

# Salmon River State Forest

## Blackledge Block Forest Management Plan



### Forest Ecosystem Health & Diversity

The Blackledge Block contains healthy and diverse forest ecosystems of oak/hickory ridges, red maple bottomlands and meandering rivers that provide highly functional, valuable, and resilient habitats for plants and animals.



### Wildlife Habitat

Salmon River State Forest is within one of three focus areas for the conservation of American woodcock. Management recommendations presented in this plan aim to enhance habitat for this species.



### Climate Change Mitigation through Sequestration and Storage

Climate change is an important global issue. The management of the Blackledge Block provides the opportunity to sequester and store carbon, through sustainable forest management, in vegetation and long-lived wood products.



### Encouraging Mature Forest Growth

10%, 160 acres, of the Blackledge Block is designated as an Old Forestland Management Site (OFMS) allowing this remote area of the forest to remain unaltered by vegetative management activities. This will encourage mature forest growth within this block of forestland.



### Economic Benefits

The following plan outlines timber harvesting activity on 331 acres. Sustainably harvested forest products provide jobs and local goods that are sold in the local economy.



### Recreational/Health Benefits

The Airline Trail State Park, that runs along the eastern edge of the Blackledge Block, is an excellent place to explore in a healthy and active way. The large areas of forestland and meandering rivers within this block of land also present many opportunities for solitude and wildlife-based recreation.



### Forest Protection

The plan addresses threats such as wildfire, extreme weather events, invasive plants and insects and unauthorized use. Management strategies are outlined for each of these threats to protect this valuable public forestland asset.



STATE OF CONNECTICUT

DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION



Bureau of Natural Resources  
Division of Forestry

**FOREST MANAGEMENT PLAN**  
2021 through 2031

Salmon River State Forest  
Blackledge Block

1,512 Acres

Colchester, Marlborough & Hebron

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## Introduction

Connecticut is the 14<sup>th</sup> most forested state in the United States with approximately 60 % forested cover. It is also the 4<sup>th</sup> 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 2021 – 2031 Salmon River State Forest, Blackledge 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 Salmon River State Forest, Blackledge Block Management Plan with considerable site-specific input provided by the DEEP, DEEP partners and various user groups.

1. **Forest Ecosystem Health and Diversity** – The Blackledge Block contains healthy and diverse forest ecosystems of dark hemlock stands, oak/hickory ridges, red maple bottomlands and meandering rivers that provide highly functional, valuable and resilient habitats for plants and animals.
2. **Wildlife Habitat** – Salmon River State Forest is within one of three focus areas for the conservation of American woodcock. Management recommendations presented in this plan aim to enhance habitat for this species.
3. **Climate Change Mitigation through Sequestration and Storage** – Climate change is an important global issue. The management of the Blackledge Block provides the opportunity to sequester and store carbon, through sustainable forest management, in vegetation and long-lived wood products.
4. **Encouraging Mature Forest Growth** – 10 %, 160 acres, of the Blackledge Block is designated as an Old Forestland Management Site (OFMS) allowing this remote area of the forest to remain unaltered by vegetative management activities. This will encourage mature forest growth within this block of forestland.
5. **Recreational/Health Benefits** – The Airline Trail State Park, that runs along the eastern edge of the Blackledge Block, is an excellent place to explore in a healthy and active way. The large areas of forestland and meandering rivers within this block of land also present many opportunities for solitude and wildlife-based recreation.
6. **Economic Benefits** – The following plan outlines timber harvesting activity on 331 acres. Sustainably harvested forest products provide jobs and local goods that are sold in the local economy.
7. **Forest Protection** – The Salmon River State Forest Blackledge Block management plan addresses threats such as wildfire, extreme weather events, invasive plants and insects and unauthorized use. Management strategies are outlined for each of these threats to protect this valuable public forestland asset.

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

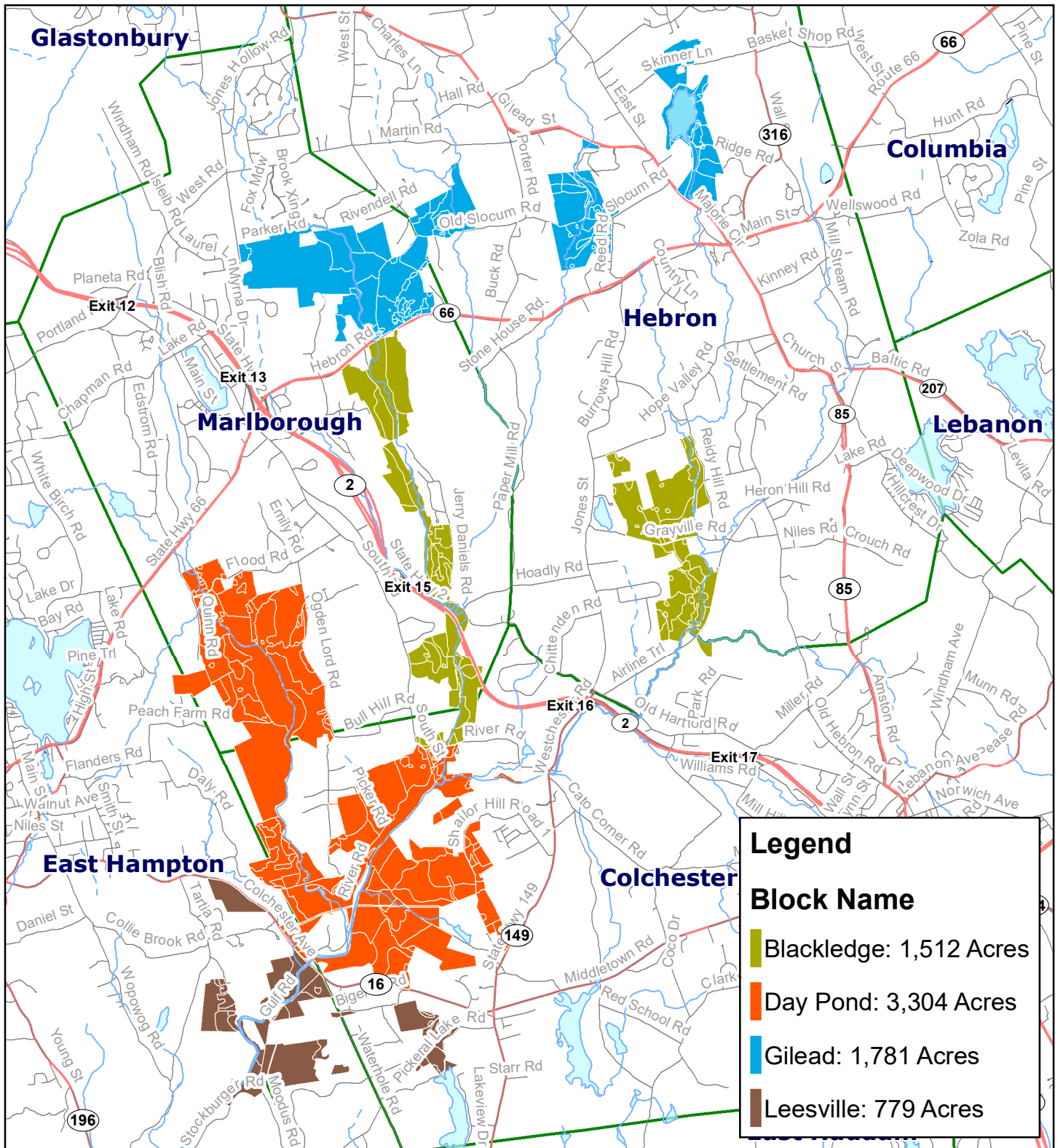
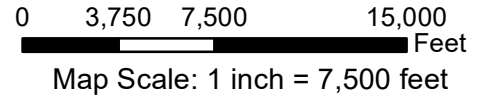


# Salmon River State Forest

## Location & Division of Forest Blocks



April 30, 2021  
Map prepared by: Nathan Piché



Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet

Projection: Lambert Conformal Conic



## A. Executive Summary

### The Blackledge Block

The Blackledge Block, 1,512 acres of forestland named after the Blackledge River that runs through it, is one of four different forest blocks located within the Salmon River State Forest. The other forest blocks being known as Day Pond, Gilead and Leesville.

This section of forestland is located within the towns of Marlborough, Colchester and Hebron, spanning three separate counties: Hartford, Tolland and New London. The block is further divided into six separate compartments. Compartment separations are determined by access and are numbered in a chronological order based on when that section of the forest was acquired. Additionally, each compartment is delineated into stands, or individual management units of similar forest composition or site quality, in order to aid in management making decisions.

The last forest management plan for Salmon River State Forest was written in 1990. That plan covered the entirety of Salmon River State Forest. Now, individual management plans will be prepared for each block separately in order to even out the flow of forest management tasks and activities over the course of the next management cycle. Since the preparation of the previous management plan, much has changed within this block of forestland. Additional lands were acquired, the forest has matured and several areas received silvicultural treatments. This management plan will focus on both short and long term objectives aimed at improving access to the forest, maintaining and diversifying wildlife habitat, supporting recreational activities and ensuring the long term health and productivity of the forest.



**Photo 1.0.** Photo of the scenic Blackledge River flowing through Marlborough, CT within the Blackledge Block of Salmon River State Forest.

## **B. History**

### **Reason for Acquisition & Funding Sources**

Recognizing the opportunity to control a significant portion of the Salmon River Watershed and its numerous tributaries, the State Board of Fisheries and Game purchased, in 1934, the first parcels of land which now make up the Salmon River State Forest. The forethought in obtaining these parcels was that they would allow the State to provide a suitable environment for trout through the implementation of a long-term development program involving stream improvement and watershed management projects. In the 56 years from the first land purchase to the last management plan, the State acquired additional parcels of land in order to fulfill the goals set forth in the original development plan. In those 56 years, the forest size grew to encompass 7,111 acres, which also included 1,300 acres originally leased from the U.S. Government. Additional acreage was acquired through a land utilization program made available by the Resettlement Administration.

### **Development of Resource Prior & After Acquisition**

Prior to State acquisition, extensive timber harvesting was carried out throughout the forest with many areas being clearcut for charcoal production in the 1930's. Black birch, a prolific seed producer whose seed is easily dispersed by the wind, was the dominant tree species regenerated by these cuttings. Black birch was then harvested to supply a birch oil extraction plant operated by the E.E. Dickinson Company until 1930.

From 1935 to 1940 a Civilian Conservation Corps (CCC) camp, named "Camp Stuart", was operated in the forest. The CCC carried out forest improvement projects, built a dam at Day Pond, restored the Comstock Covered Bridge, constructed truck roads and picnic areas, and performed many stream improvements on the Blackledge and Salmon Rivers.

After the State acquired the parcels now making up the Salmon River State Forest, the forest has been managed to protect and diversify wildlife habitat, promote a healthy watershed for the Salmon River and its many tributaries as well as sustain a healthy and productive forest. This has been carried out through timber harvests that have removed dead, dying, diseased, poor quality and mature trees to provide growing space for young trees to become established and by leaving other areas undisturbed, such as adjacent to rivers and streams so that the natural hydrology is not disrupted. Due to the State's watershed management efforts in the last several decades, a healthy trout stocking program and easy access points, the Salmon River State Forest is one of the premier fishing destinations in Connecticut.

### **Cultural Resources**

Much of this block of forestland was cleared for agricultural purposes during the colonial era. Old cellar holes, stone walls and stone piles remain as evidence of the work done by early settlers. As these fields and pastures were abandoned from agricultural uses the land gradually reverted back to forest, sprouting an abundance of oak, birch, maple, hickory and tulip trees throughout. Some areas were utilized for farming until the State acquired the land while other areas that contained mature forest at the time of State acquisition were harvested, giving the current forest a diversity of age classes and species composition.

During the early settlement, colonial era, damming ponds and streams as a source of waterpower for grist mills, sawmills and tanneries was common. By the mid-19<sup>th</sup> century, the Salmon River and its tributaries had more mills trying to utilize the power of its flow than the available water sources could supply, especially during periods of dry weather and low water levels. In North Westchester, during periods of low water, grist mills operated at night and paper mills by day. The use of hydropower to power mills eventually declined as other power sources became available during the industrial revolution. In 2016 a dam on the Jeremy River in North Westchester was removed to permit migratory fish passage. However, dams remain to this day on the Holbrook Pond in Hebron and Day Pond in Westchester.

An abandoned railroad bed passes through the southeastern most section of the Blackledge block. This railroad bed was originally intended to be used for high speed travel from New York to Boston and was owned by the Boston and New York Air-Line Railroad. The railroad is most notable for its towering iron trestle viaduct structures that spanned across rivers and rugged topographic features to make the railroad bed as flat as possible, ideal for high speed travel. The Lyman's Viaduct, located in present day Salmon River State Forest, was covered over with soil due to its instability. The railroad bed is now used as a recreational trail known as the Air-Line trail.

### **Changes in the Last 10 Years**

Since that last forest management plan expired in the year 2000, management efforts in this forest have focused on maintenance and salvaging timber after insect outbreaks. Maintenance efforts have included painting property boundary lines and improving forest roads and access points. 290 acres along the Blackledge River in Marlborough were purchased in 2015 and added to the Blackledge Block in an effort to improve access to otherwise inaccessible portions of the block.

Only one area has been harvested in the last 10 years in the Blackledge Block, adjacent to Jerry Daniels Road in Marlborough. This harvest, completed in 2009, was prompted by continued gypsy moth defoliation, which resulted in the mortality of many oak trees in the area. The harvest salvaged dead individuals while removing unhealthy and poor-quality trees. The area is now dense with white oak, black birch and red maple regeneration. The area shows great promise to grow into a good quality stand of timber in the future. At present the young forest in this area is providing excellent habitat for many birds, such as the American woodcock, and animals that thrive in young forests. Compartment 1



stand 17 on the north side of River Road was mowed by DEEP staff with a bobcat/fecon in 2013 to maintain old field habitat.

