Centennial Watershed State Forest

Lakeville Reservoir Block Management Plan

Forest Health and Diversity

The forests of the Lakeville Reservoir Block are composed primarily of northern red oak, northern hardwoods, hemlock, white pine plantations, and chestnut oak ridgetops that protect the watershed of the drinking water supply for the village of Lakeville.

Climate Change Mitigation

The management of the Lakeville Reservoir Block will promote carbon sequestration and storage. Sustainable forest management can maintain or enhance forest carbon sinks by storing carbon in wood products, replacing less environmentally friendly materials such as concrete and steel.

Economic Benefits

This plan outlines timber harvesting on 91 acres. These sustainably harvested forest products provide jobs and raw material for a locally sourced, forest-based, green economy- "Growing What We Need, Where We Live".

Forest Protection

This plan addresses threats such as exotic invasive plants, insects, pathogens, and excessive deer browse. It makes recommendations to mitigate these damaging agents. The plan recognizes that forests are dynamic and that weather events, insect or disease outbreaks, or other unforeseen conditions may require changes in the recommendations.

Wildlife Habitat

The Lakeville Reservoir Block provides mostly forested habitat with limited fragmentation. It is part of almost 5,000 acres of contiguous woodland.

Recreational/Health Benefits

Hiking will be allowed on 0.4 miles of West Road to access a trail that crosses 0.4 miles of the Block to reach Salisbury Association Land Trust property to the east, after an agreement between TNC, Aquarion Water Company, and the Salisbury Association Land Trust is finalized.

Environmental Protection

The Lakeville Reservoir Block is owned by The Nature Conservancy and Aquarion Water Company. It is managed in partnership with the CT DEEP. The forest acts as a filter to provide high quality drinking water. The complex canopy structure that will result from the forest management activities in this plan will delay peak storm flows and will minimize nutrients, sediment, and pollutants from entering the water system.

STATE OF CONNECTICUT

DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION

Centennial Watershed State Forest - Lakeville Reservoir Block
MANAGEMENT PLAN
2024-2034
400 acres

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The Nature Conservancy
Protecting nature. Preserving life.™

AQUARION Water Company
Stewards of the Environment

Bureau of Natural Resources

Division of Forestry

Approvals:

Christopher Martin, Director Division of Forestry	Date
Acting Chief Bureau of Natural Resources	Date
Mason Trumble, Deputy Commissioner Outdoor Recreation & Natural Resources	Date

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Introduction

Connecticut is the 14th most forested state with approximately 60% forest cover. It is also the 4th most densely populated. These two factors create a unique and challenging environment to develop meaningful and effective resource management strategies to meet the needs of its citizens while protecting and enhancing its natural and ecological resources.

The 2020 Connecticut Forest Action Plan was developed to address these needs with input from the DEEP, its partners, and various user groups. It serves as an implementation guide for broad statewide forest management strategies based on three national priorities:

1. Conserve and manage working forest landscapes for multiple values and uses
2. Protect forests from threats
3. Enhance public benefits from trees and forests.

The following objectives were considered in developing the management plan for the Lakeville Reservoir Block of Centennial Watershed State Forest.

1. **High Quality Drinking Water & Environmental Protection –** To continue to promote and protect high-quality drinking water. Connecticut's State Forests provide environmental benefits such as cleaning the air, protecting water quality, and contributing to soil health.

2. Forest Ecosystem Health and Diversity – Healthy and diverse forest ecosystems provide highly functional, valuable, and resilient habitats for plants and animals.

3. Climate Change Mitigation through Sequestration and Storage – TNC's Resilient and Connected Landscapes project has identified this property as possessing traits with above average resilience to changes in climate. These resilient and connected landscapes help support the survival of plant and animal species as they move in response to climate change.

The sustainable management of the Lakeville Reservoir Block provides the opportunity to sequester and store carbon in above and below ground vegetation and long-lived wood products. Forest management can also improve a forest's adaptability under changing conditions.

4. Economic Benefits – Sustainably harvesting forest products from Connecticut's State Forests provides jobs and locally-sourced goods as part of a bio-based economy. This plan outlines timber harvesting on 91 acres. State Forests are a model for private forest landowners to consider when managing their properties.

5. Forest Protection – Managing Connecticut's State Forests allows threats, such as wildfire, weather events, invasive plants, insects, and pathogens, and unauthorized use, to be addressed. This helps maintain healthy and productive forests.

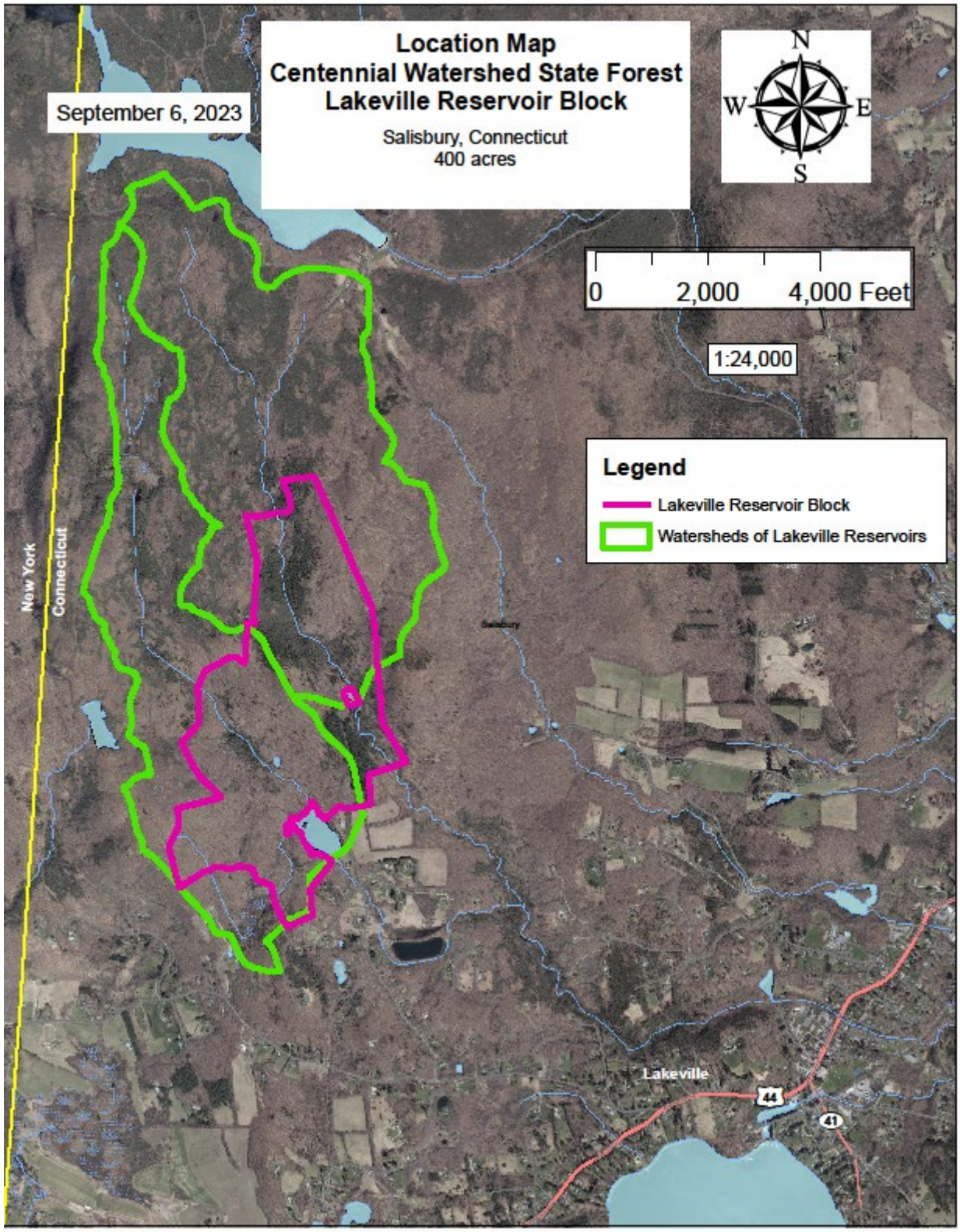
6. Wildlife Habitat – Many of Connecticut's wildlife species use a wide variety of forested habitats. Forest management deliberately creates habitat diversity while protecting critical habitat for protected species.

7. Recreational/Health Benefits – The Lakeville Reservoir Block, being the watershed of a drinking water supply, is planned to be open to limited hiking and hunting.

8. Increasing Resilience – The plan will increase the diversity of species and age classes with selection harvests and thinnings, while designating 179 acres (45% of the total acreage) as Old Forest Management Sites that will be left to the forces of nature. Diverse forest systems are more resilient to disturbance and change.

DEEP welcomes questions and comments regarding the management of state forest lands and encourages public engagement in the management of state resources. The Division of Forestry may be contacted by email at deep.forestry@ct.gov or by phone at (860) 424-3630.

A. Location Map



B. Executive Summary

1. The Lakeville Reservoir Block of Centennial Watershed State Forest (CWSF) is in northwestern Litchfield County, in the Lakeville section of Salisbury. It is approximately 400 acres, surrounding Lakeville Reservoirs 2 and 3. The reservoirs provide drinking water for the village of Lakeville.

   The Nature Conservancy (TNC) owns 351 acres by deed (woodlands comprising Class II and III lands). Aquarion Water Company (AWC) owns approximately 49 acres (the Class I land). AWC owns Reservoirs 2 and 3 and additional land that has infrastructure for water treatment. These are separate from the rest of the Block.

   The State of Connecticut Department of Energy and Environmental Protection (DEEP) does not own any of the Block but has conservation easements on the land owned by TNC and AWC.

2. The primary purpose of the property is to protect and improve the quality of the drinking water supply for the village of Lakeville. This will be accomplished by creating a diverse forest with multiple layers of canopy and many different ages and species of native trees and shrubs. This kind of forest will physically intercept raindrops at many levels, protecting the soil and allowing it to act as a natural filter.

3. Forest health in the Block is threatened by exotic invasive plants. Japanese barberry, Asian bittersweet, multiflora rose, winged euonymous, and bush honeysuckle can be found in scattered but dense patches in the understory of Stands 4, 5, 6, 7, 8, 9, 10, and 16. These invasive plants will need to be removed before the canopy is opened by mortality caused by insects, diseases, weather events, or forestry operations. This will be a multi-year project.

   In addition, excessive browsing by deer has resulted in little to no understory or regeneration of native species in much of the Block. This impacts forest resiliency and water quality.

4. This plan recommends the following to improve forest health and resiliency:

   a. Treat invasive exotic plants to allow regeneration of native species
   b. Institute a regulated deer hunting program to allow native vegetation to regenerate
   c. Conduct selection harvests on 76 acres, a thinning on 15 acres, and non-commercial Timber Stand Improvement to create more multi-aged forests with a diverse mix of species and age classes.

C. History

1. Reason for acquisition and funding sources: The Lakeville Reservoir Block of Centennial Watershed State Forest was created in 2002 when DEEP and TNC purchased land and conservation easements from the Bridgeport Hydraulic Company (now Aquarion Water Company, or AWC). The agreement, funded by $80,000,000 from DEEP and $10,000,000 by TNC, preserved approximately 15,300 acres of watershed lands, primarily in Fairfield County, but also included the Lakeville Reservoir Block.

   Management is overseen by the Conservation Land Committee (CLC), a cooperative partnership of foresters and land management professionals representing AWC, DEEP, and TNC.

   On September 16, 2004, Governor M. Jodi Rell officially designated the land as “Centennial Watershed

State Forest" to recognize its importance in protecting drinking water supplies and to commemorate the 100th anniversary of the State Forest system in Connecticut.

