Relicensing Study 3.4.2

EFFECTS OF NORTHFIELD MOUNTAIN PUMPED STORAGE DEVELOPMENT-RELATED LAND MANAGEMENT PRACTICES AND RECREATIONAL USE ON TERRESTRIAL HABITATS

Study Report

Northfield Mountain Pumped Storage Project (No. 2485)
and Turners Falls Hydroelectric Project (No. 1889)

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EXECUTIVE SUMMARY

FirstLight Hydro Generating Company (FirstLight) is the current licensee of the Northfield Mountain Pumped Storage Project (Northfield Mountain Project) (FERC No. 2485) and the Turners Falls Hydroelectric Project (Turners Falls Project, FERC No. 1889). FirstLight has initiated with the Federal Energy Regulatory Commission (FERC, the Commission) the process of relicensing the Northfield Mountain and Turners Falls Projects using the FERC's Integrated Licensing Process (ILP). The current licenses for the Northfield Mountain and Turners Falls Projects were issued on May 14, 1968 and May 5, 1980, respectively, with both set to expire on April 30, 2018. On September 13, 2013, FERC issued a study plan determination for the Projects which, among other studies, required FirstLight to conduct Study No. 3.4.2 *Effects of Northfield Mountain Project-Related Land Management Practices and Recreational Use on Terrestrial Habitats*.

The Northfield Mountain Project (Project) covers approximately 2,011 acres of forested land. The expansive forested communities of the Project lands provide high quality habitat for botanical and wildlife resources. FirstLight also manages recreational resources at the Project as part of their FERC license and agreement with the state of Massachusetts.

A wildlife and botanical inventory study was completed for the Project for the purpose of describing terrestrial wildlife and botanical resources occurring within the FERC Project Boundary. Data collected included plant and animal species using representative habitats and invasive plant species infestations. Biologists collected these field data to identify if Project-related land management and maintenance practices and/or the use of Project-related recreation areas occurring at the Project affect existing wildlife and botanical resources (e.g., clearing of vegetation). The focus of the study area was on lands around Project facilities and recreational areas throughout Northfield Mountain.

The dominant vegetative community types in the study area include northern hardwood-hemlock-white pine forests, successional northern hardwood forests, oak-hickory forests, hemlock-ravine, circumneutral cliff, hemlock swamp, red maple swamp, and woodland vernal pool. Vegetative cover throughout much of the Project area occurs in mature forest stands. Approximately 73% of the Project is forested, containing a recorded total of 179 plant species. Thirty (30) National Wetland Inventory (NWI) mapped wetlands were field-verified, and five (5) new, non-NWI mapped wetlands were identified, including forested, scrub-shrub, and emergent wetland habitats. Additionally, biologists documented 13 woodland vernal pools (VP-2 through VP-14) and associated obligate vernal pool indicator species.

The woodlands and wetlands of the study area provide quality habitat for a diverse wildlife community. Over 59 bird species were recorded, including neo-tropical migrant songbirds, raptors, waterfowl, and shore birds that use the river as a migratory pathway or may breed or winter in the study area. Common mammals include white-tailed deer, gray squirrel, and a variety of smaller species. Numerous salamanders, newts, frogs, turtles, and snakes were observed and/or may occur in the study area.

Invasive plant species were generally uncommon in the study area, limited to areas of disturbance and isolated locations within cleared areas around the Upper Reservoir, along right-of-ways, tree lines, and in discrete patches along access roads. Invasive plants were typically found where open canopy habitat provided favorable conditions for opportunistic, sun-loving invasive plants.

The occurrence and distribution of wildlife and botanical resources in the study area is generally unrelated to the Project-related land management practices or Project-related recreation. There is no evidence of any on-going Project-related adverse effects on the described resources; however, there is the potential for

occasional impacts related to ground disturbing activities which may result in the spread or establishment of invasive species within the terrestrial portion of the Project.

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LIST OF ABBREVIATIONS

FERC	Federal Energy Regulatory Commission
FirstLight	FirstLight Hydro Generating Company
GPS	global positioning system
ILP	Integrated Licensing Process
MADFW	Massachusetts Division of Fisheries and Wildlife
MESA	Massachusetts Endangered Species Act
MIPAG	Massachusetts Invasive Plant Advisory Group
Northfield Mountain Project	Northfield Mountain Pumped Storage Project
NHESP	Massachusetts Division of Fisheries and Wildlife Natural Heritage and Endangered Species Program
NMTTC	Northfield Mountain Tour and Trail Center
NWI	National Wetland Inventory
PAD	Pre-Application Document
PSP	Proposed Study Plan
RSP	Revised Study Plan
RTE	rare, threatened and endangered species
SD1	Scoping Document 1
SD2	Scoping Document 2
SPDL	Study Plan Determination Letter
VY	Vermont Yankee Nuclear Power Plant
USACE	United States Army Corps of Engineers
USDAFS	United States Department of Agriculture Forest Service
USFS	United States Forest Service
USGS	United States Geological Service
USFWS	United States Fish and Wildlife Service
WNS	white nose syndrome

1 INTRODUCTION

FirstLight Hydro Generating Company (FirstLight) is the current licensee of the Northfield Mountain Pumped Storage Project (Northfield Mountain Project, FERC No. 2485) and the Turners Falls Hydroelectric Project (Turners Falls Project, FERC No. 1889). FirstLight has initiated with the Federal Energy Regulatory Commission (FERC, the Commission) the process of relicensing the Northfield Mountain and Turners Falls Projects using the FERC's Integrated Licensing Process (ILP). The current licenses for Northfield Mountain and Turners Falls Projects were issued on May 14, 1968 and May 5, 1980, respectively, with both set to expire on April 30, 2018.

As part of the ILP, FERC conducted a public scoping process during which various resource issues were identified. On October 31, 2012, FirstLight filed its Pre-Application Document (PAD) and Notice of Intent with FERC. The PAD included FirstLight's preliminary list of proposed studies. On December 21, 2012, FERC issued Scoping Document 1 (SD1) and preliminarily identified resource issues and concerns. On January 30 and 31, 2013, FERC held scoping meetings for the two Projects. FERC issued Scoping Document 2 (SD2) on April 15, 2013.

FirstLight filed its Proposed Study Plan (PSP) on April 15, 2013 and, per the Commission regulations, held a PSP meeting at the Northfield Visitors Center on May 14, 2013. Thereafter, FirstLight held ten resource-specific study plan meetings to allow for more detailed discussions on each PSP and on studies not being proposed. On June 28, 2013, FirstLight filed with the Commission an Updated PSP to reflect further changes to the PSP based on comments received at the meetings. On or before July 15, 2013, stakeholders filed written comments on the Updated PSP. FirstLight filed a Revised Study Plan (RSP) on August 14, 2013 with FERC addressing stakeholder comments. Included in the RSP was Study No. 3.4.2 *Effects of Northfield Mountain Project-Related Land Management Practices and Recreation Use on Terrestrial Habitats*. On September 13, 2013, FERC issued its first Study Plan Determination Letter (SPDL) approving Study No. 3.4.2 with no modifications.

1.1 Existing Information

The PAD provided baseline information pertaining to the effects of Project-related maintenance, land management, and recreation use on wildlife and botanical habitats and the location of invasive plant species within the Northfield Mountain Project area. FirstLight is completing wildlife and botanical studies for the Turners Falls Project as outlined in Study No. 3.4.1[1] and Study No. 3.5.1[2]; however, those studies only address the Turners Falls Impoundment (lower reservoir for the Northfield Mountain Project) and downstream areas with a focus on assessing how Project operations potentially impact botanical and wildlife resources. This study focused on evaluating habitats associated with Northfield Mountain. Additional information on the location and abundance of invasive plant species, and the impacts on wildlife and botanical resources as a result of Project-related maintenance and land management practices in the Northfield Mountain Project study area, are needed to evaluate the Project's full effects on wildlife and botanical resources.

In 2006, FirstLight, operating under the NE Hydro Generating Company name, contracted Tighe & Bond to complete a botanical survey on Project lands where land management and recreational activities occurred. The areas surveyed included Bennett Meadow Wildlife Management Area, Barton Cove Campground, and recreational picnic areas on the Turners Falls Impoundment. While this document focused on the Turners Falls Impoundment, it does provide insight as to which species are within those areas surveyed and what

[1] Study No. 3.4.1 *Baseline Inventory of Terrestrial Wildlife and Botanical Resources.*
[2] Study No. 3.5.1 *Baseline Inventory of Wetland, Riparian and Littoral habitat in the Turners Falls Impoundment and Assessment of Operational Impacts on Special-Status Species.*

could potentially be within the Northfield Mountain Project boundary. The Massachusetts Division of Fish and Wildlife (MADFW) reviewed Tighe & Bond's 2006 botanical survey. In its review letter dated April 25, 2007, MADFW (Natural Heritage Endangered Species Program- NHESP), indicated that the Northfield Mountain Recreational Trails are not located within Priority Habitat or Estimated Habitat and concluded that existing uses of the recreational facilities described in the Operation and Maintenance Plan would not require review under the Massachusetts Endangered Species Act (MESA); however, select activities which are regulated by the FERC licenses may require review by the NHESP during the FERC review process (French, 2007).

FirstLight conducted a recreational facilities inventory of the Turners Falls Project and Northfield Mountain Project during two field visits in October 2011 and July 2012 (see Study No. 3.6.2 *Recreation Facilities Inventory*). The purpose of the inventory was to identify the current formal recreational facilities associated with the Turners Falls and Northfield Mountain Projects. This information was needed to prepare the recreation sections of the PAD. On September 15, 2014 FirstLight filed Interim Study Report No. 3.6.2 which provided a summary of each formal recreational facility that was inventoried. This report provided baseline information as to what types of recreational uses could potentially affect wildlife and botanical habitats at the Northfield Mountain Project.

The Northfield Mountain Project has many recreational features (e.g., a trail system with over 26 miles of trails, observation area, picnic areas) that are inherently attractive. Public recreation sites can affect wildlife behavior (both attracting and displacing) and impact botanical resources (e.g., trampling of vegetation, erosion along trails, and spreading invasive species). An analysis of the effects of the maintenance, land management practices, and use of these recreational features on wildlife and botanical resources will help form the basis for determining the Northfield Mountain Project's effect on these resources.

1.2 Study Goals and Objectives

The goal of this study is to gather information necessary to understand the potential effects of land management practices and recreational use on wildlife and botanical resources within the Northfield Mountain Project study area. The study objectives are to provide supporting information which will provide the basis for an assessment of the potential resource impacts of the Northfield Mountain Project that were identified during development of the PAD and FERC scoping for the License Application, as follows:

- Identify and describe FirstLight's Development-related land management practices (including the maintenance of Project-related recreation areas) occurring in the Northfield Mountain boundary.

- Provide information pertinent to describe existing wildlife and botanical habitats occurring in the Northfield Mountain Project boundary.

- Determine if Project-related land management and maintenance practices and the use of Project-related recreation areas has the potential to facilitate the growth and spread of invasive plant species.

- Provide information to identify if Project-related land management and maintenance practices and the use of Project-related recreation areas may affect existing wildlife and botanical resources (e.g., clearing of vegetation).

2 STUDY AREA

The Northfield Mountain Project study areas include approximately 2,011 acres of forested land around the Project's facilities within the FERC boundary. Figure 2.0-1 illustrates the study area. For purposes of this report, the 2,011 acres is considered the Project or study area.

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Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)

Study 3.4.2 Effects of Northfield Mountain Project-related Land Management Practices and Recreation Use on Terrestrial Habitats

Figure 2.0-1: Northfield Mountain Pumped Storage Project Study Area

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3 METHODS

The study approach followed the approved RSP (FirstLight, 2013) and consisted of the elements described in the following sections.

3.1 Review of Existing Information

Task 1 of the RSP required a literature review. As part of Task 1, existing wildlife and botanical resources in the study area were described based on review of existing literature and information sources, inspection aerial photography, geographic information systems (GIS) databases, and field observations of vegetation, wildlife and habitat communities recorded during reconnaissance surveys. Sources of existing information that was reviewed included:

- NHESP Classification of the Natural Communities of Massachusetts (Swain & Kersey, 2011),
- Tighe & Bond November 17, 2006; Rare Plant Species Survey Report to NHESP summarizing surveys completed at select Northeast Generation Services Properties,
- MADFW April 25, 2007: MADFW / NHESP Tracking No: 06-19884 - letter to Tighe & Bond, review of FirstLight operation and maintenance facilities for compliance with MESA,
- FirstLight Pre-Application Document for the Turners Falls Hydroelectric Project (No. 1889) and Northfield Mountain Pumped Storage Project (No. 2485),
- FirstLight Relicensing Study 3.6.2; Recreation Facilities Inventory and Assessment,
- MADFW / NHESP Priority Habitat and Estimated Habitat maps,
- NHESP Massachusetts Natural Heritage Atlas 13th Edition,
- National Wetland Inventory Mapping,
- GIS databases including MassGIS data layers,
- United States Fish and Wildlife Service (USFWS) Environmental Conservation Online System database,
- Massachusetts Invasive Plant Advisory Group (MIPAG) data,
- Northfield Mountain Recreational Trail maps.

Using GIS and other available sources of information, preliminary field maps were produced to assist field surveys. Available habitat data were compared against habitat requirements of regionally known wildlife and plant communities to develop lists of wildlife species most likely to occur within the study area. Prior to field investigations, biologists reviewed the practices and locations of FirstLight Development-related land use management activities (e.g., areas routinely mowed, vegetation management areas, and access roads) and recreational uses (e.g., trails, climbing areas, camping, skiing) at Northfield Mountain. These managed and recreational used areas were a focus of the study.

The NHESP and USFWS were contacted by FirstLight via letter (Howard, 2011) as part of preparing the PAD requesting information on the potential presence of rare, threatened and endangered (RTE) species and critical habitats within the study area. NHESP reviewed the study area, and provided a 2011 letter (French, 2011) identified state and federally listed species occurring or potentially occurring in the study area (Appendix A). Based on field surveys, no listed species were identified within the study area. Additionally, in a letter dated April 25, 2007 (French, 2007, also Appendix A) from NHESP to Tighe & Bond (on behalf of FirstLight Hydro Generating Company), NHESP reported that there are no state records of areas designated as Priority[3] habitats or certified vernal pools located in the study area.

3.2 Field Reconnaissance

To document representative botanical and wildlife resources biologists completed reconnaissance level field surveys over the course of several weeks starting in April 2014 and ending in August 2014.

The following is a list of 2014 field survey dates:

- April 14-18 -Vernal pool surveys and initial site reconnaissance,
- May 12-14 - Wildlife, botanical, wetland, and invasive species surveys,
- June 16-19 - Wildlife, avian, botanical, wetland, and invasive species surveys,
- July 14-18 - Wildlife, botanical, wetland, and invasive species surveys,
- August 11-15 - Wildlife, botanical, wetland, and invasive species surveys.

3.3 Wildlife and Habitat Type Mapping

A primary objective of the wildlife surveys was to provide a general census and information on the distribution and abundance of wildlife habitats. General field observations included: dominant vegetation cover classes within each respective habitat type; unique or unusual habitats; and observations of avian, reptile, amphibian, and mammal wildlife.

Wildlife surveys were completed using visual encounter surveys along transects. Transect lines were placed objectively with respect to representative habitats (with transects placed within each habitat type), including representative Project-affected habitats (i.e., areas of vegetation management or recreational use areas). Transects included non-impacted areas and impacted areas (i.e., areas of vegetation management, recreational use areas) for comparison. Biologists walked a transect at a pace of approximately five (5) minutes per 50 meters, for a total search time of up to approximately two (2) hours. The transect width was generally line-of-sight. During transect searches, biologists surveyed the area to either side of the transect, looking for targeted species and indirect signs (i.e., tracks, scat, den areas, nests, etc.). Visual encounter surveys were augmented with incidental observations of wildlife signs while completing botanical meander surveys. More intensive searches were performed where suitable or unique habitats were identified (i.e., notable cliffs and vernal pools). The locations of significant sightings and observations were documented through the use of Global Positioning System (GPS) and photographs. Data were entered into the relicensing GIS database. Field data collected were compiled into separate census lists for avian, reptile, amphibian, and mammalian species observed or likely to occur given available habitat.

[3] Priority Habitat is based on the known geographical extent of habitat for all state-listed rare species, both plants and animals, and is codified under the MESA.

To refine the habitat mapping for the study area, the following tasks were performed:

- Existing GIS vegetation cover type, land use, and recreational layers from available resources were acquired;
- Visible vegetation boundaries in aerial photos or other imagery were used to fix or update polygon boundaries, based on field observations (i.e., survey transects);
- A final vegetation type map displaying vegetation type polygon boundaries, the study area, and specific Project components; and a table of vegetation types and the percent acres of each vegetation type present in the study area was developed.

Steve Johnson, PhD, Senior Biologist for New England Environmental, assisted with completing avian surveys from June 16-19, 2014. The goal of the avian survey was to create an inventory of bird species identified at the Northfield Mountain Project. Avian surveys used continuous sampling throughout the study area with a focus primarily from existing trails and access roads, with occasional bush whacked sections and some sampling along the main paved access road. Birds were identified as occurring within the Project by visual or acoustic identification.

Approximately 39.5 miles were walked over a four day period between June 16 and 20, 2014. Surveys were conducted primarily from existing trails, with occasional bush whacked sections, and some sampling along the main paved access road to the Upper Reservoir area. To determine if avian species composition varied within the approximately 2,011 acre study area, the area was broken into five sections: northwest slope, northeast slope, southeast slope, southwest slope, and reservoir area. Observed bird species, identified by sight or by sound, were noted for each section, and efforts were made to ensure each section was sufficiently sampled

3.3.1 Baseline Vernal Pool Inventory

Based on consultation with NHESP and review of NHESP MassGIS data layers and information available in the Massachusetts Natural Heritage Atlas 13th Edition, there were no existing records of NHESP certified vernal pools within the study area. Biologists completed a baseline vernal pool inventory of the study area using NHESP vernal pool indicators and criteria outlined in NHESP *Guidance on the Field Identification of Vernal Pools* (NHESP, 2009) This was done during the spring vernal pool breeding season since vernal pools are most easily located in early spring by listening for frog chorus calls that can be heard from a distance, increasing pool findings and providing confirmation that obligate vernal pool species are utilizing the habitat.. During a five day period from April 14- 18, 2014, biologists walked the study area targeting wetland areas, topographic depressions, and highlighted areas delineated from aerial photography. Where biologists encountered suitable vernal pool habitat, physical and biological evidence were recorded including photographs, physical and biological information, and GPS locations.

3.4 Vegetation Cover Types

Botanical surveys were completed to determine the species composition, structure, and distribution of vegetative communities within the study area. Data collected included classification of vegetative communities and recordings of dominant species within the herbaceous, shrub, and tree stratums. Plants were identified to the species level if possible, or at a minimum, if the plant was outside its phenological peak and species identification was not possible, the plant was identified to the genus level. Modified timed-meander surveys consisted of biologists walking a meandering path through each representative habitat and recording species present until a period of time passed (usually approximately 1 hour) where no new species were added to the vegetation list. Plants were identified to the species level, or at a minimum, if the plant was outside its phenological peak identification period, the plant was identified to the genus level. Biologists compiled a list of all plants found within each respective habitat and an overall census list of all

plant species identified within the study area. Vegetation communities were classified using the NHESP Classification of the Natural Communities of Massachusetts (Swain & Kersey, 2011). NHESP Quantitative Community Characterization Forms were completed in the field to quantitatively characterize representative habitats. These forms are provided in Appendix B. Photographs were taken to document examples of vegetative communities.

3.4.1 Wetland Verification

Palustrine habitats were field-verified using existing NWI mapping as a base map. These areas were not formally delineated, but, where applicable, were further defined from the existing NWI maps to add a better level of detail. When observed, non-NWI mapped wetlands were located using methods outlined in the United States Army Corps of Engineers (USACE) Wetland Delineation Manual and the Regional Supplement to the *Corps of Engineers Wetland Delineation Manual: North central and Northeast Region* (USACE, 1987; USACE, 2012). Wetland types mapped were classified using the USFWS Cowardin wetland classification system (e.g., palustrine, unconsolidated bottom, riverine aquatic bed) (Cowardin *et al*., 1979).

3.5 Invasive Plant Survey

The MIPAG list of invasive plants was used to identify targeted invasive species likely to occur within the study area. Biologists used methods adapted from the United States Forest Service (USFS) Invasive Species Program, *Invasive Species Inventory and Mapping Data Recording Protocols* (USFS 2015). These adapted methods focus on presence, location, extent, and abundance to provide site infestation information. As land disturbances following the Project's maintenance activities may favor establishment of invasive plants over native plant communities, survey efforts for invasive species were focused on disturbed lands, areas of vegetation management, access roads, and recreational trails, which can be vectors for invasive species propagation.

The MIPAG maintains a list of invasive plant species occurring in Massachusetts and provides criteria used in evaluating species. In Massachusetts, the MIPAG lists 35 species as invasive, 29 as likely invasive, and three as potentially invasive. MIPAG defines invasive plants as "non-native species that have spread into native or minimally managed plant systems in Massachusetts, causing economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems." As land disturbances following the Project's maintenance activities may favor establishment of invasive plants over native plant communities, survey efforts for invasive species were focused on disturbed lands, areas of vegetation management, access roads and recreational trails which can be vectors for invasive species propagation.

Biologist also surveyed for MIPAG listed "likely invasive plants" and "potentially" invasive plants. "Likely invasive plants" are non-native species that are naturalized in Massachusetts, but do not meet the full criteria that would trigger an "invasive plant" designation. "Potentially invasive plants" are non-native species not currently known to be naturalized in Massachusetts, but that can be expected to become invasive within minimally managed habitats within the Commonwealth.

To maintain consistency with other similar studies (Study No. 3.4.1 and Study No. 3.5.1), biologists also surveyed for the following three non-native invasive shrubs that FERC requested to be included for invasive surveys under Study No. 3.5.1:

1. *Alnus glutinosa* - European alder
2. *Salix purpurea* - purple-osier willow
3. *Salix exigua* (not spp. interior) - narrow-leaf or sandbar willow

To document an infested area, biologists used a Trimble™ GPS survey data collector at sub-foot accuracy to delineate the boundary of the infestation as defined by the dominant canopy cover of the invasive plant. Areas containing only occasional invasive species were characterized with a GPS center point and a radius necessary to enclose the population. For areas where invasive species were ubiquitous or impractical to map, surveyors characterized invasive species population using estimates of areal coverage and percent cover of species present.

3.6 Land Management Practices and Recreation Uses

Pre-survey, biologists reviewed the Project-related maintenance activities of managed areas, FirstLight's Relicensing Study 3.6.2; Recreation Facilities Inventory and Assessment, and information available from Northfield Mountain's Recreation & Environmental Center. The study was conducted to determine if Project-related land management and maintenance practices and the use of Project-related recreation areas can affect existing wildlife and botanical resources (e.g., clear of vegetation, erosion from recreational activities).

4 RESULTS

4.1 Wildlife and Habitat Type Mapping

The physiographic settings of study area, with its relatively large tracts of undisturbed terrestrial habitats, provide a wide variety of habitats for terrestrial wildlife. The study area is predominantly forested by hemlock and successional northern hardwoods. Portions of the study area contains areas of development which are dominated by manicured lawns and gravel or paved surfaces. Figure 4.1-1 (end of section 4.1) shows wildlife and habitat type transects within the study area. Vegetation observed within these habitats is described in more detail in Section 4.2 and habitat types are shown on Figure 4.2-1.

