# Centennial Watershed State Forest
# Easton Reservoir Block Forest Management Plan

## Forest Diversity

Even and uneven-aged forest management techniques, invasive plant control, and promotion of softwood and hardwood stands will be used to create a multi-aged and climate resilient forest with diverse structure and species composition in the Easton Reservoir Block.

## Climate Change Mitigation

The forests of the Easton Reservoir Block can help mitigate climate change by sequestering and storing carbon in vegetation above and below ground, and as durable wood products used locally and beyond. Promoting forest health and balancing higher sequestration rates with diverse forest structure featuring high carbon storage is essential.

## Economic Benefits

This plan outlines timber harvesting activities on 1,095 acres. There are also two active sugarbushes which provide locally produced maple syrup. These sustainably harvested forest products provide jobs and raw materials for a locally sourced, forest-based economy.

## Forest Health and Protection

Managing Connecticut's State Forests helps reduce their susceptibility to threats, such as invasive plants, insects, and pathogens, allowing them to remain healthy and productive. In this Block, invasive plants, such as Japanese barberry, multiflora rose, Asiatic bittersweet, and stiltgrass are being actively controlled, and continued treatment is recommended in this plan.

## Wildlife Habitat

One State Endangered species and four Species of Special Concern are known to use the area in and round this forest Block. Many of Connecticut's wildlife species, both common and rare, use a wide variety of forested habitats. It is important to provide many kinds of forested habitats for animals that have different needs.

## Recreation/Health Benefits

Outdoor activities, such as fishing and hunting, are permitted in designated areas. All public access is regulated by the Connecticut Department of Public Health.

## High Quality Drinking Water & Environmental Protection

Recommended silvicultural treatments will create a diverse mix of tree species and age classes. Young forest acreage will increase while 265 acres will be designated as Old Forestland Management Sites. Additionally, the Easton Reservoir Block filters drinking water that hundreds of thousands of Fairfield County residents drink.

**Managed Forests Are Resilient Forests**

CONNECTICUT ENERGY & ENVIRONMENT

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

The 2025-2045 Centennial Watershed State Forest, Easton Block Management Plan incorporates priorities and specific strategies developed for Connecticut's forests within the 2020 Connecticut Forest Action Plan, 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. Protecting forests from threats; and
3. Enhancing public benefits from trees and forests.

The following objectives were considered in the development of the Easton Block Management Plan with considerable site-specific input provided by the Department of Energy and Environmental Protection, Aquarion Water Company, The Nature Conservancy, and various user groups.

1. **High Quality Drinking Water & Environmental Protection** – To continue to promote and protect high-quality drinking water. The Easton Reservoir Block filters drinking water for Fairfield County residents. This Block also provides a large area of uninterrupted forest land in Monroe and Trumbull.
2. **Forest Ecosystem Health and Diversity** – To create a more uneven-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; and
   -Using forest thinnings to improve individual tree health and species composition.
3. **Wildlife Habitat** – There are five State-listed species that are known to use this forest. Many of Connecticut's wildlife species use a wide variety of forested habitats.
4. **Climate Change Mitigation** – Connecticut's State Forests can help mitigate climate change by sequestering and storing carbon in vegetation above and below ground and as durable wood products used locally and beyond. Promoting forest health and balancing higher sequestration rates with multi-aged, complex forest structure featuring high carbon storage is essential. Under this plan, young forest habitat will increase and 265 acres will be designated as Old Forestland Management Sites.
5. **Recreational/Health Benefits** – Connecticut's State Forests provide many recreational opportunities, providing a local and economical way to stay healthy and active. The Easton Reservoir Block is open to hunting and fishing in designated areas.
6. **Economic Benefits** – Sustainably harvesting forest products like timber, firewood, witch-hazel, and maple syrup from Connecticut's State Forests provide jobs and goods that are sold in the local economy. This plan outlines timber harvesting on 1,095 acres and management of two active sugarbushes. State Forests are also a model for private forest landowners to consider when managing their own properties.
7. **Forest Protection from Certain Natural Disturbances**– Natural disturbance can lead to increased resiliency in forests ecosystems when the forest responds to these disturbances by regenerating to a diverse suite of native vegetation. Some natural disturbances, however, do not result in a such a forest, or create conditions that do not meet stewardship objectives. Managing the Easton Reservoir Block in these stands will help promote resiliency on the landscape.

# CONNECTICUT
# DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION

## Bureau of Natural Resources

## Division of Forestry

*Centennial Watershed State Forest*
*Easton Reservoir Block*
*3,125 Acres*
2025 – 2045

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Approvals:

| | | | |
|---|---|---|---|
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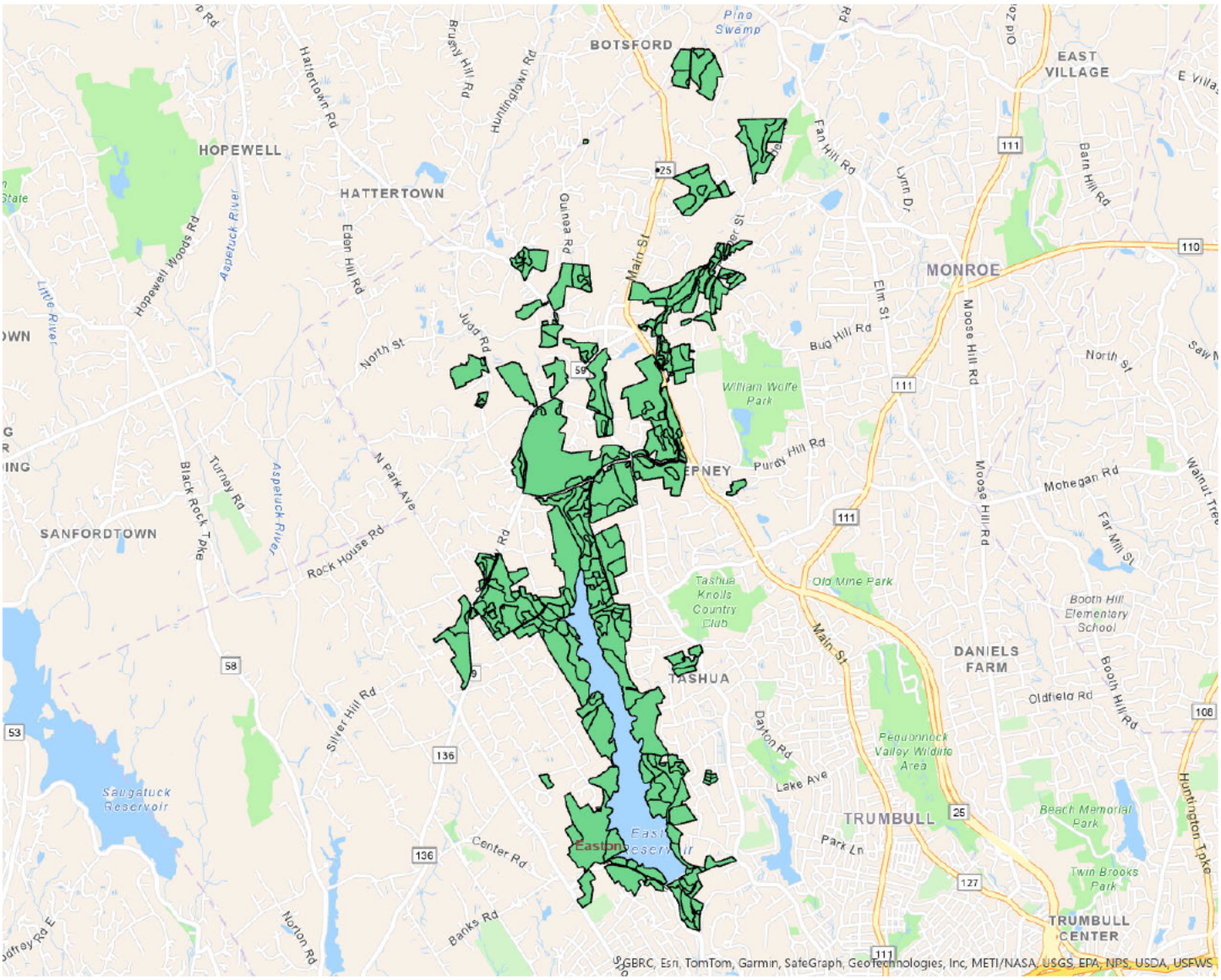
# Contents

# A. Location Map

The Easton Reservoir Block of Centennial Watershed State Forest is located in Easton, Monroe and Trumbull, Connecticut. The Block occupies roughly 3,125 acres, consisting primarily of mature hardwood forest north of and adjacent to the Easton Reservoir. This Block is one of six major watersheds within the 15,000-acre Centennial Watershed State Forest.

The surrounding landscape is generally suburban with low to medium density residential housing. The Block also abuts Silverman's Farm in Easton, Lanes Mine Nature Park in Monroe, and numerous preserved open space properties within the three towns it occupies. Altogether these lands constitute an important area of forested habitat in an otherwise highly developed area. The forest provides major water quality, wildlife, climate, health, and economic benefits to the surrounding communities.



## B. Executive Summary

A. The Easton Reservoir Block consists of 3,125 acres of forestland, swamps, and fields in Easton, Monroe, and Trumbull, CT. The watershed provides drinking water for hundreds of thousands of people in the greater Bridgeport area. The land has a long history of forest management and recreation activities. All activities are overseen jointly by representatives from Aquarion Water Company (AWC), Connecticut DEEP (DEEP), and The Nature Conservancy (TNC), who comprise a managing body called the Conservation Land Committee (CLC).

B. The Easton Reservoir Block features some highly important tracts of uninterrupted forest in Monroe and Trumbull. It is a vitally important habitat for forested species in this region, which is the most densely populated in Connecticut. The majority of these acres feature mixed upland hardwood forests, primarily consisting of dense stands of large and mature oak, maple, birch, pine, and tulip poplar. In most of these forests, there are very few understory trees and only a minor component of midstory trees.

C. The external pressures on the forest are extensive. Deer overabundance, numerous invasive species, novel forest pests and pathogens, and the omnipresent threat of climate change are the biggest issues. Combatting these threats and maintaining the health of the forest in the watershed is vital to the plant and wildlife species that live there, as well as continuing the sequestration of carbon, filtration of drinking water, and health of the nearby human communities.

D. To increase the ecological resilience of the forest in the face of these threats, it is necessary to actively manage certain areas. To improve forest structure, and maintain overstory species diversity:
    - 1,095 acres of the Block will see some type of active management over the period of this plan. 111 acres will be selectively harvested, 452 acres will be thinned, and 400 acres will be regenerated using the shelterwood with reserves system. 132 acres will undergo timber stand improvement (TSI). Softwood cover will be maintained wherever possible.
    - 2,029 acres of the forest will be managed passively (62% of the total forested acres, 64% of forested acres), including 91 acres of swamps and fields, 265 acres of Old Forestland Management Sites, 136 inaccessible acres, 273 inoperable acres, and 1,263 actively managed acres that will be left to grow.

E. In addition to forest management, action will be taken to lessen the impact of invasive species on the property. These efforts will be targeted in areas where non-native plants have fully occupied entire areas of the forest.

F. Boundary marking will occur on a 5–7-year rotation, with a goal to mark roughly 8 miles per year. Property encroachments will be handled in conjunction with DEEP, AWC, and TNC real estate.

G. Maple sugaring activities and firewood cutting will be conducted on a first come-first-serve basis, with both activities permitted through DEEP, by the CLC.

H. Road improvements will be made to woods roads on an as-needed basis, as will improvements to hunting parking areas. These activities will be executed by CLC partners with committee approval.

## C. History

**Current Ownership and Vegetative Condition**

Humans have long occupied the lands within the Easton Reservoir Block. Archeological surveys conducted near the Aspetuck River in Easton found evidence of continuous human occupation beginning at least 10,000 years ago (Reeve 2009). The place name, "Aspetuck", a Paugusett Indian term for an area of higher elevation, hints at the long occupation of this area by Native Americans before Europeans settled in the early 1600s (Brilvitch 2007). The Paugusett people, who historically had occupied much of western Connecticut, lived in the area until around the mid-1600s. Using the Naugatuck and Housatonic rivers to navigate inland, they occupied as far north as New Milford and beyond (Brilvitch 2007). This region of Connecticut is unique in that it features an expansive coastal plain; east of New Haven and West of Norwalk, the coast is rockier, and the topography is far less conducive to farming. So, while the Paugusett conducted widespread understory burning to promote game habitat and the growth of useful plants in the forest, they also planted crops such as corn, beans, and squash in widely cleared fields. "Pequonnock" was the name used to refer to the area where Bridgeport now exists, and it means "cleared land" in the language of the Paugusett. In addition to promoting game habitat throughout the forest, and cultivating crops on land, roughly 25% of the state's oyster population was said to exist at the mouth of the Housatonic River. The river itself also featured the southernmost run of Atlantic salmon on the continent (Brilvitch 2007). These fertile lands and waters helped civilization grow here, and the area immediately surrounding the Long Island Sound was said to be the most densely populated place in north America before European colonization. At that point European colonists had introduced various diseases, most infamously smallpox, to the region and the resulting infection led to the collapse of much of the Paugusett civilization.

Following the demise of the Paugusett people, occupation by European settlers and their descendants over the last four centuries was largely agriculturally based. Stone walls, bounds, wells and foundations, along with the remains of mill sites and dams along the Aspetuck River and its tributary streams, are common remnants of this period. Several roads within the Block exhibit the near-parallel 'eleven o'clock' orientation laid out by British royal surveyors in the early 1700s, as the Town of Fairfield encouraged settlers to move northward into what is now Redding, Weston, and Easton. Some of these same roads were later used by British troops in their campaigns against colonial rebels during the Revolutionary War, including a raid on the city of Danbury in 1777.

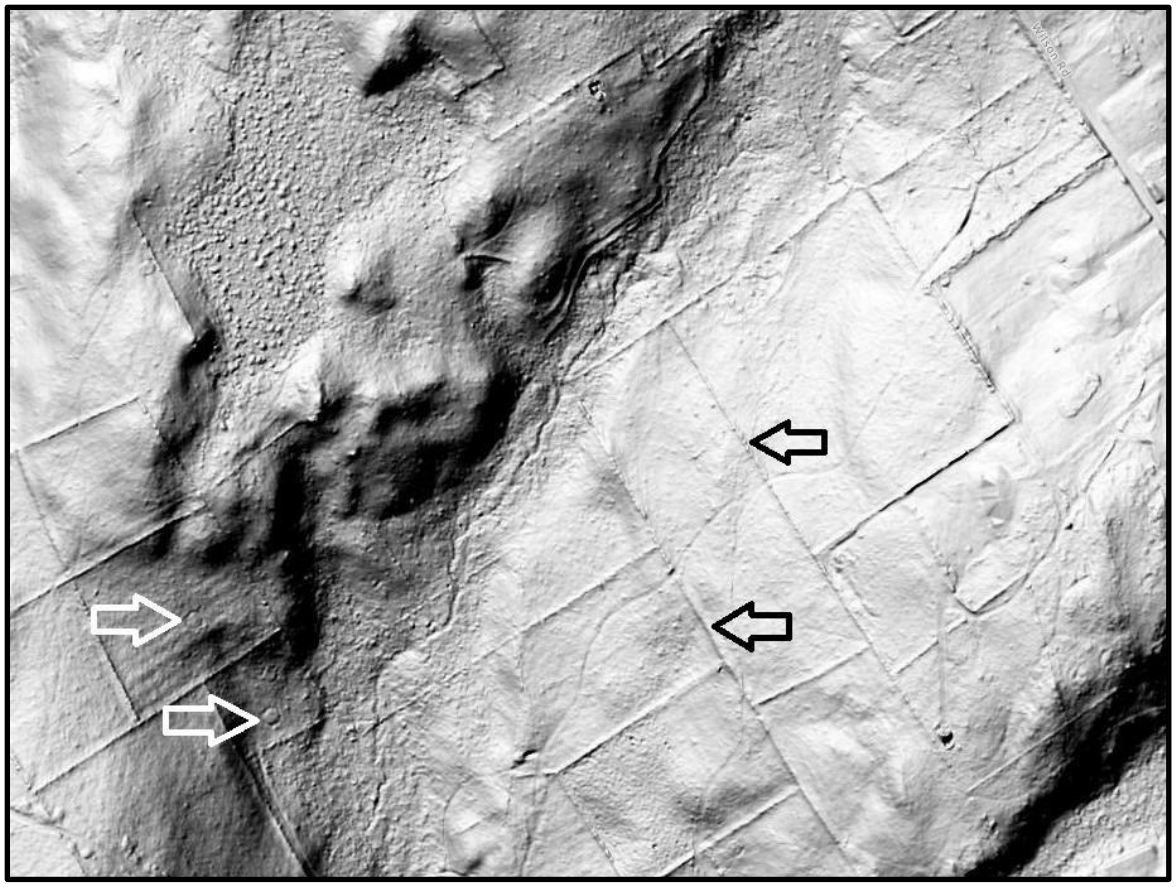


**Figure C-1:** LIDAR images show circular charcoal mounds and linear stone walls.

In the early 1900s, the Bridgeport Hydraulic Company (BHC) began acquiring land to build public drinking water supply reservoirs and establish undeveloped, forested buffer areas surrounding them. BHC actively managed the lands for wood products after selective harvesting for oak and other valuable timber species began in the mid-1900s and continued until the early 2000s. This harvesting resulted in thousands of acres of good quality timber in today's forests. Old stumps throughout the forest give hints to the management decisions made by previous foresters. In other parts of the watershed, old charcoal mounds still exist as well, albeit surrounded by the mature oaks, maples, tulip poplars, and birches that dwarf the young forests of the charcoal period.

These woodlands are second and third growth forests that regenerated after the cessation of charcoal manufacturing and the abandonment of farmlands in the late 19th and early 20th centuries. Abandoned farmland is by far the most common historic land use found in the watershed today. Few species of trees can grow up through a dense field of arable crops or a pasture of grasses, and white pine is one of them. White pine and eastern red cedar (Juniperus virginiana) became the dominant trees on these formerly abandoned farms in the late 1800s (Foster & O'Keefe 2000), and by the 1910s, these pine trees became a valuable sawtimber resource. Until the invention of corrugated cardboard in 1930, white pine logs were milled to build shipping containers (Foster & O'Keefe 2000). This became the primary industry driving the second great clearing of Connecticut's forests. After the pine was cut, it did not come back easily, however, as white pine does not sprout from the stump. Hardwood species, such as oak and maple, do prolifically sprout and began to dominate the landscape once the pine canopy was

cleared. These "new" hardwood forests, originating as stump sprouts in the 1930s, dominate much of the landscape today, including in the Easton Reservoir Block. Due in great part to the presence of the public drinking water supply reservoirs, development of privately owned lands within the watershed has been limited and largely restricted to large-lot (2-3 acre) residences.

Forestry practices and other activities in the Easton Reservoir Block by BHC included harvesting timber, milling lumber, producing firewood, planting trees, and growing nursery stock, Christmas trees, fruits and vegetables.

In the early 1920s, BHC developed tree nurseries to reforest former pasturelands and the perimeters of the reservoirs, and for Christmas tree and nursery stock. Initially, most of the nurseries grew red pine for reforestation. At its peak, BHC had about 2,000 acres of red pine plantations.

In the early 1940s, these plantations were infested by the rapidly spreading red pine scale. This insect was accidentally introduced to the United States during the New York World's Fair in 1939. BHC supplied nursery stock to the Fair and presumably carried the scale insect back to Easton on the same trucks used to haul the BHC- grown trees to New York. BHC's Red pine plantations were devastated by the infestation, and the Company spent the next 15-20 years salvage cutting the plantations and reforesting affected areas with white pine and other conifers. Some areas affected by the scale infestation were allowed to regenerate naturally.