The Natural Resources Management Agreement (NRMA) was signed by all three entities. It governs how the land is managed, stating the goals for science-based stewardship of this property as follows:

- Permanently preserve open space
- Protect and provide a safe, reliable, and adequate water supply
- Promote a healthy, diverse, and resilient forest capable of providing forest products, clean air, plant and animal habitats, recreational opportunities, and aesthetics
- Maintain significant tracts of naturally occurring, mature, diverse, and continuous forest cover
- Provide opportunities for public use consistent with the above goals.

Land owned by water companies is regulated by the Department of Public Health under State Statute (CGS 25-73c).

The Statute classifies the land as Class I, II, or III. Class I and II lands are within the watershed of a drinking water supply reservoir while Class III lands are outside the watershed.

In Centennial Watershed State Forest, AWC owns the Class I land. It also owns parcels (called "carve-outs") that are occupied by facilities and buildings.

In this Block, the Class I land owned by AWC includes the streams (McDuffee Brook and Burton Brook, respectively) and their adjacent forests. AWC also owns the carve-outs, consisting of Reservoirs 2 and 3 and the water treatment facility.

TNC owns the Class II and III land. TNC holds a conservation easement over the Class I lands.

DEEP owns none of the land but has a conservation easement on the Class I, II, and III lands.

Refer to Section N, Map E, for depictions of Class I, II, and III lands in the Lakeville Reservoir Block.

Because the Class I and II lands are intermingled on the landscape, they cannot be easily delineated on the ground. As a result, the NRMA stated that the CLC will manage them as one entity, regardless of ownership.

Revenues from forest management activities on Class I and II lands are shared by AWC, DEEP, and TNC in proportion to their fee ownership of the *entire* Centennial Watershed State Forest, not just in this Block. It breaks down to 62% to AWC, 35% to DEEP, and 3% to TNC.

2. Development of the resource before and after acquisition: In 1730, a major deposit of hematite iron ore was discovered in what is now Salisbury. The ore was of very good quality. In 1734, the first iron forge was constructed in the village of Lime Rock. Another forge was built in 1748, in the present village of Lakeville, and a blast furnace was built in 1762.

   During the Revolutionary War, cannon and cannonballs were produced here. The USS Constitution ("Old

Ironsides") was armed with cannon made from iron produced in Salisbury. Other products made of iron in the 1800s included flywheels for steam engines, machinery, plows, hay tedders, wagon wheels, clock weights, kettles, pots, and window sash weights.

In the 1840s, because of the great tensile strength of the "Salisbury iron", wheels for railroad cars were manufactured. In 1877, the Stevens Institute of Technology in Hoboken, New Jersey, tested several grades of the Salisbury iron, and reported them to be "exceptionally excellent" in strength, elasticity, ductility, and resilience and "proven to be very superior metals".

The fuel for all this industry was wood. The ore was smelted with charcoal. The companies that controlled the furnaces owned over 100,000 acres of woodland simply to produce charcoal. Forests were clearcut every 40 years or so. Colliers (charcoal makers) piled the logs vertically in circular hearths, each consisting of about 25 cords of hardwood. They covered the wood with soil, then burned the pile slowly to make charcoal.

The remains of the charcoal hearths can still be seen today. They are raised circular mounds of soil covered by leaves and low growing vegetation. The mounds are about 25 feet in diameter and about one foot high, although some can be higher if they were used repeatedly.

LIDAR images ("Laser Imaging, Detection, and Ranging") of the landscape reveal many of these round charcoal mounds, as well as old roads leading to them.

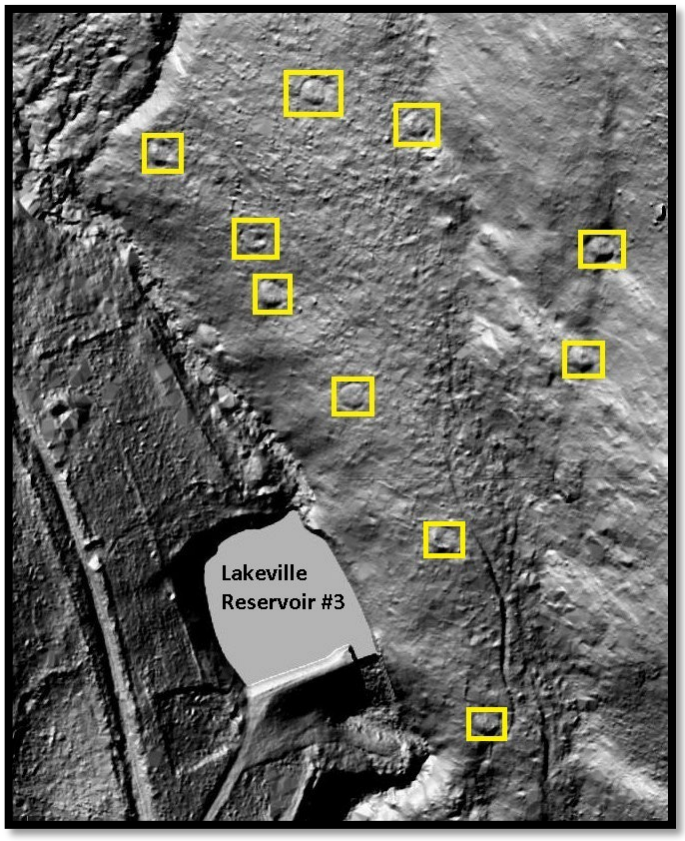


Figure 1. LIDAR image showing some of the charcoal mounds and roads leading to them.

In addition, hemlocks were felled to produce bark for local tanneries, which used the tannins to make leather from cowhides. Leather belts were used extensively by local industries to transfer power from water wheels and turbines to lathes, saws, and other machines. Leather bellows were used in blacksmith shops and blast furnaces to make iron.

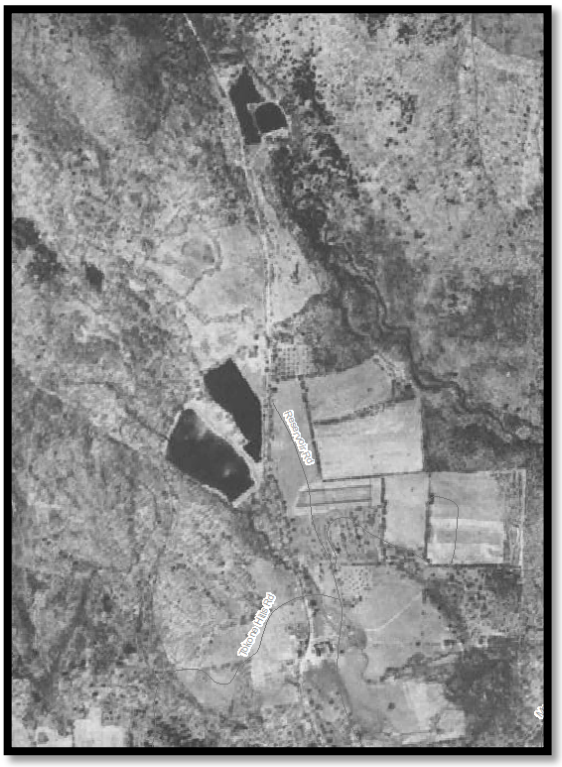


Figure 2. 1934 aerial photo of the two original "lower" Lakeville Reservoirs and "upper" Reservoir #3. At some point, the lower two reservoirs were combined and are now called Reservoir 2. There is no longer a Reservoir 1.

Most likely starting in the 1920s, the Lakeville Water Company planted red pine, white pine, and Norway spruce in fields near the reservoirs to act as buffers to protect the water supply. These plantings were in Stands 6, 8, 9, and 10.

In 1983, the Lakeville Water Company became part of the Bridgeport Hydraulic Company (now AWC).

In the early 2000s, the red pines were salvaged (Stand 6) after they became infested with red pine scale *(Matsucoccus matsumarae)*, an exotic insect from Asia, and Scleroderris canker *(Gremmeniella abietina)*. The stand was at risk of dying off completely. To capitalize on the value of the wood and protect the treatment plant and West Road from falling trees, about 185,000 board feet of red pine was cut. The nearby white pine plantations were thinned also.

3. Changes since the last plan was prepared: This is the first long-term management plan for the Block.

D. Assessment of Resources and Infrastructure

1. Acres

There are approximately 400 acres in the Block, all of which can be considered forestland.

2. Access

a. Management Access

Table 1. Management Status

Management Status	**Acres**
Old Forestland Management	179
Inaccessible	120
Active Management	94
Inoperable	7
Total	**400**

(Note: There are minor rounding errors in the following tables and charts)

b. Inaccessible areas and access potential: Most of the Block is not accessible because the major streams, McDuffee Brook and Burton Brook, do not have viable crossings. LIDAR images show old woods roads that were used to harvest timber in the past from adjacent properties. These roads are no longer usable because of erosion, or the adjacent properties have changed ownership or have been developed.

c. West Road (sometimes called Reservoir Road) was discontinued by the Town of Salisbury in 1953. As such, ownership of the road reverted to the landowners on either side. On the portion of the road within the Block, this is AWC and TNC. The road provides the only access for management purposes.

West Road begins at the entrance to the driveway leading to AWC's water treatment plant. It is graveled for 2,200 feet northerly to the driveway for Reservoir 3. Beyond this point it is an unmaintained dirt road that rapidly narrows until it is essentially a trail. After approximately 4,500 feet, it leaves the Block and continues onto land owned by Mount Riga Incorporated.

An old culvert has washed out where West Road crosses Burton Brook. When the culvert is plugged by woody debris, the stream bypasses it, scouring the banks. Removing the culvert would allow the watercourse to flow naturally, reducing the amount of sediment entering the brook, which flows into Reservoir 3.

Figure 3. The plugged culvert on Burton Brook causes scouring of the streambank.

d. Public Access: After an agreement is negotiated between TNC, AWC, and the Salisbury Association Land Trust (SALT), the public will be able to legally walk on 0.4 miles of West Road to reach the orange trail. The rest of the Block (and the road) is closed to the public.

There are no roads open to vehicular use by the public.

e. Road Maintenance/Construction: West Road occasionally needs grading and gravel. It was repaired by AWC most recently in August 2023.

f. Rights-of-Way/Easements: SALT has a 50’ wide right-of-way that runs eastward from West Road, along the southern boundary of the Block, until it reaches their 241-acre Yoakum Preserve (see Section N, Map B, for the location of the right-of-way).

TNC holds a conservation easement over the Class I lands. DEEP has a conservation easement on the entire property (Salisbury Land Records Vol.183/P.1123 and Vol. 183/P.1145).

g. Boundaries: There are approximately 4.8 miles of boundary lines. The boundaries were marked in 2022 with yellow paint and white rectangular signs that have the logos of the three organizations (AWC, DEEP, and TNC). The boundaries should be re-marked by 2032. Well-marked property lines help prevent encroachments and timber theft.

Figure 4. Boundary lines are marked with signs and yellow paint.

h. Encroachments: There are no encroachments, other than the orange trail which runs outside of SALT's 50' right-of-way.

i. Land Acquisition Goals: Any parcels that become available within the watershed that would improve access or protect the drinking water supply should be considered.

E. Special Use Areas

1. Lakes and ponds: Reservoirs 2 and 3 are surrounded by the Block. They are not open to the public for any purpose. There is a 0.5-acre manmade pond in Stand 5.

2. Rivers and streams: There are two major streams. McDuffee Brook flows from the northwestern corner of the Block into Reservoir 2. Burton Brook runs along the easterly side of the Block into Reservoir 3. It continues past the dam of Reservoir 3 and flows southeasterly onto private property.

3. Vernal pools: There were no vernal pools identified in areas to be managed, nor elsewhere in the Block. If vernal pools are discovered, they will be mapped and protected. For more information, view Best Management Practices for Water Quality While Harvesting Forest Products

Figure 5. Burton Brook cascade

4. Cultural sites: It is not known if there are sites from indigenous peoples in the Block. The Weatogue community, part of the Mohican people, had a settlement in the northeastern part of Salisbury, near the Housatonic River, before European colonization.

