

ECOLOGICAL ASSESSMENT OF THE HAMLIN/EAMES PROPERTY

TOWN OF MEREDITH, NH

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INTRODUCTION

In December, 2009, members of the Meredith Conservation Commission (MCC) expressed interest in obtaining more information on the species and communities of the Hamlin/Eames property. They conveyed a desire to inform future management activities with a deeper understanding of the condition and quality of the habitats and natural communities present on site. The report below provides the MCC and its land managers with the information necessary to achieve that goal.

The 713-acre “study area”¹ described in this report includes 4 tracts of land (see Map 1):

- The 313-acre Hamlin Town Forest – owned by the town and under stewardship of the Conservation Commission
- The 192-acre Eames Town Forest – owned by the town and under stewardship of the MCC
- The 148-acre Smyth Easement Land – owned by Mr. Louis Kahn with an easement held by the town and stewarded by the MCC
- The 60-acre Kahn Easement Land – owned by Mr. Louis Kahn with an easement held by the town and stewarded by the MCC

While the original proposal drafted in December 2009 did not include an assessment of the two easement areas, in June 2010 an addendum was added to the agreement to include these areas as part of the assessment and report.

Each sub-section in the report below describes a different natural community based on the New Hampshire Natural Community classification system (Sperduto and Nichols 2004), with updates to the classification from the New Hampshire Natural Heritage Bureau’s (NHB) forthcoming book.² More information on these communities (photographs, descriptions, species lists, statewide distributions) can be found at NHB’s [website](http://www.nhdf.org/about-forests-and-lands/bureaus/natural-heritage-bureau/photo-index/). Some “expressions” of variants described below are not officially recognized by NHB, but represent my attempt to describe some of the apparent variability within the particularly heterogeneous forest seep natural communities. All community classifications were reviewed by Dan Sperduto (author of the NH natural community classification).

Species listed under each sub-section represent species I directly observed in the field within the study area. Photos are also from on-site field visits. Field GPS waypoints where the natural community was observed are listed at the end of each section. Remarks and recommendations on the ecological condition and management recommendations are made in the section headings describing the larger natural community groupings.

¹ Note that the acreages reported here represent the area as represented in the town’s GIS data layers, and not necessarily the area reported in deeds, easements, or other official documents.

² Available online at <http://www.nhdf.org/about-forests-and-lands/bureaus/natural-heritage-bureau/photo-index/>.

The information presented in this report was collected from over 10 days in the field, not including preparation and data processing time. These site visits occurred between May 7 and July 13, 2010. While this amount of time allowed me to cover quite a bit of ground and represents my best attempt to capture the ecological variability of the landscape (see Map 3), there may be very small areas that escaped detection (especially seeps and vernal pools). If natural communities or features exist that are not described in this report, the MCC should revise and update it with the best, most up-to-date information available.

PREVIOUS STUDIES

A number of previous studies have been conducted within the study area, either as part of larger regional assessments or rapid field reconnaissance. The report below takes into account all of the information from these reports, in many cases revising and improving it based on more detailed field study. Previous studies consulted include:

- 2009 Phase 2 Natural Resource Inventory of the Town of Meredith by Rick Van de Poll
- 2005 Phase 1 Natural Resource Inventory of the Town of Meredith by Rick Van de Poll
- October 2002 Report on Eames Property Bio-Inventory and Wetlands Assessment by Rick Van de Poll
- September 2002 Report on Hamlin Recreation Area Site Visit by Rick Van de Poll

NATURAL COMMUNITY PROFILES

OPEN EMERGENT MARSHES, SHRUB THICKETS AND AQUATIC BEDS

Ecological Condition

All 31 instances of these wet natural communities within the study area have a relationship to beaver impoundment. The hydrologic flow and topography of the study area have attracted a very high intensity of beaver activity in a relatively small area. This has allowed for the establishment of a complex mosaic of shifting habitat types at various stages of flooding, drying, and re-growth. This mosaic provides excellent habitat for a particularly diverse array of plant and animal species, and is therefore one of the study area's most valuable qualities. Most of these wetlands remain in excellent shape, relatively unharmed by human activities and almost entirely free of invasive species. The old clear-cut to the west of "double-dam" pond is a notable exception. While many wildlife species (songbirds, beaver) have enjoyed the shrubby early-successional habitat along the western shores of double-dam pond, the openings have created a vector for problematic invasive plants such as *Lonicera morrowii* (Morrow's honeysuckle).

It is also worth noting that in 2002, Rick Van de Poll found 2 aquatic plant species of concern in one of these beaver impoundments:

Two plants species of special concern were found in the rookery pond on the Hamlin Recreation property, both of which are rare in the state and should be cause for conservation protection. The first, *Ceratophyllum echinatum*, is a southern species whose northern limits have not been recorded in New Hampshire beyond Rockingham County. The second, lesser bladderwort (*Utricularia minor*) is a slightly more common species that has been on an apparent decline since its preferred locations in the state are freshwater coastal ponds. Both of these species require clean, slow-moving open water in beaver drainages in order to survive, and both were found in small quantities along the south shore of the rookery wetland. (Van de Poll, Report on Eames Property Bio-Inventory & Wetlands Assessment 10-5-02)

Neither of these plants is currently classified as threatened or endangered by NHB, but both are uncommon, and the most recent revision of the state's rare plant list recommends more study to understand the rarity of lesser bladderwort within the state.

Management Recommendations

- Allow beaver to continue cycle of impoundment and abandonment
- Monitor for continued great blue heron breeding, and during the breeding season (April-August), close the western end of Arbutus Hill Pond Trail and southern end of Barbara Smyth trail, restricting recreational access within 330 feet of Arbutus Hill Pond (See NH FSSWT 1997), and preventing disruption of breeding great blue herons.
- Refrain from timber harvesting activity harvest within 100 feet of these wetlands (see Map 4).
- Monitor for adverse impact from recreational use (trampling, ruts, etc.) within these wetlands.

- If feasible, initiate an invasive plant control program to control the spread of invasive species along the shores of wetlands, and in particular along the western shore of double-dam pond. Options to consider include:
 - If a large group of volunteers is available, coordinate a volunteer work party to cut and treat (using undiluted Glyphosate, or “Round-up”) invasive plants as observed along the shores of any wetlands.
 - If money is available, hire a qualified herbicide applicator (e.g. [Vegetation Control Services](#)) to obtain permits and spray invasive plant populations in these areas with the appropriate mix of herbicides.

Sedge meadow marsh, typic southern variant



The 14 instances of the sedge meadow marsh natural community within the study area and all are associated with abandoned beaver impoundments. They are generally older (more time since abandonment) than the other marsh wetlands and aquatic beds, and the old beaver impoundments that once flooded them have now broken, lowering the water table and exposing them to more seasonal shifts in hydrology. This creates a perfect seed bed for lawns of grasses and sedges (“graminoids”) to move in and dominate the vegetative composition of the younger sedge meadow marshes (often called a “beaver meadow”). As these graminoid-dominated marshes get older and dry out even more, they tend to favor a more balanced mix of graminoids, herbs, shrubs, and ferns.

Species Observed ³

Carex utriculata (bottle-shaped sedge), *Carex stricta* (tussock sedge), *Lysimachia terrestris* (swamp candles), *Boehmeria cylindrica* (false nettle), *Carex comosa* (bristly sedge), *Spiraea tomentosa* (steeple bush), *Sphagnum* spp. (peat moss), *Thelypteris palustris* var. *pubescens* (marsh fern), *Carex scoparia* (broom sedge), *Impatiens capensis* (spotted touch-me-not), *Juncus* sp. (rush species), *Carex echinata* (prickly sedge), *Carex vesicaria* (inflated sedge), *Eupatorium perfoliatum* (perfoliate boneset), *Carex canescens* ssp. *canescens* (silvery sedge), *Triadenum virginicum* (marsh St. John's-wort), *Eleocharis* sp. (spike-rush species), *Carex lurida* (sallow sedge), *Persicaria sagittata* (arrow-leaved tearthumb), *Dulichium arundinaceum* (three-way sedge), *Carex gynandra* (perfect-awned sedge), *Juncus* c.f. *canadensis* (Canada rush), *Scirpus cyperinus* (woolly bulrush), *Carex lasiocarpa* (hairy-fruited sedge), *Typha latifolia* (common cattail), *Utricularia cornuta* (horned bladderwort), *Vaccinium corymbosum* (highbush blueberry), *Onoclea sensibilis* (sensitive fern), *Lysimachia terrestris* (swamp candles), *Iris versicolor* (northern blue flag), *Glyceria canadensis* (rattlesnake mannagrass), *Vaccinium corymbosum* (highbush blueberry), *Carex lurida* (sallow sedge)

in wet spots: *Nuphar variegata* (variegated yellow pondlily), *Pontederia cordata* (pickerel weed), *Sparganium americanum* (lesser bur-reed)]

Waypoints: 144 (largest and most diverse), 146, 151, 154, 162, 190, 192

Sedge meadow marsh, Sphagnum expression



³ All species lists in this document report species in approximate order of abundance.

This single sedge meadow marsh was unique in displaying an uncommonly high density of sphagnum moss cover and a smattering of tenacious red maple trees. Located at the upslope (western) edge of Arbutus Hill Pond, it appears that the long history of shifting water levels created by beaver impoundment are at a point now that favors the invasion of peat mosses and emergent plant species like bur reed (*Sparganium americanum*) into the typical graminoid-dominated vegetation structure.

Species Observed

[percent cover estimates in brackets]

Overstory Trees

Acer rubrum (red maple) [10% cover, dying]

Understory Trees and Shrubs

Tsuga canadensis (hemlock) [2%], *Acer rubrum* (red maple) [2%], *Vaccinium corymbosum* (highbush blueberry) [1%], *Ilex verticillata* (winterberry) [1%], *Betula alleghaniensis* (yellow birch) [<1%]

Other plants

Sphagnum (peat moss) [90%], *Sparganium americanum* (lesser bur-reed) [40%], *Carex canescens* (silvery sedge) [2%], *Carex disperma* (two-seeded sedge) [2%], *Scirpus cyperinus* (woolly bulrush) [1%], *Carex stricta* (tussock sedge) [1%], *Carex lurida* (sallow sedge) [1%], *Glyceria canadensis* (rattlesnake mannagrass) [<1%], *Osmunda regalis* var. *spectabilis* (royal fern) [<1%], *Triadenum virginicum* (marsh St. John's-wort) [<1%], *Osmunda cinnamomea* (cinnamon fern) [<1%], *Calamagrostis canadensis* var. *canadensis* (robust bluejoint) [<1%], *Poa palustris* c.f. (fowl meadow grass) [<1%], *Carex gynandra* (perfect-awned sedge) [<1%], *Coptis trifolia* (goldthread) [<1%], *Lycopus* sp. (water horehound species) [<1%], *Juncus* sp. (rush species) [<1%], *Carex echinata* (prickly sedge) [<1%], *Carex scoparia* (broom sedge) [<1%], *Dulichium arundinaceum* (three-way sedge) [<1%], *Kalmia angustifolia* (sheep laurel) [<1%], *Gaultheria hispidula* (creeping snowberry) [<1%].

