Sample Tree Growth Management Plan

LANDOWNER
Town: TOWN
County: COUNTY
Tax Map: Map X Lot X
Acreage: 93 Acres
Date Prepared: 3/13/2020

Prepared by:
Wadsworth Woodlands, Inc.

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Tree Growth Management Plan

General Information

Owner: LANDOWNER

Address: LANDOWNER
ADDRESS

Phone: LANDOWNER PHONE

Plan Prepared: 03/13/2020

Prepared by: Wadsworth Woodlands Inc.

Parcel Location:

Town:	**TOWN**
County:	**COUNTY**
Tax Map:	**Map X Lot X**
Total Acres:	**93**

Owners Objectives:
Maintain the woodlot as a healthy growing forest for the eventual commercial production of timber & firewood, for recreational use, wildlife habitat, and the continued protection of its' aesthetic beauty and biological diversity.

Location and Access:
This woodlot is located in the town of TOWN, ME on the south side of ROAD NAME, otherwise known as ROAD NAME. This is a state road and provides excellent access to this woodlot. There is an old landing area that was utilized prior to the current landowners acquisition of the lot. The landing is located in the northern part of the woodlot where the lot contains road frontage; said landing can be used again for any future forest management.

Boundaries:
The boundaries of the property are in fairly good condition. The northern boundary consists of the road, as well as the southern line of NAME, which previously belonged to the landowners but is now under different ownership. The eastern property line abuts another parcel owned by the landowners, therefore creating an interior line running southwest along this woodlot's entire eastern boundary. The southern property line contains one jog, and can be identified via old blazes and fading boundary paint. Similarly, the western boundary also contains one jog and can be identified by old blazes and boundary paint, as well as some barbed wire.

Forest Type Description:
This property is comprised of two major forest types: mixedwood and softwood. The harvesting history of this land is the most significant influence that has resulted in the current stand conditions throughout the woodlot. In general, the woodlot is dominated by beautiful hardwood growing stock, mostly red oak, that is the bread and butter of the woodlot currently.

Acreage Listing:

Cover Type	Description	Acreage
Forested	Stand 1- Mixedwood	63
	Stand 2- Softwood	10
	Stand 3- Softwood	5
	Total Classified Forested Acreage	**78**
Not in TG	Wetland	12
	Field	3
	Total Non- Forested Acreage	**15**
Total Property Acreage		**93**

Stand 1: Mixedwood, 63 Acres

Species Composition	Size Class	Quality
Red Oak	6-12”	Good
Red Maple	6-10”	Good
Balsam Fir	5-11”	Fair-Poor
White Pine	8-20	Fair-Poor
Regeneration	White pine, red maple, aspen	

Stand 1 is the largest stand on the woodlot, and contains the most diversity of tree species, sizes, and qualities. The stand lies on soils that range from poorly drained to moderately drained. It covers the majority of the center of the woodlot, and wraps around the wetland on the property. The stand does not contain significant slopes, rather it is situated upon a series of knolls and hollows. Observations on the ground during the spring of 2020 revealed multiple runs and intermittent streams that all were flowing east towards the wetland; it was clear that these drainages contain little to no water during dry months.

The timber throughout the stand is quite varying and mixed, hence the mixedwood designation. The most notable and desirable component in the stand is the red oak crop trees that show signs of excellent growth. These crop trees range in diameter from 6 to 12 inches, and all boast proper height to diameter ratios. These red oak crop trees are the future of this stand and should be protected and fostered into the future. They currently are boasting smooth, cinnamon tinted bark which is a great indication that their growth conditions are optimal. A critical piece to their successful growth into quality sawtimber is continued shade and protection for their stems. Any future management must ensure that the red oak crop trees are not exposed on the south side so that their stems don’t receive excessive sunlight in order to prevent epicormic sprouting. Epicormic sprouting is best described as sprout establishment along otherwise clear red oak stems as a response to excessive amounts of sunlight; these sprouts create knots that will continue to grow and completely diminish the tree’s ability to produce quality sawtimber in the future. Currently, many red oaks are growing alongside “trainer” trees that are helping create a healthy competition for sunlight, therefore resulting in rapid upward growth with no limbing below the crown. This is very beneficial in terms of producing tall individuals that will contain multiple sawlog lengths once mature. The woodlot is well stocked with red oak crop trees that eventually will transition this woodlot from a polewood dominated parcel to a sawtimber dominated parcel.

