Diversity Programs to identify specific areas where management will enhance growing conditions for rare, threatened, endangered, and special concern species, and to avoid areas where active management may be detrimental to the area where the species were found. Much of the work to improve or maintain habitat for some species will require the creation of small canopy gaps.

Prior to any silvicultural work, areas will be reviewed by NDDB and, if necessary, will be subject to acoustic monitoring for bat populations. Recommendations will then be considered when any individual silvicultural operation plan is designed and implemented per this management plan.



Wolf oak tree in Stand 6

Table 1 (Referred to as Table 2 in Moorhead 2021)

Table 2. Critical Habitats and Other Significant Natural Communities identified by Moorhead at The Preserve, 2017-2019.					
Community Type	**Community Sub-Type**	**In ROW**	**Out-side ROW**	**Cumulative Area (acres)**	**Comment**
Acidic Atlantic White Cedar Swamp	Cedar/Hardwood		X	1.51	
Acidic Rocky Summit Outcrop	Grassy Glade/Bald	X	X	1.31	
Acidic Rocky Summit Outcrop	Other/Unique	X		0.82	The same as Grassy Glade/Bald sub-type but called Other/Unique because it occurs in the Eversource ROW. Part of a 1.59-ac meta-occurrence in the ROW on both Preserve and adj. Old Saybrook Land Trust property
Acidic, Sandy, Wet Meadow	Other/Unique	X		0.61	
Acidic Seepage Forest				1.10	
Dry Acidic Forest	Oak Woodland		X	2.5	
Dry Subacidic Forest	Ash/Hickory Glade		X	23.9	
Dry Warm Season Grassland	Other/Unique	X		1.10	
Headwater Seepage Swamp			X	≥ 37	Only the largest occurrences mapped; perhaps 5-10 acres more exist as smaller occurrences at The Preserve

Table 2. Critical Habitats and Other Significant Natural Communities identified by Moorhead at The Preserve, 2017-2019.					
Community Type	**Community Sub-Type**	**In ROW**	**Out-side ROW**	**Cumulative Area (acres)**	**Comment**
Medium Fen	Decodon		X	0.18	
Medium Fen	Other/Unique (1)	X		0.004	Bog-like community on wet sand in Eversource ROW
Medium Fen	Other/Unique (2)		X	4.8	*Clethra*-subshrub-dominated peatland community
Medium Fen	Sedge Fen		X	1.6	Several Sub-sub-types, some of which might turn out, with closer study, to actually be Poor Fens
Medium Fen	Shrub Thicket		X	9.6	Shrub Thicket Sub-type was largely unexplored - I suspect that Species H likely occurs there in some measure
Medium Fen	*Phragmites*		X	0.7	Shrub Thicket Sub-type was largely unexplored - I suspect that Species H likely occurs there in some measure
Moderately Well-drained acidic sandy Grass-/heath-land	Other/Unique	X		0.47	In Eversource ROW
Telephone ROW thru sandy acidic seasonally wet forest	Other/Unique		X	0.15	
Sand Barren	Other/Unique	X		0.95	In Eversource ROW
Subacidic Rocky Summit Outcrop	Cedar Woodland		X	1.09	
Subacidic Rocky Summit Outcrop	Other/Unique	X		5.27	Large meta-occurrence in Eversource ROW
Vernal Pool (includes several Potential Vernal Pools)			X	13	
Cold and/or Cool Headwater Streams			X	1-3	At least 3.5 miles of headwater streams
Acidic Seepage Wet Meadow on Till	Other/Unique	X		0.4	Two occurrences in Eversource ROW

The 1.5 acre Atlantic white cedar swamp noted in the table above is located in the northeast part of the property.

Atlantic white cedar. Photo courtesy of the Sussex Conservation District, Delaware. https://shop.sussexconservation.org/products/chamaecyparis-thyoides-atlantic-white-cedar

Natural Areas

There are no state designated Natural Area Preserves on this property. As indicated earlier, TNC holds an easement over the property which can be found in Section N Appendix B.

Old Forestland Management Sites

Stand 18 and a portion of Stand 20 are designated as Old Forestland Management Sites on this property. Because stonewalls are located throughout the property and stump evidence is also prevalent, it is not likely that there are existing Old Forestland sites. Due to a current lack of reasonable access for active forest management, it is likely that more acreage will continue to mature and grow toward old forest conditions with or without the official designation.

Research Areas

Since acquisition, no applications have been submitted to conduct research on the property. As with other state forests, requests may be submitted using the scientific collector's permit application that can be found on DEEP's website (Scientific Collector's Application Wildlife).

E. Extensive Areas of Concern

Trails/signs

The Interim Trail Map showing authorized interim trails is in Section N Appendix A (G). There are at least 23.7 miles of multiuse trails present on this property (including unauthorized trails). Some portions of the trails contain areas of active erosion on steeper sections. In addition, there are wet areas within the existing trail system that have led to two multiple parallel pathways, further increasing the trail's footprint and erosion concerns. Mountain biking is a common activity on the property, and one area contains infrastructure that appears to have been built specifically for mountain bikes. Multi-use trails must can be developed and managed to balance the conflict with the DEEP's mission to conservation of natural resources including fisheries and wildlife and their habitats. Following the acquisition of The Preserve Property, no formal recreational trail planning has occured on the property. The 2022 Public Recreational Use Assessment developed by GEI Consultants provides detailed baseline review of exsisting trail conditions, results of a recreational survey, and a Recreational Use Assessment. As noted withing the Conservation Easement, Appendix C, the management plan development must allow passive recreation in the form of recreational trail (non-motorized access).

Recreational trails have been shown to fragment and degrade habitat; cause rutting, soil compaction and erosion and sedimentation of streams; cause disturbance to wildlife; and create avenues for non-native invasive plant infestations, thereby reducing biodiversity. Multi-use trails used by mountain bikers and dog walkers can also negatively impact those engaged in fish and wildlife-based recreation (e.g., hunting and wildlife viewing), especially those seeking a more solitary outdoor experience. Addressing the identified concerns on the property and potentially shutting down portions of the trail and road system that are not well-located will likely address future maintenance issues as well as soil stability and water quality concerns. A Public Recreational Use and Trail Plan defining recreational activities permitting within the Preserve, outlining a formalized trail plan and map, and defining stewardships and maintenance responsibilities, is in development through the collaboration of CT DEEP and the Town of Old Saybrook with input from the community and trail user groups. This Recreation and Trail Plan will be a separate document from the Forest Management Plan, but will adhere to recreation trail densities recommended in the Forest Management plan and Klemens Report/Addendum.

Signage is generally good on the property, though there are many more trails than are officially recognized. Standardizing kiosks at trailheads and providing educational materials would enhance user experience. In addition, creating maps that show existing trails that the landowners would like to have as official, may help reduce confusion. In addition, DEEP will be marking the property boundaries in the winter of 2024
.

Signs have been installed throughout the property at major trail intersections

Wetlands

There are approximately 143.1 acres of mapped forested wetland on this property, some of which includes between 45 and 48 vernal pools that total approximately 12.5 acres (Moorhead 2021). This number was refined to 37 pools, including some multi-part pools (Klemens 2023) Approximately 1.5 acres of the forested wetlands contains Atlantic white cedar, a declining tree species in Connecticut. Many walking trails cross through these areas using wooden bridges, culverts, or just using higher and drier patches of land that naturally exist in the wetland. In addition to the forested wetlands and vernal pools, approximately 16.9 acres of medium fen habitat are also present. The NDDB determination recommends strictly adhering to water quality standards to protect these wetland habitats from sedimentation and nutrient impacts, noting their importance to reptiles and amphibians, as well as several state-listed plants. See Table 1 from the NDDB report for the property on page 10 for a listing of Critical Habitats. The Best Management Practices for Water Quality While Harvesting Forest Products booklet (the 2012 Connecticut Field Guide) is used when planning management activities on the property.

Unauthorized or illegal activity

The Hunting Review Team report completed in 2018 noted that an increase in the use of The Preserve by the public had been observed by DEEP Environmental Conservation Police in recent years, including the use of un-blazed hiking/mountain biking trails that seemed to be growing in numbers. There are two camps with tents located in the southwest part of the property that may see occasional use. There is also some unauthorized

mountain bike infrastructure in the eastern part of the property. Both sites have been reported to DEEP and Town of Old Saybrook staff. Fortunately, no motorized vehicles were noted on the property during field visits in 2018.

F. Wildlife Habitat

Existing habitat diversity

TPSF is part of a relatively intact forest block of more than 6,000 acres and protects the drinking water supply for two towns[6]. The mixed hardwood forest with a significant oak component, open areas along and within the maintained utility corridors, some small pockets of softwood cover, undulating terrain, exposed ledge, Critical Habitats, hilltops, lowlands, and important water features combine to make this property a critical part of the habitat offerings in this part of the state. Forested wetland comprises over 15% of the total area (not including vernal pools) of the portion of the property in Old Saybrook. This area is well distributed across the property and gives it a unique character in terms of ecosystem diversity over such a large area. Many of these wetlands contain streams that drain into several different watersheds. This fact increases the importance of what occurs on this property in terms of maintaining healthy wetland ecosystems to maintain water quality. All of these features provide critical habitat for a variety of wildlife.

Softwoods

One feature that is noticeably absent from much of the property is the presence of softwoods[7]. While some scattered hemlock, pine, and cedar was observed, they were individuals or small groups of trees as opposed to groves or entire stands. The 1999 Environmental Review Team report conducted for "The Preserve" indicates that some of the harvesting prior to that time removed merchantable sawtimber-sized hemlock. The hemlock that remained after the harvests was at that time declining and infested with hemlock woolly adelgid. Future management should consider retaining softwood where noted during management activities and should attempt to encourage softwood regeneration naturally or artificially. One species that appears to be absent from the property but given that this is considered to be a coastal forest may be reasonable to attempt to cultivate in certain areas is pitch pine. Tree species diversity is a critical component to overall forest health and ecosystem function. Diverse forests are more resistant to disturbances such as pests and diseases, and they provide habitat for a greater diversity of wildlife.

This hemlock in the central portion of the property is one of a handful noted in Stand 10. Wherever feasible, encouraging the continued presence of softwood can help maintain important features of diversity. This is especially true when they grow in groups, but healthy individuals are important as well..

There are two exceptions to the lack of softwoods on the property. One is Stand 5, which is comprised mostly of

[6] https://portal.ct.gov/DEEP/State-Parks/Forests/The-Preserve

[7] In this case, softwoods means coniferous trees (i.e. pine, hemlock, cedar etc.) as opposed to hardwoods or deciduous broadleaved trees (i.e. oak, maple, birch, beech etc.).

eastern redcedar. While only 2.2 acres, it is the only softwood stand on the property and provides valuable species diversity. This stand should be managed in a way that promotes the maintenance and ideally the expansion of red cedar. This can be accomplished by removing competing hardwood trees that are overtopping the cedar to provide more sunlight for the shade intolerant cedars.

The other prominent softwood feature that will be discussed later is the Atlantic white cedar swamp in the southeastern corner of the property. This feature should also be protected and if feasible, expanded over time.

Oak

Oak is one of the most important species for wildlife on this property. Flower production in spring, and – when it produces – acorn production in fall are just two of the features of oak that provide critical sources of food for wildlife. In addition to these essential benefits for wildlife, oak is also a major driver of the forest products sector of our economy. Several species of oaks including black, red, white, scarlet, pin and swamp white were noted on the property. Again, though there are many oaks throughout the property in the overstory, very few oaks were noted successfully growing in the understory[8, 9]. If this species is to continue its special role in providing benefits for wildlife moving forward, some efforts will need to be made to encourage young oak to become established.

This "wolf tree" oak in the southcentral portion of the property is a remnant of past land use history and grew in on its own likely in an old pasture.

Oak-dominated hardwood forests cannot remain at the mature successional stage indefinitely. Without occasional significant disturbance events that provide full or nearly full sunlight to the forest floor, the oaks will eventually give way to more shade tolerant beech and maple. In places on the property, a midstory of beech is found under overstory oak. Beech bark disease has been found on many of the beech on the property, but it is not ubiquitous.

Over time, portions of the property will likely need to be regenerated using even-age silvicultural techniques that remove much of the overstory to allow sufficient amounts of sunlight to reach the forest floor to successfully regenerate oak. These kinds of treatments change the immediate character of the forest and the current aesthetics and may temporarily impact public access and recreation, but provide the best chance of long-term oak management in our region.

Forest Structure

While there are signs of tree cutting throughout much of the property, most stands share a similar physical structure with fully stocked overstories, generally closed canopies, and minimal native understory regeneration. There are pockets of mountain laurel that provide structural diversity in the

[8] For the purposes of this plan, understory refers to vegetation from ground level to 5 ft. above the ground. Midstory refers to vegetation between 5-30 ft. above the ground, and overstory refers to vegetation > 30 ft. above the ground.

[9] Property-wide, oak species combine to constitute approximately 1/3 (32%) of the overstory trees per acre and make up 55% of the basal area. On the other hand, oak constitutes only 5% of the understory trees which include seedlings and saplings and it is almost entirely white oak.

understory, but again much of the property is fairly uniform. The exception to this is Stand 14, which contains numerous mostly small canopy gaps from previous management activities that have been repopulated with black birch and American hornbeam saplings, primarily. Many species of wildlife and some plant life depend on structural diversity for habitat. Healthy forests often contain age, species, size, and structural diversity. While no cores were taken during the 2018 inventory, 1934 aerial imagery and evidence of previous harvest activity suggest much of the property is either even-aged or two-aged. Over time, creating canopy gaps of various sizes can help to diversify both structural components and age classes of vegetation, and may help to further diversify species composition as well.

White-Tailed Deer

Evidence of white-tailed deer, including browsed vegetation, rubs, and scat, was noted on the property, though no official population estimates have been conducted. The impact of deer on the productivity of forestland can be substantial. A staple in the diet of a deer is the buds and twigs of young trees. Once young trees have been browsed, they will grow with a poor form and will be stunted from their full potential. Deer impact is a function of deer density, expressed in deer per square mile, and forage availability such as young trees, acorns and agricultural crops. Deer densities greater than 20 deer per square mile can have significant negative impacts on forest regeneration. Browse evidence and an overall lack of desirable and diverse species of tree regeneration

throughout the property make it likely that opening the property to recreational hunting would simultaneously help to ensure long-term sustainability of the forest resource.

Above: The lack of understory vegetation seen in the foreground in common throughout much of the property. This results in a lack of habitat offerings and a lack of species diversity which results in reduced resilience.

Investment in habitat improvement

There is limited evidence of specific wildlife habitat work being done on this property. The most prominent feature noted during the inventory is a bat box placed along the interim section of the red trail east of Pequot Swamp Pond. Other wildlife habitat work that may be feasible here such as prescribed burns, mowing, patch cuts, or plantings etc. were not noted. Given the large percentage of the property covered by known occurrences of state-listed and Species of Greatest Conservation Need (SGCN) species, future forest stewardship will need to

The densely growing vegetation in one of the forested wetlands in the southeastern portion of the property shows better structural complexity

consider what wildlife species and/or special plant species may occur there. The maintenance of those features will need to be considered when prescribing treatments for habitat or forest health improvement throughout the property. Important habitat features that will inform and help drive the management of the property include:

- Diverse size, species mixes, and age classes of trees;
- Diverse understory vegetation (structural attributes and species diversity);
- Wetlands and wetland buffers;
- Critical Habitats and Other Significant Natural Communities;
- Mast production (both hard, especially oak, and soft mast);
- Softwoods; and
- Open areas and sunny hilltop conditions among others.

Above: This bat box is located in the southcentral portion of the property near a property boundary

Wildlife-Based Recreation

The interim trail system provides good access to much of the property, and it is likely that the final decisions on trail locations will do the same. This access allows property visitors the ability to enjoy many aspects of passive recreation here. This includes but is not limited to wildlife viewing, photography, and nature study. Having a large, forested area like TPSF in densely populated areas like Connecticut's shoreline is important to help people connect to nature. Installing an observation blind or other similar infrastructure near the Pequot Swamp Pond may enhance visitor experience at the property.

Hunting is not currently allowed on TPSF, but a recommendation made by the DEEP's Hunting Review Team in 2018 to open the property to all forms of hunting for deer and small game with exception to waterfowl, was approved by the CMC (see Appendix D). Currently, the CMC is working with the Hunting Review Team to formulate an action plan for public outreach to be carried out prior to opening the property to hunting.

G. Vegetative Condition

Silviculture

The forest management practices implemented prior to current ownership suggest that treatments were generally relatively light based on stump evidence and retained relatively high stocking levels throughout[10]. This previous management and in other places a lack or absence of management has resulted in a mostly closed canopy forest with shade tolerant species regenerating. Moving forward, accessible portions of the property where active management is appropriate, a mixture of even-age and uneven-age management will be practiced. One very important tree species on the property is oak. The long-term presence of oak in our forests is critical for many reasons (some of which are discussed in Section F), but overall oak is declining both on the property and regionally. Where feasible, successfully regenerating oak over time in parts of this property can help to ensure the long-term sustainability and productivity of the forest. Details regarding silvicultural

[10] The 1999 ERT review indicates that at that time and +/- 20 years prior the predominant treatments removed mostly scattered larger diameter trees (16 inches dbh and greater) with the last known harvest occurring in 1997, just two years prior to the report.

recommendations can be found in the *Stand Descriptions and Recommendations* section and are summarized in the Work Plan in Section M.

Silviculture[11] on this property will be driven by the goals stated at the beginning of this plan. Some of the treatments recommended in this plan and likely in future plans will result in the removal of trees that have commercial value. Being able to sustainably produce a variety of forest products as part of the management of the forest provides an additional benefit to local, regional, and global economies as well as carbon budgets at all scales.

Stand types and acreages are summarized in the table below.

[11] Silviculture is defined as the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

Stand	Acres	Cover Type	Primary Soil Type	Site Index (Northern Red Oak)	Size Class
1	94.2	White oak/red oak/hickory	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	65	Small Sawtimber
2	14.7	Mixed upland hardwoods	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	65	Poletimber
3	72.1	Mixed upland hardwoods	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	65	Poletimber
4	20.4	Mixed upland hardwoods	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	65	Small Sawtimber
5	2.2	Eastern redcedar/hardwood	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	65	Seedling
6	17.6	Mixed upland hardwoods	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	65	Medium Sawtimber
7	16.3	White oak/red oak/hickory	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	65	Poletimber
8	33.5	Mixed upland hardwoods	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	65	Small Sawtimber
9	12.2	White oak/red oak/hickory	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	65	Small Sawtimber
10	81.5	White oak/red oak/hickory	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	65	Small Sawtimber
11	41.4	Mixed upland hardwoods	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	65	Medium Sawtimber
12	32.4	White oak/red oak/hickory	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	65	Small Sawtimber
13	7.5	White oak/red oak/hickory	Woodbridge fine sandy loam, 3 to 15 percent slopes, extremely stony	72	Small Sawtimber
14	98.8	White oak/red oak/hickory	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	65	Poletimber
15	67.0	Mixed upland hardwoods	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	65	Poletimber
16	46.5	Mixed upland hardwoods	Canton and Charlton fine sandy loams, 15 to 35 percent slopes, extremely stony	-	Small Sawtimber
17	39.3	Mixed upland hardwoods	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	65	Poletimber
18	29.3	White oak/red oak/hickory	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	65	Poletimber
19	6.7	White oak/red oak/hickory	Merrimac fine sandy loam, 0 to 3 percent slopes	-	Small Sawtimber
20	143.1	Red maple/lowlands	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	66	Poletimber
21	20.0	Water	Water	-	-
22	22.4	Open	Canton and Charlton fine sandy loams, 15 to 35 percent slopes, extremely stony	-	-
23	2.1	Mixed upland hardwoods	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	65	Small Sawtimber
24	2.9	Developed	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	-	-

Forest health

Insects, Disease, and Storms

Emerald ash borer (EAB) was noted at during the 2018 field inventory. Ash is a relatively minor component of the property though the presence of EAB on the property likely means that the mature ash in the area will succumb to mortality in the relatively near future. The loss of ash on the landscape will likely not have a major impact in terms of overall forest health because of its relatively low population levels, however given the interconnectedness of nature and ecological relationships, once any part of the puzzle is lost (or at least significantly depleted), that can and does have impacts that impact other parts.

The "D"shaped exit hole of the emerald ash borer in the center of the photo is from an ash in the south-central portion of the property.

Nectria canker was noted on black birch throughout the property. While trees can survive with the canker for many years, the presence of the fungus within the tree is likely to be the cause of its demise either directly through girdling or indirectly through facilitating stem breakage at weak points where Nectria has colonized. In the meantime, infested trees lose most, if not all, economic value. Black birch is a prolific seeder and can successfully germinate and become established in a variety of soil types and light conditions. These features and their relatively rapid growth rates oftentimes enable them to outcompete most other species following a disturbance in the forest (i.e. storm damage or human caused disturbances such as a timber harvest). Any future forest stewardship activity should prioritize removing infected black birch and limit the establishment of black birch regeneration to attempt to ensure future forest tree diversity.

The "target" shape of Nectria canker seen here in the north-central portion of Stand 4 is a common occurrence on many of the black birch throughout the property.

Beech bark disease was noted on many of the beech on the property. Like Nectria canker, beech trees can survive many years with beech bark disease (BBD), but over time they often grow weak at heavy infestation points where Nectia has impacted the structural integrity of this wood. This in turn frequently results in a condition known as “beech snap” where the trees break where the tree has begun to rot. Beech bark disease can also hinder the growth and development of young trees and possibly prevent them from ever producing seed or becoming mature trees. Beech nuts are important source of food for a variety of wildlife including bears, squirrels, deer and some birds. Future management should emphasize removing beech trees infected with BBD and retaining “clean” beech in order to improve the genetic stock of beech on the property, and attempting to regenerate species other than beech.

Another emerging health issue at this property is beech leaf disease (BLD). BLD was not known to be in Connecticut at the time of the inventory and no indications of its presence were noted, however it has been observed on the property in 2020 and 2021. Given the density of beech saplings in many parts of the understory and midstory on this property, it may prove to be a significant issue. Little is known at this time about BLD but it is caused by a foliar nematode. Its long-term health impacts and potential treatments in Connecticut forests are unknown. Because beech plays a major role in the understory on many parts of the property, the presence of BBD and BLD combine to indicate a need to diversify the regeneration present at the property. Beech can and should continue to remain a component, just not as dominant as it currently is.

Above: These three photos show different issues with beech in the northcentral portion of the property. Slightly more advanced beech bark disease (BBD) (left); the beginnings of beech bark disease on the left-hand tree compared to a "clean" beech (center); and the small white dot in the center of the photo is the outer woolly covering of the beech scale (right), a tiny insect that acts as the entry point for the Nectria fungus which is the next phase of the BBD complex.

Left: The alternating stiped pattern on these beech leaves in the southeastern portion Stand 10 indicate the presence of beech leaf disease (BLD).

The relatively closed canopies at TPSF tend to favor shade tolerant species such as beech. In the absence of significant disturbances that allow sunlight to reach the forest floor providing sufficient resources for more shade intolerant species to be able to regenerate, the property will likely continue to trend in the direction of being dominated by beech and other shade tolerant species in the midstory and understory. Besides beech's susceptibility to the diseases noted above, their relative lack of vigor, and the monoculture conditions they can create, their presence on a large scale also represents a loss of vegetative and habitat diversity for the future forest, and a potential reduction in the area's ability to uptake and store carbon long-term.

There appeared to be limited storm damage on the property. While storm damage is a natural part of the way our forests grow and develop, and in and of itself is not a forest health issue on a small scale, storm damage does have impacts on the trees being damaged and the immediate area where the damage is occurring. The physical location of the property near the coast, can increase the likelihood for hurricanes and other storms to make landfall, creating larger-scale disturbances. This has occurred throughout Connecticut's history, most notably and most recently with the Hurricane of 1938. With a changing climate, our forests are likely to experience more intense and more frequent disturbances. Management planning should consider proactively creating more diverse and resilient stands by enhancing age class diversity and species diversity across the forest.

This tree located along a trail in the southwestern portion of the property was damaged in a recent storm event. The "v-shaped fork" had a significant amount of bark included in the union which weakened the are where the two forks came together.

Forests, carbon & climate change[12]

Forests play an important role in mitigating the effects of climate change. Trees and green plants absorb carbon dioxide from the atmosphere for use in photosynthesis. They release oxygen and store carbon in trunks, roots, branches, and leaves. Dead trees store additional carbon which is transferred to the soil when snags fall and gradually decompose. The soil also acts as its own carbon sink which on average stores over 30% of the combined carbon pool in regional forests.

In their importance toward mitigating climate change, forests serve two significant functions; sequestering carbon dioxide, and storing carbon, often referred to as "sequestration" and "storage". However, the forests' ability to perform these functions is maximized at two different points during development.

Sequestration potential is maximized in vigorously growing forests which are efficiently photosynthesizing, and rapidly adding wood. This occurs when a forest is aged 30-70 years. Carbon storage benefits begin to peak in maturing forests, generally over 70 years old, which support larger diameter trees, and greater accumulations

[12] Much of this section "Forests, carbon & climate change" was taken from a forest management plan that was recently completed (2021) for a block of the Mohegan State Forest (Page 19) prepared by the Forestry Division of DEEP.

https://portal.ct.gov/-/media/DEEP/forestry/Management_Plans/MoheganMgmtPlan_2021-2031.pdf.

of above-ground wood volume. This peak carbon storage period will start at age 70 and may last for well over 100-years assuming stable growing conditions.

It is beneficial to pursue a diversity of carbon management strategies to meet the demands of a changing climate while also accomplishing traditional land and forest management objectives. Not only forests, but forest products play a critical role in mitigating climate change. Value-added wood products from responsibly managed forests store carbon for decades and beyond while tree removals from sound forest stewardship allocate growing space to higher quality trees, improve sequestration and wood production rates, add structural complexity, and improve wildlife habitat.

CT DEEP's Division of Forestry uses a triad approach to forest management with its policy regarding "management status" zoning using the forest stands database. Old forestland management sites are analogous to forest reserves which are intended to grow undisturbed for long periods of time and store large amounts of accumulated forest carbon. Areas designated as inoperable, inaccessible, and inactive similarly receive no active forest management and can store large volumes of carbon. A portion of the actively managed landscape is managed on an uneven-aged basis, in which there are both high levels of carbon storage through mature trees, with balanced sequestration occurring through tree reproduction in the understory and within canopy gaps. Another portion of actively managed lands are managed to promote the persistence of species or communities of species which require young forests managed rotationally through periodic disturbance across the landscape. These stands managed with even-aged regeneration treatments will come to represent rapid carbon sequestration areas while simultaneously providing the traditional wildlife habitat, rare plant community, and forest sustainability values of young forests.

Over time, climate change will affect soil moisture resulting in changes in regional species composition. In this region it is expected that species at or near the southern extent of their range will be among the first impacted. Sugar maple, eastern white pine, aspens, eastern hemlock, and gray/paper birch may experience decline in this region due to climate. On the other hand, it is anticipated that growing conditions will improve for species towards the northern extent of their ranges. Scarlet oak, pitch pine, and black gum should fare well barring any impacts from other stressors like southern pine beetle.

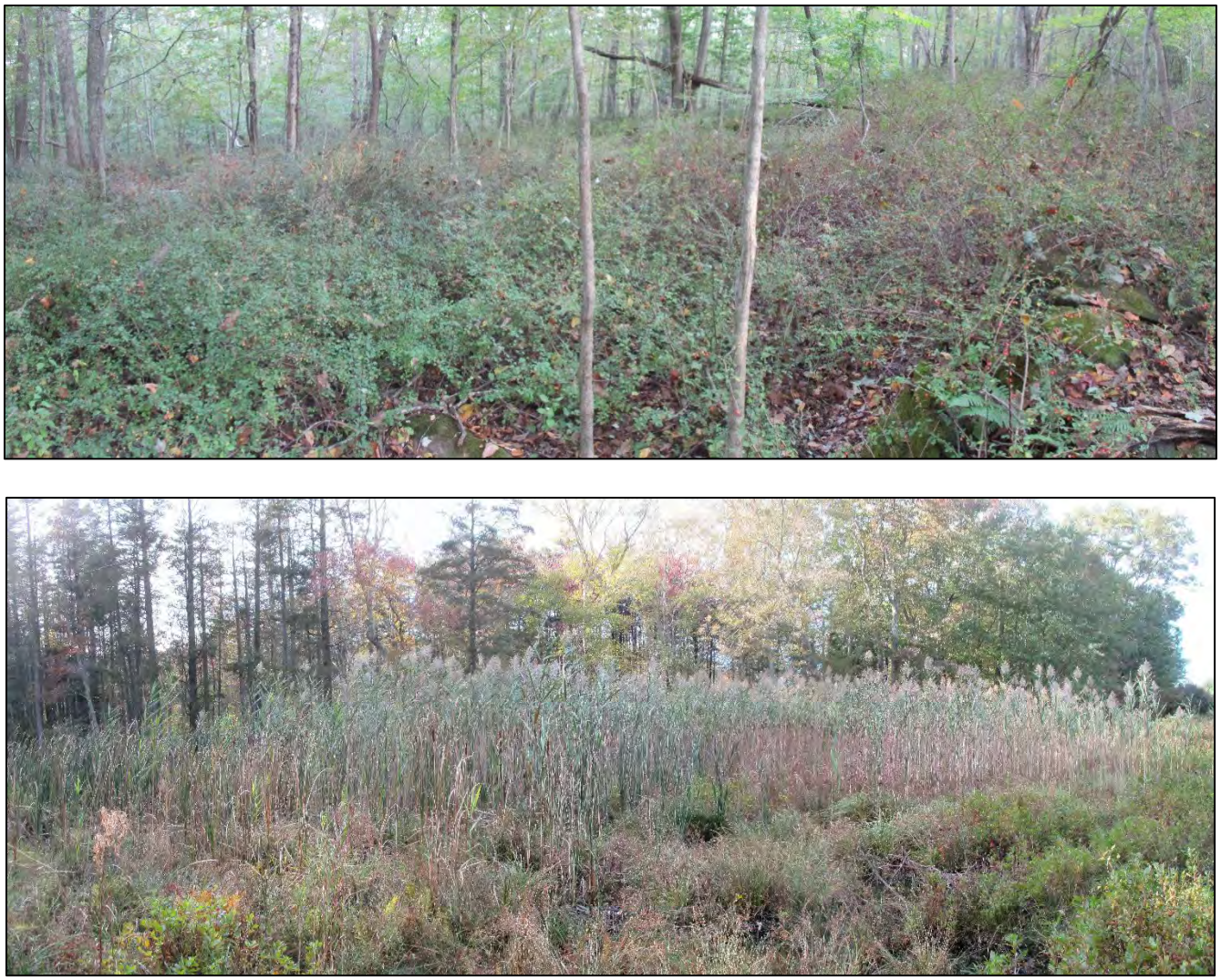
Forest stewardship strategies will affect how well forests adapt to a changing climate. Some compositional changes may be initiated by changes in soil moisture. Forest managers will strive to make appropriate decisions regarding species composition and site quality. Similarly, complex forest structure and reasonably diverse species mixtures will help promote climate resilience in both managed and unmanaged stands. Thinning in stands which are expected to be impacted by climate change may be a good strategy for prolonging health. Intentionally selecting against maladapted future species on poorly suited sites will help build climate-resilience into the residual forest. Similarly, fostering abrupt transition through more aggressive management action may be advisable in climate-threatened forests.

Invasive Species

Invasive plant species are present in generally low numbers throughout the property, but are overwhelming in a few concentrated areas. The most common species noted was Japanese barberry, appearing in approximately 25% of sample plots during the 2018 forest resources inventory conducted by Ferrucci & Walicki, LLC. Other common species include burning bush (*Euonymus alatus*), Asiatic bittersweet (*Celastrus orbiculatus*), multiflora rose (*Rosa multiflora*), Japanese stiltgrass (*Microstegium vimineum*), which was primarily located along walking

trails[13], and some common reed (a.k.a. phragmites *Phragmites australis*) which was noted in Pequot Swamp Pond as well as in portions of the utility rights-of-way.

The southwestern portion of Stand 14 was infested with multiple species of invasive plants. There appeared to be an epicenter near the peak of a hill where a gap in the forest canopy allowed these plants to establish and spread. If feasible, this area should be treated immediately to reduce the seed source and attempt to limit its spread to surrounding areas. Another prominent patch of invasive plants is located near the old parking area north of Ingham Hill Road in Old Saybrook. Again, if feasible, this area should be treated immediately for similar reasons. Treating the plants currently there will help to suppress the spread of those invasive species.



Top: Japanese barberry in Stand 14 is excluding the growth of almost all other vegetation where it grows this densely. This condition results in a reduction of biodiversity and productivity. Above: A pocket of phragmites overtops some native cattail in the southern portion of Pequot Swamp Pond. Continuing efforts to reduce populations of invasve plants here and throughout the property can help ensure continued presence of diverse vegetation and the wildlife that depend on it.

[13] Treatment of stiltgrass was conducted along some of the trails in 2018 using a weedwhacker.

The treatment of invasive species prior to any management activity that creates canopy gaps and/or soil disturbance is critical to maintaining biodiversity and the future health of the forest. Invasive species will often take advantage of new sunlight more efficiently than native plants. That characteristic is in part what makes them successful to the point where they become invasive. Plants like Japanese barberry, multiflora rose, burning bush, Asiatic bittersweet, and others can completely occupy the growing space made available on the forest floor under canopy gaps. Significant populations of invasive plants can prevent the establishment of regeneration of native species of trees, shrubs and herbs if not treated. In the long-term, this can mean fewer native plants on the landscape, reduced food availability for local wildlife, reduced biodiversity, and higher forest operation costs.

Regeneration

During the 2018 forest inventory, regeneration was observed in two ways. The first was a nested 1/1000th acre plot at each inventory point that tallied seedlings[14] greater than 1ft. tall and saplings[15]. The second method of observation was qualitative notes made at each inventory point that recorded whether a species was present or not, regardless of the sapling or seedling's height, and regardless of whether the sapling or seedling fell within the 1/1000th acre nested plot.

Most of the property is lacking significant amounts of diverse sapling-sized trees in the understory and midstory. Black birch and beech makes up most of the regeneration. The lack of diversity in saplings that appeared in the nested plots is unlikely to be a result of plot location due to the amount of plots at which information was gathered. It is more likely to be a reflection of forest conditions as a whole. The same can be said for seedlings with the exception of American beech. Most stands have established beech seedlings, which is an indication these stands have dense overstory canopies with minimal amounts of direct sunlight reaching the forest floor. While not appearing in nested plots, black birch, red maple, and various oak saplings were commonly found throughout the property.

Densely growing beech saplings in the midstory shown here in Stand 8 can create monocultures and limit the development of other species. Their presence if often an indication of relatively complete canopy closure and a lack of sunlight reaching the forest floor.

In addition to lack of sunlight, browsing by deer may also be impacting the amounts of regeneration throughout the property. The overall lack of desirable regeneration in the understory should be addressed with future management practices that focus on creating gaps in the canopy to encourage additional size and age class diversity of trees. More detail on stand management recommendations can be found beginning on page 28 (Stand Descriptions).

The tables on the following two pages detail observed regeneration in each stand. Species that were tallied within the 1/1000th acre plot are marked with the number of stems per acre of saplings and seedlings. All other

[14] A tree less than 0.5" DBH

[15] A tree between 0.5" - 4.5" DBH

species observed near the plot but located outside the 1/1000th acre (or, in the case of seedlings, less than 1ft. tall) are marked with an 'x'. Stands 21, 22, and 24 are excluded because they are not considered forested.

Saplings

Stand	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	23	Total
American Chestnut																						0
Beech	154	x	100	x		x	x	250		x	x	x	1000	x	125	714	167	x			x	308
Black Birch	154	x		x		x	x	x	1000	83	250			83	x	857	x	x	x			0
Black Cherry										x												100
Black Oak	x									x							x		x	x		0
Blackgum																				x		667
Chestnut Oak																						0
Dogwood						x								x	x							0
Eastern Hemlock	x									x							x					0
Eastern Red Cedar	x									x												0
Elm						x																0
Grey Birch																						0
Hickory	x		x	x		x		x		x		x		x	x		x					667
Hophornbeam	x		x	667		x		250	x	x	x	x		x	375	143	x	x				100
American Hornbeam	x			x							x	x		250	125	x				x		0
Northern Red Oak	x	x	x	x					x	x							x			x		250
Norway Spruce																						83
Paper Birch																						1000
Pin Oak																						500
Red Maple	x	x	x			x		x		x	x	x		x	125				x	x		0
Sassafrass	x		x						x	x							x	x				750
Scarlet Oak	x									x												333
Serviceberry				x																		1000
Sugar Maple			x								x				x		x					250
Swamp White Oak																				x		0
White Ash																						1714
White Oak	x							x	x	x							x	x	500	x		167
White Pine																						0
Yellow Birch																				x	x	0
Yellow Poplar		x																				0

Seedlings

Stand	American Chestnut	Beech	Black Birch	Black Cherry	Black Oak	Blackgum	Chestnut Oak	Dogwood	Eastern Hemlock	Eastern Red Cedar	Elm	Grey Birch	Hickory	Hophornbeam	American Hornbeam	Northern Red Oak	Norway Spruce	Paper Birch	Pin Oak	Red Maple	Sassafrass	Scarlet Oak	Serviceberry	Sugar Maple	Swamp White Oak	White Ash	White Oak	White Pine	Yellow Birch	Yellow Poplar	Total
1		231	77		x											x				154	x	x		77			231	x			769.5
2		x			x											x						x					x				0
3		x	100		x			x					x	x						x	x			x		x	x				100
4		x	x	x	x								333			x						x				333	x			x	666.6
5																															0
6		x			x								x			x						x		x			x				0
7		1000												x						x								x			1000
8		750			x									x		x				x							x				750
9		167			x											x						x					x				166.7
10		x	x		x								x	x		x				x	x	x				x	x	x			0
11		x			x										x	x				x		x				x	x				0
12		750	x		x											x				x		x					x				750
13		2000																													2000
14		83	x		x								x	83	x	x					x	x		x			x				166.6
15		250	375		x								x	125		x					x	x					x				750
16		286	143		x								x		x	x						x				x	x				428.6
17		x	x		x									x		x				x		x					x				0
18		x	x		x											x				x	x	x					x				0
19					x																						x				0
20		x													x					x						x	x				0
23		x																													0

Stand Descriptions and Recommendations

The following is a stand-by-stand description of current conditions, desired future conditions, and multiple use recommendations of potential activities to achieve stated goals. It is important to keep in mind that this is a guidance document and that management activities implemented on the ground must be flexible to respond appropriately to changing conditions or goals (i.e., adaptive management).

This property is important to many people and organizations, so public outreach and education is important to helping maintain clear understanding of what management is occurring on the property and why it is being undertaken. In addition, this property is one of the largest protected coastal forests in southern New England. Though this plan focuses only on the portions of The Preserve in Old Saybrook and Westbrook (TPSF), if feasible, the property should be treated as a single unit. Ideally, whenever feasible, management techniques and operations should complement those occurring in Essex and on other adjacent properties[16] and vice versa. The same is true for the adjacent property to the south of the Preserve also owned and managed by the Town of Old Saybrook. As part of the working forest concept for this property, management recommendations contained in this document are intended to:

- Maintain and enhance forest health, resilience, productivity, complexity, and long-term sustainability
- Protect water quality and soil stability
- Protect and maintain sensitive/critical habitats, plants and wildlife species known to exist here
- Maintain and enhance wildlife habitat diversity and biodiversity
- Provide educational opportunities and diverse recreational experiences for the public

Protecting and maintaining sensitive archeological sites (Eastern, 1999), and sensitive habitats and species noted in current NDDB information is also critical and will be part of the decision-making process for many if not all of the management activities considered for implementation. If over time, these goals stated above are largely met, it can help maintain the resiliency and productivity of this area for future generations.

Excerpt from the NDDB response

Three State listed plant populations are in imminent peril due to succession, and the habitats should be prioritized for management…Those occurrences of these habitats that have rare plant populations that are declining due to canopy closure should be prioritized for management.

At any given time, most of TPSF will contain relatively mature, relatively closed canopy forest which will benefit suites of species that use this forest condition for all or parts of their habitat needs. As stated earlier, property managers will work with biologists and botanists/plant community ecologists from DEEP Wildlife Division's Ecological Services (NDDB) and Wildlife Diversity Programs to determine specific locations where some treatments can help improve habitat for species the NDDB has identified as needing work done to maintain current conditions or begin the process of resetting succession for longer term viability of those species. As part of the multiple use framework by which this state forest is to be managed, periodic timber harvests will be conducted to achieve goals laid out in this or future plans. Forest stewardship will be planned to benefit forest-dependent species, including birds in part by increasing tree age class and species diversity.

[16] This is meant to include any work undertaken on adjacent lands also owned and managed by the Town of Old Saybrook, but it does not need to be specific to ownerships that are partners to this property.

Many of our neo-tropical migrant birds that are considered forest specialists or even species that prefer mature woods benefit from the creation of canopy gaps, provided the vegetation that regenerates is composed of native species[17]. Birds such as eastern wood-pewee, scarlet tanager, and the cerulean warbler which are typically considered to be forest interior species, all utilize areas with canopy gaps and regenerating forest for at least some of their habitat needs (especially feeding) during the breeding season (Audubon Connecticut, 2020) and post-fledging period. Usable canopy gaps are created both through natural disturbances (weather, insect, and/or disease related), and sometimes they are intentionally created by forest stewardship activities.

The recommendations in this plan are designed to work with the strengths of each stand and site, and are intended to maintain or enhance conditions based on the goals as laid out in the beginning of this document on page 3.

Above: A natural amphitheater seen here in Stand 14 is one of many landscape features we have of glacial activity at the property. There are many glacial erratics (boulders dropped by retreating glaciers) also found in many parts of the property (below seen in Stand 15).

[17] Some species including the hooded warbler (which can breed in forests in Connecticut) can and do nest in areas dominated by invasive plants, but on balance for a variety of reasons promoting native species is preferable.

Stand 1

Acres – 92.5 ac.

Cover Type – White oak/red oak/hickory

Size – Small Sawtimber

Stage of Development[18] – Stem Exclusion

Major Soils:

- Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky

Water features – Most of this stand is well-drained. There is a forested wetland and drainage with associated riparian areas along the eastern and southern boundaries. In addition, there is a small wet area in west-central portion of the stand.

Topography – Moderate to steep southern aspects. Some areas to the east and west are gently rolling. Thin soils near the higher elevations of the stand with ridgetop conditions in some places. There are several sections of exposed ledge.

Access – A walking trail that could serve as an access trail enters from the west off of Route 153. The road passes through the stand and turns north along its eastern border. There are several more walking trails that traverse the northern part of the stand near the height of land. There is a wet section of trail with a wood-planked road in the eastern portion of the stand just south of the finger of wetland.

Planking in a wet section of old forest road in Stand 1.

Stand description – This stand is located in the far western portion of the property. Trees in the overstory are a mixture of sawtimber-sized hardwoods primarily composed of beech, black birch, black oak, northern red oak, and white oak. Hickory, red maple, and scarlet oak can also be found. There are some scattered eastern redcedar stems at the higher elevations and sugar maples along the troughs and at least once occurrence of blackgum in the western portion of the stand. There are a fair amount of saplings, the majority of which are beech and black birch. In addition, there are scattered black oak, hemlock, redcedar, hickories, hophornbeam, American hornbeam, red oak, red maple, sassafras, scarlet oak, and white oak. Seedlings include many beech and white oak, some red maple, black birch, and sugar maple, and scattered black oak, red oak, sassafras, scarlet oak, and white pine. Shrubs include pockets of mountain laurel, ferns,

[18] There are four recognized stages of development that will be referred to in this Plan. They are stand initiation, stem exclusion, understory reinitiation, and old growth. For more information see:

https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5413728.pdf

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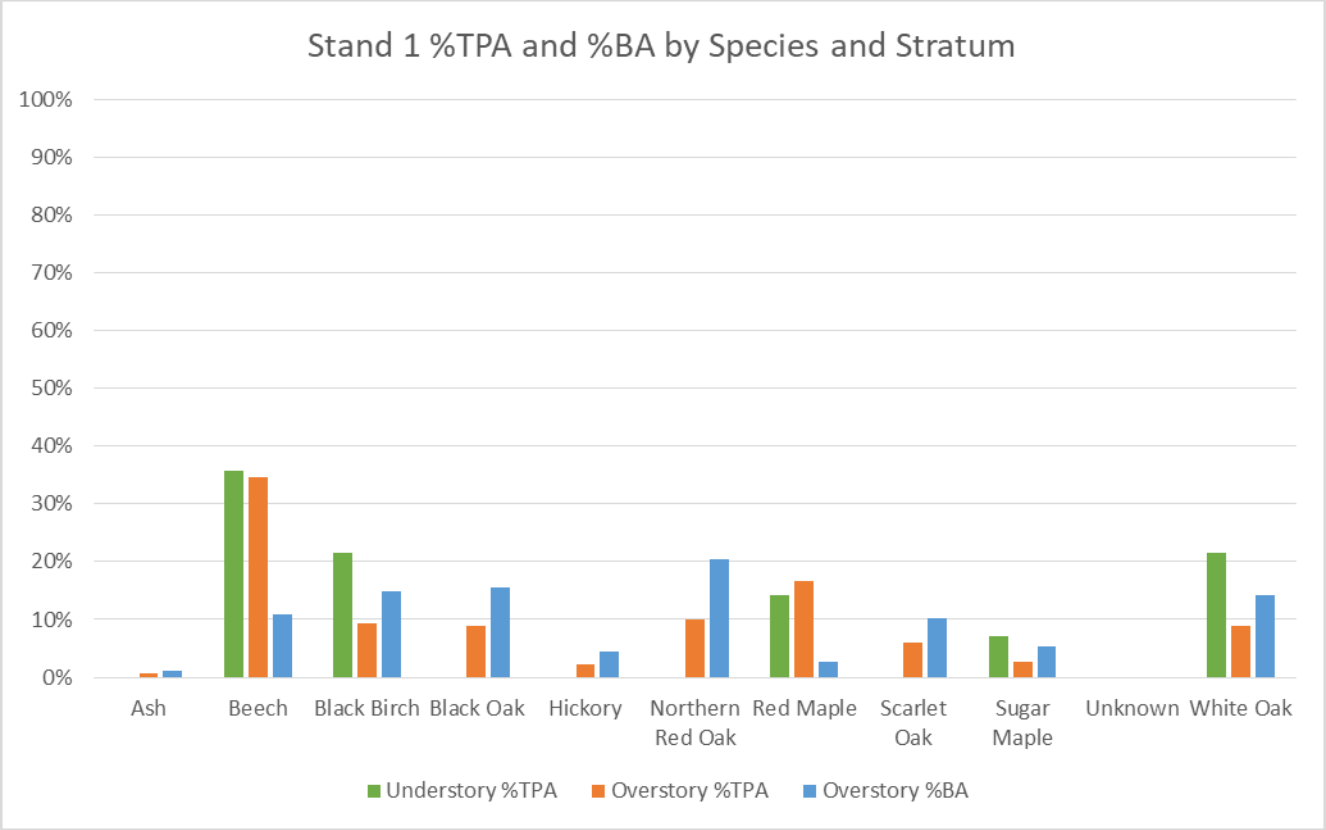
huckleberry, and lowbush blueberry, as well as scattered maple-leaf viburnum, sedge, Indian pipe, Canada mayflower, Virginia creeper, dewberry, trillium, and raspberry.

Management History – It is likely that this stand as well as most of the rest of the property was at one time cleared for agricultural purposes. In the far western portion of the stand near the town boundary with Westbrook, there is an old borrow pit adjacent to the main access road that may have at one time been used for sand or gravel excavation, but is now overrun with invasive plants. Some stumps were observed during the 2018 inventory, but the exact date of the last cutting is unclear. Given the current stand conditions, it is likely the previous harvest was a light treatment. The Ingham Home Foundation is found on the boundary between this stand and Stand 20 along the current red trail (see Interim Trail Map in Appendix N (G)). Based on the 1934 aerial photo many old road and trail networks existed at that time as did a patchwork of reverting forest and semi-open conditions. Softwood played a more significant role in the composition of the forest at that time compared to today. In addition, there was a cleared corridor that ran diagonally through the northern portion of the stand that is still partially visible today (based on 2019 aerial photography).

Health – Several invasive species were found in this stand, including Japanese stiltgrass along the trails, Japanese barberry, multiflora rose, Asiatic bittersweet, and burning bush. Many black birch were infected with Nectria canker and should be targeted for removal during the next treatment. Some beech bark disease and emerald ash borer (EAB) were also observed in this stand. While some desirable seedlings are present, the overall lack of desirable regeneration both in the seedlings and sapling size classes is a concern. Future management should consider treating the stand in a way that encourages successful tree regeneration of diverse species.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in most of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 1									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	769.2	-	-	-	-	-	-	-	-
Saplings	307.6	3.9	-	35.3	0.8	-	-	-	-
Sawtimber	51.7	69.2	5.606.8 MBF	49.9	66.9	5,393.2 MBF	49.7	67.7	5,497.1 MBF
Poletimber	157.6	45.4	7.0 cord	105.2	16.9	3.3 cord	25.0	22.3	3.2 cord
Snags	3.7	2.3	-	-	-	-	-	-	-
Total	**1,289.8**	**120.8**	**-**	**190.4**	**84.6**	**-**	**74.7**	**90.0**	-
Quadratic Mean Stand Diameter (Trees > 5") = 11.7"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 14.5"									



TPA stands for trees per acre
BA stands for basal area
Stratum[19] refers to where (vertically) the trees are located (i.e., understory or overstory)

Desired future conditions:

Continue to convert the manageable portions of this stand to uneven-aged conditions. Retain high species diversity. Species to manage for include sugar maple, oaks, hickory, and where feasible, eastern redcedar. Retain snags and cavity trees where safety is not an issue.

Management Recommendations:

Currently, this stand is considered to be overstocked for the size and species present here. That means that there are too many trees for the growing space that is available, most notably sunlight. This has potential consequences both in terms of health and vigor of the trees in the overstory (too much competition can weaken many trees), and the understory specifically in terms of diversity of regeneration. The topography of this stand makes forest management with equipment difficult. In some areas, the terrain is too steep to operate safely in addition to there being some sensitive areas where active management may not be advisable. In other areas, trees are small and poorly formed due to dry and shallow soils. There are some areas that can support active management that includes tree cutting as evidenced by old stumps, but the overall percentage of manageable area compared to the entire stand is low. In those areas, however, there is work that can be done.

[19] In other parts of this plan the strata are broken down further into understory, midstory and overstory. See page 16 and Glossary in Appendix B for additional description.

2023

- The Ingham Home Foundation is located along the southeastern boundary of this stand and the riparian area surrounding the nearby drainage. If resources exist, consider treating all invasive plants (mostly Japanese barberry) in the area, and cutting trees off of the foundation to ensure their roots don't do damage to the stones as they grow or if the trees were to fall. If feasible, consider cutting additional trees in the area and replanting with low maintenance fruit and nectar producing flowers and shrubs for pollinators and wildlife. It would be advisable to conduct an archeological review prior to conducting management activity here to determine if there are any unknown special sites that should be avoided or somehow mitigated.

2025

- In operable areas where vetting has occurred to ensure no NDDB species will be negatively impacted by activities, conduct a single tree and group selection harvest. Trees to remove include black birch and other undesirable trees to release pockets of oak and white pine regeneration. In conjunction with the single tree and group selection, attempt to release oak crop trees and create patch cuts (where it makes sense to do so based on overstory composition and condition) to release understory shrubs such as lowbush blueberry and huckleberry to enhance nectar, pollen and soft mast production as well as increase low cover. A controlled burn may also be considered in some of the isolated higher elevation sections to reinvigorate the huckleberry and blueberry. One location where thinning for oak would be appropriate is the finger in the northeastern section which is bounded east and west by forested wetland.

Ongoing

- In higher elevation portions of the stand where openings currently exist, attempt to manage those areas to maintain them as open or semi-open. This can be done with periodic clearing or thinning to reset succession (all or partially). In addition, creating some softer edges surrounding the openings can be beneficial for some species of wildlife that can use those areas for cover and potential nesting and/or forage areas. This should be done in consultation with NDDB species are reviewed for proposed areas.

- Monitor for and treat invasive plant species.

- Monitor health of beech trees and spread of beech bark disease and beech leaf disease. If disease appears to be spreading rapidly consider cutting and removing infected stems to reduce the amount of inoculum and nematode numbers present.

- Monitor for dead ash trees as a result of EAB or other pests/diseases. If dead trees are located near roadways or infrastructure they could be felled for safety purposes while working in adjacent areas in the stand.

- Consider rerouting trails or discontinuing some trails that may provide unnecessary access to sensitive areas or areas that contain sensitive or rare species.

Stand 2

Acres – 14.7 ac.

Cover Type – Mixed upland hardwoods

Size – Poletimber

Stage of Development – Stem Exclusion

Major Soils:

- Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky

Water features – There is a forested wetland and drainage with associated riparian area along sections of the northern boundary. In addition, the stand borders a small wetland along its southeastern boundary.

Topography – Gently rolling throughout most of the stand with some gentle northern aspects.

Access – Currently, there are no access roads for forest management with equipment, but there are two walking trails that enter the stand from a residential neighborhood to the west. There is a potential access road to the north, but a stream crossing would have to be constructed through a section of forested wetland in order to access this stand with equipment.

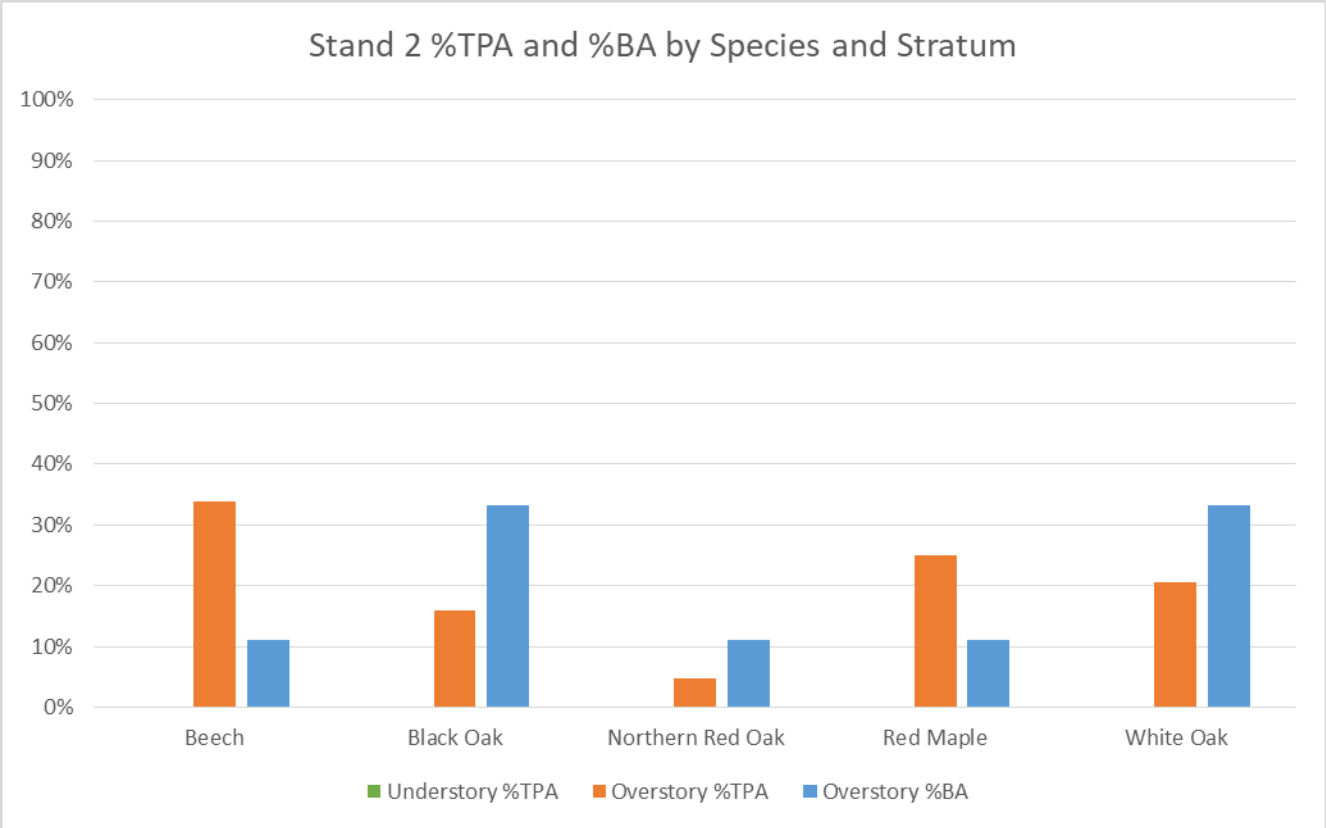
Stand description – This stand is located in the far southwestern portion of the property. Mixed hardwood poletimber with scattered oak sawlogs. Overstory species include beech, black birch, black oak, red maple, red oak, and white oak. Saplings include scattered beech, black birch, red oak, red maple, and yellow birch. Seedlings include scattered beech, black oak, red oak, scarlet oak, and white oak. In the understory, there were scattered lowbush blueberry, Canada mayflower, and sedge.

Management History – Some stumps were observed during the 2018 inventory, but the exact date of that harvest is unclear. Given the current stand conditions, it is likely the previous cutting was a heavy treatment. The 1934 aerial photo indicates that the area was at least partially forested at that time with a denser component of softwood trees than what exists today along its northern boundary with the riparian area along Stand 20. It is unclear if the area was impacted by the 1938 hurricane.

Health – This stand is in good overall health for the stage of development it is in. There were no major invasive species or tree health-related issues noted.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in most of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 2									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	0.0	-	-	-	-	-	-	-	-
Saplings	0.0	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	41.9	50.0	3,982.7 MBF	41.9	50.0	3,982.7 MBF	41.9	50.0	3,892.7 MBF
Poletimber	121.0	50.0	6.5 cord	63.7	20.0	2.7 cord	19.9	20.0	2.3 cord
Snags	0.0	0.0	-	-	-	-	-	-	-
Total	**162.9**	**100.0**	**-**	**105.6**	**70.0**	**-**	**61.8**	**70.0**	-
Quadratic Mean Stand Diameter (Trees > 5") = 9.9"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 14.3"									



Desired future conditions:

Over time, attempt to maintain oak in this stand using even-age management techniques. Retain species diversity. Species to manage for include all species that currently exist here and any scattered softwoods noted as well. Retain snags and cavity trees where safety is not an issue. Access will be difficult to conduct even-aged management, but in order to encourage the long-term persistence of important oak species even-age management techniques provide a better opportunity to create suitable conditions for their successful regeneration.

Management Recommendations:

Ongoing

- This stand is currently well-stocked for continued growth. Allow the stand to continue to develop for the next 10 years. A light thinning or crop tree release to encourage stand vigor and mast production may be considered during the next planning period.

- Monitor for and treat invasive species.

Stand 3

Acres – 72.1 ac.

Cover Type – Mixed upland hardwoods

Size – Poletimber

Stage of Development – Stem Exclusion

Major Soils:

- Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky

Water features – Forested wetlands with associated riparian areas surround most of this stand. In addition, there are pockets of forested wetlands in the stand's eastern half and at least two potential vernal pools in the central and northern portions of the stand.

Topography – Gently rolling in most areas with some steeper slopes and sections of exposed ledge in the northeast.

Access – A potential access road traverses the northern portion of this stand with several walking trails branching off of it to the southwest. These trails could be used for equipment access to most of the stand for forest stewardship purposes. There is one stream crossing over an old bridge along the potential access road just west of the stand boundary. The approaches to the bridge are wet. There is another area wet area in a trail just southeast of the old bridge.

An old bridge with wet approaches in Stand 3.

Stand description – The overstory of this stand is composed of mixed hardwood poletimber with some black oak, red oak, and white oak sawlogs. Species mix includes many common hardwoods found throughout southern New England. There are only scattered saplings of beech, hickory, hophornbeam, red oak, red maple, sassafras, and sugar maple. Seedlings are a similar mixture but contain a moderate number of black birch as well. Understory species include several heavy patches of mountain laurel along with Canada mayflower, maple-leaf viburnum, greenbrier, aster, sedge,

lowbush blueberry, partridgeberry, ferns, dewberry, Virginia creeper, trillium, princess pine, and eastern starflower.

