



Integrated Forest Management

Helping Landowners Achieve
Their Natural Resource Objectives

Town of Cumberland Town Forest

Forest Management Plan

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Scope of Plan

This Forest Management Plan contains detailed characteristics and prescriptions for the Town of Cumberland's Town Forest. This lot equals 96 acres, plus or minus and varies in forest cover type, topography and soil and site makeup. Approximately 10 acres is not included in this plan as it is non-forested portion of the property that is the site of the former town landfill, now capped.

This plan aims to document the current parameters of each stand and make recommendations on how each stand is to be managed through the next 10 years. Silvicultural activities will be outlined for each stand for the initial entry, with recommendations beyond based on likely harvesting results. Following initial entry these stands should be reevaluated to ensure they are on track to meet health and productivity goals initiated in the first entry. Second entry silviculture will depend slightly on how each stand performs following the first entry and may need to be adjusted based on anticipated, versus planned results. Recognizing that each stand is unique will dictate how that stand is managed and inputs such as vegetation types, soils, wildlife habitats, and topography will all be duly considered when making recommendations.

The Town has outlined the follow as management goals for the property:

- Influence forest stands to enhance habitat to the extent that is possible by maintaining and expanding mature portions of the forest while adding balance by creating some early successional habitat in small forest openings.
- Protect biological features and functionality intrinsic to the property (i.e. riparian zones and wetlands, forest structure, etc.).
- Manage and realistically maximize the biological diversity.
- Make every reasonable effort to control invasive plant species.
- Implement exemplary forest management that is certified to the highest globally accepted standard, Forest Stewardship Council (FSC).
- Manage the Town Forest as a model of a well managed forest with sustainable and quality timber production and revenue generation over the long-term.

Plan Methodology

The following pages contain the detailed stand descriptions, silvicultural recommendations and rationale for each forest stand as depicted on the forest type map. These pages represent my conclusions and are based on significant thoughtful analysis. The details of some of this analysis can be found in the appendix to this plan and include:

- Forest typing including GPS'd stand boundaries, see map section, page 19.
- Exploration of the history, origins and past treatments conducted on the Rines Forest, see Appendix 1, page 22.
- Analysis of the current soils found on the forest including discussion of the most relevant types, their influence on productivity and species composition and operability, see Appendix 2, page 23.
- Details of the resource inventory cruise, see Appendix 3, page 28.
- A copy of the site review prepared by the Maine Natural Areas Program (MNAP), see Appendix 4, page 29.
- A copy of the site review prepared by the Maine Historical Preservation Commission (MHPC), see Appendix 5, page 36.
- Synthesis of the most critical and readily applied management concepts for enhancing biodiversity in the forests of Maine, adapted from: Biodiversity in the Forests of Maine: Guidelines for Land Management (Flatebo, Foss & Pelletier, 1999), see Appendix 6, page 39.
- An Integrated Pest Management (IPM) plan for control of invasive plants including Buckthorn, and other invasive species found on the forest, see Appendix 7, page 48.
- Also contained in the appendix to this plan is a more detailed definition/discussion of the silvicultural methods prescribed for the Town Forest, see Appendix 8, page 49.

Table 1. Next Entry Stand Schedule					
Stand	Type	Description	Acres	Next Treatment	Approx. % Removal
1	H4B3	Young Hardwood	6	Grow	0%
2	S4A4	Red Pine/ Norway Plantation	7	1st Entry, Long Shelterwood	30%
3	WP4C5	Open Limby White pine	6	Weeding	0%
4	SH4B5	Mixedwood; Hemlock & Red Maple	38	2nd Entry, Long Shelterwood	45%
5	S4B5	Mixed softwood plantation	10	2nd Entry, Long Shelterwood	45%
6-11	XXX	Non-Forested	30	No Treatment	0%

Stand 1: H4B3

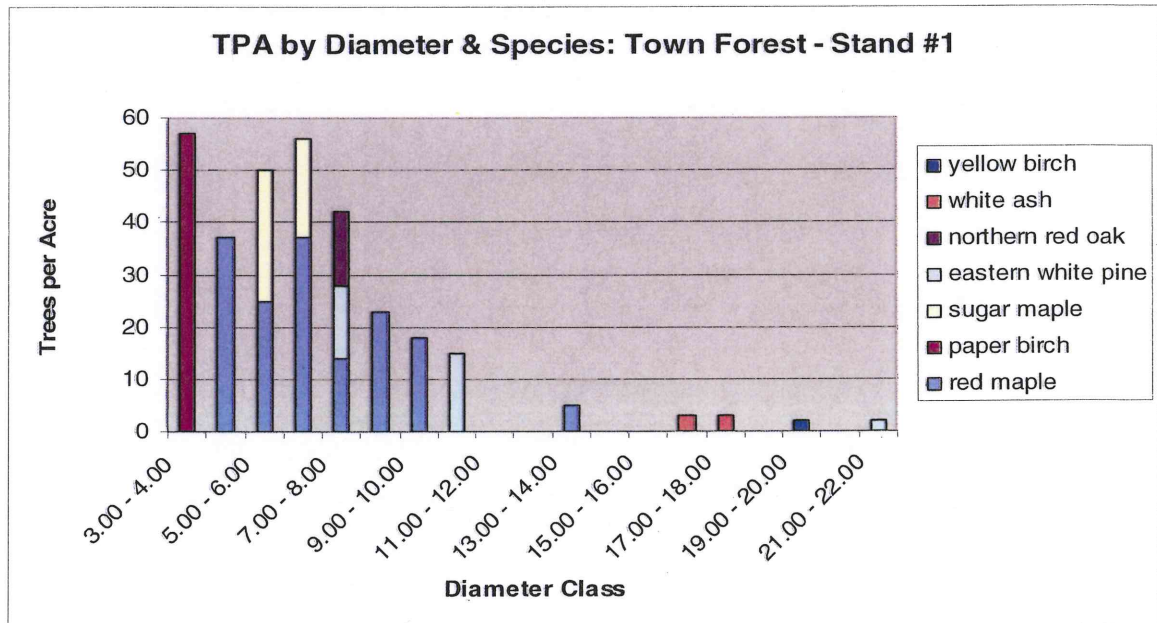
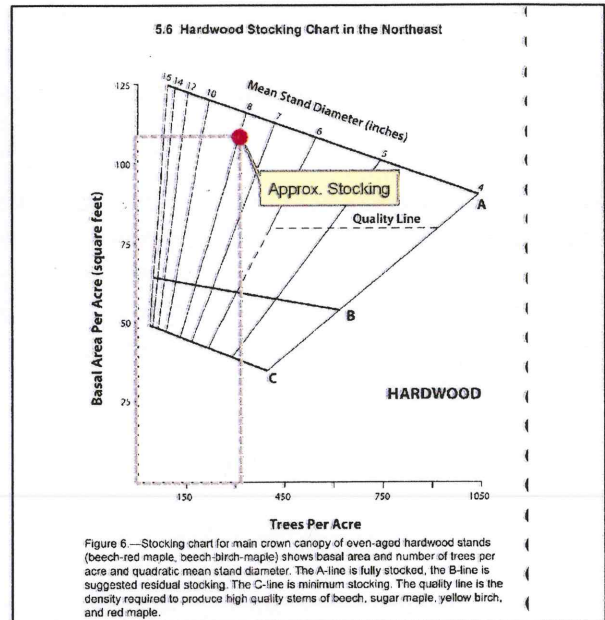
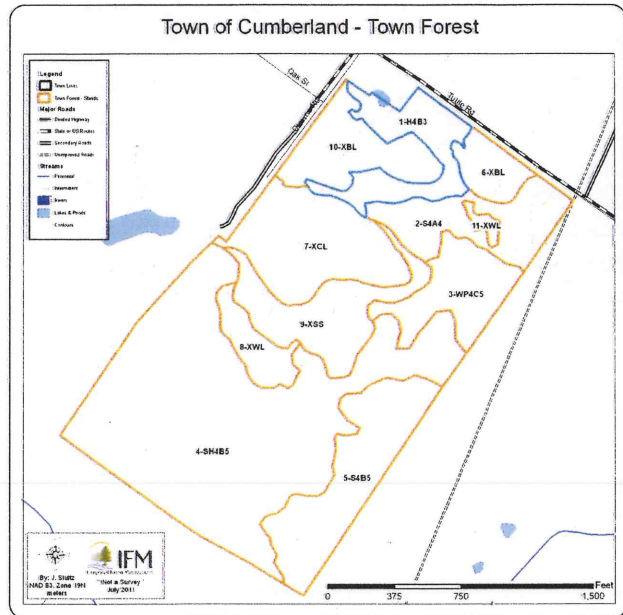
This stand is roughly 6 acres in size and is located in the northwestern corner of the property. The stand is a mix of classic northern hardwoods with some eastern white pine scattered throughout. The hardwood component is dominated red maple at nearly 51% of the total stocking while paper birch, sugar maple, red oak, white ash and yellow birch are present in order of decreasing abundance. Eastern white pine was the only softwood specie tallied. Important to note from a biodiversity standpoint that shagbark hickory was observed in the stand but was not tallied during the inventory process.

The stocking chart shows that this stand is overstocked if optimal stand growth is the goal. The stand is generally even aged and of good quality and growth. The stand also has good stocking and composition in the pole-size classes. No advanced signs of pest or pathogen activity were noted other than normal occurrence of beech scale.

Detailed volume information can be found in the inventory summary supplemental to this plan. A brief summary of that report includes a gross sawtimber volume of 392 bf/acre, all of which is yellow birch, and a gross pulpwood volume of 23 cords/acre, with a gross total volume for this stand equal to 24 cords/acre. 100% of the sawlog volume is derived yellow birch.

This stand is even-aged with good overall composition and complexity and is well above the B line on a hardwood stocking chart. However, given the low volume per acre and the small diameter size, this stand should be allowed to grow over the next ten year period. Exceptions would include removing scattered individual trees near the border of Stand 2 while a machine in the area.

Stand – 1: H4B3



Total Basal Area (per/acre)	105 sqft
Total Stems per acre	315
Mean DBH	7.2 inches (Medial = 10.3")
Quadratic Mean DBH	7.8 inches
Prescription	Grow

