James L. Goodwin State Forest
Forest Resource Management Plan

Forest Health and Diversity

The James L. Goodwin State Forest supports a diversity of forest types and age-classes reflecting a long history of active forest management dating back to the early 1900's. Management efforts focus on forest health and resilience to both natural and anthropogenic disturbance.

Climate Change Mitigation

Management of the James L. Goodwin State Forest will promote climate resilience, carbon sequestration and carbon storage. Sustainable forest management can maintain or enhance forest carbon sinks by sequestering CO^2 from the atmosphere and storing carbon in wood products which replace more carbon intensive materials such as concrete and steel.

Economic Benefits

This management plan prescribes 425-acres of commercial timber harvesting intended to achieve the broader goals identified in the plan. These sustainably harvested forest products provide jobs and raw material for a locally sourced, forest-based, green economy.

Forest Protection

Management planning incorporates strategies to mitigate forest damage associated with invasive plants, non-native insects, and wildland fire. Boundary marking additionally protects the forest from trespass and timber theft. Concepts of adaptive management provide a framework for changing strategies as needed to address changing conditions and protect the forest from unforeseen threats.

Wildlife Habitat

Supporting nearly all of Connecticut's common woodland wildlife, and plant species, the James L. Goodwin State Forest also hosts occurrences of State-listed species and communities including: a State Special Concern reptile, several invertebrates, many listed herbaceous plants, and the Acidic Atlantic White Cedar Swamp Natural Community.

Recreational/Health Benefits

With over 19-miles of authorized trails and 27-miles of combined trails and cart roads, the James L. Goodwin State Forest provides ample recreational opportunities for a diverse suite of user groups. DEEP, Friends of Goodwin Forest and CFPA collaborate on trail management and improvement projects to maintain the recreational resource.

Environmental Protection

Forested watersheds filter water before it enters rivers, lakes, and streams to ensure clean inputs into the hydrologic system. Utilizing Best Management Practices (BMPs) to preserve water quality while harvesting forest products further protects surface waters, enabling high quality fish habitat in tributaries and major river systems like the Natchaug River.



STATE OF CONNECTICUT

DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION

Bureau of Natural Resources

Division of Forestry

FOREST MANAGEMENT PLAN
2025 through 2035

James L. Goodwin State Forest

2,207-acres
Chaplin & Hampton, CT

Approvals:

4/24/2025

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Division of Forestry

4/24/2025

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Introduction

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

The 2020 Connecticut Forest Action plan was developed to address these needs with input provided by the DEEP, DEEP partners and various user groups. The plan serves as a guidance document for implementation of broad statewide forest management strategies based on three national priorities;

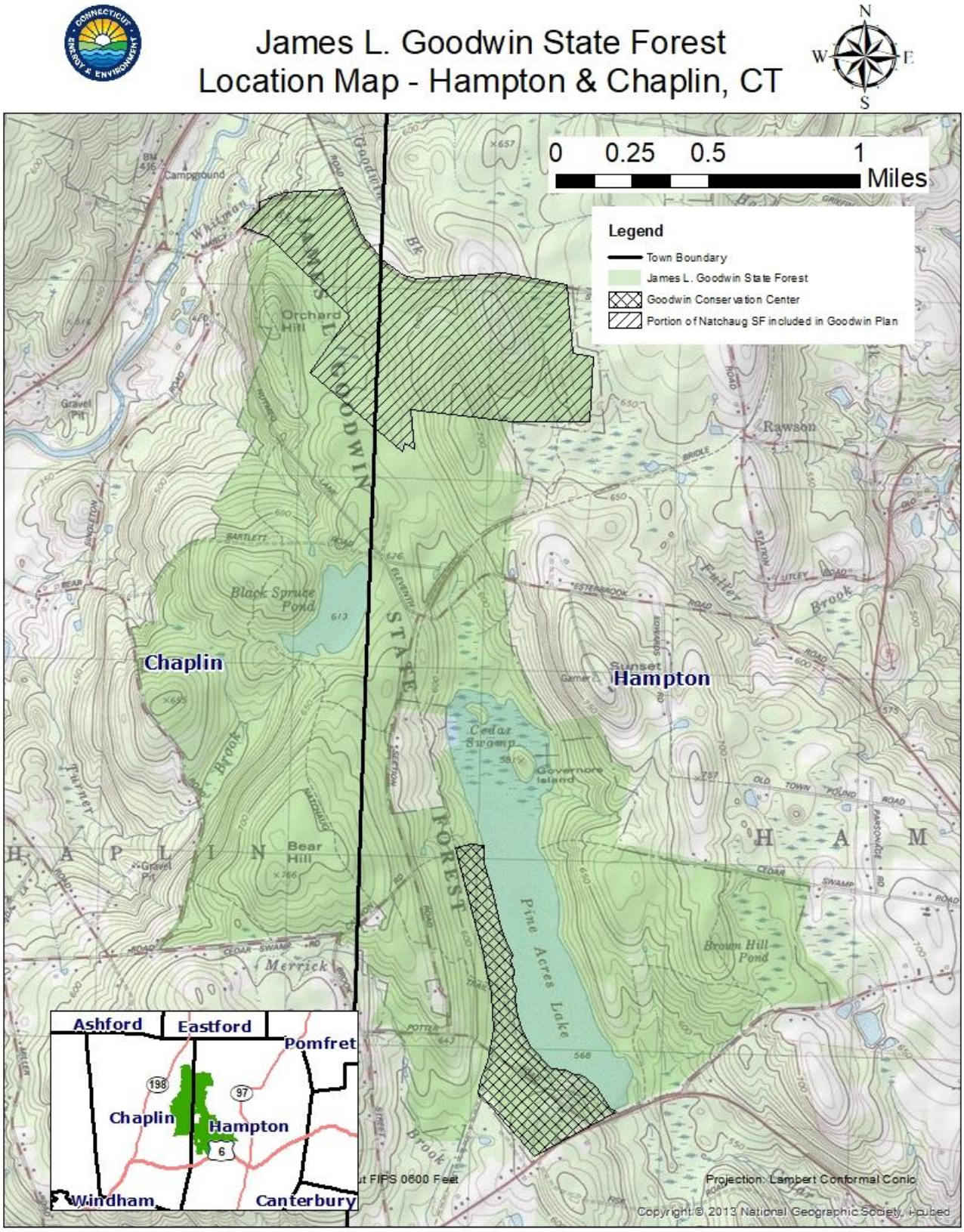
1. Conserve and manage working forest landscapes for multiple values and uses;
2. Protect forests from threats; and
3. Enhance public benefits from trees and forests.

The following plan incorporates priorities and plan specific strategies developed for Connecticut's state forests. The following objectives were considered in the development of the James L. Goodwin State Forest Management Plan.

1. **Forest Ecosystem Health and Diversity** – The James L. Goodwin State Forest supports a diversity of forest types and age-classes reflecting a long history of active forest management dating back to the early 1900's. Management efforts focus on promoting forest health and resilience to both natural and anthropogenic disturbance.
2. **Wildlife Habitat** – Supporting nearly all of Connecticut's common woodland wildlife, and plant species, the James L. Goodwin State Forest also hosts occurrences of State-listed species and communities including: a State Special Concern reptile, several invertebrates, many listed herbaceous plants, and the Acidic Atlantic White Cedar Swamp Natural Community.
3. **Climate Change Mitigation through Sequestration and Storage** – Management of the James L. Goodwin State Forest will promote climate resilience, carbon sequestration and carbon storage. Sustainable forest management can maintain or enhance forest carbon sinks by sequestering CO^2 from the atmosphere and storing carbon in wood products which replace more carbon intensive materials such as concrete and steel.
4. **Environmental Protection** – Forested watersheds filter water before it enters rivers, lakes, and streams to ensure clean inputs into the hydrologic system. Utilizing Best Management Practices (BMPs) to preserve water quality while harvesting forest products further protects surface waters, enabling high quality aquatic habitat in tributaries and major river systems like the Natchaug River.
5. **Recreational/Health Benefits** – With over 19-miles of authorized trails, and 27-miles of combined trails and cart roads, the James L. Goodwin State Forest provides ample recreational opportunities for a diverse suite of user groups. The Friends of Goodwin Forest and CFPA collaborate on trail management and improvement projects to maintain the recreational resource.
6. **Economic Benefits** – This management plan prescribes 425-acres of commercial timber harvesting intended to achieve the broader goals identified in the plan. These sustainably harvested forest products provide jobs and raw material for a locally sourced, forest-based, green economy.
7. **Forest Protection** – Management planning incorporates strategies to mitigate forest damage associated with invasive plants, non-native insects, and wildland fire. Boundary marking additionally protects the forest from trespass and timber theft. Concepts of adaptive management provide a framework for changing strategies as needed to address new impacts from non-native, invasive species.

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 email at deep.forestry@ct.gov or by phone at 860-424-3630.

A. Location Map



B. Executive Summary

The James L. Goodwin State Forest was named for, owned, and managed by one of Connecticut's first professional foresters. For 51-years James L. Goodwin engaged in the acquisition and stewardship of Pine Acres Farm, all while acting as a leader in Connecticut's emerging forestry profession. Trained at Yale University, the nation's first professional forestry school, Goodwin practiced a wide range of forestry, agriculture, and land management activities prior to donating Pine Acres Farm to the people of Connecticut as The James L. Goodwin State Forest in 1964. Since that point the DEEP Division of Forestry has continued the mission of practicing sound, scientific forestry with a focus on forest education and demonstration. This updated 10-year Forest Resource Management Plan will guide DEEP Forestry through the implementation of practices to maintain and enhance forest conditions at the James L. Goodwin State Forest, while providing opportunities for forestry-specific education using the managed forest as a demonstration area.

Recommendations provided in the Forest Resource Management Plan were informed by a comprehensive inventory of the entire State Forest and subsequent targeted evaluation of stands with proposed management treatments. Current forest conditions such as size-class distribution and species composition are compared against desired future conditions. Work plans are developed to direct current forest conditions to better achieve desired future conditions. Meeting desired future conditions will support a more resilient forest, capable of meeting traditional objectives and contemporary habitat needs while remaining adaptable against vulnerabilities like climate change and invasive species.

This Forest Resource Management Plan prescribes over 900-acres of various land management activities to be implemented over the next 10-years to benefit the health, resilience, and sustainability of the forest. Silviculture will be one of the primary tools used to influence stand-level forest growth dynamics and habitat enhancement. Other tools, including herbicide treatments of invasive plants, forestry mowing and mulching projects, and prescribed burns will also help enhance habitat conditions and facilitate forest recovery from recent spongy moth impacts. Implementation of the silvicultural work plan will help maintain wildlife habitat, improve forest growth rates, initiate tree reproduction, enhance non-self-sustaining communities, decrease competition from non-native invasive species, and help the forest adapt to the challenges of climate change. Revenue from forest product sales – a byproduct of good land stewardship – are reinvested in forest maintenance and management, including controlling invasive species and upgrading infrastructure to better withstand future storm events.

C. History

The land currently known as the James L. Goodwin State Forest was once part of the original homelands of the Nipmuck Nation. These indigenous people of the northeastern woodlands lived in scattered villages throughout present-day central Massachusetts, northeastern Connecticut, and northern Rhode Island. They were careful planners, good stewards of the land upon which they lived and had early contact with traders and fisherman from Europe prior to broader colonization.

Following early European settlement colonists encroached on their lands, negotiated fraudulent land deals, and made laws in favor of broader European settlement. As a result, many Nipmuck people joined Metacomet's War against colonial expansion. Today, the Nipmuck Nation is one of New England's most historic, and largest native communities.

1. **Reason for acquisition**

In 1913, James Lippincott Goodwin, a recent graduate of the Yale School of Forestry, purchased 28-acres of abandoned agricultural land in the town of Hampton, Connecticut. This initial acquisition eventually grew into Pine Acres Farm, and subsequently, the James L. Goodwin State Forest. Further detailing the motivations behind his land acquisitions, James L. Goodwin, in 1951, wrote; "A forester should…own and manage a tract of woodland according to forestry principles and learn in a truly practical way what it means to cut timber conservatively and make it pay".

2. **Development of resource prior to and after acquisition**

Over each subsequent year following initial acquisition in 1913, additional acreage was acquired. Abandoned fields were planted to white pine, red pine, and Norway spruce, while existing hardwood stands were thinned. Forest fires were sparked from the railroad and brush burning, but resource protection increased as new roads were constructed, existing roads were improved with gravel, and fire protection ponds were established to assist in fire suppression. A steam-powered stone crusher proved useful in providing crushed stone from the abundant stone walls for road hardening. Early resource management ranged from timber and wildlife improvements to Christmas tree plantations, seedling wholesale, dairy farming, orchards, livestock, and other agricultural commodities. Agriculture helped to keep farm workers busy during the summer months, when work in the woods was slow, and supported the ongoing WWI effort. American chestnut salvage following chestnut blight and the early tending of softwood plantations yielded posts sold to the CT Highway Department. Hardwood stumpage was also occasionally sold, including in 1920, when 175,000 board-feet sold for $2,000. Christmas trees were sold from plantations, while hemlock boughs were sold for other Christmas decoration. An Amidon sawmill was later installed, and occasional pine stumpage was purchased from the Yale Forest in Union. All along, hardwood stands were thinned to produce logs for the mill, and firewood for the farm. Most of this work was done by farm workers, and occasionally the men from Civilian Conservation Corps (CCC) Camp Fernow in Natchaug State Forest – 5 miles north. Goodwin always employed a forestry-trained Forest Superintendent to manage day-to-day operations on Pine Acres Farm.

The Hurricane of 1938 had a drastic impact on Pine Acres Farm. For the previous 25 years James L. Goodwin had gone to considerable effort to establish forest plantations and improve the growth of hardwood stands on Pine Acres. The hurricane blew down roughly 75% percent of the trees in eastern Connecticut. Goodwin later described 50 acres of older red and white pine blow-down as "a tangled mass of trunks and branches". Forest records show it took the men of the CCC 4,208 hours to clear six miles of forest road. This hurricane salvage eventually yielded over 500,000 board-feet of lumber, nearly 3 miles of posts and roughly 1300 cords of firewood. It took four years to partially salvage the wind-thrown timber on Pine Acres before rot rendered the rest unusable. This volume was only a

small fraction of the total hurricane impact to Pine Acres Farm. Wind-thrown evidence of the 1938 hurricane can still be identified in many forested areas of eastern Connecticut today.

James L. Goodwin is widely considered to be the father of the Connecticut Tree Farm program. He was the first certified tree farmer in the state for his ownership and management of the Great Pond Forest (Tree Farm #1) and Pine Acres Farm (Tree Farm #13). He also served as Secretary and Treasurer of the local Forest Protective Association, Treasurer and Manager of The Shaker Pines Forestry Corporation, and his private consulting forestry firm, James L. Goodwin Associates, Inc. A thorough history of stewardship activities carried out on Pine Acres Farm from 1914-1951 may be obtained by reading A History of Pine Acres Farm by James L. Goodwin.

On September 4th, 1964, James L. Goodwin presented Pine Acres Farm to the people of Connecticut as the James L. Goodwin State Forest (GSF). The terms of this gift set aside the farmhouse, grounds, outbuildings and an additional 83 acres of forest land as the James L. Goodwin Conservation Center. The Conservation Center provides environmental education opportunities for all-ages through guided hikes, educational programs, and naturalist training. The initial 28-acre acquisition, purchased in 1913, encompasses the land surrounding the James L. Goodwin Conservation and Education Center. Up until 1993 the Center was under the direct oversight of the Division of Forestry. It is now part of the CT DEEP Division of State Parks and Public Outreach. The Center was managed cooperatively by agreement between DEEP State Parks & Public Outreach and Connecticut Forest & Park Association (CFPA) until the 2023 expiration of the agreement. The Center is supported by The Friends of Goodwin Forest 501(c)(3) who assist the Conservation Center and State Forest through volunteer efforts on trails, gardens, and educational programs. The 83-acre Conservation Center land is managed under a separate Forest Management Plan, in a manner intended to reflect sound private forestland stewardship.

3. Changes Since the Last Management Plan

The last forest management plan for GSF was approved in 2012 and silvicultural treatments to benefit forest health and diversity were implemented steadily from 2013-2016. In 2016 and 2017 portions of GSF were subject to repeat defoliation by spongy moth caterpillar. These defoliations coincided with State-wide drought, and the effects of combined multiple stressors contributed to severe oak mortality in portions of GSF and elsewhere on the landscape. Treatments implemented during the second half of the planning period were predominantly initiated under emergency planning procedures to address severe stand-level oak mortality and benefit oak forest resilience and public safety. A detailed list of the forest management activities carried out over the last ten years is below.