Stand 1 also contains an impressive number of rock maple growing stock, almost all of which is of crop tree sizing. These maples show good form and height, and will grow into quality sawtimber down the road; they should be protected during any future management to allow their continued height and diameter growth. Many areas of the stand contain abundant numbers of advance white pine regeneration in the midstory which was established following the 2001 harvest. This advance regeneration is of 10-20’ in height and appears to be in heavy competition with hardwood saplings where present; so far, the white pine stems show the ability to compete with the hardwood saplings. Eventually, the hardwood saplings growing with the white pine may begin to out-compete, which may require a biomass thinning to try to remove some of the hardwood saplings and release the white pine.

Beautiful red oak crop tree in stand 1 boasting excellent growth growing alongside white pine and red maple “trainers”

Sugar maple crop tree in Stand 1

White pine advance regeneration competing with hardwood saplings in Stand 1

Other secondary components of the stand include balsam fir and hemlock. The balsam fir component is the one with the highest mortality rates; most of this is due to competition. Observations revealed that in many areas containing balsam fir in stand 1, self-thinning is occurring. While not very aesthetically pleasing, self-thinning (natural die off due to competition from surrounding components) is usually beneficial for stand growth. In this stand, most balsam fir mortality is resulting in a release of surrounding oak, maple, and pine crop trees. In light of this, it doesn't seem as though the high mortality rates of balsam fir mandate any immediate action. However, upon the next entry into the stand, it would benefit the more desirable growing stock if the remaining balsam fir were removed from stand 1. Additionally, the hemlock component in stand 1 is in need of reduction. Areas containing hemlock throughout the stand are lacking any regeneration, and have extremely dense canopy conditions; indications that growth rates are quite low. The next entry into the stand should focus on reducing the hemlock component enough so that new growth can be established and surrounding crop trees can be released.

Areas with canopy gaps boast good regeneration stocking and are good examples of how gap creation in uneven aged stands can result in stocking throughout all age classes. Though the majority of them were removed in 2001, there is still some scattered stocking of white pine sawtimber throughout stand 1. Unfortunately, most of it consists of fairly poorly formed, limby pine trees. However, observations did yield sightings of multiple straight, healthy, midsized white pine sawtimber that show potential to continue their growth into larger sawtimber sizes. These promising white pine individuals should be allowed several more growing seasons prior to any treatment in order for them to reach diameters that will be wind-firm enough to withstand the removals of the ugly pasture pines that are growing alongside.

Canopy gap in stand 1 created by self-thinning balsam fir mortality which has released several desirable crop trees, including a red oak

Patch of white pine in stand 1 with several ugly pasture pines in need of removal during the next entry with multiple "hidden" straight pines that will benefit from the release

Red oak crop tree (center) growing in front of multiple decent white pines capable of yielding quality sawlogs during future harvesting

An image displaying the impressive number of red oak and sugar maple crop trees that are scattered throughout Stand 1

Stand 1 Prescription

Time Frame	Silvicultural Recommendations
2020-2030	Stand 1 would benefit from an improvement thinning near the middle or end of this time period. The improvement thinning should focus on promoting all crop trees by targeting balsam fir, hemlock, pasture pines, and hardwood saplings competing with white pine regeneration.

Stand 2: Softwood, 10 Acres

Species Composition	Size Class	Quality
Balsam Fir	4-8”	Fair
Eastern Hemlock	3-6”	Fair
White Pine	4-8”	Fair-Good
Red Maple	4-8	Fair
Regeneration	None	

Stand 2 is located in the southwestern corner of the property abutting the back field. The stand is an even-aged softwood stand comprised of mostly balsam fir. The stand is overstocked and not growing well due to high canopy competition among stems. The nature of the stand creates a challenge in terms of silvicultural decisions. The balsam fir is tall and skinny, therefore not all that windfirm. A thinning in the stand would likely result in whatever remaining balsam fir wind throwing or just snapping off due to wind or snow. It is likely that the best answer is to conduct a complete removal of the fir within this stand in order to release the pine, hemlock, and red maple present there. This would result in fairly open conditions in the southwest corner of the property, and therefore would be a judgement call for the landowner to make. The understory of the stand is completely dark; removal of the balsam fir would certainly open the canopy and spark the establishment of regeneration in the understory. It likely would also produce fruit bearing vegetation such as blackberry and brambles because of the amount of light that would suddenly hit the forest floor. Because of the stand’s small size, any harvesting here should be timed with a harvest in Stand 1.

Stand 2 Prescription

Time Frame	Silvicultural Recommendations
2020-2030	The treatment of stand 2 is a judgement call by the landowner at the time of harvest. The stand would benefit from a complete removal of the balsam fir component but residual effects of that may or may not be desired by the landowner. Any action in this stand should be timed with the harvest in Stand 1.

