

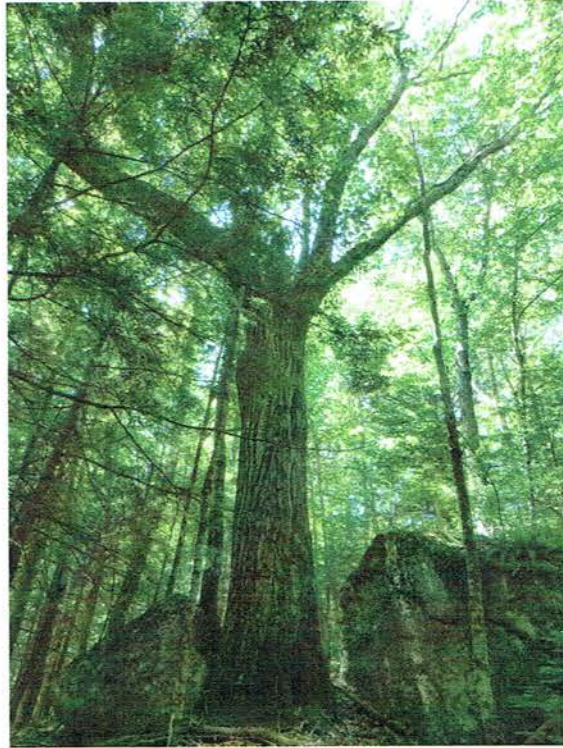
FOREST MANAGEMENT PLAN

for the

McNeil Woods

Deerfield, New Hampshire

63± acres



Commissioned By:

**The Deerfield Forestry Committee and
The Deerfield Conservation Commission**

Prepared by:

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July 2, 2013**



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Consulting Forester
Report Copy # _____**

FOREST MANAGEMENT PLAN
for the
McNeil Woods
Deerfield, New Hampshire
63± acres



Large diameter red oaks amongst hemlock in the McNeil Woods.

July 2, 2013

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The purpose of this plan is to provide natural resources information and forest and wildlife management recommendations to the Deerfield Forestry Committee and the Deerfield Conservation Commission, citizens of Deerfield, and others interested in the management of the McNeil Woods in Deerfield, New Hampshire. This document is a work for hire done by Moreno Forestry Associates for the Town of Deerfield, New Hampshire, and may be used by the Town of Deerfield, New Hampshire for any purpose. Copying of this plan by any other individual or organization, including all written material, plan content and format, requires appropriate citation and/or the written permission of Charles A. Moreno, Consulting Forester.



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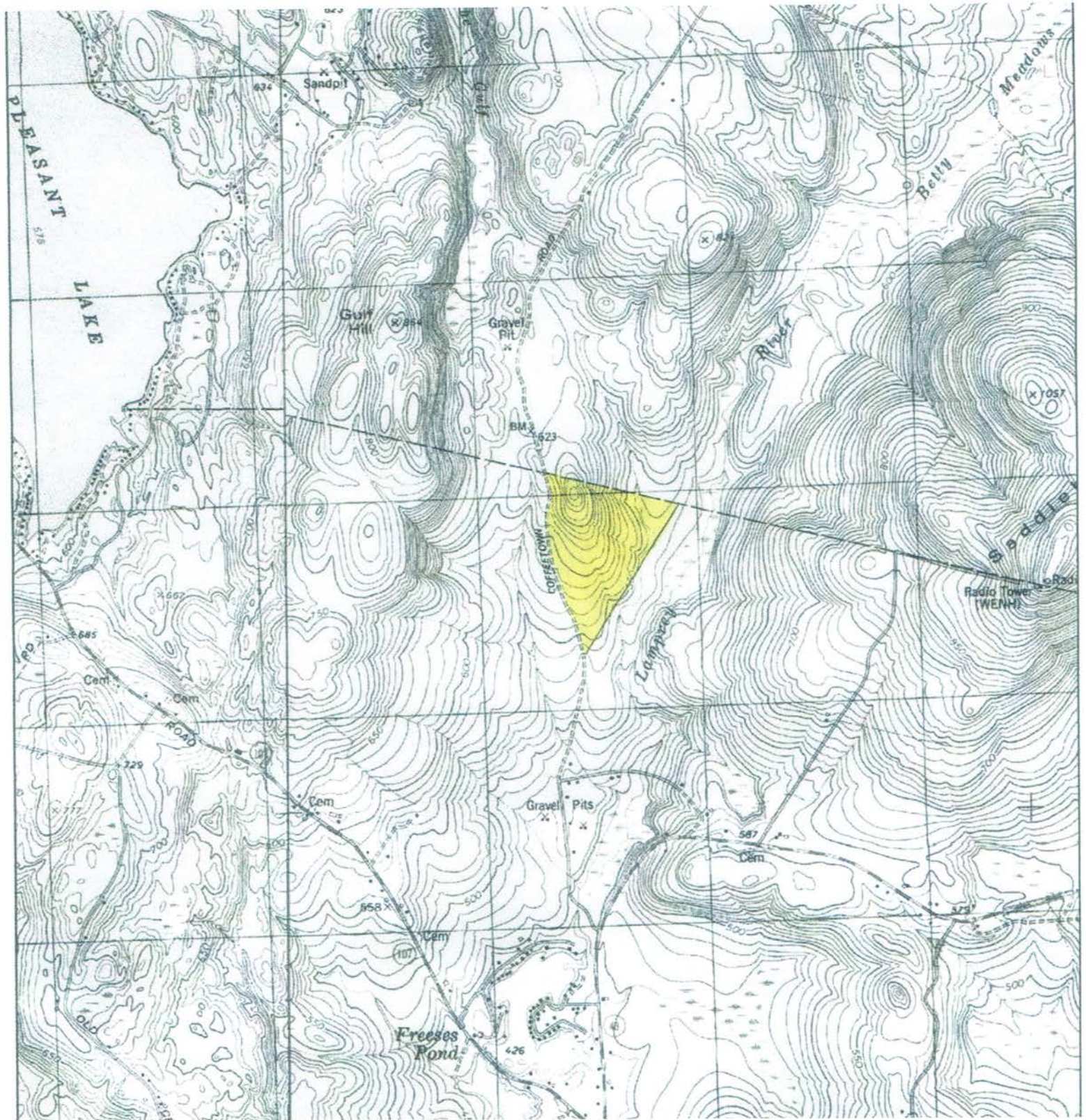
MAPS

**Locus Map of the
McNeil Forest
Deerfield, New Hampshire
64± Acres**

MAP SCALE:



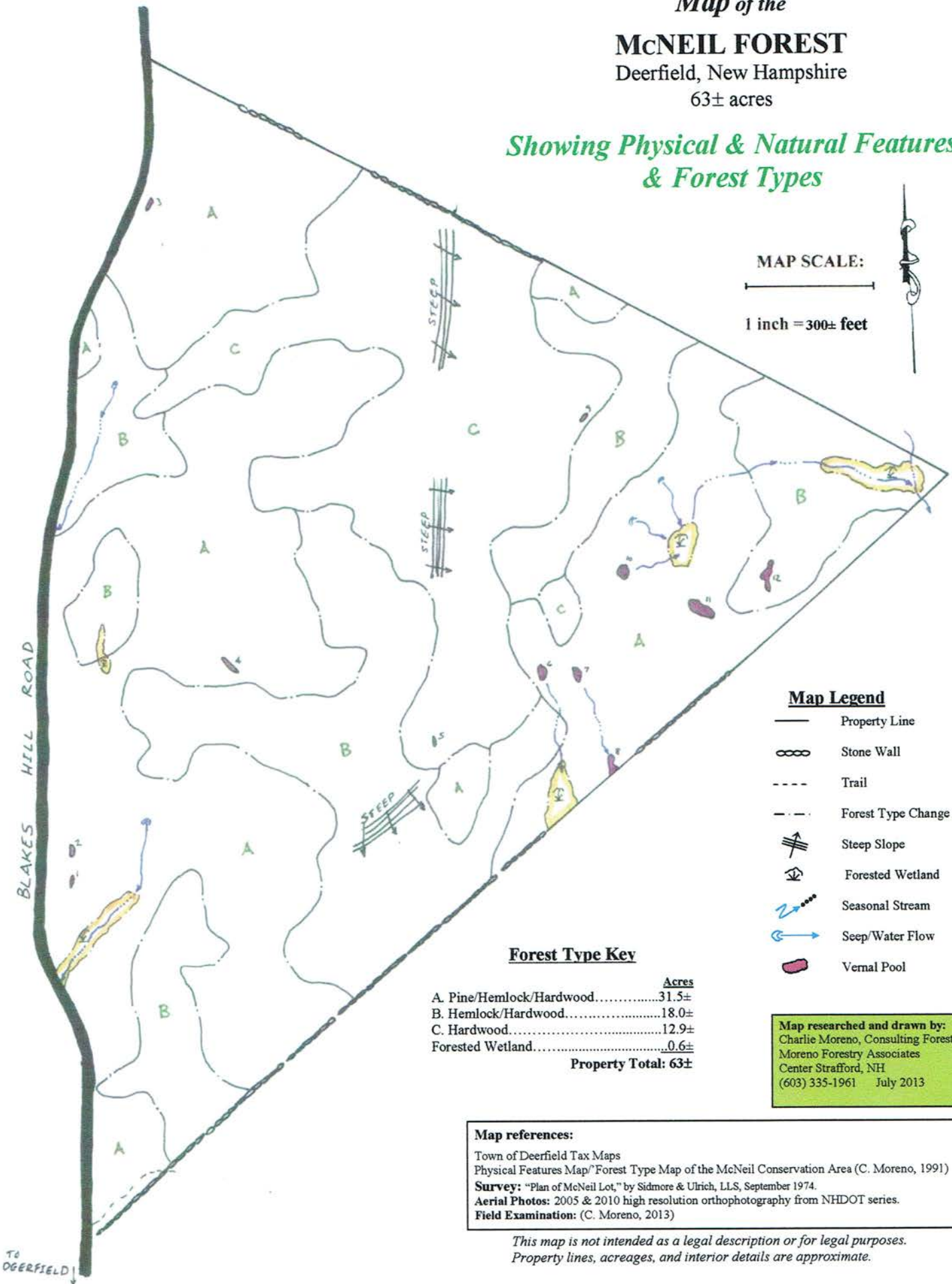
1 inch = 2000± feet



USGS Topographic Map, "Northwood" Quadrangle

Map of the
McNEIL FOREST
 Deerfield, New Hampshire
 63± acres

*Showing Physical & Natural Features
 & Forest Types*



MAP SCALE:
 1 inch = 300± feet

Map Legend

- Property Line
- ∞ Stone Wall
- - - Trail
- · - · Forest Type Change
- ⚡ Steep Slope
- ⊕ Forested Wetland
- ~ Seasonal Stream
- ↻ Seep/Water Flow
- Vernal Pool

Forest Type Key

	<u>Acres</u>
A. Pine/Hemlock/Hardwood.....	31.5±
B. Hemlock/Hardwood.....	18.0±
C. Hardwood.....	12.9±
Forested Wetland.....	0.6±
Property Total: 63±	

Map researched and drawn by:
 Charlie Moreno, Consulting Forester
 Moreno Forestry Associates
 Center Strafford, NH
 (603) 335-1961 July 2013

Map references:
 Town of Deerfield Tax Maps
 Physical Features Map/Forest Type Map of the McNeil Conservation Area (C. Moreno, 1991)
Survey: "Plan of McNeil Lot," by Sidmore & Ulrich, LLS, September 1974.
Aerial Photos: 2005 & 2010 high resolution orthophotography from NHDOT series.
Field Examination: (C. Moreno, 2013)

*This map is not intended as a legal description or for legal purposes.
 Property lines, acreages, and interior details are approximate.*

Map of the
MCNEIL FOREST
 Deerfield, New Hampshire
 63± acres

Showing Management Recommendations



Map Legend

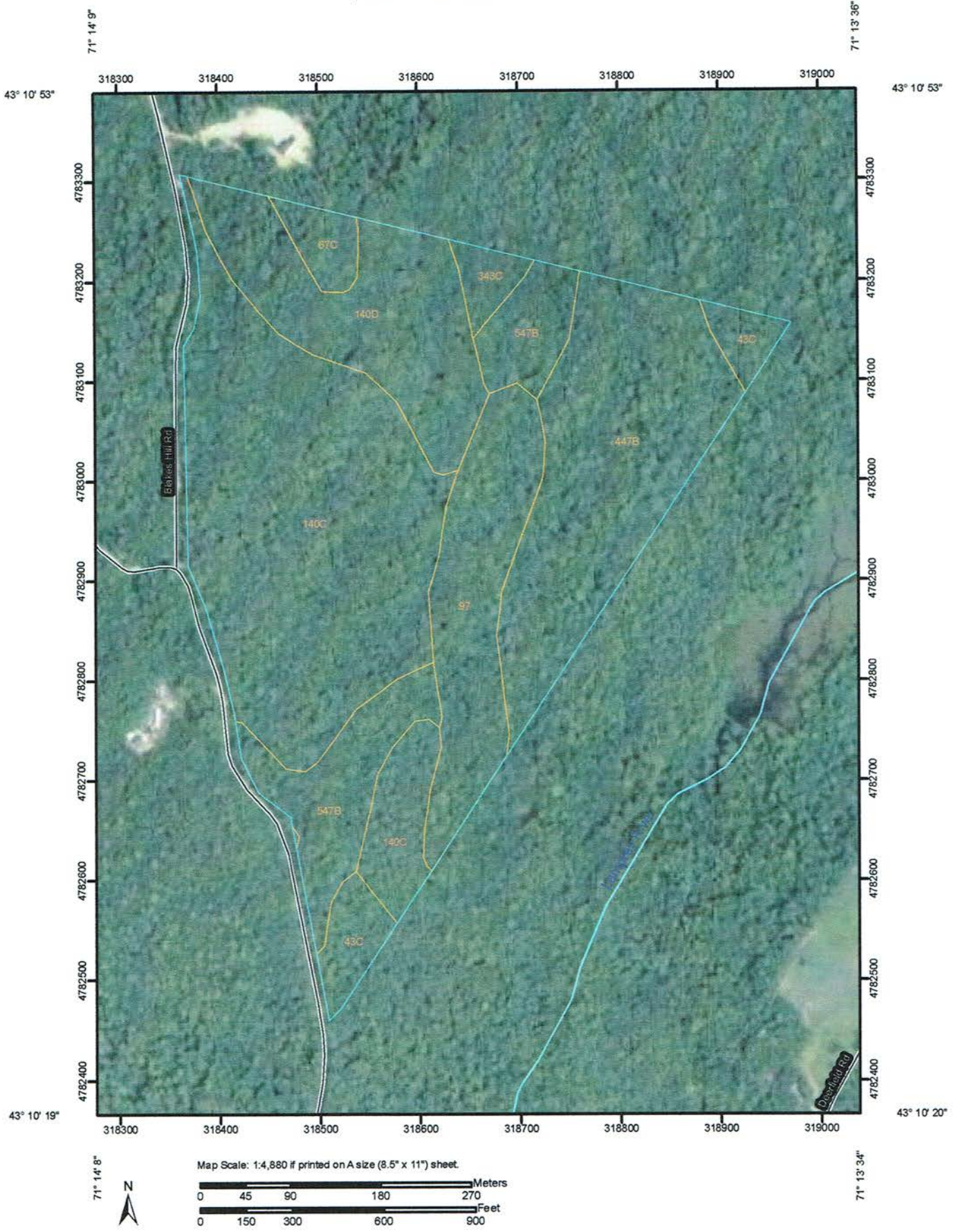
- Property Line
- ⊗ Potential Landing
- - - Potential Trail
- ⊕ Forested Wetland
- ~ Seasonal Stream
- ↔ Seep/Water Flow
- Vernal Pool
- Silvicultural Management Area (52± acres)
- Reserve Areas (11± acres)