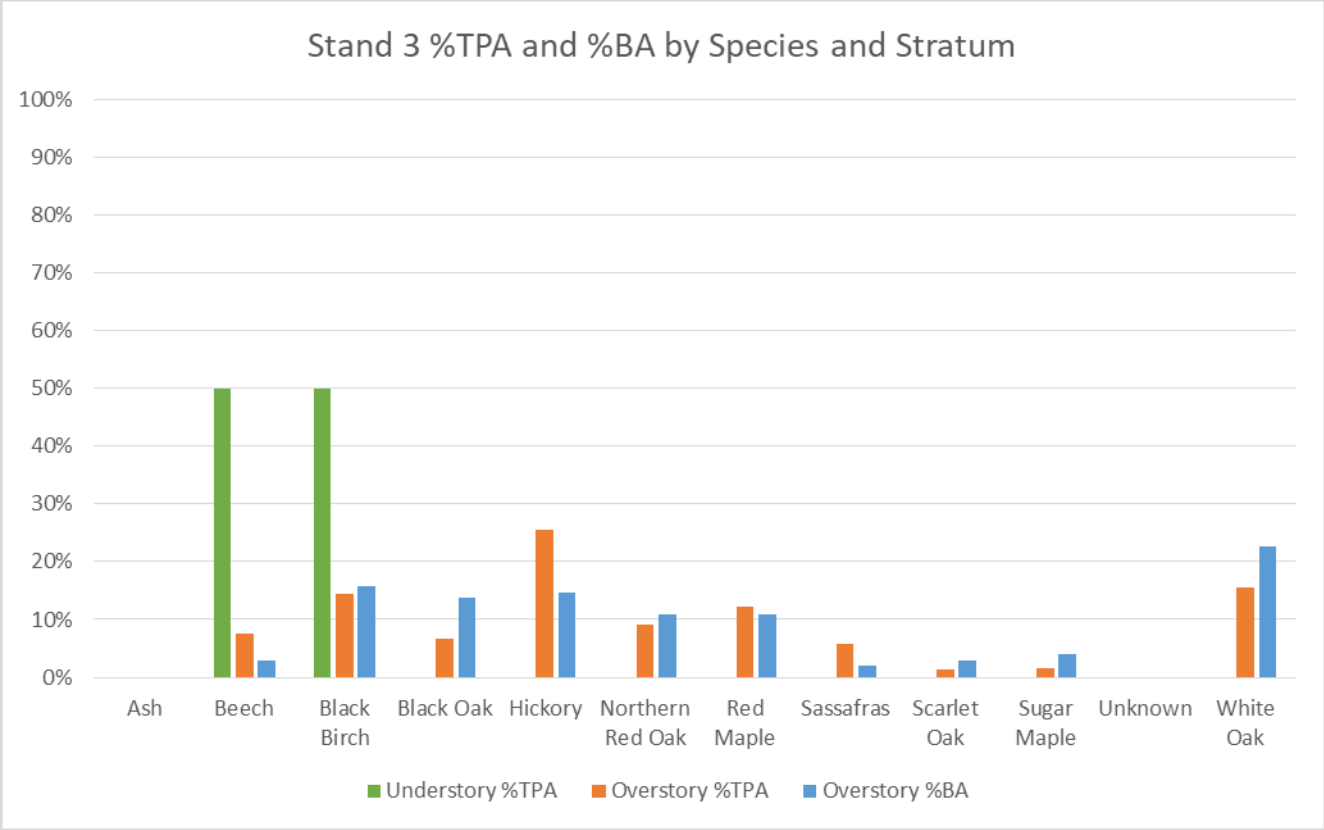
Management History – Some stumps were observed during the 2018 inventory, but the exact date of that treatment is unclear. Given the current stand conditions, it is likely the previous harvest was moderate in terms of the amount of trees cut. The 1934 aerial photo indicates that the area was mostly forested at that time with a much denser component of softwood trees than what exists today. It is unclear if the area was impacted by the 1938 hurricane.

Health – This stand is in good overall health for the stage of development it is in. There are areas of dense Japanese barberry and burning bush, and some of the black birch have evidence of Nectria canker.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in most of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 3									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	100.0	-	-	-	-	-	-	-	-
Saplings	100.0	3.0	-	11.5	1.0	-	-	-	-
Sawtimber	43.8	53.0	4,257.7 MBF	40.0	49.0	3,996.5 MBF	40.9	50.0	4,038.9 MBF
Poletimber	135.7	49.0	7.7 cord	40.3	17.0	3.1 cord	24.0	18.0	2.6 cord
Snags	23.0	8.0	-	-	-	-	-	-	-
Total	**402.5**	**113.0**	**-**	**91.8**	**67.0**	**-**	**64.9**	**68.0**	-
Quadratic Mean Stand Diameter (Trees > 5") = 9.7"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 13.4"									

Releasing some of the huckleberry in the understory by cutting some small groups of overstory trees can enhance flowering and fruit production. This area is located in the southwestern portion of Stand 3.



Desired future conditions:

Over time, convert portions of this stand (where maple, birch and beech are the predominant species) to uneven-aged conditions. In portions of the stand dominated by oak, consider attempting to manage these areas for oak over the long-term using even-age management techniques. In either case, retain high species diversity. Species to manage for include sugar maple, oaks, hickory, sassafras, good quality black birch and red maple, as well as any scattered softwoods noted. Retain snags and cavity trees where safety is not an issue.

Management Recommendations:

Current stocking levels in this stand are high, but are not yet to the point where the stand is considered overstocked for this forest type and size of trees.

<u>2023</u>

- Treat invasive plants where noted
- Consider attempting to improve the approaches to the old bridge that crosses near the drainage along the northern boundary of the stand.

<u>Ongoing</u>

- Continue to monitor for, and treat, invasive species.

- Attempt to enhance potential for access for forest management and other purposes.

- For the most part this stand is inaccessible for equipment to aid in management activities, but would benefit from non-commercial forest stand improvements. The stand is in a stage of development where releasing crop trees would be appropriate and desirable, but given the high component of poletimber, such an operation would likely be non-commercial. If a crop tree release is to be done, retain healthy, good quality individuals of a wide variety of species. Preemptively treat invasive plants noted in any areas in which cutting is to occur. A three to four sided crown touching release would likely benefit the residual trees if this is to be done. Otherwise, allow this stand to continue to develop and re-examine during the next plan period.

- Work with Wildlife Division staff to determine if any areas should be treated to create canopy gaps.

Stand 4

Acres – 20.4 ac.

Cover Type – Mixed upland hardwoods

Size – Small Sawtimber

Stage of Development – Stem Exclusion

Major Soils:
- Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky

Water features – A riparian area surrounding Roaring Brook runs along the northern and western boundaries.

Topography – Gentle western aspects throughout most of the stand with a small peak near the eastern boundary where there is also some exposed ledge.

Access – Currently there are no roads that access this stand and connect to other stands or a road which effectively isolates the stand. Additionally, the stand is located just south of a private residence, further cutting off most direct access. There are several walking trails that go from this private residence southwest to another residential neighborhood. There is an old road that runs northeast-southwest through the eastern portion of the stand. The most reasonable access points would come from further east and north along Ingham Hill Road and would have to go through the eastern redcedar (Stand 5).

Stand description – This stand is located in the southcentral portion of the property. Trees here are growing on abandoned farmland that began reverting to forest only a few years prior to 1934. It is classified as mixed hardwood sawtimber comprised mostly of black birch, black oak, white oak, tulip-poplar, sugar maple, and red oak saw logs. Several wolf trees are also present. Other species include hickory, hophornbeam, and white ash. Saplings include a significant amount of hophornbeam, as well as scattered beech, black birch, hickory, American hornbeam, red oak, and serviceberry. Seedlings include some pockets of white oak, hickory, and white ash with scattered beech, black birch, black cherry, black oak, red oak, scarlet oak, and Tulip Poplar. Shrubs include sedge,

maple-leaf viburnum, Canada mayflower, white snakeroot, greenbrier, trillium, dewberry, and lowbush blueberry.

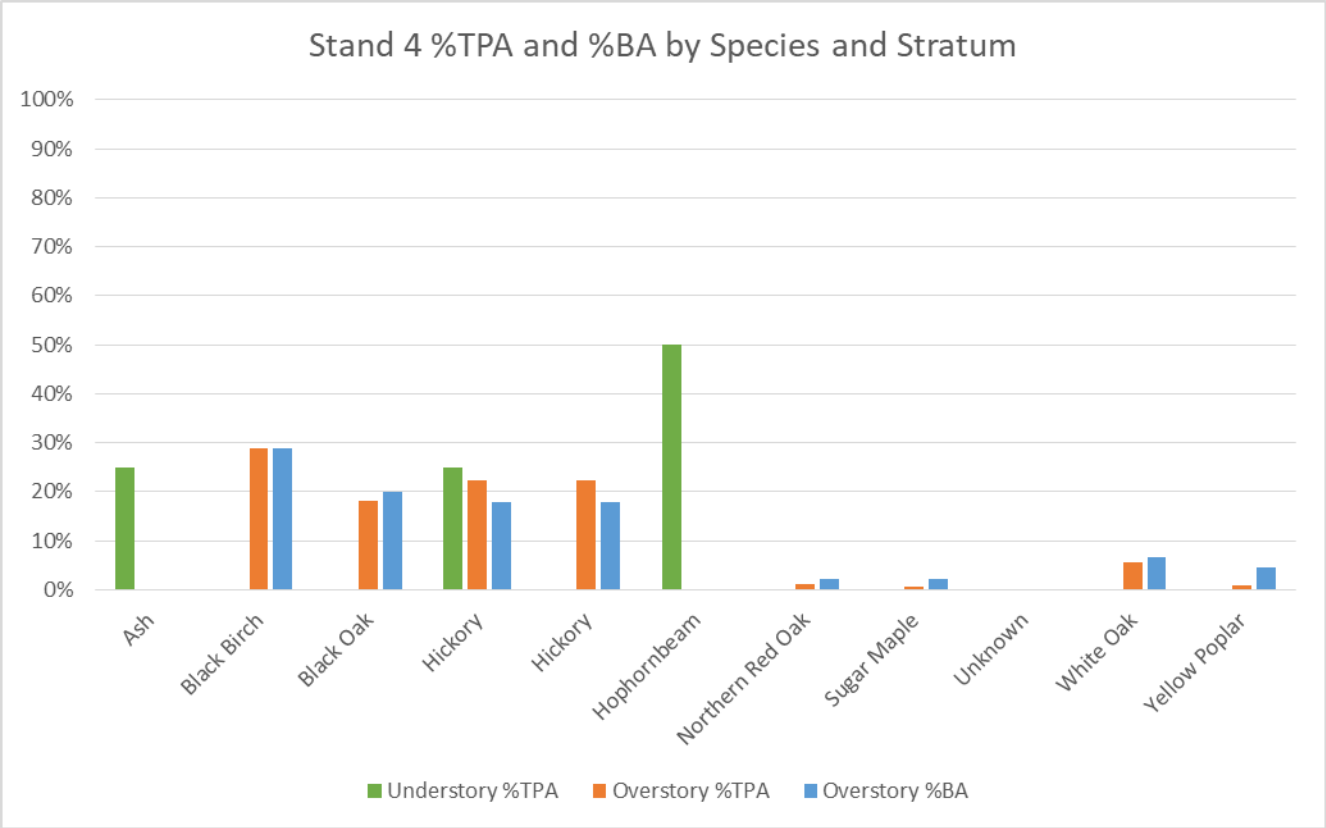
Management History – This stand was used as agricultural land more recently than much of the rest of the property. It is unclear whether any forest management activities have occurred following field abandonment. The 1934 aerial photo indicates that the area was mostly open at the time that photo was taken.

Health – The most obvious health issue in this stand is the presence of invasive species, specifically Japanese barberry. Other species present include burning bush, Asiatic bittersweet, and multiflora rose. Treating these invasives prior to any other management activity will be critical to the future health of the stand. Some of the black birch also displayed Nectria canker. Otherwise, the stand is lacking in desirable tree regeneration, possibly as a result of the presence of invasives and possibly the relative stage of normal stand succession/development.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in most of this stand. See Natural Diversity Data Base map in Appendix N (K).

This wolf tree in the northcentral portion of Stand 4 is a remnant of when the area was in an open condition.

Stand 4									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	666.7	-	-	-	-	-	-	-	-
Saplings	666.7	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	52.3	66.7	5,828.7 MBF	48.7	63.3	5,586.4 MBF	52.3	66.7	5,828.7 MBF
Poletimber	123.9	56.7	8.5 cord	27.2	13.3	2.8 cord	34.0	23.3	3.0 cord
Snags	21.0	16.7	-	-	-	-	-	-	-
Total	**1,530.6**	**140.0**	**-**	**75.9**	**76.7**	**-**	**86.3**	**90.0**	-
Quadratic Mean Stand Diameter (Trees > 5") = 10.7"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 13.4"									



Desired future conditions:

Over time, if reasonable access can be gained, attempt to manage this stand using even-age techniques to attempt to regenerate species such as tulip poplar, oaks and hickories. Where sugar maple currently exists, consider leaving higher residual basal areas if treatments are to occur in order to maintain the viability of this species in this area. Climate change models predict a northward shift of range for sugar maple and given its relative shade tolerance can continue to grow with some competition. Retain high species diversity. Species to manage for include sugar maple, oaks, hickory, tulip poplar, and good quality black birch, as well as any scattered softwoods noted. Retain snags and cavity trees where safety is not an issue.

Management Recommendations:

<u>2021</u>

- If resources are available, consider attempting to treat invasive plants. Where feasible (i.e. where light and soil conditions will permit) consider replanting with native species that can provide a source of nectar, mast and cover.

<u>2027</u>

- Currently, this stand is overstocked based on species and size class of trees present. The primary species is black birch, which for a variety of reasons including its susceptibility to Nectria canker (present in this stand) is not ideal. If access for machinery can be gained into this stand, consider creating canopy gaps using group selection and/or small patch cuts to release advance white oak seedlings and single tree

selection or light thinning to remove unacceptable growing stock (UGS) trees. If it makes sense to do so based on composition and condition of overtopping vegetation, create small gaps over existing pockets of blueberry/huckleberry. This can maintain their vigor to ensure they are providing nectar and mast and growing densely enough to provide low cover. This is likely to be a light treatment and should be done in conjunction with other activities in nearby stands in order to improve efficiency. Treating invasive species prior to any tree cutting is critical to attempting to establish control of invasives in the short and long-term here.

Densely growing huckleberry in the northeastern portion of Stand 3 could benefit from some additional sunlight by expanding the gap that currently allows some sunlight to reach the forest floor.

Stand 5

Acres – 2.2 ac.

Cover Type – Eastern redcedar/hardwood

Size – Poletimber

Stage of Development – Stem Exclusion

Major Soils:

- Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky

Water features – None

Topography – Flat

Access – There are no access roads or walking trails that pass through this stand, and it is adjacent to private property to the north. Access can be gained on foot from Ingham Hill Road through Stand 6.

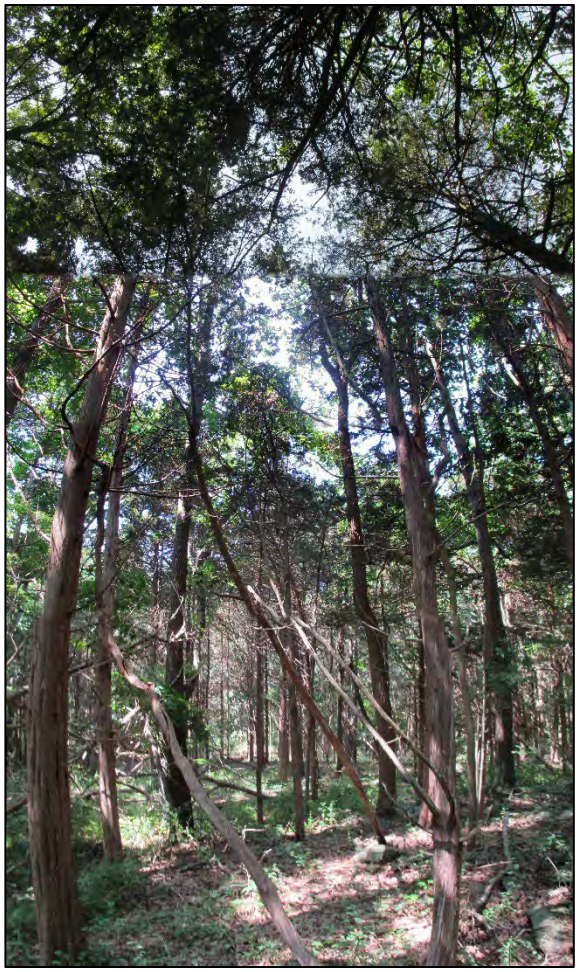
Stand description – While no inventory plots to collect quantitative data were taken in this stand, visual observation suggests it is primarily an eastern redcedar stand with some scattered hardwoods including oaks and black birch beginning to overtop the cedar. Understory is mostly absent, but where it exists is a mix of

herbaceous species and invasive plants. Some of the invasives are vines and have begun to climb into the canopies of the cedar.

Management History – This stand was once used as farmland more recently than much of the rest of the property. The 1934 aerial photo indicates that the area was beginning to revert to forest at that time and scattered redcedar were already present.

Health – This stand is a valuable asset to habitat portfolio on this property and in the area in general because there are very few areas that contain enough softwood to be classified as a stand (though with that said, this stand is small). Currently, hardwoods growing amongst the redcedar are beginning to overtop them. Since these cedars are so shade intolerant and in fact are considered pioneer species, being shaded by competing tree will eventually cause their decline and mortality. Asiatic bittersweet in the understory has begun to reach into the middle and higher portions of the crowns of some of the trees.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in all parts of this small stand. See Natural Diversity Data Base map in Appendix N (K).



Eastern redcedar in Stand 5 provides some of the densest softwood cover on the property

Desired Future Condition:

Over time, retaining and potentially expanding the softwood presence in this stand (and if feasible proximal portions of adjacent stands) can help ensure the diversity that this area currently provides remains. It is unlikely that given the small acreage of this stand silvicultural techniques will facilitate much in the way of natural regeneration so managing this stand as an even-aged softwood inclusion may work in the short term. Long term it may be necessary to consider plantings once the cedar begin to decline from age. If desired, softwoods should eventually be replanted here to ensure continued presence of softwoods.

Management Recommendations:

<u>2023</u>

- Cut bittersweet vines in cedar trees to stop their progress and attempt to retain cedar vigor

<u>2027</u>

- Release cedar trees that are healthy enough to respond to release by removing adjacent overtopping hardwood competition.

Ongoing

- Monitor for and treat invasive species.

Stand 6

Acres – 17.6 ac.

Cover Type – Mixed upland hardwoods

Size – Medium Sawtimber

Stage of Development – Stem Exclusion

Major Soils:

- Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky

Water features – A semi-open wetland that may act as a vernal pool is located along this stand's northeastern boundary. Otherwise, the stand is fairly well-drained.

Topography – Varies from gently rolling in some areas to moderate eastern aspects in others. Some exposed ledge was noted in the northeastern section of the stand.

Access – The northern boundary of Stand 6 abuts Ingham Hill Road. There are no potential access roads or walking trails, though a partially cleared and flat area in the northern part of the stand would provide good access and/or could act as a potential landing area.

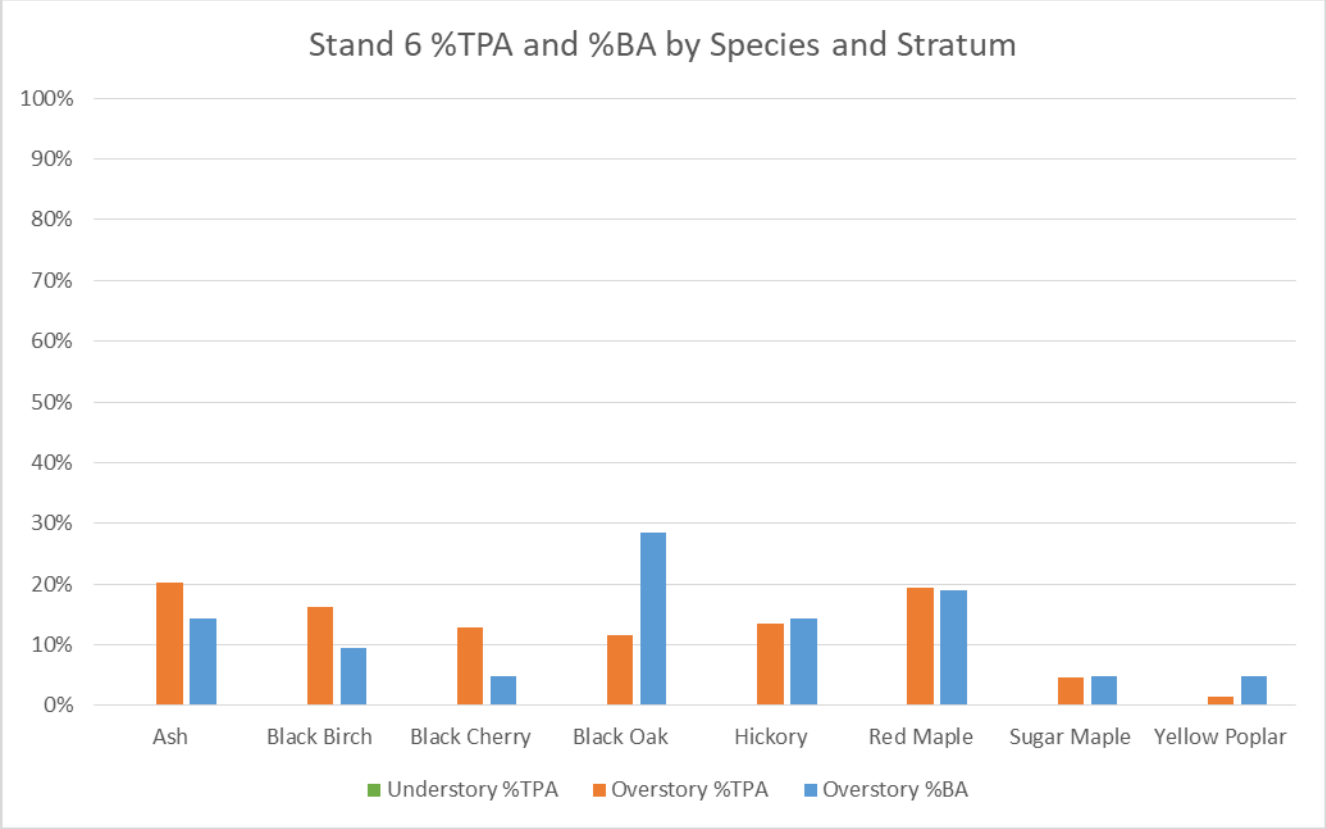
Stand description – This stand's overstory is comprised mostly of black birch and black oak sawlogs with some red oak, sugar maple, white oak, and tulip-poplar as well. The understory is lacking in regeneration. Saplings include scattered beech, black birch, dogwood, elm, hickory, hophornbeam, and red maple. Seedlings include scattered beech, black oak, hickory, red oak, scarlet oak, sugar maple, and white oak. Shrubs include trillium, pyrola, sedge, Indian pipe, grape vine, mountain laurel, raspberry, and Virginia creeper. There are some small existing canopy gaps within the stand. Where these exist, mostly barberry has regenerated.

Management History – Stonewall evidence in the center of the stand indicates that this area was likely once cleared for agricultural purposes. The far western portion of the stand was still open when the 1934 aerial photo was taken, though much of the rest of the stand appears to have begun to revert to forest already by that time. No stump evidence was noted.

Health – There are very dense patches of Japanese barberry in this stand, as well as scattered individuals and small pockets of Asiatic bittersweet, multiflora rose, and burning bush within the stand and Japanese stiltgrass along the road. These invasives should be treated before/if any management activities that involve the cutting of trees can take place and likely should be treated regardless of whether or not any additional management activities occur. The lack of established native tree regeneration is also a concern for the future.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in most of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 6									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	0.0	-	-	-	-	-	-	-	-
Saplings	0.0	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	32.4	60.0	6,005.9 MBF	29.6	55.0	5,571.3 MBF	27.0	55.0	5,648.4 MBF
Poletimber	54.8	45.0	5.6 cord	0.0	0.0	0.0 cord	24.4	25.0	3.0 cord
Snags	0.0	0.0	-	-	-	-	-	-	-
Total	**87.2**	**105.0**	**-**	**29.6**	**55.0**	**-**	**51.4**	**80.0**	-
Quadratic Mean Stand Diameter (Trees > 5") = 13.8"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 15.8"									



Desired Future Condition:

Over time, attempt to treat invasive plants to reduce their densities and convert the stand to an uneven-age condition. Retain species diversity. Retain a buffer surrounding the potential vernal pool in the eastern portion of the stand to ensure that habitat feature remains viable and to limit any potential negative impacts. Promote a mixture of tree sizes and ages using small and medium-sized canopy gaps. Attempt to develop a road or trail system through which Stand 4 and 5 may be accessed. A portion of this area could also act as a future parking and/or landing because it is relatively flat, well-drained and adjacent to Ingham Hill Road. Retain wolf trees, snags, and cavity trees wherever feasible.

Invasive Japanese stiltgrass grows along the roadsides in Stand 6 and 10 adjacent to Ingham Hill Road.

Management Recommendations:

2023

- Work with the town (or whoever is in charge of mowing roadsides) to develop protocols for mowing (including timing of mowing and cleaning of machinery) that will limit the spread of roadside stiltgrass. In addition, attempt to reduce populations of existing stiltgrass. If feasible attempt to combine with other treatments to reduce or ideally eliminate populations there.

- If resources are available, consider attempting to treat the dense pockets of barberry in the southern and western portions of this stand. If control can be gained, there is a good diversity of trees in the overstory (hickory, tulip poplar, oak and maples) and some existing canopy gaps, which could facilitate seeding and establishment of desirable tree regeneration.

<u>Ongoing</u>

- Consider attempting to develop a road and/or trail system through this stand to access Stand 4 and 5.

- Tree density in this stand is reasonable for continued growth during this plan period (i.e. the stand is not yet overstocked). Aside from invasive plant treatments, allow the trees in this stand to continue to grow and develop. In future plan periods, if ground conditions warrant (i.e. if invasive plants can be controlled) and existing canopy gaps continue to close indicating higher stocking levels, attempt to regenerate portions of the stand using group selection with some single tree selection of declining individual mature trees.

<u>Stand 7</u>

Acres – 16.3 ac.

Cover Type – White oak/red oak/hickory

Size – Poletimber

Stage of Development – Stem Exclusion

Major Soils:

- Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky

Water features – A forested wetland and associated drainage runs along the eastern stand boundary.

Topography – Two hills dominate the middle of the northern block of this stand, which creates gentle to moderate slopes of all aspects. Exposed ledge is also visible in both the northern and southern blocks of this stand.

Access – A potential access road begins at Ingham Hill Road (in Essex) and runs along the western boundary of the northern block of this stand. There are walking trails that weave through this stand as well at least one of which appears to be the remnants of an old skid road. The southern block of this stand, roughly 2.5 acres, is separated from the rest of the stand by a power line right-of-way. There is an existing road and an old bridge in the southern portions of the southern block of the stand.

Stand description – This stand is found in the northwestern corner of the property and is bisected by a transmission corridor. The stocking is composed of mostly mixed hardwood poletimber with some black oak sawlogs. Overstory species include American chestnut, beech, black birch, black oak, red maple, red oak, scarlet oak, and white oak. Saplings are scattered and include beech and black birch. There are many beech seedlings, but other species noted include scattered hophornbeam, red maple, and a few white pine. Understory species include patches of lowbush blueberry and huckleberry, Canada mayflower, and a variety of herbs.

The small white pine seedlings in the norther block of Stand 7 are some of the few softwood pockets of regeneration present on the property. Maintaining and expanding softwood populations is important.

Currently, the stand is overstocked. With the amount of established beech regeneration already in the understory, performing any type of lighter cuttings would likely result in a future beech stand unless the beech seedlings were treated to reduce their populations. A beech stand is undesirable from the perspective of species diversity (because they tend to create monocultures), economic viability (beech is a relatively low value forest product), and resilience (beech is susceptible to beech bark disease and beech leaf disease both of which are present at TPSF).

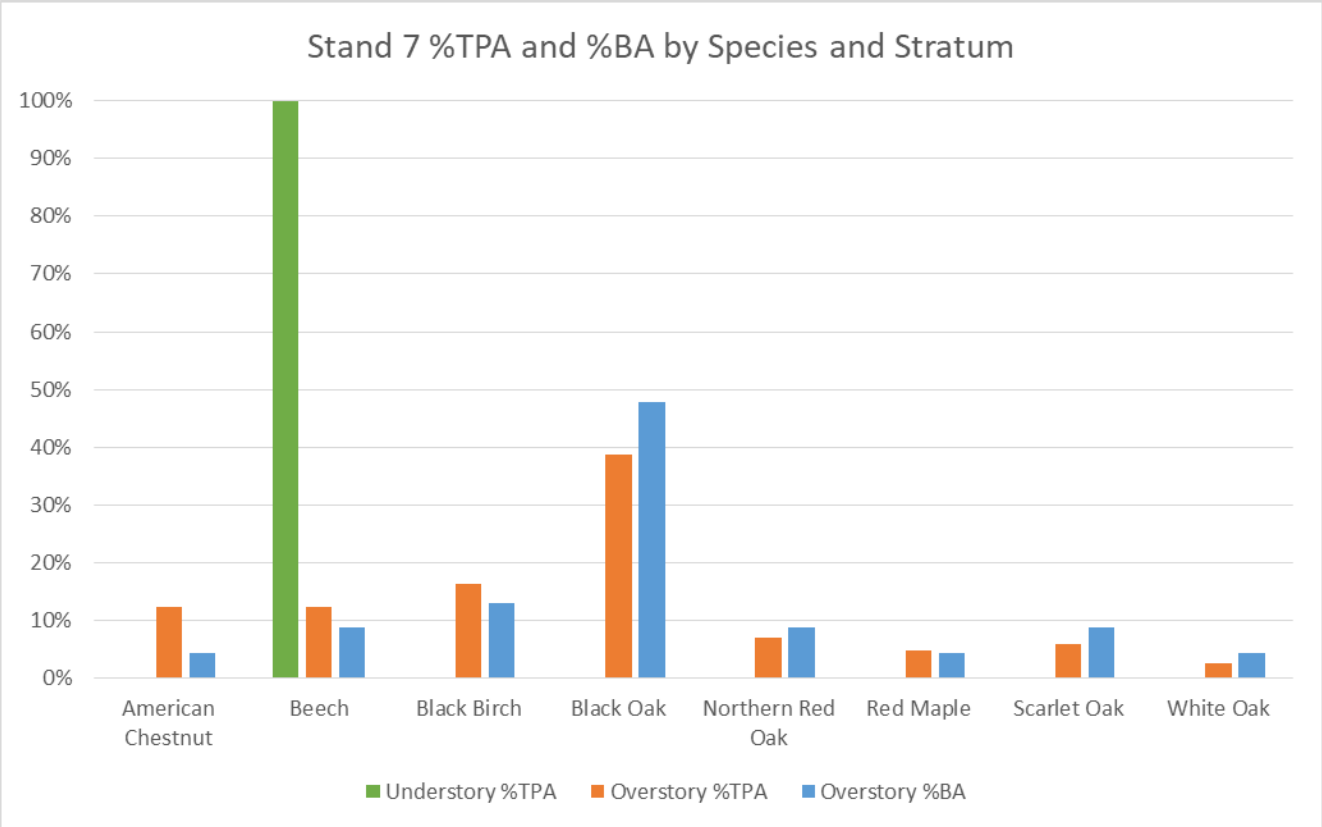
Management History – Some stumps were observed during the 2018 inventory, but the exact date of the last treatment is unclear. Given the current stand conditions, it is likely the previous cutting was relatively light. Both blocks of the stand appear to have been mostly forested at the

time that the 1934 aerial photo was taken. The northern block in particular appears to have had a much higher concentration of softwood at that time.

Health – Invasive plants are present in parts of the interior and along edges of this stand, especially where it is adjacent to the maintained transmission corridor. There is an overall lack of established native regeneration other than beech, which may cause an undesirable future stand condition unless future management can encourage the successful establishment of additional native tree species.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in all parts of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 7									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	1,000.0	-	-	-	-	-	-	-	-
Saplings	0.0	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	44.8	45.0	3.590.5 MBF	44.8	45.0	3,590.5 MBF	44.8	45.0	3,590.5 MBF
Poletimber	251.8	70.0	10.9 cord	120.3	35.0	5.8 cord	61.5	30.0	4.9 cord
Snags	0.0	0.0	-	-	-	-	-	-	-
Total	**1,296.6**	**115.0**	**-**	**165.1**	**80.0**	**-**	**106.3**	**75.0**	-
Quadratic Mean Stand Diameter (Trees > 5") = 7.9"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 11.1"									



Desired Future Condition:

Maintain stand vigor and existing species diversity and reduce populations of invasive plants. If desired, and if an appropriate location can be found, it may be feasible to soften edges along the transmission corridor to create an additional age and size class of trees and shrubs which would provide habitat for birds and other wildlife that use young forest/transition areas.

Management Recommendations:

Ongoing

- If resources are available, treat invasive plants along the edges of the transmission corridor and within the interior of the stand. Subsequent to controlling the invasive plants if an appropriate location can be found to do so, consider softening the edges of the stand (especially along the north side of the transmission corridor) to diversify habitat offerings here by creating canopy gaps adjacent to the corridor. This is expected to be a non-commercial treatment. Work with wildlife division staff to determine if there are specific treatments that can be done to enhance conditions for plants or wildlife in these areas.

- Currently this stand is overstocked for this forest type and tree size. If cutting of overstory trees is to occur in this stand, consider creating canopy gaps over pockets of blueberry if it makes sense to do so based on overstory composition and condition. Given the stand's small size any activity should probably be done in coordination with other nearby treatments.

Stand 8

Acres – 33.5 ac.

Cover Type – Mixed upland hardwoods

Size – Small Sawtimber

Stage of Development – Stem Exclusion

Major Soils:

- Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky

Water features – A forested wetland and associated drainage runs along the western stand boundary, and a small section of Pequot Swamp Pond is adjacent to the southeast. In addition, there are portions of the northern block of the stand with wet soils, though no specific drainages or open water features were noted.

Topography – Gently rolling throughout most of the stand with some occasional moderate slopes and some exposed ledge. The western half of the stand contains steep sections of west facing aspects that descend into the adjacent forested wetland some of which are likely to be inoperable. See the Inoperable Areas map in Section N Appendix A (I) for location of this area.

Access – There is a power line right-of-way access road that bisects and divides the stand in half. Otherwise, there are some walking trails in the northern block of the stand that afford access to portions of the area on foot. Areas of exposed ledge and steep terrain make access with equipment difficult in places.

Stand description – This stand is found in the northeastern portion of the property adjacent to the town line with Essex. It is divided in half by a power line right-of-way. It is comprised of a mixture of sawlog-sized trees including black oak, red maple, red oak, scarlet oak, white oak, and some tulip-poplar. Black birch, hophornbeam, hickory, and beech are also in the overstory. Saplings include beech and hophornbeam along with scattered black birch, hickory, red maple, and white oak. Seedlings include many established beech and some scattered black oak, hophornbeam, red oak, red maple, and white oak. Understory vegetation includes dense patches of mountain laurel and huckleberry with some witch hazel, Canada mayflower, ferns, sedge, Christmas fern, and lowbush blueberry.

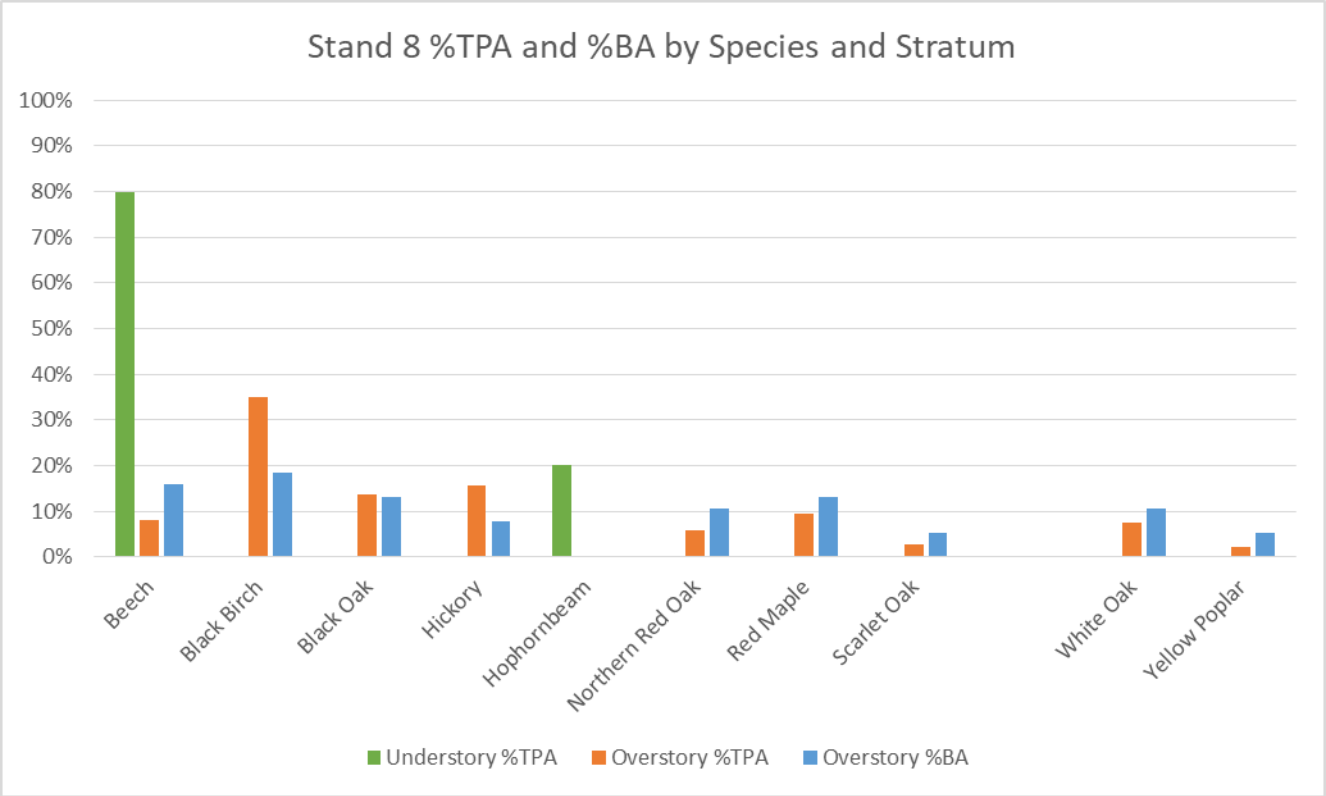
Management History – Some stumps were observed during the 2018 inventory, but the exact date of that cutting is unclear. Given the current stand conditions, it is likely the previous treatment was relatively light. Based on the 1934 aerial photo, portions of both blocks of this stand were still in a semi-open condition. The most densely forested portion at that time is along the western edge of the southern block which contained a significant amount of softwoods. Those softwoods are mostly gone at this point. It is unclear whether or not the hurricane of 1938 impacted the trees in this stand.

Mushroom in the northern block of Stand 8

Health – No invasive plant species were recorded in the 2018 inventory, but some beech were found to have beech bark disease. The overall lack of established regeneration other than beech is of concern for the future development of the stand.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in all parts of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 8									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	750.0	-	-	-	-	-	-	-	-
Saplings	500.0	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	47.2	54.5	5,242.9 MBF	41.3	50.0	4,688.8 MBF	47.2	54.5	5,242.9 MBF
Poletimber	71.4	40.0	5.5 cord	30.5	12.5	2.1 cord	21.5	25.0	3.1 cord
Snags	16.2	7.5	-	-	-	-	-	-	-
Total	**1,384.8**	**102.0**	**-**	**71.8**	**62.5**	**-**	**68.7**	**79.5**	-
Quadratic Mean Stand Diameter (Trees > 5") = 11.1"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 14.6"									



Desired Future Condition:

Retain species diversity. Over time, in areas where operating equipment is feasible, attempt to convert the area to uneven-aged conditions, encouraging the development of a variety of species of tree seedlings.

Management Recommendations:

<u>Ongoing</u>

- This stand is currently well-stocked to continue future growth. Despite the lack of desirable regeneration of diverse species, immediate treatment in this stand is not necessary. Allow this stand to continue to develop during this plan period. In future plan periods, potential treatments could include thinning to favor the vigorous and well-formed oaks, hickories, and tulip poplar or where feasible canopy gaps using patch cuts to release huckleberry. Any treatment should target beech infected with beech bark disease for removal.

- Work with Wildlife Division to determine if any areas should be treated to create canopy gaps.

- Monitor for and treat invasive species if noted.

<u>Stand 9</u>

Acres – 12.2 ac.

Cover Type – White oak/red oak/ hickory

Size – Small Sawtimber

Stage of Development – Stem Exclusion/Understory reinitiation (in pockets)

Major Soils:

- Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky

Water features – Forested wetland and an associated drainage runs along the western and southwestern stand boundary, and a section of Pequot Swamp Pond is adjacent to the east.

Topography – Stand 9 is located on a hill with thin, dry soils near the apex and moderate slopes on all sides and some exposed ledge, particularly to the west.

Access – There is no direct access to this stand either with potential access roads or walking trails. For forest stewardship purposes, a skid trail would need to be built through Stand 8 to the north in order to reach this stand.

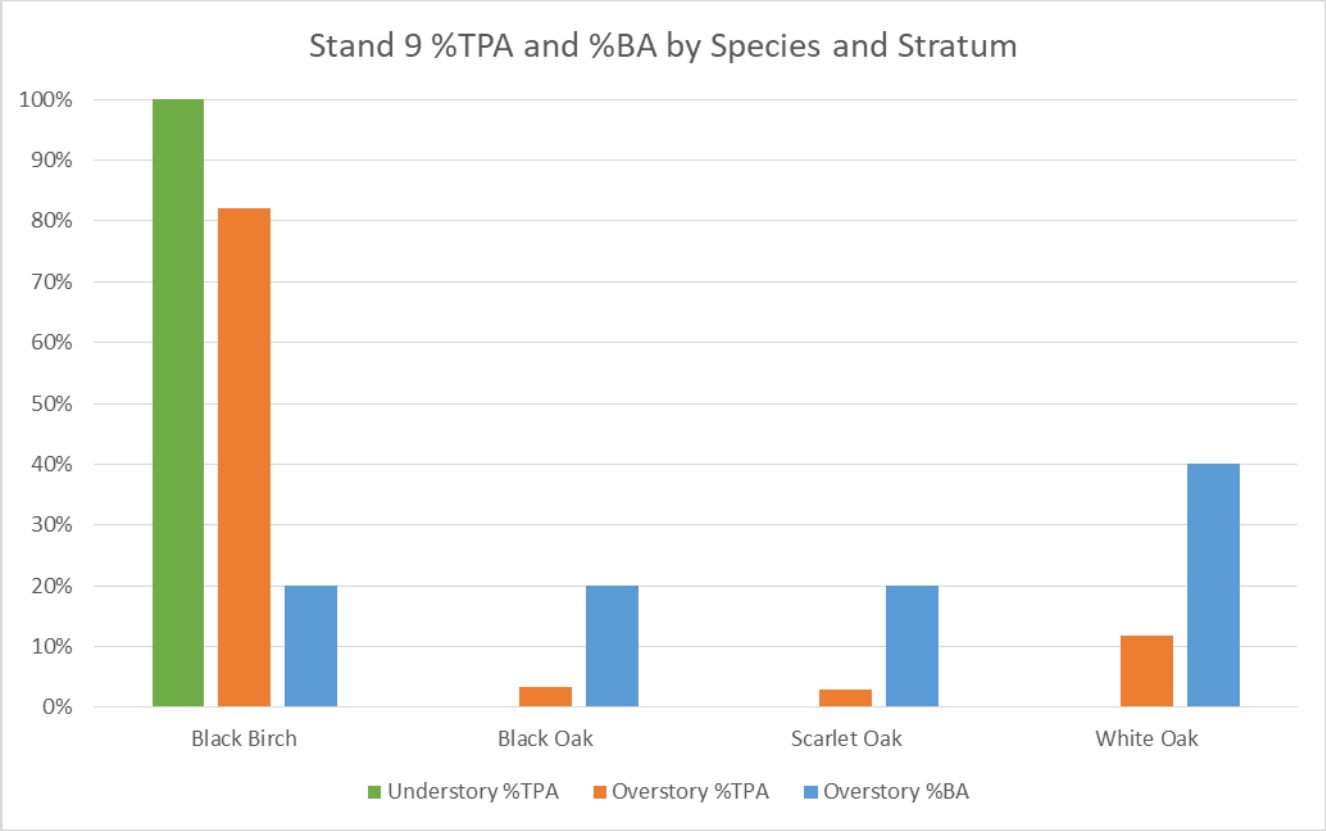
Stand description – This hilltop oak stand contains low quality black oak, scarlet oak, and white oak sawtimber. There is a significant component of pole-sized black birch as well. Seedlings and saplings are a scattered mix of overstory species plus hophornbeam and red maple. Black birch is the primary species noted amongst saplings.

Management History – No stumps were noted during the 2018 inventory and without any evidence of past agricultural uses (stone walls etc.) it is difficult to tell what occurred here in the past. At the time the 1934 aerial photo was taken, the area appears to be forested perhaps with softwood species or mountain laurel due to the dark coloring present in much of the stand. Few to no softwoods were noted in the current stand.

Health – In spite of somewhat poor site conditions, this stand is in relatively good health. No invasive species or tree diseases were noted during the inventory, however with the large component of black birch it is possible that Nectria canker exists, but was just not noted.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in most of this stand. See NDDB map in Appendix N (K).

Stand 9									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	0.0	-	-	-	-	-	-	-	-
Saplings	1,000.0	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	52.3	60.0	4,446.6 MBF	52.3	60.0	4,446.6 MBF	52.3	60.0	4,446.6 MBF
Poletimber	444.1	40.0	7.7 cord	0.0	0.0	0.0 cord	36.7	20.0	3.7 cord
Snags	0.0	0.0	-	-	-	-	-	-	-
Total	**1,496.4**	**100.0**	**-**	**52.3**	**60.0**	**-**	**89.0**	**80.0**	-
Quadratic Mean Stand Diameter (Trees > 5") = 12.6"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 12.6"									



Desired Future Condition:

Continue to maintain a significant oak component. This is a small stand so even-aged management may be appropriate, but eventual large scale regeneration treatments are likely unfeasible and undesirable, especially given the stand's position on the landscape and proximity to important water features. Over time, maintaining this area as an oak-dominated ridgetop would be ideal.

Management Recommendations:

<u>Ongoing</u>

- Given the lack of access to this stand, small size, allow this stand to continue to develop this plan period.
- Monitor for and treat invasive species if noted.
- If desired, the location of this stand may be able to provide some interesting views of Pequot Swamp Pond if a spur trail was developed from the north. If this is to be done, it is possible that some trees along the eastern slope would need to be cut to enhance the view of the pond. Great care must be taken if this is to occur to ensure soil stability and associated water quality given the proximity to the pond and the relatively steep slopes. In addition, a thorough review of NDDB data should be completed to

ensure that a potential vista and trail creation would not negatively impact NDDB species that may be present here.

Stand 10

Acres – 81.5 ac.

Cover Type – White oak/red oak/ hickory

Size – Small Sawtimber

Stage of Development – Stem Exclusion

Major Soils:

- Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky

Water features – Pequot Swamp Pond comprises the majority of the western boundary. In addition, there is a small wet area in the southern portion of this stand near the old parking area north of Ingham Hill Road. Otherwise, much of this stand is relatively well-drained.

Topography – Stand 10 is mostly hilltop topography with some ridge and ledgy outcrops and moderate western aspects that descend to Pequot Swamp Pond. There is one east-facing aspect in the central portion of the stand that is gently sloping to moderately steep. In addition, there is a small section in the western portion of the stand that is likely to be inoperable due to steep slopes above Pequot Swamp Pond. See the Inoperable Areas map IN Section N Appendix A (I) for location of this area.

Access – The main trail that begins at the old parking area north of Ingham Hill Road travels the length of this stand. This trail, and one of the branching trails that runs eastward, could be used as access roads for equipment for a variety of purposes. There are several walking trails that split off from the main trail at a few points. Trail signs at some locations in the interior of the stand help visitors keep their bearings while on the property.

Stand description – This stand is comprised mostly of sawtimber sized oaks with some black birch, hickory, red maple, and sassafras poletimber as well. There are small pockets of much younger trees indicated by the species present in those pockets including pin cherry and grapevine, but most of the stand is older. The quality of the sawtimber trees in this stand in terms of their economic potential is relatively low, though overall stand health is fair to good. Saplings include a mixture of overstory species plus beech, black cherry, hemlock, eastern redcedar, and hophornbeam. Seedlings include a similar species mix. Shrubs include dense pockets of sedge, huckleberry, lowbush blueberry, mountain laurel, and witch hazel. There are also specimens of Canada mayflower, Indian pipe, pyrola, Virginia creeper, raspberry, dewberry, greenbrier, and partridgeberry. The presence of laurel in particular is noteworthy here because if forest stewardship activities are conducted in the future, the laurel will impact regeneration because it grows so densely in places.

Management History – Some stumps were observed during the 2018 inventory, but the exact date of that cutting is unclear. Given the current stocking levels, it is likely the previous treatment was relatively light. In addition, the presence of stonewalls throughout the stand indicate that it was at one time likely cleared for agricultural purposes. This is certainly the case for the southwestern corner of the stand that was still open when the 1934 aerial photo was taken. Another activity recently undertaken (2017) is the clearing and subsequent piling of invasive understory plants in the southern portion of the stand.

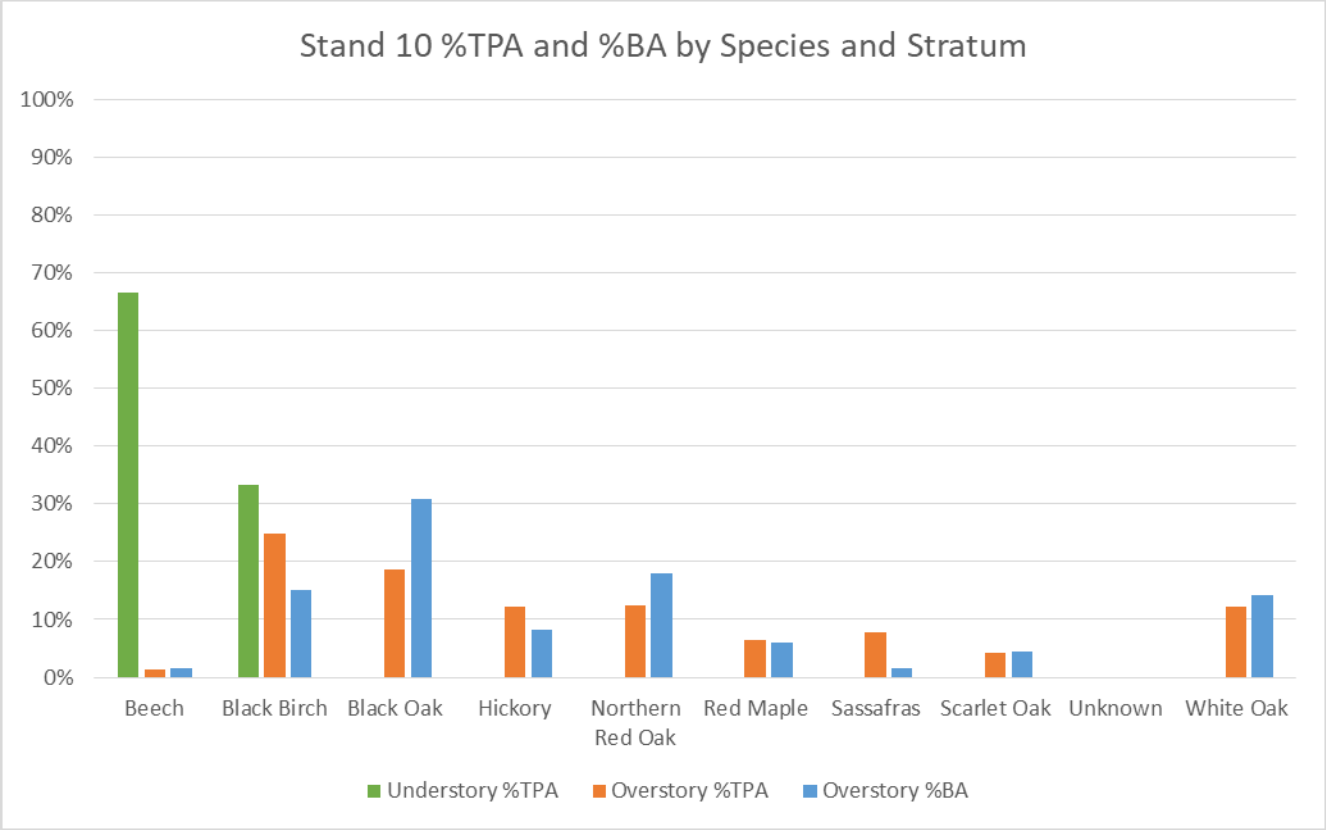
Health – Some patches of Japanese barberry were discovered scattered throughout. In addition, Japanese stiltgrass is present along the southern boundary of the stand on Ingham Hill Rd and along the major access road running north from the old parking lot again adjacent to Ingham Hill Road in the southern portion of the stand.

Japanese stiltgrass grows densely along portions of the interim trail network (above). In late summer 2018 portions of the trail system were weedwhacked to reduce the likelihood of the stiltgrass going to seed (right).

Some of the black birch have Nectria canker. Otherwise, the stand is in good health. There is a fair amount of regeneration and there is a variation in stand structure and species composition. During late summer 2018, the stiltgrass in the access road north of the old parking area was weed whacked.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in any part of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 10									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	166.7	-	-	-	-	-	-	-	-
Saplings	83.3	0.8	-	0.0	0.0	-	-	-	-
Sawtimber	51.8	66.7	5,211.7 MBF	51.8	66.7	5,211.7 MBF	49.7	65.0	5,092.8 MBF
Poletimber	112.2	50.0	7.5 cord	52.7	20.8	3.7 cord	27.2	20.0	3.3 cord
Snags	8.7	5.8	-	-	-	-	-	-	-
Total	**422.7**	**123.3**	**-**	**104.5**	**87.5**	**-**	**76.9**	**85.0**	-
Quadratic Mean Stand Diameter (Trees > 5") = 10.7"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 14.0"									



Desired Future Condition:

This is a large stand and given its location within the property, it features prominently in terms of recreation, forest health, aesthetics, and water quality. Currently, oak species combine to compose over half of the stocking of the stand. Over time and long-term, where equipment operation is feasible and desirable, attempting to maintain a significant oak component is important. Maintain species diversity (especially oaks, hickory, and where viable softwoods are found). In order to regenerate a diverse mix of tree species, different sizes of canopy gaps will need to be created and different silvicultural treatments (potentially including some significant gaps to regenerate oak and other shade intolerant species) will need to be utilized. In addition, reducing populations of invasive plants and some native plants (particularly beech and laurel) can help facilitate long-term sustainability and diversity.

Management Recommendations:

<u>2023</u>

- Treat invasive plants especially barberry and stiltgrass. Work with the town (or whoever is in charge of mowing roadsides) to develop protocols for mowing (including timing of mowing and cleaning of machinery) that will limit the spread of roadside stiltgrass. If feasible attempt to combine with other treatments to reduce or ideally eliminate populations there.

2024

- Treat invasive plants adjacent to the old parking area.

2023

- According to inventory data, this stand is nearly overstocked for the forest type and size of trees present, though this condition isn't ubiquitous. In central and some northern portions of the stand where trees are overstocked, consider a light thinning to maintain stand vigor reducing basal areas to approximately 80 square feet/acre where thinnings are to take place. In the southern portion of the stand, trees are relatively small, but stocking levels are high. If desired, a pre-commercial treatment using crop tree release is applicable in places here. Crop trees in this stand are primarily oaks and hickory, but if there are any healthy softwoods, release those as well to retain that component if it makes sense based on overtopping vegetation composition and condition. Retain sassafras for diversity and potential for soft mast production especially when it is not competing with potential crop trees.

- In portions of the stand where overstory trees are to be cut that contain significant amounts of mountain laurel, consider attempting to treat the laurel in strips or patches. Treatment of the laurel can do several potentially beneficial things simultaneously. In places where canopy gaps are to be created, setting back the laurel underneath the gaps can help encourage the development of tree regeneration. In addition, it is likely that without follow-up and continued treatments the laurel will regenerate over time which can create an additional size and age class of laurel. From a wildlife perspective, this can help diversify the habitat in the area. The same principles apply to the treatment of beech within areas where overstory trees are to be cut.

- In the northern portion of the stand consider creating a canopy gap over the pocket(s) of huckleberry and blueberry to enhance production of nectar and soft mast.

Ongoing

- Continue to monitor for and treat invasive plant species.

- In the southern portion of the stand where invasive plants were recently cleared, if sufficient amounts of sunlight are available, consider attempting to replant some of the understory with native species of shrubs and/or flowers that can provide nectar and/or mast. If plantings are desired, but sufficient amounts of sunlight do not exist, consider a crop tree release in this area. This treatment can provide additional sunlight on the forest floor and additional growing space to the residual crop trees. If this is to be done, focus retention on healthy oaks and tulip poplar.

- Work with Wildlife Division to determine if any areas should be treated to create canopy gaps.

Stand 11

Acres – 41.4 ac.

Cover Type – Mixed upland hardwoods

Size – Medium Sawtimber

Stage of Development – Stem Exclusion

Major Soils:

- Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky

Water features – There is a forested wetland that runs along the eastern boundary. In addition, a finger of forested wetland and an associated drainage can be found in the southern end of the stand. Scattered pockets of wetter soils are also found.

Topography – Gentle to sometimes moderately steep eastern aspects. May have ridgetop conditions in some parts of the northwest corner.

Access – A potential access road that connects to the main trail from the old parking area on the north side of Ingham Hill Road in Old Saybrook runs along the southern and eastern boundary. There are also three trails that run west to east and provide good access to much of the stand.

Stand description – This is a medium-sized sawtimber mixed hardwood stand comprised mostly of black birch, red maple, and tulip-poplar in the overstory. Also present are black oak, hickory, red oak, and white oak. In the understory, saplings are primarily black birch with scattered beech, hophornbeam, American hornbeam, red maple, and sugar maple. Seedlings include scattered beech, black oak, hophornbeam, American hornbeam, red maple, scarlet oak, white ash, and white oak. Shrubs include thick patches of ferns and scattered maple-leaf viburnum, raspberry, dewberry, Virginia creeper, sedge, poison ivy, trillium, greenbrier, and Christmas fern.

The multiple stems of many of the largest oak and tulip poplar trees in this stand indicate their origins from sprouts of previously cut trees. These trees are along the interim trail network in the southeastern portion of the stand.

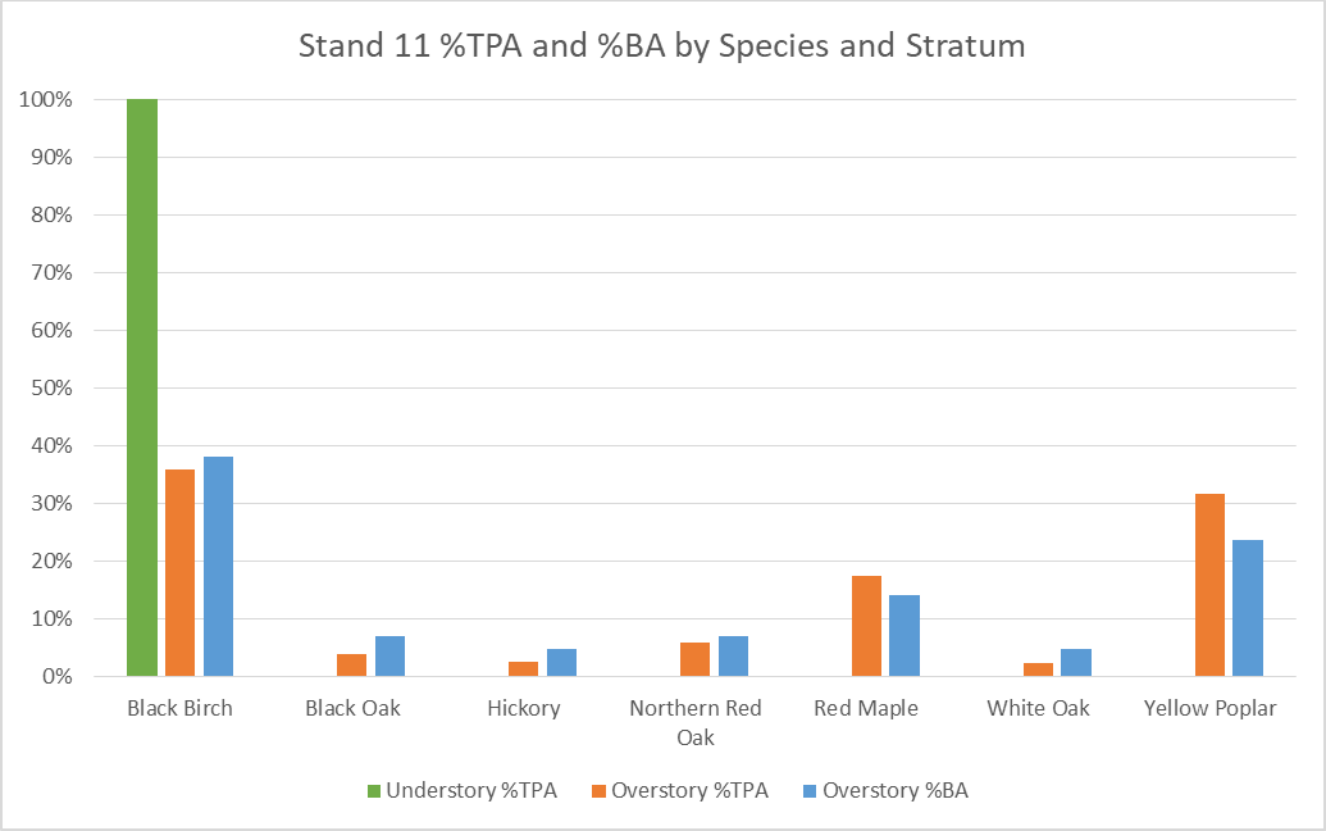
This stand contains pockets of some of the largest and most mature trees on the property. Red oak and tulip poplar are present in the southern and central portions of the stand though their distribution is not uniform.