Portions of what is now the Easton Reservoir Block supported orchards and vegetable gardens that were ancillary to the nearby Aspetuck Valley Orchard, owned and operated by BHC from 1918 to 1990. In the early 1930s, BHC became the first large scale Christmas tree grower in the area, producing trees for retail and wholesale markets for more than seventy years. Along with cut Christmas trees, nursery stock was balled and burlapped for sale to landscape contractors.

In the 1940s, BHC purchased a sawmill located on Route 58 just north of the Aspetuck Reservoir in Easton. The sawmill produced lumber for apple boxes, which were made on site for use by the Aspetuck Valley Orchard. It also produced custom cut and dimension lumber for barn siding and flooring.

BHC produced firewood commercially starting during World War II. Soaring heating oil costs in the late 1970s and early 1980s prompted BHC to expand its commercial firewood operation to produce approximately 2,000 cords annually. During this period, BHC also sold stumpage of approximately 1,200 cords of firewood annually through its homeowners firewood program. Intermediate improvement cuttings by BHC provided most of the raw wood material for these cordwood programs.

In addition to timber harvesting, there is a history of recreation on the property, including hunting and fishing. Deer, pheasant, and small game hunting was permitted in leased areas to the members of four fish and game clubs throughout the old BHC lands which consisted of residents who paid to have various areas of the property stocked with trout and pheasants. The leases for all four clubs have since expired.

The lands included in the Easton Reservoir Block were conserved in the 2002 purchase and acquisition of rights between BHC and a partnership of DEEP and TNC. The agreement was funded by $80,000,000 in State money and $10,000,000 contributed by TNC. The Easton Reservoir Block is now managed by the Conservation Land Committee (CLC), a coalition of foresters and land management professionals representing AWC, DEEP, and TNC.

The Natural Resources Management Agreement (NRMA), which governs how the land is managed, states that the goals for science-based stewardship of this property include:

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

Land owned by water companies is regulated by State Statute (CGS25-73c). Land is classified as Class I, II, or III. Class I and II lands are within the watershed of a reservoir while Class III lands are outside the watershed. In the Easton Reservoir Block, AWC owns the Class I land. The State owns the Class II and III land. Both the State and TNC own conservation easements on the Class I land.

Because the Class I and II lands are intermingled on the landscape to such an extent that they cannot be easily delineated in detail on the ground, they are managed as one entity.

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.

## D. Assessment of Resources and Infrastructure

### 1. Acres

The Easton Reservoir Block totals 3,125 acres, of which 3,033 are forested. The Block primarily consists of mature hardwood forests. There are also 3 acres of fields, and 88 acres of open wetlands (referred to as "swamps"). These areas do not include the forested wetlands, which are reflected in the 166 acres of the red maple/lowland forest type. These are considered forest stands in this plan.

**Table D-1:** Breakdown of forest types and acreage in the Easton Reservoir Block Watershed.

| Cover Type | Acres |
|---|---|
| Cherry/ash/yellow-poplar | 160 |
| Chestnut oak/black oak/scarlet oak | 76 |
| Douglas-fir | 6 |
| Eastern hemlock | 10 |
| Eastern redcedar | 3 |
| Eastern redcedar/hardwood | 19 |
| Eastern White pine | 257 |
| Eastern White pine/northern red oak/white ash | 30 |
| Mixed upland hardwoods | 1487 |
| Northern red oak | 163 |
| Red maple/lowlands | 165 |
| Red maple/oak | 71 |
| Red maple/uplands | 192 |

| | |
|---|---|
| **Sugar maple/beech/yellow birch** | 93 |
| **Tamarack (eastern larch)** | 12 |
| **White oak/red oak/hickory** | 261 |
| **Yellow-poplar** | 13 |
| **Yellow-poplar/white oak/northern red oak** | 15 |
| **Swamp** | 89 |
| **Field** | 3 |
| **Forest Stands Total** | **3033** |
| **Non-Forest Stands Total** | **91** |
| **Grand Total** | **3125** |

## 2. Access

### a. Management Status

Most of the Block is accessible either by roadside parking or woods roads. Many of these gated areas are used as parking for hunters in the fall and winter (specific locations detailed in "Base Map"). There are numerous state and local roadways that cross the Block. Many of these roads have pull-offs that can be used if necessary. Major byways through the Block include State Route 25 (Monroe Turnpike), Route 59 (Sport Hill Road), Madison Avenue in Trumbull, and Hattertown Rd in Monroe.

While every compartment in the Easton Reservoir Block borders a state or local road this does not necessarily mean the entire property is universally accessible for forest management operations. The highly parcelized nature of this forest means that some parcels are not conducive to logging operations; they are either too small, too wet, or too steep for heavy machinery to enter without damage. While technically every compartment is accessible, there are many areas where heavy forestry equipment cannot access. Some stands are inoperable by nature of their soils. Old Forestland Management Sites are described in detail in section E-8.

**Table D-2:** Management status of the Easton Reservoir Block. "Active" means the stand is accessible and operable, "inaccessible" means that forestry equipment cannot access the stand, "inoperable" means the soils are too sensitive for equipment to work in, "OFM" means Old Forestland Management Site.

| Management Status | Acres |
|---|---|
| Active | 2360 |
| Inaccessible | 136 |
| Inoperable | 273 |
| OFM | 265 |
| Swamp | 89 |
| Field | 3 |
| **Total** | 3125 |

**b. Access Roads**

In addition to the accessible internal woods roads, there are roughly 3 miles of unimproved roads within the Block. Due to their generally poor condition, these derelict roadways are for the most part impassable to vehicles and would require extensive work to become usable for forest management activities.

**c. Road Maintenance/Construction**

Because woods roads receive the most use, they should continue to receive routine maintenance. Poorly maintained roads are the greatest potential source of sediment inputs to tributaries in undeveloped watersheds. Maintenance includes:

- Storm damage cleanup after high windstorms,
- Cleaning drainage culverts after periods of high winds and significant rainstorms, especially during fall leaf drop,
- Repair of road shoulder drainage gullies, water bars, and drainage dips,
- Regrading of the road surface and resurfacing with gravel where necessary.

**d. Rights-of-Way & Relevant Easements**

There are no ROWs granted to any external party within the property of the Easton Reservoir Block. There are, however two areas where water mains run beneath the ground through the property. In both locations, AWC maintains open access to the pipes by regularly cutting back vegetation along these pipes to a width defined by the diameter of the pipe. One of these areas runs through compartment 27, between Route 25 and Purdy Hill Road in Monroe (10 feet either side), and the other runs from the AWC property just below the Easton dam in Easton, out to Buck Hill Road (40-50 feet either side, though the full width of this ROW is not cleared).

**e. Boundaries**

The Easton Reservoir Block is comprised of 51 separate forested parcels or "compartments." The external property boundaries of these compartments have been inventoried in four categories describing what type of property the forest borders: Residential boundaries, Commercial boundaries, vacant land boundaries, and roadside boundaries. All boundaries are marked by yellow paint and signs. The road frontage boundaries are posted with signs only. Residential and commercial boundaries will be marked at a greater frequency than vacant land boundaries, as they are more likely to feature property encroachment. Across 51 compartments, external property boundaries total about 75 miles.

Residential and commercial boundaries will be marked on a 3–5-year schedule, while vacant land and roadside boundaries will be marked on a 7–10-year schedule. Under current capacity, about 8 miles of boundaries will be marked each year.

### f. Encroachments

The Block shares property boundaries with many subdivisions and other residential properties. This means that it is under particularly high pressure from encroaching lawns, landscaping debris and leaf dumping, and encroaching construction, among many other things. Forest managers note encroachments while boundary marking and contact neighbors to resolve such issues. Encroachments are dealt with on a case-by-case basis by all three parties of the CLC. State Statute Sec. 52-560a provides for civil penalties for encroachment on state, municipal, or nonprofit land conservation open space.

## E. Special Use Areas

### 1. Lakes and ponds

The Easton Reservoir is a 460-acre impoundment of the Mill River. The Easton Reservoir also receives flowage from the West Pequonnock Reservoir and watershed in Monroe. A diversion was built into the river along Route 25, to divert water to the Mill River. A channel was created adjacent to Judd Rd to bring water from the diversion in the West Pequonnock to the Mill River in Easton. The diversion allows the West Pequonnock to maintain its natural course, as it does not divert 100% of its flow. In total, the Easton Reservoir System receives drainage from nearly 8,243 acres of the Easton Reservoir watershed and receives flow from the 2,522-acre West Pequonnock watershed area. This means that a total of 10,765 acres of watershed area drains into the reservoir. It is the principal source of drinking water for hundreds of thousands of Fairfield County residents.

### 2. Rivers and streams

The West Pequonnock River is the largest river in the Block. It joins with the Mill River, which eventually flows into the Easton Reservoir. Because many of the land acquisitions by BHC protected the tributaries to their reservoirs, some of the West Pequonnock's 5.4-mile length north of the Easton Reservoir flows through undeveloped, forested areas. The river also passes under Route 25 and runs through areas of higher development pressure in Monroe. The Mill River flows from Easton into the Long Island Sound in Westport. The river totals 35 miles in length, though only 3.4 miles are north of the Easton Reservoir. South of the reservoir, this river is a vital trout management area for brook and brown trout. Numerous other unnamed streams flow into the Mill River. Tatetuck Brook and Chub Brook are the two named streams flowing into the Easton Reservoir.

### 3. Cultural sites

Sites of archeological significance that may be located within the Forest are mentioned in reports produced as part of development proposals of private properties adjacent to the Forest. Old cellar holes of abandoned mill buildings, homes and farms, along with ubiquitous stonewalls, are also found throughout the Forest.

### 4. Recreation and scenic sites – trails and signs

There are no maintained segments of any hiking, biking, or equestrian trails within the Easton

Reservoir Block. Dogs, horses, and mountain bikes are not allowed on any of the parcels in this watershed.

There is a designated shoreline fishing area on the West Pequonnock River just south of where route 25 runs into Pepper Street in Monroe. Parking is roadside on Route 25, where a small pull-off exists. This is the only area within the Block where fishing is permitted.

Bowhunting and shotgun hunting for white-tailed deer is permitted in this Block. Bowhunting and shotgun-specific areas are detailed on AWC's hunting website. Parts of this Block are included in CT DEEP's shotgun lottery area 56.

Small game hunting is also permitted in compartment 12, off Garder Rd.

All public access in the Forest is regulated by the Connecticut Department of Public Health (Connecticut General Statute Sec. 25-43c).

**5. Unauthorized / Illegal Activity**

Dogs, other pets, horses, and mountain bikes are not allowed on trails within the Easton Reservoir Block. Any type of motorized vehicle is also prohibited. Fishing outside of the designated fishing areas is also prohibited.

**6. Critical Habitat (State listed rare or endangered plants and animals)**

A report from the DEEP Natural Diversity Database (NDDB), dated 2/01/2024, is attached in the appendix. The names of species that are referred to in the NDDB report have been redacted to protect them. Some information on these species is included on page 32.

The report noted 5 protected wildlife species in this block including 1 bird species, 2 turtles, one snake, and one plant.

**7. Natural Areas**

There are no Natural Area Preserves (as defined by CT General Statutes 23-5a) in the Easton Reservoir Block of CWSF.

**8. Old Forestland Management Sites**

Old Forestland Management Sites (OFMS) exhibit specific characteristics including tall trees, vertical stratification, numerous downed logs (coarse woody debris) in the understory, and abundant woody structure in all strata of the forest (understory, midstory, canopy, emergent layer). These forest types are lacking in the Easton Reservoir Block, and no stand truly exhibits all these features throughout. There are some stands, however, that exhibit some of these features individually. Some stands have been set aside because they appear to be developing these characteristics naturally, even if they are not present now.

***Compartment 43***, ***stands 3, 4, 5, and 6*** are just north of Old Oak Rd in Easton, exhibit some old forest

characteristics. There is a diverse and mature canopy, however the understory is generally lacking in many places, and invasive species are rampant throughout the forest floor. Aside from the management of invasives here, the stand will be managed passively in the hopes that old forest structures develop overtime. Together they constitute 180 acres. Similarly, 1,939 acres of the Easton Reservoir Block will be managed passively.

In addition to the above-mentioned stands, stands **64-1, 64-2, 53-2, 53-3, 53-4**, and **53-5** will be managed as OFMS. Altogether, there are 265 acres of OFMS established in this plan.

**9. Research Areas**

Scientists at the Connecticut Agricultural Experiment Station are studying the successional implications of white ash mortality and the emerald ash borer infestation in stands where ash was abundant. The research site is off of Andrews Road in Easton.

**10. Miscellaneous**

There are several potential sugarbush sites in this watershed. Stands containing younger sugar maple pockets are in Compartments 29, 30, 33, 42, 53, 55, and 62. These sites have fertile soils where sugar maple thrives. DEEP leases maple taps to the public through its forest products permitting program. There are two active sugarbushes in the Easton Reservoir Block, one off of Velvet Street in Trumbull (compartment 62) and one south of Judd Road in Monroe (compartment 30).

## F. Forest Ecosystem Health and Diversity

**1. Landscape Context**

The Easton Reservoir Block contains some of the larger areas of contiguous forest in the region. Southern Fairfield County is highly developed and densely populated. Most of the privately-owned parcels surrounding the Forest are less than 5 acres and subject to land use changes that may not include habitat conservation. This Block represents a key core forest habitat for the county.

Other protected ownerships exist in the immediate vicinity, but none of them are comparable in size to the Easton Reservoir Block. Some examples are Lanes Mine Nature Park and The Aspetuck Land Trust's Pointdexter Preserve in Monroe, as well as the Paine Open Space area in Easton. These smaller preserves, and others across Fairfield County, make up a complex of core forest habitat important to this region. To the west, particularly in Easton, the Easton Reservoir Block abuts the larger Aspetuck-Hemlock Reservoir Block of Centennial Watershed State Forest, which itself is connected to thousands more acres of preserved land. In Monroe and Trumbull, however, the Easton Reservoir Block provides the only large areas of contiguous forest.

**2. Current Vegetative Condition**

The Easton Reservoir Block features primarily mixed upland hardwood forests. Northern red oak was the most common in these stands until an overabundance of deer resulted in the ingrowth of black birch, red maple, and American beech. Now these three species make up a significant proportion of

the basal area of most oak stands. In these mixed upland hardwood stands, red oak is still the dominant canopy species. However white oak, black oak, and hickory species are common as well. In the more mesic and toe-slope stands of the watershed, yellow poplar becomes prominent. The more recently appearing black birch, red maple, and American beech usually occupy more subdominant canopy positions and midstory positions throughout these stands. Some pure northern red oak stands do appear, in greatly reduced abundance from the last inventory in the early 2000s. These forest types occupy nearly 2/3 of the acreage of the watershed and are generally found at mid-slope and lower-slope positions in the topography surrounding the Easton Reservoir.

In compartments 36 and 33, where the topography is higher in elevation, there are stands comprised of a mix of oak species. White, Black, Red, and Chestnut oak all appear within short distances of each other likely owing to the topography of the area. Chestnut and black oak dominate at the high points, whereas red and white oak become more prominent on the slopes. These areas are the points of highest elevation in the watershed at around 500 feet. A similar forest type exists at a smaller scale in the northern section of compartment 29, and at the high point of the watershed in compartment 20 just south of Bart Rd.

Red maple lowlands are dotted throughout the watershed where red maple grows to smaller sizes, but in high density on poor-quality anoxic soils. This forest type also encompasses the many perched swamps and vernal pools throughout the Block.

White pine is by far the most common softwood species in the watershed. It accounts for 257 acres and exists mostly in single-aged stands that were likely planted between 30-50 years ago. There are a few places, such as north of Judd Rd in Easton and Monroe, and west of Velvet Street in Trumbull, where younger white pine in the stem exclusion phase of development exists. Compartment 62 heavily features pine, where younger and dense stands exist in ½ to one-acre gaps after Hurricane Sandy blew down the canopy trees in 2012. These gaps, and the west-facing slope of compartment 33 are the only areas where white pine is regenerating in the watershed.

Sugar maple stands occupy many of the mesic slopes in the watershed in stands 30, 33, 36 61, 62, and others. These stands typically exhibit sugar maple at the midstory and canopy levels but lack a persistent and vigorous understory.

### 3. Forest cover types by Percentage

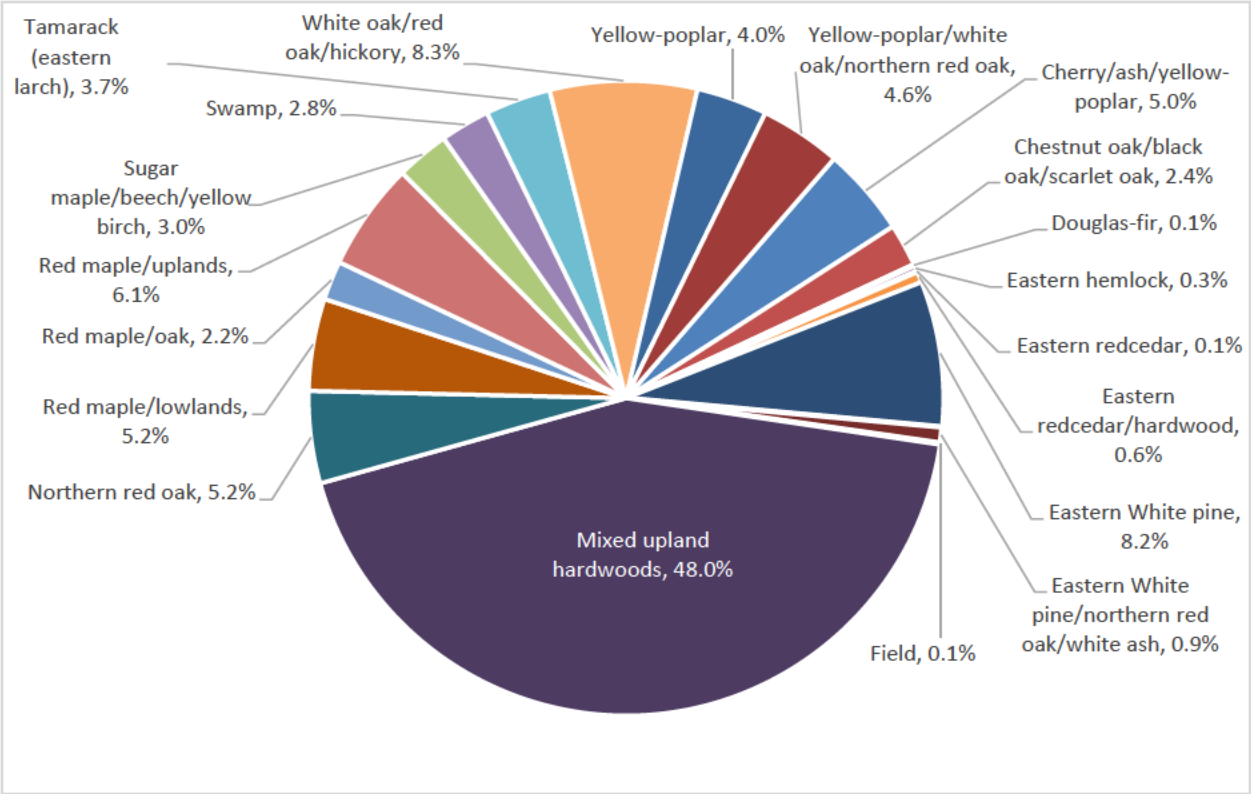



**Figure F-1**: Forest types and their relative abundance (percentage of total acres) in the Easton Reservoir Block.

### 4. Forest type, Size class and Timber Volume

The trees were classified into size classes to describe their structural complexity and inform future management practices. These size classes describe the average size of an entire stand of trees. The size classes are referred to as follows.