Map researched and drawn by:
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 Property lines, acreages, and interior details are approximate.*

Soil Map—Rockingham County, New Hampshire
(McNeil Lot, Deerfield, New Hampshire)



INTRODUCTION & OBJECTIVES

The McNeil Woods Deerfield, New Hampshire

INTRODUCTION

The McNeil Woods property covers 63± acres of decidedly rugged terrain. Most of the property contains low knolls with very rocky ground. Ledge outcrops, glacial erratics, and talus accumulations are characteristic of the property's terrain. A steep central ridge drops to more level ground that approaches the Lamprey River floodplain on the adjacent property. The property's forest is mid-aged to mature, having escaped logging and natural disturbance for at least 5 decades. The property contains numerous hemlocks, red oaks, and black birch that are 140 – 180± years of age.

Remote from town, the parcel is undeveloped at present, lacking trails or any significant recreational use. The property lies adjacent to the NALMC property association, a contiguous group of properties (private, school, town, and State) covering 3,000± acres which are permanently protected from development.

PROPERTY INFORMATION

LOCATION and GEOGRAPHY

The McNeil Woods is located on the east side of Blake Road in the north-central section of Deerfield. The property's north boundary is on the Deerfield-Northwood town line, and the property lies 3.5± miles from the town center.

The property is situated on the southerly edge of the Sebago-Ossipee Hills and Plain Ecoregion¹, approximately 29± miles inland from the Atlantic Ocean. The area's climate is moderated by the sea, which in turn, influences the forest's species composition. The McNeil Woods lies at the northerly extent of the Appalachian oak-pine zone, at the beginning of the transition hardwood-conifer zone². A few red spruce, a boreal forest species, were noted.

The property is situated within the Lamprey River watershed. Soils on the property are formed from glacial tills and are underlain by metamorphic bedrock. Topography is rolling (8 – 15±% grades), with steep slopes (35+%) along the central ridge on the property. The property's high elevation is 690 feet above sea level at the top of the knoll in the northeastern section of the property, while the low elevation is 540± feet in the easternmost property corner.

¹ Keys, J.E. and C.A. Carpenter. 1995. Ecological Units of the Eastern United States: First Approximation. U.S. Department of Agriculture, Forest Service.

² Sperduto, D. D. and W.F. Nichols. 2004. Natural Communities of New Hampshire. New Hampshire Natural Heritage Bureau and The Nature Conservancy.



REFERENCE INFORMATION

Surveys:

> “Plan of McNeil Lot”, by Sidmore & Ulrich. LLS, Sept 1974.

Aerial Photos: 2005 and 2010 high resolution orthophotography from NHDOT series.

Tax Maps: Deerfield Tax Map 406, Lot 12.

Acreeage: TOTAL – 63± Acres

Upland forest –	61.3± acres
Wetland forest –	1.7± acres
Wetlands (open) –	0.0± acres
Field	– 0.0± acres

PROMINENT PROPERTY FEATURES

- A significant number of 140 – 180± year old hemlocks, red oaks, white pines, sugar maples, and black birch.
- Approximately one dozen vernal pools.



Vernal pool #7 in the McNeil Woods.

- The parcel is contiguous to a large, extensively protected, open space block that includes the Lamprey River headwaters.
- The property’s rugged terrain, with strewn boulders and multitudes of rock; the east slope of the central ridge is steep and rocky/ledgy.



KEY PROPERTY FINDINGS

- Maturing, upland forest covers almost 98% of the McNeil Woods.
- The property contains a significant number of 140 to 180± year old trees of various species, both scattered and in small groups. The great majority of the property's trees are mid-aged, however: 65 to 125± years.
- Only a few small pockets (< 1 acre) of younger forest growth, 30-40± year, were noted. Young forest covers less than 1% of the property area.
- White pine, hemlock, red oak, red maple, and beech are the most common tree species.
- Pitch pine, shagbark hickory, and aspen were not noted on the property.
- Hemlock regeneration is ubiquitous on the property.
- The property does not contain an extensive wetland or significant stream.
- At least a dozen vernal pools were found in the McNeil Woods. Most are open, and during wet years, retain water into early July.
- Any surface runoff from the central ridge to the east travels towards the Lamprey River, which lies about 1/4 ± mile beyond the McNeil Woods' boundary.
- The property's forest provides softwood thermal habitat and mast forest, and generally, undisturbed habitat that lies adjacent to extensive protected forest.
- This well-shaded, established forest habitat supports: Broad-winged hawk, barred owl, pileated woodpecker, blue-headed vireo, wood thrush, black-throated green warbler. Red squirrel, porcupine, gray fox, white-tailed deer, and black bear. Northern goshawk might also utilize this forest.
- The property does not have any known endangered/threatened plant or animal species, or natural communities (present NH Natural Heritage Bureau data check). Within one mile, Blanding's turtle has been reported, likely associated with the Lamprey River riparian area, but possibly making use of some of the property's eastern vernal pools, or pools in the surrounding area.
- The property appears to be free of non-native, invasive plants.
- Forest management access: The property lacks forestry access. A landing site must be established to do forestry.
- Recreational access: The property lacks trails (with the exception of an entrance trail that quickly leaves the property onto the adjacent forest). The parcel's main present use is hunting.



MANAGEMENT OBJECTIVES

Recommendations for the management of the McNeil Woods are based on the natural resource findings for this study and corresponding long-term management objectives which the Deerfield Forestry Committee and Deerfield Conservation Commission have considered for the property. These objectives include:

- **TIMBER: Sustainably manage the timber resource.** About 80% of the property's forestland area is recommended for silvicultural management with periodically scheduled harvests. In the actively managed areas of the property, periodic harvests are for the purpose of maintaining forest health and wildlife habitat; improving forest growth and timber quality; regenerating a variety of tree species, including substantial commercially valuable species; and generating income for Town Forest management or other conservation purposes.
- **WETLANDS: Protect vernal pools and wetland integrity.** Though the property contains limited wetlands, vernal pools are an important feature. Protection of the property's wetlands is a major objective to maintain water quality, hydrologic function, and valuable habitat. Forestry activities are minimized in the vicinity of the vernal pools, where minimal harvest buffers (75 to 100± feet wide) are suggested.
- **WILDLIFE: Protect and enhance wildlife habitat.** The McNeil Woods are part of a 3,000± acre block of unfragmented open space. This large forest area is valuable for a diversity of mammals, birds, reptiles, amphibians, and fish. The McNeil Woods represents undisturbed, well-established forest habitat. Silvicultural management will serve to prompt the progression towards structural complexity—multiple age classes, canopy layers, woody debris, etc., as well as promoting mast sources.
- **RECREATION: Manage for light-impact recreation.** The McNeil Woods are lightly used by the public, presently mostly for hunting. There are no significant trails, allowing the opportunity to manage the property as a trail-less area for wildlife. However, establishing a connector trail to the adjacent NALMC management area is also a possibility.
- **FINANCIAL: Manage the property on a breakeven or positive cash-flow basis.** Carefully staged harvests in silviculturally managed areas will improve the timber inventory and establish favorable regeneration. Financially, improvement cutting will provide a positive cash flow of \$6,000 - \$9,000± every 15 years.
- **ACCESS: Establish basic forest management access.** To stage silvicultural prescriptions, a short woods road and landing site must be constructed off the Blake's Hill Road frontage. Two possible sites are presented as options in this study.
- **FOREST HEALTH: Maintain a healthy forest in managed areas:** 1) Improve forest growth and promote quality timber; 2) Remove diseased or poor quality trees (with low wildlife value); 3) Encourage the regeneration of diverse mid-successional species including white pine, red oak, white oak, sugar maple, black birch, and yellow birch. 4) Discourage beech regeneration; 5) Manage for tree age variety, including patches of young growth, ample mid-aged forest, and older growth, 150 to 200+ years old; and 6) Respond to the looming hemlock wooly adelgid incursion.



FOREST MANAGEMENT CONCERNS

Hemlock Woolly Adelgid – Hemlock is a signature species of the McNeil Woods, found in all canopy layers across much of the property. Though infestation by hemlock woolly adelgid (HWA) was not noted during the present study (spring of 2013), HWA has been recently found nearby. It is likely that the property's hemlocks will succumb to this insect within the next 5 to 20 years unless an effective biological control is discovered in the interim.

- Loss of hemlock will drastically change the forest's composition and structure, altering habitat and scenic appeal.
- Substantial removal should be considered due to the fire hazard that would be posed by a number of dying or dead hemlocks.
- Salvage of hemlock should be timed perhaps after their decline, with the hope that a control will be found before the trees' death.

Forest Regeneration – The McNeil Woods forest is well-established, with minimal disturbance since the 1940's (most recent significant logging). As a result, forest regeneration is shade tolerant and mostly hemlock.

- This condition has excluded a number of species—for example, though an abundance of one-year red oak seedlings were noted, few will survive under the closed canopy.
- With HWA arrival, this condition will likely change; as hemlocks in all canopies succumb, more sunlight will reach the forest floor triggering the growth of other species.
- A diversity of site-appropriate regeneration, including white pine, red oak, sugar maple, black birch, and yellow birch, is favorable. White oak, shagbark hickory, and American chestnut, though not currently present, are also desirable.
- With the loss of hemlock, beech will likely increase in understory abundance. Limiting the proportion of beech through silviculture is recommended to foster the establishment of other species.

Property Access – Establishing forest management access is necessary since the property currently lacks feasible access.

- There are few possible landing locations along Blake's Hill Road.
- The establishment of a landing and a short access road requires tree removal, excavation and grading, altering roadside aesthetics and incurring cost. The landing can be installed as part of the first planned forest harvest operation.
- Two landing location options are presented in this plan.
- During the long interim (15± year) between harvests, the landing road can provide additional parking for property visitors.

Forest Aesthetics – Forest aesthetics will likely change significantly in the upcoming years with forest management and the arrival of HWA.

- The visual effects of forest harvesting can be mitigated by light harvests, and by lopping or removal (with biomass harvesting) of brush.
- Even with carefully rendered logging, negatively-perceived visual effects may last two to three years.
- A follow-up salvage of dying hemlock may be needed to lessen the visual effects of HWA.



Recreational Development – Should the property remain status quo, with minimal parking and lightly used for hunting? Or should a trail be established, connecting to NALMC, allowing for increased public access and recreational use? This policy question must be addressed in the future.

- The present status has a light footprint, with virtually no impact to wildlife.
- Parking and trail creation will introduce a new level of activity. Light pedestrian traffic may also have minor wildlife impact.
- Heavier usage, especially if ATV's discover the trail(s), will alter forest habitat.

Emerald Ash Borer – White ash is uncommon on the property. However, all ashes are threatened by emerald ash borer, a new non-native insect.



RECOMMENDATIONS & LOGISTICS

PROPERTY MANAGEMENT TEMPLATE

Management Template

Silvicultural management of the McNeil Woods should occur periodically (once every 15± years) as a single operation covering all managed areas of the property (approximately 52± acres are suggested). Access for silvicultural work would occur from a single landing site situated off Blake's Hill Road. When not in use to stage a harvest, the woods road may serve as a small parking area for recreational access.

Forest Access

While the property's road frontage extends 2800± feet, potential access points are limited due to ledgy, steep terrain, and stream drainages along much of the frontage. Two possible access points were located during the present field study, as illustrated in the Forest Recommendations Map. These are summarized as follows:

The southernmost potential access (Option #1) enters over a short grade, and then bears left, for a total road distance of about 200± feet. A 1/3± acre landing site must then be graded in an area between knolls. This access point may be better situated to maneuver through the central ridge area and access the eastern portion of the property. Projected cost is about \$2,500±. Gravel is probably unnecessary.

A second possible access point (Option #2) may be established in the central area of the road frontage. A woods road must be constructed, switch backing over a short, ledgy grade, and then bearing right for a total distance of 300-400± feet. A 1/2± acre landing would then be established on a level area at the end of the road. While allowing for a larger landing site, this route is probably more costly and also skirts a small wetland. Additionally, gravel maybe needed to fill over ledge near the road entrance. Projected cost is \$3,500±.

Recreational Access

Historically, the main public use of the property has been hunting. Recreational access in the form of trails is essentially undeveloped (a trail enters the property's southern corner but quickly exits the parcel). There is only minor evidence of public usage, and this is likely due to the property's remote location from town, lack of trails, and possibly, less widespread knowledge of land's presence.

This is not necessarily an adverse situation. Trail-less forest, which includes areas only lightly used for hunting, is generally impact-free for wildlife. Forest trails, especially if heavily-used, may disrupt breeding and nesting activities of birds, in particular. For example, deep forest birds, such as goshawks, are not likely to nest in areas frequented by people. With this caveat in mind, in the near future, a trail-based opportunity may present itself for the property.

The McNeil Woods lies adjacent to the Northwood Area Land Management Collaborative (NALMC) which includes 2500± acres of protected land under a diversity of ownerships. Member landowners are attempting to shape a shared management vision. Trails are a part of this vision, and a network of publically-accessed trails already cover interior areas of this forest block, particularly state-owned properties, which include Northwood Meadows State Park.

If the creation of a trail in the McNeil Woods is favored, it is likely that a trail link to the NALMC trails system will be urged. In this case, the trail might begin at the landing site and follow the central ridge of older forest (which is suggested as a reserve area), exiting the property



midway along the northern boundary. Unnecessary wildlife impact can be avoided *by not* creating a loop trail within the McNeil Woods.

Since the McNeil Woods lies remote from town, visitors are likely to drive (or perhaps bike) to the site. Parking is currently available in the summer along the shoulder of Blake's Hill Road for one (possible two) cars. Currently this amount of parking appears adequate. If a trail is developed, parking can be expanded to include the woods road entrance (three to four cars). The existing shoulder "pull-off" coincides with the entrance of the southernmost forest access option. Use of the landing site for parking should be limited to town-approved events (such as an educational woodlot tour) since the landing will not be fully visible from the road; open usage may invite illegal dumping or other problems. A sturdy gate on the road will probably be necessary.

