



Forest Stewardship Plan
For
Town of Casco
Open Space Commission

Town: Casco, Maine
County: Cumberland
Tax Map: Map 2, Lot 3
Total Acreage: 70+/- Acres
Total Forested Acreage: 59 Acres
Date Prepared: August 10, 2012

Prepared by:
Brian m. Reader, ME L.P.F. #3538

Wadsworth Woodlands, Inc.
35 Rock Crop Way
Hiram, Maine
04041

Forest Stewardship Plan

General Information

Owners: Town of Casco
Open Space Commission

Address: P.O. Box 60
Casco, ME
04015

Phone: 1-207-627-4515

Plan Prepared: August, 2012

Prepared by: Brian Reader, ME L.P.F. #3538
Wadsworth Woodlands Inc.
35 Rock Crop Way
Hiram, ME 04041
207-625-2468

Parcel Location:

Town:	Casco
County:	Cumberland
Tax Map:	2, Lot 3
Total Acres:	70.0 Acres
Forested Acres:	59.0 Acres

Table of Contents

Introduction	Page
Preface	
5	
Property Information	5
Acreage Listing	5
General Forest Conditions	
Owner Objectives	5
History	5
Location and Access	6
Terrain and Hydrology	6
Boundaries	6
Natural Resource Management	
Timber Management	6
Forest Type Description	7
Field Methods	7
Timber Stand Descriptions, Prescriptions & Volumes	
Soils	15
Fish and Wildlife Habitat Considerations	15
Water Quality, Wetlands, and Riparian Areas	16
Recreational Resources	17
Future Projects	17
Aesthetic Values	17
Cultural, Ecological, Archeological, Historical and Geological Features	18
Forest Protection	18
Threatened and Endangered Species and Unique Natural Communities	18
Insects and Disease	19
Project Schedule	19
Appendices	
A. Forest Type Map	20
B. Soils Map	21
C. Main Historic Preservation Commission Archaeology and Historic Resources Review	22
D. Maine Natural Areas Program Forest Management Plan Checklist	23
D1. MNAP- Habitats of Management Concern Map	
D2. DIFW- Forest Management Recommendations for Brook Trout	
E. Maine's Threatened and Endangered Species	24
F. Insects and Disease	2
G. Forest Practices Act	29
H. References	30
I. Glossary	31

Introduction

Preface

The following Stewardship Plan for the property of Town of Casco has been prepared to comply with the requirements for Project Canopy, a program administered by the Maine Forest Service.

Property Information

Ownership: Municipality Owned

Town: Casco County: Cumberland

Tax Map and Lot: Map 2, Lot 3

Tax Status: Exempt

Location: Southwest side of Rt.302, ROW from Lakewood Road (private)

Total Acres: 70.0

Acreage Listing

Forested Acres:	Timber Stands	Acres
	Stand 1-Mixed Wood	59.0
	Wetlands	11.0
	Total Acres	70.0

General Forest Conditions

Owner Objectives

The Town of Casco's Open Space Commission's objectives are to:

1. Protection of the open space for habitat and wildlife values, especially where there are sensitive areas or species;
2. Protection of the watershed and water quality;
3. A healthy community forest that can be harvested sustainably over time;
4. Safe public access and use of trails for year-round low impact recreation such as walking, skiing, hunting, and some motorized use where appropriate;
5. Education about the natural values and ecosystems of the property.

History

This property was last harvested approximately 25-30 years ago.

Location and Access

This lot is located in Casco, Maine and is situated southwest of Route 302. Though there is approx. 500' of road frontage on Rt. 302, there is a steep embankment and a guard rail along the road. There is a right-of-way off Lakewood Road (private road), though there is no road there and it is located between two camps. The lot can be access from Ring Landing Road, though there is no know legal right-of-way there. There is a good trail system on the property, though no known legal access to it.

Terrain and Hydrology

This lot is situated on fairly rolling terrain with fairly well drained high areas, and poorly drained low areas with wetlands, vernal pools, and streams.

Boundaries

The boundary lines on this lot are currently in decent shape. The lines are marked with red blazes, which go around most of the lot with the exception of portion adjacent to Lakewood Road (see Forest Type Map). These lines should be re-blazed and painted in the next 10 years. Most of the corners are marked with iron pins, though three were not located (northeast corner, and two by Lakewood Road).



The boundary lines consist of red blazes that should be maintained in the next 10 years.

Natural Resource Management

Timber Management

This lot is currently adequately stocked and has not been harvested in 25-30 years. 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. It is estimated that this lot is growing at a normal rate of approximately 2.5%.

Generally, selective thinnings 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 (which increases growth rates), as well as regeneration. Small gaps in the residual canopy are preferred, which promotes regeneration (especially for more shade tolerant 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 (such as fire damage) 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 and red oak growth. It is estimated that this woodland is growing approximately $\frac{1}{2}$ cord/per acre/per year. To promote white pine regeneration, harvesting should be performed during the summer or fall of seed year, since the harvesting equipment scarifies the soil. Also, when thinning red oaks, shade should be left on the south side to prevent epicormic sprouting. These guidelines are applied to the woodlot as a blanket prescription with specific considerations to stands and the harvesting schedule outlined in the stand prescriptions.

Forest Type Description

This 59-acre woodlot is comprised of only one forest type; mixed wood (a combination of hardwood and softwood with neither being more predominant). Although this lot has been harvested in the past, it is currently well stocked with generally pole and sawtimber hard and softwoods and should continue to offer forest management opportunities in the future. It is estimated that this woodlot is growing at a rate of 2.5% per year.

