

FOREST MANAGEMENT PLAN MELENDY POND CONSERVATION AREA

PROPERTY OF:

The Town of Brookline, NH

**LOCATED IN
Brookline, NH**

469 Acres

PREPARED FOR: The Brookline Conservation
Commission

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PROPERTY REFERENCE INFORMATION

OWNERS: Town of Brookline – Conservation Commission
P.O. Box 360
Brookline, NH 03033

PROPERTY LOCATION: South of Hood Road, East of Old Milford Road, North of Mountain Road.

TOTAL ACREAGE: 469 ACRES

USGS TOPOGRAPHIC: Milford Quad. (1998, Maptech, Inc.)

SOIL SURVEY: Hillsborough County, Eastern Part

BOUNDARY MAP: Not Surveyed. Boundary information taken from deeds and abutting surveys.

TOWN TAX MAP:	D	Lot 18-5	Millrock Realty	5472/568
DEED REFERENCE:	D	Lot 21	Olson Lots	7799/158
	D	Lot 22	Olson Lots	7799/158
	B	Lot 54	(Appears to be owned by Thibeault Corp. n/f Frances Lorden)	
	B	Lot 55	Melendy Pond Authority	2111/461
	B	Lot 94	Morrill-Lord Lot	2571/748
	B	Lot 95	Frederick Worcester Lot	7385/2921
	B	Lot 98	Alden Jack Lot	7540/1949

INTRODUCTION

This plan was prepared in May 2011 for the Brookline Conservation Commission, with the intent to start a long-term forest management program, that addresses wildlife habitat, forest health and timber productivity, water quality, soil conservation, recreation and aesthetics.

Forest management planning is based on long-term management. This plan addresses the ten-year period 2011-2021. In the year 2021, the plan should be revised and updated. It is recommended that the process of creating a new plan be started in early 2020. A timber cruise of the entire property may not be necessary at that time. Since nature can be unpredictable, and timber markets and landowner objectives may change over time, some flexibility in carrying out the management recommendations may be necessary.

LANDOWNER OBJECTIVES

The first step in management planning is to determine the landowner goals for the property. Based on conversations with the Brookline Conservation Commission, it was determined that conservation of the property for outdoor recreation, timber management, wildlife habitat, scenic quality, and water quality are all important priorities. All of these goals are of equal importance and should be considered before conducting any management activities. Some activities may not be able to fulfill all of the goals.

The following objectives were identified, and are the basis for recommendations in this plan:

- 1) Conserve the property for outdoor recreation and scenic values.**
- 2) Maintain or improve wildlife habitat.**
- 3) Conserve the property predominantly in its natural, scenic, and open condition, while maintaining its forestry use, and protecting the environmental qualities of the property.**
- 4) Conserve and protect the groundwater and surface waters on the property.**
- 5) Provide income from timber harvesting and maintain or improve timber quality and health.**

OVERVIEW AND GENERAL RECOMMENDATIONS

ACREAGE AND LAND USE

The Melendy Pond Conservation Area is comprised of 472 acres, consisting of contiguous forest and wetland. The following list breaks the estimated areas down by use:

Forest Land	+/- 469 acres
White Pine	+/- 31 acres
Mixed Oak	+/- 438 acres
Wetland	Scattered through forested area
Total Acreage	+/- 469 acres

This plan assumes that most activities will not take place within 100 to 200 feet of any of the homes along Melendy Pond.

BOUNDARIES

The boundary lines shown on the Forest Type Map were identified from the Town of Brookline Tax Maps, individual deeds for the parcels and deeds and surveys of abutting parcels. Most of the boundary lines have been recently blazed and painted. Since no management activities are near the homes along Melendy Pond are planned, these lines were not located. Property lines that still need to be identified are shown on the Forest Type Map.

Recommendations: Although the boundaries are currently identifiable, they will become more difficult to locate over time; thus, the boundary lines should be re-painted every 10 to 15 years. This will help protect against timber trespass and other types of trespass. Appendix A describes how to blaze and paint boundary lines.



Freshly Blazed Pine

SCENIC VALUES AND RECREATION

Conserving the scenic and recreational values of the Melendy Pond Conservation Area is listed as an important objective for the property. The property is typical woodland for this region, with mature forests ranging in age from 60 to 100+ year old trees in the upper canopy. Recreational use of the property consists of hunting, hiking, horseback riding, and snowmobiling. All terrain vehicles (ATV's) also use the property, mostly along the snowmobile trails that are being maintained. Most of the recreation use of the property is along the three snowmobile trails. In some cases, the homeowners in the Mountain Road subdivision have started to create their own trails to access the snowmobile trails.

Although ATV's are a form of outdoor recreation, they can be very destructive to trails if driven at excessive speeds or periods of wet ground conditions. The Brookline Conservation Commission will have to decide if they will permit ATV's or discourage them from using the property. If they are permitted, regular maintenance of the trails will be necessary to prevent erosion.



Beginning of Ruts from ATV's



Mountain Laurel in Bloom

One of the trails runs from Hood Road in a southeasterly direction to the top of Birch Hill. Although no serious erosion has occurred on this trail up to this point, it is likely that it will become an issue over time. It may be advisable to relocate this trail and use the natural contours of the land to improve drainage. The other trail runs in a westerly direction from Old Milford Road to connect with the first trail. Another spur runs from the Hood Road trail to Overlook Lane.

The scenic value of the Melendy Pond Conservation Area mostly comes from the large size of the undeveloped forest. Some areas have very dense Mountain Laurel, which flowers in the spring.

Recommendations: It is a New Hampshire tradition to allow public access to most woodland property. Unfortunately many people do not respect the property owner's rights to the property. These people are generally in the minority; however, they still create costly damage to roads and wetlands. Limiting the damage created by the ATV's

and 4X4 traffic will be difficult, if they are allowed on the property. Regular maintenance of the trails will be necessary.

Blocking access with stones and logs will help keep 4X4 traffic from entering the property, but will only slightly deter ATV's. Signs at entrances, posted out of easy reach, and regular patrolling of the trails by volunteers will help discourage ATV use. NH Fish and Wildlife is responsible for enforcing ATV's in New Hampshire and may have some suggestions for management of this recreational use.

Periodically, maintain the trails by removing brush, fallen trees and putting in erosion control as necessary. Limiting use of the trails by horses and wheeled vehicles during the spring mud season will help to prevent erosion and muddy areas from developing.

Trails can be a problem for wildlife. Although trails are needed for people to enjoy the property, they also disrupt wildlife habitat especially in during nesting and rearing season. Along with people, dogs also use the trails and will wander off of the trails disrupting nesting birds and mammals. For this reason, it is wise to limit the number of trails. At this time, the number of trails appears to be balanced adequately for recreation and wildlife.

Timber harvests should be planned to minimize the disturbance to roads and trails. Skid trails should cross the recreational trails as few times as reasonably possible and should be blocked upon the completion of the harvest. Leaving 50% or greater of the basal area within 50 feet of trails and roads and keeping slash within 25 feet of trails to a minimum will help to maintain the natural character of the trail. For the most part these harvests should be shelterwood harvests and thinnings, although in some areas, heavier cuts, like seed tree and small patch cuts, may be necessary for timber management, wildlife habitat, and for opening vistas. Harvests should be planned to take place in non-contiguous areas within 3 to 5 year periods when practical. This will help to maintain a "naturally wooded" feeling along the trails and roads. Some areas, that the landowner identifies, may be left as is for an extended period of time.

ACCESS

The main access points to the property are from Hood Road to the north, Old Milford Road on the west, Overlook Lane to the south, and a potential trail access from Mountain Road on the south. A log landing is present at the access on Overlook Lane. New landing locations on Old Milford Road and Hood Road will probably need to be constructed at some point to carry out the recommendations in this plan.

Recommendations: Permanent Landings should be constructed on Hood Road and Old Milford Road. Improving some of the snowmobile trails for log truck access may be desirable at some point to shorten the distance that trees would have to be skidded to the landing.

WATER RESOURCES AND QUALITY

The major water feature on this property is Melendy Pond at the northwest end of the property. There are other small wooded wetlands mostly associated with intermittent streams and a few scattered vernal pools. Melendy Pond has warm water fish; such as, bass, pickerel, and perch. As long as Best Management Practices for timber harvesting and trail construction are carried out, there should be no effects on the water quality of Melendy Pond.

Recommendations: Trees should be felled away from streams and vernal pools when it is safe to do so, to prevent accumulation of woody material, or the tops should be pulled out if they are accidentally felled into streams or water bodies. Following practices outlined in *Best Management Practices for Timber Harvesting in New Hampshire* during timber harvests and road construction is required by law, if the *Minimum Impact Form for Forest Management* is used instead of the standard wetland application process. These practices will minimize impacts to the intermittent streams and wetlands. Wetland permits may be necessary, and a *Minimum Impact Form* will be necessary for timber harvests, which occur on wetlands or streams. A *Minimum Impact Form for Trails* is also needed when trails cross wetlands.

HISTORY AND CULTURAL FEATURES

There are few significant cultural and historical features on the property. Stonewalls are present along some of the exterior and interior lot lines and stand testament to the properties past agricultural use.

Recommendations: During timber harvesting operations, crossing of stonewalls should be kept to a minimum. Whenever possible, existing openings in the walls should be used for skid trails. Any cellar holes should be left intact and not be filled with debris.

ENDANGERED SPECIES

The New Hampshire Department of Environmental Services (DES) online Data Check Tool was used to see if there were any current records of endangered species in the vicinity. The data check showed no known records, as seen in Appendix B. A request for more information on endangered species and unique habitats for this property may be submitted to the New Hampshire Natural Heritage Inventory office in Concord, NH. Recommended management activities may need to be modified to accommodate any endangered species or unique habitats that are identified in the future.