Stand 2: S4A4

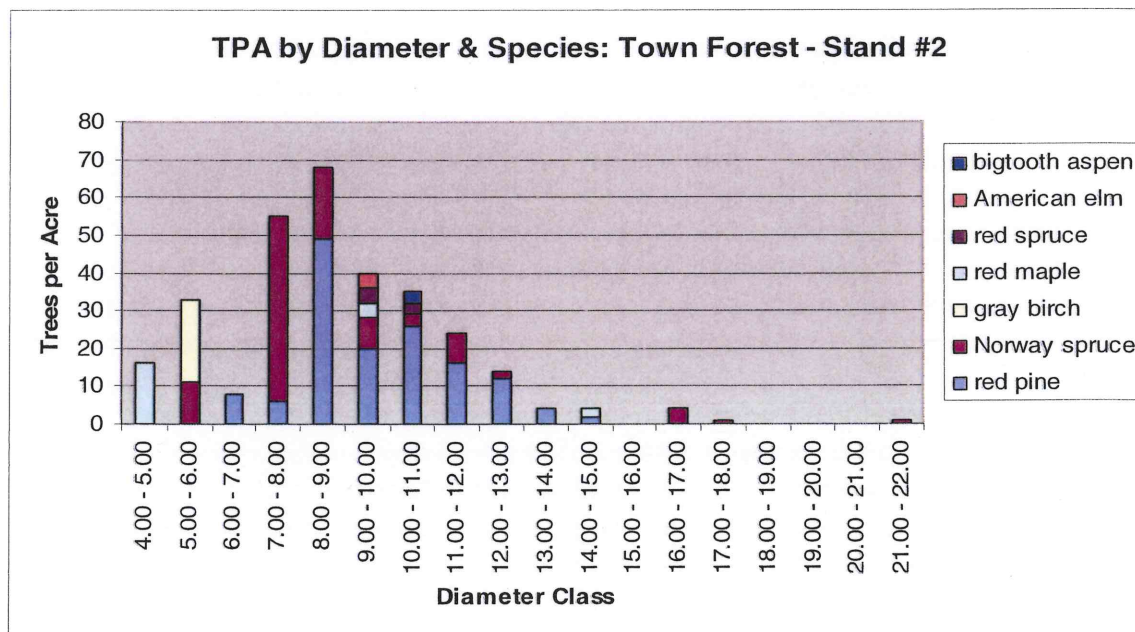
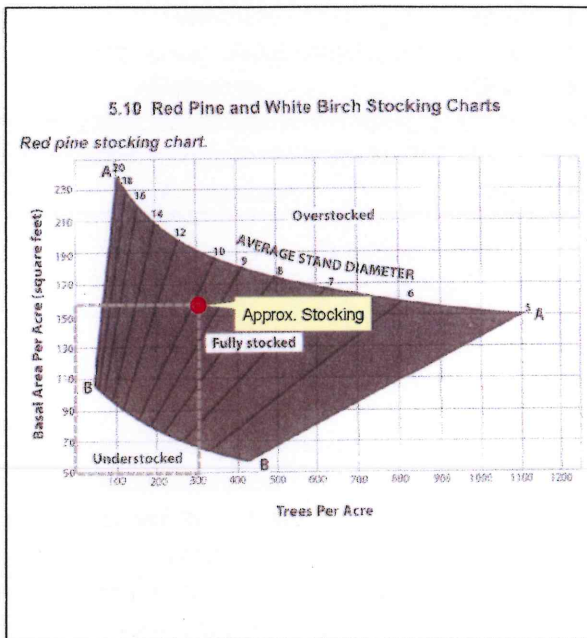
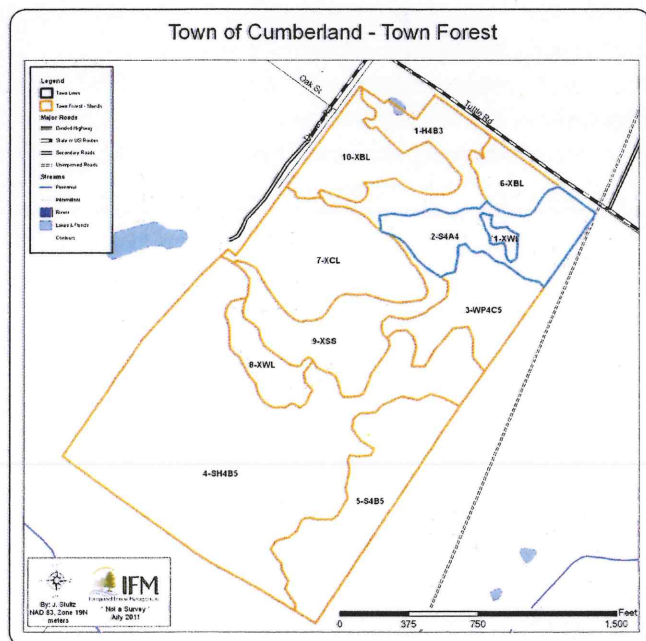
This stand is roughly 7 acres in size and is located in the northeastern corner of the lot. The stand is primarily composed of softwood with 46% of the stocking as planted red pine and 35% as planted Norway spruce. The minor hardwood component includes red maple, gray birch, and poplar in respectively smaller quantities. These hardwood trees opportunistically regenerated naturally where planted trees failed.

The stocking chart shows that this stand is just below full A-line stocking. The stand is generally even-aged (as most of the stand was planted) and of fair growth and vigor. Overall stem quality is fair with many dead limbs (black knots in sawn wood) remaining on the trees as the largest detriment to sawlog quality. No advanced signs of pest or pathogen activity observed.

Detailed volume information can be found in the inventory summary supplemental to this plan. A brief summary of that report includes a gross sawtimber volume of 7.40 Mbf/acre and a gross pulpwood volume of 27 cords/acre, with a gross total volume for this stand equal to 43 cords/acre. Red pine and Norway spruce combined make up over 93% of the total sawlog volume for the stand.

This stand is generally even-aged, nearly over stocked, and is lacking understory development with the exception of invasive shrubs. Additionally, the stand is reaching financial maturity and managing both the crop trees as well as establishing the next generation is advised. However, given the proximity to the trailhead for the hiking trail and the heavy traffic of the municipal offices a lighter entry may be more appropriate, therefore, a first entry of a long shelterwood is recommended for this stand. The long shelterwood system is one that, over three successive harvests spaced approximately 10 to 15 years apart establishes new, young growth under the “shelter” of an overstory. The first entry is intended as a preparatory cut; in this harvest 25 to 35% of the standing volume should be removed. The harvesting should focus on removing the poorest quality stems throughout the stand so as to improve the growth and value of the residual overstory. Measures to control or eradicate the buckthorn stems and other invasive plant should be undertaken concurrently with the shelterwood harvest. Also see Integrated Pest Management (IPM) plan in Appendix 7 of this plan on page 47, for details on next actions for controlling invasives. If this invasive species becomes a dominant understory shrub, it will be nearly impossible to regenerate desirable species in the subsequent shelterwood entries.

Stand – 2: S4A4



Total Basal Area (per acre)	156 sqft
Total Stems per acre	307
Mean DBH	9.3 inches (Medial = 10.7")
Quadratic Mean DBH	9.7 inches
Prescription	1st Entry, Long Shelterwood

Stand 3: WP4C5

This stand is roughly 6 acres in size and is found at the eastern edge of the old landfill site. The composition of this stand is over 85% white pine with red pine, black cherry, poplar, and white ash also tallied during the inventory in successively smaller quantities.

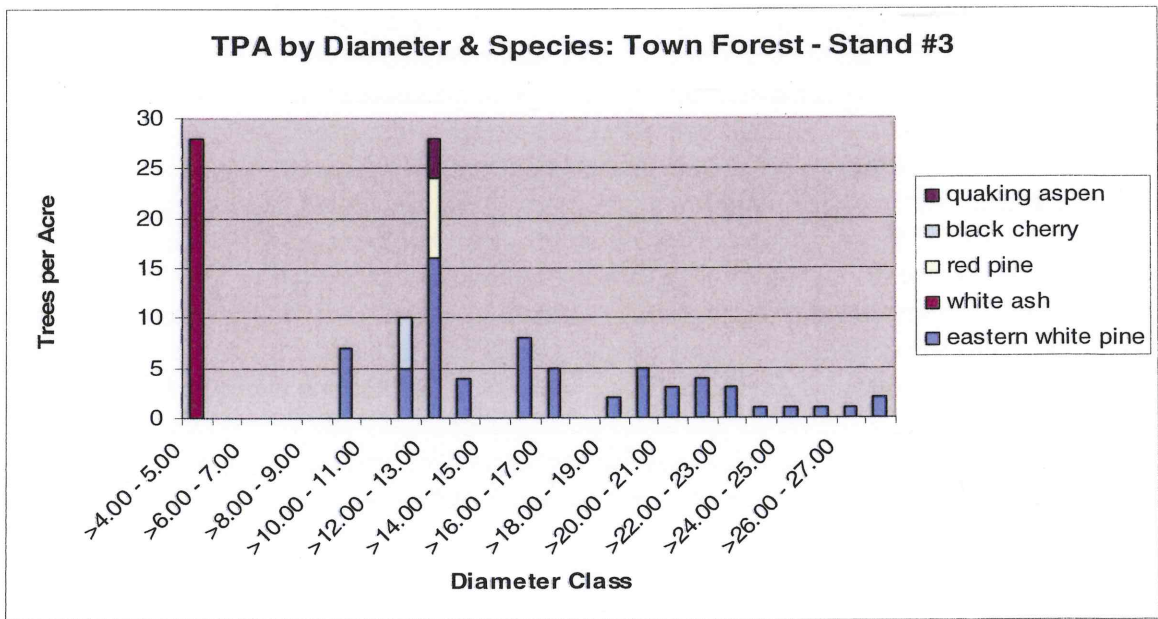
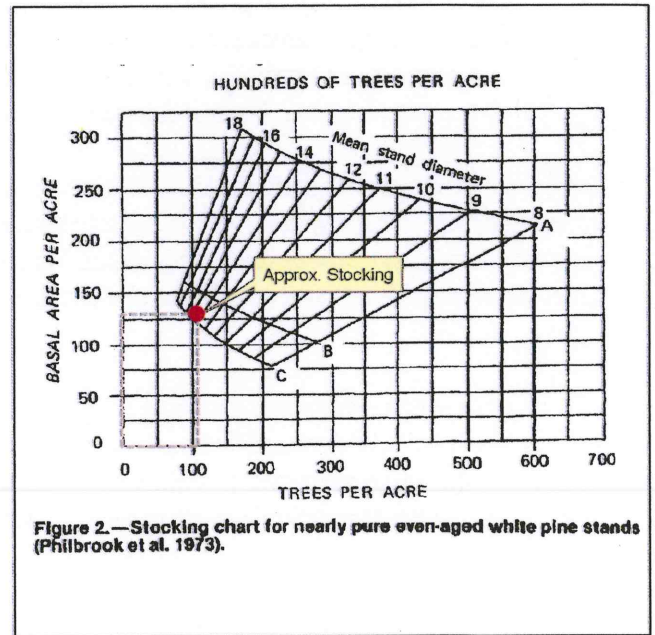
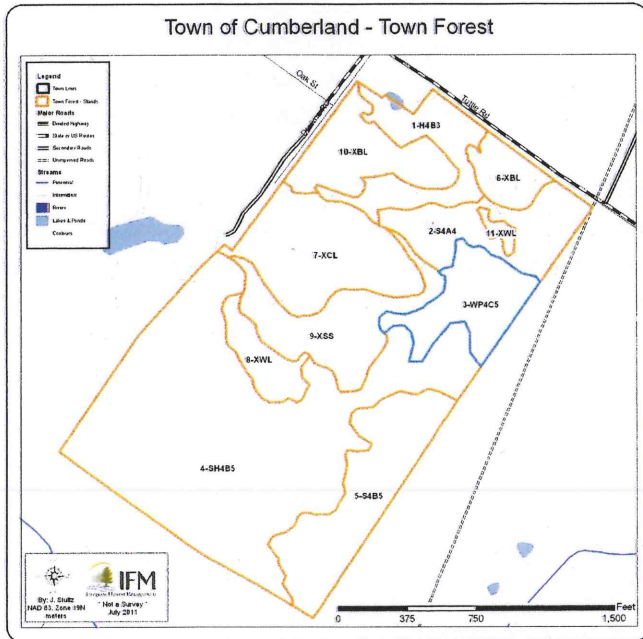
The stocking chart shows that this stand is just barely above the C-line stocking. Although this puts the stand squarely in the “understocked” category, the last entry appears to have been a shelterwood removal where the goal was more focused on regenerating and growing the understory than maximizing growth of the residual overstory. The pine that forms the overstory is even-aged and generally not of good quality with many stems having forked tops and excessive (in size and number) black knots. The understory is of special concern as it is currently dominated by the invasive species of buckthorn, likely making up 80 to 90% of the understory stem count. Also present in this sapling layer is young poplar, white pine, red maple and other scattered hardwood species as well as balsam fir.

No advanced signs of pest or pathogen activity observed. The stand appears to be growing fairly well, however, quality issues in the pine as mentioned above will be the largest limiting factor to sawlog tally. Also the buckthorn growth, if continued unattended, will likely take over the stand, preventing native species from developing.

Detailed volume information can be found in the inventory summary supplemental to this plan. A brief summary of that report includes a gross sawtimber volume of 8.06 Mbf/acre and a gross pulpwood volume of 25cords/acre, with a gross total volume for this stand equal to 43cords/acre. The highest sawlog volume is found in the white pine, which makes up 93% of all sawlog volume for the stand.

This stand is two-aged with a heavy infestation of buckthorn in the understory. It is strongly recommended that the buckthorn be removed from the stand to the highest degree possible as soon as is practical. Also see Integrated Pest Management (IPM) plan in Appendix 7 of this plan on page 47, for details on next actions for controlling invasives. The overstory trees should be left to grow so as to provide a potential seed source and a shelter for regenerating the stand to native and desirable species once the buckthorn is under control.

