

Mohegan State Forest

Forest Management Plan



Forest Ecosystem Health & Diversity

Mohegan State Forest supports healthy, diverse forests which provide innumerable benefits on the Connecticut landscape. Clean air, clean water, fish and wildlife habitat, carbon storage, and sustainably harvested forest products are each products of a healthy forest ecosystem.



Climate Change Mitigation through Sequestration and Storage

Mohegan State Forest will feature Connecticut's first Adaptive Silviculture for Climate Change Demonstration Site. The multi-partner research site will showcase 3 distinct silvicultural treatments designed to facilitate; Resistance, Resilience, and Transition to the impacts of climate change.



Economic Benefits

Portions of Mohegan State Forest were acquired with donor wishes for the demonstration of good forest management. The plan prescribes 256-acres of forest product harvesting. Facilitated by private sector businesses, timber sales produce revenue for the State while accomplishing broader forest growth goals. Funds are re-invested in improvements made within the State Forest system.



Forest Protection

Mohegan State Forest has 15-miles of boundary line. Maintaining accurate boundary line markings protects the forest from timber theft and other encroachments.



Wildlife Habitat

Mohegan State Forest lies within identified Focus Area's for both New England Cottontail, and American woodcock. Habitat enhancement and restoration for these species is a conservation priority in the area encompassed by the plan.



Environmental Protection

The forested slopes of Mohegan State Forest shade over ½-mile of the Shetucket River, over ½-mile of Merrick Brook, and 2,000-feet of the Little River, protecting these cold water fisheries and preserving water quality.



Recreational Health / Benefits

Mohegan State Forest is open to public hunting and trapping by zone and season. The old roads and cart paths provide for passive recreational access into the forest. The establishment of a formal loop trail with adequate parking is one of the goals of the plan.



STATE OF CONNECTICUT

DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION



Bureau of Natural Resources
Division of Forestry

FOREST MANAGEMENT PLAN
2021 through 2031

Mohegan State Forest
938 Acres

Canterbury, Scotland, and Sprague

Approvals:

August 3, 2021

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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. Protecting forests from threats; and
3. Enhancing 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 Mohegan State Forest Management Plan.

1. **Forest Ecosystem Health and Diversity** – Mohegan State Forest supports healthy, diverse forests which provide innumerable benefits on the Connecticut landscape. Clean air, clean water, fish and wildlife habitat, carbon storage, and sustainably harvested forest products are each products of a healthy forest ecosystem.
2. **Wildlife Habitat** – Mohegan State Forest lies within identified Focus Area's for both New England Cottontail, and American woodcock. Habitat enhancement and restoration for these species is a conservation priority in the area encompassed by the plan.
3. **Climate Change Mitigation through Sequestration and Storage** – Mohegan State Forest will feature Connecticut's first Adaptive Silviculture for Climate Change Demonstration Site. The multi-partner research site will showcase 3 distinct silvicultural treatments designed to facilitate; Resistance, Resilience, and Transition to the impacts of climate change.
4. **Environmental Protection** – The forested slopes of Mohegan State Forest shade over ½-mile of the Shetucket River, over ½-mile of Merrick Brook, and 2,000-feet of the Little River, protecting these cold water fisheries and preserving water quality.
5. **Recreational/Health Benefits** – Mohegan State Forest is open to public hunting and trapping by zone and season. The old roads and cart paths provide for passive recreational access into the forest. The establishment of a formal loop trail with adequate parking is one of the goals of the plan.
6. **Economic Benefits** – The plan for Mohegan State Forest prescribes 256-acres of silviculturally-guided forest product harvesting. Facilitated by private sector businesses, timber sales produce revenue for the State while accomplishing broader forest growth and habitat enhancement goals. Funds are re-invested in improvements made within the State Forest system.
7. **Forest Protection** – Mohegan State Forest has 15-miles of boundary line. Maintaining accurate boundary line markings protects the forest from timber theft and other encroachments.

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. Executive Summary

Mohegan State Forest was established in 1960 in Scotland, Connecticut. It has since grown and expanded into the two neighboring towns of Sprague and Canterbury. Currently it spans 938 acres across rural eastern Connecticut, and is located within a designated National Heritage corridor known as "[The Last Green Valley](#)." The forest derives its name from the Mohegan Tribe of Native Americans that were once centered along the Thames River valley and surrounding areas. It contains four compartments in total. The majority of the forest, known as Compartment 4 (713 acres), lies directly east of CT Route 97 in Scotland. Compartments 1, 2 and 3 (totaling 225 acres) are found less than a mile to the west. The western block is bordered by Talbot Wildlife Management Area directly to the north.

Management activities will be introduced back into the forest after a 25-year absence. This prolonged absence has set up great opportunities to re-enter the forest and introduce new management practices. This plan will focus on establishing short and long-term harvest schedules, recognizing and supporting recreation opportunities, maintaining and creating wildlife habitat, fostering adaptation to climate change, and applying and ensuring the general health and productivity of the actively managed acreage.

Over 75% of the forest is covered with maturing sawtimber-sized trees. Silvicultural planning will focus on establishing new cohorts of desirable regeneration to increase sustainability of the forest resources. Intermediate treatments, such as thinning, will also be utilized in areas where acceptable growing stock is still vigorous. Understory management of invasive and undesirable species will also be a large part of planned management activities.

B. History

Reason for acquisition and funding sources

In 1960, the first 300 acres of land that would become Mohegan State Forest (MSF) were gifted to the state by Margaret Bowers. The Bowers family had a history of managing the land and gave the property to the state for the purpose of demonstrating good forest management. The areas of MSF to the west of CT Route 97 were also originally acquired from a local family. From 1966 to 1969, 89 acres were acquired from Ruth Fanshaw Waldo of Scotland, CT. These pieces are located between Waldo Road and the Shetucket River, and currently constitute the only part of MSF that lies in the town of Sprague. This land had originally been in the Waldo family since the early 18th century, and in the interest of conserving history, Ruth Waldo donated the property to the state to expand MSF. The land was conveyed with the understanding that it be "*perpetuated in accordance with the rules, regulations and policies of the State Park and Forest Commission and for the enjoyment of the people of the State,... [and] known and posted as 'the Edward Waldo Tract of the Mohegan State Forest',*"

Since the two initial acquisitions, the size of MSF has more than doubled. The eastern parcel (now known as Compartment 4) has grown to 713 acres, and now stretches into the town of Canterbury along Hanover

Road. The western parcel has expanded to 225 acres, and now features forestland north of Station Road in Scotland, as well as agricultural fields located between Waldo Road and Station Road.

Development of resource prior to and after acquisition

There is evidence that large areas of MSF were once under agricultural use and have since reverted back to native forestland. Forest management had occurred on the property prior to state acquisition. In 1944, the Bowers family conducted a timber harvest in which 133,000 board-feet of timber was removed. The Waldo family used their land primarily for farming, beginning in the early 18th century. Since then certain areas have reverted to forestland, while some areas remain in agricultural use.

Under state ownership, the first management activity was establishing seed orchards of white spruce and eastern white pine, in 1973 and 1977 respectively. The forest resources were first inventoried in 1985. Once an understanding of the resources was established, Foresters moved forward with planning silvicultural activities and forest operations. So far, timber harvest operations have only been conducted in Compartment 4. Starting in 1987, 50 acres of forest was harvested for the purpose of establishing tree regeneration. This harvest helped fund the establishment of a gravel forest road that gave better access to the parts of the forest furthest from CT Route 97. Once this road was established, several more harvest operations were conducted throughout the forest. This resulted in 88 acres being thinned, and 19 acres undergoing regeneration harvests. Firewood was also collected by private landowners after several harvest operations were completed.

Changes in the last 10 years

MSF has not had any forest management activity since 1993. Over the last few decades, agricultural crop production and passive recreation (e.g., hunting, trapping, and fishing) have been the primary uses. There has been no comprehensive management plan in effect since the first plan expired in the 1990s. The purpose of this plan is to re-introduce forest management and planning into previously designated areas, as well as establish management goals and objectives into areas acquired since the last management plan.

Rotations and cutting cycles used (acres of each)

Even-aged management will use 100-year rotations, with intermediate treatments such as thinning and pre-commercial forest stand improvement included as resource needs and funding permit. The general entry period for uneven-aged management will be 20 years. During this plan period 107 acres of forest is scheduled to receive even-aged silvicultural treatments. That is approximately 18% of the actively managed forest.

C. Acres and Access

Acres

Mohegan State Forest encompasses 938 acres of land. Under current conditions, 571 acres have potential for harvest operations as guided by silvicultural management systems. The remaining land is either

inaccessible/inoperable forest land, old fields, agricultural land, designated for Old Forest Management, or standing bodies of water.

| | |
|---------------------|------------------|
| Active | 571 acres |
| Old Forest | 101 acres |
| Inactive | 90 acres |
| Inaccessible | 5 acres |
| Inoperable | 171 acres |
| Total | 938 Acres |

- “Active” forestland denotes areas which are currently or have the capacity to be actively managed for forest resources.
- “Old forest” are areas intended to be left alone as long-term forest reserves.
- “Inactive” areas are currently non-forested and not intended to be managed for forest products or wildlife habitat.
- “Inaccessible” areas cannot be physically accessed by equipment necessary for forest management operations.
- “Inoperable” areas may be accessible, but are limited in their management potential due to physical site limitations such as wetlands, steep slopes, or abundant surface stones.

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

State Route 97 and intersecting town roads provide primary access to all of Mohegan State Forest. Approximately 0.65 miles of the state highway abuts MSF. Road frontage with town roads totals 1.39 miles, across the towns of Scotland, Sprague, and Canterbury. These roads include Hanover Road and Station Road in Scotland, and Waldo Road in Sprague. These exterior roads are paved and maintained by state and local government.

The interior of Compartment 4 can be accessed via limited parking areas on Route 97, or from Hanover Road on the far eastern edge of the forest. The interior of Compartments 1 and 2 can be accessed from roadside parking areas and pull-offs along Station Road. The interior of Compartment 3 can be accessed from a small parking area on Waldo Road.

One gravel forest road was created in 1987 to help access interior parts of Compartment 4. This road was used during previous forest operations and was suitable for large trucks and equipment. It has not been maintained for 25 years and needs clearing and improvement before it could be considered for re-opening for these purposes. Improvements include depositing gravel in areas where water flow has caused ruts and depressions and repairing the road in the area where water has breached a beaver dam and started to flow across the roadway. Beaver population control is needed. This road is currently gated and is used for management purposes, emergency access and passive recreational use. There is an old forest road created by previous landowners that intersects with Hanover Road and could be improved and used for forest operations in the future. Landings and staging areas can be created roadside along the town roads abutting

Mohegan State Forest, but limited to the forest access road for all activities planned adjacent to State Route 97.

Inaccessible areas (acres) and access potential

Stand 4-15 (5.2 acres) is located along the southern boundary of the eastern block of Mohegan State Forest. The stand is inaccessible because access through state land is impeded by wetlands and their accompanied drainage areas. If access to the stand is critical, it is recommended to seek temporary permission to access state land from the abutting landowner (Joshua's Tract Conservation and Historic Trust).

Stands 1-1 and 1-2 (totaling 21 acres) also contain areas that are considered inaccessible. The area is bounded by Merrick Brook to the west and very steep cliffs and hills to the east. To access the flat areas in-between, a stream crossing could be established over Merrick Brook. Under this management plan these stands are recommended as an Old Forest Management Site, and not scheduled for active management.

Rights-of-way

The Providence and Worcester railroad owns land that passes through the forest south of Waldo Road. A right-of-way across the railroad tracks provides farm equipment access to Stand 3-2 (agricultural field). Stand 3-5 is inaccessible for forest management purposes due to steep approaches to the railroad crossing.

There is a landlocked piece of private land surrounded by Stand 4-24 that is only accessible from state land.

Boundary conditions and total miles of boundary

There is currently a total of 15 miles of boundaries across Mohegan State Forest. Boundary lines were identified with GPS, flagged, and partially marked in 2018/2019. The boundaries delineating the southwestern portion of compartment 4 were marked in 2020. Select boundaries along Hanover Road were marked in 2021. Boundaries will be completed in 2021/2022. The boundary lines were most recently marked and maintained during the last management plan period, but evidence had deteriorated, and the forest has expanded greatly in size. In areas of boundary uncertainty, accurate boundary lines should be established using resources such as old evidence, property deeds, and GIS mapping. DEEP Forestry will work with the DEEP surveyor in the resolution of any boundary uncertainties encountered during upcoming re-marking. Once the boundary lines are accurately represented, they should be maintained every 7-10 years.

Known boundary problems

There are boundary line markings that indicate the boundaries of the old forest bounds before additional parcels were added. These lines are mainly surrounding what is now Stand 4-11. There is also inaccurate boundary marking between Stands 4-18 and 4-21. Stand 4-19 has "private property" signs along the road, although it is now State Land. These boundary issues will be resolved during this planning period.

D. Special Use Areas

Lakes and ponds

There are two small ponds in Mohegan State Forest, both within Compartment 4. They have no formal name and were formed by beaver activity along Waldo Brook and Smith Brook. The smaller pond within Waldo Brook is adjacent to Route 97 and is approximately 1 acre. The larger pond within Smith Brook is in-between Stand 4-23 and the agricultural fields along Hanover Road. It is approximately 4 acres.

Rivers and streams

The entirety of Mohegan State Forest is within the Thames River Basin. This water basin encompasses most of eastern Connecticut and extends into western Rhode Island and south-central Massachusetts. More specifically, the entire forest lies in the regional Shetucket River Basin. The Shetucket River (which merges with the Yantic River in Norwich and creates the Thames River), constitutes the southernmost boundary of Compartment 3. There are also three brooks that drain the forest and flow into the Shetucket River. There is Merrick Brook, which forms the western boundary of Compartment 1. Waldo Brook, which briefly flows through the northwest corner of Compartment 4, then crosses Route 97 into private land before re-entering the forest in Compartment 3 and converging with the Shetucket River. Lastly, there is Smith Brook that provides drainage for the northeast corner of the forest. This brook flows into a system of reservoirs and ponds that were created due to industrial expansion in the 19th century. Eventually this waterway flows into the Shetucket River in Norwich.

Areas of Merrick Brook that flow through the Talbot Wildlife Management Area, abutting compartment 1 to the north and west, are considered Class 1 Wild Trout Management Areas. Parts of this Wild Trout Management Area extend into MSF, as indicated by signage along the brook. This brook is fully supportive of aquatic life.

The Shetucket River is considered a Trophy Trout Stream, meaning the state stocks it with a higher proportion of larger fish. This river also holds one of three areas statewide where broodstock Atlantic salmon fishing is permitted. This broodstock Atlantic salmon fishing area can be accessed via Compartment 3. Areas of the Shetucket River that pass through Mohegan State Forest are fully supportive of aquatic life.

It is the policy of the Fisheries Division that riparian corridors be protected with an undisturbed 100 ft. wide riparian buffer zone. A riparian wetland buffer is one of the most natural mitigation measures to protect the water quality and fisheries resources of watercourses. This policy and supportive documentation can be viewed on the DEEP website at: [Riparian Policy](#) or [Riparian Position Statement](#)

Limiting the use of herbicides within and adjacent to riparian areas will further protect water quality and fisheries resources. Additionally, applying techniques outlined in the Connecticut Field Guide: "[Best Management Practices for Water Quality while Harvesting Forest Products](#)", will allow for optimal site protection and restoration while minimizing the potential for erosion and sedimentation during or immediately following a timber harvest.