Management History – Some stumps from fairly recent tree cutting were noted in the southern portion of the stand. Pockets of large diameter multi-stemmed oak trees in the central portion of the stand indicates that they were likely the result of either long ago harvesting that encouraged stump sprouting or were of fire origin. According to the 1934 aerial photos, the northern 1/3 of this stand had mixed stocking with some open areas. The southern portions of the stand were forested at the time of that photo.

Health – Invasive species were present at every sample point in the 2018 inventory, including some very dense patches of Japanese barberry. This is especially true in the far northern section of the stand near the property boundary. Also present were burning bush and Asiatic bittersweet. The presence of invasive plants here coincide with some of the largest trees on the property which indicates that the relative productivity of the soils here is high. Some of the black birch had Nectria canker. There is very little diversity of established tree regeneration in this stand, and with the heavy presence of invasive species it will be a challenge to change that in the future unless the invasives are treated and efforts are made to create canopy gaps. Fortunately the invasive plants are not ubiquitous.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in most of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 11									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	0.0	-	-	-	-	-	-	-	-
Saplings	250.0	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	37.2	72.5	8.524.1 MBF	35.4	70.0	8,272.2 MBF	37.2	75.5	8,524.1 MBF
Poletimber	50.6	40.0	5.3 cord	0.0	0.0	0.0 cord	20.7	25.0	2.9 cord
Snags	0.0	0.0	-	-	-	-	-	-	-
Total	**337.8**	**112.5**	**-**	**35.4**	**70.0**	**-**	**57.9**	**100.5**	-
Quadratic Mean Stand Diameter (Trees > 5") = 14.4"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 17.0"									



Desired Future Conditions:

Over time, reduce populations of invasive plants and Nectria infected black birch and attempt to convert this stand to an uneven-aged condition. Retain species diversity and attempt to regenerate species that grow well here including oaks and tulip poplar. Both of those species require significant amounts of sunlight to successfully become established as seedlings and saplings which will help inform the silvicultural techniques used.

Management Recommendations:

<u>2025</u>

- Attempt to treat invasive plants in the northern portion of the stand where they are very dense. Mostly barberry is growing here and it is overtopped by black birch poletimber with Nectria. If the invasive plants can be controlled here, this would be an area that would make sense from an ecological perspective to regenerate with either a small patch clearcut or a shelterwood retaining scattered desirable trees for seed, structural purposes, and potentially aesthetics. Incorporate the silvicultural treatments described here in the treatment scheduled for 2029 below.

<u>2026</u>

- Attempt to treat invasive plants in the central and southern portions of the stand which are generally less dense than those in the north.

2029

- Though stand-wide data indicate that the stand is well-stocked for continuing to grow trees during this plan period, there are portions of the stand that are overstocked. Given the current species composition and structure[20] it may make sense to consider attempting to regenerate portions of the stand toward the latter part of this plan period. For example, there are some large diameter, relatively mature tulip-poplar and oak groves where retaining the poplars and some oaks as seed trees and removing much of the surrounding canopy could result in regenerating tulip-poplar and oak. Under current conditions neither species will be able to successfully regenerate due to shading from the nearly closed canopy. Elsewhere, there are black birch that could be removed to favor oaks and tulip poplar, and some areas may even be suitable for a heavier oak shelterwood. Given the current volume per acre in this stand, this treatment is likely to be able to be commercial[21]. Additionally, creating larger gaps in the canopy will encourage regeneration including important shade intolerant species such as tulip poplar and oak that is otherwise lacking in this stand.

Ongoing

- Continue to monitor for and treat invasive species. This is particularly relevant in areas where tree cutting is to occur.

- This stand is located along one of the main walking trails of the property, which means any management activity conducted here will be highly visible to the public. This is a great opportunity for public outreach and education. If feasible, installing educational signs as well as guided tours explaining what is occurring and why could be an important aspect of successful public engagement here.

Stand 12

Acres – 32.4 ac.

Cover Type – White oak/red oak/hickory

Size – Small Sawtimber

Stage of Development – Stem Exclusion

Major Soils:

- Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky

Water features – Forested wetland surrounds almost all of this stand. A drainage associated with the wetland can be found along the eastern boundary.

Topography – This stand is dominated by a gently sloped hill in the center with two small peaks.

[20] In this case, the structural attributes referred to include a lack of amounts and diversity of tree regeneration and in places minimal invasive plants which are likely to be controllable.

[21] As mentioned earlier, any revenue generated from the sale of forest products goes into a stewardship fund specifically for continuing to manage The Preserve.

Access – A potential access road that runs from the main hiking trail north of the old parking area on Ingham Hill Road passes through the northwest corner of this stand. There are also a couple of old roads that run through the central and southwestern portion of the stand.

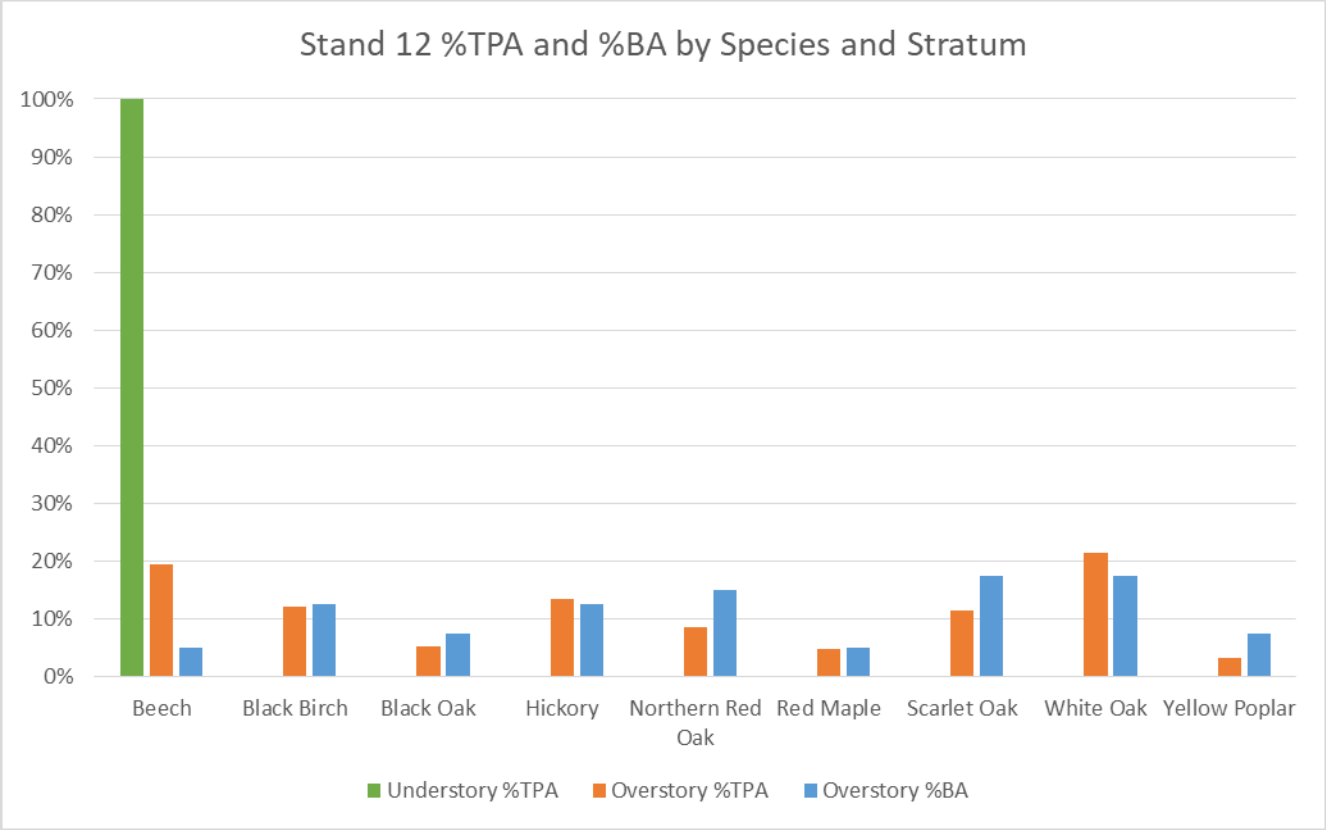
Stand description – This is a small sawtimber-sized stand comprised mostly of black birch, black oak, hickory, red oak, scarlet oak, and white oak in the overstory. Red maple and tulip-poplar are also present. Currently, oak species compose over 50% of the stocking in this stand, and the stand is well-suited to continuing to grow oak. In the understory, saplings include scattered beech, hickory, hophornbeam, American hornbeam, and red maple. Seedlings include a large number of beech and scattered black birch, black oak, red oak, red maple, scarlet oak, and white oak. Understory species include dense pockets of mountain laurel as well as scattered witch hazel, Virginia creeper, Canada mayflower, sedge, lowbush blueberry, ferns, and partridgeberry.

Management History – Stonewalls present throughout the stand indicate that this entire area was once likely cleared for agricultural purposes. Stumps from relatively recently cut trees are present throughout the stand as are old roads that likely served as skid trails. In addition, multi-stemmed sprout origin mature oaks are present in places indicating that tree cutting also occurred long ago, but following agricultural abandonment. The 1934 aerial photos show evidence of an old road cutting through the northern section of the stand and appear to show a relatively incomplete tree canopy.

Health – The overstory trees in this stand appear in fair health, but the lack of established desirable regeneration will eventually pose a problem for the future. Dense pockets of understory shrubs and beech will make establishing regeneration more complicated. Some Japanese barberry was observed, though the overall component of invasive species appears low. Evidence of rot in main trunks in many of the overstory trees provides an indication that attempting to regenerate the stand sooner than later may be beneficial.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in most of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 12									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	750.0	-	-	-	-	-	-	-	-
Saplings	0.0	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	58.1	82.5	8,048.5 MBF	56.8	80.0	7,826.9 MBF	58.1	82.5	8,048.5 MBF
Poletimber	39.9	17.5	2.5 cord	13.8	7.5	1.3 cord	8.6	7.5	1.2 cord
Snags	0.0	0.0	-	-	-	-	-	-	-
Total	**848.0**	**100.0**	**-**	**70.6**	**87.5**	**-**	**66.7**	**90.0**	-
Quadratic Mean Stand Diameter (Trees > 5") = 12.8"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 15.4"									



Desired Future Conditions

This is a relatively small stand but with good overstory diversity which is a strength. Over time retain or ideally enhance tree species diversity as well as age and size class diversity of the trees. Use even-age techniques to regenerate the stand. Reduce populations of invasive plants where noted. Successfully establishing regeneration may be difficult due to the presence of dense understory shrubs (especially mountain laurel). If attempts are made to encourage regeneration through active management, simultaneously cutting the understory shrubs and beech will be necessary. In the short term some structural attributes and habitat values may suffer due to a lack of low cover, but over time (and relatively quickly) vegetation will reclaim the site and that cover will likely be denser than before.

Management Recommendations:

<u>2024</u>

- Treat invasive plants to reduce their populations

Ongoing

- Current stocking levels are higher than optimal for encouraging stand vigor during this plan period. Conduct an initial entry to establish desirable regeneration using a shelterwood[22]. Species to favor for retention include oaks, hickory, tulip poplar, and healthy individuals of other species. This establishment harvest should be done during or immediately following a year in which the desired oak species produce significant amounts of acorns to help ensure adequate seed source for successful germination.

- Continue to monitor for and treat invasive species.

Stand 13

Acres – 7.5 ac.

Cover Type – White oak/red oak/hickory

Size – Small Sawtimber

Stage of Development – Stem Exclusion/Understory reinitiation (in pockets)

Major Soils:

- Woodbridge fine sandy loam, 3 to 15 percent slopes, extremely stony

Water features – Forested wetland surrounds all of this stand and a drainage associated with the wetland runs along the stand's eastern side. In addition, there are pockets of wet soils within the stand.

Topography – Generally flat with some slight inclines in elevation scattered around the stand.

Access – There is no direct access to this stand either by existing access road or trail, though there is evidence that previous forest management activities were conducted here and the remnants of an old skid road still exists. In order to gain access to the stand, a drainage and/or wetland crossing would be required.

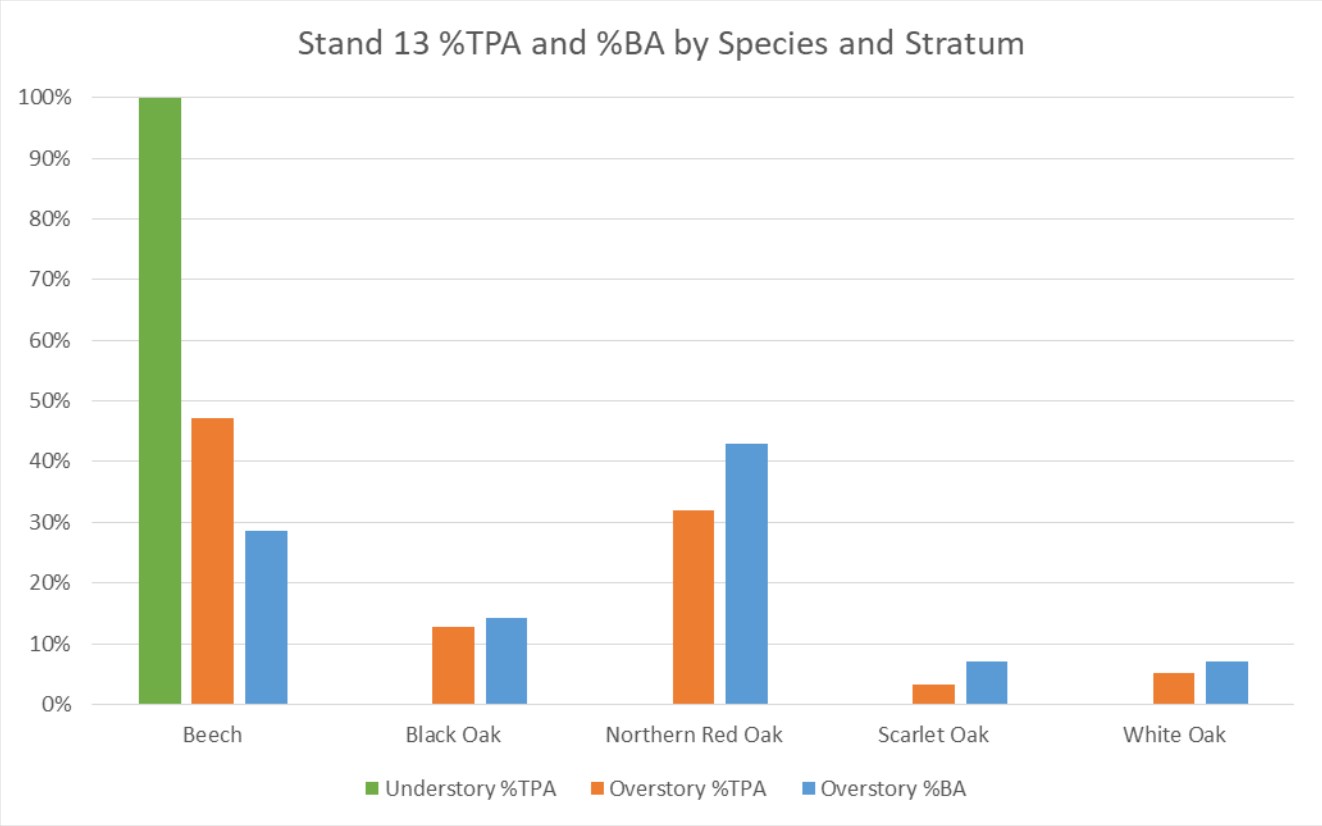
Stand description – This is a small sawtimber-sized stand composed of beech, black oak, red oak, scarlet oak, and white oak in the overstory. According to inventory data, there are a fair amount of beech saplings, though this condition is not ubiquitous. Seedlings include a large number of beech and scattered black birch, black oak, red oak, red maple, scarlet oak, and white oak. Some laurel and wet areas are present in the eastern portion of the stand.
Management History – Old stumps and remnants of an old skid trail indicate that relatively recent (within the last +/- 25 years) tree cutting has occurred here. The 1934 aerial photo indicates that a cleared transmission corridor cut through the northern portion of the stand and a road cut through the southern portion. The stand appears to have been mostly forested at the time the photo was taken. Also, based on the dark coloring in the photo, it appears as though that stand once had a significant amount more softwood and/or mountain laurel though essentially no softwood currently exists.

Health – This stand is lacking sapling-sized trees in the understory and midstory, but is otherwise healthy overall. No invasive species or tree pests/diseases were observed in the 2018 inventory.

[22] No date is provided because it is not currently known when the next appropriate mast year will be.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in the northern half of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 13									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	2,000.0	-	-	-	-	-	-	-	-
Saplings	1,000.0	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	74.2	100.0	8,876.2 MBF	74.2	100.0	7,826.9 MBF	74.2	100.0	8,876.2 MBF
Poletimber	86.1	40.0	7.4 cord	48.6	30.0	5.9 cord	48.6	30.0	5.9 cord
Snags	0.0	0.0	-	-	-	-	-	-	-
Total	**3,160.3**	**140.0**	**-**	**122.8**	**130.0**	**-**	**122.8**	**130.0**	-
Quadratic Mean Stand Diameter (Trees > 5") = 12.0"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 13.6"									



Desired Future Conditions

This stand is difficult to access, but is relatively productive in terms of tree growth and forest health. The prevalence of beech regeneration in places likely means that it will be difficult to regenerate other species in the portions of the stand where beech currently exists, but over time, attempt to retain species diversity.

Management Recommendations:

Ongoing

- Though this stand is overstocked, no major health issues were apparent during the 2018 inventory. Due to lack of easy access, consider allowing the stand to continue to develop during this plan period.

- Monitor for and treat invasive species if noted.

Stand 14

Acres – 98.8 ac.

Cover Type – White oak/red oak/hickory

Size – Poletimber

Stage of Development – Stem Exclusion/Understory reinitiation (in recently created canopy gaps)

Major Soils:

- Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky

Water features – Forested wetland is located on portions of the eastern and western stand boundaries. In addition, there is a potential vernal pool in the southwestern corner.

Topography – Gently rolling hills, eastern and western slopes, and one large hill in the center of the stand. In addition, there is a small section in the western portion of the stand that is likely to be inoperable due to steep slopes. This is the approximate area where a natural amphitheater is created by slopes that create an east-facing bowl (See photo on page 29). See the Inoperable Areas map in Section N. Appendix A (I) for location of this area.

Access – A service road for the powerline right-of-way to the north runs along the northern edge of this stand, but there are moderate slopes leading into the stand from there. In the interior, there are trails and old roads that provide good access to most of the stand. Another potential access point is from the end of Barley Hill Road in Old Saybrook, though that is a cul-de-sac at the end of a residential road which is likely to make access for mechanized equipment less desirable.

Stand description – Previous harvest activity has removed most of the sawtimber trees from this stand, but there are some black oak, hickory, and red oak sawtimber remaining in the overstory. The rest of the trees are mostly poletimber and include beech, black birch, hophornbeam, American hornbeam (called ironwood in the charts below), red maple, and white oak. Saplings include American hornbeam, black birch and scattered beech, dogwood, hickory, hophornbeam, red maple, and sugar maple. Many of these saplings are located in canopy gaps. Seedlings include some beech and hophornbeam with scattered black birch, black oak, hickory, American

hornbeam, red oak, sassafras, scarlet oak, and white oak. Understory species include pockets of witch hazel and mountain laurel as well as scattered Virginia creeper, ferns, sedge, maple-leaf viburnum, raspberry, Canada mayflower, dewberry, lowbush blueberry, trillium, poison ivy, and false Solomon's seal.

Management History – Stonewalls and associated barways are scattered throughout the stand indicating that at one time the entire area was likely cleared for agricultural purposes. Based on the 1934 aerial photo a cleared utility corridor was cut through the central portion of the stand. Tree stocking at the time that photo was taken was variable with some of the areas being relatively densely forested and some (especially in the central and far southern portions) being semi-open.

Tree stumps from relatively recent (within the last +/- 15-20 years) cutting indicate that some management was undertaken prior to the 2015 acquisition of the property by current owners. This cutting appears to be the most recent on the property. In addition, multi-stemmed clumps of mature oak trees of sprout origin were also observed during the 2018 inventory indicating that since agricultural abandonment this area has likely been cut at least a couple of times. The most recent management activities described above created some relatively small canopy gaps, which encouraged the regeneration of primarily black birch and American hornbeam saplings.

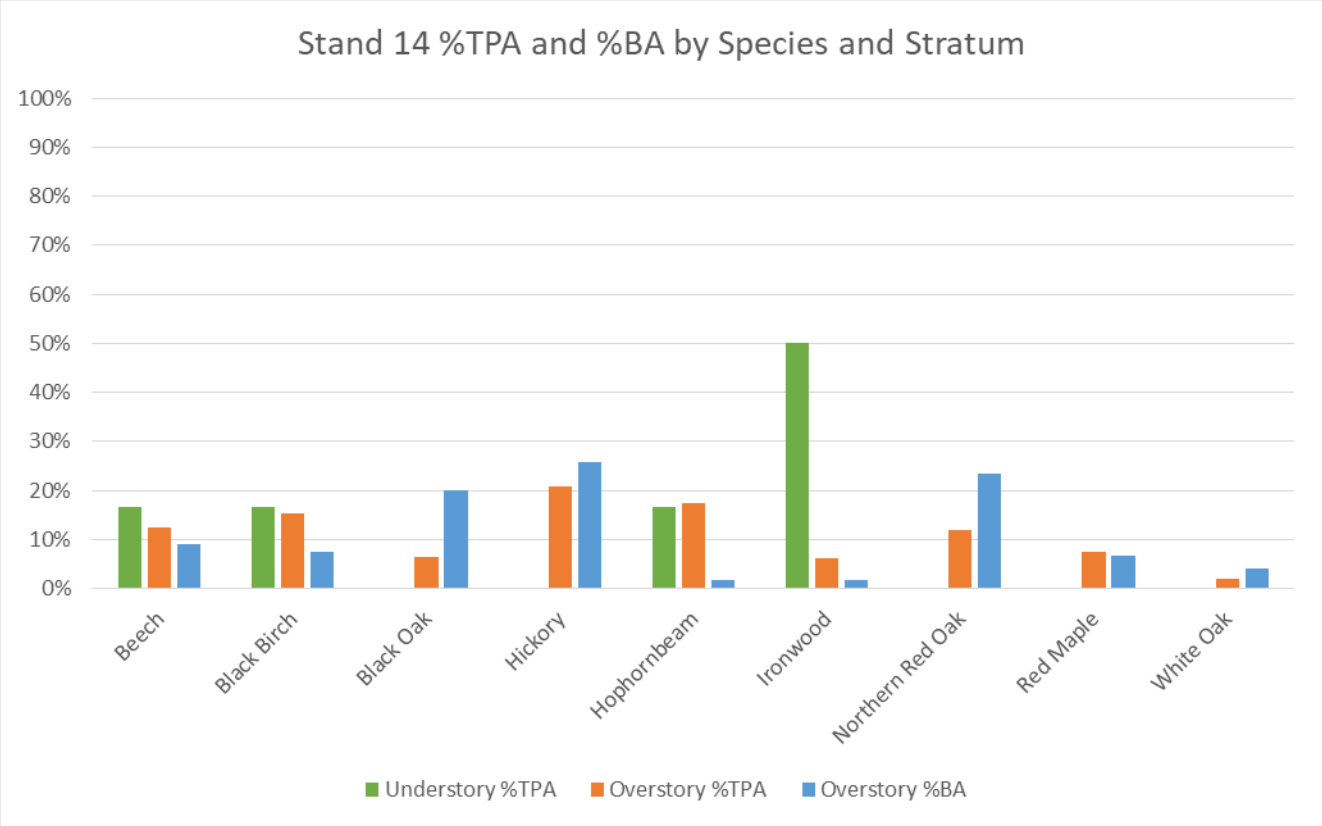
An old stump in the southcentral portion of the property from over twenty years ago (above left) created a relatively small canopy gap (left). This canopy gap has facilitated the development of a new age and size class of trees (above right). Though the regeneration is dominated by black birch which tend to be susceptible to Nectria canker here, the vegetative structure is enhanced and provides good sources of cover and potential nesting areas for birds and other wildlife that use the understory and lower parts of the midstory.

Health – There is a fair amount of tree regeneration in the canopy gaps created by the last harvest. However, that regeneration is mostly black birch and American hornbeam (called ironwood in the charts below). Invasive plants were found throughout the stand including Japanese barberry, Asiatic bittersweet, burning bush, and multiflora rose. A large and extremely dense patch of these species was discovered near the peak of the largest hill where a canopy gap likely served as an epicenter for invasive species establishment. It is unclear if this gap is from a previous harvest or some other

disturbance because the invasives were too dense to inspect the site in detail. Other health issues included the presence of beech bark disease, and Nectria on black birch.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in any part of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 14									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	166.7	-	-	-	-	-	-	-	-
Saplings	333.3	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	48.2	69.2	6,779.0 MBF	46.2	67.8	6,480.2 MBF	46.4	67.5	6,657.8 MBF
Poletimber	147.3	30.8	5.7 cord	62.5	12.5	2.8 cord	4.9	3.3	0.9 cord
Snags	0.0	0.0	-	-	-	-	-	-	-
Total	**695.5**	**100.0**	**-**	**108.7**	**80.3**	**-**	**51.3**	**70.8**	-
Quadratic Mean Stand Diameter (Trees > 5") = 10.0"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 15.7"									



Desired Future Condition:

Using a phased approach, attempt to reduce populations of invasive plants. Over time, continue to convert this area to uneven-aged conditions. Retain or enhance species diversity.

Management Recommendations:

2025

- Dense pockets of invasive species are threatening the future health of this stand, especially near the stand's highest point of elevation (See the 'Topography' map in Section N Appendix A (F). Treating these invasives immediately should be a priority of the current planning period even though no other management activity is currently scheduled. If resources are available, consider using a phased approach to reduce populations of invasive plants over time. Where feasible and if desired, when/if populations of invasives are able to be controlled, consider replanting the densest areas with site-appropriate native alternatives that provide similar structural attributes as well as a source of nectar and/or mast.

Ongoing

- Due to current stocking levels (which are adequate for maintaining growth and vigor during this plan period), relatively recent management activities, the presence of invasive plants, and the current stand structure (which is useful for wildlife that use dense understory and midstory vegetation for their habitat needs) allow this stand to continue to develop during this plan period. There are pockets of the stand that could use treatment now especially in the southeastern portion of the stand, but these are somewhat isolated and would likely not be sensible to attempt until a greater portion of the rest of the stand is scheduled to be treated.

- If desired and if appropriate areas can be located to do so, consider softening some of the edges along the boundary with the transmission corridor. If this is to be done, be sure to treat invasive plants in advance of cutting any trees.

- Work with Wildlife Division to determine if any areas should be treated to create canopy gaps following invasive plant treatments.

Stand 15

Acres – 67.0 ac.

Cover Type – Mixed upland hardwoods

Size – Poletimber

Stage of Development – Stem Exclusion/understory reinitiation (in pockets)

Major Soils:

- Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky

Water features – Forested wetland is located along the southern and western stand boundaries.

Topography – Gently rolling throughout most of the stand, primarily with northeastern and southwestern aspects. Some sections of exposed ledge are also noted in this stand. In addition, there is a small section in the southern portion of the stand that is likely to be inoperable due to steep slopes. See the Inoperable Areas map in Section N Appendix A (I) for location of this area.

Access – A service road for the power line right-of-way to the north runs along the northern edge of this stand, but there are moderate slopes leading into the stand from there which may limit access potential in places. Otherwise, there are several trails that provide good access to much of the interior of the stand. If management activities that involve the removal of trees for forest products is to occur here, it may make sense to develop a landing near the powerlines and to develop an access point from the powerlines that can act as a landing for other future activities for adjacent stands in that part of the property[23].

Stand description – This stand has a wide variety of species in the overstory, yet over 50% of the current basal area is comprised of oak species. Most sawtimber-sized trees are black oak, hickory, red oak, or white oak. There are also aspen, red maple, and scarlet oak sawtimber trees. Other species include beech, black birch, hophornbeam, American hornbeam, and sassafras. Saplings include hophornbeam, American hornbeam (called ironwood in the chart below), beech, red maple and scattered black birch, dogwood, hickory, and sugar maple. Seedlings include many black birch, beech, and hophornbeam as well as black oak, grey birch, red oak, red maple, scarlet oak, and white oak. Understory plants include dense pockets of maple-leaf viburnum and mountain laurel as well as sedge, Christmas fern, other ferns, Virginia creeper, wintergreen, lowbush blueberry, trillium, false Solomon's seal, pyrola, Canada mayflower, and partridgeberry.

The carpet of green on the forest floor shown here in the southeastern portion of the stand is dominated by maple-leaf viburnum.

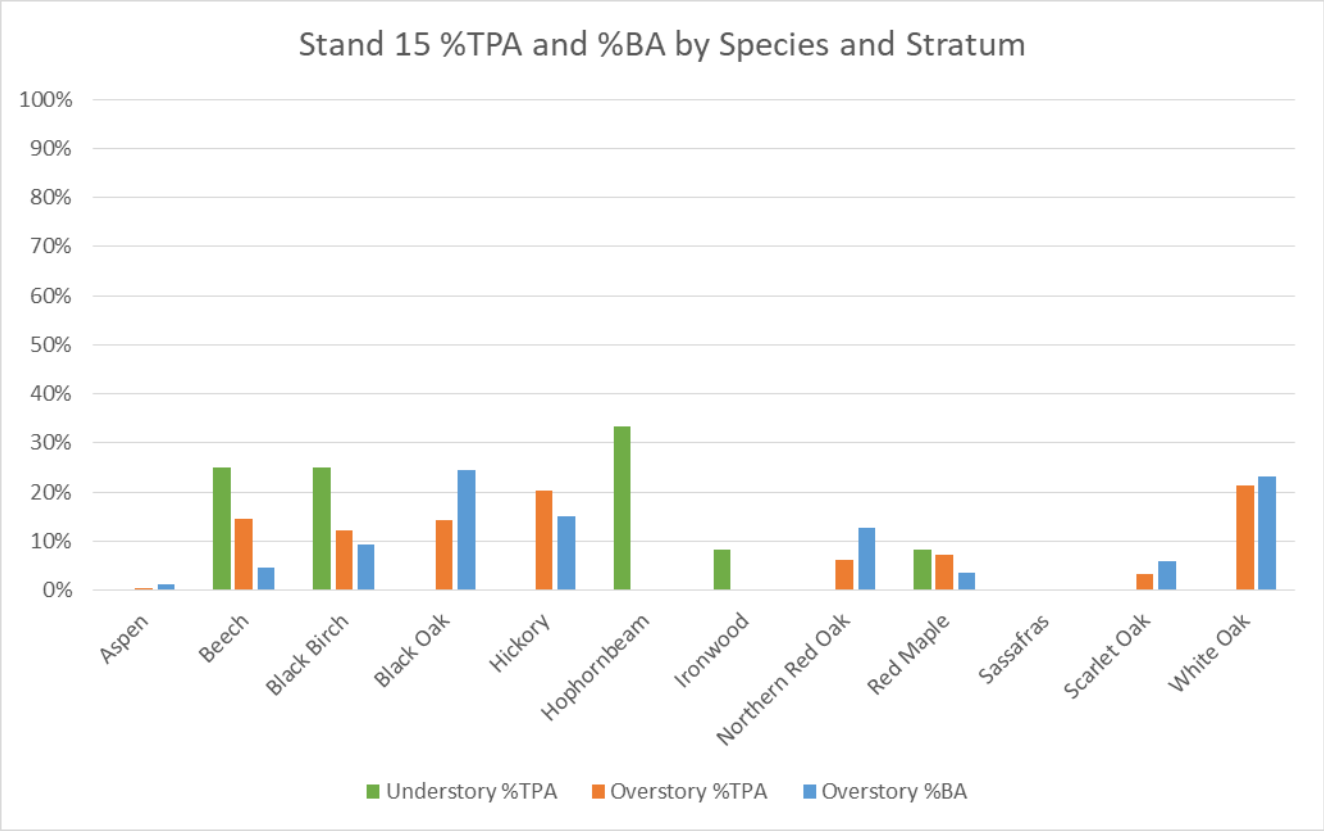
Management History – Stonewalls are scattered throughout the stand indicating that at one time the entire area was likely cleared for agricultural purposes. Tree stumps from relatively recent (within the last 15 -20 years) cutting indicate that some management was undertaken prior to the 2015 acquisition of the property by current owners. In addition, multi-stemmed clumps of mature oak trees of sprout origin were also observed during the 2018 inventory indicating that since agricultural abandonment this area has likely been cut at least a couple of times. The 1934 aerial photos indicate that the eastern half of the stand contained relatively uniform hardwood forest at that time while the western half had more variable stocking and what appears to have been a minor softwood component (based on the dark features in the image), though none is present today.

[23] One significant potential caveat of doing this is the potential for introduction of unauthorized motorized vehicles onto the property if the area is not closed out appropriately to limit access from the powerlines at the close of any operations.

Health – This stand has a healthy number of established seedlings, but fewer saplings. Additionally, Japanese barberry was observed at many of the inventory points. Other invasive species include Asiatic bittersweet, burning bush, and multiflora rose. No insect or disease of significance was noted in overstory trees and aside from the invasives the overall health of this stand is good.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in any part of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 15									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	750.0	-	-	-	-	-	-	-	-
Saplings	750.0	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	40.9	58.8	5,338.3 MBF	37.6	53.8	4,862.6 MBF	40.9	58.8	5,338.3 MBF
Poletimber	131.1	48.8	8.2 cord	103.5	36.3	6.7 cord	64.5	31.3	5.2 cord
Snags	1.6	1.3	-	-	-	-	-	-	-
Total	**1,673.6**	**108.8**	**-**	**141.1**	**90.0**	**-**	**105.4**	**90.0**	-
Quadratic Mean Stand Diameter (Trees > 5") = 9.7"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 11.6"									



Desired Future Conditions:

Over time, maintain a significant population of oak in this stand. Using a phased approach, attempt to reduce populations of invasive plants. Retain or enhance species diversity.

Management Recommendations:

2028

- Treat invasive plants.

Future Plan Period

- According to the Gingrich stocking chart for upland oaks, this stand is nearly overstocked and with ingrowth is likely to be overstocked during the next plan period. Thin this stand to favor oak, hickory, and healthy individuals of other species. Reduce basal areas to approximately 70-80 square ft. per acre. Remove overstocked, declining, low vigor, and/or unhealthy trees. If feasible and if makes sense to do so based on overstory composition and condition, create small canopy gaps above pockets of maple-leaf viburnum in an effort to increase nectar and soft mast production for pollinators and wildlife by increasing available sunlight. If pockets of aspen are noted that are vigorous enough to respond by root suckering, consider attempting to regenerate the aspen by creating a patch cut with the aspen as the center. If this is to be done, the cut should be at least 75 ft. in radius if feasible. This should only be done if it makes sense to do so based on condition and composition of surrounding/competing trees.

Ongoing

- Monitor for and treat invasive species

- Work with Wildlife Division staff to determine if any areas should be treated to create canopy gaps.

Stand 16

Acres – 46.5 ac.

Cover Type – Mixed upland hardwoods

Size – Small Sawtimber

Stage of Development – Stem Exclusion/understory reinitiation (in pockets)

Major Soils:

- Canton and Charlton fine sandy loams, 15 to 35 percent slopes, extremely stony.

Water features – A small section of forested wetland is located adjacent to the southwestern boundary of the stand. Otherwise, most of the stand is fairly well-drained.

Topography – Mostly gentle to moderate northeastern aspects. Some southern aspects to the south. In addition, there is a long section in the northeastern portion of the stand that is likely to be inoperable due to steep slopes above the powerline. See the Inoperable Areas map in Section N Appendix A (I) for location of this area.

Access – Two potential access roads stemming from Route 153 to the north in Essex intersect with a power line right-of-way road that runs adjacent to the northern and eastern boundaries of this stand. Several walking trails weave through the stand from various directions which provide access to most of the stand.

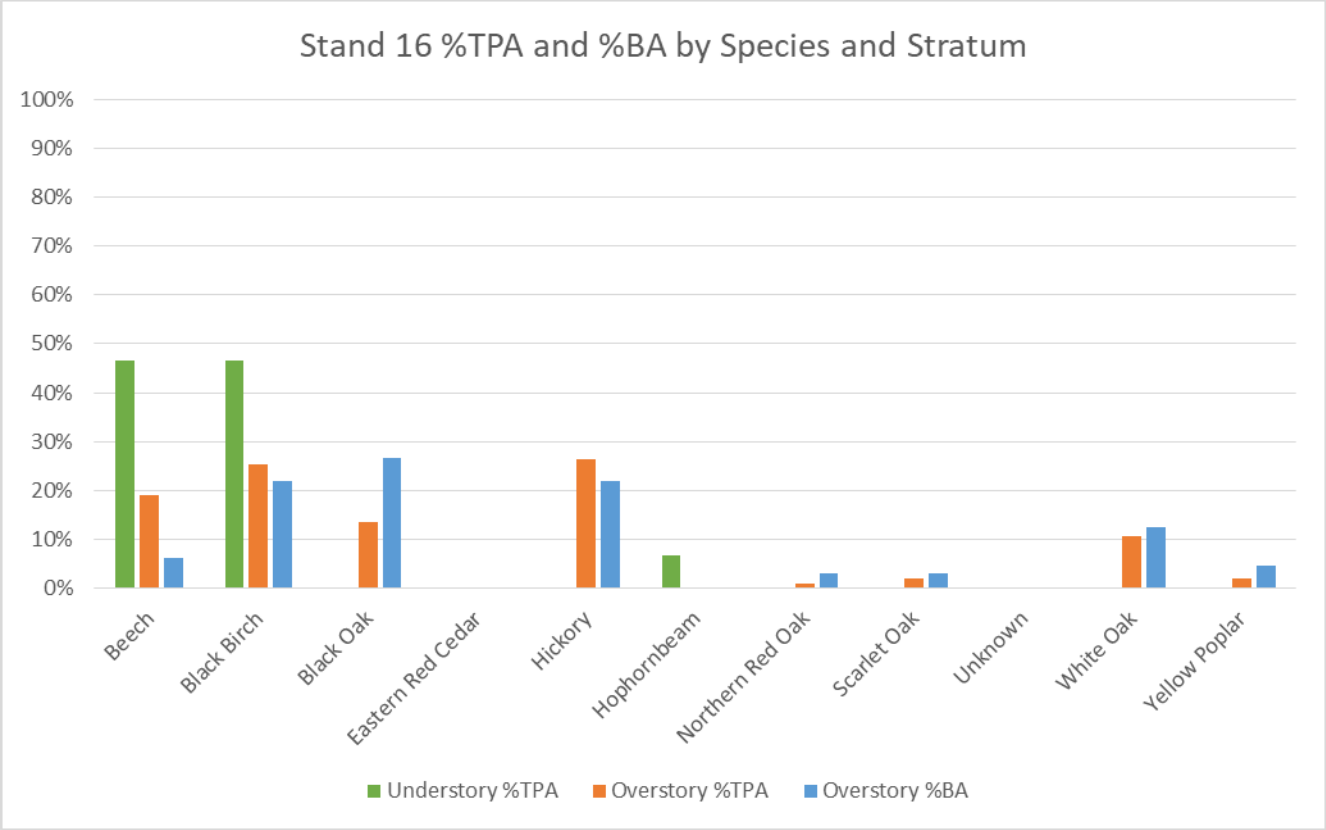
Stand description – This stand has a wide variety of species in the overstory. Most sawtimber-sized trees are black oak, hickory, or white oak. There are also some red oak, scarlet oak, and tulip-poplar. Other overstory species include beech, black birch, and eastern redcedar. Saplings include beech, black birch, hophornbeam and scattered American hornbeam. Seedlings include many beech and black birch as well as scattered black oak, hickory, American hornbeam, red oak, scarlet oak, white ash, and white oak. Understory species include thick patches of maple-leaf viburnum as well as sedge, ferns, eastern starflower, raspberry, Christmas ferns, partridgeberry, Canada mayflower, greenbrier, hog peanut, trillium, and highbush blueberry.

Management History – Some stumps were observed during the 2018 inventory, but the exact date of that cutting is unclear. In addition, stonewalls scattered throughout indicate that the area was once cleared for agricultural purposes. Based on the 1934 aerial photo portions of the southern and northwestern parts of the stand were in a semi-open condition at that point and the central portion of the stand appeared to have reverted to forest by that time. The northwestern portion of the stand contained a higher proportion of softwood than is found there today.

Health – This stand has a healthy number of established seedlings, but not saplings. Additionally, Japanese barberry was observed at many of the inventory points. Other invasive species include burning bush and Japanese stiltgrass along walking trails and roads. Some of the black birch are infected with Nectria.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in any part of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 16									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	428.6	-	-	-	-	-	-	-	-
Saplings	1,714.3	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	47.1	74.3	7,532.7 MBF	42.8	70.0	7,218.8 MBF	43.5	71.4	7,329.0 MBF
Poletimber	38.5	17.1	2.4 cord	17.0	7.1	1.2 cord	8.7	7.1	1.0 cord
Snags	12.8	5.7	-	-	-	-	-	-	-
Total	**2,241.3**	**97.1**	**-**	**59.8**	**77.1**	**-**	**52.2**	**78.6**	-
Quadratic Mean Stand Diameter (Trees > 5") = 12.3"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 16.1"									



Desired Future Condition:

Where management is appropriate, over time continue to diversify ages and size classes of vegetation in the stand as the stand is converted to an uneven-age condition. Retain species diversity including softwoods (i.e. eastern redcedar where feasible). Reduce populations of invasive plants. In future operations, consider favoring oak, tulip poplar and healthy individuals of other species. Where feasible, creating gaps over maple-leaf viburnum can help increase nectar and mast production. Creating canopy gaps above areas of existing densely growing fern should be avoided if feasible. Without treatment, fern can completely occupy areas creating a monoculture.

Management Recommendations:

<u>Ongoing</u>

- If resources are available, treat invasive plant species where noted. At the latest, this needs to be done prior to any management activities that create canopy gaps.

- This stand is currently well-stocked for growth and vigor during this plan period. Allow this stand to continue to develop and re-evaluate for potential treatments during the next plan period.

Stand 17

Acres – 39.3 ac.

Cover Type – Mixed upland hardwoods

Size – Poletimber

Stage of Development – Stem Exclusion

Major Soils:

- Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky.

Water features – Forested wetland is located along the entire western and southern boundaries of this stand.

Topography – Hilltop with exposed ridges and gentle to moderate slopes in all directions.

Access – There is one potential access road that begins at the old parking area on Ingham Hill Road that ends near the western border of this stand but will require crossing a forested wetland to enter the stand. There are several walking trails in the interior of the stand that provide access to much of the stand on foot.

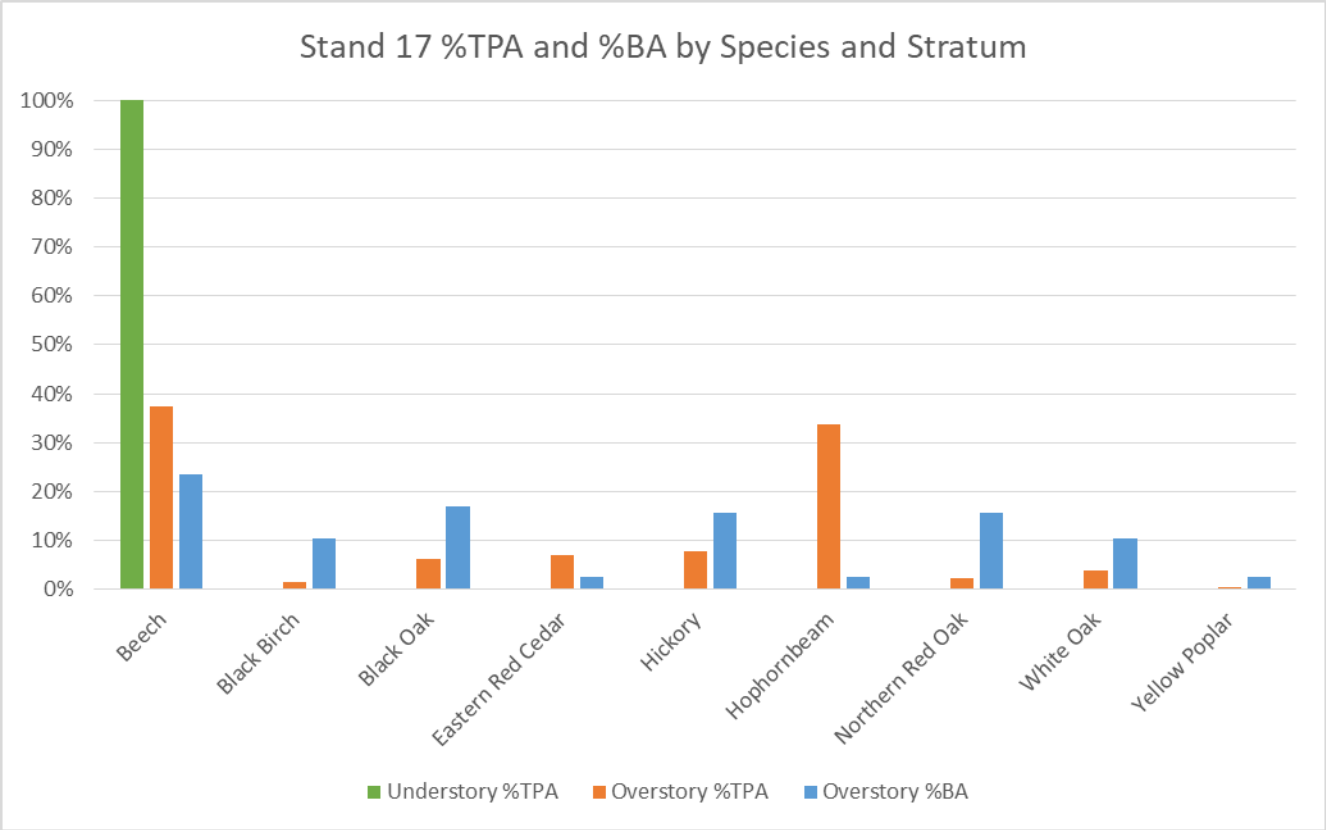
Stand description – Sawtimber-sized trees are mostly black birch, black oak, hickory, red oak, and white oak. There are some tulip-poplar sawtimber trees also. Other overstory species include beech, eastern redcedar, and hophornbeam. Saplings include beech and scattered black birch, black oak, hemlock, hickory, hophornbeam, red oak, sassafras, and white oak. Seedlings include scattered individuals and small pockets of a similar composition. Understory species include thick patches of sedge, also ferns, Canada mayflower, Solomon's seal, raspberry, greenbrier, maple-leaf viburnum, orchids, huckleberry, starflower, and Christmas fern.

Management History – Some stumps were observed during the 2018 inventory, but the exact date of that cutting is unclear. The 1934 aerial photos indicate that the northwestern portion of the stand was beginning to become a forest again and had a more substantial softwood component than is present today. Stonewalls in parts of the stand indicate a history of clearing for agricultural purposes.

Health – This stand is lacking established regeneration. Invasive species were present in small quantities. Only burning bush was observed at one of the inventory points. Some of the black birch contained Nectria, and some of the beech contained beech bark disease, but overall the rest of the trees appear to be in fair to good health.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in any part of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 17									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	0.0	-	-	-	-	-	-	-	-
Saplings	166.7	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	37.1	56.7	4,904.3 MBF	35.0	55.0	4,814.2 MBF	30.5	50.0	4,504.6 MBF
Poletimber	417.2	71.7	12.3 cord	350.8	38.3	7.2 cord	23.5	18.3	2.2 cord
Snags	0.0	0.0	-	-	-	-	-	-	-
Total	**621.0**	**128.3**	**-**	**385.8**	**93.3**	**-**	**54.0**	**68.3**	-
Quadratic Mean Stand Diameter (Trees > 5") = 9.9"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 14.1"									



Desired Future Condition:

Topography, thin soils, and potential lack of reasonable access with equipment may limit management options in this area, though clearly based on stump evidence some management has occurred here in the past. Currently the stand has good species diversity which would be ideal to retain over time. This is especially true for the softwood (eastern redcedar). Over time, attempt to reduce populations of invasive plants.

Management Recommendations:

Ongoing

- Though this stand is clearly overstocked, due to the potential limitations described above, allow this stand to continue to develop during this plan period.

- Monitor for and treat invasive plant species.

- Work with Wildlife Division staff to determine if any areas should be treated to create canopy gaps. Treat invasive plants prior to any treatments that result in additional sunlight reaching the forest floor.

Stand 18

Acres – 29.3 ac.

Cover Type – White oak/red oak/hickory

Size – Poletimber

Stage of Development – Stem Exclusion

Major Soils:

- Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky.

Water features – Seasonally wet soils along the eastern boundary adjacent to Bokum Road and pockets of wet soils along the western boundary compose most of the water features noted here.

Topography – Gently rolling in most areas with some moderately steep west-facing slopes and ridges to the south.

Access – This stand is separated from the rest of the property by a railroad and therefore cannot be accessed by any trails or potential roads used to access other stands. According to town parcel maps, however, there may be an access point on Bokum Road where a narrow finger of land appears to provide frontage between two other properties. When this potential access point was field checked it was not successfully located, and no monumentation indicating ownership was noted. Accurate boundary location and marking will be important if this access point is to be used for any purpose.

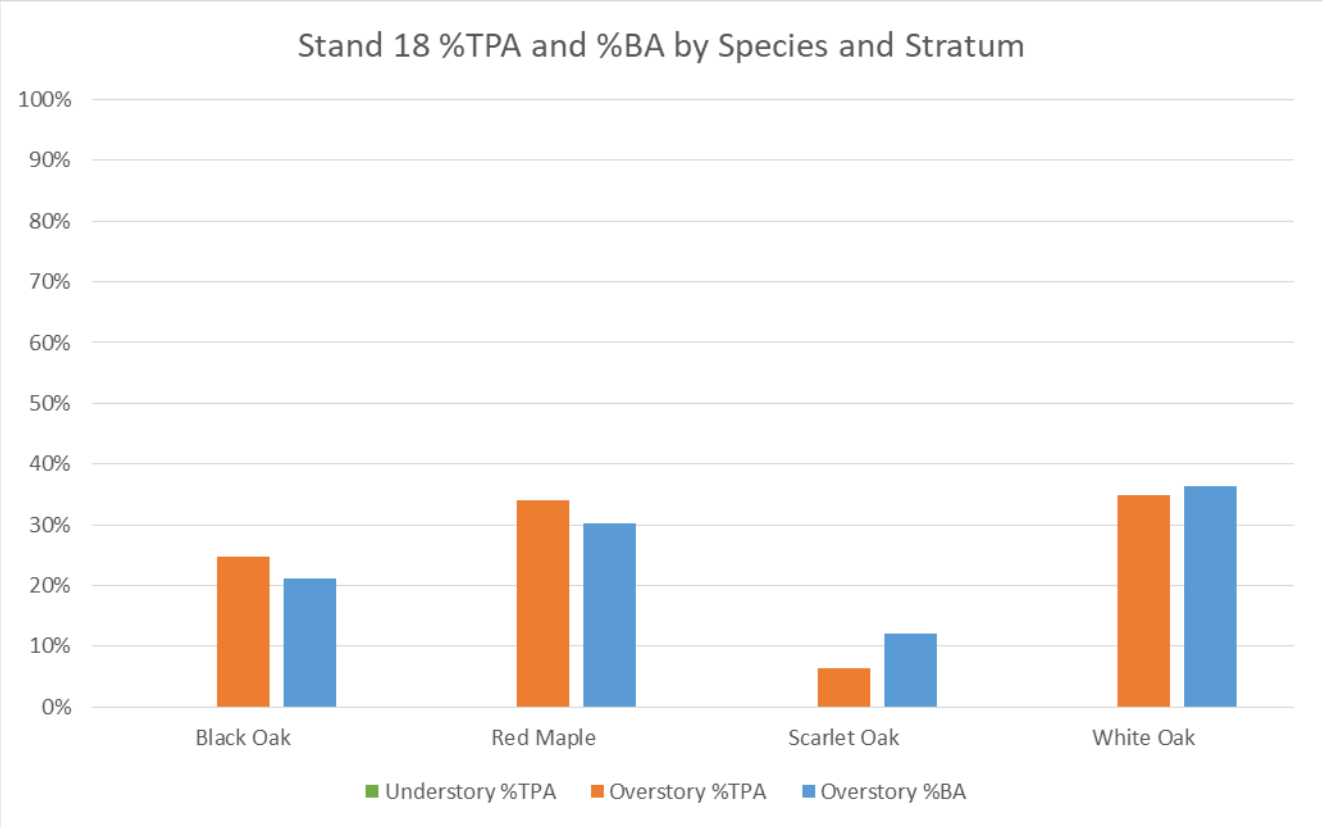
Stand description – Most overstory trees are red oak or scarlet oak. Other common associated species include black oak, red maple, and white oak. Saplings include scattered beech, black birch, hophornbeam, sassafras, and white oak. Seedlings include scattered black birch, beech, black oak, red oak, red maple, sassafras, scarlet oak, and white oak. Understory plants include some heavy patches of ferns as well as mountain laurel, maple-leaf viburnum, lowbush blueberry, sedge, sweet pepperbush, and eastern starflower. Current stocking levels indicate that the stand is well overstocked. This in turn means that individual tree vigor is likely to decrease over time due to high levels of intense completion for light.

Management History – No indication of previous management activity was noted here, though some apparent clearing in the northern portions of this stand is visible in the 1934 aerial photo.

Health – This stand is lacking established regeneration. Invasive species were present in small quantities. Only Japanese stiltgrass was observed at one of the inventory points, though some invasive plants were also noted along the section of Bokum Road near where the stand contains frontage based on mapping.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in any part of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 18									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	0.0	-	-	-	-	-	-	-	-
Saplings	0.0	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	65.1	73.3	5,673.5 MBF	65.1	73.3	5,673.5 MBF	65.1	73.3	5,673.5 MBF
Poletimber	179.9	80.0	17.0 cord	39.3	26.7	7.3 cord	8.5	6.7	2.4 cord
Snags	0.0	0.0	-	-	-	-	-	-	-
Total	**245.0**	**153.3**	**-**	**104.4**	**100.0**	**-**	**73.6**	**80.0**	-
Quadratic Mean Stand Diameter (Trees > 5") = 10.3"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 14.0"									



Desired Future Condition:

Allow this stand to continue to develop with minimal human intervention. Designation as an Old Forestland Management Site. Eventual desired condition is large overstory trees with diverse vegetation in understory, large standing and downed woody material in various stages of decomposition, and small canopy gaps where trees have died. There are no known occurrences of rare, threatened, endangered or special concern plant species in this stand that require additional sunlight to persist or thrive.

Management Recommendations:

2023

- Attempt to treat invasive plants along edges and the stiltgrass noted in the interior of the stand. Treatment of stiltgrass along edges should not negatively impact the stand's ability to develop toward old forest characteristics.

Ongoing

- Allow this stand to continue to develop during this plan period.
- Continue to monitor for and treat invasive species.
- Locate and mark boundaries. If desired, a potential access may be able to be created for future access from Bokum Road.

Stand 19

Acres – 6.7 ac.

Cover Type – White oak/red oak/hickory

Size – Poletimber and small sawtimber

Stage of Development – Stem Exclusion/understory reinitiation (in pockets)

Major Soils:

- Merrimac fine sandy loam, 0 to 3 percent slopes

Water features – Forested wetland is adjacent to portions of the western boundary. Some of the officially mapped "Critical Habitat" on the property and one block just south of the property boundary is located here.

Topography – Mostly flat with a very gently sloping hill to the east.

Access – This stand is located in the far southeastern corner of the property and is bounded by forested wetland to the west, a railroad to the east, and private property to the south. Because of this, access for equipment may be difficult although there is an existing trail and crossing with a bridge that provides access over the wetland and the rest of the property to the west. Additionally, there is a north-south running power line right-of-way

that divides the stand into two parts. Access may be possible using this right-of-way though the northern end of the corridor contains wet soils and a pocket of phragmites.

Stand description – This stand is a mixture of poletimber and sawtimber sized-trees on mostly flat ground. Most sawtimber trees are black oak, scarlet oak, or white oak. Other overstory species include black cherry and red maple. Saplings include pockets of white oak with scattered black birch, black oak, and red maple. Seedlings include scattered black oak and white oak. Understory species include very dense thickets of sweet pepperbush as well as scattered mountain laurel, huckleberry, lowbush blueberry, highbush blueberry, and greenbrier.

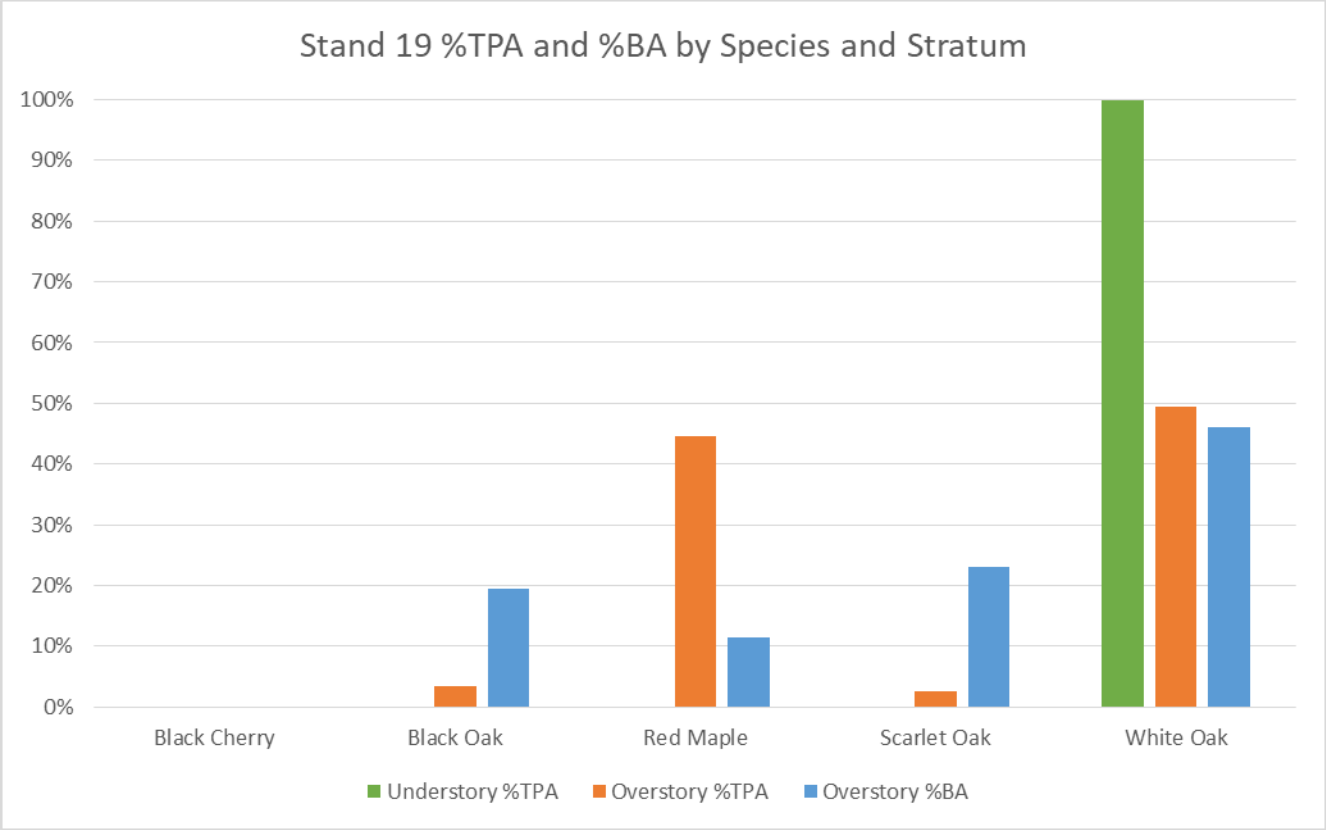
Management History – Most of this area was likely cleared for agricultural purposes at one time. In addition, there was once a cleared corridor running east-west through the stand that is still visible in the 2016 orthophoto for this area, though evidence on the ground is not obvious when walking through. The 1934 aerial photos indicate a presence of water in the northern portion of the southern block of the stand that is not as pronounced today.