Stand – 3: WP4C5



Total Basal Area (per acre)	128 sqft
Total Stems per acre	112
Mean DBH	13.1 inches (Medial = 18.2")
Quadratic Mean DBH	14.5 inches
Prescription	Weed understory, grow overstory

Stand 4: SH4B5

This stand is 38 acres in size and is the largest stand on the parcel, encompassing most of the southern half of the lot. The stand is truly mixedwood with 47% of the basal area as softwood, 53% hardwood. Softwood species, in order of dominance include, hemlock, white pine, balsam fir, red spruce and red pine. Hardwood species include red maple, red oak, poplar, white ash, paper birch, black ash, yellow birch, ironwood and sugar maple in respective dominance.

The stocking chart shows that this stand is very close to full stocking. The majority of this stand is generally even-aged, and although exhibiting a range of diameters, the smaller trees are generally the more suppressed stems in the stand, as the larger trees are those that are more dominant. There are a few gigantic stems of red oak and white pine that may actually be older than the rest of the stand. However, they are too few and too scattered to be managed as a separate age class. Some of these trees at a minimum should be retained during the next harvest entry. Regeneration is sparse throughout and limited to isolated areas where there has been a disturbance. The northeastern tail of the stand is much more poorly drained and has less stocking. This area is generally small red maple and balsam fir with heavy reeds growing throughout. The drainage characteristics of this portion of the stand may very well have been affected by the additional run-off created by the landfill. This small area (≈ 5 acres) will not be included in the treatment area prescribed for this stand.

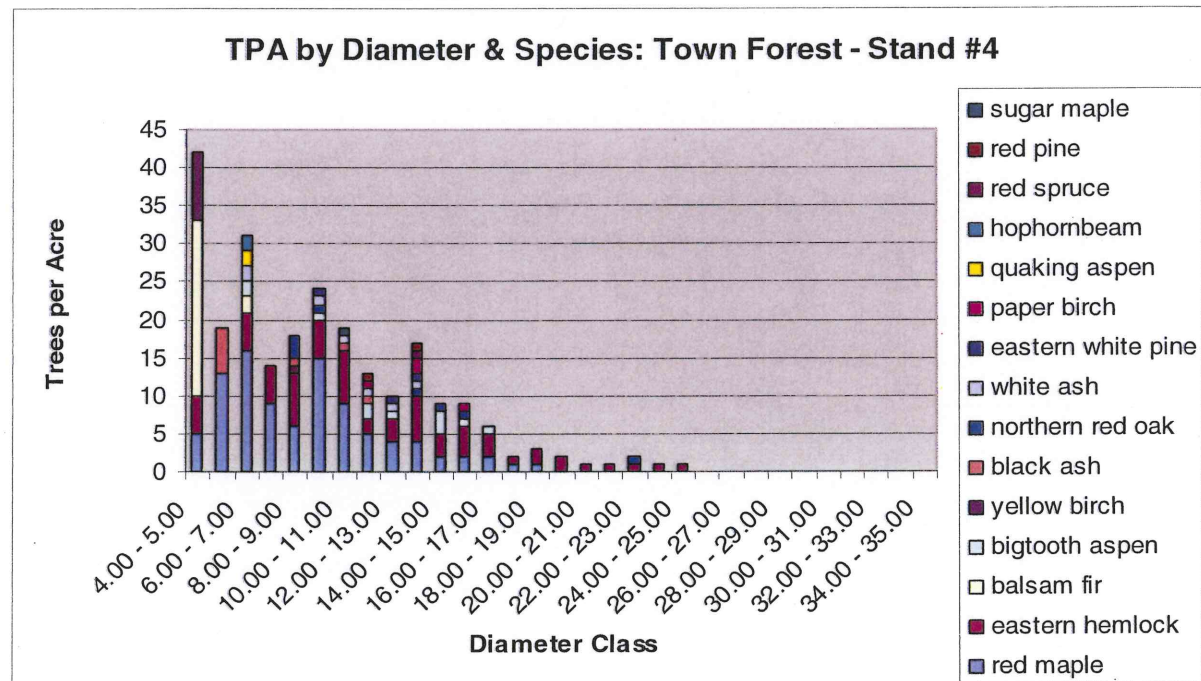
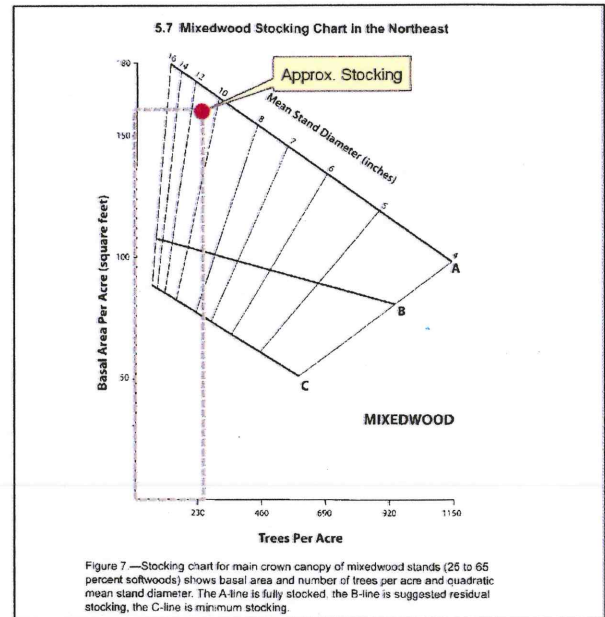
No signs of major insect pest or pathogen activity were observed. The stand appears healthy, but vigor is a bit suppressed due mainly to the somewhat poorly drained soils throughout. Windthrow and trees dying due to senescence are common in the stand as evidenced by standing snags and coarse woody debris.

Detailed volume information can be found in the inventory summary supplemental to this plan. A brief summary of that report includes a gross sawtimber volume of 6.88 Mbf/acre and a gross pulpwood volume of 29 cords/acre, with a gross total volume for this stand equal to 44 cords/acre. Roughly one-third of the total sawlog volume comes from hemlock.

This stand is predominately even-aged with a general lack of quality regeneration throughout. Goals of the next harvest should be to continue to improve residual quality, regenerate species in a manner consistent with current species mix and improve the overall growth of the stand. A second entry shelterwood system should be employed within the next 3 years to achieve the previously mentioned goals. Total stocking currently is about 160 sqft/acre and a removal of about 40 to 45% of the total standing volume is recommended. This entry is intended to create conditions more favorable to the regeneration of white pine and oak, not necessarily to optimize continued growth of the residual trees (although growth will be improved). With that in mind, high risk trees (those in danger of senescence or death within the 10 years following the harvest) and those of poor form or vigor should be targeted for removal first. Residual crop trees should be well spaced, wind-firm and of good quality. Residual composition will still be

predominately hemlock and those smaller stems with potential to reach the sawlog size class should be left presuming they are of good quality. This stand has a strong component of the invasive buckthorn in the understory which will need to be weeded and further treated as part of this entry. If possible, this harvest should also take place on dry ground and preferably during a strong white pine and red oak seed year. This will help provide adequate conditions for establishment in the understory.

3



Total Basal Area	160 sqft
Total Stems per acre	244
Mean DBH	10.0 inches (Medial = 14.1")
Quadratic Mean DBH	11.0 inches
Prescription	2nd Entry, Long Shelterwood

Stand 5 S4B5:

This stand is 10 acres in size and is located along the southern half of the eastern boundary line. This stand is nearly all planted softwood with black cherry, poplar and red maple making up a combined 5% of the basal area. Softwood species in order of dominance include white pine, red pine, scotch pine, Norway spruce, larch and balsam fir.

The stocking chart shows that this stand sits about half-way between the A and B lines when plotted on a white pine chart. A white pine stocking chart may not be appropriate for a mixed softwood stand like this, but no chart exists for the assortment of trees that were planted on this site. A white pine chart is the most conservative softwood chart and since white pine is a component it seemed like a logical choice. The stand is generally even aged with a well stocked overstory of mixed softwood (dominated by white pine) sawlog sized trees and a pole-sized component that is likely the same age as the larger trees and is of similar composition. Very little regeneration is occurring in the stand for two main reasons. The first of which is the overstory has reached crown-closure and thus very little sunlight reaches the forest floor. Second, where there are openings in the canopy allowing young growth, the invasive buckthorn plants are out-competing the native vegetation.

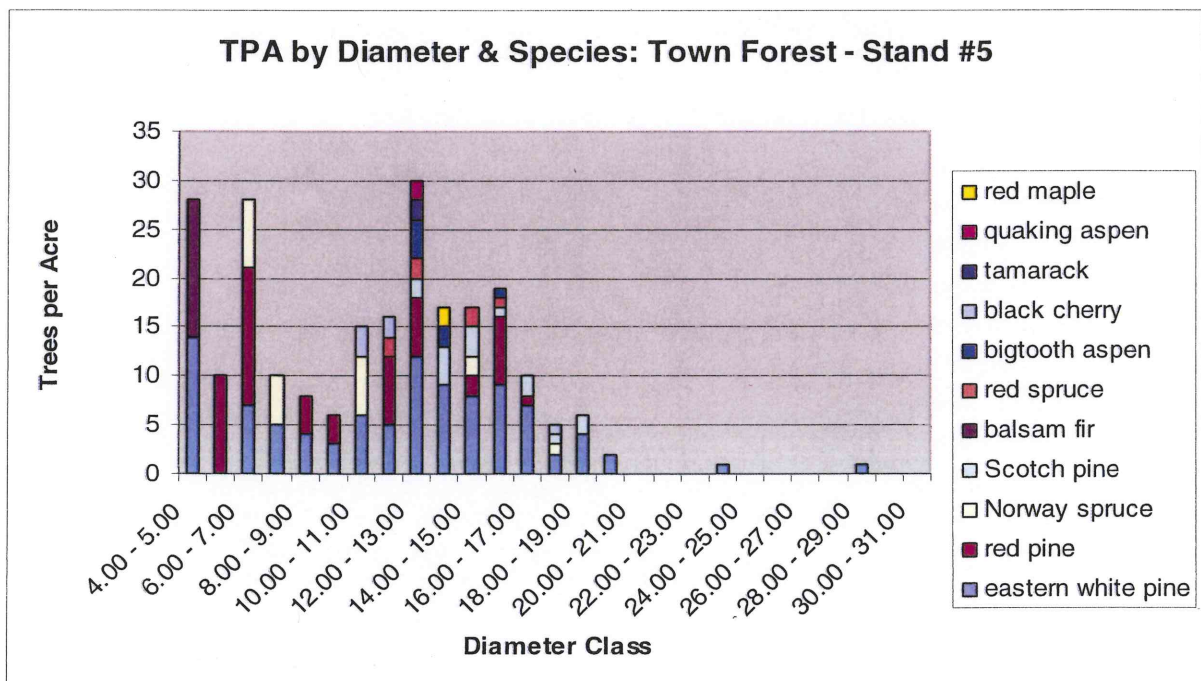
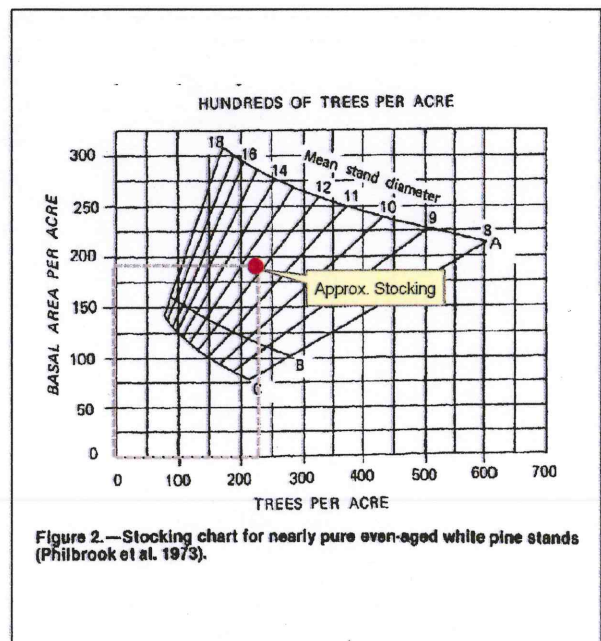
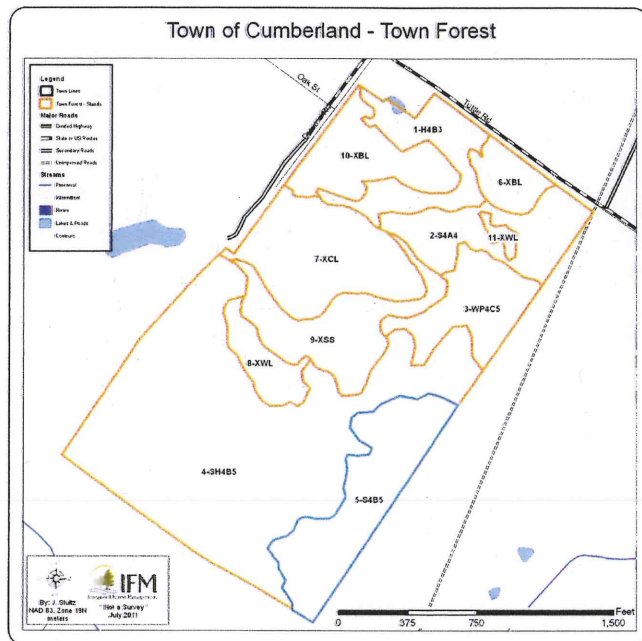
No major insectpest and pathogen activity was observed and the stand appears healthy and productive growing on a good site.