Dark understory conditions beneath balsam fir in Stand 2

Mature balsam fir growing next to a pine in Stand 2

Stand 3: Softwood, 5 Acres

Species Composition	Size Class	Quality
White Pine	4-14”	Fair-Poor
Eastern Hemlock	5-14”	Fair
Regeneration	None	

Stand 3 is the smallest stand on the woodlot and is located in the section east of the back field. Similarly to stand 2, it is an even aged softwood stand dominated by white pine and eastern hemlock. The stand lies on poorly drained soils, and several drainages can be seen running through the stand. The understory in the stand is quite dark, and competition among stems is very high. The white pine range in size from small to mid size and many of poor quality. The pine stems are fairly young in this stand and should be allowed more growth. The stand would benefit from having several skid trails cut through it to act as the initial entry into the stand and get some sunlight through the canopy. The machine could pick trees out from the skid trail and just lay them in the trail in order to create some more space in the canopy to increase growth. The eastern and northern section of this stand is where there are hemlock that range from small to large pole sizes that should continue growth.

Young white pine stems directly adjacent to the back field

Stand 3 Prescription

Time Frame	Silvicultural Recommendations
2020-2030	Stand 1 would benefit from a low thinning to remove the dying/suppressed individuals and improve growing conditions for the pine and hemlock that show potential to continue into larger, more valuable growing stock. Said thinning would produce mostly biomass, therefore it should be timed with a thinning in the adjacent stands.

Timber Management
The recommended silvicultural system for this lot is uneven-aged management, which focuses on a diversity of ages, heights and tree species on the lot. Management practices are stand specific, and designed to increase growth rates for the species best suited for the soils and terrain in each stand.

Generally, selective harvests remove the undesirable trees that are not suited for optimal growth in a stand, which may be mature trees or those with poor form, injury, or disease. This in turn allows more light to reach residual trees, as well as regeneration. Small gaps in the residual canopy are preferred, which promotes regeneration (for moderately shade tolerant trees species like white pine and red oak) without breaking up the continuity of the woodlot. This improves wildlife habitat by meeting the food and cover requirements of a greater number of species. Removal of poor quality trees is based on selecting trees with poor or inferior crowns as a result of competition, injury or disease, large knots created by dead or dying limbs, and trees that are especially prone to windfall. Trees that meet these specifics are those that are the least likely to survive the 5-10 years to the next scheduled thinning.

The majority of Southern Maine forestlands are well suited for white pine & red oak growth. To promote white pine regeneration, harvesting should be performed during the summer or fall of seed year, since the harvesting equipment scarifies the soil. A general rule of thumb for producing quality red oak sawtimber is to maintain trainer trees to help promote vertical growth and prevent any epicormic sprouting.

Wildlife Habitat Considerations

The wildlife habitat provided by this woodlot is exceptional; thick understory growth for cover, an abundance of red oak trees for acorns, significant water sources, and dense areas that intercept snowfall. Generally speaking, the more diverse a woodlot is, the more abundant wildlife habitat it contains. This woodlot is textbook uneven aged with multiple age classes that provide benefits for a wide array of species that rely on differing levels of vegetative cover.

Habitat conditions and quality are based on three environmental factors: land use (forest, non-forest, water), vegetative structure (grasses, shrubs, trees- seedlings, saplings, poles, and saw timber), and vegetative species. As the landscape is continually changing naturally, so are the species of wildlife which occupy it. Almost all species of wildlife benefit one way or another from the early successional habitats provided by timber harvesting. Different age classes of trees can help to provide a variety of habitat features for wildlife including cavity trees, snags, down woody debris, browse, hard and soft mast, cover, food, nesting or den sites, and raptor perches, to name a few.

Areas with mature red oak and beech will produce nuts that will attract a variety of wildlife species, especially on a seed year (large number of seeds produced). White-tailed deer, black bear, partridge, gray squirrels, chipmunks, and turkey commonly feed on such hard mast. In general, wildlife habitat can be improved by promoting hard and soft mast production (by releasing and/or pruning), leaving cavity and den trees of various size

classes (although the larger the tree, the better), leaving snags, maintaining openings, and by promoting adequate cover (i.e., a variety of species and age classes).

Water Quality, Wetlands, and Riparian Areas

This property contains a beautiful wetland that is fed via STREAM NAME. This wetland is a true wetland that contains grasses and shrubs that are indigenous of Maine's trademark fresh water wetland. In addition, portions of STREAM NAME north of the wetland show indications of brook trout habitat; the brook and wetland should be respected and preserved into the future to protect the critical wetland ecosystem that it provides.