As mentioned earlier, there are many charcoal mounds scattered across the property. There are several old stone foundations and stone walls.

Near where West Road crosses Burton Brook are the remains of a steam boiler. According to TNC's Baseline Documentation Report, it powered a portable sawmill.

5. Recreation and scenic sites – trails and signs: There is an orange-blazed trail that runs eastward for 0.4 miles from West Road to SALT's Yoakum Preserve. SALT installed a trail map at the trailhead.

6. Critical Habitat (State listed rare or endangered plants and animals): A report from the DEEP Natural Diversity Database is in Section H.

There are small portions of the Acidic Rocky Outcrop Critical Habitat Community on the western and eastern highlands of the Block (see Section N, Map E).

7. Natural Areas: There are no Natural Area Preserves as defined by CT General Statute 23-5a.

8. Old Forestland Management Sites: Stands 3, 12, 13, 14, 15, 16, 17, 18, and 19 will be considered as Old Forestland Management Sites. These stands will be set aside to allow natural processes (for better or worse) to occur without the influences of active forest management (except for forest fire suppression). This totals 179 acres, or 45% of the total acreage.

9. Research Areas: There are no active research areas on the Block.

F. Forest Ecosystem Health and Diversity

1. Landscape Context

The Block is in the geologic Northwest Highlands of Connecticut. The Taconic Plateau is located where Connecticut, Massachusetts and New York come together. This plateau is an extension of the Taconic Mountains, which run along the border between Massachusetts and New York.

The Block is in TNC's Berkshire-Taconic Priority Area and in their Resilient and Connected Network. In this region, TNC creates partnerships to conserve land and advise on appropriate land management practices along the boundaries of CT, NY, MA, and VT.

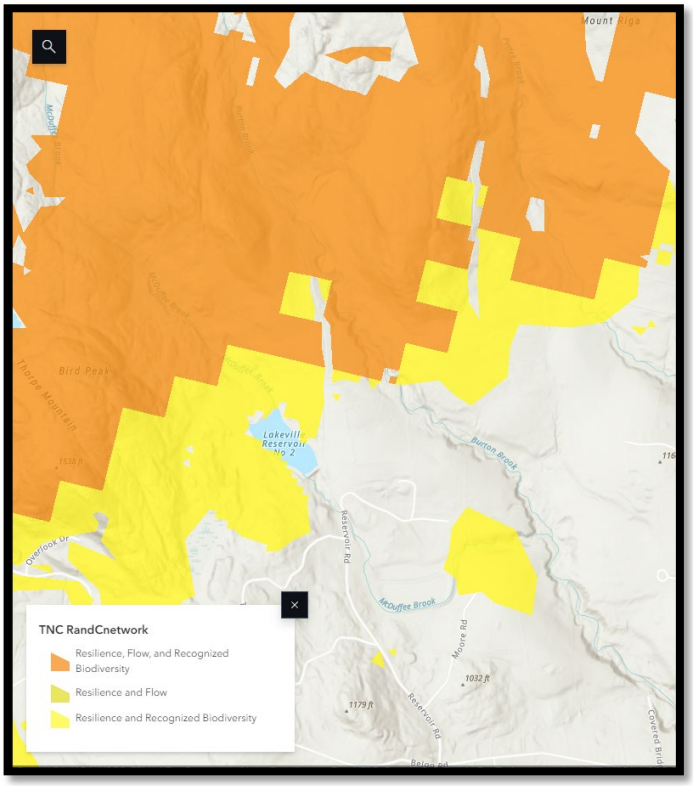


Figure 6. TNC Resilient and Connected Network in the Berkshire-Taconic Priority Area

The Block is bordered to the north by Mount Riga Incorporated, a privately owned woodland of about 4,000 acres, on which TNC holds a conservation easement on 418 acres. Also to the north, although not directly adjacent, is about 1,200 acres acquired by the National Park Service for the Appalachian Trail corridor. The 275-acre Mt. Riga State Park is not directly adjacent but is northeast of the Block.

The Block is bordered on the east by SALT's 241-acre Yoakum Preserve. Large privately-owned woodlands are adjacent to the western boundary, one of which has a conservation easement held by SALT. In addition, about one mile to the west in New York State, is Taconic State Park.

On the south, the Block is bordered by lightly developed residential areas.

Reservoirs 2 and 3 are well protected by the extensive woodlands in their watersheds (see Location Map, Page 4, for aerial photo).

2. Soils

The predominant soil in the Block is the Taconic-Rock Outcrop complex, found on the steep ridgetops in the northwestern portion. As the name implies, it is shallow to bedrock and not fertile.

Two of the other most common soils include:

a. Macomber-Taconic complex; on the east-facing slopes, west of Reservoir 2. It is moderately shallow to bedrock.

b. Dummerston gravelly loam; on the lower slopes, north of Reservoir 2, leading to West Road. It is a deeper soil and more fertile than the others.

3. Current Vegetative Condition

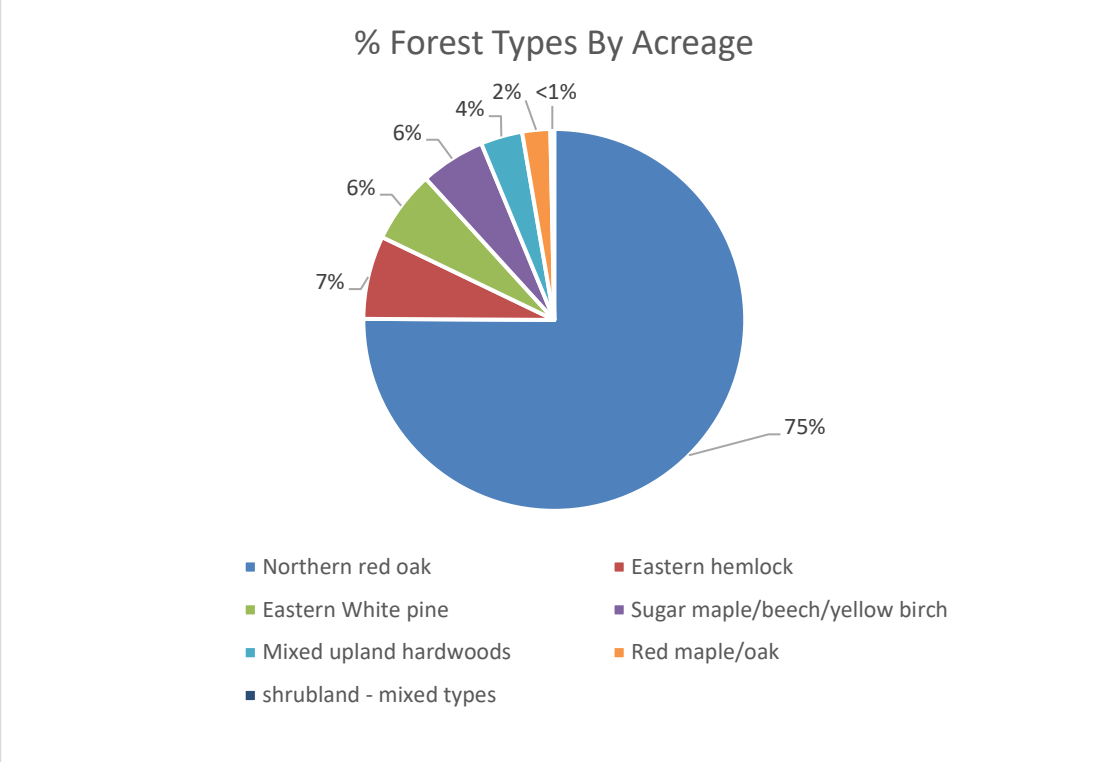


Figure 7. Forest Cover Types by Percentage

4. Forest Size classes by Forest Type (total forest)

Table 2. Forest Size Classes by Forest Type

Forest Types	**Size Classes**				
	Sapling	**Sap-Pole-Sawtimber**	**Sawtimber-Pole**	**Sawtimber**	**Total**
Northern red oak	0	0	0	300	300
Eastern hemlock	0	0	0	28	28
Eastern White pine	0	0	0	24	24
Sugar maple/beech/yellow birch	0	0	0	22	22
Mixed upland hardwoods	0	0	14	0	14
Red maple/oak	0	2	7	0	10
shrubland - mixed types	1	0	0	0	1
Total	**1**	**2**	**21**	**375**	**399**

Forest Type Descriptions (U.S. Forest Service)

Northern red oak: Mostly red oak, with lesser amounts of black oak, chestnut oak, aspen, sugar maple, red maple, and black birch.

Eastern hemlock: Mostly hemlock, with lesser amounts of sugar maple, yellow birch, basswood, red maple, black cherry, white ash, white pine, paper birch, black birch, and red oak.

Eastern White Pine: Mostly white pine, some of which are plantations and others naturally occurring. Other species include aspen, red maple, paper birch, black birch, yellow birch, black cherry, white ash, northern red oak, sugar maple, basswood, and hemlock.

Sugar maple/beech/yellow birch: Also includes basswood, red maple, hemlock, northern red oak, white ash, white pine, black cherry, and black birch.

Mixed upland hardwoods: Any mixture of hardwoods of species typical of the upland central hardwood region, includes at least some oak.

Red maple/oak: Mostly red maple and some of the wide variety of hardwoods including red oak, hickory, black birch, yellow birch, black locust, and aspen.

5. Forest type and treatments on areas to be managed during the course of this Plan

Forest Type and Management (acres)

Forest Type	Selection harvest	Thinning	Timber stand improvement	Total
Northern red oak	55	0	0	**55**
Eastern White pine	0	15	0	**15**
Mixed upland hardwoods	14	0	0	**14**
Red maple/oak	7	0	2	**9**
Total	**76**	**15**	**2**	**93**

Table 3. Forest Type and Management.

6. Forest Health

a. Understory concerns: Overbrowsing by deer is damaging the forest. In many places, the understory is either dominated by invasive exotic plants, or there is no understory other than ferns and grasses. Heavy deer browsing keeps small, native seedlings from growing into taller height classes. In addition, preferential browsing by deer reduces species richness, by favoring the growth of low palatability species such as beech and Japanese barberry.

Impact on Water Quality

The lack of understory impacts water quality by not having enough layers of vegetation in the overstory, midstory, understory, and ground cover to provide multiple opportunities to mitigate the kinetic energy of rainfall. Complex canopy structure intercepts rain and snow, delays peak storm flows, and filters sediment, nutrients, and pollutants. A healthy, forested watershed is an essential and cost-effective way to maintain a quality drinking water supply.

Figure 8. Sediment entering Burton Brook because excessive deer browsing has eliminated vegetation on the forest floor.

Impact on Wildlife

The lack of understory negatively affects ground nesting birds that need low cover to rear their young, such as ovenbirds and wild turkeys. In addition, thickets of Japanese barberry do not provide nesting sites for many native birds.

Figure 9. Overbrowsing by deer removed the lower canopy "rainfall filter" and eliminated sites for ground nesting birds.

b. Invasive exotic plants

Invasive shrubs and vines are associated with the failure to regenerate native tree and shrub species in Connecticut's hardwood forests. In the spring, shrubs such as Japanese barberry and multiflora rose leaf out before native species, giving them a competitive edge for the available sunlight.

The areas with the most invasive exotic plants in the Block are on the former agricultural lands north of Reservoir 3 as shown in Figure 1 on Page 9.

They are also in moister sites and along the sides of West Road.

The most problematic invasive exotic plants in the Block include:

Japanese barberry *(Berberis thunbergii)*, Asian bittersweet *(Celastrus orbiculatus)*, Multiflora rose *(Rosa multiflora)*, Autumn olive *(Eleagnus umbellata),* winged euonymous *(Euonymous alata)* and Amur honeysuckle *(Lonicera maacki).*

Impacts on Water Quality

Japanese barberry impacts nutrient cycling by altering soil structure and function.