Cultural sites

Upon entering Mohegan State Forest you will immediately notice an abundant presence of stone walls. When European settlers arrived they cleared vast areas of forestland. These clearing activities generated

forest products that were utilized as building materials and fuelwood sources. This cleared land was often converted into agricultural land, and as a result many stones were lifted out of the ground and moved to the edge of these fields. These stone walls signified property lines, field boundaries, and may have been used as livestock pens. It is made clear by the abundant presence of these structures in MSF that this land was used heavily for agriculture in the past. There is also a stone foundation of what was once some sort of mill along the Merrick Brook in Compartment 1.

The Edward Waldo House [<http://www.scotlandhistoricalsociety.org/waldo.htm>], is a historic home and museum maintained by the Scotland Historical Society abuts the forest in the western block. Part of the Waldo family's original farm property was given to the state in the late 1960's and is now part of MSF. This farmstead was settled in 1715 and stayed with the Waldo family for 260 years. This preserved area gives insight into what life was like for early settlers in eastern Connecticut. When Ruth Waldo gave the land to the state, she did so with the purpose of the land being managed for the enjoyment of the people of Connecticut.

The Highland Festival Association has historically received a Special Use Permit to use a portion of each; the Waldo Tract, and Talbot WMA to host the Highland Festival and Games – an annual Scottish heritage event. The event uses Waldo Tract, and Talbot fields for parking. The main stage for the event is typically situated on the south side of Waldo Road.

Recreation and scenic sites

In 2018, the First Selectman of Scotland, CT contacted DEEP to propose a partnership to improve an existing authorized parking area which provides public access to MSF from Hanover Rd. Later in 2018, DEEP approved the request and advised the Town to work with DEEP Forestry and Wildlife Divisions in the implementation of the project, while directing questions to DEEP Property Review. Preliminary site work was initiated in 2019 by the town of Scotland but the work has been delayed until DEEP staff and the town Public Works staff are able to obtain the materials needed to construct the parking area. Discussions with the Town have slowed due to administrative changes in the Town.

There has been interest from local citizens in the establishment of more opportunities for recreation within Mohegan State Forest. Establishing authorized trails from the existing network of pathways is one possible way to encourage people to use the forest and meet this goal. Foot travel is permitted within the entirety of MSF, but no formal trails are currently designated by CT DEEP or CFPA (<https://www.ctwoodlands.org/>) within the forest. Old forest roads and informal paths that stretch from CT Route 97 to Hanover Road could possibly be utilized as authorized trails where their layout is congruent with other DEEP goals for the land. These old roads and paths would need improvements such as stream crossings, debris clearing, and erosion control. It is also recommended that a small portion of the existing path network will be discontinued to minimize unchecked trail development in the State Forest. This will minimize potential negative impacts to wildlife and water quality associated with recreational trails. This will help reduce the recreational footprint of the area and keep recreationalists in designated areas where uses are appropriate given DEEP management goals.

MSF is part of the statewide letterboxing series. A letterbox can be found using clues found on the CT DEEP [Letterbox page](#).

There is a forested scenic overlook at the top of the cliffs that emerge from Merrick Brook, in Compartment 1. This area features a view that looks out upon the surrounding forested hills and Shetucket River valley.

Motorized vehicles are not allowed in any part of MSF, but their presence has been observed. There is currently only one gate present to limit the access of motorized vehicles. Another gate needs to be installed to limit access in Compartment 1. The gate should be installed along Station Road where an old forest road enters Stand 1-2. Installation and maintenance of these gates help limit the unauthorized use of forest roads and trails by motorized vehicles. Motorized vehicle activity degrades forest soil integrity and worsens the conditions of forest trails and roads. This can often lead to impaired water quality of surrounding waterways. It will be a priority during this planning period to secure these illegal entry points.

Natural areas

No state-designated natural areas occur within Mohegan State Forest.

Old forestland management sites

Stands 1-1 and 1-2, totaling 101-acres, will be designated as Old Forest Management Site (OFMS) during this management period. These predominately hemlock stands are characterized by steep slopes, rugged cliffs, and ridgetops. They are also bounded by Merrick Brook on the western end. It is a relatively unique area in the landscape and for these reasons the area will be designated for Old Forest Management. Though the areas are not necessarily older than much of the forest, it is expected that the OFMS status will eventually lead to the development of old growth attributes such as canopy gaps, multiple age-classes of trees, standing and downed dead trees, and extensive moss and lichen growth.

Research areas

Several research permits have been issued to various agencies and groups within the last decade. Students from The University of Connecticut (UConn) and Yale University have used the forest to collect data on wildlife. The Connecticut Agriculture Experiment Station has also used the forest to conduct experiments on the vegetation and experimented with biological-control for mile-a-minute vine – an invasive species. Research, field demonstration tours and outdoor education in MSF will continue to be supported and coordinated as projects arise.

A portion of stand 4-11 totaling up to 25-acres will be managed and maintained as an Adaptive Silviculture for Climate Change (ASCC) demonstration site. Working in conjunction with researchers from UConn and the Northern Institute of Applied Climate Science (NIACS), the site will receive three distinct silvicultural treatments of 5-8 acres each. Sites will demonstrate silvicultural tactics to foster; 1) resistance 2) resilience 3) transition, in anticipation of the expected local impacts from climate change. Treatments were designed through a multi-day collaborative workshop sponsored by UConn and NIACS including forest managers and ecologists from; DEEP, US Forest Service, Harvard Forest, UConn, Private Consulting, and Research sectors. Treatments will be implemented as part of a larger stand entry planned by DEEP in compartment 4. Research

units will be delineated, marked with paint, and re-measured on a semi-annual basis by UConn with assistance from DEEP if needed. Conditions in treatment units will be evaluated in comparison to a similar-sized unmanaged control unit, which will be reserved from forest management to allow for long-term comparison to the study units.

E. Extensive Areas of Concern

Wetlands

MSF contains 171 acres of designated inoperable areas, as well as poorly drained areas of actively managed sites. Beaver activity along these wetlands has resulted in forestland being inundated in standing water, as well as roads and trails becoming compromised. The forest gravel road built in Stand 4-11 has been degraded as a result. A beaver dam that was built immediately to the north of the road has since started to fall apart and is now allowing water to flow over the road into an open swamp immediately to the south. During times of heavy water flow, several inches of water have been observed flowing over the road. This has eroded the roadbed and its banks, making the road impassible during most times of the year. Facilitating drainage and stability on this roadway would greatly improve access to interior areas of Compartment 4, as well as ensure the water quality in the watercourses are not compromised. Areas containing wetlands and wetland soils will be restricted from harvest activities. Beaver population control will be conducted where necessary.

At the northwest corner of Compartment 4, Waldo Brook was modified by previous landowners resulting in the creation of a small pond (1 acre) and marsh (3 acres) along Route 97 west of Stand 4-9. Beaver are typically present here and the marsh contains a patch of *Phragmites australis* (an invasive plant). At the southern end of this marsh Waldo Brook is diverted through a culvert westward under Route 97; this structure can become obstructed by beaver debris.

Unauthorized or illegal activity

Mohegan State Forest has been passively managed by the state for the past 25 years. Unauthorized and illegal activity may be more common due to the minimal DEEP presence in the surrounding area. Only one pathway into the forest is gated, while many other pathways into the forest are open and easy to access. As a result, motorized vehicle use in the forest has been observed in Compartments 1 and 4. In addition to rutting and degrading the soil, small trees and shrubs have been cut to make these trails more accessible. Installing more gates and obstructive materials will be scheduled during this planning period to curb illegal use of the forest by these unauthorized vehicles. Enforcement of regulations and policies governing these activities are essential.

One illegal access point off Hanover Road was identified by DEEP Law Enforcement. The roadside boundary in this area was subsequently marked and the illegal access road was blocked by DEEP State Parks staff from the Hopeville unit. The access appears to have been successfully deterred as a result.

F. Wildlife Habitat – DEEP Wildlife Division

Past investment in habitat improvement

No active wildlife habitat improvement projects have been carried out on MSF over the last 25 years, with exception to administering three agricultural use license agreements with local farmers on approximately 56 acres in Stands 2-1, 3-2 and 4-31. In exchange for the use of state land for growing silage corn (approximately 51 acres), the Licensees maintain approximately 5 acres of grass, herbaceous cover, and standing corn for wildlife (see pages 38-40). The use of state-owned land for agricultural purposes is consistent with wildlife management practices and the desire to provide diverse habitats for a variety of wildlife species. The DEEP has long recognized the benefits and services provided through cooperative farming agreements. The goal of the DEEP's Agricultural Agreement Program is to improve and maintain wildlife habitat on designated department-owned lands through a cooperative effort with local agricultural producers. Agricultural license agreements consist of a license and land use plan that identifies the crops to be planted and the services and/or goods to be provided to benefit wildlife. The agreement also requires licensees to follow the implementation schedule of a conservation plan developed by the United States Department of Agriculture Natural Resources Conservation Service to ensure that soil and water quality are maintained. Areas are inspected annually by Wildlife Division staff to ensure compliance with the agreement terms.

Landscape context – Young forest wildlife considerations

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

Mohegan State Forest is located within the southern section of the Scotland-Canterbury New England Cottontail restoration Focus Area. The New England cottontail (NEC) is Connecticut's only native cottontail, and has declined by more than 85% throughout its range in the Northeast. It is a species of greatest conservation need (GCN) in Connecticut and regionally, and loss of habitat has been identified as the primary cause. The habitat restoration goal for the Scotland-Canterbury NEC Focus Area is 1,000 acres. NECs require large patches of young forest or dense shrubland to maintain viable local populations. They succumb easily to predation if they need to leave dense cover to forage. NECs have been documented approximately 1.6 miles (2.6 km) north of MSF, within accepted dispersal distance for the species. Planned forest management that results in large patches of regenerating forest, such as the 2nd shelterwood cut planned in block 4-11 may benefit NECs.

MSF also lies completely within a restoration Focus Area designated by DEEP wildlife biologists for American woodcock, another GCN species. The habitat needs of woodcock are a bit more complex than for NECs. Woodcock require areas of young forest or shrubland for nesting cover and feeding. Soil conditions must support adequate populations of earthworms and other invertebrates which make up the woodcock diet. The soils within the planned shelterwood work areas in compartment 4 are generally loamy and border

wetlands that tend to provide the conditions required for foraging; soils in compartments 2 and 3 are designated farmland soils providing excellent conditions. Male woodcock display in open areas, such as old fields and clearings, in early spring to attract mates. Later in the season these birds tend to move to dense meadows for roosting cover. It is ideal to have display and roosting cover abutting feeding and nesting areas, nearby farm fields may be used for these purposes.

While NECs and American woodcock are focal species for young forest habitat creation, over 50 GCN wildlife species rely on young forest or shrubland. On that list are many songbirds such as eastern towhee, indigo bunting, prairie, chestnut-sided and blue-winged warbler; several State-listed reptiles; a number of small mammals; and many insects including pollinators. The clear cuts and shelterwood cuts indicated in this plan will benefit many species in this suite of shrubland/young forest – dependent wildlife according to the [Connecticut Wildlife Action Plan](#).

Critical habitat (State-listed threatened and endangered plants and animals)

Mohegan State Forest does feature one critical habitat identified in the State’s Natural Diversity Data Base (NDDB). The banks of the Shetucket River along the southern boundary of Compartment 3 support a floodplain forest community. These areas can be described as mesic forests and associated open, alluvial wetlands influenced by seasonal inundation, with flood deposited sandy or nutrient-rich silty soils.

According to an NDDB site review, there are several State-listed species documented within the forest. These sensitive species are mostly associated with rivers and streams. The rapids clubtail (*Gomphus quadricolor*) is considered a State Threatened species; while mustached clubtail (*Gomphus adelphus*), wood turtle (*Glyptemys insculpta*), slimy sculpin (*Cottus cognatus*), and mountain spleenwort (*Asplenium montanum*), and one reptile species are listed as State Special Concern species. DEEP Forestry and Wildlife Divisions will apply all management recommendations provided by NDDB when planning and implementing management activities.

Should activities such as trail improvement or invasive species control occur in these areas, adherence will be made to seasonal restrictions and riparian areas will receive buffers as suggested.

Some of the planned harvesting activity would be shelterwood cuts which aim to create early successional forest. The wood turtle will benefit from this new habitat as it desires open land and early successional habitat.

Each harvest operation and any other habitat enhancement work that may be proposed will obtain a more specific NDDB review before commencing to protect and potentially enhance habitat for special concern and threatened species.

Wildlife-based recreation

Mohegan State Forest is a popular place for hunting, trapping, and fishing. Small game, waterfowl, deer, and turkey hunting (firearms and archery) are all permitted. Fishing is permitted in the Shetucket River and

Merrick Brook, which are renowned for their trout. Licensing requirements, season dates, and other regulations can all be found in the [Connecticut Hunting and Trapping Guide](#), and [Connecticut Angler's Guide](#).

G. Vegetative Condition

Silviculture

Mohegan State Forest contains a diverse array of forest cover considering it is less than 1000 acres. Oak and hickory forest is the dominant cover type, but there are also substantial areas of pine, hemlock, and maple. There is a small area of floodplain forest, which is a Connecticut Critical Habitat. Different types of silvicultural prescriptions will be assigned to areas where they are most appropriate. Oak/hickory and other shade-intolerant stands will receive primarily even-aged treatments. High density stands with significant acceptable growing stock will be considered for thinning operations to reduce stocking and increase forest growth and health.

The forest has received limited amounts of disturbance since being acquired by the state in 1960. While several thinning and regeneration cuts have benefited the residual stands, large amounts of the forest would benefit from silvicultural intervention. Over 75% of the forest contains a mature sawtimber overstory, with shade-tolerant species colonizing the understory. This forest dynamic has become more frequent across Connecticut, mostly as the result of lack of large-scale disturbances such as wildfire and clearcutting. State Land Management considers this shift in forest cover a trend that needs to be considered while designing silvicultural prescriptions that will encourage the establishment of new shade-intolerant forest communities. By creating large enough openings in the forest canopy to let adequate sunlight through to the forest floor, shade-intolerant species are given a chance to compete and establish themselves as dominant trees.

Silvicultural prescriptions will focus on improving conditions for shade-intolerant tree regeneration on the appropriate sites. Other prescriptions will emphasize creating favorable conditions for desirable shade-tolerant species that are already established as advanced regeneration. Thinning overstocked stands to increase growth rates of acceptable growing stock trees will also occur where appropriate.

Not all focus will be on the overstory vegetation. Vast areas of the forest have established young cohorts of undesirable species such as American beech and red maple. In areas where this problem occurs, focus will be on lowering the density of these species through timber harvests and subsequent timber stand improvement (TSI) work. Invasive species have also become a large problem in MSF. Over 100 acres of the forest has experienced dense colonization by invasive species, making control efforts time consuming and costly. They have negatively affected the existing native vegetation and made it close to impossible for new native vegetation to establish. These areas will broadly be excluded from silvicultural prescriptions while the problem is being addressed to prevent further spread.

