
FOREST MANAGEMENT PLAN



BETHLEHEM LAND TRUST
"BELLAMY - FERRIDAY PRESERVE"
45 Main Street North
Bethlehem, CT

February 15, 2023



ANDREW J. BOSSE FORESTRY SERVICE

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Table of Contents

	<u>Page(s)</u>
NRCS Cover Page / Record of Decisions	i
Conservation Plan & Practice Schedule	ii
Proposed Activity Map	iii
Landowner, Property & Plan Preparer Info	1
General Information	2-5
Stand 1: Existing Conditions & Management Plan	6-8
Stand 2: Existing Conditions & Management Plan	9-11
Stand 3: Existing Conditions & Management Plan	12-14
Stand 4: Existing Conditions & Management Plan	15-17
Stand 5: Existing Conditions & Management Plan	18-20
Stand 6: Existing Conditions & Management Plan	21-23
Wetland Marsh: Existing Conditions & Management Plan	24-25
Summary Tables	26

Appendices

Conservation Assistance Notes / Record of Client Contact
Glossary of Forestry Terms

Maps & Reports:

1. Proposed Activity Map (with Conservation Plan & Practice Schedule, above)
2. Location Map
3. Topographic Map
4. Current Aerial Image Map- 2019
5. Historic Aerial Image Map-1934
6. Forest Stand Map
7. Soil Map and Reports
8. Natural Diversity Database Map & Report
9. Audubon - Forest Bird Habitat Assessment

NRCS EQIP (CAP-106)

Cover Sheet / Record of Decisions

Contract #:	EQIP 2018 74110622023	FSA Tract# / FSA Farm#:	196 / 732
County:	Litchfield	Acres Covered By Plan:	81

Participant Information

Name: Bethlehem Land Trust
Address: P.O. Box 322, Bethlehem, CT 06751

Phone: 203-910-3836 (Stuart Rabinowitz – President)
Email: slrdesign213@gmail.com

TSP Information

Name: Andrew J. Bosse
Address: 130 Niles Rd., New Hartford, CT 06057

Phone: 860-379-2686
Email: ajbforestry@gmail.com

TSP#:	09-6287	Expiration Date:	Oct. 13, 2023	Service County:	Statewide
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I certify that the work completed and delivered for this DIA:

- i. Complies with all applicable Federal, State, Tribal, and local laws, and requirements.
- ii. Meets the General and Technical Requirements for this DIA.
- iii. The planned practices are based on NRCS Conservation Practice Standards (CPSs) in the state Field Office Technical Guide where the practices are to be implemented.
- iv. Is consistent with and meets the conservation goals and objectives for which the program contract was entered into by the participant.
- v. Incorporates alternatives that are both cost effective and appropriate to address the resource issues(s) and participants' objective(s).

Technical Service Provider Signature

Date

Participant's Acceptance

I accept the completed DIA deliverables as thorough and satisfying my objectives.

Participant Signature

Date

NRCS Review

NRCS technical and administrative review completed by:

NRCS Forester Signature

Date

Conservation Plan and Practice Schedule – Bethlehem Land Trust (Bellamy-Ferriday Preserve)

Tract Number	PLU / Stand #	Practice Code	Practice Name	Planned Amount	Planned Date
732	1a, 3a *	314	Brush Mgmt (mechanical heavy)	25.0 ac.	2025
732	1a, 3a *	314	Brush Mgmt (chemical heavy)	25.0 ac.	2026
732	1a, 3a *	314	Brush Mgmt (chemical moderate)	25.0 ac.	2028
732	1b, 3b* 2,4,5,6	314	Brush Mgmt (chemical moderate)	43.0 ac.	2025
732	1b, 3b* 2,4,5,6	314	Brush Mgmt (chemical moderate)	43.0 ac.	2026
732	1b, 3b* 2,4,5,6	314	Brush Mgmt (chemical light)	43.0 ac.	2028
732	1, 2, 3, 4, 5, 6	666	Forest Stand Improvement (thinning for forest health and wildlife)	68.0 ac.	2029
732	1, 3,	647	Early-successional Habitat Development	6.5 ac.	2030
732	1, 2, 3, 4, 5, 6	654	Forest Trails	5,200'	2030
732	2	655	Stream / Wetland Crossing (temporary)	1	2029

***For Brush Mgmt 314 in Stand 1 & 3: (a) denotes the area of heavy treatment (25.0 ac.) and (b) denotes the area of moderate treatment (19.3 ac.).**

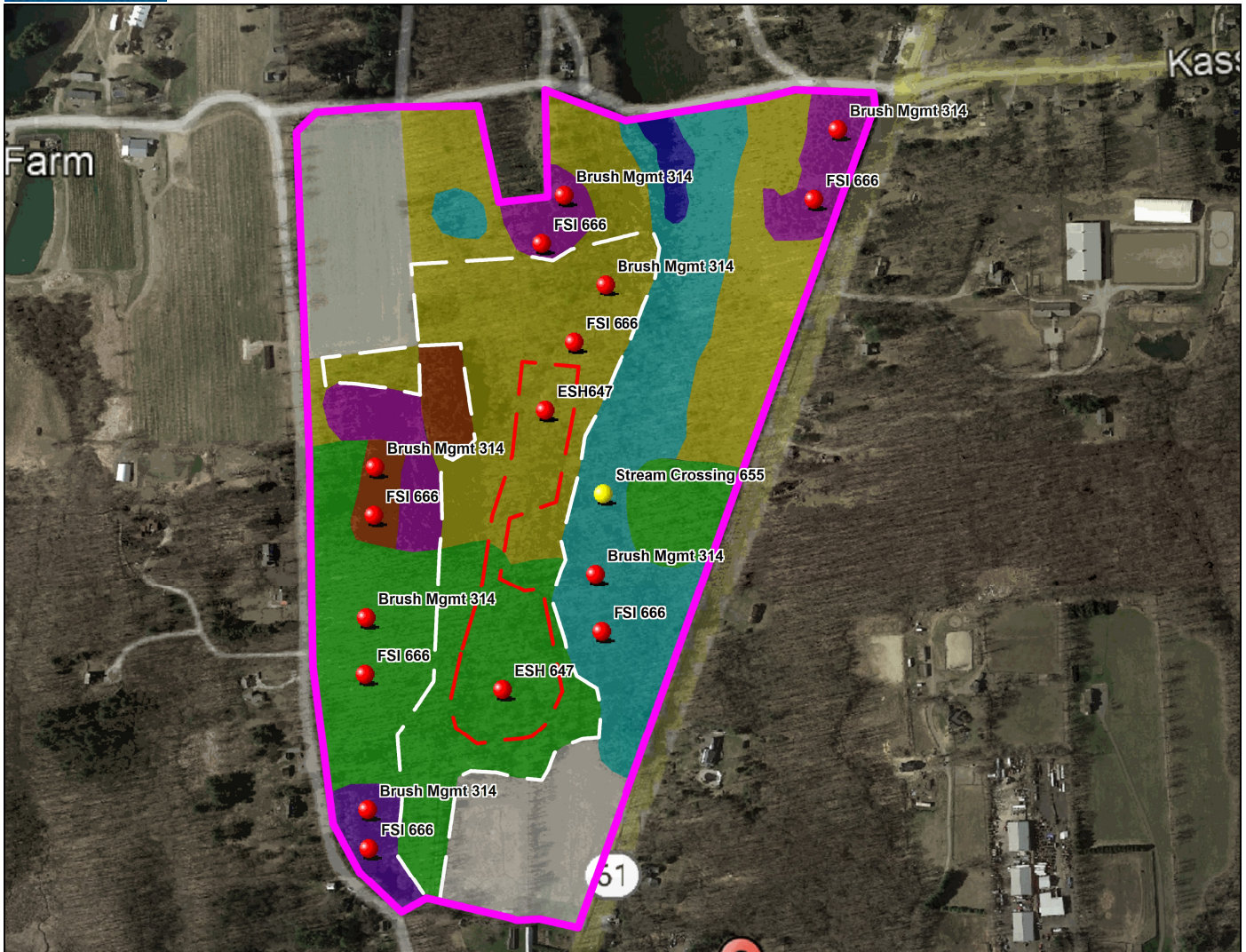
CPS-314: This practice is used to control the presence of invasive woody vegetation. This can be accomplished through mechanical, chemical, or biological means as well as a combination of methods. In most cases, multiple treatments, either multiple treatments per growing season, or treatments over multiple years will be required to achieve effective control.

CPS-647: This practice is used for the creation of early successional habitat (grassland, meadow, old field, shrubland, young forest) for species that require such habitat for one or more phases of their life cycle. Creation of early successional habitat typically requires setting back the current vegetative stage to an earlier successional stage through mowing, masticating, or cutting vegetation with large equipment.

CPS-654: This practice is used to minimize resource concerns associated with existing roads, trails and/or landings by closure and treatment to a level that facilitates future use for management activities. Grading and shaping, including the installation of necessary water control features such as water bars is the most critical component of this practice. Grading and shaping activities will follow the CT Best Management Practices Field Guide and NRCS Implementation Requirements.

CPS-655: This practice is used to provide routes for equipment during forest / habitat management activities, the periodic removal of forest products, and for temporary crossings of streams and wetlands. The location of trails, landings, and stream / wetland crossings shall be marked in the field by a licensed Connecticut forest practitioner with flagging, and will include aspects of CPS-654 (above) for grading, shaping and installation of necessary water control features for control of soil erosion. Stream / wetland crossings will utilize temporary timber mat bridges. Grading and shaping activities will follow the CT Best Management Practices Field Guide and NRCS Implementation Requirements.

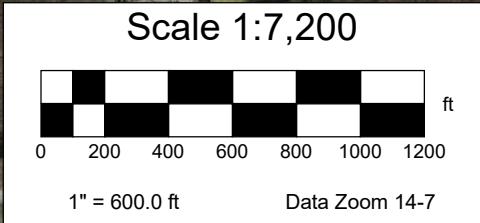
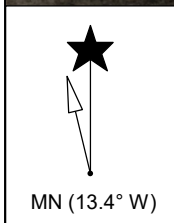
CPS-666: This practice is used to improve stand health and condition by the manipulation of species composition, stand structure, or stand density by cutting or killing selected trees or understory vegetation to achieve desired forest conditions. All trees to be felled or removed will be marked with paint by a CT certified forester. Silvicultural operations will be conducted in ways that avoid or minimize impact to residual vegetation, soils, and hydrology. Seasonal cutting restrictions will apply to minimize the potential impact on migratory birds, Northern Long Eared Bats (NLEB) and other species of concern.



KEY

- Red dots = stand-wide activity
- Yellow dot = site specific activity
- White dash = area (25 ac.) in need of heavy mechanical/chemical Brush Mgmt (CPS-314)
- Red dash = proposed 6.5 ac. ESH area (CPS-647)
- Note: Forest Trails (654) property-wide where needed

PROPOSED ACTIVITY MAP
 Bethlehem Land Trust
 Bellamy Preserve
 45 Main St. North
 Bethlehem, CT
 Litchfield County
 81 ac. +/-



Feb. 22, 2023
 Andrew J. Bosse
 Licensed Forester
 CT. lic. # F-11
 USDA-NRCS TSP# 09-6287

FOREST MANAGEMENT PLAN

This is a forest management plan developed under current USDA-NRCS Forestry CPA (106) guidelines.

Date Prepared: Feb. 15, 2023
Plan Time Frame: Y1 – Y10
Property Owner(s): Bethlehem Land Trust (Bellamy-Ferriday Preserve)
Address: P.O. Box 322
Bethlehem, CT 06751
Telephone: 203-910-3836 (Stuart Rabinowitz - President)
Email: slrdesign213@gmail.com
**Property Address:
(if applicable)** 45 Main Street North
Bethlehem, CT

**Legal description or
directions to site:** The southern end of the property is located about 0.1 mile north of the center of Bethlehem. It is bounded on three sides by roads: East by Main Street (CT Route 61); north by Bellamy Lane; West by Munger Lane; and on the south by the Bellamy-Ferriday House property (also owned by the land trust). It is listed in the Bethlehem Assessor's records as: Map 11-6; Lot 083A. The deed is listed in Volume 149, Page 261. GPS location coordinates for the property are approximately N 41° - 38.68' W 73° - 12.51'.

Prepared By: Andrew J. Bosse
Company: Andrew J. Bosse Forestry Service
Address: 130 Niles Road
New Hartford, CT
06057
Telephone: 860-379-2686
Email: ajbforestry@gmail.com

GENERAL INFORMATION

Landowner Assessment

Description of resource objectives and level of interest from the landowner: Landowners are interested in improving the health and quality of forest and wildlife habitat on the property, and controlling invasive plants. Landowner is capable of implementing some projects on their own but need professional assistance with projects that require heavy or specialized equipment.

Summary of NRCS resource concerns:

- Invasive plants present.
- Ash mortality.
- Reduced health & quality of Stand 2 due to above average amount of UGS/cull trees.
- Lack of early successional habitat on the property.

Landowner's goals for the property:

- Discourage or eliminate invasive plants.
- Promote habitat quality and diversity.
- Improve quality of forest stands.

General Property Information

Total land area: 81.0 acres

Total number of stands/mgmt units: 7

General property description: The property contains a total of about 81.0 acres according to the land records, of which about 68.5 acres are forested and 12.5 acres are fields, including a 5.5 acre grass field in the southeast corner which serves as the main entrance to the property, and a 7 acre corn field in the northwest corner.

The topography on the property is mostly gentle to moderate slopes, with some nearly flat areas. Slope aspects vary between westerly, easterly, and southerly depending upon location. The

highest elevation is about 950' in the northwest corner, and the lowest is about 870' in the southwest corner.

Water resources on the property include a small pond (approx. 0.2 acre) in the southwest corner, a vernal pool near the middle of the property, and a small, intermittent stream that flows southerly through the eastern side of the property.

There are several stone walls and the remains of wire fences in and around the forested sections of the property, which are indicative of past agricultural use, most likely pasture land due to the rocky soil which would make cultivation very difficult. It appears that the land reverted back to forest in the late 1800's.

Description of surrounding properties:

The western, northern and eastern boundaries abut roads, as described above on page 1, and the southern boundary abuts the historic Bellamy-Ferriday House property, also owned by the Bethlehem Land Trust.

Soils information:

Upland soil types comprise about 80% of the property and include: Woodbridge fine sandy loam; Canton and Charlton fine sandy loams; Sutton fine sandy loam; and Paxton and Montauk fine sandy loams. Wetland soils on the property (20%) include Ridgebury, Leicester, and Whitman soils. Please refer to the attached soil map and reports for further details.

Management access:

There is suitable management access to the property from Main Street and Munger Lane.

Presence of threatened and endangered species:

The State of Connecticut DEEP's Natural Diversity Database (NDDB) map indicates that there are no known populations of threatened or endangered species on the property. For further details, please refer to the attached NDDB map.

However, if the Landowner intends to apply for NRCS cost-share funding to implement projects involving tree cutting there are restrictions as to what time of year the projects can be implemented. To avoid effect on threatened / endangered bats, tree cutting operations should be conducted during the period of October 31 through April 1. If tree cutting needs to be done between April 1 to October 31, consultation with the CT DEEP and the US Fish & Wildlife Service through the NRCS is required. Consultation takes 30 days. For the cutting period to be compliant with the Migratory Bird Treaty Act, no tree cutting should take place Between April 15 and August 1. If the cutting schedule

extends into this window, a nest survey must be done as each section is cut to avoid trees with nests. Contact the NRCS prior to commencing the tree cutting activities.

Presence of invasive species:

During the field inventory, a heavy infestation of invasive plants (mostly euonymous plus some Japanese barberry, multi-flora rose, bittersweet, autumn olive, and honeysuckle) was found in sections of Stands 1 & 3; and a light-moderate infestation throughout the rest of the property. Implementation of an invasive species control program should be a top priority for these areas in order to prevent the further spread of these invasive plants.

Also, in recent years, the Emerald Ash Borer (EAB), a non-native invasive insect, has been discovered in Connecticut. A significant amount of dead or dying ash was recorded during the field inventory, particularly in Stand 1 but also Stands 2 and 4. For safety reasons, it is recommended that all ash on the property in the vicinity of hiking trails be felled at the earliest possibility. It can be left in place and lopped to provide habitat and coarse-woody debris. Another non-native invasive insect, the Asian Long Horned Beetle (ALB) was discovered in Massachusetts several years ago and should also be monitored for, it is capable of attacking several species of hardwoods but seems to prefer sugar maple. For further details on these and other invasive pests, contact the CT Agricultural Experiment Station and the CT D.E.E.P.

Cultural importance:

There are no known articles of cultural importance on the property, however, there are numerous stone walls present. Any management projects should include efforts minimize disturbance to the stone walls.

Forest Carbon:

Studies have proven that managed forest systems sequester carbon at higher rates than unmanaged forests, due mainly to the fact that young, faster growing trees have higher metabolic rates than mature trees and uptake and store carbon at much higher rates. Consequently, in addition to providing the renewable resources (wood, fiber, wildlife, etc.) needed every day by society, managed forests contribute much more to the removal of excess carbon from our atmosphere than unmanaged forests.

Forest Bird Habitat Assessment:

Attached to this Forest Management Plan as an addendum is a bird habitat assessment done by Audubon Connecticut. The findings in this document support and augment the recommendations made in this plan for wildlife habitat improvement in general, and in particular the recommendation to create a patch of early-

successional habitat (6.5 acres +/-) in Stands 1 & 2. For further details please refer to the Forest Bird Habitat assessment.

Sampling Method:

The forest inventory was conducted using the point sampling method with a Basal Area Factor of 10. A total of 37 sample points were taken during the inventory.

Map information:

The following maps and reports are included with this plan:

- Location Map
- Topographic Map
- Aerial Image Map
- Forest Stand Map
- Soil Type Map and Reports
- Natural Diversity Database Map and Report.
- Proposed Activity Map

EXISTING CONDITIONS FOR STAND 1

Land area: Land area: 19.4 acres

Land use history: Stand 1 appears to be mostly post-agricultural land (pasture) that reverted to forest in the late 1800's, due to the presence of stone walls and old wire fences on the property and a heavy infestation of invasive plants in areas. This stand occupies two separate areas of the property. No data available on any forestry activities in the past 30 years.

Forest Type:
- Existing Oak-Mixed hardwoods
- Potential Oak-Mixed hardwoods

Successional trend: Red oak, sugar maple, red maple, black cherry, hickory, and some scattered white pine dominate the overstory. Pole timber component is of a similar hardwood mix plus some hemlock. Understory varies from open on the western half of the stand to dense areas of euonymus and other invasives on the eastern side.

Forest health: Fair in areas of heavy invasives, good in areas without. Over stocked conditions have slowed growth rates. Better than average amount of AGS trees (79%), although many trees are reaching over-maturity. Heavy patches of invasive plants present on the eastern half of the stand. Ash mortality high due to EAB, most ash are already dead and falling down, presenting a safety issue.

Site quality: Site index is approximately 65 for red oak. Average. Site Index was estimated from the attached Forestland Productivity soil report.

Approximate age: 120+ **Size class:** large sawtimber (20"- 34")

Trees per acre: 195 **Mean Stand Diameter:** 12.0 in.

Basal Area (BA): 145 **Acceptable BA:** 114

Growth Rate: 2 % **Timber Quality:** med to high

Stocking: Over stocked (120%). AGS accounts for 79% of the basal area (above average).

