

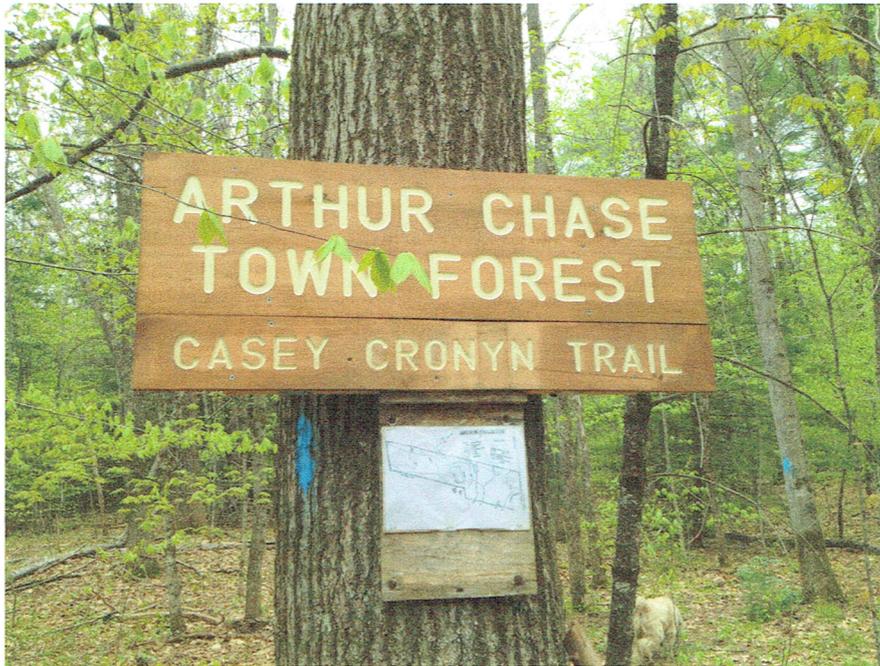
FOREST MANAGEMENT PLAN

for the

Arthur Chase Lot

Deerfield, New Hampshire

43.9± acres



Commissioned By:

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

Prepared by:

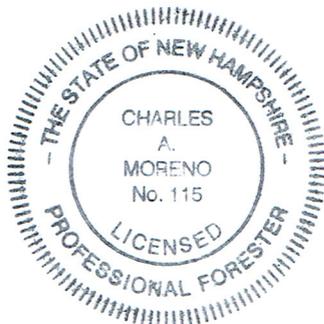
Charles Moreno, LPF

Moreno Forestry Associates

PO Box 60, Center Strafford, NH 03815

(603) 335-1961

August 20, 2014



Charles Moreno, NH LPF #115

Consulting Forester

Report Copy # _____

FOREST MANAGEMENT PLAN
for the
Arthur Chase Lot
Deerfield, New Hampshire
43.9± acres



Painted trillium on the Arthur Chase Lot.

August 20, 2014

Copyright © 2014 by Charles A. Moreno
ALL RIGHTS RESERVED

The author of this forest management plan, Charles A. Moreno, certifies that the contents of the plan, except where footnoted, but including all written material, maps (base information referenced), plan format and organization, are original to the author.

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 Arthur Chase Lot 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.



Charles Moreno, Consulting Forester
Strafford, New Hampshire, (603) 335-1961
©2014 ALL RIGHTS RESERVED

TABLE OF CONTENTS

	Page
I. MAPS	
MAP – PROPERTY LOCUS.....	1
MAP – NATURAL & PHYSICAL FEATURES.....	2
MAP – FOREST TYPES.....	3
MAP – MANAGEMENT RECOMMENDATIONS.....	4
MAP – SOILS.....	5
II. INTRODUCTION & OBJECTIVES	
Introduction.....	6
Property Information	
Location and Geography.....	6
Reference Information.....	7
Prominent Property Features.....	7
Key Property Findings.....	8
Property Management Objectives.....	9
Forest Management Concerns.....	10
III. RECOMMENDATIONS & LOGISTICS	
Overall Property Management Template.....	12
Capsule Recommendations.....	14
Financial Projections.....	14
IV. NATURAL RESOURCES	
Soils Profile.....	15
Surface Water Resources.....	16
Wildlife Habitat	
Landscape Context.....	17
Property Habitats.....	17
Species of Concern/Natural Communities.....	18
Wildlife Habitat Recommendations.....	18
Forest Resources	
Species Composition.....	19
Forest Structure and Composition.....	19
Silvicultural Overview and Scheduling	
Silvicultural Overview.....	19
Harvest Cycle and Logistics.....	20

-continued-



V. FOREST TYPES

Forest Type Descriptions and Prescriptions

White Pine.....	21
White Pine/Hardwood.....	23
Hemlock/Hardwood.....	25
Forested Wetland.....	27
Mixed Birch.....	29
Upland Hardwoods.....	31
Enriched Site Upland Hardwoods.....	33

VI. APPENDICES

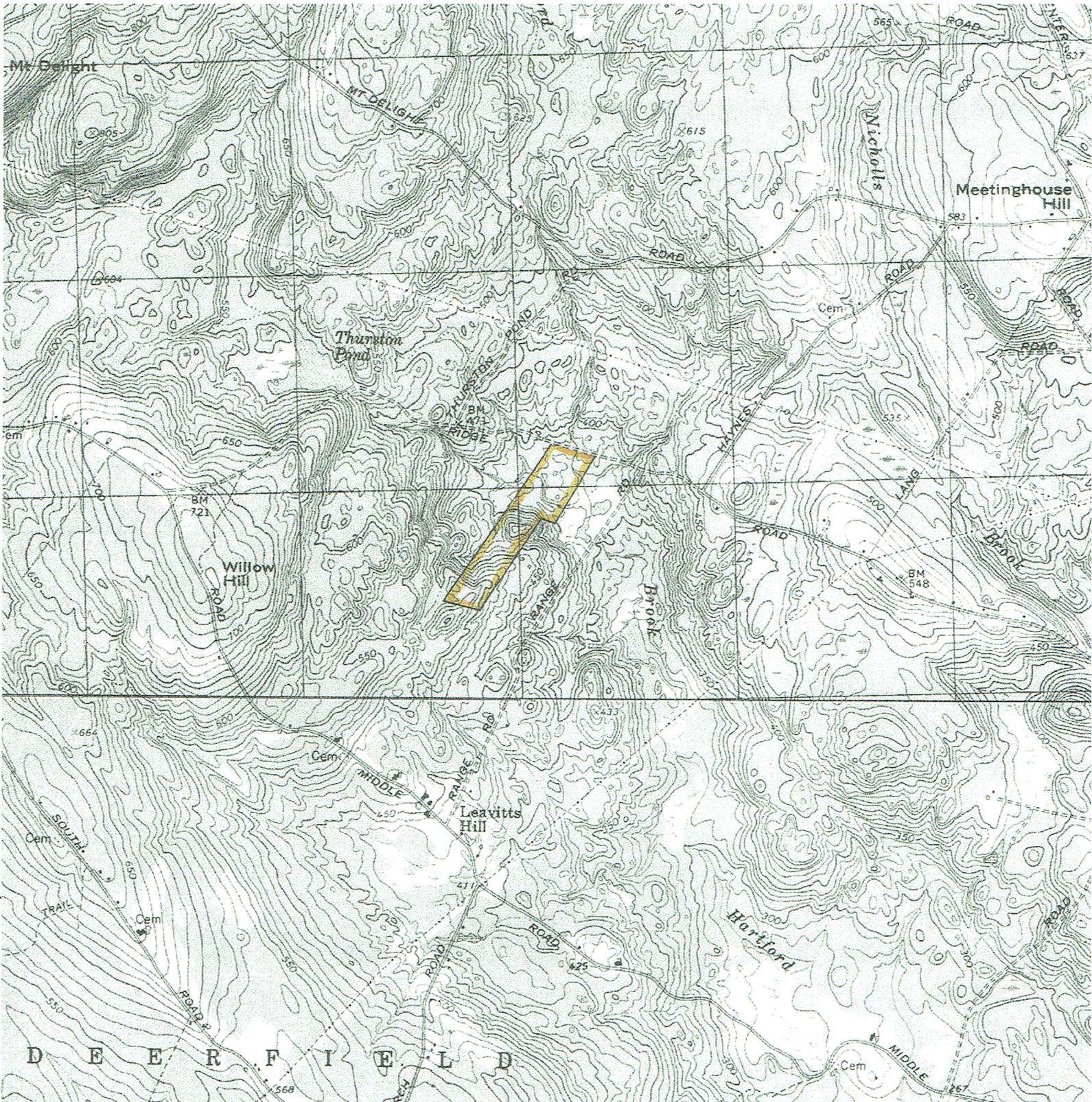
A. NH Natural Heritage Bureau Report.....	35
B. Professional Credentials.....	37