Waypoints: 072 (observed 5/18) and 187 (observed 7/9)

Highbush blueberry - winterberry shrub thicket



The single instance of this natural community within the service area occurs at a transition point along a recently abandoned beaver dam where the wetter upslope sedge meadow marsh transitions to a subacid forest seep at the base of the dam. Composition is dominated by wetland shrubs and ferns.

Species Observed

Ilex verticillata (winterberry), *Vaccinium corymbosum* (highbush blueberry), *Osmunda regalis* var. *spectabilis* (royal fern), *Osmunda cinnamomea* (cinnamon fern), *Alnus incana* ssp. *rugosa* (speckled alder), *Onoclea sensibilis* (sensitive fern), *Viburnum dentatum* var. *lucidum* (northern arrowwood), *Spiraea alba* var. *latifolia* (eastern meadowsweet)

Waypoints: 118

Tall graminoid meadow marsh, bluejoint variant



(shown in lower right portion of photograph)

This community occurs at the edges of largest sedge meadow marsh (at the southern end of the service area near the parking lot). In this portion of the wetland basin, it is drier for longer periods of the year, a situation well-suited to Canada bluejoint (*Calamagrostis canadensis*), which thereby dominates to the exclusion of the more wet-adapted sedge species.

Species Observed

Calamagrostis canadensis var. *canadensis* (robust bluejoint) [**dominant**], *Ilex verticillata* (winterberry), *Typha latifolia* (common cattail), *Spiraea alba* var. *latifolia* (eastern meadowsweet), *Carex stricta* (tussock sedge)

[**In deeper water:** *Carex utriculata* (bottle-shaped sedge)? [viewed from a distance], *Dulichium arundinaceum* (three-way sedge), *Typha latifolia* (common cattail)]

Waypoints: near 144

Cattail marsh



The single instance of this natural community represents the bulk of the largest wetland in the study area (almost 10 acres). It appears to have a long history of beaver impoundment and abandonment, and has been recently (in the last 2-3 years) re-flooded by beavers, transforming a sedge meadow marsh into a shallow emergent marsh increasingly dominated by cattails.

Species Observed

Typha latifolia (common cattail), *Sphagnum* spp. (peat moss), *Sparganium americanum* (lesser bur-reed), *Carex stricta* (tussock sedge), *Carex utriculata* (bottle-shaped sedge), *Glyceria canadensis* (rattlesnake mannagrass), *Scirpus cyperinus* (woolly bulrush), *Carex canescens* ssp. *canescens* (silvery sedge), *Lycopus* sp. (water horehound species), *Acer rubrum* (red maple), *Tsuga canadensis* (hemlock), *Pinus strobus* (white pine), *Carex lurida* (sallow sedge), *Dulichium arundinaceum* (three-way sedge), *Carex scoparia* (broom sedge), *Juncus* sp. (rush species), *Triadenum virginicum* (marsh St. John's-wort)

Waypoints: 159

Emergent marsh



Similar to the cattail marsh natural community, this community occupies semi-permanently flooded shallow-water environments (around 0.5 -2 feet deep). However, rather than displaying a dominance of cattails, they tend to favor the growth of rushes (*Juncus* spp.) and species with spongy tissue such as bur-reed (*Sparganium*). Within the study area, all instances of this natural community occur within the Arbutus Hill Pond wetland complex, occupying small channelized areas of shallower water between deep aquatic beds and sedge meadow marshes.

Species Observed

Sparganium americanum (lesser bur-reed), *Scirpus cyperinus* (woolly bulrush), *Dulichium arundinaceum* (three-way sedge), *Spiraea tomentosa* (steeple bush), *Juncus* sp. (rush species), *Lycopus* sp. (water horehound species)

Waypoints: 188-189, 195, 201

Alder seepage thicket



The single instance of this community occurs as a very small patch (1/10th an acre) nestled in a depression within a subacid forest seep, and as such could be categorized as an inclusion with the seeps below. However it's composition was distinct enough – with alder clearly dominating – to warrant recognition as a distinct community.

Species Observed

Alnus incana ssp. *rugosa* (speckled alder), *Fraxinus nigra* (black ash), *Osmunda cinnamomea* (cinnamon fern), *Onoclea sensibilis* (sensitive fern), *Ilex verticillata* (winterberry), *Rubus pubescens* (dwarf raspberry), *Toxicodendron radicans* (climbing poison ivy), *Typha latifolia* (common cattail)

Waypoints: 058

Aquatic bed



More affectionately known as “ponds,” aquatic bed natural communities are characterized by deep water (>2 feet) persisting year-round. In the study area, they occupy the center of the deeper beaver impoundment basins.

The second largest aquatic bed in the study area (Arbutus Hill Pond, 4.7 acres) is home to at least 4 Great Blue Heron Nests, 3 of which were observed with actively breeding herons in the summer of 2010. See management recommendations at the head of this section for more information.

Species Observed

Nymphaea odorata (white waterlily), *Brasenia schreberi* (water shield), *Glyceria borealis* (northern floating mannagrass), *Ceratophyllum demersum* (submerged hornwort), *Nuphar variegata* (variegated yellow pondlily), Unkonwn Liverwort sp. (*Ricciaceae*), c.f *Spirodella* sp. (duckweed species), *Dulichium arundinaceum* (three-way sedge), *Galium* sp. (bedstraw species)

Waypoints: 150, 153, 160, 164, 166, 191

FOREST SEEPS AND VERNAL POOLS

Ecological Condition

Although small (usually an acre or less), the 46 seeps and vernal pools observed within the study area contain a disproportionately high amount of the study area's most valuable wildlife habitat and plant diversity. As such, from an ecological standpoint, they represent the most unique and important features within the study area. During the field inventory, of all the important biological features of the landscape, I was most impressed with the uncharacteristically high density and intact quality of these small patch communities. I hope that the MCC and its landowner partners recognize the value of this treasure and continue to steward them with care.

Seeps

The 11 seeps mapped in the study area are characterized by groundwater percolating up to – and often vertically through – the soil surface. As a result, these seeps are generally more nutrient-rich (higher pH) than the forest matrix in which they are embedded, and thereby harbor a unique and diverse set of plant species. Also, because subsurface flow keeps seepage waters from freezing readily, seeps are often the last places to freeze in the fall, and first to thaw (and therefore “green up” with vegetation) in the spring. As such, they are particularly important as a source of water (and food) for many wildlife species, including woodcock, black bear, deer, and moose. They are also important habitat for many reptile and amphibians such as northern dusky and two-lined salamanders.

Partly because of their small size and high diversity, seeps as observed on the landscape can take many different forms, with different species compositions, hydrologic regimes, and landscape positions. Because of this protean quality, the New Hampshire Natural Heritage Bureau classifies seeps broadly into 3 communities and 10 sub-variants. However, because seeps constitute such an important part of the study area's ecological landscape, I further separate some of the formally classified sub-variants into various “expressions” below, distinguished by significant local variation in composition, structure, and nutrient enrichment.

Vernal Pools

Vernal pools are an important functional type of wetland defined by hydrology and animal species rather than by floristic composition. As such, they are technically no longer classified as a type of natural community by the New Hampshire Natural Heritage Bureau, but they *are* features that occur both independently of and within other natural community types.

“To be considered a vernal pool, the pool can't have a permanently flowing outlet and it must hold water for at least two months after spring ice-out.” (NH FSSWT 1997) Because of their hydrologic isolation and periodicity (and therefore independence from fish predation), vernal pools serve as critical breeding habitat for a specialized set of wildlife species such as spotted salamanders, blue-spotted salamanders, wood frogs, and fairy shrimp. Other at-risk species such as Blanding's turtles use vernal pools as an important source of food, and habitat.

Within the study area, 20 vernal pools showed direct evidence of breeding indicator species such as yellow-spotted salamanders and wood frogs, and 15 potential vernal pool locations were identified that should be checked for evidence of breeding in the spring. This is an uncommonly high number of vernal pools for relatively a small area. All vernal pool locations and associated photos were reported to the Mike Marchand at the New Hampshire Fish and Game Department on October 2, 2010.

Management Recommendations

Partly due to their small size, forest seeps and vernal pools are particularly sensitive to human disturbance. Currently, the seeps and vernal pools observed within the study area appear relatively intact and unperturbed by human activity, but care should be taken to ensure that the mapped seeps and vernal pools on the property are not negatively impacted by logging or recreation.

Seeps

As with all wetlands, I recommend at least a **100-foot protection buffer around all seeps** where logging (and in particular skidding and road construction) is restricted. For the **larger, richer seeps**, where subsurface flow is more active, I recommend a larger **200-foot buffer** to ensure maintenance of existing hydrologic function and limit risk of sedimentation and increase in water temperature and/or drying (due to opening up of the canopy associated with logging).

A few of the mapped seeps exist within 100 feet of recreational trails, but fortunately, at this point, no recreational trails cross through seeps. Given the current intensity of recreational use, I see no threat to the ecological integrity of seeps as a result of recreation. However, if any new trails are planned, foot-based recreational use intensifies, or wheeled forms of recreation (e.g. bicycles, ATV's) are introduced, I recommend **slight modifications to the trail network** to ensure that trails also respect the recommended buffers.