Stand Volume: 11,888 bd. ft. / acre.

Tree Diameter Distribution:

DBH	4	6	8	10	12	14	16	18
%	2	8	7	6	5	11	10	8
DBH	20	22	24	26	28	30	32	34
%	10	6	9	2	4	3	2	7

Habitat and wildlife use: Fair to average, with potential for much improvement. Numerous oaks can provide a significant seasonal food source during years of heavy mast production. Numerous large hardwood cavity trees provide denning and nesting opportunities for a variety of wildlife.

Understory on eastern side consists of mostly non-native invasives which provide some cover but are not a significant food source, and the western side of the stand is mostly open understory with little ground level cover or browse.

Recreational opportunities:

Good trail access for hiking, wildlife watching, snowshoeing, and cross-country skiing opportunities.

Potential for timber production:

Above average. Most of this stand is well stocked with large, high quality oaks and other hardwoods.

Water quality issues:

No major issues since there is no surface water in this stand and the slopes are gentle. However, due to the proximity of the small stream downslope of the stand, any management activity in this area should include measures to prevent soil erosion by implementing appropriate BMP's, as described in the *BEST MANAGEMENT PRACTICES for water quality while harvesting forest products - 2012 Connecticut Field Guide*.

Important natural features:

None noted.

MANAGEMENT PLANS FOR STAND 1

Landowner's objectives for this stand:	Control invasive plants. Improve quality of the wildlife habitat and the forest.
Desired future stand conditions:	Create a multi-aged stand of mixed hardwood (favoring oak) at full stocking level above the B line (70 sq. ft/ acre) with AGS accounting for 85% or more of the stand, 2 – 3 large snags per acre for wildlife, and a healthy understory (comprised of native shrubs, desirable tree regeneration, and herbaceous plants) that is devoid of non-native invasive vegetation.
No-action alternative:	Stand growth and vigor will continue to stagnate under the overstocked conditions; forest health will decline along with timber values as AGS trees become overmature; existing quality regeneration is not sufficient to re-stock the stand in the event of a catastrophic event; non-native invasive plants will spread steadily throughout the stand; wildlife habitat value will continue to decline; and forest carbon sequestration will be significantly reduced.

Silvicultural Prescription

Recommended silvicultural system:	Implement invasive plant control followed by a Forest Stand Improvement (FSI) thinning of mostly UGS and cull trees that would retain a minimum basal area of 70 sq. ft./acre. Possible early-succesional habitat development in areas of the stand. Post-activity trail improvement.
Details of the silvicultural prescription / planned activities:	<ol style="list-style-type: none">1) Implement an invasive plant control program.2) Potential future commercial / FSI thinning.3) Potential ESH development.4) Forest Trail improvement.

EXISTING CONDITIONS FOR STAND 2

Land area:	Land area: 13.7 acres																																				
Land use history:	Stand 2 is a forested wetland that appears to be post-agricultural (pasture) land. No data available on any forestry activities in the past 30 years.																																				
Forest Type:																																					
- Existing	Red maple wetland																																				
- Potential	Red maple wetland																																				
Successional trend:	Poletimber to large sawtimber, mostly red maple with some scattered yellow birch and hemlock. Understory is light, with a mix of winterberry, high-bush blueberry, and invasive shrubs (euonymous, Japanese barberry, multi-flora rose, and honeysuckle).																																				
Forest health:	Average, for a wetland.																																				
Site quality:	Site index is approximately 63 for red maple, average. Site Index was estimated from the attached Forestland Productivity soil report.																																				
Approximate age:	120+ Size class: med-large sawtimber (18"-32")																																				
Trees per acre:	213 Mean Stand Diameter: 10.5 in.																																				
Basal Area (BA):	128 Acceptable BA: 76																																				
Growth Rate:	2 % Timber Quality: medium																																				
Stocking:	Overstocked (110%). AGS accounts for 59% of the basal area, below average.																																				
Stand Volume:	5,506 bd. ft. /acre.																																				
Tree Diameter Distribution:	<table border="1"> <thead> <tr> <th>DBH</th> <th>4</th> <th>6</th> <th>8</th> <th>10</th> <th>12</th> <th>14</th> <th>16</th> <th>18</th> </tr> </thead> <tbody> <tr> <td>%</td> <td>2</td> <td>11</td> <td>4</td> <td>12</td> <td>9</td> <td>16</td> <td>13</td> <td>12</td> </tr> <tr> <th>DBH</th> <th>20</th> <th>22</th> <th>24</th> <th>26</th> <th>28</th> <th>30</th> <th>32</th> <th>34</th> </tr> <tr> <td>%</td> <td>9</td> <td>2</td> <td>2</td> <td>1</td> <td>3</td> <td>2</td> <td>1</td> <td>1</td> </tr> </tbody> </table>	DBH	4	6	8	10	12	14	16	18	%	2	11	4	12	9	16	13	12	DBH	20	22	24	26	28	30	32	34	%	9	2	2	1	3	2	1	1
DBH	4	6	8	10	12	14	16	18																													
%	2	11	4	12	9	16	13	12																													
DBH	20	22	24	26	28	30	32	34																													
%	9	2	2	1	3	2	1	1																													
Habitat and wildlife use:	Average-good for a wetland. Some large cavity trees present may provide denning and nesting opportunities for a variety of wildlife. During wet periods with surface water present, the small stream may provide seasonal habitat for some amphibians & reptiles.																																				
Recreational opportunities:	Good trail access for hiking, wildlife watching, snowshoeing, and cross-country skiing opportunities																																				
Potential for timber production:	Low. Forested wetland would be best be managed for wildlife. Red maple is a relatively low-value hardwood.																																				
Water quality issues:	The small, intermittent stream flows south through this stand, so erosion control measures should be taken during any habitat																																				

management activities by implementing appropriate BMP's, as described in the *BEST MANAGEMENT PRACTICES for water quality while harvesting forest products - 2012 Connecticut Field Guide*.

Important natural features:

None noted.

MANAGEMENT PLANS FOR STAND 2

Landowner's objectives for this stand:	Invasive plant control, improve quality of wildlife habitat.
Desired future stand conditions:	Maintain at full stocking level above the B line (68 sq. ft/ acre), ideally with AGS accounting for 85% or more of the stand, 2 – 3 large snags per acre for wildlife, and a healthy understory (comprised of native shrubs, desirable tree regeneration, and herbaceous plants) that is devoid of non-native invasive vegetation.
No-action alternative:	Stand growth and vigor will continue to stagnate under the overstocked conditions; forest health will decline along with timber values as AGS trees become overmature; existing quality regeneration is not sufficient to re-stock the stand in the event of a catastrophic event; non-native invasive plants will spread steadily throughout the stand; wildlife habitat value will continue to decline; and forest carbon sequestration will be significantly reduced.

Silvicultural Prescription

Recommended silvicultural system:	Invasive plant control and Forest Stand Improvement (FSI) of mostly UGS/cull trees that would retain a minimum basal area of 68 sq. ft./acre, utilizing NRCS practice code 666 (thinning for forest health and wildlife). Establish a suitable stream crossing site for management activities. Post-activity trail improvement.
Details of the silvicultural prescription / planned activities:	<ol style="list-style-type: none">1) Control invasive plants.2) Stream crossing.3) FSI.4) Forest trail improvement.

EXISTING CONDITIONS FOR STAND 3

Land area:	Land area: 24.9 acres
Land use history:	Most of Stand 3, due to the presence of old stone walls, appears to be post-agricultural (pasture) land that reverted to forest in the late 1800's. No data available on any forestry activities in the past 30 years.
Forest Type:	
- Existing	Mixed hardwoods
- Potential	Mixed hardwoods
Successional trend:	Red maple, hickory, scarlet oak, black cherry, and yellow birch dominate the overstory. Pole timber component is mostly sugar maple, red maple, and yellow birch, and some scattered red cedar. Understory varies from open to dense patches of euonymous and other invasives (bittersweet, Japanese barberry, multi-flora rose), with some native shrubs mixed in (winterberry, spicebush).
Forest health:	Fair to average. Fully stocked condition has slowed growth rates. Invasive shrubs have out-competed the native shrubs in many areas.
Site quality:	Site index is approximately 68 for red oak. Average. Site Index was estimated from the attached Forestland Productivity soil report.
Approximate age:	120+ Size class: Medium sawtimber (18" - 24")
Trees per acre:	171 Mean Stand Diameter: 10.7 in.
Basal Area (BA):	108 Acceptable BA: 75
Growth Rate:	2 % Timber Quality: medium
Stocking:	Fully stocked (93%). AGS accounts for 69% of the basal area, average.
Stand Volume:	6,618 bd. ft. / acre.

Tree Diameter Distribution:	DBH	4	6	8	10	12	14	16	18
	%	3	8	7	10	7	7	8	14
	DBH	20	22	24	26	28	30	32	34
	%	8	9	8	2	2	2	1	4

Habitat and wildlife use: Fair to average, with potential for improvement. Some mast producing trees present (oak, hickory, cherry) provide a nominal seasonal food source. Some cavity trees provide den and nesting opportunities for small mammals and birds. Dense patches of invasives provide some cover for wildlife, but control of invasives to encourage native shrubs (winterberry, spicebush) would improve the habitat.

Recreational opportunities:

Good trail access for hiking, wildlife watching, snowshoeing, and cross-country skiing opportunities.

Potential for timber production:

Average. A thinning that favors higher quality hardwoods (oak, cherry, yellow birch, hickory) instead of red maple would improve growth rates and overall stand health, quality, and vigor.

Water quality issues:

No major issues since there is no surface water in this stand and the slopes are gentle. However, due to the proximity of the small stream downslope of the stand, any management activity in this area should include measures to prevent soil erosion by implementing appropriate BMP's, as described in the *BEST MANAGEMENT PRACTICES for water quality while harvesting forest products - 2012 Connecticut Field Guide*.

Important natural features:

None noted.

MANAGEMENT PLANS FOR STAND 3

Landowner's objectives for this stand:	Control invasive plants. Improve quality of forest and wildlife habitat.
Desired future stand conditions:	Create a multi-aged stand of mixed hardwood at full stocking level above the B line (68 sq. ft/ acre) with AGS accounting for 85% or more of the stand, 2 – 3 large snags per acre for wildlife, and a healthy understory (comprised of native shrubs, desirable tree regeneration, and herbaceous plants) that is devoid of non-native invasive vegetation.
No-action alternative:	Stand growth and vigor will continue to stagnate under the nearly overstocked conditions; forest health will decline along with timber values as AGS trees become overmature; existing quality regeneration is not sufficient to re-stock the stand in the event of a catastrophic event; non-native invasive plants will spread steadily throughout the stand; wildlife habitat value will continue to decline; and forest carbon sequestration will be significantly reduced.

Silvicultural Prescription

Recommended silvicultural system:	Implement a Forest Stand Improvement (FSI) thinning of mostly UGS and cull trees that would retain a minimum basal area of 68 sq. ft./acre. Possible early-succesional habitat development in areas of the stand. Post-activity trail improvement.
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Details of the silvicultural prescription / planned activities:	<ol style="list-style-type: none">1) Implement an invasive plant control program.2) FSI thinning.3) Possible ESH development.4) Forest trail improvement.
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EXISTING CONDITIONS FOR STAND 4

Land area: Land area: 5.9 acres

Land use history: Stand 4, which occurs in three separate areas of the property, appears to be post-agricultural (pasture) land that was planted with white pine during the 1930's. This is based upon historical 1934 aerial imagery (attached to this plan) that shows the areas now occupied by the stand to be open pasture, and the fact that it was common practice during those Great Depression years to plant white pine or other conifers in old fields as a conservation project. No data available on any forestry activities in the past 30 years.

Forest Type:

- Existing White pine
- Potential White pine

Successional trend: White pine sawtimber dominates the overstory, with a few scattered hardwoods mixed in. Poletimber component is light, with mostly black birch and scattered white pine. Understory is mostly open, with some pockets of winterberry and spicebush. Scattered invasives, mostly Japanese barberry and bittersweet.

Forest health: Average. Fully stocked condition has slowed growth rates, reduced vigor, and nearly full crown closure provides deep shade that has inhibited stand regeneration.

Site quality: Site index is approximately 63 for white pine, average. Site Index was estimated from the attached Forestland Productivity soil report .

Approximate age: 80+ **Size class:** Large sawtimber (22"- 34")

Trees per acre: 136 **Mean Stand Diameter:** 17.5 in.

Basal Area (BA): 228 **Acceptable BA:** 160

Growth Rate: 2 % **Timber Quality:** med-high

Stocking: Fully stocked (95%). AGS accounts for 70% of the basal area, average.

Stand Volume: 28,977 bd. ft. / acre.

Tree Diameter Distribution:

DBH	4	6	8	10	12	14	16	18
%	0	1	0	1	8	7	10	17
DBH	20	22	24	26	28	30	32	34
%	18	15	7	8	3	3	1	1

Habitat and wildlife use: Average. Mature white pine plantation lacks diversity and ground level growth for browse and cover. Some cavity trees provide some nesting & denning opportunities for birds and small mammals.

Recreational opportunities:	Good trail access for hiking, wildlife watching, snowshoeing, and cross-country skiing opportunities.
Potential for timber production:	Average. Combination of fully stocked stand and large, mature timber is limited by the relatively small size of this stand.
Water quality issues:	No significant issues as there are no watercourses present in the stand, and it occupies relatively flat ground. Nonetheless, erosion control measures should be taken during any management activities by implementing appropriate BMP's, as described in the <i>BEST MANAGEMENT PRACTICES for water quality while harvesting forest products - 2012 Connecticut Field Guide</i> .
Important natural features:	None noted.

MANAGEMENT PLANS FOR STAND 4

Landowner's objectives for this stand:	Control any invasive plants in the stand. Improve quality of forest and wildlife habitat.
Desired future stand conditions:	Create a multi-aged stand of mixed hardwood (favoring white pine) at full stocking level above the B line (155 sq. ft/ acre) with AGS accounting for 85% or more of the stand, 2 – 3 large snags per acre for wildlife, and a healthy understory (comprised of native shrubs, desirable tree regeneration, and herbaceous plants) that is devoid of non-native invasive vegetation.
No-action alternative:	Stand growth and vigor will continue to stagnate under the nearly overstocked conditions; forest health will decline along with timber values as AGS trees become overmature; existing quality regeneration is not sufficient to re-stock the stand in the event of a catastrophic event; non-native invasive plants will spread steadily throughout the stand; wildlife habitat value will continue to decline; and forest carbon sequestration will be significantly reduced.

Silvicultural Prescription

Recommended silvicultural system:	Implement a Forest Stand Improvement (FSI) thinning of mostly UGS and cull trees that would retain a minimum basal area of 155 sq. ft./acre. Post-activity trail improvement.
Details of the silvicultural prescription / planned activities:	<ol style="list-style-type: none">1) Control invasive plants.2) Potential future commercial / FSI thinning.3) Forest trail improvement.

EXISTING CONDITIONS FOR STAND 5

Land area:	Land area: 2.4 acres																																				
Landuse history:	Stand 5, which occurs in two separate areas of the property, appears to be post-agricultural (pasture) land that was planted with Norway spruce during the 1930's. This is based upon historical 1934 aerial imagery (attached to this plan) that shows the areas now occupied by the stand to be open pasture, and the fact that it was common practice during those Great Depression years to plant white pine or other conifers in old fields as a conservation project. No data available on any forestry activities in the past 30 years.																																				
Forest Type:																																					
- Existing	Norway spruce																																				
- Potential	Norway spruce																																				
Successional trend:	Norway spruce with a few scattered hardwoods (red maple, black cherry) dominate the overstory. Poletimber component is almost non-existent, with a few scattered hardwoods. Understory is mostly open with some winterberry and birch saplings, plus some scattered invasives, mostly Japanese barberry.																																				
Forest health:	Average. Nearly full crown closure of spruce has provided deep shade that has inhibited the development of an understory and stand regeneration.																																				
Site quality:	Site index is approximately 63 for white pine, average. Site Index was estimated from the attached Forestland Productivity soil report.																																				
Approximate age:	80+ Size class: med. sawtimber (18"-24")																																				
Trees per acre:	97 Mean Stand Diameter: 16.0 in.																																				
Basal Area (BA):	155 Acceptable BA: 125																																				
Growth Rate:	2 % Timber Quality: medium																																				
Stocking:	Fully stocked (70%). AGS accounts for only 80% of the basal area, above average.																																				
Stand Volume:	18,435 bd. ft. / acre.																																				
Tree Diameter Distribution:	<table border="1"> <thead> <tr> <th>DBH</th> <th>4</th> <th>6</th> <th>8</th> <th>10</th> <th>12</th> <th>14</th> <th>16</th> <th>18</th> </tr> </thead> <tbody> <tr> <td>%</td> <td>0</td> <td>0</td> <td>0</td> <td>6</td> <td>10</td> <td>6</td> <td>7</td> <td>13</td> </tr> <tr> <th>DBH</th> <th>20</th> <th>22</th> <th>24</th> <th>26</th> <th>28</th> <th>30</th> <th>32</th> <th>34</th> </tr> <tr> <td>%</td> <td>19</td> <td>13</td> <td>10</td> <td>10</td> <td>6</td> <td>0</td> <td>0</td> <td>0</td> </tr> </tbody> </table>	DBH	4	6	8	10	12	14	16	18	%	0	0	0	6	10	6	7	13	DBH	20	22	24	26	28	30	32	34	%	19	13	10	10	6	0	0	0
DBH	4	6	8	10	12	14	16	18																													
%	0	0	0	6	10	6	7	13																													
DBH	20	22	24	26	28	30	32	34																													
%	19	13	10	10	6	0	0	0																													
Habitat and wildlife use:	Average. Stand 5 lacks mast producing trees & shrubs. Understory is mostly open with no significant understory for browse or cover.																																				
Recreational opportunities:	Good trail access for hiking, wildlife watching, snowshoeing, and cross-country skiing opportunities.																																				

Potential for timber production:

Average. Site index of this stand is favorable for white pine, red pine, and oak, but Norway spruce has little commercial value.

Water quality issues:

No significant issues as there are no watercourses present in the stand, and it occupies relatively flat ground. Nonetheless, erosion control measures should be taken during any management activities by implementing appropriate BMP's, as described in the *BEST MANAGEMENT PRACTICES for water quality while harvesting forest products - 2012 Connecticut Field Guide*.

Important natural features:

None noted.

MANAGEMENT PLANS FOR STAND 5

Landowner's objectives for this stand:	Control any invasive plants in the stand. Improve quality of forest and wildlife habitat.
Desired future stand conditions:	Create a multi-aged stand of Norway spruce at full stocking level above the B line (115 sq. ft/ acre) with AGS accounting for 85% or more of the stand, 2 – 3 large snags per acre for wildlife, and a healthy understory (comprised of native shrubs, desirable tree regeneration, and herbaceous plants) that is devoid of non-native invasive vegetation.
No-action alternative:	Stand growth and vigor will begin to stagnate under the (eventually) overstocked conditions; forest health will decline along with timber values as AGS trees become overmature; existing quality regeneration is not sufficient to re-stock the stand in the event of a catastrophic event; non-native invasive plants will spread steadily throughout the stand; wildlife habitat value will continue to decline; and forest carbon sequestration will be significantly reduced.

