FOREST MANAGEMENT PLAN

for DOE FARM

The Durham Town Lands

Durham, New Hampshire

Prepared for:

The Durham Trustees of the Trust
Durham, New Hampshire

Prepared by:

Charles A. Moreno
Consulting Forester

Center Strafford, New Hampshire
(603) 335-1961

February 9, 2001

Charles Moreno
Consulting Forester

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INTRODUCTION

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ABSTRACT

This forest management plan was prepared for an 87± acre woodland property owned by The Town of Durham, New Hampshire, known as "Doe Farm". Located off Bennett Road, this scenic woodland area has over two miles of frontage on the Lamprey River. This plan follows extensive forest management work on the property in 2000. In addition to mapping and summarizing the property's natural resources, the plan creates a record of the recently completed silvicultural work, with recommendations for the future.

PROPERTY PROFILE

AREA: Total – 87± acres. Summarized as follows:
*Silviculturally-managed areas: 65± acres.
*Reserve (no-harvest) areas: 22± acres.

LOCATION: Situated entirely in the Town of Durham, New Hampshire, the property lies along the B & M railroad bed about 1000 feet south of Bennett Road. The Lamprey River borders the property on the south and east. Including Moat Island, the property has over two miles of spectacular water frontage on the Lamprey River.

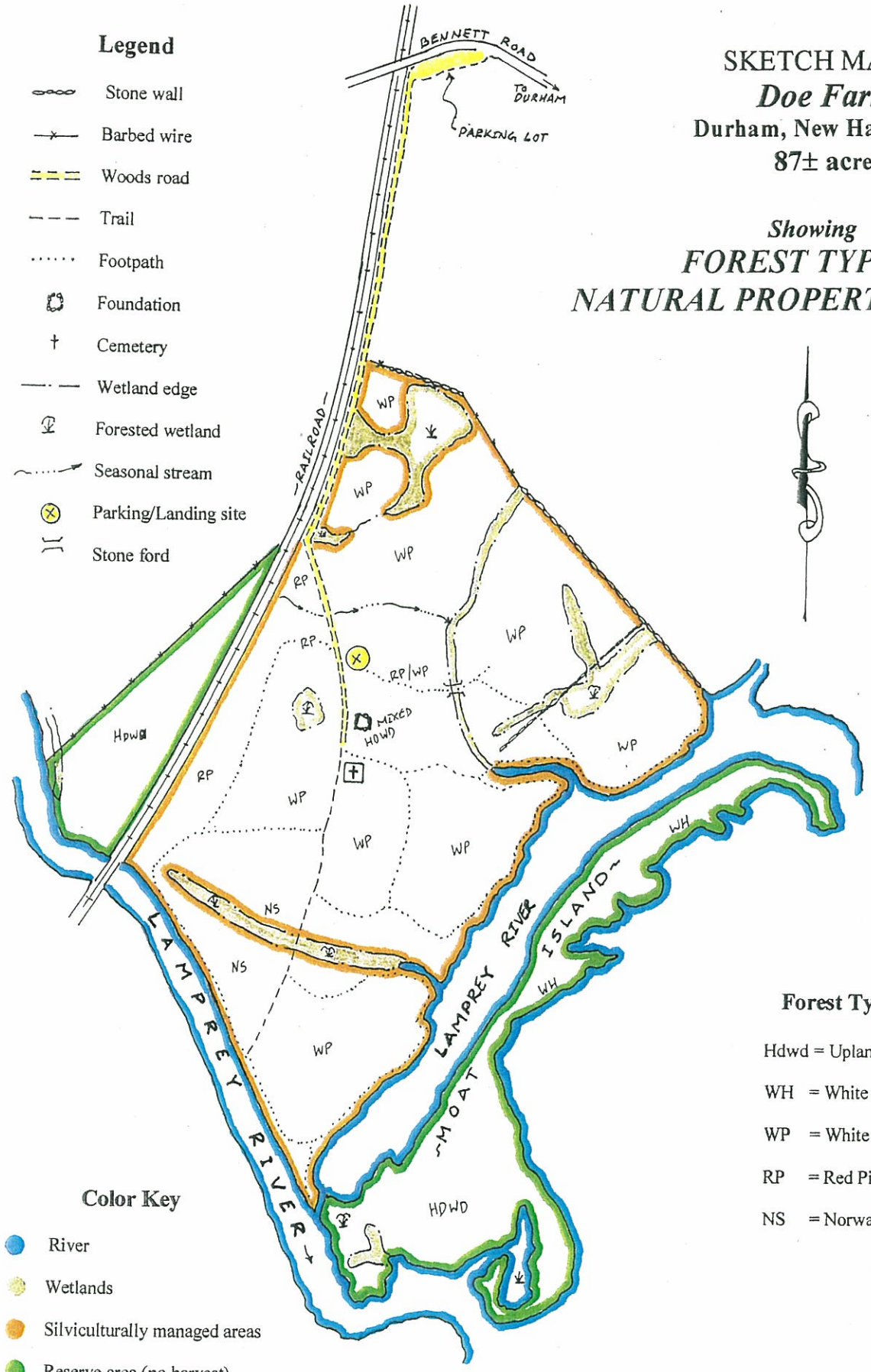
REFERENCES:

Deed – Strafford County Registry of Deeds; Olinthus Doe to The Town of Durham (1909).

Tax Map – Durham Tax Maps: Map 18, Lot 1-3.

Survey – No registered survey. Forest Type Map included with this plan.

Aerial Photo – USGS 1992 series.



SKETCH MAP *of*

Doe Farm

Durham, New Hampshire

87± acres

Showing

FOREST TYPES and NATURAL PROPERTY FEATURES

MAP SCALE:

0 500'

1 inch = 500± feet

Forest Type Key

Hdwd = Upland Hardwood

WH = White Pine/Hardwood

WP = White Pine

RP = Red Pine

NS = Norway Spruce

Map Researched and Drawn by:
Charles A. Moreno, Consulting Forester
Center Strafford, NH (603) 335-1961
January 2000

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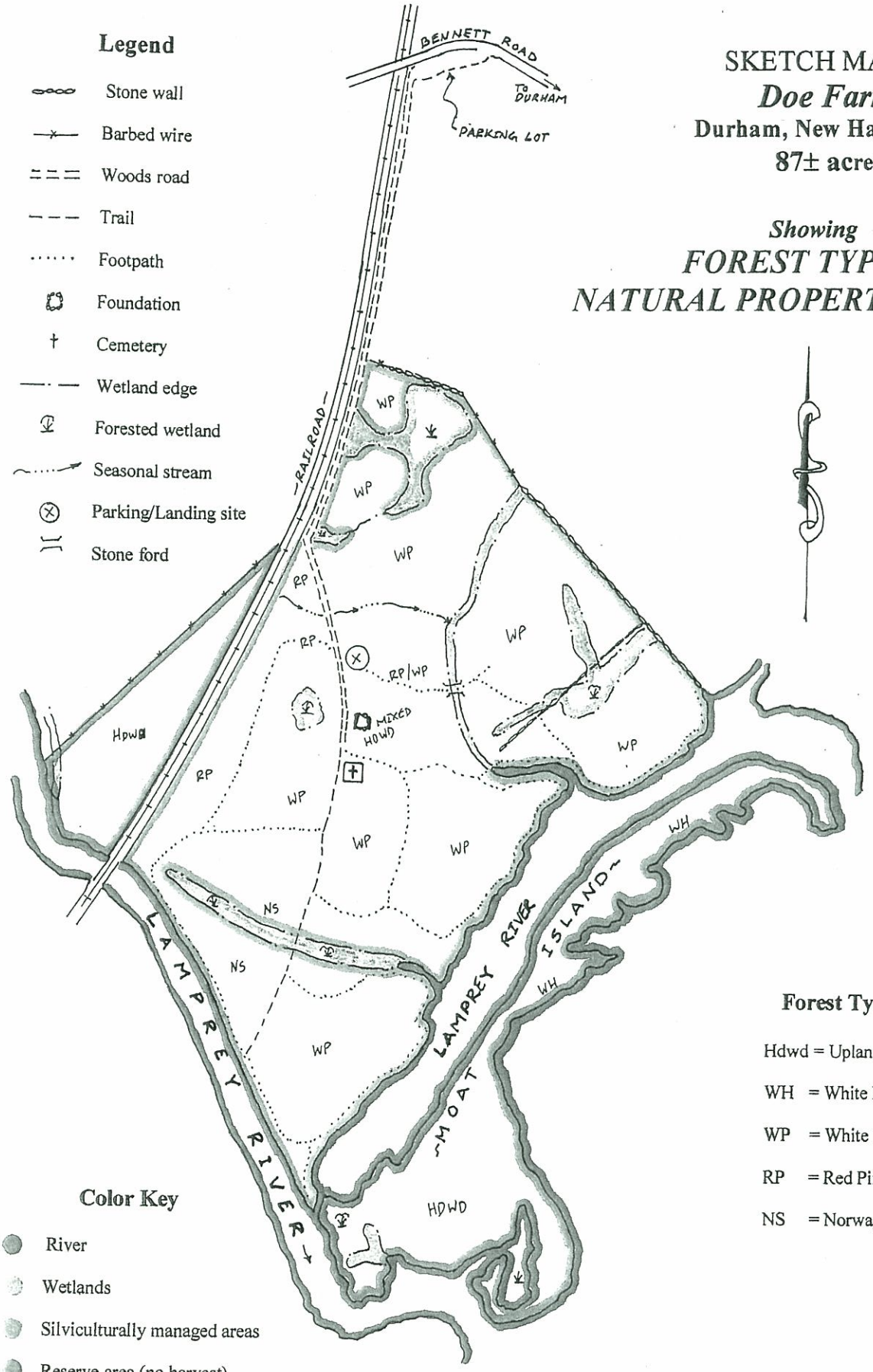