Year	Stand	Treatment	Acres	Location
2015	27-1	First-Shelterwood	33	Orchard Hill
2015	4-1, 4-2, 4-3, 4-7	Irregular shelterwood	15	Cedar Swamp Rd.
2015	2-7, 4-1, 5-5	Thinning	20	Old Rte. 6
2015	27-2	Thinning	10	Nutmeg Ln.

2016	27-5	TSI	9	Nutmeg Ln.
2019	32-1, 32-4	Irregular shelterwood	53	Station Rd.
2021	10-5	TSI	22	Airline Trail
2021	13-6, 18-1, 20-2	First-Shelterwood	97	11th Section Rd.
2021	12-4	Final Shelterwood	3	11th Section Rd.
2024	26-1, 28-1	Irregular shelterwood	64	Middle Rd. / Nutmeg Ln.
2025*	3-1, 4-11, 12-4	Irregular shelterwood	46	Cedar Swamp Rd.

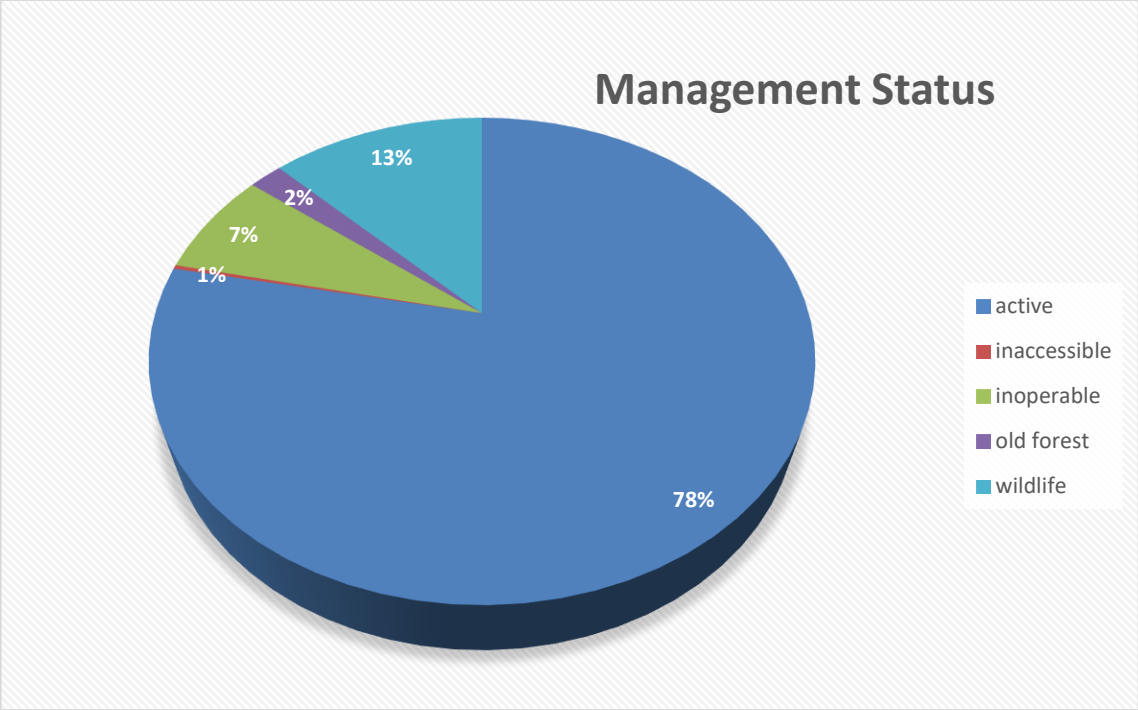
*Ongoing

D. Assessment of Resources & Infrastructure

1. Acres

The James L. Goodwin State Forest is comprised of approximately 1,853 contiguous acres in the towns of Hampton and Chaplin in Windham County, CT. To better facilitate management planning, a 354-acre portion of Natchaug State Forest (NSF) south of Station Rd / Morey Rd and east of Marcy Rd are included in the scope of this management plan. The total acreage of the Goodwin management unit is 2,207 acres. The boundary between the James L. Goodwin State Forest and the Natchaug State Forest is maintained, despite being an interior boundary, to depict the border between hunting-permitted, and hunting-prohibited tracts.

For management planning purposes the forest is divided into one of six 'management status' categories based on physical site, geographic, or biological features. Each category describes a given stands capacity for forest management or, in the case of 'recreation' and 'wildlife' categories, the DEEP discipline primarily responsible for the management of the area. The 'active' category is applied to forestland that can be actively managed using conventional forestry or wildlife management principles and equipment. 'Old Forest' stands have been set aside as predominantly passively managed forest reserves to allow for the natural processes of forest development to occur without the influence of forest management. 'Inoperable' lands contain site features such as steep slopes, excessively rocky terrain, or wetlands that prevent active management with modern equipment. 'Inaccessible' areas are functionally "landlocked" stands that cannot be accessed due to the deterioration of forest roads wetland configurations, or other factors which prohibit management access for modern equipment.



There are three wildlife impoundments totaling 245 acres. Each has its own dam and water control structure used for manipulating water levels. There are also an estimated 164 acres of forested wetlands within the State Forest. Wetlands are critically important landscape features due to the role they play in water filtration, pollutant mitigation, storm-water collection, wildlife habitat, and groundwater recharge and protection.

2. Present access (roads for public and truck roads) (gates)

a. Management Access

There are approximately 3.65-miles of truck roads which provide DEEP administrative and forest management access within the State Forest. The roads include Middle Rd., Nutmeg Ln., Cedar Swamp Rd., and Martin Rd (as named on a 1927 type map) in compartments 5, 10, 13, 14, 15. Interior roads are in fair to poor condition, exacerbated by high frequency, high intensity rain events. There are approximately 21 gates which deter public accessibility from management access roads.

b. Public Access

Public access to the James L. Goodwin State Forest is available solely from Town Roads in the Towns of Chaplin and Hampton. Primary access points are off Potter Rd., 11th Section Rd., W. Old Rte. 6, Estabrooks Rd., Cedar Swamp Rd., Station Rd., and Morey Rd. There are 10 distinct parking locations where forest users can park to access recreational trails. Despite good passenger vehicle access, parking opportunities for horse trailers is limited, and a few trailers can easily limit vehicle parking opportunities at common access points. It is proposed that a currently un-used section of 11th Section Road be brushed out and widened to support drive-in drive-out horse trailer access.

c. Road Maintenance & Construction

Maintenance of management access roads is coordinated collaboratively between DEEP State Parks and Forestry Divisions. Roads used for log truck access may be improved with gravel to enhance road base, achieve BMP standards, and better support trucking. These roads require periodic brushing out to maintain accessibility. Additional construction of new management access roads is unlikely during this planning period. Interior roads are deteriorating due to increased frequency heavy rains, lack of material and drainage ditch failures. The gated road accessible from W Old Rte. 6 is proposed to be improved with material and drainage work during the course of plan implementation.

d. Rights-Of-Way

There are no known rights-of-way affecting GSF. The State does not possess any deeded rights-of-way to cross over private land to reach the James L. Goodwin State Forest.

e. Boundaries

The James L. Goodwin State Forest has over 13-miles of boundary line. State Forest boundaries were previously marked in 2011. Boundaries were refreshed in late 2023 by a DEEP Forestry Seasonal Resource Assistant. Although most of the boundary evidence was easily observed and re-marked, DEEP Forestry is in the process of addressing the few circumstances of missing boundary evidence identified in 2023 with Land Acquisitions and Property Management (LAM).

f. Encroachments

Forest boundaries were maintained in 2023. One area of potentially encroaching lawn is currently being investigated by DEEP Forestry and LAM. The Forestry Division will report the encroachment to Land Acquisition and Property Management once a field determination is made.

g. Acquisition Goals

There are several desirable privately-owned parcels which would constitute desirable conservation acquisitions in the vicinity of the James L. Goodwin State Forest. Parcels to be prioritized for acquisition would be undeveloped land which abuts the State Forest on one or more sides. There are ten tax parcel inholdings entirely surrounded by James L. Goodwin State Forest. Nine of these inholdings are developed house lots. One inholding on the east side of the Airline Trail, and the west side of Pine Acres Lake would be a desirable inholding acquisition for DEEP. Any new forest real estate offerings observed in the vicinity will be referred to the office of Land Acquisition and Property Management.

3. Inaccessible areas (acres) and access potential

Governors Island – 4-acres – and a second 2-acre island in Pine Acres Lake are the only inaccessible portions of the State Forest. Governors Island is accessible for public recreation, the inaccessible designation applies only to forest management with conventional equipment.

E. Special Use Areas

1. Lakes and ponds

All lakes, ponds, and marshes are potential water sources for DEEP Forest Fire Control.

Pine Acres Lake – Pine Acres Lake is a 196-acre wetland impoundment created in 1936 by damming Cedar Swamp Brook. The lake provides habitat for wildlife, including migratory waterfowl, and the margins of the lake support important wetland habitats such as Atlantic White Cedar Swamp. The dam is located at the south end of the lake where the outflow passes through a water control structure. Pine Acres Lake has a watershed of 1,055 acres of primarily forested land. The lake also supports populations of American eel, largemouth bass, yellow perch, brown bullhead, pumpkinseed, golden shiner, redfin pickerel and bluegill sunfish. Pine Acres is mainly used for wildlife observation and study. The lake also contains two islands near the northern end, Governor's Island and a second smaller unnamed island. The water control structure, spillways, and pedestrian bridges over Pine Acres Dam were reconstructed by a private contractor in 2021 – 2022. The State Parks Unit operates the water control structure and mows the dam to ensure it remains free of woody vegetation.

Black Spruce Marsh and Brown Hill Marsh – Black Spruce Marsh is a 30-acre wetland impoundment and Brown Hill Marsh is a 19-acre wetland impoundment, both constructed with Wildlife Division funding and managed to provide wetland habitat for wildlife. Migratory waterfowl habitat is the primary objective at these sites. These impoundments each feature a dam and water control structure at the outflow. Most recently, a pair of inline water control structures were installed at Black Spruce Marsh in 2013; and a drop inlet water control structure was installed at Brown Hill Marsh in 2006 and repaired in 2019. Coordination between the Wildlife and Parks Divisions is required to manage the water depth to achieve habitat objectives. Maintaining relatively shallow water depth in these impoundments will sustain an abundance of herbaceous emergent vegetation that provides suitable habitat for waterfowl and other waterbirds. Controlling beaver is necessary to avoid damage to dam and water control structure infrastructure and to sustain important wetland habitat. Both marshes support populations of brown bullhead and golden shiner. The Wildlife Division and State Parks Unit cooperate to operate these water control structures and to mow the dams to ensure they remain free of woody vegetation.

2. Rivers and Streams

There are six perennial drainages which occur throughout GSF. Two of the drainages are inputs to Pine Acres Lake, one from the north and the other from the east. One represents the outlet from Pine Acres Lake to Cedar Swamp Brook, a tributary of the Little River located just south of Rte. 6. Two drainages are outputs associated with Black Spruce Marsh. One is the marsh outlet which flows into Turner Brook, exiting the forest to the west. The other, while not a direct output of the marsh, is located within three hundred feet and is most likely hydrologically linked by groundwater level. Whitman Brook is the sixth perennial drainage. This brook originates as red maple lowland in Compartment 32 Stand 3. Flowing to the north and west this drainage crosses the Natchaug Blue Trail

supporting a series of minor cascades as it exits the forest and crosses Marcy Rd. before entering the Natchaug River.

3. **Cultural Sites**

James L. Goodwin Conservation Center – The Goodwin State Forest supports, by deed, the 83-acre James L. Goodwin Conservation Center which is operated cooperatively by the CT DEEP Division of State Parks and Public Outreach. The programs carried out at the Center are coordinated by the State Parks Public Outreach Program Director, and education / Naturalist staff. The Center offers frequent educational outreach programs covering a variety of nature-based topics, using the gardens and the State Forest grounds to facilitate nature-based learning. These programs target a range of age groups including children and adults. More information can be discovered by monitoring the Conservation Center website.

Richard D. Haley Native Plant Wildlife Gardens – The spacious grounds surrounding the Goodwin Conservation Center include 1.5 acres designated as the Richard D. Haley Native Plant Wildlife Gardens, named for Center Director from 1994-2003; Richard D. Haley. In these well-maintained gardens visitors can see and learn about dozens of native trees, shrubs and perennials that offer food and cover value for a suite of wildlife species. This area is managed by Master Gardener volunteers of The Friends of Goodwin State Forest.

Governors' Island – Governors' Island – Compartment 12 Stand 7 – represents a significant ecological and cultural resource to the people of eastern Connecticut, and the users of the James L. Goodwin State Forest. This isolated island located in the north end of Pine Acres Lake has a diverse human and ecological history. In early colonial history this site was said to be one of the last eastern Connecticut encampments of the Nipmuck people prior to their forcible extirpation from the region. Governors' Island received its name as it was later owned by Connecticut Governor, John Cleveland, originally from Hampton. It was said to support an old-growth pine-hemlock forest prior to the Hurricane of 1938. Post-hurricane it was planted to red pine and white pine. During the summer of 2011 volunteers from The Friends of Goodwin State Forest donated 328 hours of time in the design, planning and construction of a migratory bird observation deck on the west side of the island.

Historic Sawmill Site – In the fall of 1930 James L. Goodwin installed a Willington, CT-built Amidon sawmill on Pine Acres Farm. Previously, all logs cut in forest operations on Pine Acres required a portable sawmill, or transportation to a custom mill 15 miles away. A small mill building was erected north of Potter Rd. just west of the present-day Air Line Trail. Goodwin operated a retail and wholesale sawmill business here for 30 years.

Foundations – James L. Goodwin assembled Pine Acres Farm by purchasing many smaller parcels with houses and barns. As a result, there are numerous visible stone foundations located throughout the forest. These foundations are often all the remaining evidence of historic farm sites and their associated homes and outbuildings. These pieces of cultural evidence are valued components of this forest environment.

Charcoal Production –The production of charcoal from wood products fueled the iron smelting process, and certain industries of the industrial revolution. Throughout the 19th century forests in Connecticut were repeatedly clear-cut for wood fiber. The men who cut wood and tended the massive smoldering charcoal mounds were called Colliers. They lived in the forest and worked a small geographic area, tending up to three charcoal mounds. After the charcoal was removed and trucked to market, the circular remnants of these mounds can be identified in the forest today, often along with chimney structures, they are the only remaining evidence of this historic forest use.

There is a demonstration site showcasing the manufacture of charcoal hearth in compartment 3 stand 1 off the red/white trail near its junction with Cedar Swamp Road.

Christmas Tree Plantations – In its early history, Pine Acres Farm supported an active Christmas tree operation. Pine Acres forest crews planted 20,000 Norway spruce at 3'x3' spacing as early as 1921. Although the spacing proved too close for efficient growth, Goodwin continued with the production of Christmas trees. Trees from these plantations were some of the first forest products sold from Pine Acres Farm under Goodwin's oversight. The Christmas tree plantation in Compartment 8, Stand 4 remained active as a demonstration area until 1997. The area comprised 14 acres and supported 75% white spruce, 15% Douglas fir, and 10% Fraser fir, (per Sherwood R. Raymond). The remaining Christmas trees are widely spaced, and the area will continue to be periodically mowed by the Wildlife / Parks Divisions. Invasive plants will be controlled, and management action will aim to maintain this area as shrubland habitat. The field is used for public outreach walks focused on birds, and a network of mowed paths crisscross throughout the field. To maintain integrity of the habitat and reduce disturbance to nesting birds, one loop path would be more appropriate. The southwest corner of the field, which has been maintained as lawn, would be better suited as an ecotone, providing transitional shrubland habitat between the field and the forest. Forestry will propose removing the remaining softwood trees and initiating a prescribed burn plan to enhance existing grassland shrubland habitat, and aide in the long-term control of invasive plants.

Orchard Hill – In 1927 Goodwin purchased 185 acres located several miles north of Pine Acres Farm. He added to this acquisition in 1931 with the purchase of 143 additional acres. These parcels together formed the beginnings of the Orchard Hill Forest subdivision. Encompassing the northern boundary of Pine Acres Farm this tract initially supported the Winslow Farm, a house and the foundation of a fallen barn. In 1932 Goodwin removed the house and constructed a stone fireplace, lean-to, and picnic area. In subsequent years the open field portions of Orchard Hill were used for apple orchards, and space to grow other agriculture commodities. In 1936, 18,000 Red Pine seedlings grown 4-6 feet high on Orchard Hill were sold to The Bay State Nurseries of Framingham, Massachusetts. Evidence of the Winslow farm site can still be identified from the Blue-Trail near Orchard Hill.