Silvicultural Prescription

Recommended silvicultural system:	Implement a Forest Stand Improvement (FSI) thinning of mostly UGS and cull trees that would retain a minimum basal area of 115 sq. ft./acre. Post-activity trail improvement.
Details of the silvicultural prescription / planned activities:	<ol style="list-style-type: none">1) Control invasive plants.2) Potential future FSI thinning.3) Forest trail improvement.

EXISTING CONDITIONS FOR STAND 6

Land area:	Land area: 1.7 acres
Landuse history:	Stand 6, which occupies the southwest corner of the property around the small pond, appears to be post-agricultural (pasture) land that was planted with a mix of conifers during the 1930's. This is based upon historical 1934 aerial imagery (attached to this plan) that shows the areas now occupied by the stand to be open pasture, and the fact that it was common practice during those Great Depression years to plant white pine or other conifers in old fields as a conservation project. No data available on any forestry activities in the past 30 years.
Forest Type:	
- Existing	Larch-white pine-Norway spruce
- Potential	Larch-white pine-Norway spruce
Successional trend:	Mostly larch with a few white pine and Norway spruce dominate the overstory. Poletimber component is a mostly larch and mixed hardwoods. Understory is mostly open with scattered euonymous throughout the stand.
Forest health:	Average. Overstocked condition has slowed growth rates and inhibited regeneration.
Site quality:	Site index is approximately 65 for white pine, average. Site Index was estimated from the attached Forestland Productivity soil report.
Approximate age:	80+ Size class: med-large sawtimber (16"-24")
Trees per acre:	222 Mean Stand Diameter: 13.5 in.
Basal Area (BA):	250 Acceptable BA: 230
Growth Rate:	2 % Timber Quality: medium
Stocking:	Overstocked (110%).
Stand Volume:	27,015 bd. ft. /acre.

Tree Diameter Distribution:	DBH	4	6	8	10	12	14	16	18
	%	0	4	0	8	4	8	20	24
	DBH	20	22	24	26	28	30	32	34
	%	20	4	8	0	0	0	0	0

Habitat and wildlife use:	Average. Stand 6 lacks mast producing trees & shrubs. Understory is mostly open with no significant understory for browse or cover.
Recreational opportunities:	Good trail access for hiking, wildlife watching, snowshoeing, and cross-country skiing opportunities.
Potential for timber production:	Average. This stand is not likely to be managed due to its small size and proximity to the pond and Munger Lane.

Water quality issues:

This stand occupies what is essentially a small basin around the pond. Even though the slopes are gentle, erosion control measures should be taken during any management activities in surrounding stands by implementing appropriate BMP's, as described in the *BEST MANAGEMENT PRACTICES for water quality while harvesting forest products - 2012 Connecticut Field Guide*.

Important natural features:

None noted.

MANAGEMENT PLANS FOR STAND 6

Landowner's objectives for this stand:	Control any invasive plants in the stand. Improve quality of forest and wildlife habitat.
Desired future stand conditions:	Create a multi-aged stand of mixed softwood at full stocking level above the B line (115 sq. ft/ acre) with AGS accounting for 85% or more of the stand, 2 – 3 large snags per acre for wildlife, and a healthy understory (comprised of native shrubs, desirable tree regeneration, and herbaceous plants) that is devoid of non-native invasive vegetation.
No-action alternative:	Stand growth and vigor will continue to stagnate under the overstocked conditions; forest health will decline along with timber values as AGS trees become overmature; existing quality regeneration is not sufficient to re-stock the stand in the event of a catastrophic event; non-native invasive plants will spread steadily throughout the stand; wildlife habitat value will continue to decline; and forest carbon sequestration will be significantly reduced.

Silvicultural Prescription

Recommended silvicultural system:	Implement a Forest Stand Improvement (FSI) thinning of mostly UGS and cull trees that would retain a minimum basal area of 115 sq. ft./acre. Post-activity trail improvement, if necessary.
Details of the silvicultural prescription / planned activities:	<ol style="list-style-type: none">1) Control invasive plants.2) Potential future FSI thinning.3) Forest trail improvement.

EXISTING CONDITIONS FOR MARSH WETLAND

Land area:	Land area: 0.8 acres	
Landuse history:	Marsh wetland comprised of a mix of cattail and wetland shrubs. No data on past land-use history.	
Habitat Type:		
- Existing	Cattail / shrub marsh.	
- Potential	Cattail / shrub marsh.	
Successional trend:	This small wetland is open in the middle with a mix of cattail and small shrubs, with mix of larger and denser shrubs, (mainly alder, winterberry, and high-bush blueberry) around the edges where it transitions into Stand 2.	
Stand health:	Average, although stand should be monitored for invasive plants and treated as necessary.	
Site quality:	N/A	
Approximate age:	N/A	Size class: N/A
Trees per acre:	N/A	Mean Stand Diameter: N/A
Basal Area (BA):	N/A	Acceptable BA: N/A
Growth Rate:	N/A	Timber Quality: N/A
Stocking:	N/A	
Stand Volume:	N/A	
Habitat and wildlife use:	Average. Appears to be functioning well as wetland habitat.	
Recreational opportunities:	Wildlife watching.	
Potential for timber production:	N/A	
Water quality issues:	No significant issues as there are no activities recommended for this stand other than invasive plant monitoring and control as needed. Nonetheless, erosion control measures should be taken during any management activities by implementing appropriate BMP's, as described in the <i>BEST MANAGEMENT PRACTICES for water quality while harvesting forest products - 2012 Connecticut Field Guide</i> .	
Important natural features:	None noted.	

MANAGEMENT PLANS FOR MARSH WETLAND

Landowner's objectives for this stand: Monitor and control invasive plants as needed.

Desired future stand conditions: Maintain as a healthy, functioning wetland ecosystem in various stages of succession comprised of native wetland vegetation that is free from non-native invasive plants, especially phragmites.

No-action alternative: It is most likely that an infestation of phragmites will eventually become established and overtake the entire stand, outcompete much of the native vegetation, and completely degrade the quality of the wildlife habitat that the stand currently offers.

Silvicultural Prescription

Recommended silvicultural system: N/A

Details of the silvicultural prescription / planned activities: 1) Monitor and control invasive plants.

Summary of management unit(s) on the property

UNIT	ACRES	COVER TYPE	STAND DIAMETER	BASAL AREA	SILVICULTURAL SYSTEM
Stand 1	19.4	Oak-mixed hardwoods	12.0 in.	145	FSI.
Stand 2	13.7	Red maple wetland	10.5 in.	128	FSI.
Stand 3	24.9	Mixed hardwoods	10.7 in.	108	FSI.
Stand 4	5.9	White pine plantation	18.0 in.	228	FSI.
Stand 5	2.4	Norway spruce plantation	16.0 in.	155	FSI.
Stand 6	1.7	Larch & mixed conifer plantation	13.5	250	FSI.
Marsh	0.8	Cattail & shrub wetland	N/A	N/A	N/A

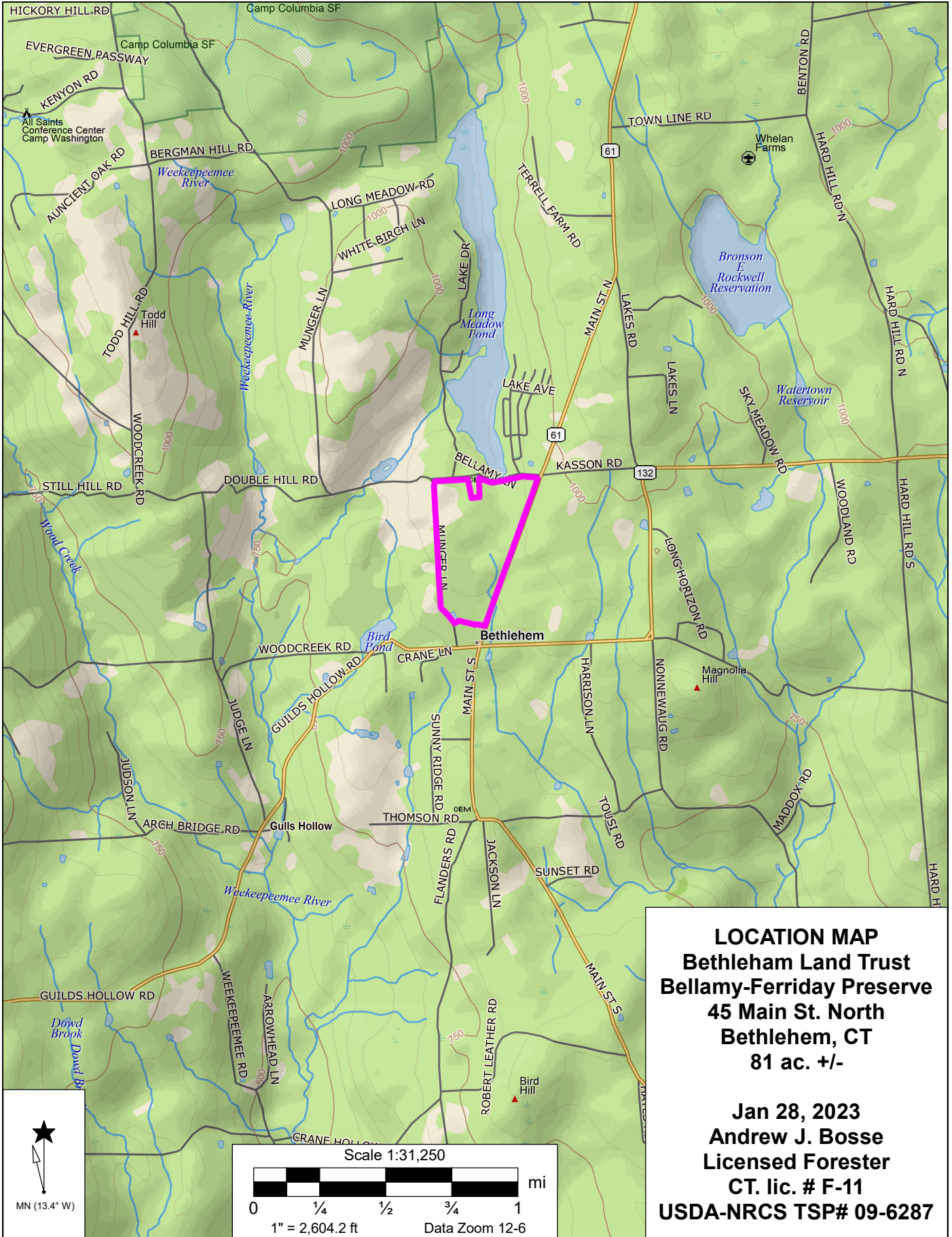
Glossary of Forestry Terms

The following are explanations of some of the technical terms that may appear in this report:

- *AGS*: acceptable growing stock. Trees of good quality that are suitable for present or future sawtimber production.
- *ALB (Asian Longhorn Beetle)*: A destructive non-native wood boring pest of maple trees and other hardwoods.
- *Basal Area*: the cross-sectional area (in square feet per acre, at dbh) of all of the stems in a stand. Used to determine stocking density.
- *Best Management Practices (BMP's)*: Specifically, forestry practices designed to minimize and prevent soil erosion as a source of water pollution. In general, any good forestry practice that promotes good forest stewardship.
- *Board foot*: a unit of volume in a tree, log, or board. One board foot measures 1'x1'x1" in dimension.
- *Browse*: young woody vegetation utilized as a food source by wildlife, especially deer.
- *Canopy*: the uppermost level of forest vegetation, comprised of the tops of the dominant trees in a stand.
- *Crop Tree Management*: A non-commercial silvicultural method that favors high quality individual trees by thinning around such trees to remove competition. This results in much improved growth rates of the selected individuals. Can be used in conjunction with other methods or combined with a commercial harvest.
- *Cull*: Low quality tree with no present or future value for sawtimber.
- *DBH*: diameter at breast height. The diameter of a tree stem 4.5 feet above ground.
- *ESH (Early Successional Habitat)*: Young forest habitat (1- 10 years age) characterized by dense growth of seedlings & saplings.
- *EAB (Emerald Ash Borer)*: A destructive non-native insect pest that attacks ash trees.

- *Even-aged Stand*: A stand of trees that are of a relatively uniform age class.
- *FSI (Forest Stand Improvement)*: A non-commercial harvest focusing on cull and UGS trees, designed to improve stand quality and increase growth rates. Same as TSI, listed below. Can be combined with a commercial harvest.
- *Group Selection*: Silvicultural method that removes trees in small groups (usually ½ to 1 acre) throughout the stand, leaving undisturbed areas in between.
- *Management Unit*: A relatively uniform area (often a Forest Stand) managed as a whole. Often interchangeable with Forest Stand.
- *Mast*: seeds produced from trees that are utilized as a food source by wildlife. Types include *hard mast* (acorns, nuts, etc.), which can be especially valuable due to their abundance and longevity, and *soft mast* (berries, fruit, etc.).
- *NRCS*: Natural Resource Conservation Service, a branch of the U.S. Department of Agriculture.
- *Overstory*: see Canopy
- *Patch cut*: a small clearcut, usually less than one acre.
- *Reserve Tree harvest*: Silvicultural method that resembles a clear-cut except that some of the best quality crop trees are left, (approx. 6 – 12 per acre) for seed production, resulting in an even-aged stand. Characterized as a high-intensity but low frequency system.
- *Riparian Area*: Forest streamside zone. This is an area of significant interaction between the water body and the surrounding forest. It can vary in size depending upon many factors, including slope and topography, soil types, and vegetation. A riparian area can have a significant impact on stream water quality by filtering out runoff and absorbing excessive nutrients, providing shade that will decrease water temperature, and many other important functions. Therefore, it is important that BMP's are implemented when conducting forestry activities in or near riparian areas in order to minimize any adverse impacts.
- *Poletimber*: trees between 4" to 12" dbh.
- *Sapling*: trees between ½" and 4" dbh.
- *Sawtimber*: trees of 12" dbh and greater.
- *Seedling*: trees less than ½" dbh.

- *Shelterwood harvest*: Silvicultural method that regenerates a new forest under the shelter of mature trees. All trees are removed except the healthiest dominant (most desirable) trees, which remain to provide a seed source and to protect the new growth, which eventually will become a new even-aged stand. Once the new stand is established, the mature trees may or may not be removed in successive harvest(s), (e.g. “Two-cut” Shelterwood; “Three-cut” Shelterwood). Compared to the *Reserve Tree harvest*, listed above, it is characterized as a lower-intensity but higher frequency system.
- *Silviculture*: The science of developing and cultivating forests for human benefit.
- *Single-Tree Selection*: Silvicultural method whereby single trees (both AGS and UGS) are selected for harvest throughout stand. Used to create an un-even aged stand.
- *Site Index*: a measure of the productive potential of a site to grow quality trees, it is a function of height vs. age.
- *Stand*: A group or unit of forest type managed as a whole.
- *Stand volume*: the volume of AGS sawtimber in a stand, expressed in board feet per acre.
- *Stocking*: a function of basal area and trees per acre, used to describe stand density. Stands are usually classified as being understocked, well stocked, and overstocked. The region between the “A” and “B” level on stocking charts (well stocked) is optimal for stand growth and, consequently, productivity.
- *TSI*: Timber Stand Improvement. Same as *FSI*, listed above.
- *UGS*: unacceptable growing stock. Low quality trees that are generally unsuitable for present or future sawtimber production, but may contain some merchantable volume.
- *Understory*: the lowest level of forest vegetation beneath the canopy.
- *Uneven-aged Stand*: A stand of trees that contains a variety of age and size classes.



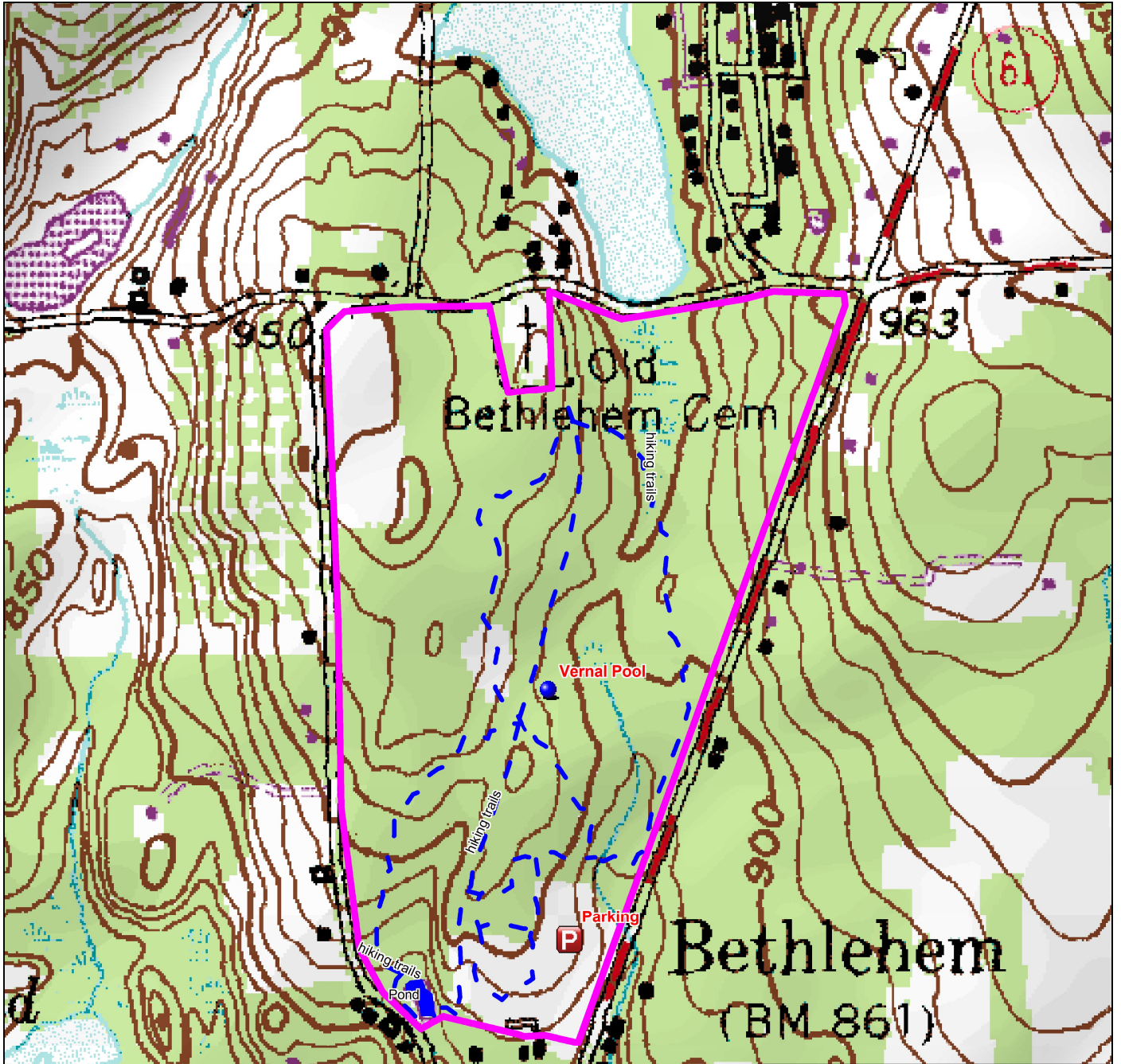
LOCATION MAP
Bethlehem Land Trust
Bellamy-Ferriday Preserve
45 Main St. North
Bethlehem, CT
81 ac. +/-

Jan 28, 2023
Andrew J. Bosse
Licensed Forester
CT. lic. # F-11
USDA-NRCS TSP# 09-6287

