



**Connecticut**  
**Department of Energy &  
Environmental Protection**

**Field Visit to the Waterworks Brook Conservation Area at 327 South Center Street in Windsor Locks, CT  
Town of Windsor Locks Park and Michael F. Gragnolati Conservation Trail  
Post Visit Report**

**Present Parties:** Darry Ruiter (Conservation Commission Chair), Paul Herrington (First Selectman), Pete Picone (DEEP Wildlife Biologist) and David Beers (DEEP Western District Service Forester) on 9/14/2023

**Stewardship Objectives**

1. Safe and enjoyable for passive recreation
2. Improve forest health
3. Improve wildlife habitat





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## FOREST HISTORY

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Between eighteenth century colonial settlement and the mid-nineteenth century, most of western Connecticut was cleared for farming, with only a few small patches of forest remaining by the mid-nineteenth century. Only 25% of Connecticut was forested then. Under these conditions, the biggest animal left in the woods was a muskrat. Turkeys, deer, bobcat, beaver, and bear were either rare or entirely gone. Most of the land was used for livestock pasture, with only the best soils used for hay or tilled crops. Imagine a very open agrarian landscape.

It was during this farming period that the stonewalls were built to keep livestock out of crops and the neighbor's property. Most of these walls were topped off with piled wood and stumps to make them taller. Stonewalls were also a depository for rocks removed from cultivated land. A stonewall with many fist-sized rocks means that one side of that wall had tilled crops, where the winter freeze of bare ground would push rocks to the surface. After barbed wire became widely available in 1875, many of these walls were supplemented with wire. Barbed wire was used to corral cows and goats, but not sheep (barbs did not hurt the sheep). Sheep pasture used smooth-wired rectangular page fencing.

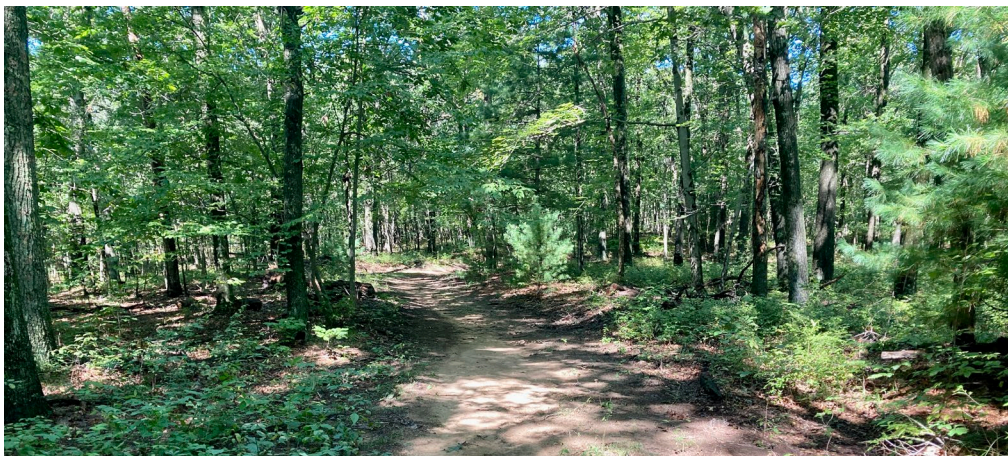
Most of the western CT hill farms were abandoned between the mid-nineteenth century and early twentieth century. The farmers either moved west for better farming soils or headed to the cities for industrial work. Immediately after this farm abandonment, the forest began to take over again. Much of the young forestlands were then cut down to make charcoal that was used in metal blast furnaces and by blacksmiths.

For charcoal making, small young trees were cut into 4' lengths and carried by hand to make a circular pile about 30' wide and 10' high. A ditch was dug around the circumference of the pile and the soil from the ditch covered the pile to limit the amount of oxygen in the smoldering pile. Once the low-oxygen burn was completed in two weeks, the almost pure carbon charcoal was removed for transport to market. Charcoal produces the hot fire needed for metal working.