Re-visiting the areas where previous silvicultural activities occurred will be a top priority. These areas already have time invested into them and have benefited from the previous activity. Only 157 acres of the forest

experienced silvicultural activities under state ownership. New areas of the forest will also be prescribed entries to help sustainably manage the resources.

Desired future conditions

- *In 15 years:* The forest will be approaching a more balanced age-class distribution following multiple management entries designed to improve forest health, habitat, and sustainability. Wildlife species dependent upon young forest habitats will be observed as areas harvested to promote resilience following repeat defoliation by gypsy moth caterpillar, and drought, support high densities of saplings. Climate-adaptation treatments will have served several years as demonstration and research examples while simultaneously increasing forest structure and productivity. DEEP will be following-up on earlier silviculture at the State Forest to ensure the timely graduation of successive age-classes, and continuation of the regeneration cycle. The forest will serve a broader role in the community supporting improved public access and trail availability.
- *In 100 years:* Areas that received even-aged regeneration harvests in this planning period will be nearly mature and requiring evaluation and potential planning for their regeneration. Forest composition should be largely maintained or potentially see increased levels of oak and hickory species as climate change makes local forests more prone to summer drought. A diverse forest landscape of early, mid, and late successional forest will be present. Mature forests will feature trees of great quality, form, health and vigor. Healthy old forest reserves allowed to advance through forest succession naturally, will remain highly valued landscape laboratories as they near 200-years old, and approach carbon storage pinnacles. Near or complete eradication of invasive species will result in more areas of diverse, healthy native vegetation. The forest will continue to serve in its long-term role as a local and regional carbon sink, sequestering and storing high volumes of carbon in all carbon pools, including both above-ground biomass, and the long-lived forest products harvested from within its bounds.

Forest size classes by forest type (total forest - acres)

| Type | Seedling-Sapling | Pole Timber | Saw-Pole | Saw Timber | Other | Total |
|---|------------------|-------------|-----------|------------|------------|------------|
| Mixed Upland Hardwood | 0 | 0 | 26 | 224 | 0 | 250 |
| Oak-Hickory | 0 | 0 | 0 | 249 | 0 | 249 |
| Red Maple/ Lowland | 0 | 0 | 31 | 0 | 125 | 156 |
| Oak-Pine | 0 | 0 | 0 | 102 | 0 | 102 |
| Pine-Hemlock | 0 | 0 | 36 | 0 | 0 | 36 |
| Eastern White Pine | 0 | 0 | 1 | 34 | 0 | 35 |
| Sycamore/Pecan/American Elm | 0 | 0 | 0 | 18 | 0 | 18 |
| Sugar Maple/Beech/Birch | 0 | 0 | 2 | 0 | 0 | 2 |
| Other (Fields, waterbodies, wetlands, etc.) | 0 | 0 | 0 | 0 | 90 | 90 |
| Total Acres | 0 | 0 | 96 | 627 | 215 | 938 |

Forest type, size class and condition class on areas to be managed (acres)*

| Forest Cover Group | Even-Aged Management | Thinning | Allow to Grow | Total |
|--------------------|----------------------|-----------|---------------|------------|
| Oak/Hickory | 100 | 0 | 332 | 432 |
| Oak-Pine | 0 | 63 | 39 | 102 |
| Eastern white pine | 0 | 16 | 19 | 35 |
| Northern Hardwoods | 0 | 0 | 2 | 2 |
| Total Acres | 100 | 79 | 377 | 571 |

*All planned harvest will be in sawtimber areas, inoperable red maple/lowland areas were not included. Oak/Hickory group includes “mixed upland hardwoods” forest type.

Forest health

The presence and impact of invasive pests and plants can be observed across the entirety of MSF. Invasive pests such as gypsy moth (*Lymantria dispar dispar*), beech scale insect (*Cryptococcus fagisuga*), and emerald ash borer (*Agrilus planipennis*) have all had negative impacts on the health of the native hardwood trees in the forest. In Stand 4.11 (largest oak/hickory stand), approximately 50% of the inventory plots visited had gypsy moth egg masses lining the boles of trees. Their presence is abundant, and large areas of oak mortality have been observed here, close attention needs to be paid to the future health of these infested and surrounding areas. Emerald ash borer – a non-native ash-killing insect – is spreading throughout eastern Connecticut, and contributing to ash decline in MSF. Scattered declining ash trees have been observed throughout the forest and further mortality in the ash resource is expected. Beech bark disease, in part caused by the beech scale insect, has also made its way through and the surrounding area. This causes established beech timber to rot and lose value. The foremost negative impact in MSF is the subsequent effort these infected beech trees make to introduce new stems to the forest via root sprouts. These new stems that use existing root systems can grow vigorously and spread quickly across the forest. These high-density shade-tolerant sprouts limit the establishment of shade-intolerant species such as oak and hickory. Beech Leaf Disease (BLD) is a newly identified forest pest threat that was discovered in CT in 2020. In 2021, the disease has been observed in beech stands across the state. The beech in MSF will be monitored during routine management activities for the expansion of the disease. Currently, there are no available treatments for forest trees to combat BLD.

Forest health concerns involving native insects and plants also occur. White pine weevil activity has been observed in stands containing large components of pine trees. These native small insects feed on the part of the tree known as the leader, the terminal stem that grows vertically at the apex of the tree. This feeding typically girdles and kills the terminal leader, and results in one or more of the lateral branches assuming the role of the leader. The outcome is a multi-stemmed tree with diminished commercial value. The Stands most drastically impacted are: 3.1 and 4.21, with Stands 2.1, 4.12 and 4.17 also seeing negative effects. Wild grape, a native vine, was also observed in every compartment of MSF. While grapes have notable wildlife food and cover benefits – especially for birds and lepidoptera species – these fast-growing vines can have negative effects on individual trees. Once in the canopy this vine can also shade out the foliage of the tree with its own foliage. The areas most impacted are Stands 3.5, 4.5., 4.10, 4.11, 4.18, and 4.28.

Mohegan State Forest is also dealing with an invasive plant issue on a large scale. The most widespread and impactful species include Japanese barberry, multiflora rose, oriental bittersweet, and winged euonymus. The areas most affected by site loss to these invasive species are Stands 3-1, 3-4 and 3-5 in Compartment 3, and Stands 4-5, 4-11, and 4-10 in Compartment 4. Eradicating these invasive plants will take priority before any silvicultural prescriptions are carried out in these areas.

Forests, carbon & climate change

Forests play an important role in mitigating the effects of climate change. Trees and 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 also 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 serve two significant functions; sequestering carbon dioxide, and storing carbon, often referred to as “sequestration” and “storage”. However, the forests ability to perform these functions is maximized at two different points during development. Sequestration potential is maximized in vigorously growing forests which are efficiently photosynthesizing, and rapidly adding wood. This occurs when a forest is aged 30-70 years. Carbon storage benefits begin to peak in maturing forests, generally over 70 years old, which support larger diameter trees, and greater accumulations of above-ground wood volume. This peak carbon storage period will start at age 70 and may last for well over 100-years assuming stable growing conditions.

The Division of Forestry believes in pursuing a diversity of carbon management strategies to meet the demands of a changing climate while also accomplishing traditional land and forest management objectives. Not only forests, but forest products play a critical role in mitigating climate change. Value-added wood products from responsibly managed forests store carbon for decades and beyond while tree removals from sound forest management allocate growing space to higher quality trees, improve sequestration and wood production rates, add structural complexity, and improve wildlife habitat.

The Division of Forestry uses a triad approach to forest management with its policy regarding “management status” zoning using the forest stands database. Old forestland management sites are analogous to forest reserves which are intended to grow undisturbed for long periods of time and store large amounts of accumulated forest carbon. Areas designated as inoperable, inaccessible, and inactive similarly receive no active forest management and store large volumes of carbon. A portion of the actively managed landscape is managed on an uneven-aged basis, in which there are both high levels of carbon storage through mature trees, with balanced sequestration occurring through tree reproduction in the under story and within canopy gaps. Another portion of actively managed lands are managed to promote the persistence of species or communities of species which require young forests managed rotationally through periodic disturbance across the landscape. These stands managed with even-aged regeneration treatments will come to represent rapid carbon sequestration areas while simultaneously providing the traditional wildlife habitat, rare plant community, and forest sustainability values of young forests.

Climate change will over time affect soil moisture resulting in changes in regional species composition. In this region it is expected that species at or near the southern extent of their range will be among the first impacted. Sugar maple, eastern white pine, aspens, eastern hemlock, and gray/paper birch may experience decline in this region due to climate. On the other hand, it is anticipated that growing conditions will improve for species towards the northern extent of their ranges. Scarlet oak, pitch pine, and black gum should fare well barring any impacts from other stressors like southern pine beetle. Forest management strategies will affect how well forests adapt to a changing climate. Some compositional changes may be initiated by changes in soil moisture. Forest management practices will strive to make appropriate decisions regarding species composition and site quality. Similarly, complex forest structure and reasonably diverse species mixtures will help promote climate resilience in both managed and unmanaged stands. Thinning in stands which are expected to be impacted by climate change may be a good strategy for prolonging health. Disfavoring maladapted future species on poorly suited sites will help build climate-resilience into the residual forest. Similarly, fostering abrupt transition through aggressive management action may be advisable in climate-threatened forests.

H. Landscape Context – Forestry – adjacent land uses

Mohegan State Forest lies in a landscape that is commonly described as “The Last Green Valley.” This area is recognized as a National Heritage Corridor by the National Park Service for its unique landscape and history. Forests and farms still constitute 77% of the landscape, while many areas outside of the corridor are heavily urbanized and developed. While Mohegan State Forest is only 1.5 of the 1,100 square miles “The Last Green Valley” encompasses, it still fits the description adequately.

As expected, MSF is bordered predominately by forest and farm. Compartment 4 shares most of its boundaries with private landowners. A small proportion of the compartment abuts against developed areas such as house lots and yards, while the bulk of the forest is bounded by private forestland. The southwestern area of Compartment 4 shares a boundary with Joshua’s Tract Conservation and Historic Trust. This specific parcel is known as the Pappenheimer Preserve and was donated to the trust to be preserved in 2005. According to the Joshua’s Trust website, the land can still be used for grazing and timber cutting during the lifetime of the donors.

Directly to the north of Compartment 1 lies Talbot Wildlife Management Area. Wildlife Management Areas share similar goals of maintaining and enhancing natural resource values and providing opportunities for wildlife-based recreation. The Sprague Land Preserve, owned by the Town of Sprague, lies across the Shetucket River from the majority of Stand 3.5. The historic Waldo Family Farm is another protected open space that shares borders with MSF in Compartment 3. The rest of the neighboring land falls into private ownership, with most of it being forestland. Agricultural land is also abundant in the areas adjacent to MSF.

I. Specific Acquisition Desires

There is a 7-acre private inholding of forestland within MSF. The parcel would represent a desirable land acquisition if ever available on the open market.

J. Public Involvement

This plan was sent to the First Selectman's office and Inland Wetlands and Watercourses Commissions in the Towns of Scotland, Sprague, and Canterbury, and to Joshua's Tract Conservation and Historic Trust in February of 2021. The interested parties had over one-month to evaluate and provide public comment on the content of the plan. At the conclusion of the one-month comment period, no comments were received from any of the affected communities. Specific discussions with the Town of Scotland regarding the pre-existing MOU and next steps to resume our partnership on parking and access are ongoing.

K. Adaptive Management

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

L. 10 Year Goals

1. Maintain and enhance forest health, productivity, and diversity.
2. Increase forest resilience to climate change
 - a. Incorporate climate adaptation planning into forest operations
3. Improve wildlife habitat diversity through sustainable forest management
 - a. Promote a balanced age-class representation across the actively managed acreage
4. Improve existing roadways in the forest to allow better interior management access
5. Control the spread of invasive plants
 - a. Eradicate invasive plants from treatment areas prior to active management
 - b. Initiate control on the heavily infested sites in compartment 3 along the Shetucket River
6. Establish and maintain accurate boundary line markings
7. Improve access for public use and enjoyment of the natural resources
 - a. Establish parking, and a sustainable trail system

M. Work Plans

Road maintenance

All forest roads need to be cleared of debris before use, following a 25-year absence of maintenance. The gravel forest road in Stand 4-11 needs to be repaired in the area where water has breached a beaver dam and started to flow on and across the road into the adjacent open swamp. The old forest road that stretches near the east boundary of Compartment 4 needs culvert maintenance in an area where it has been buried

and clogged with dirt and debris. The old forest road that travels uphill on the eastern side of Compartment 1 needs BMP's such as water bars and diversion ditches implemented along the road as needed. This is a steep road with a high possibility for erosion.

Road construction, gates, signs

Once roads are improved and easier to access, a gate should be placed at an access point where Stand 1-2 meets with Station Road. Obstructions such as large boulders or logs could also be placed to supplement the gates and further deter unauthorized access.

Boundary marking

Boundary line markings need to be accurately established along all property lines. Very little boundary evidence remains from the last management period, and the new areas acquired since that period have little to no boundary markings. Work will also need to be done on eradicating old and inaccurate boundary markings in Compartment 4. Once an accurate network is established, they will be maintained every 7-10 years.

Stream improvement

No stream improvement plans are scheduled for this management period.

Cultural site maintenance

No cultural site maintenance is planned for this management period. State land abutting the Waldo Family Farm Historic Site, in compartment 3, will be managed with a combination of invasive plant control, and brush mowing to enhance early successional habitat adjacent to existing agricultural areas.

Recreation site work

DEEP and the Town of Scotland are working in partnership to develop a parking area along Hanover Road to facilitate better recreational access to the forest. The parking area is being designed to accommodate horse trailers and connect with an existing network of old woods roads which provide the base for a trail system to be established. The state will be responsible for installing guard rails and appropriate signage for the parking area. Site work on the parking area was initiated but halted due to shifting Town priorities. Discussions with the Town regarding the existing MOU and resuming site work on the project are ongoing.

Trail maintenance

No formal established trails currently exist within Mohegan State Forest. A site review for the development of a sustainable trail will be initiated through the DEEP Trails Committee and a project request developed and circulated (District and Hartford offices) for comment and approval. The DEEP Parks Division from the Hopeville Pond State Park Unit will be responsible for trail maintenance.

Agricultural license agreements

DEEP administers three agricultural use license agreements with local farmers on approximately 56 acres in Stands 2-1, 3-2 and 4-31. In exchange for the use of state land for growing silage corn (approximately 51

acres), the Licensees maintain approximately 5 acres of grass, herbaceous cover, and standing corn for wildlife.

The three agricultural license agreements are scheduled to expire December 31, 2022 and may be renewed for 2023. If renewed, terms of future agreements may include different terms intended improve desired conditions. The current agreement in Compartment 3 will be modified to exclude the field in stand 3-2 to increase the amount of suitable wildlife habitat and to enhance wildlife-based recreation.

Wildlife habitat improvement (uplands and wetlands)

Scheduled silvicultural prescriptions will result in the creation of a more diverse forest landscape. The more diverse landscape will also create new suites of wildlife habitat. Regeneration based harvesting creates early successional forestland, which is a wildlife habitat currently missing from MSF. It also aims to establish more mast producing tree species, such as oak and hickory, which provides wildlife with a food source. Different intensities of harvest will result in greater horizontal diversity within the landscape of the forest, pinning new successional forest near mid- and old successional forest. Riparian habitats will have buffer zones from activity to allow the streams and waterbodies to remain in a natural, healthy state.