Reserve Areas

Reserve areas are sections of forest that are not silviculturally managed on a systematic timetable, or acreage that is withheld from management entirely. While managed areas of the forest are thinned on a periodic (12-15± year) schedule, harvesting is generally excluded from the reserves, with the exception of potential response to natural disturbance. Any sizable natural disturbance—storm-caused, fire, insect, or disease—triggers consideration as to whether a salvage or restorative response is desirable. A harvest to salvage damaged timber and/or to allow for regeneration may then be applied. In general, harvest interventions do not follow a silvicultural schedule, and in some cases, may rarely, if ever, occur.

On the McNeil Woods, the suggested reserve area is similar to the area outlined in the 1991 Forest Management Plan, with minor changes. It is suggested that all the extremely steep, rocky areas of the central ridge be included as reserve. By contrast, a smaller area of the eastern property corner is suggested: the forested wetland area with interlacing seasonal streams. In addition to excluding regular logging from these difficult sites, some of the oldest trees on the property lie in these reserve areas.

Vernal pools in the McNeil Woods and their immediate edges are considered "full" reserves, since management activity, with the exception of invasive plant control, will be entirely excluded from these wetlands.

Most of the McNeil Woods reserve areas will be defined as "modified reserves", as some intervention is allowable. In addition to salvage response to certain natural disturbances, activity may include invasive plant control, and trail establishment and maintenance. The looming presence of hemlock wooly adelgid (HWA) may prompt an extensive salvage response on the property, which may also involve the reserve areas.



CAPSULE RECOMMENDATIONS for PROPERTY

The following projects are recommended for the McNeil Woods, and categorized according to *present* priority:

High Priority:

- **Access** – Establish forest management access to the property, including an adequate landing site and connecting woods road.
- **Silviculture** – 52± acres of the property are recommended for silvicultural management. Harvests aim to improve conditions for trees with good value-growth potential, and to initiate canopy gap creation to allow for new tree generations, preferably with species diversity. Management of hemlock, in response to the impending arrival of HWA, is also an objective. Follow-up TSI may be needed to release favorable regeneration and minimize beech proliferation.

Medium Priority:

- **Surface Water Features** – Protect the integrity and function of the property's vernal pools, seasonal drainages, and forested wetland pockets, using minimal harvest buffers.
- **Wildlife** – Continue to develop complex forest structure in silviculturally managed areas: varied tree age, canopy cover, and accumulated woody debris. In addition to encouraging young growth and maintaining ample mid-aged forest, retain the existing older growth component (150+ years) of the forest.
- **Recreation** – Address the issue of continuing light property usage, especially hunting, or introducing a recreational trail that connects to the NALMC lands.

Low Priority:

- **Boundary Maintenance** – Property lines were recently axe-blazed and painted (2011±). The next boundary maintenance should be scheduled for 2021±. Collectively, the McNeil Woods has 4,700± feet of surveyed boundary requiring periodic maintenance.

FINANCIAL PROJECTIONS

The recommended area for silvicultural management on the McNeil Woods covers 52± acres. Projected net revenue from the initial harvest is \$8,500±, not including road and landing cost. The cost of access establishment is projected as \$2,500 - \$3,500±. Thus, the town can expect to net, after expenses (including road and forestry costs), approximately **\$6,000±** from the first improvement harvest on the property. Subsequent harvests, once every 15± years, will likely net \$8,000±.



NATURAL RESOURCES

NATURAL RESOURCE SUMMARY

SOILS PROFILE

Soil mapping is derived from the NRCS Web Soil Survey for Rockingham County, with the following inaccuracy noted: The property does not contain *Greenwood and Ossipee* soils, ponded. This area at the eastern foot of the central ridge is more likely a *Scituate-Newfields* soil area. Mapped soils types are described below.

Upland Soils

- 1) *Chatfield-Hollis-Canton (140)* – Underlying 50% of the property, this soil complex includes contains shallow-to-bedrock areas (*Hollis*), with exposed ledge in the central ridge area. Extensive areas of stony glacial till material (*Chatfield*) and gravelly pockets (*Canton*), which tend to be well-drained, are intermixed, covering much of the land along Blake’s Hill Road. With the exception of thin soil areas, the soil complex is productive for red oak, black birch, and white pine. Enriched areas grow fine sugar maple and white ash.
- 2) *Canton (43 & 343)* – Found in three scattered pockets which collectively cover 5±% of the property, this glacial till is deep and well-drained. The surface layer of *Canton* is gravelly loam, with a substratum (below 2½ feet) of loamy sandy and varying amounts of silt. While seasonal high water table is below 6 feet, *Canton* is typically wet during spring thaw or after extended rainy periods. The north-central pocket is extremely bouldery. This soil is productive for both pine and hardwood growth.
- 3) *Paxton (67)* – Underlies the northern crest of the property’s hill. This fine sandy loam is well-drained on its surface, but contains a clay layer 1½ feet below the soil surface that restricts water permeability. Water is thus available for tree growth during dry summer months, with productive results.

Mesic and Wetland Soils

- 1) *Scituate-Newfields (447)* – These intermixed sandy loams (till) underlie much of the eastern section of the property, below the central ridge. The soils have a seasonally high water table that is prone to wetness, particularly in spring and late fall, when logging equipment may create soil ruts. The soils are productive for mixed hardwoods and hemlock. While white pine grows well, trees are prone to blowdown, though the site’s lower elevation has sheltered the trees.
- 2) *Walpole (547)* very fine sandy loam, very stony – This poorly drained soil underlies the scattered, rocky drainages on the property. Red maple is typically associated with this soil.



SURFACE WATER RESOURCES

The McNeil Woods within the Lamprey River watershed. The Lamprey's headwaters are located on the nearby Northwood Meadows State Park. A marshy segment of the river flows ¼ mile east of the McNeil Lot. All surface run-off from the eastern side of the property flows into this section of the Lamprey.

The property contains relatively few surface water features. Most prominent are a series of small vernal pools, all under ¼± acre in size. Six of the pools are clustered in 10± acres of the property's eastern area. The rest are mostly scattered in nature.

A few minor seasonal drainages area also found. The largest drains a set of small forested wetlands in the eastern property corner.

Please refer (page 2) to the property's *Physical Features and Forest Types Map* for an illustration of the parcel's wetlands and streams. A summary of vernal pool conditions is found in the Appendix A.

WILDLIFE HABITAT

LANDSCAPE CONTEXT

The McNeil Woods is situated in the southwestern section of a 3,000± acre block of undeveloped and unfragmented land that straddles the Deerfield—Nottingham town line. With extensive forest and outstanding riparian habitat, this block is home to a variety of mammals, (including moose, black bear, beaver, otter, and mink), as well as waterfowl (wood duck, black duck, teal, etc.), wading birds (great blue heron, green heron) and raptors.

PROPERTY HABITATS

The McNeil Woods core forest habitats include mast forest (oak and beech); softwood thermal forest; and wetland forest. Wetland habitats include vernal pool and stream/riparian.

Forest Habitats



Wildlife cavity in old red oak, possibly home to flying squirrels.

Mast forest is represented by Forest Type C, primarily, though the other two Forest Types A and B, also contain a substantial mast tree component. Red oak is the primary source of hard mast—acorns—on the property. Beech is a secondary source. Older oaks with well-developed, spreading crowns are common, and are important for copious acorn production; silvicultural management of the forest will aim to retain and grow large-crowned oaks.

Softwood thermal forest (Forest Types A and B) covers over 2/3rds of the property. Hemlock and white pine are the major softwood species, with hemlock is largely responsible for thermal cover. Winter and summer temperature extremes are moderated under the dense hemlock shade.