Wildlife associated with habitats within the study area includes a combination of species ranging from "generalists" species adapted to a broad habitat range to more specialized species adapted to narrower habitats (specifically, open/edge habitats, and woodland vernal pool habitats) (DeGraaf, 2001). For purposes of describing the existing condition of these resources, this discussion has been divided into the following categories: mammals, avian species, and reptiles and amphibians.

4.1.1 Mammals

Appendix C lists 35 mammal species that were directly or indirectly observed in the field, as well as species that are likely to exist in the study area. The list of mammals likely to occur is inferred from available habitat types documented in the study area cross referenced with life history's of mammals that are known to occur within the region as referenced by DeGraaf, (2001). The diverse vegetated communities within the study area provide a range of habitat niches for species typical of the highlands of central to western Massachusetts and the Connecticut River valley. The majority of the species are habitat generalists with a known tolerance for habitat modifications and adaptations.

Some of the furbearing animals that are known to inhabit the study area, based on direct observation or presence of preferred habitat, include beaver (*Castor canadensis*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), muskrat (*Ondatra zibethicus*), Virginia opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), eastern chipmunk (*Tamias striatus*), eastern gray squirrel (*Sciurus carolinensis*), and striped skunk (*Mephitis mephitis*). These wildlife species reside in many different habitat types such as woodland, wetland, scrub-shrub or early successional areas, and grassland areas. Use of these areas may shift during different life stages and/or times or year. Mammal species typically found specifically within study area wetlands, based on observation or habitat preference, include white-tailed deer (*Odocoileus virginianus*), star-nosed mole (*Condylura cristata*), and masked shrew (*Sorex cinereus*).

White-nose Syndrome (WNS), a fungus that causes harm to bats has spread rapidly and has caused the catastrophic mortality of bats that hibernate over winter in Massachusetts (NHESP, 2014). This includes the little brown bat, which used to be the most abundant species of bat in the Commonwealth. As a result of WNS, most of the bat colonies are now gone (NHESP, 2014). There are three species of "tree bats" in Massachusetts that are not exposed to the WNS fungus because they migrate south for the winter. These bats include, the Red Bat, Hoary Bat, and Silver-haired Bat. These species typically use riparian habitats for nesting and cover, venturing out into surrounding habitats to forage. No summer colonies of bats were observed in the study area, but there is abundant forested habitat which could support these "tree bats".

4.1.2 Reptiles and amphibians

Of the MADFW 45 inland native species of amphibians and reptiles that are known to occur in Massachusetts (Cardoza & Mirick, 2009), a total of 23 amphibians and reptiles were observed or are likely to occur within the study area. Included are nine frogs and toads, four salamanders, three turtles, and seven snakes. These inland native species include terrestrial and semi-aquatic amphibians and reptiles. A list of reptiles and amphibians recorded or likely to occur in the study area is provided in Appendix D.


Figure 4.1.2-1: Examples of Reptile and Amphibians Recorded in the Study Area: (Left) Eastern Garter Snake, (Right) Snapping Turtle

4.1.3 Avian Species

Fifty-nine (59) species of bird were observed within the study area (Appendix E). The Northwest Slope had the greatest species richness, with 47 species, while the Northeast Slope had only 17 observed species. This is likely a reflection on the relative sizes of the various sections, rather than differing habitats. The species composition of the four slope sections was relatively similar. A few open habitat species occurred only in the mown areas and Power line Right of Ways of the Northwest Slope, but the majority of species were found in more than one slope section (e.g., Ovenbird,).

Photo 4.1.3-1: Ovenbird Fledgling Seen on Northwest Slope

4.1.4 Baseline Vernal Pool Survey

Biologists located and documented 13 woodland vernal pools in the study area (Figure 4.1.4-2). Commonly observed egg masses of obligate vernal pool indicator species included spotted salamanders *(Ambystoma maculatum)* and wood frogs. Wood frogs (*Lithobates sylvaticus*), and four local species of mole salamanders (*Ambystoma spp*.) have evolved breeding strategies intolerant of fish predation on their eggs and larvae; the lack of fish populations is essential to the breeding success of these species. Other amphibian species use vernal pools but they do not depend on them including American toads (*Bufo americanus*), green frogs (*Rana clamitans*), and red-spotted newts (*Notophthalmus viridescens*). It should be noted that green frogs and red-spotted newts feed on obligate vernal pool species eggs and larval and can have negative effects on other amphibian population dynamics. Vernal pools also support a diverse invertebrate fauna, including obligate indicator species like fairy shrimp *(Eubranchipus spp*.) which complete their entire life cycle in vernal pools.

Biologist also deployed random dip net samplings to record any macroinvertebrates and amphibian larvae. Table 4.1.4-1 details vernal pool indicator species and pool dimensions recorded for each vernal pool. Photos for documented vernal pools are provided in Appendix F.

Table 4.1.4-1. Northfield Mountain Pumped Storage Project Vernal Pool Field Notes

Pool ID	Egg Masses		Pool Dimensions (Feet)	Water Depth (Feet)	Comments
	Spotted Salamander	Wood Frog			
VP-2	0	0	200x50	3.0	Spotted salamander (Ambystoma maculatum) spermatophores man-made rock-quarry
VP-3	>66	40	45x72	1.5	
VP-4	25	0	120x30	2.0	
VP-5	50	25	100x40	1.0	
VP-6	32	0	100x45	1.0	
VP-7	25	0	125x75	2.0	
VP-8	18	6	75x40	2.0	
VP-9	12	2	20x20	2.0	
VP-10	12	0	-	3.0	
VP-11	52	18	45x25	2.0	
VP-12	15	>30	-	-	red spotted newts (Notophthalmus viridescens) feeding on egg masses
VP-13	25	>500	250x50	4.0	red spotted newts (Notophthalmus viridescens) feeding on egg masses
VP-14	5	6	120x45	2	

Figure 4.1.4-1: Example of Wood Frog Egg Masses Observed During April Vernal Pool Surveys

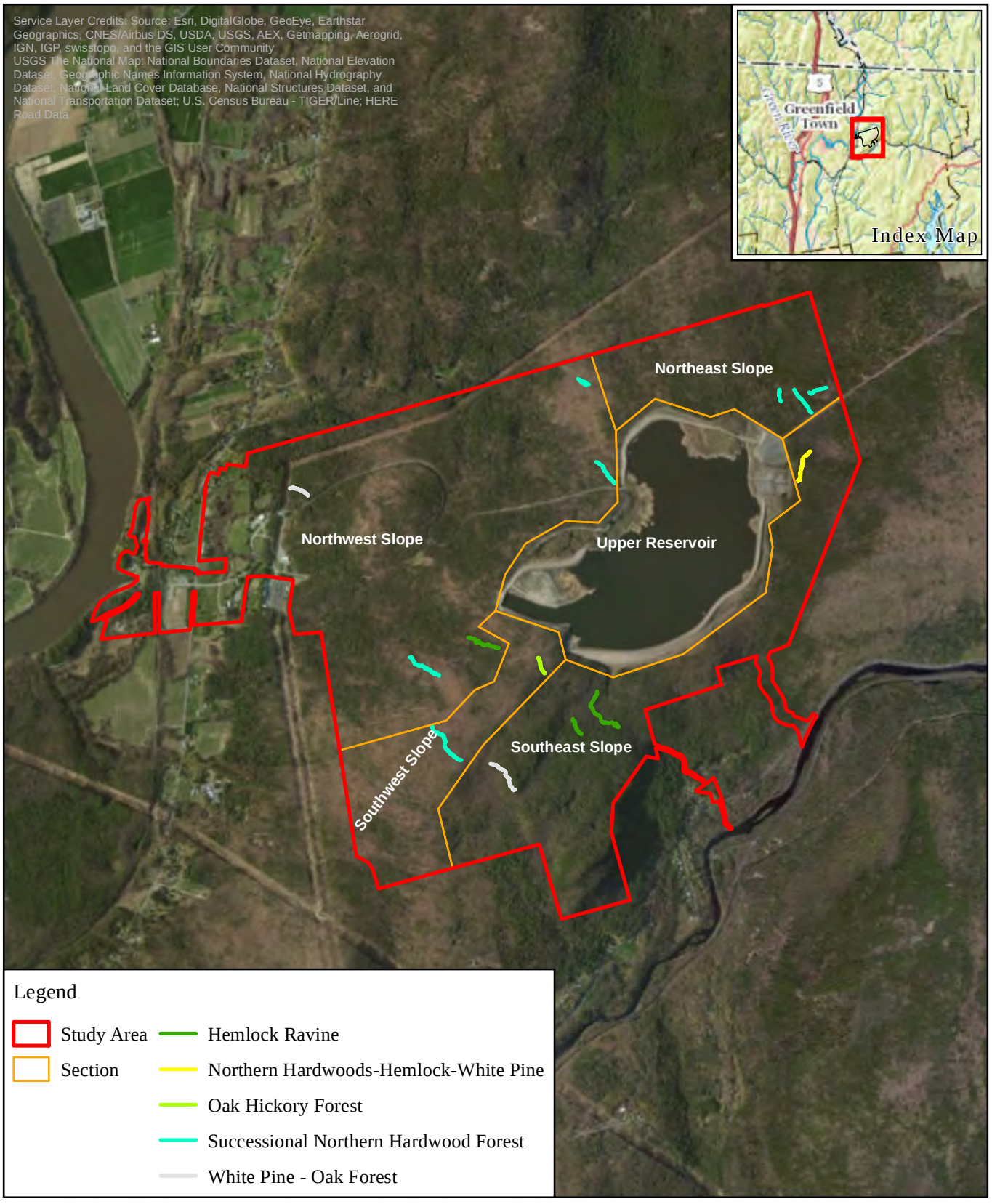

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Figure 4.1.-1: Northfield Mountain Project Wildlife and Habitat Transects

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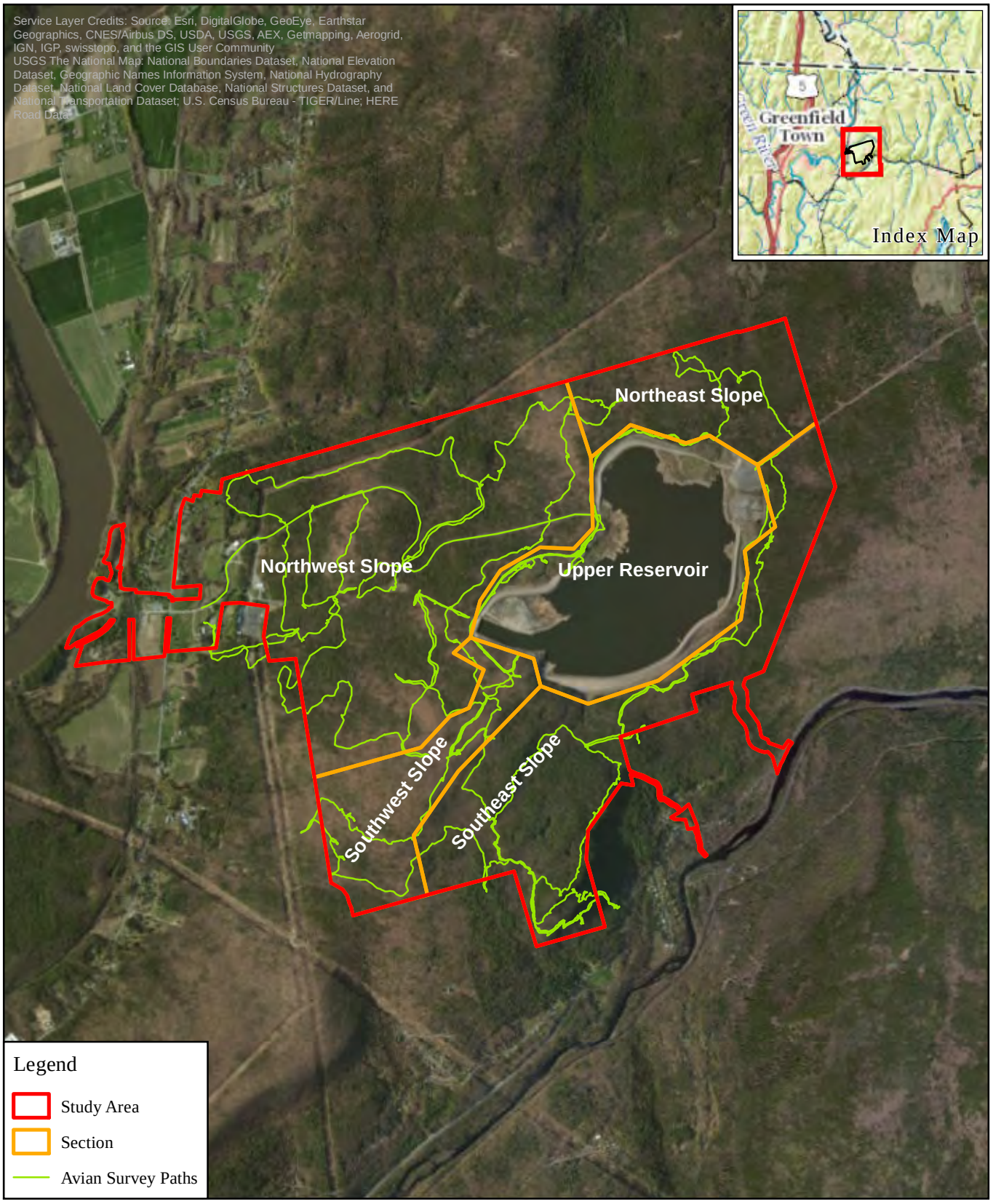

Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)

Study 3.4.2 Effects of Northfield Mountain Project-related Land Management Practices and Recreation Use on Terrestrial Habitats

N

0 0.25 0.5 1 Miles

Figure 4.1.3-2: Northfield Mountain Pumped Storage Project Avian Survey Paths

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Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)

Study 3.4.2 Effects of Northfield Mountain Project-related Land Management Practices and Recreation Use on Terrestrial Habitats

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Figure 4.1.4-2: Northfield Mountain Project Vernal Pool Locations

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4.2 Vegetative Communities

The Northfield Mountain Project is located within the Northeastern highlands-Taconic Mountain sub-ecoregion (Griffith *et al*. 1994). The study area within this sub-ecoregion is located within the Worcester/Monadnock Plateau unit. The Worcester/Monadnock Plateau contains the most hilly and mountainous area of Massachusetts' central uplands. Elevations range from 500 to 1400 feet with some peaks above 1800 feet. Northern hardwoods, transition hardwoods, and forested wetlands are common (Swain & Kersey, 2011).

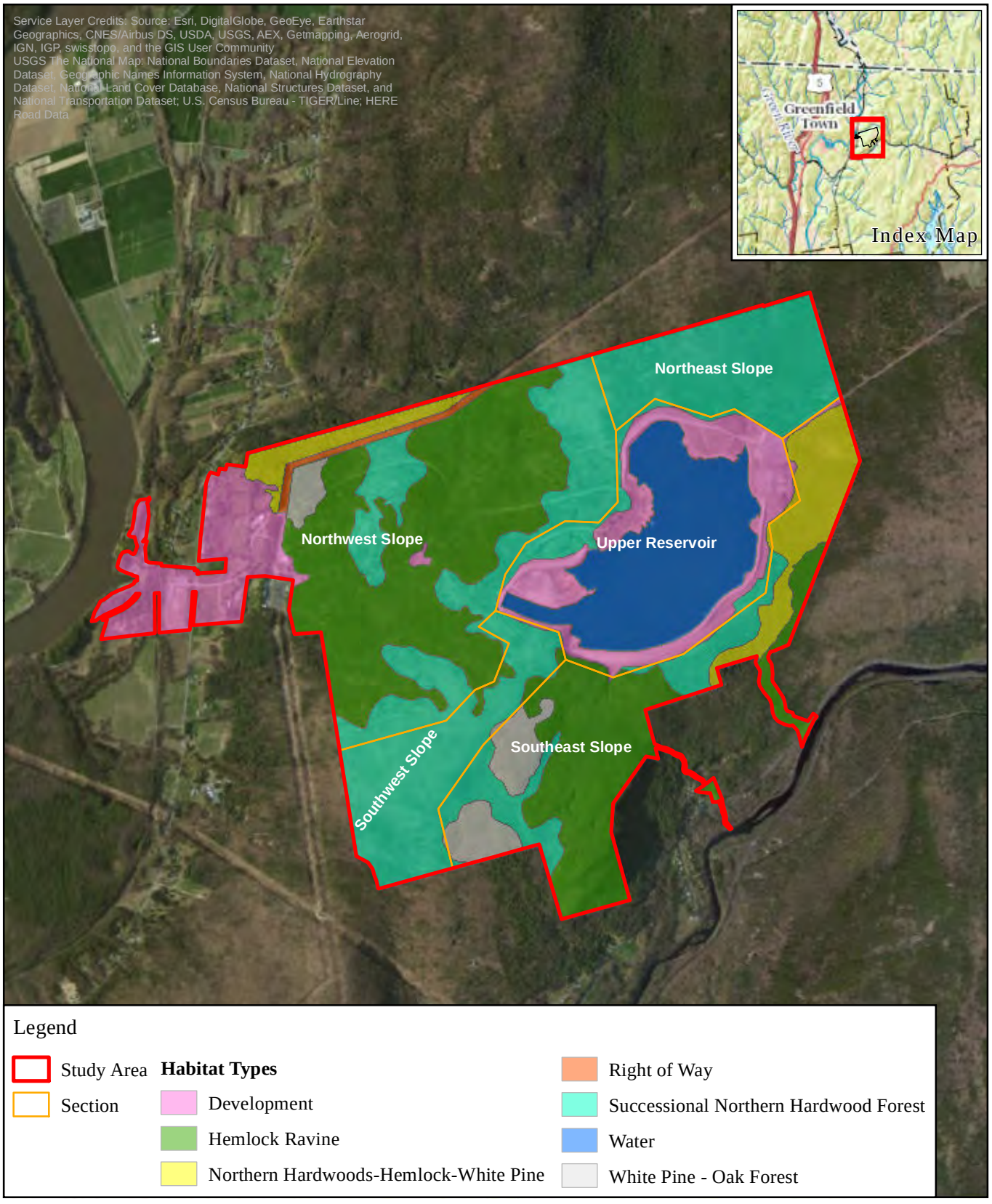
Biologists documented 179 plant species within the study area. A list of recorded plant species identified during the 2014 field season is provided in Appendix G. Based on survey transects (Figure 4.2-1), the dominant vegetative assemblages can be categorized as belonging predominantly to four terrestrial and three palustrine systems as defined by NHESP Classification of the Natural Communities of Massachusetts (Swain & Kersey, 2011). Two identified habitats which occur within the study area (Oak-hickory forest and Circumneutral rock cliff) were not mapped as the aerial signature and habitat size did not allow for identification using available aerial imagery. Two mapped habitats (not described by the NHESP and related to disturbance) include the power line right-of-way, which is dominated by shrub vegetation, and areas of development, which are dominated by manicured lawn. With the exception of 13 documented woodland vernal pool habitats (detailed below in Section 4.2.8), no state listed rare or priority habitats were recorded within the study area. Table 4.2-1 contains a description of the dominant terrestrial habitats within the study area as well as dominant vegetation. Palustrine systems, which include vernal pools, are described in Section 4.3.

The primary terrestrial natural plant communities included:

- Northern hardwoods-hemlock-white pine forest,
- Successional northern hardwoods,
- Hemlock ravine,
- White pine - oak forest,
- Oak-hickory forest (not mapped),
- Circumneutral rock cliff (not mapped),
- Right of way (not described by NHESP),
- Development (not described by NHESP),

Table 4.2-1. Mapped Habitats, Dominant Vegetation, and Percent Occurrence within the Study Area.

Habitat Type	Dominant Overstory	Dominant Shrub	Dominant Herbaceous	Acres	Percent of Area
Right of Way	N/A	white pine (6-25%), glossy buckthorn (6-25%)	goldenrod spp (6-25%), interrupted fern (6-25%), sweetfern (6-25%), bracken fern (6-25%), mullein (6-25%)	14.3	0.7
White Pine - Oak Forest	white pine (75-100%), red oak (6-25%), overcup oak (6-25%)	red maple (25%), low bush blueberry (10%), white oak (10%)	Canada mayflower (6-25%), partridge berry (6-25%)	70.1	3.5
Northern Hardwoods-Hemlock-White Pine	hemlock (75%), yellow birch (15%), American beech (10%)	hemlock (trace), hobblebush (trace), striped maple (trace)	sarsaparilla (trace), Canada mayflower (trace), wood fern (trace)	127.8	6.4
Water	N/A	N/A	N/A	225.5	11.2
Development	white pine (trace)	N/A	Kentucky bluegrass (75-100%)	284.8	14.2
Hemlock Ravine	eastern hemlock (75-100%)	mountain laurel (6-25%)	starflower (trace), wintergreen (trace)	621.5	30.9
Successional Northern Hardwood Forest	red maple, American beech, white birch, quaking aspen (51-75%)	striped maple (6-25%) witch hazel (6-25%)	sarsaparilla (6-25%), twisted stalk (6-25%), starflower (6-25%)	666.8	33.2
Total				**2010.9**	**100.0**



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Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)

Study 3.4.2 Effects of Northfield Mountain Project-related Land Management Practices and Recreation Use on Terrestrial Habitats

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Figure 4.2.-1: Northfield Mountain Project Vegetative Communities

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4.2.1 Northern Hardwoods-Hemlock-White Pine Forest

Northern hardwoods-hemlock-white pine forest is the dominant vegetative community on northwestern and northeastern slopes of Northfield Mountain. This ecosystem is associated with a closed canopy forest of deciduous and evergreen trees, with sparse shrub and herbaceous layers. This is the predominant hardwood forest community type throughout much of northern New England, and the cooler parts of Massachusetts (Swain & Kersey, 2011). The community development is on moist, well drained soils on north facing slopes. This community type is broadly defined and can be characterized by variable dominant species. The forest is generally dominated by a mix of sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), yellow birch (*Betula alleghaniensis*), and red oak (*Quercus rubra*) in variable proportions, with eastern hemlock (*Tsuga canadensis*) and white pine (*Pinus strobus*) intermingled throughout. American beech tend to dominate on drier locations. Occurrences with large portions of white pine are usually recovering from a past disturbance where the land was open. Hemlock typically dominate in ravines or cool edges of wetlands. Black cherry (*Prunus serotina*), white birch (*Betula papyrifera*), red maple (*Acer rubrum*), and other early successional tree species are often scattered, with occurrences in the subcanopy with stripped maple (*Acer pensylvanicum*), and sometimes ironwood (*Carpinus caroliniana*). The shrub layer is usually open, but may have clumps of hobblebush (*Viburnum alinifolium*) and elderberry (*Sambucus canadensis*). Individuals of honeysuckle (*Lonicera sp*.) and currant (*Ribes sp*.) are characteristically present. The diverse but sparse herbaceous layer includes Christmas fern (*Polystichum acrostichoides*), Canada mayflower (*Maianthemum canadensis*), clubmosses (*Lycopodium spp.*), asters (*Aster sp*.), trillium (*Trillium sp*.), violet (*Viola sp*.), and bluebead lily (*Clintonia borealis*), which appear in the spring.