While this charcoal making process had occurred since settlement, it came to a crescendo between 1880 and 1920. At that time, much of the landscape was cut multiple times, with patches of smoke rising from active charcoal mounds across the hills. By about 1925, less expensive coal ended charcoal making and the forest once again began growing back. The repetitive cutting of young trees for charcoal encouraged the proliferation of oak trees. Of all the tree species, oak responded best to the repetitive cutting. This, along with frequent wildfires, helped give rise to the oak dominated forest we see today.

In the 1934 air photo, almost the entire forest shows as brushy young forest, with scattered mature trees. There is also a very distinct field (likely tobacco) – see map. The 1934 map is attached. Please keep in mind that you need to mentally adjust the map because the map scale projection does not exactly match what we use today. According to [Native-Land.ca](http://Native-Land.ca), your property exists on the ancestral homeland of the Poquonook, Podunks, Wangunks and Tunxis people.

After farming abandonment, the Connecticut Water Company purchased the property as a water source, which included a small reservoir and wells. The reservoir was abandoned and filled in in 2004 and the wells were abandoned in 2014. The town acquired a conservation easement on the land in 2009 and then purchased the land outright in 2015.







Old Stump – Stand 3



Old Girdle – Stand 2



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## FOREST FUTURE

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Active forest management can nudge a forest in different directions by manipulating which trees continue to grow and how much the forest floor is exposed to sunlight by creating canopy openings of different sizes and shapes. For example, we can nudge the future forest towards oak by leaving oaks to grow and produce acorns, creating canopy openings of sufficient size to bring in the sunlight young oaks need to grow, and hunting the deer that like to eat young oak trees. Without these manipulations, and without significant natural disturbances (wind, ice, pests); the forest will gradually transition to more shade tolerant trees that are not eaten by deer (hemlock, beech, black birch and red maple).

A complete lack of management will result in a uniform forest of mature oak trees that is very vulnerable to spongy moth outbreaks and the drought that goes along with those outbreaks. Having some younger trees via management, will lessen the impact of future spongy moth outbreaks and droughts.



Stand 1



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## INTRODUCTION

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The description of your forest on the next page begins with two graphs. The first shows the relative abundance of each species by percent. Not all species found will be included in this graph because some of the less common species did not fall within a measurement point. The second graph shows the relative abundance of different tree sizes based on the diameter of the tree measured at 4.5 feet off the ground. Please keep in mind that this report is based on a very **brief** sampling of your forest. **Please contact a private forester for a much more detailed and accurate forest stewardship plan that would include timber information, forest type delineation, and detailed individual forest type descriptions based on many more inventory points.**