Detailed volume information can be found in the inventory summary supplemental to this plan. A brief summary of that report includes a gross sawtimber volume of 14.10 Mbf/acre and a gross pulpwood volume of 29 cords/acre, with a gross total for this stand equal to 59 cords/acre. Just over 50% of the total sawlog volume comes from the white pine. The red pine and Scotch pine together account for about 4.57 Mbf per acre of the sawlog component of this stand. Although these stems indeed meet traditional sawlog specifications for softwood, it is difficult to realize a market for them here in Maine and they are often sold as pulpwood. Some specialty markets exist, but are volatile; nonetheless these markets will be looked into prior to any timber sale occurring on the property. Another option may be to consider having the logs prepared by a local sawyer for use on a municipal project.

This stand is even aged, with healthy sawlog and pole-sized age classes present. The stand is not at full A-line stocking, nor is it understocked, however, given the crown closure, the health and productivity of the stand could be improved by a moderate shelterwood harvest. The stocking guide suggests that stands such as these will grow best from about 130 square feet per acre of basal area (currently it is about 187). The shelterwood harvest is recommended not to encourage regeneration in the understory, but to remove poor quality stems currently in the stand, allowing the better "crop trees" more room to grow and add value. Those trees of the poorest form and vigor should be targeted for removal first with the goal of leaving a well-spaced stand of mixed softwood. Trees left should be healthy, with good crowns and windfirm and the residual stand

should resemble the relative composition of the current stand. This entry represents a roughly 40% removal.

Stand – 5: S4B5



Total Basal Area (per acre)	188 sqft
Total Stems per acre	229
Mean DBH	11.4 inches (Medial = 14.6")
Quadratic Mean DBH	12.3 inches
Prescription	2nd Entry, Long Shelterwood

Non Forested

There are six areas typed out as non-forested areas that are not covered in this plan. They are as follows:

- Stand 6 XBL; This 2.6 acre area is the site of the current municipal buildings
- Stand 7 XCL; This 10.1 acre area cleared area is the site of the capped landfill
- Stand 8 XWL; This 2.8 acre area is a forested wetland
- Stand 9 XSS; This 7.4 acre area is scrub/shrub
- Stand 10 XBL; This 6.2 acre area is the building site of the historic Drowne Road school and includes the current baseball diamonds
- Stand 11 XWL; This 0.5 acre area is a forested wetland

Aesthetics

Managing the property for aesthetics is an important goal of the Town and the recommendations made in the Wildlife Habitat and Biodiversity section should be implemented to ensure these goals are met. Other important concepts include keeping structural diversity intact throughout the lot, meaning trees of multiple age and height classes present throughout the stands. Also, it will be important to maintain visual continuity throughout the lot as viewed from differing vantage points, meaning the avoidance of large openings in the canopy (greater than 1 acre) and creation of even-aged stands.

Additional recommendations to maintain aesthetics on the ground include chopping logging slash so it lies flat during and following logging activity. Also trails should turn and curve, especially those leading directly from the landing area, to avoid long straight sight lines through the piece. Large openings will be avoided to help maintain a more uniform and well spaced stand. Following any harvesting, skid trails will be closed out with waterbars installed where necessary, and landings will be cleaned, seeded and mulched.

Recreation

The main recreational use of the property is hiking along the Ernest A. Rand Nature Trail that loops through the property. There are several issues surrounding its use including the current travel surface and the lack of maintained signage or route markers. This represents an opportunity for the town to upgrade the trail. There is also a marked snowmobile trail that bisects the southern half of the property. This too seems to receive only minimal maintenance. There may be opportunities to work in conjunction with local snowmobile clubs to address trail maintenance issues if this portion of the forest is to continue to be used in this manner.

The property is also used seasonally for hunting despite its close proximity to homes and the municipal buildings. This is evidenced by several non-identified (against the law) tree stands.

Forestry Regulations

Several state and municipal laws regulate forestry and forest products harvesting operations on forestland in Maine. This plan will provide a brief overview of some of the more pertinent regulations. Prior to beginning any timber harvesting or any other alteration to the current use of a woodlot, checks should be made to ensure that they are in compliance with all State and local laws and ordinances.

Prior to harvesting a "Notification of Intent to Harvest" form must be filed with the Maine Forest Service, Department of Conservation. Prior to January 31 of the year following a harvest, a stumpage report must be filed with the State. This report states volumes harvested and stumpage prices paid to the landowner. On harvest operations that cover ten acres or more, and occur within 200 feet of the boundary, the boundary lines must be clearly identified. The above regulations are, by law, the responsibility of the landowner. These responsibilities can be transferred to a second party such as a forester or managing agent by contractual agreement.

Following a harvest no slash can remain within fifty feet of a town road or twenty-five feet of a boundary line. Slash cannot be deposited in a stream channel, or below the high water mark of a waterway. It is unlawful to deposit silt in a watercourse.

In addition to the laws mentioned above, there are a number of laws that deal with clear-cuts beginning at five acres in size. Another law establishes a "trip ticket" system used when transporting wood. Additional information can be obtained through the Maine Forest Service.

The Town of Cumberland has a fairly sophisticated set of requirements for Shoreland Zoning. Before any harvesting is to begin these municipal regulations need to be checked to ensure compliance. These regulations will limit harvesting activities near certain ponds, rivers and streams.

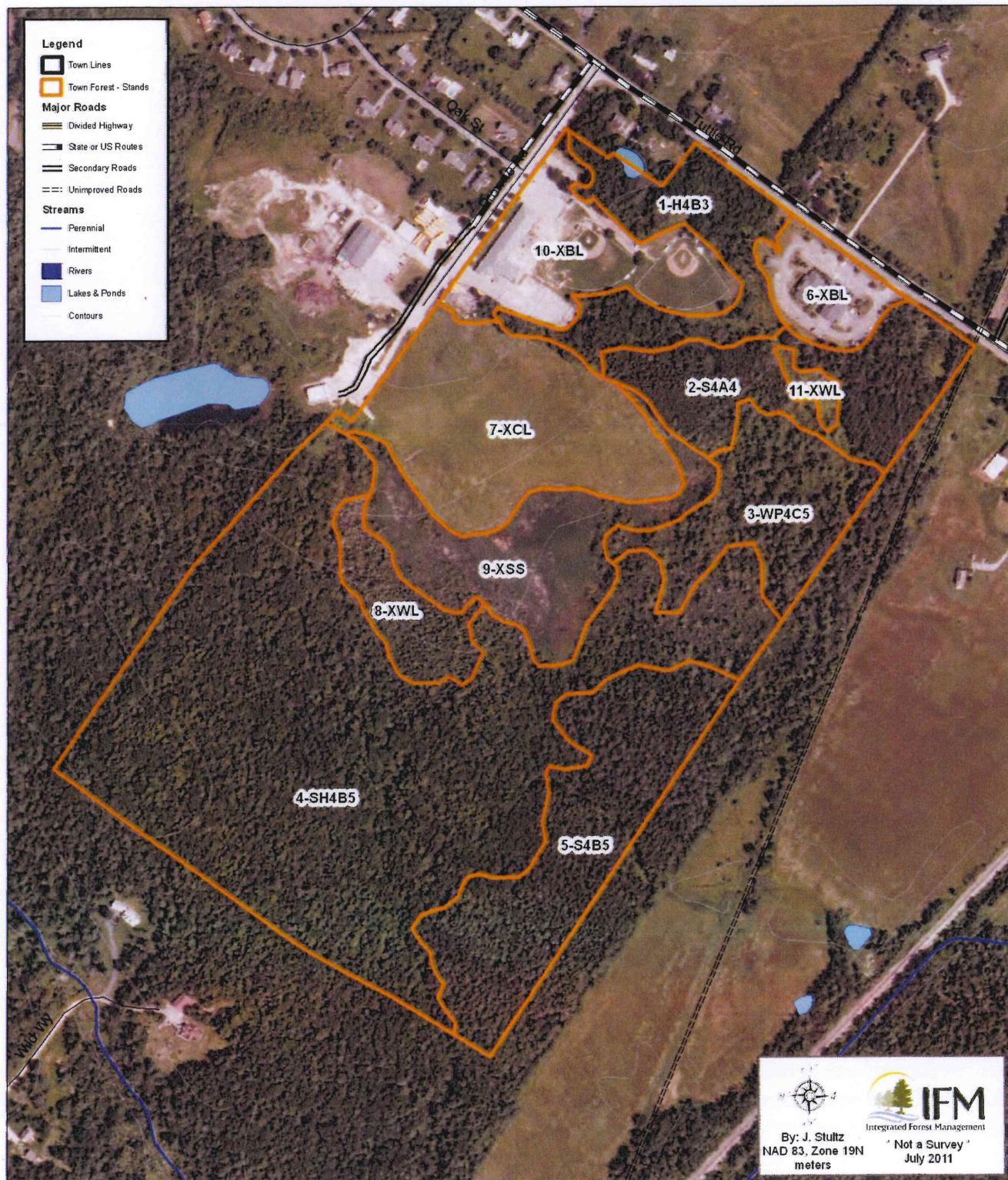
Best Management Practices (BMP'S)

Best Management Practices are strategies and actions that, when properly applied, help protect water and soil quality through all phases of timber harvesting. A detailed examination of current accepted BMP's can be found in Best Management Practices for Forestry: Protecting Maine's Water Quality. A publication released by the Maine Forest Service, Maine Department of Conservation in 2004.

These BMP's include practices such as water-barring of completed skid trails to prevent or minimize soil erosion, building proper bridges or fords when crossing brooks with equipment and constructing landings and roads to standards that minimize long term impact, to name a few. It is recommended that these BMP's be implemented wherever and whenever possible to maintain water quality while operating on the Town of Cumberland property.

Cumberland Town Forest

Town of Cumberland, Cumberland County, Maine



4, 5, 2 - Trash

Key To Forest Types

OVERSTORY TYPE
H - Hardwood (mixed)
S - Softwood (mixed)
HS - Hardwood/Softwood mix
SH - Softwood/Hardwood mix
BF - Balsam Fir
RS - Red Spruce
WP - White Pine
HE - Hemlock
TH - Tolerant Hardwood
IH - Intolerant Hardwood
RM - Red Maple
RO - Red Oak
B - Birch (white or yellow)
A - Aspen

** first two overstory species or groups
make up 75% of stand **

Density - % Crown Closure
A - >81%
B - 61-80%
C - 31-60%
D - <30%

Tree Size
1 Seedlings 0 - 0.9in
2 Saplings 1.0 - 4.4in
3 Poles 4.5 - 8.0in
4 Small Saw 8.1 - 12.0in
5 Large Saw >12in

Tree Height (total)
1 - 0-15ft
2 - 16-30ft
3 - 31-60ft
4 - >60ft

Sample Type: WPTH3B3 = 75% of overstory composition is white pine and tolerant hardwood with a total height of 31 to 60 feet, between 61 and 80% crown closure and pole size in average diameter.

Appendices

Appendix 1

Lot Location and History

The Town Forest is located at the corner of Tuttle Road and Drowne road in the Town of Cumberland, Maine. The property was donated in 1891 by Elizabeth Drowne and was one of the original colonial Proprietor's Lots. The lot was once entirely forested but portions have been carved out over the past decades. Most notably are former town landfill (now capped), the former Drowne road school, and more recently baseball fields and the current municipal offices located on Tuttle road. The balance of the property or about 67 is currently forested.