Air Line Trail – The current location of the Air Line Trail was once owned by the New York, New Haven, and Hartford Railroad Company. In 1924, sparks from a passing train ignited a forest fire which grew to 43 acres and burned in red & white pine plantations adjacent to the rail-bed. The following spring

the damage was assessed, and the land was prepared for re-planting. The railroad paid Pine Acres Farm $2,336 in damages incurred to the pine plantations, which must have been an early example of petitioning industry for commodity value of a forest resource destroyed by fire. The railroad bed was renovated by the Connecticut National Guard in the 1990's. This corridor now falls under the jurisdiction of CT DEEP Division of State Parks and Public Outreach and is managed for multi-use outdoor recreation uses including snowmobile traffic in the winter.

Historic Forest Roads – Shortly after the acquisition of Pine Acres Farm in 1913 workers began to improve the forest road system to facilitate access to remote stands and allow fire protection opportunities. In 1928 the farm purchased a stone crusher, steam boiler and engine from the Town of Tyringham, Massachusetts. Housed just west of the railroad, the machinery was used to convert old stone walls into crushed gravel for use on the forest road system. With every acquisition the forest road system grew more expansive. The availability of local inexpensive gravel benefited the establishment of sturdy forest roads which continue to support access for forest management, fire protection and non-motorized outdoor recreation. Gravel roads require regular maintenance including gravel additions, ditch maintenance, crowning, and erosion control.

4. Recreation and Scenic Sites

Pine Acres Lake – In 1933, after witnessing the habitat alteration caused by beavers which dammed a portion of Cedar Swamp Brook, Mr. Goodwin suggested creating a lake by constructing a dam at the south end of Cedar Swamp Brook, adjacent to the state highway. In the fall, work was started to construct a dam spanning the width of Pine Acres Lake (1,000 feet). The dam took two years to complete and was reinforced by a cement core for 400 feet along the state highway. Upon its completion around 1936, the Farm was left with a 196-acre lake with an average depth of 4-5 feet. As noted in the critical habitat section, the lake displaced a large Atlantic White Cedar Swamp. The dam and spillways were reconstructed by a private contractor in 2021-2022 and a new water control structure was installed. The water level of Pine Acres Lake is controlled by the State Park Unit (in cooperation with the Wildlife and Forestry Divisions) by adjusting the water control structure and is set to provide suitable wetland habitat for wildlife and to sustain and expand Atlantic White Cedar Swamp. In addition to providing wildlife habitat, the lake is primarily used for wildlife observation.

In July 2011 a migratory bird observation platform was constructed on Governors' Island. The platform was constructed by The Friends of Goodwin State Forest. Locally grown and processed wood products were harvested from State Land, milled by DEEP, and donated to the Friends for use in construction. Boating access for kayaks and canoes is available in the southwest corner of the lake via Potter Road. There is a second observation deck adjacent to the boat launch on the Goodwin Conservation Center land which was also constructed in 2011 through a collaborative effort between the Wildlife Division and the DEEP Engineering and Agency Support Services Unit. The spillways were rebuilt in 2022 including the addition of new water control structures. DEEP Forestry and Wildlife Divisions promote maintaining low water levels to support herbaceous emergent vegetation, and conditions for Atlantic white cedar.

Youth Group Camp Sites - The Goodwin Conservation Center maintains a youth group camping site made available to local scout's troops, home school groups, environmental clubs, and Envirothon teams. Eligible groups must meet specific requirements and complete an application to use the area. A Goodwin Youth Camping brochure details additional features of the site.

Letterboxing – In 2003, to honor the Centennial of the State Forest system, the Division of Forestry established a series of letterboxes throughout the State Forests. In letterboxing, follow a series of written clues which guide you through the forest as you visit interesting locations and collect unique stamps to mark your visit. Visiting five unique letterbox sites earns participants a patch. Visiting each of the letterbox sites and you will receive a walking stick from the Division of Forestry. The letterbox in the forest is maintained by the Division of Forestry. Additional letterbox-style attractions or geo-caches may not be placed at GSF without the written permission of DEEP.

Ropes Course (Discontinued) – In the past, Goodwin State Forest supported a ropes course which was established and maintained by Eastern Connecticut Educational Services Center (EASTCONN) under a Special Use License with DEEP starting in 2008. This area was established to provide leadership and team-building opportunities to students. The ropes course was in Compartment 8 Stand 3. The area has been unmaintained in recent history and the ropes course features have deteriorated significantly. There is substantial blow down and oak mortality affecting the course and in the vicinity. Currently it would take a significant time investment by EASTCONN & DEEP to restore the site and user safety in the vicinity. The ropes course features and associated hardware should be removed from the site as time and resources allow.

5. Critical Habitat

There is one known occurrence of a recognized Connecticut Critical Habitat in the management area. Its community type is Acidic Atlantic White Cedar Swamp (AWC swamp). AWCs are seasonally flooded, or rarely, saturated forests that are dominated or co-dominated by Atlantic white cedar and include red maple, yellow birch, hemlock, white pine, highbush blueberry, swamp azalea, and sometimes rosebay rhododendron. They have a variable shrub and herbaceous layer, which can range from poorly developed to well developed, to diverse, depending upon canopy light penetration. They are unique ecosystems recognized as a conservation priority throughout their range in the eastern U.S. In Connecticut, they occupy cumulatively about 4,100 acres, or slightly more than 0.1% of the land area of the state. AWC swamps are considered one of the 13 most imperiled ecosystems in Connecticut. Most are considered to be in poor condition, due to very low cedar regeneration, except in some streamside and lakeside sites without extreme water level fluctuations. Hemlock and red maple are gradually replacing the cedar. The community subtype in the project area is Cedar/Hardwood. As the name suggests, this swamp subtype is a mixed evergreen-deciduous forest, as opposed to a monotypic or sub-monotypic stand of AWC.

The occurrence in this project area occupies approximately 4 acres just northeast of Governor's Island, and it is informally known as the Pine Acres Cedar Swamp (as likely also was the larger original AWC swamp that was here). Based on a review of historic aerial photos and maps, it appears that the

existing Pine Acres Cedar Swamp is a small remnant of an AWC swamp that appears to have occupied roughly 160± acres or more in 1934. Most of this AWC swamp was converted to non-forested wetland by the damming of Cedar Swamp Brook and creation of Pine Acres Lake sometime around 1936. This illustrates one of the principal threats to AWC swamps, long term changes in hydrology caused by human activity, such as dams and ditching. Hydrology changes that impact mature AWC swamps are also caused by beaver, but these changes are often on a smaller scale, can be relatively temporary (especially if the beaver are removed), and in at least some situations the tree mortality encourages AWC reproduction (after the beaver have vacated the site).

DEEP Forestry will engage in a feasibility assessment to determine whether conditions in the northern extent of Pine Acres Lake are still environmentally suitable to AWC regeneration and persistence. This assessment may include soil analysis to determine if the soils are suitably acidic and of a soil fertility regime which will support AWC. If soils appear suitable to AWC site needs, Forestry will employ non-commercial cutting strategies to release AWC from neighboring competition and encourage conditions for cedar to regenerate on hummocks.

Pine Acres Cedar Swamp is, the only known Critical Habitat that occurs within the project area, but there is potential for one or two others: Medium Fen and/or Poor Fen. One or both of these communities (both colloquially known variously as “bogs”, “peat bogs” in some cases, and “quaking peat bogs”, in some cases) may occur in portions of the large area of non-forested wetland at the north end of Pine Acres Lake that once supported AWC, before the creation of Pine Acres Lake. Occurrences of both of these communities are often found in close association with AWC swamps, and, depending on the acidity and fertility of the substrate, may have developed in some of the unforested wetland areas in which the AWC was flooded out. Based on a review of recent aerial photos there appear to be some areas that may support the Shrub Thicket or Subshrub Subtypes of one or both of the fen community types. Exploration of the large unforested wetland and survey for these Critical Habitats should be encouraged. A large number of State listed plants and invertebrates occur in Poor and Medium Fens in Connecticut. Maintaining a relatively shallow water level within Pine Acres Lake will help maintain or restore these unique wetland communities.

6. Natural Areas

There are currently no legislatively designated Natural Areas within the James L. Goodwin State Forest.

7. Old Forestland Management Sites

There was one Old Forestland Management site established by the 2012 management plan; Compartment 19, Stand 1. This is a mixed upland-hardwood stand exhibiting multi-aged (uneven-aged) forest structure. This biologically diverse site is oriented on a northwest-facing slope supporting predominately Woodbridge fine sandy loam soils. A forest type map produced in 1927 shows the area as an all-aged forest supporting over 4,500 board-feet per acre. The 45-acre stand appears to have supported forest cover for more than 150 years with numerous biological legacy trees which have largely survived widespread stand-replacing disturbances like the Hurricane of 1938. The most recent human disturbance in the stand was likely American chestnut salvage in the 1920’s. The stand

experienced a moderate-intensity oak mortality event following defoliation by spongy moth caterpillar and drought 2016 – 2018. The historic and recent disturbance histories will establish a matrix of small groups supporting vegetation diverse in both species composition and age-class distribution. Despite the oak mortality event, oaks remain dominant in this already-diverse stand. The southern half of the area appears to have been more severely impacted by oak mortality. Still, throughout the stand there are large diameter red oak legacy trees, two age classes of sugar maple, specimen-sized yellow poplar, healthy eastern hemlock, large diameter yellow birch, American basswood, aspens, and evident tip-up mounds. Small-moderate scale canopy-gap replacement is driving forest succession in this stand. Despite being relatively protected from blow-down, wind-throw events still occur on a periodic basis. Coarse woody material is present and consists of multiple species and a range of decay classes. The stand is predominantly unaffected by invasive species, the area is only open to non-motorized use, and it is generally devoid of bisecting trails. This stand borders Turner Brook, the outlet from Black Spruce Marsh.

8. Research Areas

The Connecticut Agriculture Experiment Station (CAES) has ongoing, long-term Blue-Ribbon Forest monitoring plots established in Goodwin State Forest. Two fixed-radius plots have been established and are intermittently re-measured to assess forest health, growth rates, and compositional change over time. The plots are located within Compartment 17 and represent some of the most long-term forest research plots in Connecticut.

Scientific Collectors permits are issued by DEEP Wildlife for research on State Lands. Applications for research activities are reviewed by and commented on by Forestry as part of a multi-disciplinary review process within DEEP.

9. Miscellaneous

DEEP Forestry sells Forest Product Harvest Permits to facilitate the small-scale non-commercial use of various non-timber forest products from State Land. These include permits for the harvest of witch hazel brush, laurel boughs, fence posts, poles and pilings, and maple tapping rights. Homeowner cordwood cleanup permits are sold on an as-requested, as-available basis, based on availability of downed wood and DEEP desire to remove downed wood from a given area. Forest product permit requests can be made to the DEEP State Lands Forester assigned to the applicable unit.

DEEP Service Forestry has established a woodland management demonstration area / self-guided tour which guides users through a series of past forestry projects while describing the goals, objectives, and outcomes of work. The tour is facilitated by a web page and interactive map. The self-guided tour includes a map of the State Forest with points along the trail system which showcase past forestry projects. By following the self-guided tour or scanning a QR code at each individual tour stop, participants can learn more about past forest management applied at the site through narrations, photos and additional reference information. Future forestry projects can be added to the tour, and the plan incorporates the establishment of new stops as plan implementation occurs. The demonstration site concept is well-aligned with the mission of the James L. Goodwin State Forest

which identifies forestry education and demonstration as primary objectives dating back to the donor wishes of James L. Goodwin. The demonstration sites can be toured in a self-guided fashion by following the map and the on-screen instructions. DEEP Forestry will also use the trail to showcase different management options to private landowners and professional forest practitioners in Connecticut. Portions of the demonstration area utilize past forestry treatments to showcase different silvicultural strategies and stages of forest development. Additionally, DEEP will initiate a series of forest management treatments to showcase emerging strategies to promote climate-adapted forest responses and balance carbon storage and sequestration goals at the stand-level. There are three ways to access the woodland management demonstration area/tour: 1) scan the woodland management demonstration area QR code from the main kiosk at the Goodwin Conservation Center, click the Goodwin Demonstration Forest Tour icon and click 'start tour', 2) from Goodwin Conservation Center, hike the Blue/Yellow blazed trail southeast for 100-yards until encountering a sign/QR code for tour stop 1. Scan the QR code to learn about the first stop and follow the map to subsequent stops. 3) Type "goodwin.stqry.app" into your internet browser and follow the directions on-screen.

F. Forest Ecosystem Health & Diversity

1. Landscape Context

The James L. Goodwin State Forest represents the southern extent of a semi-contiguous block of conserved large core forest which extends north into Massachusetts, and encompasses numerous State, University, and Land Trust parcels. Natchaug State Forest, Yale-Myers Forest, Bigelow Hollow State Park, Nipmuck State Forest, Mashamoquet Brook State Park, and private conservation land occur within this "Quiet Corner" of Connecticut. GSF itself represents the southern extreme of a nearly unfragmented block of State Land extending between CT Rte.'s 6 & 44. This forested corridor provides north-south habitat and landscape connectivity for plants and animals to migrate between suitable habitats and will play an important role in mitigating the effects of climate change. A balanced distribution of young, old, and structurally diverse forest habitats will promote long-term forest resilience and plan for forest sustainability while supporting a range of landscape-level wildlife utilization opportunities.

2. Vegetative Condition

The upland forest communities at GSF are dominated by the Oak – Hickory Forest cover group. The oak family specifically has experienced significant stress in recent years due to repeated defoliations by spongy moth caterpillar, drought, and secondary stressors. There is widespread, variable intensity oak mortality throughout the entire State Forest and much of eastern Connecticut in general. Silvicultural work over the past 6 years has focused on public safety along roads and trails and promoting oak resilience through initiating stand-level regeneration in areas where overstory oak mortality exceeded acceptable levels. Many additional stands affected by mortality of the dominant age-class have gone untreated, and there is a notable composition shift toward shade-tolerant black birch and red maple in many of the heavily affected areas.

Due to the scale of unforeseen regeneration harvesting due to spongy moth, and previous silvicultural work, size-class distributions are approaching target levels set in the 2012 Forest Management Plan. Additional regeneration harvesting will be planned in this cycle, but the balanced silvicultural work plan should not change size-class diversity significantly over the next 10-years. Much of the forestry work prescribed involves rehabilitating stands from recent disturbance, performing TSI on recent harvests, facilitating invasive plant control, tending small softwood plantations, initiating stand regeneration where necessary to maintain size-class distributions, and rehabilitating or regenerating declining stands.

3. Forest Type by Size Class Tables

Forest type and size class – all forest land

Type	Seedling-Sapling	Saw – Seed or Sap	Pole	Sawtimber	Multi-Aged	Total
Elm – Ash – Red Maple	0	0	19	143	0	**162**
Atlantic White Cedar	0	0	4	0	0	**4**
Norway Spruce / Introduced Larch	0	7	11	35	0	**53**
Beech – Birch - Maple	0	0	0	0	23	**23**
Oak – Hickory	303	180	241	685	84	**1,493**
Oak – Pine	2	0	8	52	0	**62**
White Pine / Hemlock	0	5	6	109	0	**120**
Total Acres	**305**	**192**	**289**	**1,024**	**107**	**1,917**
Percentage (%)	**16%**	**10%**	**15%**	**53%**	**5%**	

Forest type and size class – actively managed forest

Type	Seedling-Sapling	Saw – Seed or Sap	Pole	Sawtimber	Multi-Aged	Total
Norway Spruce / Introduced Larch	0	7	11	35	0	**53**
Beech – Birch - Maple	0	0	0	0	23	**23**
Oak – Hickory	303	180	251	683	32	**1,449**
Oak – Pine	2	0	8	52	0	**62**
White Pine	0	0	6	109	0	**115**
Total Acres	**305**	**187**	**276**	**879**	**55**	**1,702**
Percentage (%)	**18%**	**11%**	**16%**	**51%**	**3%**	

4. Forest Type by Management Prescription (Areas to be Managed in this planning cycle)

Type	Forest Stand Improvement	Thinning	Shelterwood	Irregular shelterwood	Final Shelterwood	Selection Harvest	Seed Tree	Rx Burn	Mowing Mulching	Total
Elm – Ash – Red Maple	2	0	0	0	0	0	0	0	0	**2**
Atlantic White Cedar	4	0	0	0	0	0	0	0	0	**4**
Norway Spruce / Introduced Larch	0	33	0	0	0	0	0	0	5	**38**
Beech – Birch – Maple	0	0	0	0	0	19	0	0	0	**19**
Oak – Hickory	382	25	92	142	48	0	0	149	34	**872**
Oak – Pine	2	0	19	0	0	0	0	0	2	**23**
White Pine	0	57	0	0	0	15	0	0	12	**84**
Grassland	0	0	0	0	0	0	0	19	3	**22**
Total	**390**	**115**	**111**	**142**	**48**	**34**	**0**	**168**	**56**	**1,064**

5. Forest Health

Invasive plant species have established a strong foothold in portions of the forest. Invasive plants can out-compete native vegetation and nearly preclude tree regeneration at moderate and high density. They leaf-out early, grow late into the growing season, produce prolific seed, and are not palatable to browsing wildlife. Barberry, for one, has shown to have a positive correlation with deer tick abundance and Lyme disease positivity rates. Invasive plants also displace native vegetation that serve as important host plants for invertebrates, which are an important component of the food web. Understory vegetation will require an aggressive management approach through the life of this plan. Management techniques will entail the use of mechanical, chemical, grazing, or combined treatments applied by certified DEEP personnel or licensed contractors. A 135-acre invasive plant control project facilitated by DEEP Forestry and carried out by a private contractor began in 2024 and will subsequently continue as a multi-year treatment. The Friends of Goodwin State Forest group also have a list of volunteers willing to assist in invasive plant eradication in the Forest which DEEP may draw from for targeted work parties.