WILDLIFE HABITAT

Wildlife habitat is an important objective in the management of this property. Fortunately, good habitat for a variety of wildlife species exists and can be improved. Some minor considerations taken into account during timber harvest planning will ensure such improvements. Since, the landowner has identified no specific species of

interest, it is assumed that wildlife management will be aimed at maintaining or improving habitat diversity. Generally, the more diverse the landscape, the more chance of a larger number of wildlife species being present in a given area.

Habitat diversity can be broken into two major categories: vertical diversity and horizontal diversity. Vertical diversity is the diversity between the ground and the tree canopy. A field or a mature forest with little undergrowth has little or no vertical diversity. For this reason, planned timber harvests can actually increase vertical diversity on this property. Horizontal diversity is the amount of different habitat features across the landscape, such as wetlands, fields, hardwood, softwood, and mature and immature forests. One hundred acres of pure even-aged pine would have no horizontal diversity, but one hundred acres of mixed field, hardwood and softwood forests of various ages, and wetlands would have a great deal of diversity.

Forest openings are areas that are generally stocked with grasses, forbs, and shrubs. These areas are important sources of food for many species of wildlife. Generally, it is advisable to maintain 10 % of a managed forest in openings, but a minimum of one acre of forest openings for every 640 acres of woodland should be maintained for wildlife habitat. Often times, roads, log landings, and old beaver ponds will suffice as openings for wildlife. Clearcuts and other heavy cuts can be modified in shape to maximum benefit by keeping the widths of the cuts at less than 300' where possible, and making their shapes irregular, thus maximizing the amount of forest edge created.

Riparian areas are the areas adjacent to streams, ponds, and other water bodies. They tend to have poorly drained soils and grow multi-layered vegetation that can be important to wildlife for feed and cover. These areas are also important for protecting water quality and timber harvesting should be limited within reasonable distances from the water bodies.

Dead and dying woody, also known as coarse woody debris (CWD) material in a forest is important to wildlife as shelter and as a source of food, since insects and amphibians are likely to use dead and dying trees. More information is available in Appendix C. It is important to leave some of this dead material, especially larger logs during timber harvests. Whole tree chipping should be used with care, since there is little slash left after logging to provide this woody material for wildlife use.

Den trees are living trees with cavities in them that are useful for wildlife as shelter. Snag trees are dead standing trees that also can provide shelter, feeding sites, and roosting sites for wildlife. Generally, a minimum of 4-5 wildlife trees over 18" dbh, 10-15 wildlife trees over 14" dbh, and 20-25 wildlife trees over 6" dbh should be left per 10 acres during harvesting operations. Many of these trees can be left in areas that are difficult to operate anyhow; such as, along riparian areas or on steep slopes. More information is available in Appendix C.

Mast is any nut, seed, or fruit produced by a woody plant. Many species of wildlife depend on mast from certain forest trees for their survival. Hard mast includes beech nuts and acorns, while soft mast includes smaller seeds and berries. Since some trees

produce mast only in 3-7 year cycles, it is important to maintain a variety of mast producing species, in order to ensure some mast production on a yearly basis. Larger diameter trees with large crowns supply a significantly greater amount of mast than smaller trees with small crowns. Fortunately some of the large den trees also produce significant amounts of mast. During timber harvests, emphasis should be placed on protecting large mast producing den trees, especially in riparian areas and on steeper slopes.

Species of interest that have been seen on this property in the past include moose, and white-tailed deer. Other mammals certain to utilize the property are fisher, raccoon, coyote, gray squirrels, and chipmunks, to name a few. Bird species include ovenbird, wood thrush, and chickadee to name a few.

The Melendy Conservation Area is largely a homogeneous even-aged forest of mixed pine and hardwood, with oak species being the most common of the hardwoods. The age ranges from 60 to 100 years old. The one unique habitat that can be found on the property is a few scattered vernal pools.

The vernal pools on the property may be important breeding grounds for salamanders and amphibians. These are areas that retain water in the spring, but dry out during the summer months. Salamanders and amphibians use these areas to breed because they do not have the typical predators, like fish, to feed on their eggs. Other invertebrates, like fairy shrimp, are also found in vernal pools. More information on vernal pools can be found in Appendix C.

Recommendations:

Timber harvesting around the vernal pools is acceptable, provided that the trees are dropped away from the pools or the brush is pulled out if accidentally dropped in the pools. The canopy within 100 feet of the vernal pools should be maintained at 50% or higher if possible. This will prevent too much sunlight from reaching the pool and increasing the water temperatures.

Conduct timber harvests that will increase both vertical and horizontal diversity. This can be accomplished by using a combination of group selection (patch cuts) and individual tree selection. This will increase the amount of acreage in shrub and sapling stages and will benefit wildlife species; such as, wood thrush, eastern hognose snake, eastern towhee, whip-poor-will, and snowshoe hare to name a few. Group size should range between 0.25 and 2 acres in size. For aesthetic reasons, the larger size groups will be kept to a minimum.

A rough calculation to determine the area that should be harvested in groups based on a 120-year rotation age is:

$472 \text{ acres} / 120 \text{ years} = 4 \text{ acres annually, or } 80 \text{ acres every } 20 \text{ years}$

This would mean that if a harvest was conducted on the property every five years, 80 groups $\frac{1}{4}$ - acre in size would be created, or 10 groups 2-acres in size would be created. In real practice, what should happen in the next 20 years is to conduct a harvest at least once every five years covering about $\frac{1}{4}$ (+/- 100-acres) of the property. This could also be broken down into more frequent harvests covering less area. Using this method, it would be another 120 years before the overstory is removed in all areas. This will allow for a wide range of tree ages and species.

Single-tree selection and thinning would also be conducted between some of the groups, but care should be taken during any harvest to leave some untreated areas between the groups.

General Recommendations:

- **Maintain shade along intermittent brooks to minimize sunlight heating up the water.**
- **Maintain hemlock in areas as shelter for deer, especially on southwest slopes.**
- **Maintain buffers around vernal pools that retain 50% or greater canopy cover within 100-200 feet of the vernal pool.**
- **Reserve cavity trees and large mast-producing trees. This will allow for homes for wildlife, which rely on cavities. Rule of thumb is 3 to 9 trees per acre. The most important are large diameter trees with cavities.**

- Space timber harvests in non-contiguous areas throughout the property. This will spread the browse from cut stumps, and new growth to increase diversity.

SOILS

The following is a description of the major soil types present on the property. These descriptions were taken from the *Soil Survey for Hillsborough County, New Hampshire*. This was prepared by the United States Department of Agriculture, Natural Resource Conservation Service. More soils information is included in Appendix D.

WOODLAND MANAGEMENT & PRODUCTIVITY TABLE

MAP SYMBOL	ORDI-	MANAGEMENT CONCERNS					POTENTIAL PRODUCTIVITY			
& SOIL NAME	NATION	EROSION	EQUIPMENT	SEEDLING	WINDTHROW	PLANT	COMMON	SITE	VOLUME OF	TREES TO
	SYMBOL*	HAZARD	LIMITATIONS	MORTALITY	HAZARD	COMPETITION	TREES	INDEX	WOOD FIBER	MANAGE*
(cu. Ft./ac/yr.)										
CmB, CmC										
Canton stony fine sandy loam	5o	Slight	Slight	Slight	Slight		White pine	58	100	White pine,
							Red pine	52	29	Red pine,
CnC, CnD										
Canton very stony fine sandy loam	5x, 5r	Slight	Moderate	Slight	Slight		White pine	58	100	White pine
							Red oak	52	29	Red pine
HsB, HsC, HsD										
Hinckley loamy sand	5s	Slight	Slight	Severe	Slight		White pine	60	100	White pine
							Red Oak	49	29	

* Ordination symbol: 1=high productivity to 5=low productivity
 soil limitations: x=stoniness or rockiness, s=sandy texture, o=limitations
 and restrictions are insignificant, r=steep slopes

Trees to manage are the species best suited to commercial production for the soil type

TIMBER MANAGEMENT

Providing income from timber harvesting and maintaining or improving timber quality and health is an important objective for the Melendy Pond Conservation Area.

A timber inventory was not conducted on this property, since income from the property is not the highest priority. Following the recommended practices in this plan should ensure a sustainable supply of forest products, barring any natural disasters. This plan should be updated in 10-15 years, to reassess the conditions of each stand and prescribe new management actions.

Some basic forestry principles are important to understand when reading the stand descriptions and treatments for individual stands. Forests are dynamic and will change sometimes drastically in a short time period ex) fire, windstorms, harvesting, or more slowly by one tree dying and others fill in to take advantage of the space. Today's forest will look different than it will 100 years from now with or without the help of active management.

Forest management is aimed at mimicking natural patterns and events to produce a desired result. For instance a clearcut will be similar to a catastrophic event like a forest fire. A shelterwood harvest will more closely mimic a windstorm event. A selection harvest will be even lighter and mimic a lightning strike that kills a small group of trees.

Some potential threats to the forest on the Melendy Pond Conservation Area are the gradual expansion of the hemlock woolly adelgid, an insect that defoliates and eventually kills stands of hemlock, ash die-back that is killing much of the ash in the area and possibly the emerald ash borer that is working its way east. This introduced insect is devastating ash trees in the mid-west.

Many things affect timber quality from a commercial perspective. Knots, the result of tree branches, are the most common issue when talking about lumber quality. High quality hardwood logs will have very few if any knots or limbs, especially in the first 2-3 logs (8 foot sections). In white pine, knots are common, but knot-size and condition are important. Clear pine boards with no knots are always desirable, but rare, even in the first log (16 foot section). Red knots (from living branches) are better than black knots (from dead branches). Knots over 4" inches can sometimes make the stem of a pine tree useless for lumber. There are many other variables affecting the value of timber, such as, accessibility, species, market demands, insect damage, and rot to name a few. Markets change rapidly and a professional forester should be consulted when timber is sold.