*Size Classes*

- *Sawtimber* – Hardwood trees 12-inch dbh (diameter breast height or 4.5 feet off the ground) and larger, and softwood trees 10-inch dbh and larger, that contain at least one 8-foot sawlog.
- *Poletimber* – Hardwood trees between 5 and 11 inches dbh and softwood trees 5 to 9 inches dbh. These trees are too small for sawlogs, but could be sold as pulpwood, fuelwood, or other small products where such markets exist.
- *Saplings* – Trees 1 to 5 inches dbh.

**Table F-1**: Forested acres of Easton Reservoir Block broken into size classes. The total from this chart excludes 88 acres of swamps and 3 acres of fields.

| Size Class | Acres | % of total |
|---|---|---|
| Sapling | 11 | 0.37% |
| Poletimber | 147 | 5% |
| Sawtimber | 2875 | 94% |
| **Total** | **3033** | |

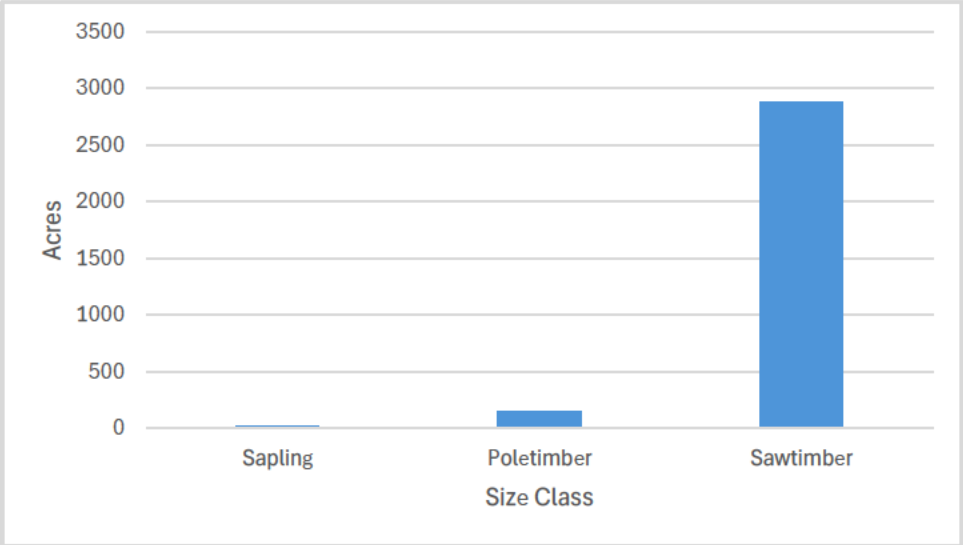



**Figure F-2**: Acres of the Easton Reservoir watershed broken into size classes.

Seedlings and saplings are hard to find in abundance on the Easton Reservoir Block. The only true stands of sapling thickets are 44-1, 45-2, and 49-6, totaling just over 19 acres. There are areas within otherwise labeled "sawtimber" stands that contain seedling and sapling stage regeneration. They are found in the gaps left behind from the Storm Sandy cleanup in 2012 in compartments 42 and 62. No other stands feature sapling as the predominant size class. When broken down into forest types, the structural issues the forests exhibit are not restricted to any particular forest type.

Pole-sized stands account for only 147 acres of the Easton Reservoir Block. The widespread lack of a sapling size class is also an issue, the consequences of which are described in greater detail in section 5 (Forest Health).

**Table F-2**: Forested acreage of the Easton Watershed based on their stocking level. This figure does not reflect 257 acres of red maple/lowlands stands, fields, and swamps, as stocking data was not gathered in these cover types.

| Stocking Level | Acres |
|---|---|
| Under | 6 |
| Full | 788 |
| Over | 2075 |

Most of the stands in this Block are overstocked. This indicates that the forest has grown to a point where the density of trees at their current size is too high to avoid mortality in the stand. In these overstocked stands, there are trees whose growth rates are trailing off while they are being "outcompeted" by other trees. Eventually, these trees will die as their neighbors usurp their resources in what is called the "stem exclusion" phase of forest development (Oliver and Larson 1996). As the stand becomes very tightly packed, growth rates eventually slow down and can even stagnate until individuals die and more resources are freed up for the remaining trees to utilize. Tree mortality is a natural process that can create important wildlife habitat in the form of downed woody debris and standing dead snags. It is important, however, to maintain a balance of these features because standing dead trees do not pull pollutants out of the soil to clean the water draining towards the reservoir, as they are no longer growing. Standing dead trees also do not sequester carbon.

Forests of the Easton Reservoir Block generally exhibit good quality timber. Thoughtful cutting to improve stand quality throughout the history of the watershed probably produced the current crop of high-quality red oak canopy trees, while the yellow poplar and Norway spruce stands (other exotic softwoods on the table) are simply younger and have not fully undergone the stem exclusion phase of forest development.

**Table F-3**: Average proportion of Acceptable Growing Stock (AGS) basal area by forest type and size class.

| Forest Type | Proportion AGS |
|---|---|
| **Mixed upland hardwoods** | |
| Pole | 85% |
| Sapling | 52% |
| Saw | 84% |
| **White oak/red oak/hickory** | |
| Pole | N/A* |
| Saw | 86% |
| **Eastern White pine** | |
| Pole | 81% |
| Sapling | 92% |
| Saw | 83% |
| **Red maple/uplands** | |
| Pole | 68% |
| Saw | 73% |
| **Red maple/lowlands** | |
| Pole | N/A* |
| Sapling | N/A* |
| Saw | N/A* |
| **Northern red oak** | |
| Saw | 92% |
| **Cherry/ash/yellow poplar** | |
| Saw | 75% |

| | |
|---|---|
| **Sugar maple/beech/yellow birch** | |
| Pole | 88% |
| Saw | 85% |
| **Chestnut oak/black oak/scarlet oak** | |
| Saw | 91% |
| **Red maple/oak** | |
| Saw | 81% |
| **Eastern White pine/northern red oak/white ash** | |
| Pole | 89% |
| **Eastern redcedar/hardwood** | |
| Pole | 72% |
| Saw | 71% |
| **Yellow-poplar/white oak/northern red oak** | |
| Saw | 88% |
| **Yellow-poplar** | |
| Saw | 84% |
| **Tamarack (eastern larch)** | |
| Saw | 91% |
| **Eastern hemlock** | |
| Saw | 75% |
| **Douglas-fir** | |
| Saw | 46% |
| **Eastern redcedar** | |
| Pole | N/A* |

Because of the large size of the trees in the Easton Reservoir Block and the overstocked nature of many of its stands, there is significant board-foot volume in the property's standing timber. Most of the forest types in this Block feature a diameter at or close to the sawtimber minimum (12 inches for hardwood), meaning opportunity for timber harvesting is fairly ubiquitous.

**Table F-4:** Average DBH of different forest types and size classes on the Easton Reservoir Block with quadratic mean diameter (QMD).

| Forest Type | QMD |
|---|---|
| **Cherry/ash/yellow poplar** | **14.3** |
| Saw | 14.3 |
| **Chestnut oak/black oak/scarlet oak** | **12.6** |
| Saw | 12.6 |
| **Douglas-fir** | **14.6** |
| Saw | 14.6 |
| **Eastern hemlock** | **13.0** |
| Saw | 13.0 |
| **Eastern redcedar/hardwood** | **10.8** |
| Pole | 10.7 |

| | |
|---|---|
| Saw | 11.3 |
| **Eastern White pine** | **13.3** |
| Pole | 11.9 |
| Sapling | 8.6 |
| Saw | 13.6 |
| **Eastern White pine/northern red oak/white ash** | **10.0** |
| Pole | 10.0 |
| **Mixed upland hardwoods** | **11.5** |
| Pole | 11.0 |
| Sapling | 11.8 |
| Saw | 11.5 |
| **Northern red oak** | **12.0** |
| Saw | 12.0 |
| **Red maple/lowlands** | **1.4** |
| Pole | 0.0 |
| Sapling | 0.0 |
| Saw | 2.4 |
| **Red maple/oak** | **11.6** |
| Saw | 11.6 |
| **Red maple/uplands** | **11.8** |
| Pole | 10.9 |
| Saw | 12.0 |
| **Sugar maple/beech/yellow birch** | **12.7** |
| Pole | 10.8 |
| Saw | 12.9 |
| **Tamarack (eastern larch)** | **10.2** |
| Saw | 10.2 |
| **White oak/red oak/hickory** | **11.7** |
| Pole | N/A |
| Saw | 12.4 |
| **Yellow-poplar** | **14.3** |
| Saw | 14.3 |
| **Yellow-poplar/white oak/northern red oak** | **14.7** |
| Saw | 14.7 |
| **Eastern redcedar** | **N/A** |
| Pole | N/A |

The majority of the forest's timber volume consists of hardwood sawlogs such as red oak, black oak, and white oak trees. However, there is significant volume in red maple, and yellow poplar sawtimber as well. Softwood stands, though less common than the mixed upland hardwood stands, also provide significant

volume due to their high stocking. Timber quality should be monitored carefully, as many of the stands in the later stages of succession probably feature a significant amount of internal decay that may not be detectable at first glance.

**5. Forest Health**

The forest health concerns related to the Easton Reservoir Block cannot be overstated. The primary health stressors in this forest are the high abundance of deer, the expanding threat of numerous invasive species, and multiple forest pests and pathogens that have been documented in the area. These three primary issues, in some areas, prevent the forest from regenerating itself to a diverse suite of native vegetation. A lack of management, or a failure to actively meet these threats, could lead to reduced biodiversity in these areas, ultimately compromising the forest's climate resiliency. The following section provides detail of the individual forest health stressors the Block faces. The combined effects of these phenomena and how they will be addressed are detailed in section G-2.

- *Understory concerns (Wildlife Impacts)*

  While the Easton Reservoir Block provides a great deal of mature forest habitat, there is little or no understory, and there is a definite deer browse line. Deer populations exceeding 15-20 per square mile affect regeneration by limiting the composition and quantity of tree seedlings needed to grow a new forest after disturbances to the overstory (Ward et al. 2017, Miller et al. 2023). Aerial surveys in February 2008, in the nearby Saugatuck Reservoir Block, estimated a range of 29 to 40 deer per square mile. It can be assumed that the deer population is similar in the Easton Reservoir Block. The lack of understory negatively affects wildlife species, such as ground nesting birds that need low cover to rear their young (Ward 2020). In some places, the herbaceous layer on the forest floor may increase in diversity under high browse intensity, as the woody regeneration that would normally overtop these plants was removed by herbivores, according to study by Faison et al. (2016); however, this has not been observed in the Easton Reservoir Block. These types of open understory habitats are abundant in the Easton Reservoir Block, and come at the expense of the diversity of woody vegetation. In general, the forest conditions on Centennial Watershed State Forest are somewhat limited for species that require dense pole timber or sapling stage forests.

**Figure F-3:** An understory with no trees caused by excessive deer browsing.

From a successional standpoint, a lack of diverse regeneration indicates that the forest will begin to lose tree biodiversity as the forest continues to age (Bradshaw and Waller 2016). American beech,

black birch, and red maple make up most of the trees in the seedling and sapling stages, while the overstory remains more diverse in many stands. This indicates that these three species will begin to dominate the forest as the overstory ages. A diverse forest is the best equipped to deal with an unpredictable climate (Thompson et al. 2009) or pest and pathogen outbreaks (Nguyen et al. 2017), so long as the mixture in the forest does not contain multiple target species that a given pathogen can jump to (Roberts et al. 2020). Forest management options must be applied carefully to each site and take the biology of each invasive pathogen into account when planning harvests.

- *Understory concerns – Water Quality Impacts*

  Healthy, productive forests with identifiable overstory, midstory, understory, and ground cover provide many opportunities for mitigating the kinetic energy of rainfall. Multiple layers of vegetation slow the rate at which raindrops hit the forest floor, causing less erosion of forest soils. The complex canopy structure intercepts rain and snow, delaying peak storm flows, as well as filtering pollutants in the air by leaf surface area. Without this protective natural filter, large amounts of nutrients, sediment, and pollutants can easily wash into the water supply during heavy precipitation.

- *Invasive exotic plants*

  Three primary invasive plant species in this Block are Japanese barberry (*Berberis thunbergii*), Oriental (Asian) bittersweet (*Celastrus orbiculatus*), and winged euonymus (*Euonymus alata*). The secondary invasives present include tree-of-heaven (*Ailanthus altissima*), autumn-olive (*Elaeagnus umbellata*), multiflora rose (*Rosa multiflora)* and shrub honeysuckles (*Lonicera* sp.). When present, these invasive plants must be controlled before any intermediate treatments and regeneration cuts.

  Studies have shown that thickets of Japanese barberry harbor black-legged ticks, the carrier of Lyme Disease and other tick-borne illnesses (Williams et al. 2009).

  Invasive species have occupied large portions of the property, mostly encroaching from nearby ownerships where they are maintained and planted as ornamentals. Collectively, these species are a concern as they block tree regeneration and displace native species. Some invasives also kill existing trees and other vegetation by girdling or smothering them. Invasive species within the Easton Reservoir Block are summarized in Table F-5.

**Table F-5:** Invasive species in the Easton Reservoir Block. This is not a complete list but does represent the most common invasive species present.

| *Common Name* | *Scientific Name* |
|---|---|
| Autumn Olive | *Elaeagnu umbellata* |
| Black swallow wort | *Cynanchum louiseae* |
| Garlic mustard | *Alliaria* petiolata |
| Japanese barberry | *Berberis* thunbergii |
| Japanese honeysuckle | *Lonicera japonica* |
| Japanese knotweed | *Fallopia japonica* |
| Japanese stilt grass | *Microstegium vimineum* |
| Oriental bittersweet | *Celastrus orbiculatus* |
| Tree-of-heaven | *Ailanthus altissima* |
| Winged euonymus | *Euonymus alata* |

The recommended management goal is to minimize the population where possible and reduce their potential effect on forest health and regeneration.

Before, during, and after harvesting activities in any stand, invasive species will be located, identified, and controlled. In addition to focusing invasive management in stands that will be harvested, actively eradicating invasive species infestations in other parts of the forest will reduce sources for further spread.

- *Insect and disease concerns*

Numerous forest insects and diseases are present in the Easton watershed, posing various levels of danger to the tree species they target. All of these pests and pathogens will be managed in some capacity on a project-to-project basis.

**Table F-6:** Pests and pathogens in the Easton Reservoir Block This is not an exhaustive list, as new pests and pathogens are discovered frequently over time.

| *Common Name* | *Scientific Name* |
|---|---|
| Hemlock Wooly Adelgid | *Adelges tsugae* |
| Beech Leaf Disease | *N/A* |
| Asian Longhorn Beetle (nearby, MA) | *Anoplophora glabripennis* |
| Spotted Lanternfly | *Lycorma delicatula* |
| Emerald Ash Borer | *Agrilus planipennis* |
| Spongy moth | *Lymantria dispar* |
| White Pine Weevil | *Pissodes strobi* |

Some forest pests that were rampant in the past continue to influence forest composition today. Red pine scale, for example, hit this Block particularly hard in the 1980s and 1990s. Hundreds of acres of red pine plantations were salvaged to avoid the total loss of the timber resource. These stands have since grown back into an array of single-aged mixed hardwoods, and some have been replanted as white pine stands.

The most significant new development is the widespread emergence of Beech Leaf Disease (BLD) in the summer of 2022. The pathogen was first encountered on the watershed several years ago by the CT Agricultural Experiment Station. However, during leaf-out in 2022, it became apparent that most of the understory had been afflicted in the large stand east of the Hemlock Reservoir (all stands in compartment 50). This issue should be monitored carefully going forward, beginning in leaf-out 2024 with an assessment of how the under-, mid-, and overstory are handling the disease.

- *Weather-related damage*

After Storm Sandy, roughly 129 acres of mature white pine blew down across CWSF and required salvage to capitalize on the value of the wood and speed up the regeneration of the forest. This project was completed in 2013. These stands have since grown into early successional forest habitat but has also been overtaken in many places by invasive species. Storms of varying severity are common, but rarely damage the forest on a stand-wide scale. Aside from the hurricane, smaller magnitude storms occur on a yearly basis in all seasons, causing disturbances to the canopy and altering the forest on a smaller scale. These events include ice storms, strong thunderstorms, heavy rain and snow, and drought. Natural disturbances are not inherent threats to forest ecosystems,

rather they have the potential to increase climate resiliency without human intervention so long as the resulting forest grows into a diverse suite of native vegetation. When large scale natural disturbances are coupled with the presence of invasive plant species, deer overabundance, and non-native pests and pathogens, the forest often does not regenerate to such a condition.

Drought now occurs more intensely than in the past. Overall, southern New England is likely to experience wetter weather in the future, but when drought strikes it will be more severe. Drought stress is evident in certain areas in the foliage of overstory trees but has yet to cause widespread mortality anywhere in the watershed. It should be noted that just because widespread mortality has yet to be observed does not mean drought is not having a negative effect. Drought-stressed trees are more likely to succumb to a secondary pest or pathogen, as they are already weakened by the drought (Kolb et al. 2016).

- *Disturbance Regimes (Fire)*
  Fire disturbances are largely absent from the Block, except for the infrequent human-caused burn. There was a fire in the Block in 2023, which was extinguished by the Trumbull Fire Department.

## G. Silvicultural Strategies and Climate Change Mitigation

### 1. Forest Carbon Science

Forests sequester carbon when individual trees undergo photosynthesis. As they grow, they pull carbon dioxide out of the atmosphere and use it, alongside water, to synthesize glucose that they convert into cellulose and release oxygen as a byproduct. Forests between 30-70 years of age sequester carbon at the highest rate as they are growing faster (CT DEEP web page), while older trees store the most carbon by sheer volume as they are physically larger. So, a young forest is sequestering carbon faster, while an older forest holds more carbon within its trees. When there is more structure in the forest, there tends to be more carbon.

This Block contains significant tracts of mature forest, which likely contain significant amounts of carbon. Most of the wooded area is between 50-100 years old, and the overstory trees tend to be structurally complex. But, while there are large pools of carbon in the canopy trees, there is also a distinct lack of an understory and midstory in many places. Because the most "carbon-full" forests are those that contain the most structure (Ford and Keeton 2017), it is vital to maintain a balance of older, larger trees, and younger regenerating trees to optimize carbon storage and sequestration on the landscape. Increasing vertical stratification with silvicultural activities such as single tree and group selection can enhance both the rate of carbon storage for a given area, while preserving old forest characteristics retains carbon that is already stored. Mature forests account for most of the stands in the Block, so creating younger forests is necessary to increase the overall rate of carbon sequestration.

Recent studies have confirmed that certain forest management activities that encourage late-successional characteristics can enhance carbon sequestration in a forest. Ford and Keeton (2017) have demonstrated that selection harvests that emphasize retention of large trees and coarse woody debris can enhance carbon storage by accelerating biomass development post-harvest, relative to traditional methods of management. These stands featured less standing carbon in the woods than no management scenarios in the short term. Over time the potential exists to increase carbon storage by conducting such treatments.

## 2. Forest Resilience

The best way to ensure a forest is resilient to multiple long-term stressors is to increase and maintain a diversity of species, age classes, and forest structure across the landscape. Some strategies to maintain such diversity outside of traditional forest management are outlined below.