A forester by the name of Earnest A. Rand was in charge of stewardship of the property during the early part of the 20th centuries. During his tenure, he established several softwood plantations on the property including some of the chic European softwoods like Scotch (Scotch) Pine and Norway spruce. The property has seen only light forest management since with a thinning in the 1960's in the southern half of the ownership and then again in the late 1980's in the northern portion nearest Tuttle Road. Evidence of additional past forest management activities exists throughout the property in the form of old skid trails and healed logging damage.

There are two access points for the property. The first is from the municipal building parking area and is for foot traffic only. Any harvest operation would need to consider coming in from the second access point at the end of Drowne road. There is evidence of an old log landing just off of the paved road although this area is currently very wet and would need to be accessed in during frozen conditions.

Appendix 2

Soils

Soil Characteristics (from the USDA Soil Survey; Cumberland County, Maine)

There are several soils types that influence the vegetative characteristics, productivity, operability, and habitat available on the Town Forest. In some instances the forest types mirror a particular soil type, while elsewhere a particular forest type spans several different soils. For that reason, I will consider soils here separately. Please refer to the included soils map for a better understanding of the location and distribution of the soils that make up the Town Forest. The list of soils found on the Town Forest is as follows and is ranked in order of relative abundance:

- Sn, Scantic silt loam
- BuB, Buxton silt loam, 3 to 8 percent slopes
- EmB, Elmwood fine sandy loam, 0 to 8 percent slopes
- BuC2, Buxton silt loam, 8 to 15 percent slopes, eroded
- WmB, Windsor loamy sand, 0 to 8 percent slopes
- HnC, Hinckley-Suffield complex, 8 to 15 percent slopes
- Minor components (1 acre or less in size):
 - BgB, Belgrade very fine sandy loam, 0 to 8 percent slopes

I will provide some further details on the most abundant types as described by Natural Resource Conservation Service. These details can be somewhat technical, but should shed some light on where to focus treatments, as well as seasonality and timing. They also shed light on composition and allow us to know if we are growing the right trees on a particular acre.

Map unit: BgB - Belgrade very fine sandy loam, 0 to 8 percent slopes

Component: Belgrade (85%)

The Belgrade component makes up 85 percent of the map unit. Slopes are 0 to 8 percent. This component is on lakebeds on lake plains. The parent material consists of coarse-silty glaciolacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map unit: BuB - Buxton silt loam, 3 to 8 percent slopes

Component: Buxton (87%)

The Buxton component makes up 87 percent of the map unit. Slopes are 3 to 8 percent. This component is on coastal plains. The parent material consists of glaciolacustrine deposits derived from siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April, May, June, November, December. Organic matter content in the surface horizon is about 6 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Map unit: BuC2 - Buxton silt loam, 8 to 15 percent slopes, eroded

Component: Buxton (90%)

The Buxton component makes up 90 percent of the map unit. Slopes are 8 to 15 percent. This component is on coastal plains. The parent material consists of glaciolacustrine deposits derived from siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 6 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: EmB - Elmwood fine sandy loam, 0 to 8 percent slopes

Component: Elmwood (88%)

The Elmwood component makes up 88 percent of the map unit. Slopes are 0 to 8 percent. This component is on stream terraces on river valleys. The parent material consists of coarse-loamy glaciolacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 27 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 5 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria.

Map unit: HnC - Hinckley-Suffield complex, 8 to 15 percent slopes

Component: Hinckley (60%)

The Hinckley component makes up 60 percent of the map unit. Slopes are 8 to 15 percent. This component is on outwash terraces. The parent material consists of sandy-skeletal glaciofluvial deposits derived from granite and gneiss. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Component: Suffield (25%)

The Suffield component makes up 25 percent of the map unit. Slopes are 8 to 15 percent. This component is on coastal plains. The parent material consists of fine glaciolacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 6 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: Sn - Scantic silt loam

Component: Scantic (85%)

The Scantic component makes up 85 percent of the map unit. Slopes are 0 to 3 percent. This component is on coastal plains. The parent material consists of fine glaciolacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during January, February, March, April, May, June, October, November, December. Organic matter content in the surface horizon is about 6 percent. Nonirrigated land capability classification is 4w. This soil meets hydric criteria.

Map unit: WmB - Windsor loamy sand, 0 to 8 percent slopes

Component: Windsor (85%)

The Windsor component makes up 85 percent of the map unit. Slopes are 0 to 8 percent. This component is on outwash terraces. The parent material consists of sandy glaciofluvial deposits derived from granite and gneiss. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3s. This soil does not meet hydric criteria.

Forestland Productivity				
Cumberland County and Part of Oxford County, Maine				
Potential productivity				
Map symbol		Volume of wood fiber		
and soil name	Common trees	Site index	Cu ft/ac	Trees to manage
BgB:				
Belgrade	Eastern white pine	75	172	Eastern white pine, European larch,
	Northern red oak	70	57	Norway spruce, White spruce
	Sugar maple	65	43	
BuB:				
Buxton	Balsam fir	55	114	Black spruce, Eastern arborvitae,
	Eastern white pine	65	114	Eastern white pine
	Paper birch	58	57	
	Red maple	58	43	
	Red spruce	45	100	
	Sugar maple	50	29	
	White spruce	55	129	
	Yellow birch	50	29	
BuC2:				
Buxton	Balsam fir	55	114	Eastern white pine, White spruce
	Eastern white pine	62	114	
	Northern red oak	60	43	
	Paper birch	57	57	
	White spruce	55	129	
EmB:				
Elmwood	Eastern white pine	66	114	Eastern white pine, European larch,
	Northern red oak	70	57	Red pine, White spruce
	Sugar maple	62	43	
HnC:				
Hinckley	Eastern white pine	62	114	Eastern white pine, European larch,
	Red pine	52	86	Red pine
	Red spruce	39	86	
	Sugar maple	61	43	
	White spruce	52	114	
Scantic				
	Balsam fir	60	114	Balsam fir, Black spruce, Eastern
	Eastern white pine	58	100	arborvitae, Eastern white pine, Red
				spruce, Tamarack, White spruce
	Red maple	55	29	
	White ash	67	29	
	White spruce	60	143	
WmB:				
Windsor	American beech	---	0	Eastern white pine, European larch,
	Eastern hemlock	---	0	Red pine
	Eastern white pine	66	114	
	Sugar maple	61	43	

Cumberland, ME

Soils
Town Forest

70°15'0"W

43°47'30"N

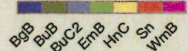
43°47'30"N

43°47'0"N

43°47'0"N



Soil - Cumberland
MUSYM

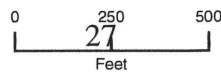


Legend

- Boundary
- Town Line
- Roads
- Contours
- Wetlands (NWI)
- Lakes and Ponds
- Streams
- Rivers

70°15'0"W

3



1 inch = 500 feet

THIS IS NOT A SURVEY
Map produced from following data:
Landowner data
Maine Geolibary



Appendix 3 Inventory Summary

Table 2 Total Standing Volume ¹						
	Acres (+/-):					
Total	98					
Forested	67					
Species	Veneer (Mbf) (1/4" Int.)	Sawlog (Mbf) (1/4" Int.)	Pallet (Mbf)	Pulpwood (Cords)	Total Cords	% of Total
Softwood						
Eastern White Pine	-	142	-	270	518	21%
Eastern Hemlock	-	83	-	312	454	19%
Red Pine	-	82	-	172	314	13%
Norway Spruce	-	39	-	89	153	6%
Scotch Pine	-	24	-	26	65	3%
Red Spruce	-	21	-	27	62	3%
Balsam Fir	-	-	-	9	9	0%
Tamarack	-	2	-	2	6	0%
Softwood Volume	-	393	-	907	1,580	65%
Hardwood						
Red Maple	-	68	-	338	463	19%
Bigtooth Aspen	-	28	-	63	111	5%
Northern Red Oak	-	29	-	51	98	4%
White Ash	-	9	-	28	43	2%
Paper Birch	-	6	-	21	31	1%
Black Cherry	-	8	-	12	23	1%
Black Ash	-	4	-	13	21	1%
Quaking Aspen	-	2	-	11	15	1%
Yellow Birch	-	2	-	8	11	0%
Sugar Maple	-	-	-	11	11	0%
Gray Birch	-	-	-	6	6	0%
American Elm	-	1	-	3	5	0%
Hophornbean	-	-	-	4	4	0%
Hardwood Volume	-	157	-	569	841	35%
Total Volume	-	550	-	1,476	2,421	-
Total Volume (Cords)	-	945	-	1,476	2,421	0%
% of Total Cord Volume	0%	39%	0%	61%	100%	-
Cords/Forested Acre	-	14	-	22	36	-
Cords/Total Acre	-	10	-	15	25	-
Basal Area/Acre 158 +/- 11% at 90% CI Average Merchantable DBH 10 # of 15 BAF Plots 46						
¹ Volumes based upon summer 2011 inventory cruise by Integrated Forest Management. Inventory volume data comprised from 46 plots, and resulted in a Standard Error of +/- 18% at 90% CI for all sawlog volume, and +/- 12% for total volume, all products combined.						

Appendix 4

Maine Natural Areas Review



STATE OF MAINE
DEPARTMENT OF CONSERVATION
93 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0093

PAUL R. LEPAGE
GOVERNOR

WILLIAM H. BEARDSLEY
COMMISSIONER

May 4, 2011

Aaron Drake
adrake@ifingt.com

Re: Forest Management Plan Review

Dear Mr. Drake:

In response to your request received on May 6, 2011, I have searched our data system for information on rare or unique botanical features, rare animal populations, and essential or significant wildlife habitats in the vicinity of the property on Tuttle Rd. in Cumberland.

For individual parcel reviews, we use a simple checklist that summarizes our findings. The enclosed checklist includes our review of several data sets, some of which are maintained by MNAP and others that are maintained by the Maine Department of Inland Fisheries and Wildlife (MDIFW), and the U.S. Fish and Wildlife Service (USFWS). If a parcel intersects with a data set maintained by MDIFW or USFWS, please contact the appropriate biologist indicated on the checklist for additional information.

This property contains habitat for the New England Cottontail, an endangered species in the state of Maine.

Thank you for using the MNAP in the forest management planning process. If you have questions about the MNAP, or if you would like more information about this site, please feel free to contact me. You can also visit us on the web at <http://www.maine.gov/doc/nrimc/mnap/>.

Sincerely,

Shonene Scott

Assistant Ecologist
Maine Natural Areas Program
17 Elkins Lane, 93 State House Station, Augusta, ME 04333
maine.nap@maine.gov
Phone: (207) 287-8044, Fax: (207) 287-8040

Enclosure
cc: Scott Lindsay, MDIFW Biologist

Forest Management Plan Review

Forester: *Aaron Drake* Landowner: Lot Name: *Tuttle Rd. property*
Date Received: *5/5/2011* Town: *Cumberland* 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>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Natural Communities: rare and/or exemplary <i>If yes, see attached summary table.</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Animals: rare, threatened, or endangered <i>If yes, see attached summary table.</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	MDIFW Regional Wildlife Biologist, Scott Lindsay, (207) 657-2345 ext. 110
Mapped Essential Wildlife Habitats: Roseate tern Piping plover and Least tern	<input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	
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	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	
Wild brook trout habitat	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Atlantic Salmon: Salmon watershed Salmon habitat: <input type="checkbox"/> General <input type="checkbox"/> Rearing <input type="checkbox"/> Spawning	<input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	
Canada lynx: Does the site occur within a town which may provide habitat for lynx?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

LANDSCAPE CONTEXT	YES	NO
Does parcel intersect with a Beginning with Habitat Focus Area? Focus Area Name:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is the parcel adjacent to state-owned land? Owner: Ownership type: <input type="checkbox"/> Fee <input type="checkbox"/> Easement Area Name:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Review completed by: *JRS*
Date: *5/6/2011*
MNAP #: *2011_05_06_JS_01*

Forester: *Aaron Drake*

Landowner:

Lot Name: *Tuttle Rd. property*

Summary Table: Plants, natural communities, and animals documented to occur at the site

Feature Name	Last Seen	State Status ^a	State Rank ^b	Global Rank ^c	EO Rank	Additional Information
New England Cottontail (<i>Sylvilagus transitionalis</i>)	12/27/2000	E	S2	G3		

^a State Status

- E Endangered; Rare and in danger of being lost from the state in the foreseeable future; or federally listed as Endangered.
- T Threatened; Rare and, with further decline, could become endangered; or federally listed as Threatened.
- SC Special concern; Rare in Maine, based on available information, but not sufficiently rare to be considered Threatened or Endangered (non-legal status).

