

FOREST MANAGEMENT PLAN

for

HANSON PINES

Rochester, New Hampshire

30.5± acres



Commissioned by:

The Rochester Trustees of the Trust Fund

City of Rochester

31 Wakefield Street

Rochester, NH 03867

Prepared by:

Charles Moreno, LPF

Moreno Forestry Associates

PO Box 60, Center Strafford, NH 03815 // (603) 234-0444

DocuSigned by:

Blaine Cox

B4F9B7BC7D0C4EB...

Landowner

Blaine Cox

City Manager

9/13/2021

A handwritten signature in black ink, appearing to read 'Charles Moreno'.

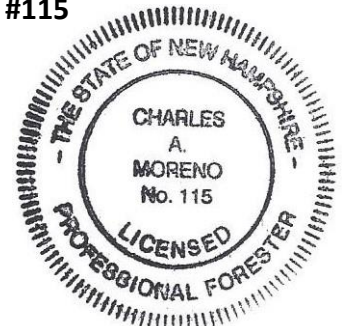
Charles Moreno, NH LPF #115

Consulting Forester

TSP #09-6203

May 7, 2014

Updated June 2021



FOREST MANAGEMENT PLAN

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30.5± acres

June 2021



Above: Trail along the Cocheco River in Hanson Pines' north section.

Cover Page: A mature stand of white pine, typical of much of Hanson Pines.

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The author of this forest management plan, Charles A. Moreno, NH LPF #115, 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 management recommendations to the Trustees of the Trust Fund, citizens of Rochester, and others interested in the management of Hanson Pines in Rochester, New Hampshire. This document is a work for hire done by Charles A. Moreno for the City of Rochester, and may be used by same for any purpose. Copying of this plan by any other individual or organization, including any written material, plan content and/or format, requires appropriate citation and/or the written permission of Charles A. Moreno, Consulting Forester. Any revisions to the plan cannot be made under the author's name without the author's written permission.



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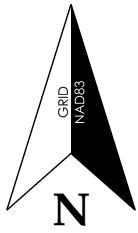
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MAPS





0 1,000 2,000 3,000 4,000 ft



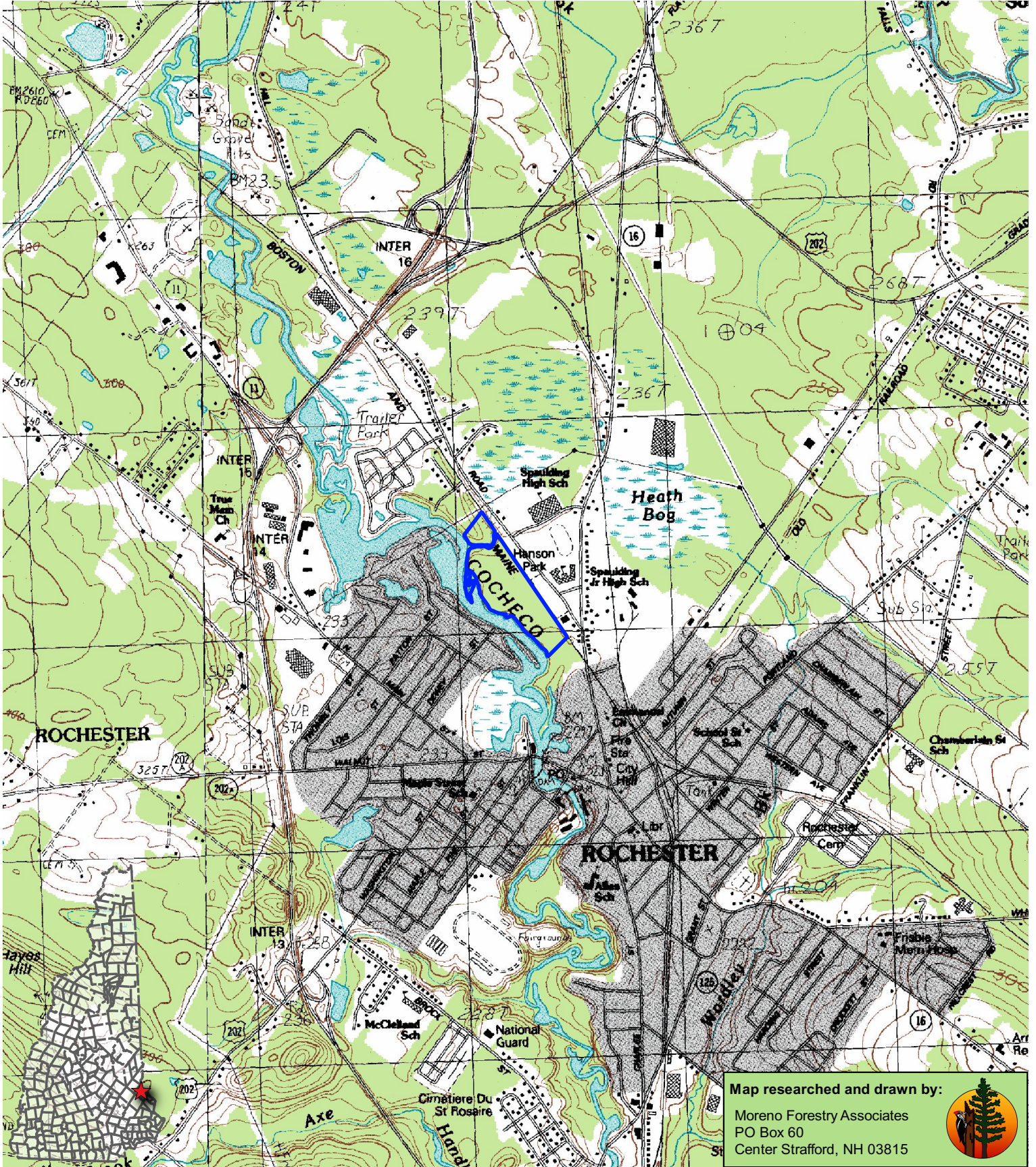
1:24,000

Locus Map of

HANSON PINES


Rochester, New Hampshire
30.5± Acres

Parcel boundary information and USGS Topographic 1:24,000 dataset provided by NH GRANIT. Map drawn June 2021.



Map researched and drawn by:

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 Center Strafford, NH 03815



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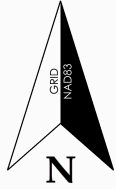
Map of