This lot was cruised in August of 2012. Forest types are broken into stand levels based on differences in age, height, and species composition. The dominant species are listed in descending order of occurrence relative to an individual stand.

Field Methods

The cruise and field work for this management plan was collected in August of 2012. The lot was cruised using a 300'x300' grid, which was measured with a string machine, and a 15 BAF prism. Trees >5" at breast height were measured with a Biltmore stick, and tallied for products in 8' sections to a 4" top. Confidence intervals of 95% were used to determine total volume and gross value for the woodlot using the Multicruise V.1 program.

The lot was mapped first by using the cruise map and cruise information, which was later transferred to the ArcView map. A GPS (Global Positioning System) was used to collect the corner waypoints and were plotted on the ArcView map, which was used to derive areas for the stands and the entire lot.

Timber Stand Descriptions, Prescriptions & Volumes

Stand 1: Mixed Wood, 59 acres

Species Composition	Size Class	Quality
Hemlock	6-21"	Fair to Good
Beech	6-12"	Poor
Red Maple	6-11"	Poor to Fair
Red Oak	6-14"	Good
White Birch	4-11"	Fair
White Pine	6-24"	Good
Spruce	8-14"	Good
Aspen	10-15"	Fair
Regeneration	Beech, Hemlock, White Birch, Red Maple, Spruce	
Basal Area Per Acre: 94.5 sq.ft.		
Mean Stand Diameter: 9.2"		

This stand encompasses the entire forested portion of the lot (not including the forested wetlands). This stand was heavily harvested about 25-30 years ago, which likely removed the more valuable trees. The stocking is currently comprised of mature hemlock and beech in the overstory, with an understory of beech, white birch, red maple and hemlock. The hemlock and beech likely range from 80-100 years old, and the understory has grown since the last harvest and those trees are <4" diameter at breast height (d.b.h.), and over 30' tall.

The hemlock is of fair quality, with some trees containing a sawlog or two, though some are entirely of pulp quality. Trees up to 21" d.b.h. were observed on lot, which are mature for this species. The beech is also of fair quality, with some sawlog quality trees, though most are infected with Beech Bark Disease. Though infected stems can live many years with the disease, it eventually kills the tree. Some of these trees could be salvaged, though there is little markets for beech other than pulp or firewood. The red maple in the stand is of fair quality and of good health, though most trees are only suitable for pulp or firewood. There is some red oak in the stand, mostly on the higher ground with better drained soils. These trees, though not yet mature, exhibit good form and smooth bark, indicating a good growth rate. These oak also act as an important food source for mammals such as squirrels, deer, and turkey to name a few. The white birch in the stand is mostly saplings sized, though a few larger trees survived the last harvest have now grown up to 11" d.b.h., which is mature for the species. Birch, like aspen, is a shade intolerant pioneer species with a relatively short life span (about 70-80 years), that gradually gets crowded by later successional, shade tolerant species. There are some aspen in this stand as well, some of which are reaching maturity and should be removed at some point. The white pines, though few and far between, are exceptional quality sawlog trees that range from 16"-24" d.b.h. All the pines observed contained at least a sawlog, some with 2 or 3. These are well formed trees with good natural pruning that should be retained for future growth and as a seed source for regeneration. The spruce, like the pine, are good quality trees, though there are few.



This stand is adequately stocked with mostly hemlock and beech, the latter of which is badly diseased.

Mixed Wood 1 Prescription

Time Frame	Silvicultural Recommendations
2012-2022	A selective thinning of the poorest quality trees of all species, i.e., trees that exhibit: poor form, excessive limbs, damage or disease should be removed in this time frame. More specifically, mature and poorly formed hemlocks could be thinned with most of the diseased beech. This thinning should help to increase the growth rates of the residual crop trees and regeneration. Crop trees (those retained for optimum growth) should consist of hemlock, red oak, and white pines that exhibit good quality characteristics. If possible, this stand should be harvested during the summer or fall of a white pine seed year, since harvesting equipment ‘scarifies’ the soil, creating a good seedbed for pine to naturally germinate.
2020-2029	Growth period; A commercial timber harvest is not recommended in this time frame. A forester should inspect the lot near the end of this time frame to best schedule the next treatment.

Total Timber Volumes

Species	Sawlogs (Board Ft.)	Pallet (Board Ft.)	Pulp (Cords)
White Pine	16,504	1,488	31
Hemlock	106,633		514
Spruce	8,256		2
Red Oak	15,134	28,970	81
Beech			281
Yellow Birch			7
White Birch			54
Red Maple			181
Total	146,527	30,458	1,151

Soils

The following soils were found to be present on the properties using the USDA Web Soil Survey.

Cumberland County and Part of Oxford County, Maine (ME005)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
HgB	Hermon sandy loam, 3 to 8 percent slopes	0.0	0.0%
HhB	Hermon very stony sandy loam, 3 to 8 percent slopes	19.8	30.2%
HhC	Hermon very stony sandy loam, 8 to 15 percent slopes	13.0	19.7%
HrB	Hollis fine sandy loam, 3 to 8 percent slopes	1.1	1.7%
HrC	Hollis fine sandy loam, 8 to 15 percent slopes	6.3	9.6%
Sn	Scantic silt loam	3.8	5.7%
Sp	Sebago mucky peat	17.1	26.0%
WsB	Woodbridge very stony fine sandy loam, 0 to 8 percent slopes	4.6	7.0%
Totals for Area of Interest		65.7	100.0%

This lot consists of high, fairly well drained stoney, sandy loams (mostly Hermon and Hollis soil types), and “limitations are slight on this soil for most uses related to community development”, though “limitations for recreational uses are moderate to very severe because of steepness of slope and stoniness” (Soil Survey, Cumberland County, Maine, August, 1974). There are some poorly drained peat soils (Sebago mucky peat and Scantic silt loam) associated with the lower wetland areas, which are generally saturated most of the year.