^b State Rank (State Rarity Rank)

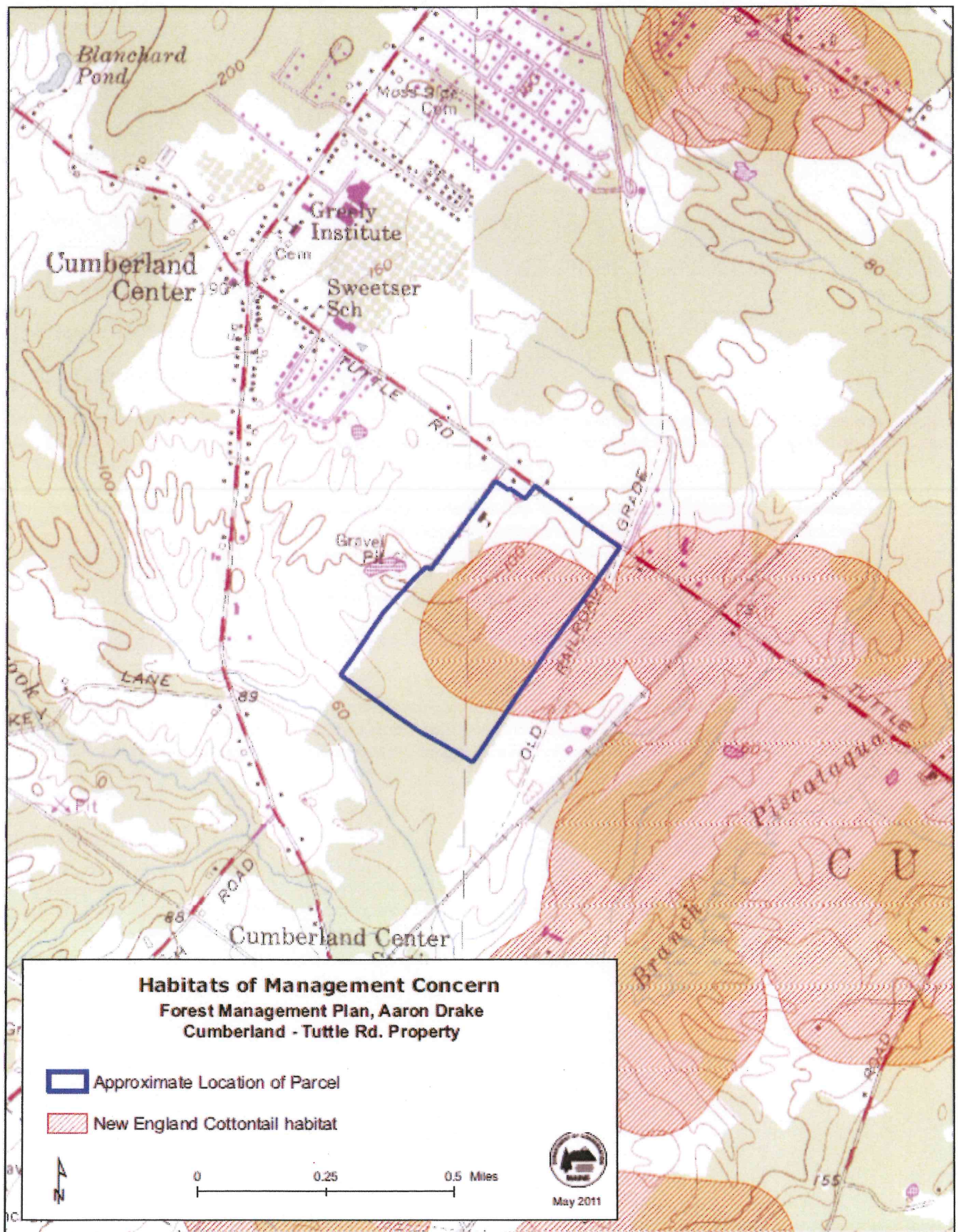
- S1 Critically imperiled in Maine because of extreme rarity or because some aspect of its biology makes it especially vulnerable to extirpation from the State of Maine.
- S2 Imperiled in Maine because of rarity or because of other factors making it vulnerable to further decline.
- S3 Rare in Maine.
- S4 Apparently secure in Maine.
- S5 Demonstrably secure in Maine.
- SU Under consideration for assigning rarity status; more information needed.
- SNR Not yet ranked.
- SNA Rank not applicable.
- S#? Current occurrence data suggests assigned rank, but lack of survey effort along with amount of potential habitat create uncertainty (e.g. S3?).

^c Global Rank (Global Rarity Rank)

- G1 Critically imperiled globally because of extreme rarity or because some aspect of its biology makes it especially vulnerable to extinction.
- G2 Globally imperiled because of rarity or because of other factors making it vulnerable to further decline.
- G3 Globally rare.
- G4 Apparently secure globally.
- G5 Demonstrably secure globally.
- GNR Not yet ranked.

^d EO Rank (Element Occurrence Rank)

- Describes the quality of a rare plant population or natural community based on size, condition and landscape context. Ranks range from A-E, where A indicates an excellent example of the community or population and D indicates a poor example of the community or population. A rank of E indicates that the community or population is extant but there is not enough data to assign a quality rank.





U.S. Fish & Wildlife Service

New England Cottontail

Sylvilagus transitionalis

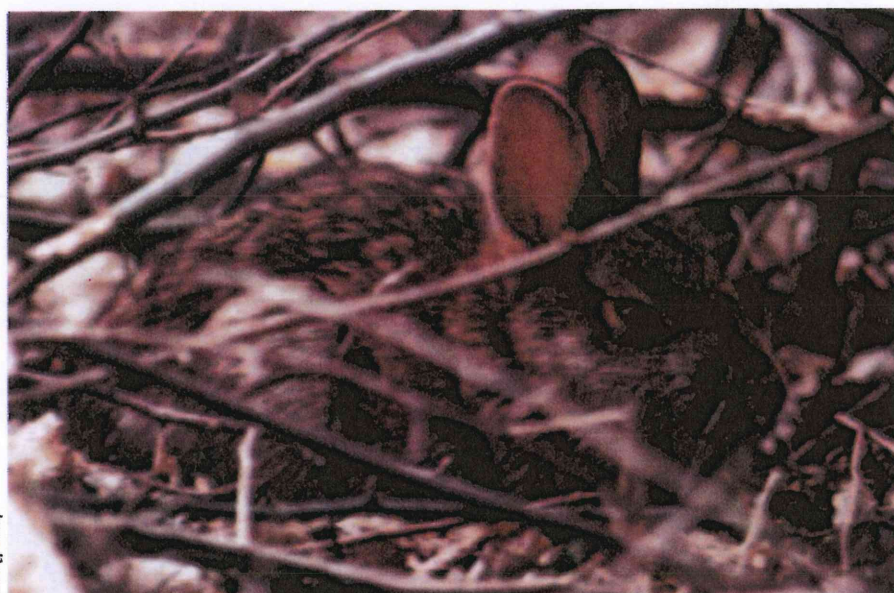
Disappearing rabbit trick

Why would a rabbit, the epitome of prolific breeding, be considered for protection under the Endangered Species Act? The New England cottontail is in just this predicament. Its population numbers are declining. As recently as 1960, New England cottontails were found east of the Hudson River in New York, across all of Connecticut, Rhode Island and Massachusetts, north to southern Vermont and New Hampshire, and into southern Maine. Today, this rabbit's range has shrunk by more than 75 percent. Its numbers are so greatly diminished that it can no longer be found in Vermont and has been reduced to only five smaller populations throughout its historic range.

Where the bunnies are

The New England cottontail prefers early successional forests, often called thickets, with thick and tangled vegetation. These young forests are generally less than 25 years old. Once large trees grow in a stand, the shrub layer tends to thin, creating habitat that the New England cottontail no longer finds suitable.

Active at dawn and at dusk or night, the New England cottontail feeds on grasses and plant leaves in spring and summer and eats bark and twigs in winter. Home ranges vary from one-half to 8 acres, with adult males having larger home ranges than females. Research has shown that New England cottontails on patches of habitat larger than 12 acres are healthier than those on patches less than 7 acres. Presumably, rabbits on small patches of habitat deplete their food supply sooner and have to eat lower quality food, or may need to search for food in areas where there is more risk of being killed by a predator.



Jane Brown

New England cottontail

Why are their numbers declining?

Biologists believe the reduced extent of thicket habitat is the primary reason for the decline in numbers and range of New England cottontails. Prior to European settlement, New England cottontails were probably found along river valleys where floods and beavers created the disturbances needed to generate its preferred habitat. Forest insect outbreaks, large storms like hurricanes and ice storms, and wild fire also created disturbances in the forest that promoted thicket growth. During colonial times, much of the New England forest was cleared for agriculture and then subsequently abandoned during the early 1900s. This abandoned farmland allowed for a great deal of early successional habitats to develop. Today, these habitats are aging while others have been developed and are no longer suitable for the New England cottontail.

The introduction of exotic invasive species, such as multiflora rose, honeysuckle bush and autumn olive, in the last century has changed the type of habitat available to New England cottontails. These plants form the major component of many patches where cottontails can be found. It may be that stands dominated by non-native species do not provide rabbits with the food resources that native plant species do.

Today white-tailed deer are found in extremely high densities throughout the range of New England cottontails. Deer not only eat many of the same plants but also affect the structure and density of many understory plants that provide thicket habitat for New England cottontails.

Introduced competitor

In the early 1900s until the 1960s, hunting clubs and some eastern states introduced another species of rabbit, the eastern cottontail, into New England. Eastern cottontails appear able to thrive in a greater variety of habitats than New England cottontails through its ability to detect predators sooner. This helps eastern cottontails forage more safely in relatively open cover, while New England cottontails risk predation whenever they leave the security of their dense thicket habitats. The slightly better ability to avoid predators enables eastern cottontails to live in more diverse habitats, such as fields, farms and forest edges, and they are gradually replacing New England cottontails in many habitat patches.

Identity is more than skin deep

It is nearly impossible to distinguish a New England cottontail from an eastern cottontail by looking at them. The minor differences of ear length, body mass, and presence or absence of a black spot between the ears and a black line on the front of each ear are subtle enough to be missed and are not 100 percent accurate. Scientists used to rely on examining the rabbits' skulls for positive identification, but can now use DNA analysis of fecal pellets. Since rabbits drop fecal material all around their territory, the extracted DNA from pellets collected throughout the region can provide a picture of where the New England cottontail is found.

Helping the cottontail

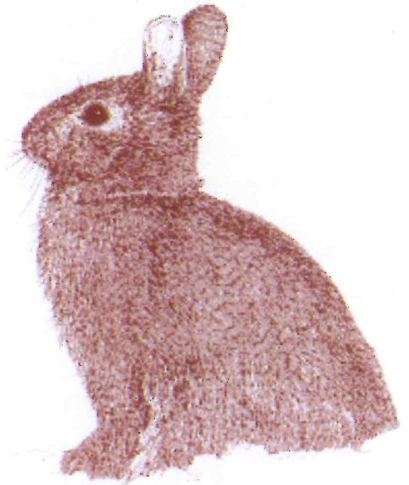
The New England cottontail is the subject of research and habitat management in New York and the New England states. Halting the decline of scrub and brushland habitat is paramount, as is identifying potential habitat free of competing eastern cottontail to which New England cottontails could be restored. The U.S. Fish and Wildlife Service shares the concern for the future of New England's only native cottontail. Working together, states and federal agencies may help improve the chances of survival for the New England cottontail.