MAPS

Locus Map of the Town of Deerfield's
Arthur Chase Lot
Deerfield, New Hampshire
43.9± Acres

MAP SCALE:
1 inch = 2000± feet



USGS Topographic Map, "Gossville" Quadrangle

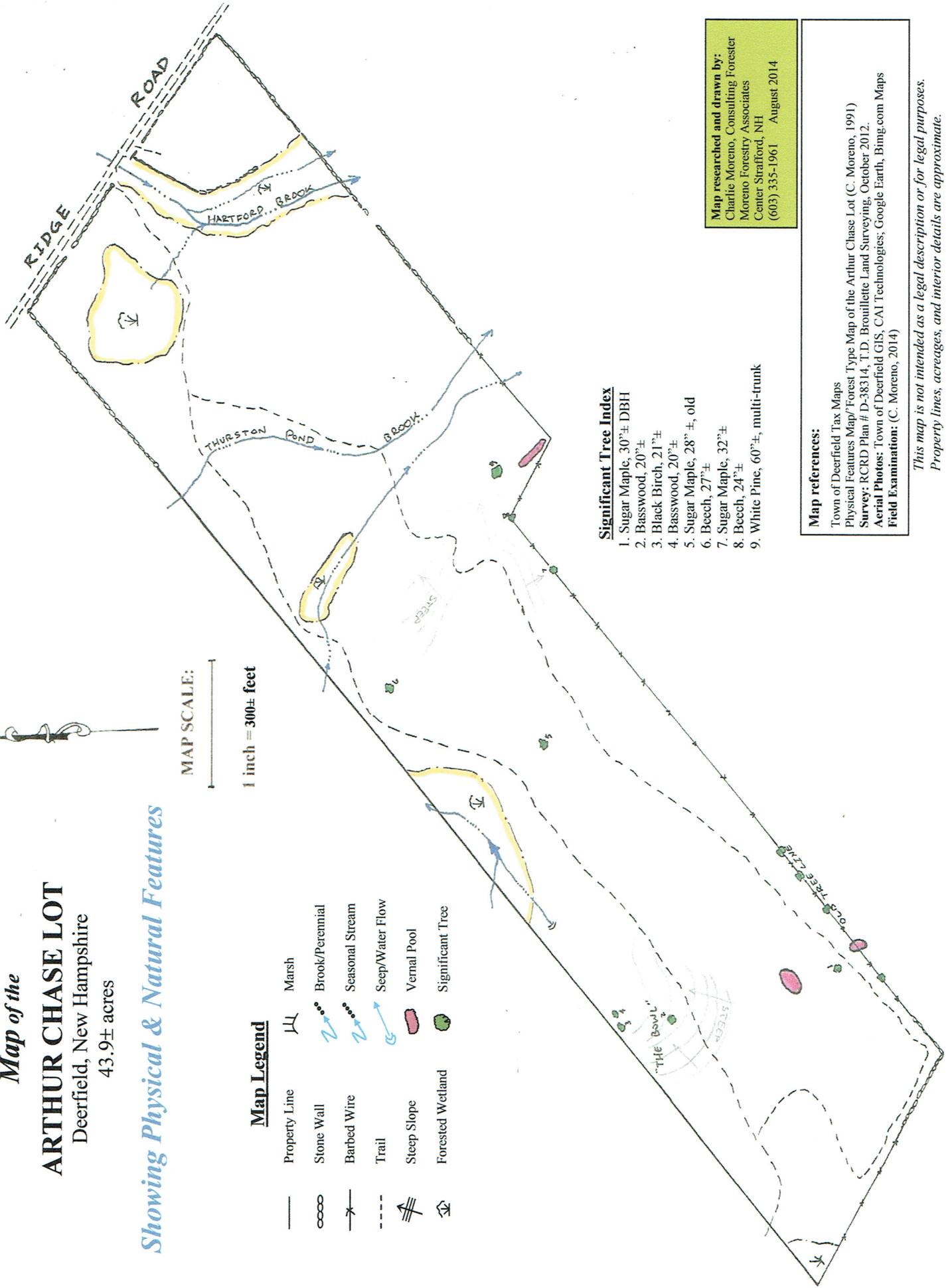
Map of the
ARTHUR CHASE LOT
 Deerfield, New Hampshire
 43.9± acres

Showing Physical & Natural Features

MAP SCALE:
 1 inch = 300± feet

Map Legend

—	Property Line	⌌	Marsh
○○○○	Stone Wall	~	Brook/Perennial
— —	Barbed Wire	~	Seasonal Stream
- - -	Trail	~	Seep/Water Flow
≡	Steep Slope	■	Vernal Pool
⊕	Forested Wetland	●	Significant Tree



Significant Tree Index

1. Sugar Maple, 30"± DBH
2. Basswood, 20"±
3. Black Birch, 21"±
4. Basswood, 20"±
5. Sugar Maple, 28"±, old
6. Beech, 27"±
7. Sugar Maple, 32"±
8. Beech, 24"±
9. White Pine, 60"±, multi-trunk

Map researched and drawn by:
 Charlie Moreno, Consulting Forester
 Moreno Forestry Associates
 Center Stratford, NH
 (603) 335-1961 August 2014

Map references:

Town of Deerfield Tax Maps
 Physical Features Map/Forest Type Map of the Arthur Chase Lot (C. Moreno, 1991)
 Survey: RCRD Plan # D-38314, T.D. Brouillette Land Surveying, October 2012.
 Aerial Photos: Town of Deerfield GIS, CAI Technologies; Google Earth, Bing.com Maps
 Field Examination: (C. Moreno, 2014)

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

Map of the
ARTHUR CHASE LOT
 Deerfield, New Hampshire
 43.9± acres

Showing Forest Types

Forest Type Key

	Acres
A. White Pine.....	1.9±
B. White Pine/Hardwood.....	10.9±
C. Hemlock/Hardwood.....	12.9±
D. Forested Wetland.....	3.7±
E. Mixed Birch.....	2.4±
F. Upland Hardwoods (BE/BB).....	7.2±
G. Enriched Site Upland Hardwoods.....	4.7±
Total Forested:	43.7±

Emergent Marsh.....0.2±
Property Total: 43.9±

MAP SCALE:



1 inch = 300± feet



Map Legend

- Property Line
- Stone Wall
- x— Barbed Wire
- - - Gravel Road
- ↗ Brook
- · - · Forest Type Delineation

Map researched and drawn by:
 Charlie Moreno, Consulting Forester
 Moreno Forestry Associates
 Center Strafford, NH
 (603) 335-1961 September 2014

Map references:

Town of Deerfield Tax Maps
 Physical Features Map/Forest Type Map of the Arthur Chase Lot (C. Moreno, 1991)
 Survey: RCRD Plan # D-38314, T.D. Brouillette Land Surveying, October 2012.
 Aerial Photos: Town of Deerfield GIS, CAI Technologies; Google Earth, Bing.com Maps
 Field Examination: (C. Moreno, 2014)