**Rotations & Cutting Cycles**

The Blackledge Block is made up of undulating terrain, creating great contrast between riparian areas densely stocked with hemlock and upland areas filled with oak and northern hardwood species. In riparian areas either no management or uneven aged management will be recommended. This will maintain the natural hydrology of these areas and avoid sedimentation and erosion issues which could affect the Blackledge River. Un-even aged treatments will use 20 year cutting cycles. During this plan period zero acres of forest will be scheduled to receive un-even aged silvicultural treatments.

In upland oak and northern hardwood sites un-even aged management typically results in the regeneration of undesirable, shade tolerant species. As a result, even aged silvicultural treatments will be the primary focus of the management activities prescribed for this forest type. Even aged management will use 100-year rotations. During this plan period 331.05 acres of forest will be scheduled to receive even aged silvicultural treatments.

**C. Acres and Access**

**Acres**

In total, the Blackledge Block is comprised of 1,512 acres. These acres are divided into one of nine different classifications which are active forest, natural preserve areas, old forest management sites, inaccessible areas, inoperable areas, recreational areas, areas managed for wildlife, wetlands and open/non-forested areas.

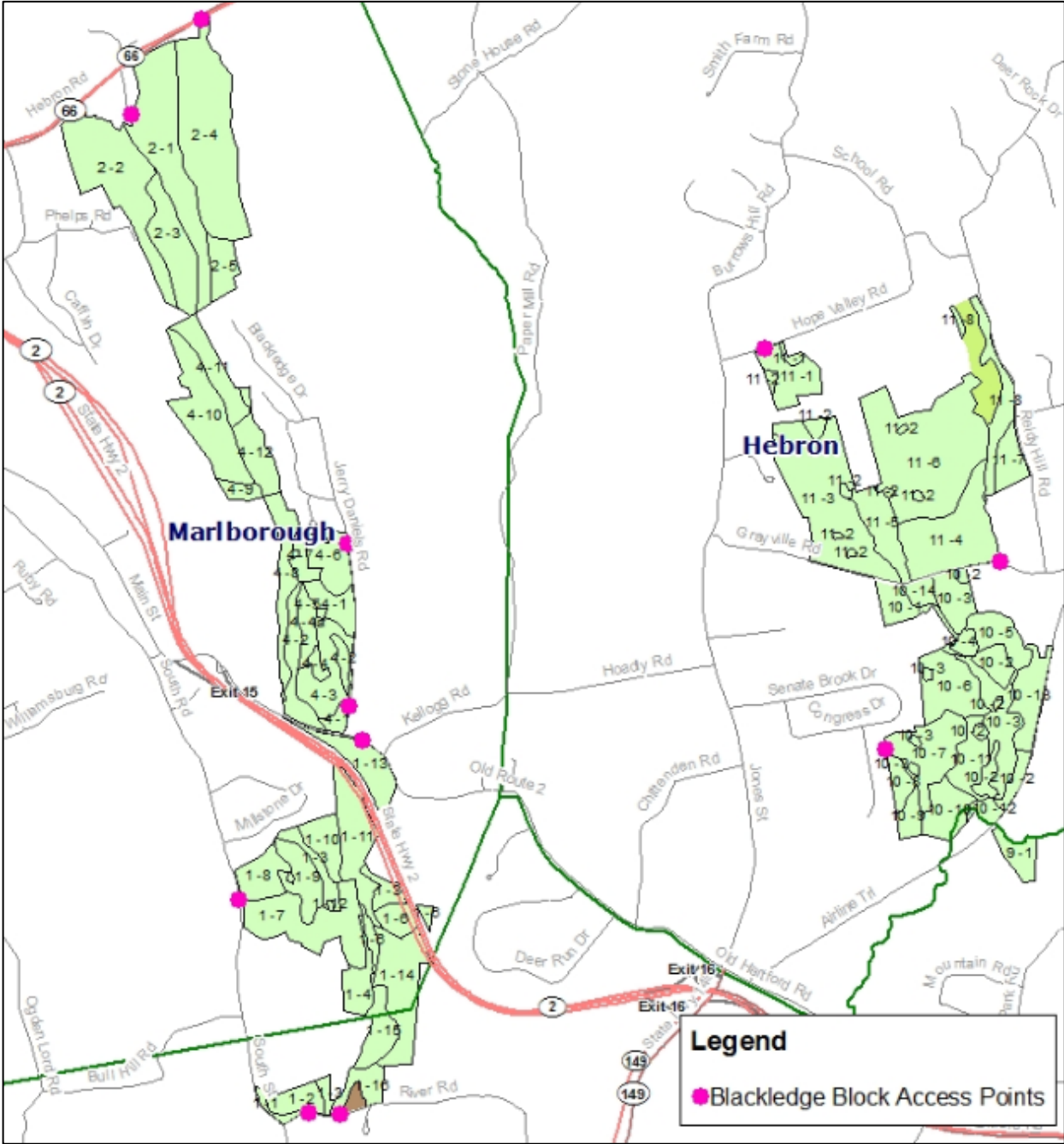
**Table 1.0.** Acres of land that fall into each land classification category within the Blackledge Block, Salmon River State Forest.

<b>Land Classification</b>	<b>Acres</b>
Active Forest	433.06
Old Forest Management Site	160.86
Natural Preserve Areas	0.00
Inaccessible Areas	588.22
Inoperable Areas	264.75
Recreational Areas	23.57
Areas Managed for Wildlife	16.59
Wetlands	24.66
Open/Non-Forested	0.00
<b>Total</b>	<b>1511.71</b>

Although there are nine different land classification categories that each acre of land falls into, these categories are not necessarily mutually exclusive. For example, land classified as “old forest management site” may have just as much wildlife benefit as land classified as an “area managed for wildlife.” Land is divided into these categories by a close analysis of their current physical condition and is done so to aid in management making decisions.

Active forestland is land actively being managed for its forest resource. Old forest management sites are a land classification that has been enacted in order to set aside a portion of land to allow for the natural processes of forest stand development to occur without the influence of active forest management. Natural Preserve Areas are state lands designated by the Governor as “natural areas.” A natural area is defined in the Connecticut State Statutes as “...an area of land or water, or land and water containing or potentially containing plant or animal life or features of biological, scientific, educational, geological, paleontological or scenic value worthy of preservation in their natural condition.” Inaccessible areas are areas that cannot be accessed due to the deterioration of access roads or due to being landlocked behind un-crossable geographical features such as wetlands, rivers, or steep terrain. Inoperable areas are lands that contain physical features such as steep slopes and excessively rocky terrain that prevents active management from taking place. Recreational Areas are areas within the forest that contain features that are of significant recreational value and are managed to maintain those recreational opportunities. In the Blackledge Block, compartment 1, stand 13, the Blackledge Fishing Area in Marlborough, is a recreational area due to its popularity among anglers. Areas managed for wildlife are designated forest stands where the primary objective of any active forest management activity will be for the benefit of wildlife. In the Blackledge Block areas managed for wildlife include compartment 1, stand 17, which is a field adjacent to River Road in Colchester that is being actively managed to maintain old field habitat. Wetlands are low lying areas that either consistently hold water or feature poorly drained soils that grow wetland associated vegetation. Lastly, open or non-forested areas are old fields, recently abandoned from agricultural use, where forest succession has not advanced to the point at which the area can be considered forested at this time.

**Access: Roads for Public, Truck Roads & Gates**



**Figure 1.0.** Map showing the various access points to the Blackledge Block, Salmon River State Forest.

Much of the Salmon River State Forest, including the Blackledge Block, occupies long and narrow sections of land adjacent to the rivers and streams that define this state forest. Much of the terrain neighboring these rivers and streams is steep and is located behind residential houses. These factors make access difficult. Over the years land acquisition efforts have increased access points to the forest. However, most of these access points are in a state of disrepair and it must be made a priority to improve these access points for the future management of this forest. Access improvements discussed in this management plan will focus on improvements exclusively for forest management purposes. The forest is also managed for public access. However, it has been determined that at this time public access opportunities to this block of land are adequate with many parking and walk in areas located at various points throughout the block.

The southwestern most section of the block, south of Route 2, can be accessed from River Road and South Street. North of Route 2 on the western side of the block can be accessed from South Main Street as well as Jerry Daniels Road. The northern most section of the western side of the block can be accessed from Route 66 (Hebron Road) and Blackledge Drive. Blackledge Drive is a dead-end road that ends at the forest access point. A gate was installed at this access point in 2019 to prevent unauthorized motor vehicle traffic in the forest. This gate will be maintained by DEEP Division of Forestry.

The eastern most side of the block can be accessed from Hope Valley Road or Grayville Road. Also, in the eastern most side of the block there is a half-acre parcel of land, owned by the State of Connecticut, which connects Old Daniels Lane to the state forest, providing an important access point to compartment 10.

There are no roads for the public or truck roads within the Blackledge Block. However, there are three gates located within this block of forestland. All three of these gates are located on River Road, in the southwestern most portion of the forest, and have been erected in an effort to prevent all-terrain vehicles from entering into the forest.

### **Inaccessible Areas**

38.9 percent of the Blackledge Block, comprised of 588.22 acres, is considered to be inaccessible. Inaccessible areas are locations within the forest that cannot be accessed due to the deterioration of access roads or due to being landlocked behind un-crossable geographical features such as wetlands, rivers, steep terrain or highways. The Blackledge Block is a forest that stretches north to south following the meandering Blackledge and Jeremy Rivers. Adjacent to these winding rivers there is steep, rugged terrain that is difficult to traverse. As a result, there are many areas locked behind the rivers and topography that cannot be reached for active management purposes.

### **Right-of-Way's**

There are no right-of-ways located with the Blackledge Block of Salmon River State Forest.

### **Known Issues**

Currently there is a gravel forest road that begins on River Road and continues north onto an adjacent parcel of private property. The owner of the adjacent private property uses this forest road to access their fields for agricultural purposes. The owner of the adjacent private property also installed a gate, on state property, blocking access to this forest road from River Road to keep trespassers out. This gate was installed without the consent of the state and the forest road is being used without a legal right-of-way agreement between the private property owner and the state. This is an issue that will be resolved during the planning horizon of this management plan. Resolution will consist of a legal right-of-way agreement between the private property owner and the state, the removal of the gate and the reinstallation of the gate across the forest road on the property boundary line where the road continues north onto private property.

### **Boundary Conditions, Encroachments & Total Miles to Maintain**

There is a total of 23 miles of boundary lines in the Blackledge Block of Salmon River State Forest. The forest does not have any known boundary issues.

## **D. Special Use Areas**

### **Lakes & Ponds**

There are no ponds or lakes within the Blackledge Block. However, in the northwestern most corner of the block, where the Jeremy River flows into the state forest, there is a wetland area (compartment 11, stand 8) taking up approximately 24 acres. This wetland area is dominated by common reed grass, also known as phragmites, as well as many other wetland associated plants. Common reed grass is a non-native plant that is considered to be an invasive species because it often displaces native wetland vegetation. Due to poor access into this wetland area, management of this invasive species is not feasible. As a result, no invasive treatment will be prescribed for this wetland in this management plan. A half-acre section in the southern portion of this wetland contains water that is deep enough to discourage aquatic herbaceous plants from covering the surface of the water. Therefore, this half acre is open water, giving the area the look of a small pond surrounded by forest. This wetland associated with the Jeremy River often attracts anglers in search for trout. The area is also excellent habitat for a variety of wildlife species that rely on wetland areas for survival.



### **Rivers & Streams**

The rivers are what have given birth to the Salmon River State Forest. The primary goal of this forest is to maintain a healthy watershed ecosystem. The Blackledge Block is rightfully named because it stretches north to south along the meandering Blackledge River in the western most section of this block, passing through compartments 2, 4 and 1. The block also includes a portion along the Jeremy River in the eastern most section, flowing through compartments 11 and 10. Both of these rivers provide habitat for many species of wildlife as well as create exceptional recreational opportunities for hikers and anglers.

### **Cultural Sites**

There are no National Heritage sites or areas within this block of state forestland. There are no specific sites that have significant cultural importance. However, the many stone walls that can be found through this block are cultural reminders of our not so distant past. A past where farmers cleared land and deposited excess stone in walls to rid the land of them and establish their land ownership boundaries. Although cultural landscape elements such as stone walls are commonplace throughout Connecticut, they shall not be forgotten nor destroyed. During forest management operations all actions necessary should be made to avoid the destruction of stone walls in order to preserve these cultural landmarks within the state forest.

### **Recreation & Scenic Sites – Trails & Signs**

The Airline State Park Trail is currently the only authorized recreational trail within the Blackledge Block. The trail traverses the southeastern most section of the block, passing through compartments 9 and 10. This is a rail bed that once offered rapid transit between New York and Boston. The rails have long since been removed and the surface of smooth gravel, winding through the forests of Connecticut, offers a place for people to enjoy cycling, hiking, cross country skiing and horseback riding.

In 2015 289.50 acres of land along the Blackledge River and directly south of Route 66 in Marlborough was acquired by the State of Connecticut and incorporated into the Blackledge Block of Salmon River State Forest. One rustic stone structure with a wooden, shingled roof is located on that newly acquired parcel of land, adjacent to the Blackledge River, and was used by the previous owner of the property as a lean-to to stay in while hunting and fishing. The structure remains on the land today and is recognized as an interesting part of the history of the land. Overnight use of this structure, such as camping, is strictly prohibited.