Northeast Region
U.S. Fish and Wildlife Service
300 Westgate Center Drive
Hadley, MA 01035
413/253 8200
<http://northeast.fws.gov>

Federal Relay Service
for the deaf and hard-of-hearing
1 800/877 8339

U.S. Fish & Wildlife Service
1 800/344 WILD
<http://www.fws.gov>

August 2006



Appendix 5
Maine Historical Preservation Commission
Review



PAUL R. LEPAGE
GOVERNOR

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

EARLE G. SHUTTLEWORTH, JR.
DIRECTOR

ARCHAEOLOGY AND HISTORIC RESOURCES REVIEW
FORESTRY PLAN

MHPC # F104-11

Date Received 5/11/2011

Township CUMBERLAND

Forester INTEGRATED FOREST MANAGEMENT

Parcel CUMBERLAND TOWN FOREST; TUTTLE RD

*****This worksheet was completed for informational purposes only*****

Prehistoric (Native American) Archaeology (for further information: arthur.spiess@maine.gov)

- ☒ No prehistoric archaeological sites known. Based on location, soils and topography, none are expected.
- ☐ No prehistoric archaeological sites known because no survey has been conducted. However, the following area is archaeologically sensitive: _____
- ☐ The property includes known sites of archaeological importance. (See attached info)

Historic Archaeology (e.g. 1800s farms, etc.) (for further information: leith.smith@maine.gov)

- ☒ No sites are known, and none are expected (based on historic maps and documents). (S 1)
- ☐ There are possible sites from former houses, barns, and outbuildings shown on maps from 1850 to 1920, now possibly recognizable as foundations or cellar holes. (See attached map.)
- ☐ The property contains known sites of archaeological importance. (See attached info)

Historic Buildings or Structures (for further information: robin.stancampiano@maine.gov)

- ☐ No historic buildings or structures are known or expected on the property (based on 7.5' USGS topographic maps and MHPC records).
- ☐ Buildings or structures may exist on the property that have not been evaluated for National Register eligibility. Our office will provide an assessment if a request letter, photos of any buildings over fifty years of age that are on the subject parcel, and a 7.5' USGS topographic map with all photos keyed to it are submitted to our office.
- ☐ Buildings or structures exist on the property that are either listed in or eligible for nomination to the National Register of Historic Places. (See attached info)

The information on this worksheet is being provided for Forestry Management Planning purposes only.

If any construction or ground disturbing activities on these properties will utilize federal funding, permitting or licensing, initiation of Section 106 review with the Maine Historic Preservation Commission is required pursuant to the National Historic Preservation Act of 1966.



Appendix 6

Wildlife Habitat and Biodiversity

This section contains a series of broad-based management ideas, principles and philosophies regarding the management of woodlands for the preservation or enhancement of biodiversity. Species biodiversity pertains to the broad array of organisms found throughout our forests from the smallest single celled types to the largest mammals. In managing a diverse forest structure, we inherently manage for a diverse wildlife population creating a healthy ecosystem that offers a wide array of habitats.

These principles are not site specific instructions on how to manage the forest, but concepts that, if applied appropriately and with proper planning, will enhance the long-term diversity, health and richness of the forests we manage. The application of these principles will also vary greatly with landowner objectives. These ideas are adapted from Biodiversity in the Forests of Maine: Guidelines for Land Management (Flatebo, Foss & Pelletier, 1999), and a more thorough explanation of these practices and their rationale may be found there.

As each of these topics pertains to this particular woodlot, a brief narrative follows each section describing whether or not field observations confirm the adequacy of said concepts. These narratives can be found in **red** following each topic.

Vertical Structure and Crown Closure

Diversity in vertical structure provides an integrated habitat from the forest floor to the canopy for a wide variety of species. Additionally, openings in the canopy regulate light, heat, and other variables throughout the forest further adding to the range of microclimates key to maintaining and enhancing species biodiversity in a stand. Bearing these principles in mind, the following guidelines will help create and/or maintain a vertical structure during forest management activities that will, in turn, help promote a diverse forest.

- ✓ When harvesting, attempt to thin trees from all layers of the strata. Maintain a healthy herb, shrub, understory and overstory structure for maximum richness whenever possible.
- ✓ Retain trees of differing species, size and age, balancing each group appropriately throughout the stand.
- ✓ Promote softwood areas in hardwood stands and vice versa.
- ✓ Encourage varying vertical structure at the landscape level as well as the stand level to ensure a diverse structure beyond the immediate area.

CURRENTLY ADEQUATE

Native Tree Species Composition

Recognizing that differing habitats exist within and around different tree species, it is important to maintain healthy tree diversity throughout a stand. Furthermore, recognizing the native species composition and its influence on the characteristics of the whole forest is essential to maintaining and promoting rich, healthy forest stands. To help promote these ideas:

- ✓ Rare or uncommon species should be identified and retained in stands where they are found. Additionally, make conditions more suitable for their regeneration where appropriate.
- ✓ Avoid converting stands from their natural composition and age structure or eliminating any species from a stand where it is found.
- ✓ Naturally uniform stands occurring because of soil or site conditions may be valuable to maintain over the landscape.

CURRENTLY ADEQUATE. However, the plantations contains non-native tree species and natural regeneration should be considered during the next rotation. Also, any trees at the northern edge of their range should be retained. For instance, the shagbark hickory present in stand 1.

Downed Woody Material, Snags and Cavity Trees

Standing and downed woody material provides essential habitat for many of our smaller plants and animals including insects, mosses, lichens and liverworts to name a few. Additionally, downed woody debris, snags and cavity trees provide a special area for hundreds of species to rest, nest, den, forage, perch, display and bask. The breakdown of woody material provides nutrients to the soil and aquatic component of the forest as well as serving as important function in the structure of streams and brooks. The following guidelines can help to promote downed woody debris, snags and cavity trees during management activities.

- ✓ Allow downed woody material to remain on site following harvesting. Also avoid damaging existing downed woody debris.
- ✓ Logs greater than 12in diameter and 6ft in length are especially rare and should be left or possibly created wherever practical.
- ✓ Snags should be left where possible, especially those currently being used as nesting or den sites. Also leave trees that will become snags and consider leaving a retention area around snags and potential snags.

CURRENTLY ADEQUATE: Consider leaving larger woody debris throughout harvesting operations, especially if whole tree chipping is chosen.

Mast

Mast, defined as nuts, seeds, berries or fruit produced by trees, plants or shrubs, is a critical food source for many wildlife species. Of particular value is what is known as hard mast; highly nutritional nuts produced by about 16 of Maine's trees. In order to promote species diversity it is critical to maintain plants that produce the wide range of food source these creatures depend on. To promote the production of mast in forest stands:

- ✓ Promote a variety of mast producing trees and shrubs in stands as they are managed to create an equal variety of actual mast.
- ✓ Oak and Beech are the most common mast producers and mature trees should be retained during thinnings to continue mast production. Select healthy trees to leave as they will likely produce healthy, mast producing offspring in the future.
- ✓ Black cherry and apple trees are rare and should be managed carefully to encourage the production of fruit and potentially offspring.
- ✓ Small openings to encourage pin cherry, raspberry and a productive herb layer are a good idea.

Red oak, beech and black cherry found throughout the lot. Retain healthy black cherry and mature oaks as well as beech. CURRENTLY ADEQUATE

Forest Soil, Forest Floor and Site Productivity

Soil health is the keystone to ensuring a healthy and productive forest. Recognizing soil types, drainage characteristics and subsurface biological activities will help to understand site productivity as well as guide management to enhance or preserve soil health. We must recognize that more fertile soils will generally lend to a more diverse forest (at all vertical levels) while more infertile soils may harbor rarer species. Some guidelines to help protect soil quality, quantity and productivity are listed below. Additionally please refer to the "Soil Characteristics" section of this management plan for a more detailed analysis of soils and soil types found on these lots. Additionally, note the connection between soils management and Best Management Practices.

- ✓ Understand soil types and conditions on site through inspections and soil maps.
- ✓ Promote the appropriate harvesting equipment for soil conditions and time of year for all harvests. For instance, more poorly drained soils should be harvested during frozen conditions to avoid rutting, compaction and general disturbance.
- ✓ Use current harvesting technology to protect the organic layer and reduce mineral soil exposure whenever practical.
- ✓ Consider leaving brush and slash on-site, especially on less productive soils.
- ✓ Avoid conditions that lead to erosion or potential erosion (like rutting or skidding long distances parallel with grades) over the entire site.

Soil types promote good site indices for species currently present. Ensure harvest timing and equipment used is appropriate for site conditions.

The following considerations refer to site-specific conditions where “Special Habitats and Ecosystems make unique contributions to biodiversity.”

Riparian and Stream Ecosystems

Riparian areas are some of the most productive and species rich areas in the landscape. They serve to buffer aquatic plants and animals from disturbance and well as offer protection to wetlands and water quality. To ensure the function and integrity of riparian areas is protected:

- ✓ Establish buffer areas around streams, ponds, lakes and wetlands where limited harvesting maintains more continuous forest cover. This helps promote shade for forest streams as well as ensuring a supply of organic matter into water bodies essential to aquatic food chains. Additionally, these buffer areas will serve as filter strips protecting water quality and wetland health.
- ✓ Buffer strips should vary in size and take into account the size and structure of the riparian area.
- ✓ Stream and wetland crossings should be limited to as few as possible. Use careful harvest layout to establish this and use Best Management Practices before, during and following harvesting activities to ensure the least possible impact.
- ✓ Avoid disturbing the mineral soils wherever possible in these areas.

Riparian areas are present on this woodlot and the above recommendations should be followed during timber harvesting.

Vernal Pools

Vernal pools qualify as a significant habitat as they are essential to the reproduction of several types of amphibians, reptiles and invertebrates. These pools further add to biodiversity by providing foraging habitat for a number of animal species. Recommendations to support vernal pool habitats and the pools themselves include:

- ✓ Identify and document vernal pools in the spring when they contain water and wildlife. The presence of indicator species (tree frogs, yellow spotted salamander etc.) helps to identify and differentiate vernal pools from other aquatic ecosystems.
- ✓ Maintain a buffer around the pool with a deep litter layer, plenty of downed woody material and shade in and around the pool itself.

- ✓ Avoid depositing slash and other logging debris in the pool, disturbing the organic layer and water flow systems of the pool and disturbing the pool floor or depression.

None observed or documented to be on-site. Keep a lookout for these habitats during additional scouting or layout activities.

Beaver Influenced Ecosystems

Flowages created by beavers are home to a great variety of plant and animal diversity. The natural cycle or progression of these systems is in itself a diverse ecosystem as it changes from newly formed ponds, to meadow to forested wetland and beyond. To help protect, maintain or even encourage beaver habitat and ecosystems:

- ✓ Determine the limits of acceptable flooding within a watershed based on historical activity and outline potential sites that may be more acceptable for both Beaver and the landowner.
- ✓ Use water control devices to control flooding where excessive tree mortality or road damage may become a concern.
- ✓ Design and construct new roads and plan other management activities away from potential flood areas.

Maine's Department of Inland Fisheries and Wildlife is an excellent source of information for Beaver control and mitigation.

None observed or documented to be on-site.

Woodland Seeps and Springs

Seeps and springs can provide a unique feature and are valuable to many species of wildlife in several ways. Areas that remain unfrozen in the winter provide a water source for many animals and may serve as a hibernation area for small amphibians. Additionally, these areas may allow for green vegetation earlier in the spring as well as support insect and invertebrate populations important to mammals and migrating birds.

- ✓ Identify seeps and springs in the spring or early summer when they are more apparent and easier to differentiate.
- ✓ Maintain a 50-ft buffer to limit equipment around the edge of seeps and springs wherever possible.
- ✓ Avoid depositing brush and slash in seeps and springs
- ✓ Consider using seeps and springs as the focal point of retention areas and further limiting disturbance to the subsurface flow to the extent.

These features are present on this woodlot and the above recommendations should be followed during timber harvesting.

Nesting Areas for Colonial Wading Birds

Maine is host to some eight species of tree-nesting colonial wading birds, seven of which are near or at their northern limit for breeding. These birds form an important link between terrestrial and aquatic ecosystems and represent a unique component of bird diversity. To help protect these populations:

- ✓ Map known locations of wading-bird colonies on stand maps and consult abutters and MDIFW biologists when working within 1500-ft of nests.
- ✓ Avoid human activity within 330-ft of active heron colonies during the breeding season.

This parcel does not have any area that intersects with the Maine Department of Inland Fisheries and Wildlife's maps of Inland Wading-bird and Waterfowl habitat.