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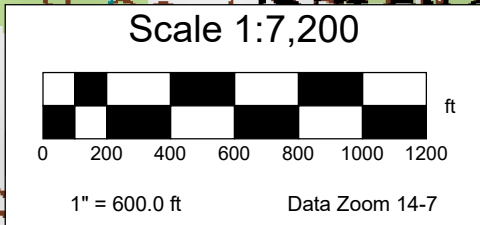
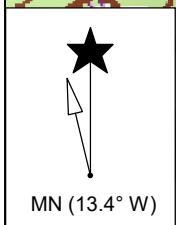
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TOPOGRAPHIC MAP
 Bethlehem Land Trust
 Bellamy Preserve
 45 Main St. North
 Bethlehem, CT
 81 ac. +/-

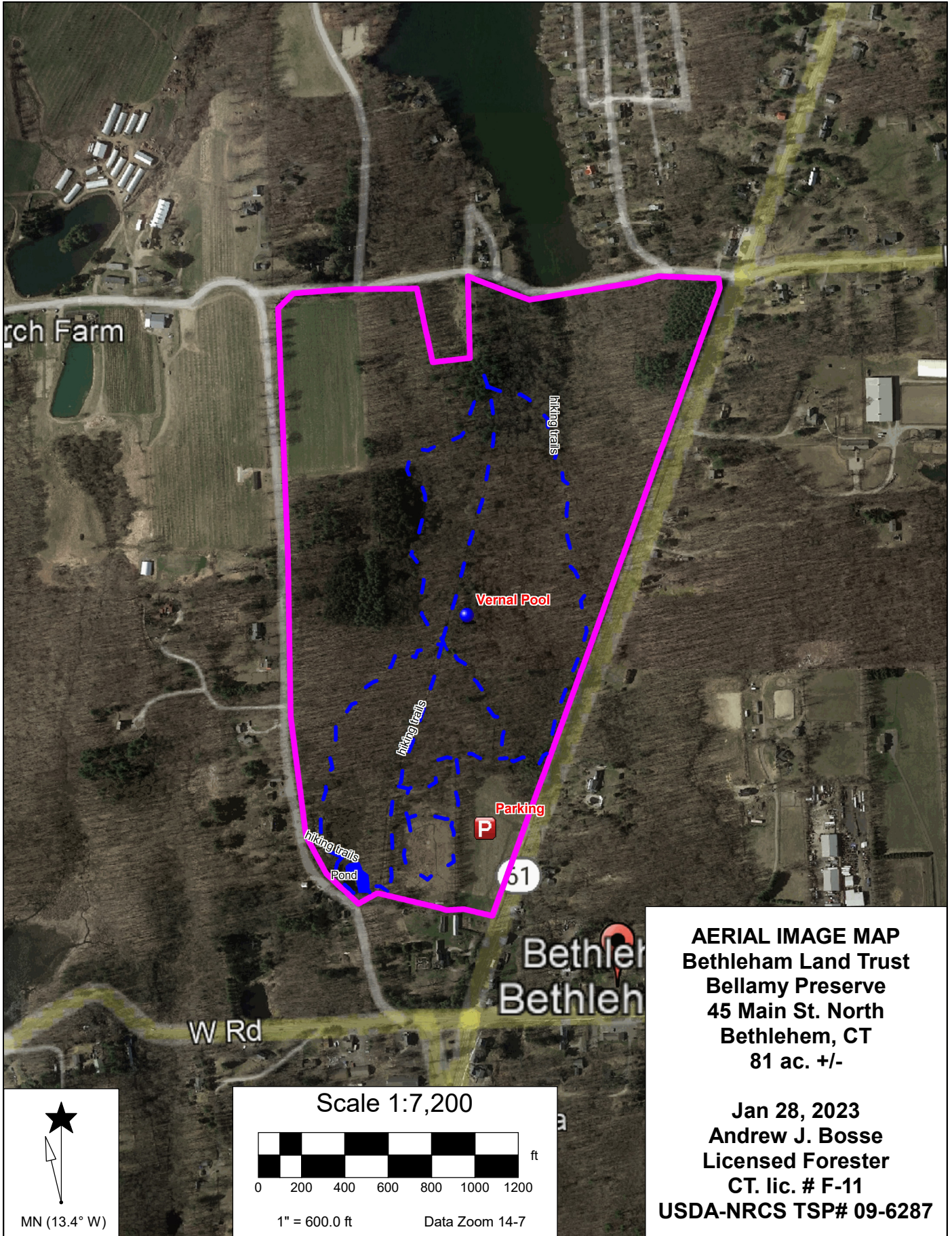
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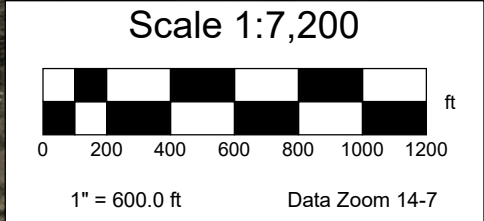
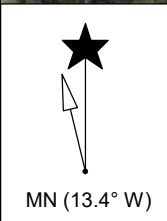
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AERIAL IMAGE MAP
 Bethlehem Land Trust
 Bellamy Preserve
 45 Main St. North
 Bethlehem, CT
 81 ac. +/-

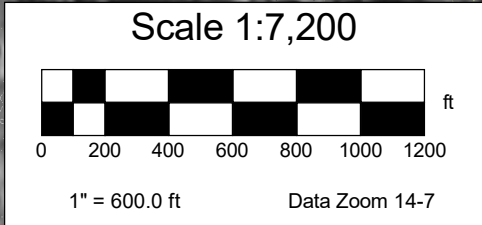
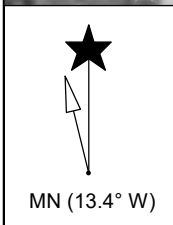
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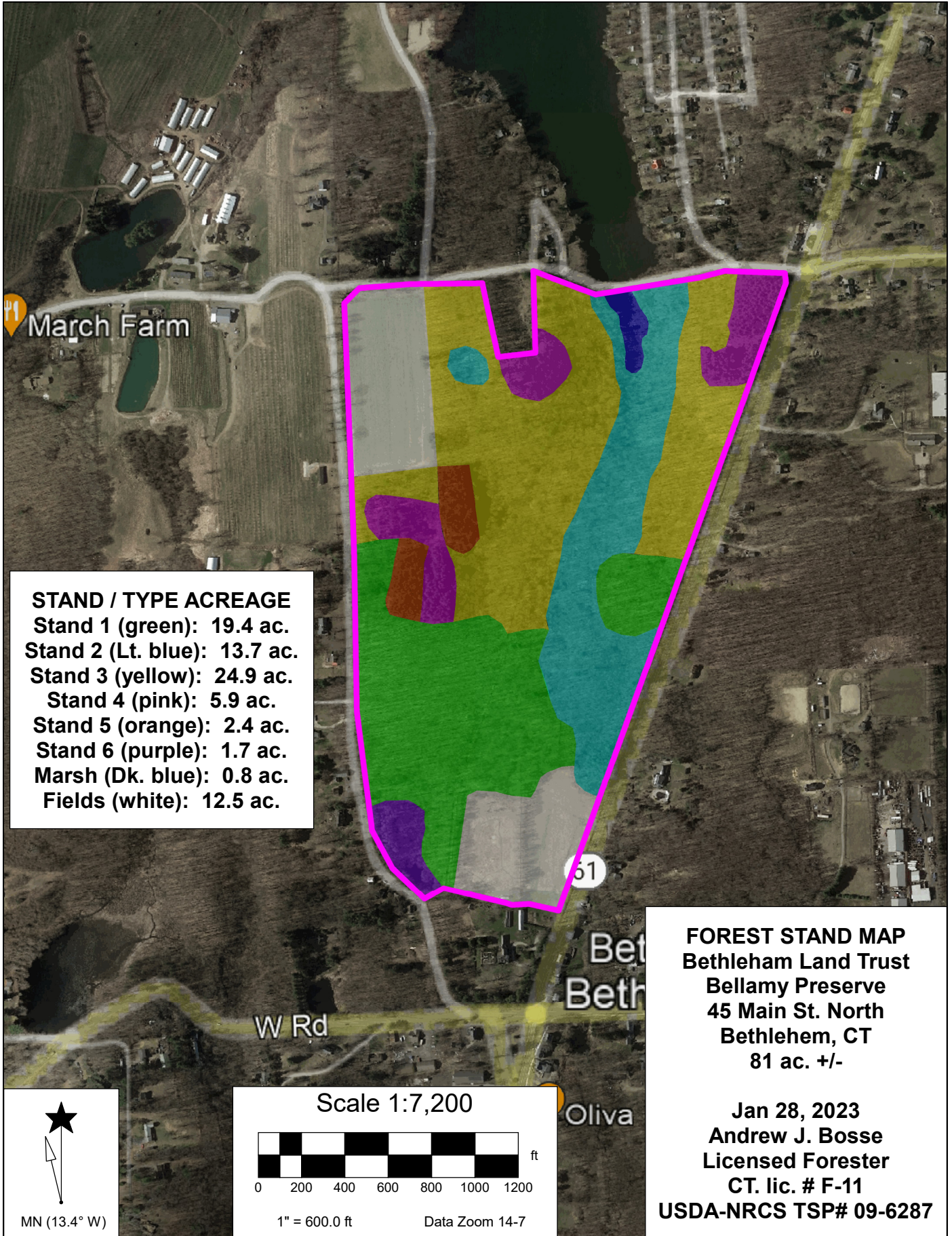




**HISTORIC 1934 AERIAL
IMAGE MAP**
Bethlehem Land Trust
Bellamy Preserve
45 Main St. North
Bethlehem, CT
81 ac. +/-

Jan 28, 2023
Andrew J. Bosse
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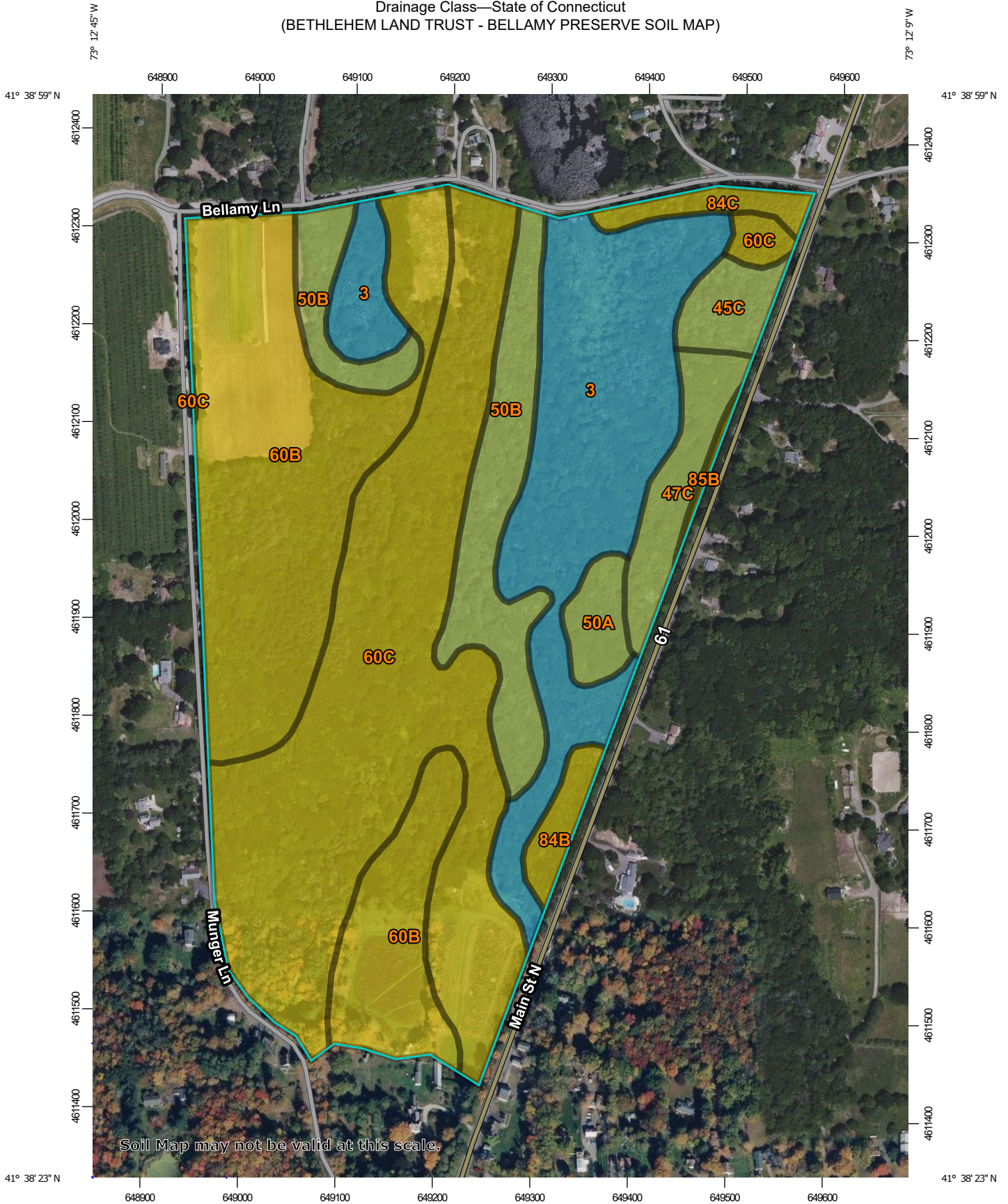


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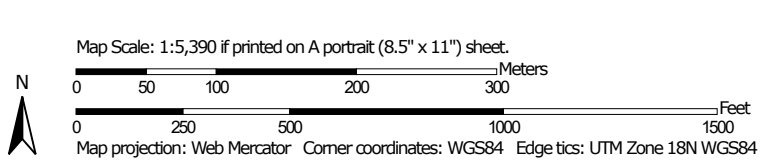
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Drainage Class—State of Connecticut
 (BETHLEHEM LAND TRUST - BELLAMY PRESERVE SOIL MAP)




Soil Map may not be valid at this scale.




MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

-  Excessively drained
-  Somewhat excessively drained
-  Well drained
-  Moderately well drained
-  Somewhat poorly drained
-  Poorly drained
-  Very poorly drained
-  Subaqueous
-  Not rated or not available


Soil Rating Lines

-  Excessively drained
-  Somewhat excessively drained
-  Well drained
-  Moderately well drained
-  Somewhat poorly drained
-  Poorly drained
-  Very poorly drained
-  Subaqueous
-  Not rated or not available




Soil Rating Points

-  Excessively drained
-  Somewhat excessively drained
-  Well drained
-  Moderately well drained
-  Somewhat poorly drained
-  Poorly drained
-  Very poorly drained
-  Subaqueous
-  Not rated or not available


Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: State of Connecticut
Survey Area Data: Version 22, Sep 12, 2022

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

Date(s) aerial images were photographed: Aug 23, 2018—Oct 14, 2020

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

Drainage Class

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	Poorly drained	19.5	19.8%
45C	Woodbridge fine sandy loam, 8 to 15 percent slopes	Moderately well drained	2.0	2.0%
47C	Woodbridge fine sandy loam, 3 to 15 percent slopes, extremely stony	Moderately well drained	3.5	3.6%
50A	Sutton fine sandy loam, 0 to 3 percent slopes	Moderately well drained	1.7	1.8%
50B	Sutton fine sandy loam, 3 to 8 percent slopes	Moderately well drained	9.7	9.8%
60B	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	Well drained	27.6	28.0%
60C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes	Well drained	31.5	31.9%
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	Well drained	1.4	1.4%
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	Well drained	1.4	1.4%
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	Well drained	0.2	0.3%
Totals for Area of Interest			98.5	100.0%

Description

"Drainage class (natural)" refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Forestland Productivity

This table is designed to assist forestland owners or managers in planning the use of soils for wood crops. It provides the potential productivity of the soils for wood crops.

Potential productivity of merchantable or *common trees* on a soil is expressed as a site index and as a volume growth rate number. The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. *Common trees* are those that forestland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. More detailed information regarding site index is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

The *Base Age* is the age of trees in years on which the site index is based. "TA" indicates total age. "BH" indicates breast height age. "N/A" indicates that base age is not applicable.

The *Site Index Curve Number* is listed in the National Register of Site Index Curves. It identifies the site index curve used to determine the site index.

The *Volume Growth Rate* is the maximum wood volume annual growth rate likely to be produced by the tree species. This number, expressed as cubic feet per acre per year, is calculated at the age of culmination of the mean annual increment (CMAI). It indicates the maximum volume of wood fiber produced per year in a fully stocked, even-aged, unmanaged stand.

Reference:

United States Department of Agriculture, Natural Resources Conservation Service, National Forestry Manual.