Fish and Wildlife Habitat Considerations

Signs of moose were observed during the field work on the lot, though other wise there was a lack of wildlife sign on the lot. However, this property contains all the necessary requirements for wildlife habitat: food, cover, and water. 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 that 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.

As forest stands grow, the under story growth declines, the overall height of the forest canopy becomes uniform, and the forest make-up decreases in diversity, thereby decreasing wildlife diversity. By harvesting wood selectively with forethought for the habitats being created and destroyed, the current high level of species diversity can be maintained.

Areas with mature oaks and beech will produce nuts that attract a variety of wildlife species, especially on a seed year (large number of seeds produced). Some of the white oaks are old enough to produce acorns, which are preferred by at least deer over those of

red oak. White-tailed deer, black bear, partridge, gray squirrels, chipmunks, and turkey commonly feed on such hard mast.

Moose sign in the form of scat and scarred trees from their lower incisors (they feed on the bark).

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 features mostly forested wetlands, a few vernal pools, as well as two small brooks that flow in and out wetland. Wetlands and water riparian zones (areas that border water) are a crucial part of the forest ecosystem. Interference in these areas has the potential to affect more species of wildlife than anywhere else.. One of the trails on the property crosses one of the brooks, which should have a bridge for any future recreational activities on the trail. While conducting timber harvesting near the wetland and brook, a liberal buffer zone and Best Management Practices should be utilized to minimize impact to the water quality.

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 or 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.

In Maine, there are laws pertaining to timber harvesting that were designed to protect water quality. The Natural Resources Protection Act states there can be no soil disturbance in areas within a 100’ from a lake, pond, river, stream, brook, freshwater wetland or tidal water. A Shoreland Zoning law applies to all areas within 250’ of lakes, ponds, rivers, tidal areas, and certain freshwater wetlands and at least 75’ from certain streams and allows for selective timber harvesting of no more than 40% of the trees 4” or more (at breast height) on any lot in a 10 year period, as long as a well-distributed stand of trees and vegetation remains (any exceptions would need to be approved by the town planning board).

Recreational Resources

Though the access to this property is a major limitation, this property is not posted and offers a variety of recreational such as hunting, hiking, snowshoeing, cross-country skiing, and nature observation to name a few.

Future Projects

If there is a suitable access, or in cooperation with an abutting landowner, the existing trail system on the lot could be improved for recreation (walking, cross country skiing, snow shoeing, etc.). This would require a parking area, with a kiosk and trail map. A bridge would also need to be built to best protect an intermittent stream that crosses the trail (see map on Appendix A for location). Interpretive signs could be placed at different locations, giving information about tree species, wildlife, vernal pools, etc.

A selective timber harvest should be considered *before* improving the trails (please refer to the Timber Stands, Prescriptions, Volumes & Values section of the plan for further details). This way, there wouldn't be a need to do any harvesting work for 15 to 20 years or more. [REDACTED]



This property features a good trail system that could be utilized for recreation.



This stream crossing will require a bridge if there will be any recreational use of the trail in the future.

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.

Cultural, Ecological, Archeological, Historical and Geological Features

The Maine Historic Preservation Commission was contacted to check for any areas of prehistoric archaeology, historic archaeology, or historic buildings or structures that may have been mapped. They have not responded to the request as of yet.

Forest Protection

Forest protection from fire is best achieved by access. Since this lot has good access, though not legally, in the case of a fire, most areas are accessible.

Threatened and Endangered Species and Unique Natural Communities

In order to best preserve biodiversity on the landscape, rare plant and wildlife species, as well as other natural communities, need to be identified and protected. Protection of such areas during a timber harvest would include a buffer zone and avoiding making any changes in the composition or condition of the stand. No threatened or endangered species or unique natural communities were observed at the time of the timber cruise, though stands should be observed during different seasons when species or natural communities might have a more obvious appearance.

Though no rare, threatened and/or endangered plant species, animals or exemplary natural communities have been documented to occur at this site, the Maine Natural Areas Program did report that there was Wild Brook Trout Habitat (see Appendix D-D2 for M.N.A.P. Forest Management Plan Checklist, Map, and Forest Management Recommendations for Brook Trout). More specifically, they reported that “Sebago Lake and its tributary streams support populations of wild brook trout. Brook trout prefer cool, well oxygenated waters that benefit from intact riparian corridors. Any forest

management activities planned for riparian zones should closely follow the state's Best Management Practices, including appropriate buffer distances, shade retention, and minimization of sediment runoff. Please see the attached fact sheet for more information about brook trout in Maine. Good management of this habitat is consistent with good forestry, and your regional wildlife and/or fisheries biologist (see the checklist for contact info) is available to assist you in maintaining its integrity while allowing for forest management and timber procurement. According to the information currently in our files, there are no other rare species or important habitats documented within the property. This lack of data may indicate minimal survey efforts rather than confirm the absence of rare features." (Maine Natural Areas Program, August, 2012).