On May 13, I observed a black drainage pipe within the Town Forest property bounds draining liquid into the white ash fern glade forest seep near Tucker Mountain Road in the southwest region of the study area (Waypoint 048, photo 1936). It was unclear what the drainage pipe is being used for, or what is being drained out of it. Regardless of the use, I recommend that the MCC consult with the landowner in possession of the drainage pipe on the abutting property and request that the landowner install a new drainage system that does not influence the water flow or contaminate the soil and water in the seep.⁴

Vernal Pools

Because many of the wildlife species that use vernal pools (such as wood frogs and salamanders) are sensitive to disturbances in an around the pool, it is important to take special precautions when managing the land around vernal pools to ensure the water quality, temperature, and shelter necessary for effective breeding. However, if a few simple rules are followed, recreation and timber harvesting *can* proceed in proximity to vernal pools with little to no impact on ecological integrity. As recommended in Good Forestry in the Granite State (FSSWT 1997), these rules/considerations are:

⁴ **Note:** Before making this document public, the conservation commission may choose to delete this paragraph.

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

Because of the uncommonly high density of high quality vernal pools in close proximity to excellent hiking trails, it might interest the MCC to cultivate a relationship with the local public schools or educational programs (such as the [Squam Lakes Natural Science Center](#)) whereby students could use the pools as an outdoor science classroom during the spring breeding season. If field trips to the pools are promoted, the MCC should ensure that trip leaders are adequately trained, groups are limited to 12 or less, trips are spaced and trip leaders pledge to limit impact within and at the edge of the pools.

Subacid forest seep, streamside variant

expression 1: small-patch, mildly enriched



The one site representing this natural community within the study area is situated below a beaver dam where the out-flowing stream spreads its surface water flow across an apron of soil. As a result, nutrient enrichment is moderately high (although not as high as expression 2 below), plant diversity is high, and composition and structure is particularly vulnerable to shifts in hydrology, which in this instance is controlled by beaver activity.

Another instance of this same expression occurs just outside the study area, along a small stream entering into Wickwas Lake just beyond the northern terminus of Wicwood Shores Road.

Species Observed

Trees

Acer saccharum (sugar maple), *Tsuga canadensis* (hemlock), *Acer rubrum* (red maple), *Betula alleghaniensis* (yellow birch), *Fraxinus americana* (white ash)

Other plants

Tiarella cordifolia (foamflower), *Arisaema triphyllum* (Jack-in-the-pulpit), *Deparia acrostichoides* (silvery spleenwort), *Osmunda cinnamomea* (cinnamon fern), *Viburnum lantanoides* (hobblebush), *Athyrium filix-femina* var. *angustum* (northern lady fern), *Rubus pubescens* (dwarf raspberry), *Taxus canadensis* (Canada yew), *Chelone glabra* (white

turtlehead), *Circaea alpina* (small enchanter's nightshade), *Toxicodendron radicans* (climbing poison ivy), *Nabalus* sp. (lettuce species), *Phegopteris connectilis* (long beech fern)

Waypoints: 039, 168,

expression 2: rich, open



This expression of the streamside subacid forest seep is perhaps the most nutrient rich (highest pH) of the forest seeps in the study area. It is restricted to the old clear-cut area of the Eames property just to the west of “double-dam” beaver pond. The whole complex of seeps here is almost large enough to be categorized as an [herbaceous seepage marsh](#), but its distribution is fairly restricted to streamside banks less than a tree canopy or two in width. In a few locations, enrichment is high enough (as evidenced by indicator species like ostrich fern) to suggest re-re-categorization as circumneutral hardwood forest seep (e.g. Waypoint 064). Because of the dominance of ferns and other herbaceous plants here, trees are slower to re-colonize after clear-cut here, and the canopy remains fairly open.

Species Observed

Onoclea sensibilis (sensitive fern), *Toxicodendron radicans* (climbing poison ivy), *Actaea pachypoda* (white baneberry), *Matteuccia struthiopteris* var. *pennsylvanica* (ostrich fern), *Acer saccharum* (sugar maple) seedlings, *Typha latifolia* (common cattail) *Lonicera morrowii* (Morrow's honeysuckle)

Waypoints: 060-064, 068, 069

expression 3: moderately enriched, diverse



The single instance of this expression of the streamside subacid forest seep is the largest and most diverse of the streamside seeps in the study area, approaching 1 acre in size with 38 plant species identified. It is restricted to sandy banks of the winding perennial stream just to the north of Chemung Road. Indicator species suggest moderately high nutrient enrichment (higher than variant 1, but not as high as variant 2).

Species Observed

Trees

Acer rubrum (red maple), *Acer saccharum* (sugar maple), *Ulmus americana* (American elm), *Betula alleghaniensis* (yellow birch), *Fraxinus americana* (white ash), *Fraxinus nigra* (black ash), *Tilia americana* (basswood),

Other plants

Osmunda cinnamomea (cinnamon fern), *Osmunda regalis* var. *spectabilis* (royal fern), *Veratrum viride* (false hellebore), *Onoclea sensibilis* (sensitive fern), *Brachyelytrum septentrionale* (northern short husk grass), *Toxicodendron radicans* (climbing poison ivy), *Thalictrum pubescens* (tall meadow-rue), *Amphicarpaea bracteata* var. *bracteata* (hog-peanut), *Solidago rugosa* (rough goldenrod), *Impatiens capensis* (spotted touch-me-not), *Carex lurida* (sallow

sedge), *Carex scabrata* (rough sedge), *Glyceria striata* (fowl mannagrass), *Circaea alpina* (small enchanter's nightshade), *Matteuccia struthiopteris* var. *pensylvanica* (ostrich fern), *Thelypteris noveboracensis* (New York fern), *Parthenocissus quinquefolia* (Virginia creeper), *Arisaema triphyllum* (Jack-in-the-pulpit), *Symphyotrichum* c.f. *cordifolium* (heart-leaved aster), *Doellingeria umbellata* (flat-topped white aster), *Athyrium filix-femina* var. *angustum* (northern lady fern), *Symphyotrichum* sp. (aster species), *Carex gracillima* (very slender sedge), *Lycopus* sp. (water horehound species), *Tiarella cordifolia* (foamflower), *Carex intumescens* (inflated sedge), *Cornus amomum* (silky dogwood), *Ranunculus acris* (tall buttercup), *Symphyotrichum novi-belgii* (New York aster), *Viola* sp. (violet species), *Boehmeria cylindrica* (false nettle), *Carex gynandra* (perfect-awned sedge)

Waypoints: 170, 171, 174-177

Subacid forest seep, herbaceous fern glade variant

expression 1: white ash expression



Unlike streamside variants of the subacid forest seep, herbaceous fern glade seeps are characterized by subsurface flow that spreads out in to the soil (rather than occurring along the banks of a channelized stream). The 3 white ash expressions of these seeps are the largest forest seeps in the study area (all around an acre) and display a high degree of nutrient enrichment and plant diversity. White ash constitutes a significant component of the canopy.

Species Observed

Trees

Acer rubrum (red maple), *Ulmus americana* (American elm), *Fraxinus americana* (white ash), *Tsuga canadensis* (hemlock), *Betula alleghaniensis* (yellow birch), *Tilia americana* (basswood), *Acer saccharum* (sugar maple)

Other plants

Impatiens capensis (spotted touch-me-not), *Onoclea sensibilis* (sensitive fern), *Toxicodendron radicans* (climbing poison ivy), *Glyceria striata* (fowl mannagrass), *Carex gracillima* (very slender sedge), *Solidago rugosa* (rough goldenrod), *Symphytotrichum novi-belgii* (New York aster), *Dryopteris intermedia* (intermediate wood fern), *Carex projecta* (beaded broom sedge), *Carex gynandra* (perfect-awned sedge), *Carex crinita* (drooping sedge), *Euthamia graminifolia* (flat-topped goldenrod), *Athyrium filix-femina* var. *angustum* (northern lady fern), *Osmunda regalis* var. *spectabilis* (royal fern), *Thelypteris noveboracensis* (New York fern), *Phegopteris connectilis* (long beech fern), *Carex laxiflora* c.f. (loosely-flowered sedge), *Osmunda claytoniana* (interrupted fern), *Ranunculus acris* (tall buttercup), *Carex intumescens* (inflated sedge), *Matteuccia struthiopteris* var. *pennsylvanica* (ostrich fern), *Carex* sp.-
Laxiflorae/Careaneae group (loosely-flowered sedge), *Arisaema triphyllum* (Jack-in-the-pulpit)

Waypoints: 044, 068, 077, 138

expression 2: fern expression



This expression of the herbaceous fern glade subacid forest seep is distinguished by the absence of white ash, a more open canopy, fewer graminoid (grass-like) plant species, and more herbs and forbs. It occurs in smaller patches than the white ash expression, sometimes at the margins of larger wetland complexes. Plant diversity is high.

Species Observed

Trees

Acer rubrum (red maple), *Tsuga canadensis* (hemlock), *Betula alleghaniensis* (yellow birch), *Fagus grandifolia* (American beech), *Pinus strobus* (white pine), *Fraxinus americana* (white ash)

Other plants

Onoclea sensibilis (sensitive fern), *Osmunda cinnamomea* (cinnamon fern), *Rubus pubescens* (dwarf raspberry), *Toxicodendron radicans* (climbing poison ivy), *Athyrium filix-femina* var. *angustum* (northern lady fern), *Dryopteris intermedia* (intermediate wood fern), *Viburnum lentago* (nannyberry), *Tiarella cordifolia* (foamflower), *Osmunda claytoniana* (interrupted fern), *Impatiens capensis* (spotted touch-me-not), *Toxicodendron radicans* (climbing poison ivy), *Oclemena acuminata* (whorled aster), *Veratrum viride* (false hellebore), *Thelypteris palustris* var. *pubescens* (marsh fern), *Chelone glabra* (white turtlehead), *Rubus pubescens* (dwarf raspberry), *Ilex verticillata* (winterberry), *Carex intumescens* (inflated sedge), *Viola* spp. (violet)

species), *Tiarella cordifolia* (foamflower), *Thelypteris noveboracensis* (New York fern), *Phegopteris connectilis* (long beech fern), *Nabalus* sp. (lettuce species), *Viburnum lantanoides* (hobblebush), *Glyceria striata* (fowl mannagrass), *Osmunda regalis* var. *spectabilis* (royal fern), *Equisetum* sp. (horsetail species), *Carex stipata* (awl sedge), *Viola* sp. (violet species), *Scutellaria lateriflora* (mad-dog skullcap), *Lycopus* sp. (water horehound species), *Rubus dalibarda* (false violet)

Waypoints: 090, 113, 116 (Kahn), 083 (Smyth)

Vernal pool



As mentioned above under the ecological condition heading for this section, the study area contains an uncommonly high density of high-quality actively-breeding vernal pools. Plant composition within and along the edges of the pools is often characterized by the dominance of red maple and cinnamon fern, with white ash and yellow birch as common canopy associates. Other wetland shrub species such as winterberry and highbush blueberry often occupy the deeper parts of the pool's interior.