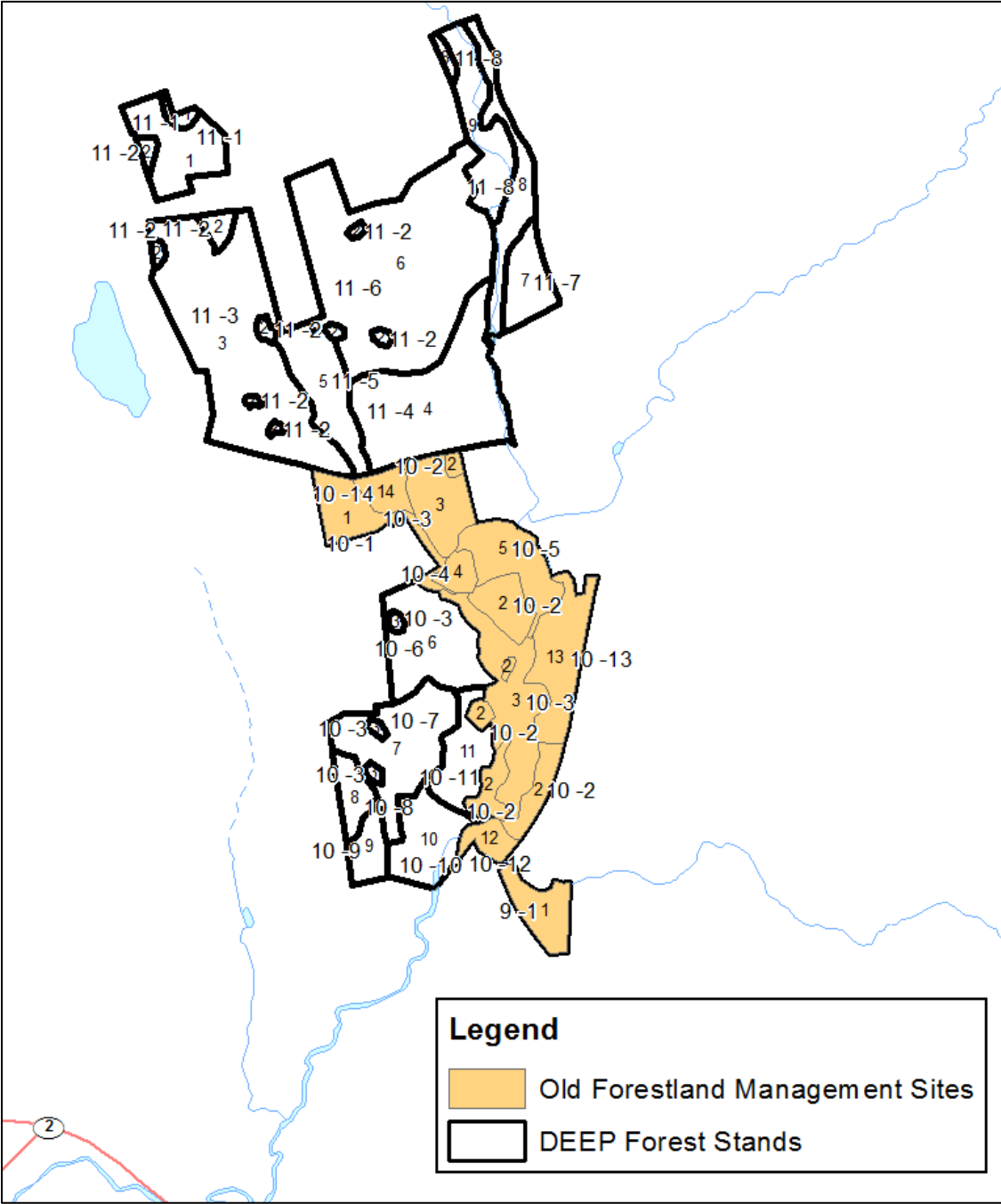
**Critical Habitat (State listed rare or endangered plants and animals)**

The majority of the Blackledge Block has known occurrences of eight species identified as state endangered or of special concern, including one bird, four reptiles, two freshwater mussels and one freshwater fish. This block of forestland is also identified as a core area that is important for wood duck and the red-shouldered hawk. All of these species are negatively affected when forestland is fragmented, forest management operations take place during their active or breeding season or when forest management operations do not buffer riparian areas according to best management practices for water quality (DEEP, 2012). As a result, forest management activities in this block will be largely influenced by these species to preserve critical habitat. These efforts will be made in the form of preserving habitat as is, through Old Forestland Management Sites, and harvesting trees in strategic areas. Timber harvesting activity can increase habitat diversity and structure for wildlife in many cases. Any timber harvesting done in this block will be limited to the dormant season of the listed species above (November 1<sup>st</sup> – April 1<sup>st</sup>) unless a DEEP wildlife biologist confirms that the harvesting will not negatively impact these species if completed outside of the dormant season.

**Natural Preserve Areas**

No state-designated natural preserve areas are present within the Blackledge Block.

**Old Forestland Management Sites**



**Figure 1.1.** Map showing the location of Old Forestland Management Sites within the Blackledge Block of Salmon River State Forest.

The old forestland management site land classification has been enacted to set aside a portion of land to allow for the natural processes of forest stand development to occur without the influence of active forest management.

One old forest management site has been established consisting of 160.86 acres. This area is located on the eastern side of compartment 10 and in all of compartment 9, adjacent to the Airline State Park Trail and extending westward to encompass several different forest stands as well as approximately a mile of the Jeremy River. This area was chosen due to its diversity. It features the Jeremy River, riparian areas, hemlock stands, a white pine grove, forested wetlands, northern hardwoods as well as expanses of mixed oak species. Through the implementation of a non-active management regime in an area with such diversity will allow for long term observation. Observations which will help draw conclusions on how different forest cover types respond to various forest stressors in the absence of direct human influence. Overtime, these conclusions can be compared to areas that are being actively managed to help managers better understand the forest ecosystem.

#### **Research Areas**

No research areas are currently present within the Blackledge Block. However, on occasion the forest has been utilized for research projects and will continue to be available for research proposals from DEEP partners and collaborators.

#### **Miscellaneous Uses**

There are no other authorized miscellaneous uses of the Blackledge Block.

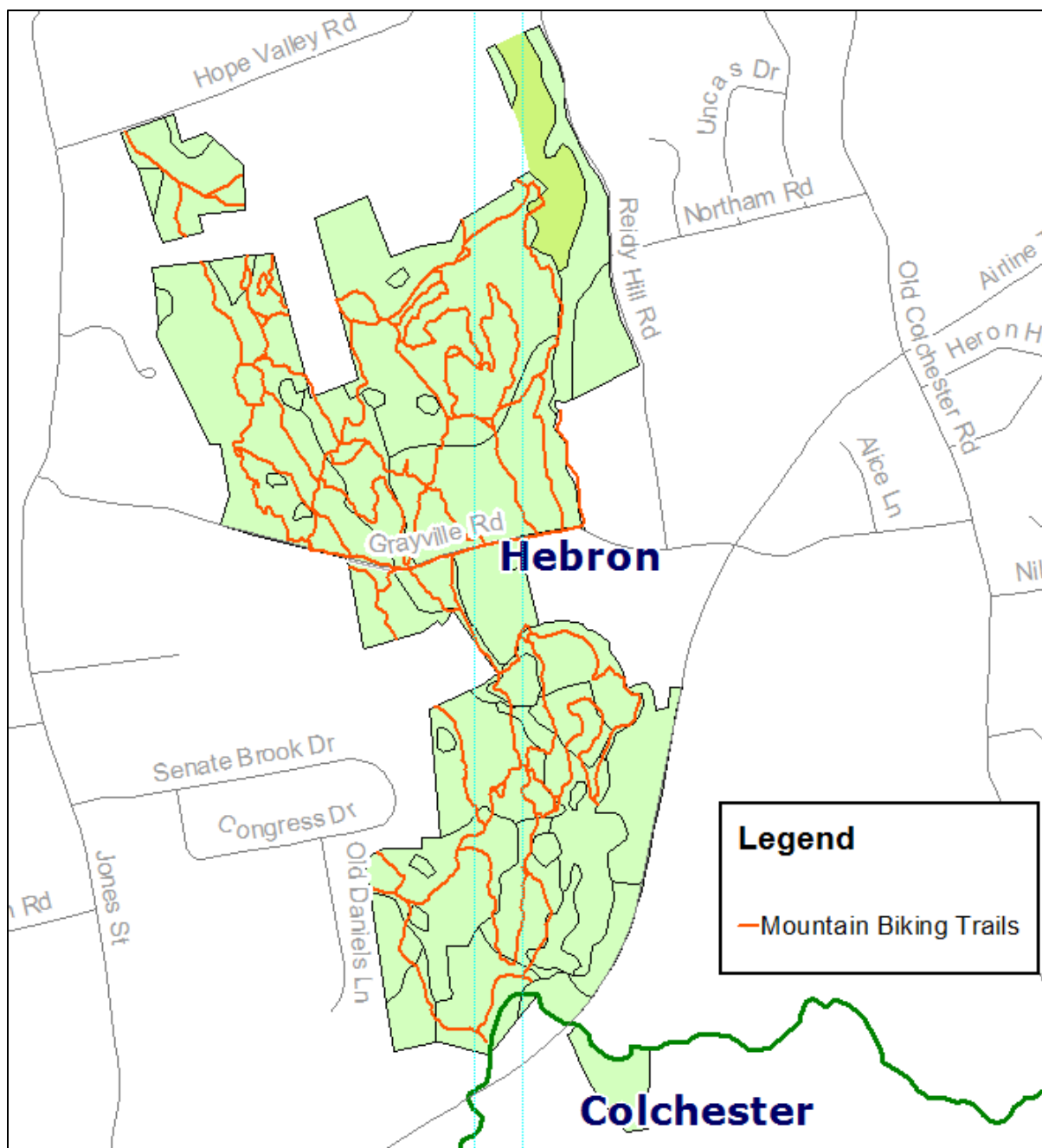
## **E. Extensive Areas of Concern**

### **Trails/Signs & Unauthorized/Illegal Activity**

As stated, the Airline State Park Trail is the only authorized trail in the Blackledge Block. However, this block of forestland is home to an extensive network of unauthorized trails. This unauthorized trail system is found in the eastern most section of the block, traversing compartments 10 and 11. Trail construction has included cutting herbaceous plants out of intended pathways, cutting downed trees out of trails and installing narrow wooden bridges in order to cross streams. Section 23-4-1 (b) of the general regulations of the Department of Energy and Environmental Protection states *“No person shall deface, destroy, alter, remove or otherwise injure in any manner any structures buildings, vegetation, earth or rock material, trees, or fuelwood, nor shall any wildlife be molested or disturbed except as authorized by the Department of Energy and Environmental Protection.”* This trail network was constructed without authorization and has resulted in the alteration of vegetation, earth, rock material and trees in this area of state forestland. The trail system is mostly present in upland forestland with dry, stony soils. However, these trails traverse wet areas and steep slopes that are rutted and eroded. Wet areas tend to have the widest trails as hikers and cyclists search for the driest route around the wet area. In wet areas the impact of these trails is most severe and has resulted in rutting, soil compaction and erosion. On trails that feature steep slopes, water drainage can be an issue resulting in

water running down the trail, increasing soil erosion. These developed, multi-use trails conflict with the DEEP's mission to conserve fisheries, wildlife and their habitats. Recreational trails fragment and degrade habitat by creating recreational disturbance to wildlife as well as creating avenues for non-native invasive plant infestations, which reduce biodiversity. According to the publication *Trails for People and Wildlife* (2019) published by the New Hampshire Fish and Game Department in collaboration with the U.S. Fish and Wildlife Service, trails can negatively impact wildlife within 400 feet of each side of a trail. Negative impacts include direct stress to wildlife such as changing the animal's heart rate, temperature or stress hormones as well as causing them to change their foraging locations, reducing the area available for them to raise their young and putting them at increased risk of predation. Using the 400 feet on each side of a trail as a trail's corridor of influence on the local wildlife, within compartments 10 and 11 of the Blackledge Block there is only seven percent of the total land area not being disturbed by recreational traffic. Multi-use trails used by mountain bikers, hikers and dog walkers can also negatively impact those engaged in fish and wildlife-based recreation such as hunting and wildlife viewing, especially those seeking a more solitary outdoor experience. Trails can be a great way to help the public see the beauty of their public forestland, however, the authorization and construction of such trails needs to be well planned in order to maximize recreational opportunities while minimizing negative impacts.





**Figure 1.2.** Map showing the extensive network of unauthorized trails throughout compartments 10 and 11 of the Blackledge Block, Salmon River State Forest.

The forest is managed to maintain a productive and healthy forest ecosystem, its associated wildlife and wildlife habitats and for public access. Management efforts seek to strike a balance between these overarching management goals. The current unauthorized trail network is extensive and was constructed without being properly vetted through DEEP's trail request process. This process weighs the need for recreational trails against potential negative impacts on soils, vegetation, wildlife and wildlife-based recreation. However, due to the popularity of the current trail network there is a need for an authorized trail system. Within the timeframe of this management plan, DEEP will strive to develop an authorized trail system that balances the recreational demand with the management and protection of the areas natural resources. For additional details on specific goals that this authorized trail network will aim to achieve, please refer to section M, Work Plans, of this management plan.

### **Wetlands**

Areas that are considered wetlands or consistently have wet, saturated soils will be restricted from timber harvesting activities. 24.66 acres are considered to be wetlands within the Blackledge Block. Additionally, 198 acres are considered red maple lowlands or bottomland hardwoods areas that feature wet, poorly drained, and saturated soils. Water quality and protection of these wetland areas are vital. Therefore, all forest management activities that take place adjacent to these areas will maintain buffers of a minimum of 100 feet. No timber harvesting, woods road construction, landing construction or other intensive management activities shall take place within buffer strips.

## **F. Wildlife Habitat**

### **Landscape Context**

Forestry, wildlife and fisheries management traditionally are complementary functions. The abundance and distribution of wildlife associated with forest ecosystems is determined by the composition, structure and diversity of the forest habitat. The Salmon River State Forest is a large forested area, spanning across multiple towns and counties, featuring a diversity of forest types, rivers, streams, wetlands and topographical features. All of these habitat elements are nestled within bustling and growing communities. Therefore, the Blackledge Block and the rest of the Salmon River State Forest serve as critical protected and management land that is providing vital habitat for a variety of wildlife species.

### **Young Forest Wildlife Considerations**

Young forest and the wildlife that depend on it have been decreasing throughout Connecticut and the region for many years. Some of this habitat loss can be attributed to development, but many areas have simply grown into mature forest. Even-aged forest management planned here for Salmon River State Forest will contribute toward the recovery of young forest wildlife.