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

Map of the

ARTHUR CHASE LOT

Deerfield, New Hampshire

43.9± acres

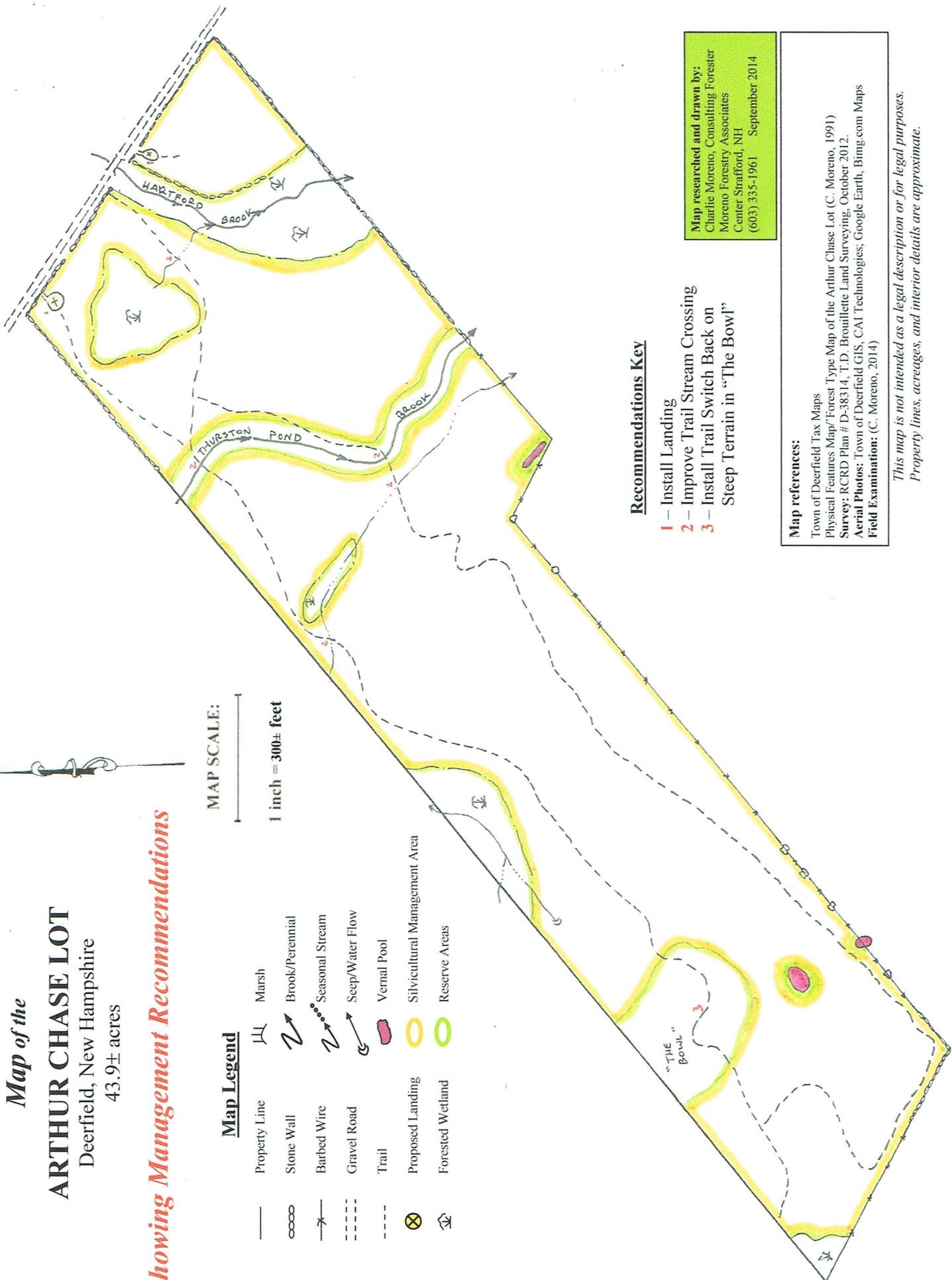
Showing Management Recommendations

MAP SCALE:



Map Legend

- Property Line
- ⊞ Marsh
- ⊞ Stone Wall
- ⊞ Brook/Perennial
- ⊞ Barbed Wire
- ⊞ Seasonal Stream
- ⊞ Gravel Road
- ⊞ Seep/Water Flow
- ⊞ Trail
- ⊞ Vernal Pool
- ⊞ Proposed Landing
- ⊞ Silvicultural Management Area
- ⊞ Forested Wetland
- ⊞ Reserve Areas



Recommendations Key

- 1** — Install Landing
- 2** — Improve Trail Stream Crossing
- 3** — Install Trail Switch Back on Steep Terrain in "The Bowl"

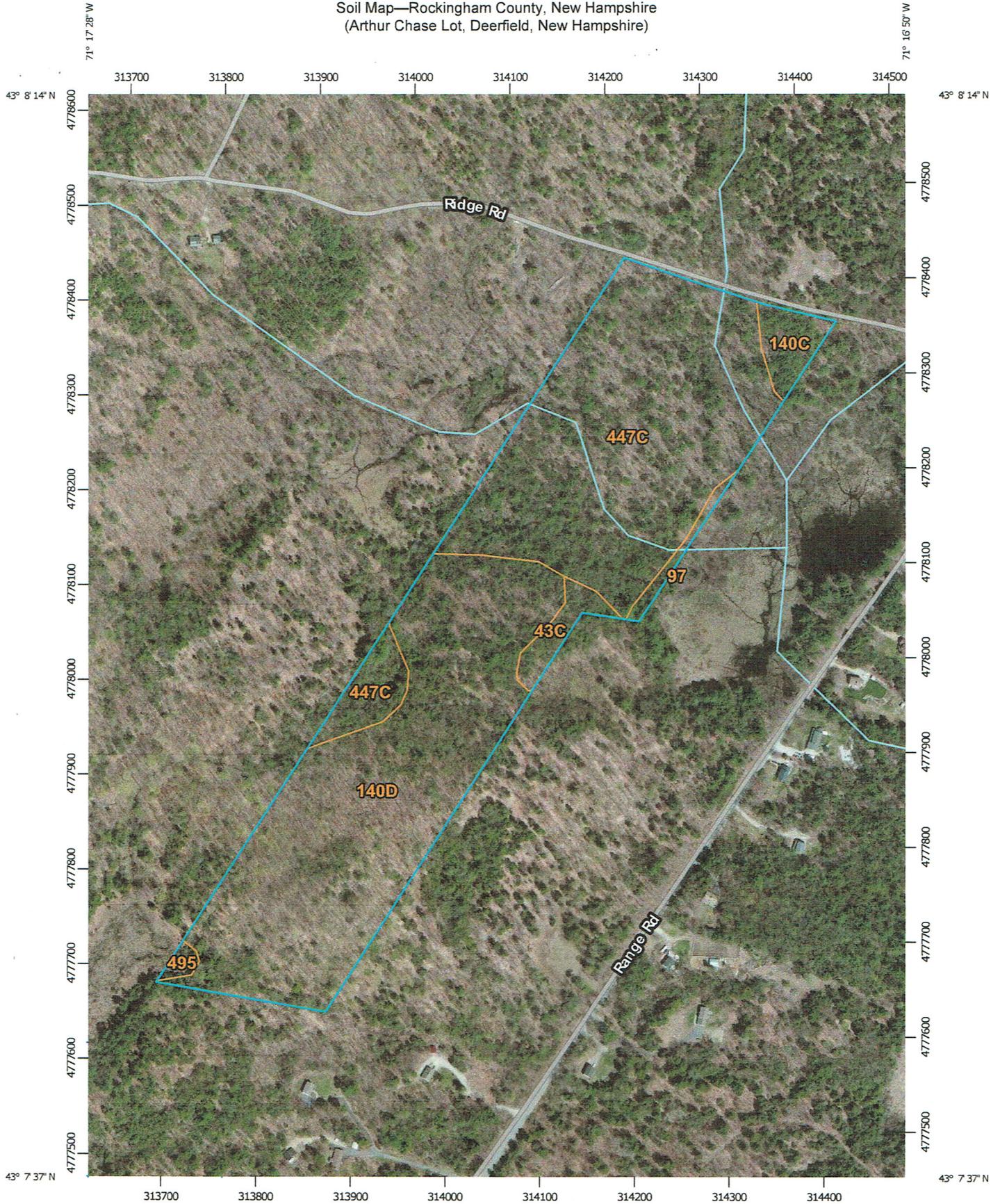
Map researched and drawn by:
 Charlie Moreno, Consulting Forester
 Moreno Forestry Associates
 Center Strafford, NH
 (603) 335-1961 September 2014

Map references:

Town of Deerfield Tax Maps
 Physical Features Map/Forest Type Map of the Arthur Chase Lot (C. Moreno, 1991)
 Survey: RCRD Plan # D-38314, T.D. Brouillette Land Surveying, October 2012.
 Aerial Photos: Town of Deerfield GIS, CAI Technologies; Google Earth, Bing.com Maps
 Field Examination: (C. Moreno, 2014)

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

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



71° 17' 28" W



Map Scale: 1:5,560 if printed on A portrait (8.5" x 11") sheet.

0 50 100 200 300 Meters

0 250 500 1000 1500 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

5/28/2014
Page 1 of 3

INTRODUCTION & OBJECTIVES

The Arthur Chase Lot Deerfield, New Hampshire

INTRODUCTION

Though situated not far from the geographic center of Deerfield, the Arthur Chase Lot is somewhat remote, situated on an unmaintained section of discontinued road. The property covers 43.9± acres configured as a narrow, ½ mile deep strip running west of Ridge Road. Two substantial streams—Hartford Brook and Thurston Pond Brook—cross the more level eastern ground on the property. West of Thurston Pond Brook, the rocky terrain slopes uphill, sometimes steeply. The property's forest is mid-aged, with a few scattered 140+ year old trees; the parcel has not been logged and has escaped natural disturbance for several decades. While remote from town, a fine loop trail has been developed by local Scouts.

PROPERTY INFORMATION

LOCATION and GEOGRAPHY

The Arthur Chase Lot is located on the southwest side of Ridge Road (a gravel road, discontinued from town use) approximately 700'± west of the intersection with Range Road. The property lies 2.5± miles from the town center.