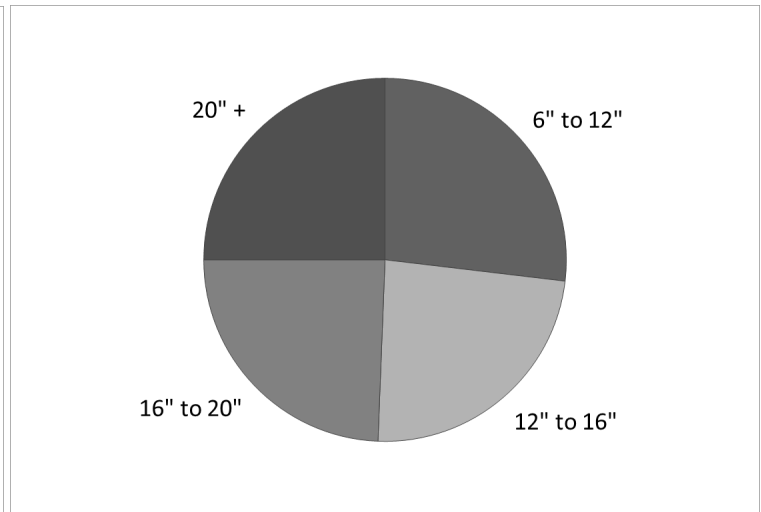
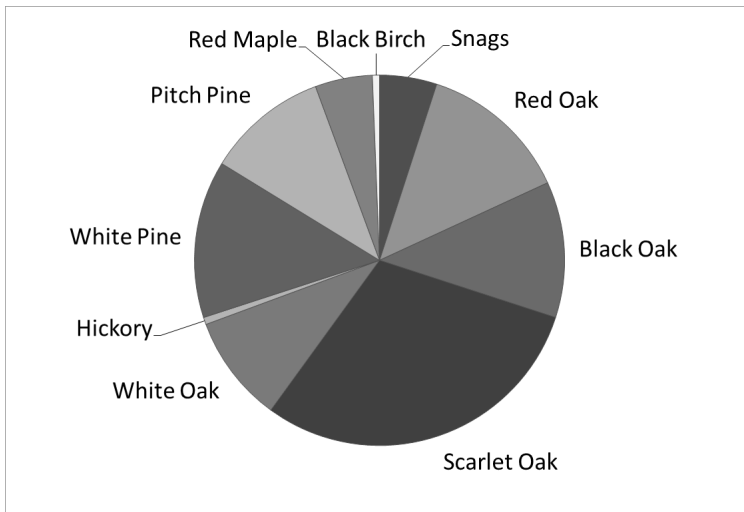
The CT DEEP Natural Diversity Database (NDDB) does have occurrences of threatened or endangered species on or near this property. Maps showing wetland and farmland soils, along with the NDDB areas, is attached to this report. There are 60 acres of dry acidic forest critical habitat growing on stratified sand and gravel – see maps.



Stand 2: Oak overstory and huckleberry understory in critical habitat dry acidic forest



## FOREST (200 ACRES)



Other Species (not measured)	Yellow birch, paper birch, sassafras, aspen, locust, hemlock, beech, black cherry, red pine Planted mature northern white cedar along the access road
Understory	A few red maple, pine and oak saplings Spicebush shrubs on lowland wetter sites Low-bush blueberry and huckleberry shrubs on dry sites
Insect/Disease/Disturbance	Beech leaf disease (nematode) killing the few beech Minor black birch canker (fungus)
Exotic Invasives	A few multi-flora rose shrubs, barberry shrubs and bittersweet vines -Most common on forest edges with sunlight and in wetter lowland soils Phragmites reed in the wetlands
Canopy Closure	90%
History	Likely livestock pasture 100+ years ago Some tobacco fields in the 1934 air photo Mostly brushy young forest in the 1934 air photo Old stumps indicate a timber harvest 20+ years ago south of Waterworks Brook (Stand 3) Odd 10' wide 3' deep holes that appear to have been hand dug with a shovel -Unknown purpose, see 'Big Holes' on the map and in photo below



Darry Ruiter standing in a big hole



This forest is dominated by oak and pine trees growing on sandy site conditions that vary with slope position. The lower slopes tend to have larger trees in wetter richer soils. There are at least four main forest types or stands.

**Stand 1:** The first is north of the access road that has mature oak trees, with a few mature pine trees intermixed. This stand also has many patches of white pine saplings in the understory that give it the darker appearance on the air photo. There is a second section of this stand over along the western boundary (darker appearance in the air photo).

**Stand 2:** The second is the critical habitat dry acidic forest (see map). This very dry site grows oak trees very slowly and has a history of fires. The oaks are smaller in diameter (pole-sized), and shorter here, with a thick understory of blueberry and huckleberry. There are larger pitch pine and oak trees scattered about that survived past fires due to their thick bark and are older and larger than the smaller oak trees.

**Stand 3:** Third is the oldest and largest trees south of Waterworks Brook. The oak and white pine trees here are impressively large and tall, with many deep-cut drainages. This third stand was commercially logged about 20 years ago.