Salmon River State Forest is located within one of three restoration focus areas designated in the Management Plan for American Woodcock in Connecticut, a species of Greatest Conservation Need (GCN) in Connecticut and regionally, and loss of habitat has been identified as the primary cause (See Appendix for a map of designated Woodcock Focus Areas in Connecticut). These focus areas contain mixed ownership, with either a wildlife management area or state forest as their core. Utilizing DEEP properties as the core of these focus areas ensures that the habitat will be managed appropriately and ensure that a long-term commitment is made to the management of woodcock and other young forest obligate wildlife species.

The woodcock is a popular gamebird throughout eastern North America. Woodcock populations have been declining within their range during the last 40 years (Cooper & Parker, 2011). While environmental factors such as contaminants (Scheuhammer et al., 1999) may be limiting woodcock populations, their decline is most likely attributable to the loss of young forest habitat on both their breeding and wintering grounds. This loss of young forest habitat has been caused primarily by forest maturation and urbanization (Dwyer et al., 1983, Owen et al., 1977, Straw et al., 1994). As woodcock populations continue to decline, so do the recreational opportunities associated with their presents.

The Blackledge Block has good too excellent potential to provide ideal woodcock habitat based on soil type, topography, wetlands and the ability for portions of it to be managed for grassland/old field and new young forest habitats. The habitat needs of woodcock are complex. Woodcock require areas of young forest or shrubland for nesting cover and feeding. Soil conditions must support adequate populations of earthworms and other invertebrates which make up the woodcock diet. The soils within compartment 1, stand 17, an old field within this block that will be managed specifically for American woodcock habitat, are not heavily sloped, contain a loamy component and border wetlands. These areas provide the conditions required for woodcock nesting, brood rearing and feeding cover. Male woodcock display in open areas, such as old fields and clearings, in early spring to attract mates. Later in the season these birds tend to move to dense meadows for roosting cover. It is ideal to have display and roosting cover abutting feeding and nesting areas, nearby farm fields may be used for these purposes.

While the American woodcock is a focal species for young forest habitat creation, over 50 GCN wildlife species rely on young forest or shrubland. On that list are many songbirds such as eastern towhee, indigo bunting, prairie, chestnut-sided and blue-winged warbler; reptiles such as box turtle, wood turtle and smooth green snake; a number of small mammals; and many insects including pollinators ([Chapter 4, 2015 Connecticut Wildlife Action Plan](#)). The shelterwood cuts prescribed in this management plan will benefit many species in this suite of shrubland/young forest-dependent wildlife.

### **Fisheries Resources**

The Blackledge River and the Jeremy River flow through this block of forestland. Efforts by the state to preserve and manage the forestland adjacent to these streams have helped protect the quality of these resources. Watershed management efforts combined with fisheries efforts to protect, sustain and diversify fish habitat have resulted in these streams being a vital habitat resource for a variety of fish species. In conjunction with these pushes to manage and protect streams and adjacent forestland, is a robust stocking program aimed at enhancing and diversifying recreational fisheries. The Blackledge and the Jeremy are stocked annually with thousands of brown trout, brook trout, rainbow trout, among several other species creating great opportunities for anglers.

### **Existing Diversity Situation**

The structure of the forests within the Blackledge Block is a good metric for the diversity of its habitat. Forty-four percent of the forest in this block is considered to be in the sawtimber size class, featuring trees with an average diameter of twelve inches or greater. This represents mature forestland. Forty percent of the forest is in a transitional phase between pole timber (6-11-inch diameter trees) and sawtimber (12 inches or greater). This category represents stands that will develop into mature timber. Twelve percent of the forest is in the pole size class, with tree diameters ranging between six and eleven inches in diameter. In a pole sized stand the forest canopy closes above a forest dense with young trees. Only four percent of this block is considered to be in the seedling/sapling stage, which represents the youngest age class of forests, featuring trees that are one to five inches in diameter. Each one of these age class categories represents a different forest structure and a different habitat type. Some wildlife species thrive in specific habitat types while others are generalists that can survive and thrive in a multitude of different habitats. Most of the forest stands within the Blackledge Block are either mature or are approaching maturity while only a small percentage of forest is in a young, early successional stage of development. A forest structure such as this is great for wildlife, such as barred owls, that thrives in older forests but lacks habitat for species that flourish in young forests such as woodcock. Silvicultural activity prescribed in this management plan will aim to not only preserve the older forest habitat that is present within this block, but it will also strive to create more early successional habitat in order to make the forest structure more diverse, thereby producing a more diverse wildlife habitat.

### **Investment in Habitat Improvement**

There is only one open land area within this block of forestland, just north of River Road in Colchester (Compartment 1, Stand 17, 4 acres). This area is currently overgrown with herbaceous vegetation. It is desired to keep this area open, rather than letting it revert back to forest, in order to maintain this habitat type. This will be done by periodic mowing. Mowing should be completed every 15 to 20 years. Completing the mowing of this area is an investment in maintaining early successional, shrub land habitat, ideal for the American woodcock, within this tract of land.

### **Deer Impact**

The impact of white-tailed deer on the productivity of forestland can be substantial. A staple in the diet of a deer is the buds and twigs of young trees. Once young trees have been browsed, they will then grow with a poor form and will be stunted from their full potential. Deer impact is a function of deer density, expressed in deer per square mile, and forage availability such as young trees, acorns and agricultural crops. Deer densities greater than 20 deer per square mile can have significant negative impacts on forest regeneration.

During the forest inventory analysis conducted within this block of forestland it was observed that deer prefer to browse on oak species rather than tree species such as black birch and American beech. However, when deer density is very high deer will browse less palatable species to survive. The deer density does not appear to have reached the point where these less favorable tree species are being browsed and deer impact on the forestland is moderate.

### **Hunting**

The Blackledge Block is open to the public for firearms and archery hunting for small game, waterfowl, turkey and deer. All the Blackledge Block is open to firearms hunting, except for in areas which are within 500 feet of a house and/or building. Public access maps for the Blackledge Block are available for viewing or printing on the DEEP Public Hunting Areas in CT Webpage which can be found by following this link [Hunting Information](#). These maps may also be obtained by contacting the Eastern District Headquarters in Marlborough. Trapping is also allowed in the Salmon River State Forest under the state land trapping permit system. For additional information pertaining to hunting regulations, seasons and fees visit the DEEP Hunting and Trapping Webpage which can be found by following this link [Hunting Information](#).



## G. Vegetative Condition

### Silviculture

The Blackledge Block of Salmon River State Forest is comprised of a diversity of different forest types. Oak and northern hardwoods is the most dominant forest cover found throughout the block. However, stands of pure northern hardwoods, red maple lowlands, white pine and hemlock are also common. Within these different forest types there are young stands that feature mostly pole sized individuals (6 – 12 inches in diameter) and there are others that are more mature and are likely 100 years old or more, featuring many large diameter individuals (20 + inch diameters). Forest stocking, or density, varies greatly with forest type, age, site conditions, soil types and a complex of past and present forest health issues. As a result, the silvicultural treatments recommended in this plan will be tailored to each stand as appropriate. Treatments will also focus on areas where access could be improved to the forest, for forest management purposes, through timber harvesting.

To foster the growth of and regenerate shade intolerant and intermediate shade tolerant species such as red oak, black oak, white oak, scarlet oak and white pine this plan will focus primarily on even aged silvicultural techniques. In stands where there may be a high density of quality stems, commonly referred to as Acceptable Growing Stock (AGS), to grow into the future, thinning's will be implemented in order to improve growing space and capture natural mortality that occurs through competition. In stands where the dominant trees are mature, over-mature or are of very poor quality, referred to as Unacceptable Growing Stock (UGS), regeneration harvests will be implemented in order to allow enough sunlight to reach the forest floor to stimulate the establishment of a new cohort of young trees. Even aged management will use 100-year rotations. During this plan period 331.05 acres of forest are scheduled to receive even aged silvicultural treatments.

In stands where the long-term objective is to maintain a diversity of age classes and trees in all canopy positions un-even aged silvicultural techniques will be utilized. The recommended cutting cycle for un-even aged treatments is 20 years. During this plan period no un-even aged treatments are scheduled. This is because in the forest types that are present within this block, un-even aged treatments (typically in the form of single or group selection) often result in a forest that remains relatively dense and the forest floor still quite shaded under a canopy of trees, favoring shade tolerant species to regenerate. The most dominant shade tolerant species that is present in all of these forest types is American beech and it sprouts prolifically from its roots and from cut stumps. This species is prone to disease as well, as described in the forest health section of this management plan, and as a result it is an undesirable species. The dominant regeneration after un-even aged silvicultural treatments would likely be American beech. Therefore, during this management cycle un-even aged treatments will not be utilized in an effort to reduce the density of beech sprouts that would alter forest stand composition.

### **Silviculture in the Context of Carbon Sequestration & Storage**

With the understanding that rising atmospheric carbon dioxide levels are a primary cause of ever-increasing global temperatures, generally referred to as climate change, forests are often looked at as a way to offset climate change impacts. This is due to the fact that forests take in an enormous amount of carbon dioxide from the atmosphere through photosynthesis, using it to maintain themselves and grow (Catanzaro & D'Amato, 2019). Forests sequester and store carbon. However, the rate at which they do these is largely influenced by a variety of factors such as forest age and natural and/or anthropogenic disturbances. Carbon sequestration is greatest in young forests, peaking when the forest is around 30 to 70 years old, but will continue to sequester carbon throughout its entire life span (Catanzaro & D'Amato, 2019). A forest's carbon storage level increases with its age in the form of live and dead aboveground biomass such as trees, down woody debris and soil (Catanzaro & D'Amato, 2019). As a result, in the context of forest carbon, there is a place for both forest reserves (areas that go unmanaged and/or not harvested that serve as carbon sinks) and other areas that receive management (through silvicultural treatments aimed at regenerating the forest, creating early successional habitat and creating a forest that is sequestering high amounts of carbon from the atmosphere). This management plan aims at striking this balance within the Blackledge Block by designating 160.86 acres as an Old Forestland Management Site as well as over 900 acres that will not be actively managed in the next 10 years that will serve as a forest reserve and carbon sink, maximizing carbon storage. This plan balances this by scheduling silvicultural activity to be done on 331.05 acres in order to regenerate the forest, capture natural tree mortality, improve the growing conditions for residual trees and increase the forest's carbon sequestration rate.

### **Desired Future Conditions & Long-Term Planning**

Within the next 10-year planning cycle management actions will be taken on sections of the forest that were acquired since the last forest management plan was written and follow up treatments will be made on previously treated areas where applicable. Employing this strategy provides the opportunity for recently acquired parcels, that may have previously gone unmanaged or had been poorly managed, to be set on a long term path of sustainable management and previously treated areas will receive the attention needed so they may continue on a long term path of sustainable management. By the end of this 10-year planning cycle 331.05 acres will have been treated using even aged regeneration techniques. The primary silvicultural technique used will be the shelterwood, 202.50 acres will be treated with this method. An additional 95.11 acres will be treated with thinning's. The remaining 33.44 acres scheduled for silvicultural activity will be timber stand improvement work done as a follow up to an area previously harvested using the shelterwood method. Therefore, 21 percent of the total land area in the block will be receiving direct attention. This management plan also aims to be adaptive in the next 10 years. The remaining portions of the block, not actively managed, will be actively monitored. If conditions arise, that are unforeseeable at this time such as destructive weather events or insect outbreaks that pose a significant detrimental effect to the forest resource, silvicultural options will be assessed and emergency actions will be taken as necessary. See section K. Adaptive Management (Page 40) for more information on the dynamic flexibility of forest management considering unforeseen events and/or circumstances.

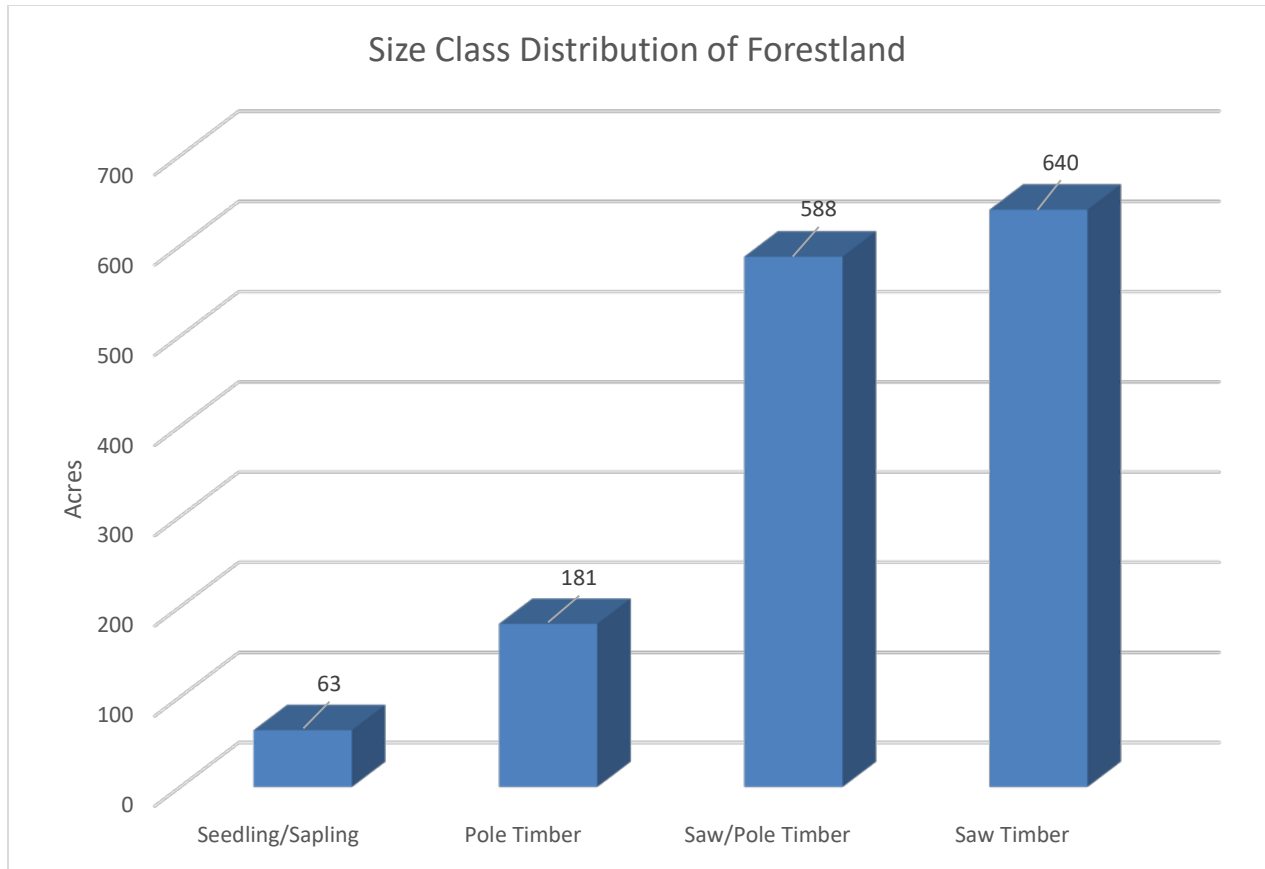
The following 10-year planning cycle (2031 – 2041) will aim to continue the strategy outlined above. Areas that were harvested using even aged regeneration techniques, as prescribed in this management plan, will have regenerated a mixture of species. Intermediate treatments, such as release or general timber stand improvement will be employed in order to favor the best quality individuals of the most desirable species. Also, areas that were thinned, as prescribed in this management plan, may have developed into stands favorable for regeneration harvests in order to continue producing the next generation of forests. During the next 10-year planning cycle each stand will once again be put under the management planning microscope and intensive management will be brought to stands previously left to grow where it would be advantageous to do so.