There are currently 18 endangered species of wildlife in Maine, and another 16 that are threatened, that include species of mammals, birds, fish, reptiles, and invertebrates (Appendix E). Some well known endangered species include the golden eagle, peregrine falcon, and box turtle.

Insects and Disease

Field observations in the summer of 2012 showed no signs of serious insect or disease infestations other than Beech Bark Disease. However, conditions should be monitored periodically and during different seasons when insect or disease infestations may be more obvious (such as in the spring for Hemlock Woolly Adelgid). 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 (Appendix F for the names and descriptions of the latest locally threatening insects and diseases).

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.

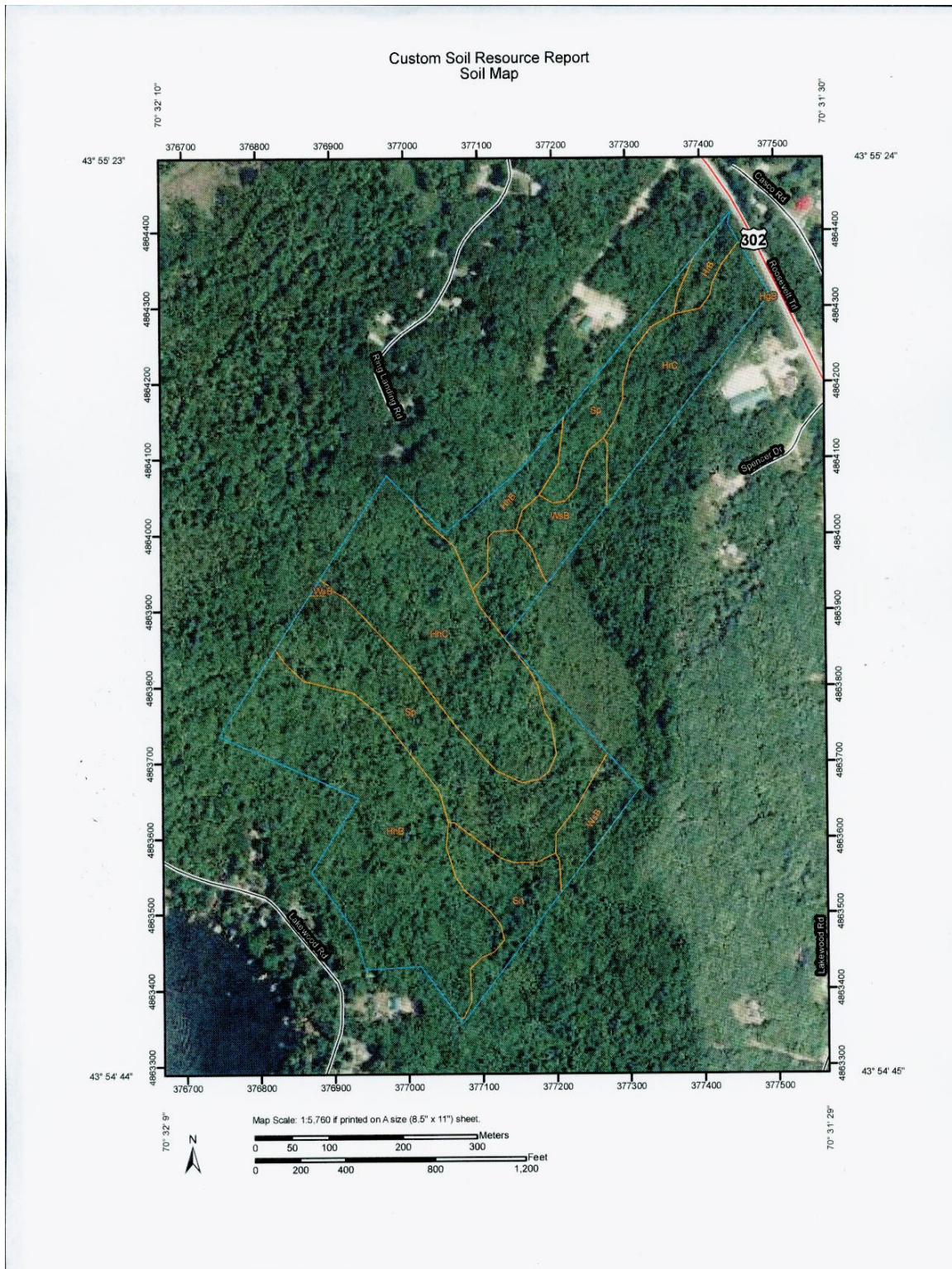
Project Schedule

Stand	Acres	Activity	Time Period
1	59	Selective thinning harvesting approximately: 20Mbf of hemlock sawlogs 100 cords of hardwood pulp/firewood 50 Cords of hemlock pulp	2012-2022
1	59	Growth Period. This stand should be periodically inspected by a forester.	2022-2032

Appendix A- Forest Type Map

Appendix B

Soils Map



Maine Historic Preservation Commission Review

Appendix D

MAINE NATURAL AREAS PROGRAM
(207)287-8044 or maine.nap@maine.gov

Forest Management Plan Review

Forester: *Brian Reader*

Landowner:

Lot Name: *Casco Map 2 Lot 3*

Date Received: *8/10/2012*

Town: *Casco*

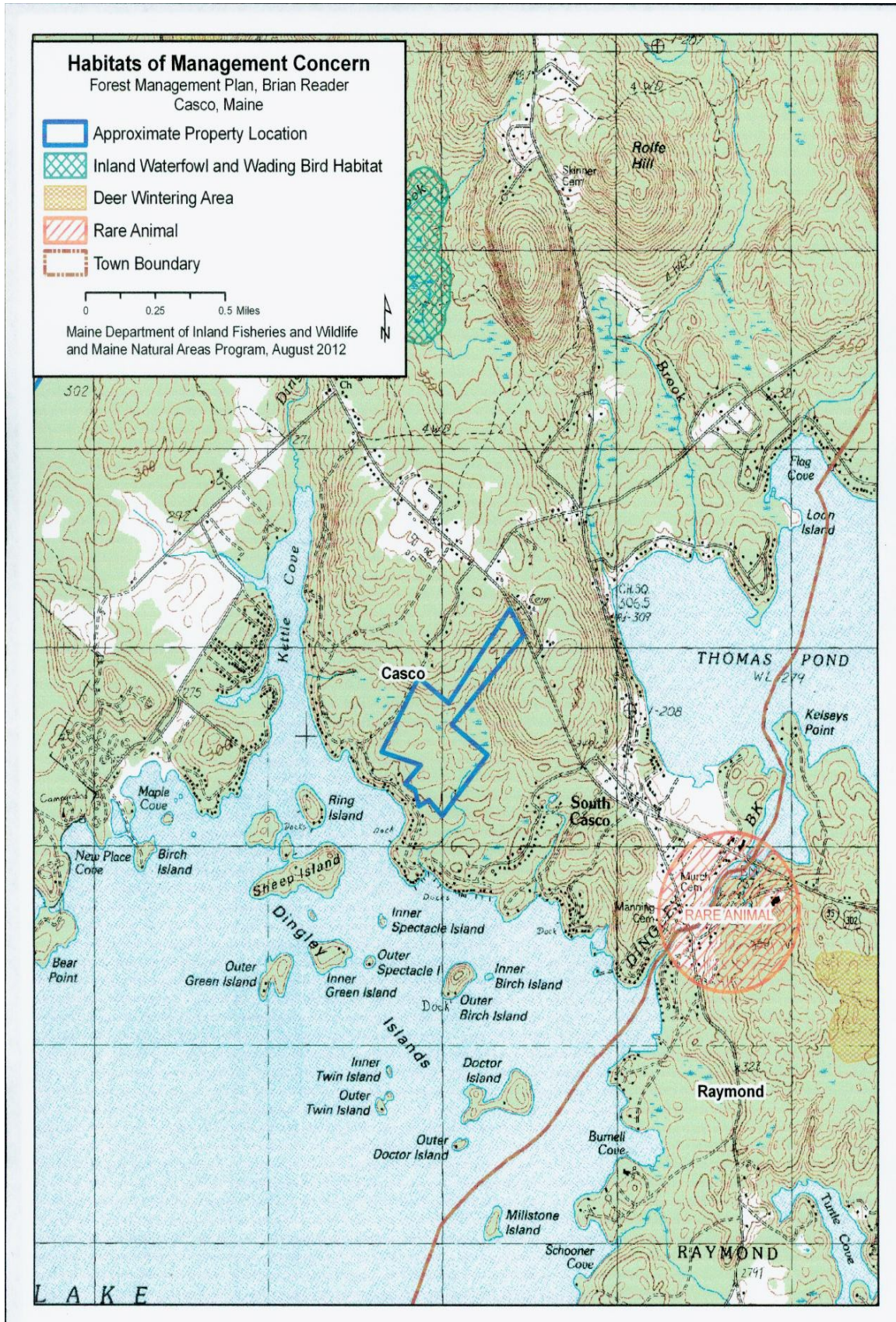
County: *Cumberland*

MDIFW Region: *A*

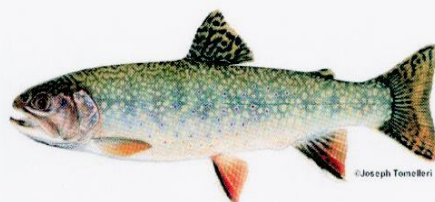
PLANT, ANIMAL, AND HABITATS	Documented to occur at the site?		Contact the following biologist to discuss conservation considerations
	YES	NO	
Plants: rare, threatened and/or endangered <i>If yes, see attached summary table.</i>	☐	☒	
Natural Communities: rare and/or exemplary <i>If yes, see attached summary table.</i>	☐	☒	
Animals: rare, threatened, or endangered <i>If yes, see attached summary table.</i>	☐	☒	
Mapped Essential Wildlife Habitats: Roseate tern Piping plover and Least tern	☐ ☐	☒ ☒	
Mapped Significant Wildlife Habitats: Deer wintering area Inland waterfowl and wading bird habitat Tidal waterfowl and wading bird habitat Significant vernal pool Shorebird roosting area	☐ ☐ ☐ ☐ ☐	☒ ☒ ☒ ☒ ☒	
Wild brook trout habitat	Yes ☒	Unknown ☐	MDIFW Regional Fisheries Biologist, James Pellerin, 657-2345
Atlantic Salmon: Salmon critical habitat Salmon stream habitat	Yes ☐ Yes ☐	No ☒ Unknown ☒	
Canada lynx: Does the site occur within a town which may provide habitat for lynx?	☐	☒	