Legend

- Stone wall
- Barbed wire
- Woods road
- Trail
- Footpath
- Foundation
- Cemetery
- Wetland edge
- Forested wetland
- Seasonal stream
- Parking/Landing site
- Stone ford

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Color Key

- River
- Wetlands
- Silviculturally managed areas
- Reserve area (no harvest)

Map Researched and Drawn by:
Charles A. Moreno, Consulting Forester
Center Strafford, NH (603) 335-1961
January 2000

PROPERTY HISTORY

The Town of Durham acquired ownership of the 87± acre waterfront property once known as "Moat Farm" (now "Doe Farm") in 1909, through the will of Olinthus Doe. The will stipulated that management of the property was to be supervised by the Durham Trustees of the Trust Fund. Any revenue generated from the property would go into property maintenance, with excess monies granted to "Durham schools".

Time has obscured the transition of Doe Farm from primarily open fields to full forest over the course of the 20th century. During this period, there has been a long history of community involvement and forest management activity on the property. In the initial years, it is likely that the fields were tended. The first forest management project was an ambitious one: In the early 1920's, the Durham Boy Scouts planted thousands of red pine, white pine, and Norway spruce seedlings in the remaining field areas. These developed into the scenic plantation areas visible today along the main woods road and trails in the western portion of the property.

Though records are sketchy, logs and/or firewood were periodically cut from the more established forest areas before 1950. In the early 1950's, a timber sale was conducted with the assistance of Strafford County Forester, Roger Leighton. UNH forestry and wildlife classes also became involved with the property, conducting field labs and studies. In 1972, the UNH Thompson School forestry class, under the supervision of Professor Melvin Jenkins, conducted a logging operation in an old forest stand on the property's northeast. Over the following quarter century, recreational use by townspeople and university students increased greatly, including snowmobiling, walking, jogging, skiing, birdwatching, fishing, and boating.

Though attempts were made to continue forest management on the property, particularly in the heavily overstocked plantation areas, no silvicultural activity took place until the winter and spring of 2000. At this time, all accessible areas of the forest were thinned. Weak and poorly-growing trees were harvested to favor the growth of the healthier, more valuable trees, and promote forest regeneration. Coincidentally, the logging operation was carried-out by Roger Leighton's son, Steve, and his logging crew. Charlie Moreno, Consulting Forester, conducted silvicultural management, including tree marking.

FOREST MANAGEMENT OUTLOOK

Silvicultural recommendations aim to maintain forest health, productivity, and value over the long-term (100+ years). As the forest continues to grow and develop, growing space between trees once again diminishes. Competition for light collectively stifles the growth of upper canopy trees, and prevents the establishment of a diverse forest understory. This was the condition of much of the Doe Farm woodlands prior to the 2000 forest thinning. Immediately after the thinning, the property was silviculturally up-to-date, with trees left free to grow. It is important to note that the forest will naturally replace the timber volume removed in 2000 over roughly 12 to 15 year's time. Tree growth rates will again begin to slow near the end of this cycle as tree competition increases. The Doe Farm woodlands will be ready for a follow-up improvement harvest in 2012-2017 (2015±).

It is the aim of forest improvement work to remain compatible with the other *uses,* recreational and educational, and *values*—wildlife, natural aesthetics, water quality—of

the property. Though silvicultural activity, especially logging, is temporarily disruptive, careful planning and execution are necessary steps to insure that negative impacts are avoided, mitigated, and/or promptly restored. In addition, silvicultural recommendations will address wildlife habitat enhancement and water quality protection.