**Stand 4:** Along the main access road are some areas of thick younger tree growth (poles and saplings) that appears to be a 20–30-year-old red pine salvage clearing back when the red pine was dying from the exotic red pine scale. This area is growing tulip poplar, oak, larch, aspen, Norway spruce and white pine. This area also has invasive exotic multi-flora rose shrubs, Russian olive shrubs, and bittersweet vines.



Stand 4



## Recommendations

There are a few scattered pitch pine trees in your forest. Pitch pine is an increasingly rare tree in Connecticut because it cannot grow in shade, it needs dry sandy soils and traditionally its young growth is dependent on ground fire or hot sunny ground conditions for the cones to open and seed the soil. We now keep ground fires in check for the most part such that young growth of pitch pine is rare. Like most of Connecticut, your few pitch pine trees are gradually being shaded out and outcompeted by the surrounding oak and white pine trees. While I do not suggest starting a fire in your woods, we can assist the survival of pitch pine by cutting down the competing trees around each pitch pine tree to give them more room to grow and thrive in more sunlight. Such crop tree thinning work will also help prevent the southern pine beetle from attacking pitch pine trees by providing more tree crown air flow. This air flow will help prevent the beetle pheromone plumes that attract more beetles to attack pitch pine trees in mass. This thinning work around each pitch pine can be done as part of a timber harvest or non-commercially by either felling or girdling trees that are immediately adjacent to each pitch pine tree (crown-touching trees removed). Such work will also bring sunlight to the forest floor to stimulate understory blueberry and huckleberry production for wildlife/human forage.

While the landowner currently does not express interest in a timber harvest, this forest could certainly support a harvest in the future. Such a harvest could create some canopy gaps that would encourage patches of thick understory growth for wildlife. As previously mentioned, it would also make the forest more resilient to future spongy moth outbreaks.

There might be cost-share monies through the Natural Resource Conservation Service (NRCS) available. Please contact Todd Bobowick at 475-355-3864.



Powels Marsh with a Great Blue Heron



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## GENERAL RECOMMENDATIONS

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### FOREST PROTECTION

No other protected land abuts this property. This forest is part of a small core forest block having less than 250 acres of contiguous forest. Core forests are large tracts of unbroken forest that provide a much more stable home for plant and animal species, thereby protecting biodiversity. They are forested areas surrounded by more forested areas.

### DIVERSITY

A healthy forest has a large diversity of native plant species, particularly trees, that supports a diverse array of fungi and wildlife (animals, insects, microbes). A healthy forest also has multiple layers of native vegetation to maximize biodiversity and structural complexity. This means having trees of different ages, diameters, and heights. A healthy forest has both standing dead trees (snags) and dead downed wood as important habitat elements and to hold moisture during droughts. A healthy forest is resilient because it is better able to handle diseases, pests, and extreme weather events. Increasing species and structural diversity of this forest provides multiple pathways of recovery from disturbance.

### INVASIVES/VINES

There are some exotic invasive shrubs on the property – see forest description. Invasive species are typically from another part of the world and when established here they have no native enemies to hold their population in check. When left uncontrolled, they spread into natural landscapes and replace what would grow there naturally, including tree regeneration and other native understory vegetation. Native understory growth has many more native insects and arthropods that wildlife needs to forage on. Exotic invasive understory growth can provide better habitat for ticks and associated pathogens while greatly reducing biodiversity.

Control methods include mechanical and chemical methods. In a shady forest, cutting a vine is enough to kill it. Invasive shrubs are not so easy. Pulling the invasives out by the roots can be effective, but extremely difficult and labor intensive. Yearly cutting back of the aboveground stems, during the growing season, will keep the invasives under control, and perhaps kill them after a few years. The most effective control method is to apply an herbicide to the green foliage, and to cut the larger invasive shrubs and treat stumps with a herbicide to prevent resprouting.