The land is situated within the Lamprey River watershed, near the regional divide of waters flowing to Great Bay and waters confluent with the Merrimack River. The property is located within the Gulf of Maine Coastal Plain ecoregion subsection.¹ It lies about 30± miles inland from the Atlantic Ocean, near the northerly extent of the Appalachian oak-pine forest.² The area's climate is moderated by the sea, which in turn, influences the forest's species composition.

Soils in this region are formed from glacial tills and glacio-fluvial deposits. The property is strewn with multitudes of rock and occasional boulders. Bedrock is often near the soil surface in higher elevation areas. Topography is rolling, from level to steeply sloping, with elevations ranging from about 370 to 540± feet above sea level. Low elevation is at Hartford Brook on the parcel's southeastern side, while high elevation is in the property's northwest corner, just above the bowl area. A centrally-located knoll also approaches the height of land.

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: None recorded.

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

Tax Maps: Deerfield Tax Map 414, Lot 73.

Acreeage: TOTAL – 43.9± Acres

Upland forest –	40.0± acres
Wetland forest –	3.7± acres
Wetlands (open) –	0.2± acres
Field –	0.0± acres

PROMINENT PROPERTY FEATURES

- Two substantial streams, Hartford Brook and Thurston Pond Brook, both headwater streams to the Lamprey River.
- A steep-sided “bowl” area with enriched soils containing a diverse hardwood mix including sugar maple and basswood.
- A forested wetland with black ash.



Upland vernal pool within the Arthur Chase Lot.

- Scattered old trees, including 140 – 180± year old sugar maples, hemlocks, and beech.
- At least three vernal pools.
- A 1± mile long recreational trail loop traversing much of the property.



KEY PROPERTY FINDINGS

- The Arthur Chase Lot contains an increasingly late-successional species mix, though structurally, the forest is relatively young. Logging, most recently in the 1960-70's±, is the freshest and most salient form of forest disturbance.
- The property contains older trees, 140+ years, including sugar maple, hemlock, red oak, black birch, and beech, both scattered and in small groups. The great majority of the property's trees are young to mid-aged, however: 35 to 95± years.
- The property does not contain young forest growth areas (<40± years).
- Beech and hemlock are the most common tree species. Black birch, red oak, red maple, sugar maple, and white pine are relatively common in sections of the property, while not found in other areas. Basswood, black ash, and red pine are uncommon tree species.
- Beech regeneration (seedling/sapling) is ubiquitous on the property.
- Two major streams traverse through the property, however, the parcel does not contain an extensive wetland.
- At least three vernal pools are found in the Arthur Chase Lot. Two are located in the property's hilly upland.
- The property's forest provides softwood thermal habitat and mast forest (beech dominated), and generally, undisturbed habitat that is surrounded by other forested areas.
- The parcel's forest habitats includes shaded softwood areas, and upland hardwood areas. These forest habitats support: Broad-winged hawk; Cooper's hawk; barred owl; downy, hairy and pileated woodpecker; wood thrush; black-throated green warbler. Also, porcupine, gray fox, fisher, white-tailed deer, and black bear.
- The property does not have known endangered/threatened plant or animal species, or natural communities (present NH Natural Heritage Bureau data check). Within one mile, Blanding's turtle and Northern black racer have been reported, as well as a *Black gum-red maple basin swamp* natural community.
- The property appears to contain a small area of *Red maple-black ash-swamp saxifrage swamp* natural community. The bowl area is representative of *Rich red oak rocky woods* natural community.
- The property appears to be free of non-native, invasive plants.
- Forest management access: The property currently lacks forestry access. Two landing sites must be established to do forestry.
- Recreational access: The property contains a well demarcated 1± mile loop trail (the "Casey Cronyn" Trail). The trail needs possible stream crossing improvements and switch-backing in the bowl area.



MANAGEMENT OBJECTIVES

Recommendations for the management of the Arthur Chase Lot 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.** Most of the property's upland forest area (with the exception of steep slopes, and vernal pool/streamside buffers) 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/STREAMS: Protect vernal pools and stream water quality.** The property's three vernal pools, streamside riparian areas, and forested swamps (especially the black ash swamp) are important features. Protection of water quality (siltation or pollution), hydrologic function, and valuable habitat is a primary objective. Forestry activities are minimized in the vicinity of the vernal pools and forested wetlands minimal harvest buffers (50± feet wide), and entirely excluded from stream riparian areas except for a minimal number of fords for recreational trails and forest management.
- **WILDLIFE: Protect and enhance wildlife habitat.** The Arthur Chase Lot lies adjacent to approximately 1500± acres of mostly unfragmented open space. This open space block contains a variety of forested and wetland habitats that supports a diversity of mammals, birds, reptiles, amphibians, and fish. The Arthur Chase Lot contains 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. Maintaining a diversity of tree species over time is also an important goal.
- **RECREATION: Manage for low-impact recreation.** The Arthur Chase Lot contains an outstanding trail loop which is somewhat lightly used, as the property is not readily accessible along a main road. The property is also used for hunting. Encouraging these light impact uses, and perhaps increasing community usage, are objectives. Periodic trail maintenance is critical to its continued use.
- **FINANCIAL: Manage the property on a breakeven or positive cash-flow basis.** Carefully staged harvests will improve the timber inventory and establish favorable regeneration. Financially, improvement cutting will provide a positive cash flow of \$3-\$5,000± every 15 years.
- **ACCESS: Establish basic forest management access.** To stage silvicultural prescriptions, two small landings must be established off of Ridge Road on either side of Hartford Brook.
- **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 woolly adelgid incursion.



FOREST MANAGEMENT CONCERNS

Forest Health – Most of the beech on the Arthur Chase Lot has beech bark disease, caused by *Nectria* fungus which decays the interior of the tree. Over time, 60±% of the beech die, while another 30±% are weakened. Removal of diseased beech over time (saving good cavity trees for wildlife), as well as other diseased trees—oaks with *Strumella* canker, and black birch with *Nectria*—will improve overall forest health and vigor. Reduction in the proportion of beech while encouraging a diversity of species, is also conducive to the forest's health.

Forest Regeneration – The Arthur Chase Lot's forest is well-established, but had significant logging in the 1960's and 1970's, as well as in the more distant past (1930's±). White pine, the most commercially valuable species, was removed from the higher elevation western half of the property. Beech is highly common in the overstory in most of the western area, while dominating the understory throughout the property. This shade tolerant species represents the majority of the forest's future composition unless silviculture is used to encourage the growth of a wider set of 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.
- Limiting the proportion of beech through silviculture is recommended to foster the establishment of other species. Retaining (not cutting) valuable seed sources including red oak, white pine, and sugar maple is critical.
- With the arrival of Hemlock Woolly Adelgid (HWA) more sunlight is expected to reach the forest floor as hemlocks succumb triggering the growth of other species.

Property Access – Establishing forest management access is necessary to stage forest improvement work.

- Two landing sites are needed on either side of Hartford Brook. Potential sites are available.
- The establishment of the landings requires tree removal, excavation and grading, altering roadside aesthetics and incurring cost. The landings are to be installed as part of the first planned forest harvest operation.
- One of the landings may provide parking for property visitors during the long interim (15± year) between forest harvests.

Hemlock Woolly Adelgid – Hemlock is common in the central area of the property, and dominates the stands around Thurston Pond Brook. Though infestation by hemlock woolly adelgid (HWA) was not noted during the present study (spring of 2014), HWA is now present in forests within 10 miles of the property. It is likely that the property's hemlocks will succumb to the adelgid within the next 20 years unless an effective biological control is discovered in the interim (recent research with a predacious beetle holds some promise).

- Loss of hemlock will drastically change the composition and structure of hemlock-hardwood stands, altering habitat and scenic appeal. Alteration of stream temperatures may be expected.
- Substantial removal should be considered due to the fire hazard that is 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 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.
- Removal of HWA afflicted hemlock will open the forest canopy significantly in the hemlock-hardwood forest type.

Emerald Ash Borer – Some white ash is found in the property's enriched sites as well as forested wetlands. Black ash is found in the west-central forested wetland. The emerald ash borer threatens all ash species, with the loss of the more uncommon black ash most alarming. There is currently no biological control or proven silvicultural strategy to counteract this insect.



RECOMMENDATIONS & LOGISTICS

PROPERTY MANAGEMENT TEMPLATE

Management Template

Silvicultural management of the Arthur Chase Lot should occur periodically (once every 15± years) as a single operation covering all managed areas of the property (approximately 35.2± acres).

Forest Access

The Arthur Chase Lot lies on Ridge Road, a discontinued dirt road no longer maintained by the Town. The potential access points for the property lie roughly 800 and 1000± feet from the nearest paved town road, Range Road. Despite a somewhat steep grade onto Ridge Road at the junction with Range Road, Ridge Road is in reasonably good condition and should be accessible to log trucks. Trailer truck access is questionable, however. The Hartford Brook culvert will need additional gravel to support truck traffic.