Forest management is not a one-time occurrence, but rather, a continuum. Though improvements are gradual, a century of management will have significant financial and ecological results. Occasional disturbances, both natural and logging, play a great role in the development of the forest.

LANDOWNER MANAGEMENT OBJECTIVES

OBJECTIVES SUMMARY

	Degree of Importance			
GOALS	High	Med	Low	None
Access	X			
Wildlife Habitat	X			
Forest Health And Productivity	X			
Recreation	X			
Aesthetics	X			
Timber Income				
Present		X		
Long Term		X		
Reserve Areas		X		
Forest Protection	X			

STATEMENT of MANAGEMENT OBJECTIVES:

Doe Farm, with management directed by the Trustees of the Trust Fund, has long been used by the community of Durham and UNH for recreation and educational purposes. In addition to these important uses, the property provides rich and diverse wildlife habitat. Consistent with these values, the Town of Durham would like to foster the growth of a healthy and valuable forest at Doe Farm over the long-term through silvicultural management. Periodic forest harvesting for improvement and maintenance purposes, under careful silvicultural planning and preparation, will remain a central component of management of the Doe Farm woodlands.

SUMMARY of
FOREST MANAGEMENT
RECOMMENDATIONS

SUMMARY OF FOREST MANAGEMENT RECOMMENDATIONS

Access:

*Maintain main access road and gate to Doe Farm from Bennett Road.
*Create interior parking area (on former landing site) for group events.

Aesthetics:

*Carry-out careful harvest preparation and supervision for all harvesting, and post-harvest reclamation measures.
*Retain scenic "specimen" trees (large maples, birch, oaks, hemlocks, spruce, white pines, etc.) throughout woodlands.
*All harvesting should include residual slash height standard of 2 ½ feet or less.
*Avoid damage to property's natural and physical features such as streams, trails, waterfront, stonewalls, and foundation site.
*"Glade" (remove dense understory growth and selected trees) from foundation and cemetery sites.

Cultural/ Historic

*Protect and maintain Doe Homestead foundation site and cemetery.

Forest Protection

*Maintain property lines regularly, preferably blazed & brush painted.
*Develop and maintain a forest fire access and prevention plan.

Recreation

*Maintain and demarcate existing trail system.
*Install bridges and/or adequate fording structures for foot traffic and snowmobiles across streams.
*Develop an interpretive trail guide for public use.

Reserve Areas

*Designate Moat Island and the hardwood stand west of the railroad tracks as natural "reserve areas", where tree harvesting is excluded indefinitely.

Silviculture/ Timber

*Harvest on a 15± year (12-17 year) management cycle. Harvest volume should not exceed forest's capacity to grow the removal volume back in 15 year's time.
*Apply even-aged, two-aged, and multi-aged silviculture, as follows (application specifics are outlined in the Forest Type Summary, Descriptions and Prescriptions):

- *Liberation harvest* -- Where overtopping residual trees are removed to release favorable young growth. This normally results in a commercial harvest (revenue generating).

- *Weeding & Thinning* – In sapling and young pole-sized stands removing poorly growing trees, while providing growing space to promising young trees. Oak and pine are generally favored. This silvicultural treatment is non-commercial.
- *Pruning* – Removal of all dead and live branches from the trunks of white pines (usually), up to a standard height of 17 feet. Straight, fast-growing trees between 6 and 16 inches in diameter are prime candidates for this treatment which greatly increases the grade value of the tree.
- *Improvement cut /crown thinning* -- Similar to weeding and thinning, however, trees are older and of commercial size.
- *Shelterwood* – In an even-aged stand, the *mature* overstory trees are removed in 3(±) harvests, allowing for favorable regeneration.
- *Single-tree selection* – Individual trees of various sizes and ages are removed with the purpose of encouraging forest regeneration and developing a multi-aged forest.
- *Group selection* – Micro (2 to 6 trees) to patch (1/4+ acres) sized groups of trees are harvested to create forest openings for regeneration and to develop a multi-aged forest.

Water/ Wetlands

*Protect the Lamprey River and all tributary wetlands from any negative logging and recreational impacts. Maintain 25-foot no-logging buffer area around Lamprey River frontage, and a minimal harvest buffer zone around streams and riparian areas.
*Implement BMP practices when fording streams for trails, i.e., install "bog" bridges, stone, culverts, or foot bridges.
*Monitor impact of recreational use on the banks of the Lamprey River.