At a collection of vernal pools nestled amongst the high ledges along the red trail near the northern end of the Hamlin Forest, a few individuals of a particularly unique and special tree species can be found. In September of 2002, Rick Van de Poll (at the guidance of Peter Miller)

measured the diameter at breast height (DBH) of three large black gum (*Nyssa sylvatica*) trees (71 cm or 28 inches, 61 cm or 24 inches, and 50 cm or 20 inches) that he estimated to be 450 to 500, 375 to 200, and 315 to 325 years old based on tree coring. Eight years later, in May 2010, I revisited at the larger (still measured at 71 cm) and smaller (having grown to 52 cm) black gums, and found them still thriving. I also observed at least 4 other medium-sized black gum trees in the vicinity, ranging from 20 to 35 cm DBH.



Black gum trees are the oldest trees in New Hampshire, with the oldest known individual estimated at over 680 years of age. They are restricted to small isolated wetland basins like the bedrock depressions along the ridge overlooking Wickwas Lake's western shores.

Species Observed

Acer rubrum (red maple), *Nyssa sylvatica* (black gum), *Osmunda cinnamomea* (cinnamon fern), *Ilex verticillata* (winterberry), *Vaccinium corymbosum* (highbush blueberry), *Onoclea sensibilis* (sensitive fern), *Sphagnum sp.* (peat moss), *Scutellaria lateriflora* (mad-dog skullcap), *Lysimachia terrestris* (swamp candles), *Carex debilis* var. *rudgei* (Rudge's sedge), *Coptis trifolia* (goldthread), *Osmunda regalis* var. *spectabilis* (royal fern), *Carex gynandra* (perfect-awned sedge), *Spiraea alba* var. *latifolia* (eastern meadowsweet), *Glyceria striata* (fowl mannagrass), *Hydrocotyle americana* (water pennywort), *Thelypteris palustris* var. *pubescens* (marsh fern), *Iris versicolor* (northern blue flag), *Carex lurida* (sallow sedge)

Waypoints

Confirmed Vernal Pools with evidence of breeding vernal pool indicator species: 002, 003, 010, 012-016, 021, 028-030, 032, 033, 035, 040, 043, 045, 052, 053, 076

Potential Vernal Pools: 099, 102, 121, 122, 125-125, 143, 172, 219, 237, 277, 278

FORESTED SWAMPS

Ecological Condition

The study area's swamps are its most sensitive, diverse, and unique natural communities. Fortunately, most of the swamps are located in the more isolated high ground of the northern portion, where human disturbance has played a lesser role in the recent history. Therefore, these swamps remain remarkably intact, containing diverse assemblages of plant species, and uncommon specialists such as black ash and black gum.

Management Recommendations

As with all wetlands I recommend a 100 foot no-logging buffer around all forested swamps. However, 2 swamps in particular – the large red maple - black ash swamp on the Kahn easement and the red maple sphagnum basin swamp nestled in the high ledges of the Hamlin Forest – warrant extended buffers (300 feet). These swamps are the study area's most unique natural communities (perhaps worthy of exemplary natural community status). Given their greater sensitivity to disturbance, close proximity in the high headwaters of Wickwas lake, difficulty of access, and unique flora (including black ash and black gum), I recommend the designation of a no-cut Ecological Reserve Area encompassing the entire northern portion of the Hamlin Forest, including perhaps the Kahn Easement (at the landowner's discretion).

If logging activities are planned near swamps, they should only occur under frozen ground conditions to limit rutting and erosion, adhere to a management that follows best management practices, and retain a high percentage of larger trees, especially trees with cavities, standing dead trees, downed logs, and large supra-canopy trees. (FSSWT 1997)

Recreational use in the Kahn easement red maple - black ash swamp community appears to be fairly restricted to snowmobile use in the wintertime. While damage to vegetation is minimized by snowpack, seepage communities like this one are probably the last place to freeze over in the fall and the first places to thaw in the winter, which might make them vulnerable to damage

during marginal snowmobile conditions. If possible, the community should be monitored in the early and late snowmobile seasons to make sure that damage is not occurring to the vegetation and soil.

Also, caution should be taken to ensure that summer recreational users do not follow snowmobile trails into this area, thereby damaging the fragile hydric soils and wetland vegetation. While the southern example lies very close to the yellow trail, it is protected by its position at the bottom of the slope, and receives little to no impact from recreational users.

Red maple - sphagnum basin swamp



These small, hydrologically isolated “pocket swamps” are characterized by acidic (i.e. nutrient-poor), saturated organic soils, dense to patchy carpets of sphagnum moss, a canopy dominated by red maple and hemlock, and a lack of nutrient indicator plants like sensitive fern. The vernal pools described above often occur within the matrix of these communities, especially in the northern portion of the Hamlin Forest, where black gum is also present.

Species Observed

Trees

Acer rubrum (red maple), *Tsuga canadensis* (hemlock), *Betula alleghaniensis* (yellow birch), *Pinus strobus* (white pine)

Other plants

Osmunda cinnamomea (cinnamon fern), *Sphagnum* spp. (peat moss species), *Ilex verticillata* (winterberry), *Coptis trifolia* (goldthread), *Aralia nudicaulis* (wild sarsaparilla), *Trientalis borealis* (starflower), *Viburnum lantanoides* (hobblebush), *Clintonia borealis* (blue-bead lily), *Coptis trifolia* (goldthread), *Cornus canadensis* (bunchberry), *Carex disperma* (two-seeded sedge), *Viburnum nudum* var. *cassinoides* (witherod), *Thelypteris palustris* var. *pubescens* (marsh fern)

Waypoints: 023-027, 084, 100-102, 123, 172

Red maple - black ash swamp



Statewide, this community contains plants indicative of seepage and/or enriched conditions. Red maple dominates the tree canopy, and the presence of black ash (even in low abundance) is diagnostic. A diverse assemblage of shrubs, herbs, and bryophytes indicative of nutrient-rich seepage conditions distinguish this community from most other types of rich swamps. (Sperduto and Nichols, 2004)

On the Hamlin-Eames properties, the community occurs in gently sloping, spring-fed headwater basin wetlands where groundwater discharge and/or subsurface upland runoff influence the rooting zone of the swamp. It is the study area's most unique (State Rank = S3 – uncommon) and diverse (57 plant species identified) natural community.

Of the two examples of this community within the study area, the one in Kahn Easement to the north is by far the largest (3 acres) and most intact, and as such, is almost large enough to be considered as a Natural Heritage Bureau certified exemplary natural community. The swamp to the south is small (only one-half acre), and relatively isolated, although it remains floristically diverse.

Species Observed

Trees

Acer rubrum (red maple), *Pinus strobus* (white pine), *Fraxinus nigra* (black ash), *Tsuga canadensis* (hemlock), *Betula alleghaniensis* (yellow birch),

Other plants

Osmunda cinnamomea (cinnamon fern), *Onoclea sensibilis* (sensitive fern), *Ilex verticillata* (winterberry), *Sambucus canadensis* (common elderberry), *Rubus pubescens* (dwarf raspberry), *Lycopus* sp. (water horehound species), *Symphyotrichum novi-belgii* (New York aster), *Persicaria arifolia* (halberd-leaved tearthumb), *Amphicarpaea bracteata* var. *bracteata* (hog-peanut), *Parthenocissus quinquefolia* (Virginia creeper), *Toxicodendron radicans* (climbing poison ivy), *Alnus incana* ssp. *rugosa* (speckled alder), *Chelone glabra* (white turtlehead), *Tiarella cordifolia* (foamflower), *Nabalus* sp. (lettuce species), *Osmunda regalis* var. *spectabilis* (royal fern), *Galium* spp. (bed-straw species), *Lycopus virginicus* (Virginian water horehound), *Viola* sp. (violet species), *Arisaema triphyllum* (Jack-in-the-pulpit), *Thelypteris palustris* var. *pubescens* (marsh fern), *Carex trisperma* var. *trisperma* (three-seeded sedge), *Carex leptalea* (delicate sedge), *Pyrola* sp. (shinleaf), *Cardamine pensylvanica* (Pennsylvania bitter cress), *Cornus amomum* (southeastern silky dogwood), *Viburnum dentatum* var. *lucidum* (northern arrowwood), *Iris versicolor* (northern blue flag), *Carex gracillima* (very slender sedge), *Clematis virginiana* (virgin's bower), *Carex rosea* (star sedge) *Hydrocotyle americana* (water pennywort), *Glyceria striata* (fowl mannagrass), *Viola blanda* (red-stemmed violet), *Selaginella* sp. (spikemoss), *Arisaema triphyllum* (Jack-in-the-pulpit), *Osmunda regalis* var. *spectabilis* (royal fern), *Rubus pubescens* (dwarf raspberry), *Dryopteris carthusiana* (spinulose wood fern), *Impatiens capensis* (spotted touch-me-not), *Carex gynandra* (perfect-awned sedge), *Dryopteris cristata* (crested wood fern), *Carex folliculata* (follicled sedge), *Toxicodendron vernix* (poison sumac), *Coptis trifolia* (goldthread), *Cornus canadensis* (bunchberry), *Trientalis borealis* (starflower), *Pyrola* sp. (shinleaf species), *Rubus hispidus* (bristly dewberry), *Uvularia sessilifolia* (sessile-leaved bellwort), *Maianthemum canadense* (Canada mayflower).

Waypoints: 049, 091

Photos

[2682](#) - [2712](#) and [1988](#) - [1994](#)

Red spruce swamp



This community occupies a less minerotrophic, slightly drier arm of the Kahn easement red maple – black ash swamp. Here red spruce replaces black ash, but remains co-dominant with red maple.

Species Observed

Trees

Acer rubrum (red maple), *Picea rubens* (red spruce), *Pinus strobus* (white pine)

Other plants

Osmunda cinnamomea (cinnamon fern), *Cornus canadensis* (bunchberry), *Sphagnum* spp. (peat moss species), *Ilex verticillata* (winterberry), *Carex trisperma* var. *trisperma* (three-seeded sedge), *Gaultheria hispidula* (creeping snowberry), *Osmunda regalis* var. *spectabilis* (royal fern), *Coptis trifolia* (goldthread), *Rubus dalibarda* (false violet), *Nemopanthus mucronatus* (mountain holly)

Waypoints: 094

HARDWOOD FORESTS

Ecological Condition

The hardwood forests within the study area are typical of the region: they have endured a long and varied history of human land use including pasture and logging, but when managed well, remain resilient in their ability to continue growing valuable timber stock. Fortunately for the MCC and abutting landowners, in the Forest Management Areas shown in Map 4, ample growing stock remains that could, if well-managed over the coming decades, provide regular and sustainable timber revenue. The recent logging operation managed by Sean Lagueux on the Smyth Easement serves as an excellent model.