Our current forest is a direct by-product of management actions taken, insect and disease problems arising, herbivore browsing and competing vegetation being present within the last 100 years. All management actions taken, insect and disease problems arising, herbivore browsing and competing vegetation being present from European settlement to current day has produced the forest as we now know it. With there being more and more insect and disease issues plaguing forests, a steady demand for forest products ever present, and with a rising climate change issue, the forest resource is under greater stress than ever. The next 100 years of management will be critical. Due to the near eradication of fire on our forest landscape, continual herbivore browsing and the competitiveness of black birch, American beech and red maple it is likely that our forests will transition into a northern hardwoods forest type and away from an oak/hickory forest type. Also, as average annual temperatures rise due to global warming some tree species may become less prominent due to a shifting in their native range. Extreme weather events that can cause severe damage to forest ecosystems such as ice storms and hurricanes may also become more frequent. However, through sustainable management practices that will continually choose desired phenotypic traits, representing several age classes and a diversity of species, over undesirable traits and monocultures, our forests will be as resilient and as diverse as they can possibly be, making them able to not only survive but thrive over the next 100 years.

### **Forest Type, Size Class & Condition of Areas to be Managed**

To aid in forest management decision making a full forest inventory of the block was completed. This inventory collected information on trees throughout the area such as species, diameter, merchantability, health and quality. This data was analyzed using NED II forestry software. To see how much of the block is considered mature forest, young forest, or anywhere in between, average size class was calculated for each stand. Size classes are divided into the following diameter ranges.

- Seedling/Sapling: 1 inch – 4.5 inches
- Pole Timber: 4.6 inches – 10.5 inches
- Saw/Pole Timber: 10.6 inches – 13.5 inches
- Saw Timber: 13.6 inches +



**Figure 1.3.** Size class distribution of forestland within the Blackledge Block. This chart excludes areas of the block which are considered developed, wetlands, right-of-way's or open land.

**Table 1.1.** Acres of forestland by size class and forest type. This chart excludes acres of the forest which are considered developed, wetlands, right-of-way's or open land.

Acres of Forestland by Size Class & Forest Type					
Forest Cover Group	Seedling/Sapling	Pole Timber	Saw/Pole Timber	Saw Timber	Total
Elm-Ash-Red Maple	0	22	136	0	158
Maple-Beech-Birch	0	0	110	6	116
Oak-Hickory	63	101	288	442	894
Oak-Pine	0	58	35	86	179
Spruce-Fir	0	0	0	24	24
White-Red-Jack Pine	0	0	19	82	101
<b>Grand Total Acres</b>					<b>1472</b>

### **Elm-Ash- Red Maple**

The Elm-Ash-Red Maple group makes up 11 percent of all the forestland in the block with 158 acres falling into this category. These areas are characterized as having wet, saturated or poorly drained soils and as a result, grow tree species that do well in wet conditions such as American elm, black ash and red maple. These areas are mostly located adjacent to the Blackledge River or the Jeremy River that flow through this block. These areas are also more prone to the establishment and expansion of invasive plants. Due to these areas being adjacent to rivers and streams and having poorly drained soils, no management activities will take place within this forest type.



**Photo 1.1.** Photo of the typical stocking levels and forest structure within the Elm-Ash-Red Maple group.



### Maple-Beech-Birch

The Maple-Beech-Birch group makes up 8 percent of all the forestland in the block with 116 acres falling into this category. This forest group is dominated by sugar maple, American beech, yellow birch and black birch. Often other species can be found within this forest group at lower densities, such as hemlock, white pine, white ash and red oak. A large portion of this group is considered mature forest or is approaching maturity with 95 percent of the acres in this group being considered in the saw/pole timber size class. As a result, there are excellent opportunities for active forest management within this group. 95.11 acres in the Maple-Beech-Birch group of the Blackledge Block are scheduled for harvesting in the next 10-year planning cycle.



**Photo 1.2.** Photo of the typical stocking levels and forest structure within the Maple-Beech-Birch group.



### **Oak-Hickory**

The Oak-Hickory group makes up 61 percent of all the forestland in the block with 894 acres falling into this category. The dominant species found within this group are red oak, black oak, scarlet oak, chestnut oak, shagbark hickory, pignut hickory, black birch and red maple. Within this group there are several sub-groups, referred to as forest types or stand types that are commonly found in this block. These forest types are upland oak, characterized by a poor-quality upland site growing mostly chestnut oak and scarlet oak, and mixed upland hardwoods, characterized as having a medium quality site growing all the species found within the oak-hickory group. A large portion of this group is considered mature forest or is approaching maturity with 49 percent of the acres within this group being considered in the saw timber size class. As a result, there are excellent opportunities for active forest management within the oak-hickory group. 154.39 acres in the Oak-Hickory group of the Blackledge Block are scheduled for harvesting in the next 10-year planning cycle. Timber stand improvement will be completed on an additional 33.44 acres of Oak-Hickory forest during this plan's lifespan.



**Photo 1.3.** Photo of the typical stocking levels and forest structure within the Oak-Hickory group.



### Oak-Pine

The Oak-Pine group makes up 12 percent of all the forestland in the block with 179 acres falling into this category. This group consists of forestland dominated by white pine, red oak, black oak and scarlet oak. This forest type adds diversity to the landscape, with dense conifer canopies providing cover and the hard mast producing oak species creating an abundance of acorns for wildlife to forage on. 34.61 acres in the Oak-Pine group of the Blackledge Block are scheduled for harvesting in the next 10-year planning cycle.



**Photo 1.4.** Photo of the typical stocking levels and forest structure within the Oak-Pine group.



### **Spruce-Fir**

The Spruce-Fir group makes up 1 percent of all the forestland in the block with 24 acres falling into this category. This is the least represented forest group within this block of forestland. Often when this forest group is found in New England it is comprised of red spruce and balsam fir, two species that are not common in Connecticut. The area that is considered Spruce-Fir within the Blackledge Block is dominated by Norway spruce, a European species which was planted by the CCC in the early 1940's. With this spruce approaching 80 years old, much of it is currently mature. As a result, 13.50 acres of the Spruce-Fir group are scheduled for harvesting in the next 10-year planning cycle.



**Photo 1.5.** Photo of the typical stocking levels and forest structure within the Spruce-Fir group.



### **White-Red-Jack Pine**

The White-Red-Jack Pine group makes up 7 percent of all the forestland in the block with 101 acres falling into this category. All the stands that fall into this category are dominated by white pine or hemlock. This is a relatively common forest type in this block of forestland because the riparian areas adjacent to the Blackledge and Jeremy Rivers are mostly occupied by hemlock or white pine. Due to much of the acreage taken up by this forest group being located within riparian areas, no forest management activities are planned in this forest group in the next 10-year planning cycle.



**Photo 1.6.** Photo of the typical stocking levels and forest structure within the White-Red-Jack Pine group.

**Table 1.2.** Acres to be managed through even aged silvicultural techniques. Of the 202.50 acres scheduled to be regenerated, 119.48 of those acres are considered to be in the saw/pole timber size class and the remaining 83.02 acres are considered to be in the saw timber size class. All 95.11 acres scheduled to be thinned are in the saw/pole timber size class. All 33.44 acres scheduled for timber stand improvement are in the seedling/sapling size class.

<b>Acres to be Managed through Even Aged Techniques</b>			
<b>Forest Cover Group</b>	<b>Regenerate</b>	<b>Thinning</b>	<b>Intermediate Treatment</b>
Elm-Ash-Red Maple	0	0	0
Maple-Beech-Birch	0	95.11	0
Oak-Hickory	154.39	0	33.44
Oak-Pine	34.61	0	0
Spruce-Fir	13.50	0	0
White-Red-Jack Pine	0	0	0
<b>Total Acres</b>	<b>202.50</b>	<b>95.11</b>	<b>33.44</b>

### **Forest Health: Disease Issues**

Chestnut blight is a fungal infection caused by the *Cryphonectria parasitica* fungus. This fungus was accidentally introduced to the United States, from nursery stock from Asia, in the early 1900's. Quickly after its identification it became evident that the mortality of the chestnut species as a whole was imminent. The fungus causes diffuse cankers to form underneath the bark of chestnut trees, ultimately cutting off the flow of water and nutrients up and down the stem of the tree. The American chestnut likely once constituted a large portion of all the trees present in the Blackledge Block. The loss of this species from this disease was a tremendous set back to the growth of the forest in this area.

Nectria canker, caused by *Nectria galligena* fungus, is another common disease found in this block of land, often creating what are known as "target cankers" on black birch individuals. Nectria fungus typically does not result in the mortality of affected individuals, however, it does significantly affect the quality of wood products produced from trees with it.

Armillaria fungus, *Armillaria mellea*, is a third disease that can be found sporadically throughout this block. This disease is often called "shoestring root rot" because the fungus has a shoestring like appearance growing on the roots of affected trees. Branch dieback and crown thinning are common symptoms. Affected trees will typically not die from this fungus alone, however, it does act as a secondary pathogen which will develop on trees already under stress from a variety of other biotic and abiotic factors.

### **Forest Health: Insect Concerns**

Gypsy moth caterpillar is a non-native moth introduced to North America that defoliates many tree species, oak species in particular. Successive years of gypsy moth caterpillar defoliation and drought like conditions in 2016 and 2017 has resulted in the mortality of thousands of trees across Connecticut. Damage varies greatly by locality. In the Blackledge Block, gypsy moth effects vary greatly by species and site location. Although white oak, red oak, black oak, chestnut oak and scarlet oak all have been heavily affected, the mortality of white oak seems to be the highest. Also, ridgetops and hilltops generally have a higher proportion of mortality, likely due to the trees already being drought stressed. Individuals that may have been partially defoliated are more susceptible to secondary pathogens such as two-lined chestnut borer and shoestring root rot. Overall, gypsy moth has had a major impact on the Blackledge Block, however, the area does not show signs of widespread mortality that is common in many other forests throughout eastern Connecticut. Silvicultural treatments will aim to salvage gypsy moth killed individuals where possible.

Two-lined chestnut borer is an insect that is common from southern Canada through the eastern United States. The insect bores galleries underneath the bark of many species of oaks. These galleries can eventually cut off the flow of water and nutrients up and down the stem of a tree, thereby resulting in its mortality. Tree mortality rarely occurs due solely from the efforts of two-lined chestnut borer. The insect primarily attacks trees that are weakened by drought, defoliation, soil compaction or any number of other stressors. Two-lined chestnut borer, in combination with other stressors is what results in mortality. Silvicultural treatments will aim to thin overstocked stands to increase vigor and

capture natural mortality caused by competition. These actions are the best ways, on a state forest wide scale, to prevent excessive two-lined chestnut borer damage.

Emerald ash borer is present in the state forests throughout Connecticut. This beetle, native to northeastern Asia, feeds on all species of ash. Females lay eggs in the bark of ash trees and larvae feed underneath the bark until they mature into adults. Once they mature into adults they bore through the bark, fly to another host tree and the cycle continues. Signs of the emerald ash borer are horizontal galleries underneath the bark created by the larvae feeding as well as D shaped holes in bark created when adults bore through the bark. The larvae feeding underneath the bark cuts off the flow of water and nutrients to the rest of the tree and results in the mortality of the affected individual. Salvaging affected trees during timber harvesting operations is the only way to minimize the spread of this insect on a state forest wide scale. Fortunately, ash species make up a very low percentage of all the trees present within the block. Therefore, this beetle is expected to have a minimal impact on this block.

Hemlock woolly adelgid, named for its white woolly appearance and for its preferred host, is an insect native to eastern Asia that was inadvertently introduced to the United States in 1950. Juvenile hemlock woolly adelgid feed on eastern hemlock trees by inserting their mouthparts into the base of the needles of a host tree. These insects feed on the tree's stored starches and they remain on the same needles for their entire lives. This insect has no natural predators in North America. Therefore, population levels increase exponentially and excessive feeding on infected host trees eventually die due to the disruption of the flow of nutrients to its twigs and needles. Several predators of the hemlock woolly adelgid from Asia have been evaluated, approved and successfully introduced into the forests of Connecticut. Salmon River State Forest was one of the original sites selected to release these predators due to the extensive stands of hemlock adjacent to the Salmon River and its tributaries. These efforts have been quite successful and the hemlock stands in Salmon River are considered to be healthy at this time.