Overstory health is tenuous in many of the older oak and ash-dominated stands. There are high densities of standing dead trees in some forest interior locations. Even oak stands that experienced low to moderate impact have been structurally altered, and previous management trajectories have changed.

Emerald Ash Borer, an invasive insect native to Asia, was identified in Chaplin in 2016 and in Hampton in 2019. The insect has killed millions of ash trees in the US since its introduction in Michigan in 2002.

Ash occurs at moderate density in portions of GSF due to the rich soils. Many road and trail-side ash trees were removed during Agency-wide hazard tree efforts starting in 2018, and roughly 450 dead oak and dying ash trees were removed as hazard trees in 2023. Ash stands supporting moderate to high density invasive plant populations will be prioritized for invasive plant control in the early implementation of the plan.

The issue of oak resilience has been exacerbated by the recent oak mortality events brought on by spongy moth defoliation, drought, and other factors. There is still a general lack of oak reproduction in portions of GSF. In areas where oak canopies have declined due to spongy moth, black birch and red maple sub-canopies continue to limit oak seedling graduation. Red oaks produced a good acorn crop in 2021. Acorn distribution coupled with mortality may result in some seedling recruitment, but seedlings may still be subject to shade from middle canopy trees. Healthy turkey and deer populations also affect acorn mast crops which are eaten before germination or consumed as browse once above the winter snow depths. It has been estimated that the GSF area supports roughly 89.4 deer per square mile, compared to 34.2 deer per square mile on the surrounding landscape. Small natural canopy gaps or low intensity silvicultural treatments favor the growth of black birch, red maple, and other shade tolerant and lesser-browsed species. Due to these long-term challenges regenerating oak, high deer densities, no permitted hunting, and recent disturbances which have affected oak forest health, oak resilience is a critically important objective in this management planning cycle.

As a result of this broad overarching goal, and the mission of the James L. Goodwin State Forest as an education and demonstration forest, DEEP Forestry will initiate the installation of a slash wall around the perimeter of an appropriate commercial harvest scheduled within this planning cycle. Slash walls are a new technique in regeneration harvesting intended to physically exclude deer and deer browse from recent regeneration harvests for a period of time to benefit regeneration success, increase species richness, and enhance stem density. Selective browsing of desirable tree and shrub regeneration by white-tailed deer often results in the dominance of lesser-preferred and unpalatable species. In eastern forests, dominance of these generalist tree species often results in less diverse, less productive, and less valuable forests over time. Slash walls exclude deer for a period of roughly 8-10 years following harvest and have shown to allow for a more diverse assemblage of plants to become established during early stand development. The concept was first employed at Cornell University Arnot Forest, and over a dozen slash walls have been constructed in New England and New York between 2017 – Present. Data has shown seedling height growth outside of the slash wall (unprotected from browse) is only 36%-54% of the observed height growth inside the wall perimeter. Costs have shown to average $283 per harvest acre. Slash wall experimentation by DEEP will introduce a low-cost method of temporarily excluding deer browse to benefit regeneration success of desirable species, while utilizing the project site as an education and demonstration tool to communicate forestry concepts and study the outcomes of management activities.

Walls are constructed during the harvest operations by the logging contractor using low-value trees and tops, from generally within 100-feet of the wall site. Walls are constructed to be 10-feet high, approximately 20-feet wide at the base, and stacked densely with wood to prohibit passage and deter

climbing by deer. Gate structures are installed using abutting tree stems to allow personnel or emergency access and are filled with wood and brush unless needed. The stacked brush in the wall breaks down over time but protects regeneration during critical years during stand re-initiation. James L. Goodwin State Forest is ideally suited to demonstrate slash wall benefits due to oak regeneration goals, a documented high deer density, prohibition of public hunting, and educational objectives.

G. Silvicultural Strategies & Climate Change Mitigation

1. Forest Carbon Science

Forests play an important role in mitigating the effects of climate change. Trees and other green plants absorb carbon dioxide from the atmosphere for use in photosynthesis. They release oxygen and store carbon in trunks, roots, branches, and leaves. Dead trees store additional carbon which is transferred to the soil when snags fall and gradually decompose. The soil acts as its own carbon sink which on average stores over 30% of the combined carbon pool in regional forests.

In their importance toward mitigating climate change, forests perform two important processes; sequestering carbon dioxide, and storing carbon, often referred to as “sequestration” and “storage”. However, the forest’s ability to perform these functions is maximized at two different points during forest growth and development. Sequestration potential is maximized in vigorously growing forests which are efficiently photosynthesizing and rapidly adding wood. Typically, this occurs when a forest is aged 30-70 years. Carbon storage benefits peak in old forests which support large diameter trees and accumulations of dead and downed wood. These attributes begin to appear in 70-year-old forests, but benefits can peak at ages well-over 100 years old.

The Division of Forestry believes in pursuing a diversity of forest carbon management strategies to meet the demands of a changing climate while also accomplishing other contemporary land management objectives. Forest products also play a critical role in mitigating climate change. Value-added wood products from responsibly managed forests store carbon for decades and substitute for more carbon-intensive building materials. Tree removals from sound forest management allocate growing space to higher quality trees, improve sequestration and wood production rates, add structural complexity, improve wildlife habitat, and allow for enhanced resilience against the expected impacts of climate-change. Conversely, the Forestry Division allocates unmanaged old forest sites which develop without human influence come to store high volumes of carbon despite lower sequestration rates.

2. Forest Resilience

Resilience can be thought of as ecological elasticity, or the ability of a forest system to bounce back after disturbance. This ability is enhanced by ensuring forest representation from a wide variety of different age-classes and species mixtures. Forests with composition weighted too heavily toward one species, family, or age-class are the most vulnerable to any disturbance, including climate change. Diversifying forest composition and age structure promotes forest resilience. This is specifically true when favoring future-adapted species and discouraging climate-threatened species during forest

operations. In addition, maintaining two or more age-classes within stands will allow for multiple disturbance recovery pathways. Complex forest structure and balanced age-class distributions will help promote forest resilience in both managed and unmanaged stands.

3. Expectations: Desired Future Conditions

It is the intent that GSF be managed to maintain a balance of forest structural conditions promoting forest sustainability and wildlife habitat diversity, while offering numerous and diverse examples of the varied forest management strategies applicable on the Connecticut landscape. Stands will be allowed to mature through all phases of stand development while receiving periodic silvicultural treatment to enhance growth and ensure the timely graduation of trees to successively larger size-classes. Management will strive to achieve the desired level of residual stocking in treated stands. Maintenance efforts will continue to improve forest infrastructure and minimize competition from invasive plants.

4. Management Systems: Even Aged & Uneven-Aged Stands

A 100 – 120-year rotation will be applied to all even-aged, Oak – Hickory dominated stands at GSF. The extended rotation stands will apply predominantly to red oak and white oak stand types. Shorter-lived black oak and scarlet oak will be managed on a 100-year rotation. White pine will generally be managed uneven-aged, but any stands subject to even-aged management can be considered extended rotation stands, where rotation age may be 120-years or longer depending on the health and quality of the growing stock, and conditions in the stand at large.

A 15-20 year cutting cycle will be applied to stands managed on an uneven-aged basis. Planning with a variable cutting cycle allows for the inclusion of qualitative decision-making during management planning, and flexible implementation during the planning period.

5. Sustainability

Forest sustainability is calculated on a plan-by-plan basis to document and describe the careful accounting that foresters perform to ensure the needs of contemporary society are met without compromising the ability to continue meeting those needs into the future.

The James L. Goodwin State Forest has roughly 1,702-acres which have the potential to be actively managed using traditional forestry practices. Excluding acreage which is unlikely to be managed using even-aged methods due to composition or structure leaves approximately 1,502-acres of even-aged forest that has the potential to be actively managed using even-aged silviculture. Applying an extended rotation of 120-years to the entire plan area, forest management treatments should aim to regenerate 12.5-acres per year, or 125-acres over the 10-year planning period. This maximum level of even-aged regeneration release harvesting coupled with judicious thinning in stands of all size-classes and preparatory cuts to plan for future regeneration, will allow for the maintenance of the desired size-class distribution and the timely graduation of stands into successively larger size-classes growing increasingly more valuable forest products.

6. Silvicultural Prescriptions

Silviculture is the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis. These diverse forest values include wildlife habitat, timber and non-timber forest products, carbon sequestration and storage, clean air and water, ecological restoration, and outdoor recreation. Silvicultural systems guide forests into even-aged or uneven-aged pathways. Within each system, there are numerous methods of tending and regenerating to achieve a desired stand composition and structure based on broader goals. Appropriate treatments will move stands forward through their natural development, where possible, mimicking the ways natural disturbances change forests over time.

The silvicultural work prescribed in this plan is intended to enhance the health and resilience of the forest, applying tactics which will achieve the goals and objectives of the plan, and direct the forest closer to its desired future condition. Silvicultural treatments will also help maintain desired forest size-class distributions, ensuring predictable graduation of trees into successively larger size-classes and allowing for stable wildlife habitat and steady forest product production over time. Silvicultural prescriptions are developed by DEEP Foresters at the time of inventory for management plan composition. Silvicultural designs are refined during Forest Operation Plan preparation. Forest operation plans containing site-specific project details are reviewed, vetted through multiple disciplines, including NDDB and approved by the State Forester prior to initiating any planned management actions on the ground.

A portion of the silvicultural work plan will be implemented to expand opportunities for forest education and demonstration. The demonstration area will utilize both historically managed stands and incorporate newly implemented management practices to promote climate and carbon adapted forestry in softwood stand types. The harvest will be initiated as a stand-alone operation in order to study the economics and feasibility of small-scale harvesting for private woodland owners.

Timber stand improvement treatments are prescribed to occur over 390-acres of GSF. This work is generally focused on stands that are <20 years old which require non-commercial tending to ensure the graduation of acceptable numbers of desirable species. When applied at the correct stand age, and time of year it is possible to perform this work efficiently to the benefit of our forests. DEEP Forestry is exploring the potential of using private contractors to perform a portion of this TSI work along with DEEP staff as time and resources allow.

First-phase shelterwood harvesting is prescribed for 111-acres of the State Forest over the next 10-years. This treatment is designed to establish desirable regeneration in the understory of a partial canopy forest. When suitable numbers of seedlings are attained in the understory, additional overstory trees can be removed to facilitate the development of a new even-aged stand of trees. Shelterwood harvesting is a critical step in oak regeneration silviculture. Stands may be re-entered at short interval in this planning cycle to release desirable regeneration if deemed an appropriate next step in the shelterwood system.

Thinning is scheduled for 115-acres of GSF over the next ten-years. Much of the prescribed thinning is taking place in overstocked white pine and Norway spruce plantations established after the hurricane of 1938. Thinning is planned to return the stand to full stocking levels and improve individual tree growth rates. Due to the cultural importance of the plantations, it is suggested that much of this work occur at non-commercial intensity to facilitate incremental change in stands which have not experienced much contemporary management or natural disturbance.

Irregular shelterwood harvesting is planned for 142-acres. These treatments are aimed at forest regeneration while maintaining a component of structural retention and complexity. Stands develop with 2-3 age-classes post-harvest and can incorporate a wide variety of shade tolerance regimes.

Final shelterwood harvesting will be applied on 48-acres. These areas have been subject to earlier shelterwood harvesting aimed at securing desirable cohorts of new trees. With those new age-classes established, overstory trees will be removed to culminate the regeneration process and establish young forest stands that support oak composition.

Uneven-aged, selection system silviculture is prescribed for 34 acres. Silviculture in these areas will work toward developing multiple age-class stands which support an assemblage of shade intolerant and intermediate tolerance species including sugar maple, yellow birch and white pine. These uneven-aged areas can be harvested routinely on a 20-year cutting cycle to maintain uneven-aged conditions.

A patchwork mosaic of 'thinning, small patch cut, and no harvest' areas will be established as part of the carbon – climate adapted management demonstration prescribed as part of this plan. The treatment will be applied within white pine plantations in compartment 13.

Invasive plant management will be applied judiciously wherever time, funding and work priorities allow. Currently 151-acres have invasive plant control measures prescribed, but additional invasive plant control may occur as needed. Maintaining a consistent invasive plant eradication work plan will be essential to reducing invasive plant competition at GSF and maintaining long term forest resilience.

7. Adaptive Management

This plan is based on an adaptive management approach which enables forest resource managers a process to amend the plan components to respond to changing conditions. Forest management occurs on a dynamic landscape affected by innumerable variables which can introduce change and alter management needs. Changes in climate, precipitation, trail-use, and severe storm events can alter the condition of a forest and warrant an immediate management response which may not have been planned from the onset. Additionally, outcomes of past management activities are evaluated in terms of their effectiveness towards achieving plan goals. Adaptive management allows a process for management changes in light of unforeseen circumstances, rapidly changing conditions, undesirable outcomes, or if new information becomes available.

H. Wildlife Habitat

1. Habitat Management

The DEEP Wildlife Division has a mission to advance the conservation, use, and appreciation of Connecticut's wildlife resources; and the Wildlife Division supports the Forestry Division in planning and conducting management within State Forests. Maintaining sustainable populations of wildlife requires suitable habitat. State-owned conservation land provides large tracts of undeveloped space that contain a diversity of habitats, and habitat management can further create and enhance these spaces. A variety of techniques are employed by resources managers, including silviculture, which can play an important role in the conservation of biological diversity in forested ecosystems. Silvicultural treatments help maintain healthy forests for wildlife and can be used to provide specific conditions that certain wildlife of conservation concern require, such as young forest or pitch pine-oak woodland. Within these blocks, the silvicultural treatments carried out by the Division of Forestry have helped maintain a healthy and diverse forest, and future treatments outlined in this plan will create additional suitable habitat for a wide array of wildlife including game species and Species of Greatest Conservation Need (SGCN) identified by the CT State Wildlife Action Plan (SWAP 2015) which guides wildlife conservation efforts.

Other forms of habitat management that occur within State Forests include maintenance of early successional habitats by mowing, invasive plant control, and maintenance of wildlife impoundments. Early successional habitats including grassland, shrubland, and agricultural land provide important habitat diversity for wildlife within State Forests; the Wildlife Division coordinates management of these areas. Many wildlife species rely on early successional habitats to survive or reproduce. At Goodwin State Forest, there are six patches of grassland and shrubland habitat totaling 21.5 acres. Most grassland and shrubland patches are maintained by the practice of conservation mowing wherein vegetation is mowed once every two to five years to maintain early successional conditions important to a variety of wildlife species. Prescribed fire, selective cutting, and selective herbicide applications are also used to sustain these habitats. Invasive plant control aims to reduce the abundance of invasive plants through mechanical and chemical methods to allow native plants to grow and proliferate to benefit native wildlife and support healthy ecosystems. Additionally, there are four patches of agricultural land totaling 20.3 acres managed for hay and corn within the Natchaug SF section of this area. Agricultural use is arranged by the Wildlife Division with private parties through formal license agreements to assist the Department in maintaining early successional habitat and providing certain hunting opportunities. The agricultural use of these patches may be modified during the tenure of this plan to better accomplish wildlife conservation objectives.

The Wildlife Division coordinates the management of three wetland impoundments in these blocks: Black Spruce Marsh, Brown Hill Marsh, and Pine Acres Lake. Wetland impoundments are shallow dammed water bodies constructed to provide high quality habitat for wetland-dependent wildlife. Most impoundments were constructed using Federal Aid in Wildlife Restoration Program funds and have been maintained and repaired with funding provided by the Federal Aid Program, Connecticut Duck Stamp Program, and Ducks Unlimited. Impoundments typically feature a water control structure

that allows managers to manipulate water levels to promote emergent wetland habitat and to provide waterfowl hunting opportunities where permitted. Regular maintenance is needed to ensure the structural integrity of dams and the functionality of water control structures; this maintenance is made challenging by aging infrastructure, lack of manpower, and blockage caused by beavers. Impoundments here continue to be maintained at a level commensurate with staff time and resources; periodic mowing is conducted at these sites to keep dams free of woody vegetation, beaver debris is cleared from water control structures as needed, and beaver control is carried out when necessary.