Two landing sites are needed to stage silvicultural access on the Arthur Chase Lot. A small landing on the east side of Hartford Brook will access thinning of the 1.9± acre pine stand in this area. When not in use to stage a harvest, this small landing may serve as a parking area for recreational access.

A larger landing west of Hartford Brook is needed to provide silvicultural staging for all other areas of the property. Installation of the westerly landing requires tree and stump removal as well as grading of the terrain. The area is limited in size—the landing must be situated between the westerly stonewall boundary, an interior forested wetland, and Ridge Road. From this landing, a narrow passage between of the forested wetland and stonewall allows enough space for the main skid trail access into the forest. This route is recommended to avoid disrupting (from an aesthetic standpoint) the property's recreational trail entrance in the central area of the Ridge Road frontage.

Recreational Access

A fine trail loop has been developed by local Boy Scouts, traversing much of the Arthur Chase Lot. The trail, named the “Casey Cronyn Trail”, runs approximately 1± mile, and is demarcated with blue blazes. The trail currently crosses Thurston Pond Brook at two points, utilizing stepping stones.

Recommended upgrades to the trail are as follows:

- Use only *one crossing point* on Thurston Pond Brook by installing the trail fork on the south side of the stream.
- The lightly-used stepping stone crossings are generally low-impact for the streams, though they may be difficult to navigate for some persons. A footbridge crossing allows ready access to the trail, but is susceptible to washing out over time.
- Stepping stone crossings through minor seasonal flowages works well, not impeding stream flow.
- The trail currently passes straight through the steep “bowl” area, on a 25±% grade. Trail erosion is occurring. A trail switchback through the bowl is recommended to reduce grades. Carefully located water bars are also needed to divert rainwater and snowmelt off the trail.



Due to the stream crossings and steep terrain, trail use should be limited to pedestrian recreational uses, such as hiking and snowshoeing. The property is also open to the public for hunting.

Minimal Harvest Buffers and Reserve Areas

Minimal harvest buffers are recommended around the property's vernal pools (50± feet) and encompassing the riparian areas of Hartford Brook and Thurston Pond Brook (50 to 100± feet). While the buffer areas will generally be left intact, occasional tree removal is allowable, for instance, to permit removal of diseased trees, salvage valuable dying trees, or allow for a skid trail crossing to access the property interior. As a rule of thumb, tree removals in the minimal harvest buffers are generally limited to less than 10% of the basal area. The purpose for the buffers are to avoid temperature changes to hydrologic features such as the pools and streams, and to minimize terrain disruptions.

Reserve areas are sections of forest that are not silviculturally managed on a systematic timetable ("modified reserve"), or acreage that is withheld from management entirely ("full reserve"). Harvesting is generally excluded from the reserves, with the exception, in modified reserves, 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 Arthur Chase Lot, the steep bowl area is suggested as a modified reserve. Full reserve status is recommended for the forested wetland areas, particularly the forest seep and black ash swamp.



CAPSULE RECOMMENDATIONS for PROPERTY

The following projects are recommended for the Arthur Chase Lot, and categorized according to *present* priority:

High Priority:

- **Access** – Establish forest management access to the property, including two adequate landing sites.
- **Silviculture** – 35.2± acres of the property are recommended for silvicultural management. Harvests aim to: remove diseased trees, especially beech, and improve conditions for trees with good value-growth potential. Also, to initiate canopy gap creation to encourage forest regeneration. For a diverse species future forest, follow-up TSI is needed to release favorable regeneration and minimize beech proliferation. Management of hemlock, in response to the impending arrival of HWA, is also an objective.
- **Surface Water Features/Recreation** – Protect water quality of the property's two main streams, by consolidating trail crossings and utilizing BMP's. Also, protect the integrity and function of the property's vernal pools, seasonal drainages, and forested wetland pockets, using minimal harvest buffers.

Medium Priority:

- **Wildlife** – Encourage 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 forest's existing older trees (presently 140+ years of age).

Low Priority:

- **Boundary Maintenance** – The Arthur Chase Lot was surveyed, and property lines axe-blazed and painted, in 2012. The parcel has 6,000± feet of boundary (excluding the road frontage). Property lines should be re-painted on a 10± year rotation.

FINANCIAL PROJECTIONS

The recommended area for silvicultural management on the Arthur Chase Lot covers 35.2± acres. Projected net revenue from the initial harvest is \$4,500 - \$5,000±, not including road and landing cost. The cost of access establishment is projected as \$1,000 - \$2,000±. Thus, the town can expect to net, after expenses (including road and forestry costs), approximately **\$3,000±** from the first improvement harvest on the property. Subsequent harvests, once every 15± years, will likely net \$5,000±.



NATURAL RESOURCES

NATURAL RESOURCE SUMMARY

SOILS PROFILE

Soil mapping is derived from the NRCS Web Soil Survey for Rockingham County. Mapped soils types are described below.

Upland Soils

- 1) *Chatfield-Hollis-Canton (140)* – Underlying almost 50% of the property, this soil complex includes contains shallow-to-bedrock areas (*Hollis*), with exposed ledge in the central knoll area. Extensive areas of stony glacial till material (*Chatfield*) and gravelly pockets (*Canton*), which tend to be well-drained, are intermixed with shallow to ledge areas. With the exception of very 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)* – A small pocket of Canton is found along the east-central area 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. This soil is productive for both pine and hardwood growth.

Mesic Soils

- 1) *Scituate-Newfields (447)* – These intermixed sandy loams (till) underlie most of the northeastern half of property, below the central knoll. 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 pines appear to be sheltered by the site's lower elevation.

Wetland Soils

- 1) *Ossipee (495)* mucky peat – This very poorly drained soil underlies the emergent swamp in the property's western corner. Ossipee's peat layer is deep, with bedrock more than 5 feet below the soil surface.



SURFACE WATER RESOURCES

The Arthur Chase Lot lies within the Lamprey River watershed. Two main streams flow through the property feeding into the nearby Lamprey River: Hartford Brook is a second order stream, while Thurston Pond Brook is a third order stream. Both streams converge in a shrub



Scenic Thurston Pond Brook is a third order stream that bisects the Arthur Chase Lot.

swamp/emergent marsh that lies immediately east of the parcel. (Note: Thurston Pond Brook is mislabeled “Hartford Brook” on town tax maps. Hartford Brook crosses the property, but flows from a northerly direction under Ridge Road. Its source waters are at the base of Nottingham Mountain. Thurston Pond Brook enters from the northwest and eventually flows into Hartford Brook. Its source is Thurston Pond, ½ mile away.)

Though the property’s wetlands are cumulatively not large in extent, the property contains a variety of surface water features. A forested wetland surrounds Hartford Brook and its secondary channel where it enters the shrub swamp on the adjacent property. These cobble-strewn streams periodically flood over intermediary low ground that is primarily stocked with red maple. Thurston Pond Brook is also a rocky stream, but has a consistently defined upland embankment throughout its entire route through the property. An unnamed seasonal stream roughly paralleling Thurston Pond Brook has forested wetland along its riparian area.

There are at least two other forested wetland pockets on the property. A small pocket in the parcel’s northerly corner near Ridge Road contains a diversity of hardwoods. Perhaps more interesting is the forested wetland in the property’s central area along the western boundary. Fed by a forest seep and a seasonal stream, this wetland contains a number of black ash (*Fraxinus nigra*), a less common species dependent on saturated, but enriched (minerotrophic), soil conditions.



Minerotrophic forested swamp containing black ash, hemlock and red maple.

A section of an upland emergent swamp can be found in the parcel’s western corner. Tree snags valuable for wildlife are found within this swamp.

The property also contains at least three vernal pools. All are under 2500± square feet in size and are open bodies of water, with little or no interior vegetation. Their location on the landscape—within reasonable proximity to other wetlands—makes them very conducive to wildlife usage, however, their hydroperiod may be limited (drying prior to July) in droughty years.

Please refer (page 2) to the property’s *Physical Features and Forest Types Map* for an illustration of the parcel’s wetlands and streams.



WILDLIFE HABITAT

LANDSCAPE CONTEXT

The Arthur Chase Lot is situated in the southern area of a 1,500± acre largely undeveloped block which includes Thurston Pond. With extensive forest, scattered wetlands, 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 (hawks and owls).

PROPERTY HABITATS

The Arthur Chase core forest habitats include mast forest (oak and beech); softwood thermal forest; and wetland forest. Wetland habitats include stream/riparian, emergent swamp, and vernal pool.