Existing field habitat in and around Stands 4-5, 4-9, and 3-2, and any future sites resulting from the modification of existing agricultural agreements will be maintained by periodic brush mowing by the Wildlife Division to sustain early successional habitat. Woody growth has obstructed mowing access in some places such as at the fields near Stands 4-5 and 4-9; access to certain fields will be reclaimed as necessary to conduct periodic mowing. Within Stands 3-4 and 3-5 forestry mulching/mowing may occur to create and enhance early successional habitat.

Wildlife and fisheries population research and management

Two wood duck nest boxes are monitored and maintained on the Hanover Road Pond by the Wildlife Division’s Migratory Game Bird Program. These boxes are used intermittently by hooded mergansers. Hunting and trapping is permitted throughout Mohegan State Forest. These activities help to keep wildlife populations in balance and are regulated and administered by CT DEEP. Fish are stocked in the Shetucket River, in population restoration efforts.

The Wildlife Division will provide assistance in managing beaver activity as needed to minimize potential conflicts with planned management activities.

Forestry

| Stand | Acreage | Activity |
|----------------|---------|---|
| 4-11 (a, b, c) | 22 | Irregular shelterwood |
| 4-11 (n, s, e) | 22 | ASCC – patch cuts, first-shelterwood, clear cut w/ reserves |
| 4-11 (w) | 12 | Thinning |
| 4-21 | 17 | Invasive plant control |

| | | |
|---------------|------------------|------------------------|
| 4-12 | 16 | Thinning |
| 4-11 | 60 | Second Shelterwood |
| 4-24 and 4-28 | 40 | First Shelterwood |
| 3-4 and 3-5 | 49 | Invasive plant control |
| 3-5 | 18 | Irregular shelterwood |
| Total | 256 acres | |

Stand 4-11: This was one of the first areas of the forest to undergo forest management under state ownership. Between 1987 and 1991, 71 acres of the area received thinning treatments and 69 acres received regeneration harvests. The area has since grown into a highly stocked, mature oak dominant stand, but during this management plan the block has suffered extensive canopy mortality from sequential years of drought and gypsy moth infestation. Focus will be on salvage harvesting and re-creating the shelterwood system of management to help establish a new cohort of shade-intolerant trees and utilize the mature sawtimber. The first planned harvest will be an irregular shelterwood with harvesting of standing dead timber and will occur in the part of the stand closest to Route 97. In 1987, a 50-acre harvest was implemented. The next harvest will help to encourage the growth of the desirable regeneration that was established, as well as create opportunity for new seedlings to emerge. There is hope that this harvest will help generate funds that can possibly be used to repair the gravel road that leads to the eastern half of Stand 4-11. Repairing this road is vital to continuing with future treatments of this compartment.

Three areas (of 5 to 8 acres each) in block 4-11 – where mortality was not severe enough to initiate restoration harvesting – will be designated for forest management as an Adaptive Silviculture for Climate Change demonstration site. A combination of UConn researchers, local foresters, state land managers, and regional forestry professionals developed climate adaptive management strategies through a three-day collaborative workshop. Management recommendations will be implemented on this acreage in concurrence with planned DEEP management. The site will represent an ASCC demonstration site and receive periodic growth monitoring by UConn or others.

Stand 4-12: This stand contains predominately eastern white pine with oak and hickory spread throughout. The majority of the pine has not experienced white pine weevil damage and has grown to sawtimber size with acceptable form. The prescribed treatment for this stand will be a commercial thinning. In 1991, 9 acres of the stand was thinned to encourage improved growth of residual trees. The stand responded well and is now once again fully stocked.

Stands 4-17 and 4-21: These are two neighboring stands on the eastern side of Compartment 4 that have never undergone any management by the state. Stand 4-21 is a predominately white pine stand, while Stand 4-17 has large components of both white pine and oak/hickory. The plan is to prescribe a thinning treatment to reduce stocking in these high density stands. There is an old forest road established by the previous landowners that will need to be utilized for these planned harvests. This road has not undergone maintenance since the last management entry and will need several improvements. The road will need to be cleared of debris and obstructions prior to use. Also, new gravel/stone will need to be laid to improve the grade of the road and fill in

depressions. Lastly, a culvert that allows water to drain away from the steep hill on the western side of the road will either need to be repaired or replaced. These road improvement projects should be capable of being accomplished by the operator of the planned harvest.

Stands 4-24 and 4-28: A first shelterwood harvest is scheduled for these two stands in the northern area of Compartment 4. Inventory showed these stands comprised of approximately 70% unacceptable growing stock, therefore a silvicultural prescription to begin regenerating the area is recommended. The harvest operation will neighbor late and mid-successional forest habitat in Stands 4-23 and 4-26 respectively. There is a potential that Stand 4-24 will increase by 7 acres if a private inholding within the stand is acquired by the state.

Timber stand improvement/invasive control

Due to the lack of state presence in this forest, many areas have suffered negative consequences due to the lack of tending and maintaining. This is exemplified by the burgeoning presence of invasive species across the landscape. Species such as Japanese barberry, oriental bittersweet, multiflora rose, winged euonymus, autumn olive, and Japanese knotweed have colonized vast areas and are continuing to spread. The establishment and spread of these species are exacerbated by disturbances, such as timber harvesting and tree mortality.

Several areas of MSF have been excluded from harvest operation planning because of the threat of further site loss to these invasives. It is crucial to treat these stands that have been overtaken by invasives before any activity commences therein. Also, it is recommended that harvest areas are buffered from areas that have excessive presence of invasive species. This will help to limit the spread of invasives into these newly opened up areas. Invasive plant management is a component of the 10-year workplan, including a desire to begin eradication in some of the heaviest infestations in high productivity stands adjacent to the Shetucket River.

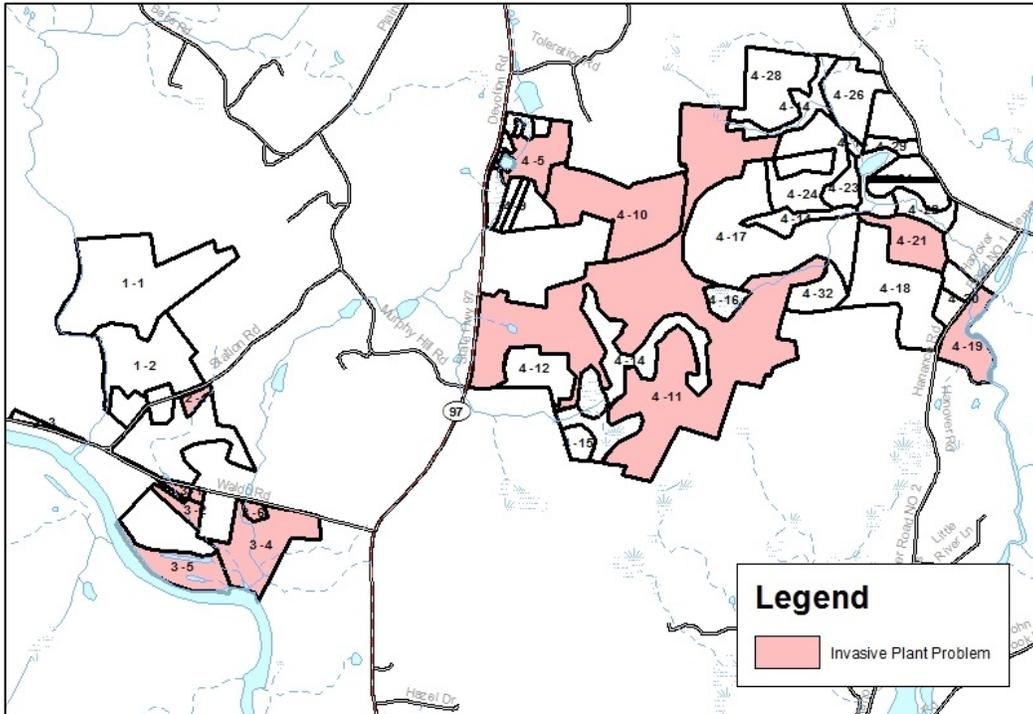


Figure 1 Map of stands with substantial invasive species problems

Suggested invasive species treatment methods:

Manual: Removal of plants through manual labor. This can include using hand tools, such as shovels, weed wrenches and Pulaski's to physically cut or remove the plant from the ground. This method can either eradicate the whole plant through removal from the ground, or just remove the above-ground vegetation while leaving the root system. Multiple treatments may be needed if vegetation re-sprouts. This method is best for smaller areas with minor infestations.

Mechanical: This method utilizes mechanized tools and machines to remove or stop the spread of invasive plants. Smaller tools such as brush saws and chainsaws can be utilized to treat single plants, or larger equipment such as mowers and bulldozers can be used for larger area applications. This method may also require repeated treatments in vegetation re-sprouts.

Chemical: Using chemical substances such as herbicides to infect and kill the vegetation. Plants can be targeted singularly or in large groups. This method will typically kill the entire plant, above and below the ground, and can be spread through connected root systems. This method requires strict adherence to safety guidelines. If done properly, much of the vegetation will have a greatly reduced chance of re-sprouting.

Burning: This method uses flames and high temperature to burn and girdle vegetation at ground level. It will generally kill the vegetation above the ground, and can cause damage to exposed root systems. It can be applied to single plants using tools such as torches, or applied to large areas of land via prescribed burning. Multiple treatments may be needed if vegetation re-sprouts.

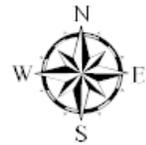
An integrated system that utilizes a combination of these treatments will be most effective. Choosing the appropriate treatment to apply will be based on the type of invasive plant present, the time of application, the size of the infested area, and the resources such as staff and funding required. It is recommended that treatment starts by removal of smaller isolated infestations that are spread out far from areas of complete site loss. This stops the spread of invasive plants into new land, and helps to contain the infestation into a smaller, more manageable area. Within MSF, Stands 4-11 and 4-21 should be treated first, as they are planned for harvest activities and are most vulnerable. The patches of *Phragmites australis* in the marsh west of Stand 4-9 will be controlled by herbicide treatment in cooperation with the Wildlife Division if time and resources permit.