- *Why Active Management is Necessary to Address Issues influencing Resiliency; Deer, Invasives, Species Diversity, and Forest Structure*

  The widespread lack of young forest and understory diversity in the Easton Reservoir Block is highly concerning. These younger forest components not only feature important habitats for wildlife but stands featuring younger trees are generally more resilient to natural disturbances than older forests. Younger trees can rebound and continue growing if the canopy dies, thus maintaining forest cover. Older forests, with trees more towards the end of their lives, are more likely to experience tree mortality and regenerate themselves if something like an ice-storm or hurricane comes through. If these older stands feature a mid and understory of ample proportions of saplings and poles, these younger trees rapidly begin growing into the canopy once the mature overstory begins to die back. This phase of forest growth is referred to as the "understory reinitiation phase" (Oliver and Larson 1996). Because the young trees are already occupying the newly created canopy gap, invasives have a tougher time moving in. This is the process through which forests naturally perpetuate themselves.

  In the Easton Reservoir Block, there are many areas with a complete lack of regeneration in large tracts of the woods. In these areas, no younger trees are present in the mid or understory to take the place of the deceased canopy tree. If deer populations were more regulated (via predators, hunting, silviculture, etc.), this growing space would be quickly filled in by germinating or sprouting young trees. In many places on the Block, however, this is not often the case. At such high deer densities, it is difficult for younger trees to grow large enough to overtop the deer's browsing height before they are killed. Often, deer will browse back all the native regeneration, even if sunlight is reaching the forest floor, so that the growing space is left open for invasive species to take hold. Deer prefer to eat the native species, and often leave the invasives either untouched or in a state where they are able to rebound. The results of this phenomenon are evident throughout the Easton Reservoir Block, where one can find invasive understories taking hold beneath declining native overstories where native saplings *should* exist. This is a widespread trend throughout the east coast of the US; Miller et al. (2023) consistently found that where high invasive plant abundance and high deer density overlap, "canopy gaps often result in conversion to invasive shrub thickets that suppress tree regeneration". The study goes on to recommend that promoting resilience via the creation of canopy gaps is only recommended for stands where deer control is being exerted and invasive plants are being removed. The issue for this forest, however, is that many of the stands end up converting to these invasive thickets as canopy trees die, even if gaps are not intentionally established.

  This creates a highly complex issue; many tree species will struggle to regenerate under closed canopy forests, and at the same time deer are heavily browsing the native vegetation that does successfully grow. These combined effects will reduce future canopy tree diversity while promoting the spread of invasive species in natural canopy gaps when they form (Miller et al. 2023, Bradshaw and Waller 2016). Opening up more canopy gaps can in theory help to promote the regeneration of

more diverse tree species and introduce younger age classes into the forest (Kern et al. 2014). However, creating such gaps without managing deer and invasives can have the effect of spreading non-native vegetation cover and *reducing* the diversity of trees species. The recommended best path forward is to be deliberate and careful in creating these gaps, while managing deer browse and invasive species continuously throughout the duration of this plan. If resources are not available to manage both deer and invasives in a given area, then it is likely better to use passive management and allow that stand to develop complexity naturally over a much longer time period.

Using forest management as the tool to increase the proportion and species diversity of poles and saplings within forest stands while controlling the invasives, the landscape overall will become less susceptible to regeneration failure. If deer densities were lower, than these areas would likely feature far more young trees. But as is the case in much of southern New England, the combined effects of deer and invasives necessitate management in certain places to maintain a balance of age classes, and regenerate certain species. ***It is vital to maintain a balance of age classes to maintain flexibility in management decisions and to maximize resilience to changes in climate (Vangi et al. 2024). This Block features a forest structure heavily skewed to the older and larger sizes.***

- Forest Fire

In the past, fire was a prominent feature of the Connecticut landscape, as indigenous peoples have been using it as a management tool for thousands of years. In more recent times, there is a distinct lack of fire in most places, especially within the Easton watershed. There have been no prescribed burns in the past ten years, and no major wildfire outbreaks either. The climate in southwest Connecticut is generally humid and wet, making forest-floor burns difficult and natural fires infrequent.

With the onset of increasingly unpredictable drought, however, fire risk does increase. The most likely causes of forest fires in this region are humans. Most stands are generally at lower risk for a significant fire, but some of the abandoned conifer plantations could be more susceptible. Stands 4006 and 4205 contain younger exotic spruce and fir, both of which are species that contain resins that are highly flammable. Given the dense nature of these stands, fires could prove to carry much more easily and be catastrophic. Extra care should be taken to manage fire risk in these stands if the issue arises, such as thinning dense plantations and maintaining roads for fire suppression.

Controlled, professionally applied fire is a useful tool in maintaining the presence of species like oak and hickory. In addition, native lowbush blueberry and other fruiting plant communities sometimes rely on fire to establish, or greatly benefit from its occurrence, similar to the oak. These fruiting plants in a formerly burned area can be excellent sources of food for wildlife. The Paugussett people used fire for this exact purpose and it could be a strategy to maintain certain aspects of forest biodiversity.

- Insects, Disease, and Timber Salvage Guidelines

As mentioned above, insects and diseases can prove lethal to certain tree species if left unmanaged. The emerald ash borer, for example, can kill an entire stand of white ash in a very short period. While a certain amount of dead standing wood is vital for wildlife, an entire stand of dead standing wood is a threat to those who walk in the woods, a higher fire risk during warm periods, and will slowly but surely release carbon to the atmosphere on a stand-wide scale as the

trees decompose. Diligent management of the insects and diseases listed in the previous section, and quick action to authorize salvaging operations will be necessary to curtail invasive plant establishment if possible.

A presalvage operation for white ash occurred in the nearby Saugatuck Reservoir Block in 2016. Some of the ash trees were dead but had died recently enough so that the timber had not lost value. About 223,000 bf of timber came out of that stand, the vast majority of it ash. In this case, as in many cases, the best thing to do for the stand was to open up the forest f or increased sunlight to allow for the ash to establish as seedlings and regenerate. Because the emerald ash borer only attacks trees over 2" DBH, the young seedlings and saplings survived and maintain the ash component in this stand. This example will serve as a model for future salvaging operations.

Timber salvage on this watershed should occur when there is a widespread and imminent threat to the health of a given stand, and if harvesting individual trees would be effective at halting the spread of the pest/pathogen. Additionally, salvaging should be conducted if capitalizing on the value of the wood is a priority for that stand, such as pre-salvaging oak if an outbreak of spongy moth (*Lymantria dispa*r) occurs. In both these cases, harvesting timber pre-emptively will serve to increase the vigor of the trees left behind, increasing their chances of survival, but also to regenerate the stand so that widespread mortality is avoided, and a new cohort of individuals can be established to ensure the continuity of forest cover in the watershed. Thorn et al. (2018) does show that salvaging dead timber could reduce the biodiversity of certain groups of organisms, if certain measures such as dead wood retention are not taken. Salvaging operations in this Block should strive to minimize the negative effects.

- Encouraging Mature Forest Growth

  Encouraging mature forest habitat is vital to maintaining a climate-resilient watershed. Mature forest is characterized generally by older trees that contain significant structure in all strata of the forest, a higher diversity of tree ages, species, and sizes, and a higher component of dead trees (Ford and Keeton 2017). This type of habitat can be achieved by both allowing a forest to mature on its own as long as it is healthy and has the right species mix, and by using single tree and group selection techniques to open up small gaps throughout a younger forest to accelerate the development of these features. The gaps fill in with established seedlings of nearby mature individuals, creating more structure beneath the canopy. Well planned selection activities can successfully speed up the development of mature forest structure by introducing a new age class into the woods and by enhancing the growth of the trees already there.

**3. Expectations: Next 100 years in Succession**

The Easton watershed is expected to undergo significant changes in its forest composition in the future because of a lack of tree species diversity in the understory, it is likely that the forest canopy will homogenize in the future without management. DEEP and AWC foresters will implement a variety of forest management techniques to address this issue and create a diverse and resilient forest moving forward. Additionally, forest health issues will be addressed decisively with management to maintain and improve the current forest cover.

## 4. Management System Guidelines

In Centennial Watershed State Forest as a whole, one goal is to preserve and promote diverse forest habitats by maintaining a steady component of early successional habitat and young forest, while maintaining a large proportion of the forest in the mature size classes. In addition, passive management areas will be established. Ultimately, in the areas subject to management in the term of this plan, sustainable forest products will be secured while providing for increased tree diversity, wildlife habitat, carbon storage, and other values that are compatible with sustaining a living filter for high water quality. The forest will be resilient to changes in climate as well, but as stated above in section G2, establishing a successful deer and invasive species control measures is critical. It should also be mentioned that the 2012 document "Forest Management Guidelines for CWSF", prepared by consulting foresters Ferrucci & Walicki, Inc., calls for a similar proportion of young forest on the landscape ( Ferrucci & Walicki 2009), as do a set of recommendations given to the CLC from the then-CT DEP (Department of Energy and Environmental Protection) regarding the same plan (unpublished, 2009).

That said, the proportion of size classes in CWSF is heavily skewed towards sawtimber. Table G-1 represents the number of acres of each size class of forested acres in the watershed only.

**Table G-1**: Current proportion of age classes on CWSF of operable forest acres.

| Size Class | Acres | % of total |
|---|---|---|
| Sapling | 11 | 0.37% |
| Pole | 147 | 5% |
| Saw | 2875 | 94% |
| **Total** | **3033** | |

The below numbers provide a loose framework to work towards in CWSF. Forestry operations will be constrained by various factors, particularly in a densely populated area with a variety of different habitat stressors like CWSF. Even if these exact proportions are never attained, however, work will be conducted to increase and maintain the diversity of canopy tree species and forest age classes. Climate resiliency of the forest will increase as a result.

**Table G-2**: Forestry work plan for Easton Reservoir Block. These target acreages are based on their target proportion of active management acres in the watershed. This is an idealized representation of a future goal to work towards. "Active Management" acres are all acres that are accessible and operable.

| Forestry Work Plan | | | | |
|---|---|---|---|---|
| **Size Class** | **Current Acreage** | **Target % of total** | **Current % of Total** | **Target Acreage** |
| Seedling (Active Management) | 0 | 5% | 0% | 152 |
| Sapling (Active Management) | 7 | 15% | 0% | 455 |
| Pole (Active Management) | 82 | 15% | 3% | 455 |
| Saw (Active Management) | 2270 | 40% | 74% | 1213 |
| Old Forestland Management Sites, Inoperable, and Inaccessible Acres | 674 | 25% | 23% | 758 |
| **Total Forested, Active Management** | **2360** | | | |
| **Total Forested Acres** | **3033** | | | |

Trees in CWSF will be managed on a 100-year rotation. It is recommended that central hardwood forests be regenerated at a rate of roughly 1% of the total acreage per year, so that by the end of a 100-year rotation there would be an ample diversity of size classes. The forest would theoretically feature stands aged 1-100 if 1% were regenerated every year, with size class area proportions corresponding directly to stand ages (i.e., saplings are typically between 3-15 years old and would thus account for 12% of the landscape cover at the end of a 100-year period). Using this metric, roughly 25 acres per year will be regenerated within this Block (1% of the active acreage). Applied to the acreage of this Block, 511 acres of forest will be regenerated over the next 20-year period.

A further 452 acres of this block will undergo forest thinnings to encourage and maintain ideal species compositions in the younger stands. By selecting rarer, more valuable, and ecologically more important species during these thinnings, the overall composition of the forest will shift increasing species diversity.

One hundred thirty-two (132) acres of this Block will be slated for Timber Stand Improvement (TSI). TSI is essentially a thinning process when the forest is not yet commercially viable, in the early stem exclusion stage of development. Like commercial thinnings, TSI operations allow forest managers to control the species composition of a given stand moving forward, to make sure the landscape is sufficiently species-diverse (among other values) to achieve management goals.

Lastly, 1263 active management acres of this Block will be passively managed within the 20-year term of this plan ("growing"). These areas will be reassessed for management after the 20-year term of this plan has passed. In addition to the 766 acres of this Block that are not accessible to management, inoperable, swamp, fields or OFMS, a total of 2,029 acres of the Easton Reservoir Block will be managed passively through the term of this plan.

**Table G-3:** Summary of management activities in Easton Reservoir Block through the term of this plan. "OFM" stands for Old Forestland Management Site.

| | |
|---|---|
| **Active** | **2360** |
| Growing | 1263 |
| Shelterwood with Reserves | 400 |
| Selection | 111 |
| Thinning | 453 |
| TSI | 132 |
| **Inaccessible** | **136** |
| Growing | 136 |
| **Inoperable** | **273** |
| Growing | 273 |
| **OFM** | **265** |
| OFM | 265 |
| **Field** | **3** |
| Growing | 3 |
| **Swamp** | **89** |
| Growing | 89 |
| **Total** | **3125** |

***Even vs. Uneven Aged Management***

Over the next 20 years, 111 acres of the Block will be managed using uneven-aged regeneration strategies (single tree, group and patch selection harvests). 400 acres of the Block will be managed using "shelterwood with reserve" systems to target the regeneration of oak, pine, and hickory. Shelterwood systems are traditionally classified as even-aged treatments, however multiple age classes will be maintained within each stand managed under this plan (hence the term "with reserves"). 452 acres will be managed using even-aged strategies (forest thinnings).

Ultimately, all stands will feature more than one age class even if a given silvicultural treatment is geared toward the regeneration or release of a single cohort of trees. This gradual favoring of multi-aged stands on a landscape level will contribute to the forest's overall climate resilience. As described in section 4, a variety of stands of different ages and size classes across the landscape (not all mature forests) will be more resilient to catastrophic disturbances such as spongy moth and hurricanes.

**5. Sustainability (acres or % harvested per management period)**

As detailed above in table G-3, regenerating 1% of the total forested area per year would result in a more sustainable forest structure over time. This means regenerating 25 acres of forest annually for the next 100 years if the goal was to treat the entire forest. This would mean regenerating roughly 511 acres over the term of this management plan. Thinnings and Timber Stand Improvement (non-regeneration focused activities) will occur on a further 584 acres.

**6. Silvicultural Practice and Treatments**

In addition to the regeneration treatments discussed in sections G4 and G5, **forest thinnings** provide three key benefits to the watershed:

1. Thinnings maintain high growth rates within a stand by opening up growing space for the residual trees. A fast-growing tree pulls more nutrients out of the soil, so thinnings optimize the living filter.
2. Thinnings help to maintain biodiversity by selecting residual trees of as many species as possible.
3. By encouraging high growth rates and increasing the resources available to each individual tree, thinnings can increase the ability of trees to fight forest pathogens (Hood and Kimberley, 2009, Meadows et al. 2013). All three benefits hold true even in older trees as shown by Ward (2002). Accordingly, 452 acres of forest thinnings are prescribed in addition to regeneration treatments.

***Timber stand improvement*** is a method of forest thinning that targets younger stands, before they are commercially viable. Thinning a young stand to a certain spacing (determined by species composition) can maintain high tree growth rates at a crucial point in the stand's development where growth typically slows. Once the crown closes in a stand of saplings, meaning all available space in the stand is occupied by growing trees, the stand stalls somewhat as certain trees "out-muscle" others for the slightest advantage over their neighbors. Eventually, the "winners" manage to slightly overtop their immediate neighbors and end up overtopping them as they take off vertically and continue growing again. TSI can speed up this process by thinning the stand manually and allows the forester to pick the composition of the resulting stand instead of simply leaving it to the forces of nature, thus ensuring the maintenance of tree biodiversity. Generally, TSI accelerates the growth of the stand into maturity. TSI is recommended in multiple stands within the Easton watershed (see Chapter L, work plans).

### 7. Adaptive Forest Management

The DEEP and the CLC understand the nature of forest management as it occurs as part of a dynamic landscape. Management actions are often affected by outside variables which influence the outcome of resource decisions. The CLC reserves the right to reasonably change the management approach as environmental change and resource needs warrant. Some of these changes may be associated with biological factors such as insect and disease, or population outbreaks. Increased unauthorized motorized recreation which erodes trails and roads may require action unforeseen during the composition of this plan. Additionally, environmental conditions such as hurricanes or record - breaking precipitation may additionally affect resource condition and work requirements. The CLC and colleagues in DEEP, Wildlife and Fisheries, evaluate circumstances and use an adaptive- management philosophy and additionally 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

Most of the Easton Reservoir Block is mature deciduous forest habitat, with a mix of hardwood and softwood stands, small openings within Christmas tree and open field areas, and a network of various wetland types and watercourses. Maintaining a variety of forest types across the landscape not only improves forest resiliency but is also vital for the maintenance of a great diversity of wildlife species (Degraff and Yamasaki 2001).

### 2. Critical Habitat

A preliminary review by the DEEP's NDDB in February 2024 for the Easton Reservoir Block produced the following list of Federal, or State Endangered, Threatened, or Special Concern Species in the vicinity of this property. Each species comes with specific recommendations for the maintenance and establishment of their habitat, as well as best practices for their protection.

| Common Name | State Protection Status | Compartment of Concern |
|---|---|---|
| [redacted] | Endangered | 33,36,42,43,53,62 |
| [redacted] | Special Concern | 29,30,56, |
| [redacted] | Special Concern | 15,16,17,18,19,20,27 |
| [redacted] | Special Concern | 12,22,23,24,25,26,37,38,39,40,43,53, |
| [redacted] | Special Concern | 23,53 |

### 3. Actions needed for Increased Diversity and Critical Habitat

There are opportunities to maintain and enhance habitat throughout this Block. There is an existing mix of hardwood and softwood stands, small openings within Christmas tree and open field areas, and a network of various wetland types and watercourses. This current framework using a mix of even and uneven-aged management to maintain forest diversity is a good starting point from which to increase diversity using the recommended timber management program. In addition, opportunities to maintain early successional habitat should be explored.

### 4. Hunting and Trapping

A hunting program for white-tailed deer is administered by AWC in certain areas of the forest. 1,428 acres of the Easton Reservoir Block are open to archery hunting only. There are no shotgun areas within this Block. In addition to the deer hunt program, there is a small game hunt area on Garder Road in Monroe. This area features 96 acres open to the public, through the DEEP permitting system. This area has been used as a small-game hunt area since the 1950s, when the then State Board of Fisheries and game leased the land from BHC.

### 5. Fisheries Habitat and BMPs

The Mill River features an important trout conservation area, just south of the Easton Dam. This area is considered "off-watershed", but the forested parcels on the west bank of the river there are included in this plan (compartment 53). It is desirable for both brown and brook trout (*Salvelinus fontinalis*), as the river temperature is maintained by releases of cold water from the bottom of the Easton Reservoir. Brook trout are known to reproduce here, and the section of river south of the confluence of Canoe Brook is considered a class 1 wild trout management area. This means there are equipment restrictions when fishing, but the area is open year-round to catch and release fishing.

The most effective way to preserve aquatic habitats in a timber harvest is through the strict adherence of forestry BMPs for water quality. There are a litany of practices and techniques laid out in CT DEEP's booklet; "Best Management Practices for water quality while harvesting forest products". These ideas will be referenced and enforced whenever forestry operations are planned on CWSF. These practices can include the establishment of 100-foot no-cut buffers around perennial streams, establishing water bars on skid trails and truck roads on a slope, reseeding areas of exposed soil that are near watercourses, and filling in ruts that may have resulted from heavy equipment. Additionally, wetland stands will be considered inoperable.

## I. Economic Benefits

### 1. Connecticut Forest Economy

CT DEEP estimates that the forest products economy in Connecticut accounts for nearly 16,000 jobs and $3 billion of output annually. The growing and harvesting of sustainable wood products can be a vital tool in the fight against climate change. Maintaining a robust forest economy in Connecticut is essential to promoting these markets. CWSF can play an important role by providing an additional source of wood for local sawmills. Locally sourced wood is better for the environment because it has a smaller carbon footprint than wood from other places. With over 70% of the state's woodlands in some sort of private ownership (Peracchio 2020), keeping these mills open and functioning also presents an opportunity to smaller landowners who may be interested in managing their woodlands.