This bridge provides access on foot to Stand 19 through Stand and is located on or near the property line.

Health – This stand is lacking established regeneration, but otherwise appears to be in good health.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in any part of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 19									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	0.0	-	-	-	-	-	-	-	-
Saplings	500.0	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	49.9	80.0	6,395.5 MBF	49.9	80.0	6,395.5 MBF	49.9	80.0	6,395.5 MBF
Poletimber	448.4	40.0	6.9 cord	22.6	90.0	1.6 cord	0.0	0.0	0.0 cord
Snags	114.6	10.0	-	-	-	-	-	-	-
Total	**1,112.9**	**130.0**	**-**	**72.5**	**170.0**	**-**	**49.9**	**80.0**	-
Quadratic Mean Stand Diameter (Trees > 5") = 13.5"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 16.8"									



Relatively small trees overtop briar and huckleberry in the eastern portion of the stand. If feasible, portions of this stand could be treated with prescribed burns to enhance a variety of important ecological and wildlife features.

Desired Future Condition:

If feasible, consider managing this stand or portions of it to promote young oak forest conditions with a diverse understory of native shrubs. Manage this area as even-aged. Maintain current absence of invasive plants if feasible. Given the very dense huckleberry and blueberry in the adjacent transmission corridor, it appears as though the area can support this kind of vegetation. Over time, consider developing a burning or clearing regime that can maintain dense stands of blueberry and huckleberry for nectar and mast production as well as the cover it can provide.

Management Recommendations:

Ongoing

- Monitor for and treat invasive species.

- This stand is overstocked according to the Gingrich Stocking Diagram for upland oaks. Access to the stand with equipment for management purposes may be a challenge. If reasonable access can be gained, consider attempting to regenerate portions of the stand using even-age techniques including the seed tree method or small clearcuts. This should be done where pockets of blueberry or huckleberry exist. Avoid tree cutting in areas of invasive plants, though if found, invasives should be treated prior to any tree cutting. In areas that are not going to be regenerated, consider a crop tree release focusing on releasing healthy oak with good crowns and any cherry that is vigorous enough to respond to release irrespective of form. This is likely to be a non-commercial operation.

Stand 20

Acres – 143.1 ac.

Cover Type – Red maple/lowlands

Size – Poletimber

Stage of Development – Stem Exclusion

Major Soils:
- Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony.

Water features – This entire stand is forested wetland and/or riparian area and contains five identified drainages throughout the property. The only blue-line perennial watercourse is Roaring Brook that drains from Pequot Swamp Pond and runs through the southern portion of the property. Many of the confirmed and potential vernal pools and other are found in the Water Features map in Section N Appendix A (J).

Topography – Located in valleys, mostly flat with wet soils.

Access – This stand is broken into many blocks that are found throughout the entire property. Multiple walking trails and potential access roads cross different sections of the stand with a variety of methods including bridges and fords. Some areas are more isolated than others, but all can be accessed on foot.

Stand description – This stand is forested wetland and has a much different species composition than the rest of the property. Overstory sawtimber-sized trees are mostly red maple with some red oak, ash, yellow birch, blackgum, and white oaks with occasional swamp white oak, basswood, elm and other species as well. Some black birch is also present. Saplings include scattered black oak, blackgum, American hornbeam, red oak, red maple, swamp white oak, white oak, and yellow birch. Seedlings include scattered beech, American hornbeam, red maple, white ash, and white oak. Understory vegetation includes dense patches of ferns, sweet pepperbush, skunk cabbage, grasses, and witch hazel with scattered highbush blueberry, poison ivy, Canada mayflower, arrowwood, sedge, tussock, Virginia creeper, spicebush, greenbrier, winterberry, and a variety of herbs.

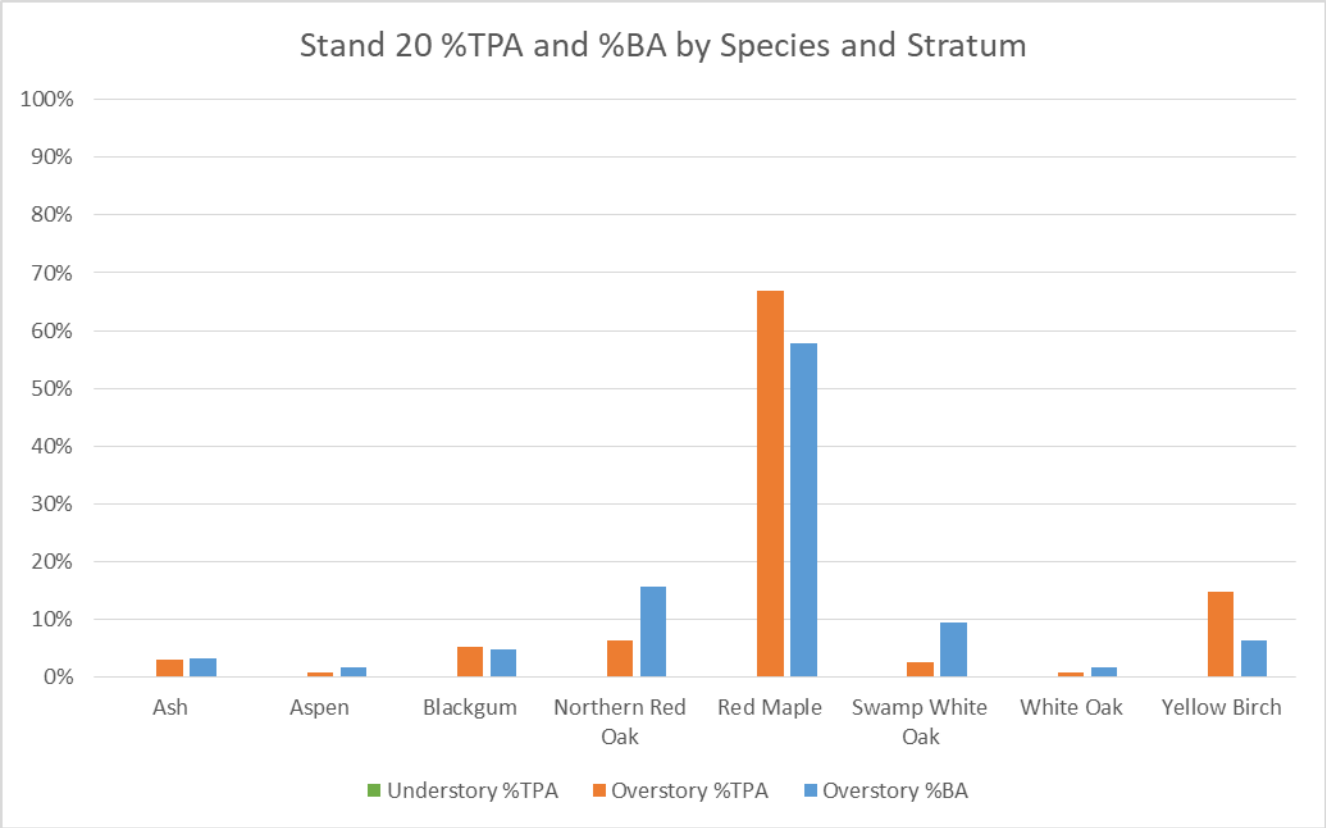
Many interesting and important features are present throughout Stand 20 including this bog-like area

Management History – Minimal amounts of evidence of previous management was noted during field visits to the property, though some stumps of cut trees appear along the edges of some blocks of this stand. Wet soils likely limited the feasibility of using many of the areas for agriculture, though the areas may still have been cleared at one time.

Health – This stand is lacking established regeneration, but that may change as forest succession continues and natural gaps form in the canopy from dying trees. Japanese barberry is present in many portions of the stand, though dense patches are infrequent. Some of the ash displayed signs of emerald ash borer.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in any part of this stand. In addition, the southeastern block of this stand contains an occurrence of mapped Critical Habitat: a 1.5 acre stand of Acidic Atlantic White Cedar Swamp. This used to be a much more prominent natural community in this area. With previous conversions to agriculture, development, and cutting for other purposes, the numbers of these stands continues to decline. See Natural Diversity Data Base map in Appendix N (K).

Stand 20									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	0.0	-	-	-	-	-	-	-	-
Saplings	0.0	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	26.2	41.7	3,315.1 MBF	26.2	41.7	3,315.1 MBF	26.2	41.7	3,315.1 MBF
Poletimber	189.8	71.7	10.8 cord	67.5	25.0	3.8 cord	96.4	50.0	7.4 cord
Snags	10.0	5.0	-	-	-	-	-	-	-
Total	**226.0**	**118.3**	**-**	**93.7**	**66.7**	**-**	**122.6**	**91.7**	-
Quadratic Mean Stand Diameter (Trees > 5") = 9.0"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 11.0"									



Desired Future Condition:

Access for equipment in the various blocks of this stand is generally not advisable unless a reasonable crossing is or can be established to access adjacent areas more appropriate for management. Over time, considering a more hands-off approach in this stand may be more reasonable, aside from the treatment of invasive plants.
Management Recommendations:

<u>Ongoing</u>

- Consider allowing this stand to continue to develop during this plan period.
- If resources are available, treat known populations of invasive species.
- Regularly monitor the pocket of Atlantic white cedar in the southeastern block of this stand. If decline is noted and the health of the grove can be improved by doing so, consider cutting some competing trees along the edges of the grove to provide some additional growing space. Care must be taken to limit size of canopy gaps surrounding the grove to reduce the likelihood of windthrow. Over time, if desired, consider attempting to expand the grove with additional targeted plantings in adjacent areas or other portions of the property where it makes sense to do so based on site conditions and current vegetation present in the areas. If personal safety can be maintained and infrastructure would not be threatened, girdling the competing hardwoods to create standing dead snags can serve dual purposes of releasing the cedar while simultaneously creating additional potential habitat features.

- A small portion of this stand in the northeastern corner of the property adjacent to Stand 18 is proposed for inclusion in the Old Forestland Management Site described in that stand.

Stand 21

Acres – 20 ac.

Cover Type – Swamp, open water

Size – N/A (Open water with shrubs and pockets of trees)

Stage of Development – N/A

Major Soils: N/A

Water features – This entire area is a water feature. It is one of the most prominent on the property and is known as Pequot Swamp Pond.

Topography – Flat

Access – There is a causeway along the southern end of the pond as well as trails that run along portions of the pond. Other infrastructure includes a dam on the western side.

Stand description – This area contains some of the more important habitat features on the property and is one of the larger water bodies in the area. It acts as the headwaters of Roaring Brook which flows from the southern end of the pond. The pond itself is a mixture of open water with pockets of dense shrubby vegetation along the edges, some small pockets of young trees, some small islands of other vegetation, and emergent wetland vegetation scattered throughout.

Management History – The 1934 aerial photo shows very clearly that this feature existed at that time and was basically the exact same shape then that it is today.

Evidence of beaver activity in the northern portion of the pond.

Health – Some evidence of active beaver chewing was noted during the summer of 2018 especially along the northern shore where there is less human activity since no trails or roads are nearby. There is a dense pocket of phragmites in the south-central portion of the pond, and some other invasive plants near cleared areas in the south shore along the causeway and southeastern shore. Otherwise, pond health and habitat offerings here appear in good condition.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in any part of this stand. See Natural Diversity Data Base map in Appendix N (K).

Future Desired Condition:

Continue to manage this area as an open water or semi-open water feature. Over time, attempt to reduce populations of invasive plants.

Management Recommendations:

Ongoing

- Continue to monitor invasive plants. If resources are available, treat phragmites in an attempt to eliminate it from where it currently exists in the pond. If successful control can be gained, if feasible, and if necessary for habitat benefits or other reasons, consider replanting the area with native alternatives including cattail.

- Continue to monitor beaver activity to ensure no damage is being done to infrastructure (causeway or dam) by their activity. If necessary, consider installing beaver friendly management structures such as baffles to ensure infrastructure integrity while allowing the beaver to remain at the site.

- If desired, consider installing a bird blind or other such structure to facilitate viewing of wildlife from one of the shorelines.

- If desired, consider installing nest boxes for a variety of species of birds along shorelines and/or within the pond itself.

- If desired and if feasible, periodically cut pockets of shrubs and/or trees to encourage sprouting response. If this is to be done, only a portion of any given area should be cut to ensure that existing habitat feature and structure remains while the cut area regenerates.

- Attempt to limit tree growth within the pond to keep the pond semi-open. This can be done by girdling trees not near any infrastructure. Successfully girdled trees will have the dual benefit of keeping the area open/semi-open while creating standing dead snags and potential cavity trees.

Stand 22

Acres – 22.4 ac.

Cover Type – Transmission corridor

Size – Open or low-growing shrubs with some small trees (seedlings and saplings) along some edges.

Stage of Development – N/A (because the area will continuously be cleared)

Major Soils:

- Variety including exposed ledge

Water features – Portions of the transmission corridors on the property contain wet soils some of which are mapped wetland soils according to NRCS mapping available through DEEP.

Topography – Variable with variable aspects.

Access – All three transmission corridors have at least some sections of well-established and relatively well-maintained access roads throughout.

Stand description – There are three main transmission corridors on the property: one in the north, one in the east that runs along most of that side of the property, and a spur in the far southeast. Vegetation present includes a wide variety of shrubs such as mountain laurel, witch hazel, huckleberry, and blueberry, as well as some seedlings and saplings of trees along forest edges. Many herbaceous species are also present. Some pockets of invasive plants were noted.

The dense vegetation along the north edge (right side of photo) of this section of transmission corridor near Stands 7 and 8 contains some younger trees from clearing that occurred years ago. The dense foliage and smaller size of younger trees can provide some edge habitat used by a variety of wildlife. Having some younger and smaller trees and other vegetation along the boundary between cleared, open area and more mature forest can also create a "soft edge" which is the more gradual transition that many species of young forest and shrub nesting birds and other wildlife utilize.

Management History – The 1934 aerial photo shows that at that time, these areas were forested or beginning to revert back to forest. All the land within this area is periodically cleared of trees to ensure no vegetation can interfere with access and the other infrastructure present.

Health – Some pockets of invasive plants were noted including phragmites in the southeast and in the north.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in any part of this stand. See Natural Diversity Data Base map in Appendix N (K).

Future Desired Condition:

The utility company manages the area as needed to ensure stability of power transmission. Working with them to identify sensitive habitats and/or plants can help them plan to avoid or mitigate some areas.

Management Recommendations:

Ongoing

- Work with the utility company to treat invasive plants within the ROW. This includes but is not limited to the pockets of phragmites. If feasible, and if necessary for habitat benefits or other reasons, consider replanting the area with native alternatives including cattail where appropriate and native low-growing shrubs that can provide a source of nectar, mast, and cover.

- If desired and if appropriate areas can be found to do so, soften edges along some of the existing open area/forest boundaries. If this is to be done choose areas with no or limited existing populations of invasive plants and no known special features or habitats.

- Where necessary and appropriate, work with the utility company to develop plans to use existing road systems as part of the recreational infrastructure on the property.

- Work with the utility company to identify potentially sensitive areas and species that exist within or adjacent to the Rights-of-Way. Manage those areas appropriately to help ensure their continued presence and ideally enhance their populations and vigor as well.

Stand 23

Acres – 2.1 ac.

Cover Type – Mixed upland hardwoods

Size – Small Sawtimber

Stage of Development – Stem Exclusion

Major Soils:

- Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky.

Water features – Forested wetland is adjacent to the northern boundary.

Topography – Mostly flat. This stand is situated in a “bowl” formed by the topography of Stand 2.

Access – There is no direct access to this stand either by potential access roads or walking trails.

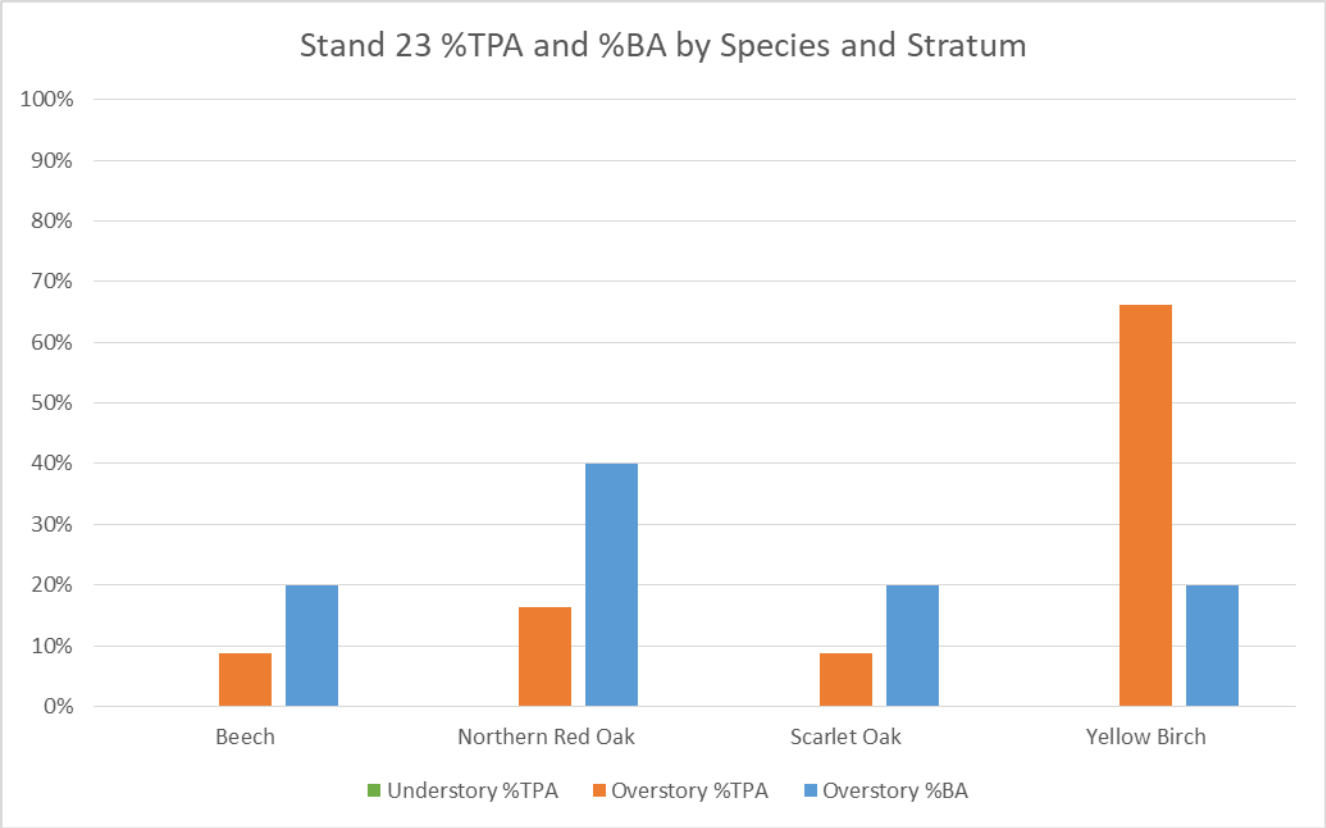
Stand description – This stand is unique from other stands on the property in that it contains several very large trees over 20” in diameter in a small area. It was separated from the rest of Stand 2 for that reason. Overstory species include beech, red oak, scarlet oak, and yellow birch. Saplings include scattered beech and yellow birch. Seedlings include scattered beech. Understory species include scattered sedge and maple-leaf viburnum.

Management History – Some stumps were noted during the 2018 inventory, but the exact date of when those trees were cut is unclear. The stand appears to have been mostly forested at the time the 1934 aerial photos were taken.

Health – Japanese stiltgrass was noted near the inventory point, and some of the beech showed signs of beech bark disease. Otherwise, forest health in this small stand is good.

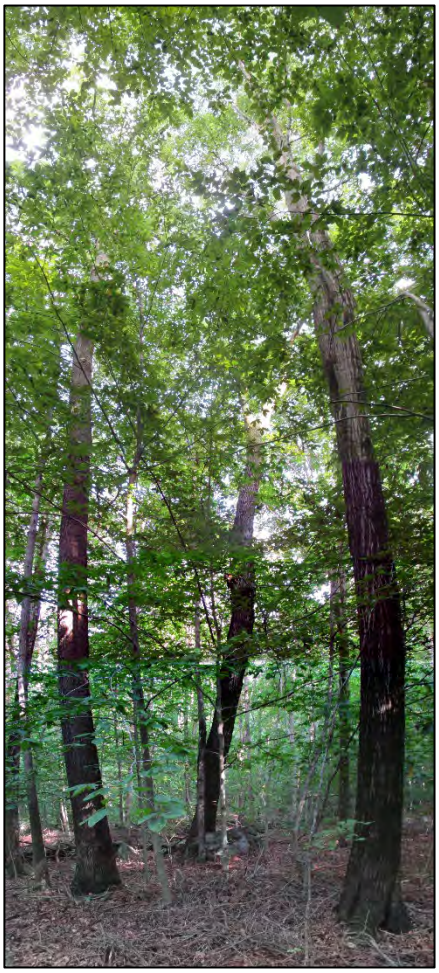
NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in any part of this stand. See Natural Diversity Data Base map in Appendix N (K).

Stand 23									
	All Trees			Acceptable Growing Stock			Dominant/Co-Dominant		
Size Class	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**	**# Trees/ac**	**BA/ac**	**Volume/ac**
Seedlings	0.0	-	-	-	-	-	-	-	-
Saplings	0.0	0.0	-	0.0	0.0	-	-	-	-
Sawtimber	21.8	60.0	5,327.9 MBF	16.7	40.0	3,703.2 MBF	21.8	60.0	5,327.9 MBF
Poletimber	64.9	40.0	5.1 cord	0.0	0.0	0.0 cord	7.6	20.0	2.2 cord
Snags	0.0	0.0	-	-	-	-	-	-	-
Total	**86.7**	**100.0**	**-**	**16.7**	**40.0**	**-**	**29.4**	**80.0**	-
Quadratic Mean Stand Diameter (Trees > 5") = 12.8"									
Quadratic Mean Stand Diameter (Trees > 5") Dominant/Co-Dominant = 22.2"									



Desired Future Conditions:

Manage this stand to ensure the large trees are able to persist for as long as possible. Over time, reduce populations of invasive plants. If adjacent areas in Stand 2 are to be actively managed, care must be taken to reduce the size of canopy gaps adjacent to this stand to reduce the likelihood of windthrow.



Some of the larger trees in this small stand

Management Recommendations:

<u>Ongoing</u>

- Allow this stand to continue to develop during this plan period and perhaps beyond. The current species composition would make excellent late-stage successional habitat if left untreated and there are no major natural disturbances (i.e., gypsy moth, storm damage etc.) that impact the overstory trees.

- If resources are available, treat invasive species.

- Regularly monitor this area for tree vigor. If beech bark disease begins to impact the trees here, consider removing them if activity is occurring in adjacent areas, or leave them to continue to develop and allow the disease to take its course if preferred.

<u>Stand 24</u>

Acres – 2.9 ac.

Cover Type – Open area/developed

Size – N/A

Stage of Development – Open or shrubby

Major Soils:

- Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky.

Water features – None noted.

Topography – Flat

Access – There is a main access road that leads directly to the western block of this stand from a gated entrance in Westbrook along Route 153 south of the parking area. The eastern block of this stand is the newly created 12-car parking area north of Ingham Hill Road in Old Saybrook.

Stand description – There are three blocks of this area. The western block includes the parking and adjacent maintained open area on the east side of Route 153 in Westbrook. There is a second small block of open area just east of that, and the third area is the newly created parking lot in Old Saybrook north of Ingham Hill Road. The second area described above is unique in that there are very few portions of the property that are in an open condition. Vegetation present in this opening includes a mix of grasses and herbs, especially goldenrod, beneficial for late-season pollinators. The area is relatively small and is surrounded by dense forest. Both other areas (the parking lots) are cleared and maintained as gravel lots.

Management History – The parking lot along Route 153 (western block of this stand) was open at the time the 1934 aerial photos were taken. That same area was still cleared and had a couple of houses on it as recently as the 2004 aerial photo. Those houses have been removed and the parking area has taken their place. Based on the condition of the area and its location, it is likely that the small area surrounded by forest (the second area described above in "Stand description") was used as a log landing at some point and it was mostly open in the 1934 aerial photograph. This area also had a small house on it as recently as 2004. The new parking area was previously forested prior to clearing.

Health – Some invasive plants are present along the edges of the second area. Otherwise health seems good and the plants here provide an important late-season nectar sources for pollinators.

NDDB, critical habitats, special features – According to DEEP data, there may be rare, threatened, endangered species, or species of special concern in any part of all three blocks of this stand, though due to current vegetative cover, development, and management that is unlikely. See Natural Diversity Data Base map in Appendix N (K).

Desired Future Conditions:

Manage the open area surrounded by woods east of Route 153 to remain open or semi-open. As it exists, it may be able to be used as a landing for this portion of the property. Continue to manage the parking areas.

Management Recommendations:

<u>2023</u>

- Treat invasive plants in opening and in the nearby borrow pit east of the Route 153 parking area. If feasible and if desired, once invasives are controlled, consider replanting with native flowers and/or shrubs that can provide sources of nectar and/or mast.

<u>Ongoing</u>

- Install DEEP signage and State Forest shield with kiosk at new parking area on Ingham Hill Road
- Install connector trail from new parking area to trail network
- Allow the areas east of the Route 153 parking lot to remain open periodically mowing when necessary to keep from reverting to forest. This includes both the area directly adjacent to the parking area as well as the block of this stand just east but surrounded by forest. If desired, and if appropriate areas can be found to do so, expand the opening by cutting pockets of trees adjacent to the opening and allowing the cut areas to regenerate to create softer edges.

- If sufficient area exists to do this, create a low-maintenance native species pollinator garden and/or rain garden adjacent to the newly created 12-car parking area in Old Saybrook adjacent to Ingham Hill Road and/or the Route 153 parking area.

- If resources are available, continue to treat invasive species.

GENERAL PROPERTY RECOMMENDATIONS

- With any activity undertaken on the property, attempt to:
  1. Ensure water quality and soil stability
  2. Protect/maintain critical habitats, rare species, and other sensitive areas
  3. Maintain or improve forest health and vegetative species diversity
  4. Improve vertical and horizontal structural diversity and complexity, including retaining and recruiting snags and cavity trees where doing so is not counter-productive to the goal of the activity
  5. Maintain or enhance biodiversity
  6. Limit the spread of invasive plant species; treat populations of invasives in and adjacent to the area where trees are to be cut prior to forest stewardship activities.

- Attempt to limit populations of invasive plant species. Keep abreast of information regarding invasive insects, especially the emerald ash borer and Asian long-horned beetle. Amend plan to salvage imminently infested stems if necessary. **Vigilance and re-treatment of invasives will be critical.**

- Check with the NDDB program for regular updates and to ensure planned management activities will not negatively impact known species or Critical Habitat features.

- Develop a sustainable trail plan within the first year of this 10-year plan's implementation following the CT DEEP Policy/Procedure #310 Multiuse Trail Policy for DEEP Properties, taking into consideration guidance provided in *Trails for People and Wildlife* (Stevens, 2019) and *Trails Guidelines and Best Management Practices* (Massachusetts DCR) as planning tools. In the interim, continue to maintain roads and authorized trails (with blazing and/or signage where appropriate) to maintain access and limit erosion throughout the property. Reroute and/or close trails where necessary to maintain soil stability and water quality and/or to protect sensitive areas. Per Klemens (2023), this plan should include elimination/relocation of all trails that enter a vernal pool or go within 100' of a vernal pool. It is recommended also that the trail density be reduced to "low" within the CPA and "moderate" as defined in Massachusetts DCR 2019.

- Review and consider the DEEP Hunting Review Team recommendations approved by the CMC to provide hunting opportunities for the public and reduce the potential for deer to negatively affect forest regeneration and rare plant populations,while taking into consderation overall public access and recreation.
  Develop a Public Recreational Use and Trail Plan defining recreational activities permitting within the Preserve, outlining a formalized trail plan and map, and defining stewardships and maintenance responsibilities, is in development through the collaboration of CT DEEP and the Town of Old Saybrook with close coordination with the community and trail user and hunting groups. This Plan will be ammended to this Forest Management Plan upon completion.
- Follow Connecticut's Field Guide for Best Management Practices for Water Quality while Harvesting Forest Products during any forest management operations.

- Where aspen trees are encountered during treatments, consider attempting to regenerate those areas to encourage dense sprouting for wildlife habitat where it makes sense to do so.

- Attempt to maintain and enhance populations of oaks and softwood tree species on the property.

- Whenever possible, avoid beginning to cut trees during the songbird breeding and migration season and bat nesting and roosting seasons. (i.e., April 1-November 1) if it is feasible given operational concerns and goals of the treatment. Harvest timing restrictions are subject to NDDB recommendations for individual operation plans, and not all harvests will have recommended timing restrictions.

- Attempt to recruit large trees scattered throughout the property, even if these trees are not "wolf trees" to increase structural diversity. These large trees could become "legacy trees" and be allowed to mature and die naturally.

- Locate, mark, and maintain all boundary lines at regular intervals.

- Whenever feasible, attempt to work with adjacent landowners (i.e., other municipally owned lands, Essex Land Trust, Town of Westbrook, privately held inholdings, etc.) to "manage across boundaries."

- During or after forest stewardship activities that involve cutting trees, consider piling tops of some felled trees to increase value for wildlife. Pile tops near edges of openings where they exist and do not create more than 2-3 piles/acre. In addition, consider installing some deer exclosures and/or piling tops on recently cut oak stumps to help facilitate successful stump sprout regeneration.

- Where feasible based on operational concerns and safety, attempt to retain one (1) snag tree/acre that is greater than 18 inches in diameter at breast height (dbh), and three (3) snag trees (or potential snags) that are greater than 12 inches dbh[24].

- Consider developing educational partnerships to encourage local schools to use the area where it does not conflict with other planned uses or user groups.

- Consider implementing research projects regarding interesting and unique portions of the property including the bogs.

- Investigate the potential origins of unusual cultural features including stone piles and walls with incorporated boulders.

- Consider creating some mountain bike specific trails and/or limiting or prohibiting use of mountain bikes on other trails that are more sensitive.

- Periodically update trail maps to ensure maps reflect current information and trail locations.

- Future forest stewardship activities should prioritize the removal of Nectria-infected black birch and beech with beech bark disease if those trees do not appear to be actively used as cavity trees.

- Monitor health of beech trees and spread of beech bark disease. If disease appears to be spreading rapidly consider cutting and removing infected stems to reduce the amount of inoculum present.

[24] Hagenbuch, Steve, Katherine Manaras, Jim Shallow, Kristen Sharpless, and Michael Snyder. Silviculture with Birds in Mind. Huntington & Waterbury, VT: Audubon Vermont & VT FPR, 2011. Printed guide.

- Monitor for dead ash trees as a result of EAB or other pests/diseases. If dead trees are located near roadways or infrastructure they should be felled for safety purposes.

- Over time, convert some of the even-aged or two-aged forest to uneven-age conditions where appropriate. Forest stewardship activities should encourage the development of additional size and age classes when using uneven-age management techniques.

- Retain wolf trees

- Remove illegal and/or unauthorized infrastructure.

- If appropriate locations and seed/seedling sources can be found, reintroduce pitch pine

- Conduct appropriate wildlife surveys and establish monitoring protocols to inform management.

- Use prescribed fire as a management tool where appropriate to enhance specific features including (but not limited to) heath-dominated areas, and places where burning can be done safely to enhance the likelihood of successful oak regeneration. Work with DEEP Wildlife Division staff and plant ecologists to determine appropriate locations, extents, and intensity of treatments. Planning and safety precautions are essential.

- As feasible, work with the utility company to protect individual species and Critical Habitats found in ROW

- During silviculture activities conducted on the property, and mechanized work will be kept out of the CPA (Klemens 2023). This does not include hand felling, weeding, or use of hand held devices such as chainsaws, brush saws, etc. Timber Stand Improvement is an approved activity (done without ground impacting machinery) within the CPA.

- Monitor Beech Leaf Disease (BLD) and associated mortality within American beech populations. If mortality becomes prevalent, address during subsequent operation plans.

- Remove pre-development infrastructure (i.e. test wells) and additional detritus and debris remnants from the pre-conservation era of The Preserve.

- Mapping of invasive species present on the property, and addition of this map into the mapping section of this plan.

- Utilization of volunteer groups to assist in any of the above recommendations including but not limited to invasive removal and mapping, trail work, debris removal, etc.

STAND SPECIFIC RECOMMENDATIONS[25]

Forest Management

Stand	Year*	Acres**	Prescription
1	2026	51.5	Single tree/group Selection, thinning, patch cuts
3	^	20.8	Non-commercial forest stand improvement/crop tree release/canopy gap creation
4	2029	18.1	Single tree/group selection/patch cuts
5	2029	2.2	Timber stand improvement
7	^	5	Non-commercial canopy gaps over blueberry in interior/soften edges along transmission corridor
8	^	1	Create canopy gaps
10	2025	50	Thinning/crop tree release/laurel treatment/canopy gaps
11	2031	27.0	Thinning / Group Selection / Patch Cut
12	***	10.4	Shelterwood
15	^	5	Non-commercial canopy gaps
15	^^	37.8	Thinning
17	^	4	Non-commercial canopy gaps
19	^	3	Non-commercial regeneration treatment and crop tree release

* Recommendations without years are referred to in the plan as "Ongoing" which is intended to give managers a suggestion, but indicates no immediate need

** Acres are approximate

*** Harvest year undetermined because of need to time treatment with mast year

^ As staff availability and funding permits

^^ Future plan period

Depending on funding and staff availability, the following stands are suitable for non-commercial forest stand improvement to promote important native plants and plant communities. Work with wildlife division staff to determine if any areas would be appropriate for creating canopy gaps non-commercially.

- 1, 3, 4, 6, 8, 10, and 14-17

[25] Not all the recommendations for each stand are listed here. Additional detail can be found in the recommendations section for each stand.

Invasive Plant Treatments

Stand	Year*	Acres*	Recommendation
1	2025	20	Invasive plant treatment at Ingham Home Foundation and other locations in stand
3	2025	20	Invasive plant treatment
4	2026	15	Invasive plant treatment with potential replanting of native alternatives
5	2025	2.2	Invasive plant treatment
6	2025	5	Work with whoever manages roadside vegetation to treat stiltgrass along road
6	2025	10	Invasive plant treatment
7	^	5	Invasive plant treatment
10	2025, 2026	20	Invasive plant treatment
11	2027-2028	40	Invasive plant treatment
12	2026	15	Invasive plant treatment
14	2027	30	Invasive plant treatment and potential replanting with native alternatives
15	2030	30	Invasive plant treatment. Modify date to occur before tree cutting if canopy gap creation is planned during this period
17	^	4	Invasive plant treatment
18	2025	5	Invasive plant treatment
21		2	Invasive plant treatment
24	2025	4	Invasive plant treatment

* Recommendations without years are referred to in the plan as "Ongoing" which is intended to give managers a suggestion, but indicates no immediate need

** Estimates of acres based on general observations of invasive plan infestations. Actual treatment acres may be more or less than figures presented.

^ As staff availability and funding permits

Other Recommendations

See following page for symbol meanings

Stand	Year*	Acres**	Recommendation
1	2025	5	Clear vegetation surrounding Ingham Home Foundation; conduct archeological review
1	Ongoing	5	Maintain open and semi-open areas in stable condition
3	2025		Improve approaches to bridge in northern portion of stand
4	^		Attempt to develop an access road for management purposes
5	^	2.2	Attempt to develop an access road for management purposes
6	^		Attempt to develop an access road for management purposes
9	^		Consider creating a spur trail for additional views of Pequot Swamp Pond
10	^	2	Plantings in southwest portion of stand if feasible and desired
18	^		Investigate for potential access from Bokum Road
20	Ongoing	1.5	Monitor Atlantic white cedar grove. Release cedar as needed
21	Ongoing		Monitor beaver activity, especially with respect to whether impacting or benefitting Medium Fen Critical Habitat
21	^		Consider installing bird blind and/or nest boxes
21	^		Periodically cut pockets of shrubs and/or trees to encourage sprouting response.
21	^		Cut or girdle some interior trees to ensure swamp remains open
22	^		Soften edges along portions of the forest boundary
22	^		Identify sensitive areas with utility operator and avoid and/or manage appropriately to retain sensitive species
23	Ongoing	2	Monitor the area for progression of beech bark disease
24	^	0.6	Keep the area open with periodic mowing. Expand area and/or soften edges if desired.
24	^	2	Incorporate pollinator and/or rain garden features at parking areas
24	^		Install DEEP State Forest shield and kiosk with signage at new parking area on Ingham Hill Road; create connector trail
All	2025	All	Locate and mark property boundaries
All	^	All	Regularly inspect and maintain roads, culverts, and other infrastructure
All	^		Where appropriate incorporate plantings of locally sourced pitch pine
All	^		Conduct a breeding bird survey to determine avian usage
All	^		Conduct a second year vernal pool and turtle telemetry study (does not need to be in the same year).
All	^		Implement development of permanent multi-use sustainable trail program based on recommendations in GEI's Recreation Use Assessment Report

* Recommendations without years are referred to in the plan as "Ongoing" which is intended to give managers a suggestion, but indicates no immediate need

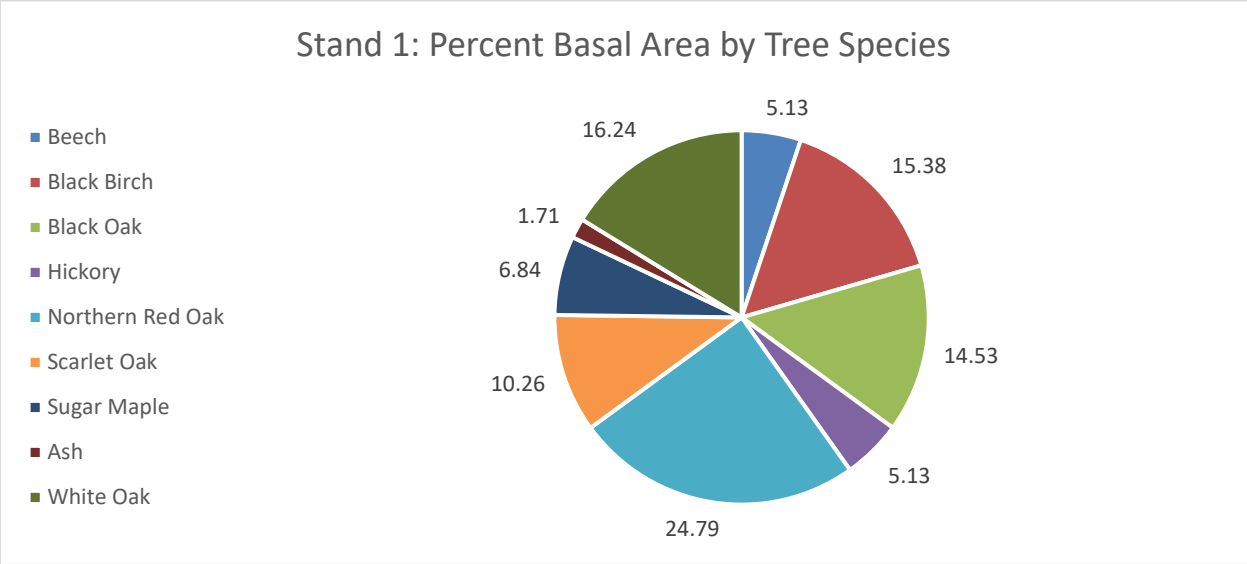
** Estimates of acres based on general observations needs. Actual treatment acres may be more or less than figures presented.

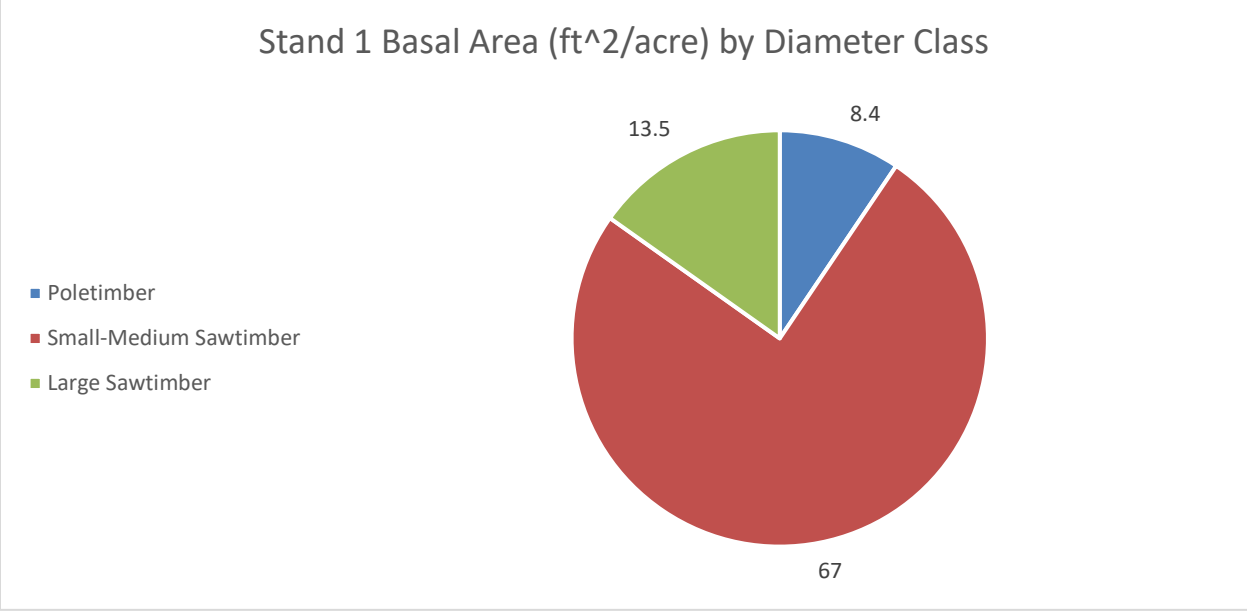
^ As feasible based on staff availability and resources

Summary of Stand-level Data

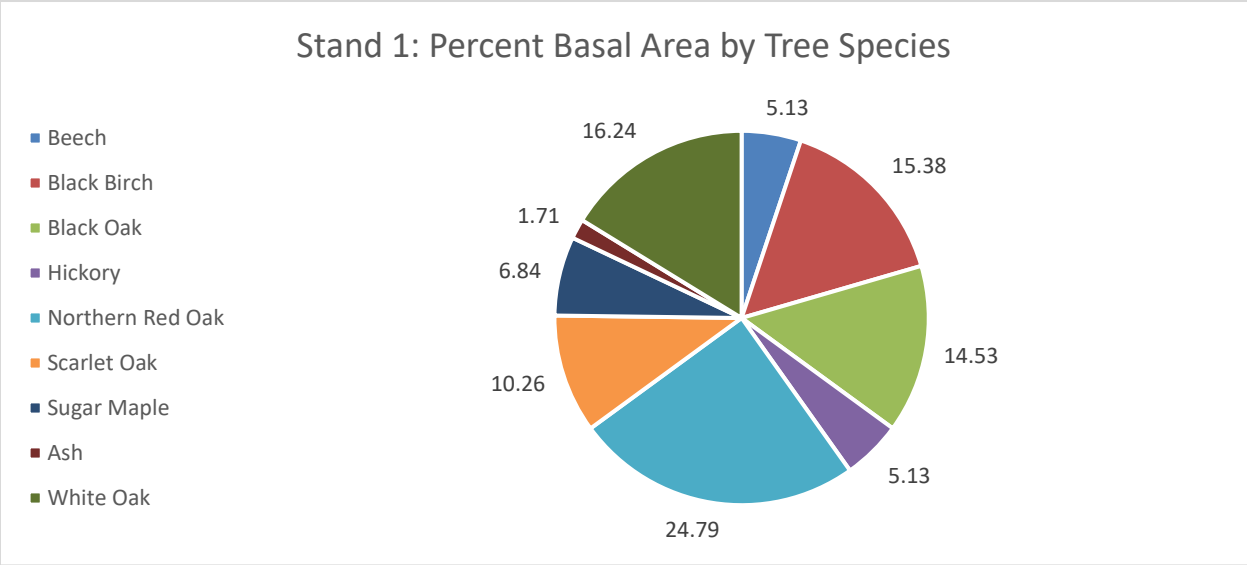
The following is a breakdown of stand-level information in pie chart form. The information provided includes percent by species as well as percent by size class in each stand, then property level information at the end of this section. The figures in the percent by species charts are the percentage of total basal area each species represents. The figures in the basal area by diameter class charts represent the amount of square feet of basal area each size class represents. As a reminder poletimber are trees that are between 5-11 inches dbh, small-medium sawtimber are between 12-16 inches, and large sawtimber is > 18 inches dbh.

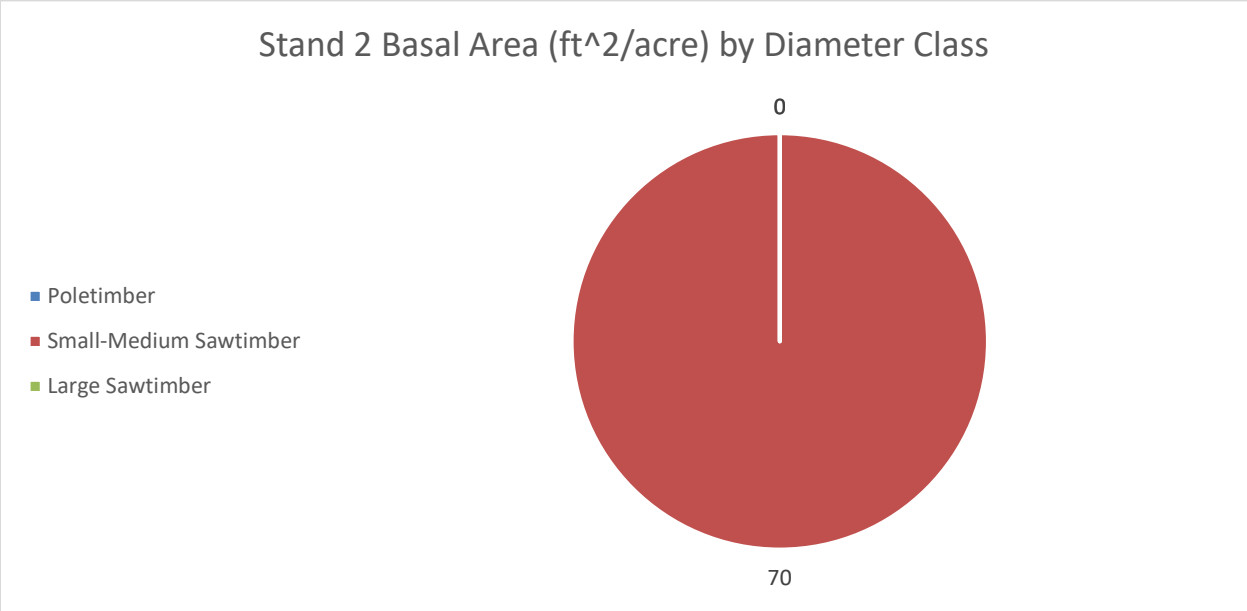
Stand 1



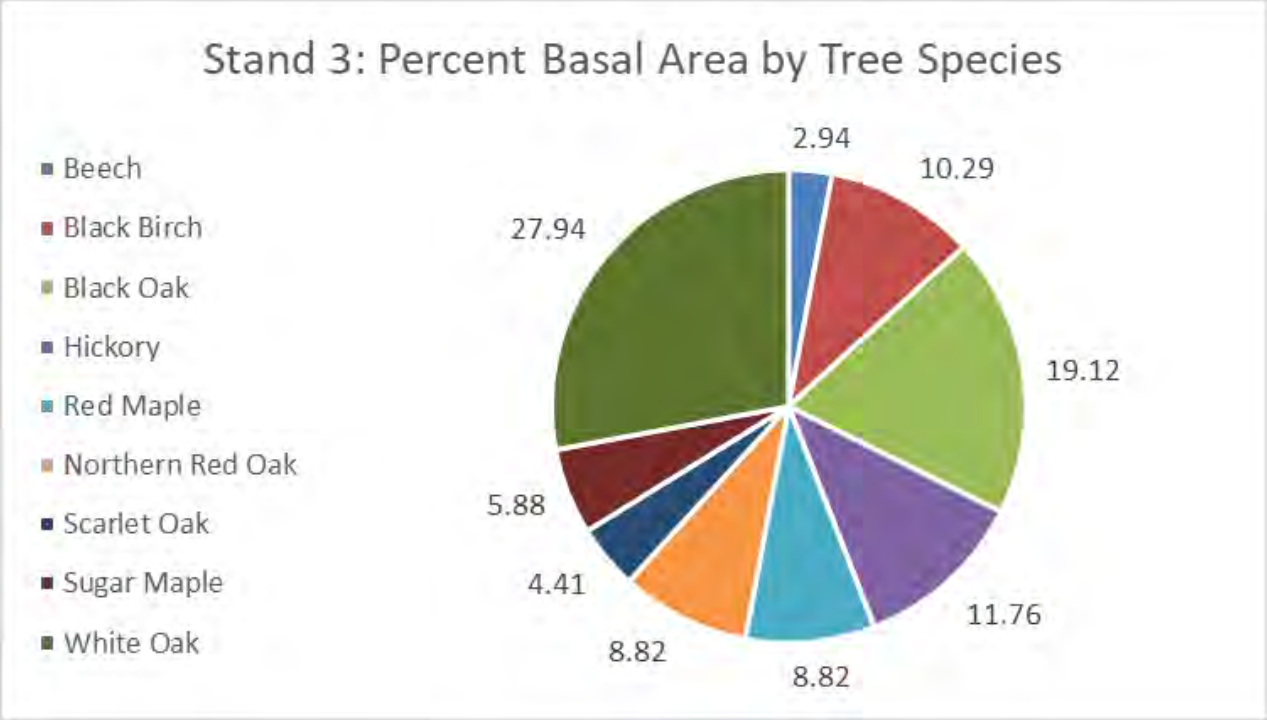


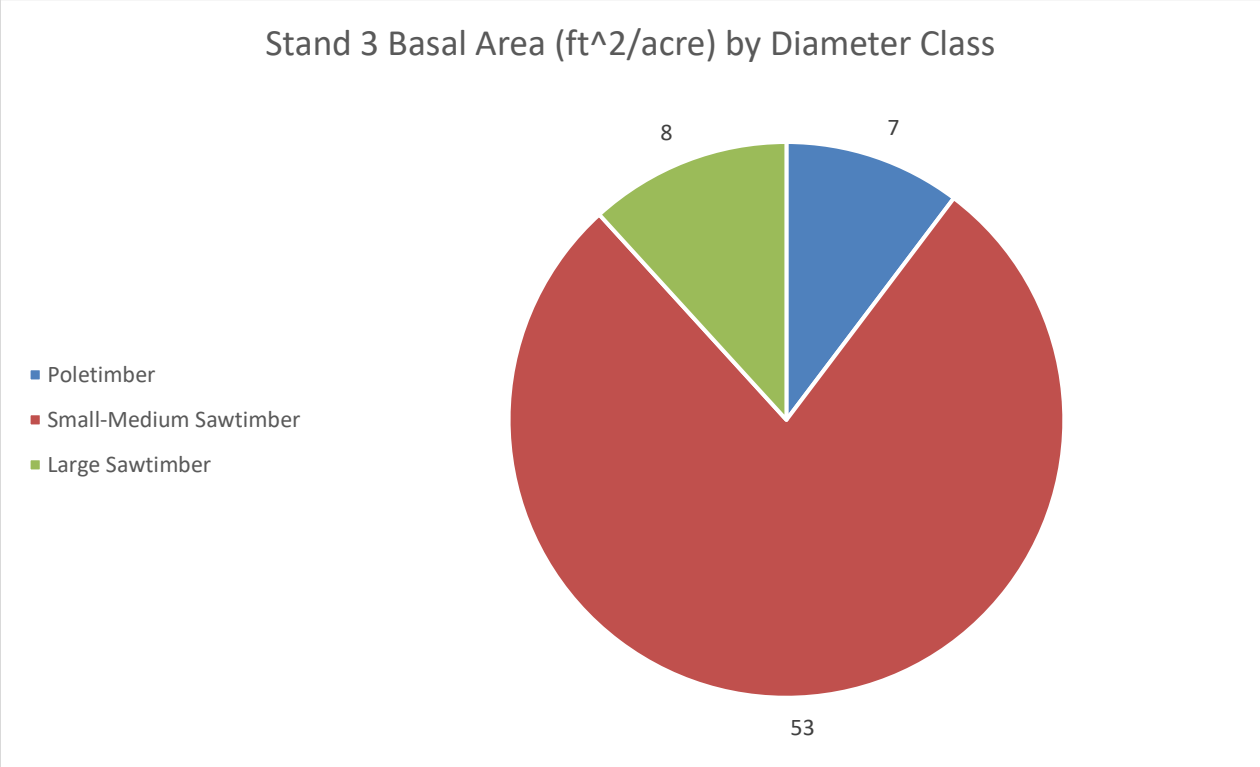
Stand 2


Stand 1: Percent Basal Area by Tree Species
Beech
Black Birch
Black Oak
Hickory
Northern Red Oak
Scarlet Oak
Sugar Maple
Ash
White Oak
5.13
15.38
14.53
5.13
24.79
10.26
6.84
1.71
16.24

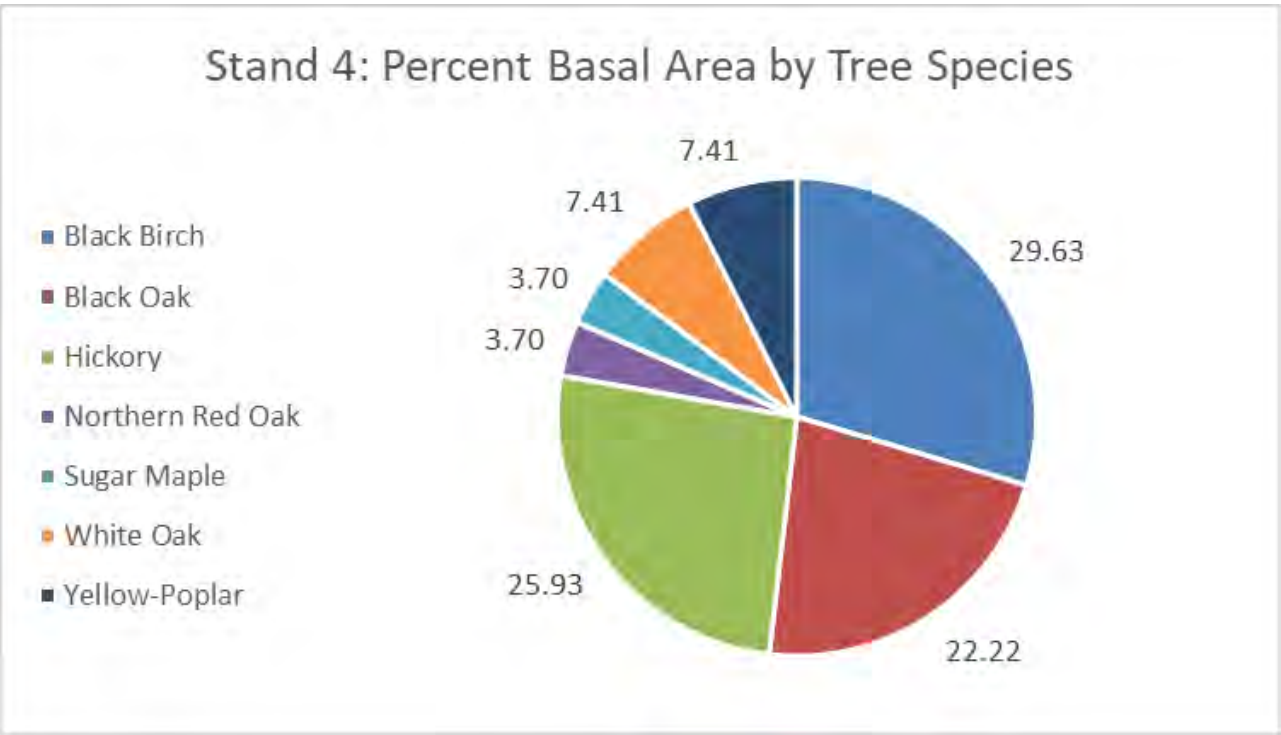

Stand 2 Basal Area (ft^2/acre) by Diameter Class
Poletimber
Small-Medium Sawtimber
Large Sawtimber
0
70

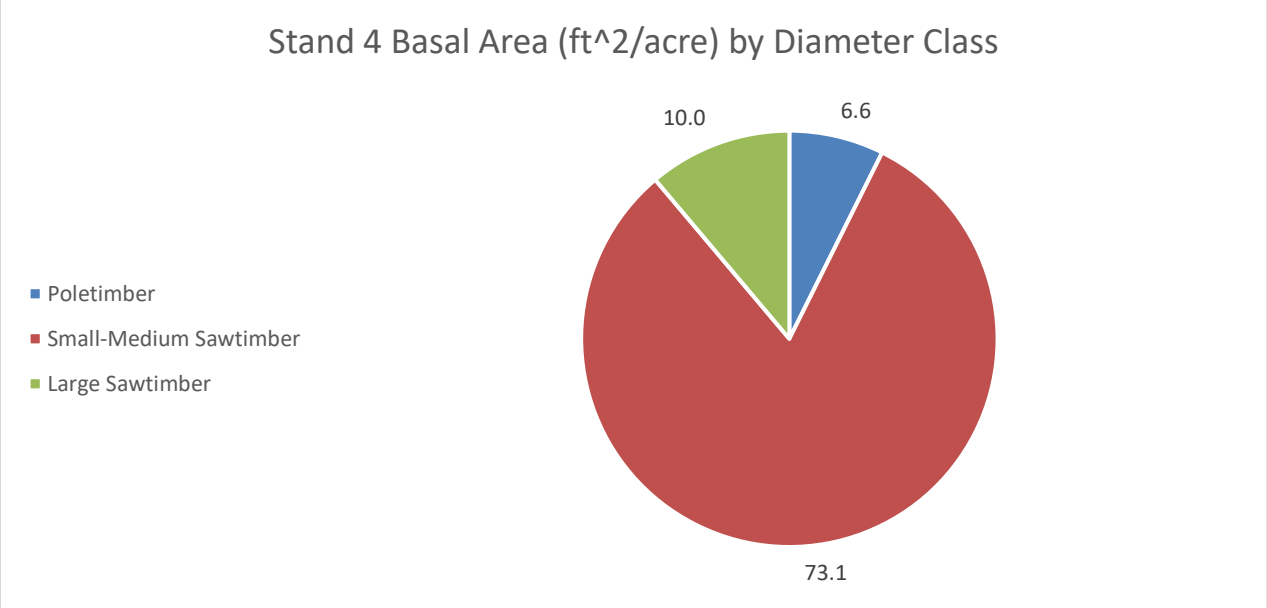
Stand 3


Stand 3: Percent Basal Area by Tree Species
Beech
Black Birch
Black Oak
Hickory
Red Maple
Northern Red Oak
Scarlet Oak
Sugar Maple
White Oak
2.94
10.29
19.12
11.76
8.82
8.82
4.41
5.88
27.94


Stand 3 Basal Area (ft^2/acre) by Diameter Class
Poletimber
Small-Medium Sawtimber
Large Sawtimber
8
7
53