STAND DESCRIPTIONS

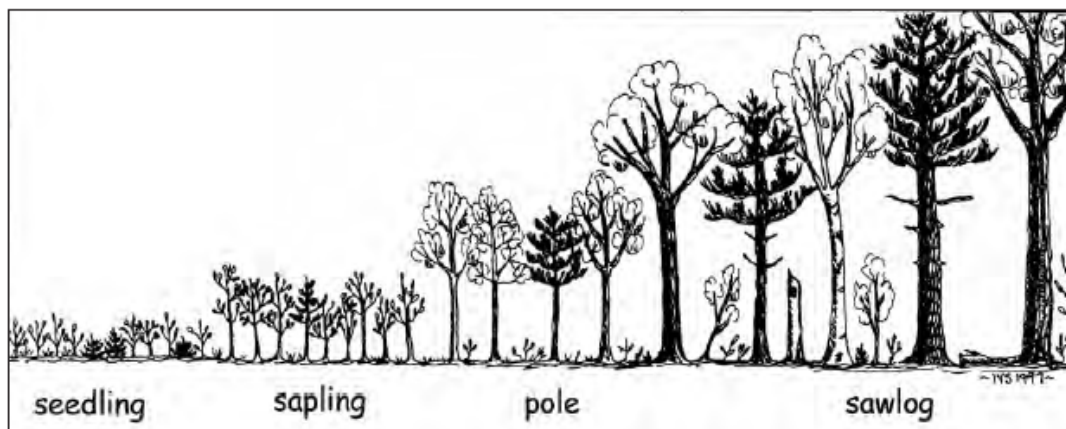
The following section describes the different forest types (stands) on the property. The forest types are determined by the predominant species within the stand. Within the description for each stand, a recommended treatment is described.

DEFINITIONS

- MSD:** Mean Stand Diameter. The average diameter at breast height (dbh) measured 4.5' above the ground. Measured in inches.
- BA/AC:** Basal Area per Acre. Basal area is a measure of stand density. It is obtained by summing the area of all the trees in an acre at dbh. Measured in square feet.
- VOL/AC:** This is the merchantable volume per acre. Logs are measured by thousands of board feet (mbf), and pulpwood is measured in cords (cds).
- SI:** Site Index. This is a measure of the soil productivity. The higher the site index number indicates a more productive site. Site Indexes are taken from the *Soil Survey for Hillsborough County, New Hampshire*. This was prepared by the United States Department of Agriculture, Soil Conservation Service.
- Size Class Groupings:** A description of the size classes from *Good Forestry in the Granite State, 2nd edition*.

Size Class Groupings

Diameter in Breast Height (DBH) in inches	
Seedling	up to 1
Saplings	1-4
Pole	5-11
Sawlog	12 and larger



The treatment and timing recommendations for each stand are given as a guide to future management. Market conditions, harvesting technology and natural disturbances, may make it necessary to modify the practices for each stand. The actual recommended practice should be followed for the stand when conducting a harvest, with little emphasis being placed on the actual volume removed.

STAND DESCRIPTIONS

STAND NO.	TYPE	ACRES	SIZE-CLASS MSD	SITE INDEX	TREATMENT
1	WP	31	Poletimber Sawtimber	WP 58-60	Improvement/ Thinning

This is a two-storied (white pine in the upper canopy with mixed hardwood and pine in the lower canopy) white pine stand of average quality that was last harvested in the late 1940's. This is a dense forest with pole size white pine, red oak, white oak, red maple, birch and beech. The quality is average. Some scattered large diameter white pine +/- 24" dbh are present. Blueberry, mountain laurel and witchhazel are common understory shrubs.

The stand is broken into two locations, one is along Hood Road, and the second location is along Old Milford Road. The section along Old Milford Road has gravel deposits that may be useful for improving landings and roads on the property.

Wildlife use of this stand is generally low due to lack of diversity, food, and cover, however, red squirrels and owls would frequent these types of forest.

The terrain has slopes between 3-15%, and the soils are Hinckley loamy sand (HsB & HsC) and Canton stony fine sandy loam (CmB). A small red maple swamp is present in Chocorua mucky peat (Cu).

TREATMENT: *An initial improvement harvest and thinning is in order for this stand. It will remove mature and poor quality white pine sawtimber and poletimber creating conditions for the pole size white pine and hardwood to grow at a faster rate. Basal area should be maintained at 50 square feet or higher.*

TIMING: 2011 - 2016

Stand 1



STAND NO.	TYPE	ACRES	SIZE-CLASS MSD	SITE INDEX	TREATMENT
2	MO	410	Poletimber Sawtimber	WP 58 RO 52	Group Selection Individual Selection

This is a mixed oak stand that covers most of the property. The area was probably harvested last in the 1940's. The resulting stand is stocked with mostly pole-sized hardwood of average quality and scattered mature sawtimber trees, mostly white pine and red, white and black oak. Red maple, beech, ash, black and white birch, and chestnut oak are also present in some areas. The mature white pine trees are generally good quality. Mountain laurel is very dense in the understory, limiting regeneration of young trees. Areas without mountain laurel have some white pine and mixed hardwood in the understory. The ice storm on 2008 damaged the crowns of many of the mature hardwood trees, but most of the damage was cosmetic and will not harm the trees overall health. Mountain laurel and witchhazel are the most common understory shrubs.

A small intermittent stream flows from south to north in the eastern portion of the stand. A few scattered vernal pools are also present and are unique areas for wildlife habitat. The moist soils along the brook are covered with forbs and ferns. Some of the vernal pools are unique because of the black gum trees present.

Much of this stand is on well-drained soils. The land generally slopes towards the north with 8 -35% slopes. The soil types are predominantly Canton stony fine sandy loam and Canton very stony fine sandy loam (CmC, CnC & CnD). The soils are best suited for growing white pine.

TREATMENT: As mentioned, this is the predominant forest type on the property and is largely one age class. In order to meet the wildlife and timber management goals for this property it would be advisable to start an uneven-aged management strategy in this stand. A combination of group selection and individual selection harvesting can be utilized to increase horizontal and vertical diversity within the stand. Harvests should occur over 3 to 5 year time periods creating openings ranging in size from ¼ acres to 2 acres in size. The total harvest area in any given year would be between 40 and 65 acres. This is a reasonable size area to make it commercially feasible to harvest timber and would allow for the entire stand to be treated in the next 20 years.

During the harvest, the patch cut areas should have logging equipment destroy as much mountain laurel as possible to reduce competition for regenerating trees.

Care should be taken to maintain adequate canopy within 100-200 feet of vernal pools. Signs should be posted during harvest operations explaining the objectives and management prescriptions used.

TIMING: 2011-2031



Stand 2



Stand 2

STAND NO.	TYPE	ACRES	SIZE-CLASS MSD	SITE INDEX	TREATMENT
3	MO	28	Poletimber Sawtimber	WP 58 RO 52	SHELTERWOOD

This is a mixed oak stand that covers most of the property. The area was last harvested in 2004, while it was still owned by Frederick Worcester. The resulting stand is stocked with mostly pole-sized hardwood of average quality and scattered mature sawtimber trees, mostly white pine and red oak. The mature white pine trees are generally good quality. The ice storm on 2008 damaged the crowns of many of the mature hardwood trees, but most of the damage was cosmetic and will not harm the trees overall health. Mountain laurel, witch hazel, and blueberry are quite dense in the understory of this stand. Other areas have started to regenerate to white pine and mixed hardwood.

A small intermittent stream flows from south to north in the eastern portion of the stand. A vernal pool is present along the southern boundary and is a unique area for wildlife habitat. The moist soils along the brook are covered with forbs and ferns.

Much of this stand is on well-drained soils. The land generally slopes towards the north with 8 -15% slopes. The soil type is predominantly Canton very stony fine sandy loam (CnC). The soils are best suited for growing white pine.

TREATMENT: *No treatment is needed in this stand for the next 10 years, since it was last harvested in 2004.*

TIMING: 2011-2021

Stand 3



PROJECTED WORK SCHEDULE (NEXT 10 YEARS)

STAND	TREATMENT	PRIORITY	YEARS
1	SHELTERWOOD	HIGH	2011-2016
2	INDIVIDUAL/GROUP SELECTION	HIGH	2011-2031
3	NONE NEEDED		2011-2021
	REPAINT BOUNDARY LINES	HIGH	2021
	TRAIL MAINTENANCE		YEARLY

SUMMARY

This Forest Management Plan for the Melendy Pond Conservation Area is the first step towards improving the wildlife habitat and timber resources on the property.

With careful timing and planning of timber harvests, a sustainable flow of wood products can be produced and income derived over the next 20 or more years. Wildlife habitat can be maintained by leaving good mast and den trees. It can also be improved by creating some openings that will grow grasses and forbs for short periods after the recommended treatments. Hopefully local users of the trails will help with keeping the trails open.

With the implementation of this plan the property can become a good example of long-term timber management and wildlife habitat management. Passive recreational opportunities will be available and this property will be available for the public to enjoy forever.

APPENDIX A
BOUNDARY INFORMATION



Woodlot Boundary Line Marking

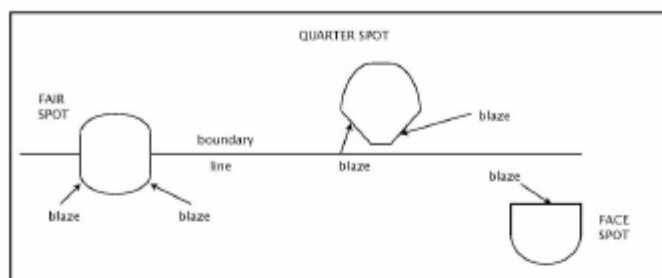
Prepared by Stephen A. Wood, Extension Educator, Sullivan County, retired
Karen Bennett, Extension Forestry Specialist

One of the most common recommendations foresters make to forest landowners has little to do with the management of their trees. Although most landowners generally know where their boundary lines are and some may even have accurate survey maps, few have their lines marked very well on the ground. "I've got a good survey map, so what's the big deal?" you say.