HANSON PINES

Showing Forest Types

Landowner:
 City of Rochester
 31 Wakefield Street
 Rochester, NH 03867

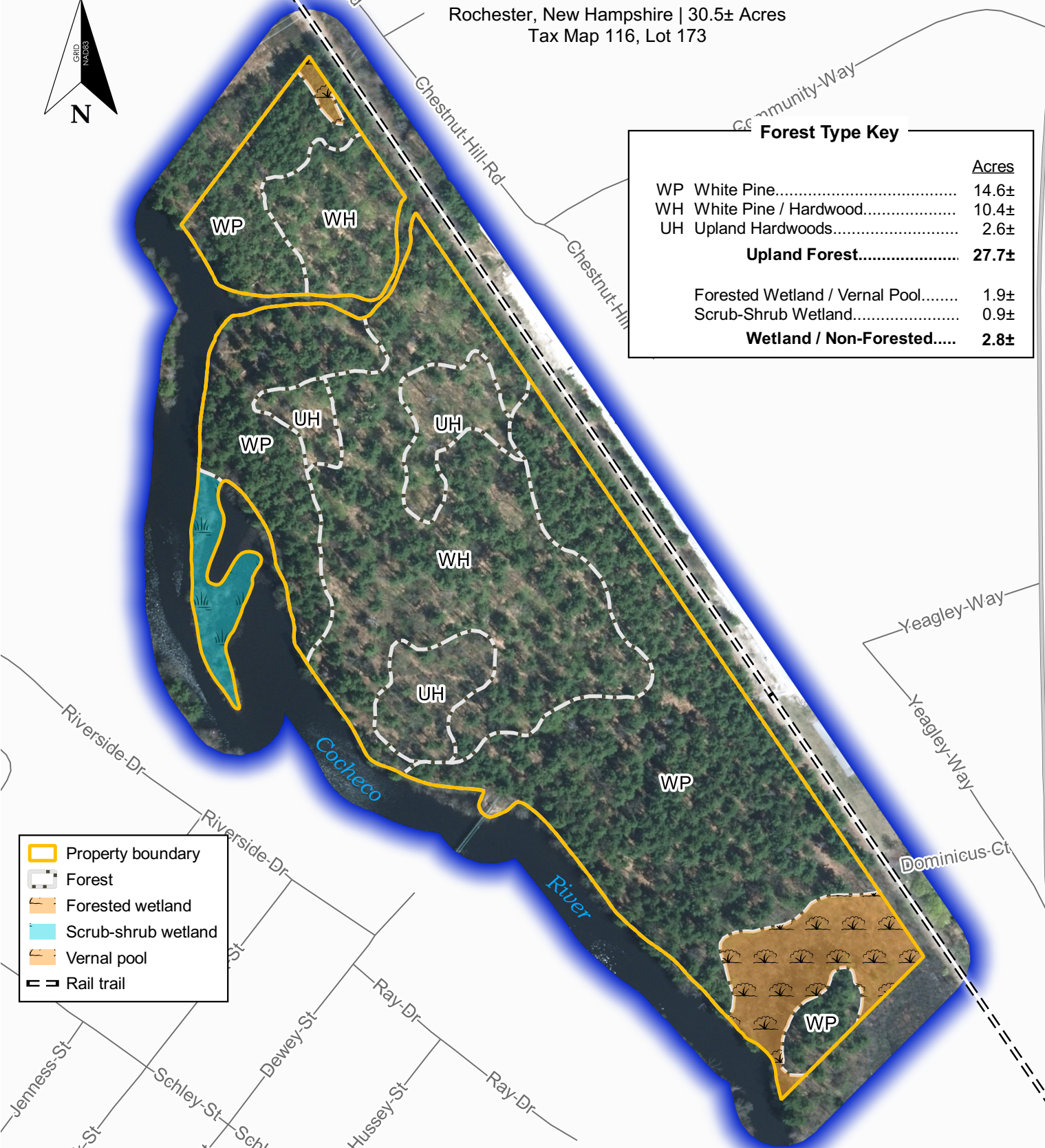
Rochester, New Hampshire | 30.5± Acres
 Tax Map 116, Lot 173



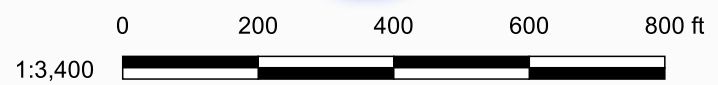
Forest Type Key

	Acres
WP White Pine.....	14.6±
WH White Pine / Hardwood.....	10.4±
UH Upland Hardwoods.....	2.6±
Upland Forest.....	27.7±
Forested Wetland / Vernal Pool.....	1.9±
Scrub-Shrub Wetland.....	0.9±
Wetland / Non-Forested.....	2.8±

- Property boundary
- Forest
- Forested wetland
- Scrub-shrub wetland
- Vernal pool
- Rail trail



Feature locations are approximate. Boundary from NH GRANIT tax parcel mosaic. Roads from NH DOT. Aerial orthophoto from NH GRANIT (2015). All other physical features from field surveys and photo interpretation. Map is not a legal description nor to be used for legal purposes. Map drawn June 2021.



Map researched and drawn by:

Moreno Forestry Associates
 PO Box 60
 Center Strafford, NH 03815



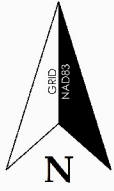
Map of

HANSON PINES

Showing Physical Features

Landowner:
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 31 Wakefield Street
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Rochester, New Hampshire | 30.5± Acres
 Tax Map 116, Lot 173



	Property boundary
	Forest
	Forested wetland / vernal pool
	Scrub-shrub wetland
	Significant tree
	Regeneration opening
	Info kiosk
	Log landing
	Vernal pool
	Bridge
	Paved
	Loop Trail
	Secondary Trail
	Footpath
	Rail trail



Significant Tree Index

1. White pine, 52"± DBH
2. Pitch pine, 28"±
3. American beech, 21"±
4. White pine, 36"±
5. "King" white pine, 42"±, 135' tall

Feature locations are approximate. Boundary from NH GRANIT tax parcel mosaic. Roads from NH DOT. LiDAR baselayer from NH GRANIT. All other physical features from field surveys and photo interpretation. Map is not a legal description nor to be used for legal purposes. Map drawn June 2021.

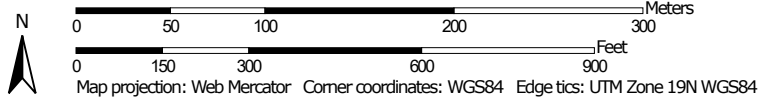


Soil Map—Strafford County, New Hampshire
(Hanson Pines)



Soil Map may not be valid at this scale.

Map Scale: 1:4,000 if printed on A portrait (8.5" x 11") sheet.



REPORT



Hanson Pines Rochester, New Hampshire

INTRODUCTION

Hanson Pines, officially “Dominicus Hanson Park”, is a 30.5± acre community-owned forest that lies just north of bustling downtown Rochester. The land was generously donated to the city by Charles A.C. Hanson in 1915, in accordance with the wishes of his late father, Dominicus. Today, a century later, first-time visitors to the park encounter an unexpected scenic gem – trails that meander through groves of stately pine growing along the banks of the Cocheco River. The park’s oldest trees, established prior to the Civil War, are up to 180± years of age, soar 125± feet in height, and measure 2 to 3 feet in girth.



Large white pines make for a dramatic forest canopy at Hanson Pines.

THE NATURE of HANSON PINES

Hanson Pines is one of the finest examples of an older growth pine forest in southeastern New Hampshire. The forest occupies a flat, sandy terrace along a pristine stretch of the Cocheco River. Over the past century, it has survived several hurricanes and many smaller, localized storms. Due to a restrictive deed, this 30-acre forest has also escaped heavy logging and development despite its prime location.

About 1000 trees define the main area of Hanson Pines. These trees are the superb tall pines that constitute the forest’s overstory. About 1/4 of these pines are first generation, starting out as pioneering seedlings when the site was abandoned as pasture possibly as early as the 1830’s. Other pines and hardwoods filled-in over the succeeding years, with most overstory trees at least a century old.