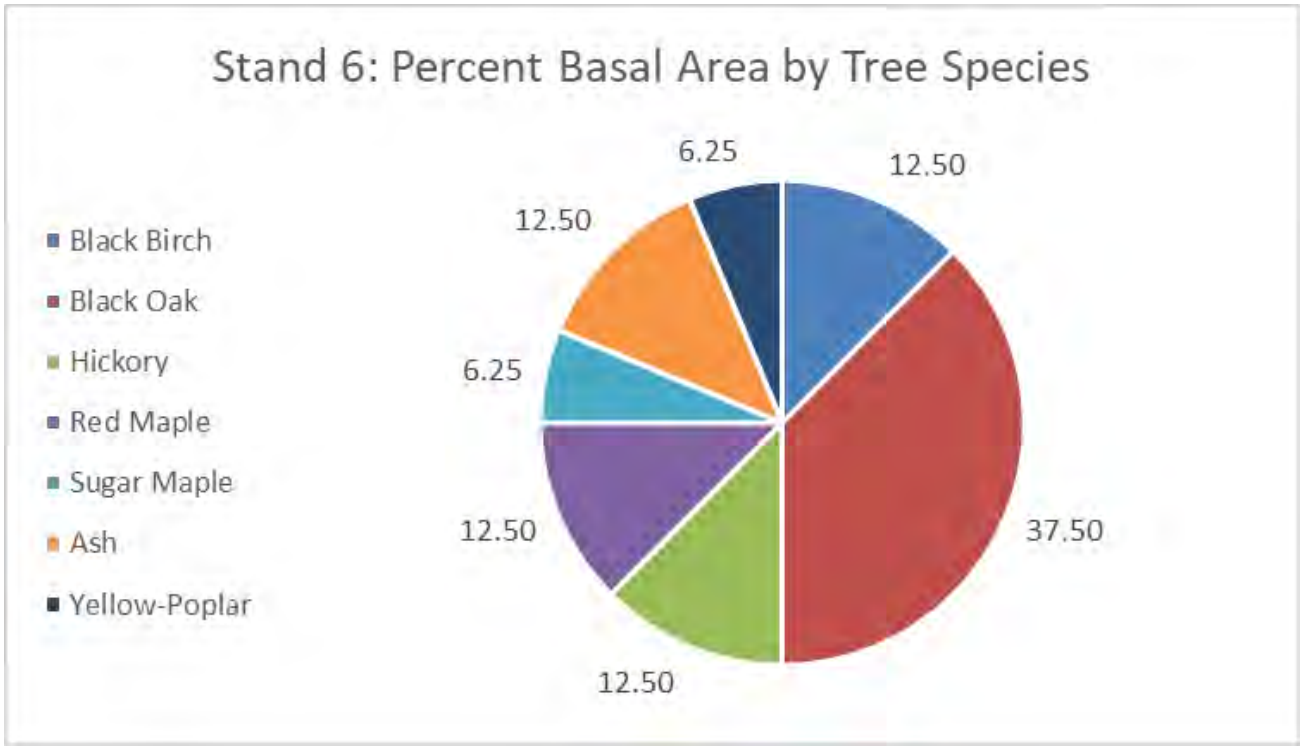
Stand 4

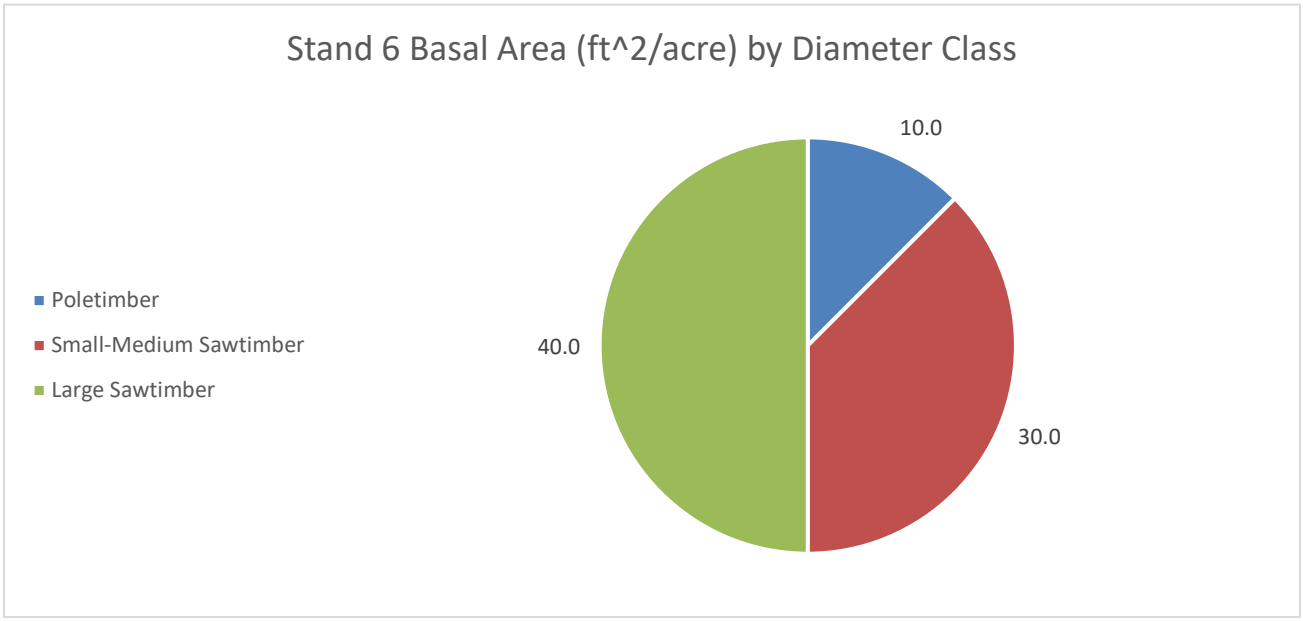

Stand 4: Percent Basal Area by Tree Species
Black Birch
Black Oak
Hickory
Northern Red Oak
Sugar Maple
White Oak
Yellow-Poplar
7.41
7.41
29.63
3.70
3.70
25.93
22.22


Stand 4 Basal Area (ft^2/acre) by Diameter Class
Poletimber
Small-Medium Sawtimber
Large Sawtimber
10.0
6.6
73.1

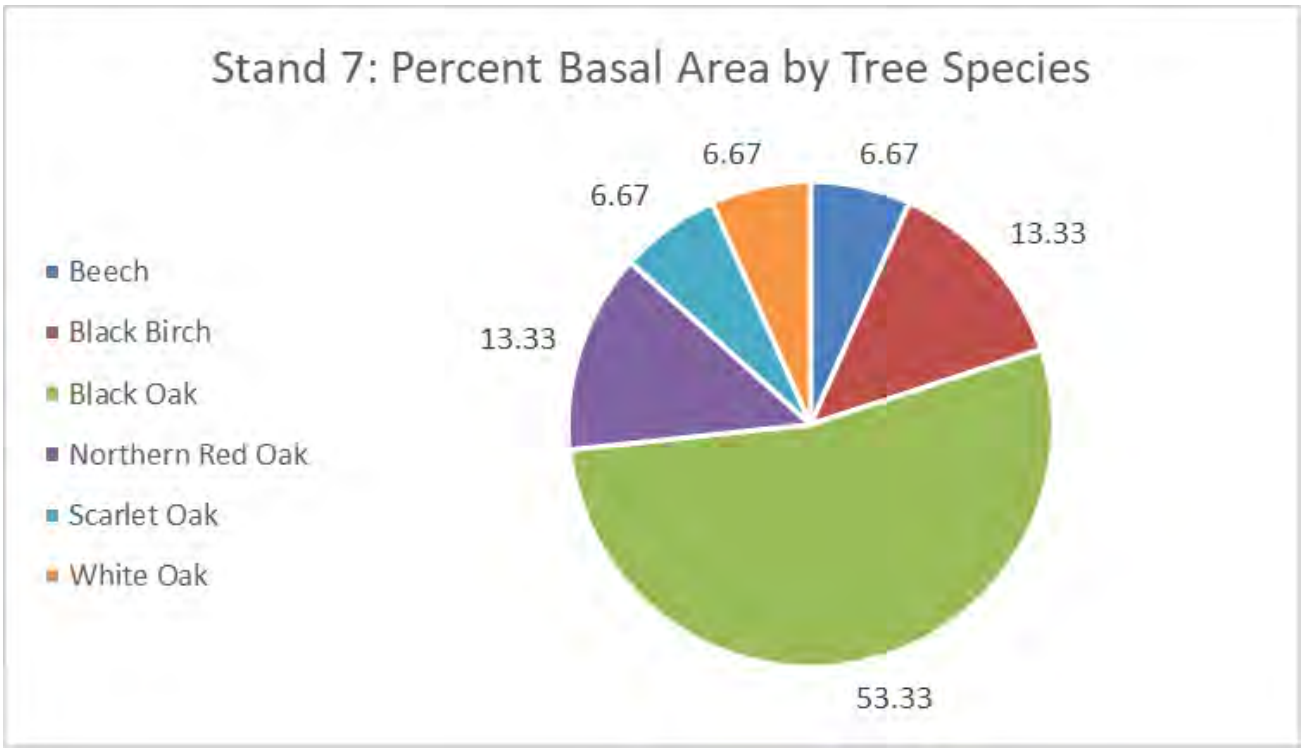
Stand 5 – No quantitative data collected, but the stand is mostly composed of eastern redcedar and is mostly poletimber-sized trees

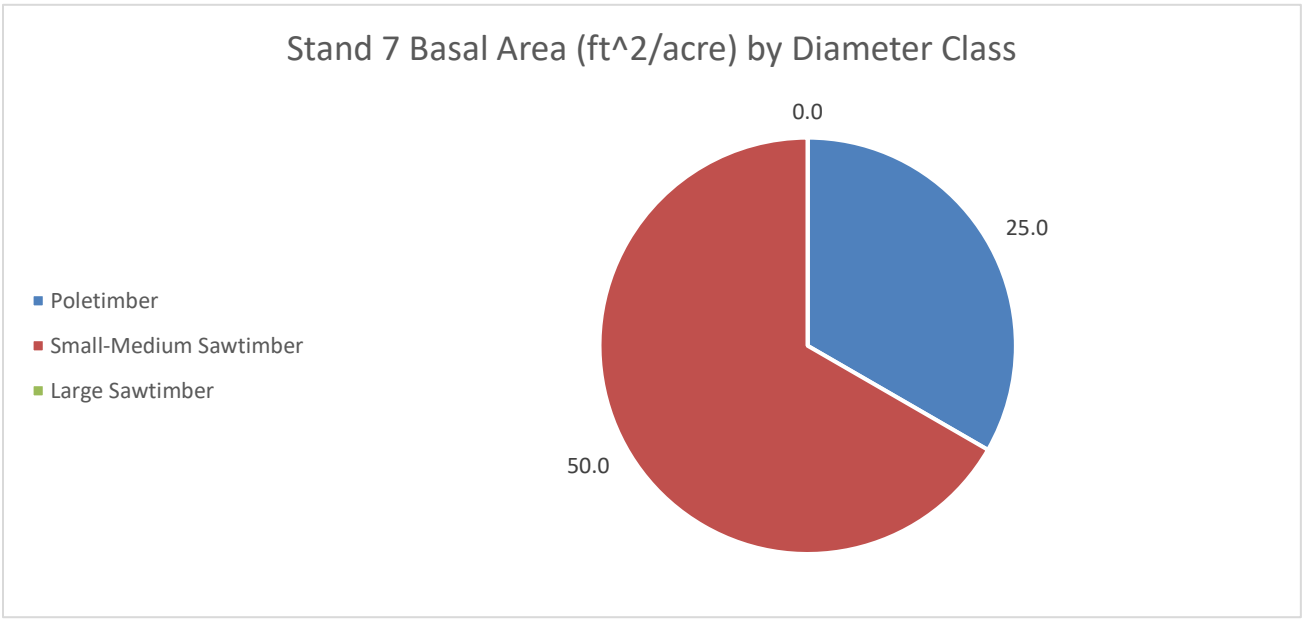
Stand 6



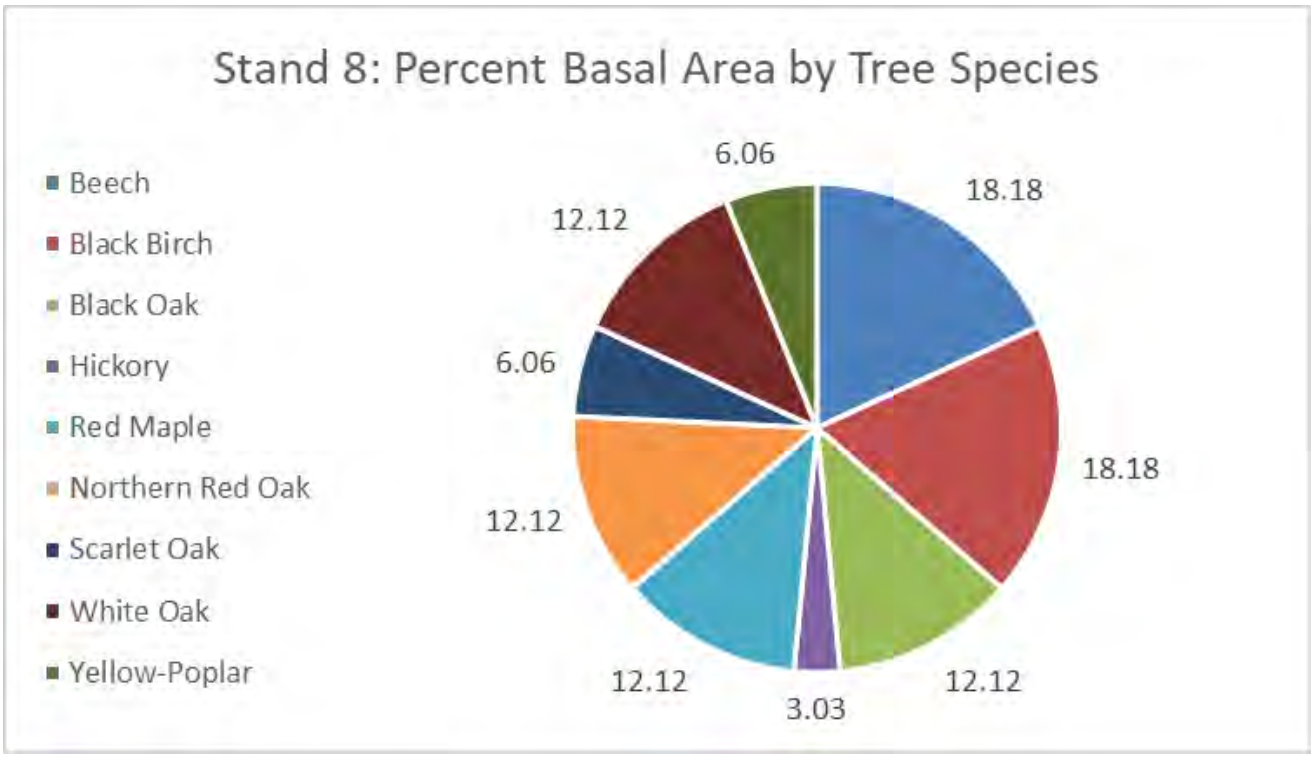


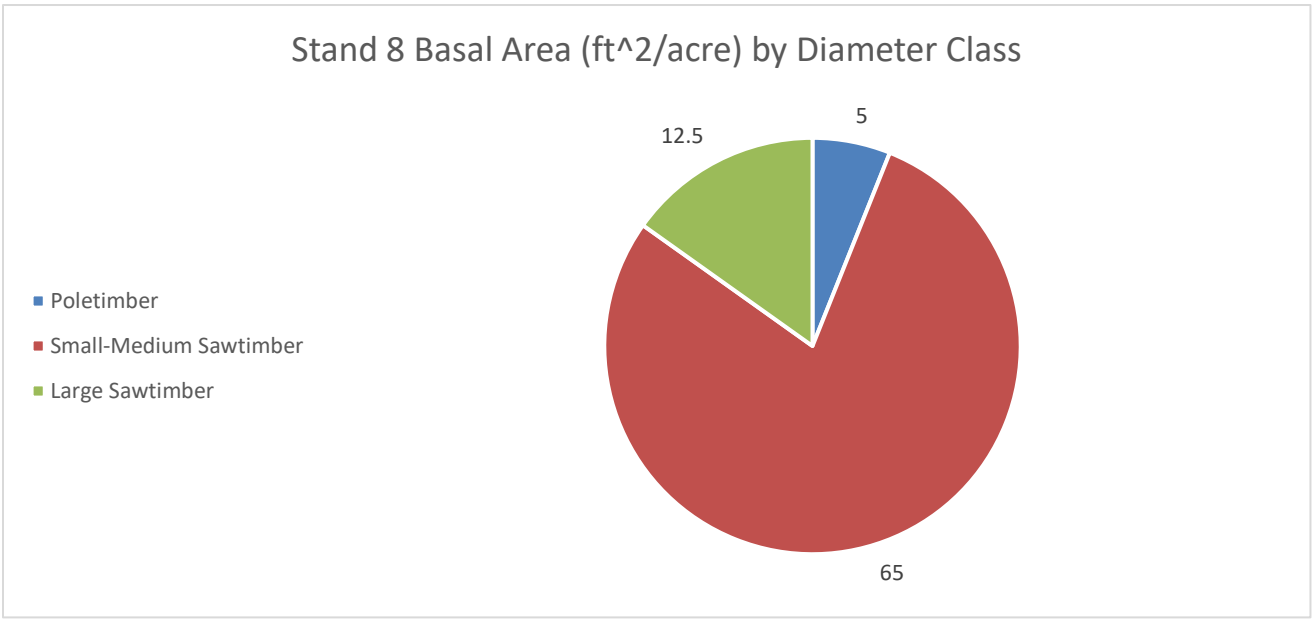
Stand 7


Stand 7: Percent Basal Area by Tree Species
Beech
Black Birch
Black Oak
Northern Red Oak
Scarlet Oak
White Oak
6.67
6.67
6.67
13.33
13.33
53.33

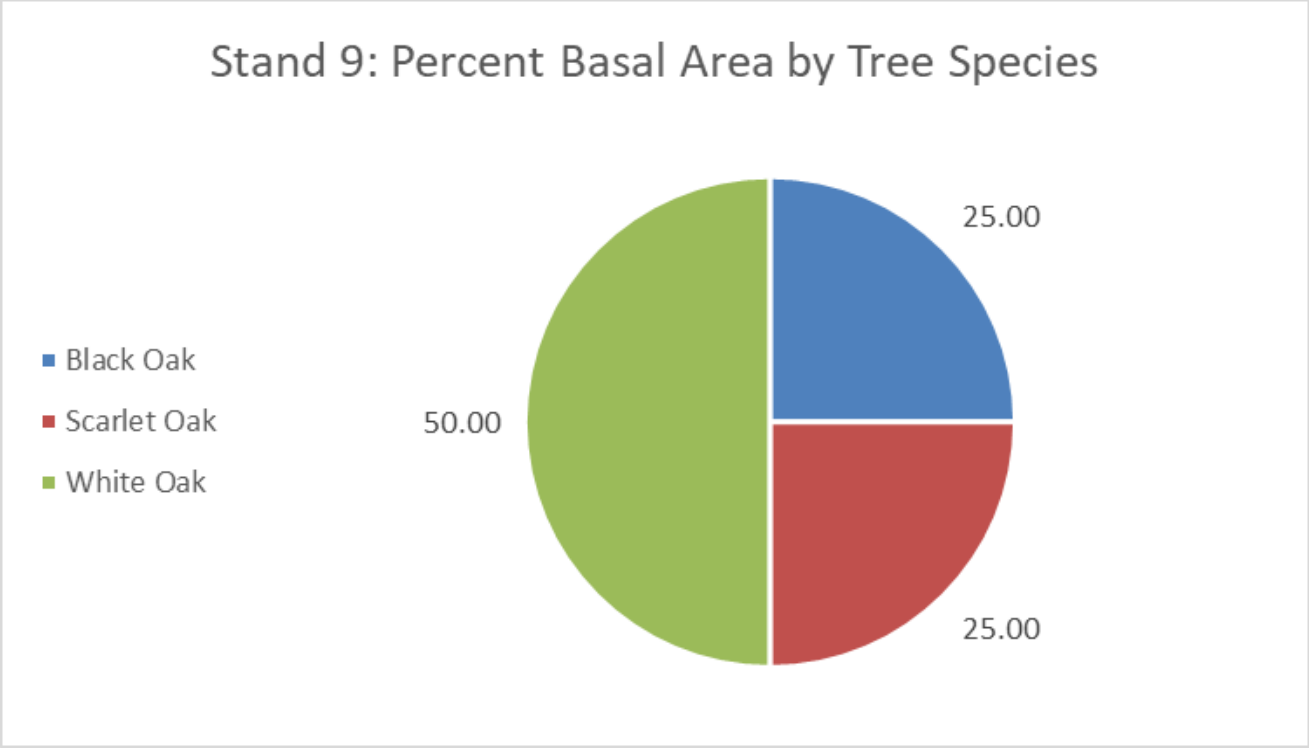

Stand 7 Basal Area (ft^2/acre) by Diameter Class
Poletimber
Small-Medium Sawtimber
Large Sawtimber
0.0
25.0
50.0

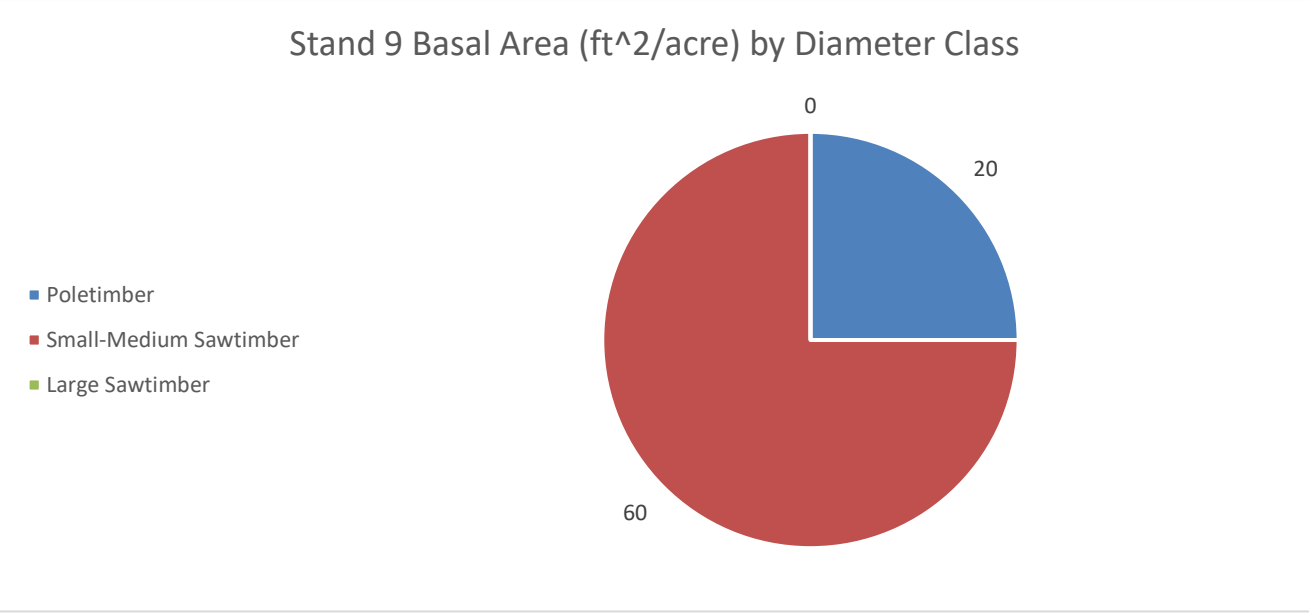
Stand 8


Stand 8: Percent Basal Area by Tree Species
Beech
Black Birch
Black Oak
Hickory
Red Maple
Northern Red Oak
Scarlet Oak
White Oak
Yellow-Poplar
6.06
18.18
12.12
6.06
18.18
12.12
12.12
3.03
12.12

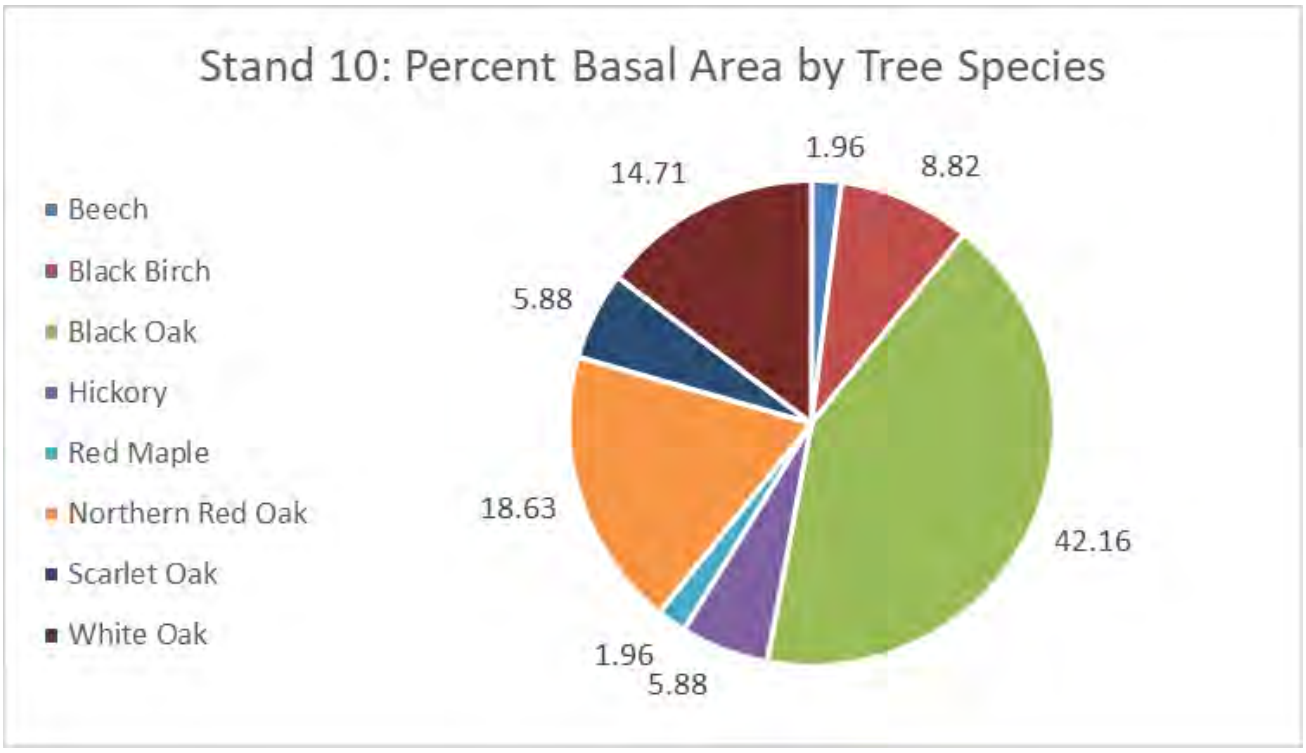

Stand 8 Basal Area (ft^2/acre) by Diameter Class
Poletimber
Small-Medium Sawtimber
Large Sawtimber
5
12.5
65

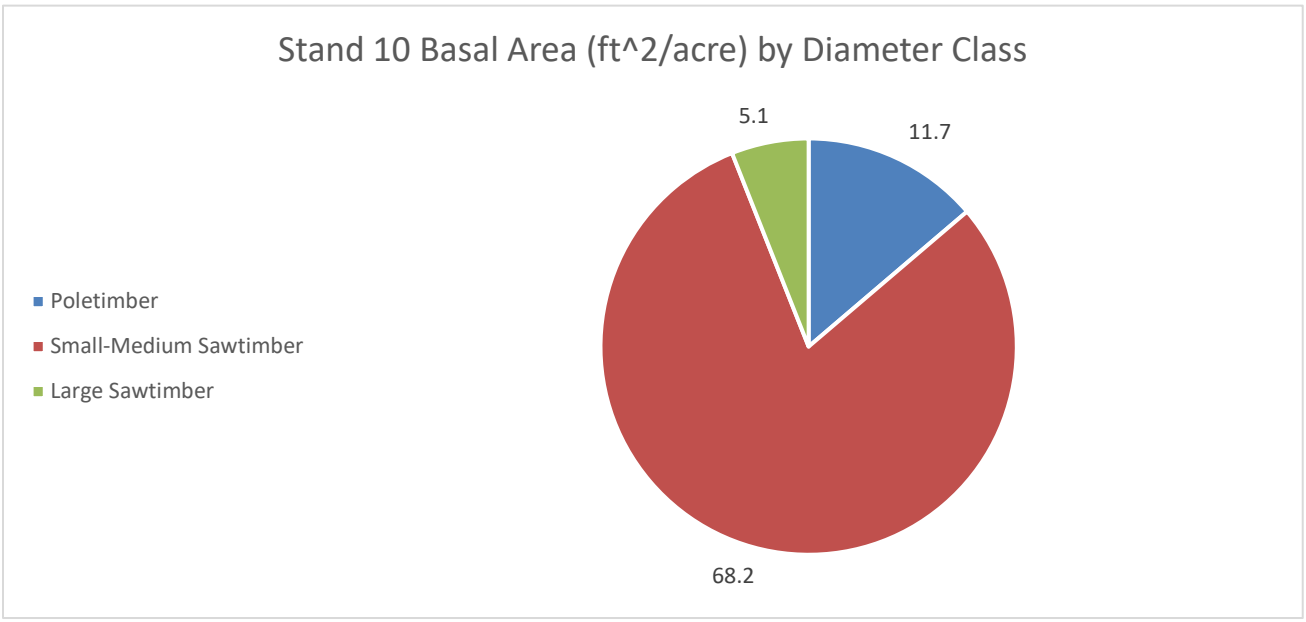
Stand 9


Stand 9: Percent Basal Area by Tree Species
Black Oak
Scarlet Oak
White Oak
25.00
50.00
25.00

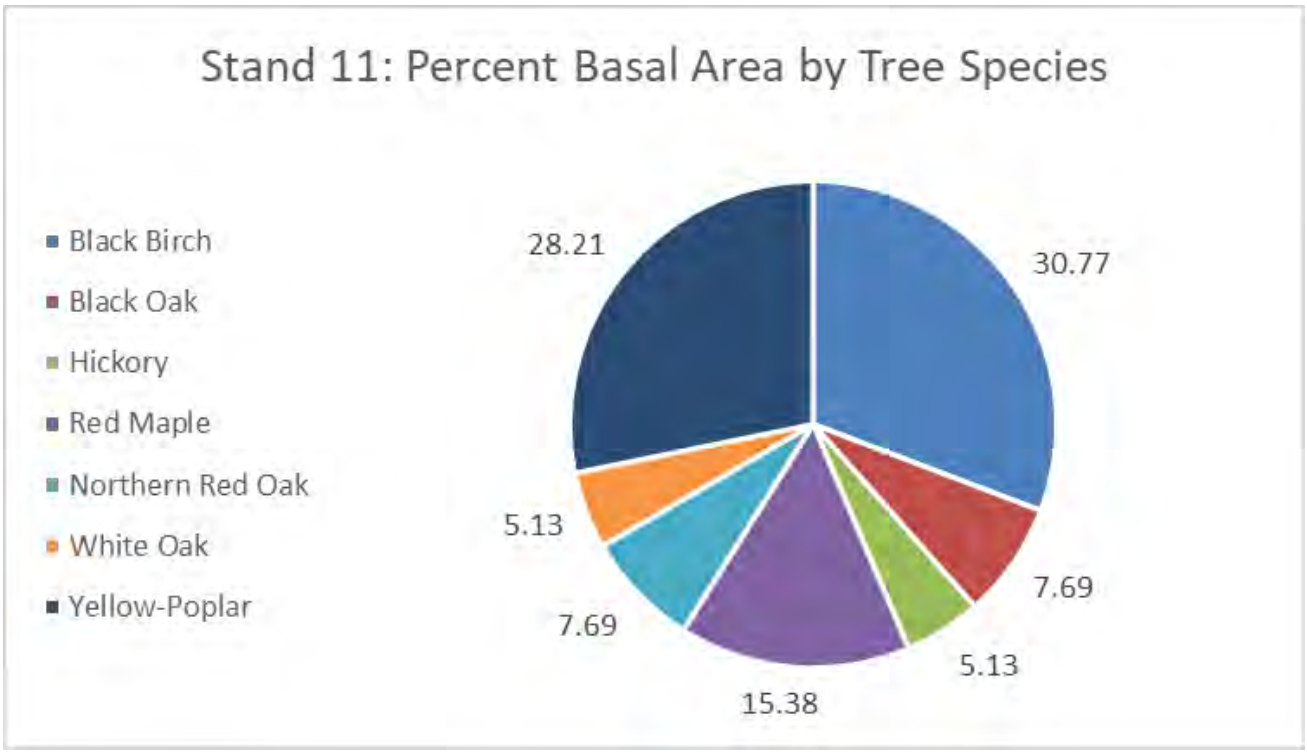

Stand 9 Basal Area (ft^2/acre) by Diameter Class
Poletimber
Small-Medium Sawtimber
Large Sawtimber
0
20
60

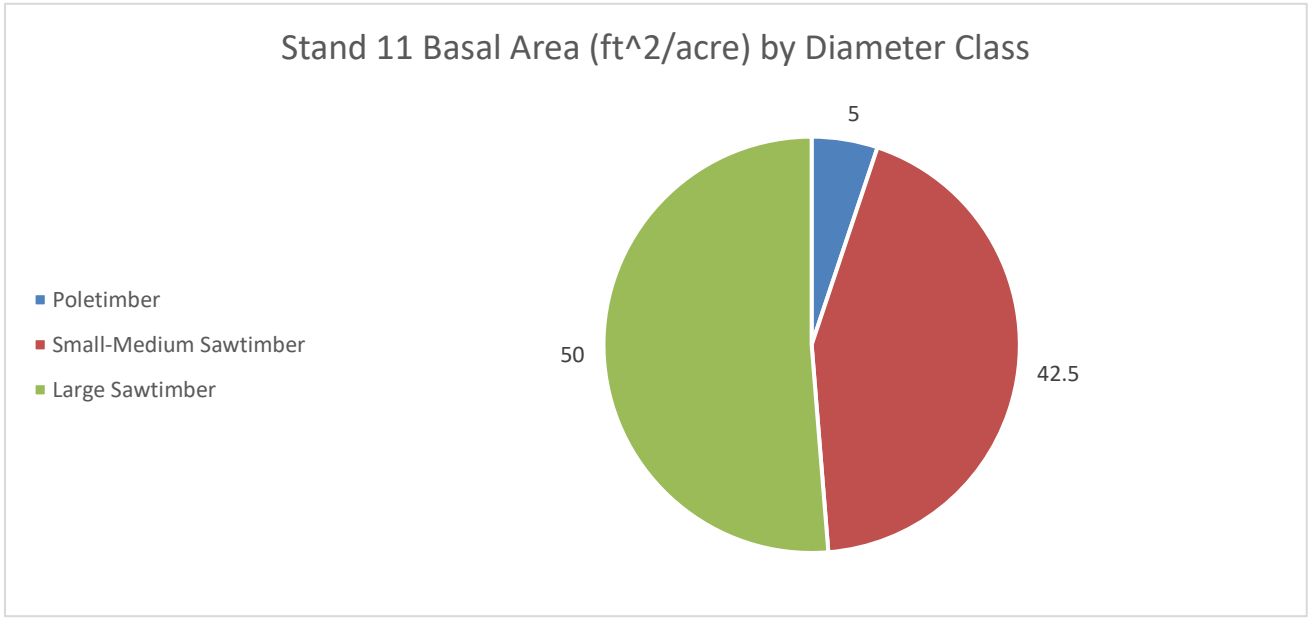
Stand 10


Stand 10: Percent Basal Area by Tree Species
Beech
Black Birch
Black Oak
Hickory
Red Maple
Northern Red Oak
Scarlet Oak
White Oak
1.96
8.82
14.71
5.88
18.63
42.16
1.96
5.88

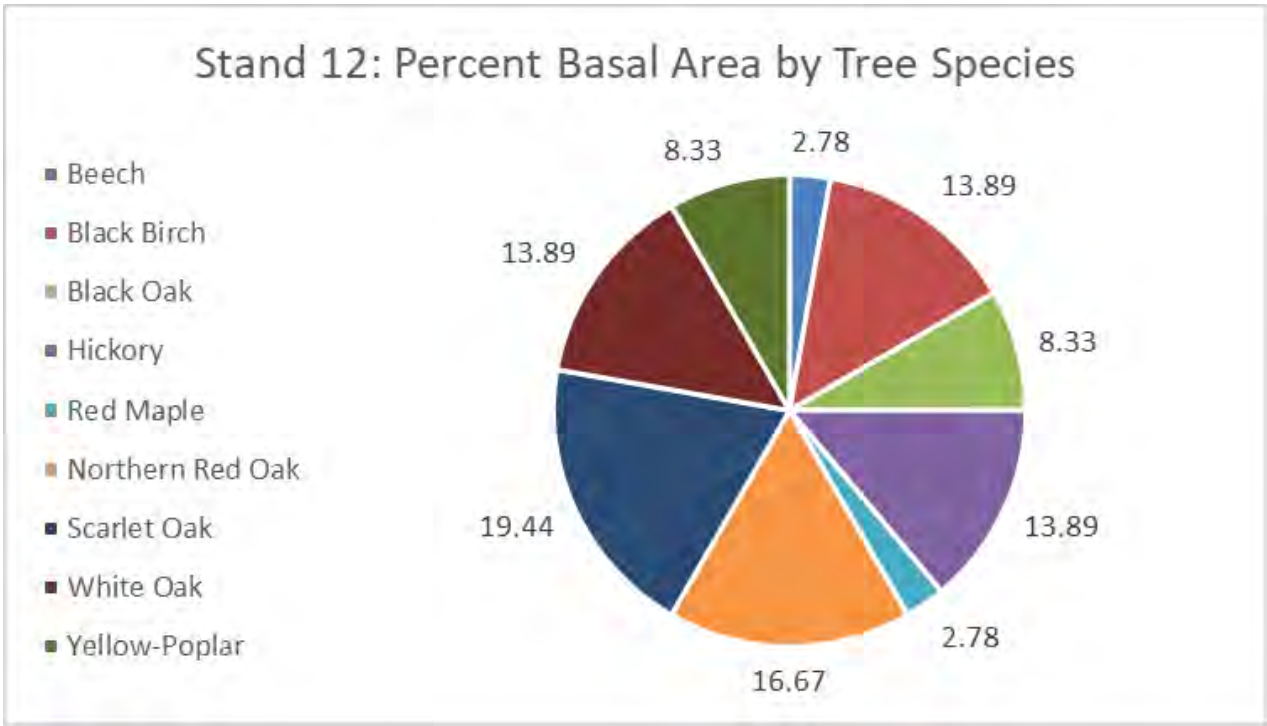

Stand 10 Basal Area (ft^2/acre) by Diameter Class
Poletimber
Small-Medium Sawtimber
Large Sawtimber
5.1
11.7
68.2

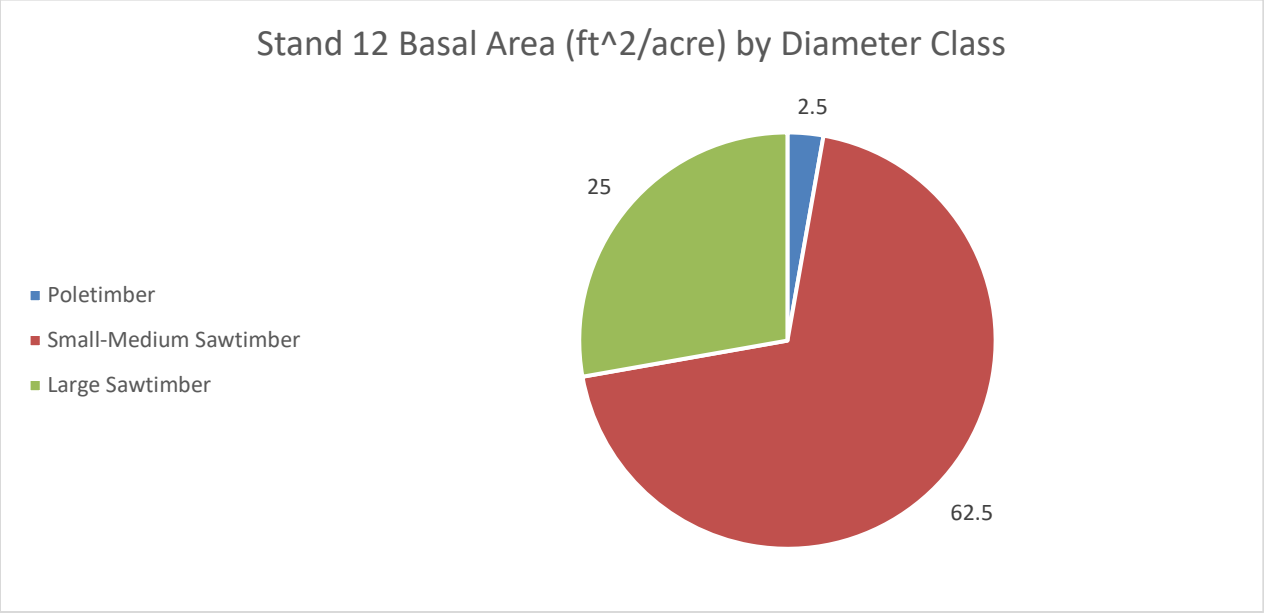
Stand 11


Stand 11: Percent Basal Area by Tree Species
Black Birch
Black Oak
Hickory
Red Maple
Northern Red Oak
White Oak
Yellow-Poplar
28.21
30.77
5.13
7.69
7.69
5.13
15.38

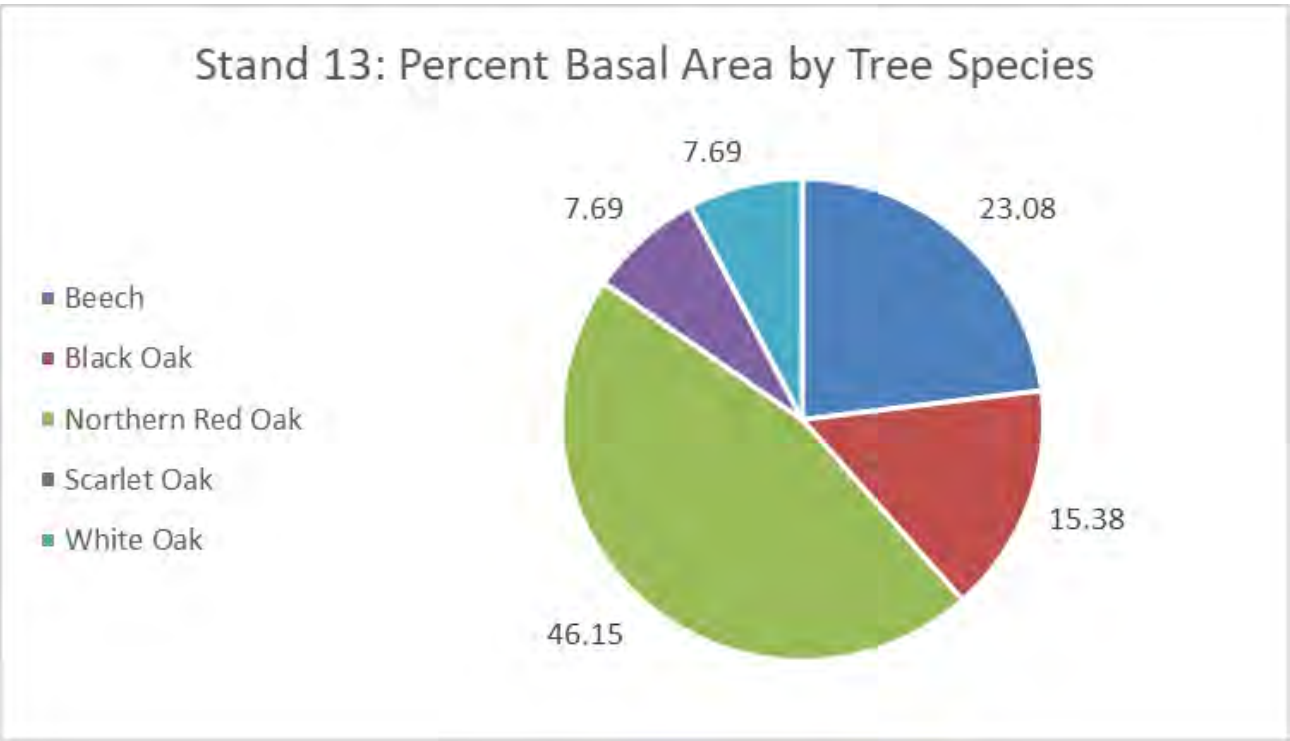

Stand 11 Basal Area (ft^2/acre) by Diameter Class
Poletimber
Small-Medium Sawtimber
Large Sawtimber
5
50
42.5

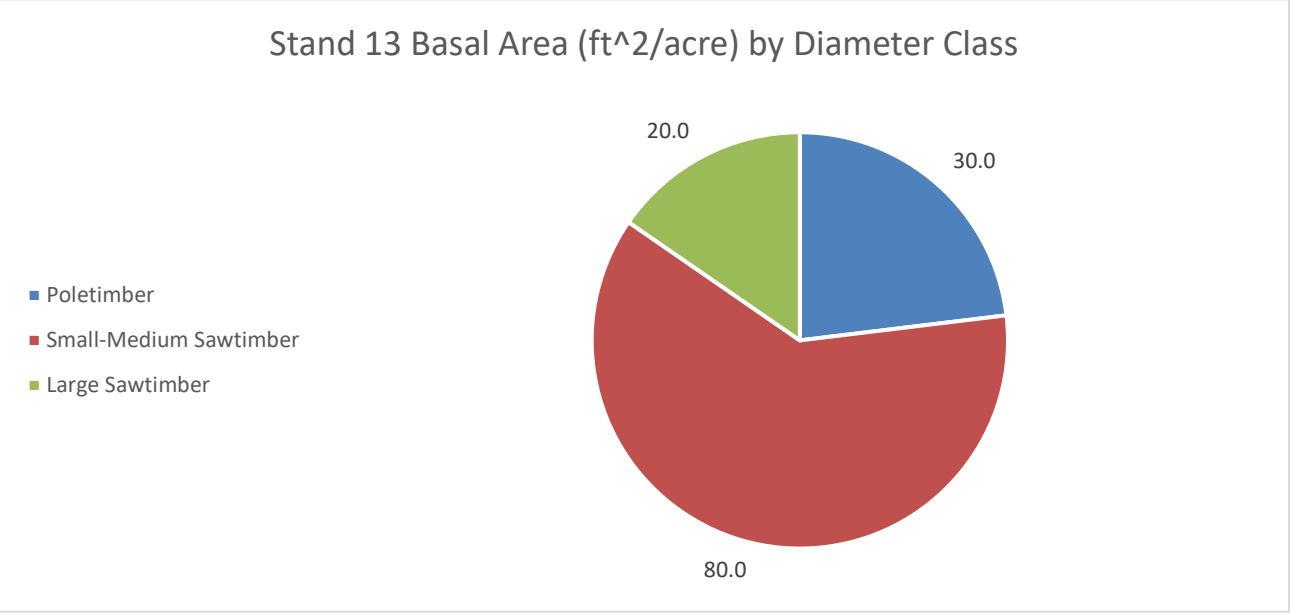
Stand 12


Stand 12: Percent Basal Area by Tree Species
Beech
Black Birch
Black Oak
Hickory
Red Maple
Northern Red Oak
Scarlet Oak
White Oak
Yellow-Poplar
8.33
2.78
13.89
13.89
8.33
19.44
13.89
2.78
16.67

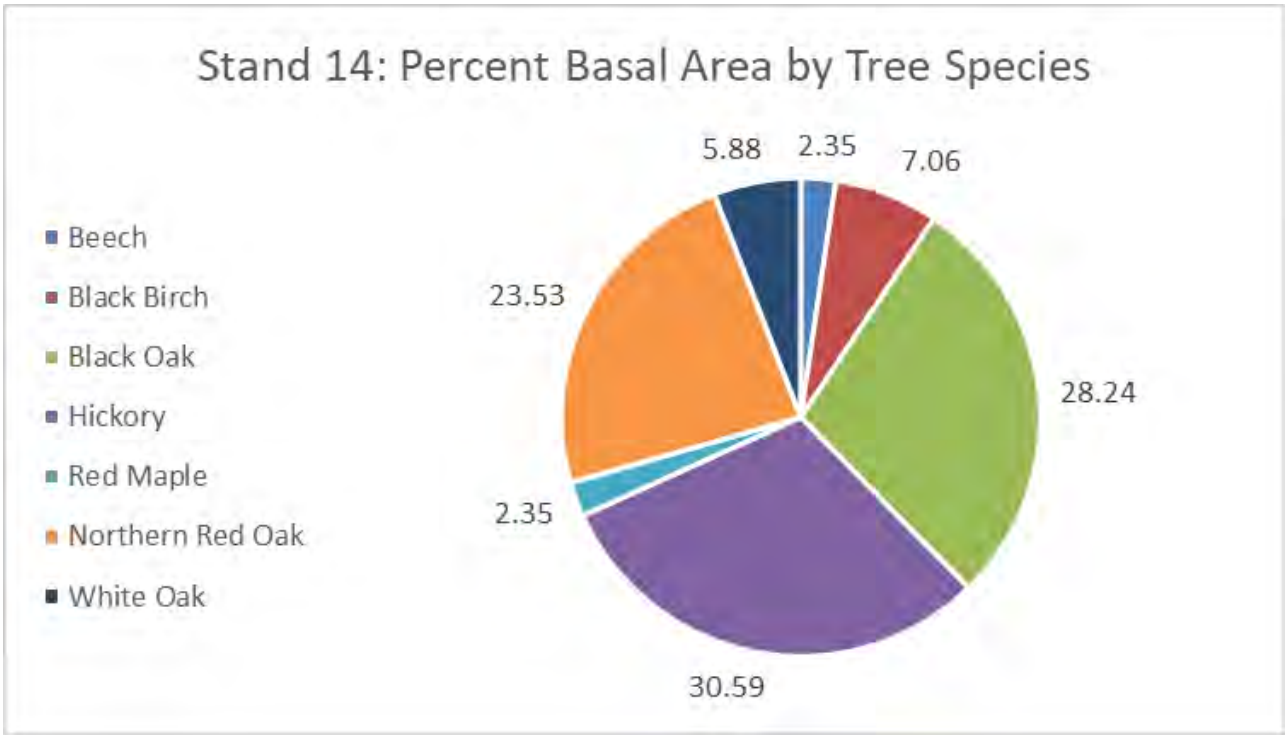

Stand 12 Basal Area (ft^2/acre) by Diameter Class
Poletimber
Small-Medium Sawtimber
Large Sawtimber
2.5
25
62.5

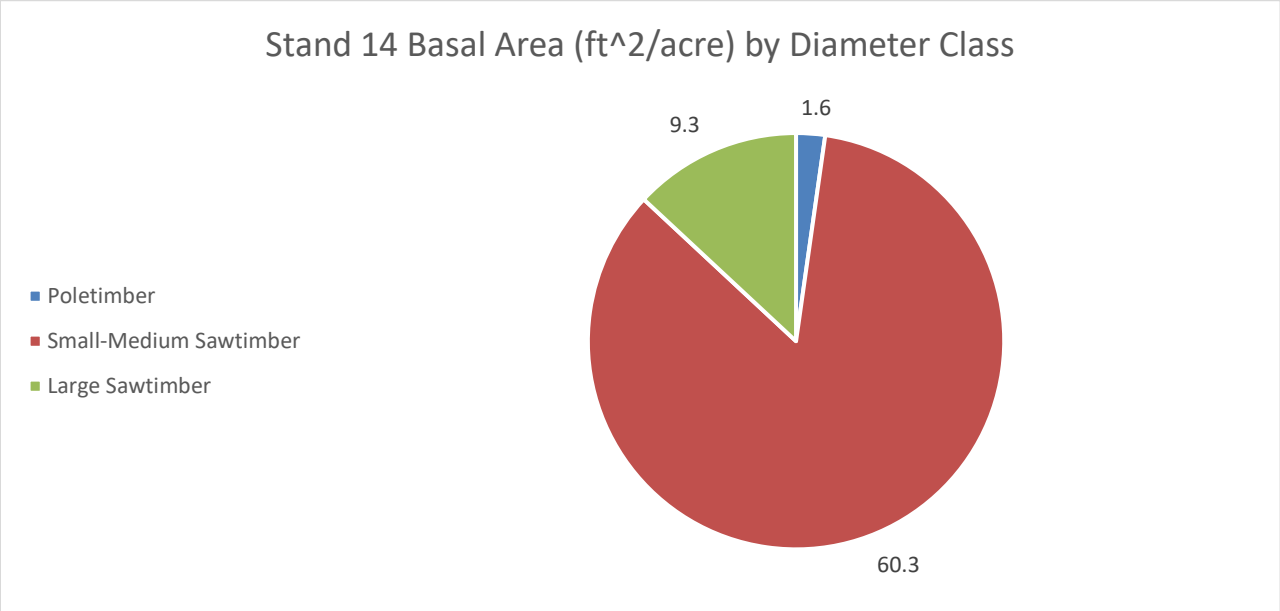
Stand 13


Stand 13: Percent Basal Area by Tree Species
7.69
7.69
23.08
15.38
46.15
Beech
Black Oak
Northern Red Oak
Scarlet Oak
White Oak

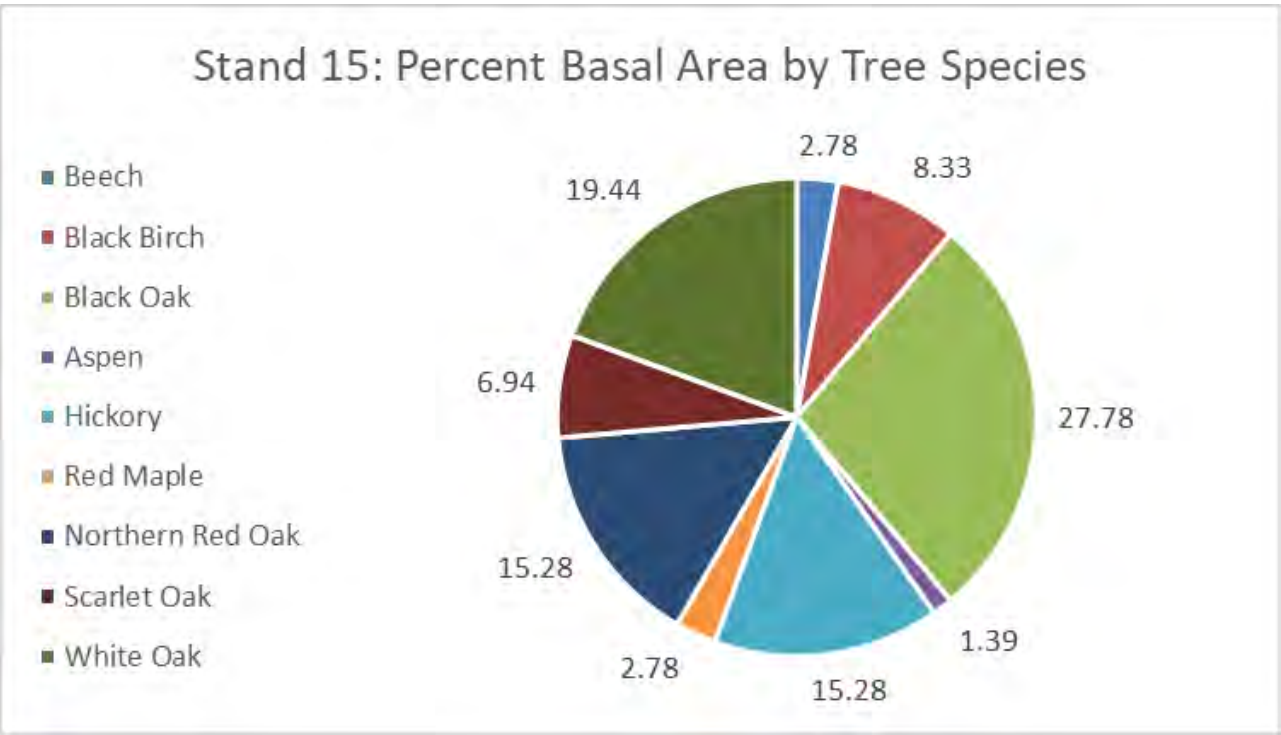

Stand 13 Basal Area (ft^2/acre) by Diameter Class
20.0
30.0
80.0
Poletimber
Small-Medium Sawtimber
Large Sawtimber

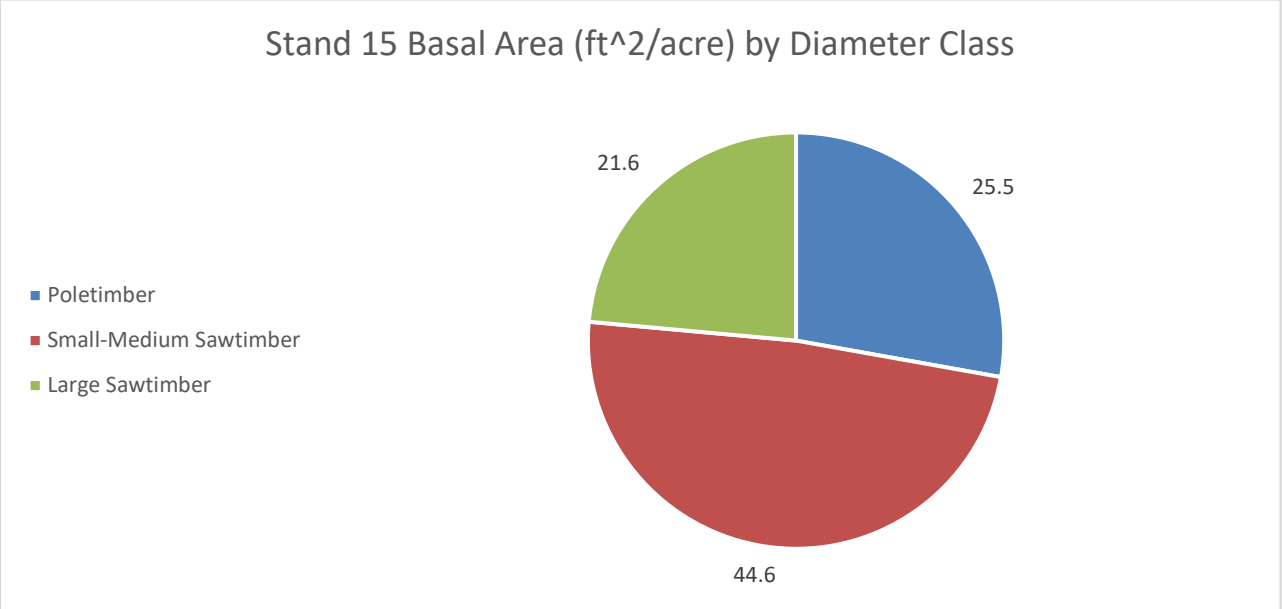
Stand 14


Stand 14: Percent Basal Area by Tree Species
Beech
Black Birch
Black Oak
Hickory
Red Maple
Northern Red Oak
White Oak
5.88
2.35
7.06
23.53
28.24
2.35
30.59

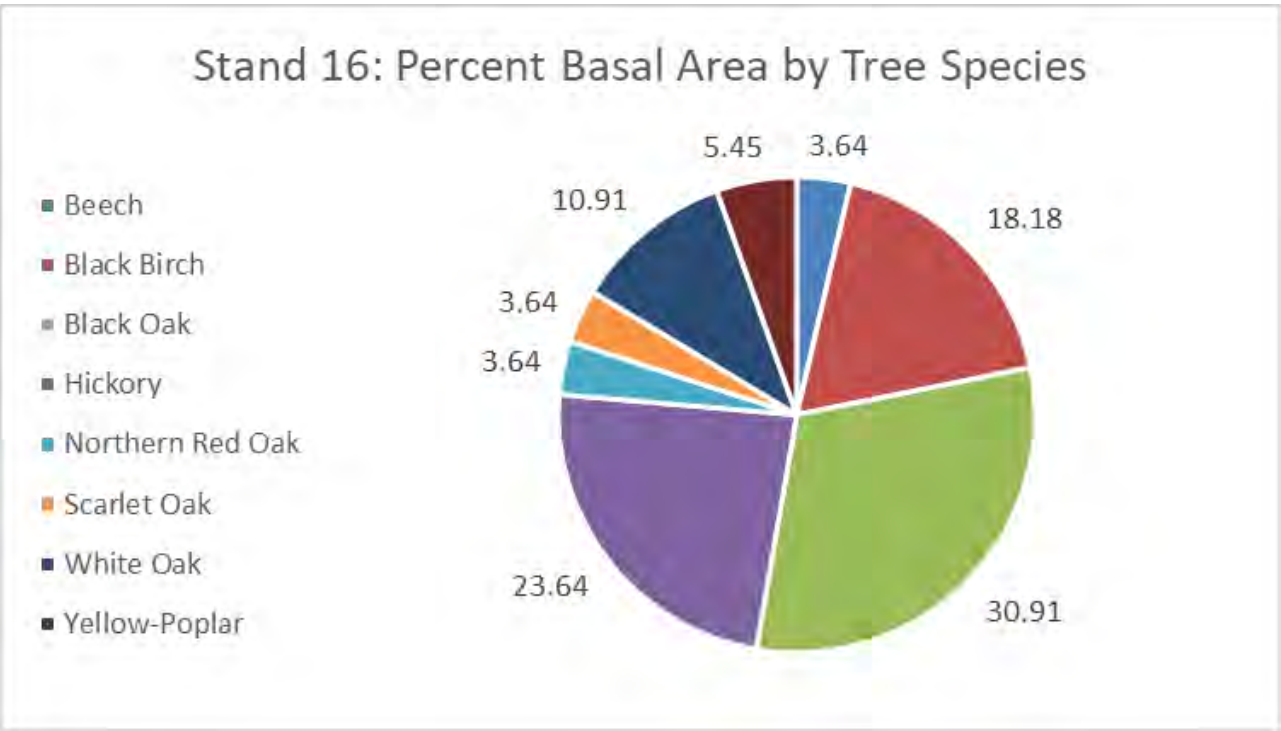

Stand 14 Basal Area (ft^2/acre) by Diameter Class
Poletimber
Small-Medium Sawtimber
Large Sawtimber
1.6
9.3
60.3