In addition to traditional lumber products, CWSF can provide numerous other economic benefits. For example, firewood in wholesale quantities and in smaller lots is a local source of residential heat that replaces fossil fuels. Maple syrup production is a small but growing industry in Connecticut, and numerous areas of Centennial provide the opportunity to establish a sugarbush.

## J. Public Involvement

Copies of the plan were sent to the Conservation Commissions of Easton, Monroe, and Trumbull for review. The plan was also sent to the Aspetuck Land Trust and Audubon Society of Connecticut.

The plan was reviewed by the CT DEEP Parks and Recreation, Fisheries, and Wildlife Divisions. No concerns were expressed, and DEEP Wildlife made recommendations on how to present the information from the NDDB report. See Appendix A.

The CLC reviewed the plan on 10/8/2024 and approved the final plan with DEEP revisions on 12/18/2025.

This plan was posted on the CT DEEP's Public Notice website, Public Notices (ct.gov), and distributed via DEEP's Public Notice eAlert system. Comments were received from one entity and considered in the final plan.

The approved plan will be on DEEP's webpage, Forest Management on State Lands (ct.gov).

Additionally, the DEEP Forestry Division engages in public outreach before all timber harvesting in State Forests. In Centennial Watershed State Forest, AWC and TNC participate in outreach efforts as well. A Forest Operation Plan, detailing the work that will occur in forest stands scheduled for harvest in the Forest Management Plan, will be created before timber harvests take place. Outreach information will be sent to the town where the work is planned, local land managers and stakeholders (including local and state representatives), and neighbors within 500 feet of the harvest. Timber harvest information will also be posted in a public location at the site.

## K. Management Goals

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** – To create a more uneven-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
3. **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. Some of these habitat types are currently present on the landscape, while others are lacking.
4. **Climate Change Mitigation** – Connecticut's State Forests can help mitigate climate change by sequestering and storing carbon in vegetation above and below ground and as durable wood products used locally and beyond. Promoting forest health and balancing higher sequestration rates with multi-aged, complex forest structure featuring high carbon storage is essential.
5. **Recreational/Health Benefits** – Connecticut's State Forests provide many recreational opportunities, providing a local and economical way to stay healthy and active.
6. **Economic Benefits** – Sustainably harvesting forest products like timber, firewood, witch-hazel, and

maple syrup from Connecticut's State Forests provide jobs and goods that are sold in the local economy. The State Forests are a model for private forest landowners to consider when managing their own properties.

7. **Forest Protection from Certain Natural Disturbances**– Natural disturbance can lead to increased resiliency in forests ecosystems when the forest responds to these disturbances by regenerating to a diverse suite of native vegetation. Some natural disturbances, however, do not result in a such a forest, or create conditions that do not meet stewardship objectives. Managing Connecticut's State Forests in these cases can help promote resiliency on the landscape.

## L. Work Plans

### *1. Silvicultural Operations Schedule*

The work plan will detail which acres will receive the following types of treatments;

- **Selection harvest –** Used in uneven-aged management. Trees are removed singly or in small groups up to an acre in size, maintaining a fairly continuous canopy. 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. **Shelterwoods "with reserves"** simply means that there will be older trees that are maintained in the stand, even if the majority of the canopy is eventually replaced in the removal harvest. 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. **Shelterwoods "with reserves"** simply means that there will be older trees that are maintained in the stand, even if the majority of the canopy is eventually replaced in the removal harvest.
- **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.
- **Timber Stand Improvement** – felling certain trees in the pole-size age growth stage (young forest) to improve the overall health of the forest stand, increase individual tree growth rates, and control the species composition of the future forest

Over the next 20 years, the following stands will be treated using even-aged, uneven-aged, and forest thinning techniques.

**Table L-1**: List of stands to be treated using Shelterwood systems.

| Compartment | Stand | Acres | Treatment |
|---|---|---|---|
| 12 | 1 | 50.2 | Shelterwood with Reserves |
| 12 | 1 | 9.1 | Shelterwood with Reserves |
| 30 | 3 | 2.6 | Shelterwood with Reserves |
| 36 | 4 | 248.3 | Shelterwood with Reserves |
| 55 | 4 | 21.3 | Shelterwood with Reserves |
| 55 | 6 | 1.0 | Shelterwood with Reserves |
| 55 | 6 | 4.7 | Shelterwood with Reserves |
| 60 | 3 | 45.7 | Shelterwood with Reserves |
| 60 | 4 | 17.6 | Shelterwood with Reserves |
| **Total** | | **400.5** | |

**Table L-2**: List of stands to be treated with selection systems.

| Compartment | Stand | Acres | Treatment |
|---|---|---|---|
| 33 | 1 | 0.8 | Selection Harvest |
| 33 | 1 | 3.4 | Selection Harvest |
| 33 | 1 | 0.9 | Selection Harvest |
| 36 | 1 | 7.4 | Selection Harvest |
| 55 | 1 | 20.2 | Selection Harvest |
| 55 | 2 | 21.6 | Selection Harvest |
| 55 | 3 | 23.2 | Selection Harvest |
| 55 | 3 | 16.6 | Selection Harvest |
| 55 | 5 | 16.5 | Selection Harvest |
| **Total** | | **110.6** | |

**Table L-3**: List of stands to be treated with thinnings.

| Compartment | Stand | Acres | Treatment |
|---|---|---|---|
| 20 | 7 | 8.6 | Crown Thinning |
| 26 | 1 | 1.9 | Crown Thinning |
| 26 | 1 | 3.0 | Crown Thinning |
| 33 | 2 | 49.5 | Crown Thinning |
| 33 | 3 | 2.3 | Crown Thinning |
| 33 | 4 | 32.6 | Crown Thinning |
| 36 | 2 | 5.7 | Crown Thinning |
| 36 | 2 | 2.6 | Crown Thinning |
| 36 | 3 | 3.3 | Crown Thinning |
| 36 | 3 | 2.2 | Crown Thinning |
| 44 | 3 | 2.8 | Crown Thinning |

| | | | | |
|---|---|---|---|---|
| 44 | | 3 | 2.4 | Crown Thinning |
| 44 | | 3 | 5.6 | Crown Thinning |
| 44 | | 4 | 4.6 | Crown Thinning |
| 44 | | 8 | 20.7 | Crown Thinning |
| 44 | 2a | | 7.0 | Crown Thinning |
| 44 | 2b | | 5.5 | Crown Thinning |
| 44 | 6a | | 53.5 | Crown Thinning |
| 59 | | 1 | 86.9 | Crown Thinning |
| 60 | | 1 | 46.9 | Crown Thinning |
| 60 | | 2 | 6.4 | Crown Thinning |
| 60 | | 2 | 9.0 | Crown Thinning |
| 60 | | 2 | 3.0 | Crown Thinning |
| 62 | | 1 | 7.6 | Crown Thinning |
| 62 | | 2 | 2.8 | Crown Thinning |
| 62 | | 3 | 14.8 | Crown Thinning |
| 62 | | 3 | 1.9 | Crown Thinning |
| 62 | | 3 | 13.3 | Crown Thinning |
| 62 | | 5 | 18.3 | Crown Thinning |
| 62 | | 8 | 13.8 | Crown Thinning |
| 62 | | 8 | 3.0 | Crown Thinning |
| 62 | | 8 | 5.8 | Crown Thinning |
| 62 | | 9 | 5.6 | Crown Thinning |
| **Total** | | | **452.9** | |

**Table L-4**: List of stands to be designated Old Forestland Management Sites.

| Compartment | Stand | Acres | Treatment |
|---|---|---|---|
| 64 | 1 | 2 | OFMS |
| 53 | 3 | 2 | OFMS |
| 53 | 2 | 4 | OFMS |
| 53 | 3 | 5 | OFMS |
| 57 | 1 | 6 | OFMS |
| 58 | 2 | 7 | OFMS |
| 58 | 2 | 9 | OFMS |
| 58 | 1 | 9 | OFMS |
| 53 | 5 | 10 | OFMS |
| 43 | 6 | 10 | OFMS |
| 53 | 2 | 10 | OFMS |
| 53 | 3 | 11 | OFMS |
| 53 | 4 | 15 | OFMS |
| 64 | 2 | 20 | OFMS |
| 43 | 3 | 27 | OFMS |
| 43 | 4 | 119 | OFMS |
| **Total** | | 265 | |

### *2. Prescribed Fire*

There are no plans for prescribed burns in the Block. Prescribed fire is a useful management tool in promoting the growth of young oak-hickory forests, so CLC will consider prescribed fire if the opportunity arises.

### *3. Forest Product Permits*

Forest product permits for firewood and maple sugaring will continue to be administered as the requests come in. Areas where both firewood is readily available, and cutting would benefit the forest are listed in table M-7.

Maple sugaring permits would be suitable for stands 24-1, areas of compartments 29, 30, and 33, 39-1, 42-6, 45-1, 53-1, 55-3, 55-5. Other suitable stands may develop over the duration of this plan, and these stands may be opened up if possible.

### *4. Invasive Treatments*

There are numerous areas of dense invasive species cover. Nearly every stand in the watershed is under some degree of invasive pressure. Each timber harvest on this watershed should be preceded by a treatment of all invasive plants within the sale area and in the immediate surrounding vicinity to avoid establishing non-native plants in the newly opened growing space once the harvest is complete.

### *5. Road Work*

Roadwork will occur on an as-needed basis. Hunting areas require new layers of gravel in the short term, and woods roads require grading and new layers of gravel in many places. Roadwork will be prioritized based on where watershed rangers and emergency vehicles need access. AWC will continue to maintain access to these roads by clearing downed trees and making sure they are passable for trucks and other emergency vehicles. Major upgrades for old logging roads that are not essential for water infrastructure access will be completed as required to conduct forest management activities and will be completed in consultation with the CLC and associated contractors.

### *6. Other Infrastructure Improvements -culverts, gates, boundary surveys*

Culvert and gate maintenance will be completed as necessary to facilitate the management activities laid out in this plan, or in case an emergency arises. Maintenance activities will be discussed and planned by the CLC.

Surveys for property boundaries will be conducted on an as-needed basis. Boundary marking schedule is detailed in section 2-e. Roughly 8 miles of property boundaries will be marked each year in this watershed.

7. ***Forest Pest and Pathogen Monitoring***

CLC members, including AWC and DEEP foresters, will continue to monitor forest pests and pathogens as they work in the watershed. Newly located affected areas will be documented on an as-needed basis by the CLC, and proper control/eradication/prevention measures will be discussed.

New pest and pathogen information will be handed out to hunters on CWSF to increase awareness as needed when new invasive species arrive.

Areas where BLD is rampant (including most mixed upland hardwood stands) will continually be monitored for tree mortality. Widespread mortality has not yet occurred as of the writing of this plan, 3 years on from the first detection of the pathogen.

8. ***Non-Commercial Forest Products Work***

Timber stand improvement (TSI) is recommended in the following stands;

**Table M-7**: Stands in the Easton Reservoir Block where Timber Stand Improvement will benefit forest composition and help achieve overall forest management goals.

| Compartment | Stand | Acres | Treatment |
|---|---|---|---|
| 21 | 1 | 34.3 | Timber Stand Improvement |
| 21 | 1 | 4.3 | Timber Stand Improvement |
| 21 | 1 | 3.2 | Timber Stand Improvement |
| 23 | 1 | 5.6 | Timber Stand Improvement |
| 23 | 1 | 21.8 | Timber Stand Improvement |
| 23 | 2 | 7.2 | Timber Stand Improvement |
| 23 | 3 | 2.2 | Timber Stand Improvement |
| 42 | 6 | 7.6 | Timber Stand Improvement |
| 44 | 1 | 2.7 | Timber Stand Improvement |
| 44 | 1 | 11.7 | Timber Stand Improvement |
| 49 | 1 | 8.7 | Timber Stand Improvement |
| 49 | 1 | 6.0 | Timber Stand Improvement |
| 49 | 1 | 3.2 | Timber Stand Improvement |
| 49 | 5 | 4.6 | Timber Stand Improvement |
| 49 | 6 | 4.8 | Timber Stand Improvement |
| 55 | 7 | 4.6 | Timber Stand Improvement |
| **Total** | | **132.6** | |

9. ***Hazardous Trees***

Public access roads maintained by the CLC, parking areas, and any other high traffic public use areas will actively be monitored for potentially hazardous trees throughout the duration of this management plan. When a hazard tree is identified, it will be addressed by members of the CLC appropriately, with consideration to public safety, employee safety, and impacts to associated natural and recreational resources.

M. Forest Map Set

# Easton Reservoir Block
# Centennial Watershed State Forest

## Base Map (1/3)

Monroe, Easton, and Trumbull, CT

3125 Acres

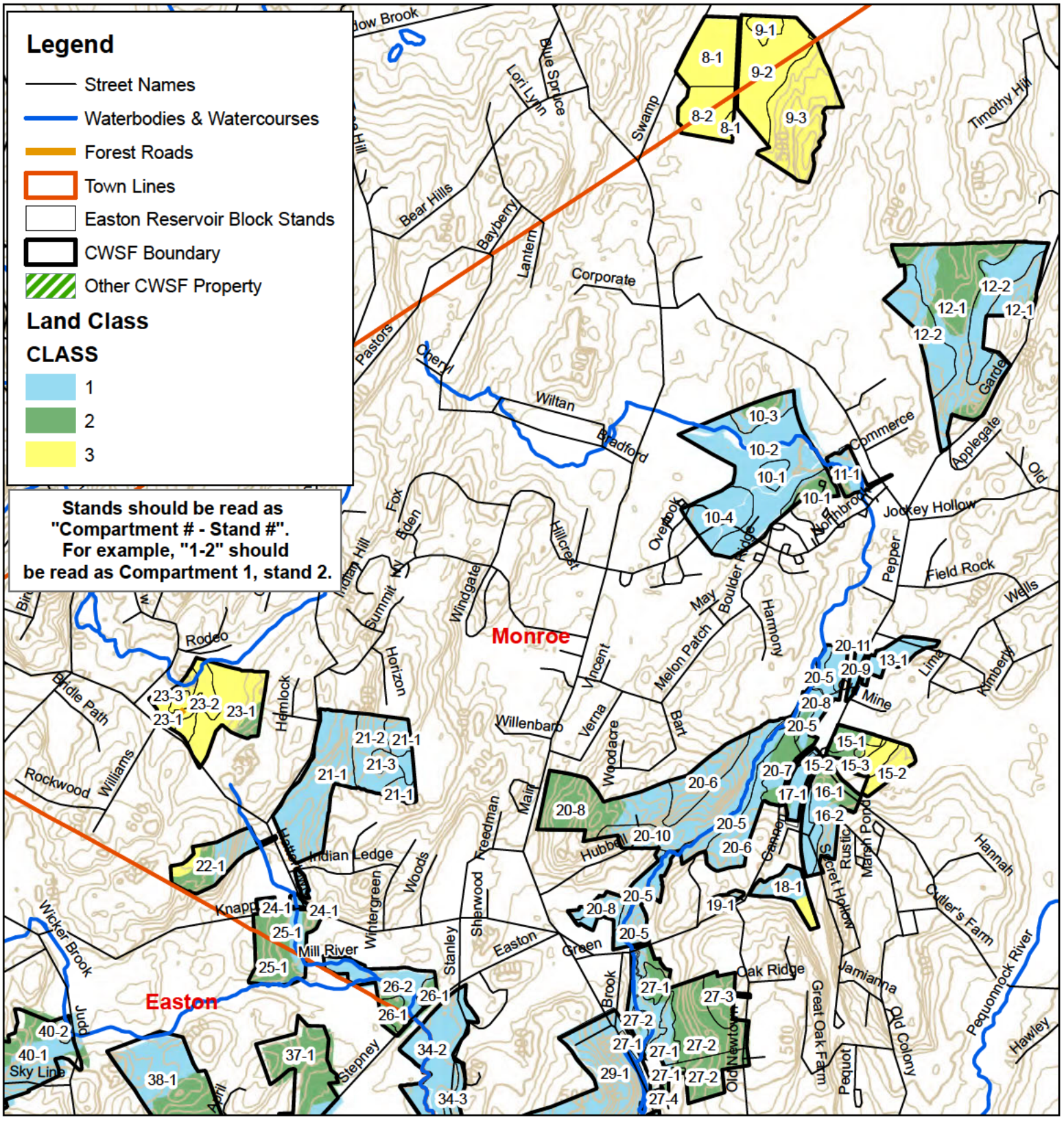
Map Scale: 1:24,000

Prepared by: R. Turnbull

2024

N W E S

0 0.225 0.45 0.9 Miles



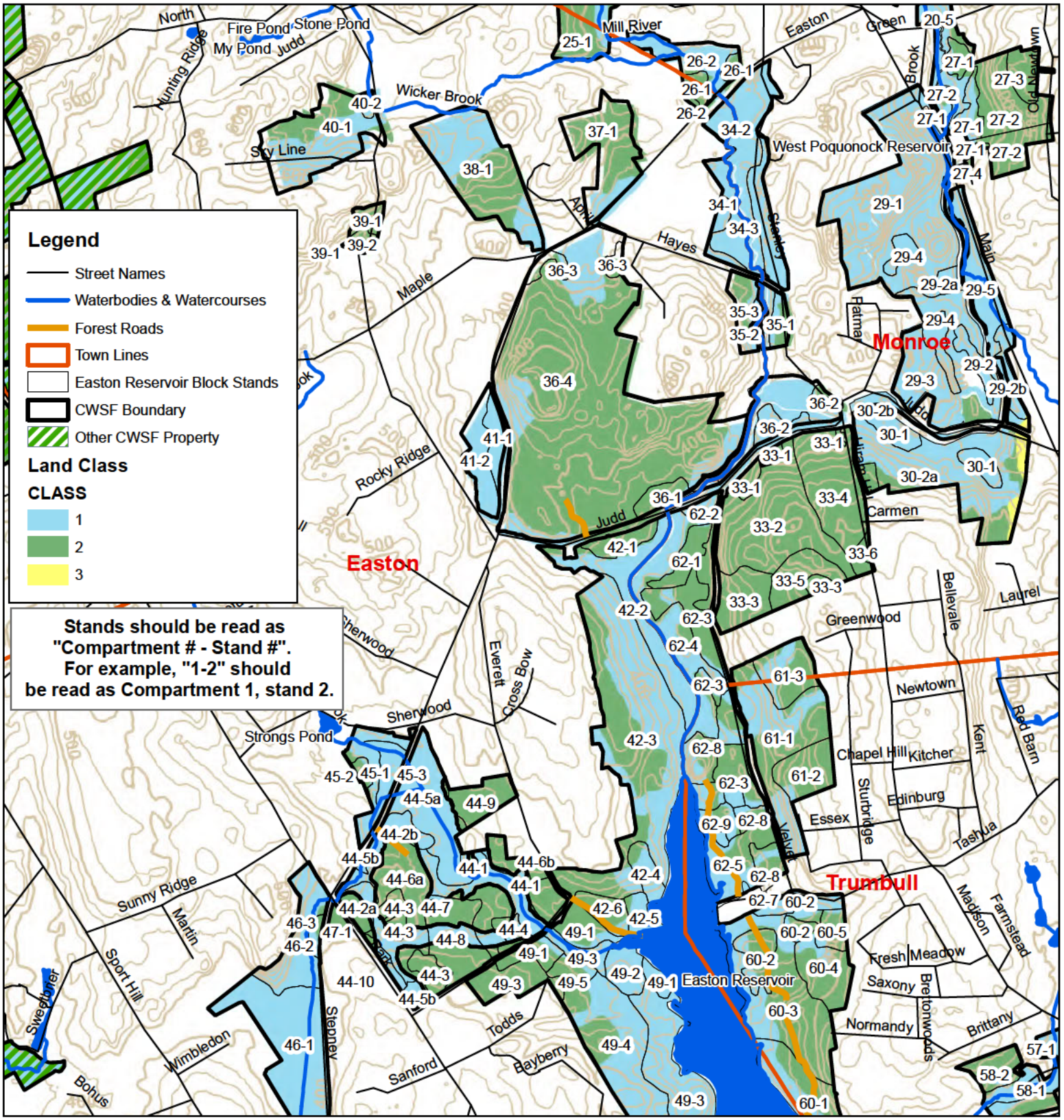
# Easton Reservoir Block
# Centennial Watershed State Forest
# Base Map (2/3)