Over time, there is natural attrition in the number of overstory pines. The last notable natural forest disturbance occurred in 1987 when strong winds from a thunderstorm uprooted a number of the old trees. Since that event, natural causes including lightning strikes, interior rot, and pine decline have gradually claimed another 100± trees. With each loss, there is a gain—light openings in the canopy where the lost pines once stood. These openings, or canopy “gaps”, present an opportunity for new forest growth to gain a foothold and possibly thrive, as long as the opening remains large enough for the young trees to grow up through. Over time, a mixed-age forest evolves as the original canopy trees succumb over a range of time, and younger generations of trees take their place. The initial single-aged condition of Hanson Pines, which occurred when all the original canopy trees grew up in unison in a deserted field,



is unlikely to reoccur, barring a catastrophic event—a destructive hurricane, tornado, or fire, for example—where the entire forest is lost. The development of a mixed age forest is far more likely, and this forest structure is inherently more resilient to damaging natural events than a single-aged, high canopy forest.

In addition to the evolution in Hanson Pines' structure from a single-aged forest towards mixed-aged conditions, there is also gradual change occurring in species composition. Though a few hardwood species, especially red oak and beech, are found in the forest overstory, white pine is by far the most common tree. Stated in a different manner, white pine is still the most common species in Hanson Pines *amongst trees over 100 years of age*.

Amongst younger trees, especially forest growth under 50 years of age, beech is by far the most common species particularly in the northern 4/5ths of the forest. Except for a few patches, white pine saplings and polewood are now largely absent, though young pine was initially established after pine-release silviculture in 1987 following the storm. Throughout the forest, beech has overtaken the pine, eliminating it through shading. Red oak saplings have had somewhat better survival and are now found both scattered and in small pockets.

In 2014, prior to the resurgence of forest management activity, the following conclusion was made: If left unchecked, hardwoods, especially beech, would eventually dominate the overstory of Hanson Pines. A second prediction was also possible: Without continued monitoring and treatment, exotic invasives, chiefly glossy buckthorn, would ultimately overtake the understory.

Fortunately, the City of Rochester has renewed its commitment to maintaining this outstanding forest. In addition to protecting and managing the overstory, this commitment also involves ensuring that diverse young growth is established so that a century from now, the forest has healthy pine, oak, and maple in the overstory rather than a monoculture of diseased beech.

A forest's young growth represents its future composition. Attention to Hanson Pines' young growth is therefore critical.

FOREST MANAGEMENT of HANSON PINES

The summary of Hanson Pines' forest ecology prompts a discussion about the management approach for the forest. Through much of its history, the approach has been to leave Hanson Pines to the course of nature, with interventions only in response to significant natural disturbances, mostly wind damage. For example, at least two timber salvages were made in the last 50 years (early 1970's± and in 1987). Following the second salvage of downed timber, hardwood saplings were removed in the southerly area to release white pine seedlings and saplings. This passive, response-based approach was effective in minimizing disruption to the park's scenic qualities, and by allowing the continued development of the tall pine canopy. However, the passive approach did not address three pressing issues.

The first issue is the unrelenting conversion of Hanson Pines towards hardwood forest—particularly beech—which will occur over the next 50 to 100 years. As the old pines deteriorate or are felled by natural events, beech, often with beech bark disease, replace them. Silvicultural management, as specified in the



silvicultural prescriptions within this plan, is needed to encourage the re-emergence of white pine, as long as this remains an objective. The deed to Hanson Pines advocates favoring a white pine forest.

A second concern is the existence of exotic, invasive plants, primarily glossy buckthorn. Over the span of a few decades, non-native plants can engulf the understory, compromising the forest's ability to regenerate. Invasive control is routine when plant numbers are few, but costly and disruptive if exotics are allowed to proliferate. For the sake of the future forest, active invasive management is essential.

A third issue is the random, recurring presence of dead or unstable trees near trails where they may pose a hazard. There must be an on-going, well-funded effort to remove these trees as they arise over time.

This plan for Hanson Pines outlines present forest concerns and methods to manage or mitigate them. Since the creation of the 2014 forest plan, a more pro-active management approach has been instituted. The management work that has been accomplished between May 2014 and May 2021 is summarized in this plan update, with future recommendations outlined. Funding will be required for all the work.

2014 Recommendation	Year and Work Implemented	Future Recommendations
Forest Management Plan	2014—May, first plan prepared. 2021—June, initial plan updated to include GIS mapping, capture all management activity since first plan, and provide new recommendations.	Update as needed, especially after major changes in the forest—either from natural disturbance or after substantial management activity.
Invasive Control	2014 & 2019—Invasives treated by licensed professional contractor in south section, followed by north.	2022 & 2026 Field assessment for presence/Control as needed.
Hazard Tree Removal	2015 – Tree service removed 68 trees 2021 – As part of biomass harvest, 23 hazard trees removed.	Annual inspection, remove trees as needed.
Follow-up Invasive Work	2014-2019 – Annual instructor/student efforts, part of educational program.	Continue to support.
Interpretive Trail Posts	2018—Student senior project.	Needs reinstallation.
Forest Mapping/Kiosk	2018-2019 – GIS map/Kiosk installation	New map copy and kiosk update needed.
Forest Maintenance Harvest	2021—April, biomass harvest—remove declining trees, create regeneration openings.	Next harvest for salvage/clean-up after large-scale disturbance, or for maintenance in 25 – 30 years.
Post-harvest Remediation	2021—May, woodscaping to clean-up harvest slash, reopen trails.	Apply after next harvest.
Beech Control	2021—May, removal of beech saplings in regeneration openings.	2022/23—spray beech re-sprout to allow pine seedlings to grow.
Regeneration Management	2021—May, competing beech saplings removed to release red oak and pine.	2025-2035—release pine and oak in regeneration openings.
Community Education	2021—May, free forest educational tour for the community.	Conduct forest educational tour annually at Hanson Pines.
Waterfront Erosion Control	Not presently addressed	Address when funding allows.



Silvicultural management of the forest—that is, any management activity that promotes the health or favorable regeneration and growth of the Hanson Pines forest—must be an ongoing concern. Professional involvement is essential, as is the support of the Trustees of the Trust and the City agencies charged with overseeing park maintenance. Public outreach is also vital so that the community understands the importance of maintaining and nurturing this fine forest. These elements were in place for the major silvicultural project that was successfully conducted in the spring of 2021.

Hanson Pines is a forest park, not a forest to be mined for timber production. The purpose of harvesting is to: a) Remove some of the declining overstory trees either to eliminate a hazard or to create regeneration openings; b) release favorable understory growth by creating a canopy gap; c) reduce the number of undesirable seed sources, such as beech; and d) to salvage storm-damaged trees. While it is important to salvage and receive value for harvested marketable timber, *the purpose of harvesting is for forest maintenance rather than commercial motives*. Silvicultural management requires funding, whether for harvesting, invasive control, establishing regeneration, releasing young pine seedlings and saplings, or removing hazard trees. The value of timber harvested, if any, might partly offset these costs.

Based on the April 2021 harvest experience, the following suggestions are offered for future harvests:

- 1) Schedule the harvest during school vacation. In addition to a major reduction in the number of people passing through the forest, vehicular traffic is nearly non-existent, and parking areas are empty allowing ready access for logging equipment and trucks.
- 2) Access the forest via Dominicus Court. Utilize the cleared staging area at this forest entrance. Turn trucks around at the beginning of Dominicus Court, and back into the landing site.
- 3) A professional forester should select and mark the trees for harvest in advance of the logging operation. The marking prescription must adhere to the ecological needs of the forest, not conventional “timbering” rationale.
- 4) Contract with a highly-competent, well-insured, and efficient harvesting contractor. Minimize the number of project days, if possible. The 2021 harvest was completed in three days.
- 5) Allow ample time (over one month) to receive the rail trail crossing permit from the NH Trails Bureau.
- 6) Within the forest, plan on a single crossover of the paved pathway. The crossover requires timber mats or other suitable bridging, which the logger typically supplies, to prevent damage to the pavement.
- 7) While the project is in progress, work with city officials to guard the main park entrances and speak with the public to avoid tree felling or equipment encounters. The Rochester Parks Department stationed personnel during the harvest to work with the public.
- 8) Biomass/chipping harvesting is suggested to reduce the amount of residual slash.