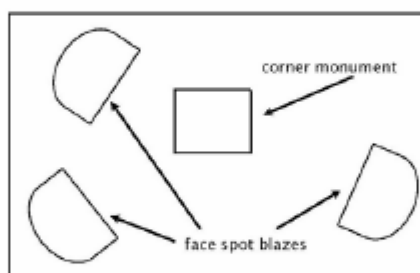
Clearly marked boundaries are the best evidence that you know where your lines are. They minimize the risk of problems, such as timber trespass, caused by others making inaccurate assumptions about your boundaries. They also help you avoid trespassing on your neighbors' land when you cut trees or build roads and trails.

Colored plastic ribbon or "flagging" is often used to mark the location of boundary lines. It is suitable only for temporary use and should be followed by more permanent blazing and/or painting trees along or near the line. You can do this yourself, *but first be certain of the exact location of the line*. Seek professional surveying advice if you have any doubts. General guidelines for blazing and painting include:

- (1) Consult with your abutters and obtain their permission to blaze and paint individual trees on their side of the line.
- (2) Make the blaze with an axe at 4 to 5 feet above the ground, removing only enough bark and outer wood to make it visible (5-6" long and 3-4" wide), and make one or two final cuts so as to leave a chip of wood firmly attached but sticking part-way out from the trunk. Do not blaze over old blazes. Leave them as supporting evidence of the original location of the line. For best results, allow the blazed surface to dry before painting.
- (3) Paint both the blazed surface and the surrounding 1-2" of bark. This will allow the uncut, painted surface to remain visible later, if the blazed mark becomes covered with callous tissue as the tree grows. Repaint only the outer edge of old blazes to make them more visible. Use a bright (fluorescent blue, red, or orange seem to work best) durable brush-on paint, such as a marine-enamel or a polyurethane-based paint. Some hardware supply stores and mail order companies sell paint especially made for marking boundary lines.
- (4) Blaze the side(s) of the tree facing the line (see diagram).
- (5) Use two fair spots when the line goes through the center of a tree (one spot where the line goes "into" the tree and another, on the opposite side of the trunk, where the line "comes out of" the tree). Two quarter spots can be made on a tree which the line just "grazes," or goes through the edge but not the center of the trunk, with the diagonally-placed spots facing the line. One face spot is used on a tree which the line goes by but does not touch. Avoid marking any trees that are farther than three feet from the line.
- (6) Mark trees close enough so that from any mark you can see the next mark in either direction.



- (7) Property boundary corners or corner monuments should be identified by three witness trees. These are differentiated from line trees by blazing and painting three face spots in a vertical row, facing the corner, on each of the three trees. Otherwise, follow the same guidelines as for blazing and painting line trees.

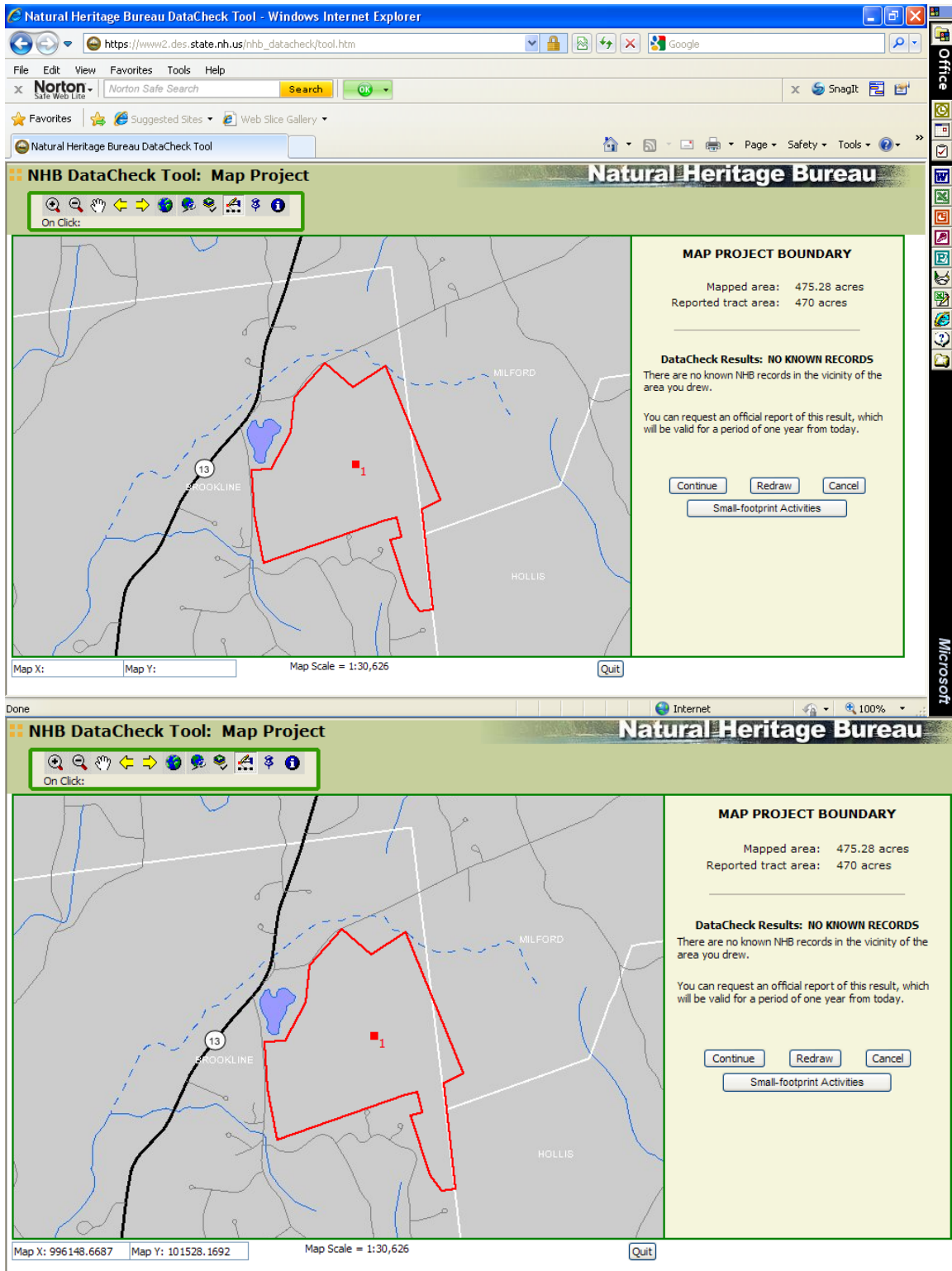


Land surveyors and foresters can help you with your boundaries. Land surveyors must be licensed by the State of New Hampshire. They are specialists in the technique of measuring land, recognition of field evidence, and the relevant law for the surveying of real property. They draw maps, write property descriptions, and establish and mark boundaries of properties as they exist and also have the ability to subdivide properties according to the landowner's intent. More information is available from the NH Land Surveyors Board: <http://www.state.nh.us/itboard/lr.htm> or 57 Regional Drive, Concord, NH 03301.

Foresters are allowed to re-mark known boundary lines in order to carry out forest management. They can also research deeds and help determine if a survey is required. Only licensed land surveyors are allowed to establish boundaries common to another owner when the corners or lines aren't known (RSA 310-A: 74). Anyone offering forestry services for compensation to private landowners in New Hampshire must be licensed by the state. More information is available from the NH Board of Foresters: <http://www.state.nh.us/itboard/fr.htm> or 57 Regional Drive, Concord NH, 03301.

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APPENDIX B ENDANGERED SPECIES



APPENDIX C

VERNAL POOLS COARSE WOODY DEBRIS SNAG & DEN TREES

From Good Forestry in the Granite State, 2nd Edition

7.3: Vernal Pools and the Surrounding Forest

- When a vernal pool fills with water, how long it holds water, and the type and abundance of amphibians and invertebrates it supports can all change dramatically from year to year. Animals that use the pools are adapted to this variation. Though some species may not be present at a particular pool in a given year, that pool and its surrounding forest may still be high-quality habitat.
- Although reptiles and amphibians are small, they travel long distances. Juvenile wood frogs and salamanders may disperse to vernal pools as far as one-half to several miles from the pool in which they were born. These movements maintain genetic variability within amphibian populations and recolonize sites where local amphibian populations are gone.
- The vernal pool and the surrounding forest make up the functional vernal pool system, but each serves different functions. Breeding habitat includes the vernal pool basin and a forested buffer extending 200 feet from the pool edge. The pool basin is the physical breeding location for vernal-pool-dependent species and a nursery for their eggs and larvae. The buffer helps protect the pool's water quality by filtering sediment and pollutants, providing shade, and slowing surface run-off. The buffer also provides leaf litter, which serves as the foundation of the vernal pool food chain and as shelter for adult and metamorphic amphibians immediately after they emerge from the pool. Core habitat extends from the breeding habitat out 950 feet from the pool edge. It provides habitat for amphibians of all ages during the nonbreeding season and provides aestivating and basking habitat for spotted and Blanding's turtles.
- The lack of long-term studies in the northeast means we still lack much knowledge about the specific effects of timber harvesting on vernal-pool-dependent reptiles and amphibians. Relevant research and experience suggests that within the core habitat:
 - Excessive compaction or scarification of the soil during timber harvesting may reduce leaf litter and burrows and reduce the amount of suitable upland habitat available to wood frogs and mole salamanders (i.e. spotted, blue-spotted/Jefferson, and marbled salamanders). Maintaining natural topography maintains the volume and timing of water reaching vernal pools.
 - Vernal-pool-dependent amphibians and reptiles are most sensitive to disturbances that alter water quality or temperature within the pools, alter the length of time the pools hold water, or alter the air and soil temperature in the forest surrounding the vernal pools.
 - Wetland buffers intended to protect water quality may be too narrow to allow amphibians to complete their entire life cycles.
 - The effects of temporary forest openings are less in a forested landscape than in a developed one.
 - As forest-opening size increases, the negative effects of habitat drying and increased soil and air temperature also increase. However, the specific effects of opening size vary and aren't completely understood. In most cases the negative effects of timber harvesting on vernal-pool-dependent species are temporary and decrease with time as the forest regenerates.
 - Canopy cover reduced below 55 percent will probably have at least a temporary negative affect on vernal-pool-dependent amphibians—until the canopy or understory cover fill in.
 - Openings such as wildlife food plots, pastures, fields, and landings create barriers to reptile and amphibian dispersal because they are often hot and dry. These openings are most likely to create barriers when they are located directly between adjacent wetlands.
 - Vehicle ruts can reduce the length of time a pool holds water by directing water away from the pool. Ruts at any distance from a pool can create breeding "traps" for amphibians, since wood frogs and salamanders will often deposit eggs in ruts. Most ruts dry too quickly to allow the eggs to develop completely.