Monroe, Easton, and Trumbull, CT
3125 Acres

Prepared by: R. Turnbull
2024

Map Scale: 1:24,000

0 0.225 0.45 0.9 Miles



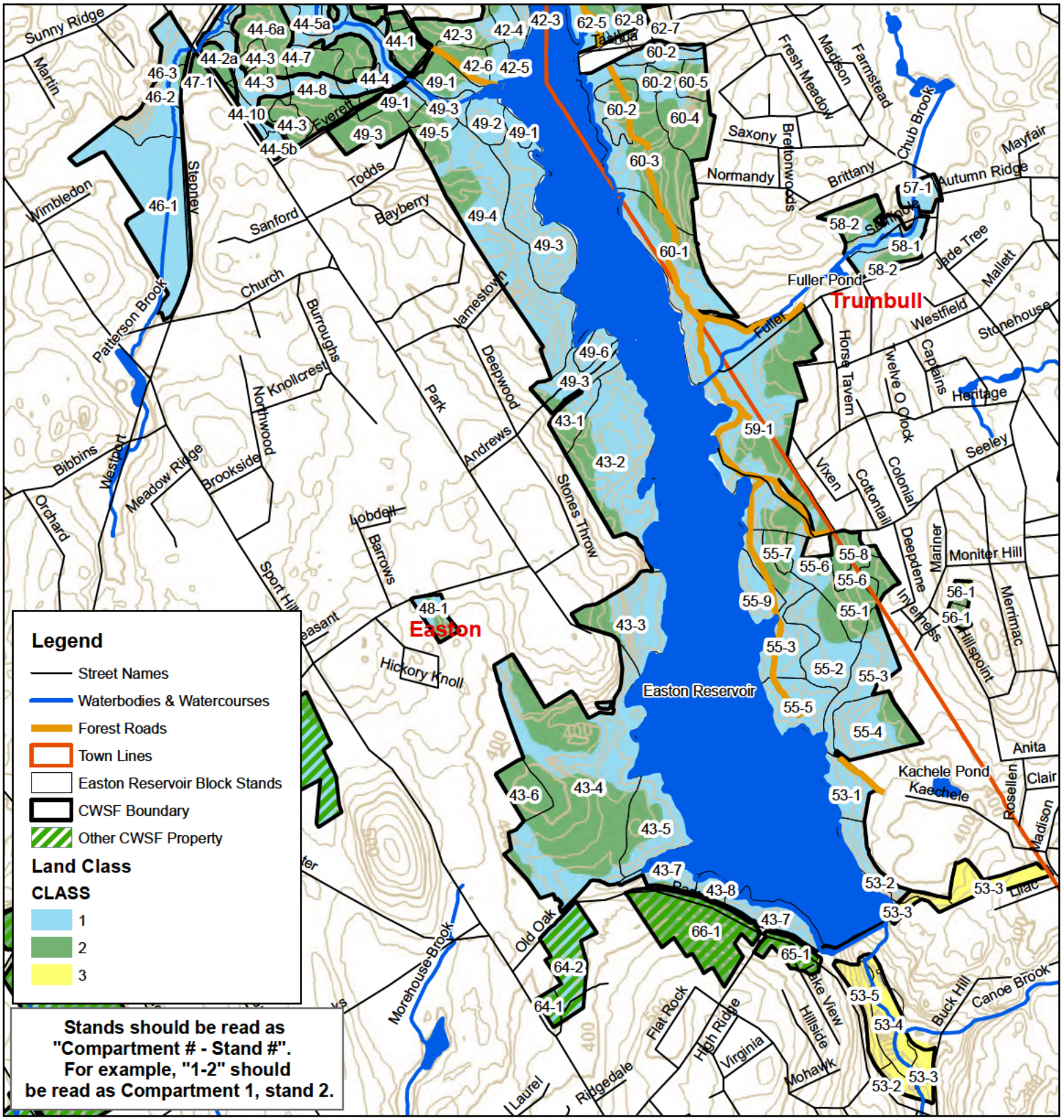
# Easton Reservoir Block
# Centennial Watershed State Forest
# Base Map (3/3)

Monroe, Easton, and Trumbull, CT
3125 Acres

Prepared by: R. Turnbull
2024

Map Scale: 1:24,000

0 0.225 0.45 0.9 Miles




## Legend

- Street Names
- Waterbodies & Watercourses
- Forest Roads
- Town Lines
- Easton Reservoir Block Stands
- CWSF Boundary
- Other CWSF Property

**Land Class**

**CLASS**

- 1
- 2
- 3

**Stands should be read as "Compartment # - Stand #". For example, "1-2" should be read as Compartment 1, stand 2.**

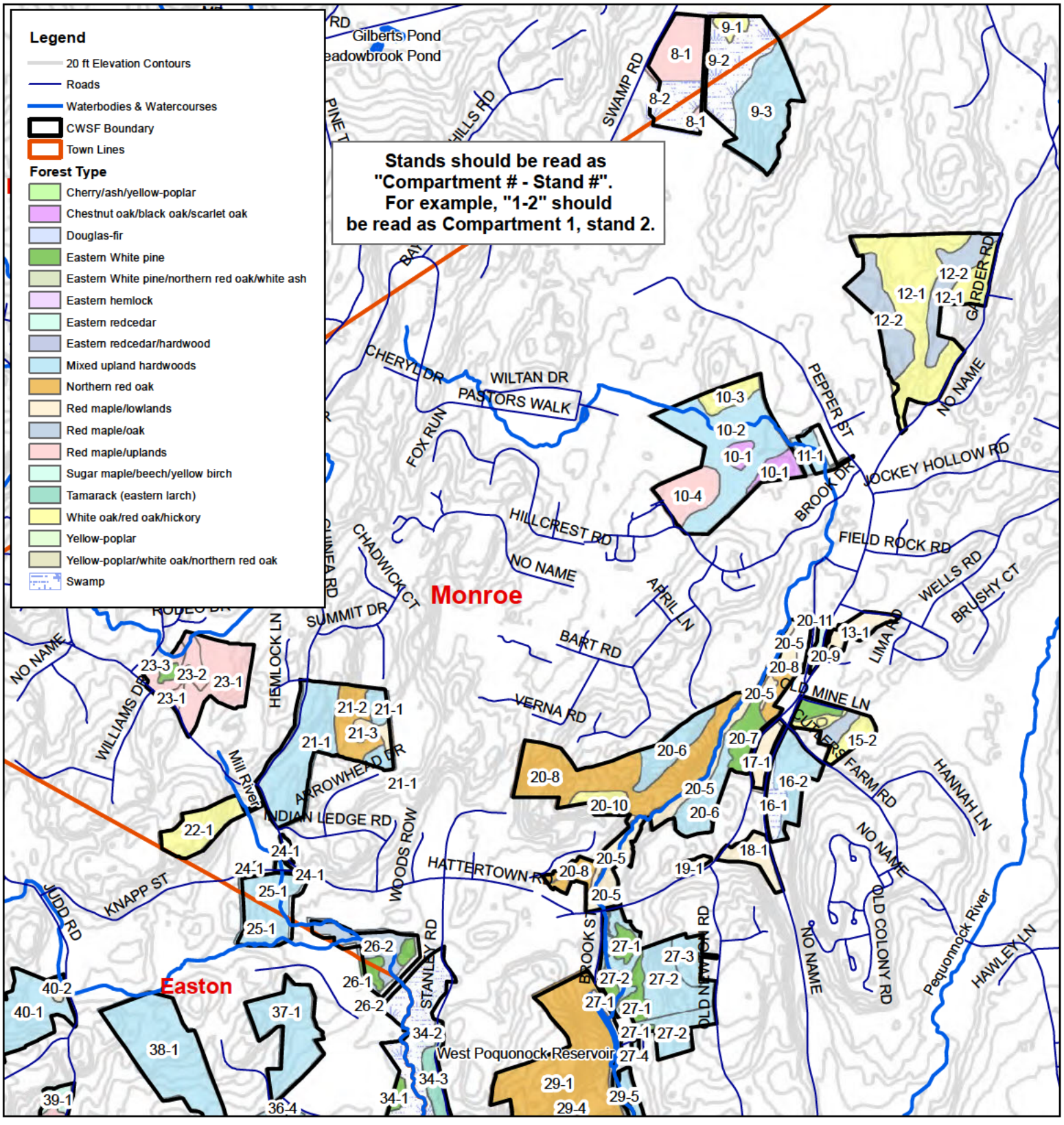
# Easton Reservoir Block
# Centennial Watershed State Forest
# Forest Type Map (1/3)

Monroe, Easton, and Trumbull, CT
3125 Acres

Prepared by: R. Turnbull
2025

Map Scale: 1:24,000

0 0.25 0.5 1 Miles



# Easton Reservoir Block
# Centennial Watershed State Forest
# Forest Type Map (2/3)

Monroe, Easton, and Trumbull, CT
3125 Acres

Prepared by: R. Turnbull
2025

Map Scale: 1:24,000

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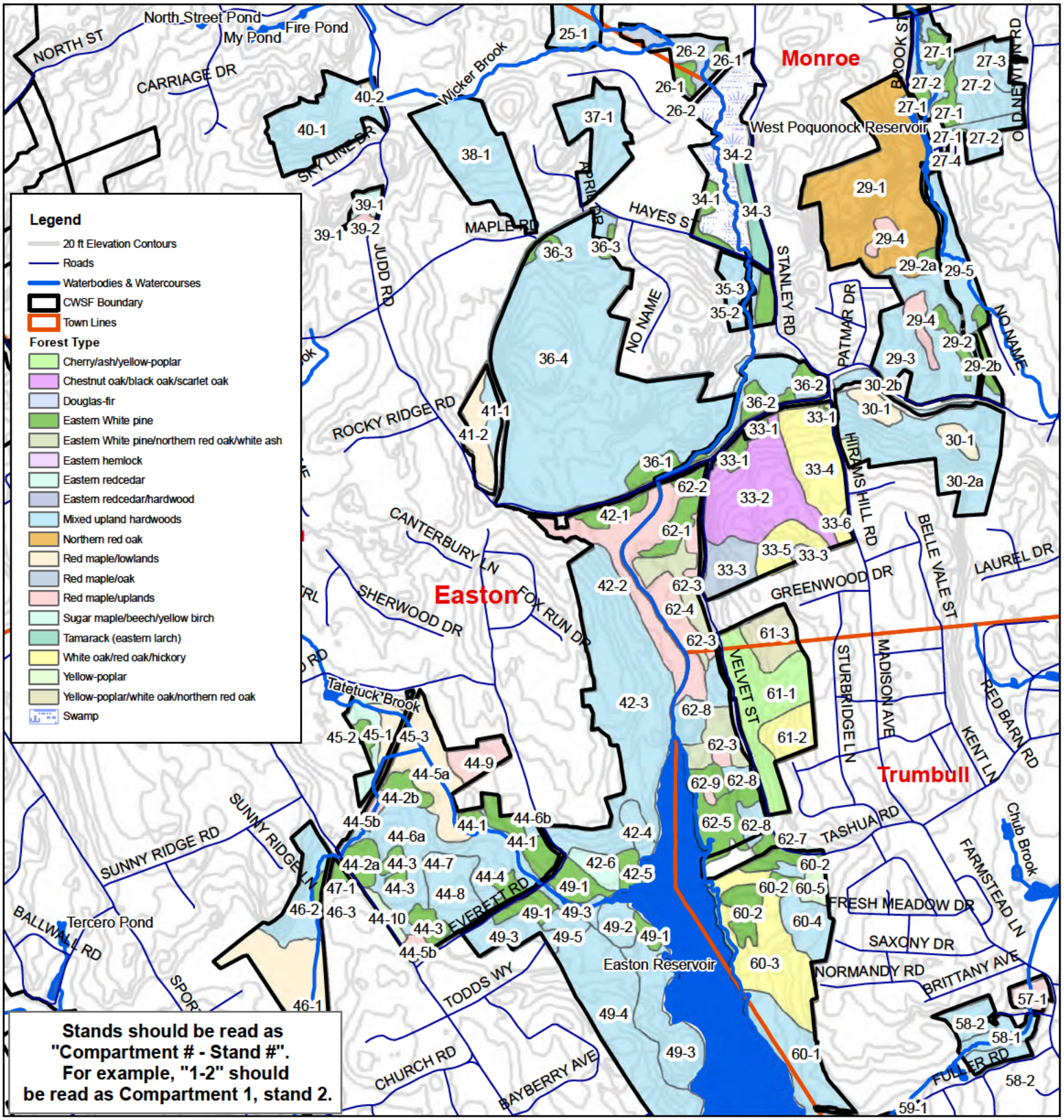

# Easton Reservoir Block
# Centennial Watershed State Forest
# Forest Type Map (3/3)

Monroe, Easton, and Trumbull, CT
3125 Acres

Prepared by: R. Turnbull
2025

Map Scale: 1:24,000

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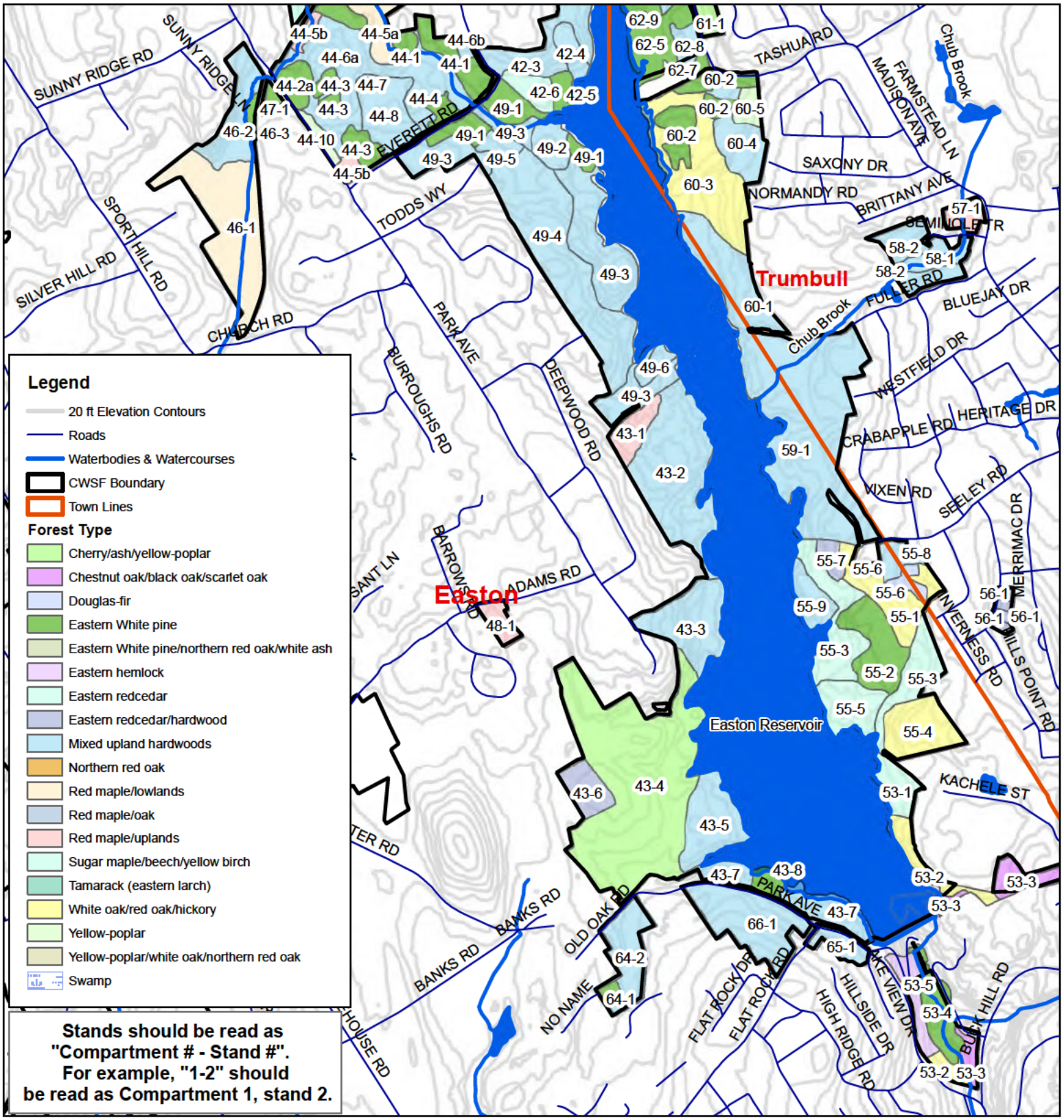



## Legend

- 20 ft Elevation Contours
- Roads
- Waterbodies & Watercourses
- CWSF Boundary
- Town Lines

**Forest Type**

- Cherry/ash/yellow-poplar
- Chestnut oak/black oak/scarlet oak
- Douglas-fir
- Eastern White pine
- Eastern White pine/northern red oak/white ash
- Eastern hemlock
- Eastern redcedar
- Eastern redcedar/hardwood
- Mixed upland hardwoods
- Northern red oak
- Red maple/lowlands
- Red maple/oak
- Red maple/uplands
- Sugar maple/beech/yellow birch
- Tamarack (eastern larch)
- White oak/red oak/hickory
- Yellow-poplar
- Yellow-poplar/white oak/northern red oak
- Swamp

**Stands should be read as "Compartment # - Stand #". For example, "1-2" should be read as Compartment 1, stand 2.**

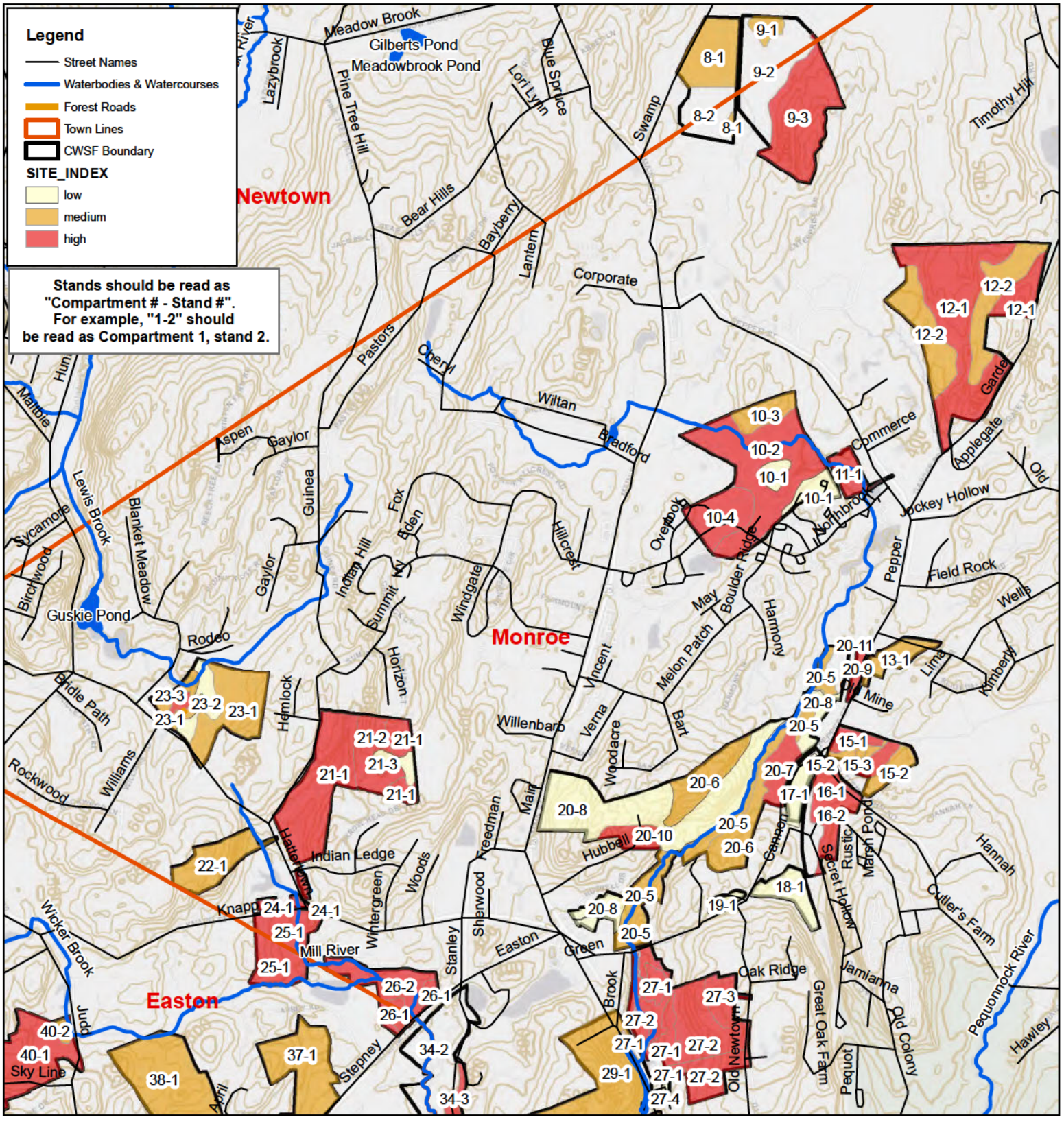
# Easton Reservoir Block
# Centennial Watershed State Forest
# Site Index Map (1/3)