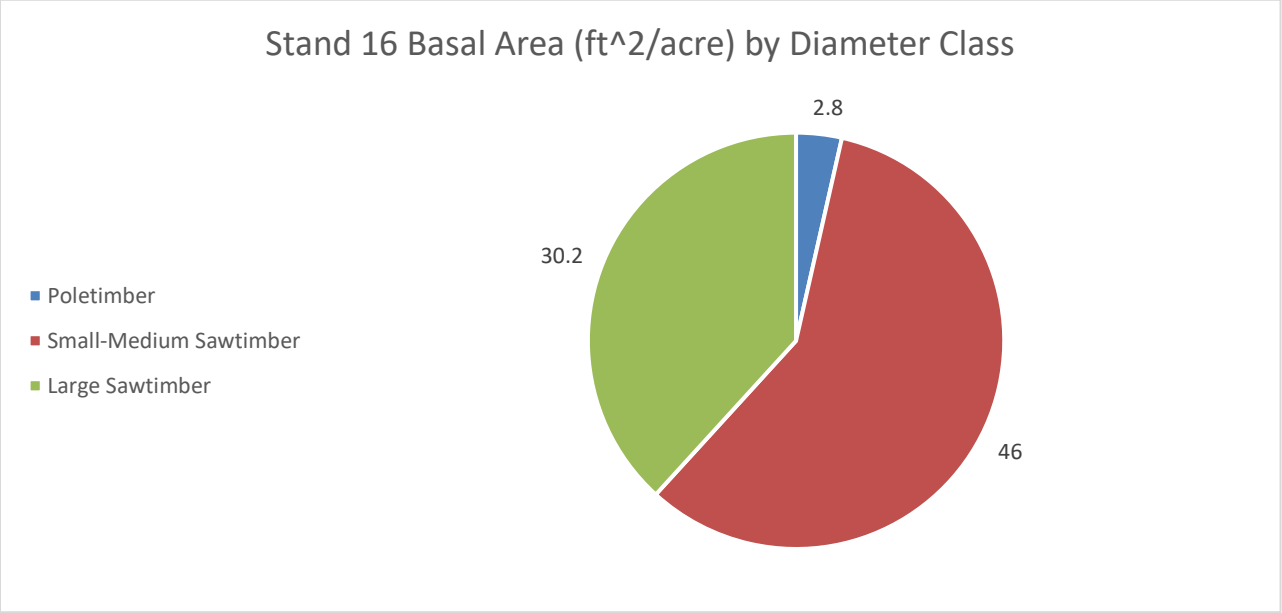
Stand 15


Stand 15: Percent Basal Area by Tree Species
Beech
Black Birch
Black Oak
Aspen
Hickory
Red Maple
Northern Red Oak
Scarlet Oak
White Oak
2.78
8.33
19.44
6.94
27.78
15.28
1.39
2.78
15.28

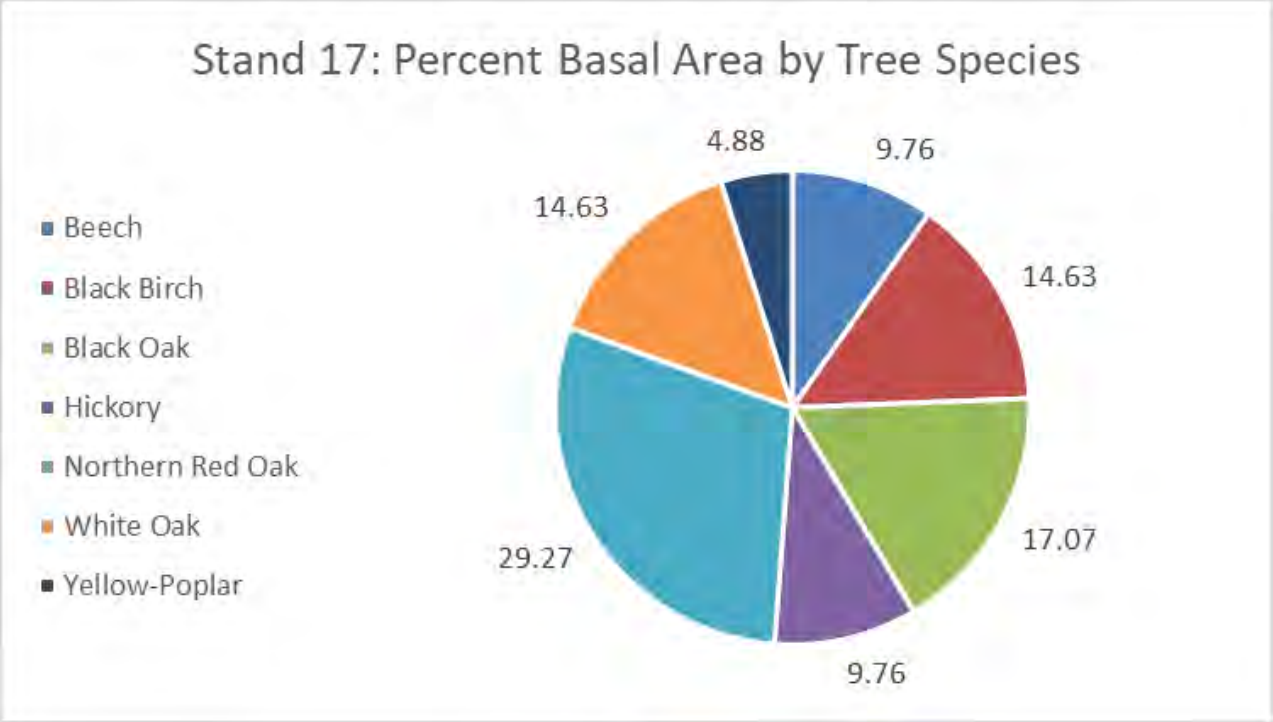

Stand 15 Basal Area (ft^2/acre) by Diameter Class
Poletimber
Small-Medium Sawtimber
Large Sawtimber
21.6
25.5
44.6

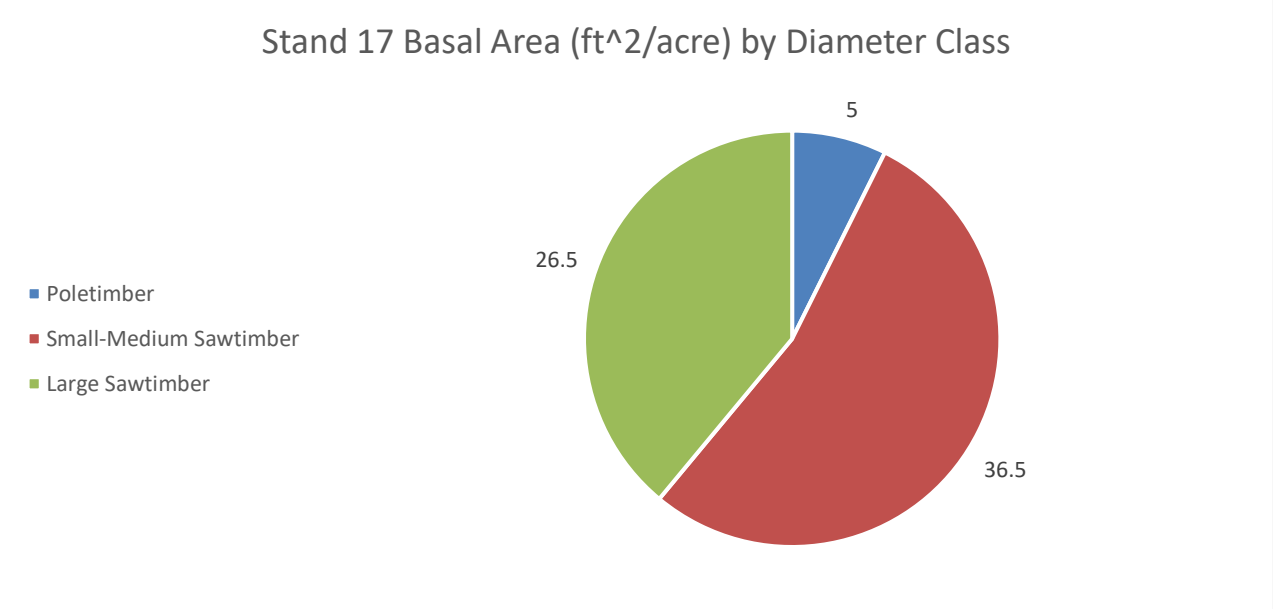
Stand 16


Stand 16: Percent Basal Area by Tree Species
Beech
Black Birch
Black Oak
Hickory
Northern Red Oak
Scarlet Oak
White Oak
Yellow-Poplar
5.45
3.64
10.91
18.18
3.64
3.64
23.64
30.91

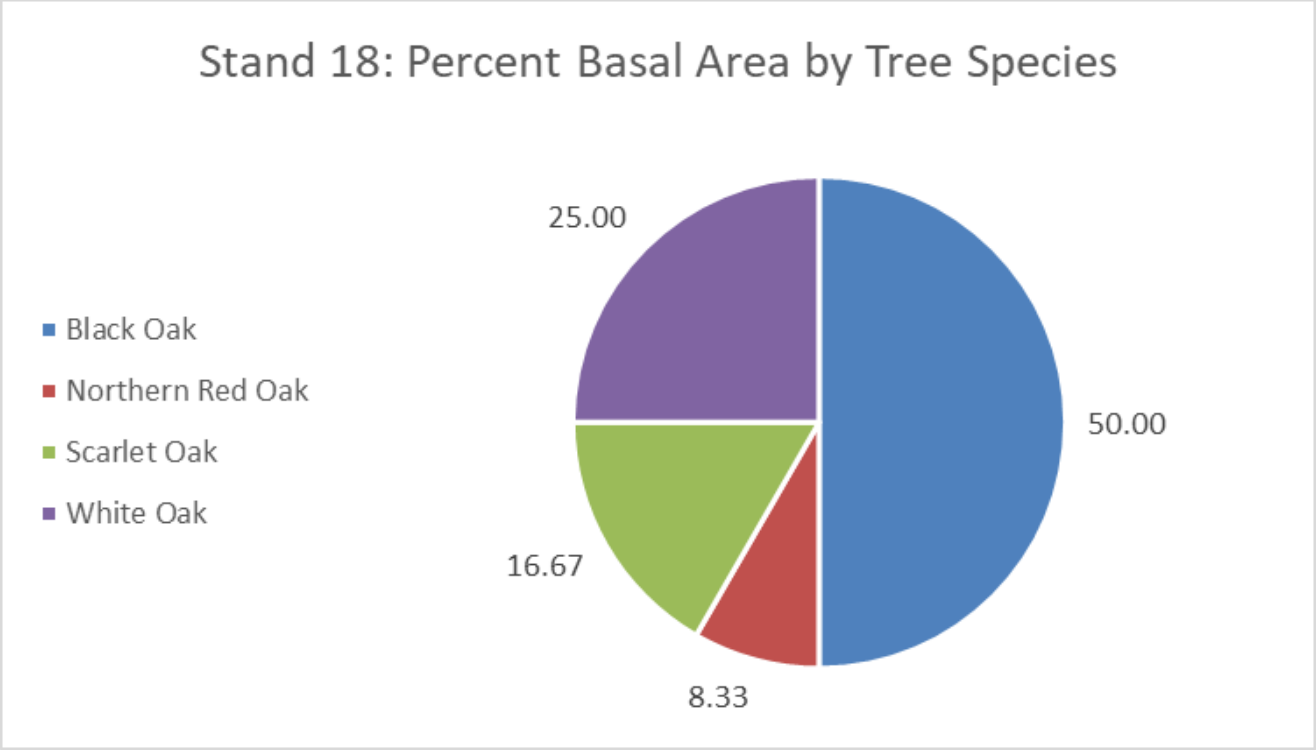

Stand 16 Basal Area (ft^2/acre) by Diameter Class
Poletimber
Small-Medium Sawtimber
Large Sawtimber
2.8
30.2
46

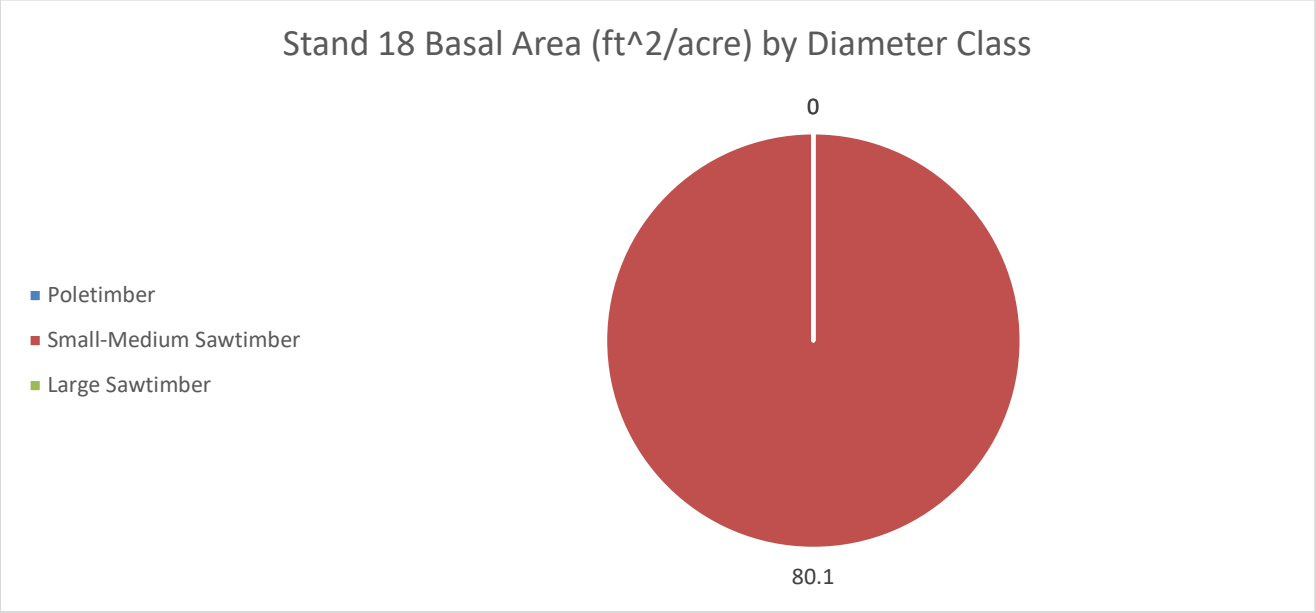
Stand 17


Stand 17: Percent Basal Area by Tree Species
Beech
Black Birch
Black Oak
Hickory
Northern Red Oak
White Oak
Yellow-Poplar
4.88
9.76
14.63
14.63
17.07
29.27
9.76

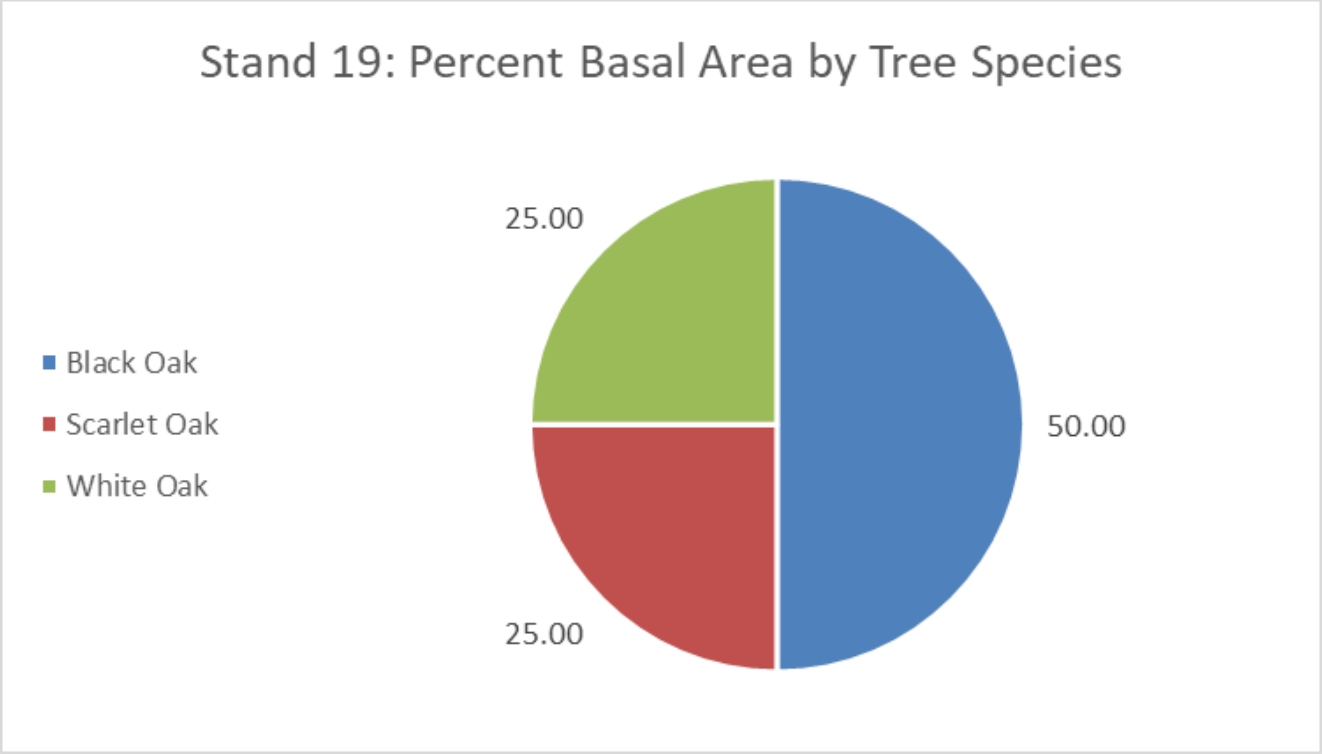

Stand 17 Basal Area (ft^2/acre) by Diameter Class
Poletimber
Small-Medium Sawtimber
Large Sawtimber
5
26.5
36.5

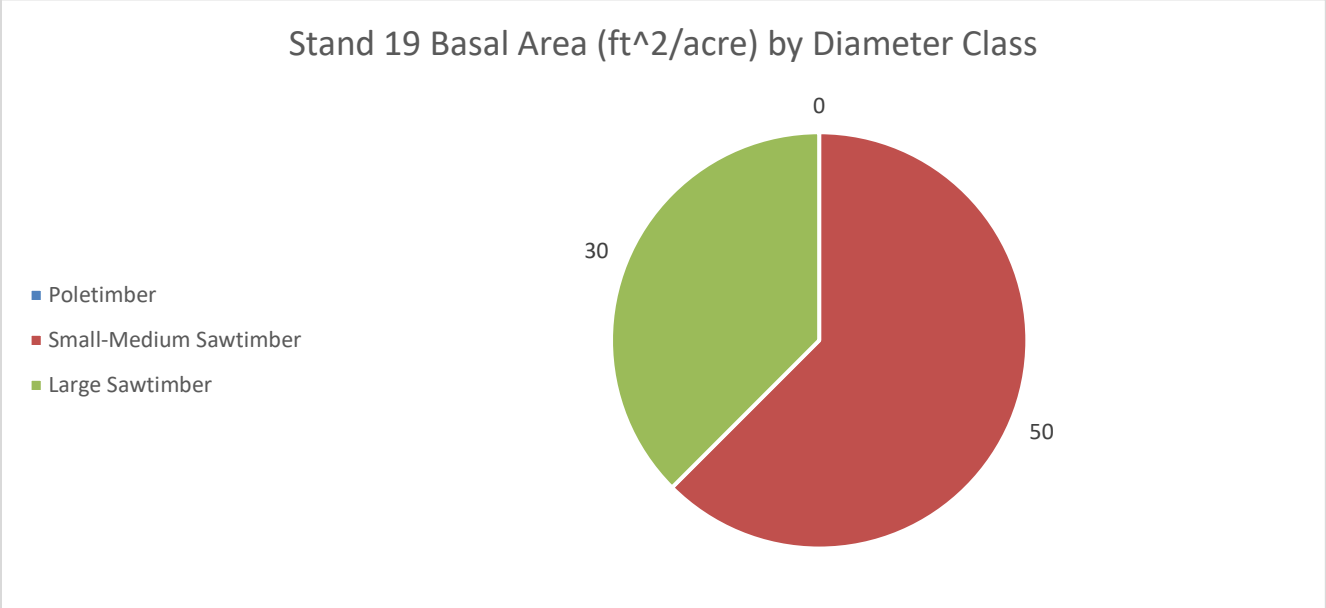
Stand 18


Stand 18: Percent Basal Area by Tree Species
Black Oak
Northern Red Oak
Scarlet Oak
White Oak
25.00
50.00
16.67
8.33

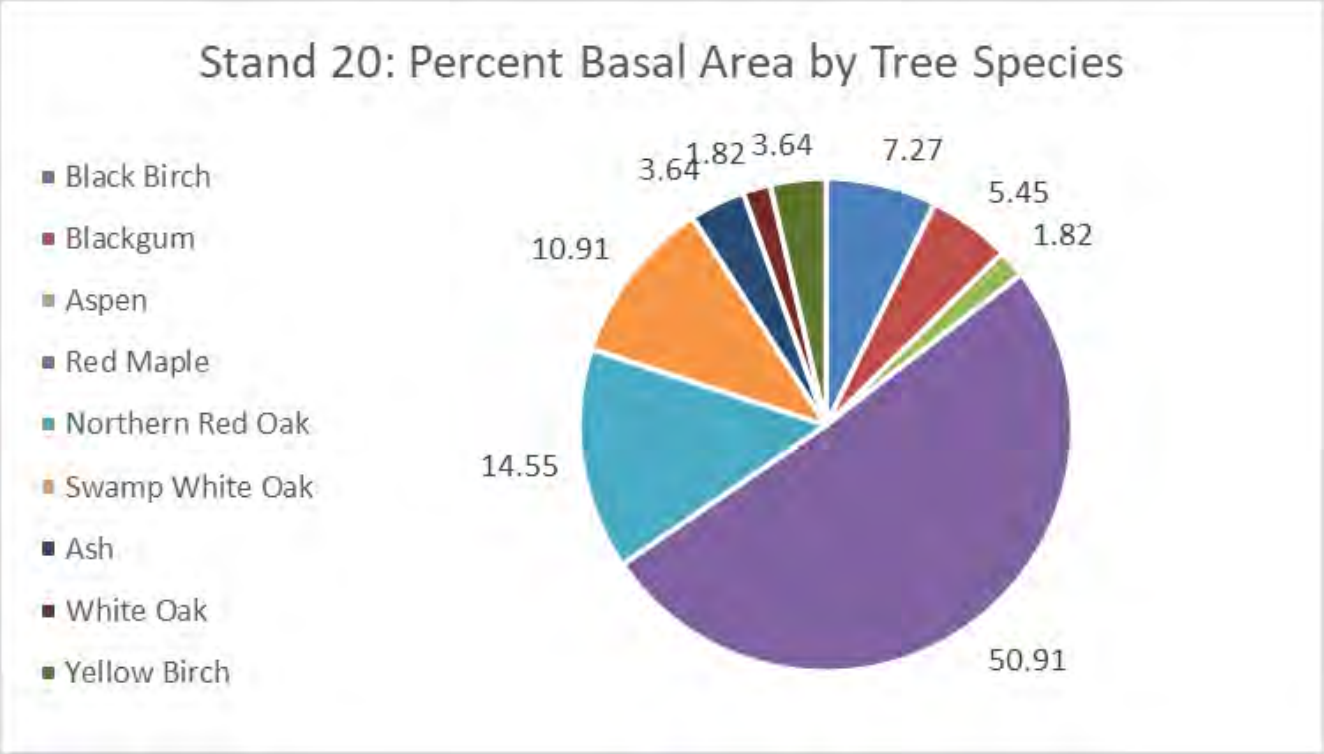

Stand 18 Basal Area (ft^2/acre) by Diameter Class
Poletimber
Small-Medium Sawtimber
Large Sawtimber
0
80.1

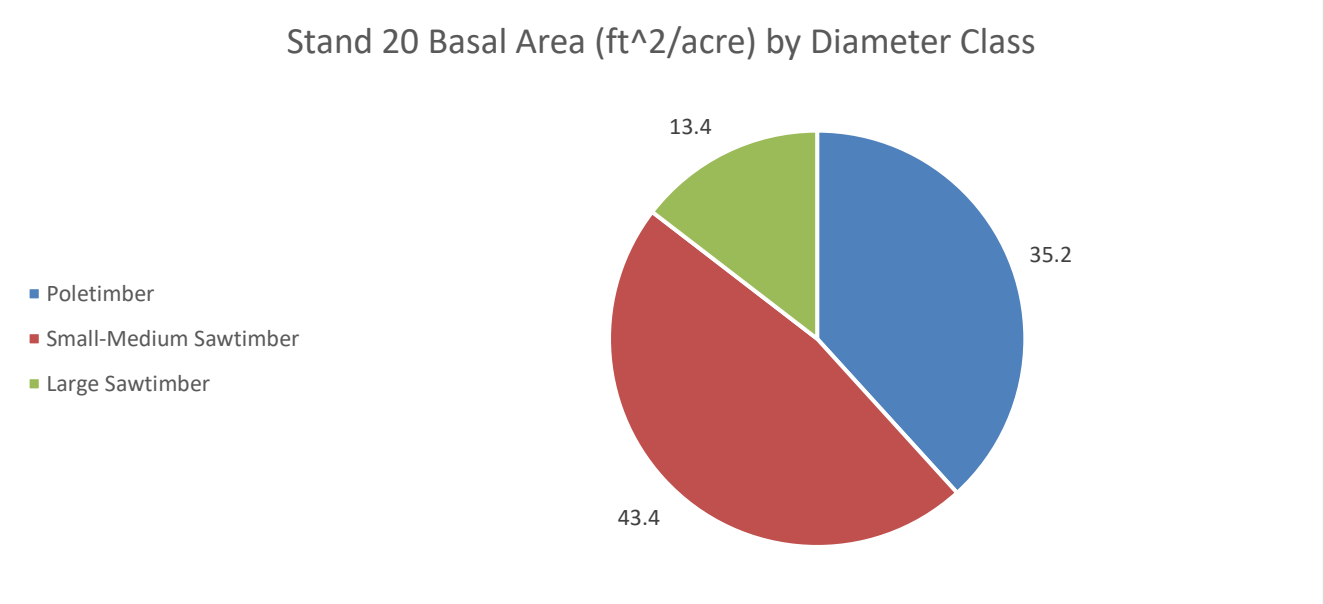
Stand 19


Stand 19: Percent Basal Area by Tree Species
Black Oak
Scarlet Oak
White Oak
25.00
50.00
25.00

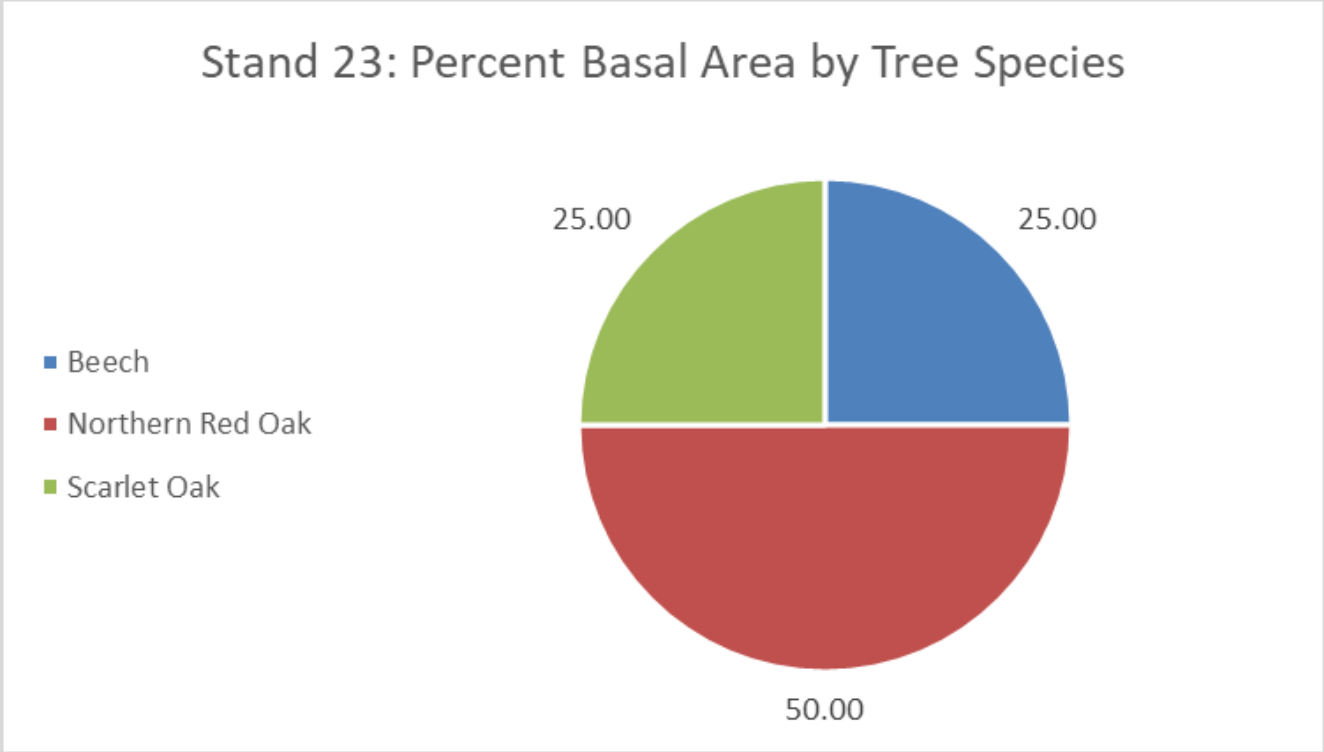

Stand 19 Basal Area (ft^2/acre) by Diameter Class
Poletimber
Small-Medium Sawtimber
Large Sawtimber
0
30
50

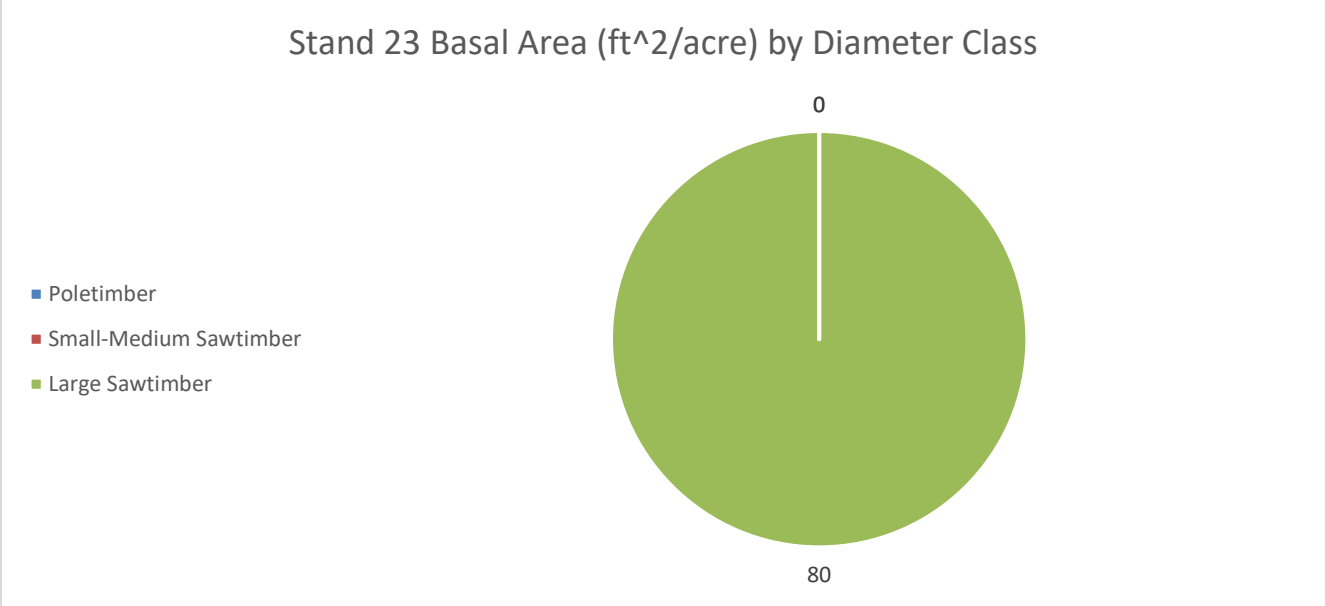
Stand 20


Stand 20: Percent Basal Area by Tree Species
Black Birch
Blackgum
Aspen
Red Maple
Northern Red Oak
Swamp White Oak
Ash
White Oak
Yellow Birch
7.27
5.45
1.82
50.91
14.55
10.91
3.64
1.82
3.64


Stand 20 Basal Area (ft^2/acre) by Diameter Class
Poletimber
Small-Medium Sawtimber
Large Sawtimber
35.2
43.4
13.4

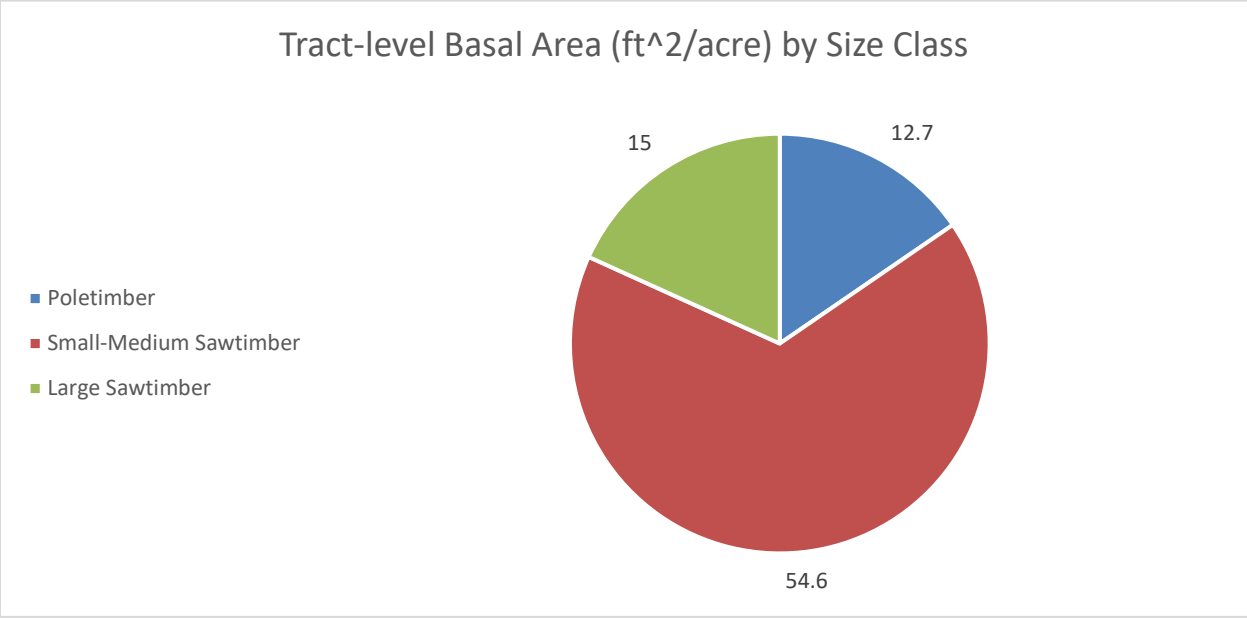
Stand 23

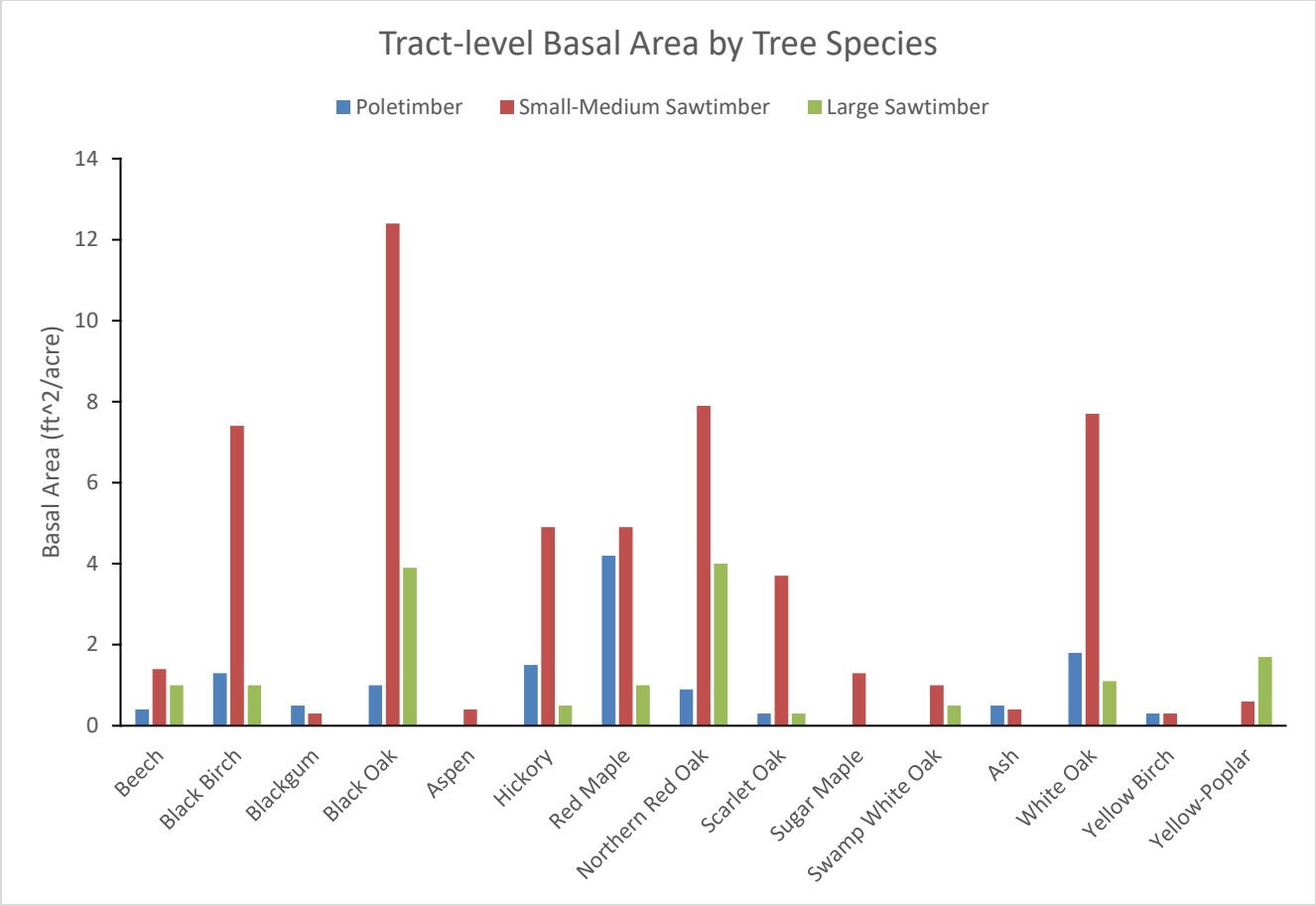

Stand 23: Percent Basal Area by Tree Species
25.00
25.00
50.00
Beech
Northern Red Oak
Scarlet Oak

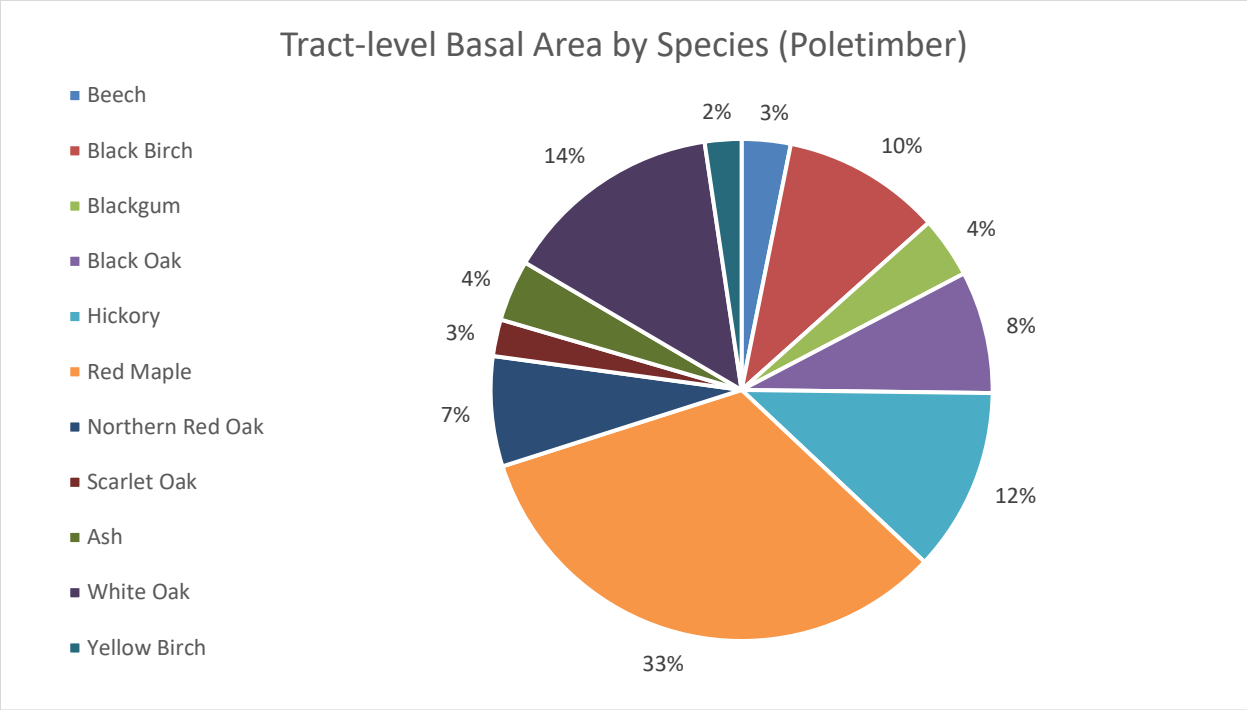

Stand 23 Basal Area (ft^2/acre) by Diameter Class
0
80
Poletimber
Small-Medium Sawtimber
Large Sawtimber

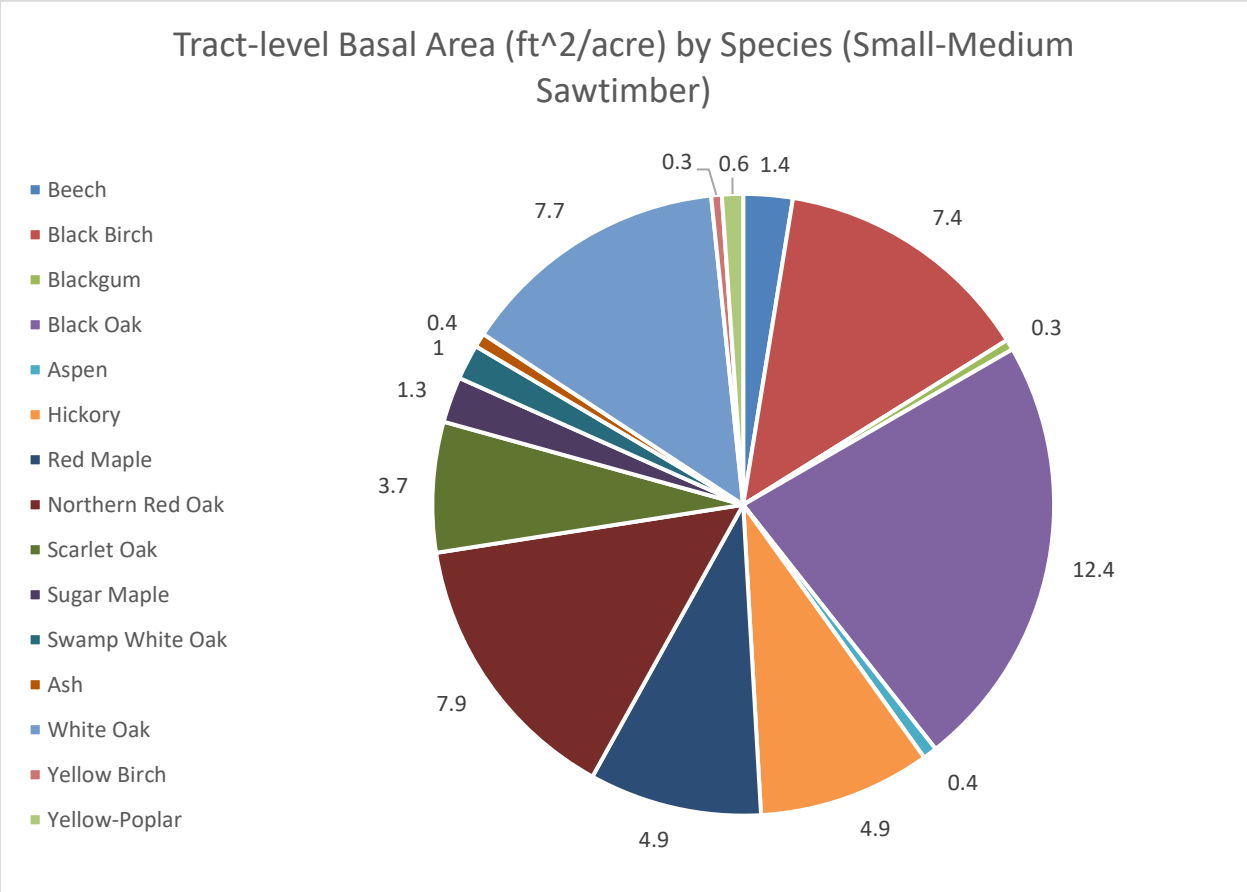
Property-wide cumulative data

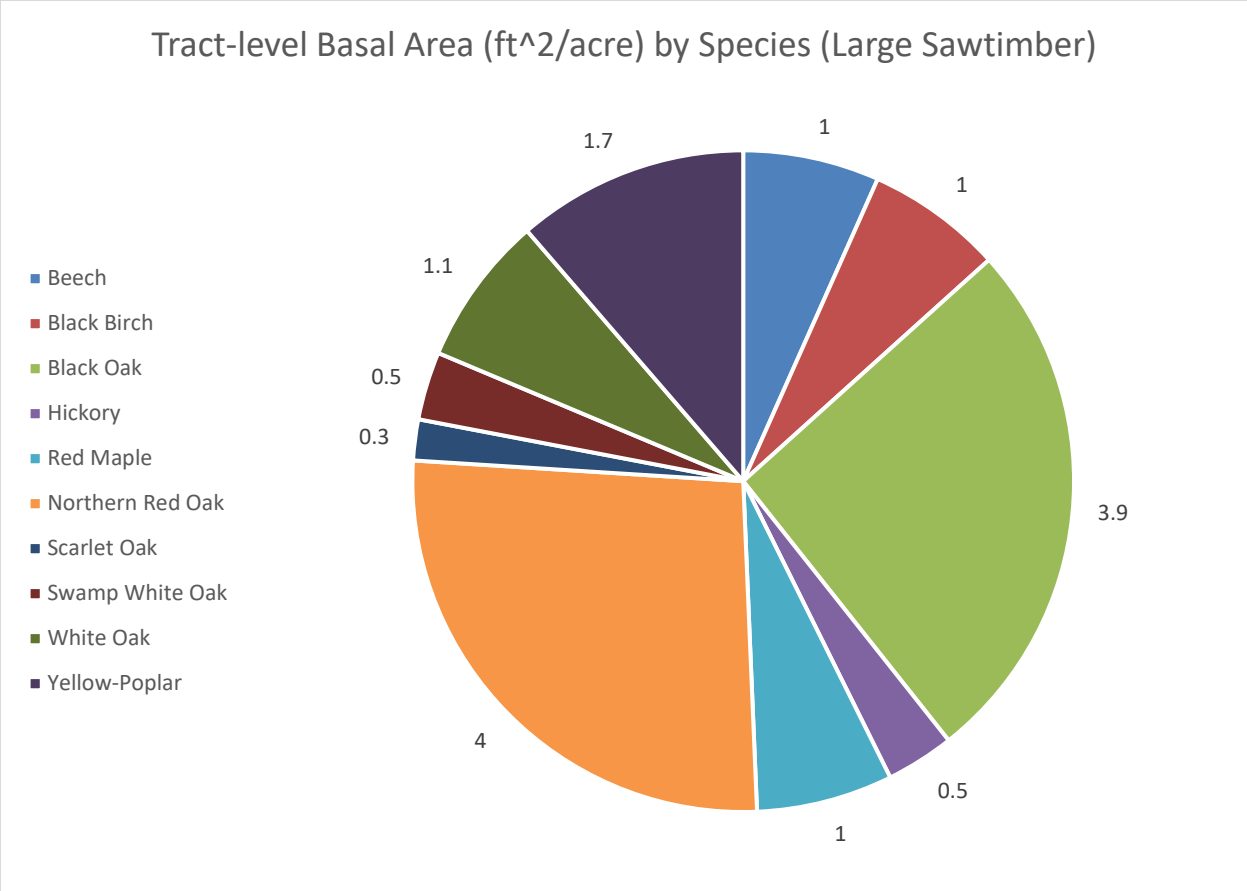
This chart represents total square feet of basal area on average per acre that each size class represents






Tract-level Basal Area by Species (Poletimber)
Beech
Black Birch
Blackgum
Black Oak
Hickory
Red Maple
Northern Red Oak
Scarlet Oak
Ash
White Oak
Yellow Birch
2%
3%
10%
4%
8%
12%
33%
7%
3%
4%
14%


Tract-level Basal Area (ft^2/acre) by Species (Small-Medium Sawtimber)
Beech
Black Birch
Blackgum
Black Oak
Aspen
Hickory
Red Maple
Northern Red Oak
Scarlet Oak
Sugar Maple
Swamp White Oak
Ash
White Oak
Yellow Birch
Yellow-Poplar
0.3
0.6
1.4
7.4
0.3
12.4
0.4
4.9
4.9
7.9
3.7
1.3
1
0.4
7.7


Tract-level Basal Area (ft^2/acre) by Species (Large Sawtimber)
Beech
Black Birch
Black Oak
Hickory
Red Maple
Northern Red Oak
Scarlet Oak
Swamp White Oak
White Oak
Yellow-Poplar
1
1
3.9
0.5
1
4
0.3
0.5
1.1
1.7

H. Landscape Context – Forestry – adjacent land uses

Landscape context
This property is a critical part of the open space portfolio of this area. Having almost 1,000 acres of conserved coastal forest is rare in Connecticut and southern New England. Twenty-five species of amphibians and reptiles, 30 species of mammals, and 57 species of birds have been documented on the property,[26] including many neo-tropical species that utilize Pequot Swamp Pond and other features as a critical stopover point during migration.

TPSF is located in close proximity to the mouth of the Connecticut River and Long Island Sound. The property itself is surrounded by a triangle of traffic corridors: Route 9 to the east, Interstate 95 to the south, and Route 153 to the west. Immediately adjacent to TPSF is a large block of forest owned by the Town of Old Saybrook. In addition, Essex Land Trust owns an additional +/- 75 acres adjacent to TPSF in Essex to make up the remainder of "The Preserve."

Beyond Route 9 lies Lord Cove Natural Area Preserve and the Connecticut River, which empties into Long Island Sound nearby. South of I-95 are three wildlife refuges located in coastal marshlands: Ragged Rock Creek Marsh Wildlife Management Area and Plum Bank Marsh Wildlife Management Area in Old Saybrook, and Roger Tory Peterson Natural Area Preserve in Old Lyme. To the southwest in Westbrook is the Salt Meadow Unit of the Stewart B. McKinney National Wildlife Refuge. There are other nearby conserved properties belonging to a variety of owners including The Nature Conservancy, CT DEEP, other land trusts, and privately conserved land. (See the map in Appendix N (O) to see some of the nearby conserved properties.) Most of the land immediately surrounding TPSF is densely developed residential neighborhoods or commercial areas. (See the map in Appendix N (P) to see the land uses immediately surrounding TPSF on the 2019 aerial photo.)

I. Specific Acquisition Desires

1. No parcels have been identified at this time.

J. Public Involvement

1. A public meeting was held to present major ideas from this plan. This plan was developed with funding from the Trust for Public Land (TPL), and with input from TNC, Town of Old Saybrook, CT DEEP, and the CMC. The comments from the meeting are presented in Appendix E.

K. Adaptive Management

Property stewards understand that forest management is a part of a resilient and dynamic landscape. Management actions are often affected by many variables which influence the outcome of resource decisions. The CMC reserves the right to reasonably change management strategies as environmental conditions and resource needs warrant. Some of these changes may be associated with biological factors such as insects and disease, weather events, and/or human caused disturbances. The CMC will evaluate circumstances and use an adaptive-management philosophy, and will address unforeseen circumstances as needed.

[26] Information taken from DEEP website (https://portal.ct.gov/DEEP/State-Parks/Forests/The-Preserve/Overview) accessed on 2/1/22.

L. 10-Year Goals

The Preserve was purchased as a means to protect roughly 1,000 acres of land from being developed into residential and commercial areas, a common occurrence along coastal Connecticut. This land has been used by a variety of user groups for hiking, mountain biking, dog walking, nature study, and scenic beauty and will continue to be managed for these and other purposes.

The land will be actively managed to maintain forest and ecosystem health, and promote biodiversity to serve current and future generations of stakeholders and satisfy the purposes of the acquisition of the property. Any stewardship projects identified with the plan will be funded using existing funds held in a stewardship account by the state of Connecticut. Any revenue generated as part of forest stewardship activities through the sale of forest products will be put into a stewardship fund and will be used to help fund future management activities on the property. Ideally, given the property's location in relation to the high school, middle school and other schools in Old Saybrook and surrounding towns, it could be used as a living laboratory in which to teach students about the natural world and attempt to engage them in it.

Most of the property is accessible for potential management and many areas are accessible with equipment if necessary. During this 10-year period, following the goals laid out in the Executive Summary of this document, it is reasonable to:

- Maintain and enhance forest health, resilience, productivity, and long-term sustainability
- Protect water quality and soil stability
- Protect sensitive/critical habitats, plants and wildlife species known to exist here
- Maintain and enhance wildlife habitat diversity
- Provide educational opportunities and diverse recreational experiences for the public

M. Work Plans

Road Construction and Gates

While there currently are few roads suitable for regular use by mechanized equipment on the property, many of the walking trails either were skid roads at one point or could be converted (temporarily or semi-permanently) in the future (see the Interim Trail Map and Infrastructure Map in Appendix N (G) and (H) respectively). These potential roads will likely require some fill and/or excavation within the road and/or along the sides for drainage. Potential hazard trees or overhanging branches should be trimmed. Gates suitable for preventing unauthorized motor vehicle traffic should be installed at each road entrance if not already present.

Parking Areas

The Preserve State Forest (TPSF) is now partially owned and managed by the State of Connecticut DEEP, which can help increase people's awareness of the property. Now that the parking lot has been moved and expanded, consider installing a low-maintenance native pollinator garden and/or rain garden with informational signs for visitors. If there are local volunteer groups willing to help with maintenance, an agreement (formal or informal) should be developed. If a garden is installed successfully, consider expanding the model to some of the other parking areas for TPSF including potentially collaborating with Essex Land Trust on their portion of "The Preserve" to determine if they're interested in implementing the same or a similar model.

Boundaries

Locate and mark all boundaries in 2024. Boundaries should be remarked every +/- 7 years.

Stream Improvements

Several of the proposed access roads have stream crossings that will require culverts, bridges (temporary or permanent), or some other type of raised crossing. These should be installed according to recommendations in the 2007 Connecticut Field Guide to Best Management Practices for Protecting Water Quality while Harvesting Forest Products. Existing culverts should be regularly inspected to ensure they are adequate according to BMP standards, and replaced if they are not. In places where new culverts are to be installed, consider climate change impacts and more severe storm events when deciding on how to size culverts. If possible, install oversized culverts in areas where precipitation events may create excessive water flow. Culverts, crossings, and roadside drainages should be cleared of debris regularly or after significant precipitation events.

Cultural Site Maintenance

At the Ingham Home Foundation along the boundary between Stand 1 and 20 in the west-central portion of the property, conduct an archeological assessment to determine relative sensitivity of the area. If feasible, remove trees from the foundation and treat invasive plants to ensure the foundation's structural integrity. In addition, investigate possible Native American connection of some of the uniquely shaped walls and those that integrated large boulders. The 1999 Environmental Review Team (ERT) report done for "The Preserve" (Eastern, 1999) showed that there were some archaeologically sensitive sites in parts of the property. The State Historic Preservation Office should be consulted prior to conducting work in and around historic features, and determine exact locations of sensitive sites so they can remain undisturbed.

Trail Planning and Maintenance

The Preserve contains a marked interim trail system maintained by the Town of Old Saybrook and DEEP. Additionally, there are a large number of unmarked trails that stretch across all parts of the property. Some of these trails may need to be closed to protect forest health and wildlife resources. During this plan period, priority issues to address in the development of the Public Recreational Use and Trail Plan include identifying sections of trail that need to be rerouted and/or closed, addressing areas of erosion, wet spots in trails, invasive plants on trails (especially Japanese stiltgrass), maintaining and/or improving drainage crossings, and the creation of new trails if desired. For more information refer to the Recreational Use Assessment developed by GEI Consultants, Inc.

Improvement of Critical Habitat

In Stand 20, consider releasing the Atlantic white cedar from adjacent hardwood trees if they appear to be competing with the cedars and the cedars are showing any signs of decline from competition. Care must be taken to limit sizes of openings adjacent to the cedar to reduce the likelihood of windthrow. Otherwise, monitor for invasive plants and remove them if noted. If the trees to be removed to release the cedar are at least two tree heights from any existing or future potential infrastructure (i.e., hiking trails), and there is no danger people who would be regularly working on or using the property for authorized uses, some of the competing hardwoods could be girdled. This can have the dual purpose of allowing more growing space for the cedar while simultaneously creating additional habitat features in the form of standing dead snags and potential cavity trees.

Several of the plant species noted in the NDDB report (2021) require sunlight to thrive, and are currently being shaded out by natural forest succession. Without intentional intervention that includes creating canopy gaps to enhance available sunlight those species are likely to decline, dwindle and potentially disappear. Work with the Wildlife Division to determine locations where targeted canopy gaps can enhance habitat necessary for endangered or special concern species to continue to persist and determine appropriate timing and techniques to create necessary habitat that doesn't conflict with personal safety or integrity of infrastructure.

In addition to the specific plants there were many other Critical Habitats noted at TPSF. Again, working in consultation with DEEP Wildlife Division biologists and botanists/plant community ecologists, determine what (if any) measures need to be taken to ensure the continued presence and vigor of these habitats. As feasible, working with the utility to protect individual species and Critical Habitats found in ROW areas will also be useful.

Wildlife Habitat Improvement

The management activities recommended in this plan are expected to enhance wildlife habitat throughout the property in several ways. First, as areas regenerate, the new vegetation will increase structural complexity within the various forest strata (i.e., understory, midstory, overstory) which can be beneficial to a variety of birds and other wildlife species. Second, cutting trees results in an influx of both coarse and fine woody material on the forest floor, which in the short term provides cover and a potential source of browse if trees are cut in winter or early spring as well as sources of forage for insects. Over the longer-term these features can provide habitat for a wide variety of species including amphibians and insects the species of which change throughout the various stages of decomposition of the wood. Third, many of the stand recommendations call for releasing pockets of mast-producing shrubs and trees such as maple-leaf viburnum, blueberry, huckleberry, oak, hickory, etc. Mast (i.e., berries, nuts, etc.) is an important source of food for many wildlife species. Snags and cavity trees should be retained when doing so will not create a safety hazard.

This plan also recommends a second year of turtle telemetry (2024) to bolster data collected during summer of 2023 and referenced in the Klemens Report. A second year of vernal pool sampling should also be conducted to establish and clarify vernal pool productivity trends. This second year will not be 2024, but, depending on funding sources, may be 2025.

In addition, working in conjunction with the Wildlife Division to maintain and enhance specific Critical Habitats can ensure the offerings that wildlife currently utilize will continue to persist or perhaps expand (where appropriate) over time.