### LAWNS AND FIELDS

The fields provide an opportunity to help pollinators and native insects. Insects and pollinators (bees, butterflies, moths, beetles, flies, wasps, hummingbirds), along with the many birds that depend on them, are in severe decline. By delaying annual mowing until after the first hard frost in October and before the beginning of plant growth in the spring, you will allow pollinators to use your fields for food and habitat during the growing season. Another habitat management strategy is to mow one-third to one-half each year on a rotational schedule. This allows some insects to overwinter in the uncut plant stalks and provide birds with much-needed winter food. For this reason, late winter mowing is best. Please keep in mind that healthy meadows store more than double the carbon of a mowed lawn.

There are also many opportunities to create pollinator-friendly habitat/food by adding native plantings, allowing areas of lawn to go natural, and leaving leaves and needles to cover the ground in these areas. Insects will overwinter in leaf litter and uncut plant stalks. Birds will pick through the winter leaves for insects. For more information please visit:

[Pollinator Pathway \(pollinator-pathway.org\)](http://Pollinator Pathway (pollinator-pathway.org))

### BOUNDARIES

Boundaries need to be well marked to protect the property from trespass and encroachment. Painted blazes are typically used to mark property boundaries. A blaze is a hand-sized shallow scrape in the bark. This scrape will last for decades and does not harm the tree if done properly. When painted, this blaze is quite visible and long lasting. Trees within arm's length of the boundaries are blazed, with the blazes facing the boundary line. Use only paint marks, without blazes, on the neighbor's side of the line. The blazes should be given a new coat of paint at least every 10 years. Custom signs can also be hung about every 100 feet to communicate anything the landowner desires. Understory vegetation and debris can be cleared from boundary lines such that the lines can be easily traversed for inspection. While I did not find any boundary markings, there is the remains of a chain link fence around over half of the property – see map. Please consider hiring a forester to locate and mark property boundaries.



## **WILDLIFE**

Your forest, and the State of Connecticut in general, is lucky to have a significant and diverse component of mature oak trees (mature trees have reached maximum height). Oak trees are considered a wildlife keystone species because of the large amount and diversity of life they support – more than any other tree. Acorns, especially white oak acorns, provide the most nutritious plant-based protein for almost 90 species of wildlife. Oaks overwhelmingly host the most species of moth and butterfly caterpillars (over 500), which in turn anchor a biodiverse food web. Oak forests have more bird abundance and diversity compared to other forest types. Oaks also produce the thickest, most ecologically beneficial, and longest lasting leaf litter; that has the most abundant and diverse soil biology. This top-of-the-line leaf litter can keep out invasive exotic stilt grass and jumping worms. It also purifies and holds the most water. For these reasons, it is important to preserve and encourage oak growth and health in your forest.

Parts of this forest have legacy trees, also known as old field trees or wolf trees. These trees were growing in open pasture, as a source of shade for livestock before the current forest started growing. They are much older than the surrounding forest. Because they used to be open grown, they have large spreading crowns and large branches low on the trunk. When the pastures were abandoned, they became a significant seed source for the present forest. These large old trees are structurally complex, with many cavities, hollows, fat branches, and thick, rough bark. They are also prolific seed producers, including acorns and nuts. This structural complexity and prolific seed production attracts an enormous number and diversity of insects, birds, and mammals. Underground, the old trees are also the hub and source of the complex fungal soil mycorrhizal growth that all trees depend on for water and nutrients. To make them healthier and more vigorous, such legacy trees could be protected and perhaps even given more sunlight by cutting some of the surrounding trees. These agrarian vestiges have become the ecological hubs in your forest. They are also great source of future large snags and large dead downed wood.