Deer Wintering Areas

Deer Wintering Areas (DWAs) are essential to the survival of white-tailed deer during the winter months of deep snow. These areas additionally provide important habitat to other species including fisher and over 40 bird species, five of which are rare or uncommon in Maine and 12 that require softwood forests.

- ✓ LURC maps and zoning maps are excellent sources for identifying current DWAs and should be used to identify these areas on the ground.
- ✓ Identify additional DWAs through scouting and cruising and designate them on stand maps.
- ✓ MDIFW biologists should be consulted when planning harvests in DWAs to help develop a collaborative plan that takes all needs and objectives into account.
- ✓ There are many considerations when harvesting in DWAs, including protecting softwood regeneration, protecting riparian travel corridors and leaving an intact softwood overstory through at least one-half the area of deer habitat.
- ✓ Schedule harvests in DWAs in the winter months whenever possible.

Not present according to MDIF&W files. Note that this area is not identified as a DWA but does see heavy seasonal traffic by white tailed deer and maintenance of their habitat should be considered during the next harvest.

Nest Sites for Woodland Raptors

There are several species of raptors that nest and breed in Maine, including hawks, owls, eagles, falcons and vultures. These birds are important members of the ecosystem and may have particular nesting needs within a forest for successful breeding. In order to help maintain suitable nesting sites across the forest and protect nesting pairs:

- ✓ Consult MDIFW for recent maps of bald eagle nest sites and further consult biologists with the department if planning forest management activities near bald eagle nests.
- ✓ Retain trees with large stick nests and inspect suitable trees (large white pine and some hardwoods) for additional nesting sites when cruising or scouting.
- ✓ Avoid forest management activities within a quarter-mile of known nesting raptors during the breeding season (February to July).
- ✓ Leave an uncut buffer of about 66-ft around known raptor nest trees and additionally, maintain about 75% crown closure within 200-ft of nests in closed canopy forests.
- ✓ Leave large “supercanopy” trees in clearcuts and along rivers and ponds as recruitment trees for future nest building.

None observed, but possible present. Keep a lookout for nests during scouting and layout activities.

Old Growth and Primary Forest

Old growth, primary and late successional forests offer a unique habitat that is not only uncommon, but important to many species of flora and fauna. A great deal of research has been done and continues to be done to understand the complex relationships that may occur in these areas and how they may differ from conditions in more managed stands. While defining an old growth stand may remain up for debate, some ideas to help identify and protect old growth, primary and late successional forests include:

- ✓ Use scouting and any old land records that may be available to help identify old growth areas on your ownership and consider a no-management option in areas that are identified on your land.
- ✓ Smaller stands with old growth conditions should be buffered with larger stands of mature forest wherever possible.
- ✓ Identify areas that may be good candidates for restoring old growth conditions. Areas near existing old growth stands are more likely to experience successful transition as species migrate.

None observed.

Rare Plants or Animal Sites

Plants and animals that occur rarely in Maine are intrinsically valuable to biological diversity. Areas where rare plants and animals occur should be considered for protection as they may be especially vulnerable to changes in the landscape. Helping to protect rare plant and animal communities starts with the ability to recognize and identify them.

- ✓ The MDIFW and MNAP are excellent sources of information to help identify sites where known rare plants and animals exist, and can further assist in developing management plans that may protect or enhance these areas.
- ✓ Become familiar with rare plants and animals to the extent possible and keep an eye out for them when scouting and cruising.

This parcel does intersect with potential habitat for New England Cottontail rabbits. The New England Cottontail is listed as “imperiled in Maine” (S2). See MNAP review as part of the management Plan for more information.

Rare Natural Communities

Maine has several natural community types that occur throughout the state. These communities are areas that represent defined criteria which make them unique in their own way. The Maine Natural Areas Program (MNAP) lists 10 closed-canopy (of 25) and 7 (of 9) partial-canopy community types as rare or very rare. Conservation at the community level helps preserve and protect all biological functions and interaction in that particular ecosystem, thus helping to preserve the natural biodiversity of the site.

- ✓ The MNAP is an excellent source of information in helping to identify these rare or uncommon natural communities as well as a source of maps depicting known communities on the ground.
- ✓ Become familiar with these rare community types and contact MNAP for management ideas and identification tips

NOTE: This lot does not contain rare natural communities according to MNAP records. However, practitioners should be mindful of the indicator species while working on the property as the MNAP database is not all inclusive.

Wildlife Habitat and Presence

Forest types on this lot are not uncommon to the area and likely support an array of wildlife one would expect to find. This property is excellent habitat for white tailed deer and turkey with cover types ranging from dense mixed-woodlands to open field (the old landfill site). A complex array of wetland areas also forms unique habitat beneficial to deer as well woodcock and many other animals. The transitional, or edge, areas are considered important for many species of woodland raptors as they hunt small birds and mammals in the fields and forest edges. Owls, as well as coyotes and foxes may well use

these transitional zones for the same purposes. These edge habitats as well as fields and nearby building areas will support a vibrant population of small mammals critical to supporting the food chain.

The habitat diversity across the lot also attracts a large diversity of migratory songbirds. The wetland areas with thick vegetation provide good habitat for common yellowthroat, yellow warblers, northern waterthrush and possibly Canada warblers. The old landfill site is now a grassland area that would be preferred by bobolinks, meadowlarks and several species of sparrows. Interior forest stands attract birds that prefer more structure and diversity such as thrushes, northern parula, ovenbirds and black throated blue and green warblers. Lastly the ball-fields and landscaped portions nearer the building areas, one would expect to find phoebes (and other flycatchers), robins, catbirds, cardinals and various sparrows. Managing a forest for structural and species diversity should continue to offer these habitat types to a wide variety of birds.

The Maine Natural Areas Program has identified a significant portion of this parcel as potential habitat for the New England Cottontail rabbit. This species is considered imperiled in Maine, mainly due to a loss of early successional habitat across its range, which includes southern Maine. Most of the suitable habitat on the parcel that could be considered suitable (thick, brushy and early successional) is dominated by invasive species such as buckthorn and honeysuckle. Although suitable cover, this can actually cause increased problems for the cottontail as the cover is suitable, which attracts the animal, but does not provide the adapted food source. Although the cottontail is State Imperiled there are no state regulations regarding forest management for or around its potential range. Thus, managing for additional early successional habitat is purely one of choice. Dealing with the invasive species problems on the parcel may in itself, help improve overall habitat for the cottontail.

By following the recommendations made in the previous section while implementing prescriptions, this lot may continue to support a healthy forest with a broad wildlife offering.

Appendix 7

Integrated Pest Management Plan (IPM)

Field observations have confirmed the presence the following invasive upland plants:

- Japanese Barberry (*Berberis thunbergii*)
- Asiatic Bittersweet (*Celastrus orbiculata*)
- Shrubby Honeysuckle(s) (*Lonicera species*)
- Japanese Knotweed (*Fallopia japonica* or *Polygonum cuspidatum*)
- Phragmites (Common Reed) (*Phragmites australis*)
- Common buckthorn (*Rhamnus cathartica*) or glossy buckthorn (*Frangula alnus*)

Of those listed above the most established and problematic is that of common buckthorn (*Rhamnus cathartica*) or glossy buckthorn (*Frangula alnus*). Very similar to the Rines Forest infestations, this invasive shrub has completely taken over large portions of the understory, chocking out all other species. The outbreaks seem to be associated both with soil condition (wet areas) and light treatment. Given the widespread nature of this infestation a significant, multi-measure control plan should be considered at this time. Currently, there are no known biological control measures available for buckthorn control as is the case for Purple Loosestrife.

The control plan should include a means of mechanically cutting the well established stems, some of which are 20' tall. Plants this tall cannot be adequately controlled, and increases the risk of applying chemicals off target, if a chemical approach is selected.

IPM Action Plan

- Mechanically remove as much buckthorn as possible as part of harvest plan (winter 2012)
- Treat by hand those stems that were missed during harvest (summer 2013)
- Chemically treat sprouts with a quality sub-contractor (fall 2013)
- Hand pull remaining individual (summer 2014)
- Monitor and hand pull, retreat chemically as needed (ongoing)

Please note that the IPM is a living document and will be completed in conjunction with an independent vegetation control expert.

Appendix 8

Definitions

Advance Regeneration:

Seedlings and saplings present in the understory.

Basal Area:

An estimate of the cross-sectional areas of trees at 4.5 feet above the ground.

Canopy/Overstory:

The uppermost layer of a forest (includes branches and leaves/needles). Trees with tops reaching into this layer are referred to as “canopy trees”.

Cohort:

a group of individuals or vital statistics about them having a statistical factor in common, such as age class. A group of trees developing after a single disturbance, commonly consisting of trees of similar age.

Conservation: Wise, disciplined and sustainable use of natural resources to meet the objectives of the landowner.

Epicormic Branching:

A type of branching that occurs when dormant buds embedded in the trunk of a tree are exposed to light conditions favorable to growth. Epicormic branches can reduce the commercial value of a tree by creating knots.

Even aged Stand:

A stand of trees composed of a single age class in which the range of tree ages is usually +/- 20 percent of rotation.

Forestland:

State of Maine def: land used primarily for growth of trees to be harvested for commercial use; may be seedlings, pole timber, or sawlog stands. Forestland does not include ledge, marsh, open swamp, bog, water and similar areas that are unsuitable for growing a forest product or for harvesting for commercial use even though these areas may exist within forestlands.

Hardwood Stand:

State of Maine def: forests in which maple, birch, beech, oak, elm, basswood, aspen and ash, singularly or in combination, comprise 75% or more of the stocking.

Mast:

The fruiting bodies of plants (e.g., nuts, acorns, and berries). A major source of food for many wildlife species.

Mixedwood Stand:

State of Maine def: forests in which neither hardwoods or softwoods comprise 75% of the stand but are a combination of both.

Overstory (Overwood): That portion of the trees forming the uppermost canopy in a two-aged forest.

Preservation: an area of the forest that will remain forever wild with not management at any time for any reason.

Regeneration:

The offspring of mature trees. Trees can be regenerated by seeding into an area, or new trees may sprout from existing stumps or root systems.

Rotation:

In even aged systems, the period between regeneration establishment and final cutting.

Shelterwood System: an *even aged* method of regenerating forest stands where the overstory is removed in intervals roughly 15 years apart.

Long shelterwood method- a forest is regenerated in three entries:

- First entry is designed to tend the stand, removing at risk and poorly formed trees. Crop trees are identified, retained, and thinned around to focus site resources on the best growing stock. This is a fairly light entry removing about 1/3 of the growing stock. The establishment of regeneration is not an objective
- The Second Entry is designed to initiate regeneration by removing about ½ of the stand volume. This can be accomplished evenly throughout the stand, or in small groups that vary in size relative to the stand conditions and species composition.
- The last entry, some 15 or so years after the Second Entry, is designed to release the regeneration established during the second entry. This entry is often referred to as an overstory removal as the balance of the mature stand is harvested. Some overwood can be retained to facilitate habitat or structural objectives of the landowner.

Short Shelterwood method- a method whereby the forest is regenerated in two entries, basically the second entry, and overstory removal entry described above under Long shelterwood method.

Softwood Type:

State of Maine def: forests in which pine, spruce, fir, hemlock, cedar and larch, singularly or in combination, comprise 75% or more of the stocking.

Stand:

A contiguous area where the species, size, age, and general condition of the trees is uniform enough to be distinguished from adjacent areas (Beattie et al., 1993).

Stocking Chart/Guide:

Visual representation indicating growing space occupancy relative to a pre-established standard; showing basal area and number of trees per acre and quadratic mean stand diameter.

A-Line: fully stocked condition; generally undisturbed stand.

B-Line: target stocking after thinning; max. growth potential of residuals.

C-Line: minimum stocking of stand.

Succession:

the gradual supplanting of one community of plants by another. **Early successional habitat** is the first community to become established after a disturbance.

Understory:

Generally the shrub layer beneath a taller layer (also includes regenerating trees).

Uneven aged Stand:

a stand with trees of three or more age distinct age classes, either intimately mixed or in small groups.

Uneven aged Management:

a planned sequence of treatments (single tree selection to group selection or a combination) designed to establish and maintain a forest stand with at least three distinct age classes.

- Single tree selection: individual trees of all size classes are removed more less uniformly throughout the stand to promote the growth of the remaining trees and to provide space for regeneration.

- Group Selection; trees are removed and new age classes are established in small groups.