Management Recommendations

- Hire a certified and qualified forester to conduct a timber cruise and write a forest management plan for the two 80-acre forest management areas delineated in Map 4.
- Consider a thinning/release of red oak growing stock in the next 10-20 years.
- Consider access options for the future: unless a Right-of-Way is granted by the abutter to the south of the Eames Forest, a new access point would need to be created (and permitted) off of Tucker Mountain Road in order to gain access to the southwestern management area.

Hemlock - beech - oak - pine forest



This natural community is the most common forest type within the study area (and the entire lakes region as a whole). It forms the “matrix” within which the smaller patch natural communities are embedded. Composition is highly variable, but best characterized by a mix of hemlock, red oak, white pine, and beech, with associated early to mid-successional hardwood species such as red maple and paper birch. Significant amounts of sugar maple and yellow birch indicate a transition to other hardwood forest types described below.

Within the study area, the dominance of hemlock is particularly variable within this natural community, with much denser hemlock on the higher, thinner-soiled areas along the red trail in the north, and almost no hemlock along the yellow trail in the western portion of Hamlin.

Species Observed

Overstory Trees

Pinus strobus (white pine), *Quercus rubra* (red oak), *Acer rubrum* (red maple), *Fagus grandifolia* (American beech), *Tsuga canadensis* (hemlock), *Betula papyrifera* (paper birch)

Understory Trees

Tsuga canadensis (hemlock), *Fagus grandifolia* (American beech), *Acer pensylvanicum* (striped maple),

Other plants

Maianthemum canadense (Canada mayflower), *Trientalis borealis* (starflower), *Medeola virginiana* (Indian cucumber root), *Viburnum acerifolium* (maple-leaved viburnum), *Aralia nudicaulis* (wild sarsaparilla), *Monotropa uniflora* (Indian pipes), *Mitchella repens* (partridgeberry), *Uvularia sessilifolia* (sessile-leaved bellwort), *Goodyera pubescens* (downy rattlesnake plantain)

Waypoints: 031, 041, 087 and 089 [species recorded here], 103, 124, 129, 133, 140, 157, 194, 205, 209, 210, 213, 215, 216, 220, 223-226, 231, 232, 234, 235, 238

Hemlock - oak - northern hardwood forest



This natural community is distinguished from hemlock - beech - oak - pine forest by the presence of sugar maple, yellow birch and striped maple. As with hemlock - beech - oak - pine, the hemlock component is highly variable, and reflects local variation in logging history and soil characteristics. It is distinguished from sugar maple - beech - yellow birch forest by the prominent presence of red oak and hemlock.

Within the study area, this forest type tends to occur towards the bottom of slopes, where soils slightly deeper soils grow timber species like red oak and sugar maple more rapidly.

Species Observed

Trees

Quercus rubra (red oak), *Acer saccharum* (sugar maple), *Acer rubrum* (red maple), *Betula alleghaniensis* (yellow birch), *Fagus grandifolia* (American beech), *Populus tremuloides* (quaking aspen), *Tsuga canadensis* (hemlock), *Pinus strobus* (white pine), *Fraxinus americana* (white ash), *Tilia americana* (basswood), *Acer pensylvanicum* (striped maple)

Other plants

Dryopteris intermedia (intermediate wood fern) [most dominant], *Thelypteris noveboracensis* (New York fern), *Viburnum lantanoides* (hobblebush), *Acer pensylvanicum* (striped maple), *Polystichum acrostichoides* (Christmas fern), *Medeola virginiana* (Indian cucumber root), *Maianthemum canadense* (Canada mayflower), *Trientalis borealis* (starflower), *Osmunda claytoniana* (interrupted fern), *Athyrium filix-femina* var. *angustum* (northern lady fern), *Dennstaedtia punctilobula* (hay-scented fern), *Diphasiastrum digitatum* (southern ground-cedar), *Uvularia sessilifolia* (sessile-leaved bellwort), *Thelypteris noveboracensis* (New York fern), *Clintonia borealis* (blue-bead lily), *Aralia nudicaulis* (wild sarsaparilla), *Trillium erectum* var. *erectum* (wakerobin), *Maianthemum racemosum* (false Solomon's seal), *Circaea lutetiana* ssp. *canadensis* (large enchanter's nightshade), *Nabalus* sp. (lettuce species),

Waypoints: 074, 095-096, 103, 111-112, 184-6, 218, 221, 229, 230, 233, 236

Sugar maple - beech - yellow birch forest



The small patches of sugar maple - beech - yellow birch forest in the study area occur in locations where coves, ledges or depressions have cultivated slightly deeper, more nutrient-rich soils that tend to favor sugar maple and yellow birch over beech, oak, and hemlock. These locations are the study area's best growing sites, but due to their topographic isolation, they are often the most difficult to access.

Species Observed

Trees

Populus tremuloides (quaking aspen), *Pinus strobus* (white pine), *Acer rubrum* (red maple), *Fagus grandifolia* (American beech), *Quercus rubra* (red oak), *Acer saccharum* (sugar maple), *Fraxinus americana* (white ash), *Betula alleghaniensis* (yellow birch), *Tsuga canadensis* (hemlock), *Betula papyrifera* (paper birch)

Other plants

Maianthemum canadense (Canada mayflower), *Trientalis borealis* (starflower), *Maianthemum racemosum* (false Solomon's seal), *Acer saccharum* (sugar maple), *Quercus rubra* (red oak), *Medeola virginiana* (Indian cucumber root), *Populus tremuloides* (quaking aspen), *Diphasiastrum digitatum* (southern ground-cedar), *Uvularia sessilifolia* (sessile-leaved bellwort), *Fraxinus americana* (white ash), *Dennstaedtia punctilobula* (hay-scented fern), *Acer pensylvanicum* (striped maple), *Polystichum acrostichoides* (Christmas fern)

Waypoints: 037, 098, 104, 106, 211, 214

FOREST OPENINGS (UPLAND FOREST INCLUSIONS)

Management Recommendations

- As with all the trails on the property, the current condition and construction of the red trail to the overlook is excellent and appropriate to its frequency and intensity of use; it should be maintained as is.
- Clear any trees from the open ledge overlook necessary to maintain viewshed as is.
- Continue to restrict access to the lichen barren by maintaining existing signage. Monitor for any informal “social trails” and cover with brush as necessary.

Open ledge



This small but distinct ledge opening provides the premier recreational attraction within the study area. Views are simply gorgeous, and the gentle breeze over Lake Wickwas provides welcome respite from the mosquitoes. It's the perfect place for a short midsummer hike.

Not large enough to be considered a red oak rocky ridge community, the ledge nonetheless contains several characteristic species of that community including red oak and black huckleberry.

Species Observed

Pinus strobus (white pine), *Quercus rubra* (red oak), *Tsuga canadensis* (hemlock), *Populus tremuloides* (quaking aspen), *Gaylussacia baccata* (black huckleberry)

Lichen barren



Like the open ledge described above, this feature is not an official natural community per se, but a distinct inclusion characterized by the dominance of fruticose lichens, caespitose grasses like *Danthonia spicata* (poverty oatgrass), and low shrubs like *Vaccinium angustifolium* (lowbush blueberry).

MANAGED COMMUNITIES

Open field



The 21 acres of open fields maintained by the Kahn family provide excellent wildlife habitat and scenic value within the study area.

Management Recommendations

- Consider delaying mowing until September to promote successful fledging of ground nesting birds.

Early successional hardwoods (old clear cut)



Around 15 years ago, approximately 45 acres of the hemlock - beech - oak - pine forest on the Eames Forest was clear-cut. As a result, this old clear-cut area is currently in a “stem exclusion” stage of forest succession, with a high density of small sapling-to-pole sized trees. Unfortunately, this type of forest lacks the wildlife value of older and younger forests, is less aesthetically attractive, and lacks compositional and structural diversity.

Management Recommendations

From an ecological standpoint, the cheapest, easiest, and least risky option is to simply allow the area to grow back into a mature forest. Over time, many of the smaller trees will become shaded out and die, the canopy will diversify, and the forest will return (as it has before) to a state that more closely resembles the more mature hemlock - beech - oak - pine forest on the rest of the study area.

However, if the MCC feels that it wants to create more early successional habitat on the property for wildlife habitat and/or aesthetic value, then commissioners might consider a management plan for the old clear-cut that would create forest openings of around 5 acres or more on a rotation of at least every 5 years. Commissioners should contact the state extension service

(<http://extension.unh.edu/Forestry/Forestry.htm>)⁵ and local commercial land-clearing operators to flesh out the details of such a plan, below is a list of items to consider:

- While some funding opportunities exist to help defray costs (e.g. [New Hampshire Fish and Game Small Grants Program](#)), land clearing is an expensive endeavor, with costs ranging from \$600 to \$1200 per acre for a Brontosaurus to clear the land. Clearing stumps costs even more (up to \$5000/acre or more).
- Research indicates that openings around 5 acres and greater appear to have higher wildlife value.
- In order to maintain the openings, they should be cleared at least every 15 years to maintain the most valuable wildlife habitat and keep land clearing costs down.

WILDLIFE

Some of the wildlife species observed during field reconnaissance include bullfrog, spring peeper, gray tree frog, green frog, red-spotted newt, yellow-spotted salamander, wood frog, barred owl, turkey vulture, broad-winged hawk, hairy woodpecker, scarlet tanager, wood thrush, veery, black-throated blue, robin, black-capped chickadee, warbler, tree swallow, swamp sparrow, red fox, moose, beaver, moose, grey squirrel, red squirrel, and white-tailed deer.