Invasive Species Control

At least some treatment of invasive plants is prescribed for most stands on the property, but it is most important in areas where tree cutting is to occur within the next 10 years (see table below) or where repeated activity (i.e., mowing roadsides) is occurring to limit potential spread. Additionally, parking areas, stands (or portions of stands) throughout the property where significant populations of invasive plants exist, and trails with Japanese stiltgrass should be treated immediately if resources are available. This can and should be done over time using a phased approach so that the habitat benefits (potential cover, soft mast, and nectar) are not eliminated all at once before some native alternatives are able to replace the invasives that are treated.

Summary of Planned Harvests

Stand	Acres**	Prescription
1	51.5	Single tree/group selection, thinning, patch cuts, non-commercial canopy gaps
3	20.8	Non-commercial forest stand improvement/crop tree release/canopy gap creation
4	18.1	Single tree/group selection/patch cuts
5	2.2	Timber stand improvement
7	5	Non-commercial canopy gaps over blueberry in interior/soften edges along transmission corridor
8	1	Create canopy gaps
10	50	Thinning/crop tree release/laurel treatment/canopy gaps
11	27.0	Thinning / Group Selection / Patch Cut
12	10.4	Shelterwood
15	5	Non-commercial canopy gaps
17	4	Non-commercial canopy gaps
19	3	Non-commercial regeneration treatment and crop tree release

** Acres are approximate

More detailed prescriptions for each stand, including those not listed in the above table, can be found starting on page 28 in Section G: Vegetative Condition.

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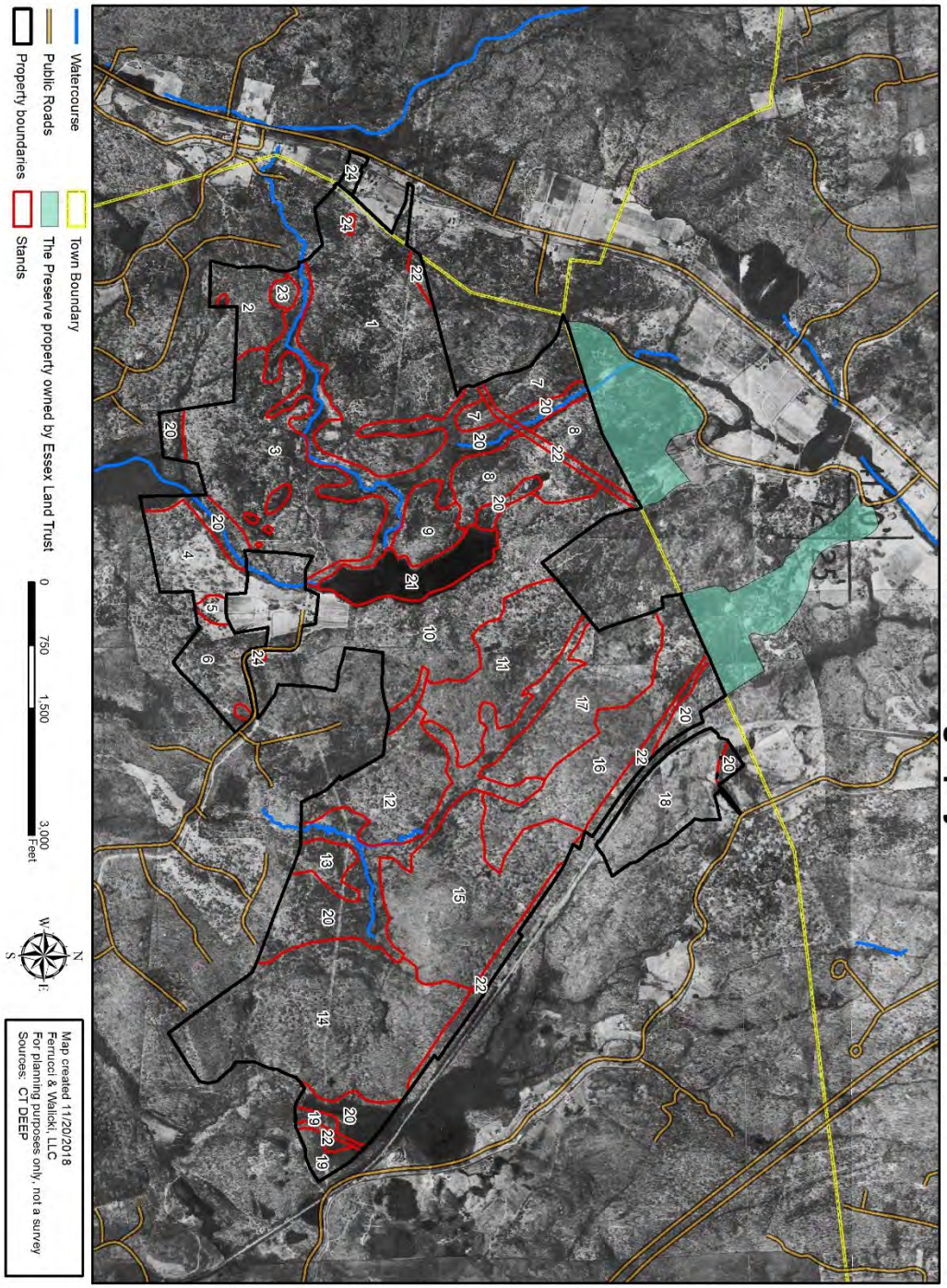
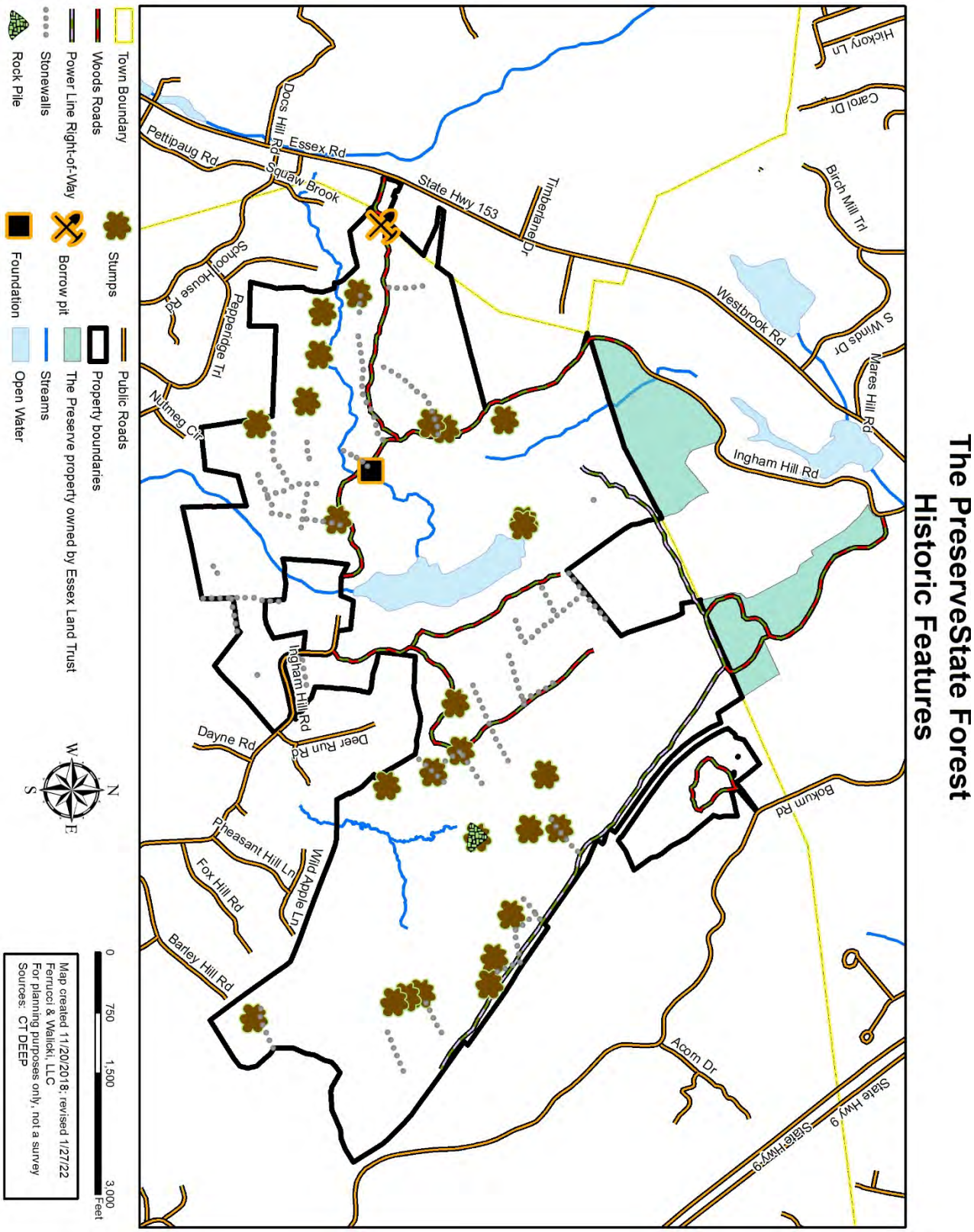
N. Appendix A – Maps

A note about the maps. An effort was made to collect information to be representative of the features shown in the maps in this plan. The occurrence or absence of features is not intended to be an absolute statement of any particular feature's presence on the property.

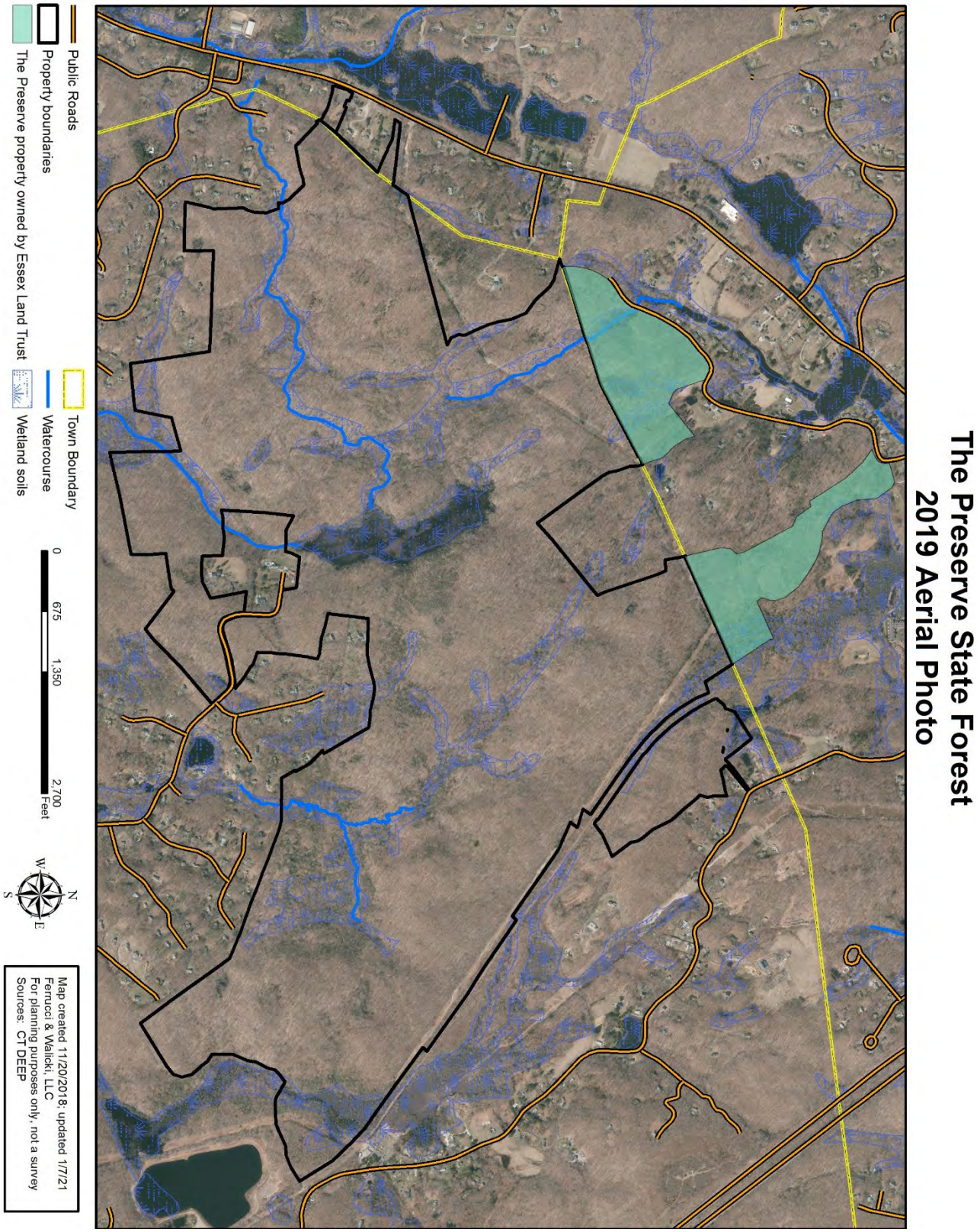
A. 1934 Aerial photo


The Preserve State Forest
1934 Aerial Photography
Watercourse
Public Roads
Property boundaries
Town Boundary
The Preserve property owned by Essex Land Trust
Stands
0
750
1,500
3,000
Feet
N
W
E
S
Map created 11/20/2018
Ferrucci & Walicki, LLC
For planning purposes only, not a survey
Sources: CT DEEP

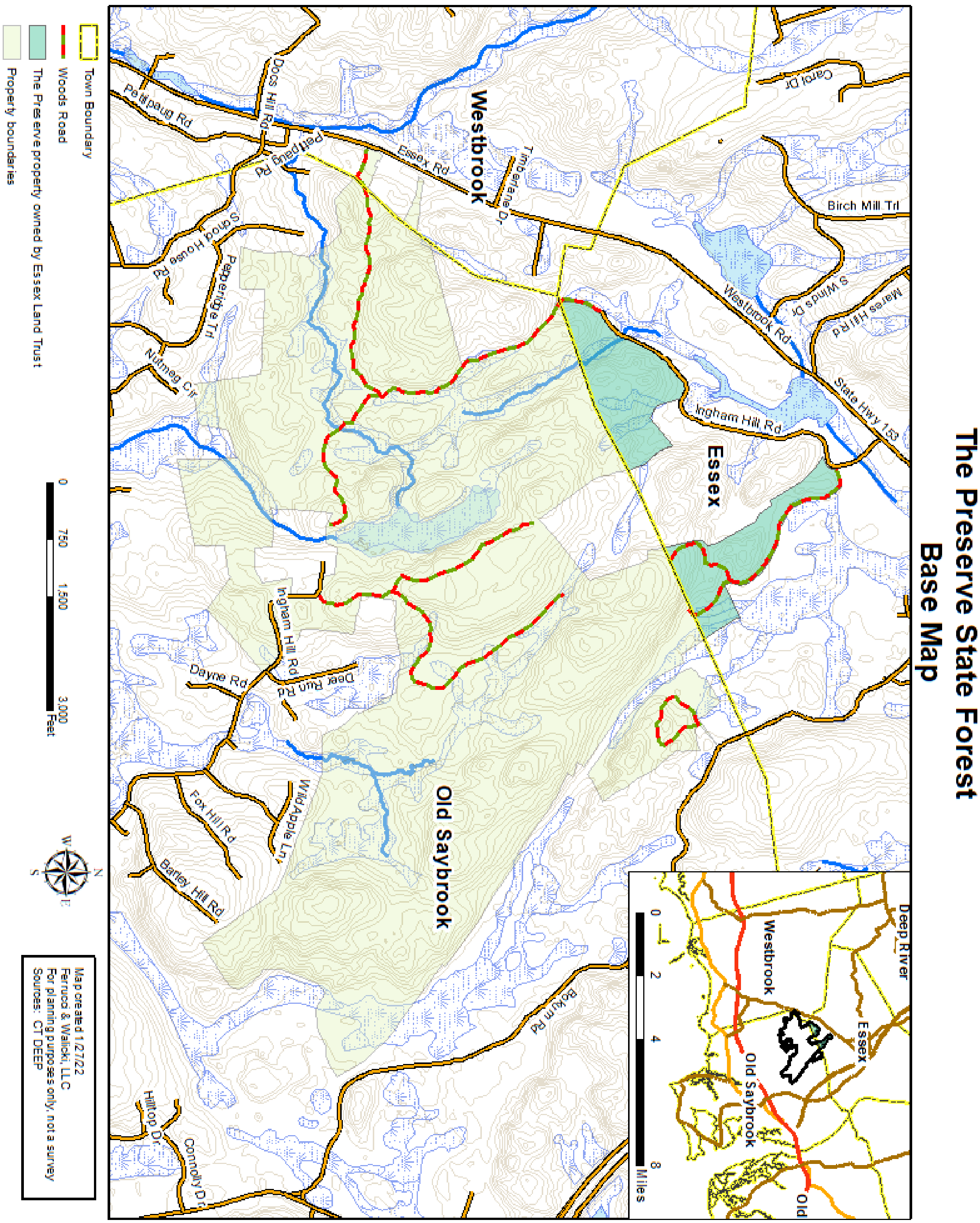
B. Historic Features



C. 2019 Aerial Photo

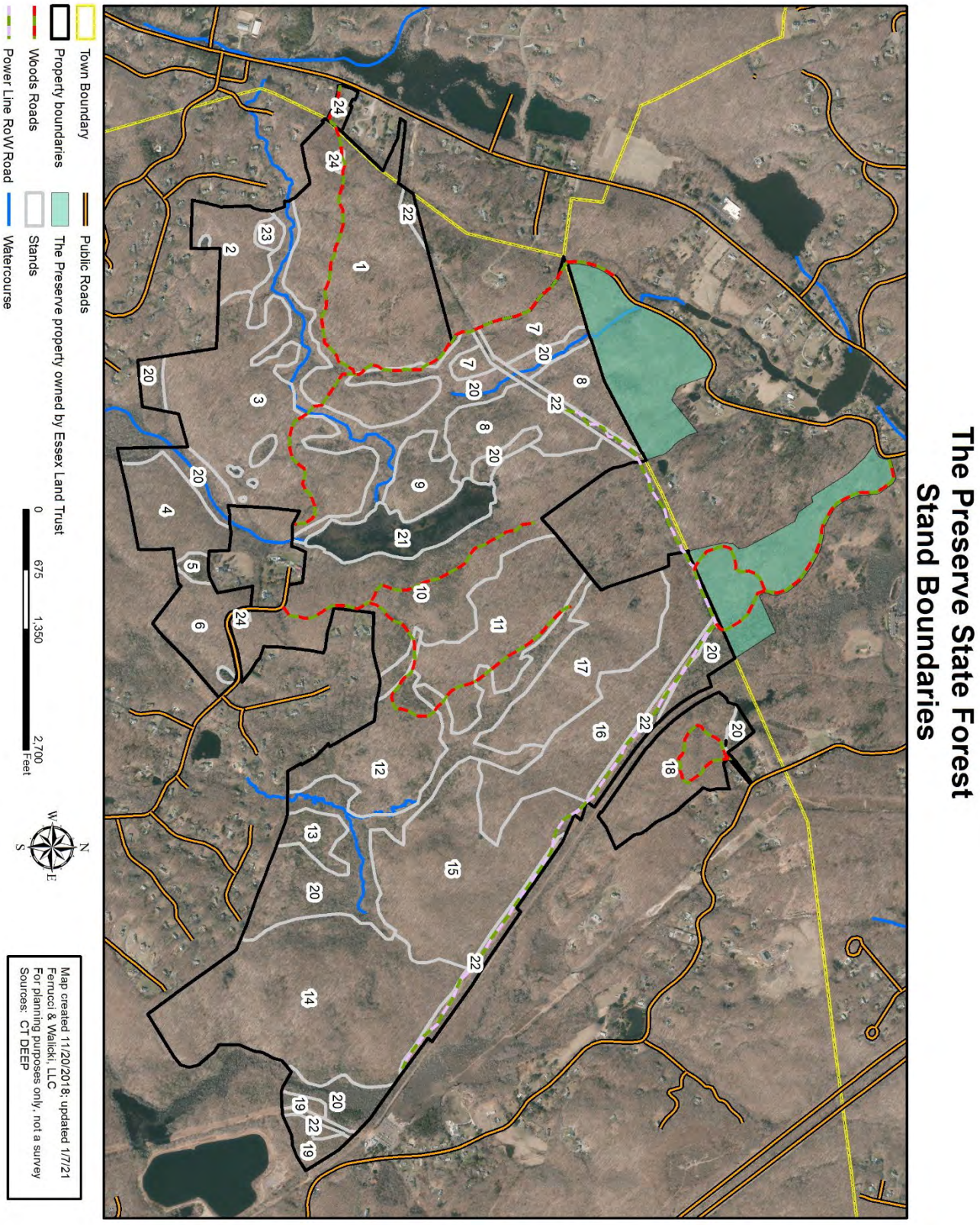


D. Base Map

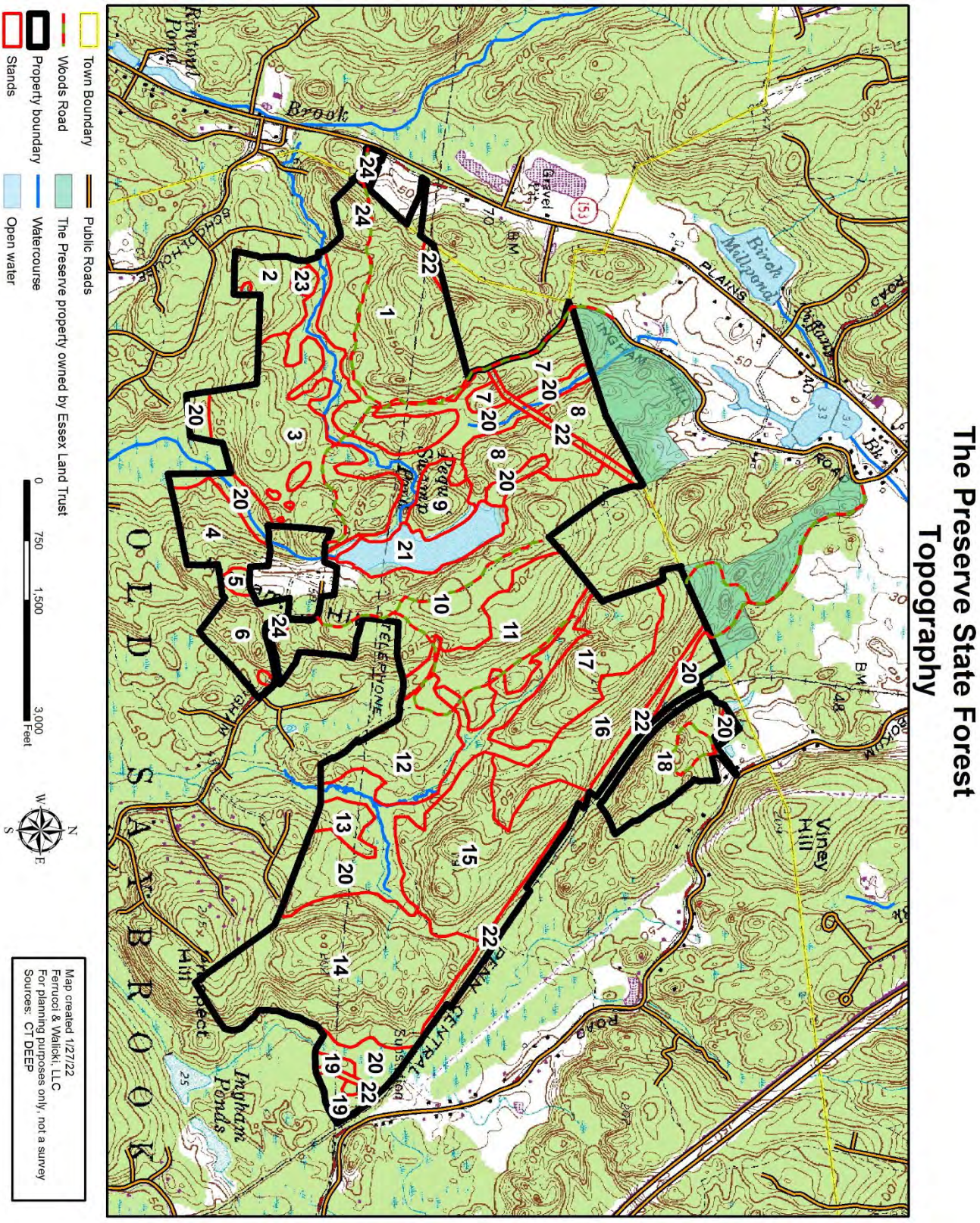


The Preserve State Forest
Base Map
Westbrook
Essex
Old Saybrook
Town Boundary
Woods Road
The Preserve property owned by Essex Land Trust
Property boundaries
Essex Rd
Pettipaug Rd
Docs Hill Rd
Timberlane Dr
Birch Mill Trl
Carol Dr
S Winds Dr
Mares Hill Rd
Westbrook Rd
State Hwy 153
Ingham Hill Rd
School House Rd
Pepperidge Trl
Nutmeg Cir
Dayne Rd
Deer Run Rd
Wild Apple Ln
Fox Hill Rd
Bartley Hill Rd
Bokum Rd
Hilltop Dr
Connolly Dr
0
750
1,500
3,000
Feet
Deep River
Miles
Map created 1/27/22
Ferrucci & Walicki, LLC
For planning purposes only, not a survey
Sources: CT DEEP