Forest Habitats

Mast forest is represented by Forest Types F and G which contain substantial beech stocking, and to a lesser extent red oak. Red oak is also prominent in Forest Type B, the white pine/hardwood type. Older oaks and mid-aged, healthy beech with well-developed, spreading crowns are excellent producers of acorns and beechnuts, respectively. Silvicultural management of the forest will aim to retain and grow large-crowned oaks. While a reduction in the proportion of beech is also recommended, particularly through the removal of diseased beech, retention of some healthy beech mast trees is desirable.

Softwood thermal forest (Forest Types A and C) covers over ½ of the property. Hemlock is the major softwood species, and is largely responsible for thermal cover. Winter and summer temperature extremes are moderated under the dense hemlock shade. The potential onset of Hemlock Woolly Adelgid may drastically alter this habitat which covers over 10 acres in the central area of the property.

Wetland forests pockets are small in area, and somewhat differentiated from one another. Most contain hardwood stocking, but hemlock is also found in the two central pockets. The black ash wetland contains a number of uprooted trees, which creates valuable habitat for birds such as wrens.

Wetland Habitats

Stream/riparian—The riparian areas of Hartford Brook, Thurston Pond Brook, and the seasonal streams provide travel corridors for furbearers (otter, mink, weasel). Raccoon and deer utilize the stream edges. The rocky streams also provide habitat for two-lined salamander and ribbon snake.

Emergent Swamp—A small portion of an upland emergent swamp covers the property's western corner. A wetland forest patch was flooded during the past 15 to 20 years, with the subsequent death of trees and snag formation. While usefulness of the snags for heron nesting has largely passed, tree swallows and other cavity-nesting birds may still utilize the snags. The snags continue to provide good perch sites for kingbirds.

Vernal pools—The property contains 3 vernal pools. All the pools are relatively small and open. Inlet and outlet streams are not associated with any of the vernal pools. The pools are ephemeral—flooding during the spring and autumn, but drying during the summer. The resulting fish-free habitat provides critical 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 At least two of the pools have the potential for a long hydroperiod during reasonably wet summers.

SPECIES of CONCERN / NATURAL COMMUNITIES

The New Hampshire Natural Heritage Bureau was consulted in May 2014 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 (S1) natural communities.

WILDLIFE HABITAT RECOMMENDATIONS

Wildlife habitat management on the Arthur Chase Lot is mostly to be integrated as part of improvement harvesting.

General habitat recommendations for all areas include:

- Monitor the property for invasive plants, and immediately remove any plants found.
- Retain the bowl area 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.
- Retain a component of healthy, large-crowned beech for mast production.
- Possibly 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.
- Promote the growth of fruit-bearing wetland shrubs, by clearing small patches (1/10 acre) 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.

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



FOREST RESOURCES

SPECIES COMPOSITION

The Arthur Chase Lot 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	– Beech and hemlock.
Common	– Black birch, red oak, red maple, white pine.
Less Common	– Sugar maple, white birch, white ash.
Scarce	– Yellow birch, American elm, black cherry, big-tooth aspen.
Rare	– Black ash, basswood, and red pine.
Not Observed	– White oak, black oak, shagbark hickory, pitch pine, red cedar, red spruce, balsam fir, quaking aspen, black willow, American chestnut.

FOREST STRUCTURE

The Arthur Chase Lot's forest developed from abandoned pasture in stages. The rugged and more remote western section of the property, beyond Thurston Pond Brook, was likely abandoned as early as the 1870's±. Pasture remained east of Thurston Brook, however, into the early 20th century (1920±). The property's perimeter stonewalls and wire fencing, and old remnant hardwoods and hemlock, indicate the formerly open conditions.

The Arthur Chase Lot has been logged at least twice since its forest was re-established after the 19th century agricultural period. An initial harvest in the 1930's± removed most of the white pine from the hilly western section. The Hurricane of 1938 may have also caused the loss of some of the western area's remaining pine. A younger beech-dominated component resulted from this earlier cut and possible hurricane blowdown. A second round of harvesting appears to have occurred in the 1960's and 70's. This included patch cut areas that are now the birch-dominated Forest Type E, and harvesting of white pine in the pine/hardwood stand (Forest Type B) between Thurston Pond Brook and Hartford Brook. Hardwoods clearly outnumber pines in this latter stand. The isolated white pine stand in the property's easternmost corner has largely escaped logging.

As a result of past disturbances, primarily logging, the Arthur Chase Lot is almost entirely 2 to 3 –aged. The overstory forest canopy is mostly closed throughout the property. Beech sapling growth is ubiquitous, growing under the forest canopy's nearly full shade.

SILVICULTURAL OVERVIEW and SCHEDULING

SILVICULTURAL OVERVIEW

The majority of the Arthur Chase Lot has not been harvested in about 50± years. The 1991 Forest Management Plan outlined silvicultural management for the property, but due to a lack of access and young tree growth, the work was not implemented. Since 1991, the entrance to Ridge Road has been improved, and woodland access is far more favorable.



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

Generally, the silvicultural strategy for the Arthur Chase Lot is to reduce the proportion of beech, both as overstory trees and understory growth, with an overall target proportion of <20% of stand density. It is also critical to initiate the regeneration of a diversity of species, including “mid-successional” species such as red oak and white pine, which can be difficult to regenerate naturally in beech-dominated stands. The removal of diseased beech and hemlock (either threatened by, or afflicted with, hemlock wooly adelgid) will create needed canopy openings for new growth. A diversity of favorable seed sources, especially red oak, white pine, black birch, and sugar maple should be retained. Follow-up TSI (a cost-incurring forest improvement treatment) is necessary to control beech sprouting subsequent to the initial beech removal. Adventitious growth of beech sprouts will otherwise heavily compete with new forest growth.

The impending arrival of hemlock wooly adelgid (HWA) threatens the long-term survival of hemlock on the property. Hemlock is the dominant species in the central area of the property including the Thurston Pond Brook riparian area. HWA may largely eliminate this species over the next 20± years. Silvicultural management at present can expedite the forest regeneration process, so that a new generation of replacement trees is established prior to the loss of the hemlock. Removal of a substantial proportion of hemlock (50 to 60%±) in less sensitive areas (i.e., not within the stream riparian area or vernal pool buffer) is roughly the template. If a biological control eventually curtails the advance of HWA, the openings where hemlock was removed on the Arthur Chase Lot will still provide space for new forest growth.

HARVEST CYCLE and LOGISTICS

Silvicultural treatment of the Arthur Chase Lot 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 Arthur Chase Lot is June-October and January-February. While a mechanized/biomass allows the removal of beech and hemlock, including sapling-sized trees, it may not be possible to create large enough landings to accommodate this type of harvest. Furthermore, the discontinued section of Ridge Road must be upgraded to allow passage by trailer trucks if a biomass operation is to occur. Cut-to-length or conventional logging are other alternative harvesting methods.



FOREST TYPES

A. White Pine – 1.9± acres

Description – The white pine forest type is confined to one small stand in the southeastern property corner. White pine dominates the overstory of this former pasture that has largely escaped previous logging. Beech saplings have filled the understory.



Species Composition

Primary ¹	White pine.
Secondary ²	Black cherry.
Uncommon ³	Red oak, popple, red pine.
Regeneration (saplings)	Beech.

Forest Structure: Forest Type A

Composition	
Stand Structure	Even/two-aged
Successional Stage	Mid-intermediate
Stand Age	85± years
Tree Size	
DBH range	8 – 21± inches
Mean DBH	15± inches
Avg. Max. Height	80± feet
Stand Density	
Relative Stocking	Considerable to dense
Basal Area/Acre	260± sq. ft./acre
Trees/Acre	200± trees
Canopy Closure	90± %
Wildlife/Ecological	
Canopy Stratification	Moderate – some understory, good midstory, and well-established overstory.
Woody Debris	Good accumulation, mostly small stems, however.
Invasive Plants	No known incidence.

Forest Type A -- Prescription

Objectives – Provide growing space around the crowns of healthy, vigorously-growing white pine, and stand's few red oak. Remove/eliminate understory beech. Create small canopy openings. Promote mixed hardwood and white pine regeneration.

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.



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

Harvest Cycle: 15± years

Silvicultural Treatments:

2015±: **Improvement cut/Crown thinning and Single-tree/micro-group selection.**

TSI: Understory removal of beech, soil scarification to promote forest regeneration.

2030±: **Single-tree/expanded micro-group selection/Liberation of favorable regeneration.**

TSI: Continue to remove understory beech.

2045±: **Single-tree selection/Expanded group selection.** Follow-up with *TSI (inter-sapling/polewood release)* in mid-story/understory.



B. White Pine/Hardwood – 10.9± acres

Description – This forest type covers a broad, level to gently sloping area between the parcel’s two main streams. Larger white pine are scattered or grouped throughout the stand, though mixed hardwoods are generally more dominant. The hardwood mix, which includes sugar maple and white ash, is indicative of a moist, reasonably fertile soil. Beech has overtaken the stand’s understory.