Wetland forests pockets are few. All are relatively small and are associated with seasonal drainages. Red maple and hemlock are typically the dominant species.



Wetland Habitats

Vernal pools—The property contains 12 potential vernal pools. All the pools are relatively small and open, with only one pool (#11) that is heavily vegetated. Flowing inlet and outlet streams are not found in the vernal pools, though some have shallow outflow drainages that have short duration. The pools are ephemeral—generally flooding during the spring and sometimes autumn, and drying out during the summer. The resulting fish-free habitat provides important breeding sites for many amphibians, reptiles, and fresh-water crustaceans. Wood frogs, spring peepers, pickerel frogs, spotted salamanders, and fairy shrimp are indicator species utilizing vernal pools. The surrounding upland forest and any nearby forested wetlands are critical to the year-round activities of several of these species.

The flooding longevity after spring thaw—the hydroperiod—is an important factor in the habitat quality of a vernal pool. Many species associated with vernal pools occur in greatest abundance when the hydroperiod is long, not drying until July or later.³ Only a few of the pools appear to have a substantial hydroperiod. A summary of vernal pool conditions is found in the Appendix A.

Stream/riparian—The property has several minor streams major steams. All are seasonal, shallow, and rocky. The streams provide possible habitat for two-lined salamander, ribbon snake, mink, and deer.

SPECIES of CONCERN / NATURAL COMMUNITIES

The New Hampshire Natural Heritage Bureau was consulted in June 2013 about the potential presence of rare species (plant or animal) or exemplary natural communities on the subject property. A database check (Appendix B) does not indicate imperiled wildlife species; however, it is possible that Blanding's turtle (state-endangered species) occasionally passes through this area. The property does not contain any rare natural communities.

WILDLIFE HABITAT RECOMMENDATIONS

Wildlife habitat management on the McNeil Woods will have two approaches. In active, silviculturally managed areas, it is integrated as part of improvement harvesting. In reserve areas, including forest and wetlands, habitat management is passive, allowing nature to take its course with minimal human interventions or disturbance.

General habitat recommendations for all areas include:

- ***Retain extensive low-disturbance, trail-less areas on the property*** to provide sections of undisturbed habitat for wildlife breeding, nesting, and denning.
- Monitor the property for invasive plants, and immediately remove any plants found.
- Retain significant areas as forest reserve to allow older growth conditions to develop naturally over time.
- Monitor HWA onset, and decide on response strategy, if any.

Specific recommendations for forested, silvicultural areas include:

- Retain and encourage the growth of broad-crowned, mast-producing oaks.
- Encourage and/or introduce alternative sources of hard mast sources such as white oak, American chestnut, shagbark hickory, and beaked hazelnut.
- Retain snags, cavity trees, blowdowns, and downed woody debris.

³ Matt Tarr and Kimberly J. Babbitt. "The Importance of Hydroperiod in Wetland Assessment". UNH.



- Promote the growth of fruit-bearing wetland shrubs, by clearing small patches near forested wetland edges.
- Through improvement cutting, increase forest canopy layering over time and develop more complex forest structure.
- Attempt to retain hemlock thermal cover and travel corridors.
- Retain and allow the growth of old legacy trees over time (trees that reach 200 to 300+ years). These may include scattered individuals as well as ancient tree groves.
- Leave a 50± foot minimal harvest buffer along the property's active vernal pools. Within 200 feet of the vernal pools, apply low-impact practices.
- Minimize stream crossings when harvesting.

FOREST RESOURCES

SPECIES COMPOSITION

The McNeil Woods has relatively low tree species diversity, with five species dominating composition. A qualitative approximation of the property's forest overstory tree species abundance is:

- Abundant – Hemlock, red oak, red maple.
- More Common – White pine, beech.
- Common – Black birch.
- Less Common – White birch, yellow birch, sugar maple.
- Scarce – White ash, hophornbeam.
- Rare – Gray birch, black cherry, American elm, black ash, white oak, red spruce, red pine, basswood.
- Not Observed – Shagbark hickory, pitch pine, red cedar, balsam fir, big-tooth aspen, quaking aspen, black willow, American chestnut.

FOREST STRUCTURE

The McNeil Woods' forest developed from pasture that was likely abandoned in the late 1800's. Perimeter stonewalls, scattered "pasture pines", and old remnant hardwoods, indicate the formerly open conditions.

At least one extensive harvest occurred on the McNeil Woods since forest establishment. White pine and perhaps other trees were removed from the property's central and eastern areas, possibly to salvage blowdowns from the Hurricane of '38, but more likely, as a partial timber harvest in the early to mid-1940's. A few small forest pockets were cut in the 1970's, creating three young forest patches totaling about 1± acre. No other harvesting or acute natural disturbance appears to have occurred on the property.

Therefore, the McNeil Woods are largely even-aged or two-aged. The overstory forest canopy is mostly closed throughout the property. Hemlock sapling growth is dense in areas, growing under this full canopy.



SILVICULTURAL OVERVIEW and SCHEDULING

SILVICULTURAL OVERVIEW

The McNeil Woods have not been harvested in many years. The 1991 Forest Management Plan outlined silvicultural management for the property, but perhaps, due to lack of access, the work was not implemented. With the impending arrival of hemlock wooly adelgid (HWA), initiating management of the property may be more critical than in the past.

Hemlock represents 30±% of forest composition. HWA may largely eliminate this species over the next 5 to 20± years. Silvicultural management at present can expedite the forest regeneration process, so that there will be a new generation of replacement trees already established prior to the loss of the hemlock. If HWA somehow bypasses the McNeil Woods (highly unlikely), the new forest growth will still provide species and structural diversity to the forest.

Generally, the silvicultural strategy is to reduce the density of hemlock, including in the understory, so that their overall proportion is 20±%. The removal of some hemlock will create canopy openings for new growth, and decrease the amount of hemlock that must be salvaged in the future. However, a reasonably strong hemlock presence should be retained through the course of HWA infestation, to allow the forest longer time to adapt to hemlock loss, and to maintain the small possibility that a few hemlocks survive infestation. Harvesting should also remove other diseased and/or declining trees, particular black birch with *Nectria* and beech with scale disease.

As with other Town Forestland tracts, silvicultural goals are also to provide growing space and upgrade the quality of the forest overstory, and to regenerate a wider diversity of species.

HARVEST CYCLE and LOGISTICS

Silvicultural treatment of the McNeil Woods is planned on a 15± year harvest interval. This interval may be disrupted by the need to salvage hemlock during the intervening years. If this occurs, the interval should be “re-set” for another 15 years after the salvage is completed.

The best times to stage a harvest in the McNeil Woods is June-October and January-February. Mechanized/biomass is recommended as the harvesting method, as this will allow the removal of hemlock, including sapling-sized trees.



FOREST TYPES

A. Hemlock/Pine/Hardwood – 31.5± acres

Description – Covering nearly half the forest area, this forest type is characterized by the presence of overstory white pine, though variable, in all its variants. The main variant A1) Hemlock/Pine/Hardwood, also contains hemlock and hardwoods in the mix. Two other variants, found in relatively small, intermixed pockets include: A2) White Pine/Hardwood, and A3) White pine. Hemlock may still be present in the overstory of the latter variants, but in much smaller proportion. Hemlock is also often common in mid-story and understory canopy positions. The presence of beech, black birch, and white birch is variable. White ash and sugar maple are present in enriched bowl areas. This forest type contains fine quality red oak (vener quality, 12-22± inches) and average to above average white pine (14 to 24+ inches).