In areas dominated by white pine, the white pine weevil has influenced their quality. This insect lays its eggs in the topmost bud of white pine individuals. These eggs hatch and the larvae feed on the bud, thereby killing it and causing other branches to take over as the terminal leader. This results in a tree with three or more main stems. The quality of white pine with multiple stems due to this insect is typically degraded from sawlog quality to no more than pulpwood quality. This insect prefers high sunlight conditions. As a result, open grown trees are the most affected. The white pine stands in the interior of the forest that regenerated under partial shade are much less affected.

Southern pine beetle is a bark beetle, native to the southeastern United States, that infests pine trees. The bark beetle enters pine trees through crevices in bark and then bores galleries into the cambium tissue beneath the bark. This boring activity disrupts the flow of nutrients and water, resulting in the mortality of the tree. It typically only takes two to four months for a tree to succumb to southern pine beetle. Although this insect is native in the southeast, it has expanded its range northward up the eastern coast in recent years. This is believed to be the result of warmer winter temperatures. Although southern pine beetle will attack all pine trees, red pine and pitch pine tend to be most heavily affected in Connecticut forests. Signs of infestation are popcorn shaped clumps of resin on the exterior of infected trees, shotgun patterned holes on the exterior of a pine trees bark and reddish-brown needles. In the Blackledge Block there are several stands of red pine that have been heavily

affected by southern pine beetle. These stands are now most easily identifiable by red pine snags, or standing dead red pine trees, that were killed by southern pine beetle some years ago. Beech bark disease is also commonly found on American beech individuals within the block. The disease results when the beech scale insect punctures the bark of a beech tree to feed, which creates a wound where the necrotic fungus can enter the tree. Once the necrotic fungus is within the tree the fungus causes cankers to form, ultimately resulting in the mortality of the tree. To compound the issue, American beech sprouts prolifically from cut stumps and from roots. Furthermore, American beech is very shade tolerant, meaning it grows well in high shade conditions such as the forest floor. Therefore, as American beech individuals succumb to disease, they sprout new stems from their roots and continue the cycle of growth and disease. For long term forest management, the difficulty is establishing desirable regeneration such as red oak in an understory already dominated by disease prone beech sprouts. Silvicultural treatments will focus on even aged management techniques which will allow high amounts of sunlight to the forest floor, thereby favoring shade intolerant and intermediate shade tolerant species over the shade tolerant beech. Treating beech stumps in recently harvested areas with an herbicide to prevent re-sprouting may be recommended as another way to favor the regeneration of more desirable species.

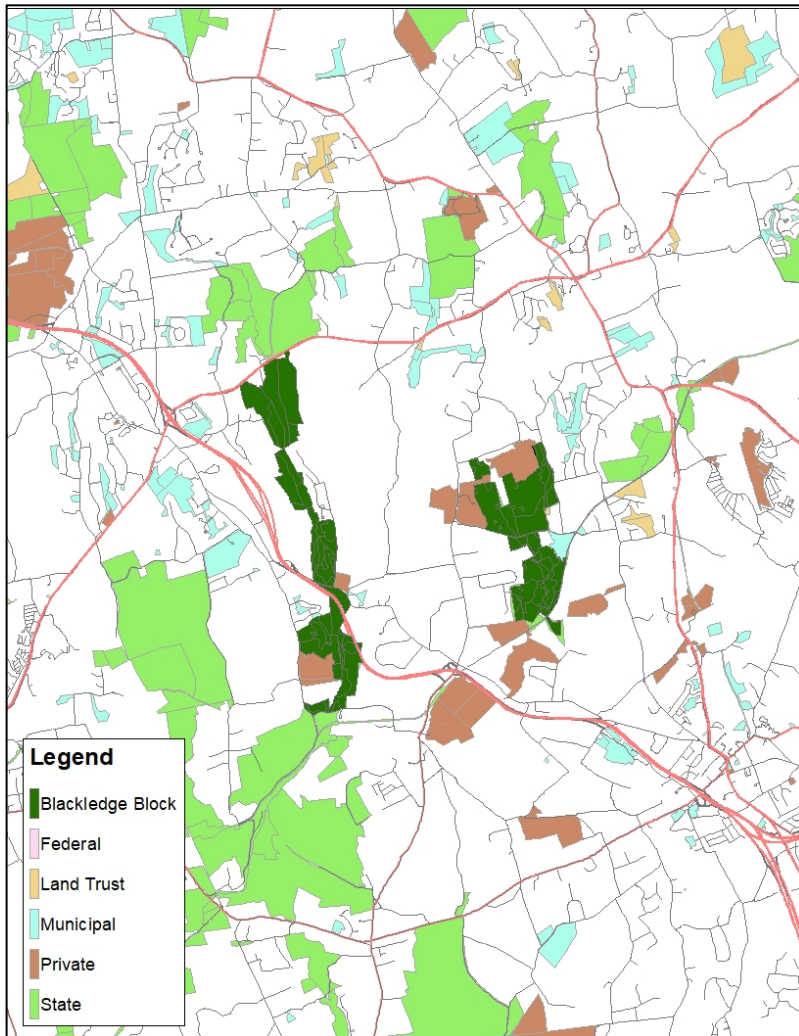
#### **Forest Health: Invasive Species**

Invasive species such as multi-flora rose, Japanese barberry, honeysuckle, Japanese stilt grass, oriental bittersweet, autumn olive and burning bush, sometimes called “winged euonymus” due to its twigs having a winged appearance, are commonly found in the Blackledge Block. Invasives can threaten to displace native understory vegetation and can overtop young trees, suppressing their growth. The native mountain laurel is also a common understory shrub found throughout the block and can act in much the same way as non-native invasive species. These shrubs tend to be most dense on roadsides, property boundary lines and field edges with a lower density being present in the interior of the forest under the canopy of trees. Unfortunately, invasive species are so common throughout Connecticut and the rest of the northeast that eradication is not a realistic goal. However, efforts can and should be made to reduce invasive species density. Therefore, each timber harvest that is prescribed in this management plan will address invasive species. If levels are considered high enough to hinder the establishment of regeneration or will overtop advance regeneration, an herbicide treatment of the invasives in that area will be warranted prior to completing the silvicultural activity.

#### **Forest Health: Abiotic Factors**

The primary abiotic factor that has a significant effect on forest health is weather. Extreme weather events such as tornados, hurricanes, ice storms and micro-bursts cannot be planned for. However, this management plan aims to be adaptive. After significant weather events, areas that were heavily affected will be re-assessed. If any immediate action would be advantageous to mitigate forest health impacts, those actions will be taken at that time.

## H. Landscape Context – Forestry – adjacent land uses



**Figure 1.4.** Location map showing federal, land trust, municipal, private and state protected lands in the vicinity of the Blackledge Block.

The Blackledge Block, with its long narrow parcels that follow the meandering Blackledge and Jeremy Rivers, is located in rural eastern Connecticut. The block is just one section of the much larger Salmon River State Forest. Interspersed throughout the region there are also many smaller parcels, owned by the federal government, land trusts, municipalities or private individuals or organizations that are designated as protected open space, as shown in Figure 1.3. Efforts by the state and other entities have been vital in protecting the rural fabric of the communities that this forest lies within. The present-day conditions are recognized as good landscape level habitat, with a diversity of cover types including forestland of varying age classes, actively managed agriculture land and open land containing a diversity of herbaceous plants. A much greater amount of land in this landscape is unprotected and may increasingly be under the stress of development. Therefore, management strategies of the Blackledge Block will need to be reviewed on a ten-year cycle to ensure habitat goals are met as landscape habitat is lost due to development.



## **I. Specific Acquisition Desires**

Future acquisition efforts should be prioritized by the following three guidelines:

1. All interior parcels should be acquired if made available to the state. This will reduce boundary line maintenance, as well as strengthen DEEP forest use policies.
2. Any parcel which currently abuts the forest on two or three sides. Acquisition of properties such as these would allow the forest to expand along its bounds, reducing maintenance issues, strengthening DEEP forest use policies and will create a large protected forest corridor.
3. Any parcel which may provide improved access to existing town roads should be acquired for management and emergency access purposes.

## **J. Public Involvement**

Public involvement and receiving stakeholder input are critical aspects of public lands management. Therefore, a preliminary draft of this forest management plan was shared with the towns that this forest resides within, the Town of Marlborough, the Town of Colchester and the Town of Hebron, as well as the Connecticut Horse Council, Connecticut River Conservancy, the southeast Connecticut chapter of the New England Mountain Biking Association (NEMBA), the New England chapter of Backcountry Hunters & Anglers (BHA), the Connecticut Conservation Advisory Council and Audubon Connecticut. These municipalities and organizations are considered major stakeholders in the management of this forest because collectively they represent the constituents of the community the forest is located within, recreational opportunity and trail stewardship and the conservation of vital wildlife habitat. These stakeholders were asked to review the plan, over a month-long period, and provide any comments or concerns they might have. Over the course of the month-long public review period, many comments were received from neighboring landowners, trail users, hunters and anglers as well as from the local towns. Every comment was read and reviewed in its entirety and carefully considered in the context of the management of the forest resource, wildlife and their habitats and public accessibility. Comments, concerns and/or recommendations were then incorporated into the plan prior to the completion and publication of the document.

This plan will be made available to the public. State forest management plans are published on the CT DEEP website and can be found by following this link <https://portal.ct.gov/DEEP/Forestry/Management-on-State-Lands/Forest-Management-on-State-Lands>. Comments and questions regarding the plan are always encouraged. Also, this plan may serve as a resource for local municipalities and non-profit organizations that are actively planning for open space protection.



## **K. Adaptive Management**

The Division of Forestry understands 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 Division of Forestry reserves the right to reasonably change our management approach as environmental change and resource needs warrant. Some of these changes may be associated with biological factors such as 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 Division of Forestry and our colleagues in Parks, Wildlife, Fisheries, and Agency Support, 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.

## **L. 10 Year Goals**

- Maintain a sustainable forest ecosystem
- Establish 160.86 acres of Old Forestland Management Sites
- Maintain areas of mature forest to serve as carbon storage
- Promote and enhance significant and/or critical habitat
- Improve access to the forest for forest management purposes
- Address unauthorized activities occurring in the forest that threaten its natural resources
- Create young forest and early successional habitat to diversify wildlife habitat
- Create young forest to increase the rate of carbon sequestration
- Control invasive species, particularly in managed areas, to prevent them from suppressing regeneration and to avert their establishment throughout the forest
- Adaptive management principles will be utilized if damage to the forest is caused by events that are unforeseen at this time such as adverse weather and insect or disease infestations

## **M. Work Plans**

### **Road Maintenance**

No road maintenance projects are scheduled for this management period.

### **Road Construction, Gates & Signs**

No road construction is scheduled for this management period.

Two forest stands (compartment 1, stands 7 & 8) adjacent to South Road in Marlborough are scheduled for harvest during the management period outlined in this plan. There is an old forest access road off of South Street that will be improved and utilized for this management activity. Improvements will consist of making the existing road wider and installing geotextile fabric and stone to prevent trucks and forestry equipment from tracking debris into the town road. By making these improvements, this portion of the forest will become much more easily accessible. Therefore, a gate will be installed, after the timber harvesting operation, where this old forest road comes out onto South Road to prevent unauthorized use, such as ATV riding, of this portion of the forest.

Educational signage will be developed and posted at the access points to the forest, particularly to the entrance to the mountain bike trails off of Hope Valley Road and Grayville Road where visitor traffic is the highest. By doing this, DEEP Division of Forestry will take an educational approach towards the issue of high trail densities, high traffic areas and their impact to the forest and wildlife. Currently, there are several signs at trail entrances that ask trail users to respect other users, respect the environment and respect closed trails. Within the timeframe of this management plan, these signs will be placed at every trail entrance to help users understand that this use is a privilege that needs to be respected.

### **Boundary Maintenance**

Boundary line maintenance consists of repainting blazes on boundary line trees, putting up new state forest signs on boundary line trees and collecting data on boundary lines features such as stone walls, barbed wire fencing and corner pins. This was last completed in the Blackledge Block approximately 10 years ago and the boundary lines around new land acquisitions have been done approximately 7 years ago. As a result, the paint is now fading and will need to be refreshed. Therefore, all boundary lines will be revisited in the next 10-year management cycle to ensure they are marked clearly. In the future, boundary lines maintenance will be done every 10 years to ensure that markings are accurate and data is as up to date as possible.

### **Stream Improvement**

No stream improvement plans are scheduled for this management period.

### **Cultural Site Maintenance**

No cultural site maintenance is planned for this management period.

### **Recreational Site Improvement**

Educational signage as described in the “Road Construction, Gates & Signs” section of this plan will be posted as a short term initiative aimed at managing high recreational use areas within this block of land, most notably in compartments 10 and 11. However, the recreational pressure in these two compartments of the forest is such that a sustainable recreational trail system will need to be authorized and managed as the long term solution to the recreational issues, outlined in section E “Extensive Areas of Concern” of this plan. The parks, forestry and wildlife divisions of DEEP will partner during the early years of this management plans lifespan to authorize an agreed upon trail system that balances the recreational needs with the conservation of the forests natural resources. The overarching goals of a sustainable trail network for the area are as follows:

- Create a designated trail head with a kiosk where all applicable notices can be posted for recreationalists to view.
- Stop the creation of additional trails that are constructed against DEEP general regulations.
- Reduce trail density to minimize recreational pressure on wildlife.
- Designate authorized trails and close non-authorized trails.
- Take measures to stabilize authorized trails. Stabilization measures will include avoiding sensitive wet and riparian areas, reducing steep grades by installing additional switchback turns, constructing bridges over unavoidable wet areas and/or streams and putting in water bars to divert water off trail to prevent erosion and sedimentation.
- Create a plan to maintain the authorized trail system and enforce violations.

### **Trail Maintenance**

As previously stated in this management plan the only authorized trail that is located within the Blackledge Block, at this time, is the Airline State Park Trail. Various improvements have been made to this trail over the years to make it an excellent place to ride a bike, go for a walk, cross country ski or go horseback riding. The section of the trail that passes through the Blackledge Block is in good condition. Therefore, no site improvements, beyond general maintenance, are planned for this trail in the management period outlined in this plan. General maintenance consists of clearing debris, ensuring drainage structures are functioning, maintaining signage, trail markers, gates, parking areas and access points. DEEP Parks Division maintains the Airline State Park Trail.