Figure 4.2.1-1: Example of Northern Hardwoods-Hemlock-White Pine Forest on Northwest Slope

4.2.2 Successional Northern Hardwoods

Successional northern hardwoods are a broadly defined time sequence of forest communities, from thick young sprouts with little diversity, to mature, diversifying forests with undergrowth of more shade tolerant trees. The canopy is seldom completely closed and undergrowth may be dense or open. Areas may be associated with past disturbance such as cutting, blow-down/storm damage, or fire within northern hardwood forest areas. Aspen (*Populus tremuloides*), white birch (*Betula papyrifera*), red maple (*Acer rubrum*), and/or black cherry tend to be common throughout the community. Gray birch (*Betula populifolia*) tends to be more common on very well drained soils. Pin cherry (*Prunus pensylvanica*) is a common associate. As the forest matures, the understory is made up of young trees (typically less than 10" diameter at breast height) of more shade tolerant species. Shrubs and herbaceous species are variable, and depend on surrounding seed sources and the type of disturbance that established the early successional community. Successional northern hardwood forests are found intermingled throughout the Northfield Mountain Project and are typical of transition areas and edge habitat around the Upper Reservoir.

Figure 4.2.2-1: Example of Successional Hardwoods along topographic divide between Northwest and Northeast Slope

4.2.3 Hemlock Ravine

Hemlock ravine communities are dominated by the dense overstory canopies of eastern hemlock trees. These cool, moist habitats are located in topographic draws and drainageways in the landscape. This heavily shaded habitat is characterized by little growth in the understory. The forest floor is typically bare, covered by needles, twigs and small branches from the hemlocks. Hemlock ravines are found throughout the

northern and southern slopes of Northfield Mountain. Occasionally deciduous trees that grow along with hemlock occur at very low percentages and include; a mixture of oak species. (red, white and black) and red maple. Generally, the shrub layer is sparse, with occasional individuals of the canopy species and small patches of mountain laurel (*Kalmia latifolia)*. Hemlock ravine communities attract wildlife that depend on mature dense evergreen forests and typically host a variety of songbirds that nest high in the canopy. Several hemlock ravines are found in topographic reliefs on the southeast slope of Northfield Mountain.

Figure 4.2.3-1: Example of Hemlock Ravine Community

4.2.4 White Pine- Oak Forest

The white-pine oak forests within the study area are limited, the survey transect for this forest type was established south of the reservoir in area near the xyz ledge. The forest has a partial closed canopy with sporadic understory shrub coverage. The overstory was dominated by white pine and red oak with the shrub layer dominated by red maple, low bush blue berry, and mountain laurel. Herbaceouis vegetation varied, but included bracken fern, Canada mayflower, and wintergreen. This habitat is ideal for generalist species such as gray squirrels (*Sciurus carolinensis*), short-tailed shrews (*Blarina brevicauda*), voles, and chipmunks (*Tamias striatus*). Common birds within this habitat may include Red-eyed Vireo (*Vireo olivaceus*), Brown Creeper (*Certhia americana*), Hermit Thrushes (*Catharus guttatus*) and Red Tailed Hawks.

Figure 4.2.4-1: View through the interior of the white pine-oak forest

4.2.5 Oak – Hickory Forest

This community consists of hardwood forests dominated by a mixture of oaks, with hickories mixed in at a lower density. It is found on well drained upper slopes and ridgetops, usually on west and south facing aspects. A broadly defined, variable forest type (Swain & Kersey, 2011), the canopy is dominated by one or several oak species including red oak, white oak *(Q alba)*, and black oak (*Q velutina*). Mixed in are lower densities of one or several hickory species (*Carya ovata*, *C. tomentosa*, *C. glabra*, and *C. ovalis*). Other trees include ash, birch, sassafras (*Sassafras albidum*), and red maple. The subcanopy commonly includes ironwood, flowering dogwood (*Cornus florida*), shadbush (*Amelanchier arborea*), chestnut (*Castanea dentata*), and witch-hazel (*Hamamelis virginiana*). Low shrubs are common and often diverse; blueberries (*Vaccinium sp.*), dogwoods (*Cornus spp.*), and viburnums (*Viburnum spp.*) are characteristically present. The herbaceous layer is also richer than in many oak forests. Plants typical of the herbaceous layer include hepatica (*Hepatica nobilis*), goldenrod (*Solidago sp.*), tick-trefoil (*Desmondium glutinosum*), wild sarsaparilla (*Aralia nudicaulis*), and false Solomon's seal (*Maianthemum racemosa*). This variable forest community is found at higher elevations on the Northfield Mountain range, most notably in a strip of deciduous forest between the northwestern slope and southeast slope, and adjacent to the upper elevations to Rose ledge.

Figure 4.2.5-1: Example of Oak Hickory Forest

4.2.6 Circumneutral Rock Cliff Community

This community type is found along the summit and higher elevations of the southeastern slope of Northfield Mountain. Rose ledge and the Farley ledges are notable examples where sparse, scattered vascular plants are found in ledges and small crevices within vertical cliff faces. Lichens are occasionally dense on cliff faces. These communities can be variable in moisture, but generally consist of areas of significant rock outcroppings that are well shaded by trees of the surrounding forest. Species of dry open areas, including pale corydalis (*Corydalis sempervirens*), bearberry (*Arctostaphylos uva-ursi*), plantain-leaved pussytoes (*Antennaria plantaginifolia*), columbine (*Aquilegia canadensis*), marginal wood-fern (*Dryopteris marginalis*), little bluestem grass (*Schizachyrium scoparium*), ebony spleenwort (*Asplenium platyneuron*), Rusty cliff-fern (*Woodsia ilvensis*), and mosses. In the area, chestnut oak (*Quercus prinus*), scrub oak (*Quercus ilicifolia*), and witch hazel are sporadically observed. These cliff areas can provide nesting habitats for Ravens (*Corvus corax*). Few to no mammals, reptiles or amphibians would be expected on these steep slope faces.

Figure 4.2.6-1: Circumneutral Rock Cliff Community- Farley Ledges (formed from granitic gneiss)

4.2.7 Right of Way Community

This community, which is not identified by the NHESP, was identified within the portion of the study area which is crossed by the Eversource transmission right-of-way. This area is maintained by period vegetation management which limits the growth of large woody vegetation. The dominant communities are shrub and herbaceous communities. Shrub layer vegetation is dominated by white pine saplings, glossy buckthorn, red cedar (*Juniperus virginiana*), and meadowsweet (*Spiraea alba* var. *latifolia*). The herbaceous community is extensive and includes several weedy species such as chicory (*Cichorium intybus*), mullein (*Verbascum Thapsus*), and pearly everlasting (*Anaphalis sp*). Additional herbaceous vegetation includes bracken fern (Pteridium aquilinum), sensitive fern (*Onoclea sensibilis*), Joe pye weed (*Eutrochium maculatum*), and milkweed (*Asclepias sp.*). Portions of this area include a gravel access road (Figure 4.2.7-1).

Figure 4.2.7-1. Representative view of the right-of-way community.

4.2.8 Developed Community

Portions of the upland habitat within the study area are dominated by maintained spaces required for the operation of the project. These areas include manicured lawn areas near the Upper Reservoir as well as mid-way up the main access road. The majority of these habitats are devoid of overstory vegetation, which occurs occasionally, often as solitary white pines. The primary vegetation in these areas is comprised of shrub and herbaceous layer vegetation. Herbaceous vegetation is dominated by mowed areas of Kentucky bluegrass (*Poa pratensis*) and occasional shrubs which include glossy buckthorn (*Frangula alnus*), autumn olive (*Elaeagnus angustifolia*), and several species of northern hardwoods.

4.3 Wetland Verification

Biologists led by a Professional Wetland Scientist field-verified NWI mapped wetlands within the study area. As stated above in the methods section these areas were not formally delineated, but the boundaries were refined to provide a better level of detail. Thirty (30) NWI mapped wetlands were field verified. An additional five non-NWI mapped wetlands were also identified and mapped. Newly identified wetland areas consisted of smaller, isolated wetland systems generally found around the periphery of the reservoir area. The newly mapped palustrine areas included two scrub-shrub wetlands, two emergent wetlands, and three forested wetlands. Figure 4.3-1 displays the location and extents of the NWI and newly identified wetlands. Dominant wetland communities within the study area include:

- Hemlock swamp
- Red maple swamp
- Woodland vernal pool

4.3.1 Hemlock Swamp

Many swamps have hemlock as a component of the canopy but hemlock swamps are differentiated by having hemlock as a major or co-dominate canopy species. In some cases hemlock forms dense stands, but more commonly hemlock is associated with a mixture of white pine, red maple and yellow birch. The understory tends to be sparse to moderately vegetated with highbush blueberry (*Vaccinium corymbosum*), winterberry (*Ilex verticillata*), and mountain laurel (*Kalmia latifoila*). Ferns are common, especially cinnamon fern (*Osmundastrum cinnamomeum*), along with a hummocky floor covered with sphagnum moss. Notable hemlock swamp habitat is found down gradient of the Farley ledges situated in a well - defined saddle in the landscape. These areas can provide year round habitat and breeding (i.e. vernal pools) for amphibian species.

Figure 4.3.1-1: Example of Hemlock Swamp near the base of the Farley Ledges

4.3.2 Red Maple Swamp

Red maple swamps are a common forested wetland type in Massachusetts that occur in a variety of physical and hydrogeology settings. Red maple is usually strongly dominate in the overstory and can often provide up to 90% of the canopy cover. A variable mixture of subordinate tree species co-occurs with red maple, including yellow birch, black gum (*Nyssa sylvatica*), white ash (*Fraxinus americana)*, white pine, elm (*Ulmus americana)*, hemlock, pin oak (*Quercus palustris*) and swamp white oak (*Quercus bicolor*). The shrub layer of red maple swamps is usually dense and well developed with greater than 50 percent cover, but it can be variable. Sweet pepperbush (*Clethra alnifolia*), highbush blueberry, winterberry, spicebush (*Lindera benzoin)*, alder (*Alnus spp)* and viburnum species often dominant the shrub stratum. The herbaceous stratum can be variable, but ferns are unusually abundant. Cinnamon fern is common with other ferns including but not limited to; sensitive fern (*Onoclea sensibilis*), royal fern (*Osmunda regalis*) and marsh fern (*Thelypteris palustris*). Gaminoides are common, mixed in with a variety of other herbaceous species commonly including; skunk cabbage (*Symplocarpus foetidus*), false hellebore (*Veratrum viride*), spotted touch-me-not (*Impatiens capensis*), swamp dewberry (*Rubus hispidus*), and marsh marigold (*Caltha palustris*).

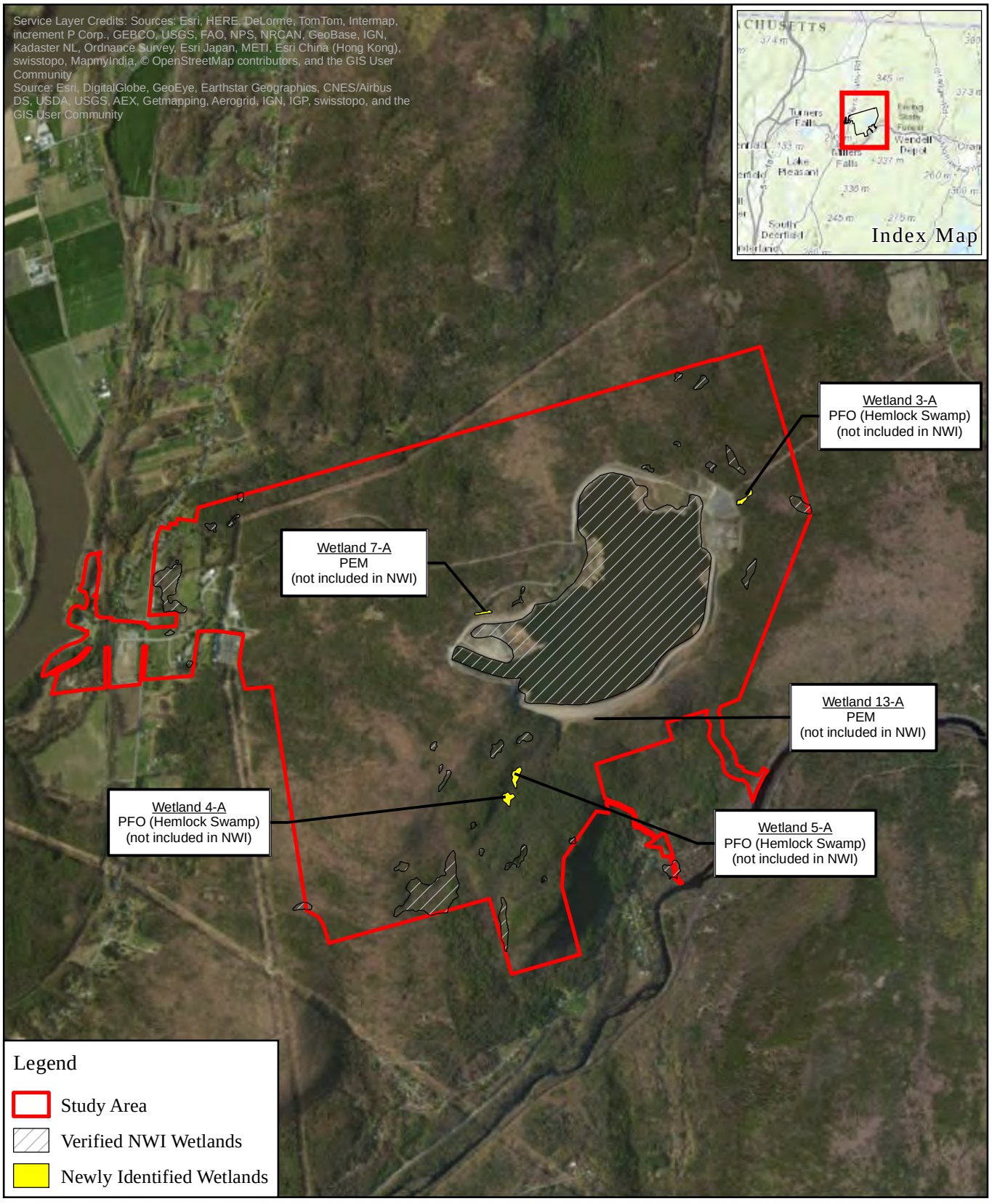
Figure 4.3.2-1: Example of Red Maple Swamp on Southeast Slope

4.3.3 Woodland Vernal Pool

Woodland vernal pools are typically small, shallow depressions that are isolated from other surface waters. They usually flood in spring and sometimes in fall, and generally hold water for a minimum of two months but are dry in summer. Because vernal pools are temporary bodies of water, they do not support fish populations. When dry, woodland vernal pools can be often be recognized by a layer of water-stained gray leaves covering the pool's basin and distinct waterline marks on the base of tree buttresses. These temporarily flooded areas provide important breeding habitat for amphibians. Due to prolonged standing water, woodland vernal pools often have sparse-to-little shrub and herbaceous vegetation within the pool

basin. Red maple and hemlock, along with lesser quantities of various wetland tree species, are found in the canopy cover, similar to hemlock swamp and red maple swamp communities. Vernal pools are tracked as a separate community type because of the important habitat they provide for amphibians and invertebrates.

Figure 4.3.3-1: Example of Woodland Vernal Pool - Vernal Pool #3 - Biologist Dip Net Sampling



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Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)

Study 3.4.2 Effects of Northfield Mountain Project-related Land Management Practices and Recreation Use on Terrestrial Habitats

0 0.25 0.5 1 Miles

Figure 4.3-1: Northfield Mountain Project Wetland Mapping

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4.4 Invasive Plants

Biologists identified 12 invasive plants in the study area including; eight MIPAG listed non-native invasive plants, one MIPAG watch list species (coltsfoot (*Tussilago farfara*)), one USDA Forestry Service early detection species (Spotted knapweed (*Centaurea maculosa*), and, for consistency with other studies, European alder (*Alnus glutinosa*). Locations of invasive species within the study area are shown in Figure 4.4-5.

Table 4.4-1. Northfield Mountain Pumped Storage Project Invasive Plant List

Scientific Name	Common Name	Lifeform type	Notes	MIPAG Status
Alnus glutinosa	European alder	Shrub	Rapidly growing shrub that establishes monspecific stands displacing natives	FERC / MADFW requested non-native invasive species - potentially invasive
Berberis thunbergii	Japanese barberry	Shrub	Wooded uplands and wetlands, grows in full sun to full shade, spread by birds, forms dense stands.	MIPAG listed non-native invasive
Celastrus orbiculatus	Oriental bittersweet	Perennial vine	Grows in full sun to partial shade, berries spread by birds and humans.	MIPAG listed non-native invasive
Centaurea maculosa	Spotted Knapweed	Perennial Herb	Spreads rapidly in artificial corridors, field margins, seed viable in soil for 7 years, Early Detection Species	Early Detection Species - recorded as potentially invasive in MA by USDA Forest Service
Elaeagnus umbellata	Autumn olive	Shrub	Grows in full sun, berries spread by birds, aggressive in open areas	MIPAG listed non-native invasive
Fallopia japonica	Japanese knotweed	Perennial Herb-Shrub	Widespread, grows in full sun to full shade, spreads vegetatively and by seed, forms dense thickets	MIPAG listed non-native invasive
Frangula alnus	Glossy buckthorn	Shrub -Tree	Occurs in uplands and wetlands, grows in full sun to full shade, forms thickets	MIPAG listed non-native invasive
Lonicera japonica	Japanese honeysuckle	Perennial vine	Widespread, grows full sun to full shade, climbs vegetation, seeds dispersed by birds	MIPAG listed non-native invasive

Scientific Name	Common Name	Lifeform type	Notes	MIPAG Status
Lythrum salicaria	Purple loosestrife	Perennial herb	Occurs in uplands and wetlands, grows in full sun to partial shade, high seed production, overtakes wetlands	MIPAG listed non-native invasive
Phragmities australis	Common reed	Perennial grass	Grows in uplands and wetlands, full sun to full shade, forms dense stands, flourishes in disturbed areas	MIPAG listed non-native invasive
Rosa multiflora	Multiflora rose	Shrub	Widespread, grows in full sun to full shade, forms thorny thickets, dispersed by birds.	MIPAG listed non-native invasive
Tussilago farfara	Coltsfoot	Perennial herb	Occurs in lowland and upland woods, grows in full sun to full shade, spreads vegetatively and by seed, forms dense stands. MIPAG likely invasive listed species	MIPAG listed watch list species likely invasive plants

Non-native invasive species occurring within the study area are present in areas that have been cleared in the past and are now labeled as disturbed habitat. The removal of the tree canopy and disturbance of the soil substrate has allowed botanical invasive species to establish populations in these areas.

The forested habitat in the study area has only trace amounts (defined as less than or equal to 0.5% cover within a survey location) of invasive species abundance and low distribution, as these areas have full canopy cover offering little sunlight penetration to the forest floor for the majority of the shade intolerant invasive species present. While some species are not tolerant of shaded habitats, the lack of invasive species within the forest interior is likely due to established native vegetation and the absence of occasional ground disturbance which can result in the spread or establishment of invasive species. Since the majority of the study area is forested, the ecological threat of invasive species is low. Daily Project-related maintenance activities are not promoting the spread of these species, there is however, potential for the spread of invasive species should ground disturbing activities be required.

Land management practices related to Project-related activities are limited to maintaining a strip of land that encompasses the Upper Reservoir envelope. This includes some mowed sections of land immediately outside of the Protected Fenced Zone surrounding the Upper Reservoir. The vegetation management area around the Upper Reservoir is maintained for safety and surveillance as part of Northfield Mountain Project Dam Safety Surveillance and Monitoring Program. Generally, this vegetation management area provides lower quality wildlife habitat compared to the undeveloped portions of the study area. It is around these managed zones and edge habitats that invasive species are more prevalent, and there is less diversity in the habitat. It should be noted that Eversource also maintains a transmission line right-of-way in the western portion of the study area.

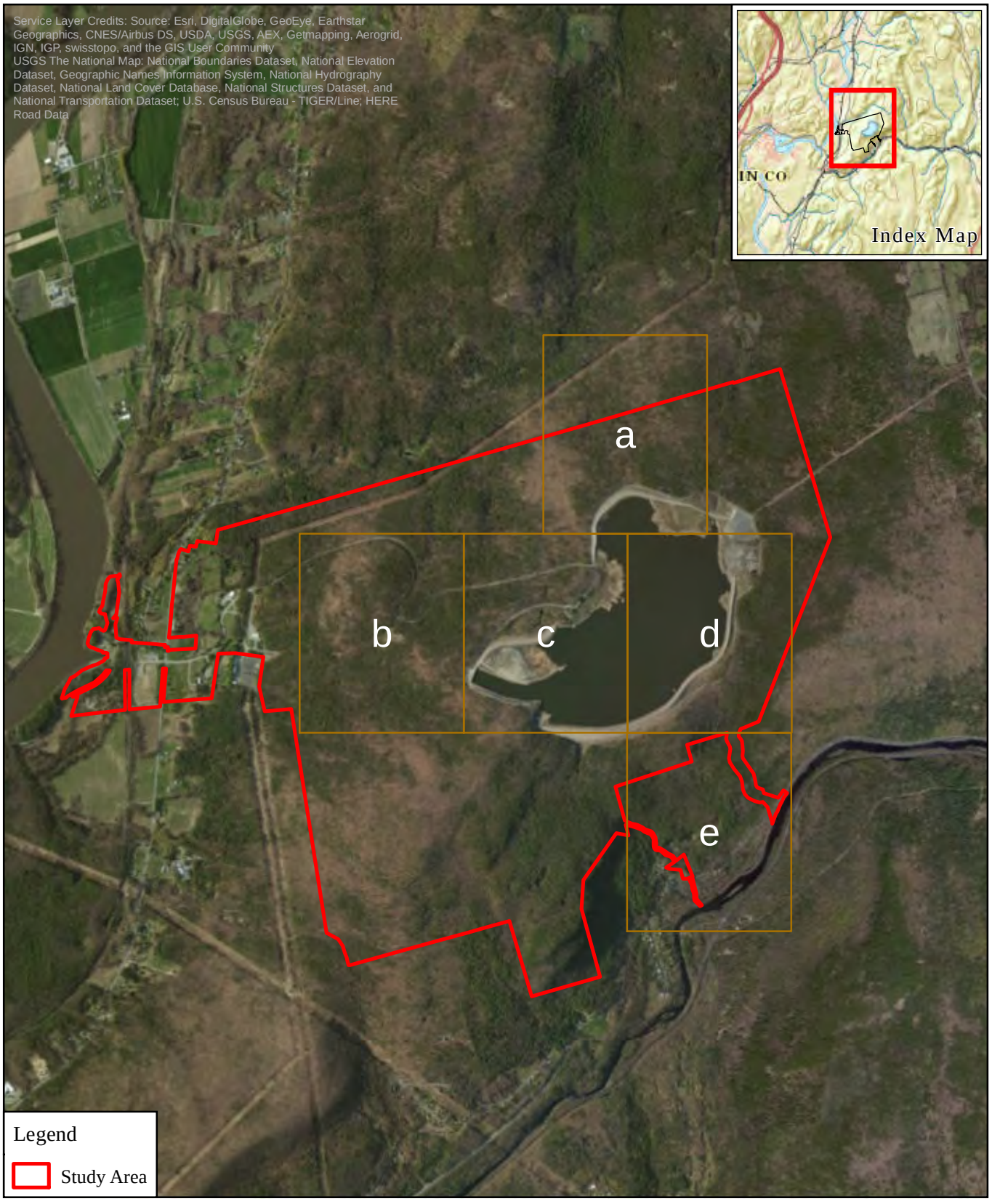
Figure 4.4-1: Example of Vegetation Management Zone Along Western Side of Upper Reservoir

Figure 4.4-2: Example of Vegetation Management Zone Along Eastern Side of Upper Reservoir

Figure 4.4-3: Example of Habitat Along Eversource Transmission Right-of-Way

Recreation at the Northfield Mountain Project centrally revolves around the Northfield Mountain trail system. The Northfield Mountain trail system includes over 25 miles of trail, which are available for hiking, biking, horseback riding, snowshoeing, and cross-country skiing. The trail system begins at FirstLight's Northfield Mountain Tour and Trail Center (NMTTC). Most of the trails are located within the Northfield Mountain Project boundary, and the trails can be used to access the mountaintop observation area offering views of the Upper Reservoir. There are two different trail types within the system. One type is wide and can be used for double track cross-county skiing or skating in the winter and hiking, horseback riding, and mountain biking in the summer. During the winter these trails are typically groomed. The second type of trail is narrow and can be used for snowshoeing in the winter or hiking and mountain biking in the summer. The narrow trails are not typically groomed in the winter. Trail systems are kept naturalized, but are typically kept clear of hazards such as fallen trees and limbs. Most trails have erosion protection structures including water bars, and culvert crossings for ephemeral streams, keeping erosion issues to a minimum. While trail systems can be potential vectors for introducing invasive species within the study area, there were only noted incidental to trace occurrences of invasive plants along the trail system.