LANDSCAPE CONTEXT	YES	NO
Does parcel intersect with a Beginning with Habitat Focus Area? Focus Area Name: Additional information on this focus area may be available at http://www.maine.gov/doc/nrimc/mnap/focusarea/index.htm	☐	☒
Is the parcel adjacent to state-owned land? Owner: Ownership type: ☐ Fee ☐ Easement Area Name:	☐	☒
Is the parcel within an area identified by MNAP as a potential inventory site for undocumented rare plants or exemplary natural communities? If so, MNAP will contact the landowner for permission prior to any inventory work.	☐	☒

Review completed by: LRS
Date: 8/13/2012
MNAP #: 2012_08_13_LS_10



MAINE DEPARTMENT OF INLAND FISHERIES AND WILDLIFE



Forest Management Recommendations for Brook Trout

Background

Brook trout (*Salvelinus fontinalis*), commonly referred to as squaretail, brookie, and speckled trout, are native to Maine and are the most preferred sport fish sought by Maine anglers. Size may vary, depending on water temperature, productivity, and food sources, but 3 year-old brook trout in Maine lakes may range from 7.5 to 17.5 inches long. Stream populations are typically slower growing, and lengths of 6 to 10 inches are more common place, although some populations mature and reproduce at lengths smaller than 6 inches.

Maine is the last stronghold for wild brook trout in the eastern United States. There are more than twice as many watersheds supporting wild populations in Maine than all of the other 16 states within the historical eastern brook trout range combined. Maine is also the only remaining state with extensive intact lake and pond dwelling populations of wild brook trout.

Brook trout require clean, cool, well oxygenated water and are very sensitive to changes in habitat and water quality. Rivers and streams typically provide spawning and nursery habitat. Adults are commonly resident in streams, but migrate throughout and between drainages to meet seasonal life history requirements.

Stream habitat suitability is maintained by the presence of intact, mature wooded riparian corridors that conserve forest soils, provide shade to reduce stream warming, protect stream water quality, provide cover for fish, and provide a source of woody debris and leaf litter from mature trees that maintain in-stream habitat for fish and the aquatic insects they feed upon. Floodplain and fringe wetlands associated with streams can be a significant source of springs and groundwater discharge that maintain stream flows and cool temperatures during warm low flow summer periods. Protection of these important riparian and wetland functions ensures that the overall health of the stream habitat and watershed is maintained.

Maine brook trout fisheries are unique and highly valuable, but they are vulnerable to habitat alteration that may be caused by poorly planned and implemented land management activities. Well planned forestry operations can protect habitat and help ensure that forests remain as forest; a compatible land use for brook trout and many other fish and wildlife.

Forest Management Recommendations

Brook trout are not afforded any special state or federal regulatory protection for forestry operations, and as such management recommendations are advisory.

The MDIFW recommends following Best Management Practices (BMPs) during all road and trail building activities, as well as timber harvesting. BMPs are detailed in the booklet titled *Best Management Practices for Forestry*, which offers guidance on managing and protecting water quality, installing road-stream crossings, and providing fish passage. This booklet is available at: http://www.maine.gov/doc/mfs/pubs/bmp_manual.htm or contact the Maine Forest Service at 1-800-367-0223.

Potential harmful impacts to fish and wildlife may be further minimized by designating low impact "riparian management zones" adjacent to streams and stream-associated fringe and floodplain wetlands in forest management and harvest plans. Smaller streams may be greatly influenced by land management practices; these systems benefit the most from well-managed and intact riparian corridors.

The MDIFW also recommends limiting the harvest of trees and alteration of other vegetation within 100 feet of streams and their associated fringe and floodplain wetlands to maintain an intact and stable mature stand of trees, characterized by heavy crown closure (at least 60 – 70%) and resistance to wind-throw. In some situations wider buffers should be considered where severe site conditions (e.g., steep slope, vulnerable soils, poor drainage, etc) increase risk to soil and stand stability. Any harvest within the riparian management zone should be selective with a goal of maintaining relatively uniform crown closure.

Maine Endangered Species

Golden Eagle - <i>Aquila chrysaetos</i>	Blanding's Turtle - <i>Emydoidea blandingii</i>
Peregrine Falcon - <i>Falco peregrinus-B</i>	Box Turtle - <i>Terrapene carolina</i>
Piping Plover - <i>Charadrius melodus**</i>	Black Racer - <i>Coluber constrictor</i>
Roseate Tern - <i>Sterna dougallii*</i>	Roaring Brook Mayfly - <i>Epeorus frisoni</i>
Least Tern - <i>Sterna antillarum</i>	Ringed Boghaunter (dragonfly) - <i>Williamsonia lintneri</i>
Black Tern - <i>Chlidonias niger</i>	Clayton's Copper (butterfly)- <i>Lycaena dorcas claytoni</i>
Sedge Wren - <i>Cistothorus platensis</i>	Edwards' Hairstreak (butterfly)- <i>Satyrium edwardsii</i>
American Pipit - <i>Anthus rubescens B</i>	Hessel's Hairstreak (butterfly)- <i>Mitoura hesseli</i>
Grasshopper Sparrow - <i>Ammodramus savannarum</i>	
Katahdin Arctic (butterfly)- <i>Oeneis polixenes katahdin</i>	