N. Mapping

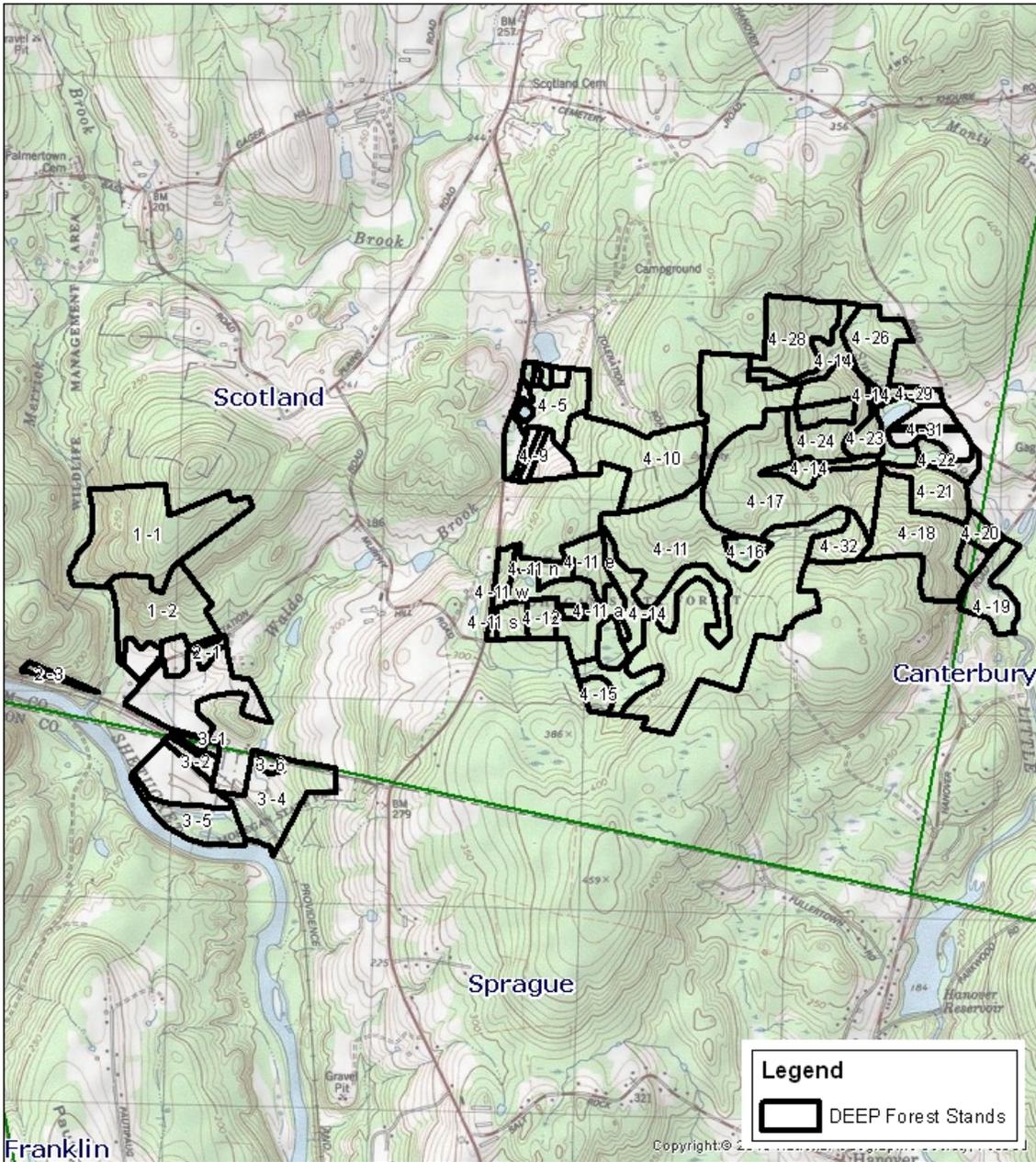


Map A - Topographic Mohegan State Forest

Scotland, Sprague and Canterbury, Connecticut
 938 Acres



February 2019



Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet

Projection: Lambert Conformal Conic

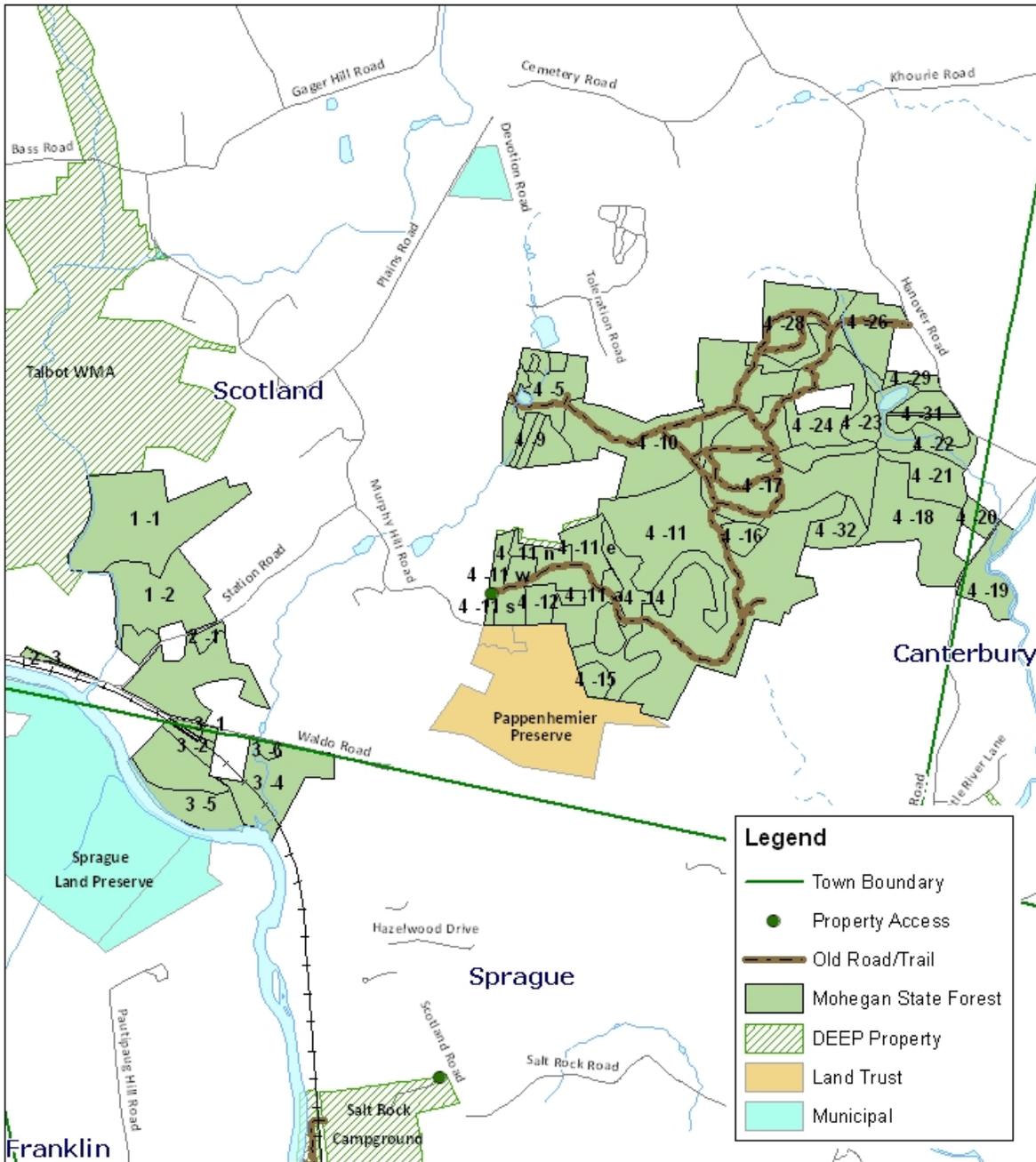


Map B - Base Mohegan State Forest

Scotland, Sprague and Canterbury, Connecticut
 938 Acres



February 2019



Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet

Projection: Lambert Conformal Conic

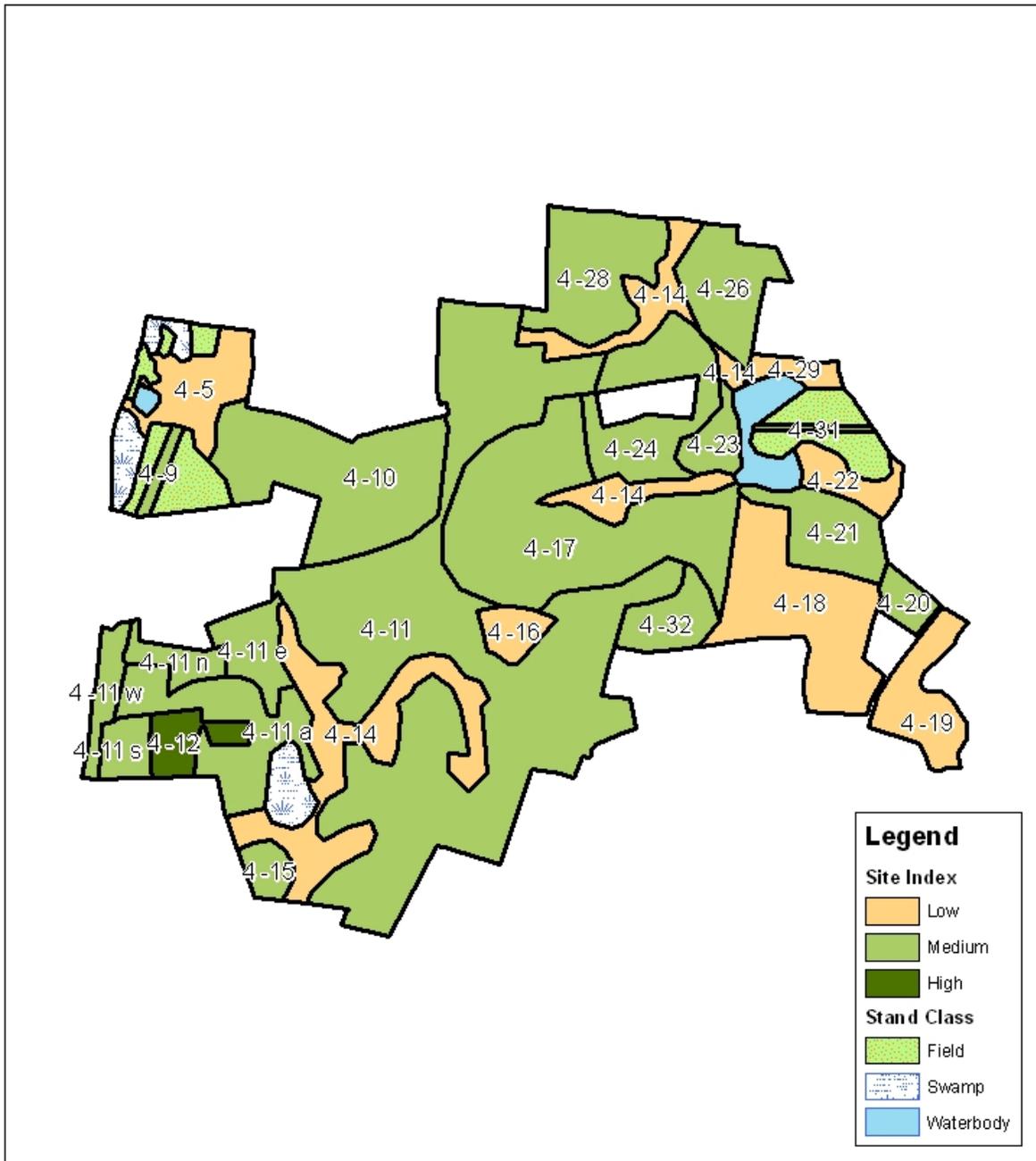


Map C - Site Quality Mohegan State Forest - Compartment 4

Scotland and Canterbury, Connecticut
713 Acres



February 2019



Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet

Projection: Lambert Conformal Conic

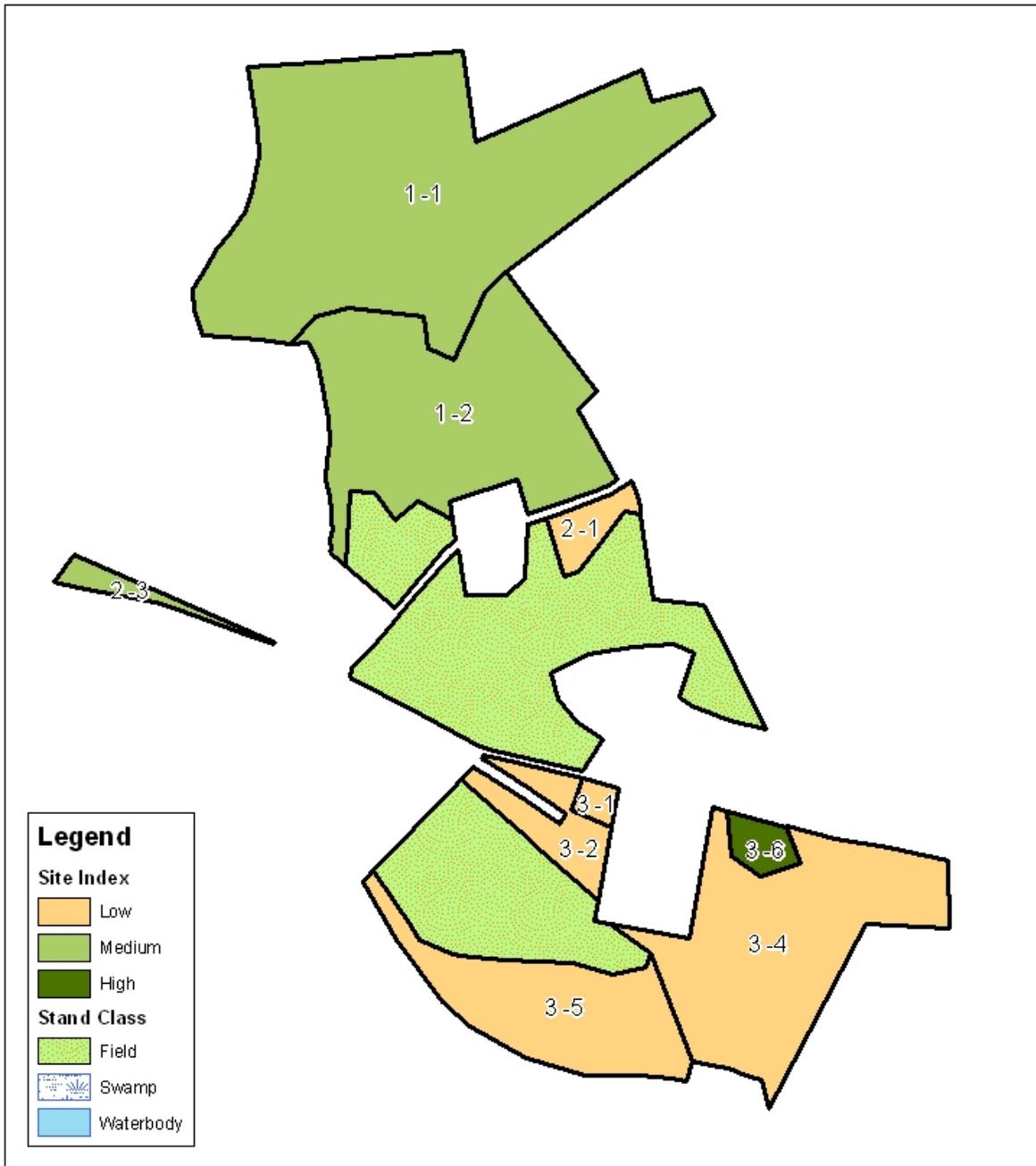


Map C - Site Quality Mohegan State Forest - Compartments 1-3

Scotland and Canterbury, Connecticut
225 Acres



February 2019



Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet

Projection: Lambert Conformal Conic

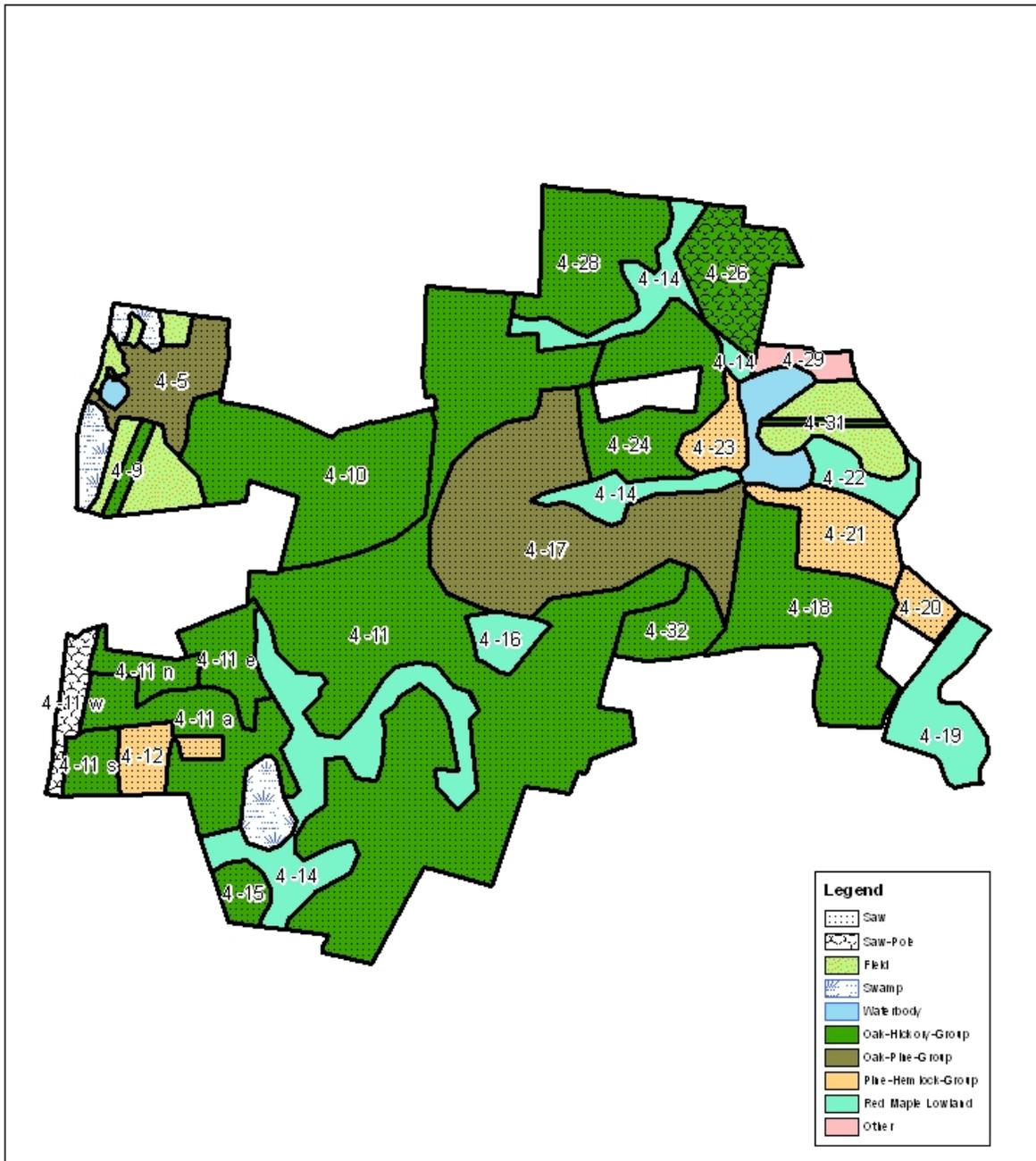