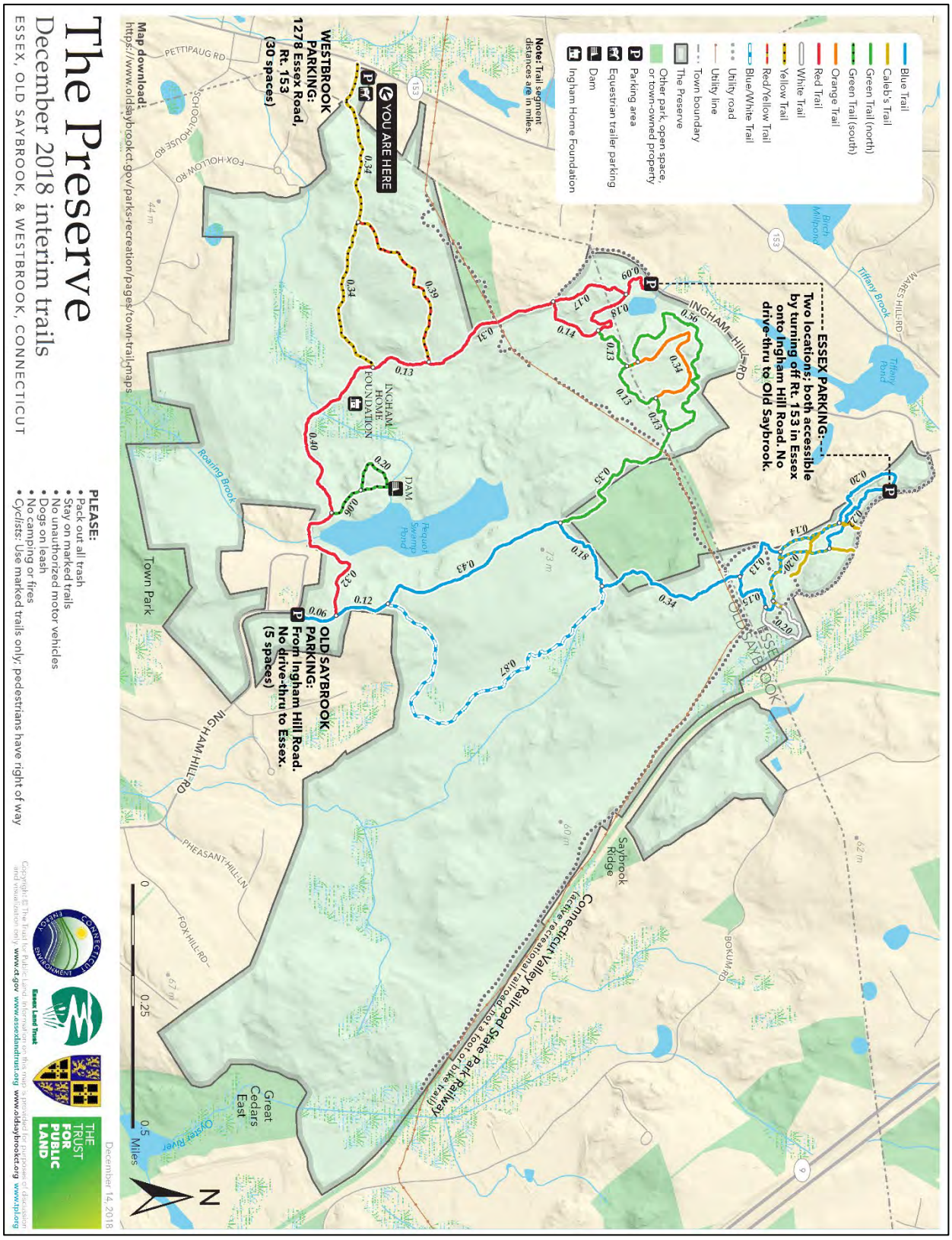
E. Stand Boundaries



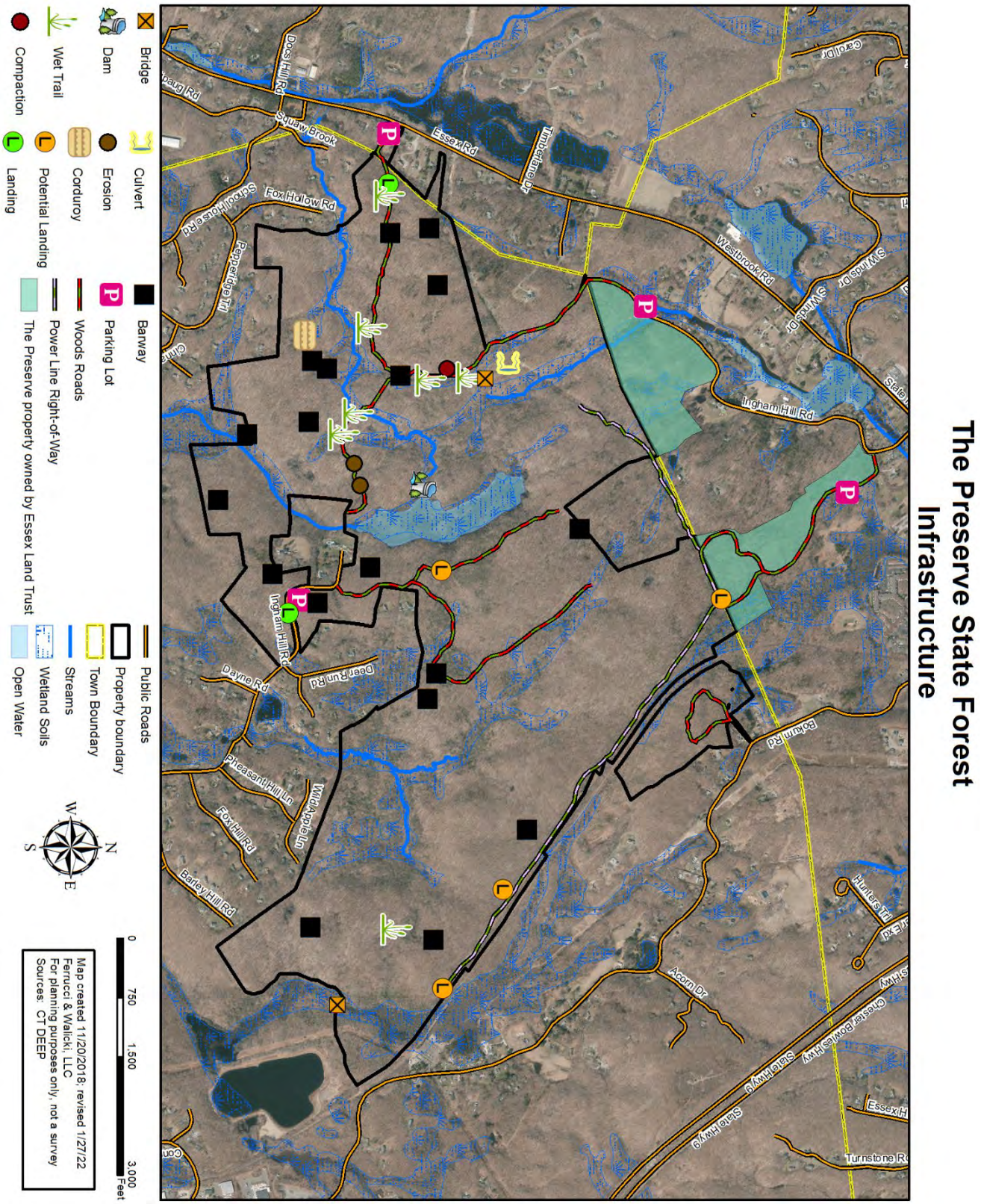
F. Topographic Map



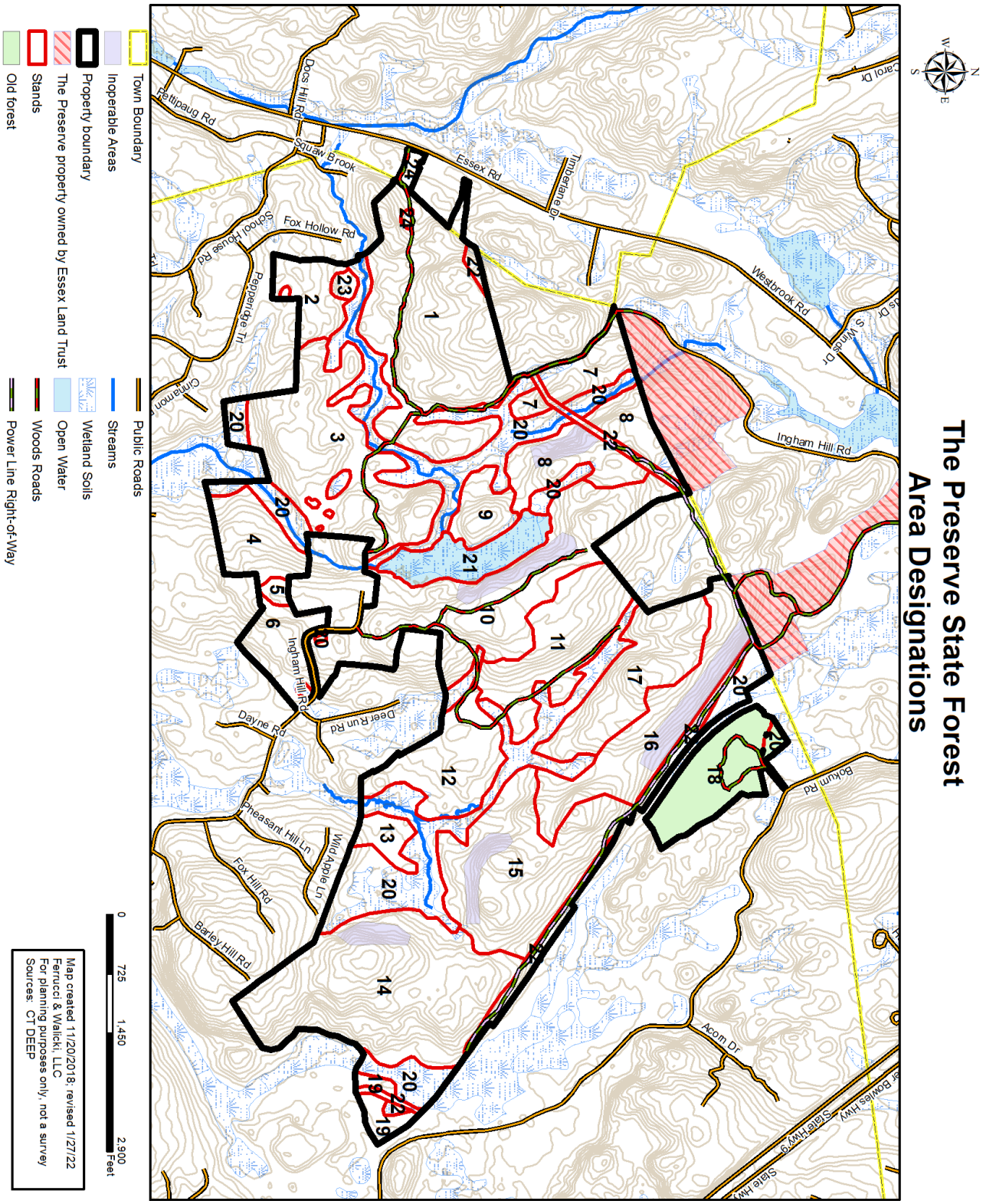
G. Interim Trail Map



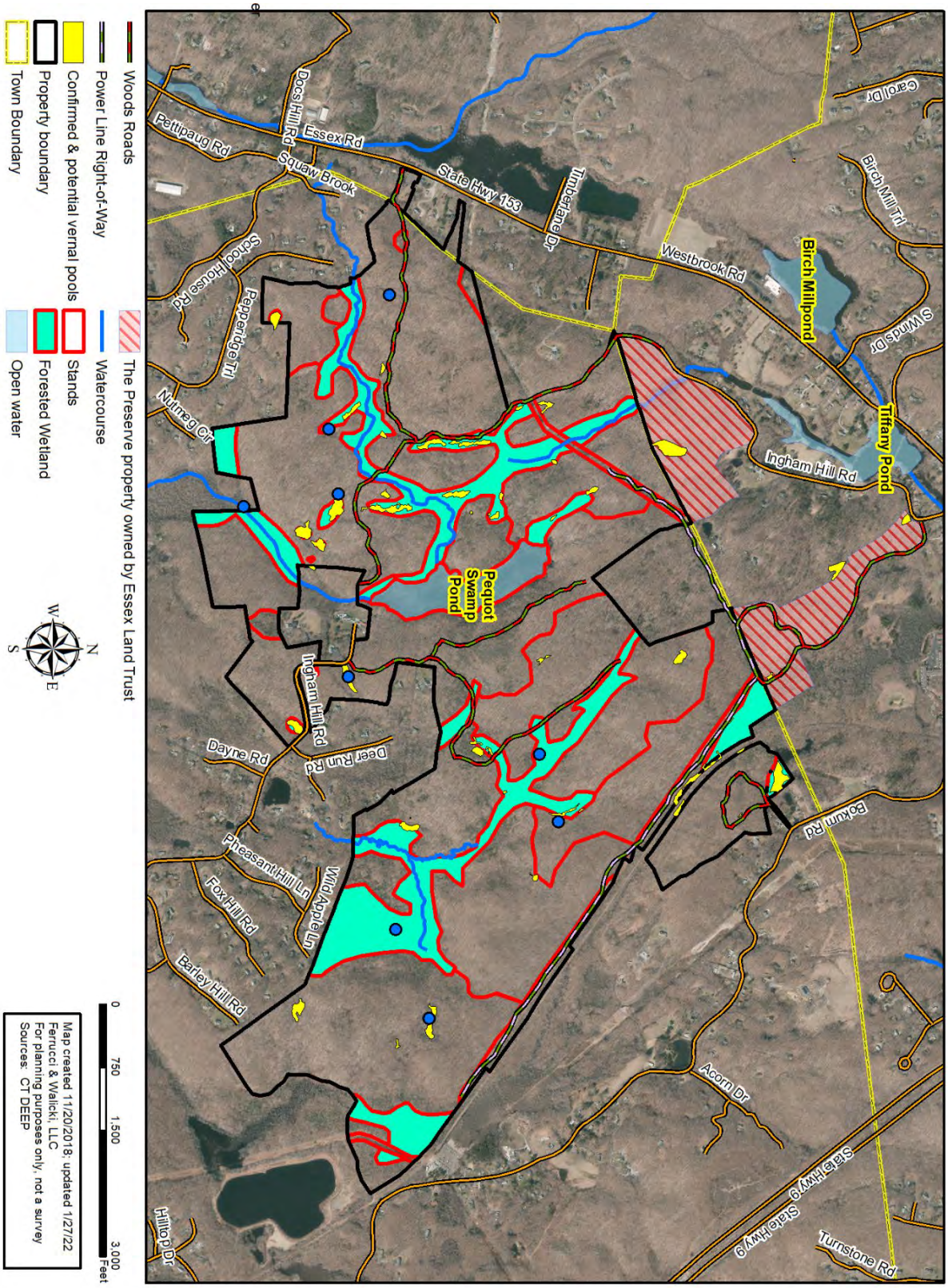
H. *Infrastructure*



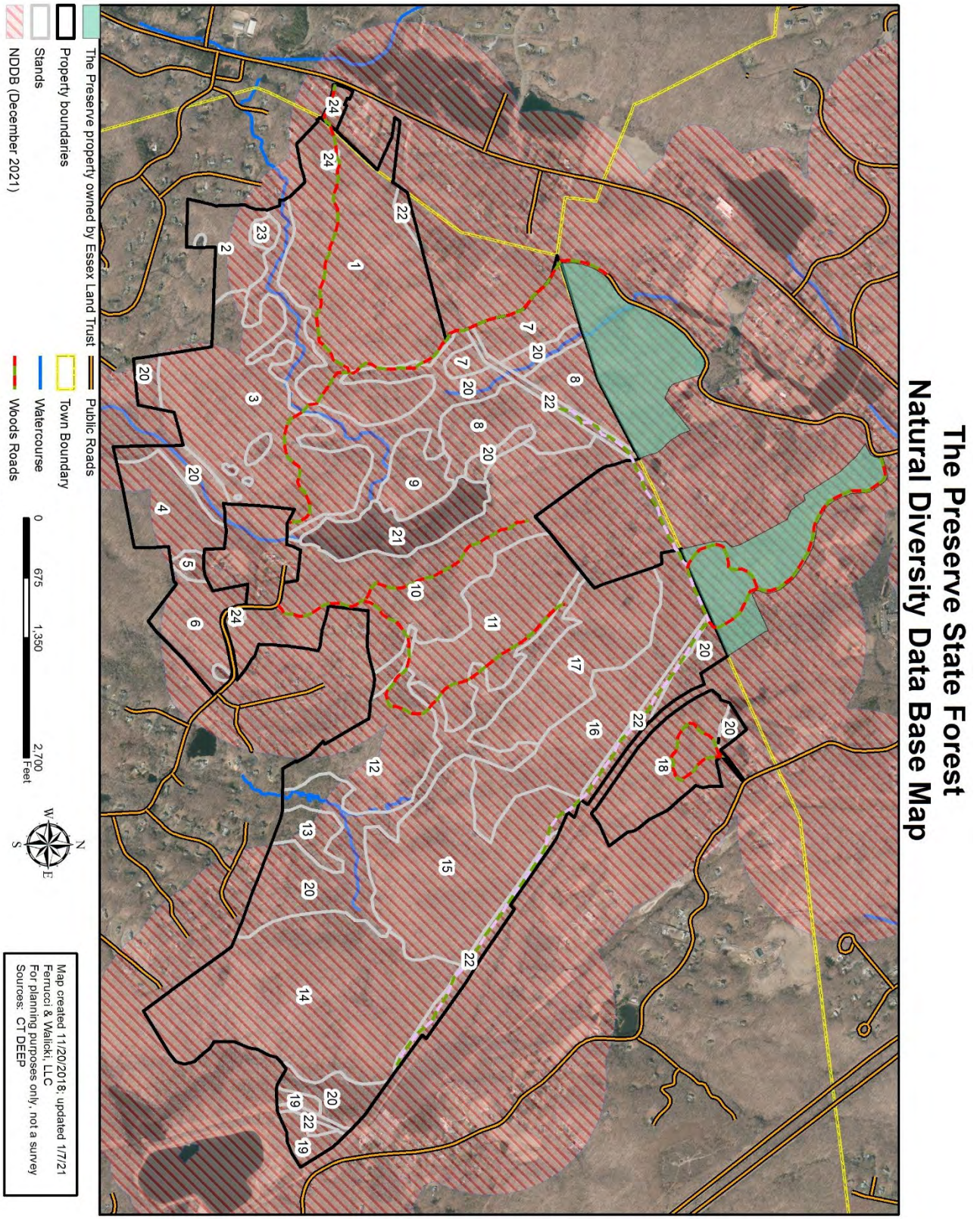
I. Inoperable Areas



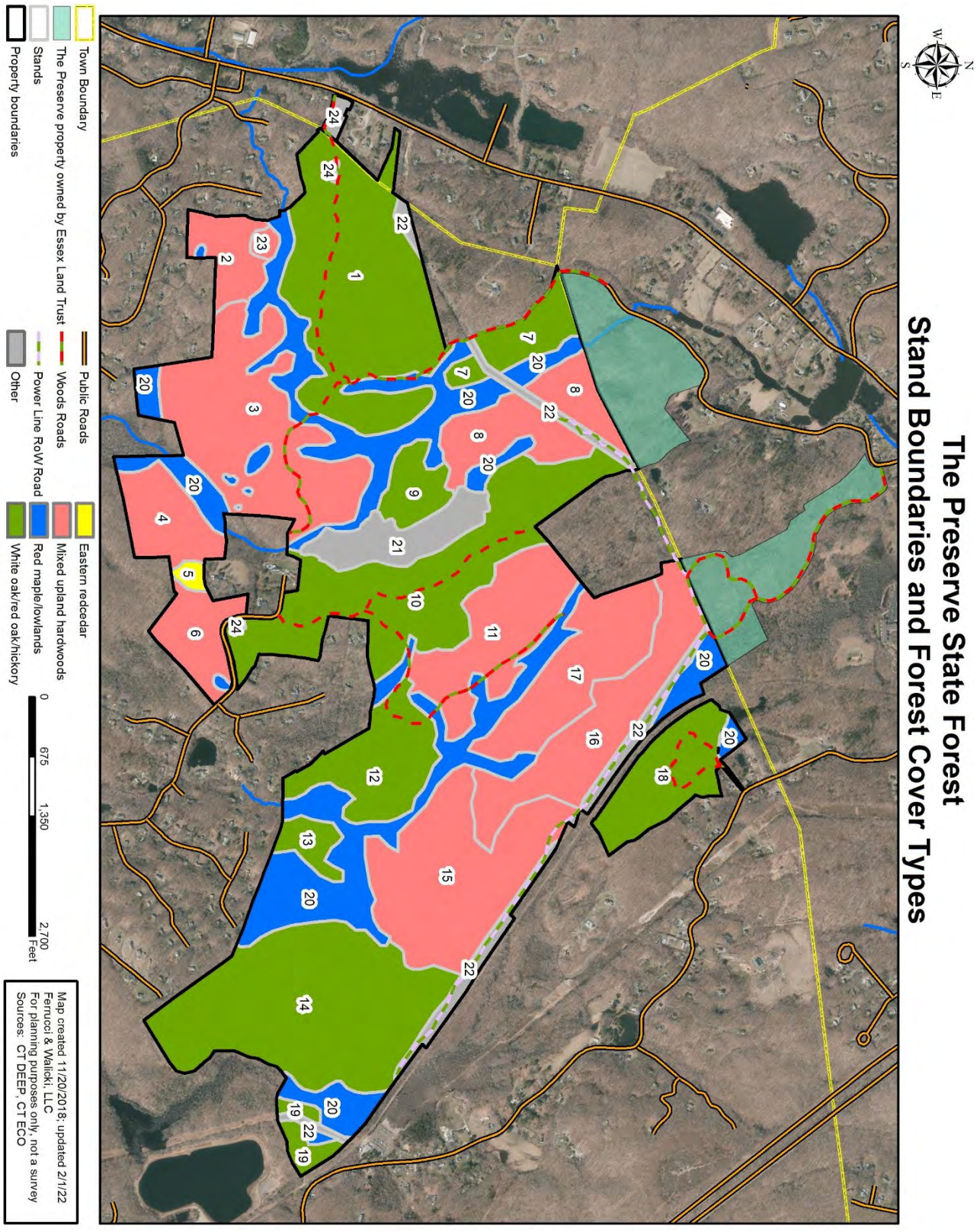
J. Water features



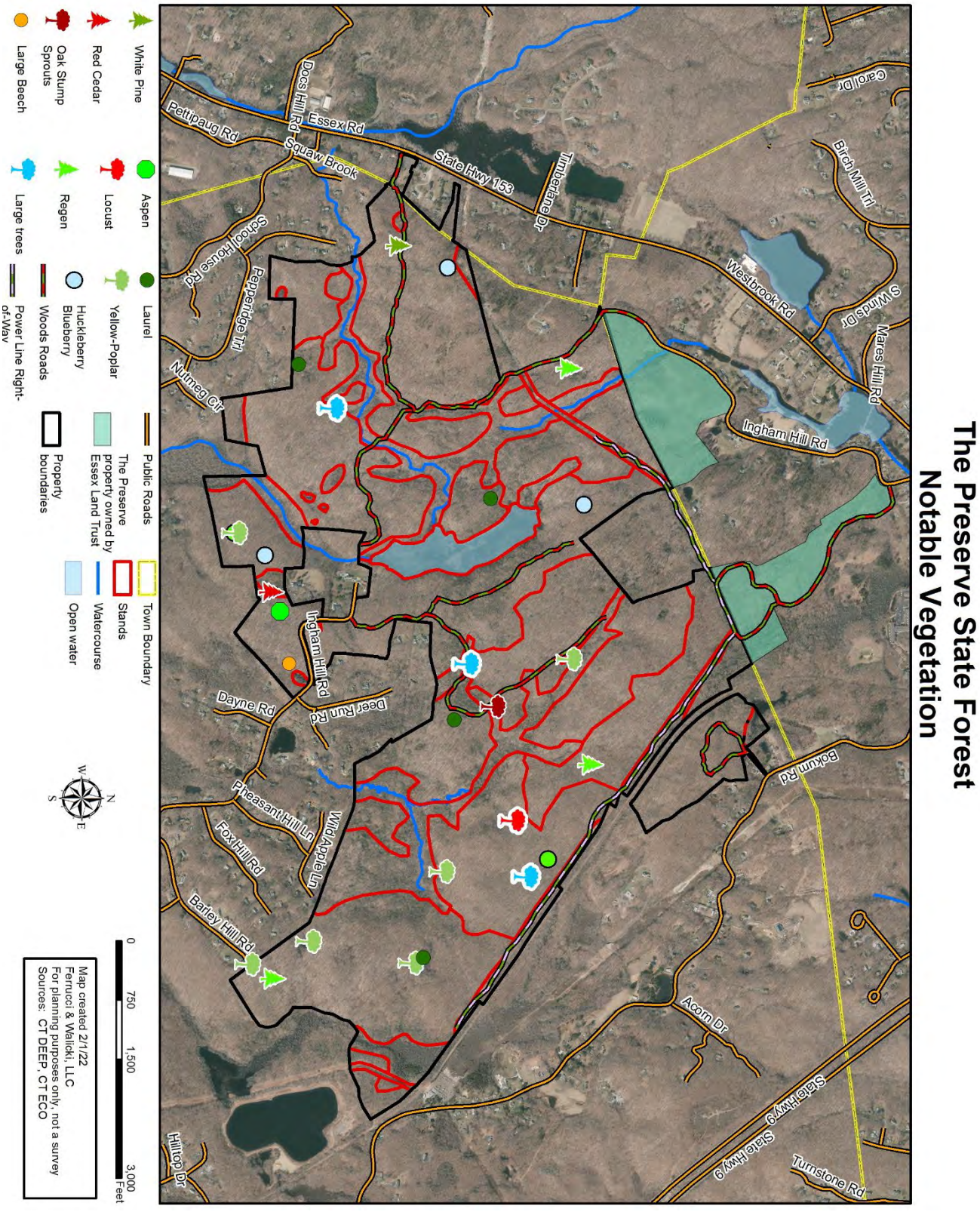
K. Natural Diversity Data Base Map



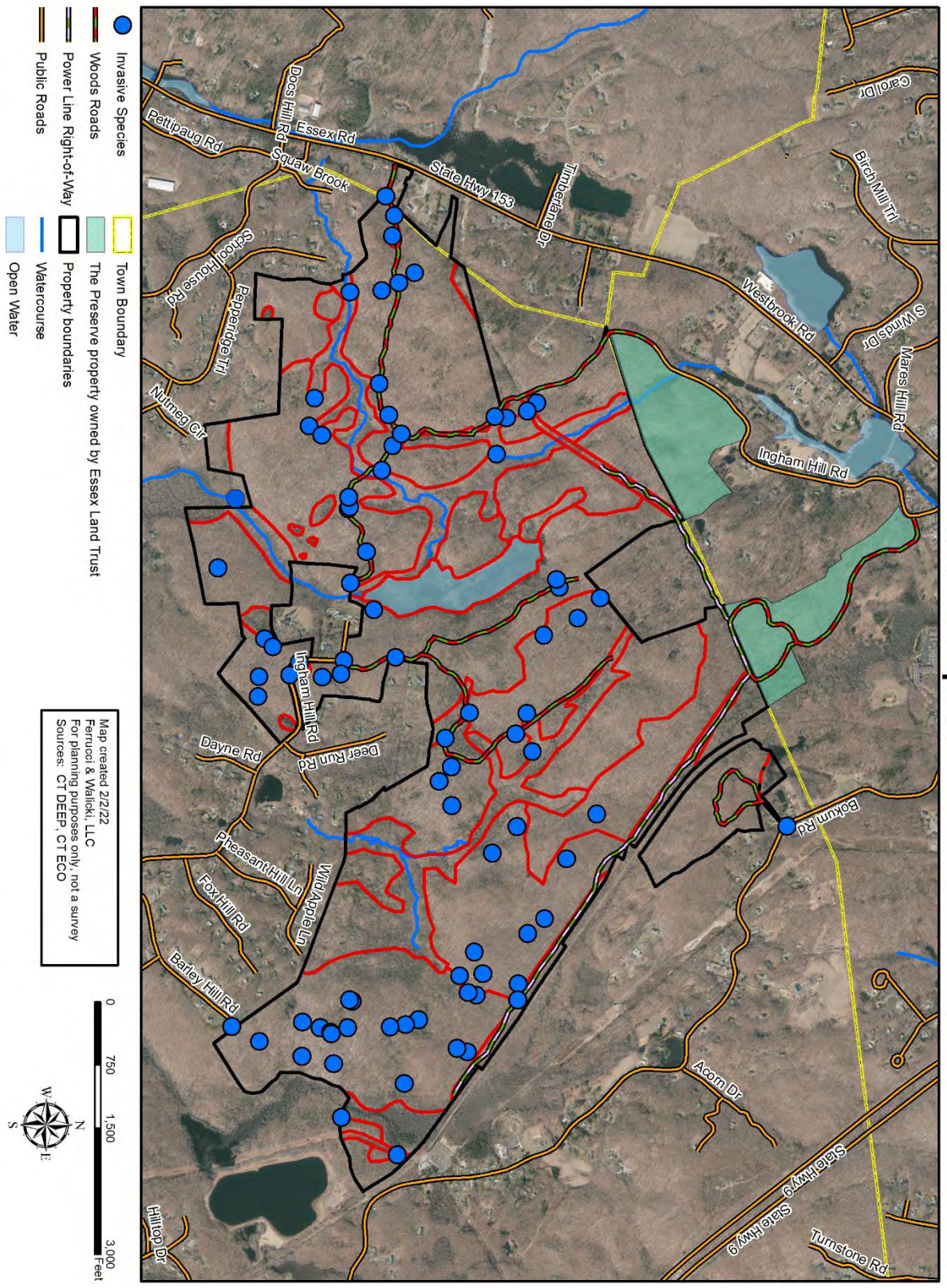
L. *Cover Types*



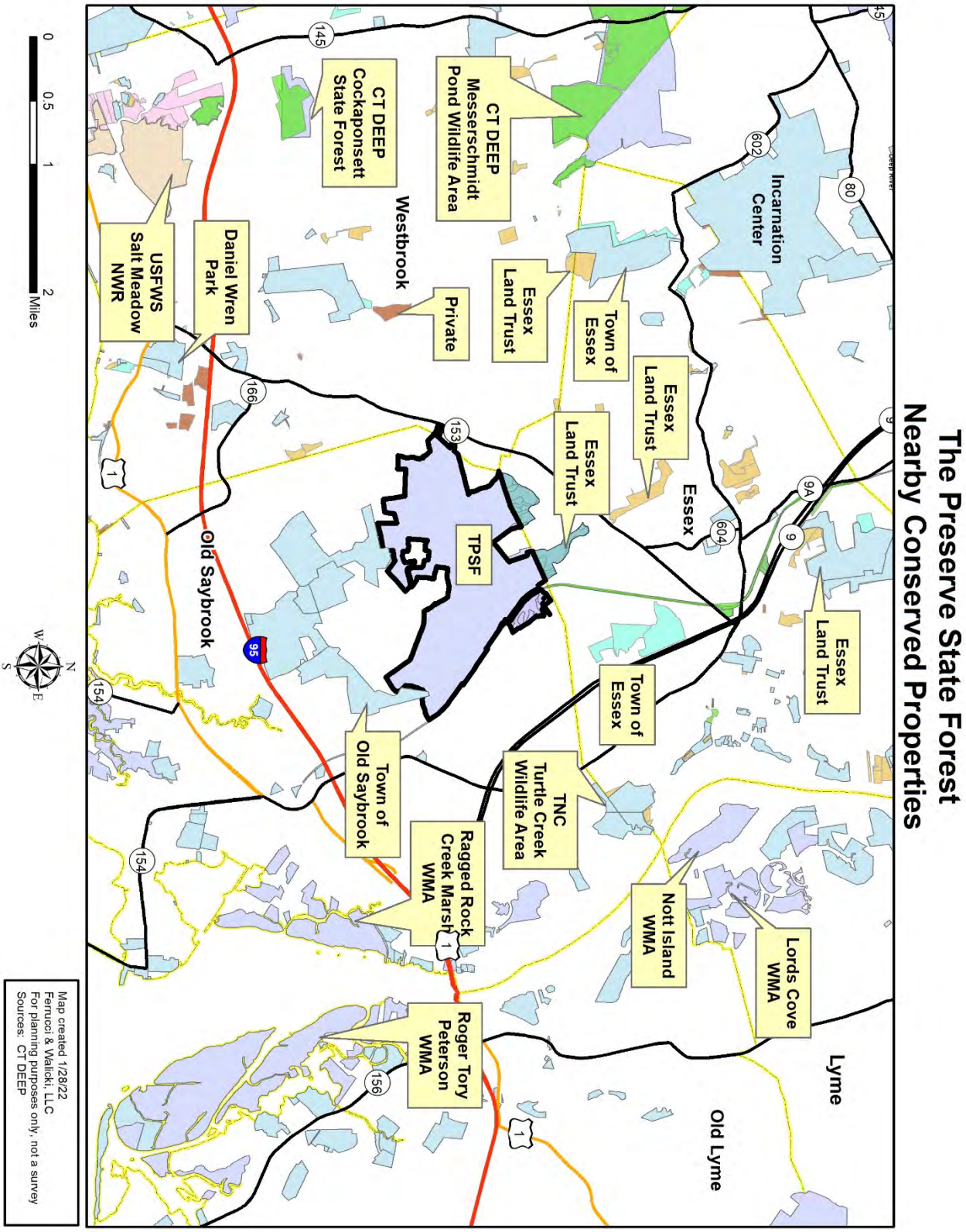
M. Notable Vegetation



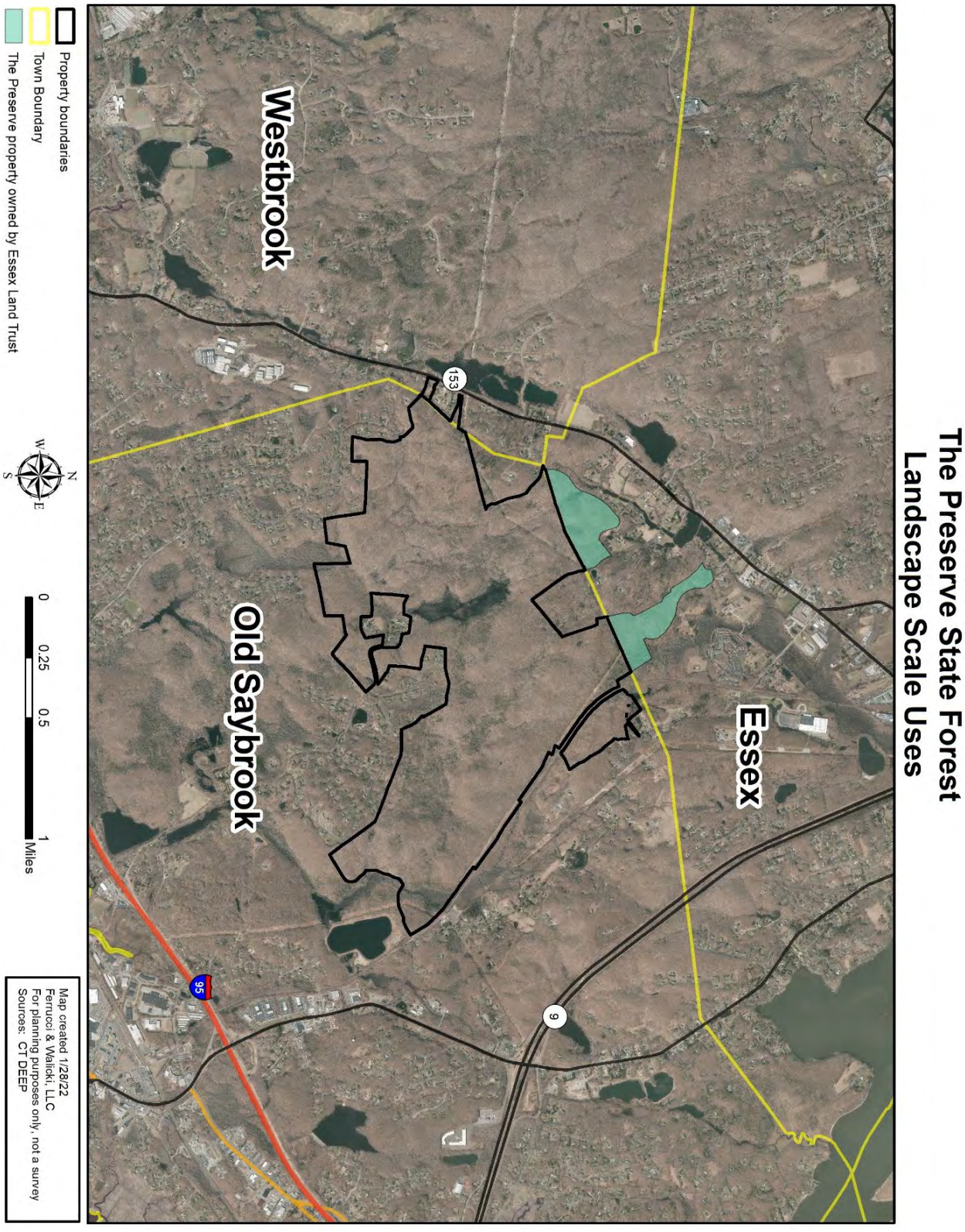
N. Invasive species



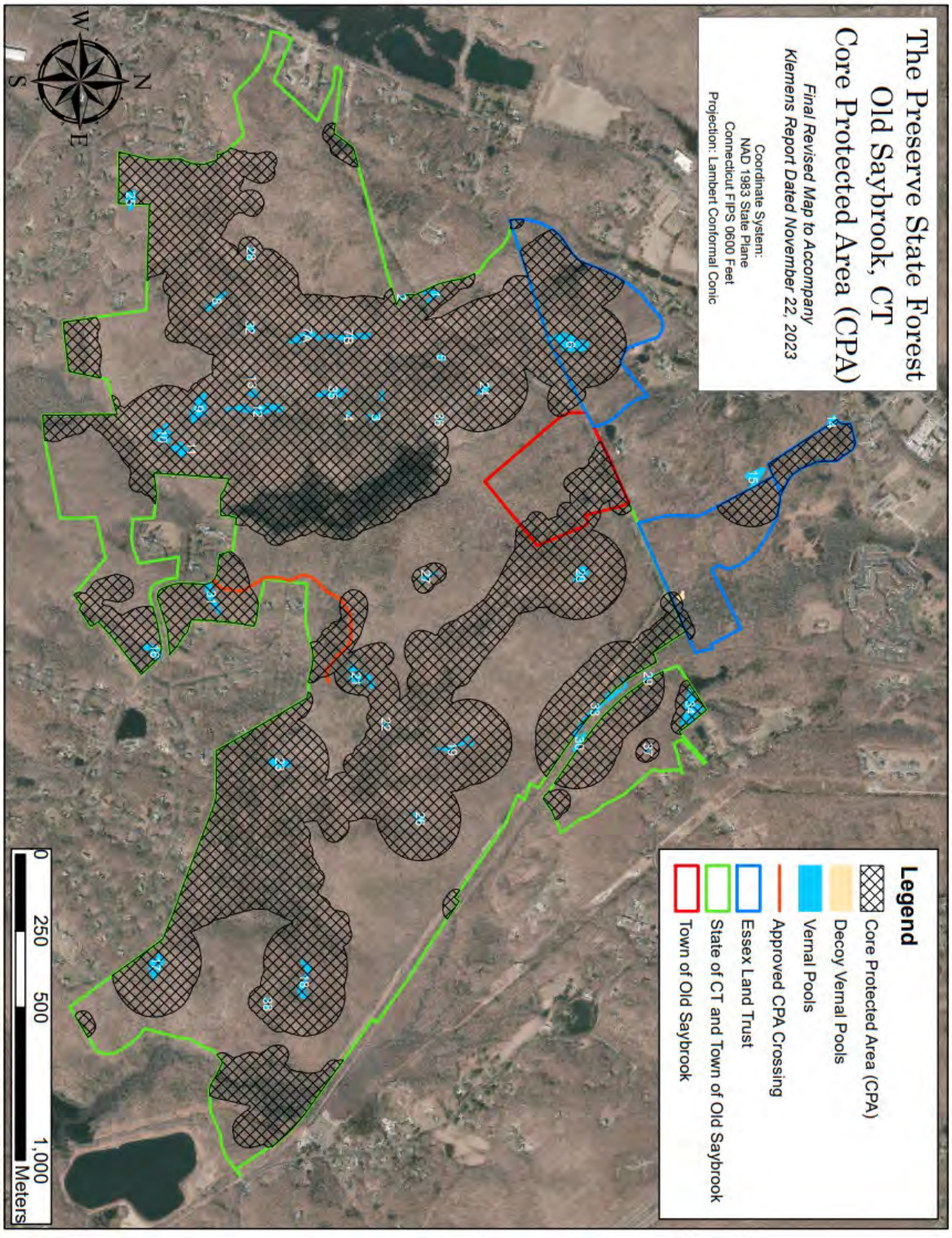
O. Nearby Conserved Properties



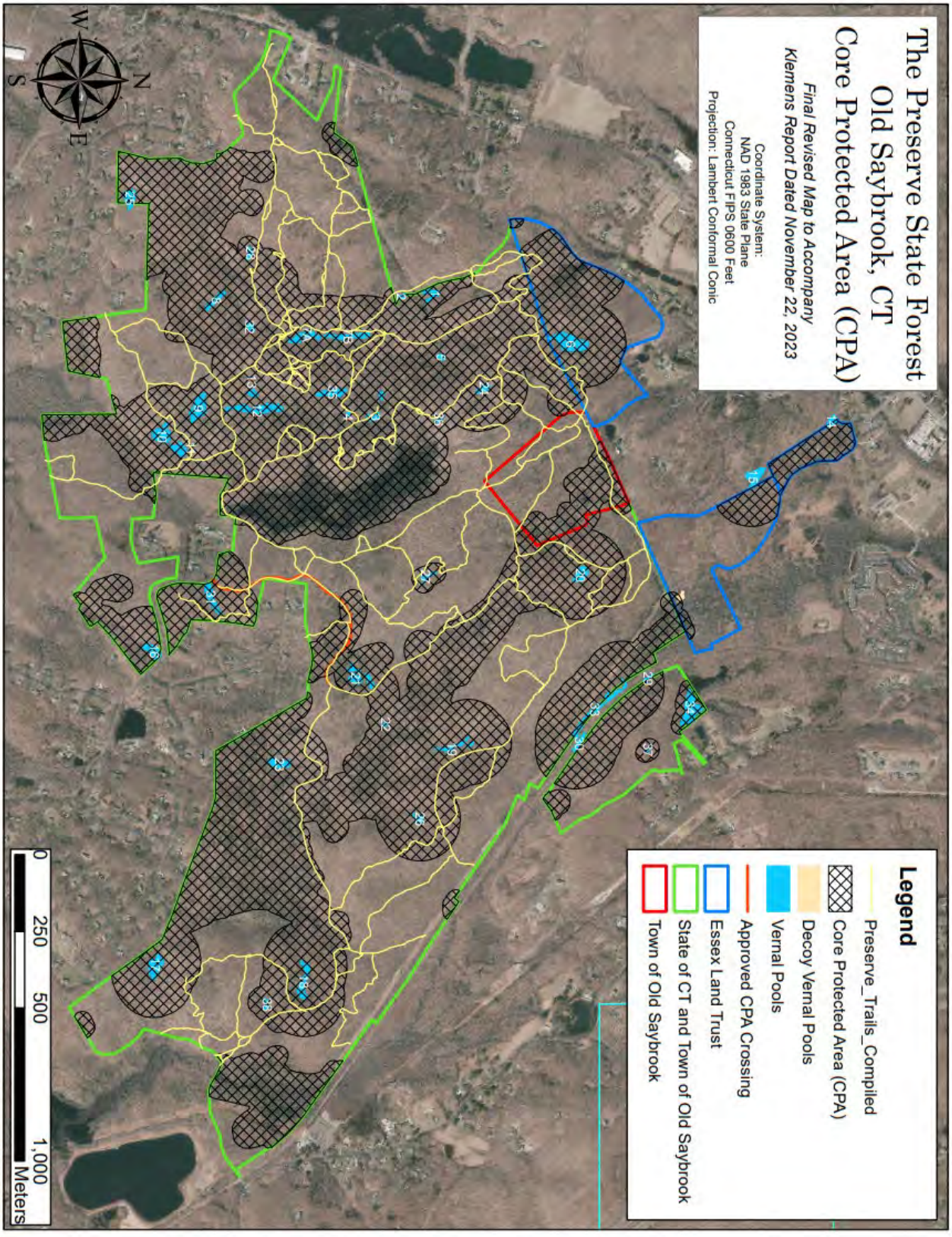
P. Landscape Context Land Use (orthophoto)



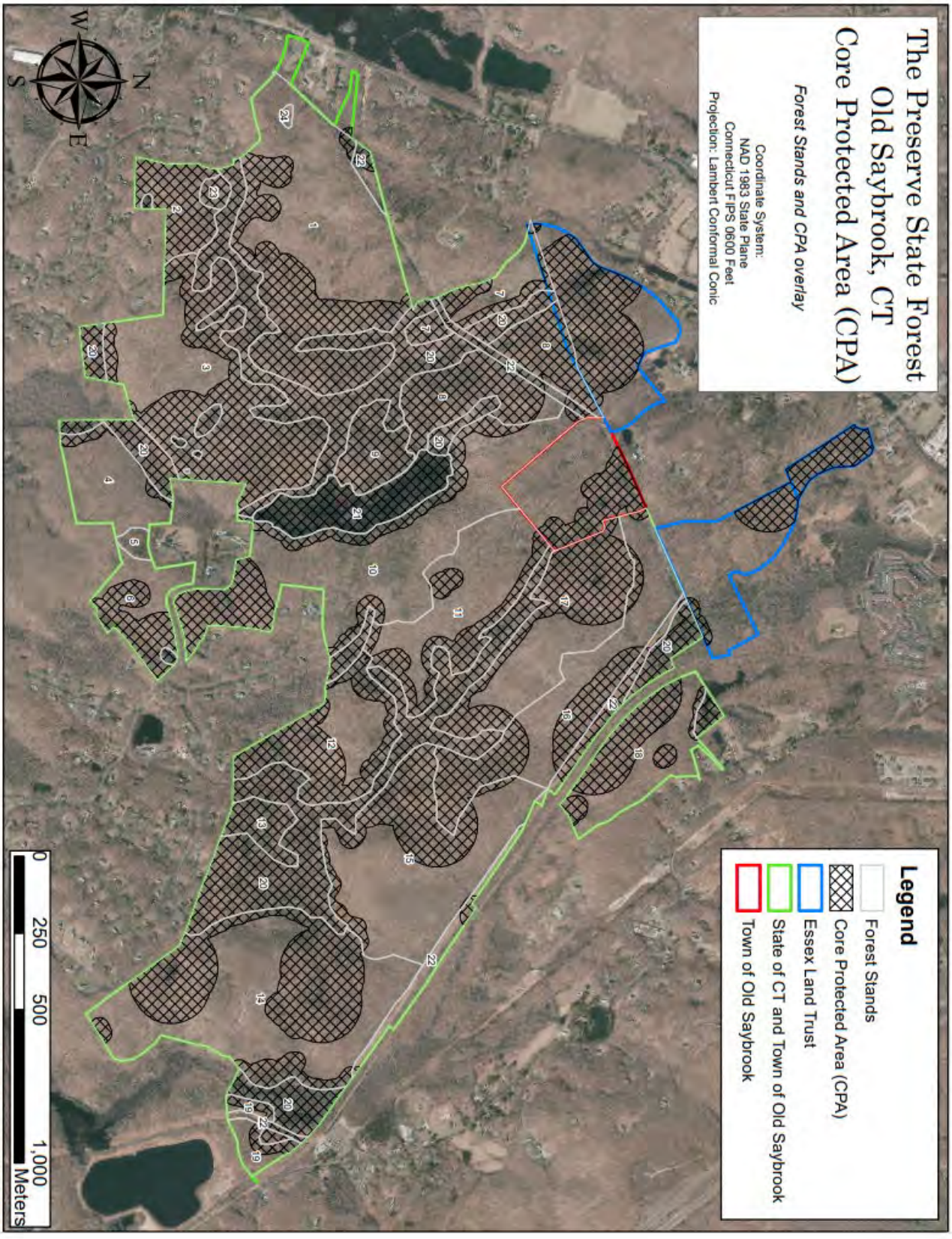
Q. Core Protected Area (CPA)



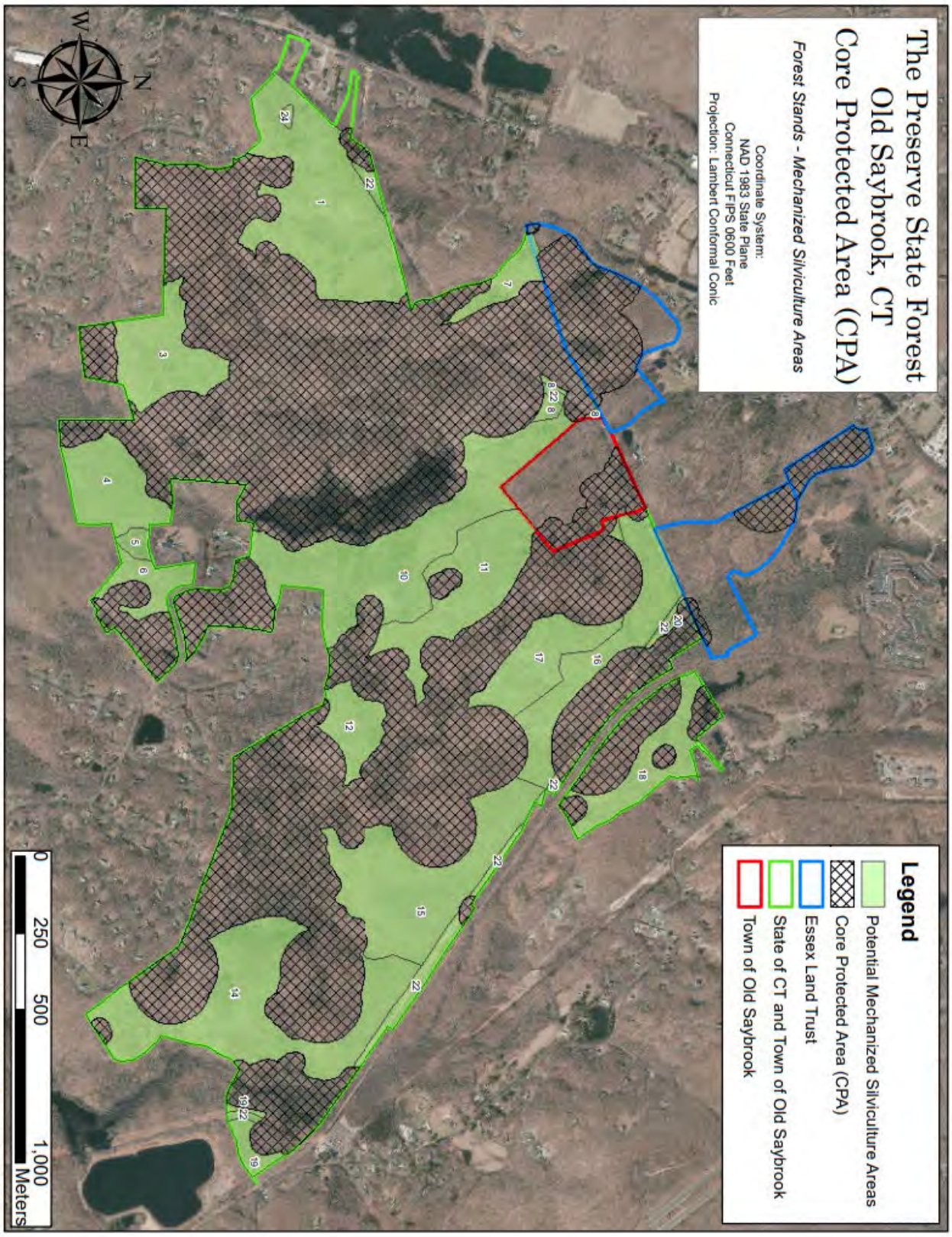
R. CPA + Trails


The Preserve State Forest
Old Saybrook, CT
Core Protected Area (CPA)
Final Revised Map to Accompany
Klemens Report Dated November 22, 2023
Coordinate System:
NAD 1983 State Plane
Connecticut FIPS 0600 Feet
Projection: Lambert Conformal Conic
Legend
Preserve_Trails_Compiled
Core Protected Area (CPA)
Decoy Vernal Pools
Vernal Pools
Approved CPA Crossing
Essex Land Trust
State of CT and Town of Old Saybrook
Town of Old Saybrook
0
250
500
1,000
Meters
Revised Map Prepared: 2/14/2024

S. CPA + Forest Stand Designations



CPA + Mechanized Silvicultural Areas



Appendix B – Glossary

This glossary contains a list of commonly used forestry terms. Provided by DEEP Forestry Division.

Acceptable Growing Stock (AGS): Saleable trees that are of good form, species and quality and would be satisfactory as crop trees.

Acre: A unit of measure describing surface area. One acre contains 43,560 square feet. A football field (without the end zones) is 45,000 square feet -- slightly larger than an acre. The inside of a professional baseball diamond is about 1/4 of an acre.

Adaptive Management: A dynamic approach to forest management in which the effects of treatments and decisions are continually monitored and used to modify management on a continuing basis to ensure that objectives are being met (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Advance regeneration: Young trees that have become established naturally in a forest before regeneration methods are applied. In other words, the regeneration is present in advance of any treatment.

Adverse Regulatory Actions: Written warning, citations or fines issued by law enforcement or regulatory bodies.

Aerial Photo: Photo taken from an elevated position like on an aircraft.

Afforestation: The establishment of a forest or a stand in an area where the preceding vegetation or land was not forest. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Age class: The trees in a stand that became established at, or about, the same time. The range of tree ages in a single age class is usually less than 20 percent of the expected age of that class.

Aspect: The direction that a slope faces (north, south, etc.).

Basal area (BA): The area of the cross section of a tree's stem at 4 1/2 feet above ground, or breast height, in square feet. Basal area of a forest stand is the sum of the basal areas of the individual trees in the stand. It is usually reported in square feet of BA per acre and is used as a measure of stand stocking, stand density, and stand volume.

Best Management Practices (BMPs)*:* Procedures and treatments that lessen soil erosion, sedimentation, stream warming, movement of nutrients, and visual quality during or following activities that alter the land.

Biodiversity: The variety and abundance of life forms, processes, functions and structures of plants, animals and other living organisms, including the relative complexity of species, communities, gene pools and ecosystems at spatial scales that range from local through regional to global (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Biomass: A renewable energy source of biological materials derived from living, or recently living organisms, such as wood, waste, and crop residues.

Board Feet: A unit for measuring wood volumes. It is commonly used to express the amount of wood in a tree, sawlog, or individual piece of lumber. A piece of wood 1 foot long, 1 foot wide, and 1 inch thick (144 cubic inches).

Broadcast: To spread or apply seed, fertilizer, or pesticides more or less evenly over an entire area. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Buffer strip: An area of land that is left relatively undisturbed to lessen impacts of treatments next to it. Common examples include visual buffers used to screen the view from roads, and stream side buffers used to protect water quality.

Canopy: The more or less continuous cover of branches and foliage formed collectively by the tops, or crowns of adjacent trees.

***Carbon Sequestration*:** The process of removing carbon from the atmosphere for use in photosynthesis. This results in the maintenance and growth of plants and trees. Generally, carbon sequestration rates are greater in younger (20-70 years old) forests. It is expressed as a rate. It is expressed as a negative value because it indicates the removal of CO2 from the atmosphere.

***Carbon Leakage*:** This is a situation that can occur when there is an increase in greenhouse gas emissions in one geographic area as a result of a reduction of emissions in another geographic area. For example, due to costs related to climate policies in one geo-political area (state, province, country, etc.), a business transfers production to another geo-political area with more relaxed climate policies. This situation could lead to an increase in total emissions. Regulatory bans on forestry in CT results in leakage – the reliance of wood products from further away, in unregulated systems has a greater carbon footprint associated with it than sourcing our wood locally.

***Carbon Storage*:** The amount of carbon in a defined area (tree, acre of forest, cord of wood, etc.). This term is typically used in reference to the carbon stored in aboveground woody biomass, 50% of which is carbon. It is stored in multiple pools in the forest, above and below ground. It is expressed as an amount per defined area (usually mega ton or tons per acre/hectare, etc.). Carbon storage is most often greatest in older, structurally complex forests.

Chip: A small piece of wood used to make pulp or wood composite or fuel. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Clearcut:

1. A stand in which essentially all trees have been removed in one operation – note depending on management objectives, a clearcut may or may not have reserve trees left to attain goals other than regeneration.

2. A regeneration or harvest method that removes essentially all trees in a stand. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Core forest: A contiguous forest that is at least 500-acres and 300' from other land uses including residences, farm land and paved roads.

Crop Tree: A tree identified to be grown to maturity for the final harvest cut, usually on the basis of its location with respect to other trees and its timber quality.

Cull: A tree, log, lumber or seedling that is rejected because it does not meet certain specifications for usability or grade. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Culvert: A device used to channel water. It may be used to allow water to pass underneath a road, railway, or embankment for example. Culverts can be made of many different materials; steel, polyvinyl chloride (PVC) and concrete are the most common. Formerly, construction of stone culverts was

common.

Cutting cycle: The planned interval between treatments in forest stands.

Damaging agent: Any one of various factors that injure trees. They include some insects, diseases, wildlife, abiotic factors, and human activities.

Den Tree: A living tree with a cavity large enough to shelter wildlife.

Desired Species: Those species of flora and fauna designated in the landowner's management plan and not known to cause negative impacts on the local environment.

Diameter Breast Height (DBH): The diameter of a tree at 4.5 feet above the ground.

Down Woody Material: Any piece(s) of dead woody material (e.g. dead tree trunk, limbs, large root ball) on the ground in the forest or in streams. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Endangered Species: Any species of plant or animal defined through the Endangered Species Act of 1976 as being in danger of extinction throughout all or a significant portion of its range, and published in the Federal Register. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Even-Aged Management: Forest management with periodic harvest of all trees on part of the forest at one time or over a short period to produce stands containing trees all the same or nearly the same age or size.

Even-Aged Stand: A stand containing trees in the main canopy that are within 20 years of being the same age. Even-aged stands sometimes are designated by age-class (10-year-old stand, 40-year-old stand) or broad size-class: seedling stand (most trees are <1 inch dbh); sapling stand (trees 1-4 inches dbh); poletimber stand (trees 5-10 inches dbh); and sawtimber stand (trees > 10 inches dbh).

Forest condition: Generally, the current characteristics of forested land including but not limited to cover type, age arrangement, stand density, understory density, canopy density, and forest health.

Forest cover type: A category of forests based on the kind of trees growing there, particularly the composition of tree species. Forest cover types are often referred to as forest types, cover types, stand types, or types.

Forest Health: The production of forest conditions by which the resilience, recurrence, persistence, and biophysical processes occur, leading to sustainable ecological conditions. An understanding of forest health is greatly dependent on spatial scale as well as the forests ability to satisfy human needs (USDA Forest Service, Science and Technology, Forest Health).

Forest Owner: Landowner or designated representative such as, but not limited to, professional resource manager, family member, trustee, etc.

Forest Product: Any raw material yielded by a forest. Generally defined in Forest Acts or Ordinances, and subdivided conventionally into major forest products, i.e. timber and fuelwood, and minor forest products, i.e. all other products including leaves, fruit, grass, fungi, resins, gums, animal parts, water, soil, gravel, stone and other minerals on forest land (F. C. Ford –Robertson, Terminology of Forest Science Technology, Practice, and Products, Society of American Foresters, 1971).

Forest Stand Improvement: See timber stand improvement.

Forest Type: A category of forest usually defined by it trees, particularly its dominant tree species as based on percentage cover of trees, e.g. spruce fir, white pine, northern red oak.

Forest vitality: The health and sustainability of a forest.

Fuel Management: The act or practice of controlling flammability and reducing resistance to control of wildland fuels through mechanical, chemical, biological, or manual means, or by fire in support of land management objectives. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Girdling: Completely encircling the trunk of a tree with a cut that severs the bark and cambium of the tree. Herbicide is sometimes injected into the cut to ensure death of the tree.

Group Selection: Trees are removed and new age classes are established in small groups. The width of groups is commonly approximately twice the height of the mature trees with smaller openings providing microenvironments suitable for tolerant regeneration and large openings providing conditions suitable for more intolerant regeneration. The management unit or stand in which regeneration, growth and yield are regulated consists of an aggregation of groups. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

GPS (Global Positioning System) Coordinates: A commonly hand held, satellite based navigational device that records x, y, z coordinators and other data allowing users to determine their location on the surface of the earth. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Hack-n-Squirt: A tree treatment method where an axe or hatchet is used to make “hacks” (injections) into the tree’s cambium layer. A plastic “squirt” bottle is used to spray a specific amount of herbicide into the cuts placed around the tree.

Harvesting: The felling skidding, on-site processing, and loading of trees or logs onto trucks. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

High conservation value forests (HCVF): Forests of outstanding and critical importance due to their environmental, social, biodiversity or landscape values. Due to the small scale and low-intensity of family forest operations, informal assessment of HCVF occurrence through consultation with experts or review of available and accessible information is appropriate.

High-Grading: Cutting only the high-value trees from a forest property, leaving a stand of poor quality with decreased future timber productivity.

Horizontal diversity: The degree of complexity of the arrangement of plant and animal communities, and other habitats across a large area of land.

Inactive forest: Management category designated for forests currently unstaffed by the DEEP Division of Forestry.

Incentive Programs: State and federal agencies will offer landowners the opportunity to apply for incentive programs that will provide support and financial assistance to implement forestry and agroforestry related practices through conservation programs. Assistance can also provide for multi-year and permanent easements to conserve forest land to meet program goals.

Integrated Pest Management: The maintenance of destructive agents, including insects, at tolerable levels by planned use of a variety of preventative, suppressive, or regulatory tactics and strategies that are ecologically and economically efficient and socially acceptable (Helms et al, The Dictionary of

Forestry, Society of American Foresters, 1998).

Interior species: Species found only or primarily away from the perimeter of a landscape element. Species commonly requiring or associated with interior habitat conditions.

Intermediate cuttings: Silvicultural cuttings applied in the culture of even-aged stands and are normally noncommercial (no products sold) or commercial thinnings (timber sold), designed to favor certain species, sizes, and qualities of trees by removal of competitors. Thinning's designed to grown quality timber commonly maintain a closed canopy; however, low-density thinning (50-70% residual crown cover) can be used to hasten diameter growth and stimulate understory development for wildlife purposes. At rotation age, the stand in considered to be mature and a regeneration cutting is applied to produce a new stand.

Intermediate treatment: Any treatment or "tending" designed to enhance growth, quality, vigor, and composition of the stand after seedlings are established and before mature trees are regenerated. For example, thinning is an intermediate treatment.

Invasive species: Non-native species whose introduction does or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112 (Feb. 3, 1999). Invasive Species: is a species that is 1) non-native (or alien) to the ecosystem under consideration and 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Invasive species can be plants, animals, and other organisms (e.g., insects, microbes, etc.). Human actions are the primary means of invasive species introductions. (Invasive Species Definition Clarification and Guidance White Paper Submitted by the Definitions Subcommittee of the Invasive Species Advisory Committee (ISAC), Approved by ISAC Apr 27, 2006.)

***Ladder Fuel*:** This is a wildland firefighting term used to describe live or dead vegetation that allows a fire to climb up from ground level or the forest floor into the tree canopy.

Landings: A cleared are in the forest to which logs are yarded or skidded for loading onto trucks for transport. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Landowner: Entity that holds title to the property for which the management plan is being written.

Large Woody Debris: Any piece(s) of dead woody material, e.g. dead boles, limbs and large root masses, on the ground in the forest stands or in streams. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Log Rules: A table showing estimated amount of lumber that can be sawed from logs of given lengths and diameters. The log rule commonly used in Connecticut is the International ¼ -inch Rule. The International ¼-inch Rule is a formula rule allowing 1/2 – inch taper for each 4 feet of length and 1/16-inch shrinkage for each one-inch board. This measure approximates the actual sawmill lumber tally.

Management Plan: Documents that guide actions and that change in response to feedback and changed conditions, goals, objectives and policies. Management plans may incorporate several documents including, but not limited to, harvest plans, activity implementation schedules, permits and research.

Mast: Nuts of trees, such as oak, walnut, and hickory, that serve as food for many species of wildlife.

Mast tree: A tree that produces nutlike fruits such as acorns, beechnuts, hickory nuts, seeds of certain pines, cherries, apples, samaras. Hard mast includes acorns, beechnuts, and hickory nuts. Soft mast includes cherries, apples, and samaras (on maple and ash trees).

Mature Tree: A tree that has reached the desired size or age for its intended use.

Matrix: The matrix is the dominant landscape element on a landscape in which smaller differentiated elements (patches) are embedded. It is commonly highly connected throughout the landscape.

MBF: Abbreviation for 1,000 board feet.

Native plant: A species that naturally occurs in a given location where its requirement for light, warmth, moisture, shelter, and nutrients are met.

Non-commercial treatment: Any activity that does not produce at least enough value to cover the direct costs of that treatments.

Noxious Plant (weed): A plant specified by law as being especially undesirable, troublesome and difficult to control (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Nutrient Cycle: The exchange or transformation of elements among the living and nonliving components of the ecosystem. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Overstocked: A forest stand condition where too many trees are present for optimum tree growth.

Overstory: That portion of the trees in a stand forming the upper crown cover.

Overstory Removal: The cutting of trees constituting an upper canopy layer to release trees or other vegetation in an understory. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Overtopped: A condition or position where a tree's crown is completely covered by the crowns of one or more of its neighboring trees. An overtopped tree's crown is entirely below the general level of the canopy and does not receive any direct sunlight either from above or from the sides.

Patch: A patch is a relatively homogeneous area that differs in some way from its surroundings (e.g., woodlot in a corn field, conifer plantation in a mixed-deciduous forest).

Pesticide: Pesticides include chemicals commonly known as herbicides and insecticides.

Plantation: A forest stand in which most trees are planted or established from seed sown by people. Typically, planted trees are in rows, with equal spacing between each tree in a row and between rows.

Pole Timber: Trees from 6 inches to 12 inches in diameter at breast height.

Prescribed Burn/Fire: To deliberately burn natural fuels under specific weather conditions, which allows the fire to be confined to a predetermined area and produces the fire intensity to meet predetermined objectives. A fire ignited by management to meet specific objectives (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Pruning: Removing live or dead branches from standing trees to improve wood quality.

Pulpwood: Wood cut primarily for manufacture of paper, fiberboard, or other wood fiber products.

Qualified Contractor: Forest contractors who have completed certification, licensing, recommended training and education programs offered in their respective states.

Qualified Natural Resource Professional: A person who by training and experience can make forest management recommendations. Examples include foresters, soil scientists, hydrologists, forest engineers, forest ecologists, fishery and wildlife biologists or technically trained specialists in such fields.

Rare species: A plant or animal or community that is vulnerable to extinction or elimination.

Reforestation: The reestablishment of forest cover either naturally (by natural seeding, coppice, or root suckers) or artificially (by direct seeding or planting) – note reforestation usually maintains the same forest type and is done promptly after the previous stand or forest was removed. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Regeneration: The number of seedlings or saplings existing in a stand. The process by which a forest is renewed by direct seeding, planting, or naturally by self-sown seeds and sprouts.

Regeneration Cut: Any removal of trees intended to assist regeneration already present or to make regeneration possible.

Regeneration cuttings: Silvicultural cuttings designed to naturally regenerate the stand by providing for seedling (or vegetative stems) establishment or development, or both. Two even-aged techniques; clearcutting and shelterwood, and two uneven-aged techniques; single-tree selection and group selection.

Regeneration method: A cutting method by which a new age class is created. These methods include clearcutting, seed tree, shelterwood, single-tree selection, and group selection; also called reproduction method.

Release: To free trees from competition by cutting, removing, or killing nearby vegetation.

Riparian: Related to, living or located in conjunction with a wetland, on the bank of a river or stream but also at the edge of a lake or tidewater – note the riparian community significantly influences and is significantly influenced by, the neighboring body of water. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Riparian Zone: The area adjacent to or on the bank of rivers and streams.

Rotation: The planned interval of time between treatments that regenerate a stand.

Rotation Age: The age at which a stand is considered ready for harvest under the adopted plan of management or the culmination of mean annual increment.

Runoff: Surface streamflow leaving a watershed. Sources of runoff are precipitation falling in the channel, overland flow (rare in forested areas), and subsurface water exiting from soils and bedrock. In this Guide, runoff is synonymous with streamflow.

Sapling: A tree, usually young, that is larger than a seedling but smaller than a pole-sized tree. Size varies by region, but a sapling is usually taller than 6 feet and between 1 and 4 inches in dbh.

Sawtimber: Trees at least 12 inches in diameter at breast height from which a sawed product can be produced.

Scale: The extent of forest operations on the landscape/certified property.

Sedimentation: The accumulation of organic and mineral soil particles and rocks in streams and water bodies due to erosion. Sedimentation often accompanies flooding. The application of Best Management Practices will usually protect against sedimentation during and after treatments.

Seed tree: A tree that produces seed. Seed trees are usually mature and high in quality.

Seedling: A tree grown from a seed. Usually the term is restricted to trees smaller than saplings, or less than 6 feet tall or smaller than 1 inch dbh.

Seed-Tree Harvest: A harvest and regeneration method where nearly all trees are removed at one time except for scattered trees to provide seed for a new forest.

Selection Harvest: Harvesting trees to regenerate and maintain a multi-aged structure by removing some trees in all size classes either singly or in small groups.

Shade intolerance: The relative inability of a plant to become established and grow in the shade.

Shade tolerance: The relative capacity of a plant to become established and grow in the shade.

Shelterwood Harvest: A harvesting and regeneration method that entails a series of partial cuttings over a period of years in the mature stand. Early cuttings improve the vigor and seed production of the remaining trees. The trees that are retained produce seed and also shelter the young seedlings. Subsequent cuttings harvest shelterwood trees and allow the regeneration to develop as an even-aged stand.

Silviculture: The art, science, and practice of establishing, tending, and reproducing forest stands with desired characteristics.

Silvicultural system: A planned process whereby a stand is tended, and re-established. The system's name is based on the number of age classes (for example even-aged or two-aged), and/or the regeneration method used (for example, shelterwood, crop-tree, or selection).

Silvicultural treatment: A process or action that can be applied in a controlled manor according to the requirements of a prescription or plan to a forest community to improve real or potential benefits.

Single Tree Selection: Individual trees of all size classes are removed more or less uniformly throughout the stand, to promote growth of remaining trees and to provide space for regeneration. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Site: The combination of biotic, climatic, topographic, and soil conditions of an area; the environment at a location.

Site Index: An expression of forest site quality based on the height of a free-growing dominant or co-dominant tree at age 50 (or age 100 in the western United States).

Skid: 1. To haul a log from the stump to a collection point (landing) by a skidder. 2. A load pulled

by a skidder. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Skid Trail: A road or trail over which equipment or horses drag logs from the stump to a landing.

Skidding: Pulling logs from where they are cut to a landing or mill.

Slash: The residue, e.g., treetops and branches, left on the ground after logging or accumulating as a result of storm, fire, girdling, or delimbing. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Snag: A standing, generally un-merchantable dead tree from which the leaves and most of the branches have fallen – note for wildlife habitat purposes, a snag is sometimes regarded as being at least 10 inches in diameter at breast height and at least 6 feet tall; a hard snag is composed primarily of sound wood, generally merchantable, and a soft snag is composed primarily of wood in advanced stages of decay and deterioration. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Soil Compaction: The process by which the soil grains are rearranged, resulting in a decrease in void space and increasing bulk density. Can occur from applied loads, vibration or pressure from harvesting or site preparation equipment. Compaction can cause decreased tree growth, increased water runoff and soil erosion. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Soil Map: A map showing the distribution of soils or other soil map units in relation to prominent physical and cultural features of the earth's surface. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Softwoods: A term describing both the wood and the trees themselves that in most cases have needles or scale-like leaves (the conifers); gymnosperms.

Special Sites: Those areas offering unique historical, archeological, cultural, geological, biological or ecological value.

Special Sites include:

A. Historical, archaeological, cultural and ceremonial sites or features of importance to the forest owner;

B. Sites of importance to wildlife such as rookeries, refuges, fish spawning grounds, vernal ponds and shelters of hibernating animals;

C. Unique ecological communities like relic old-growth, springs, glades, savannas, fens and bogs; and

D. Geological features such as terminal moraines, cliffs and caves.

Species composition: The collection of plant species found in an area. Composition is expressed as a cover type, or a percentage of either the total number, the density, or volume of all species in that area.

Stand: A group of trees with similar characteristics, such as species, age, or condition that can be distinguished from adjacent groups. A stand is usually treated as a single unit in a management plan.

Stand condition: The number, size, species, quality, and vigor of trees in a forest stand.

Stand composition: The collection of plants, particularly trees, that are found in a stand.

Stand Density: A measure of the stocking of a stand of trees based on the number of trees per area and diameter at breast height of the tree of average basal area.

Stand Management Recommendations: The recommended management activities that should be done in that stand, based on the landowner's goals and objectives.

Stand Structure: The horizontal and vertical distribution of plants in the forest, including the height, diameter, crown layers, and stems of trees, shrubs, understory plants, snags and down woody debris. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

State Forestry Best Management Practice(s) (BMPs): Forestry BMPs are generally accepted forest management guidelines that have been developed by state forestry agencies with broad public stakeholder input.

Stocking: An indication of the number of trees in a stand in relation to the desirable number of trees for best growth and management.

Succession: A gradual and continuous replacement of one kind of plant and animal community by a more complex community. The environment is modified by the life activities of the plants and animals present thereby making it unfavorable for themselves. They are gradually replaced by a different group of plants and animals better adapted to the new environment.

Sustainability: The capacity of forests, ranging from stands to ecoregions, to maintain their health, productivity, diversity and overall integrity, in the long run, in the context of human activity (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Sustainable Forest Management: The practice of meeting the forest resource needs and values of the present without compromising the similar capability of future generations (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998). Note – AFF's Standards of Sustainability reflect criteria of sustainability based on the Montreal Process, 1993, and the PanEuropean Operational- Level Guidelines (PEOLGs).

Thinning: A cultural treatment made to reduce stand density of trees primarily to improve growth, enhance forest health, or recover potential mortality. Types of thinning include: chemical, crown, free, low, mechanical, selection. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Threatened Species: A plant or animal species that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future. A plant or animal identified and defined in the Federal Register in accordance with the Endangered Species Act of 1976. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Timber Stand Improvement (TSI): A thinning made in immature stands to improve the composition, structure, condition, health, and growth of the remaining trees.

Undesirable Growing Stock (UGS): Trees of low quality or less valuable species that should be removed in a thinning.

Understocked: Insufficiently stocked with trees.

Understory: The small trees, shrubs, and other vegetation growing beneath the canopy of forest trees and above the herbaceous plants on the forest floor.

Uneven-aged stand: A stand with trees in three or more distinct age classes, either intermixed or in small groups, growing on a uniform site; a stand containing trees of several 20-year age-classes. These stands generally contain trees of many sizes (seedling through sawtimber) due to the range in age as well as differences in growth rate among species.

Vertical diversity: The extent to which plants are layered within an area. The degree of layering is determined by three factors: 1. the arrangement of different growth forms (trees, shrubs, vines, herbs, mosses and lichens); 2. the distribution of different tree and shrub species having different heights and crown characteristics; and 3. the number of trees of different ages.

Visual Quality Measures: Modifications of forestry practices in consideration of public view, including timber sale layout, road and log landing locations, intersections with public roadways, distributing logging residue, tree retention, timing of operations and other factors relevant to the scale and location of the project.

Volume: The amount of wood in a tree, stand of trees, or log according to some unit of measurement, such as board foot, cubic foot, etc.

Watershed: The area of land where all of the water that is under it or drains off of it goes into the same place. For example, the Mississippi River watershed includes all the land that drains into the Mississippi River. This watershed is the fourth largest in the world and includes water from 31 states.

Wetland: A transitional area between water and land that is inundated for periods long enough to produce wet soil and support plants adapted to that environment. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

Wolf Tree: A very large, over-mature tree that is or was open grown. These trees tend to have large full

crowns and numerous branches.

Appendix C – Easement Language

The Conservation Easement Agreement is on file in the Town of Old Saybrook Land records Book 604, pages 209-244.

Appendix D – Hunting Review Team Report

STATE OF CONNECTICUT
DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION
BUREAU OF NATURAL RESOURCES
WILDLIFE DIVISION

THE PRESERVE

HUNTING REVIEW TEAM REPORT

Prepared by: Michael Gregonis, Wildlife Biologist II

April 2018

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Purpose of Review

The Department of Energy and Environmental Protection (DEEP) has established procedures and guidelines to determine whether or not land managed by the Department shall be utilized for hunting. These guidelines pertain to: 1) initial consideration of newly acquired parcels, 2) reviews of existing DEEP lands previously closed to hunting, 3) DEEP lands currently open to hunting where the Department has received a public safety related complaint or request for closure, and 4) in-house review of current hunting policy on a parcel of DEEP land.

The Hunting Review Team (HRT) is comprised of representatives from DEEP's Divisions of Wildlife, Forestry, Environmental Conservation Police, and Parks. Members of the team conduct a thorough field inspection, evaluate aerial photography and topographical maps to identify important features including residences, nature of the terrain, roadways, trails and review historical law enforcement information to determine whether or not hunting activities may present an unreasonable risk to public safety. This hunting review was undertaken to answer the question: "Can hunting take place in a safe and prudent manner consistent with other outdoor recreation?"

Site Description

The Preserve property is jointly owned by DEEP and the Town of Old Saybrook. The 890± acre parcel was acquired in April 2015 and is managed by a Cooperative Management Committee with a representative from DEEP and a representative from the Town under the terms of a Cooperative Management Agreement. The Nature Conservancy also holds a Conservation and Public Recreation Easement on the property to ensure it will be maintained predominantly in its natural, scenic, forested, and/or open space condition, and to provide opportunities for public recreation. The overall goal is to manage the property as a multi-use forest to support public recreation and education, to maintain important natural communities and habitats, to protect threatened plant and animal populations, and to increase forest and habitat diversity.

The Preserve property may be categorized as principally an upland mixed hardwood/conifer forest with a variety of wetlands and watercourses, including vernal pools, intermittently scattered across the site. The understory is composed of mountain laurel and blueberry with spicebush in the more mesic areas. Several special concern plants and wildlife species have been identified on the property. The property is one contiguous wooded parcel with few bisecting roads and a limited number of residences, existing primarily on the south side of the property.

Site Evaluation

On November 4, 2015, a hunting evaluation was conducted on-site by the following DEEP personnel: Michael Gregonis, Wild Turkey/Deer/Small Game Biologist; Paul Rothbart, Supervising Wildlife Biologist; Ann Kilpatrick, District Wildlife Biologist; Thomas Donlon, Conservation Education/Firearms Safety Program Coordinator; Laurie Fortin, Wildlife Biologist; Matthew Stone, Environmental Conservation Police Officer; William Hochholzer, Supervising Forester; and Alexander Sokolow, Parks and Recreation Unit Supervisor.

Key Findings

Based upon the evaluation process, which included a review of aerial photographs, topographic maps and the on-site inspection, the HRT found:

- Nearly the entire property is wooded with the exception of Pequot Swamp (approx. 17 acres) and smaller wetland complexes.

- The majority of residences occur on the south side of the property with a small number on the northwest and northeast corners. Approximately 130 acres of the property is subject to the 500-foot firearms restriction regulation (Attachment A).

- An abundance of hiking trails (interim) are available throughout the property and on the adjoining property owned by the Essex land Trust (Attachment B).

- An increase in the use of The Preserve by the public has been observed by DEEP Environmental Conservation Police in recent years, including the use of un-blazed hiking/mountain biking trails that seem to be growing in numbers. A recent Eagle Scout project has clearly marked the trailheads and major trails, however, it appears that mountain bikers are creating additional unauthorized trails off of the existing trails.

- The Preserve is located in Deer Management Zone 12, one of two zones in the state where deer-human conflicts are common. Hunting regulations are designed to reduce conflicts in this zone. Further, deer populations on properties of this size must be managed in order to prevent deer from impacting habitat.

Conclusion

Regulated hunting as described in the following recommendations can be conducted safely and compatibly with other planned outdoor uses of the property.

Recommendations

- The area should be open to all forms of deer hunting including archery, shotgun, and muzzleloader, which follow the regulations established for state-managed lands.

- The area should be open for all types of small game hunting, excluding waterfowl. The one wetland area suitable for waterfowl hunting is in close proximity to a housing development, reducing its viability as a suitable hunt area.

- The area should be administered for spring, fall firearms, and fall archery wild turkey hunting under the existing state land regulations.

- Signs (similar to those shown on Attachment C) should be posted at each trailhead and along the property boundary to inform the public that hunting may be occurring on the property.

- A map similar to Attachment A showing The Preserve boundaries, parking areas, and 500-foot firearms restriction areas, should be posted at each trailhead and made available on the Town's and DEEP's websites.

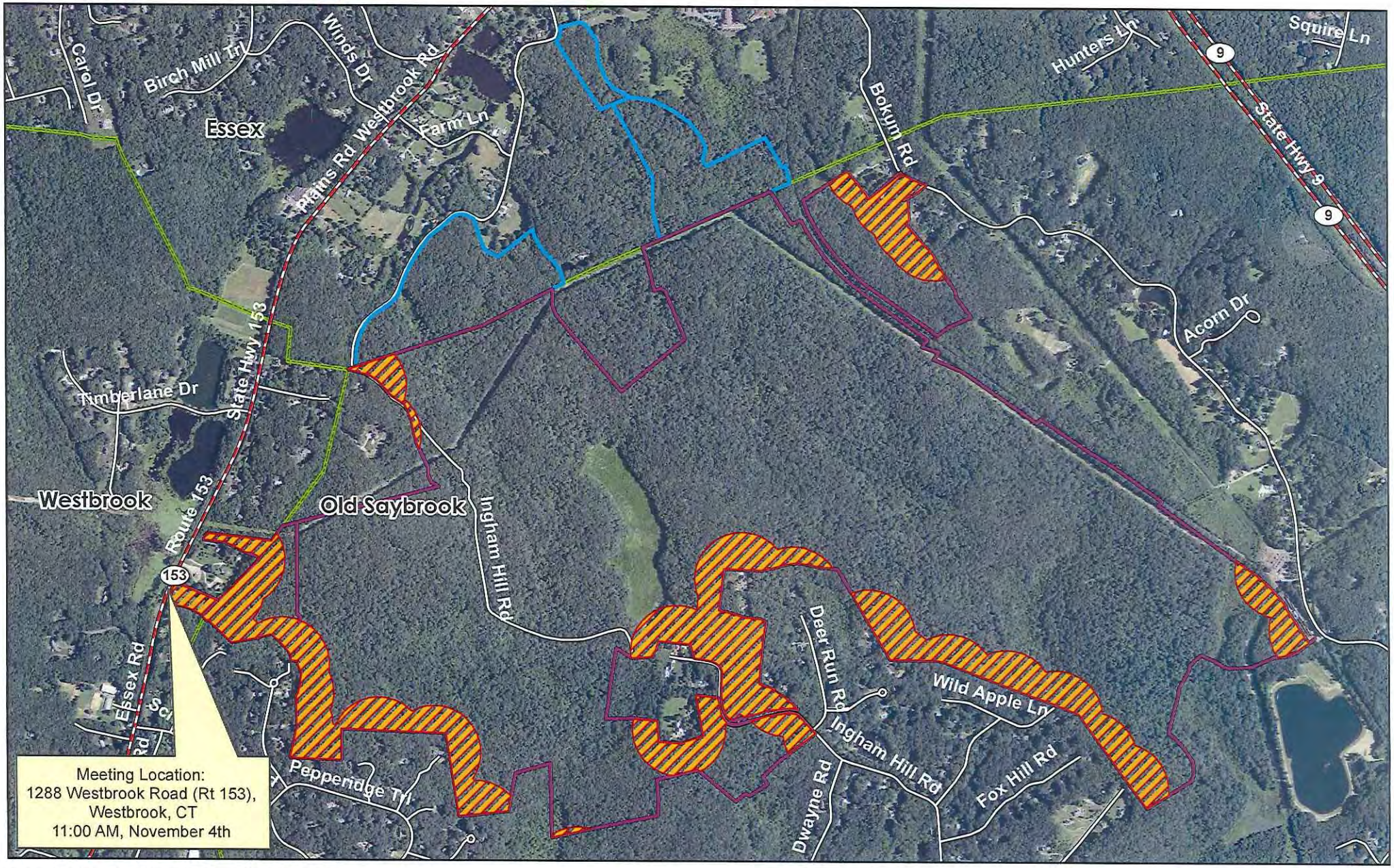
The Preserve Property

Westbrook/Old Saybrook, CT

Hunting Review Team Report Attachment A

N

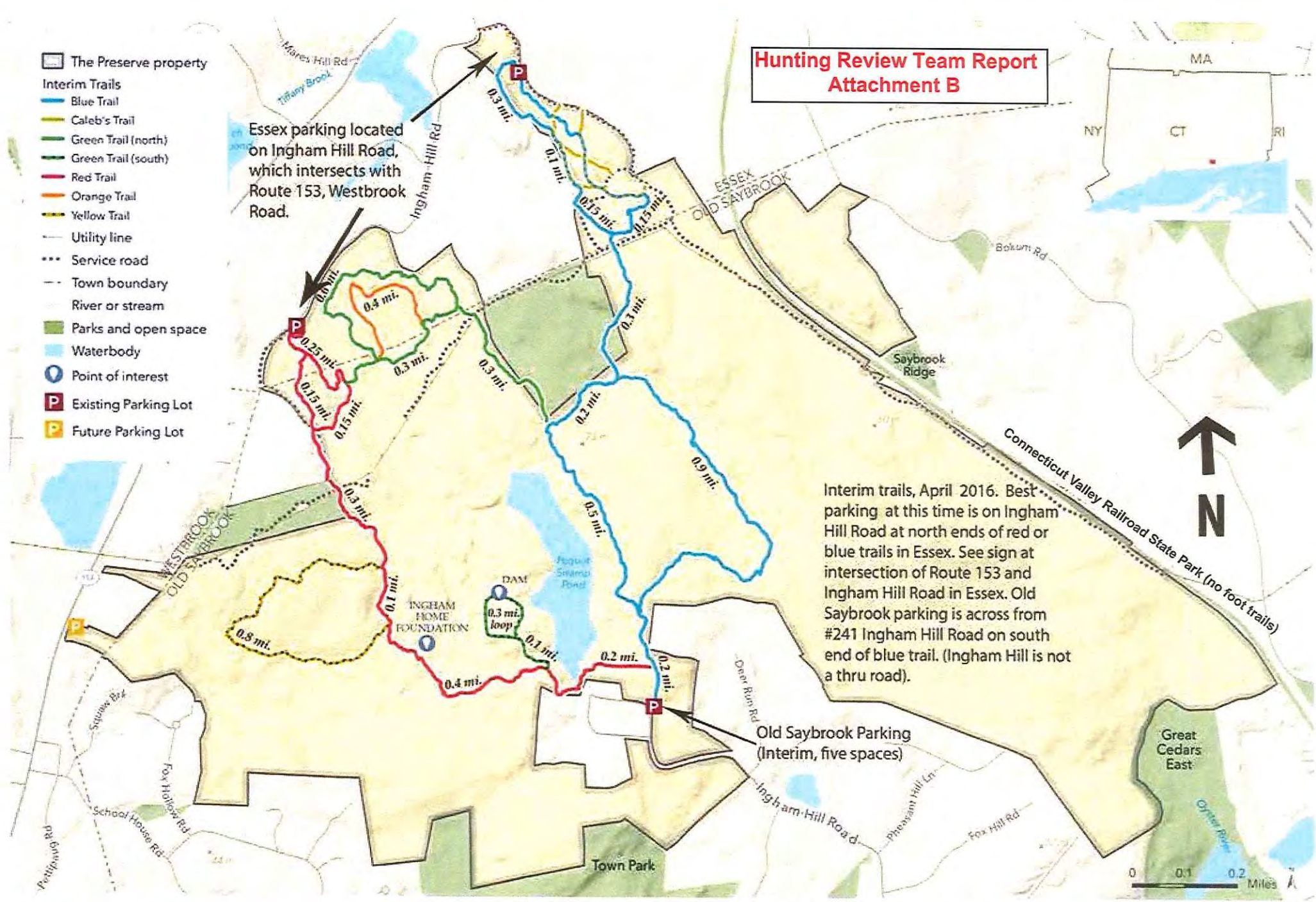
Symbols: Preserve Boundary | Essex Land Trust parcels | 500 Ft. Firearms Restriction



Map Date: 11/2/15; Ortho 2012 NAIP

1,500 750 0 1,500 Feet

State of Connecticut - Department of Energy & Environmental Protection - 79 Elm St. - Hartford, CT 06106 - www.ct.gov/deep



The Preserve

INTERIM TRAILS

Please: Pack out all trash. Stay on trails. No unauthorized motorized vehicles. No camping. No fires. Take only pictures, leave only footprints.

http://www.oldsaybrookct.org/Pages/OldSaybrookCT_CC/CC_trail_maps

THE TRUST FOR PUBLIC LAND

Attachment C

Hunting Review Team Report – The Preserve, Old Saybrook

Example - Sign for posting at trailhead kiosk

Example - Sign for posting along property boundary

Appendix E – Public Comments

A public presentation and outreach session for this Forest Management Plan (FMP) was conducted on Monday, June 24th, 2024 in the Old Saybrook middle school auditorium. This presentation was conducted in two distinct parts: (1) a presentation of the FMP and its goals/purpose and (2) a panel style question and answer session. There were approximately 100 people in attendance. Personnel present and part of the Q&A session or presentation were as follows:

- Alexander Amendola (CT DEEP Forestry Division)
- William Hochholzer (CT DEEP Forest Division)
- Ray Allen (Town of Old Saybrook)
- Carl Fortuna (Town of Old Saybrook)
- Susan Esty (Town of Old Saybrook Ad-hoc Committee)
- Bryan McFarland (The Nature Conservancy)

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Questions were asked by many different stakeholder groups including but not limited to the following:

- Northeastern Mountain Bike Association (NEMBA)
- CT Horse Council
- Conservation Land Trusts (Essex and Old Saybrook)
- CT Audubon Society
- Old Saybrook Residents

Panelists answered questions covering a broad variety of topics, including but not limited to the following:

- Invasive species
- Equestrian access/trails
- Cycling access/trails
- Unauthorized trails
- Silviculture (including stand-specific questions)
- Forest carbon storage/sequestration
- Aesthetics of silvicultural work (neighbors)
- Access for management
- Beaver activity (Pequot swamp)
- Eversource activity
- Hunting
- Endangered/threatened/special concern species
- Infrastructure repairs

Many different viewpoints were expressed during the course of the meeting and the overwhelming majority of the audience was very thankful for the opportunity to ask questions about the FMP. An additional note on recreation related questions; Kimberly Bradley, CT DEEP Trails Coordinator, was also in attendance for the meeting. Although she did not sit on the formal panel, she did introduce herself and answer several recreation-related questions.

At the conclusion of the Q&A session, the audience was notified that they would have thirty (30) days to submit additional comments or questions to Alexander Amendola via email or phone.

PUBLIC COMMENT PERIOD:
During the thirty (30) day comment period post-outreach meeting, approximately 30 total comment and/or question emails were received by Alexander Amendola. These emails ranged in their topics, and included praise for the outreach meeting, silvicultural and invasive questions, trail questions, and more. All questions were answered directly or acknowledged, and some of the more complex issues were brought to the Conservation Management Committee (CMC) on August 7th, 2024 for discussion and vote. A summary of the public comment period are detailed below in powerpoint form (presented to the CMC on August 7th, 2024).

The Preserve State Forest
Public Comment Period

Alexander Amendola

Comments:

- 25+ received via email.
- Inland Wetlands, Land Trusts, Save the Sound, SOS Trees, private citizens.
- Comment groups:
  - General questions/comments (33%)
  - Silviculture/invasive concerns (43%)
  - Recreation concerns (5%)
  - Other (19%)

General comments

- No clearcutting.
- Most happy with the depth and complexity of the plan.
- Some entirely negative, non-constructive comments.
- Worried about losing trails (NEMBA).

Specific questions (Silviculture/Invasives)

- **Addition of Klemens/Moorehead reports, anthropological report, bat study, etc.**
  - These reports should not be added. Adding these reports in any capacity only increases risk of injury/collection to wildlife/artifacts with no tangible benefits.
- **"Regularize" the boundary of the CPA.**
  - The boundary should not be further adjusted. This boundary is based on tangible, scientific metrics and analysis and is easy to follow with GPS. Signage in the field only risks injury to the area(s).

Specific questions (Silviculture/Invasives)

- **Connect the CPA areas to not be fragmented by silviculture areas to form a true "core".**
  - The CPA comprises >50% of the preserve and further CPA should not be created >400' away from vernal pools and wetlands. The CPA is designed to protect valuable habitat for vernal pool species and turtles and will remain as is.
- **Forestry operations need to be reduced in areas to protect wildlife (bats, herps, insects, etc.)**
  - Temporary disturbance via silviculture is not the issue plaguing wildlife species. Human development is the issue. Please read Tech paper 5 and 6 regarding temporary disturbance vs. development. BMP's are always adhered to, and NDDB recommendations are adhered to for imperiled species.

Specific questions (Additional)

- Removal of 1700 test pipes **(Added)**
- Locating 8 deep test wells for future closing **(Added)**
- Clearing old homes, cars, mattresses, and other detritus **(Added)**
- Hiring and managing a professional crew to remove over one mile of filter fabric, rotting lumber, and stakes **(Added)**
- Boundary marking, trailblazing, direction signs, installation of trail and parking lot kiosks, installation of benches at trail nodes **(Already in plan)**
- Planting and plant maintenance at Rt. 153 parking lot
- Invasive plant removal **(Already in plan)**
- Maintaining public communications through a Facebook page and a mailing list
- Working with professional consultants to accomplish scientific studies that support the current draft plan. **(Already in plan)**
- Monthly meetings by committee members to discuss policy and planning.

Specific questions (Additional)

- Can an invasive plants map layer be added to GIS library, along with a map exhibit in the Forest Management Plan? This would form the basis for observing change. **(Added)**
- Revegetation is mentioned a few times. Can the importance of strategic revegetation be added? **(Trail Plan)**
- The current trail free-for-all seems to be a root cause of several problems, including invasive plant spread, deterioration of land quality, and interference with animal life. This is exacerbated by several online mapping services that provide maps of user made trails along with the official trails. What is the plan for trail closing? **(Trail Plan)**
- To what extent can revegetation be part of trail closings? **(Trail Plan)**
- The document seems to be written at different dates and possibly by different authors. Will the document be made consistent with current conditions before publication? For instance, while Beech Leaf Disease is mentioned, its current vigorous status is far beyond what the authors could have known at the time. Should the imminent effects be mentioned in the final version? Will proposed actions be updated?
- Might a glossary be added after the executive summary to help non-foresters understand the document more readily? For instance, what is stem exclusion? What does it mean to "release" a plant? **(Added)**

Summary of plan changes:

- Added monitoring of Beech Leaf Disease (BLD).
- Removal of test wells/development infrastructure.
- Added/updated glossary and standardized terms (i.e. yellow/tulip-poplar)
- Added volunteer utilization recommendation.
- Added invasive species mapping recommendation.
- Minor formatting changes

Items for CMC discussion

- Emergency Management Plan?
- Beaver activity?
- HRT?
- CPA extension/additional connections
- CPA boundary changes
- Additional reports (including Klemens, Moorhead, etc.)

Appendix F