Report—Forestland Productivity

Forestland Productivity--State of Connecticut				
Map unit symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site Index	Volume of wood fiber	
			<i>Cu ft/ac/yr</i>	
3—Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony				
Ridgebury, extremely stony	Eastern white pine	63	114.00	American elm, Blackgum, Green ash, Pin oak, Red maple, Swamp white oak, Yellow birch
	Northern red oak	66	43.00	
	Red maple	62	—	
	Sugar maple	56	29.00	
	White ash	60	—	
Leicester, extremely stony	Eastern white pine	69	129.00	Green ash, Red maple, Tuliptree
	Northern red oak	56	43.00	
	Red maple	70	43.00	
	Yellow birch	—	—	
Whitman, extremely stony	Blackgum	52	—	—
	Eastern white pine	56	100.00	
	Northern red oak	70	—	
	Red maple	60	29.00	
	Red spruce	44	86.00	
	White oak	57	—	
45C—Woodbridge fine sandy loam, 8 to 15 percent slopes				
Woodbridge	Black oak	77	—	Ash, Northern red oak, Sugar maple, Tuliptree, White oak
	Eastern white pine	67	114.00	
	Northern red oak	72	57.00	
	Red pine	65	114.00	
	Red spruce	50	114.00	
	Sugar maple	65	43.00	
	White oak	—	—	
	Yellow poplar	84	—	

Forestland Productivity--State of Connecticut				
Map unit symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site Index	Volume of wood fiber	
			<i>Cu ft/ac/yr</i>	
47C—Woodbridge fine sandy loam, 3 to 15 percent slopes, extremely stony				
Woodbridge, extremely stony	Black oak	77	—	Ash, Northern red oak, Sugar maple, Tuliptree, White oak
	Eastern white pine	67	114.00	
	Northern red oak	72	57.00	
	Red pine	65	114.00	
	Red spruce	50	114.00	
	Sugar maple	65	43.00	
	White oak	—	—	
	Yellow poplar	84	—	
50A—Sutton fine sandy loam, 0 to 3 percent slopes				
Sutton	Black cherry	72	43.00	Eastern white pine, European larch, Northern red oak, Norway spruce, White oak, White spruce
	Eastern white pine	62	114.00	
	Northern red oak	62	43.00	
	Red spruce	50	114.00	
	Sugar maple	54	29.00	
	White oak	—	—	
50B—Sutton fine sandy loam, 3 to 8 percent slopes				
Sutton	Black cherry	72	43.00	Eastern white pine, Northern red oak, White oak
	Eastern white pine	62	114.00	
	Northern red oak	62	43.00	
	Red spruce	50	114.00	
	Sugar maple	54	29.00	
	White oak	—	—	

Forestland Productivity--State of Connecticut				
Map unit symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site Index	Volume of wood fiber	
			<i>Cu ft/ac/yr</i>	
60B—Canton and Charlton fine sandy loams, 3 to 8 percent slopes				
Canton	Eastern hemlock	—	—	Beech, Bitternut hickory, Black oak, Eastern hemlock, Eastern white pine, Gray birch, Mockernut hickory, Northern red oak, Pignut hickory, Red maple, Shagbark hickory, Sugar maple, White ash, White oak, Yellow birch
	Eastern white pine	58	100.00	
	Northern red oak	52	29.00	
	White oak	—	—	
Charlton	Eastern hemlock	—	—	Eastern white pine, European larch, Northern red oak, Norway spruce, Red pine, Scarlet oak, Sugar maple, Tuliptree, White ash, White oak
	Eastern white pine	65	114.00	
	Northern red oak	65	43.00	
	Red maple	55	29.00	
	Red pine	70	129.00	
	Red spruce	50	114.00	
	Shagbark hickory	—	0.00	
	Sugar maple	55	29.00	
	White oak	—	—	
60C—Canton and Charlton fine sandy loams, 8 to 15 percent slopes				
Canton	Eastern hemlock	—	—	Beech, Bitternut hickory, Black oak, Eastern hemlock, Eastern white pine, Gray birch, Mockernut hickory, Northern red oak, Pignut hickory, Red maple, Shagbark hickory, Sugar maple, White ash, White oak, Yellow birch
	Eastern white pine	58	100.00	
	Northern red oak	52	29.00	
	White oak	—	—	
Charlton	Eastern hemlock	—	—	Eastern white pine, European larch, Northern red oak, Norway spruce, Red pine, Scarlet oak, Sugar maple, Tuliptree, White ash, White oak
	Eastern white pine	65	114.00	
	Northern red oak	65	43.00	
	Red maple	55	29.00	
	Red pine	70	129.00	
	Red spruce	50	114.00	
	Shagbark hickory	—	0.00	
	Sugar maple	55	29.00	
	White oak	—	—	

Forestland Productivity--State of Connecticut				
Map unit symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site Index	Volume of wood fiber	
			<i>Cu ft/ac/yr</i>	
84B—Paxton and Montauk fine sandy loams, 3 to 8 percent slopes				
Paxton	Black oak	67	—	Eastern white pine, European larch, Northern red oak, Norway spruce, Red pine, Scarlet oak, Sugar maple, Tuliptree, White ash, White oak
	Eastern white pine	72	114.00	
	European larch	80	—	
	Northern red oak	68	43.00	
	Red pine	70	—	
	Scarlet oak	67	—	
	Sugar maple	75	43.00	
	White ash	89	—	
	White oak	60	—	
Montauk	Eastern white pine	75	143.00	Ash, Northern red oak, Sugar maple, Tuliptree, White oak
	Northern red oak	70	57.00	
	Sugar maple	65	43.00	
	White oak	—	—	

Forestland Productivity--State of Connecticut				
Map unit symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site Index	Volume of wood fiber	
			<i>Cu ft/ac/yr</i>	
84C—Paxton and Montauk fine sandy loams, 8 to 15 percent slopes				
Paxton	American beech	65	40.00	Eastern white pine, European larch, Northern red oak, Norway spruce, Red pine, Scarlet oak, Sugar maple, Tuliptree, White ash, White oak
	Black oak	67	—	
	Eastern white pine	66	114.00	
	European larch	80	—	
	Northern red oak	65	43.00	
	Red maple	65	40.00	
	Red pine	67	114.10	
	Red spruce	55	123.00	
	Scarlet oak	67	—	
	Sugar maple	74	43.00	
	White ash	85	47.00	
	White oak	60	—	
Yellow birch	65	40.00		
Montauk	Black oak	67	—	Eastern hemlock, Eastern white pine, Elm, Gray birch, Northern red oak, Red maple, Scarlet oak, Sugar maple, Sweet birch, White ash, White oak, Yellow birch, Yellow poplar
	Eastern white pine	72	114.00	
	European larch	80	—	
	Northern red oak	68	43.00	
	Red pine	70	—	
	Scarlet oak	67	—	
	Sugar maple	75	43.00	
	White ash	89	—	
White oak	60	—		

Forestland Productivity--State of Connecticut				
Map unit symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site Index	Volume of wood fiber	
			<i>Cu ft/ac/yr</i>	
85B—Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony				
Paxton, very stony	American beech	65	40.00	Eastern white pine, European larch, Northern red oak, Norway spruce, Red pine, Scarlet oak, Sugar maple, Tuliptree, White ash, White oak
	Black oak	67	—	
	Eastern white pine	66	114.00	
	European larch	80	—	
	Northern red oak	65	43.00	
	Red maple	65	40.00	
	Red pine	67	114.10	
	Red spruce	55	123.00	
	Scarlet oak	67	—	
	Sugar maple	74	43.00	
	White ash	85	47.00	
	White oak	60	—	
Yellow birch	65	40.00		
Montauk, very stony	Black oak	67	—	Eastern hemlock, Eastern white pine, Elm, Gray birch, Northern red oak, Red maple, Scarlet oak, Sugar maple, Sweet birch, White ash, White oak, Yellow birch, Yellow poplar
	Eastern white pine	72	114.00	
	European larch	80	—	
	Northern red oak	68	43.00	
	Red pine	70	—	
	Scarlet oak	67	—	
	Sugar maple	75	43.00	
	White ash	89	—	
White oak	60	—		

Data Source Information

Soil Survey Area: State of Connecticut
 Survey Area Data: Version 22, Sep 12, 2022

Selected Soil Interpretations

This report allows the customer to produce a report showing the results of the soil interpretation(s) of his or her choice. It is useful when a standard report that displays the results of the selected interpretation(s) is not available.

When customers select this report, they are presented with a list of interpretations with results for the selected map units. The customer may select up to three interpretations to be presented in table format.

For a description of the particular interpretations and their criteria, use the "Selected Survey Area Interpretation Descriptions" report.

Report—Selected Soil Interpretations

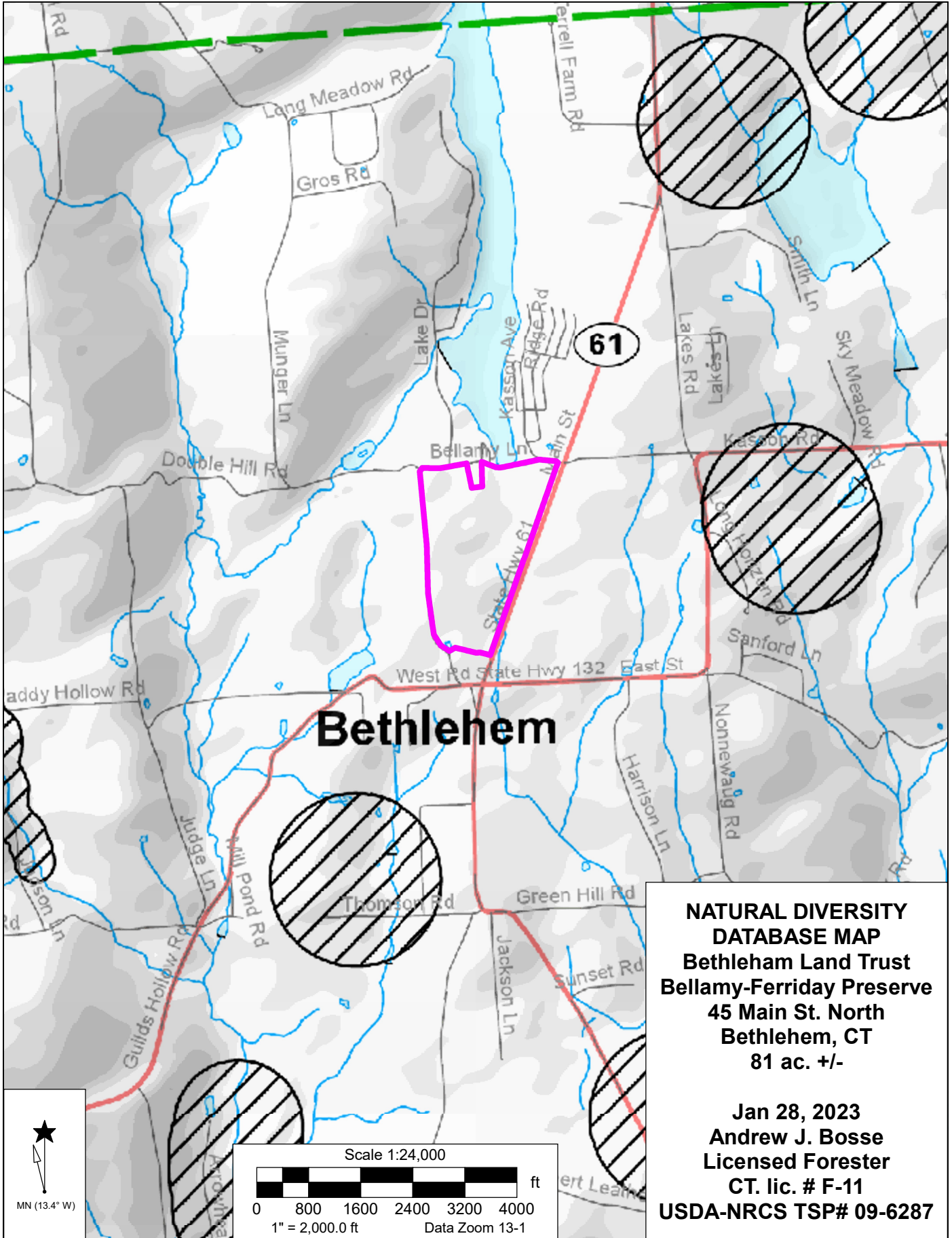
Selected Soil Interpretations—State of Connecticut									
Map symbol and soil name	Pct. of map unit	FOR - Harvest Equipment Operability		FOR - Potential Erosion Hazard (Road/Trail)		FOR - Soil Rutting Hazard		Inland Wetlands (CT)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
3—Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony									
Ridgebury, extremely stony	40	Moderately suited		Slight		Moderate		CT wetland	
		Rock fragments	0.50			Low strength	0.50		
		Dusty	0.01						
Leicester, extremely stony	35	Moderately suited		Slight		Moderate		CT wetland	
		Rock fragments	0.50			Low strength	0.50		
		Dusty	0.01						
Whitman, extremely stony	17	Poorly suited		Slight		Moderate		CT wetland	
		Wetness	1.00			Wetness	0.50		
		Rock fragments	0.50			Low strength	0.50		
		Dusty	0.01						

Selected Soil Interpretations--State of Connecticut									
Map symbol and soil name	Pct. of map unit	FOR - Harvest Equipment Operability		FOR - Potential Erosion Hazard (Road/Trail)		FOR - Soil Rutting Hazard		Inland Wetlands (CT)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
45C— Woodbridge fine sandy loam, 8 to 15 percent slopes									
Woodbridge	85	Well suited		Severe		Moderate		CT nonwetland	
		Dusty	0.01	Slope/erodibility	0.95	Low strength	0.50		
47C— Woodbridge fine sandy loam, 3 to 15 percent slopes, extremely stony									
Woodbridge, extremely stony	83	Moderately suited		Severe		Moderate		CT nonwetland	
		Rock fragments	0.50	Slope/erodibility	0.95	Low strength	0.50		
		Dusty	0.01						
50A—Sutton fine sandy loam, 0 to 3 percent slopes									
Sutton	85	Well suited		Slight		Moderate		CT nonwetland	
		Dusty	0.01			Low strength	0.50		
50B—Sutton fine sandy loam, 3 to 8 percent slopes									
Sutton	80	Well suited		Moderate		Moderate		CT nonwetland	
		Dusty	0.01	Slope/erodibility	0.50	Low strength	0.50		
60B—Canton and Charlton fine sandy loams, 3 to 8 percent slopes									
Canton	50	Well suited		Moderate		Moderate		CT nonwetland	
		Dusty	0.01	Slope/erodibility	0.50	Low strength	0.50		
Charlton	35	Well suited		Moderate		Moderate		CT nonwetland	
		Dusty	0.01	Slope/erodibility	0.50	Low strength	0.50		

Selected Soil Interpretations--State of Connecticut									
Map symbol and soil name	Pct. of map unit	FOR - Harvest Equipment Operability		FOR - Potential Erosion Hazard (Road/Trail)		FOR - Soil Rutting Hazard		Inland Wetlands (CT)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
60C—Canton and Charlton fine sandy loams, 8 to 15 percent slopes									
Canton	50	Well suited		Severe		Moderate		CT nonwetland	
		Dusty	0.01	Slope/erodibility	0.95	Low strength	0.50		
Charlton	35	Well suited		Severe		Moderate		CT nonwetland	
		Dusty	0.01	Slope/erodibility	0.95	Low strength	0.50		
84B—Paxton and Montauk fine sandy loams, 3 to 8 percent slopes									
Paxton	55	Well suited		Moderate		Moderate		CT nonwetland	
		Dusty	0.01	Slope/erodibility	0.50	Low strength	0.50		
Montauk	30	Well suited		Moderate		Moderate		CT nonwetland	
		Dusty	0.01	Slope/erodibility	0.50	Low strength	0.50		
84C—Paxton and Montauk fine sandy loams, 8 to 15 percent slopes									
Paxton	55	Well suited		Severe		Moderate		CT nonwetland	
		Dusty	0.01	Slope/erodibility	0.95	Low strength	0.50		
Montauk	30	Well suited		Severe		Moderate		CT nonwetland	
		Dusty	0.01	Slope/erodibility	0.95	Low strength	0.50		
85B—Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony									
Paxton, very stony	55	Well suited		Moderate		Moderate		CT nonwetland	
		Dusty	0.01	Slope/erodibility	0.50	Low strength	0.50		
Montauk, very stony	30	Well suited		Moderate		Moderate		CT nonwetland	
		Dusty	0.01	Slope/erodibility	0.50	Low strength	0.50		

Data Source Information

Soil Survey Area: State of Connecticut
Survey Area Data: Version 22, Sep 12, 2022



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Forest Bird Habitat Assessment

**Bellamy-Ferriday Preserve
45 Main St. N, Bethlehem, CT**

81 Acres



Assessment Date: December 2, 2022

Report Date: April 13, 2023

Prepared for: Bethlehem Land Trust

Prepared by:

Audubon Connecticut

Rosa Goldman

Bird photos courtesy of Patrick Comins, Audubon Connecticut and AJ Hand (left to right): Black-throated Blue Warbler, Scarlet Tanager, Wood Thrush, and Black-throated Green Warbler.

Background

Breeding bird surveys have shown that the forests of New England are globally important for bird populations. Connecticut's **forests are home to some of the highest concentrations of bird species breeding in the continental United States**; they are a "nursery" for approximately 70 species of neo-tropical migratory birds. Although some of these birds are still common in our area – **many are experiencing long-term population declines and have been identified by Audubon Connecticut as *Priority Species***. Audubon Connecticut's Forest Bird Initiative focuses its conservation efforts on ***Priority Species*** giving us an opportunity to keep these species common before they become threatened or endangered.

Since 85% of our region's forests are privately-owned, large blocks of forest may be owned by hundreds of individual landowners with different priorities. Even the smallest properties can be critical parts of large, forested landscapes that provide high-quality habitat for breeding birds. **Small actions by individual forest landowners can have a significant impact on maintaining large blocks of high-quality habitat for future bird populations.** Audubon Connecticut is partnering with foresters to provide **technical assistance and educational opportunities for landowners** who want to make a difference for birds in their forests. If you are interested in taking the next steps in improving and diversifying your woods with birds in mind, specific activities may be eligible for cost-share through the USDA Natural Resources Conservation Service (NRCS). The NRCS is a federal agency whose mission is to help farmers and landowners complete activities that improve conservation values on their properties.

This habitat assessment and bird survey is provided to qualifying landowners free of charge due to generous support from the United States Department of Agriculture Forest Service.

Purpose

Information in this report is presented from the landscape level to the property level. This assessment was conducted by an Audubon biologist in partnership with a Connecticut licensed forester in order to:

- Determine what birds are currently utilizing the habitats on the property.
- Describe and assess current forest bird habitat conditions on the property.
- Make recommendations for protecting and improving habitat for a suite of priority forest birds.

Birds and Habitat Types

The Bird Watcher's Dozen, listed on page 3, is a representative subset of Connecticut's Priority Birds. These species are relatively common in CT. They were some of the birds we focused on during your habitat assessment, because a forest with suitable habitats for these species likely provides habitats for a wide range of additional species.

The Birdwatcher's Dozen - Connecticut



American Woodcock
 Call: Peent
 Habitat: Deciduous woods with a dense understory. Requires some open areas for courtship display.



Black-throated Blue Warbler
 Song: Beer, beer, beer, bee
 Habitat: Deciduous or mixed woodlands with 50-80% canopy cover and a dense shrub understory. Sensitive to forest fragmentation.



Black-throated Green Warbler
 Song: Zee, zee, zee, zoo, zee
 Habitat: Strongly associated with Hemlocks. Prefers a closed canopy and uneven-aged woodlands.



Chestnut-sided Warbler
 Song: Please, please, please to meetcha
 Habitat: regenerating deciduous woods of 5-10 years old.



Eastern Wood Pewee
 Song: Pewee or wee ooh
 Habitat: Prefers deciduous woods with a nearly closed canopy and an open mid-story. Snags serves as foraging perches.



Louisiana Waterthrush
 Song: Hey, hey, hey, watch where your going
 Habitat: Forages along woodland streams, nests adjacent to stumps and other woody debris, prefers a nearly closed canopy.



Pileated Woodpecker
 Song: Key, key, key, key, key....loudest in the middle
 Habitat: Requires large trees for nesting and roosting cavities. Forest block size and the presence of snags are also important.



Red-eyed Vireo
 Song: Here I am, where are you
 Habitat: Requires moderate understory vegetation. Forages in the mid-story and canopy. Often found near canopy gaps.



Scarlet Tanager
 Song: A scratchy cheerily, cheerilo; the call sounds like chick burr.
 Habitat: Uneven aged deciduous woods (oaks and maples) with a mostly closed canopy.



Veery
 Song: a descending spiral of notes
 Habitat: Deciduous woods with a moderately closed canopy and a dense understory. Uses woody debris for nest sites and shelter. Often found in riparian areas.



Wood Thrush
 Song: Eolay, ching, ching
 Habitat: Deciduous or mixed woods with a closed canopy and a moderate mid-story and shrub layer. Likes a fairly open forest floor with damp soil.



Worm-eating Warbler
 Song: an insect like trill
 Habitat: Found on slopes with mature deciduous or mixed trees. Prefers a closed canopy and a shrubby understory.

Developed by Audubon CT with support from NEFA and USFS. Photos by AJ Hand, P Comins, and C Folsom-O'Keefe.

Priority Birds

We share our northern forests with as much as 90% of the global breeding populations of dozens of species of migratory birds, including the Scarlet Tanager, Wood Thrush, Black-throated Blue Warbler, and Worm-eating Warbler (Partners in Flight). We have a responsibility to look out for the future of these birds because our forests are the core of their breeding range. Audubon Connecticut refers to these birds as **Priority Species**, or sometimes “responsibility species.” Fortunately, because these birds are still common in our region, we have the opportunity to protect and enhance their breeding habitat now before they become threatened or endangered. Knowing which species are or may be nesting on your property is a great start for you to make a positive difference. A full list of species observed on your property during the habitat assessment can be found in Appendix A. With your permission, we may also conduct more thorough bird surveys on your property which will supplement this report and increase our collective knowledge of forest bird species distribution in CT.