Increased nitrification in the soil has been linked to Japanese barberry.

Earthworm biomass is much higher in thickets of Japanese barberry than in adjacent forests with native vegetation. Leaf litter provides a natural protective barrier to erosion. Unfortunately, the higher the earthworm population, the less leaf litter there is, which increases the risk of soil eroding into the drinking water supply.

In forests with thickets of Japanese barberry, arthropod species richness has been found to be significantly lower than in native shrubs, which may cause effects on the food web, nutrient cycling, and water quality.

Figure 10. Understory dominated by Japanese barberry.

Figure 11. Earthworms have removed the layer of organic matter that protects the soil from erosion.

An understory dominated by invasive exotic plants can cause ecological havoc when sudden openings are created by storm events or insect and fungal outbreaks. The already established invasives will

outcompete native seedlings for sunlight and moisture.

The populations of invasive exotic shrubs and vines need to be controlled to reduce their detrimental effect on forest health and regeneration. Eradicating invasive plants is necessary not only in areas scheduled for harvesting, but also in other parts of the Block to reduce seed sources for further spread by birds and wind.

c. Insect and disease concerns

As in many Connecticut woodlands, there are numerous insects and diseases present. Most native pathogens do not cause severe damage because our forests have evolved with them. The most negative impacts are caused by exotic pests for which our native trees have few defenses. A few are discussed below:

Spongy moths (formerly gypsy moth- *Lymantria dispar),* an invasive exotic insect, defoliated oak trees in the Block in 2021 and 2022. Fortunately, the moth population crashed in 2022 because of the presence of a viral disease (Nuclear Polyhedrosis Virus) and a fungus (*Entomophaga maimaga).* Observations in the summer of 2023 showed some scattered dead, mature oaks, but most of the trees appeared to have fairly healthy canopies. There were few fresh egg masses identified. This will continue to be monitored.

Emerald Ash Borer *(Agrilus planipennis)* has killed virtually all the white ash in the Block within the last few years. Most of the ash was growing on the moister soils. Fortunately, some ash is still lingering, although not looking entirely healthy, so there may be some resistance to the insect.

Hemlock elongate scale *(Fiorinia externa)* and hemlock woolly adelgid *(Adelges tsugae)* are present and are likely causing some mortality. Many of the hemlocks look unhealthy. Eastern hemlock is primarily found in the valley along Burton Brook. Hemlocks are important for water quality because they provide year-round shade to keep the water flowing into the Reservoirs cool and clear.

Beech leaf disease (BLD) is a new pathogen to Connecticut. It is associated with a foliar nematode. It causes beech leaves to discolor and wither. It may kill beech trees over the long term. Fortunately, beech is uncommon in the Block. No BLD has been observed, but it will be monitored.

Other common insects and diseases that can damage trees include white pine weevil *(Pissodes strobi)* on white pine and Nectria canker *(Nectria galligena)* on yellow and black birch. These organisms don't usually kill the trees but weaken them so the trunks may snap off during windstorms.

Tick-borne diseases: Japanese barberry thickets have higher populations of blacklegged ticks (often called "deer ticks") that transmit Lyme disease, human babesiosis, and other tick-borne illnesses.

d. Weather-related disturbances

The occasional ice storm or wet snow event appears to be the primary cause of weather-related changes to the forest. Judging from the forked stems in the upper canopies of the sugar maples in Stand 6, it is likely they were damaged in an unusual October snowstorm in 1987, when the leaves were still on the trees and heavy wet snow broke the main trunks.

A wet snow in February of 2023 broke major branches on poletimber red maples.

Damage from lightning strikes was observed while collecting data for this Plan.

It is important to note that Connecticut's woodlands are adapted to natural disturbances, which create opportunities for new forests to grow.

e. Disturbance Regimes (Fire)
Undoubtedly, fires were common during the charcoaling era. Sparks from charcoal hearths, portable sawmills, and blowing embers could easily have started a brush fire with the fuel provided by the tops of the felled trees. The fires killed thinner barked trees such as maples and birches, while thicker barked species such as oak survived, resulting in the oak-dominated forest of today. Although fires may no longer be common, it is possible that with increasingly warm and dry summers, there could be a greater potential for brush fires.

G. Silvicultural Strategies and Climate Change Mitigation

1. Forest Carbon Science

a. Carbon Sequestration and Storage
Carbon sequestration is the process where plants remove carbon from the atmosphere (in the form of carbon dioxide) during photosynthesis to make sugar. Trees use sugar to grow and make cellulose and lignin, the building blocks of wood. Wood is found in the trunks, branches, and roots of trees. Wood is stored carbon. In the northeastern United States, carbon sequestration typically peaks when forests are young to intermediate in age (30-70 years old), but they continue to sequester carbon through their entire life.

Carbon storage is the amount of carbon retained in the forest. Carbon is found in live tissue above and below the ground, dead wood, leaves and needles, and soil organic matter. In the northeastern United States, storage levels increase with forest age and typically peak when forests are about 200 years old.

As forests get older, their overall growth slows as the trees compete for sunlight, water, and nutrients in the soil. As trees die, carbon is released back into the atmosphere. In an older forest, the overall amount of stored carbon, while still increasing, eventually levels off.

Older forests have higher carbon storage and lower sequestration than younger forests. But older forests are more susceptible to damage from hurricanes, drought, insects, and diseases. Older forests with late successional characteristics such as complex stand structure, accumulation of dead, woody material, and many large, old trees can provide biodiversity benefits.

Younger forests have lower carbon storage and higher sequestration. They grow faster and also provide biodiversity benefits in that many wildlife species of greatest conservation need in Connecticut require early successional or young forests to survive. The populations of birds such as blue-winged warblers, chestnut-sided warblers, towhees, whip-poor-wills, and woodcocks are declining because of a lack of young forest habitat in Connecticut. New England Cottontail, our only native rabbit, also requires thickets of young forest to survive.

Passively managed forests, while important for many reasons, may be less resilient to disturbances. Carbon emissions from unmanaged forests can be greater than from managed forests if the unmanaged forests are experiencing high rates of mortality, such as after severe storms, infestations of spongy moth, emerald ash borer, hemlock woolly adelgid, and beech leaf disease.

Forest management, including timber harvesting, is consistent with the goals of promoting long-term carbon sequestration and storage. Younger, faster growing stands sequester carbon at a higher rate, while older stands store more carbon. Managing for complex forest structure, such as maintaining stocking of large trees while also providing growing space for younger trees, can promote higher rates of stand-level carbon sequestration and storage. In addition, the durable wood products resulting from the harvests in this plan will store carbon for a long time.

Carbon "leakage" is the shift of carbon emissions from one place to another. When the wood we use in Connecticut is not grown and harvested here, it must come from someplace else, with greater environmental impacts. Growing and harvesting wood is also more environmentally friendly than the alternatives of concrete or steel, which are fossil fuel intensive.

The silvicultural recommendations in this Plan will aim for carbon optimization in which some carbon is removed in the short term to stabilize carbon pools over the long term.

Refer to Connecticut's 2020 Forest Action Plan for more information about forest carbon in Connecticut (see Appendix B).

2. Forest Resilience

Forest resilience is the capacity of a forest to withstand, and recover from, climatic events, trends, and disruptions. Disturbances can include forest fires, severe weather, insect infestations, disease outbreaks, invasive plants and animals, and insufficient regeneration because of deer browsing.

Forests that are low in species and age diversity are more susceptible to mortality than a mixed species and multiple-aged forest when a species-specific pathogen arrives (for example spongy moth or oak wilt in an oak-dominated forest, or BLD in a northern hardwoods stand).

The recommendations in this Plan will eventually create a more diverse, resilient forest.

3. Salvage Guidelines (public safety and silvicultural objectives)

Forest insect infestations and disease outbreaks can lead to widespread mortality. For example, if an outbreak of spongy moth occurs, this could result in salvaging dead or dying oaks. Salvaging dead and dying trees removes a source of fuel for potential forest fires. Salvaging dying trees can store carbon in durable wood products, leaving less material to decay and release carbon dioxide into the atmosphere. Salvaging also captures economic value that would otherwise be lost.

It is also important to realize that dead trees have value for wildlife habitat and can keep moisture in the soil after they fall. If there was to be a salvage, many dead trees would be retained.

4. Encouraging Mature Forest Growth

A forest with a variety of stands of different age and size classes will be resilient. In the Lakeville

Block, most of the forest is considered mature, without much variety in species or age classes.

Approximately 179 acres (45% of the Block) will be classified as Old Forestland Management Sites. One hundred twenty (120) acres (30% of the total acreage) are classified as Inaccessible (see Table 1, Page 11). These stands are not likely to be actively managed unless land is acquired that provides access, or permission is granted from adjacent property owners.

5. Expectations: Next 100 years

The forest of the future can be projected by observing what kinds of trees are growing in the understory. Usually, shade tolerant tree species grow in the understory, such as red and sugar maple, American beech, yellow and black birch, and eastern hemlock. When the canopy is opened up, either by insects, diseases, weather, or selection harvesting, more sunlight reaches the forest floor, and these species will transition into the overstory. If larger openings are created, then a wider variety of both shade tolerant *and* shade intolerant species (oaks, aspen, black cherry, tulip poplar) can regenerate to create a more diverse forest.

Predicting the composition of the forest 100 years from now is confounded by the unpredictability of invasive insects and diseases. Just in the last 20 years, hemlock woolly adelgid and emerald ash borer have killed hundreds of thousands of trees in Connecticut. The best strategy is to "not put all your eggs in one basket" and grow a forest with a wide mix of species and age classes.

6. Management System Guidelines (even vs. uneven-aged)

93 acres (23% of the total acreage) will be actively managed over the next 20 years.

76 acres (Stands 6, 7 and 9) will be managed on an uneven-aged basis with single tree and group selection harvests.

15 acres (Stand 8) will be managed on an even-aged basis on a 100-year rotation.

2 acres (Stand 10) will have Timber Stand Improvement (TSI) where a non-commercial release of better-quality trees will take place.

7. Sustainability

Long term, roughly 19% of the total acreage (76 acres) will be regenerated on a 20-year cutting interval. These stands will eventually have distinct age classes created by each harvest.

307 acres (77% of the forested acreage) will be passively managed, other than treating invasive exotic plants.

8. Silvicultural Practice and Treatments

Silviculture is the art and science of controlling the establishment, growth, composition, health, and quality of forests to provide the benefits that society values on a sustainable basis. These values include wood, clean water, clean air, wildlife habitat, and recreation, among others.

Most of the actively managed acres in this forest will undergo selection harvests, meaning that over time we are encouraging the target stands to be multi-aged instead of even aged. Creating multi-aged stands will contribute to the forest's overall climate resilience, bolster carbon storage,

and increase the interception of raindrops before they reach the forest floor. A variety of stands of different ages and size classes across the landscape will be more resilient in responding to

disturbances such as invasive insects, diseases, and severe weather events.

Forest thinnings provide three key benefits to the watershed;
a. Improve growth rates within a stand by opening up space for the residual trees. (A fast-growing tree pulls more nutrients out of the soil, so a thinning can optimize a stand's ability to act as a living filter. Faster growing trees also sequester more carbon.)

b. Improve biodiversity by selecting residual trees of as many species as possible.

c. Increase the ability of trees to fight forest pathogens by encouraging high growth rates.

9. Adaptive Forest Management

The Division of Forestry understands the nature of forest management as part of a dynamic landscape. Management actions are often affected by outside variables which influence the outcome of resource decisions. The Division of Forestry reserves the right to reasonably change our management approach as environmental change and resource needs warrant. Some of these changes may be associated with biological factors such as insects and diseases.

Additionally, environmental conditions such as hurricanes or record-breaking precipitation may affect resource conditions and work requirements. The Division of Forestry and our colleagues in Parks, Wildlife, Fisheries, and Agency Support, evaluate circumstances and use an adaptive-management philosophy and reserve the right to address unforeseen circumstances should they arise during the tenure of this forest management plan.