Water quality is an important concern in every timber harvesting operation, as the quality of the ground water is directly related to the quality of the surface water. The importance of clean ground and surface water is not only crucial to humans, but to the survival of fish and other aquatic organisms. Changes in water temperature, sedimentation, and water levels in streams, bodies of water, and wetlands, are things that should be prevented against in a harvest. Skid trails should be free of surface water, which can be prevented by using water bars. Skidder bridges o r poled ford bridges should be used, with a culvert if necessary, when crossing streams or other wet areas (as recommended by "Best Management Practices for Forestry: Protecting Maine's Water Quality"). These crossings should be removed within 7 months after the harvest is completed. Winter harvests on frozen ground are recommended for minimal impact to sensitive areas.

The edge of the wetland associated with STREAM NAME

Aesthetic Values

Aesthetics are an important concern during and after a timber harvest. There are several practices that can be utilized to keep the impact on the land and the residual stand damage to a minimum;

- Timber harvests should be scheduled during periods of low recreational use and when conditions are most favorable to the protection of regeneration, wet areas, and the residual stand (i.e., dry or frozen ground conditions);
- Skid trails should be laid out efficiently and at acute angles from one another, thereby reducing the number of bumper trees (which should be designated before harvesting) and the overall residual damage to the stand;
- Bumper trees should be assessed for removal at the end of a harvest, unless there is another entry scheduled for the near future;
- Stream crossings should be in accordance with "Best Management Practices for Forestry: Protecting Maine's Water Quality";
- There should be buffer zones around lakes, ponds, rivers, streams, tidal areas, and certain freshwater wetlands;
- Timber harvesting activities, as well as landings, should be shielded from the view of main roadways, using buffer zones, whenever possible;
- Slash should be bucked up enough to achieve contact with the ground, speeding up decomposition, and returning nutrients to the soil in a timelier manner;
- Landings should be cleared of most debris, and seeded and/or hayed if it is necessary to stabilize the soil, or for wildlife or general appearance.

Insects and Disease

Field work in March of 2020 yielded no sightings of insect or disease damage on the property, with the exception of beech bark disease. Beech bark disease is common across the landscape and is not a critical threat that mandates action. Hemlock Wooly Adelgid and Balsam Wooly Adelgid were both searched for briefly during field work but was not found. Conditions should be monitored periodically and during different seasons when insect or disease infestations may be more obvious. Large weakened or dying tree populations can greatly increase the likelihood that populations of insects and pathogens will increase beyond their normal levels and eventually cause damage to adjacent healthy stands. To maintain a vigorous forest condition and increase the resistance of trees to insects or diseases, the following general silvicultural techniques are appropriate preventative measures;

- Encourage a mixture of tree species and age classes, discouraging species monocultures;
- Choose or favor species that are best adapted to existing site conditions;
- Protect against uncontrolled fires;
- Apply intermediate harvesting techniques to avoid forest stagnation, improve species composition, and optimize the presence of diseased or injured trees;
- Harvest over mature or declining trees in areas where there are already adequate stocking levels of such specimens;
- For seed sources, favor healthy specimens that seem to exhibit characteristics of pest and disease resistance;
- Maintain periodic monitoring schedules for signs of infestation, decline, or mortality.

Glossary of Common Forestry Terms

Age Class: Intervals of tree age used to describe stand characteristics, for example, 10 or 20 year age class.

Basal Area: A measure of tree density. It is determined by estimating the total cross-sectional area of all trees measured at breast height (4.5 feet) and expressed in square feet per acre.

Best Management Practices (BMP's): A practice or combination of practices determined to be the most effective and practicable means of preventing negative impacts of silvicultural activities.

Biodiversity: The variety and variability of all living organisms.

Board Feet: A unit of measurement volume of lumber. Example, MBF= thousand board feet.

Browse: Leaves, buds, and woody stems used as food by woodland mammals like deer and moose.

Canopy: The more or less continuous cover of branches and foliage formed by the crowns of adjacent trees and other woody growth.

Cord: A unit of measurement to determine cubic volume of round wood equal to 128 cubic feet, including bark and air.

Crop Tree: A tree which is retained for maximum longevity in a stand due to desired characteristics such as commercial quality or biotic contribution.

Crown: The upper part of the tree, including branches and foliage.