Species Composition

Primary	Red oak, red maple, white ash, white pine.
Secondary	Sugar maple, black cherry, hemlock, beech.
Uncommon	White birch, black birch, yellow birch.
Regeneration (saplings)	Beech.

Forest Structure: Forest Type B

<i>Composition</i>	
Stand Structure	Two-aged w/ scattered older residuals
Successional Stage	Mid- to late-intermediate
Stand Age	35-40//80-95± years
<i>Tree Size</i>	
DBH range	5 – 20± inches (residuals to 28± inches)
Mean DBH	11± inches
Avg. Max. Height	80± feet
<i>Stand Density</i>	
Relative Stocking	Moderate to considerable
Basal Area/Acre	100± sq. ft./acre
Trees/Acre	160± trees
Canopy Closure	80-100± %
<i>Wildlife/Ecological</i>	
Canopy Stratification	Good – good upper understory, good mid-story, and well-established overstory with supercanopy pines.
Woody Debris	Good accumulation, including some large trunks.
Invasive Plants	No known incidence.



Forest Type B -- Prescription

Objectives – Initiate diverse forest regeneration by removing groups of poor hardwoods to create canopy openings. Control understory beech to allow establishment of a more diverse set of hardwood species as well as white pine. Salvage valuable white ash ahead of loss to emerald ash borer.

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

Harvest Cycle: 15± years

Silvicultural Treatments:

2015±: **Improvement cut/Single-tree selection/micro selection.**

TSI: Remove and control understory beech.

2030±: **Single-tree selection/Expanded group selection/Liberation** (of regeneration).

TSI: Remove and control understory beech.

2045±: **Single-tree selection/Expanded group selection/Liberation** (of regeneration). Follow-up with

TSI (*inter-sapling/polewood release*) in mid-story/understory.



C. Hemlock/Hardwood – 12.9± acres

Description – Covering nearly 1/3 of the forest area, this forest type is characterized by a prevalence of hemlock, primarily in the overstory. Much of the stand has little to no understory due to dense upper canopy shading. Hardwoods are found in lesser quantities, with particular species often occupying specific areas. For example, oak is found intermixed with hemlock on drier, higher elevation sites. Few white pine are found, due to their removal in past harvesting.



The hemlock hardwood forest type covers almost the entire central area of the property, including much of a steep-sided knoll. A small pocket of this forest type is also located along the rear parcel boundary.

Species Composition

Primary	Hemlock.
Secondary	Red maple, red oak, yellow birch, black birch.
Tertiary	Sugar maple, beech, white pine, white ash.
Regeneration	Sparse.

Forest Structure: Forest Type C

Composition	
Stand Structure	Two-aged w/ scattered older residuals
Successional Stage	Mid- to late-intermediate
Stand Age	50//80-95± years
Tree Size	
DBH range	8 – 20± inches
Mean DBH	13± inches
Avg. Max. Height	65± feet
Stand Density	
Relative Stocking	Considerable to dense
Basal Area/Acre	195± sq. ft./acre
Trees/Acre	225± trees
Canopy Closure	90-100± %
Wildlife/Ecological	
Canopy Stratification	Fair – no understory except in hemlock sapling pockets; some mid-story, and well-established overstory with few supercanopy pines.
Woody Debris	Good accumulation.
Invasive Plants	No known incidence.



Forest Type C -- Prescription

Objectives – Salvage hemlock prior to loss to HWA while creating favorable conditions to regenerate pine and a variety of hardwood species: a) Lower the proportion of hemlock, harvesting up to 60% of the species in less sensitive areas in preparation to their loss to HWA. b) Remove poorer quality trees, partly to release healthy trees, but also to create canopy openings for regeneration. c) Retain all valuable seed sources, especially scattered pine, oak, and black birch.

Silvicultural Sequence: Two-aged with residuals (present)→Three-aged/Multi-aged (2050)

Harvest Cycle: 15± years

Silvicultural Treatments:

2015±: *Improvement cut/Single-tree, micro-group, and small group selection.*

2030±: *Single-tree selection/expanded canopy openings.*

TSI: Inter-sapling release favoring young oaks, pines, sugar maple, and black birch, if any.

2045±: *Single-tree selection/expanded canopy openings.*

TSI: Inter-sapling/polewood release.



D. Forested Wetland – 3.7± acres

Description – This forest type encompasses forested areas on the parcel that lie on water saturated, or seasonally wet, soils. The property contains four forested wetland areas, all distinct, as follows: A) A small forested wetland pocket lies near Ridge Road, containing a mix of hardwood species including white ash, yellow birch, and elm. The later species is largely not found elsewhere on the property. B) The photo at left captures an open understory red maple wetland in the riparian area of Hartford Brook. The stream may overflow the entire wetland during heavy spring runoff. C) A band of forested wetlands follows the secondary stream that parallels Thurston Pond Brook; this wetlands contains a hemlock/ hardwood mix. D) An enriched wetland area containing a black ash/hemlock/red maple mix is found along the west-central boundary line. Several uprooted trees were noted in the wetland’s saturated soils.



Harvesting activity is excluded from the forested wetland areas.

Species Composition

Primary	Red maple.
Secondary	White ash.
Tertiary	Sugar maple, yellow birch, elm, white pine.
Regeneration (saplings)	White ash, beech, red maple.

Forest Structure: Forest Type D

Composition	
Stand Structure	Even/two-aged
Successional Stage	Intermediate
Stand Age	80 - 100± years
Tree Size	
DBH range	5 – 18± inches
Mean DBH	12± inches
Avg. Max. Height	55± feet
Stand Density	
Relative Stocking	Considerable
Basal Area/Acre	120± sq. ft./acre
Trees/Acre	160± trees
Canopy Closure	80-100± %
Wildlife/Ecological	
Canopy Stratification	Good to Excellent– understory/shrub layer, good midstory, and well-established overstory with supercanopy pines.
Woody Debris	Fair accumulation.
Invasive Plants	No known incidence.



Forest Type D -- Prescription

Objectives – Allow all wetland areas to follow course of nature, excluding all logging disturbance.

Harvest Cycle: None

Silvicultural Treatments: None, though monitor for the presence of invasive plants on occasion.



E. Mixed Birch – 2.4± acres

Description – Found in two areas, this forest type is dominated by pole-sized black birch and white birch. This condition probably resulted from a patch cut or other heavy disturbance in the 1960’s.

Nectria canker afflicts a considerable number of the black birch, though healthy stems show great promise for healthy growth. The stand’s white birch is not growing vigorously.



Species Composition

Primary	White birch, black birch.
Secondary	Red maple, beech, hemlock.
Tertiary	Popple.
Regeneration (saplings)	Black gum.

Forest Structure: Forest Type E

<i>Composition</i>	
Stand Structure	Even-aged
Successional Stage	Mid-intermediate
Stand Age	50± years
<i>Tree Size</i>	
DBH range	6 – 14± inches
Mean DBH	7± inches
Avg. Max. Height	55± feet
<i>Stand Density</i>	
Relative Stocking	Considerable
Basal Area/Acre	100± sq. ft./acre
Trees/Acre	340± trees
Canopy Closure	90-100± %
<i>Wildlife/Ecological</i>	
Canopy Stratification	Low to Good – some understory and mid-story with a well-established overstory.
Woody Debris	Moderate accumulation.
Invasive Plants	No known incidence.



Forest Type E -- Prescription

Objectives – Provide growing space around the crowns of healthy, vigorously-growing black birch and red maple, while removing declining, poorer quality trees. Where larger canopy are created due to the removal of groups of poor quality trees, encourage the growth of oak, white pine, and sugar maple; remove beech.

Silvicultural Sequence: Even-aged (present)→ Two/Three-aged (2050)

Harvest Cycle: 15± years

Silvicultural Treatments:

2015±: **Improvement cut/Crown thinning and Micro-group selection.**

TSI: Remove understory beech.

2030±: **Crown thinning/Expanded micro-group selection.**

TSI: Inter-sapling release of favorable regeneration; remove understory beech.

2045±: **Single-tree selection/Expanded group selection.**



F. Upland Hardwoods – 7.2± acres

Description – This forest type is found in two areas in the hilly western section of the parcel. It contains well-stocked, well-established hardwood forest (white pine is absent) that is dominated by beech and black birch. Beech bark disease afflicts a large proportion of the beech. Beech saplings dominate the understory.



Species Composition

Primary	Beech, black birch.
Secondary	Red maple.
Tertiary	Hemlock, red oak, sugar maple, white ash, white birch.
Regeneration (saplings)	Beech.