7.3: Vernal Pools and the Surrounding Forest

RECOMMENDED PRACTICES

- ✓ Mark the locations of vernal pools before a harvest and preferably in early spring when vernal pool waters are highest. Alert equipment operators. Include locations and management recommendations in the forest management plan.
- ✓ Locate openings such as landings, main skid trails, roads, wildlife food plots, pastures, and fields as far as reasonably possible from vernal pools. Avoid locating permanent, nonforest openings directly between two adjacent vernal pools.
- ✓ In the vernal pool basin:
 - Avoid running machinery through vernal pool basins, even during dry periods, to avoid changing the pool's ability to hold water.
 - Avoid adding slash (woody material) to vernal pools. Where significant amounts of slash fall into the pool, remove it by hand or some other low-impact method. If the pool contains water, leave the slash until the dry season. Removing it when the pool holds water can disrupt amphibian egg and larval development.
 - Avoid removing trees with crowns immediately overtopping any portion of the pool to maintain water temperature and nutrient inputs.
- ✓ Within 200 feet of a vernal pool:
 - Limit tree removal to individual trees or small groups of trees. Locate groups where advanced regeneration or shrub cover occurs to help maintain shady conditions after the overstory is removed.
 - Avoid removing stumps, stones, or other large cover objects.
 - Maintain as much of the existing understory vegetation (i.e., small trees, shrubs, herbaceous ground cover) as possible.
 - Limit the activity of heavy equipment.
 - Locate main skid trails and truck roads outside this buffer.
 - Avoid applying herbicides or insecticides.
- ✓ Beyond 200 feet:
 - Limit the area that is scarified, stumped, or regraded to that necessary to accomplish silvicultural or wildlife objectives.
 - Retain as much existing dead and down woody material, stumps, stones and leaf litter as possible.
 - Avoid or minimize rutting by following best management practices (BMPs). When possible, harvest on frozen ground (preferable) or in dry summer conditions.
 - Retain as much understory vegetation as possible where its removal isn't required to meet other objectives.



CROSS REFERENCES

3.1 Timber Harvesting Systems; 4.1 Water Quality; 4.2 Wetlands; 6.3 Dead and Down Woody Material; 6.13 Wildlife Species of Greatest Conservation Need.

ADDITIONAL INFORMATION

Calhoun, A.J.K., and P. deMaynadier. 2004. *Forestry Habitat Management Guidelines for Vernal Pool Wildlife*. MCA Tech. Pap. No. 6, Metropolitan Conservation Alliance. Wildlife Conservation Society. 32 p.

Marchand M.(ed.). 2004. *Identification and Documentation of Vernal Pools in New Hampshire*. N.H. Fish and Game Dept., Concord, N.H. 70 p.

N.H. Administrative Rules Env-Wt 101.

http://www.gencourt.state.nh.us/Rules/state_agencies/env-wt100-800.html Accessed on May 27, 2010.

N.H. Dept. of Resources and Economic Development, Division of Forests and Lands. 2004. *Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire*. State of New Hampshire. http://extension.unh.edu/resources/files/Resource000247_Rep266.pdf Accessed March 13, 2010.

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<http://www.gencourt.state.nh.us/ras/html/XVIII/212-A/212-A-mrg.htm> Accessed June 2, 2010.

Tarr, M., and K. Babbitt. 2009. *The Importance of Hydroperiod in Wetland Assessment: A guide for community officials, planners, and natural resource professionals*. UNH Cooperative Extension, Durham, N.H. 23 p.

6.3 DEAD AND DOWN WOODY MATERIAL

BACKGROUND

Dead and down woody material (logs, stumps, limbs and upturned tree roots) in various stages of decay serves many critical functions.

Dead and down woody material, often referred to as coarse wood material (CWM) or coarse woody debris, is important for nutrient retention and cycling, as nurse logs for regenerating trees and understory



plants, and as wildlife habitat. Large (18+ inches) hollow or rotten logs and stumps generally have the greatest value. Softwood stands usually contain more and longer-lasting down woody material than hardwood stands. Maintaining snags and cavity trees will also serve to maintain CWM, as these trees eventually fall over.

Coarse woody material is used by more than 30 percent of the region's mammals, 45 percent of the amphibians, and 50 percent of the reptiles. It's used as a feeding site by rodents, shrews, black bears, and woodpeckers and provides shelter for many small mammals. Seventeen mammal species, including black bear, otter, mink, fisher, weasels, and deer mouse either den or hunt in or under downed logs. CWM creates moist microhabitats used by amphibians. Downed logs create pools and riffles in streams that provide important fish habitat, as well as basking and nesting locations for turtles, waterfowl, mink, and otter. Several ground-nesting birds (including juncos and winter wrens) nest in upturned tree roots. Dead and down woody material provides habitat for many other organisms including insects and other invertebrates, mosses, fungi, and lichens.

OBJECTIVE

Manage for coarse woody material by retaining material that currently exists and allowing its accumulation where it is missing.

CONSIDERATIONS

- The amount of CWM is low in many forests, because of past land use. As New Hampshire forests mature, the supply of this material is naturally increasing as older trees die and fall over. However, more use of entire trees through chipping (whole-tree or biomass harvesting) or other techniques such as firewood cutting that leave less CWM in the woods may reduce the supply of this material on certain woodlots.
- Dead and down woody material is a natural component in forests. It is created in forest stands of all ages when natural disturbances such as wind and ice break tree branches or damage entire trees. Forests that aren't managed, or those managed on a rotation long enough to allow some trees to mature and naturally die often have a greater proportion of CWM material than younger stands, and are more likely to contain large diameter (18+ inches) material.
- Recruiting and retaining this material requires a conscious effort, especially when harvesting.
- CWM may have minimal economic value as biomass.

6.3: Dead and Down Woody Material

- CWM can provide a favorable microclimate for regeneration. It can protect developing tree seedlings from deer and moose browsing when the trees are young and vulnerable to browsing damage.

RECOMMENDED PRACTICES

- ✓ Avoid damaging existing CWM, especially large (18+ inches), hollow or rotten logs and rotten stumps.
- ✓ Leave cull material from harvested trees, especially sound, hollow logs, in the woods. Leave some cull material in the woods during whole-tree or biomass harvests. Return large pieces of cull material bucked-out on the landing to the woods.
- ✓ Avoid disrupting downed logs in and adjacent to streams, ponds and wetlands.
- ✓ Avoid disrupting upturned tree roots from May through July to protect nesting birds.
- ✓ Maintain or create softwood inclusions in hardwood stands to provide a supply of longer-lasting down woody material.
- ✓ Collect information about the type and abundance of CWM as part of a forest inventory.

CROSS REFERENCES

2.2 Forest Structure; 3.1 Timber Harvesting Systems; 3.2 Logging Aesthetics; 4.2 Wetlands; 4.3 Forest Management in Riparian Areas; 4.4 Stream Crossings and Habitat; 5.3 Ice and Wind Damage; 6.2 Cavity Trees, Dens and Snags; 6.4 Overstory Inclusions.

ADDITIONAL INFORMATION

DeGraaf, R., M. Yamasaki, W. B. Leak, and A. M. Lester. 2006. *Technical Guide to Forest Wildlife Habitat Management in New England*. University of Vermont Press and University Press of New England, Burlington, Vt. 305 p.

6.2 CAVITY TREES, DENS AND SNAGS

BACKGROUND

Retaining snags (dead or partially dead standing trees) and den trees (live trees with existing cavities) helps maintain populations of wildlife that require cavities.

Ten species of New Hampshire forest birds excavate cavities for nesting and roosting. Another 15 birds and 18 mammals use natural or excavated cavities in forests for nesting, roosting, or denning. In addition, the brown creeper nests under loose flaps of bark, attached at the top, on standing dead trees. Meeting the needs of these many different species requires a variety of cavity-tree sizes (Table 1). While cavity trees of any size have value for smaller-bodied wildlife such as the black-capped chickadee and tufted titmouse, trees larger than 18 inches in diameter at breast height (DBH) accommodate larger-bodied animals and are used by more species. Due to past agricultural and timber harvesting practices, cavity trees larger than 24 inches in diameter are uncommon.

OBJECTIVE

Maintain cavity and den trees, particularly trees with diameters exceeding 18 inches.