H. Wildlife Habitat

1. Current Habitat Diversity

This Block features mature upland central and northern hardwood forests with limited fragmentation, providing habitat for mature forest species such as pileated woodpeckers, wood thrush, and red-eye vireo. Because the habitat is relatively undisturbed by development, most of the common wildlife species found in Connecticut should be here; namely raccoons, black bear, white-tailed deer, barred owl, wood frog, red-backed salamander, and many more.

The mature softwood trees in Stands 8 and 9 are excellent habitat for pine warblers, as well as black-throated blue and black throated green warblers. The small opening around Reservoir 3, and the small area of saplings enclosed by Stand 8 provide habitat for gap species like chestnut-sided warbler. A wetter area of cattails around Reservoir 2 that extends into Stand 5, provides habitat for red-winged blackbirds and red shouldered hawks, among other wetland birds.

This Block has potential habitat for the cerulean warbler. Cerulean warblers are neotropical migrants and are found in mature hardwood forests with well-spaced, large diameter trees and open understory, such as wet bottomlands and dry slopes. They are insectivores, foraging in and around deciduous trees. Breeding habitat is thought to include canopy gaps and internal forest edges (trails and narrow roads, rights-of-way, and small harvest edges).

In addition, moose scat was observed on the property.

2. Critical Habitat

The Natural Diversity Data Base (NDDB) map for Salisbury, dated December 2023, is shown below.

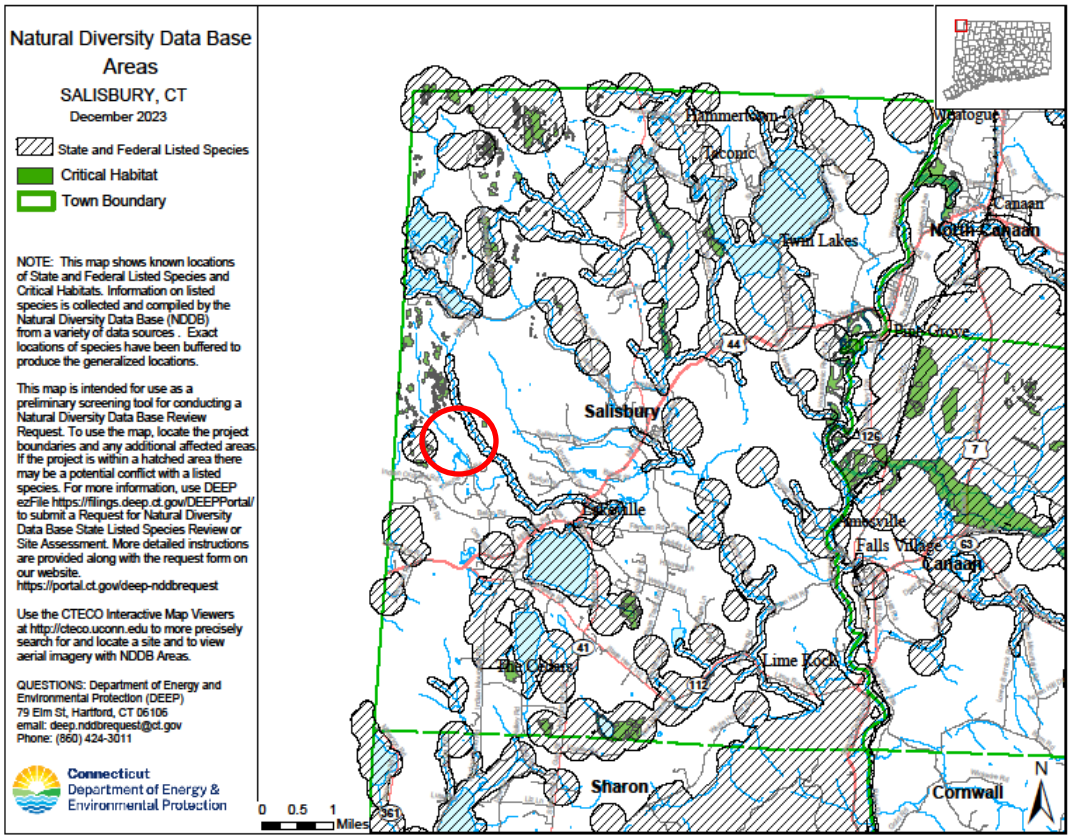


Figure 12. Natural Diversity Data Base Map of Salisbury, December 2023. Lakeville Block is highlighted in red.

The NDDB report, dated 2-7-2024, stated:

According to our records, the following State-listed species (RCSA Sec. 26-306) have been documented and may be affected by your project:

- Northern long-eared bat (Myotis septentrionalis)- State and Federally Endangered
  Location: Throughout
  The presence of northern long-eared bat (Myotis septentrionalis), a Federally endangered species, may require consultation with the US Fish and Wildlife Service to be in compliance with the Federal Endangered Species Act if the proposed project requires federal permits or uses federal funds. For more information on federal requirements visit:
  http://www.fws.gov/midwest/endangered/mammals/nleb/

- Sensitive Species- State Endangered
  Location: Throughout

- Golden-winged warbler (Vermivora chrysoptera)- State Endangered
  Location: Potential Habitat
  The northwest corner of Connecticut is the last remaining area in the state where suitable habitat can be found or managed for this species. This species arrives in April and breeding occurs through

July. This species is especially vulnerable to colonization by blue-winged warbler. Where feasible,

work with biologists to create appropriate forest openings to manage this property or neighboring properties to help support this species.

Note: A publication, entitled "Best Management Practices for Golden-winged Warbler Habitats in the Appalachian Region", recommends creating patches of greater than 25 acres, with 30-70% shrubs and saplings and widely spaced overstory trees (5-15/acre), resulting in 10-30% canopy cover (20-40 sq. ft./acre basal area).

Unfortunately, patches of this size are impossible to create and maintain sustainably over the long-term on the Block because there simply isn't enough operable acreage to keep making 25-acre openings.

However, optimum habitat for the golden-winged warbler could be created if the adjacent landowners, such as SALT, or Mount Riga Incorporated, managed their forests to benefit not only this species, but others whose populations are disappearing because of a lack of early successional and young forest habitat.

We will try to partner with nearby landowners to manage and create vital habitat on a landscape scale.

- Cerulean warbler (Setophaga cerulea)- State Special Concern
  Location: Throughout
  Cerulean warblers are neotropical migrants and are found in mature hardwood forests with well-spaced, large diameter trees and open understory, such as wet bottomlands and dry slopes. They are insectivores, foraging in and around deciduous trees. Breeding habitat is thought to include canopy gaps and internal forest edges (trails and narrow roads, rights-of-way, small harvest edges). This species is in decline due to habitat loss, and will benefit from maintaining large blocks of unfragmented, structurally diverse forest. In actively managed forests, small scale harvests (10-25 acres) can mimic natural disturbances and enhance habitat for this species. Shelterwood cuts, group selection cuts (uneven-aged) or modified uneven-aged regeneration are the preferred harvest types. Large chestnut oaks, white oaks, hickories and sugar maples should be retained and the residual basal area should be no less than 40 square feet per acre (40-90 square feet per acre is optimal).

- Northern spring salamander (Gyrinophilus porphyriticus)- State Threatened
  Potential Suitable Habitat: Burton Brook, upstream of Reservoir 3
  This species requires cold, clean, well-oxygenated springs, brooks or seepage areas. Their favored habitat is heavily forested steep, rocky ravines. Any activities that decrease the forest canopy would increase the water temperature and impact this species.

- Slimy sculpin (Cottus cognatus)- State Special Concern
  Location: Downstream Burton Brook
  Consult with a fisheries biologist for management recommendations.

- Three-toothed cinquefoil (Sibbaldiopsis tridentata)- State Threatened
  Location: Stands 2, 3, and 16

Habitat: Open, exposed soils, exposed ledges & bare mountain tops

- Wild currant (Ribes rotundifolium)- State Special Concern
  Location: Stands 12, 13, 14, 17
  Habitat: Swampy woods, cool open talus slopes

- Critical Habitat - Acidic Rocky Summit Outcrop
  Location: Stands 14, 17, and 18

3. Habitat in Forestry Operations
Plans for forestry operations are reviewed by the DEEP NDDB, DEEP Habitat Wildlife Biologists, and DEEP Fisheries Biologists. These plans are site specific about which areas will be harvested. Recommendations made by the NDDB and DEEP Biologists regarding the above listed species are incorporated into the forestry operation plan.

4. Hunting and Trapping
A regulated deer hunting program is recommended.

5. Fisheries Habitat and BMPs
No crossings of McDuffee or Burton Brooks will be needed to conduct the proposed timber harvests. A 100-foot no cut buffer will be adjacent to both streams.

DEEP's current forestry BMP guide, "Best Management Practices for Water Quality While Harvesting Forest Products", will be referenced when forestry operations are planned. Best Management Practices for Water Quality While Harvesting Forest Products

I. Recreation

1. Trails: Until the relevant CWSF partners (TNC and AWC) reach an access agreement with SALT, there are no authorized trails on the Block.

2. Exclusion Areas: The watershed of the Reservoirs could easily be negatively impacted by recreation disturbances. Soil compaction, litter, and excrement from dogs, horses, and people, can all result in water quality issues. Recreation use will be limited to the orange trail when there is an access agreement.

3. Unauthorized/Illegal Activity: Hikers sometimes bring dogs onto the property. They may go past the gate at the trailhead of the orange trail and walk north on West Road to Reservoir 3.

4. Sustainable Recreation: There are no plans for any additional trails besides the proposed orange trail.

J. Economic Benefits

1. Connecticut Forest Economy
According to the Connecticut Forest Action Plan, in 2020, the total output of Connecticut's Forest Products Industry was $3.96 billion. Of that, primary wood product manufacturing was $198 million, secondary wood product manufacturing was $402 million, wood furniture was $781 million, and paper manufacturing was $2.5 billion. Forestry and logging accounted for an additional $26 million in output.

Approximately 7.6% of Connecticut's 2015-2018 average wood harvest of 27.5 million board feet of

sawtimber originated from State Land. Nontimber forest products such as maple syrup and witch-hazel also contribute to the local economy. Locally sourced firewood reduces our need for fossil fuels imported from faraway places.

Forest products from the harvests recommended in this Plan will provide the raw materials for a bio-based economy using renewable resources.

K. Public Involvement

This Plan was reviewed and approved by DEEP, AWC, and TNC at a meeting of the CLC on March 15, 2024.

The Plan will be sent to the Salisbury Conservation Commission, the Salisbury Association Land Trust, the Housatonic Valley Association, Mount Riga Incorporated, and the Northwest Connecticut Land Conservancy. It will be posted on the CT DEEP website.

Additionally, the DEEP Forestry Division engages in public outreach before all timber harvesting in State Forests.

L. Management Goals

1. High Quality Drinking Water & Environmental Protection – To continue to promote and protect high-quality drinking water.

2. Forest Ecosystem Health and Diversity – To create a more multi-aged and climate resilient forest with diverse structure and species composition by:

-Using a combination of even-aged and uneven-aged forest management techniques;
-Controlling non-native invasive plants;
-Promoting a mix of softwood and hardwood stands;
-Forest thinnings to improve individual tree health and species composition;
- Institute a regulated deer hunting program.

3. Diverse Wildlife Habitat – Many of Connecticut's wildlife species, both common and rare, use a wide variety of forested habitats. It is important to provide diverse forested habitats for animals with different needs.

4. Climate Change Mitigation through Sequestration and Storage – Optimize carbon sequestration and storage by promoting forest health and balancing higher sequestration rates with multi-aged, complex forest structure featuring high carbon storage. TNC's Resilient and Connected Landscapes project has identified this property as possessing traits with above average resilience to changes in climate. These resilient and connected landscapes help support the survival of plant and animal species as they move in response to climate change.