Wildlife

*Favor forest diversity, i.e., diverse tree species, ages, and forest structure.
*Favor the development of lower and mid-story canopy layers in the forest, particularly plantation areas.
*Retain scattered old trees, ie., 100+ years.
*Retain the scattered, large 20 to 40 inch oaks for denning sites and mast.
*Retain and encourage the growth of healthy oak as a source of mast.
*Retain hemlock and spruce, both scattered and in groves, as cover for wildlife.
*Favor the eventual development of old growth forest areas, particularly in the reserve areas.
*Maintain areas of young forest growth, particularly near wetlands.
*Retain dead and down trees, as well as trees with wildlife cavities.
*Harvest red maple on interior wetland edges to create stump sprouts and release important wildlife shrubs such as highbush blueberry and winterberry holly.

OTHER PROPERTY RESOURCES

Endangered Species *No endangered plant or animal species were noted in this preliminary property examination.

Natural Communities *The extensive Lamprey River shorefront and related wetlands (shrub and forested swamp), though not unique, are important natural communities for wildlife and watershed protection. Moat Island, remote and largely undisturbed for almost a century, also holds good potential to develop as an old growth forest over time.

Soils **Windsor* loamy sandy and *Suncook* loamy sand are the two major soil types underlying the upland areas of the property. Both are especially productive for the growth of white pine. *Buxton* silt loam, a poorly drained soil, underlies the property's forested wetlands.

FOREST TYPE ASSESSMENT AND SILVICULTURE

FOREST TYPE SUMMARY

Descriptions and Prescriptions with Reference to Forest Type Map

TYPE 1: White Pine (35.2± acres)

Description: Much of the Doe Farm property is covered by the white pine forest type, though the type varies greatly in tree age distribution and density from area to area. Even-aged section of pine ranging from 60 to 85 years of age are perhaps most extensive, particularly along the east side of the woods access road, and in the vicinity of the cemetery. These areas are typically well-stocked (post-harvest basal area density averages 140 sq. feet/acre), with trees generally between 8 and 16 inches in diameter.

Somewhat older, better developed, areas of white pine are found along the Lamprey River, with trees mostly between 10 and 18 inches in diameter. Basal area density averages about 160 sq. feet/acre.

A third section lying east of the brook area (with the stone ford) and along the northeastern property line, contains mature pine. These trees range up to 30 inches in diameter, are tall, and display the "flattened-top" characteristic of old pine. A 1998 ice storm severely damaged the treetops some of these trees, the worst of which were salvaged in the 2000 harvest. Timber was also removed from this area by the Thompson School harvest in the early 1970's.

Pine decline, probably resulting from two significant droughts in 1995 and 1999, was noted in the white pine forest type. Trees with very thin tops, in some cases, holding only one year's needles, were removed in 2000 as a salvage measure. Some mortality was noted.

Prescription:

2000 *Crown thinning/Improvement cut* in younger forest areas. Poor quality trees were generally removed, while providing growing space to healthier, better quality trees.

Shelterwood harvest, 1st stage in older forest section. Young hardwood sapling and pole-sized growth in understory was released to allow for its development. Weak overstory trees were salvaged.

2015± *Crown thinning/Improvement cut.* Follow-up harvest.

Shelterwood harvest, 2nd stage, in older forest section. Continue to release promising young hardwoods. Retain some older white pine indefinitely, if healthy.

Financial prognosis: This stand has excellent potential for white pine sawtimber production over the next 50 years.

TYPE 2: Red Pine/White Pine/Norway Spruce Plantation (15.4± acres)

Description: Planted by the Durham Boy Scouts in the 1920's, this forest type covers much of the area between the main woods road and trail, and the railroad tracks. A small section of planted red pine is also found between the foundation and the gravel pit.

This forest type is characterized by areas of each planted species, though the red and white pine intermingle to an extent. Occasional pitch pine and planted scotch pine are also present. Trees are about 75 years old, but vary in diameter from 8 to 18 inches, mostly based on the amount of growing space available through the trees' development. This stand does not appear to have been previously thinned, and were in a densely overstocked condition prior to thinning in 2000. Post-harvest basal area ranges from 120 to 180 sq. feet per acre.

The tall, evenly-spaced red pine, and the sections of dense spruce by the Lamprey River are aesthetically appealing to visitors of the Town Forest.

Prescription:

2000 *Crown thinning* of dense plantation areas. Poorer quality trees were removed while favoring trees with best crown development.

2015± *Crown thinning.* Follow-up harvest, removing 20 to 25% of trees. Release the crowns of remaining trees on a least two sides.

Financial prognosis: This forest type has excellent potential to produce pine and spruce sawtimber over the next 50 years. Silvicultural work will increase understory density, to insure future stand establishment.