- 9) Hire post-harvest remediation to chop slash into small pieces that lie close to the ground for quick decomposition. Park footpaths must also be cleared and graded. The logging crew may or may not be available to do specialized “woodscaping” work which falls outside the scope of standard logging but is appropriate for a park setting.

Pre-harvest, approximately 1,100 high-canopy white pines (greater than 10-inch diameter) stood in the main section of Hanson Pines, south of the Heath Brook gully. The 2021 harvest removed 88 white pines from this area, an 8% harvest magnitude. A post-harvest 100% inventory indicated that exactly 1,022 overstory pines remain. 259 trees (25%) were the oldest set of pines, running 160+ years of age; nearly all the older trees are located north of the paved pathway. The inventory also indicated a total of 58 pitch pines and 8 red pines (all likely to die within a few years from red pine scale). Overstory hardwoods were not counted.

May 2021 White Pine Inventory—Hanson Pines*	
Total remaining overstory white pines	1,022 trees
Old growth pines (150 - 180± years)	259 trees
Mid-aged pines (75 – 150± years)	763 trees

*This inventory covers the 25± acre area south of Heath Brook only.

The 1,022 remaining large pines are the forest’s foundation. Many are concentrated along the river, rail trail, and south of the paved trail. This foundational number will inevitably decrease over the next century, with the last of the old trees not expected to linger beyond another 100 to 120 years (2140±). Overstory trees are dying-off at an average rate of 2 to 5 per year, with occasional natural disturbances escalating the loss rate. Single tree death is precipitated by crown decline, stem failure (treetop breakage), lightning strikes, and other reasons. Larger disturbances are typically caused by high winds, though ice storms and heavy snows may take a toll.

The establishment of favorable regeneration must begin now to allow sufficient time for stately mature trees to develop in the future. While white pine dominates the present forest’s overstory, representing 90±% of the species mix, the future forest will likely contain an overstory mix of white pine, pitch pine, red oak, white oak, black oak, red maple, black birch, beech, and possibly chestnut. White pine and red oak are predicted to be the dominant overstory species, but many factors may skew this forecast. The future forest is also envisioned as mixed-age, with many generations of trees ranging from seedlings to ancients.



PROPERTY INFORMATION

Location and Geography

Hanson Pines is located on the west side of Wakefield Street (aka NH Route 125), less than a mile north of downtown and adjacent to Spaulding High School. The Park is bounded by the “Lilac City Greenway” – a multi-use recreational trail located on an abandoned rail corridor – to the east and the Cocheco River to the west. The main access point is from the paved parking lot at the high school; however, a gated entrance is found at the end of Dominicus Court and a footbridge over the Cocheco River connects the park to Dewey Street and the neighborhood west of the river.

The land is situated near the transition between the Gulf of Maine Coastal Plain and the Sebago-Ossipee Hills and Plain,¹ a little more than 20± miles inland from the Atlantic Ocean. It lies at the northerly extent of the Appalachian oak-pine forest.² Soils in this region are formed from glacial tills and glacio-fluvial deposits and are underlain by both igneous and metamorphic bedrock. Hanson Pines is situated on a nearly level plain of outwash sand. The site’s elevation ranges from about 220 to 240± feet above sea level.

PROMINENT TRACT FEATURES

- Stately, 150+ year old white pines.
- Nearly 1½± miles of readily accessible trails through scenic forest.
- Over ½ mile of undeveloped Cocheco River frontage.
- Riparian buttonbush shrublands along the Cocheco River.

Reference Information

Deeds: The Charles Hanson conveyance, **Strafford County Registry of Deeds – Book 375, Page 269**, given in memory of his father Dominicus Hanson, specifies several conditions for the property held under this deed.

DEED SUMMARY

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.



Deed clauses that are relevant to management activities on the land are summarized below. Please note that this is a very brief, non-comprehensive summary of the deed; it is necessary to refer to the document itself for full comprehension of the deed's terms and obligations.

- 1) The City of Rochester "shall forever hold (the) property in trust for the benefit of the public as a wooded and timbered park, and a place for recreation for the people not only of Rochester and surrounding towns and cities, but for the world at large."
- 2) "The growth of pine should be encouraged..."
- 3) "No evergreen or nut bearing trees shall be cut...until they have died and it is apparent from their age and decay that they are no longer advantageaces (*sic*) for the purposes for the park."
- 4) "Whatever proceeds may come from the timber cut and removed from (the property) ...shall be kept and used as a fund for improvement and for beautifying (the) park."
- 5) "If more than five hundred dollars (\$500) in value of trees be cut at any one time, except in case of damage by fire or hurricane or if at any time the unexpended fund arising from the cutting of trees or growth on (the property) exceeds the sum of five hundred dollars (\$500)...that sum be paid...to the Protestant Churches of Nashua." **This clause was amended by court decree to a sum of \$20,000 in 2020.**

Surveys: No survey recorded.

Tax Maps: Rochester Tax Map 116, Lot 173.

Conservation Easement: Conserved by deed restrictions, not by easement.

Acreage

CURRENT CONDITIONS:

Upland Forest –	26.9± acres
Wetland –	<u>3.6± acres</u>
TOTAL –	30.5± acres



FINDINGS

Natural Resources and Community Uses

TERRAIN AND TOPOGRAPHY

Few surface rocks are found on this near-level parcel. There is a prominent embankment, 5 to 10± feet high, along much of the Cocheco River frontage. The property's highest point, located in the northern section, rises about 20± feet above the River.

SOILS

Windsor loamy sand underlies nearly the entire property. Common on terraces along the Cocheco River, this soil is characterized as a deep sand that was deposited by glacial outwash activity. Despite its rapid permeability and droughty summer qualities, Hanson Pines' soil is fertile and conducive for the growth of tall pines, oaks, and beech. American chestnut was likely once an important forest constituent on these dry, sandy soils.

WETLANDS

The Cocheco River extends along ½ mile of Hanson Pines' undeveloped forested shoreline. The extensive undeveloped river frontage in a prominent downtown location is an exceptional feature of the property. The riverfront contains a speckled alder and buttonbush. Heath Brook bisects the northerly portion of the property, flowing through a small ravine into the river. The parcel also contains forested wetlands in the southernmost section and a small vernal pool in the northeastern corner.

WILDLIFE HABITAT

The Cocheco River provides outstanding riverfront habitat. The slow-flowing waterway is attractive for a variety of ducks and as a flyway/roosting area for raptors and herons. Beaver, mink, and otter utilize the river and its banks. The pine forest provides preferred habitat for red squirrel, red-breasted nuthatch, and pine warbler, among others. Other notable habitats are the buttonbush peninsula, the forested wetland, and the small vernal pool.

RARE SPECIES & NATURAL COMMUNITIES

The parcel does not contain *documented* rare species or natural communities.

FOREST COMPOSITION and STRUCTURE

The parcel has a moderate diversity of tree species—only about half a dozen species are common on the land, with a few additional species infrequently found in the forest. There are many large diameter white pines (>24 inches), with the oldest set of trees approaching 180± years of age (1840±). A high pine canopy still characterizes much of the forest, with a few pockets of mid-aged hardwoods (125± years old), and dense young hardwood in much of the understory.