5. Economic Benefits – Sustainably harvesting forest products such as timber and firewood will provide jobs and goods that are sold in the local, bio-based economy. Revenues from harvests can help pay for invasive treatments and road improvements.

6. **Recreational/Health Benefits –** Establish an agreement between AWC, TNC, and SALT to allow pedestrian use of the trails.

7. Increasing Resilience – The plan will increase the diversity of species and age classes with selection harvests and thinnings, while designating 179 acres (45% of the total acreage) as Old Forest Management Sites that will be left to the forces of nature. Diverse forest systems are more resilient to disturbance and change.

M. Work Plans

1. Silvicultural Operations

Activity	Forest Stands	Acres
Selection harvest	6, 7, 9	76
Thinning	8	15
Timber Stand Improvement	10	2

2. Prescribed Fire
No prescribed burns are planned.

3. Forest Product Permits
Forest products permits may be issued to cut firewood, black locust posts, or to harvest other products as approved by the Conservation Land Committee.

4. Invasive Treatments
Invasive exotic plants will be treated in Stands 4, 5, 6, 7, 8, 9, and 10, with a priority to those stands that will have selection harvests.

5. Road Work
West Road will need additional gravel and grading to maintain access for management and forest fire suppression.

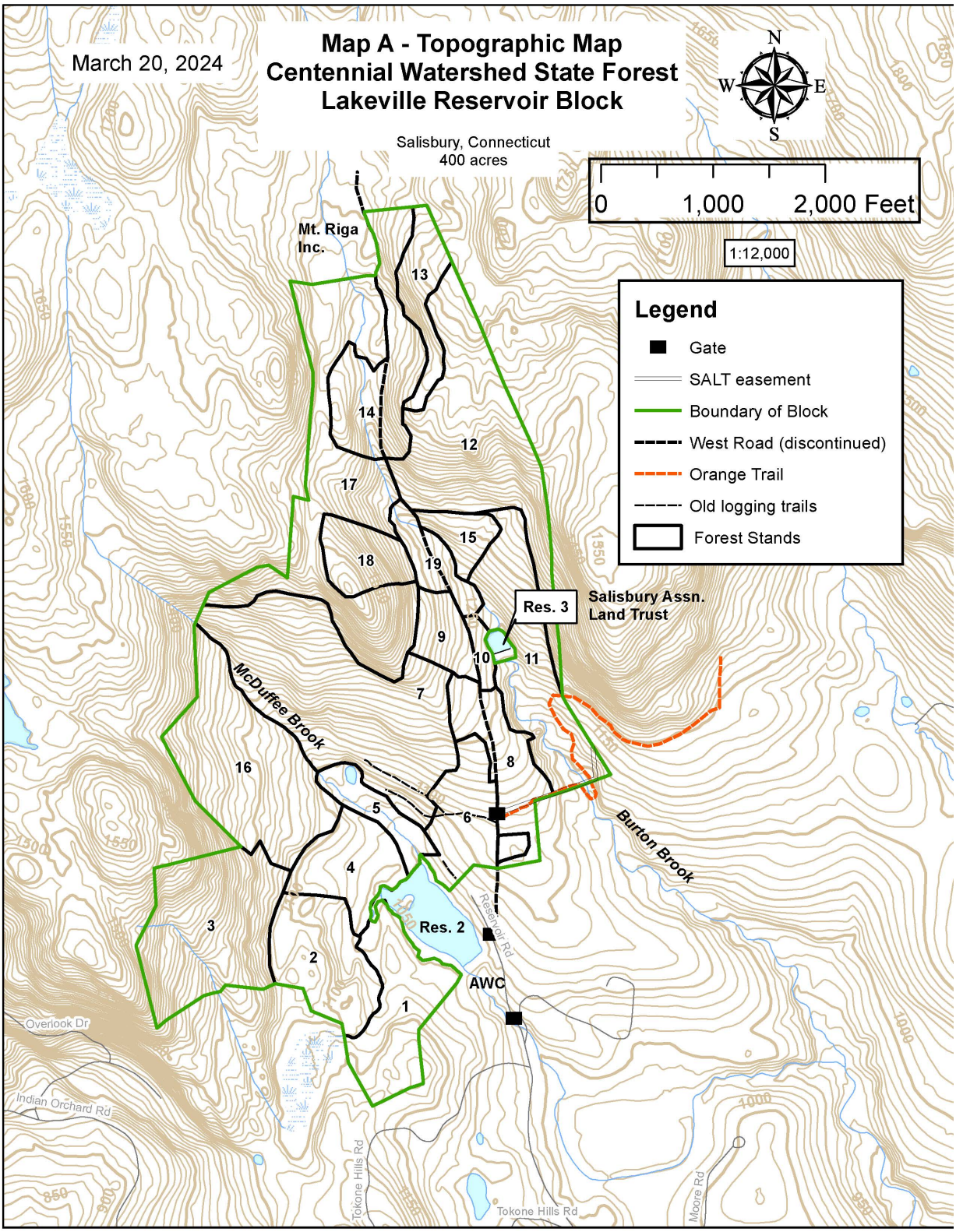
6. Other Infrastructure issues:
Remove the old culvert on Burton Brook to improve stream flow and reduce erosion (in consultation with DEEP Fisheries).
Re-mark the boundary lines by 2033.

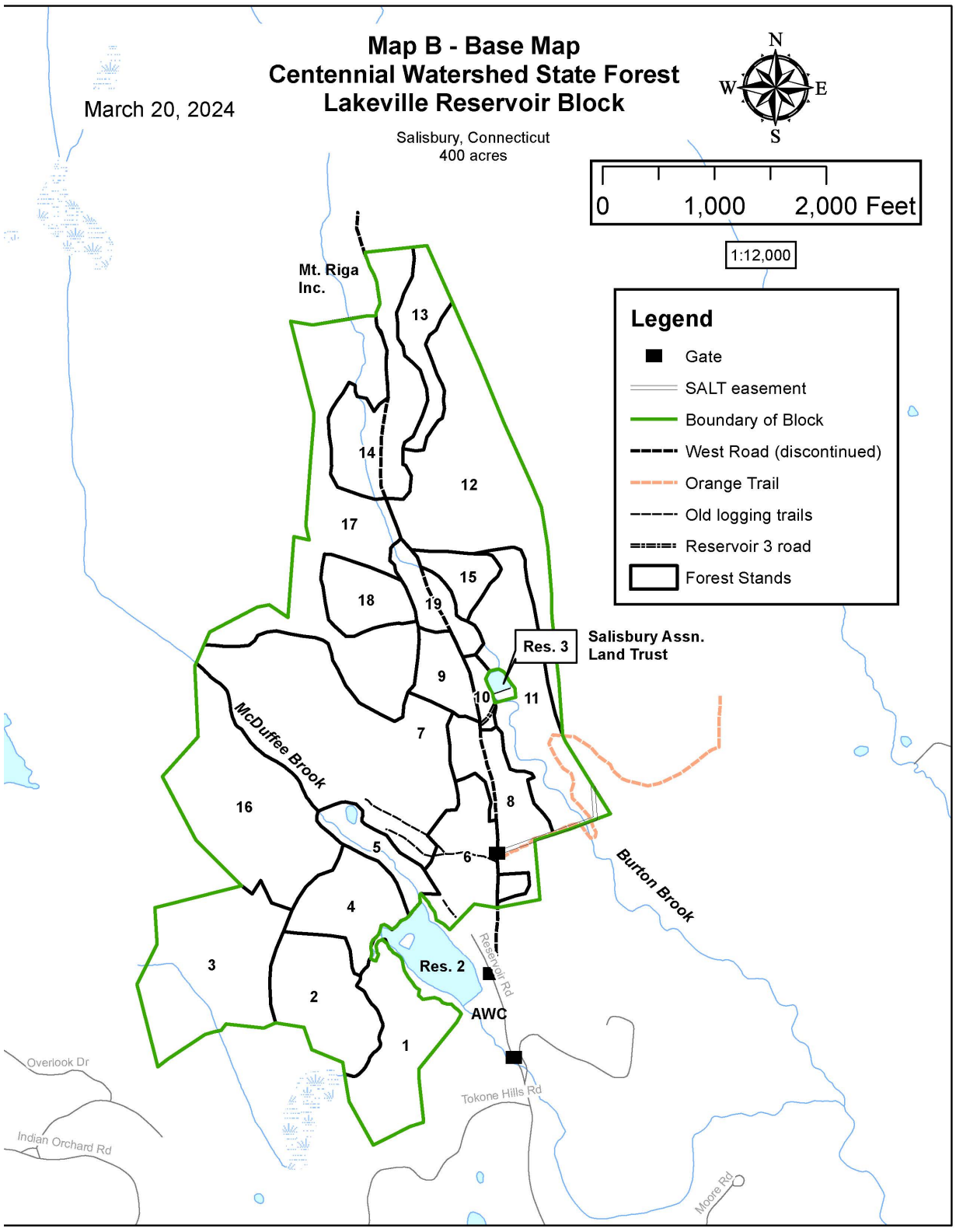
7. Habitat Enhancement Work
No habitat enhancement work is planned other than treating invasive exotic plants and the benefits created by silvicultural operations.