Note: This assessment was conducted in December, when migratory birds are not present in our region. This table and the list in Appendix A are not representative of all the bird species using the property throughout the year.

Connecticut Priority Birds					
Mature Hardwoods/Mixed Forest	Confirmed	Potential	Young Hardwoods /Mixed Forest	Confirmed	Potential
American Redstart		X	Canada Warbler		X
Black-and-white Warbler		X	Chestnut-sided Warbler		X
Blackburnian Warbler		X	Eastern Whip-poor-will		X
Black-throated Blue Warbler		X	Northern Flicker		X
Blue-gray Gnatcatcher		X	Ruffed Grouse *		X
Blue-headed Vireo		X	Forest Edges/Dense Shrubs		
Broad-winged Hawk		X	Baltimore Oriole		X
Brown Creeper		X	Black-billed Cuckoo		X
Cerulean Warbler		X	Blue-winged Warbler		X
Eastern Wood Pewee		X	Brown Thrasher		X
Hairy Woodpecker *		X	Eastern Towhee		X
Hermit Thrush		X	Gray Catbird		X
Hooded Warbler		X	Indigo Bunting		X
Northern Goshawk		X	Orchard Oriole		X
Ovenbird		X	Prairie Warbler		X
Pileated Woodpecker *		X	Rose-breasted Grosbeak		X
Purple Finch		X	Yellow-billed Cuckoo		X
Red-eyed Vireo		X	Riparian Corridors or Wetlands		
Red-shouldered Hawk		X	Barred Owl *		X
Ruby-throated Hummingbird		X	Eastern Kingbird		X
Scarlet Tanager		X	Eastern Screech Owl *		X
Sharp-shinned Hawk		X	Great-crested Flycatcher		X
Veery		X	Least Flycatcher		X
Winter Wren		X	Louisiana Waterthrush		X
Wood Thrush		X	Willow Flycatcher		X
Worm-eating Warbler		X	Mature Softwood Forest		
Yellow-throated Vireo		X	Pine Warbler		X
Other			Black-throated Green Warbler		X
American Woodcock		X			

* denotes year-round residents. denotes one of the Birdwatchers Dozen. (0 observed)

How the Assessment Was Done

This assessment was done in collaboration with a licensed forester. The forester did the preliminary work of mapping your property’s distinct land use and land cover types, after superimposing the property boundaries over an aerial photograph. For each of these areas, the forester generated descriptions of the stand or cover type and condition that can be used as the basis for recommendations to achieve certain management objectives. The role of biologists from Audubon Connecticut is to supplement management recommendations made by the forester by focusing on management objectives specific to enhancing bird habitat. The Audubon biologist observed which birds were present or potentially present in each type of forest (or other cover type). Recommendations for management measures were then generated, based on the quality of existing habitat or the potential for enhancing habitat, for the priority birds listed above and occasionally for other bird species. Different alternatives may be presented, to meet the landowner’s own conservation interests. The entire list of observed birds is provided in Appendix A.

Property Summary

The Bellamy Preserve is a mostly wooded property containing mixed hardwood forest and several planted softwood stands. There is a marsh at the north of the property and an intermittent stream flowing through the eastern side, along with a small pond at the southern end of the parcel. The barn sits in an open area made up of lawn and hayfields; another field at the northwestern corner is used by a local farm. This variety of cover types provides diverse habitat for birds that require mature forest, softwood, edge, wetland/shrubby, and grassland habitats. The understory and midstory vary in density across the forest; these canopy layers are important for birds that nest at different heights. A large portion of the forest is dominated by winged euonymus in the understory, and there are several other invasive plant species found here as well. Controlling these and encouraging native regeneration instead would go a long way towards improving bird habitat at the preserve.

The actions recommended in the forest management plan that this assessment accompanies will help to maintain the health, diversity and structural complexity of native vegetation in the wooded areas. This in turn can enhance the quality of priority forest bird habitat, particularly for species that nest or feed in the mid-story or understory. These measures will also protect water quality and soil integrity.

Landscape Context

The composition of the landscape that immediately surrounds your property affects how wildlife will use the property. Heavily forested surroundings, with large connected blocks of mature forest, will likely contain the suite of forest priority birds. Below, the category highlighted in **color** is the value that best describes the surrounding landscape. **The values below are for the 2,500 acres surrounding your property, as shown in the map that follows the table.**

Feature	Value for forest birds			Comments
	Good	Fair	Low	
% Forest Cover	>70% of area	50-70% of area	<50% of area	The surrounding landscape is estimated to be just below 50% forested.

Feature	Value for forest birds			Comments
	Good	Fair	Low	
Forest Block Size	>2500 acres	500-2500 acres	<500 acres	Within the surrounding 2,500 acres, this property lies within a forest block less than 500 acres in size.
% Established Forest >20 years (with some old forest >100 years)	>80% of forest	70-80% forest	<70% forest	Most of the forest in the surrounding landscape is mature forest habitat.
% Young Forest <20 years	3-5% of forest	5-10% of forest	<3% or >10% forest	Less than 1% of the total forested area is estimated to be young forest, though this should be ground-truthed.

Your Property within the Landscape Description

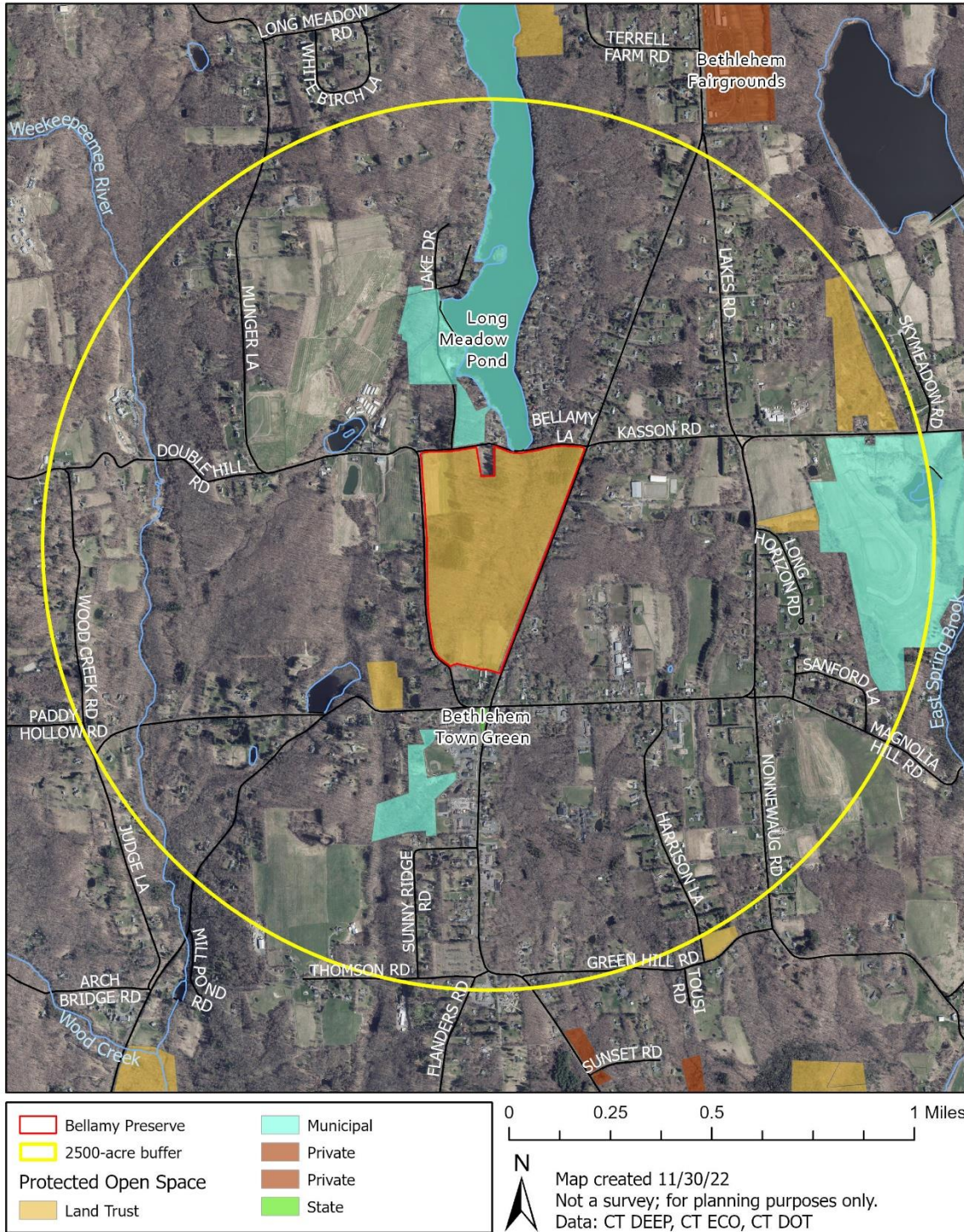
Within the surrounding 2,500 acres, the Bellamy Preserve is one of the largest blocks of forest on the landscape, located just north of the tow center of Bethlehem. Much of the surrounding area is in agriculture or residential development, with just less than 50% of it estimated to be forested. The preserve’s status as protected forest is valuable, particularly given its location within a relatively small forest block. Many species of forest birds require large tracts of contiguous forest, and Bethlehem Land Trust is playing an important role for landscape-level conservation and connectivity by maintaining this parcel as forest within a fragmented landscape.

In addition to the preserve itself, there are several other tracts of protected open space on the landscape, including Long Meadow Pond directly to the north. That is also the largest water body within the 2,500 acres, and it is associated with the marsh at the north end of the preserve. There are several smaller ponds and streams present in the surrounding area as well. Of the total forested land within the landscape, only a small portion of it is young forest, or early successional habitat. For bird species that rely on early successional forest, having 3-5% of the total forest in that habitat type would provide more opportunities for nesting and forage. However, given the low percent forest cover overall, maintaining that existing forest is a priority for habitat management.

Cooperative management of this forest on a landscape scale, in collaboration with nearby forest landowners, is highly recommended. Such management might result in adjusting some recommendations for particular parcels, in part to meet different landowner interests, while allowing habitat enhancement to be carried out on a larger scale.

Landscape Context Map

Bellamy Preserve -- Landscape Context
45 Main Street North, Bethlehem, CT (81 ac)



Property Narrative

General Description

This property contains a patchwork of forest, field, and wetland. The forest is mostly hardwood, with several softwood plantations. The fields in the southern part of the property are hayed, while the northern field is used for agriculture. There is a shrubby marsh at the northern boundary and a wooded wetland with a seasonal stream, as well as a small pond in the southwest corner of the property. Much of the southern part of the property is dominated by winged euonymus in the understory. In other parts of the forest, the understory and midstory range in density in terms of native plant species. The presence of this protected forest on the landscape, as well as its connectivity with adjacent parcels, is an important habitat feature for interior forest birds that require larger blocks of contiguous forest.

Detailed descriptions and boundaries of the property's different forest stands are provided in the forest management plan that this bird habitat assessment accompanies. In contrast, the descriptions below focus on the factors relevant to habitat for birds, especially priority forest birds.

Some key features for bird habitat are: the edges between open areas and deep woods; the overall vertical structure from forest floor to canopy; variation between patches of forest; presence or absence of gaps in the canopy; the mix of hardwood and conifers; the amount of standing dead wood (snags) and downed dead wood; leaf litter; water features; variety of tree sizes and tree cavities; sources of hard mast (acorns and nuts), soft mast (fruits and berries), and seeds; sources of insect food; and prevalence of invasive non-native species vs. native species.

Comments about habitat value may apply to year-round resident birds, neotropical migrants that use this property during the breeding season, or migrants using this habitat as a stopover in spring and fall.

Comments may also include bird habitat on the non-forested portions of the property that may not be covered in the forest management plan.

Stands

Hardwood forest (Stands 1, 2, and 3)

Mixed hardwood forest makes up most of the forested area on the preserve and includes stands 1, 2, and 3 as described in the forest management plan. The canopy in stands 1 and 3 is composed variably of maples, oaks, hickories, birches, cherry, and pine. Stand 2 is a red maple wetland that contains a small seasonal stream, which adds valuable watercourse habitat and has potential to support Louisiana Waterthrush, Winter Wren, various flycatchers, and other species that nest or forage along woodland streams. The presence of oaks provides good foraging opportunities for birds seeking insects and caterpillars; oaks host the highest diversity of native insects in our forests. Their acorns, along with hickory and beech nuts, are also eaten by birds such as Wild Turkeys and Blue Jays. Other hardwood species, such as maples and birches, offer seeds and associated insects as well, and the cherries provide soft mast (fruit) for forage.

The scattered softwoods here (and of course in the softwood stands) contribute to structural diversity within the forest and are an important habitat feature, providing insect food, seeds, and nesting sites for conifer-loving

species such as Pine Warbler and Black-throated Green Warbler. Within stand 2, there is a small hemlock grove on the eastern boundary of the preserve. In addition to the hemlock, this area contains red oak, red maple, and some emergent white pine. There is a moderate density here of hemlocks in the midstory, and an open understory (which is typical of a hemlock stand). Hemlocks are preferred nest sites for Black-throated Green Warblers, and they also provide year-round thermal regulation and evergreen cover for overwintering species. The forest edge here along Route 61 is fairly hard, with clear visibility into the forest from outside. This is partially due to the typical open understory of a hemlock stand, and it would benefit interior forest birds to soften that edge by planting some native shrubs along the roadside. See the “fields and forest edge” section below for more information on the importance of edge habitat and how to manage it for bird habitat.

Dense understories in mature forest provide nesting habitat for bird species that nest from ground level to about 10 feet, including Ovenbird, Veery, and Black-and-white Warbler, as well as other warblers and some sparrows. A large portion of the understory of stand 1 is dominated by invasive plants, mostly winged euonymus (also known as burning bush) along with multiflora rose. This makes for a dense understory that provides good structure, but it would be preferable to have an understory of native plants. Invasive plants take up growing space from native species, and although they may provide some structure and soft mast forage for birds, their fruits are often not as nutritious as native ones. Most critically, invasive plants do not support the full life cycles of the native insects that birds rely on for nutrition during the breeding and migration seasons. Here and elsewhere on the preserve, controlling the invasive plants in favor of native ones would help to create better habitat for forest birds. In this portion of stand 1, given the severity of the invasives and the fact that they are contributing such high understory density, they should be managed in a phased approach rather than all at once. This would allow for native understory species to establish (and/or for some to be planted) as the invasives are cleared from successive areas, while maintaining some understory structure for birds throughout the process. It also may be that completely removing the euonymus is not feasible; in that case it is recommended to manage it around its edges and in other parts of the preserve, to contain it and prevent it from spreading any further.

Elsewhere in the hardwood stands, the understory varies in density. It is dense across much of the wooded wetland (stand 2), where it is composed mainly of winterberry and spicebush. These are native shrubs that create good understory and midstory structure for nesting birds. They also provide soft mast forage wherever they get enough light to flower and fruit, which is occurring throughout stand 2 due to its lower canopy density. In other parts of the hardwood stands where euonymus, winterberry, and spicebush are largely absent (such as the western part of stand 1 and parts of stand 3), the understory can be sparse. This limits the available habitat for birds that nest in the understory, as well as potential for foraging and seeking cover. Silvicultural treatments to open up the canopy would encourage understory and midstory development in these areas, creating more vertical structural diversity across the forest.

The midstory in the hardwood forest stands ranges from sparse to moderately dense. A well-developed midstory layer provides nesting habitat for midstory nesters such as Wood Thrush, Black-throated Blue Warbler, and Red-Eyed Vireo. Some parts of the forest have a denser midstory, where there are saplings of maple, oak, pine, and other species. This occurs, for example, just north of the hemlock grove in stand 2 where there is a pocket of mixed-species regeneration, as well as in parts of stand 3. In other areas, the midstory is pretty sparse, such as in the western part of stand 1 that also has a more open understory. If any forest management is planned for the preserve, opening the canopy in these areas with a thinning or gap creation would allow more light down to the lower layers of the forest, encouraging development of the understory and midstory. Any such management, particularly gap creation, should be sited away from the densest invasive patches, and invasives should be treated before any management occurs.

Leaf litter is ample across the forest, and downed wood is present throughout. Birds that forage on the ground, such as Wood Thrush and Eastern Towhee, benefit from leaf litter and fine woody debris where they can find many invertebrates and other food. Both coarse (logs and branches over 4 inches in diameter) and fine woody material on the ground provide year-round cover and breeding season nest sites. Ground nesters on this property, such as Ovenbird and Black-and-white Warbler, benefit from this habitat feature. Downed logs are also favored drumming sites for Ruffed Grouse (if the habitat is otherwise suitable for them), and Pileated Woodpeckers will forage on them for insect food. There are snags (standing dead trees) found throughout the forest, and allowing more larger trees to reach maturity and become snags will be beneficial over time. Snags provide important habitat for cavity-nesting species such as woodpeckers, as well as opportunities for foraging, and they should be retained wherever possible. Living trees with cavities also provide nesting and forage sites; some notable cavity trees on the preserve include the large wolf trees that line the main path just north of the pond.

Softwood plantations (Stands 4, 5, and 6)

There are several softwood plantations on the preserve, which help to diversify the landscape by adding valuable softwood habitat within the predominantly hardwood forest. These include white pine and Norway spruce plantations in the northern half of the preserve (stands 4 and 5), as well as a stand of white pine, Norway spruce, and larch in the southwest corner (stand 6). Many species of birds rely on conifers for nesting sites and forage, such as Pine Warbler and Black-throated Green Warbler. The softwoods (except for the larch, which is deciduous) also provide year-round cover and thermal regulation for birds and other wildlife.

There is some hardwood regeneration within and at the edges of the softwood stands, but most of the trees represented are pine, spruce, and larch. In some areas there is regeneration of pine as well as Norway spruce. Norway spruce is non-native but does not exhibit characteristics of an invasive species, in that it may naturalize and regenerate but does not spread quickly and take over growing space from native plants. It is sometimes recommended as an alternative to hemlock in areas that have been hit hard by the hemlock woolly adelgid and elongate scale, two insects that are harmful to hemlocks. The hemlocks on the preserve look healthy, but the regenerating spruce gives some assurance that even if the hemlocks decline, there will still be a similar softwood species present in the forest to provide that structure.

There is abundant downed woody material in the softwood stands, which provides good foraging opportunities and cover for birds. Aside from the scattered regeneration (and some invasive presence including barberry and multiflora rose), the understory and midstory are mostly open due to the closed canopy at the current stage of stand development. As mentioned in the management plan, thinning in the softwood plantations would allow more light through the canopy, encouraging understory and midstory development. This would also benefit the future forest, ensuring that there is a younger cohort of trees ready to grow into the canopy. Additionally, invasives control would be a good project to undertake in these stands. The invasives are not as severe as in some other areas on the preserve, so it may be more feasible to remove them.