REFERENCES CITED

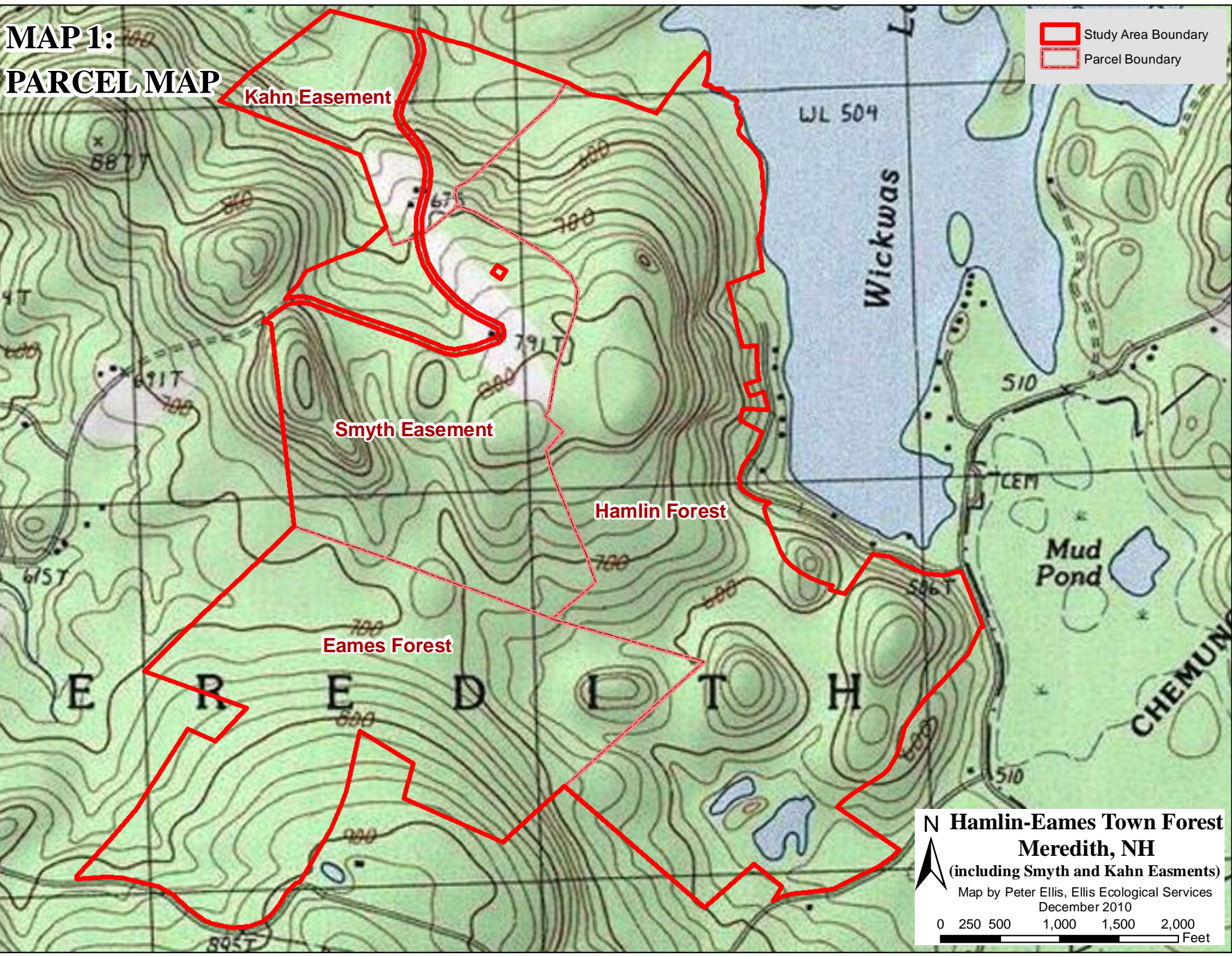
Sperduto, D.D. and W.F. Nichols. 2004. Natural communities of New Hampshire. The NH Natural Heritage Bureau and The Nature Conservancy. Concord, NH.

New Hampshire Forest Sustainability Standards Work Team (NH FSSWT). 1997. Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire. Division of Forests and Lands and the Society for the Protection of New Hampshire Forests. Concord, NH. (Note: At the current time, a new second edition of this book is awaiting publication. A draft can be viewed here: <http://goodforestry.pbworks.com/>)

⁵ See also the presentation given to the town of Meredith by State Wildlife specialist Matt Tarr (matt.tarr@unh.edu) on September 18, 2010.

MAPS

MAP 1:
PARCEL MAP

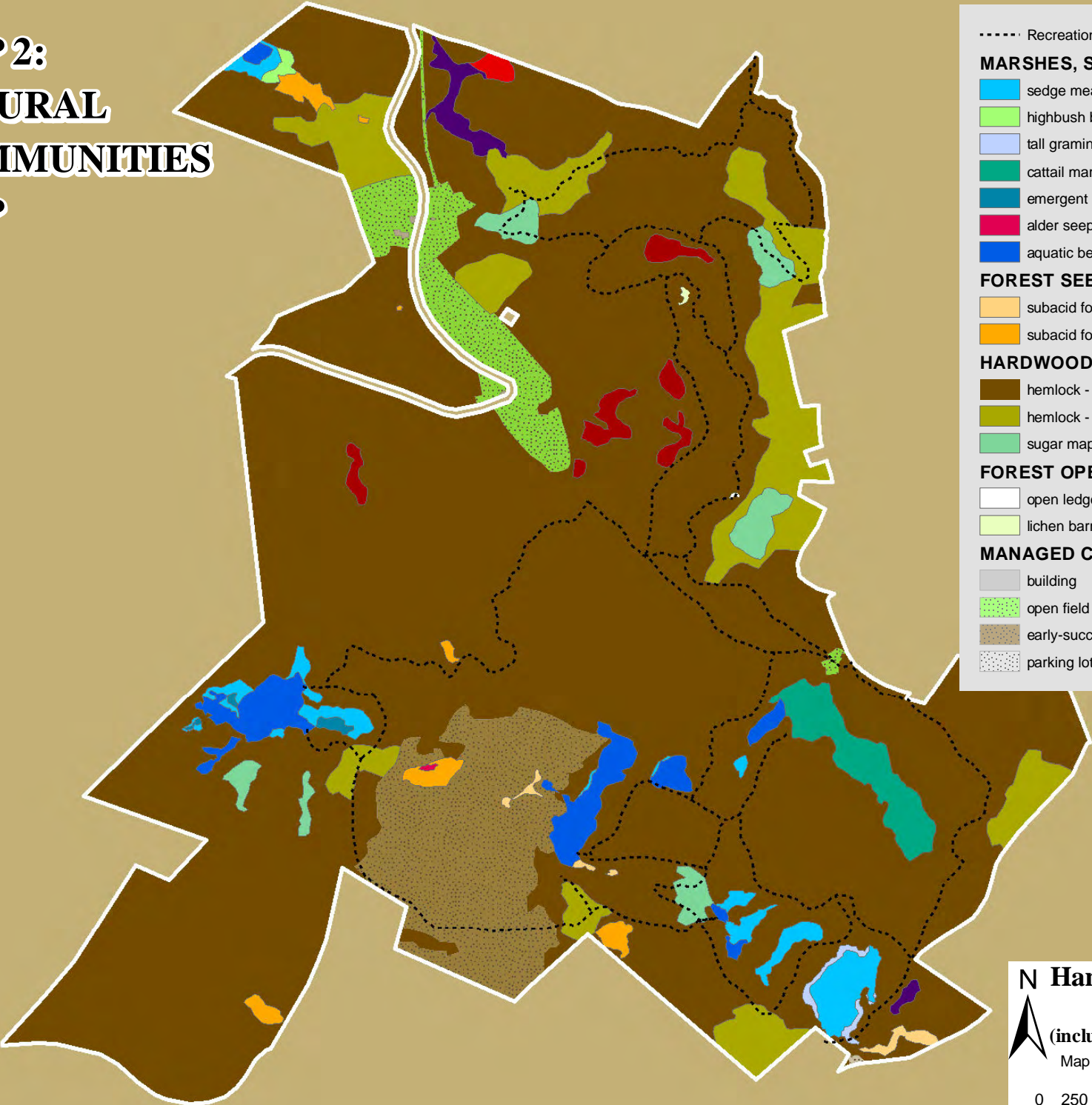


- Study Area Boundary
- Parcel Boundary

N Hamlin-Eames Town Forest
Meredith, NH
(including Smyth and Kahn Easements)
Map by Peter Ellis, Ellis Ecological Services
December 2010

0 250 500 1,000 1,500 2,000 Feet

MAP 2:
NATURAL
COMMUNITIES
MAP



- Recreational Trails
- MARSHES, SHRUB THICKETS, AQUATIC**
- sedge meadow marsh
 - highbush blueberry - winterberry shrub thicket
 - tall graminoid meadow marsh, bluejoint variant
 - cattail marsh
 - emergent marsh
 - alder seepage thicket
 - aquatic bed
- FOREST SEEPS**
- subacid forest seep, streamside variant
 - subacid forest seep, herbaceous fern glade variant
- HARDWOOD FORESTS**
- hemlock - beech - oak pine
 - hemlock - oak - northern hardwood forest
 - sugar maple - beech - yellow birch forest
- FOREST OPENINGS**
- open ledge
 - lichen barren
- MANAGED COMMUNITIES**
- building
 - open field
 - early-successional hardwoods (old clearcut)
 - parking lot

N Hamlin-Eames Town Forest
Meredith, NH
(including Smyth and Kahn Easements)
Map by Peter Ellis, Ellis Ecological Services
December 2010
0 250 500 1,000 1,500 2,000
Feet