Figure 4.4-4: Example of Typical Wide Trail on Northfield Mountain



Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)

Study 3.4.2 Effects of Northfield Mountain Project-related Land Management Practices and Recreation Use on Terrestrial Habitats

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0 0.25 0.5 1 Miles

Figure 4.4.5 Index: Northfield Mountain Project
Invasive Species Mapping

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Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)

Study 3.4.2 Effects of Northfield Mountain Project-related Land Management Practices and Recreation Use on Terrestrial Habitats

N

0 250 500 1,000 Feet

Figure 4.4-5a: Northfield Mountain Project Invasive Species Mapping

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Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)

Study 3.4.2 Effects of Northfield Mountain Project-related Land Management Practices and Recreation Use on Terrestrial Habitats

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0 250 500 1,000 Feet

Figure 4.4-5b: Northfield Mountain Project Invasive Species Mapping

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Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)

Study 3.4.2 Effects of Northfield Mountain Project-related Land Management Practices and Recreation Use on Terrestrial Habitats

N

0 250 500 1,000 Feet

Figure 4.4-5c: Northfield Mountain Project Invasive Species Mapping

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Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)

Study 3.4.2 Effects of Northfield Mountain Project-related Land Management Practices and Recreation Use on Terrestrial Habitats

N

0 250 500 1,000 Feet

Figure 4.4-5d: Northfield Mountain Project Invasive Species Mapping

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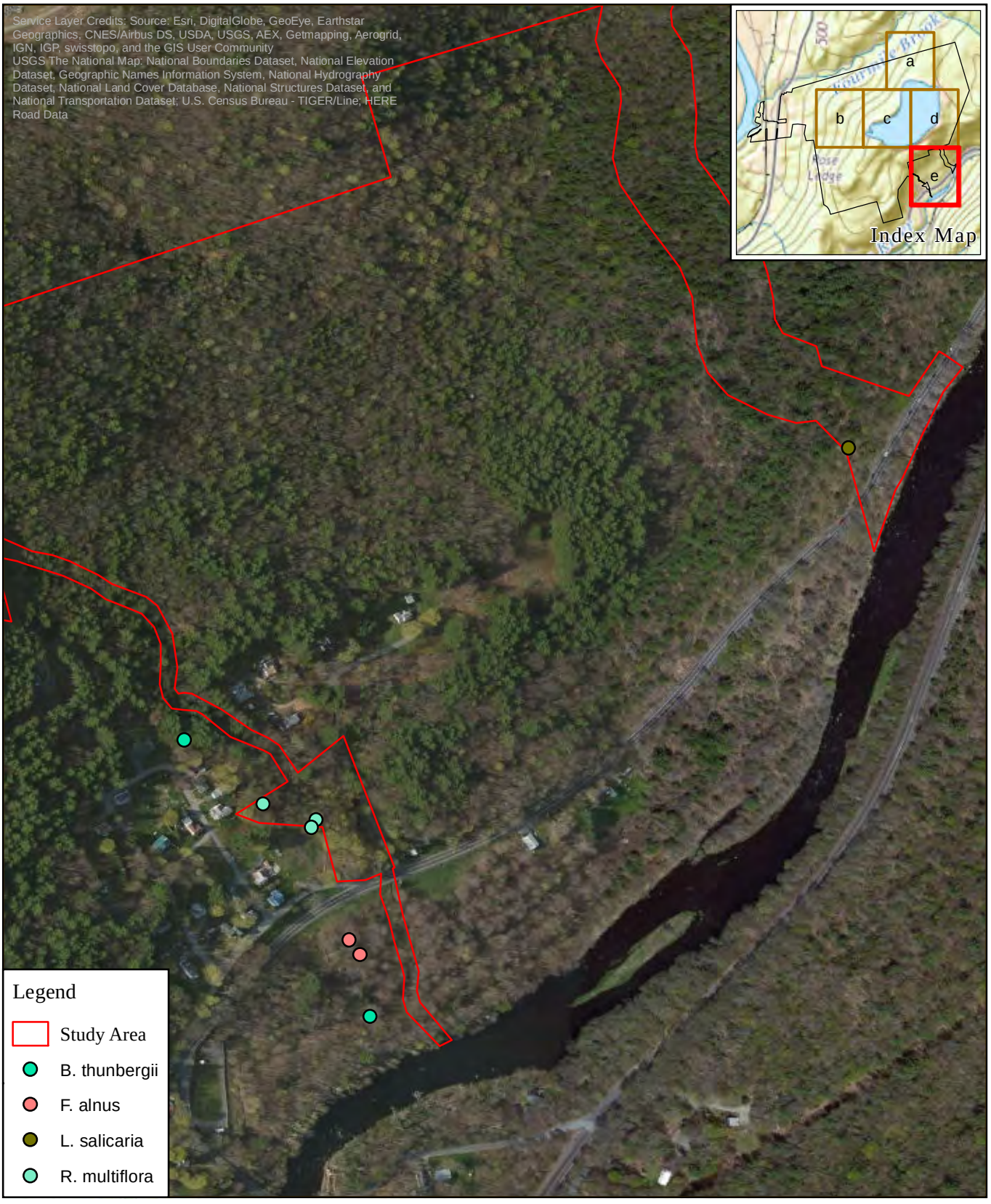

Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)

Study 3.4.2 Effects of Northfield Mountain Project-related Land Management Practices and Recreation Use on Terrestrial Habitats

N

0 250 500 1,000 Feet

Figure 4.4-5e: Northfield Mountain Project Invasive Species Mapping

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5 DISCUSSION

The Project has very little, if any, effect on botanical and wildlife resources within the study area and bordering lands. The occurrence and distribution of wildlife and botanical resources in the study area is generally unrelated to Project-related activities. There is no evidence of any on-going adverse effects to the described resources. Recreational activities at Northfield Mountain do not cause extensive harm or have a negative impact on the environment. Recreational facilities are maintained in a naturalized state, and usage for recreational activities is not currently disrupting and dispersing wildlife or indirectly contributing to the introduction of invasive species. The only Northfield Mountain Project effects to botanical resources within the study area include the potential for spread or introduction of invasive species and vegetation management and maintenance of Project lands around the Upper Reservoir and associated support structures, and the maintenance of Project-related access ways.

6 REFERENCES

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APPENDIX A – LETTER FROM NHESP

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

MassWildlife

Wayne F. MacCallum, *Director*

John Howard
FirstLight Hydro Generating Company
99 Millers Falls Road
Northfield MA 01360

October 27, 2011

RE: Project Location: Connecticut River
Town: GILL
NHESP Tracking No.: 11-30121

To Whom It May Concern:

Thank you for contacting the Natural Heritage and Endangered Species Program ("NHESP") of the MA Division of Fisheries & Wildlife for information regarding state-listed ra re species in the vicinity of the above referenced site. Based on the information provided, this project site, or a portion thereof, is located **within** *Priority Habitats 32, 1336, 1337, & 1401* (PH 32, PH 1336, PH 1337, PH 1401) and *Estimated Habitats 76, 486, 252 & 996* (EH 76, EH486, EH 252, EH 996) as indicated in the *Massachusetts Natural Heritage Atlas* (13th Edition). Our database indicates that the following state-listed rare species have been found in the vicinity of the site; Please note that Section A refers to species associated with the river area north of the Turners Falls Dam, Section B refers to species associated with the river area south of the Turners Falls Dam to the Holyoke Dam:

Scientific name	Common Name	Taxonomic Group	State Status	Section
Ambystoma jeffersonianum	Jefferson Salamander	Vertebrate Animal	Special Concern	A
Ambystoma opacum	Marbled Salamander	Vertebrate Animal	Threatened	A
Botaurus lentiginosus	American Bittern	Vertebrate Animal	Endangered	A
Calystegia spithamaea	Low Bindweed	Vascular Plant	Endangered	A
Cerastium nutans	Nodding Chickweed	Vascular Plant	Endangered	A
Corallorhiza odontorhiza	Autumn Coralroot	Vascular Plant	Special Concern	A
Enallagma carunculatum	Tule Bluet	Invertebrate Animal	Special Concern	A
Malaxis monophyllos var. brachypoda	White Adder's-mouth	Vascular Plant	Endangered	A
Morus rubra	Red Mulberry	Vascular Plant	Endangered	A
Viola adunca	Sand Violet	Vascular Plant	Special Concern	A
Deschampsia cespitosa ssp. glauca	Tufted Hairgrass	Vascular Plant	Endangered	A, B
Acipenser brevirostrum	Shortnose Sturgeon	Vertebrate Animal	Endangered	A,B
Alnus viridis ssp. crispa	Mountain Alder	Vascular Plant	Threatened	A,B
Boechera missouriensis	Green Rock-cress	Vascular Plant	Threatened	A,B
Carex grayi	Gray's Sedge	Vascular Plant	Threatened	A,B
Carex lenticularis	Shore Sedge	Vascular Plant	Threatened	A,B

Division of Fisheries and Wildlife
Field Headquarters, North Drive, Westborough, MA 01581 (508) 389-6300 Fax (508) 389-7891
An Agency of the Department of Fish and Game

Eleocharis diandra	Wright's Spike-rush	Vascular Plant	Endangered	A,B
Eleocharis intermedia	Intermediate Spike-sedge	Vascular Plant	Threatened	A,B
Eleocharis ovata	Ovate Spike-sedge	Vascular Plant	Endangered	A,B
Eragrostis frankii	Frank's Lovegrass	Vascular Plant	Special Concern	A,B
Falco peregrinus	Peregrine Falcon	Vertebrate Animal	Endangered	A,B
Glyptemys insculpta	Wood Turtle	Vertebrate Animal	Special Concern	A,B
Gomphus abbreviatus	Spine-crowned Clubtail	Invertebrate Animal	Endangered	A,B
Gomphus vastus	Cobra Clubtail	Invertebrate Animal	Special Concern	A,B
Gomphus ventricosus	Skillet Clubtail	Invertebrate Animal	Special Concern	A,B
Haliaeetus leucocephalus	Bald Eagle	Vertebrate Animal	Endangered	A,B
Lampsilis cariosa	Yellow Lampmussel	Invertebrate Animal	Endangered	A,B
Lota lota	Burbot	Vertebrate Animal	Special Concern	A,B
Mimulus alatus	Winged Monkey-flower	Vascular Plant	Endangered	A,B
Minuartia michauxii	Michaux's Sandwort	Vascular Plant	Threatened	A,B
Neurocordulia yamaskanensis	Stygian Shadowdragon	Invertebrate Animal	Special Concern	A,B
Prunus pumila var. depressa	Sandbar Cherry	Vascular Plant	Threatened	A,B
Rhodoecia aurantiago	Orange Sallow Moth	Invertebrate Animal	Threatened	A,B
Salix exigua ssp. interior	Sandbar Willow	Vascular Plant	Threatened	A,B
Solidago ptarmicoides	Upland White Aster	Vascular Plant	Endangered	A,B
Stylurus amnicola	Riverine Clubtail	Invertebrate Animal	Endangered	A,B
Stylurus scudderi	Zebra Clubtail	Invertebrate Animal	Special Concern	A,B
Stylurus spiniceps	Arrow Clubtail	Invertebrate Animal	Threatened	A,B
Symphyotrichum tradescantii	Tradescant's Aster	Vascular Plant	Threatened	A,B
**Data Sensitive Species*			Endangered	A,B
**Data Sensitive Species*			Threatened	A,B
Agrimonia pubescens	Hairy Agrimony	Vascular Plant	Threatened	B
Alasmidonta heterodon	Dwarf Wedgemussel	Invertebrate Animal	Endangered	B
Alasmidonta undulata	Triangle Floater	Invertebrate Animal	Special Concern	B
Amelanchier sanguinea	Roundleaf Shadbush	Vascular Plant	Special Concern	B
Ammodramus savannarum	Grasshopper Sparrow	Vertebrate Animal	Threatened	B
Aplectrum hyemale	Putty-root	Vascular Plant	Endangered	B
Arisaema dracontium	Green Dragon	Vascular Plant	Threatened	B
Asclepias verticillata	Linear-leaved Milkweed	Vascular Plant	Threatened	B
Carex tuckermanii	Tuckerman's Sedge	Vascular Plant	Endangered	B
Carex typhina	Cat-tail Sedge	Vascular Plant	Threatened	B
Cicindela duodecimguttata	Twelve-spotted Tiger Beetle	Invertebrate Animal	Special Concern	B
Cicindela marginipennis	Cobblestone Tiger Beetle	Invertebrate Animal	Endangered	B
Cryptogramma stelleri	Fragile Rock-brake	Vascular Plant	Endangered	B
Elatine americana	American Waterwort	Vascular Plant	Endangered	B
Gomphus fraternus	Midland Clubtail	Invertebrate Animal	Endangered	B

Gomphus quadricolor	Rapids Clubtail	Invertebrate Animal	Threatened	B
Hybognathus regius	Eastern Silvery Minnow	Vertebrate Animal	Special Concern	B
Ligumia nasuta	Eastern Pondmussel	Invertebrate Animal	Special Concern	B
Ludwigia polycarpa	Many-fruited False-loosestrife	Vascular Plant	Endangered	B
Nuphar microphylla	Tiny Cow-lily	Vascular Plant	Endangered	B
Ophiogomphus aspersus	Brook Snaketail	Invertebrate Animal	Special Concern	B
Pooecetes gramineus	Vesper Sparrow	Vertebrate Animal	Threatened	B
Rumex verticillatus	Swamp Dock	Vascular Plant	Threatened	B
Scaphiopus holbrookii	Eastern Spadefoot	Vertebrate Animal	Threatened	B
Strophitus undulatus	Creeper	Invertebrate Animal	Special Concern	B
Symphoricarpos albus var. albus	Snowberry	Vascular Plant	Endangered	B
Terrapene carolina	Eastern Box Turtle	Vertebrate Animal	Special Concern	B
Tillaea aquatica	Pygmyweed	Vascular Plant	Threatened	B
Trichostema brachiatum	False Pennyroyal	Vascular Plant	Endangered	B
**Data Sensitive Species*			Endangered	B
**Data Sensitive Species*			Endangered	B
**Data Sensitive Species*			Endangered	B
**Data Sensitive Species*			Endangered	B

*These species are considered "Sensitive Species". They are highly susceptible to collection and are therefore of high concern to Natural Heritage. Information about these species (including presence/absence) cannot be released to anyone (especially including release to third parties or published) unless such release is agreed to in writing by the Natural Heritage Program (See Massachusetts Public Records law: M.G.L. chapter 66 section 17D).

The species listed above are protected under the Massachusetts Endangered Species Act (MESA) (M.G.L. c. 131A) and its implementing regulations (321 CMR 10.00). State-listed wildlife are also protected under the state's Wetlands Protection Act (WPA) (M.G.L. c. 131, s. 40) and its implementing regulations (310 CMR 10.00). Fact sheets for most state-listed rare species can be found on our website (www.nhesp.org).

Please note that projects and activities located within Priority and/or Estimated Habitat **must** be reviewed by the NHESP for compliance with the state-listed rare species protection provisions of MESA (321 CMR 10.00) and/or the WPA (310 CMR 10.00).

Wetlands Protection Act (WPA)

If the project site is within Estimated Habitat and a Notice of Intent (NOI) is required, then a copy of the NOI must be submitted to the NHESP so that it is received at the same time as the local conservation commission. If the NHESP determines that the proposed project will adversely affect the actual Resource Area habitat of state-protected wildlife, then the proposed project may not be permitted (310 CMR 10.37, 10.58(4)(b) & 10.59). In such a case, the project proponent may request a consultation with the NHESP to discuss potential project design modifications that would avoid adverse effects to rare wildlife habitat.

A streamlined joint MESA/WPA review process is available. When filing a Notice of Intent (NOI), the applicant may file concurrently under the MESA on the same NOI form and qualify for a 30-day streamlined joint review. For a copy of the NOI form, please visit the MA Department of Environmental Protection's website: http://www.mass.gov/dep/water/approvals/wpaform3.doc.

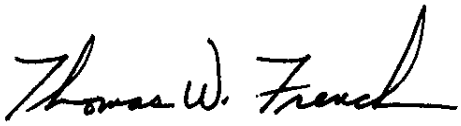
MA Endangered Species Act (MESA)

If the proposed project is located within Priority Habitat and is not exempt from review (see 321 CMR 10.14), then project plans, a fee, and other required materials must be sent to NHESP Regulatory Review to determine whether a probable "take" under the MA Endangered Species Act would occur (321 CMR 10.18). Please note that all proposed and anticipated development must be disclosed, as MESA does not allow project segmentation (321 CMR 10.16). For a MESA filing checklist and additional information please see our website: www.nhesp.org ("Regulatory Review" tab).

We recommend that rare species habitat concerns be addressed during the project design phase prior to submission of a formal MESA filing, as avoidance and minimization of impacts to rare species and their habitats is likely to expedite endangered species regulatory review.

This evaluation is based on the most recent information available in the Natural Heritage database, which is constantly being expanded and updated through ongoing research and inventory. If you have any questions regarding this letter please contact Lauren Glorioso, Endangered Species Review Assistant, at (508) 389-6361.

Sincerely,



Thomas W. French, Ph.D.
Assistant Director

Commonwealth of Massachusetts
Division of Fisheries & Wildlife
MassWildlife

Wayne F. MacCallum, *Director*

April 25, 2007

David Cameron
Tighe & Bond, Inc.
53 Southampton Road
Westfield, MA 01085

Re: NE Hydro Generating Company
Town, MA
NHESP Tracking Number: 06-19884

Dear Mr. Cameron,

Thank you for your recent communication regarding the operation and maintenance of facilities now owned by First Light Hydro Generating Company, and for submitting information specific to the annual operation and maintenance of facilities formerly operating under the NE Hydro Generating Company name. These properties were purchased by Energy Capital Partners from Northeast Generation Company on November 1, 2006. This information was submitted to the Natural Heritage and Endangered Species Program ("NHESP") of the MA Division of Fisheries & Wildlife for compliance with the Massachusetts Endangered Species Act (MESA; MGL, Ch 131A) and its implementing regulations (321 CMR 10.00). The information submitted included site maps, shapefiles, general descriptions of routine activities at each site, and the results of plant surveys conducted in the summer of 2006. These project sites are located within Priority Habitat 1233 and Estimated Habitat 874 as indicated in the 12th Edition of the Massachusetts Natural Heritage Atlas. We have reviewed the sites and would like to offer the following comments on a site-by-site basis.

1. Munn's Ferry Boat Camping Area

The existing seasonal use of this site—operation of camping area, pit toilets, seasonal docks—does not require review under the MESA, provided there is no change to the current use. Lawn mowing and vegetation control may be exempt from the standard MESA review set forth in 321 CMR 10.18 pursuant to 321 CMR 10.14(9) which states that:

> (9) "the maintenance or replacement but not the expansion of existing lawns and landscaped areas…shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The addition of new docks beyond what is currently used at this site and the expansion of lawn or landscaped areas are **not** exempt from review and would require the filing of a MESA Checklist and any required materials pursuant to 321 CMR 10.00 as new projects not as a part of a routine operation and maintenance plan. Routine vegetation control outside of existing lawn and landscaped areas is not exempt from review pursuant to 321 CMR 10.18, and should be specified (i.e. exact locations, type of vegetation to be removed, removal method, purpose of vegetation removal, etc.) to NHESP either as a part of this operation and maintenance plan, as a part of a routine vegetation management plan, or as part of a habitat management plan to fulfill the requirements of 321 CMR 10.14(11) which states that:

(11) "the active management of State-listed Species habitat, including but not limited to mowing, cutting, burning, or pruning of vegetation, or removing exotic or invasive species, for the purpose of maintaining or enhancing the habitat for the benefit of rare species, provided that the management is carried out in accordance with a habitat management plan approved in writing by the Division… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The maintenance of the gravel access road, while not exempt, will not result in a "take" of state-listed species provided such maintenance does not involve the widening, realigning, or substantial alteration to the road and does not impair water quality in the Connecticut River. The NHESP also notes that the addition and maintenance of a vegetated buffer along the river edge would help maintain water quality in the river. This would help protect the aquatic larval habitats of state-listed dragonfly species, as well as provide emergence structures, foraging habitat, and protection for adult dragonflies along the river's edge.

2. Kidds Island

Standard use activities at this site do not require review under the MESA. New projects and activities which occur in Priority Habitat and which do not meet the requirements for exemption pursuant to 321 CMR 10.14 and are not part of routine operations and maintenance at this site must be filed as new projects with the NHESP pursuant to 321 CMR 10.18. Continued cooperation with USFWS and NHESP will further the protection of nesting Bald Eagles at this site.