Monroe, Easton, and Trumbull, CT
3125 Acres

Prepared by: R. Turnbull
2024

Map Scale: 1:24,000

0 0.225 0.45 0.9 Miles



# Easton Reservoir Block
# Centennial Watershed State Forest
# Site Index Map (2/3)

Monroe, Easton, and Trumbull, CT
3125 Acres

Prepared by: R. Turnbull
2024

Map Scale: 1:24,000

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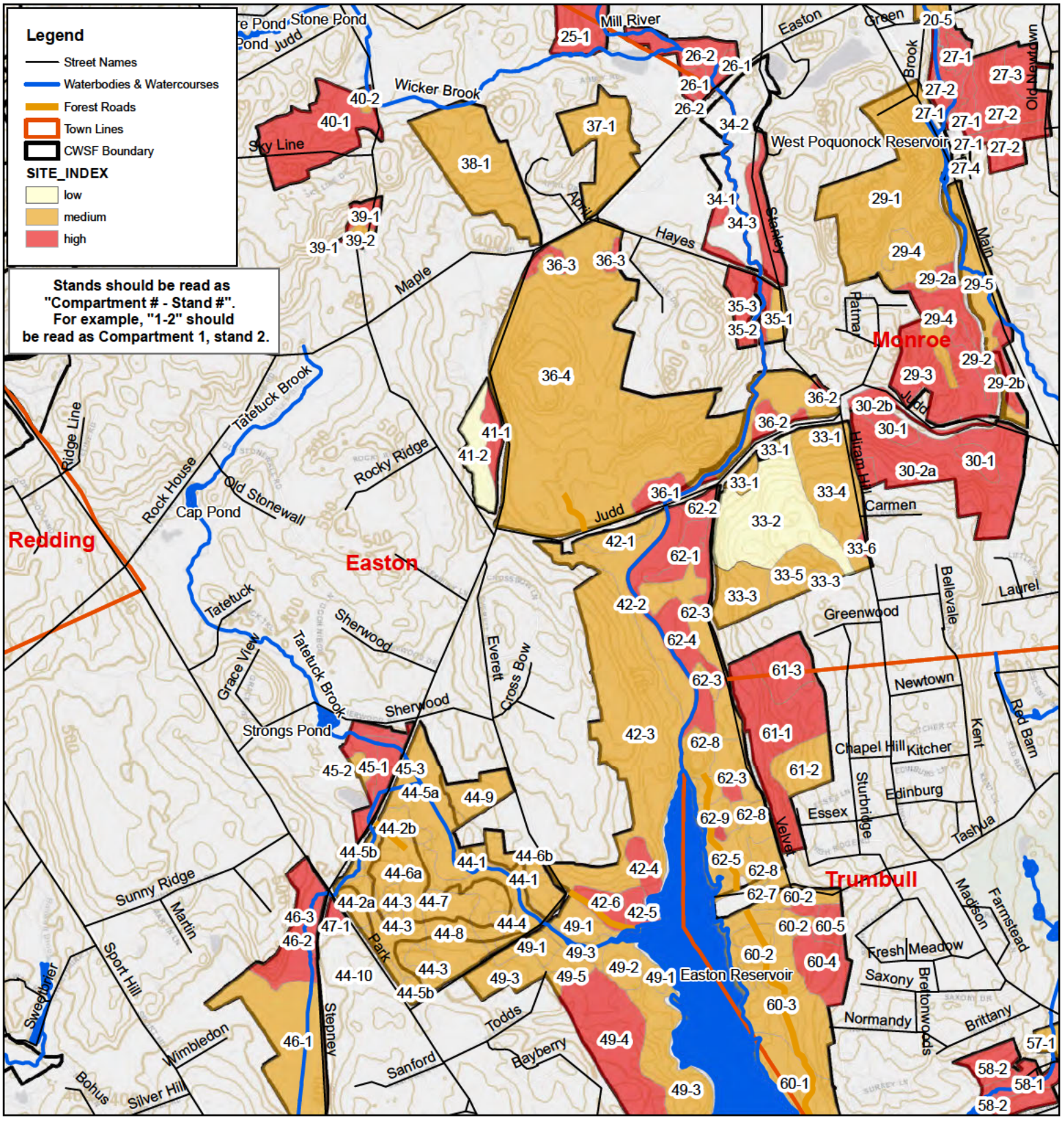

# Easton Reservoir Block
# Centennial Watershed State Forest
# Site Index Map (3/3)

Monroe, Easton, and Trumbull, CT
3125 Acres

Prepared by: R. Turnbull
2024

Map Scale: 1:24,000

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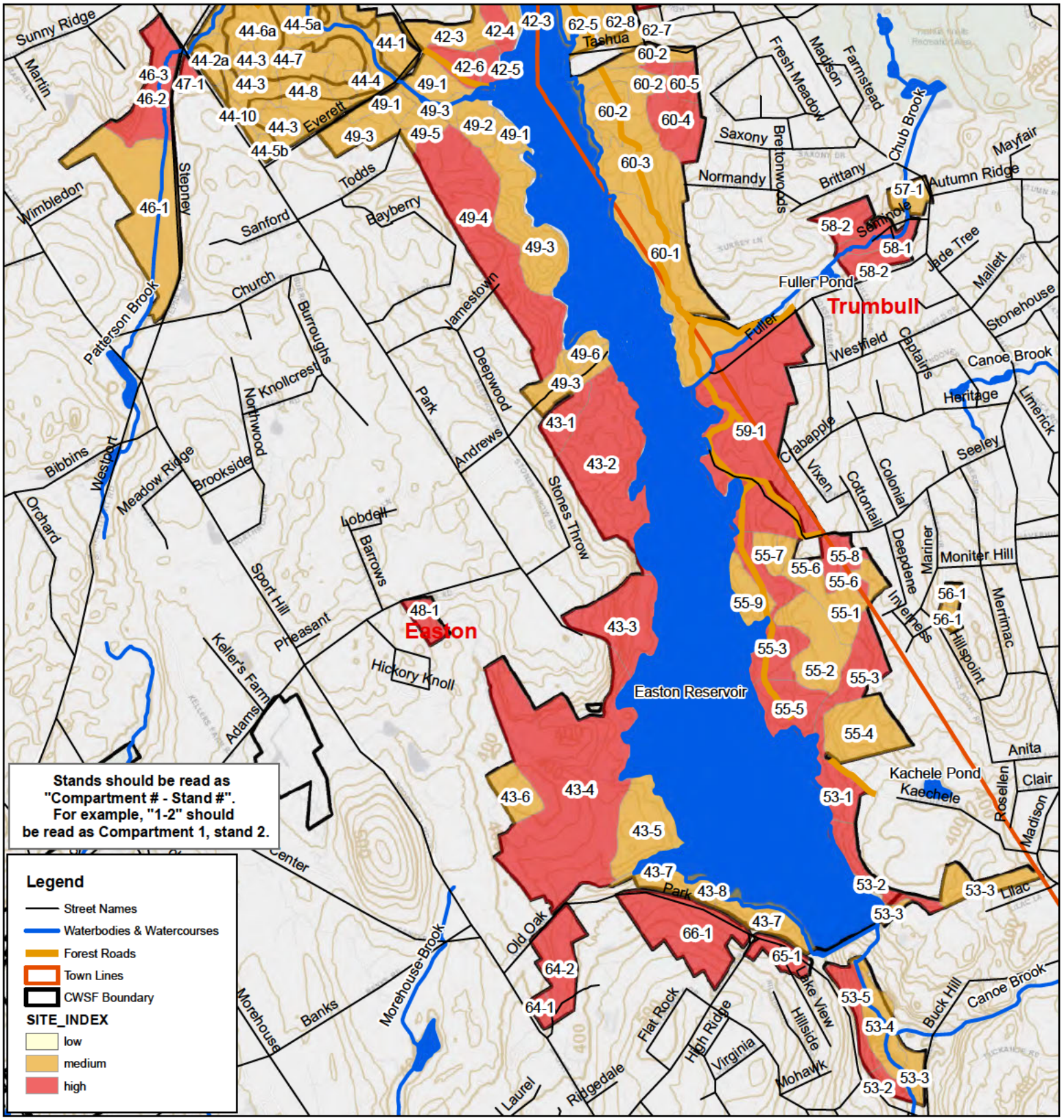


**Stands should be read as "Compartment # - Stand #". For example, "1-2" should be read as Compartment 1, stand 2.**

**Legend**

- Street Names
- Waterbodies & Watercourses
- Forest Roads
- Town Lines
- CWSF Boundary

**SITE_INDEX**

- low
- medium
- high

# Easton Reservoir Block
# Centennial Watershed State Forest
# Size Class Map (1/3)

Monroe, Easton, and Trumbull, CT
3125 Acres

Prepared by: R. Turnbull
2025

Map Scale: 1:24,000

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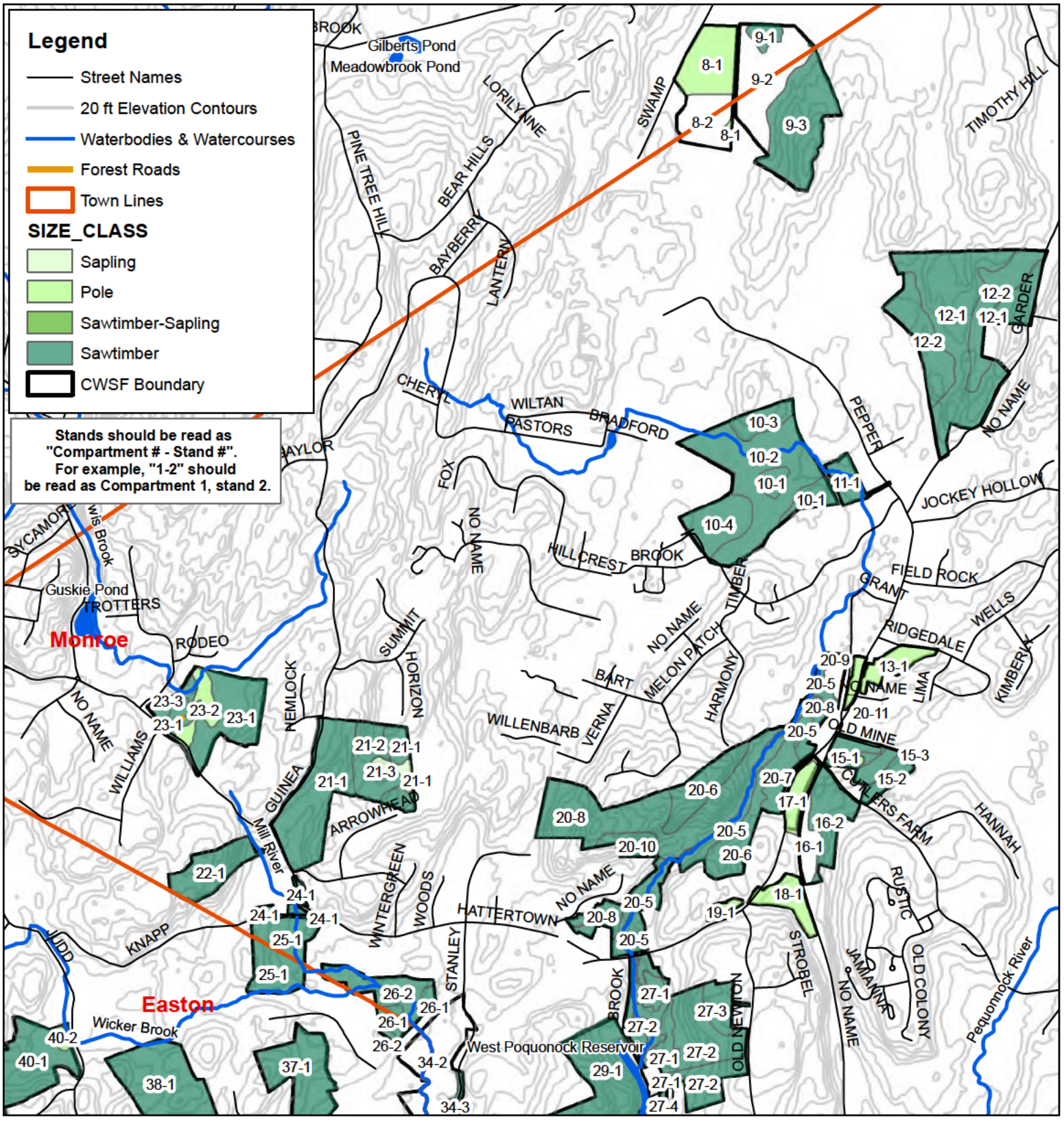

# Easton Reservoir Block
# Centennial Watershed State Forest
# Size Class Map (2/3)

Monroe, Easton, and Trumbull, CT
3125 Acres

Prepared by: R. Turnbull
2025

Map Scale: 1:24,000

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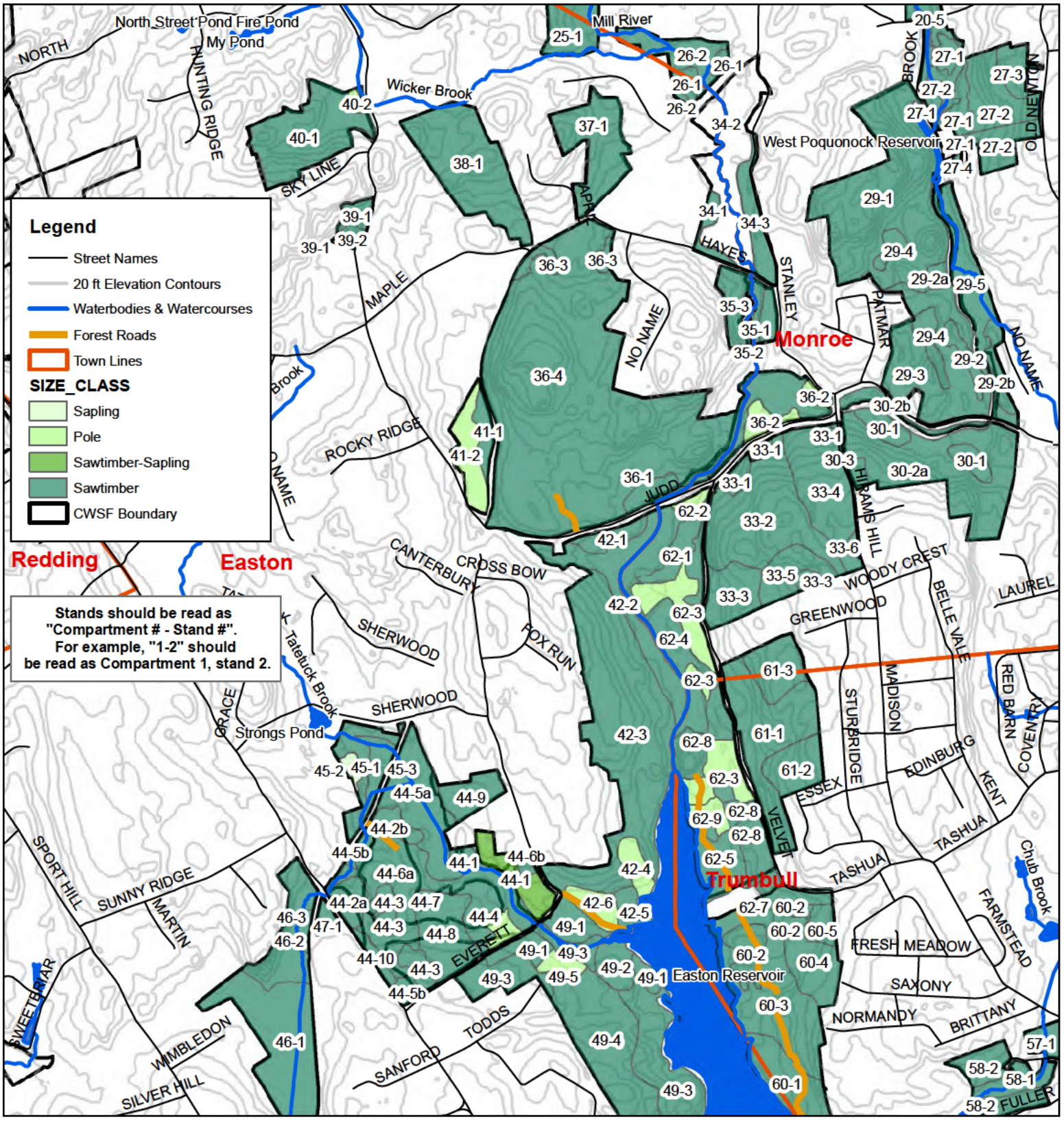