CONSIDERATIONS

- U.S. Occupational Safety and Health Administration (OSHA) regulations regarding the removal of dangerous trees may conflict with recommendations in this section. OSHA requires the removal of all snags (i.e., standing dead or dying trees) by mechanical or other means. If the tree is to be left standing, it must be marked, and no work can occur within two tree lengths of the tree, unless the employer demonstrates a shorter distance won't create a hazard for an employee.
- Cavity trees account for a very small percentage (less than 10 percent) of the standing tree in most forests.
- Broken large limbs in hardwood crowns provide smaller-diameter cavities over time. These cavities are often difficult to spot from the ground.
- Sawtimber and large-sawtimber snags remain standing longer than pole-size snags.
- Snags provide various substrates on which woodpeckers and other bark gleaners forage for insects. Snags also grow lichens, mosses, liverworts and fungi upon which many small mammals forage.
- Riparian zones, roadside buffers, scenic areas, and uncut patches contribute to snag-retention goals for an ownership.
- Snags and cavity trees are created in forest stands of all ages when natural disturbances such as wind and ice break tree branches or damage entire trees. Unmanaged forest stands or those managed on a rotation long enough to allow some trees to mature and die of natural causes often contain a greater proportion of snags and cavity trees than younger stands, and are more likely to contain large diameter (18+ inches) trees.
- Even distribution of snags may be desirable for some species, but there are many benefits to encouraging clumps of snags. Uniformity isn't always operationally practical or desirable.
- Landowners interested in retaining and recruiting snags and cavity trees greater than 24 inches in diameter may have to make an intentional effort to leave some trees uncut during a timber harvest. On smaller ownerships it may be necessary to manage snags on an acre-by-acre basis. On larger landholdings, it's usually more practical to take an approach that incorporates the broader surrounding landscape, emphasizing snag retention on some areas, while not on other areas.

RECOMMENDED PRACTICES

- ✓ In areas under uneven-aged management:
 - Retain a minimum of six live cavity trees and/or snag trees per acre, with one exceeding 18-inches DBH and three exceeding 12-inches DBH.
 - When lacking such cavity trees, retain live trees of these diameters with defects likely to lead to cavity formation.
- ✓ In areas under even-aged management:
 - Leave an uncut patch for every 10 acres harvested, with patches totaling 5 percent of the area. Patch size may vary from a minimum of one-quarter acre. Riparian zones and other buffers can help satisfy this goal.
 - Focus retention patches with the following trees as their nuclei:
 - Existing cavity trees exceeding 18-inches DBH or active den trees.
 - Broken-topped live trees exceeding 12-inches DBH.
 - Secure standing dead trees, especially those with top-attached bark flaps.
 - Living, large aspen and white pine, red spruce, eastern hemlock, sugar maple, beech, yellow birch, elm and oaks. Except for aspen, these trees will persist for long periods as standing dead trees.
- ✓ Retain large-diameter snags.
- ✓ Retain live trees with existing cavities.
- ✓ Include the species, diameter and condition (e.g. living or dead) of snags and cavity trees as part of a forest inventory.

CROSS REFERENCES

2.2 Forest Structure; 4.2 Wetlands; 4.3 Forest Management in Riparian Areas; 6.1 Mast; 6.3 Dead and Down Woody Material; 6.4 Overstory Inclusions.

ADDITIONAL INFORMATION

Elliott, C.A. 1988. *A Forester's Guide to Managing Wildlife Habitats in Maine*. University of Maine Cooperative Extension, Orono, Maine.

USDL Occupational Safety and Health Administration. http://www.osha.gov/SLTC/etools/logging/userguide/safety_health/trecharvestingplan/trecharvestingplan.html Accessed February 22, 2010.

Table 1:
Minimum Tree Diameters
for Cavity-Using Species

6-8"
Downy woodpecker*
Black-capped chickadee*
Boreal chickadee*
Tufted titmouse
House wren
Winter wren
Eastern bluebird
6-12"
Northern saw-whet owl
Hairy woodpecker*
Yellow-bellied sapsucker*
Red-breasted nuthatch*
White-breasted nuthatch
Brown creeper
Chimney swift
Southern flying squirrel
Northern flying squirrel
Ermine
12-18"
Eastern screech-owl
Three-toed woodpecker*
Black-backed woodpecker*
Northern flicker*
Great crested flycatcher
Northern long-eared bat
Indiana myotis
> 18"
Wood duck
Common goldeneye
Hooded merganser
Common merganser
Turkey vulture
Barred owl
Pileated woodpecker*
Silver-haired bat
Gray squirrel
Red squirrel
Porcupine
American marten (pine marten)
Fisher
Long-tailed weasel
> 24"
Little brown bat
Big brown bat
Gray fox
Black bear
Raccoon

* = primary cavity excavators

APPENDIX D
SOILS INFORMATION

From Soil Survey, Hillsborough County NH, EASTERN PART
USDA – NATURAL RESOURCES CONSERVATION SERVICE

CmC—Canton stony fine sandy loam, 8 to 15 percent slopes. This soil is sloping and well drained. It is on side slopes and hills of wooded uplands. The areas are irregularly shaped and range from 5 to 150 acres. Stones that are 1 to 1-1/2 feet in diameter and 5 to 30 feet apart cover the surface.

Typically, the surface layer is dark brown fine sandy loam about 4 inches thick. The subsoil is yellowish brown fine sandy loam 15 inches thick. The substratum is pale brown and light brownish gray gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of gently sloping Scituate soils, areas of Chatfield soils, and areas of soils with a weak hardpan at a depth of more than 40 inches. Included soils make up 10 to 15 percent of the unit.

The permeability of this Canton soil is moderately rapid in the surface layer and subsoil and rapid in the substratum. Available water capacity is moderate. The depth to bedrock is more than 5 feet. The frost-action potential of the soil is low.

Most areas of this soil are wooded (fig. 3). A few areas are used for unimproved pasture. Some areas in the cities and suburbs are used for residential development.

The stones on the surface make this soil unsuited to row crops and limited for hay or pasture. Areas that are cleared of stones and trees have fair potential for hay and pasture and for apple orchards.

This soil is poorly suited to most tree species; productivity is low.

The stones on the surface and slope are the main limitations of the soil for most types of community development and recreational use.

The capability subclass is VIc.

CmD—Canton stony fine sandy loam, 15 to 25 percent slopes. This soil is moderately steep and well

drained. It is on hillsides of wooded uplands. The areas are long and narrow and range from 5 to 35 acres. Stones that are 1 to 1-1/2 feet in diameter and 5 to 30 feet apart cover the surface.

Typically, the surface layer is dark brown fine sandy loam about 4 inches thick. The subsoil is yellowish brown fine sandy loam 15 inches thick. The substratum is pale brown and light brownish gray gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Chatfield soils and small areas of sloping and steep, very stony Canton soils. Included soils make up 10 to 15 percent of the unit.

The permeability of this Canton soil is moderately rapid in the surface layer and subsoil and rapid in the substratum. Available water capacity is moderate. The depth to bedrock is more than 5 feet. The frost-action potential of the soil is low.

Most of the acreage of this soil is wooded. A few areas are used for unimproved pasture.

Slope and the stones on the surface make this soil unsuited to row crops and limited for hay or pasture.

The soil is poorly suited to most tree species; productivity is low. Slope limits equipment operation. Erosion is a hazard if logging equipment is used during

CnC—Canton very stony fine sandy loam, 8 to 15 percent slopes. This soil is sloping and well drained. It is on hills and low mountains. The areas are irregularly shaped and range from 25 to 150 acres. Stones and boulders less than 5 feet apart cover the surface.

Typically, the surface layer is dark brown fine sandy loam about 4 inches thick. The subsoil is yellowish brown fine sandy loam 15 inches thick. The substratum is pale brown and light brownish gray gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of very stony soils with slopes of 3 to 8 percent and areas of stony Scituate soils in slight depressions and sloping Chatfield soils. Included soils make up 10 to 20 percent of the unit.

The permeability of this Canton soil is moderately rapid in the surface layer and subsoil and rapid in the substratum. Available water capacity is moderate. The depth to bedrock is more than 5 feet. The frost-action potential is low.

Most of the acreage of this soil is wooded. A few areas are used for unimproved pasture.

The stones and boulders on the surface make this soil unsuited to farming. The soil is poorly suited to most tree species, and productivity is low. The stones and boulders limit logging operations. Erosion is a hazard if logging equipment is used during wet periods, but this hazard can be controlled by constructing logging roads on the contour.

The stones and boulders on the surface limit the soil for most types of community development and recreational use.

The capability subclass is VIIc.

CnD—Canton very stony fine sandy loam, 15 to 35 percent slopes. This soil is moderately steep to steep and is well drained. It is on hills and low mountains. The areas are irregularly shaped and range from 25 to 150 acres. Stones and boulders are less than 5 feet apart on the surface.

Typically, the surface layer is dark brown fine sandy loam about 4 inches thick. The subsoil is yellowish brown fine sandy loam 15 inches thick. The substratum is pale brown and light brownish gray gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of sloping Scituate soils, moderately steep Chatfield soils, and soils with slopes of more than 35 percent. Included soils make up 10 to 20 percent of the unit.

The permeability of this Canton soil is moderately rapid in the surface layer and subsoil and rapid in the substratum. Available water capacity is moderate. The depth to bedrock is more than 5 feet. The frost-action potential of the soil is low.

The stones and boulders on the surface and the slope make this soil unsuitable for farming. Most areas are wooded, but the soil is poorly suited to most tree species and productivity is low. The stones and boulders and slope are limitations for logging operations. Erosion is a hazard if logging equipment is used during wet periods, but this hazard can be reduced by constructing logging roads on the contour.

The stones and boulders and slope also limit the soil for most types of community development and recreational use.

The capability subclass is VIIc.

HsB—Hinckley loamy sand, 3 to 8 percent slopes.
This soil is gently sloping and excessively drained. It is on terraces and outwash plains. The areas are irregularly shaped and range from 10 to 150 acres.

Typically, the surface layer is very dark brown loamy sand 3 inches thick. The subsoil is yellowish brown gravelly loamy sand 18 inches thick. The substratum extends to a depth of 60 inches or more. The upper part of the substratum is pale brown gravelly coarse sand, and the lower part is brownish yellow very gravelly coarse sand.

Included with this soil in mapping are areas of Deerfield soils, Windsor soils, and soils with stones 1 to 1-1/2 feet in diameter and 5 to 30 feet apart on the surface. Included soils make up 10 to 15 percent of the unit.

The permeability of this Hinckley soil is rapid in the surface layer and subsoil and very rapid in the substratum. Available water capacity is very low. The depth to bedrock is more than 5 feet.