At these three impoundments and one other wetland site within James L. Goodwin SF, the Migratory Bird Program maintains 13 wood duck boxes. These boxes provide nesting opportunities for wood duck and hooded merganser. Boxes are cleaned and inspected annually for evidence of nesting activity and replaced as necessary. Invasive plant control of Phragmites is an important component of impoundment management as this species can displace native plants thereby degrading wildlife habitat and Critical Habitats. Phragmites control by mechanical and chemical means may occur within wetland habitats here as deemed necessary by the Wildlife Division.

2. Habitat Conditions and Landscape Context

Landscape-level conservation of wildlife requires land managers to consider actions in a regional context. James L Goodwin SF contains significant tracts of undeveloped forestland composed of multiple large core forest blocks (>500 acres; CLEAR 2015) within the increasingly fragmented landscape of southern New England. From 1985 to 2015, Connecticut lost an estimated 115,181 acres of forestland due primarily to development (CLEAR 2015); a significant habitat loss for wildlife associated with forests. The towns of Chaplin and Hampton have experienced a -549-acre change (-2.4%) in forest cover from 1985-2015 (CLEAR 2015). Sustaining large tracts of healthy and resilient forests is important for efforts to maintain sustainable wildlife populations in the face of ongoing land use conversion.

Following historical land clearing practices, the forest has grown since the 1920's with limited disturbance resulting in a somewhat homogenous forest that lacks structural complexity. As noted, many wildlife species require or benefit from forests that are diverse in age and structure that is mostly lacking in Connecticut. In general, a goal of maintaining at least 10-15% of a landscape in young forest habitat is considered beneficial to wildlife and is within the historical range of what was present on the landscape and to which wildlife have become adapted (DeGraaf 2003, Dettmers 2003). A 2021 mapping effort to assess the statewide extent of young forest and shrubland habitat (Connecticut Young Forest and Shrubland Vegetation GIS Layer) estimates Connecticut is composed of approximately 3% young forest/shrubland habitat. The current forest inventory indicates 16% of JGSF forest land to be in the seedling/sapling age-class; the silvicultural treatments planned in this plan will maintain a similar age-class distribution, important for declining wildlife that rely on these habitats. GSF also features other early successional habitats (grassland, shrubland, and agricultural land) that have become less common in Connecticut over the past 100 years due to land use conversion and forest maturation. The Wildlife Division (in cooperation with other Divisions) will continue to maintain

and sustain these patches of habitat, totaling 41.8 acres, by conducting periodic mowing, prescribed burning, and selective mechanical and herbicidal treatments.

3. Biodiversity

James L. Goodwin SF supports a wide range of wildlife associated with forested habitat, and the area is particularly important to forest nesting birds that require large blocks of undeveloped forestland. These blocks fall within the northern portion of the Audubon Connecticut identified, Natchaug Important Bird Area, noted for importance to bird species such as wood thrush, worm-eating warbler and cerulean warbler. This site has been recognized as an Important Bird Area due to the valuable habitat it provides for forest nesting birds and migrating birds. These blocks also support a wide array of forest generalists such as white-tailed deer, bobcat and wild turkey. Black bear are present but relatively uncommon when compared to other regions of Connecticut. Moose have not been documented recently in this area.

American woodcock is an important migratory game bird that has experienced population declines throughout the northeast due in part to habitat loss and forest maturation. A SGCN, it is associated with young forest and other early successional habitats, and the Wildlife Division has created Focus Areas to help direct conservation efforts such as habitat creation and enhancement where existing environmental conditions are suitable. GSF is located with within an American woodcock Focus Area. While American woodcock is a focal species for young forest habitat creation, over 50 SGCN rely on young forest or shrubland. This includes many birds such as eastern towhee, indigo bunting, prairie warbler, and chestnut-sided warbler; several State Listed reptiles; several small mammals; and many invertebrates including pollinators. Additionally, many birds that nest within mature forest use areas of young forest for foraging and raising young. The silvicultural treatments prescribed in this plan will benefit many species in this suite of disturbance-dependent wildlife. Alternatively, large tracts of sawtimber-class forest are important for many forest nesting birds such as cerulean warbler, wood thrush and worm eating warbler. Significant amounts of suitable habitat will remain unmanaged in this planning period and be available to these species; and silvicultural practices that promote growth in the midstory and understory while retaining intermediate to high levels of canopy cover are consistent with maintaining or creating suitable habitat for these species.

The Wildlife Division maintains a spatial database of known locations of threatened, endangered and special concern species and important natural communities– the Natural Diversity Database (NDDB). As part of the planning process, a data request was submitted to inform this plan and future management, and a Determination was received December 22, 2021. This report identified eight plants, one vertebrate, three invertebrates, and two natural communities occurring within the planning area. One additional plant listed as historic or identified within one mile of the planning area was also identified. The Determination provides DEEP staff with descriptions and recommendations relevant to silvicultural treatments and other management activities for each element; each planned silvicultural operation undergoes an additional site-specific NDDB data request and Determination before commencing. The two natural communities noted to occur within GSF are: Acidic Atlantic White Cedar Swamp, and Medium and Poor Fens (“bogs”). These communities are both threatened by

hydrologic changes (among other things) caused by damming and beaver activity reinforcing the need to maintain relatively shallow water levels within Pine Acres Lake. Many State-listed plants and invertebrates occur in Medium and Poor Fens and Acidic Atlantic White Cedar Swamp in Connecticut.

One mammal species, northern long-eared bat, has been classified as Federally endangered during the plan review cycle. DEEP Forestry has worked closely with DEEP's small mammal biologist assigned to the bat program to adopt a bat monitoring protocol for sites with planned forest management activities. DEEP Foresters actively deploy acoustic monitoring microphones in forests with planned management practices, and deliver monitoring data to the DEEP bat biologist and NDDB program for analysis and incorporation into NDDB guidance and seasonal operating timeframes.

4. Wildlife-Based Recreation

James L. Goodwin SF is closed by deed to all forms of regulated hunting and trapping. Opportunities for passive wildlife-based recreation such as birding, wildlife photography and wildlife viewing are available year-round throughout the entire property. The portions of Natchaug SF included within this plan are open to all forms of regulated hunting and trapping. Hunting opportunities include small game, wild turkey, and white-tailed deer. There are no lottery restrictions for deer hunting in this area and there are no Designated Deer Bowhunting Only Areas. Annual fall pheasant stocking does not currently occur here but may again in the future. Regulated trapping is permitted with a State Lands Trapping permit.

Trails through State Forests facilitate a variety of recreational opportunities. Authorized trails are approved by the Department only after formal consideration for forest, water, and wildlife resources, and after considering the impacts to wildlife-based recreation. Trails can degrade wildlife habitat through sedimentation, erosion, and the introduction of invasive species; trails also cause negative impacts to wildlife by the ongoing disturbance of human use (Stevens and Oehler 2019). Where appropriate, low density trail networks better sustain and protect wildlife populations, wildlife habitat, and wildlife-based recreational opportunities while high-density trail networks can compromise the ecological integrity of an area. Unauthorized trails and illegal off-road motor vehicle use further degrade habitat and disturb wildlife. Closing unauthorized trails can benefit wildlife and wildlife-based recreation.

5. Fisheries Habitat & BMPs

A portion of the James L. Goodwin State Forest lies within a cold-water habitat basin associated with Merrick Brook, and The Little River. It is the policy of the DEEP Inland Fisheries Division (IFD) that riparian corridors be protected with an undisturbed 100 ft. wide riparian buffer zone on perennial streams and a 50 ft. no equipment buffer on intermittent drainages. A riparian wetland buffer is one of the most natural mitigation measures to protect the water quality and fisheries resources. This policy and position statement can be viewed on the DEEP website.

The DEEP IFD will review any forest road maintenance projects that involve replacement of culverts. Culvert replacements are covered by a general wetlands permit issued to the State Parks and Agency

Support Services Divisions. These projects would be assessed by the IFD to ensure fish passage needs are met.

Please see the CT BMP Guide for preserving water quality while harvesting forest products. BMP's are employed during and at closeout of all Forest Operations conducted under the supervision of DEEP Forestry.

I. Recreation

1. Trails

The James L. Goodwin State Forest supports a diversity of outdoor recreational opportunities which are congruent with multi-resource forest management. GSF is specifically unique due to its role as an education and demonstration forest. The trails and recreational features of the forest play a critical role in facilitating access for education and demonstration while also serving the broad recreational needs of the local community. The Friends of Goodwin Forest support a volunteer Trail Crew which is active in maintaining the extensive trail network. With over 19.4 miles of authorized trail, trail density metrics would place the State Forest in a 'moderate' trail density category. The trails are generally open to non-motorized, multiple-use outdoor recreation including mountain biking and equestrian use, except for the Natchaug Trail, part of the Connecticut Blue-Blazed Trail System, which is open to foot-travel only. Management of the trail system is a collaborative effort between the CT DEEP Parks Division, CFPA, and The Friends of Goodwin Forest volunteer Trail Crew. Trail modifications are reviewed by DEEP Parks, Forestry, Wildlife, Fisheries and The Friends of Goodwin Forest Trails Committee.

Considering established cart paths, gravel access roads, and unauthorized trails in addition to the authorized trail network described above, there are approximately 27 miles of utilized paths through the James L. Goodwin State Forest. Unauthorized trails are unmapped, often un-blazed and not sanctioned for use by DEEP. Unauthorized trails encountered will be brought to the attention of the DEEP Trails Coordinator, and removed / rehabilitated as time and resources allow.

Goodwin Conservation Center land supports a 2/3-mile-long Forest Stewardship Trail. Marked with a Blue/Red Blaze, this trail departs the Conservation Center from the northwest corner of the Richard D. Haley Native Wildlife Gardens and forms a loop which brings visitors through several managed forest areas.

There is one scenic vista in the State Forest accessible off the Natchaug Trail. This section of trail climbs to the top of Orchard Hill – Compartment 27 Stand 1 –providing views of the Natchaug River Valley and the Town of Chaplin visible to the southwest.

The Forest supports a 4.2-mile segment of the Natchaug Trail. The trail is an important component of the CT Blue-Blazed Hiking Trail System. Primarily located in Windham County, the trail begins in the Forest, continuing north through the Natchaug State Forest before joining the Nipmuck Trail in

Eastford, CT. The CT Blue Blazed Hiking Trail System is open to foot travel only. Trails which limit use to foot travel only comprise 22% of the trail system at GSF. 78% of the trail system is open to multiple uses.

GSF supports a 6-mile portion of a 15-mile equestrian trail which extends north into neighboring Natchaug State Forest. The equestrian trail traverses portions of the Airline Trail, the Blue-Blazed Trail system, old cart paths, and Town Roads between Rte. 6 in Chaplin / Hampton and Rte. 44 in Eastford. The plan calls for brushing out a currently unused road toward the end of 11th Section Road to serve as pull-in pull-out horse trailer parking nearby to two trail access points. Currently horse trailer parking is limited. Trailers using existing parking lots can significantly limit parking for passenger cars, and trailers are often observed parking in poor spots along Town Roads. Brushing out this 300-foot section of 11th Section Road will create space for horse trailers to park on the shoulder, enable other horse trailers to bypass parked vehicles, and allow for drive-in drive-out horse trailer access to the forest. It is recommended that DEEP establish signs at this location to inform users that this specific parking area is solely for use by horse trailers. Additional signage at existing parking locations to direct horse trailers to dedicated horse trailer parking spots will help minimize future parking issues associated with trailer's using vehicle parking lots.

2. Exclusion Areas

To promote the unique benefits associated with intact, unfragmented forest habitat, there are areas where trail development may not be supported by the Division of Forestry. These areas may include old forest management sites, forest stands with a history of active forest management, areas near sensitive natural communities, or areas otherwise unsuitable for new trail expansion. As general guidelines for trails which support State Forest management, trails should be located close to stand boundaries, designed in a flowing linear fashion with minimal spurs to limit the so-called corridor of influence, and be planned not to exceed moderate density trail layout.

3. Unauthorized / Illegal Activity

Forest impacts from unauthorized trails are an issue of concern at James L. Goodwin State Forest. Generally unauthorized use refers to any activity that is not permitted, examples occur at multiple scales. ATV / off-road motorcycle use is prohibited throughout the State Forest, whereas mountain biking – an activity permitted on many trails – only constitutes unauthorized activity when it occurs on trails classified for other uses, or unauthorized trails which have been made and advertised by user groups without permission of the Agency. Unauthorized or illegal activity will be reported to the DEEP Trails Coordinator, DEEP Park & Recreation Supervisor, or DEEP Encon Police depending on the type of unauthorized activity observed. The DEEP Trails Coordinator will be informed of unauthorized trails which are mapped or publicized on third-party websites. DEEP will engage in communications with entities which publicize the use of unauthorized trails and will request that maps and descriptions of trails which are not authorized by DEEP be removed from the web. Additionally, unauthorized trails may be closed or decommissioned as deemed necessary to protect natural resources and improve recreational safety.

4. **Sustainable Recreation DEEP Policy #310**

   DEEP Trail Policy #310 describes the step-by-step process necessary to authorize new trails on DEEP State Land. It describes how trail location decisions may be affected by the land designation (State Forest, State Park, Wildlife Management area etc.) on which trails are proposed. It also details the concept of additionality – citing that proposed trails must demonstrate that the existing trail network cannot accommodate the stated need. If a proposed trail is deemed to be necessary, the trail location will be mapped, and an internal DEEP review will be conducted and the 'Trail Design and Use Form' will be submitted. If a consensus decision is not reached during the DEEP field review, the final decision will be made by the Director of Forestry and the Director of Parks in collaboration.

J. Economic Benefits

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

Approximately 7.6% of Connecticut's 2015-2018 average wood harvest of 27.5 million board feet of sawtimber and veneer, originated from State Land. This is slightly lower than the 1997 – 2018 average which suggests roughly 10.2% of all standing timber purchased in Connecticut comes from State Land.

The US Department of Commerce – Bureau of Economic Analysis estimated that recreational activities in the state of Connecticut generated $3.3 billion in direct, indirect, and induced economic activity and supported 41,712 jobs with a labor income of $1.9 billion in 2020. This economic activity was generated through the following recreational activities (in order of economic impact): boating/fishing, hunting/trapping/shooting, RVing, motorcycling/ATV, hiking/camping/climbing, snow activities, equestrian, bicycling, recreational flying. Residential property values are increased when homes are adjacent to protected open spaces or have access to open space for outdoor recreation.

K. Public Involvement

A draft of this management plan has been provided to the Selectman's office in both Chaplin and Hampton. Chaplin Wetlands & Conservation Commission and Hampton Conservation Commission were also notified and sent a copy of the plan. Additionally, the Friends of Goodwin Forest, CFPA, CLCC, CT Horse Council, Quiet Corner NEMBA, CT Audubon, Thames Valley Trout Unlimited, CT Conservation Advisory Council, and Backcountry Hunters and Anglers were also sent copies of the plan. The groups were invited to review and make comments on the plan. DEEP Forestry engages in public outreach efforts for all forest product harvesting work which occurs at the State Forest. Frequent naturalist walks, forester walks, and other guided nature-learning offer frequent opportunities for interested parties to learn about forest management within the James L. Goodwin State Forest. The public / stakeholder review period lasted 60-days. The majority of the comments received were from Friends of Goodwin Forest members. The comments were largely complimentary

regarding the breadth and depth of the plan. There was broad support for the control of invasive plants. The concept of slash wall installation also piqued some interest with comments about the importance of accompanying education. There were a few questions about management status designations which were clarified via follow-up emails. The one comment received from outside the Friends of Goodwin was supportive of the protections of the Natchaug River, and the headwaters of Merrick Brook.

A notification of this draft forest resource management plan was posted on the Public Notices portion of the DEEP website for 30-days. The notice included a map of the plan area, the infographic highlighting important plan components which align with the CT Forest Action Plan, and contact information for the forester / author. Interested parties were invited to email the forester to receive a full copy of the draft management plan and invited to provide comments back to DEEP Forestry. One comment from the CT Council on Environmental Quality (CEQ) was received.

L. Management Goals

- Promote oak resilience and restoration
- Maintain balanced size class distributions
- Increase softwood growth rates
- Reduce understory competition from invasive plants
- Rehabilitate stands affected by oak mortality
- Facilitate opportunities for silvicultural education and demonstration
- Improve forest infrastructure, access, and protection
- Maintain and enhance non-forested upland habitats

M. Work Plans

Non-Commercial Forest Management Work

Forest management work which does not produce sufficient volumes of forest products to be considered commercially feasible may be referred to as non-commercial, or pre-commercial management. Pre-commercial management often involves significant labor or economic investment to accomplish, whereas the commercial management described later typically yields revenue as a byproduct of management. A list and partial description of non-commercial management activities called for in the plan is below.