3. Riverview Picnic Area/Tailrace/Intake

Certain routine operation and activities at this site currently may not require review under the MESA:

a. The operation and maintenance of the tailrace/intake structures, which allow for the pumping and releasing of water to the Connecticut River, is primarily regulated by the Federal Energy Regulatory Commission (FERC). However, alterations to current FERC licenses may require review by NHESP during the FERC review process and possibly pursuant to the MESA. Please coordinate with NHESP when proposing alterations or reauthorizations to current FERC licenses/authorizations that involve activities within Priority Habitats.
b. Current standard use of the picnic area and boat docks and boat barrier booms, operation and maintenance of public water supply systems, maintenance of security fencing/lighting, and snow plowing as described, do not require review under the MESA.
c. Pursuant to 321 CMR 10.14(9), "the maintenance or replacement but not the expansion of existing lawns and landscaped areas…shall be exempt from the requirements of 321 CMR 10.18 through 10.23."
d. Pursuant to 321 CMR 10.14(8), "the maintenance, repair or replacement, but not widening, of existing paved roads, shoulder repair that does not exceed 4 feet from an existing travel lane, paved driveways, and paved parking areas, but not including parking areas on barrier beaches, coastal beaches, coastal dunes, or salt marshes, as defined by the Massachusetts Wetlands Protection Act (c. 131 § 40 and 310 CMR 10.00), and not including actions that are likely to result in changes in storm water drainage… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The addition of new docks beyond what is currently used at this site and the expansion of lawn or landscaped areas are **not** exempt from review and would require the filing of a MESA Checklist and any required materials pursuant to 321 CMR 10.00 as new projects not as a part of a routine operation and maintenance plan. Routine vegetation control outside of existing lawn and landscaped areas is not exempt from review pursuant to 321 CMR 10.18, and should be specified (i.e. exact locations, type of vegetation to be removed, removal method, purpose of vegetation removal, etc.) to NHESP either as a part of this operation and maintenance plan, as a part of a routine vegetation management plan, or as part of a habitat management plan to fulfill the requirements of 321 CMR 10.14(11) which states that:

> (11) "the active management of State-listed Species habitat, including but not limited to mowing, cutting, burning, or pruning of vegetation, or removing exotic or invasive species, for the purpose of maintaining or enhancing the habitat for the benefit of rare species, provided that the management is carried out in accordance with a habitat management plan approved in writing by the Division… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The maintenance of gravel roads, while not exempt, will not result in a "take" of state-listed species provided such maintenance does not involve the widening, realigning, or substantial alteration to the road and does not impair water quality in the Connecticut River. The NHESP also notes that the addition and maintenance of a vegetated buffer along the river edge would help maintain water quality in the river. This would help protect the aquatic larval habitats of state-listed dragonfly species, as well as provide emergence structures, foraging habitat, and protection for adult dragonflies along the river's edge.

4. Northfield Mountain Recreational Trails

This project site is not located within Priority Habitat or Estimated Habitat.

5. Barton Cove Campground Office and Canoe Rental Facility

The existing seasonal use of this site—operation of campground office and supporting facilities, seasonal paddle craft rental operation, snow plowing—does not require review under the MESA, provided there is no change to the current use. Lawn mowing and vegetation control may be exempt from the standard MESA review set forth in 321 CMR 10.18 pursuant to 321 CMR 10.14(9) which states that:

> (9) "the maintenance or replacement but not the expansion of existing lawns and landscaped areas…shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The expansion of lawn or landscaped areas is **not** exempt from review and would require the filing of a MESA Checklist and any required materials pursuant to 321 CMR 10.00 as a new project, not as a part of a routine operation and maintenance plan. Routine vegetation control outside of existing lawn and landscaped areas is not exempt from review pursuant to 321 CMR 10.18, and should be specified (i.e. exact locations, type of vegetation to be removed, removal method, purpose of vegetation removal, etc.) to NHESP either as a part of this operation and maintenance plan, as a part of a routine vegetation management plan, or as part of a habitat management plan to fulfill the requirements of 321 CMR 10.14(11) which states that:

> (11) "the active management of State-listed Species habitat, including but not limited to mowing, cutting, burning, or pruning of vegetation, or removing exotic or invasive species, for the purpose of maintaining or enhancing the habitat for the benefit of rare species, provided that the management is carried out in accordance with a habitat management plan approved in writing by the Division… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The maintenance of paved roads is exempt from the standard MESA review set forth in 321 CMR 10.18 pursuant to 321 CMR 10.14(8) which states that:

> (8), "the maintenance, repair or replacement, but not widening, of existing paved roads, shoulder repair that does not exceed 4 feet from an existing travel lane, paved driveways, and paved parking areas, but not including parking areas on barrier beaches, coastal beaches, coastal dunes, or salt marshes, as defined by the Massachusetts Wetlands Protection Act (c. 131 § 40 and 310 CMR 10.00), and not including actions that are likely to result in changes in storm water drainage… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The maintenance of gravel roads, while not exempt, will not result in a "take" of state-listed species provided such maintenance does not involve the widening, realigning, or substantial alteration to the road and does not

impair water quality in the Connecticut River. Snow removal should not include pushing snow into the Connecticut River, where road salts and automobile fluids can impair water quality and impact aquatic state-listed dragonfly larvae overwintering in the River. The NHESP also notes that the addition and maintenance of a vegetated buffer along the river edge would help maintain water quality in the river. This would help protect the aquatic larval habitats of state-listed dragonfly species, as well as provide emergence structures, foraging habitat, and protection for adult dragonflies along the river's edge.

6. Barton Cove Campground and Picnic Area

The existing seasonal use of this site—seasonal operation and maintenance of camping areas, picnic areas, and nature trails; seasonal boat docks; operation and maintenance of public water system, septic system, and pit toilets; snow plowing; educational programs—does not require review under the MESA, provided there is no change to the current use or locations of trails, camping, and picnic areas. Lawn mowing and vegetation control may be exempt from the standard MESA review set forth in 321 CMR 10.18 pursuant to 321 CMR 10.14(9) which states that:

> (9) "the maintenance or replacement but not the expansion of existing lawns and landscaped areas…shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The expansion of lawn or landscaped areas is **not** exempt from review and would require the filing of a MESA Checklist and any required materials pursuant to 321 CMR 10.00 as a new project, not as a part of a routine operation and maintenance plan. Routine vegetation control outside of existing lawn and landscaped areas is not exempt from review pursuant to 321 CMR 10.18, and should be specified (i.e. exact locations, type of vegetation to be removed, removal method, purpose of vegetation removal, etc.) to NHESP either as a part of this operation and maintenance plan, as a part of a routine vegetation management plan, or as part of a habitat management plan to fulfill the requirements of 321 CMR 10.14(11) which states that:

> (11) "the active management of State-listed Species habitat, including but not limited to mowing, cutting, burning, or pruning of vegetation, or removing exotic or invasive species, for the purpose of maintaining or enhancing the habitat for the benefit of rare species, provided that the management is carried out in accordance with a habitat management plan approved in writing by the Division… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The maintenance of paved roads and parking lots is exempt from the standard MESA review set forth in 321 CMR 10.18 pursuant to 321 CMR 10.14(8) which states that:

> (8), "the maintenance, repair or replacement, but not widening, of existing paved roads, shoulder repair that does not exceed 4 feet from an existing travel lane. paved driveways, and paved parking areas, but not including parking areas on barrier beaches, coastal beaches, coastal dunes, or salt marshes, as defined by the Massachusetts Wetlands Protection Act (c. 131 § 40 and 310 CMR 10.00), and not including actions that are likely to result in changes in storm water drainage… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The maintenance of gravel roads, while not exempt, will not result in a "take" of state-listed species provided such maintenance does not involve the widening, realigning, or substantial alteration to the road and does not impair water quality in the Connecticut River.

Trails and other public use areas should avoid areas containing state-listed species such as the Sand Violet and Jefferson's Salamander. Snow removal should not include pushing snow into the Connecticut River, where road salts and automobile fluids can impair water quality and impact aquatic state-listed dragonfly larvae overwintering in the River. The NHESP also notes that the addition and maintenance of a vegetated buffer along the river edge would help maintain water quality in the river. This would help protect the aquatic larval

habitats of state-listed dragonfly species, as well as provide emergence structures, foraging habitat, and protection for adult dragonflies along the river's edge.

7. Power Canal

Certain routine operation and activities at this site currently may not require review under the MESA:

a. Many routine operation and maintenance activities are primarily regulated by the Federal Energy Regulatory Commission (FERC). However, alterations to current FERC licenses may require review by NHESP during the FERC review process and possibly pursuant to the MESA. Please coordinate with NHESP when proposing alterations or reauthorizations to current FERC licenses/authorizations that involve activities within Priority Habitats.

b. Pursuant to 321 CMR 10.14(9), "the maintenance or replacement but not the expansion of existing lawns and landscaped areas…shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The addition of new docks beyond what is currently used at this site, the installation of new bike paths or other facilities, and the expansion of lawn or landscaped areas are **not** exempt from review and would require the filing of a MESA Checklist and any required materials pursuant to 321 CMR 10.00 as new projects not as a part of a routine operation and maintenance plan. Routine vegetation control outside of existing lawn and landscaped areas is not exempt from review pursuant to 321 CMR 10.18, and should be specified (i.e. exact locations, type of vegetation to be removed, removal method, purpose of vegetation removal, etc.) to NHESP either as a part of this operation and maintenance plan, as a part of a routine vegetation management plan, or as part of a habitat management plan to fulfill the requirements of 321 CMR 10.14(11) which states that:

> (11) "the active management of State-listed Species habitat, including but not limited to mowing, cutting, burning, or pruning of vegetation, or removing exotic or invasive species, for the purpose of maintaining or enhancing the habitat for the benefit of rare species, provided that the management is carried out in accordance with a habitat management plan approved in writing by the Division… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

Vegetation management along the canal, maintenance activities along canals, walls, dikes, and bridges which require work within the river, and controlled water fluctuations should occur outside the peak of the emergence period of state-listed dragonfly and damselfly species (June through August). These species utilize structures within the water—vegetation, bridges, dikes, etc.—to emerge from their aquatic larval state into flighted adults. Immediately after emergence, adults must dry and harden their wings before their first flight. Disruption of this drying period or fluctuations of water that could drown adults or damage soft wings before flight, can wipe out an entire cohort of certain species emerging en masse.

8. Turner's Falls Power Station #1

Certain routine operation and activities at this site currently may not require review under the MESA:

a. The operation and maintenance of the water powered electric generation plant, gates, control devices, instrumentation, and flow devices are primarily regulated by the Federal Energy Regulatory Commission (FERC). However, alterations to current FERC licenses may require review by NHESP during the FERC review process and possibly pursuant to the MESA. Please coordinate with NHESP when proposing alterations or reauthorizations to current FERC licenses/authorizations that involve activities within Priority Habitats.

b. Pursuant to 321 CMR 10.14(9), "the maintenance or replacement but not the expansion of existing lawns and landscaped areas…shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

c. Pursuant to 321 CMR 10.14(8), "the maintenance, repair or replacement, but not widening, of existing paved roads, shoulder repair that does not exceed 4 feet from an existing travel lane, paved driveways, and paved parking areas, but not including parking areas on barrier beaches, coastal beaches, coastal dunes, or salt marshes, as defined by the Massachusetts Wetlands Protection Act (c. 131 § 40 and 310 CMR 10.00), and not including actions that are likely to result in changes in storm water drainage… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The expansion of lawn or landscaped areas is **not** exempt from review and would require the filing of a MESA Checklist and any required materials pursuant to 321 CMR 10.00 as a new project, not as a part of a routine operation and maintenance plan. Routine vegetation control outside of existing lawn and landscaped areas is not exempt from review pursuant to 321 CMR 10.18, and should be specified (i.e. exact locations, type of vegetation to be removed, removal method, purpose of vegetation removal, etc.) to NHESP either as a part of this operation and maintenance plan, as a part of a routine vegetation management plan, or as part of a habitat management plan to fulfill the requirements of 321 CMR 10.14(11) which states that:

(11) "the active management of State-listed Species habitat, including but not limited to mowing, cutting, burning, or pruning of vegetation, or removing exotic or invasive species, for the purpose of maintaining or enhancing the habitat for the benefit of rare species, provided that the management is carried out in accordance with a habitat management plan approved in writing by the Division… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

Vegetation removal should not include removal of Mountain Alder or other state-listed plant species. The maintenance of the gravel access road, while not exempt, will not result in a "take" of state-listed species provided such maintenance does not involve the widening, realigning, or substantial alteration to the road and does not impair water quality in the Connecticut River. Snow removal should not include dumping snow into the Connecticut River, where road salts and automobile fluids can impair water quality and impact aquatic state-listed dragonfly larvae overwintering in the River.

9. Turner's Falls Dam

Certain routine operation and activities at this site currently may not require review under the MESA:

a. The operation and maintenance of the gatehouse facility and dam, fish passage facilities, and structures is primarily regulated by the Federal Energy Regulatory Commission (FERC). However, alterations to current FERC licenses may require review by NHESP during the FERC review process and possibly pursuant to the MESA. Please coordinate with NHESP when proposing alterations or reauthorizations to current FERC licenses/authorizations that involve activities within Priority Habitats.

b. Current standard operation and maintenance of the picnic area, emergency generators, floating boom/boat barrier, public safety systems, public fish viewing facility, security fencing and lighting, and snow removal as described, do not require review under the MESA.

c. Pursuant to 321 CMR 10.14(9), "the maintenance or replacement but not the expansion of existing lawns and landscaped areas…shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

d. Pursuant to 321 CMR 10.14(8), "the maintenance, repair or replacement, but not widening, of existing paved roads, shoulder repair that does not exceed 4 feet from an existing travel lane, paved driveways, and paved parking areas, but not including parking areas on barrier beaches, coastal beaches, coastal dunes, or salt marshes, as defined by the Massachusetts Wetlands Protection Act (c. 131 § 40 and 310 CMR 10.00), and not including actions that are likely to result in changes in storm water drainage… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The expansion of lawn or landscaped areas are **not** exempt from review and would require the filing of a MESA Checklist and any required materials pursuant to 321 CMR 10.00 as a new project, not as a part of a routine operation and maintenance plan. Routine vegetation control outside of existing lawn and landscaped areas is not exempt from review pursuant to 321 CMR 10.18, and should be specified (i.e. exact locations, type of vegetation to be removed, removal method, purpose of vegetation removal, etc.) to NHESP either as a part of this operation and maintenance plan, as a part of a routine vegetation management plan, or as part of a habitat management plan to fulfill the requirements of 321 CMR 10.14(11) which states that:

> (11) "the active management of State-listed Species habitat, including but not limited to mowing, cutting, burning, or pruning of vegetation, or removing exotic or invasive species, for the purpose of maintaining or enhancing the habitat for the benefit of rare species, provided that the management is carried out in accordance with a habitat management plan approved in writing by the Division… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The maintenance of gravel roads, while not exempt, will not result in a "take" of state-listed species provided such maintenance does not involve the widening, realigning, or substantial alteration to the road and does not impair water quality in the Connecticut River. The NHESP also notes that the addition and maintenance of a vegetated buffer along the river edge would help maintain water quality in the river. This would help protect the aquatic larval habitats of state-listed dragonfly species, as well as provide emergence structures, foraging habitat, and protection for adult dragonflies along the river's edge.

Controlled water fluctuations should occur outside the peak of the emergence period of state-listed dragonfly and damselfly species (June through August) and preferably towards the end of the day. These species utilize structures within the water—vegetation, bridges, dikes, etc.—to emerge from their aquatic larval state into flighted adults. Immediately after emergence—which often occurs in the morning—adults must dry and harden their wings before their first flight. Disruption of this drying period through fluctuations of water that could drown adults or damage soft wings before flight, can wipe out an entire cohort of certain species emerging en masse.

10. Cabot Power Station

The existing seasonal use of this site for picnicking and fishing access does not require review under the MESA, provided there is no change to the current use. Certain routine operation and activities at the power station currently may not require review under the MESA:

a. The operation and maintenance of the water powered electric generation plant, gates, control devices, instrumentation, and flow devices are primarily regulated by the Federal Energy Regulatory Commission (FERC). However, alterations to current FERC licenses may require review by NHESP during the FERC review process and possibly pursuant to the MESA. Please coordinate with NHESP when proposing alterations or reauthorizations to current FERC licenses/authorizations that involve activities within Priority Habitats.
b. Pursuant to 321 CMR 10.14(9), "the maintenance or replacement but not the expansion of existing lawns and landscaped areas…shall be exempt from the requirements of 321 CMR 10.18 through 10.23."
c. Pursuant to 321 CMR 10.14(8), "the maintenance, repair or replacement, but not widening, of existing paved roads, shoulder repair that does not exceed 4 feet from an existing travel lane, paved driveways, and paved parking areas, but not including parking areas on barrier beaches, coastal beaches, coastal dunes, or salt marshes, as defined by the Massachusetts Wetlands Protection Act (c. 131 § 40 and 310 CMR 10.00), and not including actions that are likely to result in changes in storm water drainage… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The expansion of lawn or landscaped areas is **not** exempt from review and would require the filing of a MESA Checklist and any required materials pursuant to 321 CMR 10.00 as a new project, not as a part of a routine operation and maintenance plan. Vegetation control outside of existing lawn and landscaped areas is not exempt from review pursuant to 321 CMR 10.18, and should be specified (i.e. exact locations, type of vegetation to be removed, removal method, purpose of vegetation removal, etc.) to NHESP either as a part of this operation and maintenance plan, as a part of a routine vegetation management plan, or as part of a habitat management plan to fulfill the requirements of 321 CMR 10.14(11) which states that:

> (11) "the active management of State-listed Species habitat, including but not limited to mowing, cutting, burning, or pruning of vegetation, or removing exotic or invasive species, for the purpose of maintaining or enhancing the habitat for the benefit of rare species, provided that the management is carried out in accordance with a habitat management plan approved in writing by the Division… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The maintenance of gravel roads, while not exempt, will not result in a "take" of state-listed species provided such maintenance does not involve the widening, realigning, or substantial alteration to the road and does not impair water quality in the Connecticut River. Snow removal should not include dumping snow into the Connecticut River, where road salts and automobile fluids can impair water quality and impact aquatic state-listed fish, mussels, and dragonfly and damselfly larvae overwintering in the River.

11. Barton Island

Seasonal maintenance of Barton Island Eagle Cam equipment in conjunction with USFWS at this site does not require review under the MESA. Continued cooperation with USFWS and NHESP will further the protection of Bald Eagles at this site.

12. Bennett Meadow Wildlife Area

The existing seasonal use of this site—seasonal operation/maintenance of the wildlife observation area, rubbish removal, release of game birds for Commonwealth of Massachusetts, and provision of wildlife enhancements in cooperation with state agencies—does not require review under the MESA, provided there is no change to the current use.

The seasonal lease of land to area farmers is exempt from the standard MESA review set forth in 321 CMR 10.18 pursuant to 321 CMR 10.14(1) which states that:

> (1) "the normal maintenance and improvement of land in agricultural or aquacultural use…shall be exempt from the requirements of 321 CMR 10.18 through 10.23." It also states that, "This exemption shall continue only so long as such land remains in agricultural or aquacultural use. Land in agricultural use does not include those portions of a site that are not in such use and are not designated fallow land. The normal maintenance and improvement of land in agricultural or aquacultural use does not include site preparation for purposes of conversion ot another, non-agricultural or non-aquacultural use."

Lawn mowing and vegetation control may be exempt from the standard MESA review set forth in 321 CMR 10.18 pursuant to 321 CMR 10.14(9) which states that:

> (9) "the maintenance or replacement but not the expansion of existing lawns and landscaped areas…shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

Mowing and other vegetation control methods should avoid areas known to contain the Winged Monkeyflower. The expansion of lawn or landscaped areas is **not** exempt from review and would require the filing of a MESA Checklist and any required materials pursuant to 321 CMR 10.00 as a new project, not as a part of a routine operation and maintenance plan. Vegetation control outside of existing lawn and landscaped areas is not exempt

from review pursuant to 321 CMR 10.18, and should be specified (i.e. exact locations, type of vegetation to be removed, removal method, purpose of vegetation removal, etc.) to NHESP either as a part of this operation and maintenance plan, as a part of a routine vegetation management plan, or as part of a habitat management plan to fulfill the requirements of 321 CMR 10.14(11) which states that:

> (11) "the active management of State-listed Species habitat, including but not limited to mowing, cutting, burning, or pruning of vegetation, or removing exotic or invasive species, for the purpose of maintaining or enhancing the habitat for the benefit of rare species, provided that the management is carried out in accordance with a habitat management plan approved in writing by the Division… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The maintenance of paved roads is exempt from the standard MESA review set forth in 321 CMR 10.18 pursuant to 321 CMR 10.14(8) which states that:

> (8), "the maintenance, repair or replacement, but not widening, of existing paved roads, shoulder repair that does not exceed 4 feet from an existing travel lane, paved driveways, and paved parking areas, but not including parking areas on barrier beaches, coastal beaches, coastal dunes, or salt marshes, as defined by the Massachusetts Wetlands Protection Act (c. 131 § 40 and 310 CMR 10.00), and not including actions that are likely to result in changes in storm water drainage… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."

The maintenance of unpaved roads, while not exempt, will not result in a "take" of state-listed species provided such maintenance does not involve the widening, realigning, or substantial alteration to the road and does not impair water quality in the Connecticut River.

Summary

1. Existing uses of the recreational facilities described in this Operation and Maintenance Plan do not require review under the MESA.
2. Select activities are primarily regulated by the Federal Energy Regulatory Commission (FERC). However, alterations to current FERC licenses may require review by NHESP during the FERC review process and possibly pursuant to the MESA. Please coordinate with NHESP when proposing alterations or reauthorizations to current FERC licenses/authorizations that involve activities within Priority Habitats.
3. Select activities are exempt from review pursuant to 321 CMR 10.14:
    a. (1) "the normal maintenance and improvement of land in agricultural or aquacultural use…shall be exempt from the requirements of 321 CMR 10.18 through 10.23"
    b. (8) "the maintenance, repair or replacement, but not widening, of existing paved roads… shall be exempt from the requirements of 321 CMR 10.18 through 10.23"
    c. (9) the maintenance or replacement but not the expansion of existing lawns and landscaped areas…shall be exempt from the requirements of 321 CMR 10.18 through 10.23"
    d. (11) the active management of State-listed Species habitat… shall be exempt from the requirements of 321 CMR 10.18 through 10.23."
4. Maintenance of unpaved roads, while not exempt, will not result in a "take" of state-listed species provided such maintenance does not involve the widening, realigning, or substantial alteration to the road and does not impair water quality in the Connecticut River.
5. Routine vegetation management outside of existing lawn and landscaped areas is not exempt and should be described in detail for review by the NHESP, as rare plants could be inadvertently impacted by such activities.
6. Snow removal should not include dumping snow into the Connecticut River, where road salts and automobile fluids can impair water quality.

7. Controlled water fluctuations should occur outside the peak of the emergence period of state-listed dragonfly and damselfly species (June through August), preferably late in the day, to prevent harm to emerging and drying adults.
8. New projects which are not routine operation and maintenance activities (i.e. creation of new facilities, bike paths, roads, etc.) and which will occur within Priority Habitat should be submitted to the NHESP for review pursuant to 321 CMR 10.18.
9. The addition and maintenance of a vegetated buffer along the river edge would help maintain water quality in the river. This would help protect the aquatic habitats of state-listed fish, mussel, dragonfly and damselfly species, as well as provide emergence structures, foraging habitat, and protection for adult dragonflies and damselflies along the river's edge.

Additionally, the Connecticut River provides habitat for a number of state-listed species not included in the list provided in response to your information request. These species may not be located within the "footprints" of the areas of operation, but may be impacted by water fluctuations within the Connecticut River due to normal operation and maintenance activities not specifically described in the previous submittal due to FERC oversight. The NHESP would appreciate the opportunity to meet with First Light Hydro Generating Company in order to discuss methods for addressing state-listed species concerns associated with water fluctuations within the Connecticut River.

If you have any questions regarding this review, or if you are unable to follow any of these conditions, please contact Sarah Haggerty, Endangered Species Review Biologist, at (508) 389-6367 (sarah.haggerty@state.ma.us).