# Easton Reservoir Block
# Centennial Watershed State Forest
# Size Class Map (3/3)

Monroe, Easton, and Trumbull, CT
3125 Acres

Prepared by: R. Turnbull
2025

Map Scale: 1:24,000

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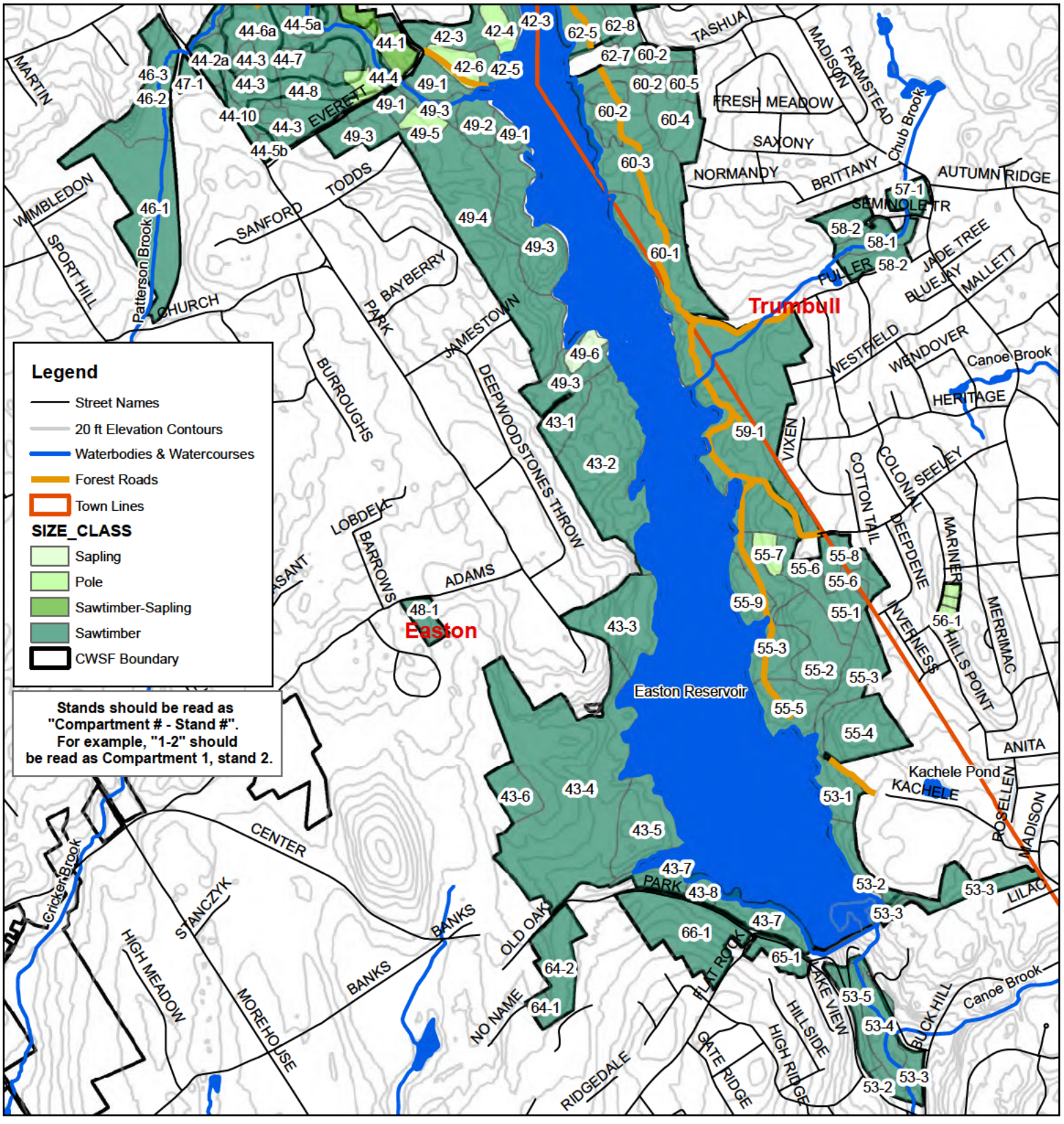


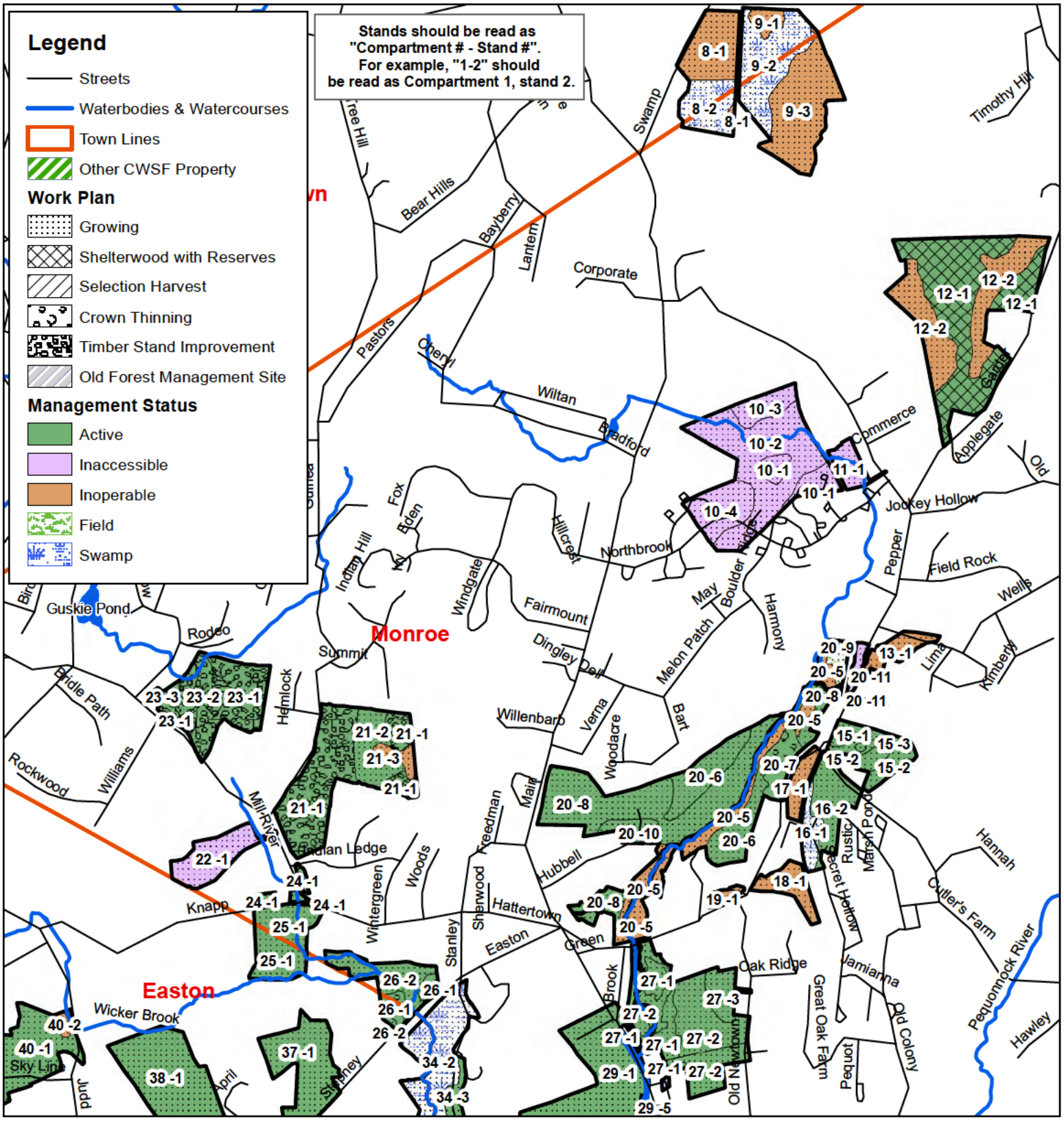
# Easton Reservoir Block
# Centennial Watershed State Forest
# Work Plan Map (1/3)

Monroe, Easton, and Trumbull, CT
3125 Acres

Prepared by: R. Turnbull
2025

Map Scale: 1:24,000

0 0.225 0.45 0.9 Miles



# Easton Reservoir Block
# Centennial Watershed State Forest
# Work Plan Map (2/3)

Monroe, Easton, and Trumbull, CT
3125 Acres

Prepared by: R. Turnbull
2025

Map Scale: 1:24,000

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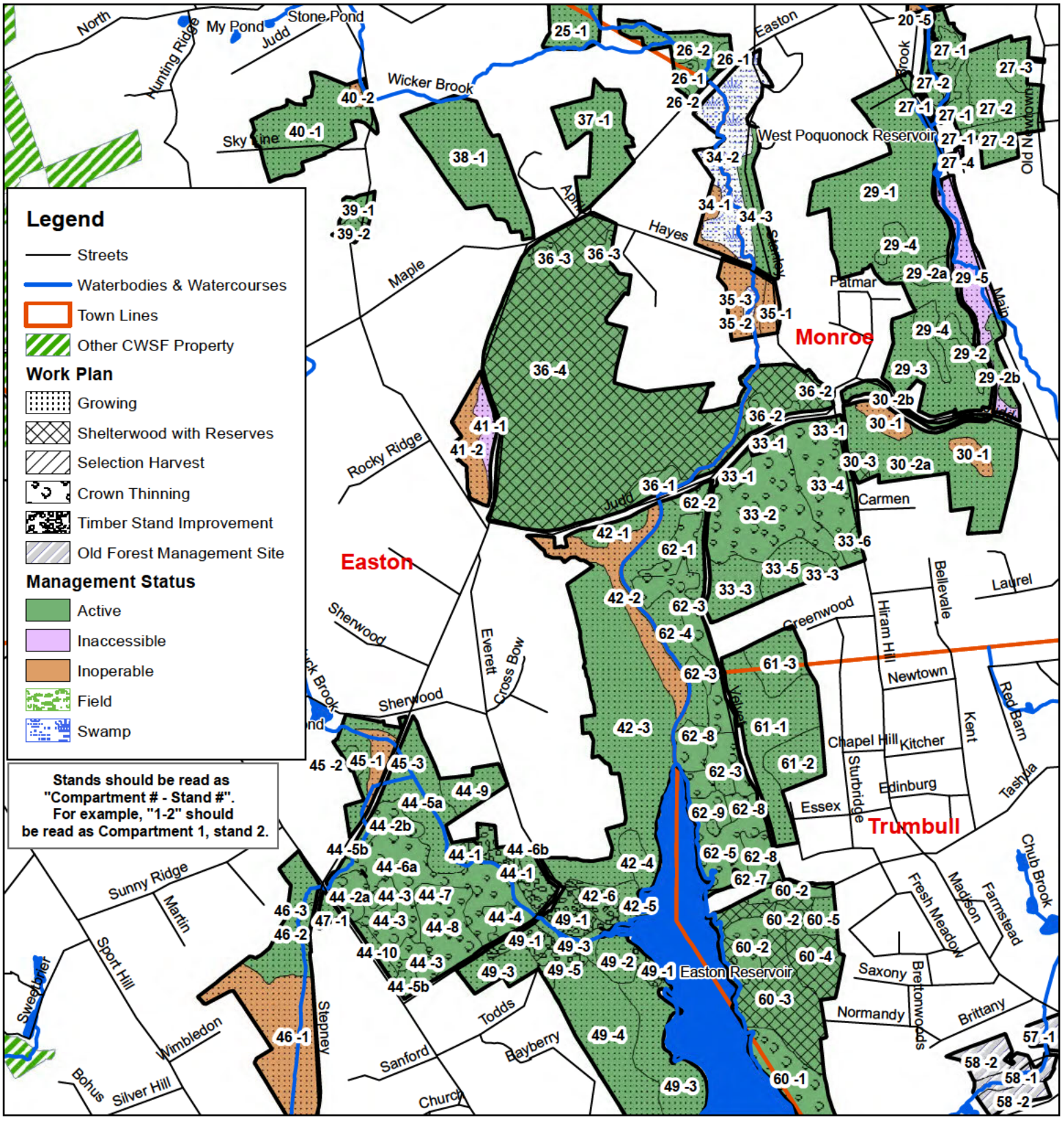

# Easton Reservoir Block
# Centennial Watershed State Forest
# Work Plan Map (3/3)

Monroe, Easton, and Trumbull, CT
3125 Acres

Prepared by: R. Turnbull
2025

Map Scale: 1:24,000

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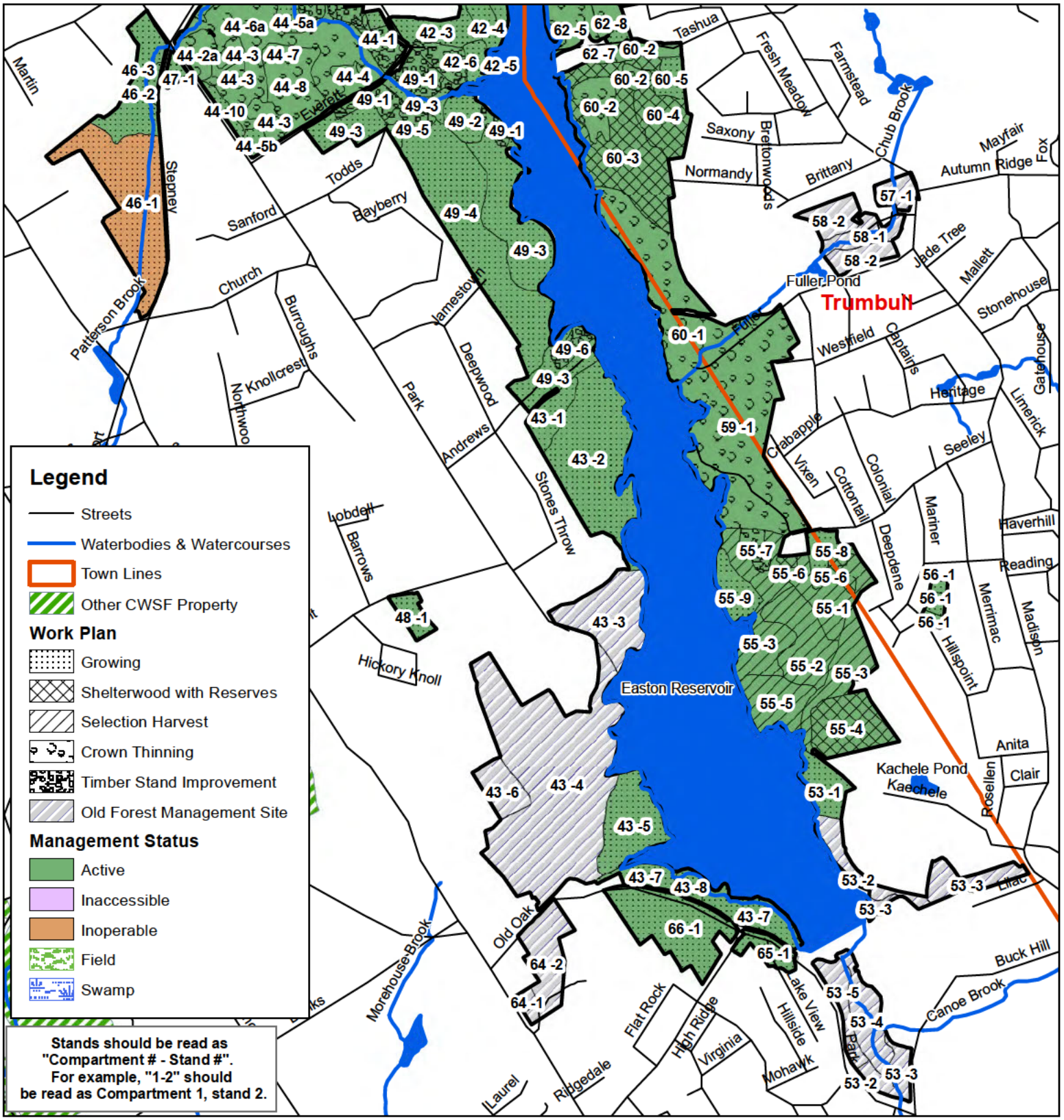

# Appendix A

Review and Comments

Copies of the plan were sent to the Conservation Commissions of Easton, Monroe, and Trumbull for review and in person meetings were held with each. Trumbull and Easton Conservation Commissions had no comments. The Monroe Conservation Commission was supportive of the plan and provided a letter.

The plan was also sent to the Aspetuck Land Trust and Audubon Society of Connecticut. Aspetuck Land Trust did not make any comment. Rosa Goldman of Audubon Connecticut was very supportive of the management work laid out in the plan and provided a letter.

The plan was reviewed by the CT DEEP Parks and Recreation, Fisheries, and Wildlife Divisions. No concerns were expressed. DEEP Wildlife made recommendations on how to present the information from the NDDB report. Comments were incorporated into the plan.
-Skip Kearns, DEEP District Operations and Support Divisions
-Tammy Talbot, DEEP Parks and Recreation
-Joe Cassone, DEEP Fisheries Biologist
-Peter Picone, DEEP Wildlife Biologist

The CLC reviewed the plan on 10/8/2024 and approved the final plan with DEEP revisions on 12/18/2025.

This plan was also posted on the CT DEEP's Public Notice website, Public Notices (ct.gov), and distributed via DEEP's Public Notice eAlert system. Comments were received from one group and considered in the final document.

# Appendix B

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## Appendix C Definitions

**Size Classes**

- **Sawtimber –** Hardwood trees 12-inch dbh (diameter breast height or 4.5 feet off the ground) and
- larger, and softwood trees 10-inch dbh and larger, that contain at least one 8-foot sawlog.
- **Poletimber –** Hardwood trees between 5 and 11 inches dbh and softwood trees 5 to 9 inches dbh. These trees are too small for sawlogs, but could be sold as pulpwood, fuelwood, or other small products where such markets exist.
- **Saplings –** Trees 1 to 5 inches dbh.
- **Seedlings –** Trees less than 1-inch dbh.

**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 removed 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 small groups up to an acre in size, maintaining a fairly continuous canopy. 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.
- **Timber Stand Improvement** – felling certain trees in the pole-size age growth stage (young forest) in order to

improve the overall health of the forest stand, increase individual tree growth rates, and control the species composition of the future forest.

- **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 species you are trying to regenerate (i.e. oak).

**Definitions**

- **Acceptable Growing Stock (AGS) –** Trees that meet the landowner's objectives. Usually this includes saleable trees that are of good form, species and quality and would be satisfactory as crop trees.
- **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.
- **Active management –** Involves using equipment to manipulate the condition of the forest canopy. This could include timber harvesting on a large scale, or simply felling some trees for firewood with a single chainsaw.
  Further descriptions of specific active management activities are provided in this glossary.
- **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 1x1 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).
- **Mature tree –** A tree that has reached biological maturity shows declining year-to-year volume growth.
- **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** – A forest community that has remained undisturbed by man for a long period of time, the length of which is relative and dependent upon locality.
- **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.
- **Passive Management –** refers to NOT conducting any forest management activities (no timber harvests).

Passive management approaches still allow for the removal of identified adversely affecting agents such as invasive species and management of the deer population.

- **Patch** – A patch is a relatively homogeneous area that differs in some way from its surroundings (e.g., woodlot in a corn field, conifer plantation in a mixed-deciduous forest).
- **Peak water flow** – The instantaneous maximum flow of water, often occurring as the result of an intense storm, snowmelt, or a combination of both.
- **Plantation** – A forest stand in which most trees are planted. Typically, planted trees are in rows with equal spacing between each tree.
- **Quadratic Mean Diameter**– A statistical measure used in forestry to represent the average diameter of trees in a stand, calculated by taking the square root average of the squared diameters of all trees in a sampled area. It gives more weight to larger trees than a simple average, since bigger trees contain disproportionately more volume and basal area.
- **Regeneration cuttings** – Silvicultural cuttings designed to naturally regenerate the 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.
- **Seed tree** – A tree that produces seed. Seed trees are usually mature and of acceptable quality.
- **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** – The art, science, and practice of establishing, tending, and reproducing forest stands with desired characteristics.
- **Species diversity** – The number of different plants, animals, and other life forms coexisting in a community.
- **Stand –** An area of trees of a certain species composition (cover/IV 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.
- **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.
- **Sustainable** – The indefinite and steady supply of something
- **Unacceptable Growing Stock (UGS)** – Trees of low quality or less valuable species that should be removed in a thinning.
- **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 quality and quantity –** A category of factors associated with forests that include intensive protection of water quality, riparian areas, wetlands, and fisheries.
- **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.
- **Wetland –** In the absence of a single, universally recognized definition, a wetland is a land/water ecosystem characterized by periodic inundation. The soils are developed under the influence of saturation. It supports plants and animals adapted to these conditions. According to CGS 22a – 29(2) Inland wetlands are defined by soil type and include poorly drained soils, very poorly drained soils, alluvial soils, and flood plain soils.