Maine Threatened Species

Bald Eagle - <i>Haliaeetus leucocephalus**</i>	Loggerhead Turtle - <i>Caretta caretta**</i>
Razorbill - <i>Alca torda</i>	Swamp Darter (fish) - <i>Etheostoma fusiforme</i>
Atlantic Puffin - <i>Fratercula arctica</i>	Harlequin Duck - <i>Histrionicus histrionicus</i>
Arctic Tern - <i>Sterna paradisaea</i>	Tomah Mayfly - <i>Siphonisca aerodromia</i>
Upland Sandpiper - <i>Bartramia longicauda</i>	Pygmy Snaketail (dragonfly) - <i>Ophiogomphus howei</i>
Northern Bog Lemming - <i>Synaptomys borealis</i>	Twilight Moth - <i>Lycia rachelae</i>
Spotted Turtle - <i>Clemmys guttata</i>	
Pine Barrens Zanclognatha (moth) <i>Zanclognatha martha</i>	
Tidewater Mucket (freshwater mussel)- <i>Leptodea ochracea</i>	
Yellow Lampmussel (freshwater mussel)- <i>Lampsilis cariosa</i>	

Federally Listed Endangered or Threatened Species currently or historically occurring in Maine, but not listed under Maine's Endangered Species Act

Eskimo Curlew - <i>Numenius borealis*?</i>	Sei Whale - <i>Balaenoptera borealis*</i>
Gray Wolf - <i>Canis lupus**?</i>	Leatherback Turtle - <i>Dermochelys coriacea*</i>
Eastern Cougar - <i>Felis concolor cougar*?</i>	Atlantic Ridley Turtle - <i>Lepidochelys kempi*</i>
Right Whale - <i>Eubalaena glacialis*</i>	Shortnose Sturgeon - <i>Acipenser brevirostrum*</i>
Humpback Whale - <i>Megaptera novaeangliae*</i>	Finback Whale - <i>Balaenoptera physalus*</i>
Karner Blue - <i>Lycaeides melissa samuelis*?</i>	Sperm Whale - <i>Physeter catodon*</i>
American Burying Beetle - <i>Nicrophorus americanus*?</i>	

note: * = Federally listed Endangered Species; Maine ? = current presence uncertain in Maine

** = Federally listed Threatened Species; Maine B = breeding population only.

(For the companion list of Endangered and Threatened Plants in Maine, contact the Maine Natural Areas Program, DOC, State House Station #93, Augusta, ME 04333-0093)

Appendix F

Insects and Diseases

Increased awareness and monitoring of the following insect and disease populations is recommended.

Gypsy Moth

The gypsy moth is a serious forest pest in New England. The moth was first introduced into the United States in 1869 when it was accidentally released in Massachusetts. Natural predators of the gypsy moth are rodents, birds, parasites, fungi, ground beetles, and a wilt virus. Although these predators destroy a large number of these insects, they cannot prevent the occurrence of a major outbreak. The caterpillars prefer to feed on the leaves of oak, apple, birch, poplar, and willow trees, and often defoliate the tree completely. In short, damage from feeding caterpillars can reduce timber value by killing the tree, causing epicormic branching along the bole, or increasing the risk of secondary damage by other insects. Peak outbreaks occur every 7 to 10 years with the last recorded outbreak in 1981. The threat of gypsy moths is greater where there is significant red oak stocking.

Saddled Prominent

Small to moderate-sized outbreaks of this insect occur frequently and are usually of short duration. The saddled prominent caterpillar causes the loss and deterioration of woody growth in trees. The young larvae are leaf skeletonizers, but most of the damage is done by the older caterpillars, which consume most of the leaf tissues of deciduous broad-leaved species like beech and maple.

The moths appear during the spring and the females lay the eggs singly on the leaves. Each female may lay as many as 500 eggs. These hatch in a week to 10 days and the caterpillars mature in 5 to 6 weeks after hatching. They then descend to the ground where they pupate in the leaf mold to spend the winter. There is only 1 generation per year.

Sugar Maple Borer

Attack by this wood-boring insect is found mainly on trees with low vigor and usually on the lower 20' of the tree trunk. Damage by this insect is a result of feeding from the insect larvae just beneath the bark during the first year following egg hatch. In the second year, the larvae continue to feed and prepare an over wintering tunnel, dug 2 to 4 inches into the bole; the adult borer emerges the following spring. This insect rarely kills sugar maple trees, but its' long term effect may reduce the available space for tapping, reduce the crown sized from dieback, make it more susceptible to wind damage, and degrade the volume and value of recoverable lumber. To prevent or minimize future damage from the sugar maple borer, especially within a sugarbush, stands should be kept healthy and vigorous by thinning from below and maintaining stocking levels of 65-85 square feet of basal area per acre.

White Pine Weevil

Adult and larvae feeding on the terminal leader cause injury from the white pine weevil. Two or three years of growth may be killed under conditions favorable to larval development and survival. Trees subjected to this damage become crooked, forked, or multi-stemmed. Because of this, the trees tend to produce low quality sawlogs, or, in most cases, only pulp quality wood. To reduce the occurrence of weevil injury, allow white pine regeneration to grow in partial shade to a height of at least 16' before releasing it to full sunlight.

White Pine Blister Rust

The blister rust fungus lives alternately on white pine and plants of the genus *Ribes* (current and gooseberries). The fungus cannot spread from pine tree to pine tree since it requires the alternate host plant in order to complete its' life cycle. Blister rust can kill pines of all sizes, though smaller trees die faster. On larger trees, cankers on the trunk will retard growth, which weakens the stem at the canker, and can eventually girdle the tree. This is usually noticeable by a warped looking trunk with resinous exudations and possibly sloughed bark. Primary control is the eradication of the alternate host *ribes*, which is often found in nearby fields, openings, or even skid trails.