Sincerely,

Thomas W. French

Thomas W. French, Ph.D.
Assistant Director

cc: Robert Perry; FirstLight Hydro Generating Company

APPENDIX B – NHESP COMMUNITY FIELD FORMS

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

MA Natural Heritage & Endangered Species Program

rev. June 2006

A. Identifiers

1. Site name: Northfield Mountain 2. Survey site name: A-1

3. Town (LOCALJURIS): Northfield MA 4. Directions: Take I-91 to exit 27 in Greenfield, MA Follow Rte. 2 east to the intersection of Rte. 2 & Rte 63. Take Rte 63 2.5 miles north. Turn east onto the Main Access Rd & follow to Northfield MH

5. GPS (if not below) _____ Lat. _____ Long _____ Make and Model Trimble GEO-6000

6. Sourcecode (NHESP use): _____ 7. Survey date 7/15/14 8. Main Surveyor: Steve Kruggo

9. Other Surveyors: Sarah Donahue

B. Topography 10. Transect A-1

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

C. Vegetation / Habitat

12. Observation point 1. GPS Pt _____ GPS Lat. 42.617 Long -72.432	Observation point 2 GPS Pt _____ GPS Lat. 42.618 Long -72.432	Observation point 3 GPS Pt. _____ GPS Lat. 42.618 Long -72.431
13. Community type: hemlock/hardwood 14. Additional data: Site form2___ form 3___	Community type: _____ Additional data: Site form2____ form 3___	Community type: _____ Additional data: Site form2____ form 3____
15. General description (physiognomy, characteristic & dominant spp. of all layers) Hemlock, yellow birch American beech dominant Sparse understory Little disturbance in forest interior but adjacent to clearing for upper reservoir	General description: Same as pt. #1	General description: Same as pnt. #1

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

Observation Point 4 GPS Pt_____	**Observation Point 5** GPS Pt_____	**Observation Point 6** GPS Pt_____	**Observation Point 7** GPS Pt_____
GPS Lat. Long	GPS Lat. Long	GPS Lat. Long	GPS Lat. Long
Community type:_____ Additional data: Site form2___form 3_____	Community type:_____ Additional data: Site form2____form 3____	Community type:_____ Additional data: Site form2____form 3_____	Community type:_____ Additional data: Site form2___ form 3_____
General Description: Same as pnt. #1	General Description: Same as pnt. #1	General Description: Same as pnt. #1	General Description: Same as pnt. #1

Natural Heritage & Endangered Species Program

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

FORM 2: NATURAL COMMUNITY SUMMARY AND RANKING

rev. June 2006

(A location map must accompany this form.)

A. Identifiers:

Community Name (MNHESP: Swain & Kearsley, 2000): (Hemlock Forest) Northern Hardwoods - Hemlock - White Pine

NatureServe Association Name (Optional): ____

Survey Date: 7/15/14 Today's Date: 7/15/14

Survey Site Name: Northfield Mountain

Surveyor Name(s): Steve Knapp, Sarah [illegible]

Best Source (Field survey or secondary source used to complete this form, NHESP use): Field Survey

Transcriber (NHESP use only. YY-MM-DD XXX): ____ Town Name: Northfield, MA

Directions to site: Take I-91 to exit 27 in Greenfield, MA. Follow Rte 2 east to the intersection of Rte. 2 & Rte. 63. Take Rte. 63 2.5 North. Turn east onto the Main Access Rd. to Northfield MH.

GPS Point(s) Yes X No ___ Latitude 42.618 Longitude -72.431

B. Community Description:

Vegetation Description (*EODATA*: **Summarize** the vegetation: dominant and/or characteristic species, indicator species, community structure, variants/microhabitat features, unvegetated surface; spatial distribution (i.e., size, number, and separation distance of patches); intact natural processes, geology, hydrology, topography, and soil properties, especially if relevant to the community identification):

Dominate overstory - hemlock (75%) yellow birch, [illegible] beech, Red Maple (T), [illegible] (T)
Shrub - Very sparse, hobble bush, Stripped maple
herbaceous - very sparse, Sarsaparilla

____ Estimated size (acres) GIS Acres (if available) ____

Physical Description (*GENDESC*: Describe the landscape surrounding the community, including the natural area. Both within and surrounding the community, describe: physical structures and land use practices; natural disturbances; embedded, adjacent, and nearby natural communities including aquatic features; notable landforms; scenic qualities):

- [illegible] hemlock
- little disturbance in forest [illegible]
- adjacent red maple hardwood [illegible]
- adjacent to [illegible]

Is community on conservation land (if known): No Managed Area Name: [illegible]

[illegible]

Evidence of Disturbance/Threats to the Community/Management Recommendations (*MGMTCOM*: Describe the anthropogenic disturbances that have decreased the quality and viability of the community such as hydrologic alterations (ditching, damming, erosion etc.), logging, mining, livestock grazing, plantations, orchards, structures, trampling, and exotic flora or fauna within and surrounding the community. Discuss threats to the site and management implications.):

Little threat. [illegible]

Recreational Use (evidence of ATV's, ORV's, mountain bikes, horses, walking trails, etc.):

None

Protection Comments (*PROTCOM*: Comment on the legal protectability of the site):

General Comments (*COMMENTS*: Note the type of sampling done; observation point (form 1), releve plot (form 3), plant list, etc.; note any additional field work needed. Comment on questionable identification.):

Rare old growth hemlock forest

Owner's Name (if known): ______ Telephone: (__) ______

Address:

Is Owner: aware of community? __yes _no __unknown; Protecting community? __yes _no __unknown

Owner Comments (*OWNERCOM*: e.g., contact owner prior to visiting the site):

C: Community Element Occurrence Ranking: (Refer to community ranking specifications for assistance.)

Community Size Rank: (Compare relative size to other known occurrences, configuration, patchiness)

A – Excellent **B** – Good (circled) **C** – Marginal **D** - Poor

Comments:

Community Condition Rank: (Consider development/maturity (e.g., old growth), abiotic condition, species and physiognomic diversity, ecological processes, abundance of exotic species, internal connectivity, degree of anthropogenic disturbance including fragmentation).

A – Excellent (circled) **B** – Good **C** – Marginal **D** - Poor

Comments: old growth hemlock

Community Landscape Context Rank: (Consider the size and connectivity of the natural landscape, the position of the community within the landscape, and the landscape condition)

A – Excellent **B** – Good (circled) **C** – Marginal **D** - Poor

Comments: adjacent to upper [illegible]

Community EO Rank: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality? A summary of all factors listed above. Explain the basis of your ranking: range wide, state wide, or locally.)

A – Excellent **B** – Good (circled) **C** – Marginal **D** - Poor

Comments (*EORANKCOM:* Summarize the above and justify the EO Rank assigned):

Other rare species and/or natural communities observed at this site (**NHESP use**) T/U = Transcribed/Updated?):

	SPECIES OR COMMUNITY	T/U?		SPECIES OR COMMUNITY	T/U?
1			4		
2			5		
3			6		

Form 3: Quantitative Community Characterization

MA Natural Heritage & Endangered Species Program

June 2006

A. Identifiers (general EOR information)

1. Community type (observed): Hemlock forest
2. GPS Point: A1
3. Assigned type (NHESP use): Northern Hardwoods-Hemlock-White Pine
4. Lat: 42.618 N Long -72.431 W
5. Site name: Northfield Mountain
6. Quad name(s):
7. Ecoregion (DFW):
8. County name(s): Franklin Co.
9. Town: Northfield, MA
10. Directions: Take I-91 to exit 27 in Greenfield MA. Follow Rte. 2 east to the intersection of Rte. 2 & Rte 63. Take Rte. 63 2.5 miles North. Turn east onto the Main Access Rd. & follow to Northfield Mt
11. Survey date 7/15/14
12. Previous observations at this site:
13. Surveyors: SEK / SAD

B. Environmental Description

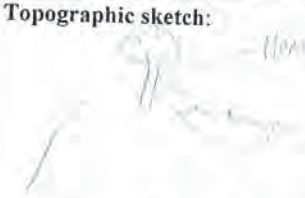
14. **PLOT #** A-1

15. **Photos taken** (Y) N; **Identfier** 911-714

16. **Elevation (from topo):** 360 (m) or ft

17. **Topographic position:**
- ✓ Summit/Crest
- ___ High slope
- ___ Mid slope
- ___ Low slope
- ___ Rolling Terrain
- ___ Level
- ___ Basin floor
- ___ Other
- ___ Step in slope
- ___ Toe of slope
- ___ Channel wall
- ___ Channel bed

18. **Topographic sketch:**



19. **Slope aspect:** South facing

20. **Slope Class** (Percent):
- Flat (<2%)
- (Gentle (2-9%))
- Moderate (10-25%)
- Rather Steep (26-47%)
- Steep (48-95%)
- Very Steep (>95%)
- Abrupt (cliff or ledge)

21. **Slope Shape:**

Vertically: Concave Convex (Linear)

Horizontally: Concave Convex (Linear)

22. **Downed Wood** (within or partially within plot)
- -Max. diameter/length/decay class: ___
- -Average diameter for all downed wood ≥4 in. 7" (estimate)
- -Abundance of downed wood ≥4 in. diameter (using cover classes) 2 or 3

23. **Fuel load (< ¼ inch in diameter):**
Low = (1) Moderate = 2 High = 3

24. **Snags ≥ 4" DBH:** Species DBH height

25. **Un-vegetated surface (check the single, most dominant feature):**
- ___ Bedrock
- ___ Large rocks (boulders > 24 in.)
- ___ Small rocks (stones 10-24 in.)
- ___ Cobbles (2-9 in.)
- ___ Gravel (<2 in.)
- ___ Sand
- X Litter
- ___ Bare soil
- ___ Water
- ___ Other: ___

26. **Combined litter & duff depth:** 2" inches

27. **Parent material:** till

28. **Moisture regime:**
- ___ Very dry
- X Dry
- ___ Moist
- ___ Wet
- ___ Saturated
- ___ Periodically inundated
- ___ Permanently inundated

29. **Soil type** (if observed)
- ___ sand
- ___ clay
- X loam
- ___ peat
- ___ muck

other ___

30. **Sphagnum hummocks overhanging water:** NO

(only if >25 m² and visible from plot)

GPS point (location): ___

Size of habitat: ___

3 water depths ___ (max. inches)

Circle: Moving channels or Pools of Water

Comments: ___

31. **Evidence of Land Use History:**

stone walls, barbed wire, wolf trees

cut stumps, multi-trunk trees,

foundations, wells

Other old logging rd

32. **Evidence of Disturbance:**

Fires: fire scars, charcoal, standing snags

Blowdowns: aligned downed trees

Ice damage: broken tree tops

Disease: adelgid, gypsy moth, beech bark

Other: NONE

33. **Environmental Comments:** vegetation homogeneity, erosion / sedimentation. invasive species presence/distribution, etc:

C. VEGETATION 34. **System:** X Terrestrial ___ Palustrine ___ Estuarine 35. **PLOT NUMBER:** 4 36. **Plot Dimensions:** 30'R

37. **Leaf phenology:**
- ___Deciduous
- ___Semi-deciduous
- ___Semi-Evergreen
- X Evergreen
- ___Perennial
- ___Annual

38. **Physiognomic type:**
- X Forest
- ___Sparse woodland
- ___Shrubland
- ___Dwarf shrubland
- ___Sparse dwarf shrubland
- ___Herbaceous
- ___Woodland
- ___Scrub thicket
- ___Sparse shrubland
- ___Dwarf scrub thicket
- ___Non-vascular
- ___Sparsely vegetated

39. **Photo Cover Type:** _____ 39a. **Field-Observed Cover Type:** _____

40. **Strata/life forms**

	height (m or ft)	% cover	Cover Classes
T1 Emergent tree			+ <1%
T2 Tree canopy		5	1 =1-5%
T3 Tree sub- canopy		2	2 =6-25%
S1 Tall shrub		1	3 =26-50%
S2 Short shrub		1	4 =51-75%
H Herbaceous		1	5 >75%
N Non-vascular		+	
V Vine / liana		5	

41. **Plant Species & abundance**: list each species and the corresponding cover class for each stratum.

hemlock	T2	Solomon's Seal	H		
yellow birch	T2				
Maple sp.	T2				
Pine sp.	T2				
American beech	T2				
hemlock	T3				
hemlock	S1				
hemlock	S2				
witch hazel	S2				
Striped maple	S2				
maple leaf	S2				
Sarsaparilla	H				
wood fern	H				
Bear flower	H				
canada mayflower	H				
twisted stalk	H				
partridge berry	H				
Squash berry	H				
Striped maple seedling	H				
white birch	H				
[illegible]	H				

A1

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. June 2006

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: Northfield Mountain
2. Survey site name: A-2
3. Town (LOCALJURIS): Northfield, MA
4. Directions: Take I-91 to exit 27 in Greenfield, MA. Follow Rte. 2 east to the intersection of Rte. 2 & Rte 63. Take Rte. 63 2.5 north. Turn east onto the Main Access Rd & follow to Northfield Mt.
5. GPS (if not below) _____ Lat. _____ Long _____ Make and Model Trimble GEO-6000
6. Sourcecode (NHESP use): _____ 7. Survey date 7/15/2014 8. Main Surveyor: Steve Knapp
9. Other Surveyors: Sarah Drahovzal

B. Topography 10. Transect

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

C. Vegetation / Habitat

12. Observation point 1. GPS Pt 2-A GPS Lat. 42.617 Long -72.445	Observation point 2 GPS Pt_____ GPS Lat. Long	Observation point 3 GPS Pt._____ GPS Lat. Long
13. Community type: Hardwood 14. Additional data: Site form2 X form 3 X	Community type:_____ Additional data: Site form2____ form 3____	Community type:_____ Additional data: Site form2____ form 3____
15. General description (physiognomy, characteristic & dominant spp. of all layers) T: Red maple, beech, red oak, white birch, Quaking aspen S: Striped maple, hornbeam, witch hazel, Mt. Laurel H: Squashberry, Sarsaparilla, ground pine, NY fern, twisted stalk, Cinnamon fern, lb blueberry, Star flower Mature - aged stand w/ little disturbance	General description: Same as pt. #1	General description: Same as pt. #1

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

Observation Point 4 GPS Pt_____ GPS Lat. Long	**Observation Point 5** GPS Pt_____ GPS Lat. Long	**Observation Point 6** GPS Pt_____ GPS Lat. Long	**Observation Point 7** GPS Pt_____ GPS Lat. Long
Community type:_____ Additional data: Site form2____form 3_____	Community type:_____ Additional data: Site form2_____form 3_____	Community type:_____ Additional data: Site form2____form 3_____	Community type:_____ Additional data: Site form2____ form 3_____
General Description: Same as pt. #1	General Description: Same as pt. #1	General Description: Same as pt. #1	General Description: Same as pt. #1

Natural Heritage & Endangered Species Program

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

FORM 2: NATURAL COMMUNITY SUMMARY AND RANKING

rev. June 2006

(A location map must accompany this form.)

A. Identifiers:

Community Name (MNHESP: Swain & Kearsley, 2000): Hardwood

NatureServe Association Name (Optional): Successional Northern Hardwood

Survey Date: 7/15/14 Today's Date: 7/15/14

Survey Site Name: Transect 2A

Surveyor Name(s): Steve Knapp, Sarah Drahozal

Best Source (Field survey or secondary source used to complete this form, **NHESP use**): Field Survey

Transcriber (**NHESP use only**. YY-MM-DD XXX): _____ Town Name: Northfield MA

Directions to site: Take I-91 to exit 27 in Greenfield MA, Follow Rte. 2 east to the intersection of Rte. 2 & Rte. 63. Take Rte. 63 2.5 miles north Turn east onto Main Access road & follow to Northfield Mt.

GPS Point(s) X Yes ___ No ___ Latitude _____ Longitude _____

B. Community Description:

Vegetation Description (*EODATA*: **Summarize** the vegetation: dominant and/or characteristic species, indicator species, community structure, variants/microhabitat features, unvegetated surface; spatial distribution (i.e., size, number, and separation distance of patches); intact natural processes, geology, hydrology, topography, and soil properties, especially if relevant to the community identification): _____

Dominate trees: Red maple, Beech red oak, White birch, Quaking aspen

Shrubs: striped maple, hornbeam, witch hazel, Mt. Laurel,

ground/herbaceous: Solomon's seal, Sarsaparilla, ground pine, NY fern, twisted stalk, Canadian ferns, lowbush blueberry, Star flower

_____ Estimated size (acres) GIS Acres (if available) _____

Physical Description (*GENDESC*: Describe the landscape surrounding the community, including the natural area. Both within and surrounding the community, describe: physical structures and land use practices; natural disturbances; embedded, adjacent, and nearby natural communities including aquatic features; notable landforms; scenic qualities): Not disturbed,

Medium - aged Stand, Sloped

Is community on conservation land (if known): No Managed Area Name: Northlight project boundary

Evidence of Disturbance/Threats to the Community/Management Recommendations (*MGMTCOM:* Describe the anthropogenic disturbances that have decreased the quality and viability of the community such as hydrologic alterations (ditching, damming, erosion etc.), logging, mining, livestock grazing, plantations, orchards, structures, trampling, and exotic flora or fauna within and surrounding the community. Discuss threats to the site and management implications.): Some understory logging / stone walls near by

Recreational Use (evidence of ATV's, ORV's, mountain bikes, horses, walking trails, etc.): adjacent to hiking trail

Protection Comments (*PROTCOM*: Comment on the legal protectability of the site): Ø

General Comments (*COMMENTS*: Note the type of sampling done; observation point (form 1), releve plot (form 3), plant list, etc.; note any additional field work needed. Comment on questionable identification.): Ø

Owner's Name (if known): _____ Telephone: (__) _____

Address: _____

Is Owner: aware of community? __yes _ no __unknown; Protecting community? __yes __no __unknown

Owner Comments (*OWNERCOM*: e.g., contact owner prior to visiting the site): _____

C: Community Element Occurrence Ranking: (Refer to community ranking specifications for assistance.)

Community Size Rank: (Compare relative size to other known occurrences, configuration, patchiness)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community Condition Rank: (Consider development/maturity (e.g., old growth), abiotic condition, species and physiognomic diversity, ecological processes, abundance of exotic species, internal connectivity, degree of anthropogenic disturbance including fragmentation).

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community Landscape Context Rank: (Consider the size and connectivity of the natural landscape, the position of the community within the landscape, and the landscape condition)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community EO Rank: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality? A summary of all factors listed above. Explain the basis of your ranking: range wide, state wide, or locally.)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments (*EORANKCOM:* Summarize the above and justify the EO Rank assigned): _____

Other rare species and/or natural communities observed at this site (**NHESP use**) T/U = Transcribed/Updated?):

	SPECIES OR COMMUNITY	T/U?		SPECIES OR COMMUNITY	T/U?
1			4		
2			5		
3			6		

Form 3: Quantitative Community Characterization

June 2006

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

1. Community type (observed): Hardwood
2. GPS Point:
3. Assigned type (NHESP use): Successional Northern Hardwoods
4. Lat: 42.617 N Long -72.445 W
5. Site name: Northfield Mt.
6. Quad name(s):
7. Ecoregion (DFW):
8. County name(s): Franklin Co.
9. Town: Northfield, MA
10. Directions: Take I-91 to exit 27 in Greenfield, MA Follow Rt. 2 east to the intersection of Rte. 2 & Rt. 63. Take Rte. 63 2.5 miles north. Turn east on to Main Access Rd. & follow to Northfield Mt.
11. Survey date 7/15/2014
12. Previous observations at this site:
13. Surveyors: Stein Knapp, Sarah Dashoush

B. Environmental Description

14. **PLOT #**

15. **Photos taken** (Y) N; **Identfier** 919-920

16. **Elevation (from topo):** 300 (m) or ft

17. **Topographic position**:
___Summit/Crest
___High slope ___Step in slope
X Mid slope ___Toe of slope
___Low slope
___Rolling Terrain
___Level ___Channel wall
___Basin floor ___Channel bed
___Other

18. **Topographic sketch**:

19. **Slope aspect:** North facing

20. **Slope Class** (Percent):
Flat (<2%) Steep (48-95%)
Gentle (2-9%) Very Steep (>95%)
Moderate (10-25%) Abrupt (cliff or ledge)
Rather Steep (26-47%)

21. **Slope Shape**:
Vertically: Concave Convex Linear
Horizontally: Concave Convex Linear

22. **Downed Wood**
(within or partially within plot)
-Max. diameter/length/decay class: N/A
-Average diameter for all downed wood ≥4 in. N/A (estimate)
-Abundance of downed wood ≥4 in. diameter (using cover classes) N/A (not on transect)

23. **Fuel load (< ¼ inch in diameter)**:
Low = 1 Moderate = 2 High = 3

24. **Snags ≥ 4" DBH**: Species DBH height

25. **Un-vegetated surface (check the single, most dominant feature)**:
___ Bedrock
___ Large rocks (boulders > 24 in.)
___ Small rocks (stones 10-24 in.)
___ Cobbles (2-9 in.)
___ Gravel (<2 in.)
___ Sand
___ Litter
___ Bare soil
___ Water
X Other: leaf litter / duff

26. **Combined litter & duff depth**:
1 inches

27. **Parent material:** Till

28. **Moisture regime**:
___Very dry
___Dry ___Wet
X Moist ___Saturated
___Periodically inundated
___Permanently inundated

29. **Soil type** (if observed)
___ sand X loam
___clay ___peat
___muck
other

30. **Sphagnum hummocks overhanging water:**
(only if >25 m^2 and visible from plot)
GPS point (location):
Size of habitat:
3 water depths (max. inches)
Circle: Moving channels or Pools of Water
Comments:

31. **Evidence of Land Use History**:
stone walls, barbed wire, wolf trees
cut stumps, multi-trunk trees,
foundations, wells
Other

32. **Evidence of Disturbance:**
Fires: fire scars, charcoal, standing snags
Blowdowns: aligned downed trees
Ice damage: broken tree tops
Disease: adelgid, gypsy moth, beech bark
Other:

33. **Environmental Comments**: vegetation homogeneity, erosion / sedimentation, invasive species presence/distribution, etc:

C. VEGETATION 34. **System:** X Terrestrial ___ Palustrine ___ Estuarine 35. **PLOT NUMBER:** 2A 36. **Plot Dimensions:** 30'

37. **Leaf phenology:**
- X Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- ___ Perennial
- ___ Annual

38. **Physiognomic type:**
- X Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular
- ___ Sparsely vegetated

39. **Photo Cover Type:** _____ 39a. **Field-Observed Cover Type:** _____

40. **Strata/life forms**

	height (m or ft)	% cover	Cover Classes
T1 Emergent tree		+	+ <1%
T2 Tree canopy		4	**1** =1-5%
T3 Tree sub- canopy		2	**2** =6-25%
S1 Tall shrub		2	**3** =26-50%
S2 Short shrub		1	**4** =51-75%
H Herbaceous		2	**5** >75%
N Non-vascular		+	
V Vine / liana		+	

41. **Plant Species & abundance:** list each species and the corresponding cover class for each stratum.

Spicebush	S1				
Hornbeam	S1				
Sassafras	H				
Blueberry	S1,2				
Hemlock	S1				
Red Maple	T2				
Beech	T2				
Red Oak	T2				
Sarsaparilla	H				
Mountain Laurel	S1				
Cedar	N				
Tulip Tree	T2				
New York fern	H				
Twisted stalk	H				
Witch hazel	S1,2				
Cinnamon fern	H				
Ironweed blossoms	H				
Solomon's seal	H				
Aspen	T2				

A2

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. June 2006

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: Northfield Mt. 2. Survey site name: 3A

3. Town (LOCALJURIS): Northfield, MA 4. Directions: Take I-91 to exit 27 in Greenfield, MA Follow Rte 2 east to the intersection of Rte 2 & Rte. 63. Take Rte. 63 2.5 miles north. Turn east onto the Main Access Rd & follow to Northfield Mt.