TYPE 3: Mixed Hardwoods/White Pine (2.5± acres)

Description: This forest type covers a relatively small area near the Doe Homestead foundation site. Mixed hardwoods including large-tooth aspen, red maple, red oak, white ash, elm, black and white birch, along with scattered white pine, characterize the forest type. Large cottonwoods, exotics planted in the 1920±'s, are found near the foundation.

Trees range in size from 6 to 18 inches, while stand density is moderate at 80 sq. feet per acre.

Prescription:

2000 *Improvement cut.* Removal of poorest quality trees near the foundation.

2015± *Improvement cut.* Follow-up harvest, primarily to maintain aesthetics around the foundation site

Financial prognosis: Low potential for sawtimber production, both because of the low quality of trees presently growing, as well as, the conflicting objective to maintain forest scenery around the foundation, which precludes intensive management to improve timber quality.

TYPE 4: Upland Hardwood/White Pine (22.4± acres)

Description: Containing upland hardwoods and a significant amount of white pine, this forest type occurs primarily on Moat Island. Small sections of this forest type also occur on the mainland forest. Hardwoods include red, black and white oak, red maple, black and white birch, and beech, and constitute about 50% of species composition.

Trees are well-stocked, with basal area running 120± sq. feet/acre. Upper canopy tree diameters range from 8 to 20+ inches.

Prescription:

Moat Island: *No treatment.* Designate as a preserve area.

2000 *Crown thinning/Improvement cut* in mainland forest areas. Poor quality trees were generally removed, while providing growing space to promising, better quality trees.

2015± *Crown thinning/Improvement cut.* Follow-up harvest.

Financial prognosis: Though accessible areas are small in acreage, this forest type has good long-term potential for hardwood sawtimber production over the next 50 years hence.

TYPE 5: Upland Hardwoods (6.1± acres)

Description: The upland hardwood type is found in the isolated section of woodlands west of the railroad tracks. Large oak—red, black, and white—are found here, as well as other hard mast bearing trees such as shagbark hickory and beech. Red maple and black birch were also noted. Trees appear to be at least 100 years of age, and range to over 20 inches in diameter. There is no direct access to the site.

Prescription: *No treatment.* Designate as a preserve area.

TYPE 6: Forested Wetlands (5.4± acres)

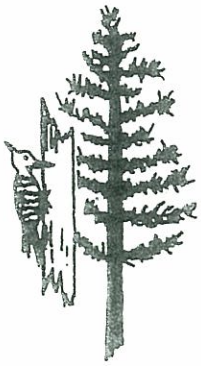
Description: Dominated by red maple and elm, this forest type occupies the hydric sites along the property's drainages, streams, and swamps. Access for forest management is precluded by wet soil conditions.

Prescription: *No treatment.*

Forest Recommendations Summary

	Silvicultural Treatment							
	Crown Thinning		Improvement Cut		Shelterwood		No Treatment	
	2000	2015	2000	2015	2000	2015	2000	2015
Forest Type 1	X	X	X	X	X	X		
Forest Type 2	X	X						
Forest Type 3			X	X				
Forest Type 4	X	X	X	X			X	X
Forest Type 5							X	X
Forest Type 6							X	X

APPENDICIES



CHARLES MORENO

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Center Strafford, NH 03815
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FOREST MANAGEMENT PLANNING
WOODLAND APPRAISALS
TIMBER SALES
TIMBER STAND IMPROVEMENT
FOREST PRODUCT MARKETING
FOREST TAXATION
WILDLIFE MANAGEMENT
TOWN FOREST MANAGEMENT
LAND PROTECTION

State of 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

Harvard University
Coursework in land management and land use planning, 1986

PROFESSIONAL AFFILIATIONS

Forest Stewards Guild – Board of Directors (1999-)
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 - Present	FORESTRY CONSULTANT, founder and proprietor of business. Over twenty years experience managing private and public forests in New Hampshire. Projects include forest management planning, timber appraisals, timber sales, mapping, forest taxation and litigation, timber stand improvement, and conservation plans for towns, corporations, and private landowners. Over 25,000 acres under management.
1984- Present	TOWN FOREST MANAGER for the Towns of Exeter, Londonderry, Atkinson, Plaistow, East Kingston, Deerfield, Epping, Northwood, Rye, Derry, Dover, Madbury, Strafford, and Rochester developing/implementing multiple-use plans for publicly owned forests.
1985- 1992	ALTON TOWN FORESTER. Consultant to Town on Current Use Assessment and NH Timber Tax matters.
1980- 1988	K-F TREE FARM, Forest Manager. Experience in all areas of woodlot management in this intensively managed, 700-acre property in Alton, New Hampshire. Selected as 1988 Belknap County Tree Farm of the Year.