Marsh and pond

The small marsh at the northern boundary is associated with both Long Meadow Pond across Bellamy Lane and the wooded wetland and stream through stand 2. The marsh contains typical native wetland plants such as cattails, alder, winterberry, and blueberry. As mentioned in the landscape context section above, there is a lack of young forest habitat in the 2,500-acre area surrounding the preserve. This marsh functions much like a canopy gap, providing some of that shrubby structure around its edges where there is not open water. Small openings in

wooded areas are beneficial, as they provide sunny gaps where a dense understory can develop to provide more cover for ground-nesting birds and a more abundant source of insects and soft mast plants. Birds that use sunny gaps for foraging include Scarlet Tanager, Great Crested Flycatcher, Northern Flicker, and fledgling Wood Thrush. The marsh should be monitored for invasive species so that they can be treated if and when they appear, but at this time there is not a severe invasive presence in the marsh.

The small pond at the southwest corner of the preserve also provides wetland habitat for forest birds. It is surrounded by hemlock, red maple, and old-field juniper trees that are a relic of past land use. The hemlock and juniper contribute to year-round cover and thermal regulation around the pond. The understory species surrounding the pond are largely invasive – euonymus, barberry, and multiflora rose – in addition to some *Rubus* brambles. As with the invasive plants elsewhere on the preserve, managing these in favor of native species would increase habitat value for forest birds. Given that it is a somewhat discreet zone and is near the main entrance of the preserve, it might be a feasible project to remove the invasive plants around the pond and replant that area with native shrubs and small trees.

Fields and forest edge

There are two hayfields in the southeast corner of the property, as well as a field in the northwest corner that is used by a local farm. The hayfields are mowed once per year. To reduce disturbance to nesting birds, it is recommended to delay haying as late as possible in the season, understanding that this may be difficult due to the need to balance hay quality and financial considerations. There is a nest box at the northern end of the western field; paired nest boxes rather than a single box would benefit bluebirds if they are present in the field. Having paired nest boxes allows for one box to be used by tree swallows, leaving the second box free for bluebirds. Over the last several decades, Eastern Bluebirds have recovered from low population levels with the help of landowners who have put up boxes. Bluebird boxes should be made of untreated wood and be able to be opened for monitoring and cleaning. It is important to monitor the boxes at least once a week during nesting season to make sure other birds such as European Starling and House Sparrows have not taken over the Bluebirds' home.

The edges between open areas and forest are soft in some places, and harder in others. In those spots, softening the edge would be beneficial for forest birds. A soft edge is one that has shorter vegetation growing at the front, rising up to taller vegetation at the back as it leads into mature forest (the “stadium seating” effect). This provides both physical and visual screening into the forest and is ideal for forest birds because it limits predation and nest parasitism. Planting some native shrubs and small trees along the edge is a great way to soften it, adding screening and cover along the edge of the forest. Choosing species to plant that bear soft mast fruit will also offer foraging opportunities at the forest edge. Another way to soften the edge is to feather it by cutting a few trees along the edge, encouraging development of a native understory and midstory there.

Some of the forest and field edges are dominated by invasive species. An example of this is along the hayfield adjacent to the parking area, as well as at the edge of the agricultural field. In these cases, the edges are softer, but just not filled with the native plants that we would prefer to see. The invasive species, particularly multiflora rose, are providing some structure, fruit, and screening into the forest interior, and simply removing them would make the edge even more abrupt. If managing invasives along edges is feasible, it is recommended to do so in a phased approach. Addressing small areas at a time, and replanting with native species, will maintain some structure along the edge while transitioning from invasive to native plants that are more beneficial for birds.

Representative photos



The field and parking area at the main entrance to the preserve. Mowing as late in the season as possible will limit disturbance to nesting birds.

The edge between the fields is dominated by invasive species such as multiflora rose.





The pond is surrounded by mostly invasive species in the understory. Removing these and replanting with native trees and shrubs would improve habitat for forest birds using the pond.

The main path through the preserve is lined with large wolf trees, which often contain cavities and provide great nesting and forage opportunities.





A large portion of the forest is dominated by winged euonymus below the canopy. This offers structure for birds, but a native understory and midstory would be preferable.

The hemlock grove in stand 2 has an open understory and a hard edge along the roadside. Softening this edge would improve habitat for interior forest birds.





Regeneration of pine and hardwoods (which are less visible in this wintertime photo) contribute to understory and midstory density near the wetland.

Winterberry, spicebush, and downed wood are some of the features that make the wooded wetland a valuable habitat for forest birds.





The forest edge along the agricultural field could be softened, and does contain some invasives.

Looking into the spruce stand from stop 5 on the trail. There is some pine regeneration contributing to a moderate understory here.





The western portion of stand 1 has a very open understory and only slightly denser midstory, with little structure for birds that nest below the canopy.

The pine/spruce/larch stand also has a relatively open understory, with abundant downed wood providing some cover and forage opportunity.





The edges of the marsh function much like a canopy gap, adding shrubby structure to the landscape.

Assessment by Property Feature
4. Buildings, Roads, and Yards

Habitat loss and degradation caused by human development are some of the leading threats to Connecticut’s wildlife. Forests become fragmented when they are broken into small, unconnected patches. Causes may include residential and commercial development, roads, houses, and lawns. The features below can sometimes be modified to reduce their impact and help keep your land more functional for birds.

Feature	Condition			Comments
	Good	Fair	Needs Work	
Building Envelope	Small	Moderate	Large	The small barn is the only building, but the building envelope is fairly large, especially considering that it connects with the grounds of the neighboring Bellamy-Ferriday House.
Lawn	Small	Moderate	Large	The lawn area is mainly used for parking, as well as a section surrounding the barn.
Landscaping	Lots of native plants and nectar sources	Some native plants	Few or no native plants	N/A
Forest roads and trails	All <20’ wide	Most < 20’ wide	Many >20’ wide	
Forest edges	All soft edges	Some soft edges	No soft edges	There are some soft edges, and some that could be softened to provide better habitat.

2. Plant Diversity

Forest birds rely on a variety of native plants for food, whether for soft mast (berries), hard mast (nuts and seeds), buds, pollen, or nectar. Some native plants are especially important as sources of caterpillars and other insect food that is essential for birds, and is far less abundant on non-native plant species. Maintaining native plants and controlling non-native, invasive plants will thus benefit birds in your woods.

Feature	Condition			Comments
	Good	Fair	Needs Work	
Native plant diversity	High	Moderate	Low	There is a good diversity of native plant species across the forest on the property.

Feature	Condition			Comments
	Good	Fair	Needs Work	
Invasive plant infestation	None	Low	Moderate to severe	The southern part of the forest is dominated by winged euonymus in the understory. Other invasives present include Japanese barberry, multiflora rose, autumn olive, and privet (as well as devil's walking stick, which may be invasive).
Soft mast native fruits and berries	Abundant	Some	Absent	There is abundant spicebush and winterberry fruiting across the forest. Other sources of soft mast include <i>Rubus</i> , juniper, grape, poison ivy, cherry, and sumac.
Softwood pockets in hardwood stands	Present		Absent	Softwoods are abundant throughout the forest, including a hemlock grove along Main St. N, as well as planted stands of Norway spruce, larch, and white pine.

3. Forest Structure

Well-developed forest structure can be a signature of a healthy forest and key to supporting a wide diversity of living things in your woods. It's not mess; it's structure!

Feature	Condition			Comments
	Good	Fair	Needs Work	
Understory	Dense	Moderate density	Sparse	The understory ranges in density across the property and is dominated by invasive species in some areas.
Midstory in mature forests	Dense	Moderate density	Sparse	The midstory ranges in density across the property.
Canopy gaps in mature forests	Present		Absent	
Leaf litter	Present		Absent	
Snags and cavity trees	Many	Some	Few or none	Leaving snags and cavity trees wherever possible will benefit birds and other wildlife.
Downed dead wood	Many	Some	Few or none	Leaving downed woody material wherever possible will benefit birds and other wildlife.
Big trees	Present		Absent	Several trees greater than 24" in diameter.

4. Other Habitats

These habitats add diversity and habitat value for birds within forested landscapes.

Feature	Condition			Comments
	Good	Fair	Needs Work	
Waterways and riparian areas	Good condition	Fair condition	Poor condition	Stream in good condition with some invasives.
Wetlands	Good condition	Fair condition	Poor condition	Wetland in good condition with minimal invasives.
Meadows	> 1 acre AND mowed every 2-3 years	> 1 acre OR mowed every 2-3 years	< 1 acre AND mowed every year	N/A
Hayfields	Grassland bird-friendly		NOT Grassland bird-friendly	Hayfields should be mowed as late in the season as possible in order to minimize disturbance to nesting birds.

Area Descriptions and Recommendations

Summary of Recommendations

Some of these recommendations may not be able to be completed without some cost (i.e. the activities may be non-commercial). In order to complete the treatments, there may be cost-share funding available through the USDA Natural Resources Conservation Service (NRCS) to help offset those costs. Additional information about some of these programs can be found at:

<https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/connecticut#programs>

The desired future conditions in the forest management plan, and the recommendations in the forest management plan, are compatible with recommendations for birds mentioned below. Please consult with your forester or the Audubon bird biologists if any questions or conflicts arise between managing for forest birds and managing for other objectives.

Recommendations below include suggestions for both priority forest birds, and birds that use other habitats.

Forest, both hardwood and softwood stands:

- Manage and contain the spread of invasive species in the forest. This should be done in a phased approach. In some cases, such as with the extensive euonymus, it may be more feasible to contain it than to completely remove it.
- If and where they are recommended in the management plan, consider silvicultural treatments that maintain and increase species diversity as well as the understory and midstory density across the forest; this may include canopy gaps and/or thinnings. Be sure to treat invasives prior to any planned harvesting.
- Leave snags and woody material in the forest wherever possible.

Marsh and pond:

- Monitor for invasive species in the marsh and treat them as it is feasible where they occur.
- Consider removing the invasives around the edge of the pond and replanting with native trees and shrubs.

Fields and forest edge:

- Work to soften the edge between the open area and mature forest where needed. This can be done by planting native shrubs and small trees along the edge. Feathering the trees at the forest edge is another option, if active management is occurring.
- Consider removing invasive species at the forest edges in a phased approach, and replanting with native species to maintain the softness of the edge.
- Consider installing paired bluebird boxes. See sialis.org for more information.

Audubon's [Native Plants Database](#) is a great resource for choosing plants that will enhance habitat value for forest birds.

Additional Property Recommendations. (Some may be in progress already, or not apply).

- Call a Forester to arrange a visit and discuss implementing some of the recommendations. Cost-share funds may be available through the USDA Natural Resources Conservation Service (NRCS) to help offset the costs of implementation. See description of NRCS in the **Terms and Explanations** section M Appendix B.
- Update your existing forest management plan to include consideration for birds.
- Learn the *Birdwatcher's Dozen* by sight and sound.
- Start, or invite, bird monitoring on the property.
- Learn more about invasive plants and develop a plan for monitoring and control.
- Talk with your neighbors about what you learned. Look for opportunities to coordinate management across property boundaries.
- Keep interior forest intact; avoid subdividing forest (or plan subdivisions that maintain maximum continuous forest cover), minimize construction of new roads or trails greater than 20 feet wide, and keep new buildings close to existing roads.
- Promote a diversity of forest age classes from very young (<20 years; <10% of the property) to very old (>20 years with some forest >100 years; >75% of the property) across the property and landscape.
- Promote a dense understory and midstory of native trees and shrubs.
- Retain biological legacies including large-diameter (24"+ DBH) living trees, snags, and downed deadwood.
- Retain tree tops on site during timber harvests and avoid or minimize lopping slash.
- Contact Audubon Connecticut for follow up assistance, to review a new or updated management plan, or to consult on the implementation of one of our recommendations.

Appendix A - Bird species observed during a December 2022 habitat assessment, or otherwise documented as described in the Notes. This is not considered a complete list of all birds using the property. Observations are affected by season, weather, time of day, and other factors. For this particular assessment, the site visit was conducted in December when migratory birds are not present in our region, so only a small portion of the species that benefit from the habitats on the property could be observed. The common names in this table are live links to more information about each species.

CONNECTICUT FOREST BIRD LIST		Forest and edge	NOTES
<p> denotes Priority Bird Name: Rosa Goldman Date: 12/2/2022 Property: Bellamy-Ferriday Preserve 45 Main St. N, Bethlehem, CT Click on bird names for more info online </p>			
Canada Goose	<i>Branta canadensis</i>		
Mute Swan	<i>Cygnus olor</i>		
Wood Duck	<i>Aix sponsa</i>		
American Black Duck	<i>Anas rubripes</i>		
Mallard	<i>Anas platyrhynchos</i>		
Hooded Merganser	<i>Lophodytes cucullatus</i>		
Common Merganser	<i>Mergus merganser</i>		
Ring-necked Pheasant	<i>Phasianus colchicus</i>		
 Ruffed Grouse	<i>Bonasa umbellus</i>		
Wild Turkey	<i>Meleagris gallopavo</i>		
Great Blue Heron	<i>Ardea herodias</i>		
Green Heron	<i>Butorides virescens</i>		
Turkey Vulture	<i>Cathartes aura</i>		
Black Vulture	<i>Coragyps atratus</i>		
Osprey	<i>Pandion haliaetus</i>		
Bald Eagle	<i>Haliaeetus leucocephalus</i>		
 Sharp-shinned Hawk	<i>Accipiter striatus</i>		
Cooper's Hawk	<i>Accipiter cooperii</i>		
 Northern Goshawk	<i>Accipiter gentilis</i>		
 Red-shouldered Hawk	<i>Buteo lineatus</i>		
 Broad-winged Hawk	<i>Buteo platypterus</i>		
Red-tailed Hawk	<i>Buteo jamaicensis</i>		
American Kestrel	<i>Falco sparverius</i>		
Peregrine Falcon	<i>Falco peregrinus</i>		
Killdeer	<i>Charadrius vociferus</i>		
Spotted Sandpiper	<i>Actitis macularius</i>		
American Woodcock	<i>Scolopax minor</i>		
Rock Pigeon (i)	<i>Columba livia feral</i>		

Mourning Dove	<i>Zenaida macroura</i>		
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>		
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>		
Eastern Screech Owl	<i>Megascops asio</i>		
Great Horned Owl	<i>Bubo virginianus</i>		
Barred Owl	<i>Strix varia</i>		
Eastern Whip-Poor-Will	<i>Caprimulgus vociferus</i>		
Chimney Swift	<i>Chaetura pelagica</i>		
Ruby-throated Hummingbird	<i>Archilochus colubris</i>		
Belted Kingfisher	<i>Megaceryle alcyon</i>		
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>		
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>		
Downy Woodpecker	<i>Picoides pubescens</i>	X	
Hairy Woodpecker	<i>Picoides villosus</i>		
Northern Flicker	<i>Colaptes auratus</i>		
Pileated Woodpecker	<i>Dryocopus pileatus</i>		
Eastern Wood-Pewee	<i>Contopus virens</i>		
Acadian Flycatcher	<i>Empidonax virescens</i>		
Alder Flycatcher	<i>Empidonax alnorum</i>		
Willow Flycatcher	<i>Empidonax traillii</i>		
Least Flycatcher	<i>Empidonax minimus</i>		
Eastern Phoebe	<i>Sayornis phoebe</i>		
Great Crested Flycatcher	<i>Myiarcus crinitus</i>		
Eastern Kingbird	<i>Tyrannus tyrannus</i>		
White-eyed Vireo	<i>Vireo griseus</i>		
Yellow-throated Vireo	<i>Vireo flavifrons</i>		
Blue-headed Vireo	<i>Vireo solitarius</i>		
Warbling Vireo	<i>Vireo gilvus</i>		
Red-eyed Vireo	<i>Vireo olivaceus</i>		
Blue Jay	<i>Cyanocitta cristata</i>	X	
American Crow	<i>Corvus brachyrhynchos</i>		
Fish Crow	<i>Corvus ossifragus</i>		
Common Raven	<i>Corvus corax</i>		
Purple Martin	<i>Progne subis</i>		
Tree Swallow	<i>Tachycineta bicolor</i>		
N. Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>		
Bank Swallow	<i>Riparia riparia</i>		
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>		
Barn Swallow	<i>Hirundo rustica</i>		
Black-capped Chickadee	<i>Poecile atricapillus</i>	X	
Tufted Titmouse	<i>Baeolophus bicolor</i>	X	

Red-breasted Nuthatch	<i>Sitta canadensis</i>		
White-breasted Nuthatch	<i>Sitta carolinensis</i>	X	
Brown Creeper	<i>Certhia americana</i>		
Carolina Wren	<i>Thryothorus ludovicianus</i>		
Winter Wren	<i>Troglodytes hiemalis</i>		
House Wren	<i>Troglodytes aedon</i>		
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>		
Golden-crowned Kinglet	<i>Regulus satrapa</i>		
Eastern Bluebird	<i>Sialia sialis</i>		
Hermit Thrush	<i>Catharus guttatus</i>		
Wood Thrush	<i>Hylocichla mustelina</i>		
Veery	<i>Catharus fuscescens</i>		
American Robin	<i>Turdus migratorius</i>		
Gray Catbird	<i>Dumetella carolinensis</i>		
Northern Mockingbird	<i>Mimus polyglottos</i>		
Brown Thrasher	<i>Toxostoma rufum</i>		
European Starling (i)	<i>Sturnus vulgaris</i>		
Cedar Waxwing	<i>Bombycilla cedrorum</i>		
Ovenbird	<i>Seiurus aurocapilla</i>		
Worm-eating Warbler	<i>Helmitheros vermivorum</i>		
Louisiana Waterthrush	<i>Parkesia motacilla</i>		
Northern Waterthrush	<i>Parkesia noveboracensis</i>		
Golden-winged Warbler	<i>Vermivora chrysoptera</i>		
Blue-winged Warbler	<i>Vermivora cyanoptera</i>		
Black-and-white Warbler	<i>Mniotilta varia</i>		
Nashville Warbler	<i>Leiothlypis ruficapilla</i>		
Mourning Warbler	<i>Geothlypis philadelphia</i>		
Common Yellowthroat	<i>Geothlypis trichas</i>		
Hooded Warbler	<i>Setophaga citrina</i>		
American Redstart	<i>Setophaga ruticilla</i>		
Cerulean Warbler	<i>Setophaga cerulea</i>		
Northern Parula	<i>Setophaga americana</i>		
Magnolia Warbler	<i>Setophaga magnolia</i>		
Blackburnian Warbler	<i>Setophaga fusca</i>		
Yellow Warbler	<i>dendroica petechia</i>		
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>		
Black-throated Blue Warbler	<i>Setophaga caerulescens</i>		
Pine Warbler	<i>Setophaga pinus</i>		
Yellow-rumped Warbler	<i>Setophaga coronata</i>		
Prairie Warbler	<i>Setophaga discolor</i>		
Black-throated Green Warbler	<i>Setophaga virens</i>		

Canada Warbler	<i>Cardellina canadensis</i>		
Eastern Towhee	<i>Pipilo erythrophthalmus</i>		
Chipping Sparrow	<i>Spizella passerina</i>		
Field Sparrow	<i>Spizella pusilla</i>		
Savannah Sparrow	<i>Passerculus sandwichensis</i>		
Song Sparrow	<i>Melospiza melodia</i>		
Swamp Sparrow	<i>Melospiza georgiana</i>		
White-throated Sparrow	<i>Zonotrichia albicollis</i>		
Dark-eyed Junco	<i>Junco hyemalis</i>		
Scarlet Tanager	<i>Piranga olivacea</i>		
Northern Cardinal	<i>Cardinalis cardinalis</i>		
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>		
Indigo Bunting	<i>Passerina cyanea</i>		
Bobolink	<i>Dolichonyx oryzivorus</i>		
Red-winged Blackbird	<i>Agelaius phoeniceus</i>		
Eastern Meadowlark	<i>Sturnella magna</i>		
Common Grackle	<i>Quiscalus quiscula</i>		
Brown-headed Cowbird	<i>Molothrus ater</i>		
Orchard Oriole	<i>Icterus spurius</i>		
Baltimore Oriole	<i>Icterus galbula</i>		
Purple Finch	<i>Haemorhous purpureus</i>		
House Finch	<i>Haemorhous mexicanus</i>		
American Goldfinch	<i>Spinus tristis</i>		
House Sparrow (f)	<i>Passer domesticus</i>		
Total confirmed			5 species
			Note: this species list is by no means exhaustive and should not be considered representative of the birds that can be found on this property.