MAP 3:
WAYPOINTS
MAP

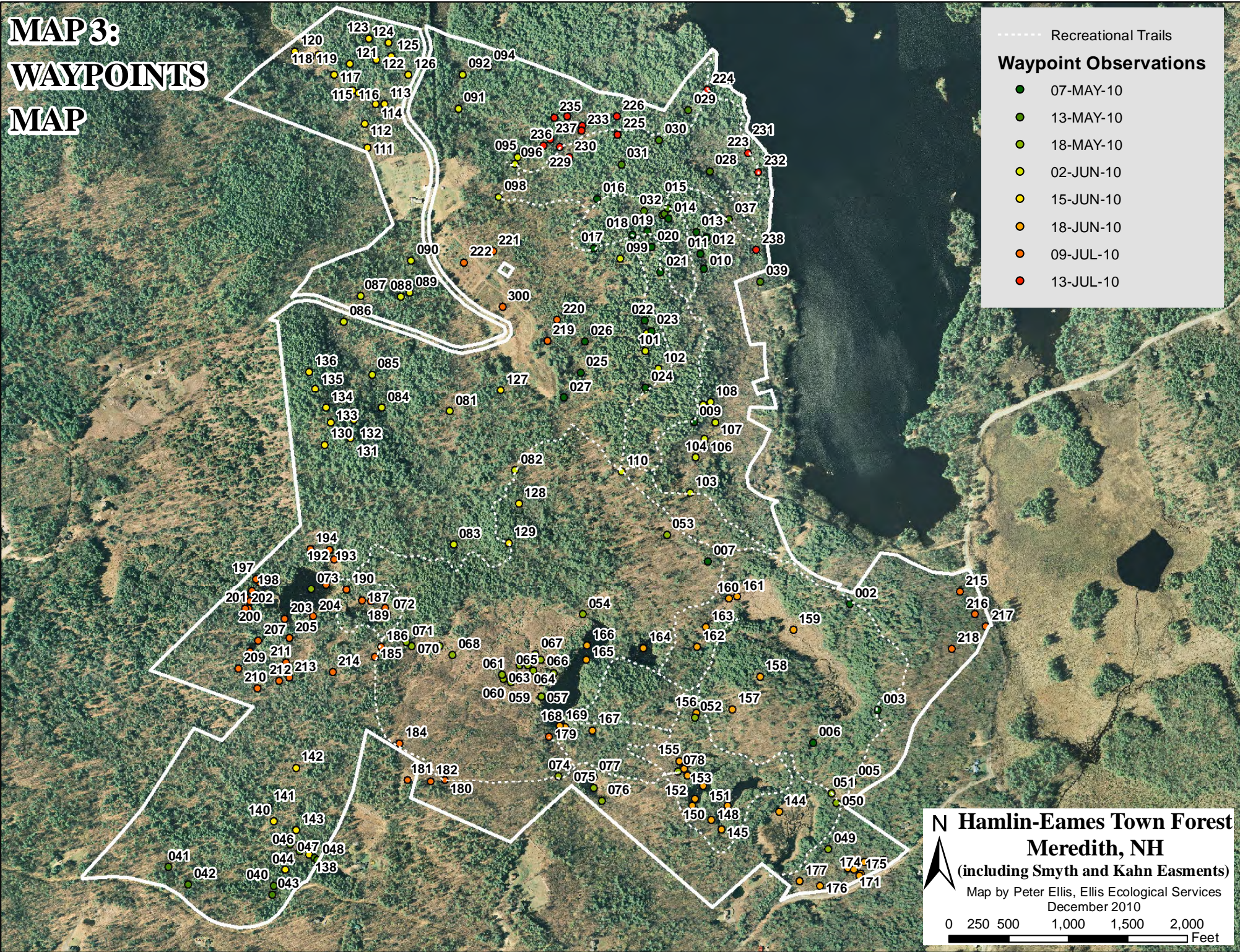
----- Recreational Trails

Waypoint Observations

- 07-MAY-10
- 13-MAY-10
- 18-MAY-10
- 02-JUN-10
- 15-JUN-10
- 18-JUN-10
- 09-JUL-10
- 13-JUL-10

N Hamlin-Eames Town Forest
Meredith, NH
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December 2010

0 250 500 1,000 1,500 2,000 Feet



**MAP 4:
RECOMMENDED
MANAGEMENT
AREAS MAP**

----- Recreational Trails

Recommended Management Areas

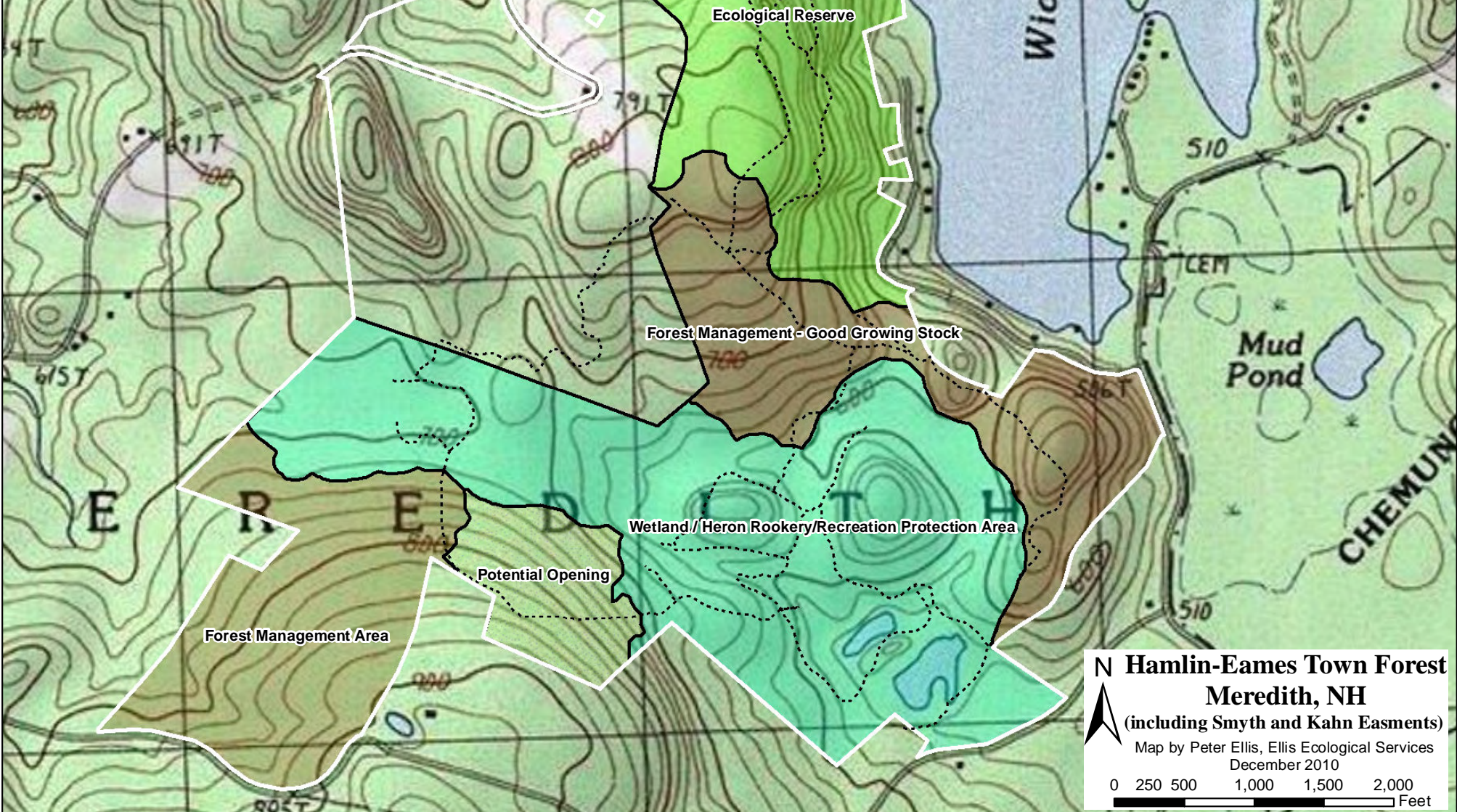
Ecological Reserve

Forest Management - Good Growing Stock

Forest Management Area

Potential Opening

Wetland / Heron Rookery/Recreation Protection Area



N

Hamlin-Eames Town Forest
Meredith, NH
(including Smyth and Kahn Easments)

Map by Peter Ellis, Ellis Ecological Services
December 2010

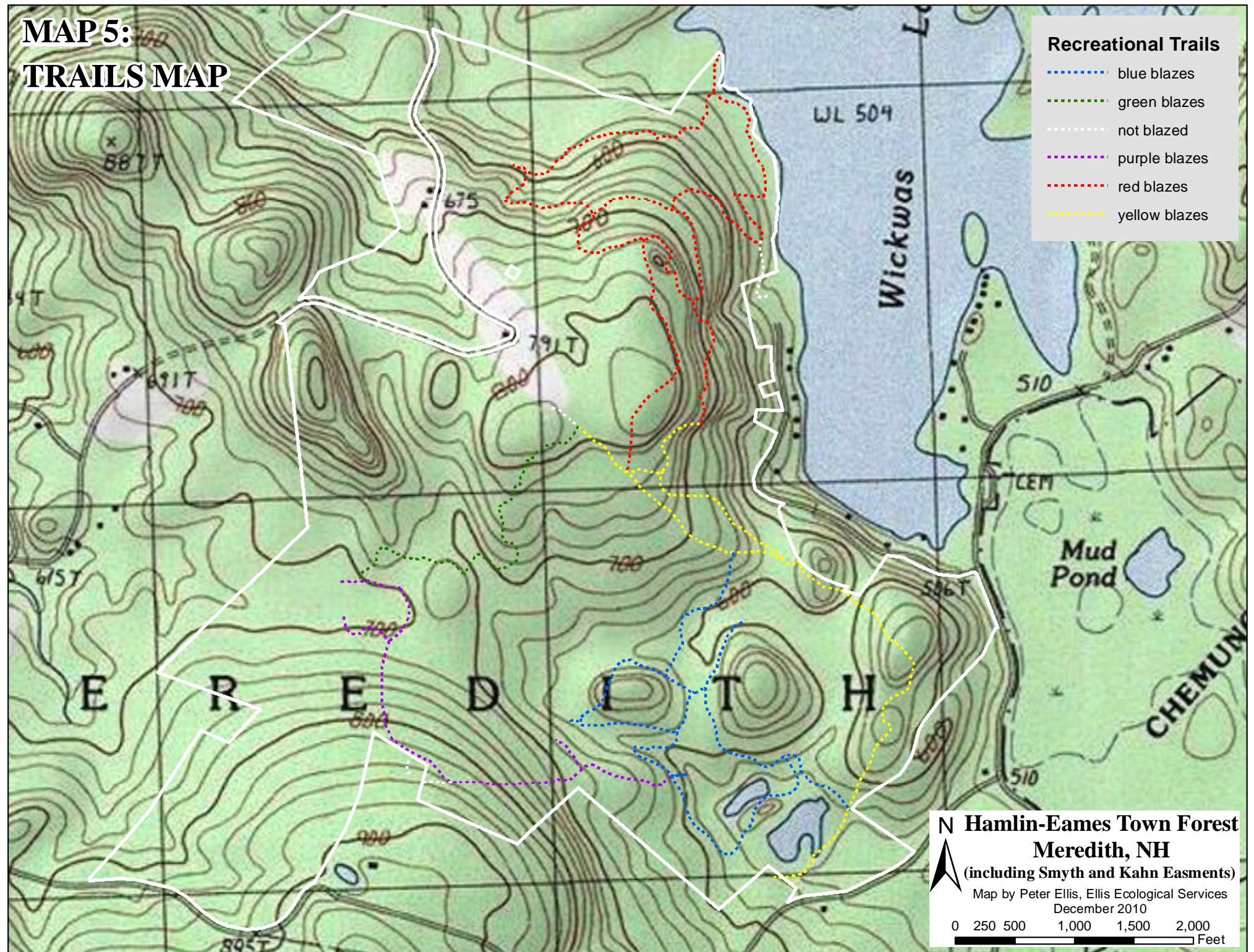
0 250 500 1,000 1,500 2,000

Feet

MAP 5: TRAILS MAP

Recreational Trails

- blue blazes
- green blazes
- not blazed
- purple blazes
- red blazes
- yellow blazes