### **Wildlife Habitat Improvement**

The Blackledge Block is within a conservation focus area for American woodcock. The planned silvicultural activity will create a diversity of wildlife habitat for woodcock and other wildlife dependent on various stages of forest growth. This will be done through regeneration harvests that will create early successional habitat, an element that is lacking within this block of forestland.

Compartment 1, stand 17 (approximately four acres), located adjacent to the Blackledge River on the north side of River Road, the only open land area within this block of forestland, will be managed for woodcock along with the five acre field that lies directly south of it on the opposite side of River Road. The field on the south side of River Road is located in the Day Pond Block of Salmon River State Forest. Both fields were last mowed with a bobcat/fecon in 2013. Although the fields have not been formally surveyed, woodcock have been observed displaying in both areas in the spring and nesting is likely occurring based on current conditions. Presently the fields are in good condition for feeding, nesting and displaying with a patchwork of grass/open ground and shrubs and should not be mowed until 2028 and 2033 when they are 15 and 20 years old. However, both fields contain some large woody trees, particularly on the margins of the fields where adjacent forest stands are encroaching in, that should be removed. These fields also contain invasive shrubs, most notably autumn olive, along with others such as honeysuckle, multi-flora rose and Japanese barberry. Mowing of these fields may be done in conjunction with herbicide spraying of these invasive shrubs to favor native herbaceous plant growth.

### **Wildlife Population Management**

Hunting and trapping is permitted within the Blackledge Block. These activities aid in the management of wildlife populations. Hunting and trapping rules and regulations are created by CT DEEP, Wildlife Division, and are made based on current wildlife population data.

**Silviculture**

**Table 1.3.** Table of silvicultural activity scheduled for the next 10 years within the Blackledge Block, Salmon River State Forest.

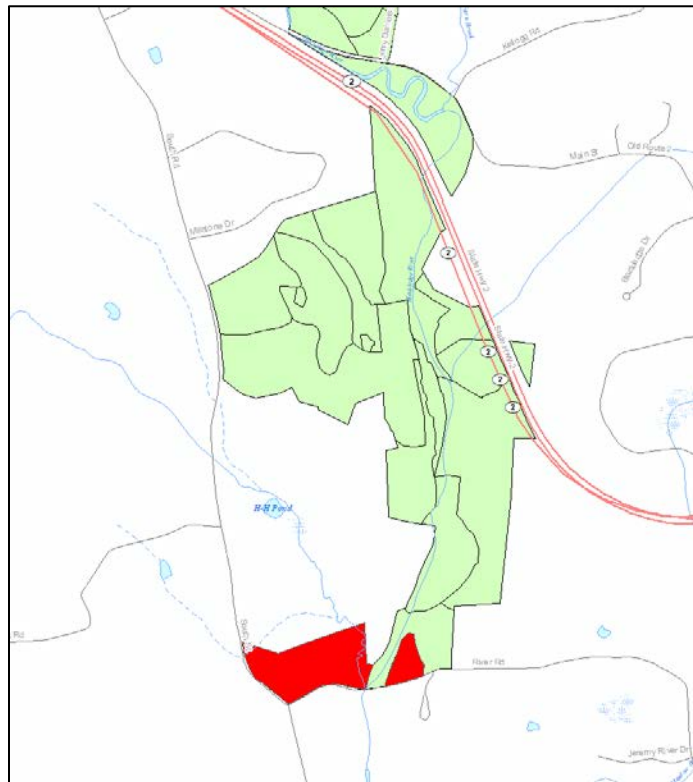
<b>Fiscal Year</b>	<b>Compartment</b>	<b>Stand</b>	<b>Acreage</b>	<b>Activity</b>
2022	1	2	13.50	Final Shelterwood
2022	1	7	51.00	1st Shelterwood
2022	1	8	18.52	1st Shelterwood
2023	4	1	14.21	Timber Stand Improvement
2023	4	6	19.23	Timber Stand Improvement
2024	11	7	14.21	1st Shelterwood
2026	2	2	70.66	2nd Shelterwood
2026	2	3	34.61	2nd Shelterwood
2026	2	4	95.11	Thinning
<b>Total Acreage</b>			<b>331.05</b>	

**Timber Stand Improvement/Invasive Control**

In 2009 compartment 4, stands 1 and 6 were harvested to salvage dead oak trees that had succumbed to gypsy moth defoliation. These stands are high on a ridge above the Blackledge River and are excellent sites for all oak species. As a result, this harvest regenerated an abundance of oak regeneration, white oak in particular. However, black birch remains a strong competitor against the oak. In many places the black birch is beginning to overtop and shade out the oak regeneration. Therefore, timber stand improvement work will be completed in this stand, in the form of a release cutting. Release cutting is the act of freeing sapling sized trees from undesirable competing vegetation that overtops or closely surrounds them (Nyland, 2007). In the case of these two stands, that means cutting black birch saplings that surround and/or overtop oak saplings. This action ensures the oak saplings are given enough sunlight to survive and eventually graduate into the upper forest canopy as dominant trees.

Silvicultural regeneration efforts in the next 10 years will likely result in an abundance of black birch and red maple regeneration. It is probable that timber stand improvement will be necessary in harvested areas in the next management cycle to foster the growth of oak regeneration.

It is imperative that invasives be treated so they do not suppress regeneration efforts. Invasive species are common and well established across the landscape. Eradication is not a realistic goal. Therefore, invasive control efforts will be concentrated to areas where harvesting is scheduled. Fortunately, in much of the upland forest stands where harvesting has been scheduled the density of invasives is low or non-existent. Invasive control will focus on areas where invasives are the most prevalent, along boundary lines and access points. Chemical treatment, such as the use of herbicides, is the preferred invasive treatment method. This is because chemical treatments can target individual plants or large groups and they are effective at killing an entire plant above and below ground. Also, from a time and economic management perspective, herbicide treatments are quite efficient.



**Figure 1.6.** Map of the southwestern most section of the Blackledge Block where invasives will be treated. Areas shaded in red are the areas that will be treated.

**Table 1.4.** Table describing where, when and how much land will be treated for invasives within the Blackledge Block, Salmon River State Forest.

Fiscal Year	Compartment	Stand	Acreage
2022	1	1	3.46
2022	1	2	13.50
2022	1	3	3.58
2028	1	17	4.18
<b>Total Acreage</b>			<b>24.72</b>

**Salmon River State Forest: Blackledge Block Work Plan by Year**

<b>Fiscal Year</b>	<b>Scheduled Activity</b>	<b>Forest Compartment</b>	<b>Forest Stand</b>	<b>Restrictions</b>	<b>Area</b>
2021	Boundary Line Maintenance			None	12 Miles
2021	Development/authorization of a Sustainable Recreational Trail Network north & south of Grayville Road	10 & 11		None	650 Acres
2022	Invasive Treatment	1	1	Seasonal	3.46 Acres
2022	Invasive Treatment	1	2	Seasonal	13.50 Acres
2022	Invasive Treatment	1	3	Seasonal	3.58 Acres
2022	Final Shelterwood	1	2	Seasonal	13.50 Acres
2022	1st Shelterwood	1	7	Seasonal	51.00 Acres
2022	1st Shelterwood	1	8	Seasonal	18.52 Acres
2022	Install Gate on South Road			None	N/A
2022	Boundary Line Maintenance			None	11 Miles
2023	Timber Stand Improvement	4	1	None	14.21 Acres
2023	Timber Stand Improvement	4	6	None	19.23 Acres
2024	1st Shelterwood	11	7	Seasonal	14.21 Acres
2026	2nd Shelterwood	2	2	Seasonal	70.66 Acres
2026	2nd Shelterwood	2	3	Seasonal	34.61 Acres
2026	Thinning	2	4	Seasonal	95.11 Acres
2028	Field Mowing	1	17	Seasonal	4.18 Acres
2028	Invasive Treatment	1	17	Seasonal	4.18 Acres
2030	Re-inventory Forest			None	1511.71 Acres
2031	Update Forest Management Plan			None	1511.71 Acres

## **N. Appendix**

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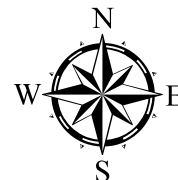






# Map B - Base Salmon River State Forest: Blackledge Block

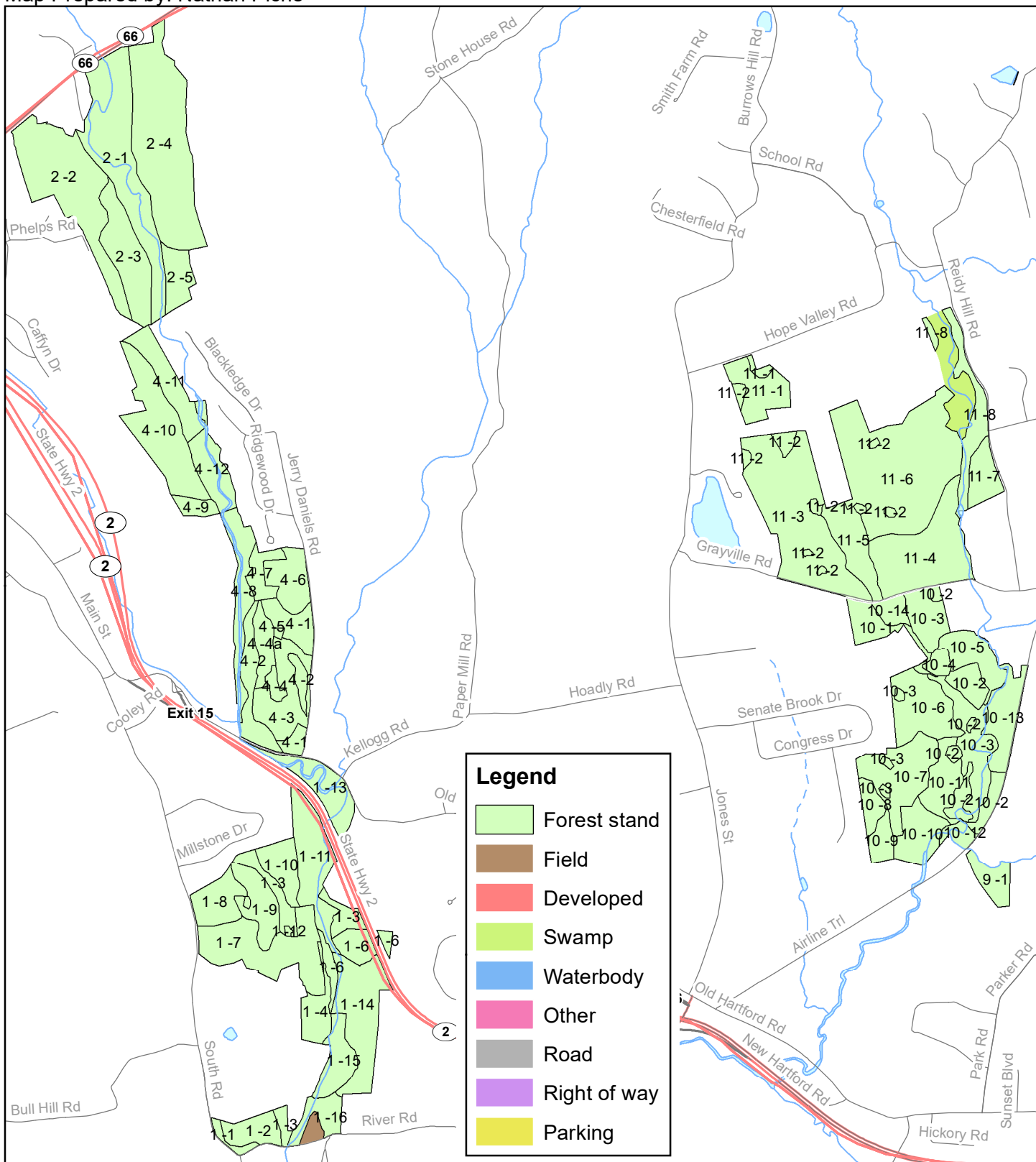
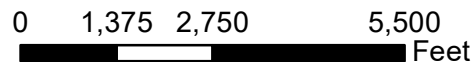
Project: Forest Management Plan  
Located in the Towns of Colchester, Marlborough & Hebron  
1,512 Acres



July 23, 2019

Map Prepared by: Nathan Piché

Map Scale: 1 inch = 2,750 feet



**Legend**

- Forest stand
- Field
- Developed
- Swamp
- Waterbody
- Other
- Road
- Right of way
- Parking