Most areas of this soil are wooded. Some areas in the cities and suburbs are used for residential or industrial development.

This soil has limited suitability for farming; irrigation and heavy applications of fertilizer are needed for most crops. Adding manure and mixing crop residue into the soil help to maintain the organic matter content.

This soil is suited to drought-tolerant tree species, but productivity is low. Droughtiness causes a high rate of seedling mortality.

The rapid permeability is the main limitation of the soil for community development. It causes a hazard of ground-water contamination in areas used for septic tank absorption fields. Droughtiness limits the soil as a site for lawns. Some areas of this Hinckley soil are a good source of gravel.

The capability subclass is IIIs.

HsC—Hinckley loamy sand, 8 to 15 percent slopes.

This soil is sloping and excessively drained. It is on terraces and outwash plains. The areas are irregularly shaped and range from 5 to 75 acres.

Typically, the surface layer is very dark brown loamy sand 3 inches thick. The subsoil is yellowish brown

gravelly loamy sand 18 inches thick. The substratum extends to a depth of 60 inches or more. The upper part of the substratum is pale brown gravelly coarse sand, and the lower part is brownish yellow very gravelly coarse sand.

Included with this soil in mapping are areas of sloping Windsor soils and small areas with stones on the surface. Included soils make up 10 to 15 percent of the unit.

The permeability of this Hinckley soil is rapid in the surface layer and subsoil and very rapid in the substratum. Available water capacity is very low. The depth to bedrock is more than 5 feet.

Most areas of this soil are wooded. Some areas in the cities and suburbs are used for residential development.

This soil is better suited to drought-resistant grasses and legumes than to row crops. Irrigation is needed for most row crops and for the establishment and maintenance of a grass cover. The hazard of erosion is moderate. Using grasses and legumes, stripcropping, and using cover crops keep soil losses to a minimum. Fertilizer is quickly leached through this soil and needs to be reapplied frequently.

This soil is best suited to drought-tolerant tree species but productivity is low; droughtiness causes a high rate of seedling mortality. There are few limitations for most types of forest management or logging operations.

Slope limits this soil for some types of community development and recreational use. The rapid permeability causes a hazard of ground-water contamination in areas used for septic tank absorption fields. Establishing lawn grasses is difficult because of droughtiness. This soil is a good source of gravel.

Slope is a limitation for most recreational uses.

Capability class IVs.

HsD—Hinckley loamy sand, 15 to 35 percent slopes. This soil is moderately steep to steep and is excessively drained. It is on terrace escarpments, eskers, and kames. The areas are long and narrow or irregularly shaped and range from 10 to 40 acres.

Typically, the surface layer is very dark brown loamy sand 3 inches thick. The subsoil is yellowish brown gravelly loamy sand 18 inches thick. The substratum extends to a depth of 60 inches or more. The upper part of the substratum is pale brown gravelly coarse sand, and the lower part is brownish yellow very gravelly coarse sand.

Included with this soil in mapping are areas of moderately steep to steep Windsor soils and small areas that have stones on the surface. Included soils make up 10 to 15 percent of the unit.

The permeability of this Hinckley soil is rapid in the surface layer and subsoil and very rapid in the substratum. Available water capacity is very low. The depth to bedrock is more than 5 feet.

Droughtiness and slope make this soil unsuitable for farming. Nearly all areas of this soil are wooded, and the soil is suited to drought-tolerant trees. However, logging operations are limited by slope, droughtiness causes a high rate of seedling mortality, and productivity is low.

Slope limits this soil for most types of community development and recreational use. Some areas are a good source of gravel.

The capability subclass is VIIc.

Cu—Chocorua mucky peat. This soil is nearly level and very poorly drained. It is in depressions on terraces, plains, uplands, and flood plains. The areas are irregularly shaped and range from 10 to 50 acres.

Typically, this soil consists of black, partly decayed organic material to a depth of 22 inches. Between depths of 22 and 33 inches, the soil is dark yellowish brown and olive gray gravelly loamy sand and gravelly sandy loam. From 33 inches to a depth of 60 inches or more, the soil is light brownish gray coarse sand and loamy sand.

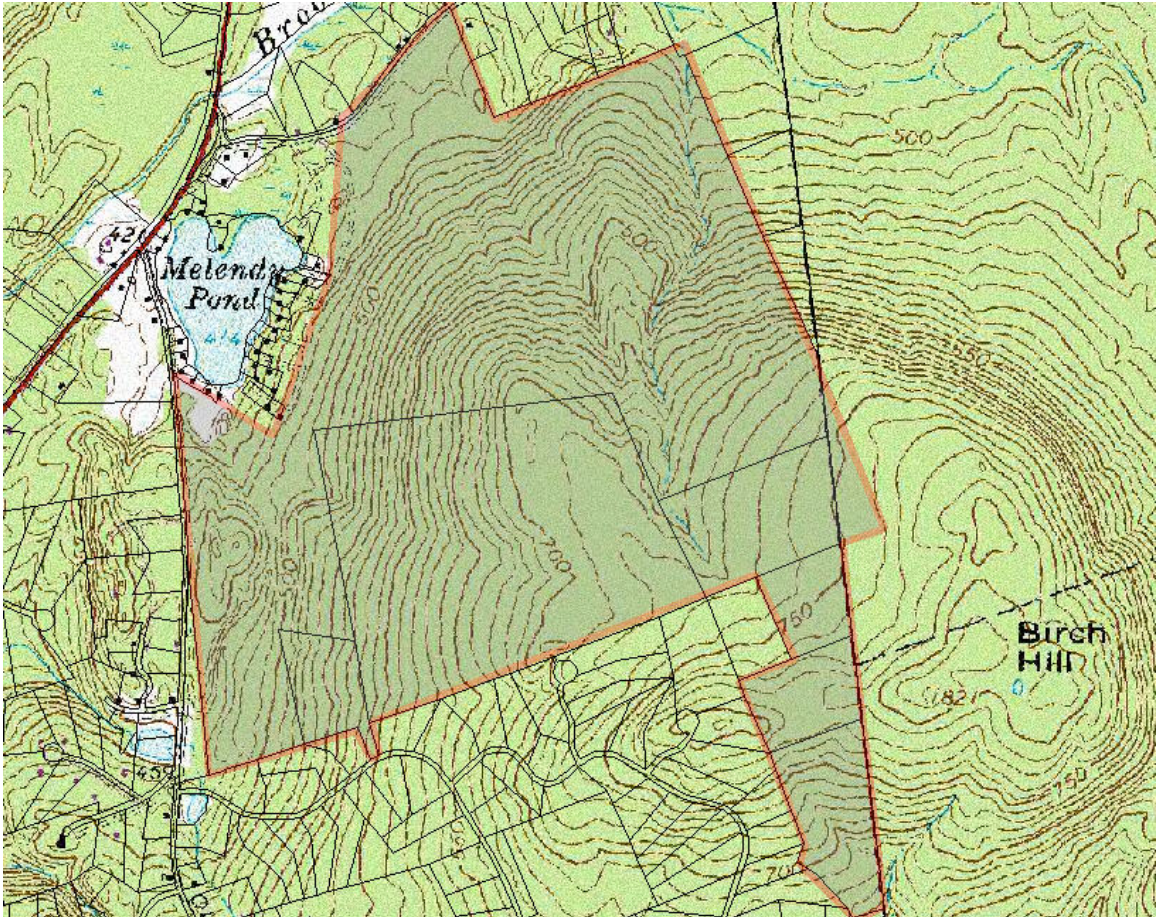
Included with this soil in mapping are areas of very poorly drained Scarboro and Greenwood soils and areas of Borochemists, nearly level, and Borochemists, ponded. Also included are a few areas where the soil underlying the organic deposits is loam or sandy loam. Included soils make up 10 to 15 percent of the unit.

The permeability of this Chocorua soil is moderate in the organic material and rapid in the mineral layers. Available water capacity is high. The depth to bedrock is more than 5 feet. The water table is between the surface and a depth of 6 inches year-around, and water is ponded on the surface of some areas. The frost-action potential of the soil is high.

Most areas of this soil are in open bogs or are wooded. Red maple and small shrubs such as highbush blueberries are the common types of vegetation. The water table and poor stability make the soil unsuitable for most uses other than as wetland wildlife habitat.