PROFESSIONAL RECOGNITION

National Outstanding Tree Farm Inspector Award -- 1999
Austin Cary Practicing Professional Award – (NESAF, 1998)
Outstanding New Hampshire Tree Farm Award 1987 & 1992
NH Wildlife Stewardship Award – 1995
NH Tree Farm Inspector of the Year – 1985, 1990, 1992, 1993, 1998
Farrington Forestry Scholarship (UNH, 1980)
Xi Sigma Pi (Forestry Honor Society, 1978)

TREE FARM The Sign of Good Forestry

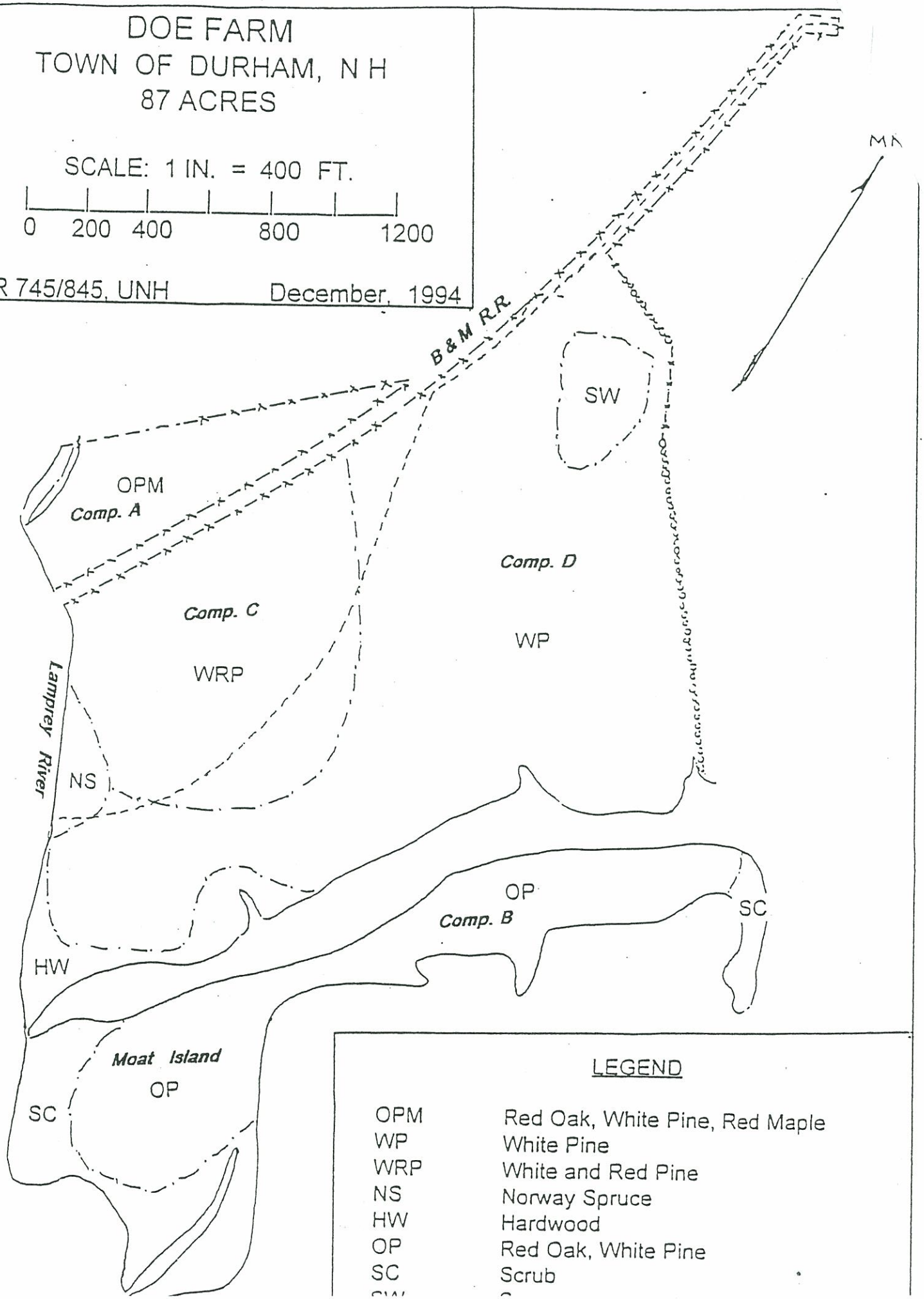
Inspector

DOE FARM
TOWN OF DURHAM, N H
87 ACRES

SCALE: 1 IN. = 400 FT.