FOREST HEALTH

The park appears to be largely free of tree pathogens and damaging insects at this time; however, the advanced age of many of the pines leaves them vulnerable to natural disturbances such as windstorms. Many of the older pines will be lost to natural mortality over the coming decades.

EXOTIC INVASIVE PLANTS

Invasive plants, particularly glossy buckthorn, was spreading within the forest; upland forest areas were successfully treated in 2014 and 2019 by a licensed professional contractor. Spaulding High School's environmental sciences classes have participated in teacher-led invasive control work (uprooting) along the riverfront annually since 2014. A concentration of buckthorn remains in the forested wetland on the poorly-accessed southern tip of Hanson Pines; the buckthorn patch extends into the abutting property.

HISTORIC SITES

There are no known historic sites on the property, though the Hanson Pines riverside terrace was likely used by Native Americans and early settlers.

RECREATIONAL USE

The park's trail network, easily accessible and heavily used, is popular year-round. Primary uses are walking and dog walking. Running, biking, fishing, and boating (light craft) access are secondary activities. The main trail follows the park perimeter along the Cocheco River up to Heath Brook. A paved crossover trail connects the High School parking lot with Dewey Street via a footbridge over the Cocheco River. The city undertook the upgrading and replacement of the bridge in 2017-2018, a major endeavor with outstanding results.

TIMBER

As of May 2021, 1,022 overstory white pines remain in Hanson Pines in the acreage south of the Heath Brook Gully. Despite the advanced age of many of the white pines, with associated rot, the southerly forest contains roughly 350,000± board feet of sawtimber. The property deed explicitly states that the forest is not to be exploited for timber production. The existence of the park's stately pines—an assemblage of mature trees that is rarely found—is largely due to this deed provision, wherein the ability to profit from the trees was removed. The occasional removal of relatively small numbers of trees strictly for forest health reasons, or as storm salvage, which are then utilized as timber is the accepted management approach.

BOUNDARY LINES

The Park is bordered by the State's recreational trail way on the east, city land to the north, and the Cocheco River to the west. It shares 430± feet of common boundary with abutting private land on the southern boundary. Though this boundary line is not well-demarcated, it lies within a wetland where encroachment is unlikely.



MANAGEMENT CONCERNS & RECOMMENDATIONS

There are several major concerns for Hanson Pines including:

- Declining overstory trees;
- Forest regeneration;
- Exotic, invasive plants;
- Trailside hazard trees;
- Waterfront erosion;
- Public safety;
- Vandalism, trash; and
- “Rogue” trails.

Each of these concerns are discussed in this section, with corresponding recommendations.

DECLINING TREES

Due to the advanced age of many of the white pines, natural mortality from storm damage, lightning, rot, insects, and natural senescence, will continue in the forest. This is a natural part of the forest’s ecology. As long as they are not in a hazardous location, i.e., near trails, dead trees (“snags”) provide valuable habitat to wildlife.

Recommendations:

- Remove hazard trees but retain deep forest snags as important habitat features.
- Consider the application of silvicultural management to ensure diverse forest regeneration, including white pine, to replace the declining trees.

FOREST REGENERATION

While promising patches of young pine are established in southerly sections of Hanson Pines, dense hardwood regeneration is found in most of the forest. Without silvicultural management, Hanson Pines will convert into a beech-oak forest over the next 50 to 75 years. Silvicultural management to ensure pine regeneration requires funding, tenacity, and strategic interventions.

Recommendations:

- Apply the silvicultural prescriptions specified in this plan to ensure the natural regeneration and establishment of white pine, thereby assuring that the future forest high canopy consists at least partly of white pine.
- Retain a consistent, periodic approach to silvicultural treatments.
- Silviculture entails occasional light harvests of declining trees to create canopy openings for regeneration; soil scarification to induce the germination of pine seeds; encouraging natural regeneration (rather than tree planting); hardwood control; invasive plant control; and protection of regeneration from foot traffic.



- Brush generated from tree harvesting may need to be gathered and chipped to reduce fuel build-up in the forest (and the potential for arson).

EXOTIC INVASIVE PLANTS

Sections of Hanson Pines contained severe infestation of non-native, invasive plants, particularly glossy buckthorn. This can be a serious condition: The plants aggressively spread if left unchecked. Without control, these invasive plants diminish the property's biodiversity, habitat, ecological functioning, scenic beauty, and inhibit the forest's ability to naturally regenerate.

Recommendations:

- Priority eradication effort – Locate areas with plants, and contract a qualified, licensed applicator to treat plants with herbicides.
- Annually monitor and reapply control efforts as needed.

HAZARD TREES

Natural senescence and structural defects of older trees pose a threat to recreational users of the park. To protect public safety, dead, dying, and unstable trees need removal along trails. These trees can be felled and left lying in the woods. Funding is needed to periodically carry-out this maintenance.

Recommendations:

- Annually identify and GPS hazard trees in need of removal.
- Fell as many as possible if a forest harvest is being conducted.
- Contract with a tree service to fell remaining trees, especially those with difficult removal, i.e., near powerlines, etc.
- Continue to inspect the forest for new hazard trees.

WATERFRONT EROSION

The Cocheco River frontage is one of the property's outstanding natural features. Many visitors to the Hanson Pines are naturally drawn to the water. Unfortunately, heavy use at several riverbank locations causes erosion and sedimentation which adversely impacts water quality.

Recommendations:

- Create 2 or 3 well-designed access points for fishing, river viewing, and perhaps a boat launch. Install a river viewing platform.
- Remediate retired river access points. Control erosion.

PUBLIC SAFETY

Illegal activities in the park occur creating concern for the safety of park users.

Recommendations:

- Work with police department to increase police patrols if needed.
- Promote personal safety awareness education for the public.

LITTER and VANDALISM



Littering is a constant, however, Recreation Department workers, park visitors, and community volunteers continuously remove trash. Park vandalism in recent years has included damaged benches, scarred/painted trees, and destruction of a student's interpretive trail QR posts. Human-caused ground fires have occurred and are a major concern during dry seasons.

Recommendations:

- Organize an annual litter clean-up.
- Reinstall interpretive trail.
- Seek the help of interested students or civic organizations to combat the problems.

ROGUE TRAILS

Trails are heavily used by the public, primarily for walking and dog walking, as well as mountain biking. While these uses have relatively light impact on the park, there are concerns—dog sanitation, as well as the expansion of “rogue trails”.

Recommendations:

- Install dog sanitation stations at park entrances.
- Discourage additional trail building.

RECOMMENDATIONS SUMMARY for HANSON PINES

High Priority:

- Follow-up beech control in regeneration openings.
- Invasive plant monitoring and control.
- Fell remaining hazard trees.

Medium Priority:

- Conduct annual educational walk through the forest for the community.
- Organize periodic litter clean-up.
- Control waterfront erosion.

Lower Priority:

- Address trail concerns.
- Improve public safety as needed.