# Map D - Forest Type & Size Class Salmon River State Forest: Blackledge Block

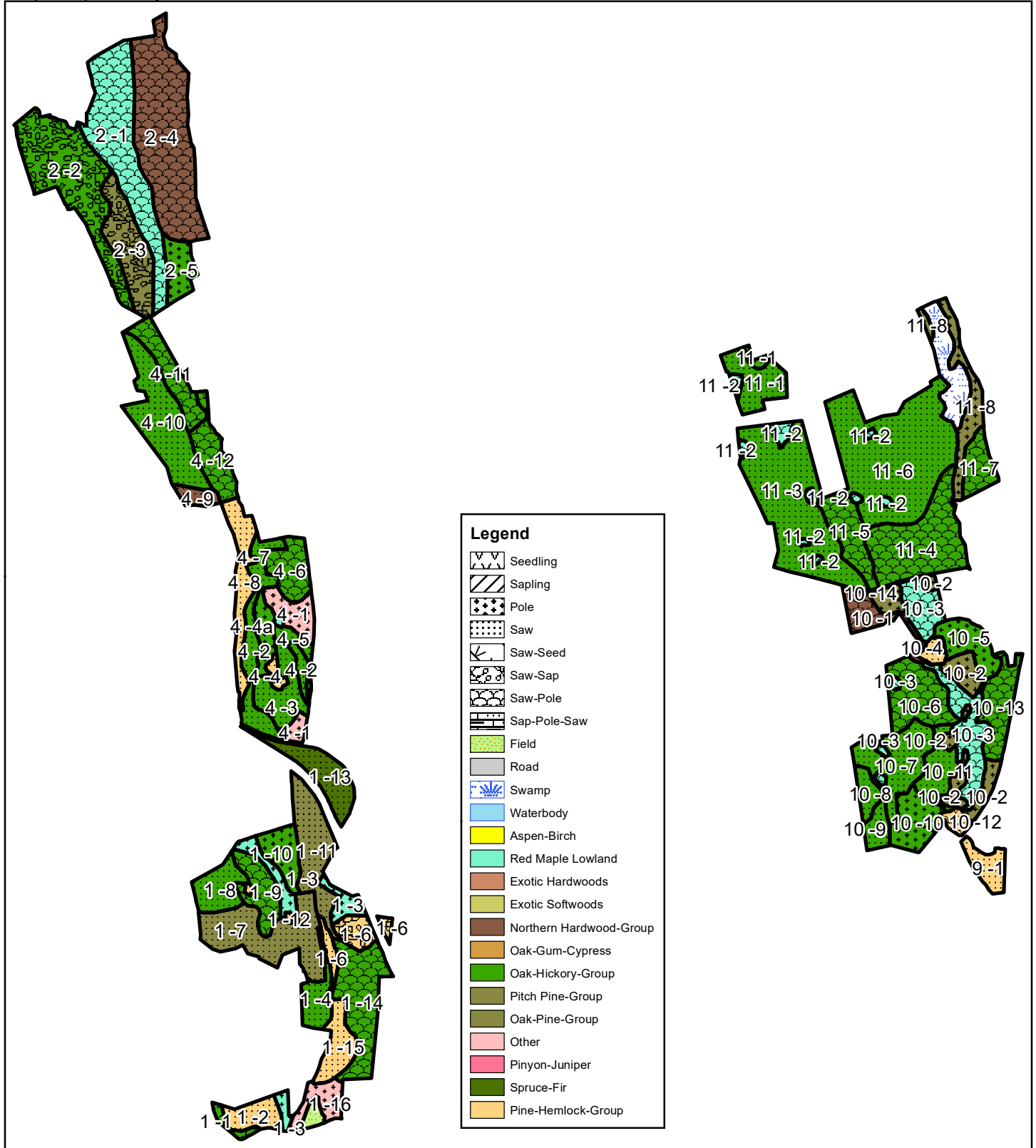
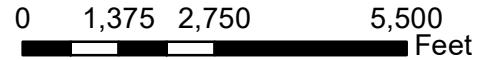
Project: Forest Management Plan  
Located in the Towns of Colchester, Marlborough & Hebron



July 23, 2019

Map Prepared by: Nathan Piché

Map Scale: 1 inch = 2,750 feet

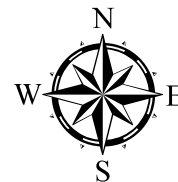






# Map F - Work Plan Salmon River State Forest: Blackledge Block

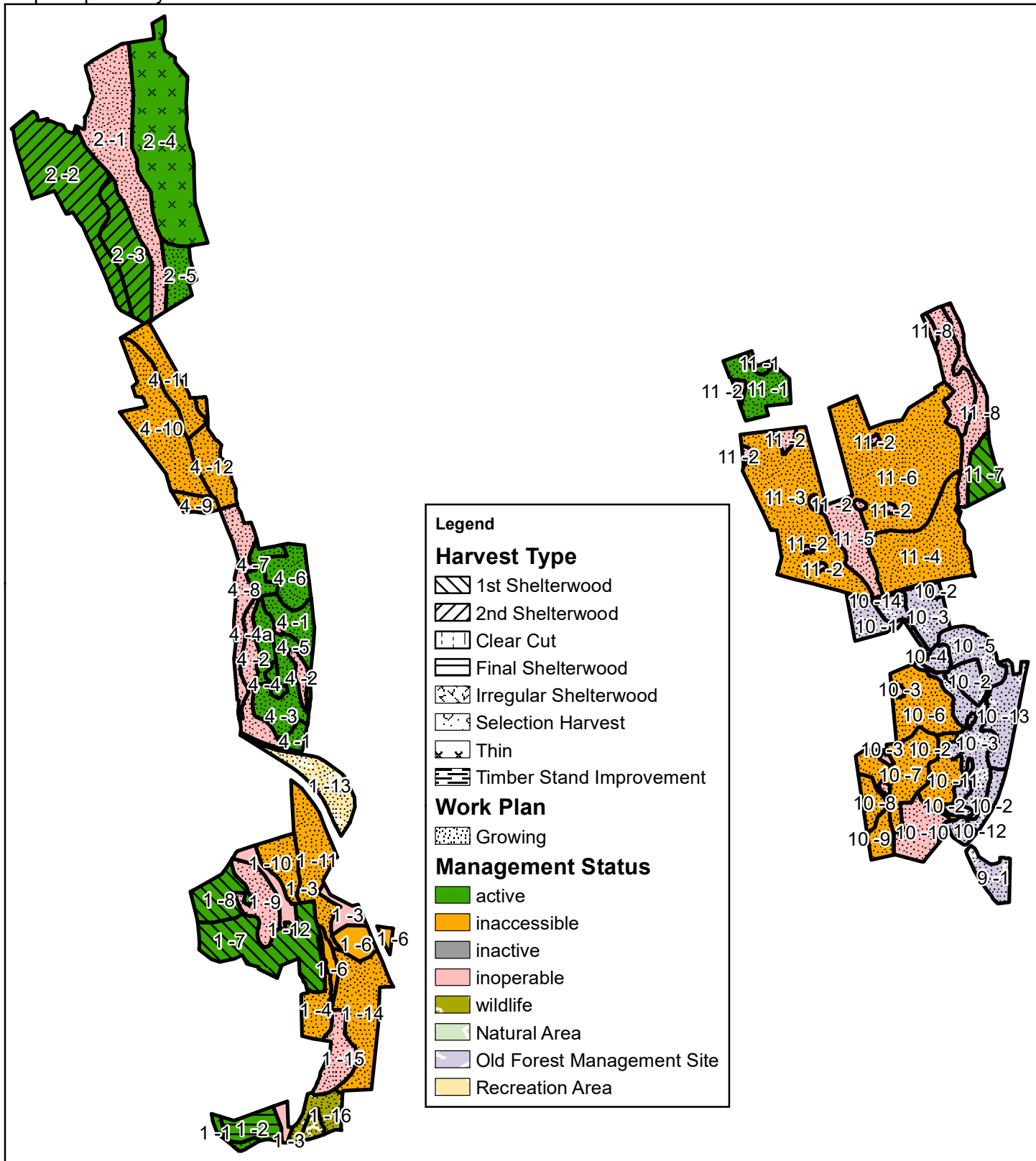
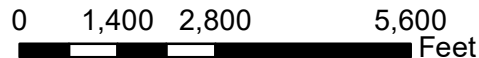
Project: Forest Management Plan  
Located in the Towns of Colchester, Marlborough & Hebron



July 23, 2019

Map Prepared by: Nathan Piché

Map Scale: 1 inch = 2,750 feet



**Legend**

**Harvest Type**

- 1st Shelterwood
- 2nd Shelterwood
- Clear Cut
- Final Shelterwood
- Irregular Shelterwood
- Selection Harvest
- Thin
- Timber Stand Improvement

**Work Plan**

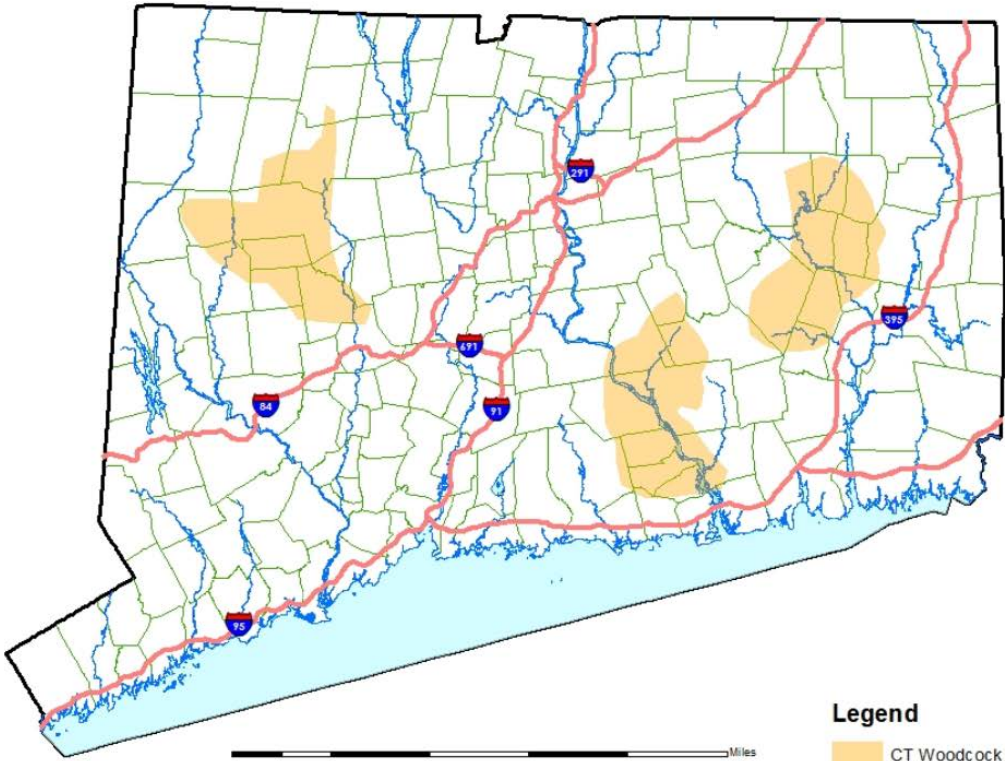
- Growing

**Management Status**

- active
- inaccessible
- inactive
- inoperable
- wildlife
- Natural Area
- Old Forest Management Site
- Recreation Area



### Department of Energy and Environmental Protection American Woodcock Focus Areas





<b>List of Tables, Figures &amp; Photos</b>		
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## Stakeholder Outreach Correspondence

The following message was sent to the Town of Marlborough, the Town of Colchester and the Town of Hebron, as well as the Connecticut Horse Council, Connecticut River Conservancy, the southeast Connecticut chapter of the New England Mountain Biking Association (NEMBA), the New England chapter of Backcountry Hunters and Anglers (BHA), the Connecticut Conservation Advisory Council and Audubon Connecticut.



Good morning,

My name is Nathan Piché and I am the state lands forest manager for Salmon River State Forest. One of my primary responsibilities is to take inventory of our state land resources and develop management plans describing our forests and how we plan to manage them for the next 10 year period. Recently I've been working on developing a forest management plan for a section of Salmon River State Forest that we call the Blackledge Block, which encompasses 1,512 acres of state forestland. I've attached a draft of this forest management plan and ask that you review it and provide me with any comments and concerns you may have. If you have any colleagues that would like to read and review this plan, please feel free to forward it to them. Please respond with any questions, comments or concerns there may be by Monday, November 30<sup>th</sup>.

Thank you,

Nathan Piché  
Forester 1  
State Lands Management Program  
Division of Forestry  
Connecticut Department of Energy and Environmental Protection  
209 Hebron Road, Marlborough, CT 06447  
P: 860.424.4036 | F: 860.306.9597 | E: nathan.piche@ct.gov



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*Conserving, improving and protecting our natural resources and environment;  
Ensuring a clean, affordable, reliable, and sustainable energy supply.*

## Glossary

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

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

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

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

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

**Age Class:** A distinct aggregation of tree that originated at the same time, from a single natural event or regeneration activity or a grouping of trees (e.g. ten year age class) as used in inventory or management. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

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

**Basal Area:** The cross-sectional area of a tree, in square feet, at 4.5 feet from the ground (at breast height). When the basal area of all the trees in a stand are added together, the result is expressed as square feet of basal area per acre, which is a measure of a stand's density.

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

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

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

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

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

**Carbon Sequestration:** The incorporation of carbon dioxide into permanent plant tissue. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

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

**Clearcut:**

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

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

**Contour Map:** A map where each line represents a change in elevation.

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

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

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

**Cutting Cycle:** The time interval between harvesting operations when uneven-aged methods are employed using group or single tree selection.

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

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

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

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

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

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

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

**Forest Stand Improvement:** See timber stand improvement.

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

**Forest vitality:** The health and sustainability of a forest.

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

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

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

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

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

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

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

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

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

**Integrated Pest Management:** The maintenance of destructive agents, including insects, at tolerable levels by planned use of a variety of preventative, suppressive, or regulatory tactics and strategies that are ecologically and economically efficient and socially acceptable (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

**Intermediate Cut:** Removing immature trees from the forest sometime between establishment and stand harvest to improve the quality of the remaining forest stand. Contrast this technique with a harvest cut.

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

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

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

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

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

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

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

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

**MBF:** Abbreviation for 1,000 board feet.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

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

**Sapling:** Trees from 2 inches to 6 inches in diameter at breast height.

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

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

**Seedling:** A young plant.

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

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

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

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

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

**Skid:** 1. To haul a log from the stump to a collection point (landing) by a skidder. 2. A load pulled by a skidder. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

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

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

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

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

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

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

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

Special Sites include:

- A. Historical, archaeological, cultural and ceremonial sites or features of importance to the forest owner;
- B. Sites of importance to wildlife such as rookeries, refuges, fish spawning grounds, vernal ponds and shelters of hibernating animals;
- C. Unique ecological communities like relic old-growth, springs, glades, savannas, fens and bogs; and
- D. Geological features such as terminal moraines, cliffs and caves.

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

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

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

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

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

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

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

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

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

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

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

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

**Understocked:** Insufficiently stocked with trees.

**Understory:** All forest vegetation growing under an overstory. (Helms et al, The Dictionary of Forestry, Society of American Foresters, 1998).

**Uneven-Aged Management or Stand:** A stand of trees containing at least three age classes intermingled on the same area.

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

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

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

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

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

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

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