8. Non-Commercial Forest Products Work
Timber stand improvement in Stand 10 to release better quality poletimber.

9. Hazardous Trees
Hazardous trees will be dealt with if they become an issue.

N. Forest Map Set




Map B - Base Map
Centennial Watershed State Forest
Lakeville Reservoir Block
March 20, 2024
Salisbury, Connecticut
400 acres
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1,000
2,000 Feet
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Legend
Gate
SALT easement
Boundary of Block
West Road (discontinued)
Orange Trail
Old logging trails
Reservoir 3 road
Forest Stands
Mt. Riga Inc.
Salisbury Assn. Land Trust
Res. 3
Res. 2
AWC
McDuffee Brook
Burton Brook
Reservoir Rd
Tokone Hills Rd
Overlook Dr
Indian Orchard Rd
Moore Rd
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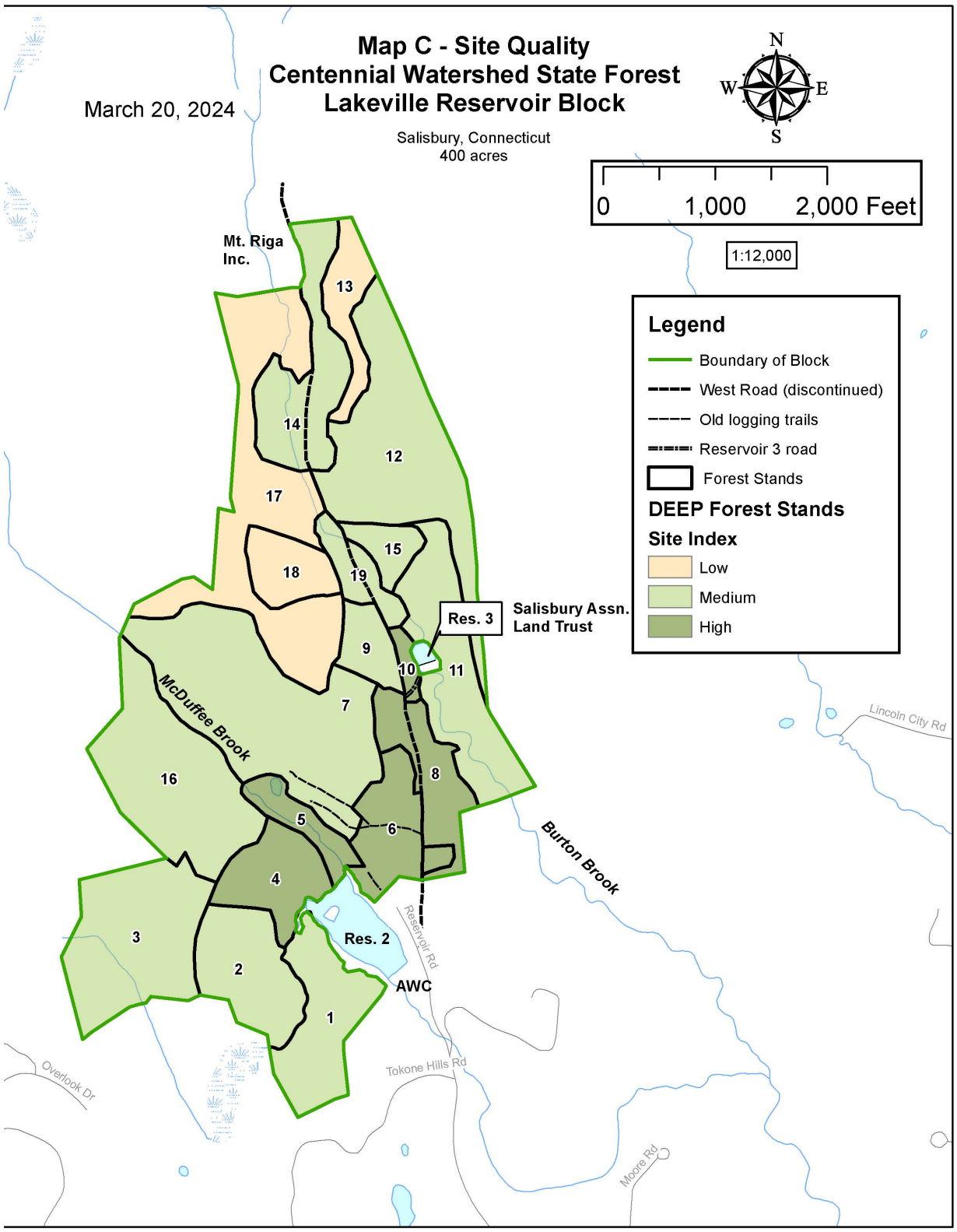
Map C - Site Quality
Centennial Watershed State Forest
Lakeville Reservoir Block
March 20, 2024
Salisbury, Connecticut
400 acres
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1,000
2,000 Feet
1:12,000
Legend
Boundary of Block
West Road (discontinued)
Old logging trails
Reservoir 3 road
Forest Stands
DEEP Forest Stands
Site Index
Low
Medium
High
Mt. Riga Inc.
Salisbury Assn. Land Trust
Res. 3
Res. 2
AWC
McDuffee Brook
Burton Brook
Reservoir Rd
Tokone Hills Rd
Lincoln City Rd
Overlook Dr
Moore Rd
1
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4
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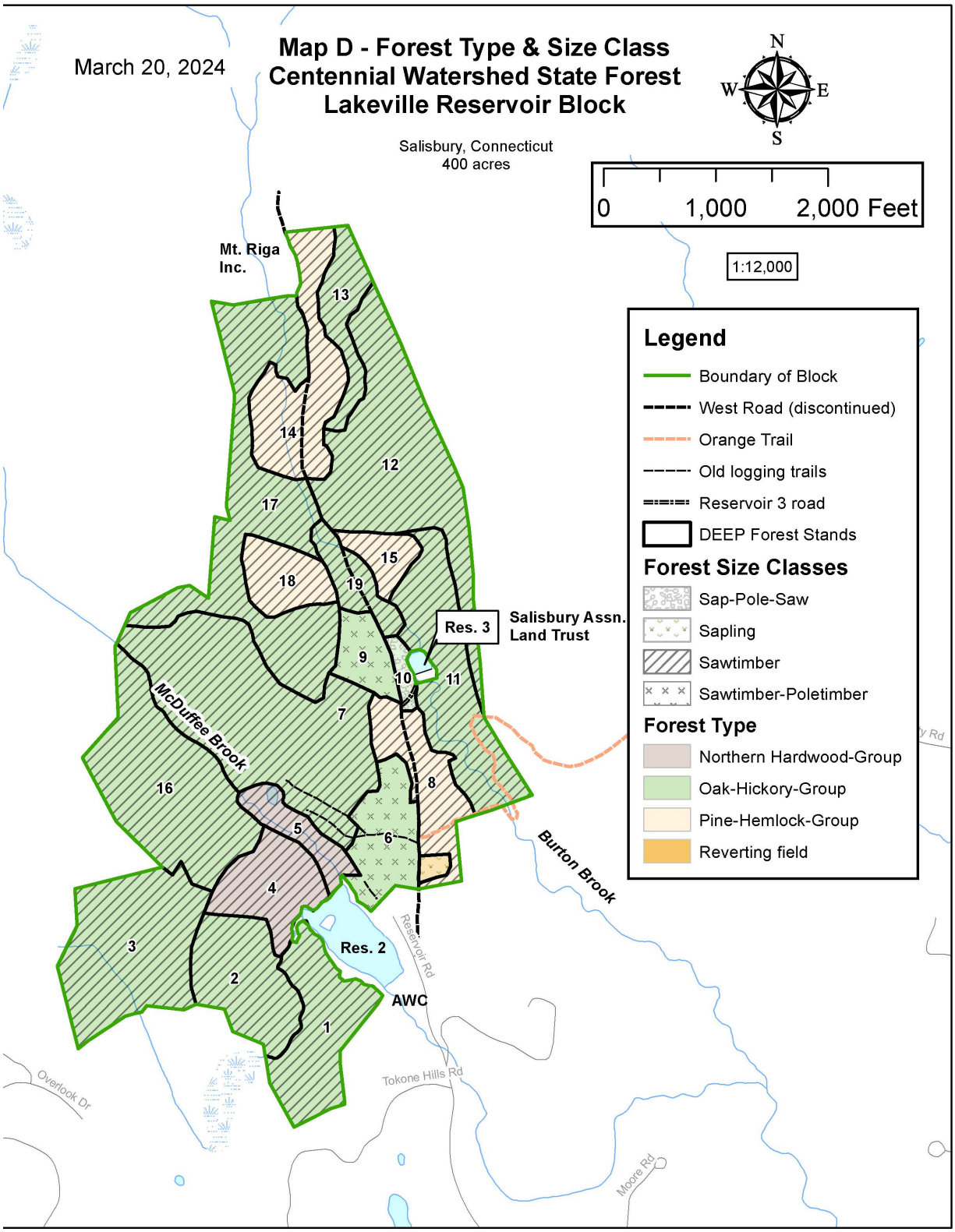
March 20, 2024
Map D - Forest Type & Size Class
Centennial Watershed State Forest
Lakeville Reservoir Block
Salisbury, Connecticut
400 acres
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2,000 Feet
1:12,000
Mt. Riga Inc.
Salisbury Assn. Land Trust
Res. 3
Res. 2
AWC
McDuffee Brook
Burton Brook
Reservoir Rd
Tokone Hills Rd
Overlook Dr
Moore Rd
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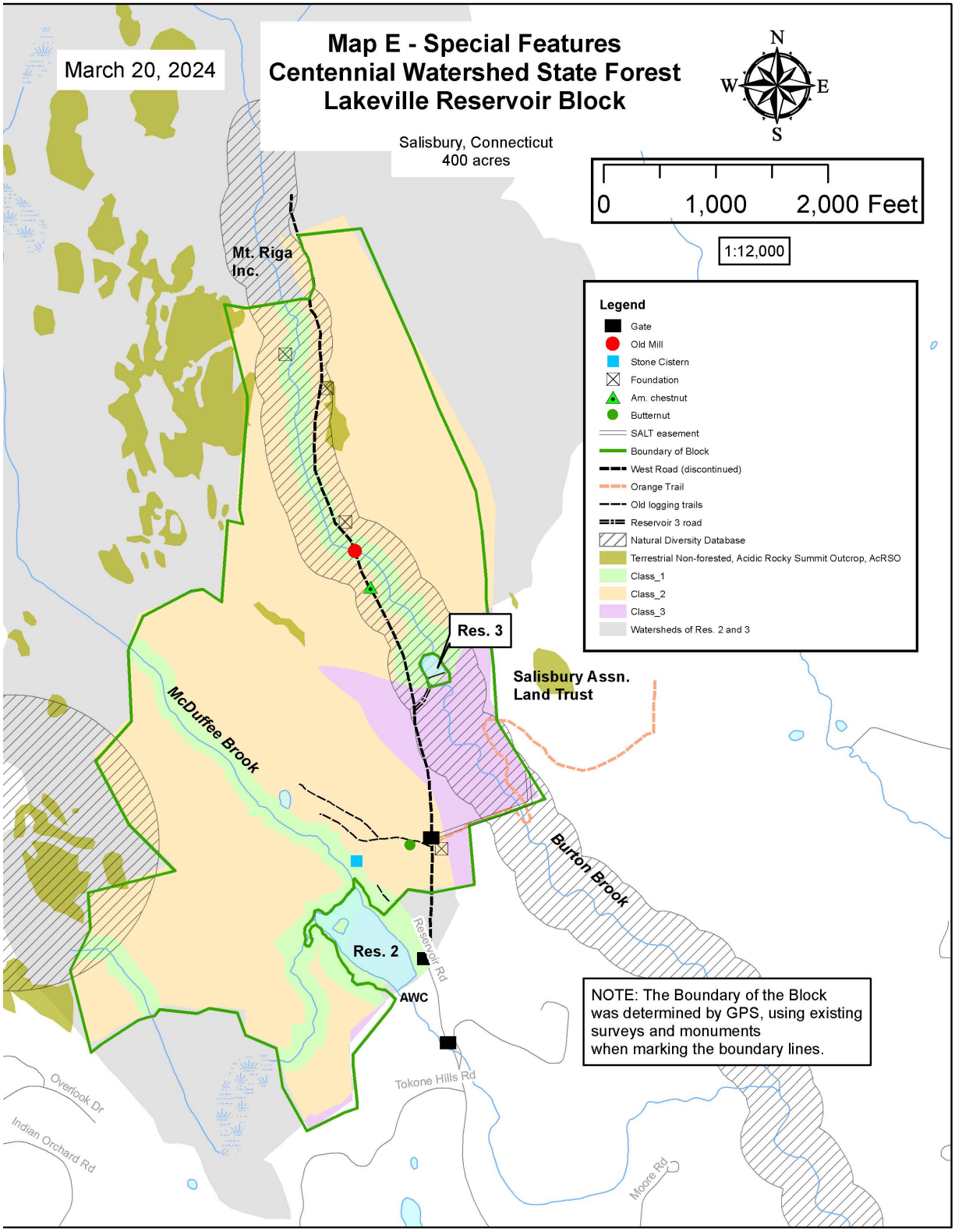
Legend
Boundary of Block
West Road (discontinued)
Orange Trail
Old logging trails
Reservoir 3 road
DEEP Forest Stands
Forest Size Classes
Sap-Pole-Saw
Sapling
Sawtimber
Sawtimber-Poletimber
Forest Type
Northern Hardwood-Group
Oak-Hickory-Group
Pine-Hemlock-Group
Reverting field