Crown Classes of Forest Trees:

a) Dominant: A tree whose crown receives full sunlight on the top and all sides.
b) Co-Dominant: A tree whose crown receives full sunlight on the top and indirect lighting on the sides.
c) Intermediate: A tree whose crown and sides receive only indirect lighting.
d) Suppressed: A tree which has grown in low light which has thwarted its growth.

DBH: Diameter at Breast Height, four and a half feet above the ground. Diameters are measured at this height to calculate volumes of trees.

Depletion Unit: A calculable value of timber at the time of harvest which is deducted from the taxable income. Expressed as $/MBF, it is based on the value of the timber at the time of purchase and the total volume on the lot at harvest. This value is known as Depletion Unit Allowance.

Epicormic Branching: The sprouting of dormant buds from under the bark of the tree, on either the bole or limbs, due to environmental stress such as over-exposure to sunlight following a harvest, insect defoliation, disease, ice damage or weakening of the tree.

Even-Aged Management: A timber management system that results in the creation of stands in which trees of essentially the same age grow together. Regeneration in a particular stand is obtained during a short period at or near the time that a stand has reached the desired age or size for regeneration and is harvested. Cutting methods producing even aged stands are clearcutting, patch clearing, strip clearcutting, shelterwood, and seed tree harvests.

Even-Aged Stand: All trees are the same age or at least of the same age class. A stand is considered even-aged if the difference in age between the oldest and youngest trees does not exceed 20 years or 20 percent of the length of the rotation.

Forest Stand or Type: A group of trees, occupying a specific area and uniform I composition, species, age arrangement and condition, as to be distinguished from other adjoining forested areas.

Habitat: Any area that contains all resources essential to the survival of a wildlife population. Essential ingredients include food, water, and cover.

Improvement Cut: A broad term used to describe a harvest technique designed to promote health, growth, vigor, and optimum stocking for crop trees.

Landing: A place where trees and logs are gathered in or near a harvest site for further processing and transport.

MBF: An abbreviation of the industry standard for sawtimber equaling thousand board feet.

Pulpwood: The portion of a tree not suitable for lumber, due to size or quality, which has economic value in the production of paper products or fuelwood.

Regeneration: The natural or artificial restocking of an area with a new generation of trees.

Release Cutting: Includes all operations designed to regulate the species composition or improve the growth of very young stands. Can be commercial or non-commercial, the later is considered timber stand improvement (or TSI).

Residual Trees: Trees that are left to grow in the stand following a silvicultural treatment.

Rotation: The period of years required to reproduce, grow, and harvest a crop of timber under definite objectives of timber management.

Salvage Cut: The harvest of timber that has compromised by nature (i.e. ice or wind storms, disease, etc.), which its value would be lost if left untouched.

Sawlog: The part of the tree which has economic value as sawed lumber.

Scarification: A method of disturbing the ground cover in preparation of natural or artificial regeneration. Is a very important factor in reproducing white pine.

Selective Harvest: The removal of trees, either as single scattered individuals or in small groups, at relatively short intervals, repeated indefinitely, so that the continuous establishment of reproduction is encouraged and an uneven-aged stand is maintained.

Shelterwood: A series of two or three harvests that gradually opens the stand and stimulates natural reproduction of a new even aged stand.

Silviculture: The art and science of managing a forest.

Site Index: A measure of the productivity of the site based upon the average height of the canopy trees at age 50, i.e. SI of 80=80’ tall at age 50.

Snag: A standing dead tree.

Stocking Density: The number of trees on a given area of land in relation to what the optimum number should be. Generally referred to as under, over, or moderately stocked.

Timber Stand Improvement (TSI): Silvicultural activities, usually non-commercial, that improve the composition, constitution, condition and growth of a timber stand. Common practices include pruning and weeding.

Tree Size Classes:

a) Regeneration: less that 4.5’ tall, and 0-2 inches DBH

b) Sapling: more that 4.5’ tall, but less than 5” DBH
c) Pole: between 4-10 inches DBH
d) Sawlog: over 11 inches DBH

Uneven-Aged Management: The application of actions needed to maintain a continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a wide range of ages and sizes to provide a sustained yield of forest products. Cutting methods that develop and maintain uneven-aged stands include single tree selection and group selection.

Uneven-Aged Stand: A stand of trees that contains at least three well defined age classes intermingled on the same area.

Vernal Pool: A ephemeral body of water that fills in the spring, holds water for at least 10 days, and dries up by fall or in some or all years and that does not contain fish.

Weeding: Removal of trees or other vegetation to encourage the growth of desirable trees.

Windfirm: The ability of the root system of a tree to withstand wind pressure and keep the tree upright.