Species Composition

Primary ¹	Hemlock, red maple, red oak.
Secondary ²	White pine, beech, black birch, white birch.
Tertiary ³	White ash, sugar maple.
Regeneration (saplings)	Hemlock.

¹ Dominant tree species in main canopy layer.

² Fairly common to less common tree species.

³ Less common, or a unique tree species with only one or a few specimens in the forest type.



Forest Structure: Forest Type A

Forest Structure	
Composition	
Stand Structure	Two-aged w/ older residuals
Successional Stage	Mid to late-intermediate
Stand Age	60-70//90-110± years (scattered residuals up to 140 or 150± years)
Tree Size	
DBH range	7 – 24± inches
Mean DBH	12± inches
Avg. Max. Height	70± feet
Stand Density	
Relative Stocking	Considerable to dense
Basal Area/Acre	205± sq. ft./acre
Trees/Acre	250± trees
Canopy Closure	90-100± %
Wildlife/Ecological	
Wildlife Features	Summer and winter thermal cover. Partial mast source (red oak)
Canopy Stratification	Good – some understory, good midstory, and well-established overstory with supercanopy pines.
Woody Debris	Good accumulation, including some large trunks.
Invasive Plants	No known incidence.

Forest Type A -- Prescription

Objectives – Provide growing space around the crowns of healthy, vigorously-growing white pine, red oak, and black birch. Lower the proportion of hemlock, while removing poorer quality trees, partly to release healthy trees, but also to create canopy openings for regeneration. Lower the proportion of hemlock from all canopy layers by approximately 1/3rd.

Silvicultural Sequence: Two-aged (present)→ Multi-aged (2050)

Harvest Cycle: 15± years

Silvicultural Treatments:

2014±: *Improvement cut/Crown thinning and Single-tree/micro-group selection.*

2014- 2029 *Monitor stands for HWA presence. Prepare a hemlock salvage response if warranted.*

2029±: *Single-tree/expanded micro-group selection.*

2044±: *Single-tree selection/Expanded group selection . Follow-up with TSI (inter-sapling release) in understory.*



B. Hemlock/Hardwood – 18.0± acres

Description –

While similar to the hemlock/pine/hardwood type, this forest type lacks white pine. Extensive areas of the upland variant (B1) of this forest type are found near Blake’s Hill Road the western and



Hemlock/hardwood: Dry site variant.



Hemlock/Hardwood: Moist site variant.

central ridge areas. The stands contain many of the oldest trees on the property, including hemlocks, red oaks, and black birches. Red oak is an important timber species in this variant. A somewhat less extensive, moist variant of this type (B2) contains mesic hardwoods. This variant is particularly evident in the eastern corner of the property. Yellow birch is fairly common in this stand.

<i>Species Composition</i>	B1) Dryer Variant	B2) Moist Variant
Primary	Hemlock, red maple, black birch.	Hemlock, yellow birch.
Secondary	Red oak, yellow birch, white birch, beech.	Red maple, sugar maple, white ash, black birch.
Tertiary	White pine, black cherry, spruce, red pine.	Red spruce, red oak, white birch, basswood.
Regeneration (saplings)		



Forest Structure: Forest Type B

Forest Structure	B1) Dryer Variant	B2) Moist Variant
<i>Composition</i>		
Stand Structure	Two-aged w/ older residuals and inclusions	Two-aged w/ older residuals
Successional Stage	Mid- to late-intermediate	Late-intermediate to mature
Stand Age	60-70 // 100 – 140+ years (scattered older residuals)	60-70 // 100 – 140+ years (scattered older residuals)
<i>Tree Size</i>		
DBH range	5 – 18± inches (up to 26")	6 - 24± inches
Mean DBH	13± inches	11± inches
Avg. Max. Height	80+ feet	70± feet
<i>Stand Density</i>		
Relative Stocking	Considerable/Dense	Considerable
Basal Area/Acre	300± sq. ft./acre	150± sq. ft./acre
Trees/Acre	320± trees	240± trees
Canopy Closure	90-100± %	90 - 100±%
<i>Wildlife/Ecological</i>		
Wildlife Features	Older trees. Beech snags and cavity trees. Rocky—large strewn boulders and ledge with den sites/shelter. Hemlock thermal cover. Sapsucker activity in hemlocks.	
Canopy Stratification	Fair – Ample mid-story and full overstory, but often lacks understory.	Fair – Full overstory, some supercanopy.
Woody Debris	Good, including large branches and tree trunks.	Good accumulation, including some large trunks.
Invasive Plants	No known incidence.	No known incidence.

Forest Type B -- Prescription

Objectives – Retain older forest component. Initiate diverse forest regeneration by creating openings in the hemlock canopy. Prepare for hemlock salvage response if/when HWA arrives.

Silvicultural Sequence: Two-aged (Present)→ Multi-aged (2050)

Harvest Cycle: 15± years

Silvicultural Treatments:

2014±: *Single-tree selection/micro and small group selection.*

2014- 2029 Monitor stands for HWA presence. Prepare a hemlock salvage response if warranted.

2029±: *Single-tree selection/Expanded group selection/Liberation (of regeneration).*

2044±: *Single-tree selection/Expanded group selection/Liberation (of regeneration).*



C. Hardwood – 12.9± acres

Description – This forest type represents all stands that are primarily hardwood. Though softwoods—white pine and hemlock—may be present, their stocking is minimal. This forest type is found as a large stand of upland hardwoods (C1) covering much of the central/north ridge area. In addition to containing valuable red oak sawtimber, this stand has some of the property’s oldest trees scattered amongst the steep rocky ridge. Smaller areas of enriched soils below the ridge contain mixed hardwoods (C2), with sugar maple sometimes amongst the dominant species. Three small pockets of younger hardwood growth are included in the C2) variant; these pockets contain 40± year old red maple, gray birch and white ash.



<i>Species Composition</i>	C1) Upland Hardwoods	C2) Mesic Hardwoods
Primary	Red oak, red maple.	Sugar maple, white birch, red maple.
Secondary	Beech, black birch, white birch	Red oak, black birch, white ash.
Tertiary	White pine, hemlock	Hophornbeam, black cherry, yellow birch.
Regeneration (saplings)	Hemlock, primarily. Also beech. Oak seedlings.	Hemlock, red maple.



Forest Structure: Forest Type C

Forest Structure	C1) Upland Hardwoods	C2) Mesic Hardwoods
Composition		
Stand Structure	Even-aged w/ older residuals	Even-aged w/ older residuals
Successional Stage	Mid to late intermediate	Mid-intermediate
Stand Age	60 - 85+ (scattered residuals up to 150± years)	60 - 85+ (scattered residuals up to 150± years)
Tree Size		
DBH range	8 – 20± inches	6 – 16± inches
Mean DBH	12± inches	10± inches
Avg. Max. Height	60± feet	65± feet
Stand Density		
Relative Stocking	Considerable	Moderate to considerable
Basal Area/Acre	95± sq. ft./acre	80± sq. ft./acre
Trees/Acre	120± trees	160± trees
Canopy Closure	100± %	90-100± %
Wildlife/Ecological		
Wildlife Features	Red oak and beech mast; beech with raptor nesting branch structure; tree cavities; rock crevices.	
Canopy Stratification	Fair/Good – some understory with mid-story and a well-established overstory.	Good – some understory with ample mid-story and a well-established overstory.
Woody Debris	Good accumulation, including some large trunks.	Good accumulation.
Invasive Plants	No known incidence.	No known incidence.