N Hamlin-Eames Town Forest
Meredith, NH
(including Smyth and Kahn Easements)
Map by Peter Ellis, Ellis Ecological Services
December 2010
0 250 500 1,000 1,500 2,000
Feet

**MAP 6:
WETLANDS
AND
VERNAL POOLS MAP**

Recreational Trails

100' contour line

20' contour line

Vernal Pools

Breeding indicator species observed

No Breeding indicator species observed

Potential VP - needs confirmation in breeding season

Wetlands

alder seepage thicket

aquatic bed

cattail marsh

emergent marsh

highbush blueberry - winterberry shrub thicket

red maple - black ash swamp

red maple - sphagnum basin swamp

red spruce swamp

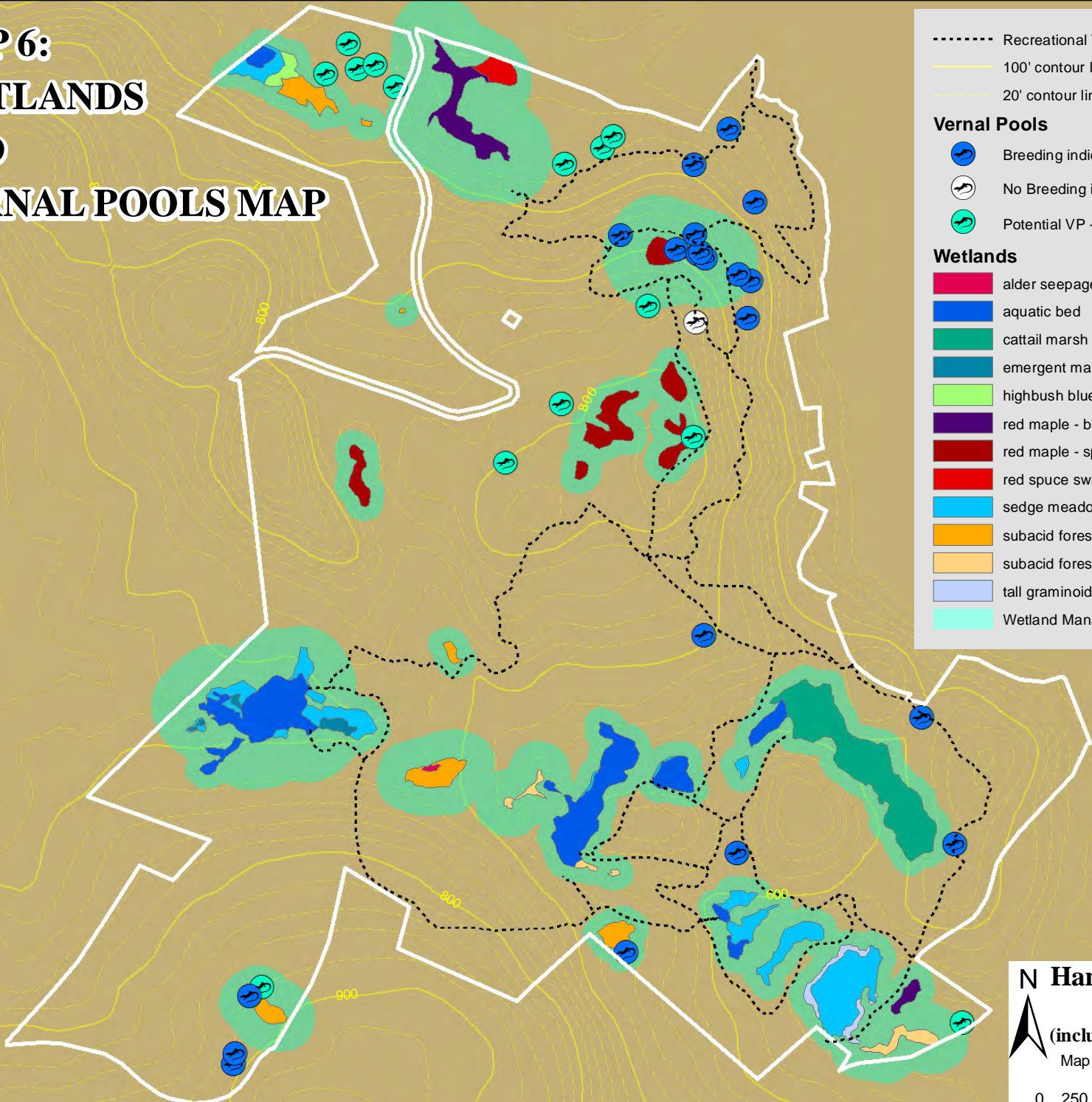
sedge meadow marsh

subacid forest seep, herbaceous fern glade variant

subacid forest seep, streamside variant

tall graminoid meadow marsh, bluejoint variant

Wetland Management Buffers



N

Hamlin-Eames Town Forest

Meredith, NH

(including Smyth and Kahn Easements)

Map by Peter Ellis, Ellis Ecological Services

December 2010

0

250

500

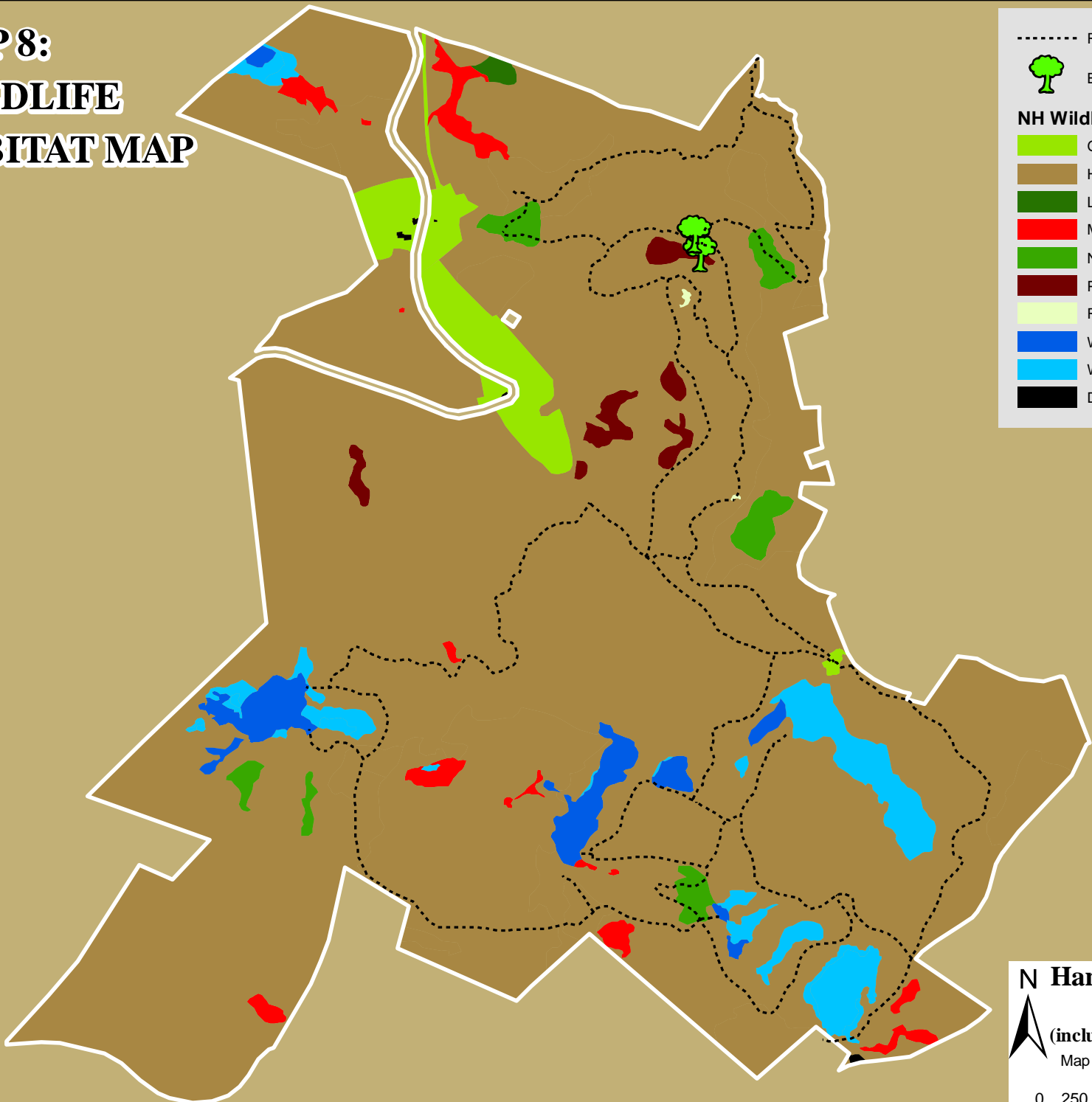
1,000












1,500

2,000

Feet

MAP 8:
WILDLIFE
HABITAT MAP



- Recreational Trails
-  Black Gum Trees
- NH Wildlife Action Plan Habitat Types**
-  Grasslands
-  Hemlock-Hardwood-Pine
-  Lowland Spruce-Fir
-  Matrix Forest Inclusion
-  Northern Hardwood-Conifer
-  Peatlands
-  Rocky Ridges and Talus Slopes
-  Water
-  Wet Meadow/Shrub Wetland
-  Developed

N Hamlin-Eames Town Forest
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December 2010

0 250 500 1,000 1,500 2,000 Feet