Map D - Forest Type & Size Class Mohegan State Forest, Compartment 4

Scotland and Canterbury, Connecticut
713 Acres



February 2019



Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet

Projection: Lambert Conformal Conic

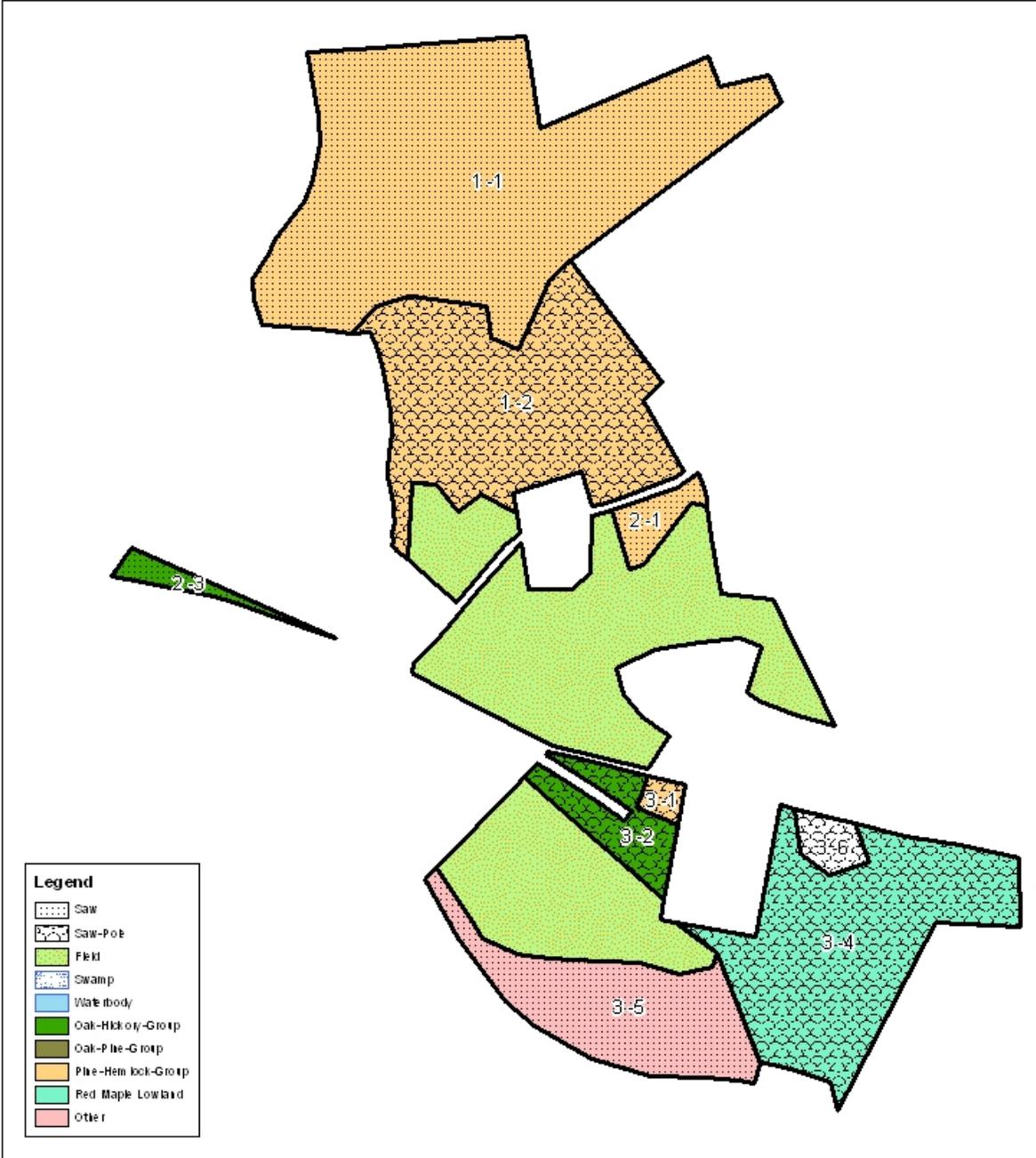


Map D - Forest Type & Size Class
Mohegan State Forest, Compartments 1-3

Scotland and Canterbury, Connecticut
 225 Acres



February 2019



Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet

Projection: Lambert Conformal Conic

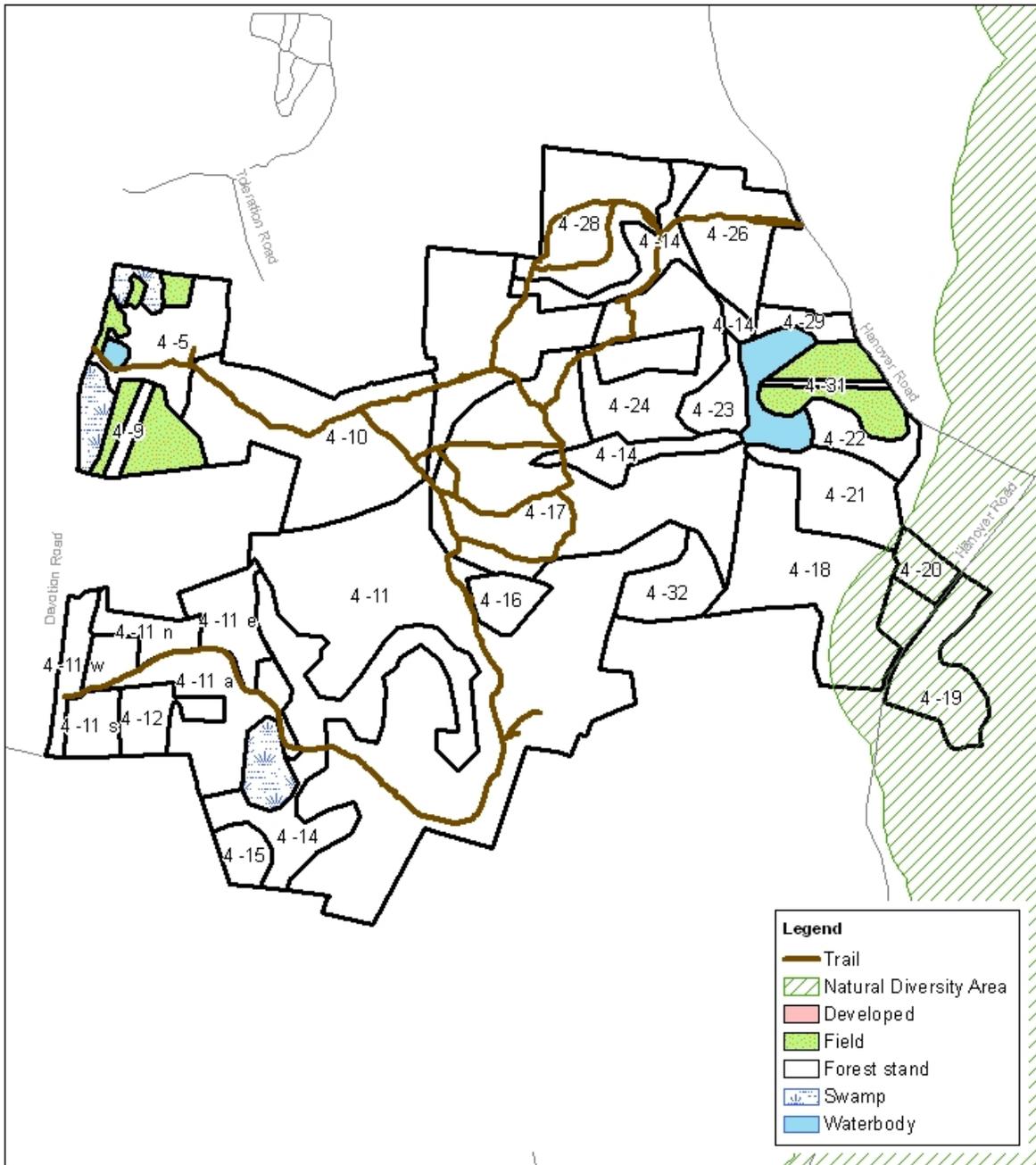


Map E - Special Features Mohegan State Forest, Compartment 4

Scotland and Canterbury, Connecticut
713 acres



February 2019



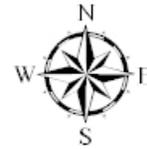
Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet

Projection: Lambert Conformal Conic

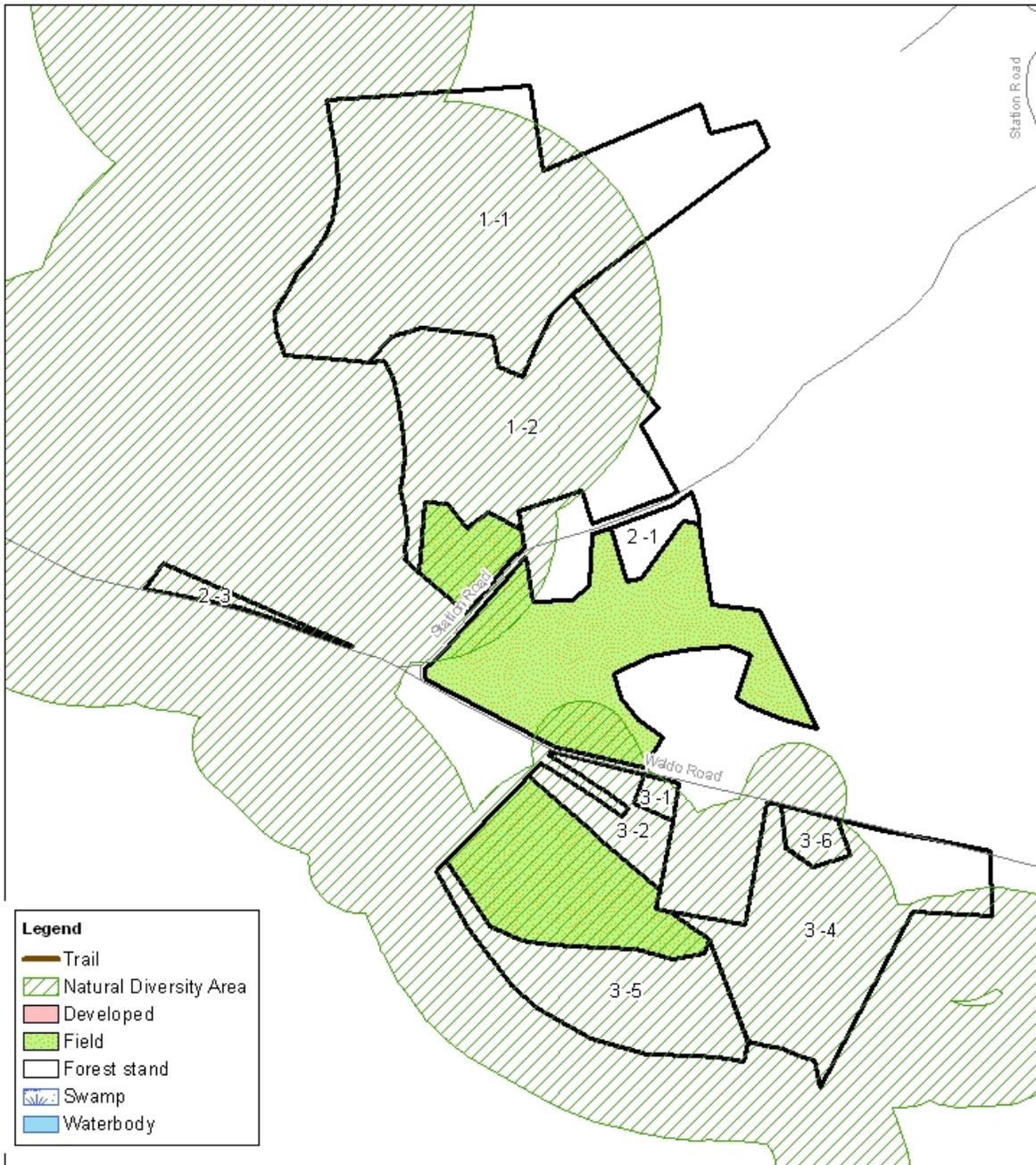


Map E - Special Features Mohegan State Forest, Compartments 1-3

Scotland and Canterbury, Connecticut
225 acres



February 2019



Legend

- Trail
- Natural Diversity Area
- Developed
- Field
- Forest stand
- Swamp
- Waterbody

Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet

Projection: Lambert Conformal Conic

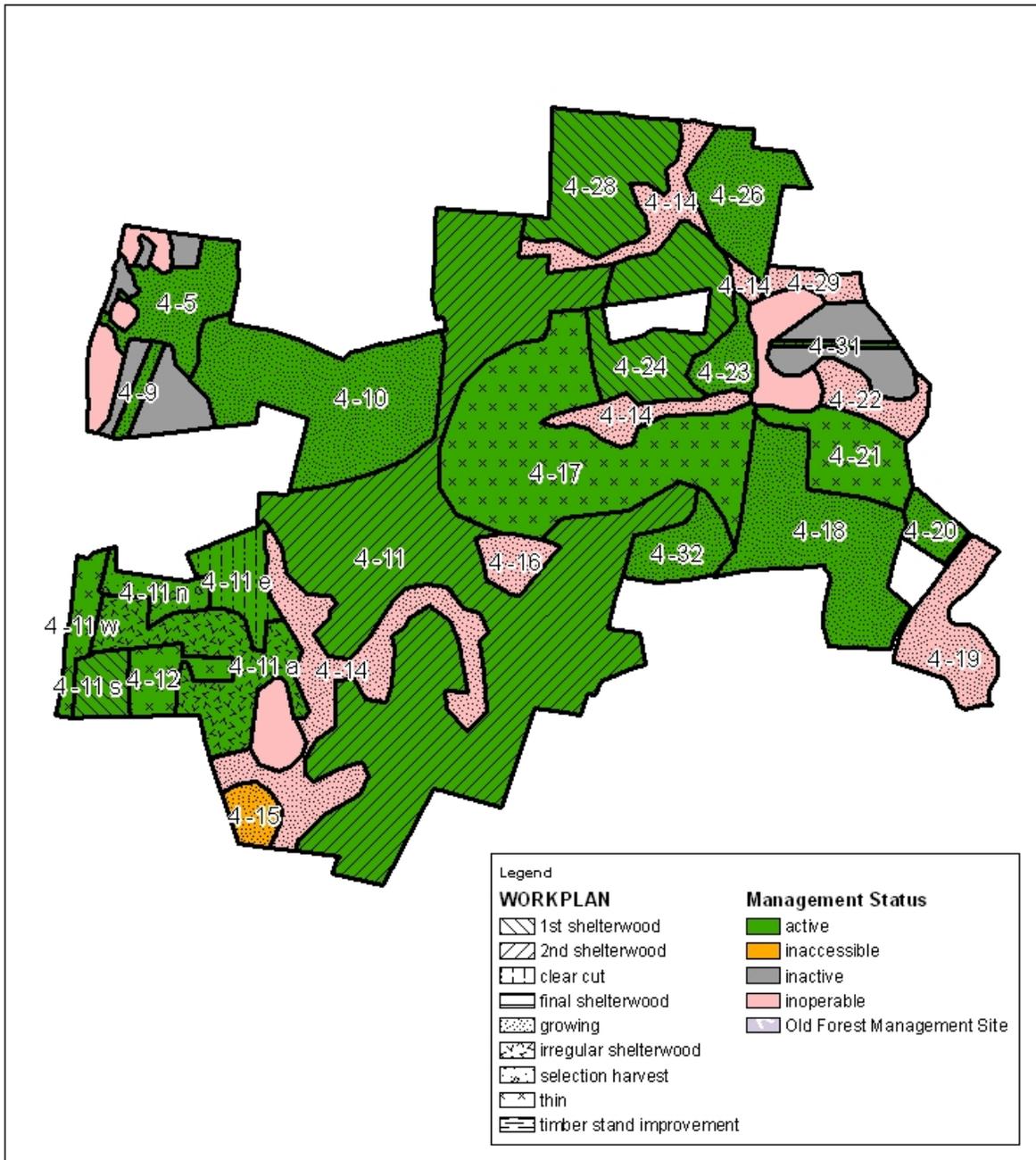


Map F - Work Plan Mohegan State Forest, Compartment 4

Scotland and Canterbury, Connecticut
 713 Acres



February 2019



Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet

Projection: Lambert Conformal Conic

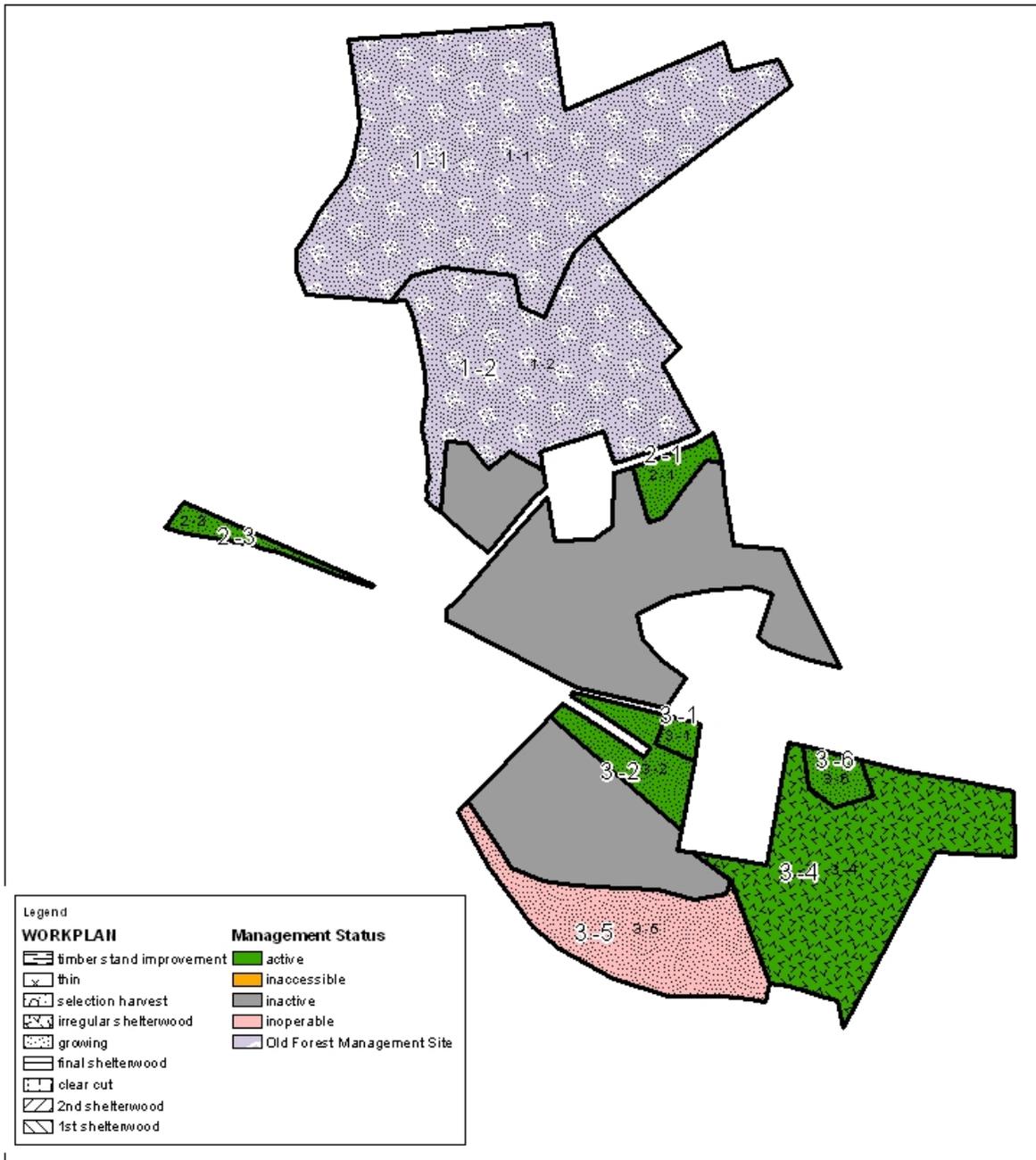


Map F - Work Plan Mohegan State Forest, Compartments 1-3

Scotland and Canterbury, Connecticut
 225 Acres



February 2019



Coordinate System: NAD 1983 State Plane Connecticut FIPS 0600 Feet

Projection: Lambert Conformal Conic

O. Hunting, Focus Area & Agricultural License Agreement Maps



Mohegan State Forest

Page 1 of 2



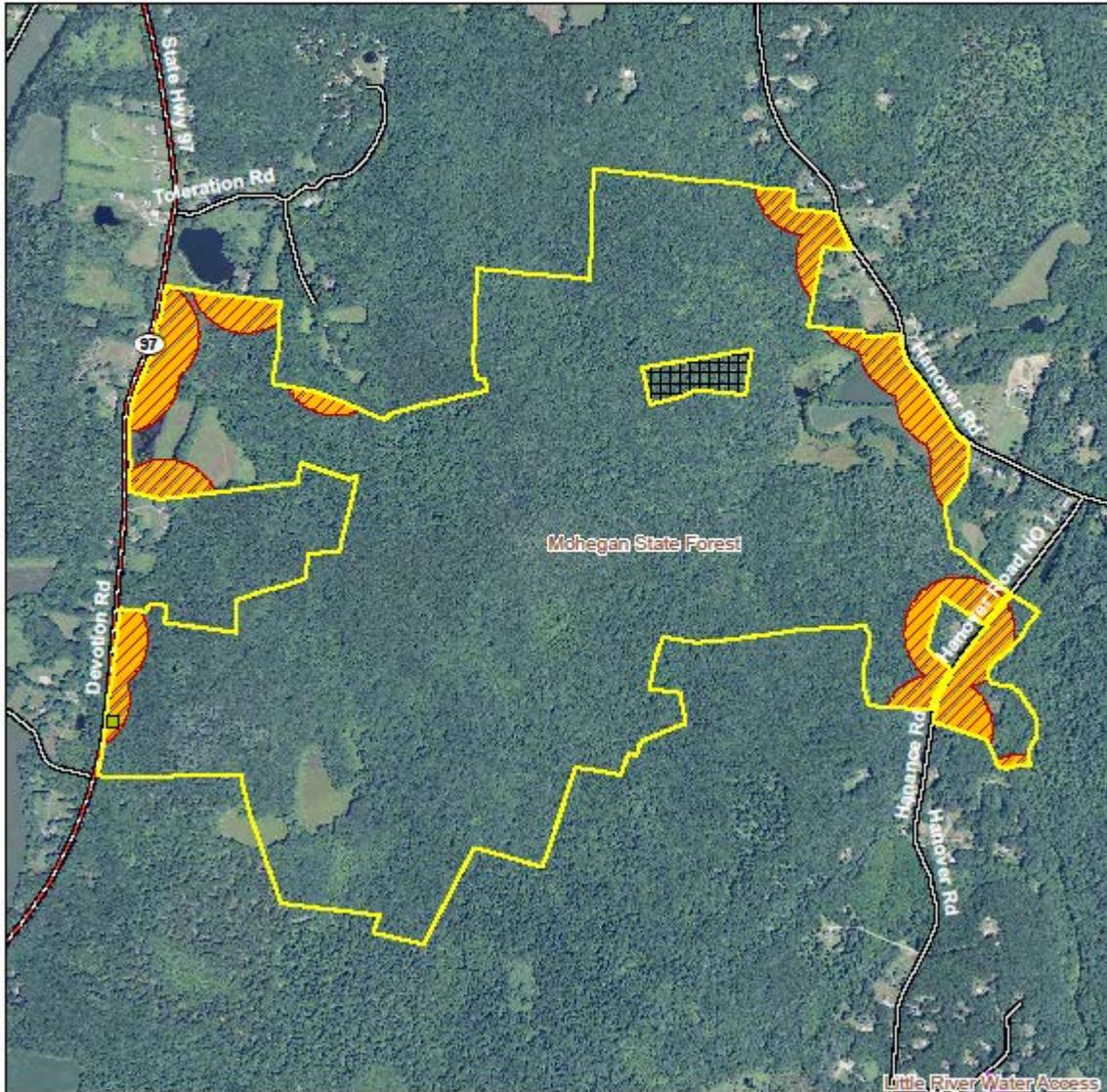
Location: Scotland, Sprague, Canterbury

Description: 962 acres. Hunting also permitted at the Waldo Tract.

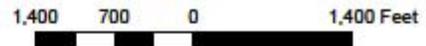
Access: Rt. 97 (Devotion Rd.)

Note: This map depicts an approximation of property boundaries. Please obey all postings.

Symbols: Approximate Boundary 500 Foot Boundary Closed to Firearms Hunting Private Inholding



Map Date: 11/10/2015; Ortho 2012 NAIP



State of Connecticut - Department of Energy and Environmental Protection - 79 Elm St. - Hartford, CT 06106 - www.ct.gov/deep



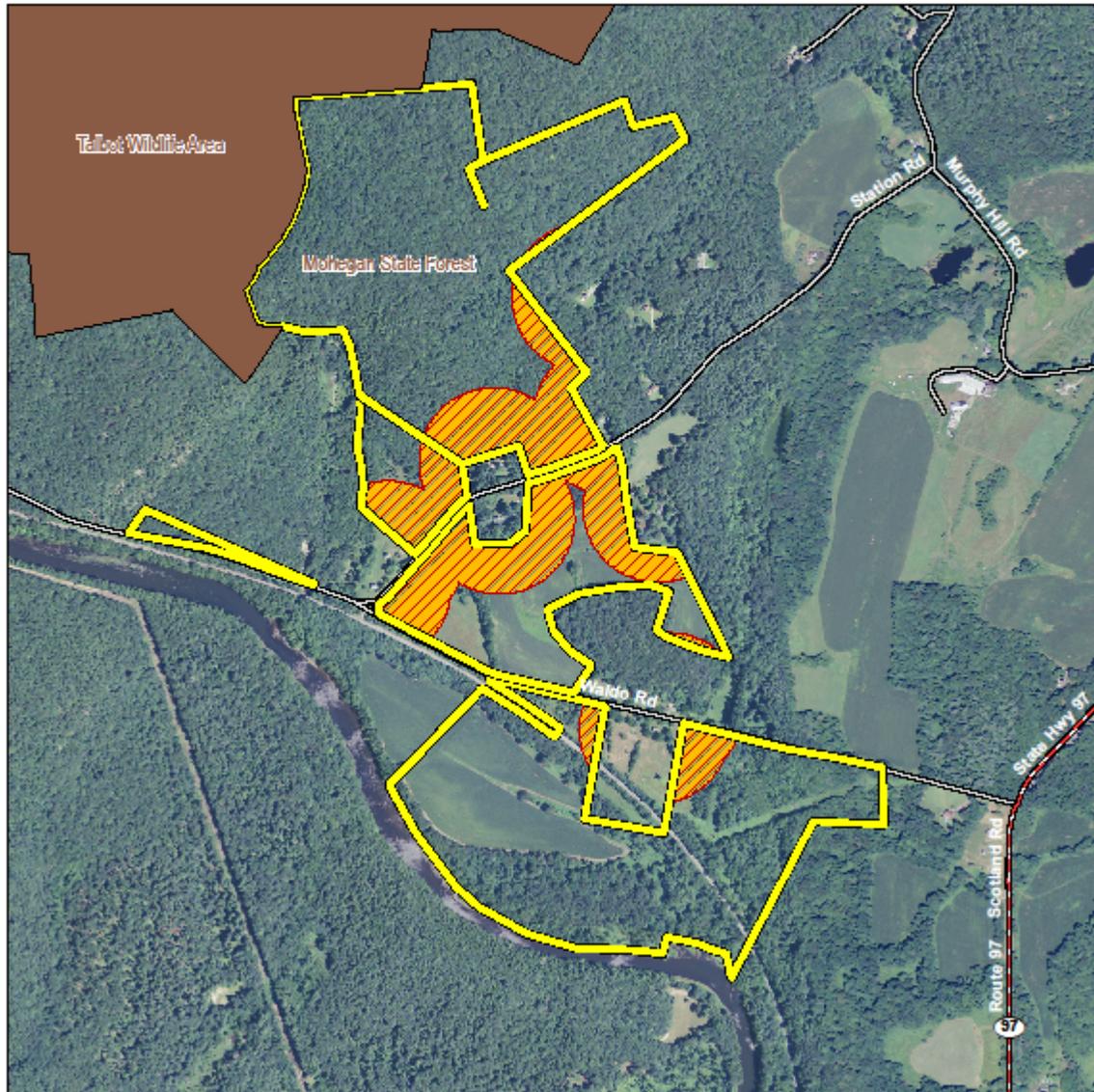
Mohegan State Forest

Waldo Tract
Page 2 of 2



Location: Scotland, Sprague, Canterbury
Description: 962 acres. Adjacent to Talbot WMA.
Access: Take Waldo Rd. off of Rt. 97
Note: This map depicts an approximation of property boundaries. Please obey all postings.