Forest Stand Improvement

Forest stand, or timber stand improvement is a pre-commercial tree harvest where trees are cut or otherwise removed from competition to favor the growth of trees which have superior long-term growth potential. Early improvement cutting can shift the competitive advantage to a more desirable mix of species and improve early stand growth rates. Forest stand improvement cutting may be accomplished by DEEP staff or trained contractors hired through competitive bid.

Forest Stand Improvement cutting is prescribed to occur in the following stands as time and resources allow during the management plan period:

Stand(s)	Acres	Regeneration Year	Notes
2-3	6	2014	
2-5	5	1990's	Old Red Pine Clear Cut
3-1, 4-11, 12-4	46	2024	E-1067
4-1 E, 4-2, 4-3, 4-7, 5-7	15	2014	
9-5, 9-6, 9-7	10	1990's	Old Red Pine Clear Cut
10-5	22	2006	
12-1	6	1990's	Old Red Pine Clear Cut
12-9	4	NA	AWC Swamp
26-1, 28-1	64	2024	
27-1a, 27-5	9	1997	Old Red Pine Clear Cut
27-1	34	2014	
27-6	6	1990's	Old Red Pine Clear Cut
30-1	52	2013	North Bear Hill Rd.
32-1	52	2018	Spongy moth

Prescribed Burn Work Plan

The Division of Forestry plans to implement prescribed burning as a tool to accomplish management objectives in both grassland and woodland habitats. Controlled burns will be implemented by DEEP to maintain grassland habitat, promote oak resilience, and restore stands impacted by spongy moth.

Grassland units will be maintained with prescribed fire on a 2–3-year rotation.

Stand	Acres	Cover Type	Prep Work Needed
2-4, 3-3, 4-9	9	Grassland Shrubland	Control line refresh
8-4		Old Christmas Tree Plantation	Tree removal, control lines mowed, planning
2-11	3	Grassland Shrubland	Control lines, planning
13-6, 20-1, 18-2*	97	Oak – MHW	Control lines, planning
23-1, 24-1*	52	Oak	Control lines, planning

* Stands may be considered for a one-time burn to enhance regeneration

Forestry Brush Mowing Work Plan

The Division of Forestry plans to utilize forest mowing and mulching as a management tool to initiate a vegetative response in areas where growth potential has been reduced and resetting vegetation will benefit short-term habitat and long-term forest growth. Sites proposed for this work fall into

numerous categories: old timber sales, declining Christmas tree plantations, and historic cultural sites. Mowing and mulching work will also facilitate an opportunity to reduce invasive plant competition when followed-up with immediate invasive control and long-term monitoring. Projects which have clear wildlife habitat benefits may be implemented collaboratively between DEEP Forestry and Wildlife Divisions. The following stands have the potential to be managed with brush mowing and mulching treatments as time and resources allow:

Stand(s)	Acres	Condition	Notes
4-1, 4-2, 4-3, 4-7, 5-7, 9-7	16	Shrubland / forest understory	
2-4, 8-4, 9-10	11	Declining spruce planted as Christmas trees	
10-6	2	Shrubland / Invasive	Old sawmill site
2-11	3	Shrubland / invasive	w/ Herbicide / Rx burn
2-3	1	Shrubland	

Forest Invasive Plant Mgmt.

Invasive plant management will be required both within and outside of harvest areas on an ongoing basis throughout management plan implementation. Invasive plant management may be accomplished by DEEP staff or contractors depending on severity of the invasive plant issue and availability of funds. Invasive plant management issues which may require management intervention occur in, but are not limited to the following stands:

Invasive plant management may occur in other stands as needs arise and resources allow.

Stand(s)	Acres	Target spp.	Notes
2-1, 2-2, 2-5, 3-1s, 2-9, 2-10, 2-11, 10-3, 10-6	135	Barberry, multiflora rose, bittersweet, cork tree, devils walking stick, stiltgrass	Starting in ‘24
4-11, 4-12,	6	Barberry	
9-10, 9-5, 9-6	13	Bittersweet, barberry	
31-2, 31-8, 31-10	14	Barberry, bittersweet	Started in ‘23

Forest Plantation Establishment

Two-acre pine plantation establishment in 16-1, or 17-2 as time, resources, and Demonstration interests allow.

Road Maintenance – Agency Support Services / Parks / Forestry

May be accomplished via a Forestry Division project plan with Agency Support Services Division. Specific road improvement projects will be evaluated with the Agency Support Services Division District Supervisor on an annual basis. Road work will be funded out of either the Timber Revolving Fund, or State General Funds. The specific funding source will be determined at the time of project implementation.

Road / Area	Length	Work Needed	Notes
Yellow Trail Rd.	3950-feet	Material / ditch / culverts	Hill is most immediate issue – 1200-feet
Martin Rd.	4750-feet	Material	Patch low spots
Middle Rd.	1745-feet	Material	Patch low spots
Nutmeg Lane	2930-feet	Material / access rest.	Add to base
Cedar Swamp Rd.	1150-feet	Material / Erosion control	Western portion of Rd.
11th Section Rd.	300-feet	Brush out trees, gravel edges	Pull-in, pull-out horse trailer parking & signs

Gate Installations – Parks / Forestry / Agency Support Services

- 11th Section Rd. – Road to Black Spruce Pond Dam
- Middle Rd. – replace (2) bar gates (posts exist), at the eastern end of Middle Rd., and on Blue Trail north of Middle Rd.
- Blue Trail off Nutmeg Lane
- Nutmeg Lane (2) (At DEEP boundary)
- South of Cedar Swamp Rd.

Recreational or Scenic Work – Parks Division

No specific recreational or scenic site work has been planned by the Division of Forestry or incorporated by the State Parks and Public Outreach Division.

Boundary Maintenance – Forestry Division

State Forest boundaries were refreshed in late 2023. Boundaries will be re-marked in 2030.

Stream Improvement – Forestry / Fisheries / Agency Support Services

No specific in-stream projects are planned or were proposed by the DEEP Fisheries Division.

Wetland Impoundment and Non-forested Upland Management – Wildlife Division

The Wildlife Division will continue to coordinate periodic mowing, and selective mechanical and herbicidal treatments to maintain non-forested upland areas. Also, the Wildlife Division will continue to maintain wood duck nest boxes and a mix of open water and emergent vegetation in the Wildlife Marshes to benefit waterfowl and other wetland-dependent wildlife. Management activities will

include maintenance of the dam and water control structure (i.e., annual mowing, removal of beaver debris, beaver population management and water level manipulation). The State Lands Habitat Management Program will continue to aid in monitoring beaver activity within the property and addressing problems where public health and safety and/or important habitats are being threatened. Assistance from Agency Support Services, State Parks Unit and the Wetlands Habitat and Mosquito Management Program in providing equipment and personnel may be requested.

Silviculture Work Plan

Year	Stand(s)	Prescription(s)	Acres	Notes
2025	13-1, 13-4, 13-5	Selection*	7	Demo Site
2025	17-2	Irregular shelterwood	10	Demo Site
2025	31-2	Irregular / Final Shelterwood****	30	Final east portion
2025	31-9	Thinning	7	
2025	31-10	Selection*	10	
2025	23-1, 24-1	Irregular Shelterwood****	52	Or Rx burn
2025	22-1 (s)	Thinning	20	
2026	4-1, 4-2, 4-7, 5-7	Forestry mow	15	Ask EFSS
2026	32-4	Selection	9	
2026	32-5	First Shelterwood	28	
2027	2-10, 3-2, 3-4, 4-8, 4-10	Thin**	18	
2028	29-1	First Shelterwood	58	
2029	20-2	Final Shelterwood	28	
2029	13-6, 18-1	Irregular shelterwood	69	
2030	12-1, 12-2	Thin*	7	
2030	12-3, 12-4	First Shelterwood	24	
2031	20-1, 25-2	Thin**	7	
2031	10-2, 10-4	Thin*	16	
2032	13-1, 13-4, 13-5	Selection	10	Outside demo site
2032	14-1, 14-2, 14-4	Thin**	7	
2032	9-2, 9-3, 9-4, 9-8	Thin	17	
2033	2-8, 5-4	Thin**	6	
2033	8-2, 8-3	Thin**	5	

*Invasive plant treatment required in portions of the stand

**thinning in small softwood stands <5 acres and <15,000 BF may be accomplished at any point in plan period as local stumpage interest and DEEP resources allow.

***Prescribed burn possible if commercial harvest is infeasible

****Potential for slash wall installation

N. Forest Map Set

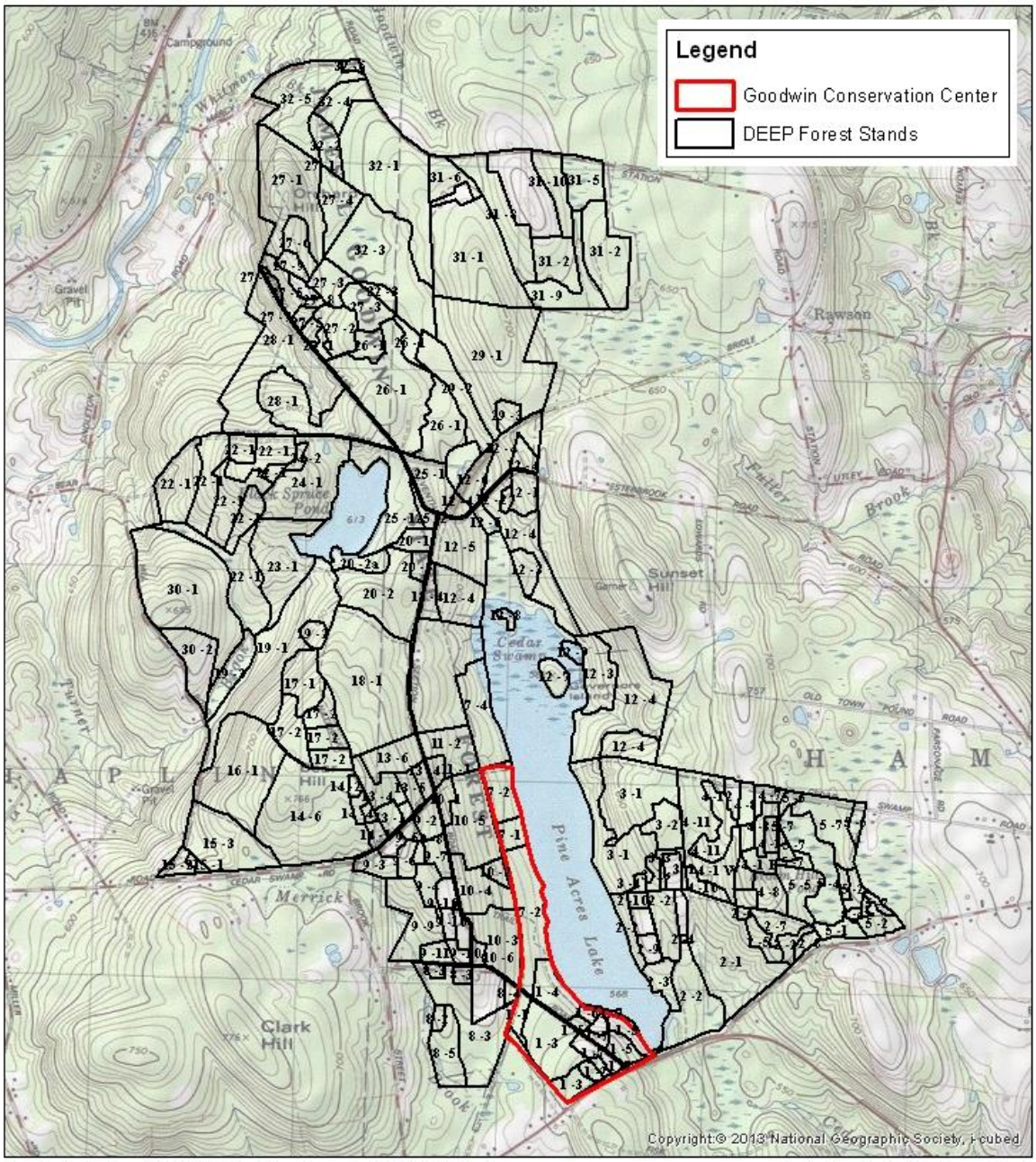
Map A - Topographic
James L. Goodwin State Forest