Forest Structure: Forest Type F

Composition	
Stand Structure	Even/two-aged
Successional Stage	Mid-intermediate
Stand Age	30-40//35-55//60-80± years
Tree Size	
DBH range	6 – 19± inches
Mean DBH	9± inches
Avg. Max. Height	70± feet
Stand Density	
Relative Stocking	Moderate to considerable
Basal Area/Acre	110± sq. ft./acre
Trees/Acre	270± trees
Canopy Closure	90-100± %
Wildlife/Ecological	
Canopy Stratification	Moderate – little understory, some midstory, and well-established overstory.
Woody Debris	Low to moderate accumulation.
Invasive Plants	No known incidence.

Forest Type F -- Prescription

Objectives – Provide growing space around the crowns of healthy, vigorously-growing black birch, as well as the stand’s few red oaks, sugar maples, and red maples. Reduce the proportion of beech substantially by removing diseased trees. Control beech regeneration, while encouraging diverse species regeneration, including white pine.



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

Harvest Cycle: 15± years

Silvicultural Treatments:

2015±: **Improvement cut and Single-tree/micro-group selection.**

TSI: Remove understory beech.

2030±: **Single-tree/expanded micro-group selection.**

TSI: *Inter-sapling release* and continue to remove understory beech.

2045±: **Single-tree selection/Expanded group selection.**

TSI: *Inter-sapling release* in understory.



G. Enriched Site Upland Hardwoods – 4.7± acres

Description – This forest type is found in the western section of the parcel, including a steep bowl area. Though rocky, soils are enriched as indicated by the presence of site demanding species such as sugar maple, yellow birch, and basswood. Fine red oak and white ash are also found. Beech is a primary species in the overstory, and dominates the understory. The stand surrounds a vernal pool; striped maple and hobblebush are found in this area.



Species Composition

Primary	Beech, sugar maple.
Secondary	Black birch, white ash, red oak, red maple.
Tertiary	Yellow birch, white birch, basswood.
Regeneration (saplings)	Beech.

Forest Structure: Forest Type G

Composition	
Stand Structure	Three-aged
Successional Stage	Late-intermediate to mature
Stand Age	40//60-80//120+ years
Tree Size	
DBH range	8 – 24± inches
Mean DBH	13± inches
Avg. Max. Height	75± feet
Stand Density	
Relative Stocking	Considerable to dense
Basal Area/Acre	160± sq. ft./acre
Trees/Acre	180± trees
Canopy Closure	80-100± %
Wildlife/Ecological	
Canopy Stratification	Moderate to Good – some understory and mid-story with a well-established overstory.
Woody Debris	Good accumulation, including some large trunks.
Invasive Plants	No known incidence.



Forest Type G -- Prescription

Objectives – Much of this stand is reserved from active management, including the steep bowl area and the minimal harvest buffer surrounding the vernal pool.

In actively managed areas, provide growing space around the crowns of all healthy, vigorously-growing hardwoods, removing diseased beech and black birch with *Nectria*. Reduce the proportion of beech and create canopy openings to allow the regeneration of a diversity of hardwood species. Increase the proportion of sugar maple, red oak, and black birch. Sugar maple will serve as an important seed source for much of the property.

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

Harvest Cycle: 15± years

Silvicultural Treatments:

2015±: **Improvement cut/Crown thinning and Single-tree/micro-group selection.**

TSI: Remove understory beech.

2030±: **Single-tree/expanded micro-group selection.**

TSI: *Inter-sapling release* and continue to remove understory beech.

2045±: **Single-tree selection/Expanded group selection.**

TSI: *Inter-sapling release* in understory.



APPENDICES



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: Melissa Coppola, NH Natural Heritage Bureau

Date: 6/2/2014

Re: Review by NH Natural Heritage Bureau of request dated 5/28/2014

NHB File ID: 1879

Town: Deerfield

Project type: Landowner Request

Location: Ridge Road Vicinity- Map 414 Lot 73

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>)	2011	--	E	G4	S1
Northern Black Racer (<i>Coluber constrictor constrictor</i>)	2004	--	T	T5	S2
Natural Community		Federal	NH	Global	State
Black gum - red maple basin swamp	1991	--	--	--	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.

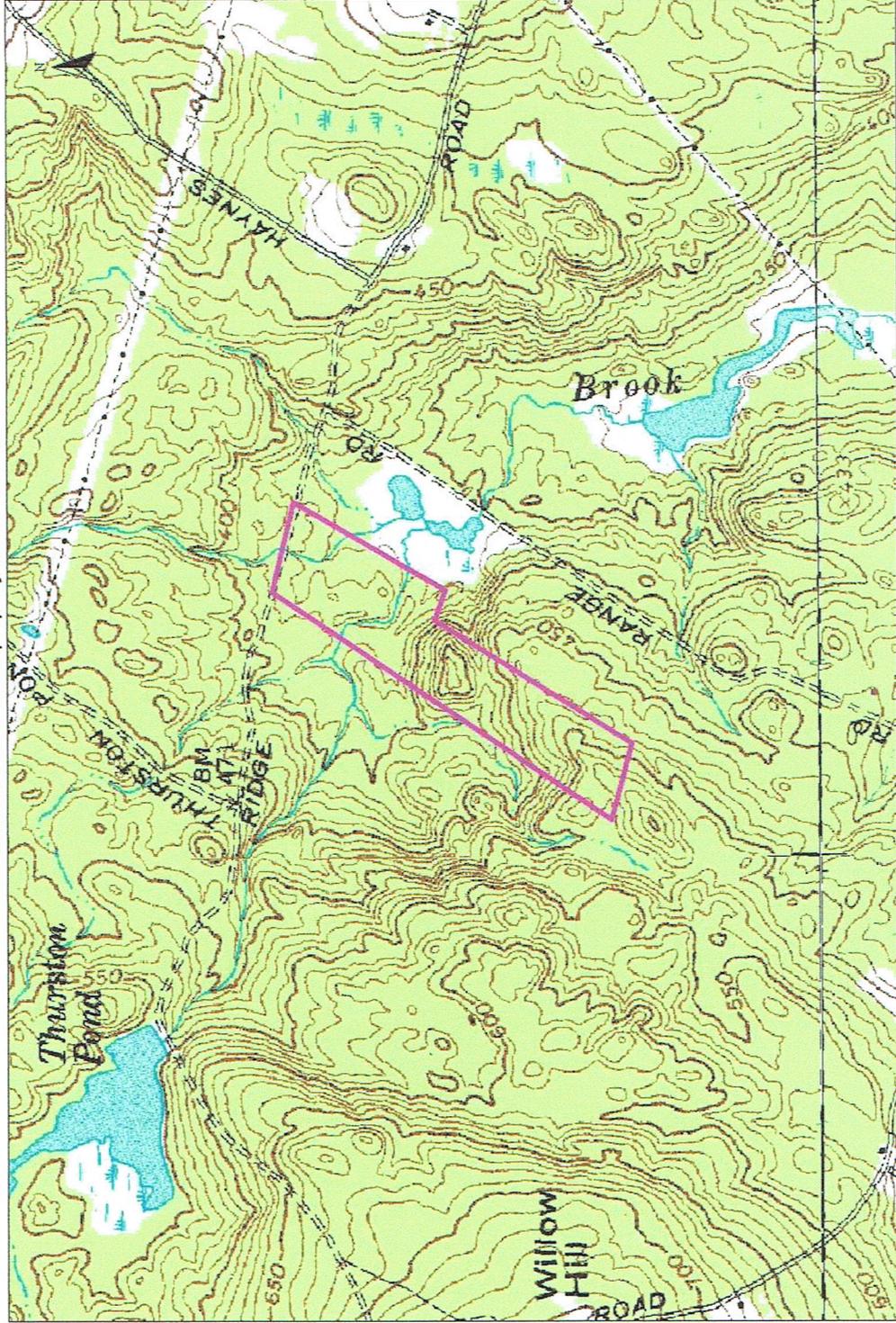
NHB: L1879



NH NATURAL HERITAGE BUREAU

Known locations of rare species and exemplary natural communities

Sensitive species are labelled but not mapped. All other records are clipped to the property boundaries. Occurrences not on the property are not shown.



Property: Town of Deerfield "Arthur Chase Lot"

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 - Present FORESTRY CONSULTANT, founder and proprietor of Moreno Forestry Associates. Thirty-four 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- Present TOWN FOREST MANAGER for the Towns of Exeter, Londonderry, Candia, Plaistow, 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- 1992 ALTON TOWN FORESTER. Consultant to the Town on Current Use Assessment and NH Timber Tax matters.

1980- 1988 K-F TREE FARM, Forest Manager. Experience in all areas of woodland and wildlife 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)



Charles Moreno, Consulting Forester
Center Strafford, New Hampshire
(603) 335-1961