## **ECOLOGICAL SERVICES**

Forests remove carbon dioxide from the atmosphere (called sequestration), create oxygen, and remove many pollutants from the air and water. Forests absorb heavy rains and release that water to streams and underground aquifers during droughts. Your forest contributes to these valuable services with carbon stored in the below-ground roots/soil and in the above ground vegetation, dead wood, and fallen leaves. These services are enhanced by having a diverse mix of native tree species of different sizes and varied arrangements. Sustainable, scientifically based forest management to remove forest products and promote young forests or regeneration of desired species has no long-term negative effect on your forest's ability to provide these vital ecological services. When trees are young and growing fast, they sequester carbon at high rates and once they are large (over 18" diameter, and often older) they store the most carbon. Whether you choose to actively manage your forest or not, your forest does a great service to our planet's health just by being a healthy forest.

## **MAPPING**

Attached to this report is a geo-referenced map that the landowner can use with the free smartphone app 'Avenza Maps'. This map shows the landowner where they are on the property. The landowner can also record tracks and waypoints on the property. These phone mapping features allows the landowner to locate/map property boundaries and trails. To get map layers and to view maps, please visit [CT ECO Home \(cteco.uconn.edu\)](http://cteco.uconn.edu).



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## CONCLUSION

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Here are some possibilities for your forest:

- Contact NRCS and/or a private forester about doing a forest stewardship plan
- Optimize grassland bird habitat using properly timed and targeted mowing, along with pollinator plantings
- Crop tree release of pitch pine trees
- Potential to sell timber to produce a sustainable revenue stream while always maintaining a healthy forest
  - Create some canopy gaps that bring sunlight to the forest floor to encourage patches of thick understory growth for wildlife habitat
- Fix, clean out and maintain culverts and drainage ditches along the main access road
- Potential to add additional trails and to create a loop trail
  - Create additional trail access points at Juniper Park, and Southwest Ave in the northwest corner
- Properly locate and mark your property boundaries

Please consider hiring a forester to help you implement any of the recommendations in this report.

There might be cost-share monies through the Natural Resource Conservation Service (NRCS). Please contact Todd Bobowick at **475-355-3864**.

Please feel free to share this report.



*In the end, we will conserve only what we love; we will love only what we understand.” -Baba Dioum*



Waterworks Brook Conservation Area  
327 South Center Street  
200 Acres in Windsor Locks CT

- Trailhead Parking
- Big Holes
- Chainlink Fence
- Old Fenceline
- Streams
- Road
- Woods Roads
- Trails
- Bounds
- Dry Acidic Forest
- 1934 Field (8ac)
- Wetlands
- 10 FT Contours

Powels Marsh

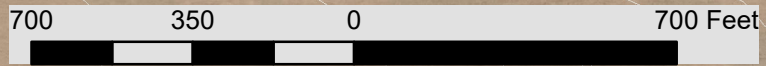
Juniper Park

Waterworks Brook

47ac

13ac

Prepared by David Beers  
CT DEEP Service Forester  
9/14/2023





Waterworks Brook Conservation Area  
327 South Center Street  
200 Acres in Windsor Locks CT

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- Dry Acidic Forest
- 1934 Field (8ac)
- Wetlands
- 10 FT Contours
- Wetland Soils
- Floodplain Soils
- Prime Farmland Soils
- Statewide Important Farmland Soils
- Locally Important Farmland Soils
- Natural Diversity Area

Powels Marsh

Juniper Park

Waterworks Brook

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Powels Marsh

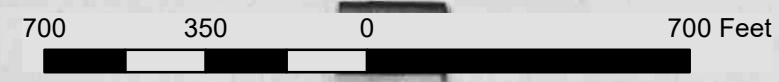
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Waterworks Brook

Prepared by David Beers  
CT DEEP Service Forester  
9/14/2023  
1934 Air Photo





Waterworks Brook Conservation Area  
327 South Center Street  
198 Acres in Windsor Locks CT

- Trailhead Parking
- Little Craters
- Stonewalls
- Streams
- Road
- Woods Roads
- Trails
- Dry/Acidic Forest
- Bounds
- Wetlands
- 10 FT Contours



500 ft

Prepared by David Beers  
CT DEEP Service Forester  
September 2023



700 350 0 700 Feet