Chaplin and Hampton, Connecticut
2,206 Acres

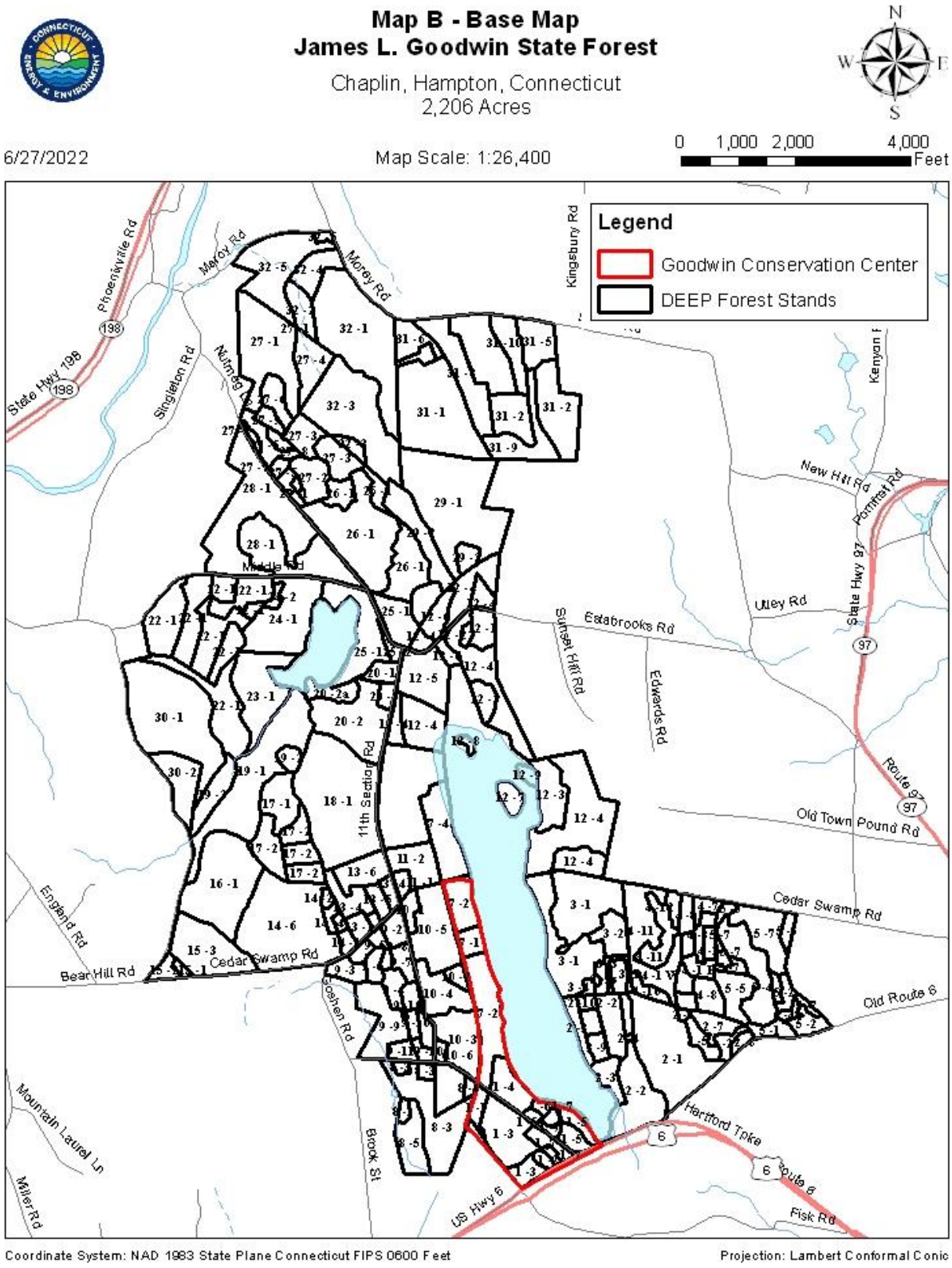
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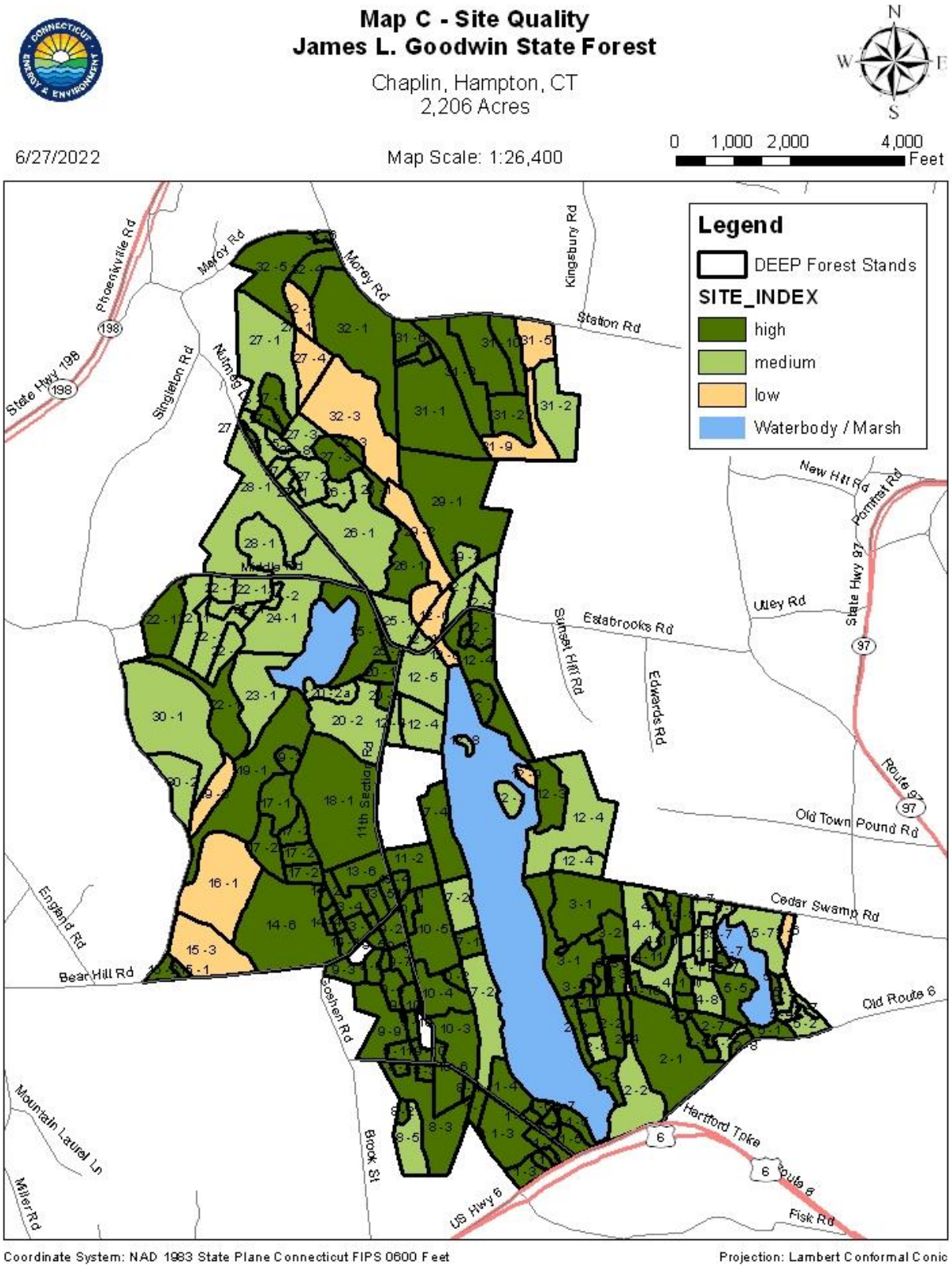
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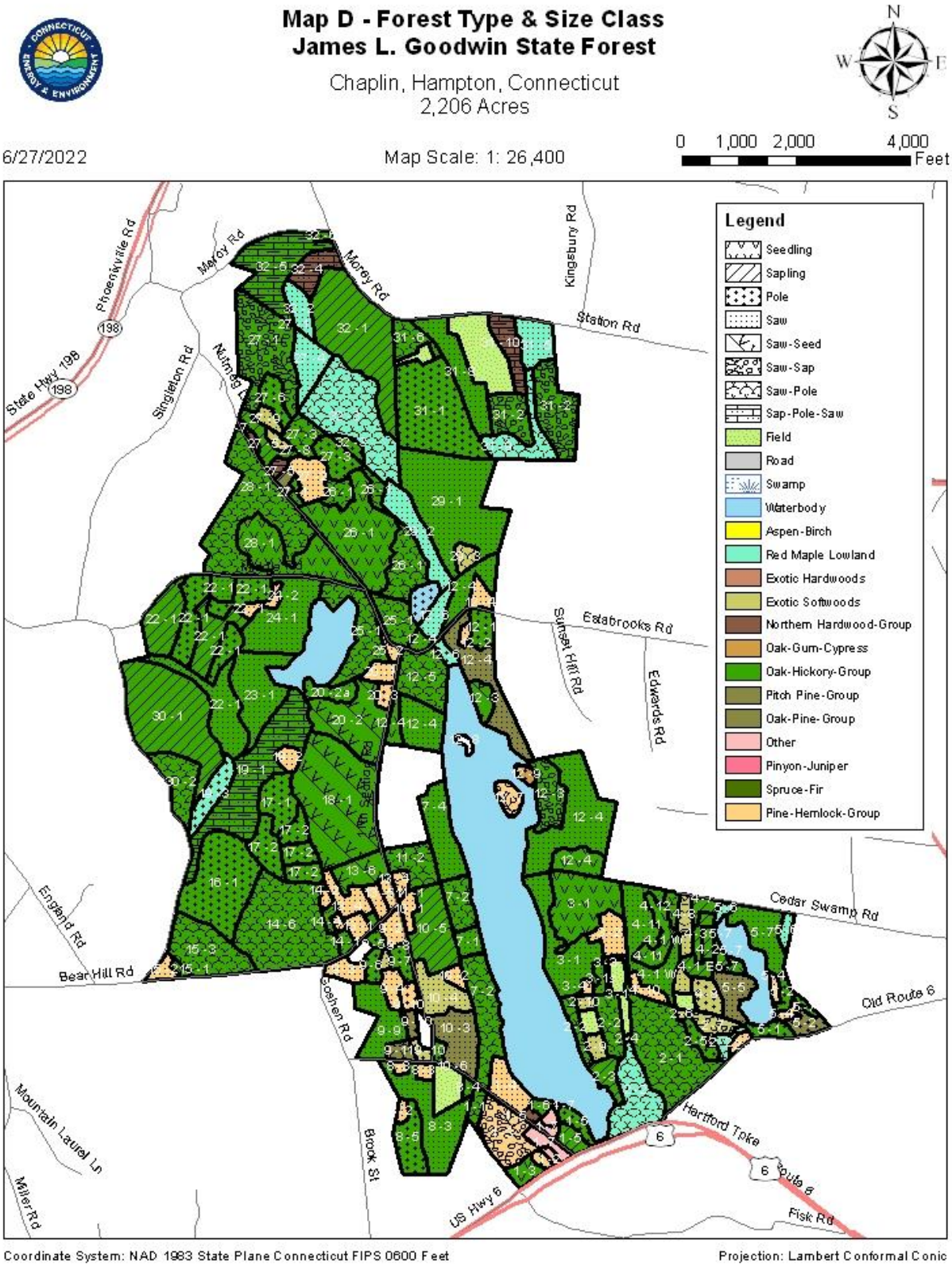
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Feet

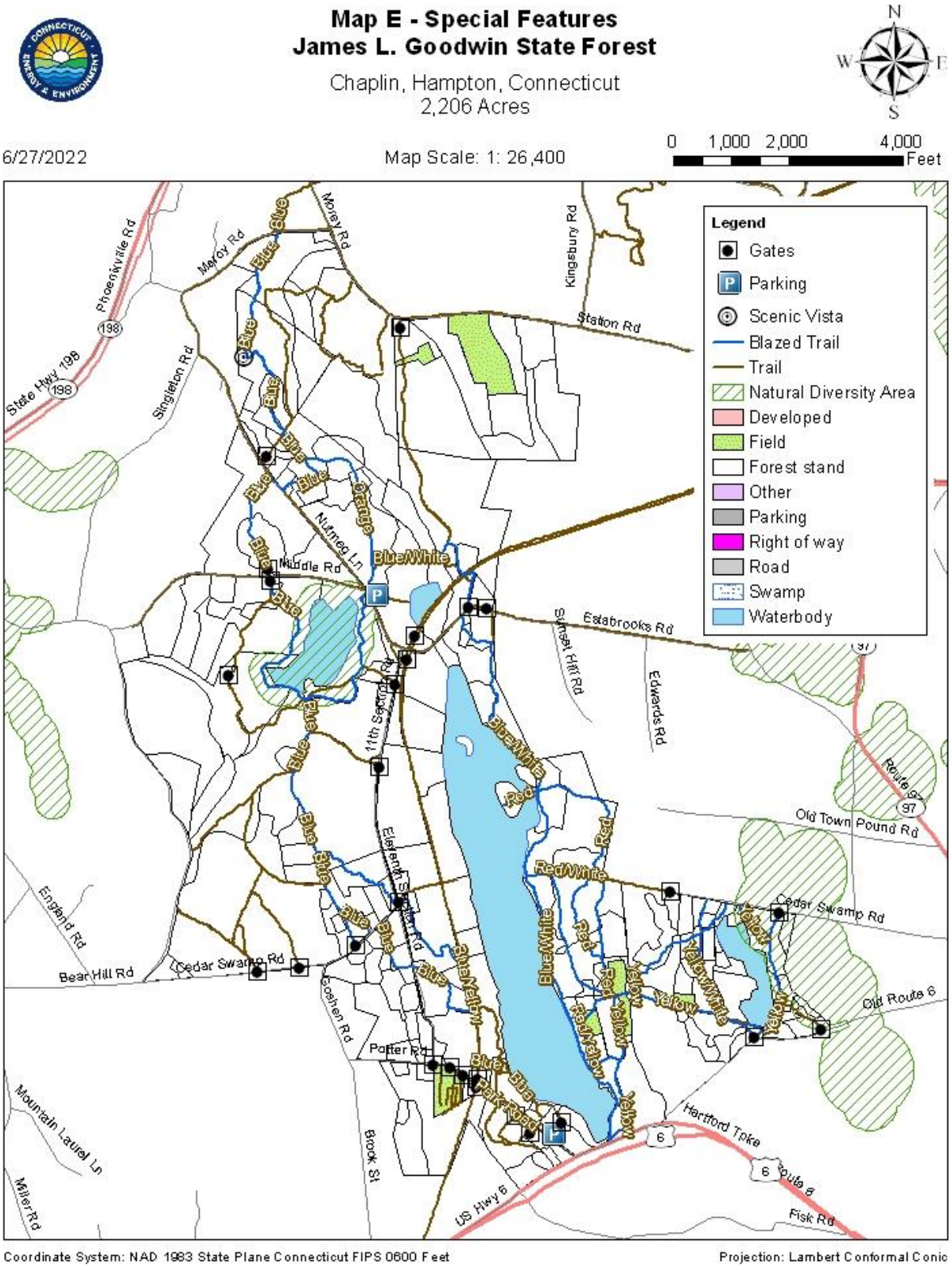


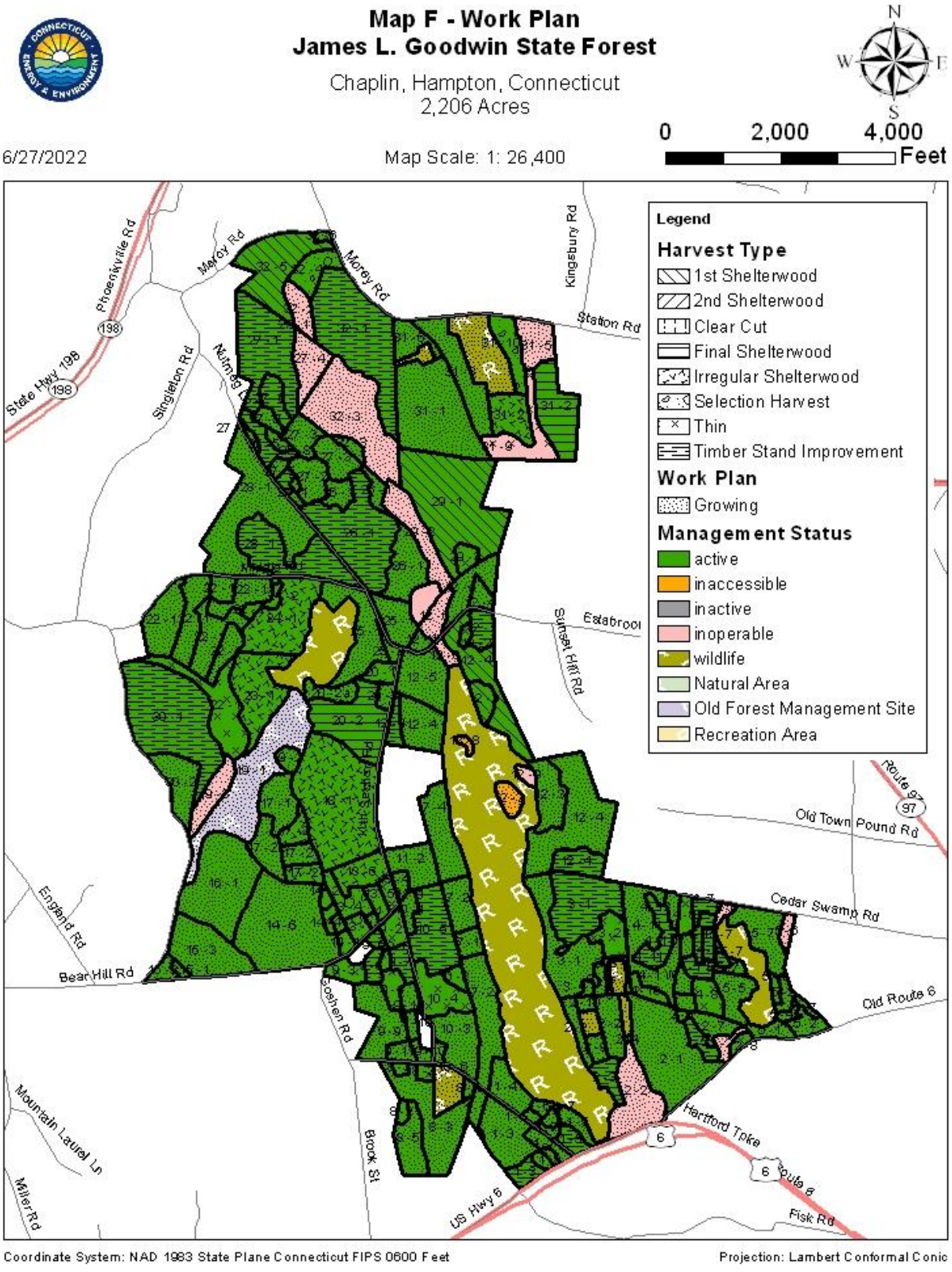
Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet
Projection: Lambert Conformal Conic
Map Scale: (1:26,400)


Map B - Base Map
James L. Goodwin State Forest
Chaplin, Hampton, Connecticut
2,206 Acres
N
W
E
S
6/27/2022
Map Scale: 1:26,400
0 1,000 2,000 4,000
Feet
Legend
Goodwin Conservation Center
DEEP Forest Stands
Phoenixville Rd
State Hwy 198
198
Singleton Rd
Nutmeg Ln
Morey Rd
Kingsbury Rd
Kenyon Rd
New Hill Rd
Pomfret Rd
State Hwy 97
97
Middle Rd
Eastabrooks Rd
Sunset Hill Rd
Edwards Rd
Utley Rd
11th Section Rd
Route 97
Old Town Pound Rd
Cedar Swamp Rd
England Rd
Bear Hill Rd
Goshen Rd
Old Route 6
Mountain Laurel Ln
Miller Rd
Brook St
US Hwy 6
Hartford Tpke
6
Route 6
Fisk Rd
Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet
Projection: Lambert Conformal Conic


Map C - Site Quality
James L. Goodwin State Forest
Chaplin, Hampton, CT
2,206 Acres
6/27/2022
Map Scale: 1:26,400
0 1,000 2,000 4,000 Feet
N
W
E
S
Legend
DEEP Forest Stands
SITE_INDEX
high
medium
low
Waterbody / Marsh
Phoenixville Rd
State Hwy 198
Singleton Rd
Nutmeg Ln
Merry Rd
Morey Rd
Kingsbury Rd
Station Rd
New Htf Rd
Pomfret Rd
State Hwy 97
Route 97
Utley Rd
Sunset Hill Rd
Estabrooks Rd
Edwards Rd
Middle Rd
11th Section Rd
Old Town Pound Rd
Cedar Swamp Rd
England Rd
Bear Hill Rd
Goshen Rd
Brook St
Old Route 6
Hartford Tpke
US Hwy 6
Fisk Rd
Mountain Laurel Ln
Miller Rd
Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet
Projection: Lambert Conformal Conic