SCHEDULE of MANAGEMENT ACTIVITIES

Year	Season	Activity	Whom
2021 Completed Projects			
2021	Winter - Spring	Prepare forest harvest: Tree marking, permitting; logistics; project showings, bidding; contracting.	F
	Spring	Implement forest harvest on southern 23± acres of Hanson Pines. Remove 22 hazard trees.	C
	Spring	Post-harvest woodscaping.	F
	Spring	Post-harvest beech sapling removal from regeneration openings.	F
	Spring	Host educational tour of <i>Hanson Pines</i> ; public invited.	P&R/RTT/F/V
Future Projects			
2021	Summer	Remove remaining hazard trees	A
	Summer/Fall	Interface with Environmental Sciences teacher to coordinate student projects.	P&R/RTT/F/V
2022	Summer	Treat beech sprouts in regeneration openings	F
	Late summer	Inspect forest for invasive plants. Implement control.	F/C
	Fall	Host educational tour of <i>Hanson Pines</i> ; public invited.	RTT/V
2023-2035	Summer	Treat beech sprouts in regeneration openings	F
	Late summer	Continue invasive plant monitoring and spot control.	F/C
		Apply silvicultural treatments to release pine regeneration.	F
	Fall	Host annual educational tour of <i>Hanson Pines</i> ; public invited.	P&R/RTT/F/V
	Winter/Spring	Remove hazard trees	A

KEY: A = Arborist; C = Contractor; F = Forester; P&R= Parks and Rec Department; RTT = Rochester Trustees of the Trust Fund; V = Community Volunteers (Ex.: High School Students, Scouts, etc.)

Forestry



Recreation/Safety



Invasive Control



Educational



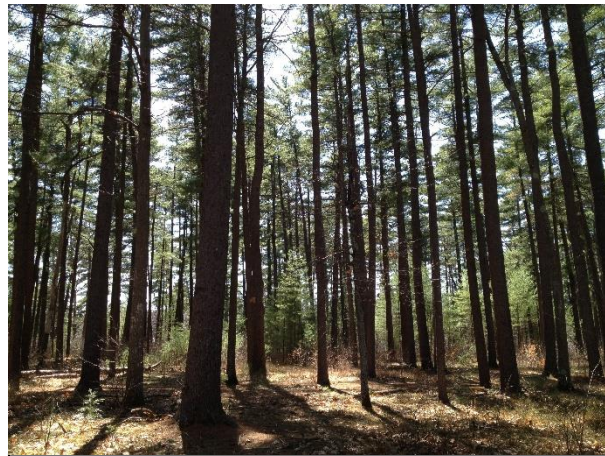
Charles Moreno, Consulting Forester, Ecologist
Strafford, New Hampshire // (603) 234-0444
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FOREST TYPES & PRESCRIPTIONS



A. White Pine – 12.9± acres

Description – White pine dominates this forest type, constituting at least 75% of the overstory, which is often pure pine. The groves contain many of the property’s signature trees – stately pines towering to 125± feet in height and 2 to 3 feet in girth. The oldest pines developed on pasturelands that were abandoned before the Civil War. These old trees have escaped harvesting and major natural disturbances for over 150 years.



Scenic, tall, large diameter pines dominate Forest Type A.

Species Composition	
Primary	White Pine
Secondary	Red oak, pitch pine
Regeneration (saplings)	Beech, red oak, white pine



Forest Structure: Forest Type A	
Composition	
Stand Structure	Two- to three-aged
Successional Stage	Late-intermediate to Mature
Stand Age	20-45//115-130//150-180± years
Tree Size	
DBH range	10 – 30± inches
Mean DBH	22± inches
Avg. Max. Height	125± feet (WP)
Stand Density	
Relative Stocking	Considerable/Dense
Basal Area/Acre	190± sq. ft./acre
Trees/Acre	70± trees
Canopy Closure	75-100± % (Some overhead canopy openings have been created by the death of individual large pines or through harvesting).
Wildlife/Ecological	
Wildlife Features	Light thermal cover, pine seed, tall roosting trees, snags and cavity trees – foraging and nesting sites for woodpeckers and other birds.
Canopy Stratification	Low – some understory (includes beech, pine, and oak saplings). Well-established overstory. Mid-story not well developed.
Woody Debris	Generally low accumulation – some large trunks from recently fallen trees.
Invasive Plants	Glossy buckthorn mostly controlled, but present in low numbers.

Forest Type A -- Prescription

Management Objectives –

Short-term: Continue to introduce new generations of pine and oak in understory, while promoting the growth of young established pines and oaks. Remove competing beech. Eradicate invasives.



Long-term: Develop resilient mixed-aged stands that are predominately white pine, but also contain red oak, white oak, and black birch. Maintain a wide age range from viable seedlings to ancients 150 to 200+ years of age.

Management Approach: Silviculture to maintain the mid-successional species mix of pine and oak, while also creating a more complex and naturally resilient forest structure.

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

Silvicultural Treatments:

2021 (completed): **Micro-group selection:** Expand existing canopy gaps and create new gaps by removing groups of up to 6± trees while minimizing understory disturbance.

Beech sprout removal to create regeneration openings.

2024 - 2035±: **Seedling/sapling release (FSI)** of viable understory where needed.

2045 - 2050±: **Expanded micro-groups/Create additional, new micro-group openings.**

2070 - 2075±: Expanded group openings, while creating additional canopy gaps. Thin developing mid-story and understory.



B. White Pine/Hardwood – 11.0± acres

Description – This forest type is characterized by a partial white pine overstory that is shared with mixed hardwoods, pitch pine, and occasional red pine. This forest type contains the oldest white pines ranging up to 180± years of age. Through the course of the last century, substantial openings developed in the older pine canopy. Younger trees (in somewhat grouped age-classes up to 125± years) became established as canopy gaps developed in the pines. Hardwoods—oak and beech—represent the younger cohorts, including the most recent regeneration which resulted from storm salvage harvests in the late 1980's and early 1970's. Beech dominates sapling growth, while pine is virtually absent. A variant of the main pine/hardwood forest type is found in the remote northern section of the park. While this area has a similar species suite, the oldest trees are 125± years of age, and the stand is two-aged in structure.



White pines are more scattered, and hardwoods are an important component of the Pine/Hardwood Forest Type.

Species Composition	
Primary	White Pine, red oak
Secondary	Beech, white oak, pitch pine
Uncommon	Red pine, red maple, white birch
Regeneration (saplings)	Beech predominates. Also present: red maple, red oak, white oak, black birch.



Forest Structure: Forest Type B – Main Variant	
Composition	
Stand Structure	Three-aged to multi-aged
Successional Stage	Late-intermediate to Mature
Stand Age	25-50±//115-130±//150+ years
Tree Size	
DBH range	<1 – 4±// 6 – 11±// 12 - 30± inches
Mean DBH	16± inches
Avg. Max. Height	125± feet (WP)
Stand Density	
Relative Stocking	Considerable
Basal Area/Acre	120± sq. ft./acre
Trees/Acre	90± trees
Canopy Closure	40 - 90± % (overstory)
Wildlife/Ecological	
Wildlife Features	Large mast-producing oaks. Snags and cavity trees.
Canopy Stratification	Good – Including partially developed mid-story.
Woody Debris	Moderate accumulation – some large trunks and branches.
Invasive Plants	Glossy buckthorn controlled in 2019 by a licensed professional contractor. Likely still present in trace numbers.

Forest Type B – Prescription

Management Objectives –

Short-term: Continue to introduce new generations of trees, especially white pine and red oak, with a corresponding decrease in the proportion of beech. Eradicate exotic invasives.

Long-term: Develop a mixed-aged, mixed species stand with ample white pine, as well as red oak, white oak, and black birch. Introduce American chestnut, if disease-resistant seedlings become available. Maintain a wide tree age range from viable seedlings to ancients 150 to 200+ years of age.