Appendix B: Terms and Explanations

Big Trees: Live trees greater than 19 – 24 inches diameter at breast height (DBH which is measured 4.5 feet above ground level).

Importance for Forest Birds: Big trees are a key characteristic of old forests and high-quality mature forest habitat for songbirds. Researchers in Wisconsin found priority birds were more abundant and successful in forests with >10% of the live basal area in big trees (19+ inches DBH) than in forests with fewer big trees (Managed old-growth silvicultural study (MOSS), Wisconsin Department of Natural Resources, 2013). Structurally-sound, large-diameter trees are important stick nest sites for woodland raptors, such as the Northern Goshawk. If retained as legacies, these large trees can also provide cavity nest sites for large woodland birds including owls and Pileated Woodpeckers.

Building Envelope: Open space cleared around a house or other building.

Importance for Forest Birds: The 200-300 feet into the woods surrounding clearings and openings associated with development, such as houses, are noisier, less sheltered, and vulnerable to invasion by domestic animals and nest predators and parasites. The impacted area also favors a new group of relatively tough, generalist omnivores such as raccoons, jays and crows that outcompete and may prey on more specialized mature forest priority species, such as Wood Thrush and Black-throated Blue Warbler. Keeping building envelopes small is one way to minimize this negative impact on surrounding forest habitat.

Canopy: The uppermost layer(s) of tree foliage in the forest. Many second or third growth stands in CT contain similar aged trees and have a relatively uniform canopy height.

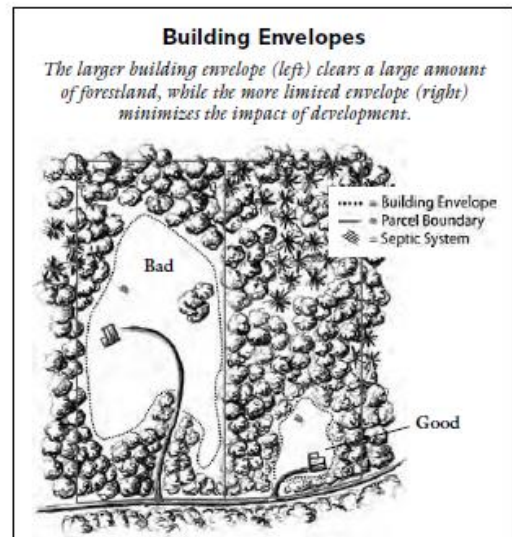
Importance for Forest Birds: Forest birds have specific habitat requirements for breeding and nesting. Canopy density, height, distribution, and species mix all impact the quality of habitat the canopy provides and in turn can affect the species of birds that may use the area.

Canopy Gap: A canopy gap is an opening in the canopy of a mature forest ranging in size from one tree crown up to 1/4 acre.

Importance for Forest Birds: Birds such as the Eastern Wood-Pewee forage in canopy gaps, which also allow sunlight to reach the forest floor through the upper canopy stimulating new growth in understory and midstory. Gaps created where trees fall, blow over, or are cut down are a normal and important part of a healthy forest and high-quality mature forest habitat.

Crop Tree: A tree that has been selected as desirable to manage into the future.

Importance for Forest Birds: See description of *Importance for Forest Birds* for *Crop Tree Release* below



Source: *Community Strategies for Vermont's Forests and Wildlife: A Guide for Local Action*. Vermont Natural Resources Council. 2013. Drawing by Jeannie Sargent.

Crop Tree Release: A silvicultural treatment in which individual trees or groups of trees are given additional growing space and sunlight by removing competition from adjacent trees. Removing adjacent trees that are competing with the crowns of crop trees is important to maintain vigor of crop trees. Crop tree release frequently works best when the trees are released from competition on at least 3 sides of the crown (out of 4 sides that can be likened to the cardinal directions) and at least 10-15 feet of growing space is created.

Importance for Forest Birds: Crop tree release (CTR) is a relatively small scale treatment that increases the vigor of individual trees or small groups of trees, which in turn can provide additional mast, as well as additional vegetation for nesting, cover and forage. In addition, CTR can provide coarse and fine woody material and can stimulate regeneration on the forest floor, which can in turn enhance structural diversity providing additional habitat opportunities.

Downed Deadwood: Coarse woody material (CWM) are downed logs and branches >4 inches in diameter. Fine woody material (FWM) are limbs and branches <4 inches in diameter including slash.

Importance for Forest Birds: CWM provides perch sites for singing (e.g. by Ovenbird) and other male courtship displays, and provides habitat for the insects and other arthropods that are a significant part of the breeding season diet of many birds. Ruffed Grouse tend to use CWM >8 inches diameter as drumming perches. When aggregated in piles (e.g. tree tops or slash piles) FWM offers a nesting substrate and cover for Louisiana Waterthrush and Veeries. Scattered individual pieces have minimal habitat value.

Forest Block: A large area of contiguous forest cover.

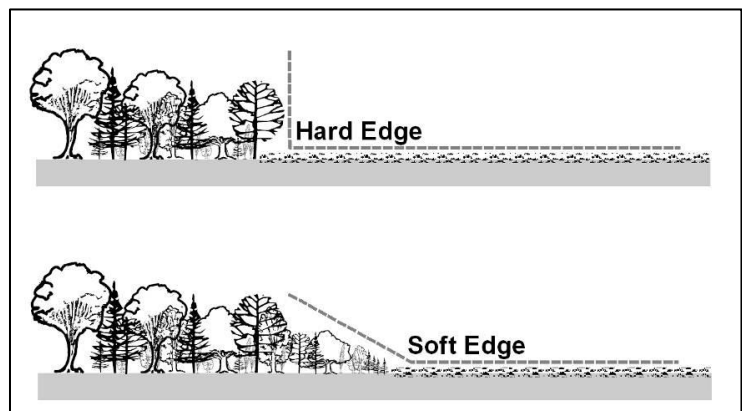
Importance for Forest Birds: Very large (>2500 acres) blocks of contiguous forest provide the highest quality habitat for interior-nesting birds like Wood Thrush that reproduce more successfully away from edges and development. Large blocks also likely contain the full range of habitat types and conditions required to support most or the entire suite of priority birds. Smaller forest patches >500 acres in size provide important habitat in more fragmented landscapes and can connect larger patches. Patches <500 acres in size can still support breeding birds in heavily forested landscapes and are important habitat during the migration season. Think about your land as it fits within a larger mosaic.

Forest Cover: Area of land that is forested or wooded.

Importance for Forest Birds: Heavily forested landscapes (70+% forest cover) provide the greatest quantity, diversity, and quality of habitat for priority birds compared to fragmented and/or developed landscapes with lower percentages of forest cover.

Forest Edge: The boundary between forest and open land, such as a field or backyard.

Importance for Forest Birds: The transition from low herbaceous vegetation to tree canopy can be considered either a “soft” or “hard” edge. A soft edge is a gradual change in vegetation height moving into the forest. This gradual transition is important for buffering interior forest specialists like the Wood Thrush from the incursions of nest predators (such as raccoons and skunks) and nest parasites (such as the Brown-headed Cowbird) that are frequently found in open and developed areas. A gradually increasing canopy height helps to shield interior-nesting birds



from view by predators and parasites. Additionally, the brushy conditions that often develop in a soft edge may provide breeding habitat for young forest habitat bird species including Chestnut-sided Warbler and Blue-winged Warbler.

Forest Structure: The density and physical orientation of live and dead vegetative, woody, and herbaceous plants and trees in a forest. See horizontal structure and vertical structure for more in-depth descriptions of different views of forest structure.

Importance for Forest Birds: Diverse forest structure can provide many habitat requirements for forest birds. Increasing the complexity of the forest structure through the maintenance or enhancement of tree and plant species diversity, the creation of canopy gaps, the establishment of regeneration, and the retention and recruitment of snags, cavity trees and woody material on the ground can all help to improve not only ecological diversity and forest health, but also can improve bird habitat.

Fragmented Forest: Forest that is broken into small, unconnected patches primarily due to some form of development (e.g. residential, commercial, or major roads).

Importance for Forest Birds: Fragmentation increases the occurrence of “generalist” wildlife species, such as raccoons and skunks, and the parasitic Brown-headed Cowbird both of whom decrease nesting success of interior-nesting forest birds. Fragmentation also decreases connectivity. Larger landscapes are better for forest interior birds and act as wildlife corridors for mammals and migrating bird populations. Isolated islands of habitats are at greater risk to loss of biodiversity.

Hardwood Forest: A forest dominated by broad-leaved (i.e. deciduous) trees which lose their leaves in the fall.

Importance for Forest Birds: Some breeding birds are associated with hardwood forests, such as Chestnut-sided Warbler, Eastern Wood-Pewee, and Scarlet Tanager.

Horizontal Structure: The arrangement of different habitat types across the landscape.

Importance for Forest Birds: A landscape with mature and young forest habitats, open fields, and wetlands would be rich in horizontal diversity. Landscapes with greater horizontal diversity support a greater diversity of breeding forest birds and other wildlife.

Interior Forest: Forest condition that occurs with increasing distance from a forest edge.

Importance for Forest Birds: As perceived from a bird’s perspective, interior forest conditions begin to occur approximately 200-300 feet from a forest edge. At this distance, negative edge-associated effects such as nest predation, parasitism, and creep from invasive plant species generally no longer occur. Interior-nesting species, such as Scarlet Tanager, Wood Thrush, Ovenbird, Black-throated Blue Warbler, and Red-eyed Vireo, have greater reproductive success when they nest away from forest edges.

Invasive Plant: A plant that is able to establish on many sites, grow quickly, and spread to the point of disrupting native ecosystems. Often non-native.

Importance for Forest Birds: Non-native, invasive plants, such as bush honeysuckles, bittersweet, Autumn olive, burning bush, buckthorn, and Japanese barberry, present a variety of threats to forest health in Connecticut and the northeast. Although some species of native forest birds successfully use these shrubby, woody plant species as nesting sites and eat their fruits, the fruits generally have low nutritional value and the invasive plants reduce the diversity of other nesting and foraging options in forest ecosystems. Many invasive plants can form dense uniform stands that outcompete and can crowd out native plants. The threat is exacerbated by its impacts on native insect populations that may require certain plants for food and in turn pollinate these native plants. This can eliminate two forms of food

resources for bird populations. Overall, non-native, invasive plant species degrade the quality of native forest bird habitat in our region.

Leaf Litter: Dead plant material such as leaves, bark, and twigs that has fallen to the ground.

Importance for Forest Birds: An abundant layer of moist leaf litter is home to an array of insects, mites, and spiders. These arthropods make up a significant component of Ovenbird, Veery, and Wood Thrush diets during the breeding season. Ovenbirds also rely upon a deep layer of deciduous litter for constructing their ground nests, and nest site selection is strongly associated with this habitat variable.

Mast Tree: A tree that produces seeds, nuts, or fruit eaten by wildlife. There are two general categories of mast: hard mast and soft mast. Hard mast includes oak acorns and nuts including hickory, beech, walnut, hazelnut and other nut producing trees and shrubs. Soft mast includes all fruits produced by shrubs and trees including blackberries, raspberries, blueberries, huckleberries, apples, shadbush, and black cherry among others.

Importance for Forest Birds: See description of *Importance for Forest Birds* for *Mast Tree Release* below

Mast Tree Release: This is basically the same silvicultural practice as described in *Crop Tree Release* toward the beginning of this section except it focuses on the release of mast trees specifically. The method of releasing the trees from competing vegetation is the same.

Importance for Forest Birds: Mast – both hard and soft – can be an important source of food for birds. Even trees that produce large nuts like acorns which many songbirds do not eat because the nuts are too large can still provide valuable food sources for birds due to the volume of insects that feed on leaves and flowers.

Mature Forest Habitat: For birds a forest is considered structurally mature when the forest canopy is greater than 30 feet tall.

Importance for Forest Birds: Many priority birds breed in mature forest habitats where they find nest sites, cover, and food. Typically, the quality of mature forest habitat increases for forest birds as a forest ages and structure diversifies. Pole stands – the youngest type of mature forest habitat - are typically structurally simple and attract a small suite for forest birds including Ruffed Grouse and American Redstart. Older stands with understory and midstory layers, canopy gaps, large trees, snags, and logs, attract a much greater diversity of birds including Black-throated Blue Warbler, Wood Thrush, Canada Warbler, and Black-throated Green Warbler.

Midstory: Live, woody vegetation in the 6-30 foot height range including trees and shrubs.

Importance for Forest Birds: High stem and foliage densities of woody plants in this forest layer provide nest sites, foraging substrates, and protective cover for many forest birds. Stand-wide coverage is desirable but not necessary; well distributed patches are sufficient. The majority of priority bird species nest and/or forage within the first 30 feet of the forest floor. Nests of Wood Thrush, American Redstart, Black-throated Green Warbler, and Red-eyed Vireo are most commonly found in the midstory level.

Mixed Forest: A forest made up of hardwood and 25-75% softwood tree species.

Importance for Forest Birds: Some breeding birds are associated with mixed forests, such as Black-throated Blue Warbler, Wood Thrush, and Worm-eating Warbler.

Natural Resources Conservation Service (NRCS): An agency that is a branch of the USDA whose mission is to help farmers, ranchers and landowners achieve conservation goals on their properties.

Importance for Forest Birds: NRCS helps to fund on-the-ground activities to improve habitat conditions for wildlife, including birds.

Poletimber: Trees that are between 4.5 inches and 11 inches in diameter measured outside the bark at 4.5 feet above the ground.

Importance for Forest Birds: Frequently poletimber has foliage in lower canopy strata (i.e. in the midstory) than sawtimber-sized trees. If the midstory foliage is dense enough, forest breeding birds can use it for nesting, forage and cover. Species such as Wood Thrush use poletimber stands for nesting and as singing perches.

Sawtimber: Trees that are 11 inches or greater in diameter measured outside the bark at 4.5 feet above the ground.

Importance for Forest Birds: Sawtimber is often the largest and most mature trees in the forest and provide larger scale structure within a variety of forested habitat types. Sawtimber also tends to have greater capacity for seed/fruit production.

Silviculture: The art and science of growing trees. This is the study that forestry and forest management is based on.

Importance for Forest Birds: Many of the silvicultural techniques that are traditionally used in forestry are beneficial for creating and maintaining quality bird habitat when applied appropriately.

Snags and Cavity Trees: Snags are standing dead or partially dead trees that are relatively stable. Cavity trees may be alive or dead.

Importance for Forest Birds: Snags provide opportunities for nesting cavity excavation by Yellow-bellied Sapsuckers and Northern Flickers, and existing cavity trees provide potential nesting cavities for owls. Aspen and birch species are frequently chosen as trees to excavate. Cavities are often made in trees with the heartwood and sapwood decay fungi. Branches on snags may be used as foraging perches and nest sites. Suggested targets for snags and cavity trees combined are ≥ 6 per acre, with one tree >18 inches DBH and 3 >12 inches DBH.

Soft Mast: Soft fruits and berries.

Importance for Forest Birds: Fruits including cherry, apple, *rubus* species (e.g. blackberry and raspberry), dogwood, shadbush, and others are important food sources for forest birds. In the late summer and early fall, after fledging and before migrating, many birds feed on these fruits and the insects that are attracted to them in order to build up critical fat reserves needed to endure long fall migrations.

Softwood Forest: A forest dominated by coniferous trees, usually “evergreen” (the exception being tamarack), with needles or scale-like leaves.

Importance for Forest Birds: Some breeding birds are associated with softwood forests, such as Magnolia Warbler and Blue-headed Vireo. Other birds, such as Blackburnian and Black-throated Green Warbler, are associated with small clusters of softwood trees called inclusions in hardwood stands. For this reason, maintaining or increasing the softwood component in hardwood stands increases their overall habitat value.

Stand: Forested area on a property with relatively uniform vegetation composition, age class, size class, density, and site quality so as to be considered relatively homogenous.

Importance for birds: Birds require a variety of habitat types depending on the species for different stages of life and activities throughout the year (i.e. breeding, nesting, foraging etc.). Having a diversity of stand types, and features within stands can help provide quality habitat for different species and needs within birds' life cycles.

Understory: Live vegetation in the 1-5 foot height range, including tree seedlings and saplings, shrubs, and herbaceous vegetation.

Importance for Forest Birds: High stem and foliage densities of woody plants in the understory provide nest sites, foraging substrates, and protective cover for many forest birds. Stand-wide coverage is desirable but not necessary; well distributed patches are sufficient. Herbaceous plants may also be used by songbirds for foraging and nesting, but generally less so than woody plants. Species in this layer frequently used by birds include sugar maple, American beech, hobblebush, mountain laurel, *rubus* species, and striped maple. Black-throated Blue Warbler and Wood Thrush place nests in this layer, and Canada Warbler and Veery tend to nest on or near the ground, concealed by dense understory growth. The best breeding habitats for Prairie Warbler and Chestnut-sided Warbler are patches of dense, low growth with <30% overstory cover in patches >1 acre in size (young forest habitat conditions).

Vertical Structure: The complexity of vegetation and other structures as they are vertically arranged in the forest.

Importance for Forest Birds: A forest with a well-developed understory, midstory, and canopy exhibits complex or diverse vertical structure, which offers habitat for a greater array of bird species compared with a structurally simple forest. Non-living features, such as coarse woody material and the microtopography of the forest floor, add to the complexity of vertical structure.

Young Forest Habitat: Forest patches greater than one acre in size dominated by a high density of seedlings, saplings, and shrubs less than 20 feet tall.

Importance for Forest Birds: Several priority birds and many other wildlife species use young forests during all or part of their life cycle. Chestnut-sided Warbler, American Woodcock, and Blue-winged Warbler all use young forests during the breeding season. Although these species may be found in patches smaller than one acre in size, research has shown that abundance and nesting success is greater in larger patches. Young forest habitats include regenerating patchcuts, clearcuts, and old fields. Early-successional young forest habitats dominated by shade intolerant species such as aspen and paper birch are particularly valuable for woodcock and grouse. Shrublands that will never mature into forest, such as those associated with beaver wetland complexes, can also attract species associated with young forest habitats since they have a similar vegetative structure. Recent research has also shown the importance of young forest habitats as post-breeding habitat for birds that nest in mature forest, such as Worm-eating Warbler and Red-eyed Vireo. Young forest provides dense, protective cover for juveniles, and can also provide abundant sources of soft mast, which are important pre-migration food sources. Young forest habitats are ephemeral; they generally only persist 10-15 years where forest regenerates after a patch or clear-cut and slightly longer on old field sites. Due to natural forest succession and development, the amount of this habitat type is decreasing in our region, which is a threat to the species associated with it.