Map D - Forest Type & Size Class
James L. Goodwin State Forest
Chaplin, Hampton, Connecticut
2,206 Acres
6/27/2022
Map Scale: 1: 26,400
0 1,000 2,000 4,000 Feet
N
W
E
S
Legend
Seedling
Sapling
Pole
Saw
Saw-Seed
Saw-Sap
Saw-Pole
Sap-Pole-Saw
Field
Road
Swamp
Waterbody
Aspen-Birch
Red Maple Lowland
Exotic Hardwoods
Exotic Softwoods
Northern Hardwood-Group
Oak-Gum-Cypress
Oak-Hickory-Group
Pitch Pine-Group
Oak-Pine-Group
Other
Pinyon-Juniper
Spruce-Fir
Pine-Hemlock-Group
Phoenixville Rd
State Hwy 198
Singleton Rd
Merry Rd
Morey Rd
Kingsbury Rd
Station Rd
Estabrooks Rd
Sunset Hill Rd
Edwards Rd
Cedar Swamp Rd
Old Route 6
Hartford Tpke
US Hwy 6
Fisk Rd
Bear Hill Rd
England Rd
Goshen Rd
Brook St
Mountain Laurel Ln
Miller Rd
Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet
Projection: Lambert Conformal Conic


Map E - Special Features
James L. Goodwin State Forest
Chaplin, Hampton, Connecticut
2,206 Acres
6/27/2022
Map Scale: 1: 26,400
0 1,000 2,000 4,000 Feet
N
W
E
S
Legend
Gates
Parking
Scenic Vista
Blazed Trail
Trail
Natural Diversity Area
Developed
Field
Forest stand
Other
Parking
Right of way
Road
Swamp
Waterbody
Phoenixville Rd
State Hwy 198
198
Singleton Rd
Merey Rd
Money Rd
Kingsbury Rd
Station Rd
Nutmeg Ln
Middle Rd
Estabrooks Rd
Sunset Hill Rd
Edwards Rd
11th Separate Rd
Eleventh Separate Rd
Route 97
97
Old Town Pound Rd
Cedar Swamp Rd
England Rd
Bear Hill Rd
Joshen Rd
Potter Rd
Park Road
Mountain Laurel Ln
Miller Rd
Brook St
US Hwy 6
6
Hartford Tpke
Route 6
Old Route 6
Fisk Rd
Blue
Orange
Blue/White
Red
Red/White
Blue/Yellow
Yellow
Yellow/White
Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet
Projection: Lambert Conformal Conic


Map F - Work Plan
James L. Goodwin State Forest
Chaplin, Hampton, Connecticut
2,206 Acres
6/27/2022
Map Scale: 1: 26,400
0
2,000
4,000
Feet
N
W
E
S
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
Phoenixville Rd
Merry Rd
Morey Rd
Kingsbury Rd
Station Rd
State Hwy 198
198
Singleton Rd
Nutmeg Ln
Eastbrook
Sunset Hill Rd
Route 97
97
Old Town Pound Rd
Cedar Swamp Rd
England Rd
Bear Hill Rd
Goshen Rd
Old Route 6
Mountain Laurel Ln
Brook St
Hartford Tpke
6
US Hwy 6
Fisk Rd
Miller Rd
Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet
Projection: Lambert Conformal Conic

Appendix A: DEEP Review and Comments

Staff Project Review *[Hard Copy Review Option]*

DISTRICT	**HARTFORD**
Discipline: Initials: Date:	Discipline: Initials: Date:
Discipline: Initials: Date:	Discipline: Initials: Date:
Discipline: Initials: Date:	Discipline: Initials: Date:
Discipline: Initials: Date:	Discipline: Initials: Date:

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Appendix C – Definitions

This glossary contains a list of commonly used forestry terms.

- **acre** – A unit of measure describing surface area. One acre contains 43,560 square feet. A football field (without the end zones) is 45,000 square feet -- slightly larger than an acre. The inside of a professional baseball diamond is about 1/4 of an acre.
- **advanced regeneration** – Young trees that have become established naturally in a forest before regeneration methods are applied. In other words, the regeneration is present in advance of any treatment.
- **age class** – The trees in a stand that became established at, or about, the same time. The range of tree ages in a single age class is usually less than 20 percent of the expected age of that class.
- **basal area** – The area of the cross section of a tree's stem at 4 1/2 feet above ground, or breast height, in square feet. Basal area of a forest stand is the sum of the basal areas of the individual trees in the stand. It is usually reported in square feet of BA per acre and is used as a measure of stand stocking, stand density, and stand volume.
- **board-foot volume** – The amount of wood products expressed as the number of boards 1 foot wide by 1 foot long and 1 inch thick that are sawn from logs.
- **biological diversity** – The variety and abundance of species, their genetic composition, and the communities, ecosystems, and landscapes in which they occur. Also, the variety of ecological structures and functions at any one of these levels.
- **Best Management Practices** – Procedures and treatments that lessen soil erosion, sedimentation, stream warming, movement of nutrients, and visual quality during or following activities that alter the land.
- **buffer strip** – An area of land that is left relatively undisturbed to lessen impacts of treatments next to it. Common examples include visual buffers used to screen the view from roads, and stream side buffers used to protect water quality.
- **Canopy** – The continuous cover of branches and foliage formed collectively by the crowns of trees.
- **Clearcutting** – An even-aged silvicultural technique involving the removal of all stems in the stand. Strip cutting is a form of clearcutting.
- **Core forest** – A contiguous forest that is at least 500-acres and 300’ from other land uses including residences, farm land and paved roads.
- **crop tree** – Any tree selected to provide a specific benefit such as mast, dens, veneer, or sawtimber. Crop trees are usually selected when they are young.
- **cutting cycle** – The planned interval between treatments in forest stands.
- **damaging agent** – Any one of various factors that injure trees. They include some insects, diseases, wildlife, abiotic factors, and human activities.
- **Dbh** – Diameter at breast height; the diameter of the trunk of a tree measured at 41/2 feet above ground level. It is measured on the uphill side of the tree.
- **den tree** – A living tree that has holes in the trunk, or stem, from broken branches and decay, or hollow trunks; a cavity tree.
- **even-aged stand** – A stand containing trees in the main canopy that are within 20 years of being the same age. Even-aged stands sometimes are designated by age-class (10-year-old stand, 40-year-old

stand) or broad size-class: seedling stand (most trees are <1 inch dbh); sapling stand (trees 1-4 inches dbh); poletimber stand (trees 5-10 inches dbh); and sawtimber stand (trees > 10 inches dbh).

- **even-aged system** – A planned sequence of treatments designed to maintain and regenerate a stand with one age class.
- **forest condition** – Generally, the current characteristics of forested land including but not limited to cover type, age arrangement, stand density, understory density, canopy density, and forest health.
- **forest cover type** – A category of forests based on the kind of trees growing there, particularly the composition of tree species. Forest cover types are often referred to as forest types, cover types, stand types, or types.
- **group selection** – An uneven-aged silvicultural technique involving the removal of trees in groups usually 1/10 to 2/3 acre in size, but sometimes up to 1 to 2 acres on large properties. Group selection can be applied in combination with single-tree selection between groups.
- **horizontal diversity** – The degree of complexity of the arrangement of plant and animal communities, and other habitats across a large area of land.
- **inactive forest** – Management category designated for forests currently unstaffed by the DEEP Division of Forestry
- **interior species** – Species found only or primarily away from the perimeter of a landscape element. Species commonly requiring or associated with interior habitat conditions.
- **intermediate cuttings** – Silvicultural cuttings applied in the culture of even-aged stands and are normally noncommercial (no products sold) or commercial thinnings (timber sold), designed to favor certain species, sizes, and qualities of trees by removal of competitors. Thinning's designed to grown quality timber commonly maintain a closed canopy; however, low-density thinning (50-70% residual crown cover) can be used to hasten diameter growth and stimulate understory development for wildlife purposes. At rotation age, the stand in considered to be mature and a regeneration cutting is applied to produce a new stand.
- **intermediate treatment** – Any treatment or "tending" designed to enhance growth, quality, vigor, and composition of the stand after seedlings are established and before mature trees are regenerated. For example, thinning is an intermediate treatment.
- **mast tree** – A tree that produces nutlike fruits such as acorns, beechnuts, hickory nuts, seeds of certain pines, cherries, apples, samaras. Hard mast includes acorns, beechnuts, and hickory nuts. Soft mast includes cherries, apples, and samaras (on maple and ash trees).
- **matrix** – The matrix is the dominant landscape element on a landscape in which smaller differentiated elements (patches) are embedded. It is commonly highly connected throughout the landscape.
- **native plant** – A species that naturally occurs in a given location where its requirement for light, warmth, moisture, shelter, and nutrients are met.
- **non-commercial treatment** – Any activity that does not produce at least enough value to cover the direct costs of that treatments.
- **overtopped** – A condition or position where a tree's crown is completely covered by the crowns of one or more of its neighboring trees. An overtopped tree's crown is entirely below the general level of the canopy and does not receive any direct sunlight either from above or from the sides.
- **patch** – A patch is a relatively homogeneous area that differs in some way from its surroundings (e.g., woodlot in a corn field, conifer plantation in a mixed-deciduous forest).

- **plantation** – A forest stand in which most trees are planted or established from seed sown by people. Typically, planted trees are in rows, with equal spacing between each tree in a row and between rows.
- **Pole** – A tree, usually young, that is larger than 4 inches dbh and smaller than 8 to 11 inches dbh.
- **prescribed burn** – The application of fire in forested or other areas, usually under specific conditions of weather and fuel moisture, to control vegetation for silvicultural purposes or to reduce hazards.
- **regeneration** – The seedlings and/or saplings in a new forest stand or age class. Natural regeneration originated from seeds, sprouts, or root suckers.
- **Regeneration method** – A cutting method by which a new age class is created. These methods include clearcutting, seed tree, shelterwood, single-tree selection, and group selection; also called reproduction method.
- **Regeneration cuttings** – Silvicultural cuttings designed to naturally regenerate the stand by providing for seedling (or vegetative stems) establishment or development, or both. Two even-aged techniques; clearcutting and shelterwood, and two uneven-aged techniques; single-tree selection and group selection.
- **rotation** – The planned interval of time between treatments that regenerate a stand.
- **runoff** – Surface streamflow leaving a watershed. Sources of runoff are precipitation falling in the channel, overland flow (rare in forested areas), and subsurface water exiting from soils and bedrock. In this Guide, runoff is synonymous with streamflow.
- **sapling** – A tree, usually young, that is larger than a seedling but smaller than a pole-sized tree. Size varies by region, but a sapling is usually taller than 6 feet and between 1 and 4 inches in dbh.
- **sawtimber** – Trees greater than 11” in diameter
- **sedimentation** – The accumulation of organic and mineral soil particles and rocks in streams and water bodies due to erosion. Sedimentation often accompanies flooding. The application of Best Management Practices will usually protect against sedimentation during and after treatments.
- **seed tree** – A tree that produces seed. Seed trees are usually mature and high in quality.
- **seedling** – A tree grown from a seed. Usually the term is restricted to trees smaller than saplings, or less than 6 feet tall or smaller than 1 inch dbh.
- **shade intolerance** – The relative inability of a plant to become established and grow in the shade.
- **shade tolerance** – The relative capacity of a plant to become established and grow in the shade.
- **shelterwood** – An even-aged silvicultural technique involving the removal of the understory and lower crown canopy trees to allow the new stand to regenerate under shade. Subsequent removal of the overstory in one or several cuts.
- **silvicultural system** – A planned process whereby a stand is tended, and re-established. The system's name is based on the number of age classes (for example even-aged or two-aged), and/or the regeneration method used (for example, shelterwood, crop-tree, or selection).
- **silvicultural treatment** – A process or action that can be applied in a controlled manor according to the requirements of a prescription or plan to a forest community to improve real or potential benefits.
- **silviculture** – The art, science, and practice of establishing, tending, and reproducing forest stands with desired characteristics.
- **single-tree selection** – An uneven-aged silvicultural technique involving the removal of trees singly or in groups of 2 or 3, which maintains a continuous canopy and an uneven-aged or uneven-sized mixture.

- **site** – The combination of biotic, climatic, topographic, and soil conditions of an area; the environment at a location.
- **snag** – A standing dead tree without branches, or the standing portion of a broken-off tree. Snags may provide feeding and/or nesting sites for wildlife.
- **softwoods** – A term describing both the wood and the trees themselves that in most cases have needles or scale-like leaves (the conifers); gymnosperms.
- **species composition** – The collection of plant species found in an area. Composition is expressed as a cover type, or a percentage of either the total number, the density, or volume of all species in that area.
- **stand** – An area of trees of a certain species composition (cover type), age class or size class distribution and condition (quality, vigor, risk), usually growing on a fairly homogeneous site. The trees are sufficiently uniform in spacing, condition, age arrangement and/or forest type to be distinguished from neighboring stands. The conditions of the site are relatively uniform, including soil properties, water drainage, slope, exposure to weather, and productivity. Stands of 5 acres and larger commonly are recognized, though minimum stand size depends upon size of ownership and intensity of management.
- **stand composition** – The collection of plants, particularly trees, that are found in a stand.
- **stand condition** – The number, size, species, quality, and vigor of trees in a forest stand.
- **stand density** – A quantitative measure of the proportion of area in a stand actually occupied by trees. This is an absolute measure rather than a relative measure, or percentage.
- **stand structure** – The arrangement of trees of different sizes and ages in a stand.
- **succession** – A gradual and continuous replacement of one kind of plant and animal community by a more complex community. The environment is modified by the life activities of the plants and animals present thereby making it unfavorable for themselves. They are gradually replaced by a different group of plants and animals better adapted to the new environment.
- **thinning** – The removal of some trees to improve and enhance the vigor and growth of other trees. Thinning enhances forest health and allows you to recover any excess of potential mortality.
- **understory** – The small trees, shrubs, and other vegetation growing beneath the canopy of forest trees and above the herbaceous plants on the forest floor.
- **uneven-aged stand** – A stand with trees in three or more distinct age classes, either intermixed or in small groups, growing on a uniform site; a stand containing trees of several 20-year age-classes. These stands generally contain trees of many sizes (seedling through sawtimber) due to the range in age as well as differences in growth rate among species.
- **vertical diversity** – The extent to which plants are layered within an area. The degree of layering is determined by three factors: 1. the arrangement of different growth forms (trees, shrubs, vines, herbs, mosses and lichens); 2. the distribution of different tree and shrub species having different heights and crown characteristics; and 3. the number of trees of different ages.

Appendix D: Supplemental Information

Figure 1. Bird species observed as Probable or Confirmed breeding: CT Breeding Bird Atlas Blocks 42C, 42D, 42E (2018-2021). *Species of Greatest Conservation Need (CT Wildlife Action Plan)

American Crow	Downy Woodpecker	Pileated Woodpecker
American Goldfinch	Eastern Bluebird	Pine Warbler
American Redstart	Eastern Kingbird*	Prairie Warbler*
American Robin	Eastern Phoebe	Purple Martin*
American Woodcock*	Eastern Screech Owl	Red bellied Woodpecker
Baltimore Oriole*	Eastern Towhee*	Red breasted Nuthatch
Bank Swallow*	Eastern Wood Pewee*	Red eyed Vireo
Barn Swallow	European Starling	Red shouldered Hawk
Barred Owl	Field Sparrow*	Red tailed Hawk
Black and white Warbler*	Gray Catbird	Red winged Blackbird
Black billed Cuckoo*	Great Blue Heron	Rock Pigeon
Black capped Chickadee	Great Crested Flycatcher	Rose breasted Grosbeak*
Black throated Green Warbler	Great Horned Owl	Ruby throated Hummingbird
Blue gray Gnatcatcher	Green Heron	Scarlet Tanager*
Blue Jay	Hairy Woodpecker	Song Sparrow
Blue winged Warbler*	Hooded Merganser	Spotted Sandpiper
Bobolink*	House Finch	Swamp Sparrow
Broad winged Hawk*	House Sparrow	Tree Swallow
Brown Creeper*	House Wren	Tufted Titmouse
Brown headed Cowbird	Indigo Bunting*	Veery*
Brown Thrasher*	Killdeer	Warbling Vireo
Canada Goose	Louisiana Waterthrush*	White breasted Nuthatch
Carolina Wren	Mallard	Wild Turkey
Cedar Waxwing	Mourning Dove	Willow Flycatcher*
Cerulean Warbler*	Northern Cardinal	Wood Duck
Chestnut sided Warbler*	Northern Flicker*	Wood Thrush*
Chimney Swift*	Northern Mockingbird	Worm eating Warbler*
Chipping Sparrow	Northern Rough winged Swallow	Yellow bellied Sapsucker
Common Grackle	Northern Waterthrush*	Yellow throated Vireo
Common Yellowthroat	Ovenbird*	Yellow Warbler
Cooper’s Hawk		

Appendix E: Distribution List

First Selectman's office's (Chaplin, Hampton)
Conservation Commissions (Chaplin, Hampton)
DEEP District Review Staff
DEEP Hartford Review Staff
Connecticut Forest & Park Association
Friends of Goodwin Forest
DEEP Public Notices / e-Alert