Management Approach: Silviculture may be applied to increase the proportion of pine in the future stand. Presently, young pines are absent in the understory. Unless silvicultural steps are taken to regenerate and establish young pines, the pine/hardwood forest type will continue to convert to hardwood, primarily beech.

Structural Sequence: Three/Multi-aged (present) → Multi-aged (2050)

Silvicultural Treatments:

2021 (completed): **Expanded group selection//Micro-group and small-group selection.** Expand existing canopy gaps to release young growth. Create new canopy gaps by removing declining pines and diseased beech.

Crown thinning/improvement cutting (FSI) in promising polewood pockets.

Inter-sapling release (FSI) removing beech.

2024 - 2035±: **Seedling/sapling release (FSI)** of viable understory where needed.

2045- 2050±: **Expanded group openings/Create additional, new micro-group openings.** Thin pockets of younger trees.

2070 - 2075±: Expanded group openings, while creating additional canopy gaps. Thin developing mid-story and understory.



C. Upland Hardwood – 2.6± acres

Description – This minor forest type is characterized as primarily mid-aged, upland hardwoods (mostly polewood sized trees, 6 – 13-inch diameter). These hardwood pockets developed in relatively large canopy gaps that formed between the 1930±s and the early 1970's. A few residual large white pines are found in the overstory. There are two forest type variants: C1) is a small pocket of even-aged red oak polewood, with a dense pine understory; and C2) which is found in several pockets that are generally two-aged and are dominated by red oak and beech with scattered, large, and older white pine.



Young, healthy red oaks dominate variant C1.



A mix of beech and red oak is found in variant C2.

Species Composition	C1 – Red Oak Variant	C2 – Red Oak/Beech Variant
Primary	Red oak	Red oak, beech
Secondary	White pine, red maple	White pine, red maple
Regeneration (seedlings/saplings)	Dense white pine, some beech and red oak.	Beech, red oak, white oak. Few white pines.



Forest Structure: Forest Type C		
	C1) Variant	C2) Variant
Composition		
Stand Structure	Even-aged w/ older residuals & two-aged w/ older residuals	Two-aged w/ older residuals
Successional Stage	Young- to mid-intermediate	Mid-intermediate
Stand Age	50-70± years.	50-70//110//150+ years.
Tree Size		
DBH range	6 – 16± inches	6 – 30± inches
Mean DBH	13± inches	16± inches
Avg. Max. Height	75± feet	115± feet (white pine)
Stand Density		
Relative Stocking	Considerable	Considerable
Basal Area/Acre	85± sq. ft./acre	110± sq. ft./acre
Trees/Acre	95± trees	80± trees
Canopy Closure	80-100± %	70-100± %
Wildlife/Ecological		
Wildlife Features	Hard mast – red oak acorns and beech nuts.	
Canopy Stratification	Good – high understory, overstory and supercanopy.	Good – ample understory, mid-story, overstory and supercanopy.
Woody Debris	Light, sparse.	Good—including some large snags.
Invasive Plants	Moderate incidence – glossy buckthorn.	Low incidence – some glossy buckthorn.



Forest Type C – Prescription

Management Objectives –

Short-term: Promote the growth of the healthiest oaks in both variants. Remove disease beech. Encourage white pine regeneration. Eradicate exotic invasives.

Long-term: In C1, develop red oak into scattered mature trees while allowing some understory pines to develop into main canopy. In C2, promote existing oaks, including white oak. Encourage an increased presence of white pine.

Management Approach: Silviculture may be applied to increase the proportion of pine, remove poor hardwood growth, and create a more complex and naturally resilient forest structure.

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

Silvicultural Treatments:

2021 (completed): C1 – **Crown thinning.** Release finest oaks.

C2 – **Improvement cut/Single-tree selection.** Remove diseased beech and poor hardwoods to release promising trees and allow space for new growth.

2045 - 2050±: C1 – **Single-tree selection/Overstory release.** Retain finest oaks, while releasing understory pine.

C2 – **Single-tree selection/Improvement cut.** Create new canopy gaps for regeneration.

2070 - 2075±: Similar treatments as previous.



APPENDICES



APPENDIX A – Relative Abundance of Tree Species

SPECIES COMPOSITION

Due to uniform sandy soils, Hanson Pines contains only a few tree species. The property's wetlands contribute some diversity to the tree species suite.

A qualitative approximation of the property's relative overstory tree species abundance is:

Abundant – White pine.

More Common – Red oak.

Common – Red maple, pitch pine.

Less common – Beech, white oak, red pine.

Scarce – Gray birch, white birch, sugar maple, hemlock.

Rare – American elm, black gum, basswood, red spruce.



Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
MI	Mixed alluvial land, wet	0.8	2.5%
Mp	Freetown and Swansea mucky peats, 0 to 2 percent slopes	0.2	0.8%
W	Water	0.1	0.3%
WdA	Windsor loamy sand, 0 to 3 percent slopes	29.4	96.4%
Totals for Area of Interest		30.5	100.0%



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: 2012-10-17

Re: Review by NH Natural Heritage Bureau of request dated 2012-10-12

NHB File ID: 1322

Town: Rochester

Project type: Landowner Request

Location: Hanson Pines (Tax Map 116, Lot 173)

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)					
Redfin Pickerel (<i>Esox americanus americanus</i>)	2000	--	SC	T5	S3
Wood Turtle (<i>Glyptemys insculpta</i>)	2009	--	SC	G4	S3
Natural Community					
Poor level fen/bog system	1998	--	--	--	S3
Invertebrate Species					
Swamp Darner (<i>Epiaeschna heros</i>)	2010	--	--	G5	S1
Plant species					
button sedge (<i>Carex bullata</i>)	2011	--	E	G5	S1
clustered sedge (<i>Carex cumulata</i>)	1994	--	T	G4	S2
variable sedge (<i>Carex polymorpha</i>)	2011	--	E	G3	S1
Long's Bulrush (<i>Scirpus longii</i>)	2011	--	E	G2	S1
Nuttall's reed grass (<i>Calamagrostis cinoides</i>)	1989	--	E	G5	S1

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.