0 200 400 800 1200

FOR 745/845, UNH December, 1994



LEGEND

OPM	Red Oak, White Pine, Red Maple
WP	White Pine
WRP	White and Red Pine
NS	Norway Spruce
HW	Hardwood
OP	Red Oak, White Pine
SC	Scrub

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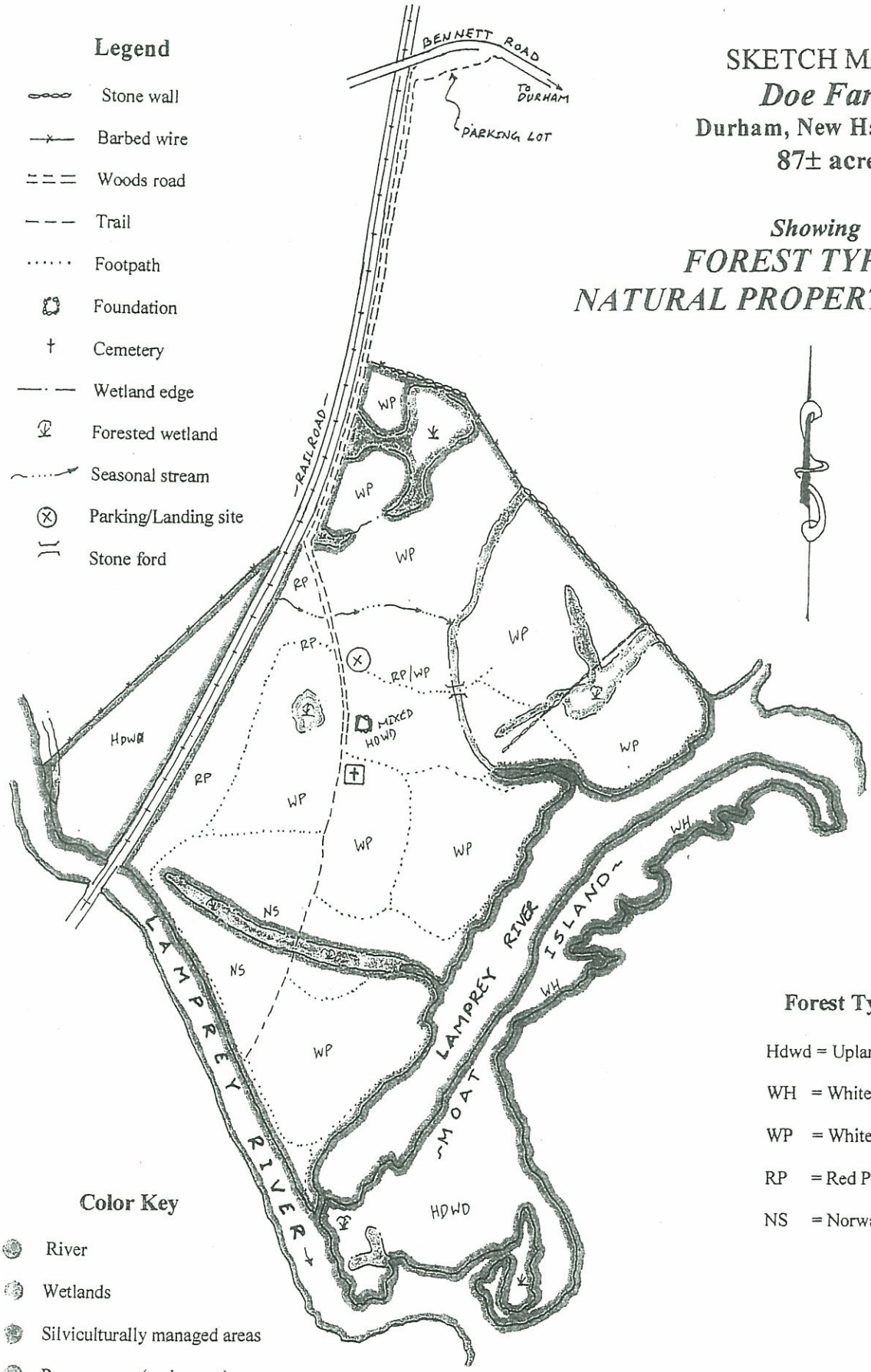

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