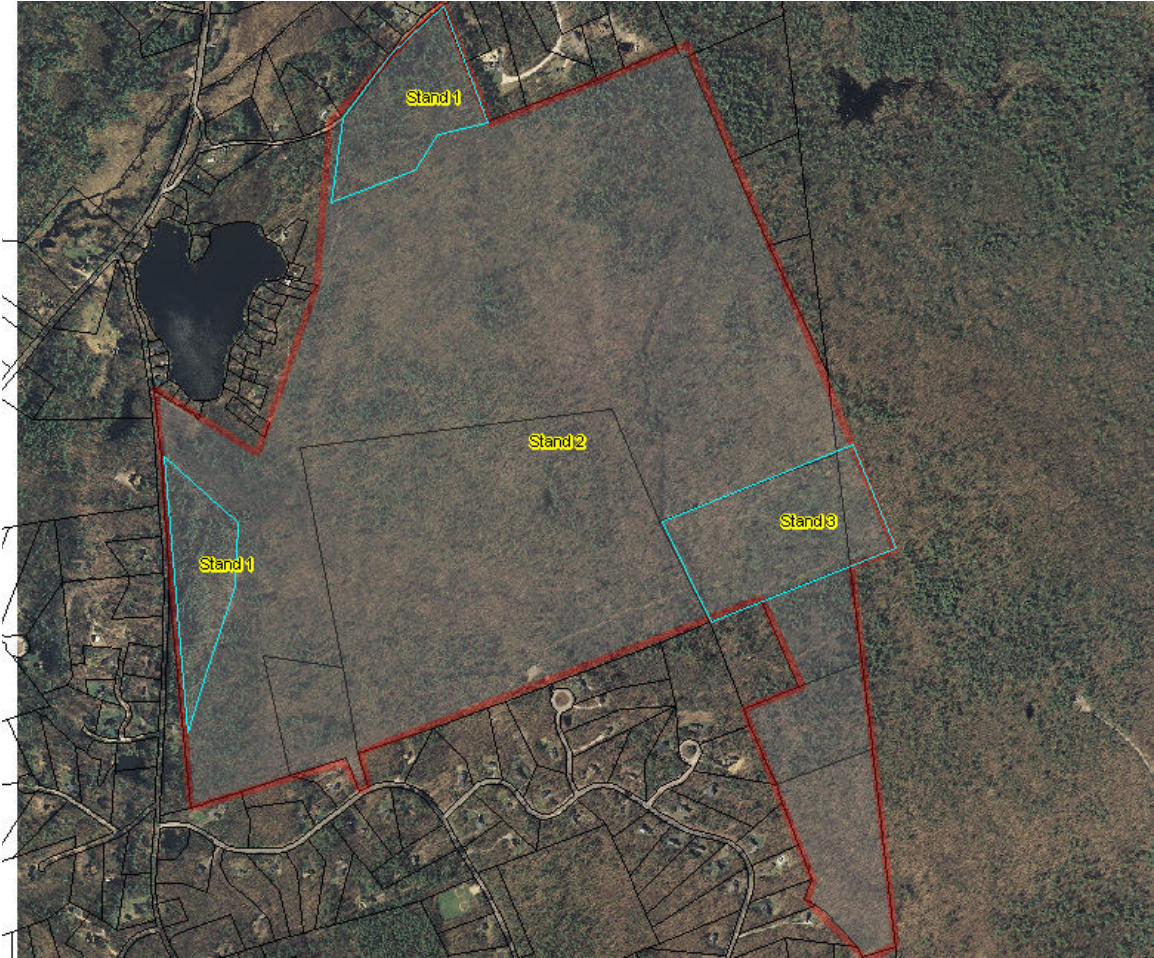
The capability subclass is VIIIw.

APPENDIX D MAPS

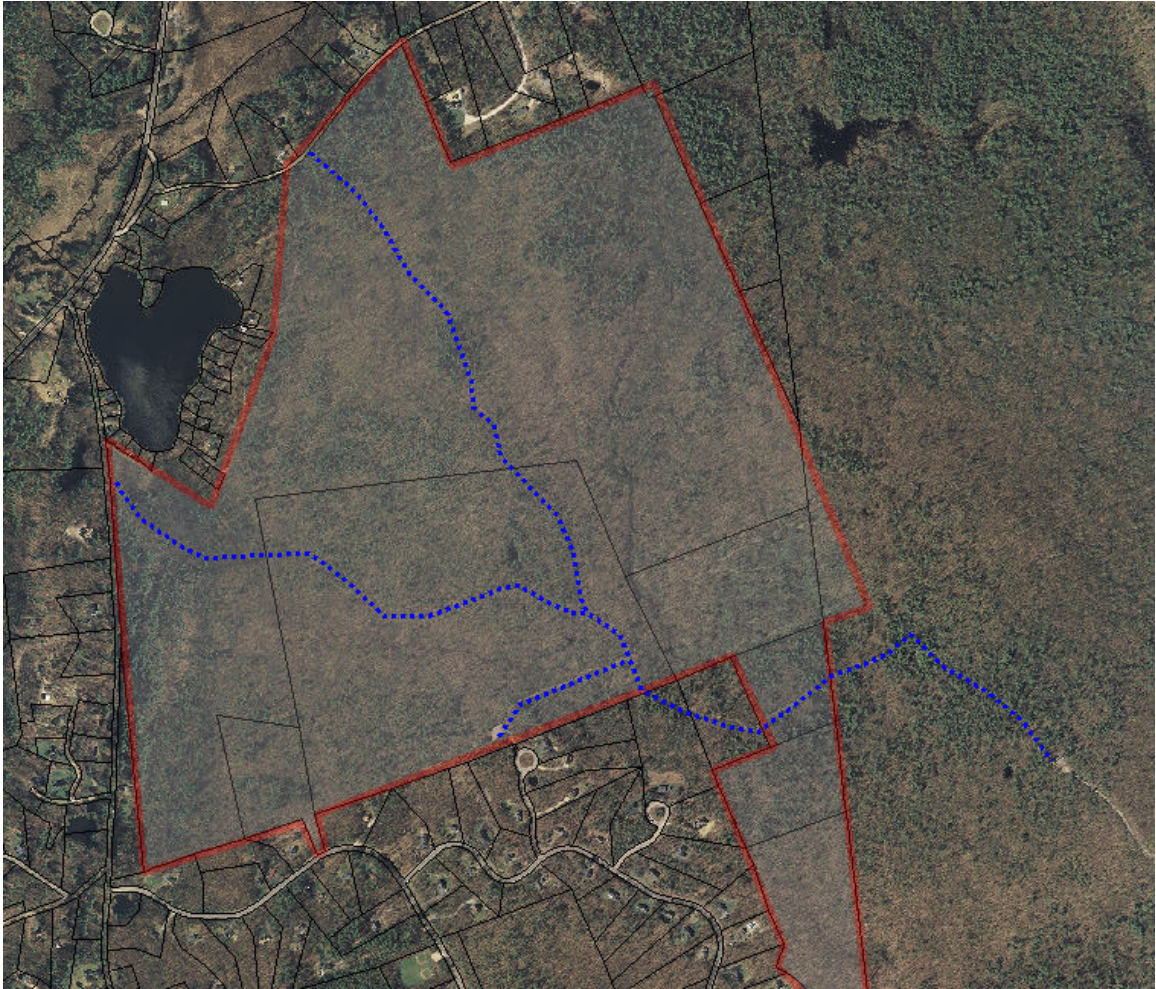


Melendy Pond Conservation Area
Brookline, NH
6/14/11

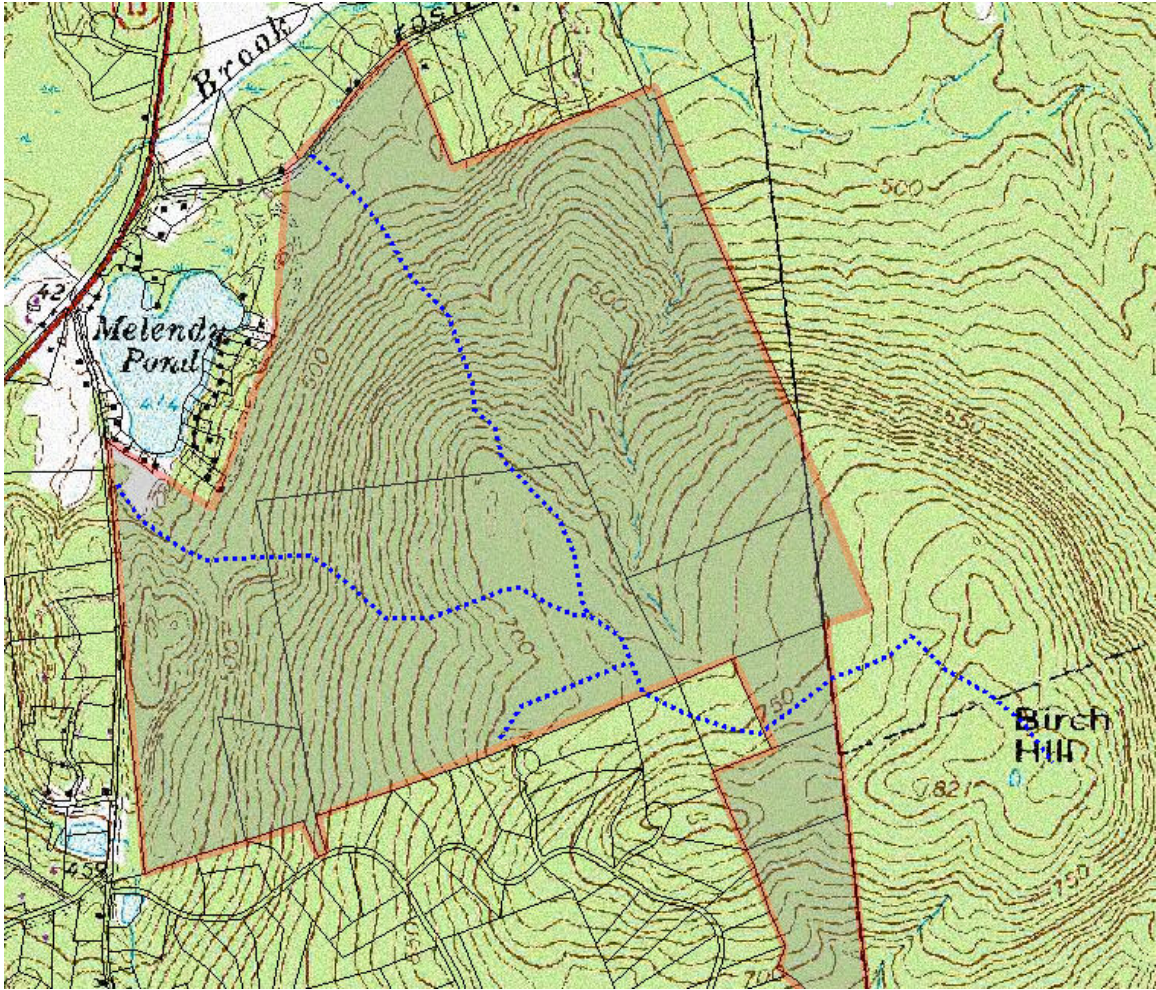
Milford Quadrangle



Melendy Pond Conservation Area
Forest Type Map
6/14/11



Melendy Pond Conservation Area
Trails Map
6-14-11



Melendy Pond Conservation Area
Trails Map
6-14-11