March 20, 2024
Map E - Special Features
Centennial Watershed State Forest
Lakeville Reservoir Block
Salisbury, Connecticut
400 acres
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2,000 Feet
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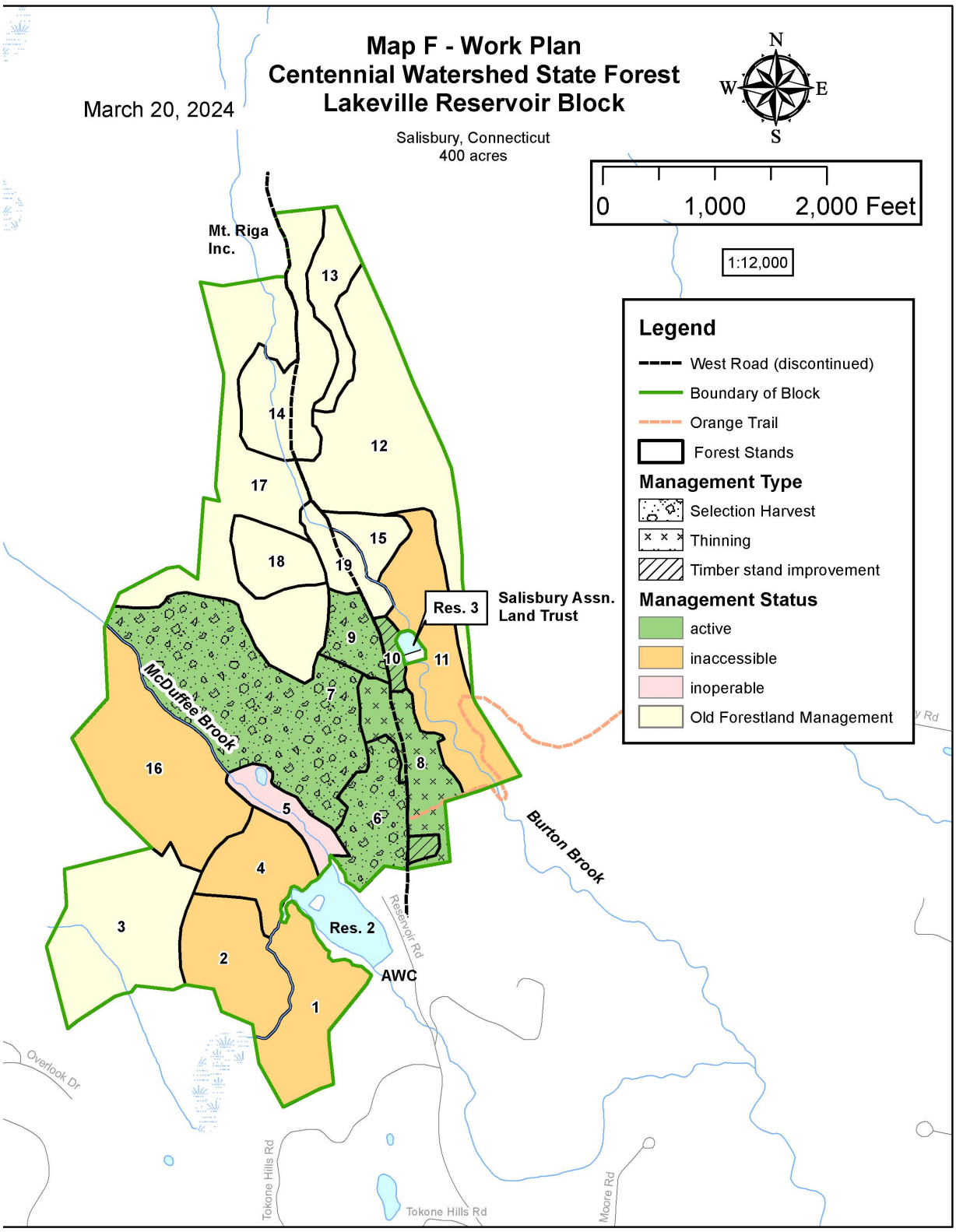
Legend
Gate
Old Mill
Stone Cistern
Foundation
Am. chestnut
Butternut
SALT easement
Boundary of Block
West Road (discontinued)
Orange Trail
Old logging trails
Reservoir 3 road
Natural Diversity Database
Terrestrial Non-forested, Acidic Rocky Summit Outcrop, AcRSO
Class_1
Class_2
Class_3
Watersheds of Res. 2 and 3
Mt. Riga Inc.
Res. 3
Salisbury Assn. Land Trust
McDuffee Brook
Burton Brook
Res. 2
AWC
Reservoir Rd
Tokone Hills Rd
Overlook Dr.
Indian Orchard Rd
Moore Rd
NOTE: The Boundary of the Block was determined by GPS, using existing surveys and monuments when marking the boundary lines.


Map F - Work Plan
Centennial Watershed State Forest
Lakeville Reservoir Block
March 20, 2024
Salisbury, Connecticut
400 acres
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2,000 Feet
1:12,000
Legend
West Road (discontinued)
Boundary of Block
Orange Trail
Forest Stands
Management Type
Selection Harvest
Thinning
Timber stand improvement
Management Status
active
inaccessible
inoperable
Old Forestland Management
Mt. Riga Inc.
Salisbury Assn. Land Trust
Res. 3
Res. 2
AWC
McDuffee Brook
Burton Brook
Reservoir Rd
Tokone Hills Rd
Moore Rd
Overlook Dr
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Appendix A Review and comments (DEEP and others)

DEEP Western District Review and Comments

Shalyn Zappulla- DEEP Fisheries Division
Peter Picone- DEEP Wildlife Division
Tammy Talbot – Outdoor Recreation
Skip Kearns- DEEP District Operations Division

Comments from DEEP are incorporated into the plan.

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Map Showing Property of the Lakeville Water Company, Town of Salisbury, Conn. – rev. Feb. 3. 1959
Map Prepared for Salisbury Association, Inc., Middle Road, West Road, Salisbury, CT - Dec. 3, 2019
Map of Taconic State Park, Southern Section. NY State Parks, Recreation, and Historic Preservation

Appendix C - Definitions

Size Classes

- **Sawtimber –** Trees 12-inch dbh (diameter breast height or 4.5 feet off the ground) and larger that contain at least one 8-foot sawlog.
- **Poletimber –** Trees between 5 and 11 inches dbh. These trees are too small for sawlogs, but could be sold as pulpwood, fuelwood, posts, or other small products where markets exist.
- **Saplings –** Trees 1 to 5 inches dbh.
- **Seedlings –** Trees less than 1 inch dbh.
- **Stand –** An area of trees of a certain species composition (cover type), age/size class distribution, and condition (quality, vigor, risk), usually growing on a fairly homogeneous site.

An **even-aged** stand contains trees in the main canopy that are within 20 years of being the same age.

An **uneven-aged** stand contains trees of several 15–20-year age classes.

Types of Silvicultural Treatments

- **Clearcut –** Used in even-aged management to regenerate a new forest using seeds already in the soil,

seeds brought in from adjacent areas via wind or animals, and/or sprouts from stumps. All stems are cut to provide maximum sunlight for the new forest. Trees such as black cherry, yellow poplar, aspen, and paper birch often regenerate after clearcuts. Often used to create early successional wildlife habitat.

 Selection harvest – Used in uneven-aged management. Trees are removed singly or in groups up to 1-2 acres. Selection harvests tend to favor trees that can grow in partial shade such as sugar and red maples, black and yellow birch, beech, and hemlock.

 Single-tree selection – An uneven-aged silvicultural technique involving the removal of trees singly or in groups of 2 or 3, which maintains a continuous canopy and an uneven-aged or uneven-sized mixture.

 Group selection – An uneven-aged silvicultural technique involving the removal of trees in groups usually 1/10 to 2/3 acre in size, but sometimes up to 1 or 2 acres on large properties. Group selection can be applied in combination with single-tree selection to create a more varied landscape.

 Shelterwood – Used in even-aged management. Understory and lower crown canopy trees are removed to allow the new stand to regenerate in partial sunlight. Trees to be retained are usually of the best quality to serve as a desirable source of seed and improve the genetic stock of the forest. After adequate regeneration is established, the overstory is removed in one or two cuts. Shelterwoods are often used to regenerate species such as oak and white pine that have irregular crops of seed and gain an advantage over other species when regenerating in partial shade.

 Thinning – The removal of some trees to enhance the vigor and growth of other trees without intentionally regenerating the stand. Allows for the removal of undesirable trees either due to genetic quality, disease, or potential mortality.

 Seed Tree – An even-aged silvicultural technique similar to a clearcut, but leaves several residual trees per acre to provide a seed source of the desired species to regenerate (e.g. oak).

Definitions

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

 Basal area – The cross sectional area of a tree's stem at 4.5 feet above the ground, or breast height. Basal area per acre is often used as a stand metric to determine stand stocking and density.

 Best Management Practices – Procedures and treatments that lessen soil erosion, sedimentation, stream warming, movement of nutrients, and visual quality during or following forest management activities.

 Biological diversity – The variety and abundance of species, their genetic composition, and the communities, ecosystems, and landscapes in which they occur. Also, the variety of ecological structures and functions at any one of these levels.

 Board-foot volume – The volume of wood expressed as the number of boards 1 foot x 1 foot and 1 inch thick

 Carbon sequestration – The process of removing carbon from the atmosphere in photosynthesis, resulting in the maintenance and growth of plants and trees. The rate (or amount and speed) at which a forest sequesters carbon changes over time. In the northeastern United States, carbon sequestration rates typically peak when forests are young to intermediate in age (around 30-70 years old), but they continue to sequester carbon through their entire life span.

 Carbon storage – The amount of carbon that is retained in a carbon pool within the forest. Storage levels increase with forest age and typically peak in the northeastern United States when forests are old (>200 years).

 Native plant – A species that naturally occurs in a given location where its requirements for light, warmth, moisture, shelter, and nutrients are met.
 Non-commercial treatment – Any forest management activity that does not produce enough revenue to pay for the costs associated with the treatment.
 Nutrient – Elements and other chemical substances that support biological activity (i.e. Nitrogen, phosphorus, potassium, sulfur, etc.)
 Old Growth – In southern New England, is defined as a forest community that has remained undisturbed by agriculture or logging since European settlement.
 Overland flow – The portion of rain or snowmelt that flows over the surface of the soil until it reaches a stream channel. It is not absorbed by the soil. Overland flow in forests is rare unless leaf litter and organic horizons of the soil have been severely disturbed or mineral soils have been compacted.
 Plantation – A forest stand in which most trees are planted. Typically, planted trees are in rows with equal spacing between each tree.
 Regeneration cuttings – Silvicultural cuttings designed to naturally regenerate a stand by providing for seedling or stump sprout establishment.
 Relative Density – An index of crowding in forest stands, also called the tree-area ratio; a measure of the absolute stand density expressed as a ratio to the density of some reference level. The reference level is usually the stand density of a fully stocked stand for a particular species composition, site, and method of treatment.
 Sedimentation – The accumulation of organic and mineral soil particles and rocks in streams and water bodies due to erosion. Sedimentation often accompanies flooding. The application of Best Management Practices will help protect against sedimentation during and after treatments.
 Shade intolerance – The relative inability of a plant to become established and grow in shade.
 Shade tolerance – The relative ability of a plant to become established and grow in shade.
 Silviculture – Silviculture is the art and science of controlling the establishment, growth, composition, health, and quality of forests to provide the benefits that society values on a sustainable basis. These values include wood, clean water, clean air, wildlife habitat, and recreation, among others.
 Species diversity – The number of different plants, animals, and other life forms coexisting in a community.
 Stand condition – The relative number, size, species, quality, and vigor of trees in a forest stand
 Stand density – A quantitative measure of the proportion of area in a stand occupied by trees such as basal area or trees per acre.
 Stocking – A subjective indication of stand density that helps determine whether the stand needs to grow further, be thinned, or regenerated
 Understory – The saplings, shrubs, seedlings, and other vegetation growing beneath the forest canopy and above the herbaceous plants on the forest floor.
 Vertical diversity – The extent to which plants are layered within an area. The degree of layering is determined by two factors: 1.The arrangement of different growth forms (trees, shrubs, vines, herbs, mosses, and lichens); 2. The distribution of different tree and shrub species having different heights and crown characteristics
 Water yield – The distribution and total quantity of runoff, usually considered over some specified period of time. Water yield may be characterized by total volume of runoff and flow duration curves.
 Watershed – An area of land through which precipitation is redistributed into components of the hydrologic cycle, including evaporation, groundwater, and streamflow. A watershed is all the land giving rise to streamflow at a selected point in a stream channel; the area drained by a river or stream and its tributaries.