5. GPS (if not below) _____ Lat. _____ Long _____ Make and Model _____

6. Sourcecode (NHESP use): _____ 7. Survey date 7/16/2014 8. Main Surveyor: Steve Knapp

9. Other Surveyors: Sarah Drahovzal

B. Topography 10. Transect

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

C. Vegetation / Habitat

12. Observation point 1. GPS Pt 3-A GPS Lat. 42.603 Long -72.447	Observation point 2 GPS Pt _____ GPS Lat. Long	Observation point 3 GPS Pt. _____ GPS Lat. Long
13. Community type: Hemlock forest 14. Additional data: Site form2 X form 3 X	Community type: _____ Additional data: Site form2 X form 3 X	Community type: _____ Additional data: Site form2 X form 3 X
15. General description (physiognomy, characteristic & dominant spp. of all layers) Hemlock, Mt. Laurel trillium Mature hemlock forest w/ boulders Till soils w/ 0-4" Duff	General description: Same as pt. #1	General description: Same as pt. #1

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

Observation Point 4 GPS Pt_____ GPS Lat. Long	**Observation Point 5** GPS Pt_____ GPS Lat. Long	**Observation Point 6** GPS Pt_____ GPS Lat. Long	**Observation Point 7** GPS Pt_____ GPS Lat. Long
Community type:_____ Additional data: Site form2___form 3_____	Community type:_____ Additional data: Site form2____form 3____	Community type:_____ Additional data: Site form2____form 3_____	Community type:_____ Additional data: Site form2____ form 3_____
General Description: Same as pt. #1	General Description: Same as pt #1	General Description: Same as pt #1	General Description: Same as pt #1

Natural Heritage & Endangered Species Program

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

FORM 2: NATURAL COMMUNITY SUMMARY AND RANKING

rev. June 2006

(A location map must accompany this form.)

A. Identifiers:

Community Name (MNHESP: Swain & Kearsley, 2000): Hemlock Ravine
NatureServe Association Name (Optional): Hemlock Ravine
Survey Date: 7/16/14 Today's Date: 7/16/14
Survey Site Name: NORTHFIELD (2A)
Surveyor Name(s): Steve Knapp, Sarah Dadaian
Best Source (Field survey or secondary source used to complete this form, **NHESP use**): Field Survey

Transcriber (**NHESP use only**. YY-MM-DD XXX): _____ Town Name: Northfield, MA
Directions to site: Take I-91 to exit 27 in Greenfield, MA. Follow Route 2 east to the intersection of Rte. 2 & Rte 63. Take Rt. 63 2.5 miles north. Turn east onto Main Access road & follow to Northfield Mt
GPS Point(s) X Yes ___ No ___ Latitude 42.603 Longitude -72.447

B. Community Description:

Vegetation Description (*EODATA*: **Summarize** the vegetation: dominant and/or characteristic species, indicator species, community structure, variants/microhabitat features, unvegetated surface; spatial distribution (i.e., size, number, and separation distance of patches); intact natural processes, geology, hydrology, topography, and soil properties, especially if relevant to the community identification):
Mt. Laurel
Hemlock, ~~Rhododendron~~, trillium - mature hemlock forest w/ boulders. till soils w/ 0-4" Duff ~~till~~

_____ Estimated size (acres) GIS Acres (if available) _____

Physical Description (*GENDESC*: Describe the landscape surrounding the community, including the natural area. Both within and surrounding the community, describe: physical structures and land use practices; natural disturbances; embedded, adjacent, and nearby natural communities including aquatic features; notable landforms; scenic qualities):
Near ~~fast~~ lodges and PEO wetlands w/in a ravine

Is community on conservation land (if known): No Managed Area Name: Northlight project boundary

Evidence of Disturbance/Threats to the Community/Management Recommendations (*MGMTCOM*: Describe the anthropogenic disturbances that have decreased the quality and viability of the community such as hydrologic alterations (ditching, damming, erosion etc.), logging, mining, livestock grazing, plantations, orchards, structures, trampling, and exotic flora or fauna within and surrounding the community. Discuss threats to the site and management implications.): little threat of disturbance, some recreational trails, but community appears to be intact and not impacted.

Recreational Use (evidence of ATV's, ORV's, mountain bikes, horses, walking trails, etc.): trails.

Protection Comments (*PROTCOM*: Comment on the legal protectability of the site): _____

General Comments (*COMMENTS*: Note the type of sampling done; observation point (form 1), releve plot (form 3), plant list, etc.; note any additional field work needed. Comment on questionable identification.): transect -

Owner's Name (if known): _____ Telephone: ( ) _____

Address: _____

Is Owner: aware of community? __yes _ no __unknown; Protecting community? __yes __no __unknown

Owner Comments (*OWNERCOM*: e.g., contact owner prior to visiting the site): _____

C: Community Element Occurrence Ranking: (Refer to community ranking specifications for assistance.)

Community Size Rank: (Compare relative size to other known occurrences, configuration, patchiness)

(A) – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community Condition Rank: (Consider development/maturity (e.g., old growth), abiotic condition, species and physiognomic diversity, ecological processes, abundance of exotic species, internal connectivity, degree of anthropogenic disturbance including fragmentation).

(A) – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community Landscape Context Rank: (Consider the size and connectivity of the natural landscape, the position of the community within the landscape, and the landscape condition)

(A) – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community EO Rank: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality? A summary of all factors listed above. Explain the basis of your ranking: range wide, state wide, or locally.)

(A) – Excellent (B) – Good **C** – Marginal **D** - Poor

Comments (*EORANKCOM:* Summarize the above and justify the EO Rank assigned): poor access - isolated by existing PEO wetlands - low chance of impacts

Hemlock adelgid - not observed, but is threat.

Other rare species and/or natural communities observed at this site (NHESP use) T/U = Transcribed/Updated?):

	SPECIES OR COMMUNITY	T/U?		SPECIES OR COMMUNITY	T/U?
1			4		
2			5		
3			6		

Form 3: Quantitative Community Characterization

June 2006

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

1. Community type (observed): Hemlock
2. GPS Point: 3-A
3. Assigned type (NHESP use): Hemlock Ravine
4. Lat: 42.603 N Long -72.447 W
5. Site name: Northfield Mt.
6. Quad name(s):
7. Ecoregion (DFW):
8. County name(s): Franklin Co.
9. Town: Northfield, MA
10. Directions: Take I-91 to exit 27 in Greenfield, MA. Follow Rte. 2 east to the intersection of Rte. 2 & Rte 63. Take Rte 63 2.5 miles North. Turn east onto the Main Access Rd. & follow to Northfield Mt.
11. Survey date 7/16/2014
12. Previous observations at this site:
13. Surveyors: Steve Knapp, Sarah Drahovzal

B. Environmental Description

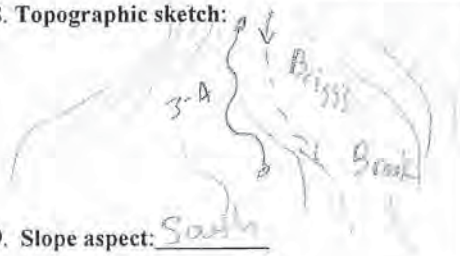
14. PLOT #

15. Photos taken (Y) **N; Identfier** 943-943

16. Elevation (from topo): 270 (m) or ft

17. Topographic position:
- ___ Summit/Crest
- ___ High slope ___ Step in slope
- ___ Mid slope ___ Toe of slope
- ___ Low slope
- ___ Rolling Terrain
- ___ Level ___ Channel wall
- X Basin floor ___ Channel bed
- ___ Other

18. Topographic sketch:



19. Slope aspect: South

20. Slope Class (Percent):
- Flat (<2%) Steep (48-95%)
- (Gentle (2-9%)) Very Steep (>95%)
- Moderate (10-25%) Abrupt (cliff or ledge)
- Rather Steep (26-47%)

21. Slope Shape:

Vertically: Concave Convex (Linear)

Horizontally: Concave Convex (Linear)

22. Downed Wood
(within or partially within plot)

-Max. diameter/length/decay class: ___

-Average diameter for all downed wood ≥4 in. 10-20" (estimate)

-Abundance of downed wood ≥4 in. diameter (using cover classes) 0-10%

23. Fuel load (< ¼ inch in diameter):
Low = 1 Moderate = 2 High = 3

24. Snags ≥ 4" DBH: Species / DBH / height

Species	DBH	height
Hemlock	15"	50'

25. Un-vegetated surface (check the single, most dominant feature):
- ___ Bedrock
- ___ Large rocks (boulders > 24 in.)
- ___ Small rocks (stones 10-24 in.)
- ___ Cobbles (2-9 in.)
- ___ Gravel (<2 in.)
- ___ Sand
- X Litter
- ___ Bare soil
- ___ Water
- ___ Other: ___

26. Combined litter & duff depth:
4" inches

27. Parent material: till

28. Moisture regime:
- ___ Very dry
- ___ Dry ___ Wet
- X Moist ___ Saturated
- ___ Periodically inundated
- ___ Permanently inundated

29. Soil type (if observed)
- ___ sand X loam
- ___ clay ___ peat
- ___ muck

other ___

30. Sphagnum hummocks overhanging water: NONE
(only if >25 m² and visible from plot)

GPS point (location): ___

Size of habitat: ___

3 water depths ___ (max. inches)

Circle: Moving channels or Pools of Water

Comments: ___

31. Evidence of Land Use History:

(stone walls), barbed wire, wolf trees

cut stumps, multi-trunk trees,

foundations, wells

Other ___

32. Evidence of Disturbance:

Fires: fire scars, charcoal, standing snags

Blowdowns: aligned downed trees

Ice damage: broken tree tops

Disease: adelgid, gypsy moth, beech bark

Other: NONE

33. Environmental Comments: vegetation homogeneity, erosion / sedimentation, invasive species presence/distribution, etc:

.

C. VEGETATION 34. **System:** X Terrestrial ___ Palustrine ___ Estuarine 35. **PLOT NUMBER:** 3-A 36. **Plot Dimensions:** 35'

37. **Leaf phenology:**
- ___ Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- X Evergreen
- ___ Perennial
- ___ Annual

38. **Physiognomic type:**
- X Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular
- ___ Sparsely vegetated

39. **Photo Cover Type:** _____ 39a. **Field-Observed Cover Type:** _____

40. **Strata/life forms**

	height (m or ft)	% cover	Cover Classes
T1 Emergent tree		+	+ <1%
T2 Tree canopy		4	1 =1-5%
T3 Tree sub- canopy		1	2 =6-25%
S1 Tall shrub		1	3 =26-50%
S2 Short shrub		2	4 =51-75%
H Herbaceous		1	5 >75%
N Non-vascular		+	
V Vine / liana		+	

41. **Plant Species & abundance**: list each species and the corresponding cover class for each stratum.

Hemlock	T2				
Red Maple	T3				
Red oak	T3				
Yellow birch	T3				
beech	S1/S2				
Mountain Laurel	S1/S2				
White pine	T2/3				
Sarsaparilla	H				
Wintergreen	H				
Trillium	H				
Lady Slipper	H				
Witch hazel	S2				

A3

A3

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. June 2006

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: White Pine - Oak forest 2. Survey site name: 4A

3. Town (LOCALJURIS): Northfield, MA 4. Directions: Take I-91 to exit 27 in Greenfield, MA. Follow Rte. 2 east to the intersection of Rte 2 & Rte 63. Take Rte. 63 2.5 miles north. Turn east onto the Main Access Rd & follow to Northfield Mt.

5. GPS (if not below) _____ Lat. _____ Long _____ Make and Model Trimble GEO-6000

6. Sourcecode (NHESP use): _____ 7. Survey date 7/16/2014 8. Main Surveyor: Steve Knapp

9. Other Surveyors: Sarah Drahovzal

B. Topography 10. Transect

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

C. Vegetation / Habitat

12. Observation point 1. GPS Pt _____ GPS Lat. 42.601 Long -72.451	Observation point 2 GPS Pt _____ GPS Lat. 42.602 Long -72.452	Observation point 3 GPS Pt. _____ GPS Lat. 42.602 Long -72.452
13. Community type: _____ 14. Additional data: Site form2 X form 3 X	Community type: _____ Additional data: Site form2 ____ form 3 ____	Community type: _____ Additional data: Site form2 ____ form 3 ____
15. General description (physiognomy, characteristic & dominant spp. of all layers) White Pine, Red oak, Red maple Mountain laurel Lowbush blueberry Little dark huckleberry	General description: Same as pt. #1	General description: Same as pt. #1

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

Observation Point 4 GPS Pt_____ GPS Lat. 42.602 Long -72.452	**Observation Point 5** GPS Pt_____ GPS Lat. 42.602 Long -72.453	**Observation Point 6** GPS Pt_____ GPS Lat. 42.602 Long -72.452	**Observation Point 7** GPS Pt_____ GPS Lat. 42.602 Long -72.453
Community type:_____ Additional data: Site form2____ form 3_____	Community type:_____ Additional data: Site form2____ form 3_____	Community type:_____ Additional data: Site form2____ form 3_____	Community type:_____ Additional data: Site form2____ form 3_____
General Description: Same as pt #1	General Description: Same as pt #1	General Description: Same as pt. #1	General Description: Same as pt. #1

Natural Heritage & Endangered Species Program

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

FORM 2: NATURAL COMMUNITY SUMMARY AND RANKING

rev. June 2006

(A location map must accompany this form.)

A. Identifiers:

Community Name (MNHESP: Swain & Kearsley, 2000): T- 4A

NatureServe Association Name (Optional): White Pine - Oak forest

Survey Date: 7/16/2013 Today's Date: 7/16/2014

Survey Site Name: Pine Meadow (T-4A)

Surveyor Name(s): Steve Kanaga, Sean Dudley

Best Source (Field survey or secondary source used to complete this form, **NHESP use**): Field survey

Transcriber (**NHESP use only**. YY-MM-DD XXX): _____ Town Name: Northfield, MA

Directions to site: Take I-91 to exit 27 in Greenfield, MA. Follow Rte. 2 east to the intersection of Rte 2 & Rte 63. Take Rte. 63 2.5 miles north. Turn east onto the Main Access Rd & follow to Northfield Mnt

GPS Point(s) X Yes ___ No ___ Latitude 42.602 Longitude -72.453

B. Community Description:

Vegetation Description (*EODATA*: **Summarize** the vegetation: dominant and/or characteristic species, indicator species, community structure, variants/microhabitat features, unvegetated surface; spatial distribution (i.e., size, number, and separation distance of patches); intact natural processes, geology, hydrology, topography, and soil properties, especially if relevant to the community identification):

Shrubs ... Mt. laurel

_____ Estimated size (acres) GIS Acres (if available) _____

Physical Description (*GENDESC*: Describe the landscape surrounding the community, including the natural area. Both within and surrounding the community, describe: physical structures and land use practices; natural disturbances; embedded, adjacent, and nearby natural communities including aquatic features; notable landforms; scenic qualities):

Is community on conservation land (if known): NO Managed Area Name: Northfield Light project boundary

Evidence of Disturbance/Threats to the Community/Management Recommendations (*MGMTCOM*: Describe the anthropogenic disturbances that have decreased the quality and viability of the community such as hydrologic alterations (ditching, damming, erosion etc.), logging, mining, livestock grazing, plantations, orchards, structures, trampling, and exotic flora or fauna within and surrounding the community. Discuss threats to the site and management implications.): little disturbance, some recreational bikes, low threat of development

Recreational Use (evidence of ATV's, ORV's, mountain bikes, horses, walking trails, etc.): adjacent to hiking trails

Protection Comments (*PROTCOM*: Comment on the legal protectability of the site): _____

General Comments (*COMMENTS*: Note the type of sampling done; observation point (form 1), releve plot (form 3), plant list, etc.; note any additional field work needed. Comment on questionable identification.): Mountain Biking along hiking trail

Owner's Name (if known): _____ Telephone: ( ) _____

Address: _____

Is Owner: aware of community? __yes _no __unknown; Protecting community? __yes __no __unknown

Owner Comments (*OWNERCOM*: e.g., contact owner prior to visiting the site): _____

C: Community Element Occurrence Ranking: (Refer to community ranking specifications for assistance.)

Community Size Rank: (Compare relative size to other known occurrences, configuration, patchiness)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community Condition Rank: (Consider development/maturity (e.g., old growth), abiotic condition, species and physiognomic diversity, ecological processes, abundance of exotic species, internal connectivity, degree of anthropogenic disturbance including fragmentation).

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community Landscape Context Rank: (Consider the size and connectivity of the natural landscape, the position of the community within the landscape, and the landscape condition)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community EO Rank: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality? A summary of all factors listed above. Explain the basis of your ranking: range wide, state wide, or locally.)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments (*EORANKCOM:* Summarize the above and justify the EO Rank assigned): _____

Other rare species and/or natural communities observed at this site (NHESP use) T/U = Transcribed/Updated?):

	SPECIES OR COMMUNITY	T/U?		SPECIES OR COMMUNITY	T/U?
1			4		
2			5		
3			6		

Form 3: Quantitative Community Characterization

June 2006

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

1. Community type (observed): Pine - hardwood
2. GPS Point:
3. Assigned type (NHESP use): White Pine - Oak forest
4. Lat: 42.602 N Long -72.453 W
5. Site name: 4-A
6. Quad name(s):
7. Ecoregion (DFW):
8. County name(s): Franklin Co.
9. Town: Northfield, MA
10. Directions: Take I-91 to exit 27 in Greenfield, MA. Follow Rte. 2 east to the intersection of Rt. 2 & Rt. 63. Take Rt. 63 2.5 miles north. Turn east onto the Main Access Rd & follow to Northfield MT.
11. Survey date 7/16/2014
12. Previous observations at this site:
13. Surveyors: Steve Knapp, Sarah Drahovzal

B. Environmental Description

14. **PLOT #**

15. **Photos taken** (Y) N; **Identfier** 954-955

16. **Elevation (from topo):** 360 (m) or ft

17. **Topographic position**:
- ___ Summit/Crest
- ___ High slope ___ Step in slope
- X Mid slope ___ Toe of slope
- ___ Low slope
- ___ Rolling Terrain
- ___ Level ___ Channel wall
- ___ Basin floor ___ Channel bed
- ___ Other

18. **Topographic sketch**:

19. **Slope aspect**: South

20. **Slope Class** (Percent):
- Flat (<2%)
- Gentle (2-9%)
- Moderate (10-25%)
- Rather Steep (26-47%)
- Steep (48-95%)
- Very Steep (>95%)
- Abrupt (cliff or ledge)

21. **Slope Shape**:

Vertically: Concave Convex (Linear)

Horizontally: Concave Convex (Linear)

22. **Downed Wood** (within or partially within plot)

-Max. diameter/length/decay class: _____

-Average diameter for all downed wood ≥4 in. 15-18 (estimate)

-Abundance of downed wood ≥4 in. diameter (using cover classes) 2

23. **Fuel load (< ¼ inch in diameter)**:

Low = 1 Moderate = 2 High = 3

24. **Snags ≥ 4" DBH**: Species DBH height

25. **Un-vegetated surface (check the single, most dominant feature)**:
- ___ Bedrock
- X Large rocks (boulders > 24 in.)
- ___ Small rocks (stones 10-24 in.)
- ___ Cobbles (2-9 in.)
- ___ Gravel (<2 in.)
- ___ Sand
- ___ Litter
- ___ Bare soil
- ___ Water
- ___ Other: _____

26. **Combined litter & duff depth**: 0-1 inches

27. **Parent material**: Till

28. **Moisture regime**:
- ___ Very dry
- ___ Dry ___ Wet
- X Moist ___ Saturated
- ___ Periodically inundated
- ___ Permanently inundated

29. **Soil type** (if observed)
- ___ sand ___ loam
- ___ clay ___ peat
- ___ muck
- other _____

30. **Sphagnum hummocks overhanging water**: None

(only if >25 m² and visible from plot)

GPS point (location): _____

Size of habitat: _____

3 water depths _____ (max. inches)

Circle: Moving channels or Pools of Water

Comments: _____

31. **Evidence of Land Use History**:

stone walls, barbed wire, wolf trees

cut stumps, multi-trunk trees,

foundations, wells

Other None

32. **Evidence of Disturbance**:

Fires: fire scars, charcoal, standing snags

Blowdowns: aligned downed trees

Ice damage: broken tree tops

Disease: adelgid, gypsy moth, beech bark

Other: None

33. **Environmental Comments**: vegetation homogeneity, erosion / sedimentation, invasive species presence/distribution, etc:

C. VEGETATION 34. **System:** __ Terrestrial X Palustrine ___ Estuarine 35. **PLOT NUMBER:** 44 36. **Plot Dimensions:** 30' (R)

37. **Leaf phenology:**
- X Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- ___ Perennial
- ___ Annual

38. **Physiognomic type:**
- X Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular
- ___ Sparsely vegetated

39. **Photo Cover Type:** _____ 39a. **Field-Observed Cover Type:** _____

40. **Strata/life forms**

	height (m or ft)	% cover	Cover Classes
T1 Emergent tree		0	+ <1%
T2 Tree canopy		4	1 =1-5%
T3 Tree sub- canopy		1	2 =6-25%
S1 Tall shrub		1	3 =26-50%
S2 Short shrub		2	4 =51-75%
H Herbaceous		3	5 >75%
N Non-vascular		0	
V Vine / liana		0	

41. **Plant Species & abundance**: list each species and the corresponding cover class for each stratum.

[illegible]	H				
[illegible]	S2				
[illegible]	S2,T2				
[illegible]	T2				
[illegible]	T2				
[illegible]	H				
Mt. Laurel	S1,2				
[illegible]	H				
[illegible]	H				
[illegible]	H				
[illegible]	S1,S2				
[illegible]	H				
[illegible]	H				
[illegible]	H				
[illegible]	S2,T				
Wild [illegible]	S2				
Witch hazel	S,2				
Canada mayflower	H				
[illegible]	H				
[illegible]	H				
early lowbush [illegible]	S2				

A4

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. June 2006

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: Oak Hickory forest
2. Survey site name: A5
3. Town (LOCALJURIS): Northfield, MA
4. Directions: Take I-91 to exit 27 in Greenfield, MA. Follow Rte 2 east to the intersection of Rte 2 & Rt. 63. Take Rt. 263 2.5 miles north. Turn east on the Main Access Rd. & follow to Northfield MA
5. GPS (if not below) _____ Lat. _____ Long _____ Make and Model Trimble GEO-XM
6. Sourcecode (NHESP use): _____
7. Survey date 7/17/2014
8. Main Surveyor: Steve Krupp
9. Other Surveyors: Sarah Drabouzal

B. Topography

10. Transect A5

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

C. Vegetation / Habitat

12. Observation point 1. GPS Pt A5 GPS Lat. 42.607 Long -72.449	Observation point 2 GPS Pt _____ GPS Lat. Long	Observation point 3 GPS Pt. _____ GPS Lat. Long
13. Community type: Oak maple 14. Additional data: Site form2 X form 3 X	Community type: _____ Additional data: Site form2 ____ form 3 ____	Community type: _____ Additional data: Site form2 ____ form 3 ____
15. General description (physiognomy, characteristic & dominant spp. of all layers) Red oak, Red maple, Chestnut, hickory, Chestnut oak Squashberry, lowbush blueberry Forest w/ little disturbance	General description: Same as pnt. #1	General description: Same as pnt. #1

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

Observation Point 4 GPS Pt_____ GPS Lat. Long	**Observation Point 5** GPS Pt_____ GPS Lat. Long	**Observation Point 6** GPS Pt_____ GPS Lat. Long	**Observation Point 7** GPS Pt_____ GPS Lat. Long
Community type:_____ Additional data: Site form2___ form 3_____	Community type:_____ Additional data: Site form2____ form 3____	Community type:_____ Additional data: Site form2____ form 3_____	Community type:_____ Additional data: Site form2___ form 3_____
General Description: Same as pnt. #1	General Description: Same as pnt. #1	General Description: Same as pnt. #1	General Description: Same as pnt. #1

Natural Heritage & Endangered Species Program

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

FORM 2: NATURAL COMMUNITY SUMMARY AND RANKING

rev. June 2006

(A location map must accompany this form.)