Forest Type C -- Prescription

Objectives – Continue to develop high-quality, broad-crowned hardwoods, especially red oak, black birch, and sugar maple. Regenerate over time as a mixed hardwood stand with pine.

Silvicultural Sequence: Even-aged (present)→Two to three -aged (2050)

Harvest Cycle: 15± years

Silvicultural Treatments:

2014±: *Improvement cut/Crown thinning/ micro-group selection.*

2029±: *Single-tree/micro-group selection.*

2044±: *Single-tree selection/Expanded micro-groups.* Follow-up with *TSI (inter-sapling release)* in understory.



APPENDICES

VERNAL POOL INVENTORY
McNeil Forest, Deerfield, New Hampshire

June 2013

VP	Area (±)	Type	Vernal Pool Hydroperiod*	Vegetation/Hydrology	Woody Debris
1	875 sq. ft.	Forested	Medium	Rocky and heavily shaded. Close to Pool 2.	Moderate
2	1,500 sq. ft.	Forested	Medium	Heavily shaded by hemlock and mixed hardwoods.	Substantial
3	525 sq. ft.	Open	Short-Medium	Open, partially shaded pool. Isolated.	Light
4	2,750 sq. ft.	Open	Long	Elongated pool. Isolated.	Moderate
5	200 sq. ft.	Open	Medium-Long	Small, but deep pool.	Substantial
6	3,500 sq. ft.	Partially vegetated	Long	Relatively deep pool with a few islands. Shaded.	Moderate
7	2,400 sq. ft.	Open	Long	Deep, heavily shaded pool with a few hummocks.	Substantial
8	4,800 sq. ft.	Densely vegetated	Long	Large pool overlaps onto neighboring property. Contains one small black ash.	Substantial
9	300 sq. ft.	Open	Short-Medium	Small, shallow pool. Heavily shaded by surrounding forest.	Substantial
10	1,500 sq. ft.	Partially vegetated	Medium	Shallow pool, shaded by hemlock, red maple, birch, and one black gum.	Substantial
11	6,300 sq. ft.	Partially vegetated	Long	Deep. Some areas densely vegetated with highbush blueberry. May have high functionality.	Substantial
12	4,000 sq. ft.	Partially vegetated	Long	Deep, open water areas with some partially vegetated islands.	Substantial

NOTES:

- > All vernal pool locations and observations were conducted in June 2013. Vertebrate/invertebrate presence requires springtime assessment.
- > Most of the listed vernal pools are year-round ephemeral, with dry period(s), but may hold water in seasons besides spring, including summer, late fall and winter.
- > The area covered by each vernal pool is the estimated average size, i.e., the inundated area during early spring (March-April) conditions.
- > Vernal pool hydroperiod is **estimated** by the depth of the pool and the vegetation present. Precise assessment requires 3 or more observations through the course of the spring/summer, which are then repeated over at least two to three years.
- > Hydroperiod* key (length of time typically holding water after spring thaw in spring/summer): **Short**--<60 days; **Medium**--80± days; **Long**-->100 days.
- > "Woody debris" includes all tree or shrub deadfall--trunks, branches, twigs--as well as live branches. Branches and twigs provide anchoring locations for amphibian egg masses. Partially submerged trunks may be used by turtles for basking.



NEW HAMPSHIRE NATURAL HERITAGE BUREAU

DRED - DIVISION OF FORESTS & LANDS

PO Box 1856 - 172 PEMBROKE ROAD, CONCORD, NH 03302-1856

PHONE: (603) 271-2214 FAX: (603) 271-6488

To: Charles Moreno, Moreno Forestry Associates
PO Box 60
Center Strafford NH 03815

From: Sara Cairns, NH Natural Heritage Bureau

Date: 2013-06-07

Re: Review by NH Natural Heritage Bureau of request dated 2013-06-07

NHB File ID: 1534

Town: Deerfield

Project type: Landowner Request

Location: Blakes Hill Rd (Tax Map 406, Lot 12)

I have searched our database for records of rare species and exemplary natural communities on the property(s) identified in your request. Our database includes known records for species officially listed as Threatened or Endangered by either the state of New Hampshire or the federal government, as well as species and natural communities judged by experts to be at risk in New Hampshire but not yet formally listed.

NHB records on the property(s): **None**

NHB records within one mile of the property(s):

	Last Reported	Listing Status		Conservation Rank	
		Federal	NH	Global	State
Vertebrate species (For more information, contact Kim Tuttle, NH F&G at 271-6544)					
Blanding's Turtle (<i>Emydoidea blandingii</i>)	2012	--	E	G4	S1
Natural Community					
Black gum - red maple basin swamp	2000	--	NH	Global	State
Medium level fen system	1998	--	--	--	S3

Listing codes: T = Threatened, E = Endangered, SC = Special Concern

Rank prefix: G = Global, S = State, T = Global or state rank for a sub-species or variety (taxon)

Rank suffix: 1-5 = Most (1) to least (5) imperiled. "--", U, NR = Not ranked, B = Breeding population, N = Non-breeding, H = Historical, X = Extirpated.

A negative result (no record in our database) does not mean that no rare species are present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

NOTE: This review *cannot* be used to satisfy a permit or other regulatory requirement to check for rare species or habitats that could be affected by a proposed project, since it provides detailed information only for records actually on the property.

CHARLES MORENO, LPF
Consulting Forester, Forest Ecologist

New Hampshire Licensed Professional Forester #115
Maine Forester License #2000

EDUCATION

B.S. FORESTRY – University of New Hampshire, Magna Cum Laude, May 1980
SAF Study Tour of France – Three-week study of French silvicultural methods, September 1983

PROFESSIONAL SERVICE and AFFILIATIONS

Forest Stewards Guild – Board of Directors (1999-2005), Chair (2005)
Society of American Foresters (SAF) – NH Chairman (1996)
New Hampshire Tree Farm Program – Executive Committee (1984-87)
Society for the Protection of New Hampshire Forests

WORK EXPERIENCE

1980 - FORESTRY CONSULTANT, founder and proprietor of Moreno Forestry Associates.
Present Thirty-three years experience managing private and public forests in New Hampshire. Projects include forest and wildlife management planning and implementation, ecological assessments, forest inventory and appraisals, timber sales, mapping, forest taxation and litigation, forest improvement and habitat enhancement, and conservation plans for towns, corporations, and private landowners. 30,000+ acres under management.

1984- TOWN FOREST MANAGER for the Towns of Exeter, Londonderry, Candia, Plaistow,
Present Brentwood, East Kingston, Deerfield, Epping, Brentwood, Sandown, Rye, Pittsfield, Derry, Dover, Madbury, Strafford, and Rochester developing/implementing multiple-use plans for publicly owned forests.

1985- ALTON TOWN FORESTER. Consultant to the Town on Current Use Assessment
1992 and NH Timber Tax matters.

1980- K-F TREE FARM, Forest Manager. Experience in all areas of woodland and wildlife
1988 management in this intensively managed, 700-acre property in Alton, New Hampshire. Selected as 1988 Belknap County Tree Farm of the Year.

PROFESSIONAL RECOGNITION

New Hampshire Outstanding Forester Award (Society of American Foresters) -- 2001
National Outstanding Tree Farm Inspector Award -- 1999
Austin Cary Practicing Professional Award – (New England SAF, 1998)
NH Wildlife Stewardship Award – 1995
Outstanding New Hampshire Tree Farm Award 1987, 1992, 2002, & 2006
NH Tree Farm Inspector of the Year – 1985, 1990, 1992, 1993, 1998
Xi Sigma Pi (Forestry Honor Society, 1978)
Eagle Scout (1976)



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