Symbols: Approximate Boundary Area Closed to Firearms Hunting Talbot WMA



Map Date: 11/10/2015; Ortho 2012 NAIP

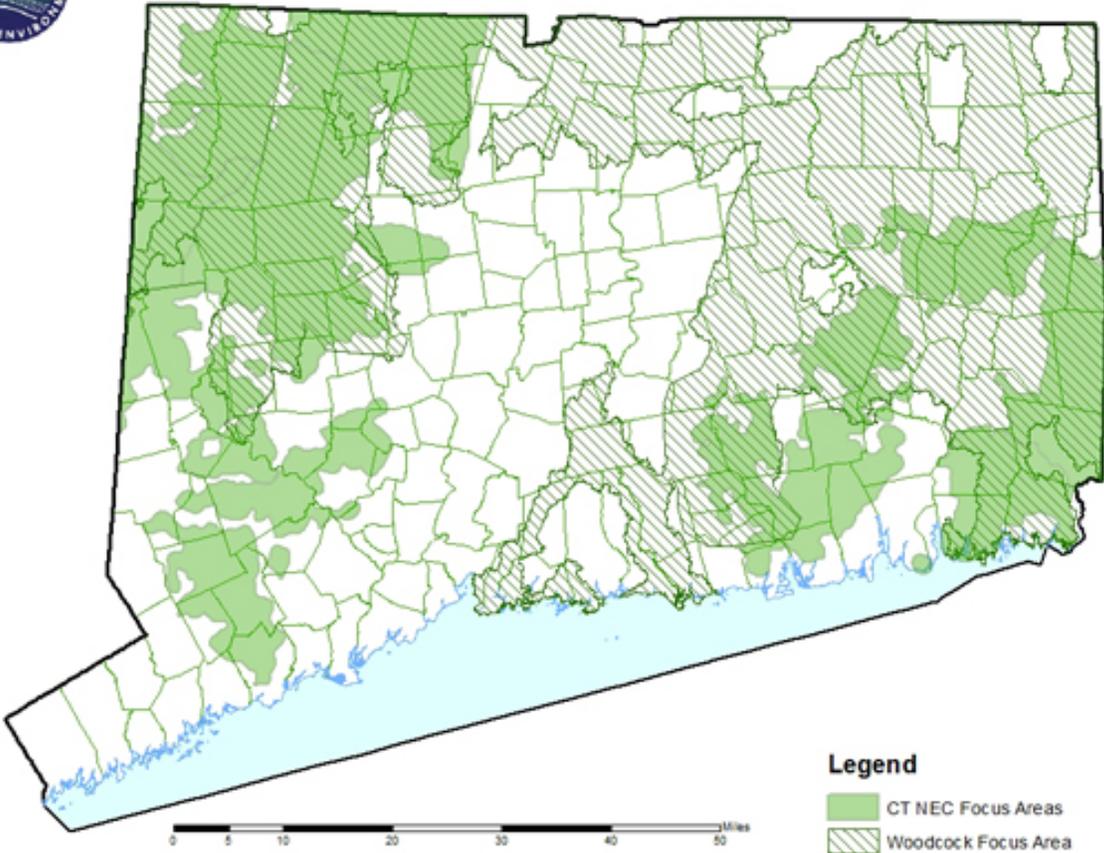
1,000 500 0 1,000 Feet



State of Connecticut - Department of Energy and Environmental Protection - 79 Elm St. - Hartford, CT 06106 - www.ct.gov/deep



New England Cottontail & American Woodcock Focus Areas



Mohegan SF - Coombs Agricultural Agreement



Licensee: Coombs
Town: Scotland
County: Windham

Total Acreage: 7.4ac
Crop Acreage: 6.4ac
Other Acreage: 1.0ac

Crop Acreage:
Lot 3: 6.4ac

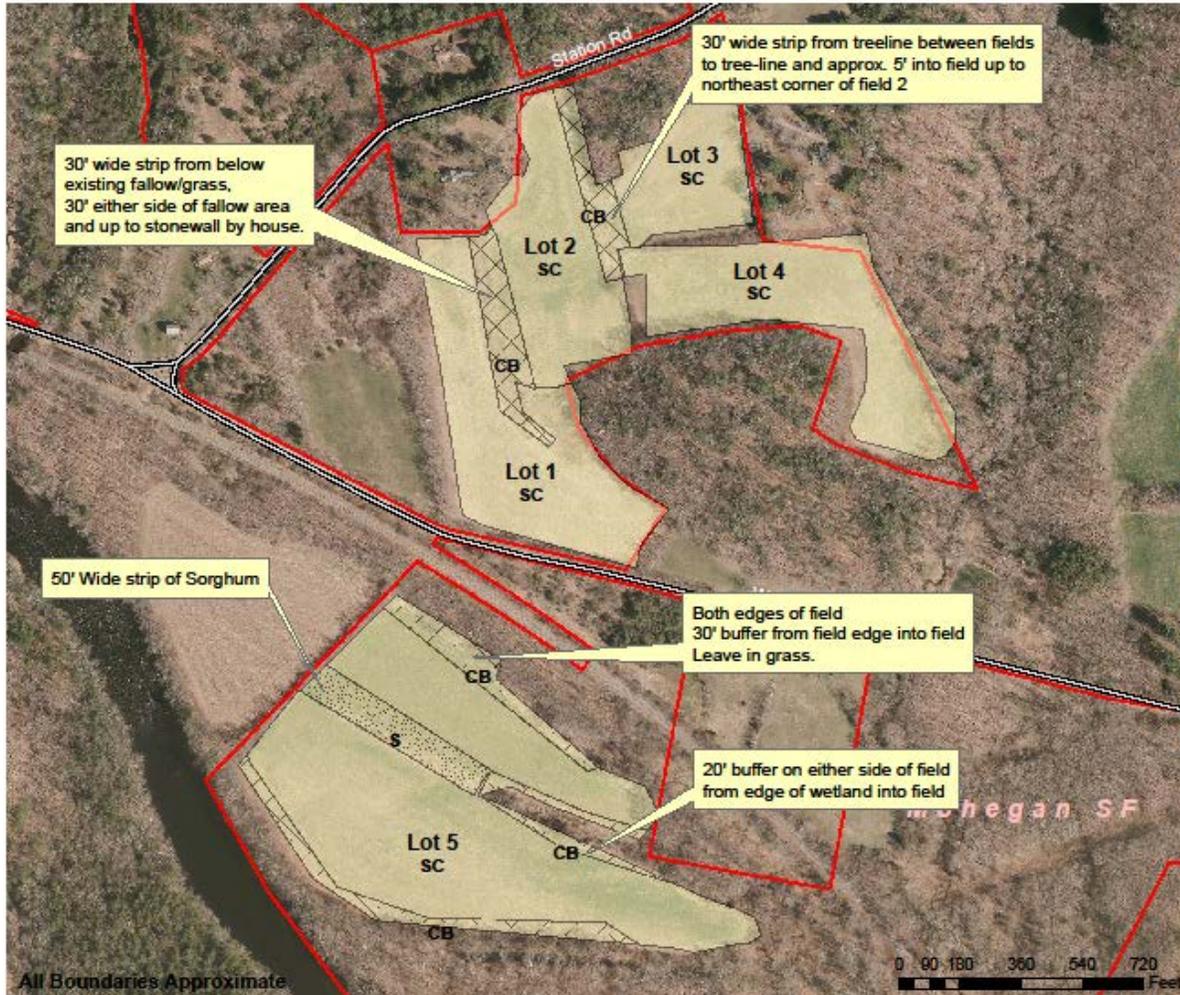
Other Managed
Acreage for Erosion
Control and Wildlife
Habitat:
Lot 3: 1ac

GF: Grass Filter
SC: Silage Corn
StC: Standing Corn

07/2016
2012 Aerial Imagery



Mohegan SF - Hillyland Farm Dairy, LLC Agricultural Agreement



Licensee: Hillyland Farm Dairy, LLC
 Town: Scotland and Sprague
 County: Windham and New London

Total Acreage: 43.2ac
 Crop Acreage: 39.5ac
 Other Acreage: 3.7ac
 Crop Acreage:
 Lot 1: 7.0ac
 Lot 2: 6.1ac
 Lot 3: 3.2ac
 Lot 4: 6.1ac
 Lot 5: 17.1ac

Other Managed Acreage for Erosion Control and Wildlife Habitat:
 Lot 1 and 2: 0.5ac
 Lot 2, 3 and 4: 0.2ac
 Lot 5: 3.0ac

S: Sorghum
 SC: Silage Corn
 CB: Cotoured Buffer

09/2018
 2016 Aerial Imagery



Mohegan SF - Twin Hill Farm, LLC Agricultural Agreement



Licensee: Twin Hill Farm, LLC
Town: Scotland
County: Windham

Total Acreage: 5.5ac
Crop Acreage: 5.0ac
Other Acreage: 0.5ac

Crop Acreage:
Lot 1: 5.0ac

Other Managed Acreage:
Lot 1: 0.5ac of corn left standing for wildlife

SC: Silage Corn
StC: Standing Corn

08/2016
2012 Aerial Imagery



Appendix A – Definitions

Size Classes

Sawtimber- A tree of commercial species containing at least one 8’ utilizable sawlog, that measures 12” or higher at 4.5’ above the ground (dbh) for hardwoods, and 10” or higher softwoods, is considered sawtimber. A stand classified as sawtimber size will feature trees in this size range as the dominant forest cover.

Pole- A stand where dominant trees are at least 5” dbh, but smaller than sawtimber trees. Can be utilized for forest products such as pulpwood, fuelwood, or other small dimension products.

Saw-Pole- A stand where sawtimber and pole trees both *dominate* the overstory.

Sapling- A stand where dominant trees are between 1.0” and 4.9”.

Seedling- A stand where dominant trees are below 1.0”

Management Systems

Even-aged: An even-aged stand has trees with little difference in age. The spread of ages between the youngest and oldest trees is less than 20 percent of the intended rotation. The aim is for regeneration to establish and compete together for the duration of the management cycle. The canopy will appear level and smooth.

Uneven-aged: An uneven-aged stand is a group of trees that differ significantly in ages, featuring a spread of ages that exceeds 25 percent of the planned rotation. The mature age class is removed in certain places across the stand area to help regenerate new age classes.

Silvicultural Treatments

Shelterwood- An even-aged regeneration cutting used to establish a new even-aged community under the protection of older trees. It reduces stocking of mature trees significantly, to allow for the establishment of tree regeneration. All but the dominant mature trees of great form, vigor, and seed producing capacity are removed. Can be applied over several treatments, culminating in the overstory removal once desirable regeneration has established.

Clearcut- Part of the even-aged management system, this treatment removes all mature trees from a site. Regeneration is expected to be sourced from the seed bed, surrounding vegetation, sprouting stumps, or artificial regeneration such as direct seeding or planting.

Selection – Part of the uneven-aged system, this treatment removes individual or small areas of mature trees, allowing small patches of regeneration to establish. This is a preferred system for shade tolerant trees that may not need full sunlight to regenerate. It creates more vertical diversity in the stand with early successional age classes neighboring more mature age classes.

Thinning – This treatment can be used as a supplement to other silvicultural treatments. It aims to reduce stocking in dense stands and improve growth and health of desirable acceptable growing stock, by removing competing trees. It can be applied at different intensities and different intervals.

Forest Types- defined by US Forest Service

White-red-jack pine: Forests in which eastern white pine, red pine, or jack pine, singly or in

combination, comprise a plurality of the stocking. Common associates include hemlock, aspen, birch, and maple.

Oak-pine: Forests in which hardwoods (usually upland oaks) comprise a plurality of the stocking, but in which pine or eastern redcedar comprises 25-50 percent of the stocking. Common associates include gum, hickory, and yellow-poplar.

Oak-hickory: Forests in which upland oaks or hickory, singly or in combination, comprise a plurality of the stocking except where pines comprise 25-50 percent, in which case the stand is classified as oak-pine. Common associates include yellow-poplar, elm, maple, and black walnut.

Oak-gum-cypress: Bottomland forests in which tupelo, blackgum, sweetgum, oaks, or southern cypress, singly or in combination, comprise a plurality of the stocking except where pines comprise 25-50 percent, in which case the stand is classified as oak-pine. Common associates include cottonwood, willow, ash, elm, hackberry, and maple.

Elm-ash-cottonwood: Forests in which elm, ash, or cottonwood, singly or in combination, comprise a plurality of the stocking. Common associates include willow, sycamore, beech, and maple.

Maple-beech-birch: Forests in which maple, beech, or yellow birch, singly or in combination, comprise a plurality of the stocking. Common associates include hemlock, elm, basswood, and white pine.

Appendix B – References

Connecticut, State of. 2007. 2007 Connecticut Field Guide: Best Management Practices for Water Quality While Harvesting Forest Products. State of Connecticut, Department of Environmental Protection, Bureau of Natural Resources, Division of Forestry. Link to BMP's

DeGraaf, et al. 1992. New England Wildlife: Management of Forested Habitats, U.S. Forest Service.

Desmarais, Kenneth M. August 1998. Northern Red Oak Regeneration: Biology and Silviculture. The University of New Hampshire and the State of New Hampshire Division of Forests and Lands. 1-22.

Roach, Benjamin, and S. Gingrich. Dec. 1968. Even-Aged Silviculture for Upland Central Hardwoods, Agriculture Handbook 355, US Forest Service.

Twery, Mark J.; Knopp, Peter D.; Thomasma, Scott A.; Rauscher, H. Michael; Nute, Donald E.; Potter, Walter D.; Maier, Frederick; Wang, Jin; Dass, Mayukh; Uchiyama, Hajime; Glende, Astrid; Hoffman, Robin E. 2005. NED-2: A decision support system for integrated forest ecosystem management. Elsevier, Computers and Electronics in Agriculture. 49:24-43.

United States Department of Agriculture. August 2008. Timber Management Field Book, NA-MR-02-08, US Forest Service.

Ward, Jeffrey, Worthley, Thomas. Forest Regeneration Handbook: A Guide For Forest Owners, Harvesting Practitioners, and Public Officials. Connecticut Agriculture Experiment Station.

Appendix C – Staff Plan Review

The following comments are provided relative to the Draft Mohegan State Forest Management Plan (2021-2031). The Fisheries Division will continue to provide specific guidance during reviews of individual timber harvest plans; however, the following technical guidance is provided to ensure the utilization and implementation of best management practices for all harvest operations. This includes:

1) Maintaining vegetated buffer strips along watercourses. It is the policy of the Fisheries Division that riparian corridors be protected with an undisturbed 100 ft. wide riparian buffer zone. A riparian wetland buffer is one of the most natural mitigation measures to protect the water quality and fisheries resources of watercourses. This policy and supportive documentation can be viewed on the DEEP website at:

<https://portal.ct.gov/-/media/DEEP/fishing/restoration/RiparianPolicypdf.pdf>

<https://portal.ct.gov/-/media/DEEP/fishing/restoration/RiparianPositionStatementpdf.pdf>

2) Limit the use of herbicides to control invasive plants within Compartment 3 along the Shetucket River.

3) Utilize seasonal harvest restrictions in sensitive areas that contain steep slopes, wet or highly erodible soils.

4) Avoiding crossings if possible on perennial watercourses. Log bridges should be constructed over watercourses that have either steep approaches or soft stream bottoms. Direct stream crossings on intermittent watercourses should only be allowed on hard, rocky stream bottoms during zero flow conditions. Any temporary bridges should be removed upon timber harvest completion.

Let me know if you have any questions. Thanks.

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Fisheries Division
Habitat Conservation and Enhancement Program
Eastern District Headquarters
209 Hebron Road
Marlborough, CT
P: 860.424-4142 brian.murphy@ct.gov

Hi Dan,

See attached documents for comments on the Mohegan SF Plan. I compiled all of the WD comments I received, and my own, in one word document; and Ann made comments in a separate document. I went through Ann's document and deleted revisions that overlapped with the WD version and moved some of her comments directly over to the WD version, to eliminate redundancy between the two version. In the

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compilation version, I added initials to each comment to attribute them to a staff member; comments without any initials are my own. Some staff members inserted revisions directly, while others are simply thoughts or questions-- I made an attempt to resolve all of these more ambiguous comments by inserting new text or revising text. I'm happy to discuss anything or help more with revisions as needed. Thanks for the opportunity to work on this.

Tanner

Message too large for both documents....part 2 coming with Ann's document

Tanner Steeves
Wildlife Biologist – Habitat Program
Wildlife Division – Bureau of Natural Resources
Connecticut Department of Energy and Environmental Protection
Eastern District HQ, 209 Hebron Road, Marlborough, CT 06447
P: 860.295.9523|F: 860.295.8175 | E: tanner.steeves@ct.gov

Hi Dan, I do not see any impact on the parks or recreation side of things. Thanks – Eric Gileau 3/15/2021

Appendix D – Public Comment

The plan was sent to the Towns of Scotland, Canterbury, and Sprague and circulated to the most-pertinent boards or commissions. The plan was also sent to the local Land Trust, Joshua’s Tract Conservation and Historic Trust. The Commissions and Land Trust had over one-month to provide comment back to DEEP. At the conclusion of the one-month comment period, and in the time since, no public comments had been received by DEEP.

Appendix E – Distribution List

First Selectman's office
Conservation Commissions
DEEP District Staff
DEEP Hartford Forestry