European Pine Shoot Beetle

This spread of this insect in the northern regions of New England is of increasing concern. Tip moth caterpillars first bore into and destroy the buds. From here they often extend their tunnels into the adjacent twigs a few inches, or in some cases, up to 6 inches. External evidence consists of resinous exudations on and around the buds and twigs, but large globs of pitch are never formed. Later, the needles around the buds turn yellow then brown. When this occurs on the terminal bud, nearby buds that are uninjured take over. This produces crooked and multi-stemmed trees, much like the effect of the white pine weevil, but not as bad since a shorter length of stem is destroyed. Heavy infestations result in bushy trees, but rarely does the tree die, though the growth rate of the tree will be reduced.

Hemlock Woolly Adelgid

This pest is also of recent concern due to its high damage potential. This pest has been in the United States since 1924, and is thought to have blown into southern New England by Hurricane Gloria in 1985. This insect, believed to be a native of Asia, has been recently discovered in Massachusetts, New Hampshire, and Maine.

This insect attacks only the Eastern hemlock and is easiest to see in the spring in the form of small cotton ball tufts on the trunk and branches at the base of needles. The insect feeds during the growing season by sucking sap from young twigs. Feeding damage either prevents or retards growth and needles begin to discolor and drop. Defoliation and tree mortality can occur within several years of infestation. This insect is spread by wind, birds, and mammals.

Hemlock Looper

This defoliating insect's larvae can be extremely destructive to hemlock, balsam fir, and white spruce. Hemlocks may die after one year of serious defoliation, while fir may last up to 2 years.

The hemlock loopers are moths that are tan to grayish-brown in color and have a wingspan of approximately 1.25 inches. The female lays her eggs throughout the forest from August to October and the eggs hatch the next year in May or June. The larvae initially feed on new foliage, but quickly turn to old foliage, and return only when the old foliage is depleted. High populations can remove nearly all the old and new needles in a single season. The looper is a wasteful feeder, sometimes only feeding on a small part of a needle before moving on to the next one. The needles then dry out and turn a reddish-brown color, and there is often a mat of needles that collect under the tree.

Beech Bark Disease

This disease is triggered by the feeding of a tiny scale insect, which by itself, causes little direct damage to the tree in light infestations. However, during a heavy infestation of the scale, the population of an associated fungus, nectria complex, increases and enters the small wounds produced by the scale, which kills patches of bark and inner tissue. The effect is reduced tree vigor, severe deformity, or death of the tree. Control methods include removing severely infested trees, removing large infested trees, and thinning or patch cutting to remove the proportion of beech in a stand.

Spruce Budworm

The preferred food sources of the spruce budworm are balsam fir and white spruce. This forest pest is most destructive in 60-80 year old stands with a high proportion of balsam fir. Although limited in effectiveness, there are some silvicultural methods that can be used for control: harvest fir stands before they become over-mature, encourage a higher spruce to fir ratio, and to try to break up large stands of fir or spruce fir with intervening stands of hardwood or mixed wood. Another method is to encourage budworm predators, as there are at least 49 bird species which are known to prey on the pupae of the budworm. The most important predators in a mature conifer mixture include the blackburnian warbler, golden-crowned kinglet, yellow-rumped warbler, and the red-breasted nuthatch.

The Forest Practices Act

This excerpt is taken from ‘A Field Guide to Laws Pertaining to Timber Harvesting in Organized Areas of Maine’, Maine Department of Environmental Protection, October, 2000.

‘In 1989, the Maine Legislature passed L.D. 429 “An Act to Implement Sound Forest Practices”, known more commonly as the Forest Practices Act. The law authorizes the Department of Conservation to develop rules (Chapter 20 Rule: Forest Regeneration and Clearcutting Standards, adopted by the Maine Forest Service) to implement the law. The law also specifies a process that municipalities must follow in adopting local timber harvesting ordinances. The rules originally became effective January 1, 1991: a revised version became effective October 1, 1999.

The major components of the Forest Regeneration and Clearcutting Standards in general are:

- Landowners must notify the Maine Forest Service before beginning any timber harvesting activities.
- Landowners who create clearcuts must adhere to standards for separation zones between clearcuts, and must prepare harvest plans for clearcuts larger than 20 acres.
- Landowners must ensure that a clearcut has adequate regeneration within 5 years after harvest.

The revised rules include a number of exemptions to provide regulatory relief to non-industrial private landowners, particularly for landowners whose total statewide ownership is 100 acres or less, and for timber harvests that cover a small area.

References

- Dept. of Conservation, Maine Forest Service, Forest Policy and Management Division, *Best Management Practices for Forestry: Protecting Maine's Water Quality*. 2004
- DeGraff, Richard M.; Yamasaki, Mariko; Leak, William B.; Lanier, John W. *New England Wildlife: Management of Forested Habitats*. U.S. Department of Agriculture, Forest Service Gen. Tech. Rep. NE-144, 1992.
- Delorme. *The Maine Atlas and Gazetteer*. 27th Edition. Delorme, Freeport, ME. 2004
- Hobson, S.S.; Barclay, J.S.; Broderick, S.H., *Enhancing Wildlife Habitats, A Practical Guide for Forest Landowners*. Natural Resource, Agriculture, and Engineering Service, Ithaca, N.Y. 1993
- Soil Survey, Cumberland County, Maine (August, 1974).

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 than 4.5' tall, and 0-2 inches DBH

b) Sapling: more than 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.