NEW HAMPSHIRE NATURAL HERITAGE BUREAU

DRED - DIVISION OF FORESTS & LANDS

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

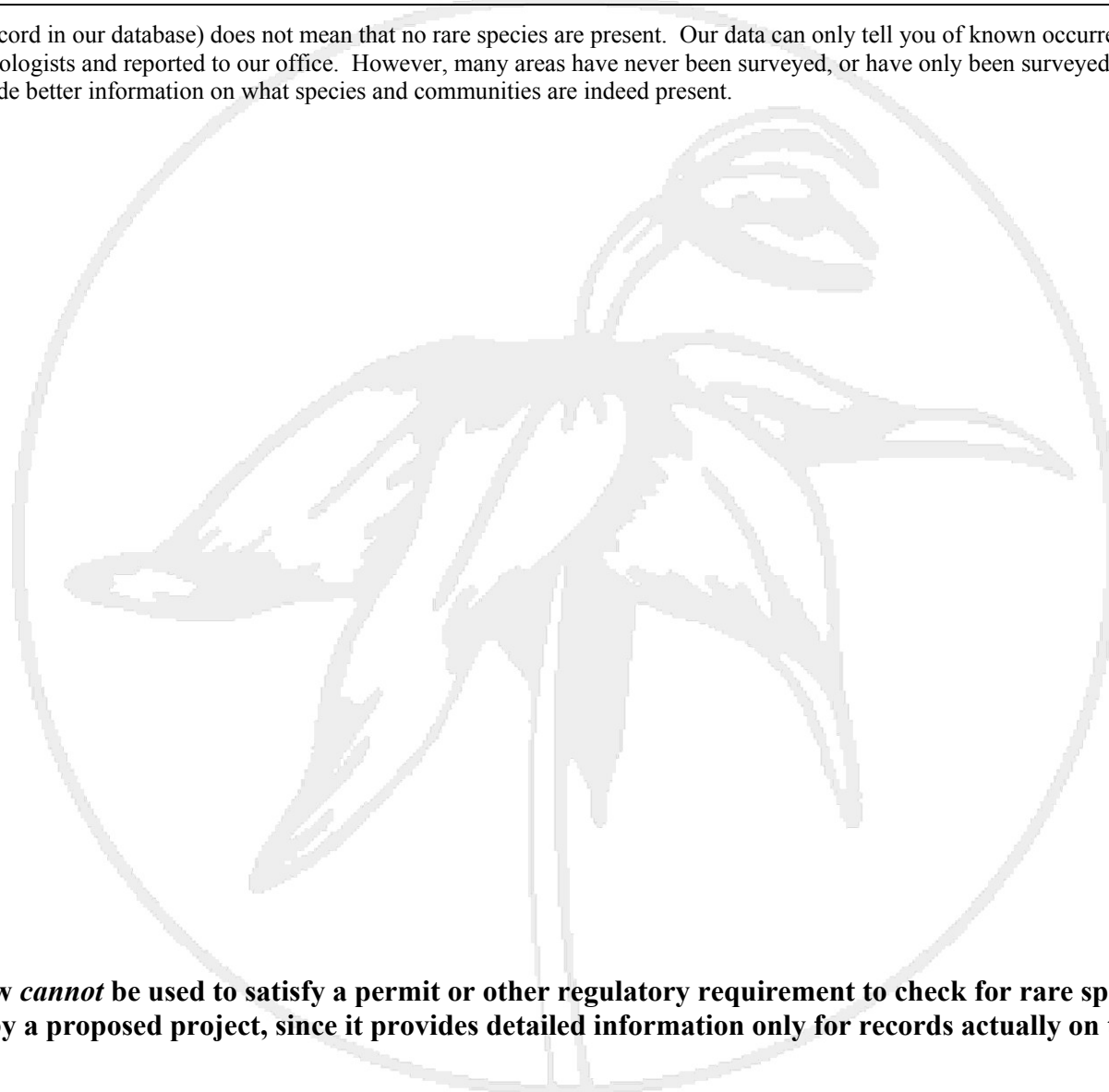
PHONE: (603) 271-2214 FAX: (603) 271-6488

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.

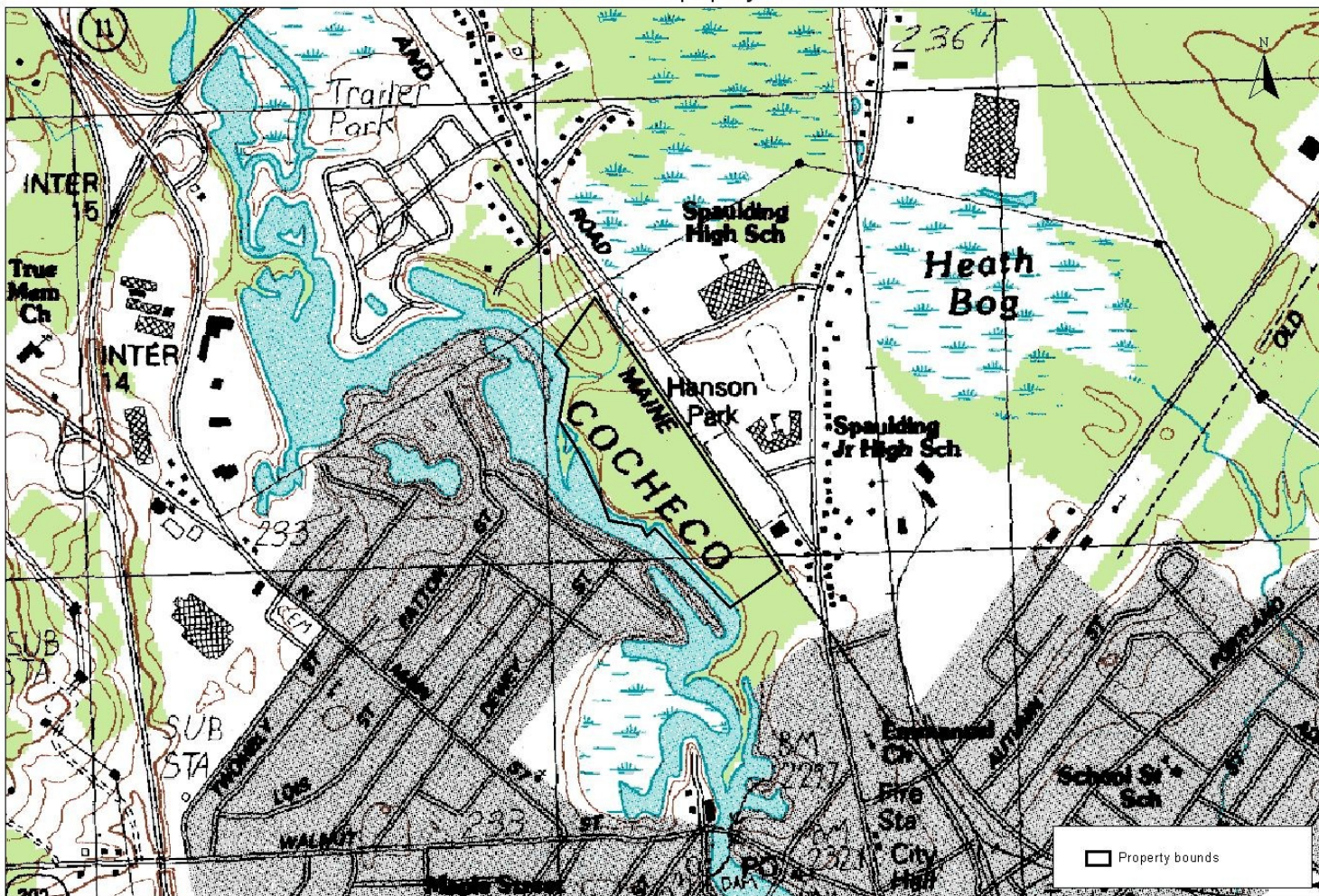
NHB: L1322



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: Hanson Pines



17 Oct 2012

APPENDIX D – Forester Professional Qualifications

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
 AFF Study Tour Germany/France/Switzerland—Mixed-aged silvicultural methods, Oct 2016

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. Forty-one 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. 40,000+ acres under management.

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

1988 - Present **FOREST MANAGER** for multiple forest properties owned by conservation organizations, land trusts, and schools. Prepared and presented numerous workshops and field tours teaching silviculture, wildlife habitat management, natural history, forest ecology, low impact harvest techniques, and other topics.

1990 - Present **FOREST CONSULTANT** for environmental studies, forest appraisals, and/or project management including Pease Tradeport (Newington, NH), Emerald Necklace (Boston, MA), Trust for Public Lands, Southeast Land Trust, and Siemon Family Charitable Trust.

2009 - Present **TECHNICAL SERVICE PROVIDER (TSP)** for Natural Resources Conservation Service (NRCS). Approximately 50 management plans completed, as well as project management for forest improvement, habitat enhancement, invasive control, & woods road construction.

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)