A. Identifiers:

Community Name (MNHESP: Swain & Kearsley, 2000): Oak Maple (AS)

NatureServe Association Name (Optional): _____

Survey Date: 17 July 2014 Today's Date: 17 July 2014

Survey Site Name: Northfield Mountain

Surveyor Name(s): Steve Knapp, Sarah Deshaies

Best Source (Field survey or secondary source used to complete this form, **NHESP use**): Field Survey

Transcriber (**NHESP use only**. YY-MM-DD XXX): _____ Town Name: Northfield, MA

Directions to site: Take I-91 to exit 27 in Greenfield, MA. Follow Rte. 2 east to the intersection of Rte. 2 & Rte 63. Take Rte. 63 2.5 miles north. Turn east onto Main Access Rd. & follow to Northfield ML.

GPS Point(s) ___Yes ___No ___ Latitude _____ Longitude _____

B. Community Description:

Vegetation Description (*EODATA*: **Summarize** the vegetation: dominant and/or characteristic species, indicator species, community structure, variants/microhabitat features, unvegetated surface; spatial distribution (i.e., size, number, and separation distance of patches); intact natural processes, geology, hydrology, topography, and soil properties, especially if relevant to the community identification): _____

Red maple, Red Oak, Chestnut oak dominate. little understory

_____ Estimated size (acres) GIS Acres (if available) _____

Physical Description (*GENDESC*: Describe the landscape surrounding the community, including the natural area. Both within and surrounding the community, describe: physical structures and land use practices; natural disturbances; embedded, adjacent, and nearby natural communities including aquatic features; notable landforms; scenic qualities): _____

Medium-aged hardwood forest, Not much disturbance

Is community on conservation land (if known): No Managed Area Name: North light project boundary

Evidence of Disturbance/Threats to the Community/Management Recommendations (*MGMTCOM*: Describe the anthropogenic disturbances that have decreased the quality and viability of the community such as hydrologic alterations (ditching, damming, erosion etc.), logging, mining, livestock grazing, plantations, orchards, structures, trampling, and exotic flora or fauna within and surrounding the community. Discuss threats to the site and management implications.): Little disturbance

Recreational Use (evidence of ATV's, ORV's, mountain bikes, horses, walking trails, etc.):

Protection Comments (*PROTCOM*: Comment on the legal protectability of the site): Ø

General Comments (*COMMENTS*: Note the type of sampling done; observation point (form 1), releve plot (form 3), plant list, etc.; note any additional field work needed. Comment on questionable identification.): Ø

Owner's Name (if known): _____ Telephone: ( )

Address: _____

Is Owner: aware of community? __yes _ no __unknown; Protecting community? __yes __no __unknown

Owner Comments (*OWNERCOM*: e.g., contact owner prior to visiting the site): _____

C: Community Element Occurrence Ranking: (Refer to community ranking specifications for assistance.)

Community Size Rank: (Compare relative size to other known occurrences, configuration, patchiness)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community Condition Rank: (Consider development/maturity (e.g., old growth), abiotic condition, species and physiognomic diversity, ecological processes, abundance of exotic species, internal connectivity, degree of anthropogenic disturbance including fragmentation).

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community Landscape Context Rank: (Consider the size and connectivity of the natural landscape, the position of the community within the landscape, and the landscape condition)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community EO Rank: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality? A summary of all factors listed above. Explain the basis of your ranking: range wide, state wide, or locally.)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments (*EORANKCOM:* Summarize the above and justify the EO Rank assigned): _____

Other rare species and/or natural communities observed at this site (**NHESP use**) T/U = Transcribed/Updated?):

	SPECIES OR COMMUNITY	T/U?		SPECIES OR COMMUNITY	T/U?
1			4		
2			5		
3			6		

Form 3: Quantitative Community Characterization

June 2006

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

1. Community type (observed): Oak maple dores 2. GPS Point: A5
3. Assigned type (NHESP use): Oak-Hickory Forest 4. Lat: 42.604 N Long -72.45 W
5. Site name: Northfield A5 6. Quad name(s):
7. Ecoregion (DFW): 8. County name(s): Franklin Co
9. Town: Northfield, MA 10. Directions: Take I-91 to exit 27 in Greenfield MA, Follow Rt 2 east to the intersection of Rte 2 & Rte 63. Take Rt 63 2.5 miles north. Turn east onto Main Access Rd & follow to Northfield MT
11. Survey date 7/17/2014 12. Previous observations at this site:
13. Surveyors: Sarah Dr. Horvat & Steve Knapp

B. Environmental Description

14. PLOT #

15. Photos taken (Y) N; Identifier 965-966

16. Elevation (from topo): 400 (m) or ft

17. Topographic position:
- ___ Summit/Crest
- ___ High slope ___ Step in slope
- ___ Mid slope ___ Toe of slope
- X Low slope
- ___ Rolling Terrain
- ___ Level ___ Channel wall
- ___ Basin floor ___ Channel bed
- ___ Other

18. Topographic sketch:

19. Slope aspect: South

20. Slope Class (Percent):
- Flat (<2%)
- Gentle (2-9%)
- (Moderate (10-25%))
- Rather Steep (26-47%)
- Steep (48-95%)
- Very Steep (>95%)
- Abrupt (cliff or ledge)

21. Slope Shape:

Vertically: Concave Convex (Linear)

Horizontally: Concave Convex (Linear)

22. Downed Wood
(within or partially within plot)

-Max. diameter/length/decay class: ___

-Average diameter for all downed wood ≥4 in. 5-6" (estimate)

-Abundance of downed wood ≥4 in. diameter (using cover classes) 1

23. Fuel load (< ¼ inch in diameter):
Low = 1 Moderate = 2 High = 3

24. Snags ≥ 4" DBH:

Species	DBH	height
Red maple	18"	250'

25. Un-vegetated surface (check the single, most dominant feature):
- ___ Bedrock
- ___ Large rocks (boulders > 24 in.)
- ___ Small rocks (stones 10-24 in.)
- ___ Cobbles (2-9 in.)
- ___ Gravel (<2 in.)
- ___ Sand
- X Litter
- ___ Bare soil
- ___ Water
- ___ Other: ___

26. Combined litter & duff depth: 0-2" inches

27. Parent material: till

28. Moisture regime:
- ___ Very dry
- ___ Dry
- X Moist
- ___ Wet
- ___ Saturated
- ___ Periodically inundated
- ___ Permanently inundated

29. Soil type (if observed)
- ___ sand
- ___ clay
- X loam
- ___ peat
- ___ muck

other ___

30. Sphagnum hummocks overhanging water: NONE
(only if >25 m² and visible from plot)

GPS point (location): ___

Size of habitat: ___

3 water depths ___ (max. inches)

Circle: Moving channels or Pools of Water

Comments: ___

31. Evidence of Land Use History:

stone walls, barbed wire, wolf trees

cut stumps, multi-trunk trees,

foundations, wells

Other Trails

32. Evidence of Disturbance:

Fires: fire scars, charcoal, standing snags

Blowdowns: aligned downed trees

Ice damage: broken tree tops

Disease: adelgid, gypsy moth, beech bark

Other: NONE

33. Environmental Comments: vegetation homogeneity, erosion / sedimentation, invasive species presence/distribution, etc:

C. VEGETATION 34. **System:** X Terrestrial ___ Palustrine ___ Estuarine 35. **PLOT NUMBER:** A5 36. **Plot Dimensions:** 30'

37. **Leaf phenology:**
- X Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- ___ Perennial
- ___ Annual

38. **Physiognomic type:**
- X Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular
- ___ Sparsely vegetated

39. **Photo Cover Type:** _____ 39a. **Field-Observed Cover Type:** _____

40. **Strata/life forms**

	height (m or ft)	% cover
T1 Emergent tree		1
T2 Tree canopy		5
T3 Tree sub- canopy		3
S1 Tall shrub		3
S2 Short shrub		2
H Herbaceous		1
N Non-vascular		
V Vine / liana		

Cover Classes
- + <1%
- **1** =1-5%
- **2** =6-25%
- **3** =26-50%
- **4** =51-75%
- **5** >75%

41. **Plant Species & abundance:** list each species and the corresponding cover class for each stratum.

Red Maple	T2				
Red Oak	T2				
Chestnut Oak	T2				
Chestnut	S1				
hickory	S1				
Squashberry	H				
lowbush blueberry	H				

A5

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. June 2006

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: Northfield Mt. 2. Survey site name: A6

3. Town (LOCALJURIS): Northfield Mt. 4. Directions: Take I-91 to ext. 27 in Greenfield, MA. Follow Rt. 2 east to the intersection of rt. 2 & Rt. 63 Take Rt. 63 2.5 miles north. Turn east onto the Main Access Rd & follow to Northfield, Mt.

5. GPS (if not below) _____ Lat. _____ Long _____ Make and Model Trimble GEO- 6000

6. Sourcecode (NHESP use): _____ 7. Survey date 7/17/2014 8. Main Surveyor: Steve Knapp

9. Other Surveyors: Sarah Draherzal

B. Topography 10. Transect A6

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

C. Vegetation / Habitat

12. Observation point 1. GPS Pt A6 GPS Lat. 42.604 Long -72.444	Observation point 2 GPS Pt_____ GPS Lat. Long	Observation point 3 GPS Pt._____ GPS Lat. Long
13. Community type: Hemlock Ravine 14. Additional data: Site form2 X form 3 X	Community type:_____ Additional data: Site form2___ form 3___	Community type:_____ Additional data: Site form2___ form 3___
15. General description (physiognomy, characteristic & dominant spp. of all layers) Dominated by hemlock w/ some red maple Not much understory - some starflower, hobble bush Rocky, bouldery adjacent to stream	General description: Same as pt. #1	General description: Same as pnt. #1

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

Observation Point 4 GPS Pt_____ GPS Lat. Long	**Observation Point 5** GPS Pt_____ GPS Lat. Long	**Observation Point 6** GPS Pt_____ GPS Lat. Long	**Observation Point 7** GPS Pt_____ GPS Lat. Long
Community type:_____ Additional data: Site form2____ form 3_____	Community type:_____ Additional data: Site form2____ form 3____	Community type:_____ Additional data: Site form2____ form 3_____	Community type:_____ Additional data: Site form2____ form 3_____
General Description: Same as pnt. #1	General Description: Same as pnt. #1	General Description: Same as pnt. #1	General Description: Same as pnt #1

Natural Heritage & Endangered Species Program

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

FORM 2: NATURAL COMMUNITY SUMMARY AND RANKING

(A location map must accompany this form.)

rev. June 2006

A. Identifiers:

Community Name (MNHESP: Swain & Kearsley, 2000): Hemlock forest

NatureServe Association Name (Optional): Hemlock Ravine

Survey Date: 7/17/2014 Today's Date:

Survey Site Name: A6

Surveyor Name(s): Steve Knapp, Sarah Drahovzal

Best Source (Field survey or secondary source used to complete this form, **NHESP use**): Field survey

Transcriber (**NHESP use only**. YY-MM-DD XXX): Town Name: Northfield, MA

Directions to site: See form 1

GPS Point(s) X Yes No Latitude 42.604 Longitude -72.444

B. Community Description:

Vegetation Description (*EODATA*: **Summarize** the vegetation: dominant and/or characteristic species, indicator species, community structure, variants/microhabitat features, unvegetated surface; spatial distribution (i.e., size, number, and separation distance of patches); intact natural processes, geology, hydrology, topography, and soil properties, especially if relevant to the community identification):

- Hemlock dominant (90%) w/ some red maple
- Little understory some Starflower, bobble bush

Estimated size (acres) GIS Acres (if available)

Physical Description (*GENDESC*: Describe the landscape surrounding the community, including the natural area. Both within and surrounding the community, describe: physical structures and land use practices; natural disturbances; embedded, adjacent, and nearby natural communities including aquatic features; notable landforms; scenic qualities):

- Medium - aged hemlock
- little disturbance
- adjacent to stream
- low development pressure (hiking trails)

Is community on conservation land (if known): no Managed Area Name: Northlight project boundary

Evidence of Disturbance/Threats to the Community/Management Recommendations (*MGMTCOM*: Describe the anthropogenic disturbances that have decreased the quality and viability of the community such as hydrologic alterations (ditching, damming, erosion etc.), logging, mining, livestock grazing, plantations, orchards, structures, trampling, and exotic flora or fauna within and surrounding the community. Discuss threats to the site and management implications.): Little threat

Recreational Use (evidence of ATV's, ORV's, mountain bikes, horses, walking trails, etc.):
hiking trails

Protection Comments (*PROTCOM*: Comment on the legal protectability of the site): _____

General Comments (*COMMENTS*: Note the type of sampling done; observation point (form 1), releve plot (form 3), plant list, etc.; note any additional field work needed. Comment on questionable identification.): _____
Transect

Owner's Name (if known): _____ Telephone: (__) _____

Address: _____

Is Owner: aware of community? __yes _no __unknown; Protecting community? __yes __no __unknown

Owner Comments (*OWNERCOM*: e.g., contact owner prior to visiting the site): _____

C: Community Element Occurrence Ranking: (Refer to community ranking specifications for assistance.)

Community Size Rank: (Compare relative size to other known occurrences, configuration, patchiness)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community Condition Rank: (Consider development/maturity (e.g., old growth), abiotic condition, species and physiognomic diversity, ecological processes, abundance of exotic species, internal connectivity, degree of anthropogenic disturbance including fragmentation).

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community Landscape Context Rank: (Consider the size and connectivity of the natural landscape, the position of the community within the landscape, and the landscape condition)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community EO Rank: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality? A summary of all factors listed above. Explain the basis of your ranking: range wide, state wide, or locally.)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments (*EORANKCOM:* Summarize the above and justify the EO Rank assigned): _____

Other rare species and/or natural communities observed at this site (NHESP use) T/U = Transcribed/Updated?):

	SPECIES OR COMMUNITY	T/U?		SPECIES OR COMMUNITY	T/U?
1			4		
2			5		
3			6		

Form 3: Quantitative Community Characterization

June 2006

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

1. Community type (observed): Hemlock Ravine
2. GPS Point: A6
3. Assigned type (NHESP use): Hemlock Ravine
4. Lat: 42.605 N Long -72.444 W
5. Site name: Northfield Mountain
6. Quad name(s):
7. Ecoregion (DFW):
8. County name(s): Franklin CO.
9. Town: Northfield, MA
10. Directions: See from 1
11. Survey date 7/17/2014
12. Previous observations at this site:
13. Surveyors: Steve Knapp, Sarah Dunbar

B. Environmental Description

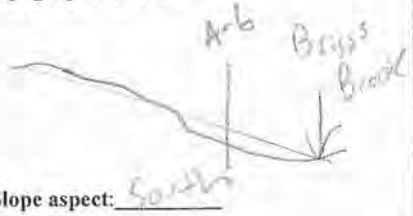
14. **PLOT #** A6

15. **Photos taken** (Y) **N; Identfier** 971-973

16. **Elevation (from topo):** 240 (m) or ft

17. **Topographic position**:
- ___ Summit/Crest
- ___ High slope ___ Step in slope
- ___ Mid slope ___ Toe of slope
- X Low slope
- ___ Rolling Terrain
- ___ Level ___ Channel wall
- ___ Basin floor ___ Channel bed
- ___ Other

18. **Topographic sketch:**



19. **Slope aspect:** South

20. **Slope Class** (Percent):
- Flat (<2%) Steep (48-95%)
- (Gentle (2-9%)) Very Steep (>95%)
- Moderate (10-25%) Abrupt (cliff or ledge)
- Rather Steep (26-47%)

21. **Slope Shape**:

Vertically: (Concave) Convex Linear

Horizontally: (Concave) Convex Linear

22. **Downed Wood**
(within or partially within plot)

-Max. diameter/length/decay class: _____

-Average diameter for all downed wood ≥4 in. 5-10 (estimate)

-Abundance of downed wood ≥4 in. diameter (using cover classes) +

23. **Fuel load (< ¼ inch in diameter)**:
Low = (1) Moderate = 2 High = 3

24. **Snags ≥ 4" DBH**: Species DBH height
- Ø

25. **Un-vegetated surface (check the single, most dominant feature)**:
- ___ Bedrock
- ___ Large rocks (boulders > 24 in.)
- ___ Small rocks (stones 10-24 in.)
- ___ Cobbles (2-9 in.)
- ___ Gravel (<2 in.)
- ___ Sand
- ___ Litter
- X Bare soil
- ___ Water
- ___ Other: _____

26. **Combined litter & duff depth:**
2" inches

27. **Parent material:** till

28. **Moisture regime:**
- ___ Very dry
- ___ Dry ___ Wet
- X Moist ___ Saturated
- ___ Periodically inundated
- ___ Permanently inundated

29. **Soil type** (if observed)
- ___ sand ___ loam
- ___ clay ___ peat
- ___ muck

other_____

30. **Sphagnum hummocks overhanging water:** NONE
(only if >25 m² and visible from plot)
GPS point (location): _____
Size of habitat: _____
3 water depths _____ (max. inches)
Circle: Moving channels or Pools of Water
Comments: _____

31. **Evidence of Land Use History:**
stone walls, barbed wire, wolf trees
cut stumps, multi-trunk trees,
foundations, wells
Other Trails

32. **Evidence of Disturbance:**
Fires: fire scars, charcoal, standing snags
Blowdowns: aligned downed trees
Ice damage: broken tree tops
Disease: adelgid, gypsy moth, beech bark
Other: NONE

33. **Environmental Comments**: vegetation homogeneity, erosion / sedimentation, invasive species presence/distribution, etc:

C. VEGETATION 34. **System:** X Terrestrial ___ Palustrine ___ Estuarine 35. **PLOT NUMBER:** A6 36. **Plot Dimensions:** 30'

37. **Leaf phenology:**
- ___ Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- X Evergreen
- ___ Perennial
- ___ Annual

38. **Physiognomic type:**
- X Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular
- ___ Sparsely vegetated

39. **Photo Cover Type:** _____ 39a. **Field-Observed Cover Type:** _____

40. **Strata/life forms**

	height (m or ft)	% cover
T1 Emergent tree		+
T2 Tree canopy		5
T3 Tree sub- canopy		+
S1 Tall shrub		+
S2 Short shrub		1
H Herbaceous		1
N Non-vascular		1
V Vine / liana		+

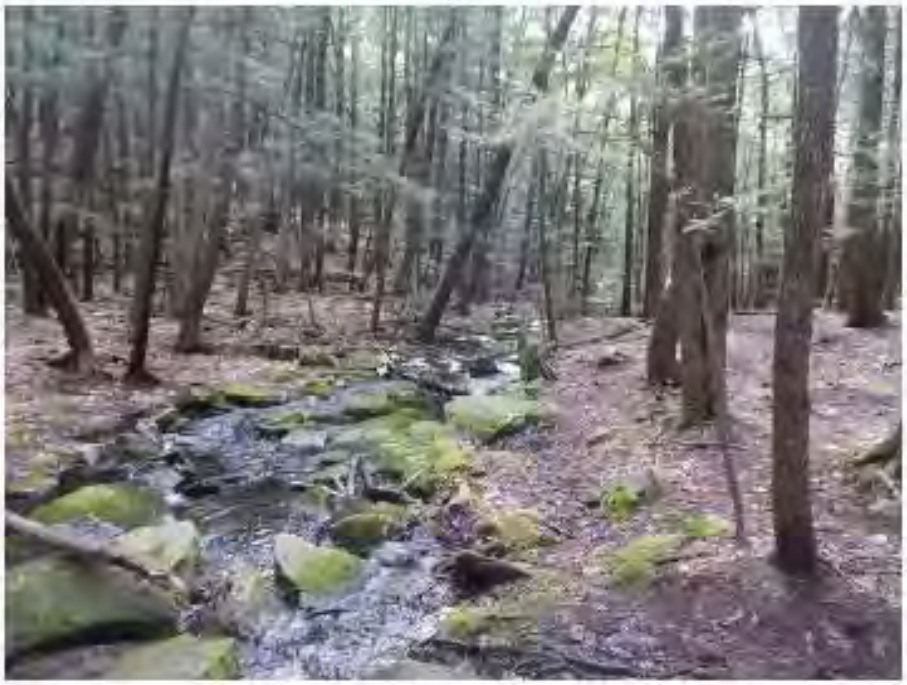
Cover Classes
- + <1%
- 1 =1-5%
- 2 =6-25%
- 3 =26-50%
- 4 =51-75%
- 5 >75%

41. **Plant Species & abundance**: list each species and the corresponding cover class for each stratum.

Hemlock	T2				
Red maple	T2				
Star flower	H				
Hobblebush	S2				

А6

A6



COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. June 2006

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: Northfield MA
2. Survey site name: A7
3. Town (LOCALJURIS): Northfield, MA
4. Directions: I-91 to exit 27 in Greenfield MA. Follow Rt. 2 east to the intersection of Rt. 2 & Rt. 63. Take rt. 63 2.5 miles north. Turn east onto the Main Access Rd & follow to Northfield Mt.
5. GPS (if not below) _____ Lat. _____ Long _____ Make and Model Trimble GEO-6000
6. Sourcecode (NHESP use): _____ 7. Survey date 7/17/2014 8. Main Surveyor: Steve Trapp
9. Other Surveyors: Sarah Drohozal

B. Topography 10. Transect A7

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

C. Vegetation / Habitat

12. Observation point 1. GPS Pt A7 GPS Lat. 42.621 Long -72.431	Observation point 2 GPS Pt_____ GPS Lat. Long	Observation point 3 GPS Pt._____ GPS Lat. Long
13. Community type: Harvested 14. Additional data: Site form2 X form 3 X	Community type:_____ Additional data: Site form2____ form 3____	Community type:_____ Additional data: Site form2____ form 3____
15. General description (physiognomy, characteristic & dominant spp. of all layers) Harvested forest. Very disturbed w/ little duff & no herbaceous layer. Open canopy w/ Red oak, American beech, hemlock, Chestnut, Stripped maple & White pine	General description: Same as pt #1	General description: Same as pnt. #1

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

Observation Point 4 GPS Pt_____	**Observation Point 5** GPS Pt_____	**Observation Point 6** GPS Pt_____	**Observation Point 7** GPS Pt_____
GPS Lat. Long	GPS Lat. Long	GPS Lat. Long	GPS Lat. Long
Community type:_____ Additional data: Site form2___form 3_____	Community type:_____ Additional data: Site form2____form 3____	Community type:_____ Additional data: Site form2____form 3_____	Community type:_____ Additional data: Site form2___ form 3_____
General Description: Same as pnt. #1	General Description: Same as pnt. #1	General Description: Same as pnt. #1	General Description: Same as pnt. #1

Natural Heritage & Endangered Species Program

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

FORM 2: NATURAL COMMUNITY SUMMARY AND RANKING

rev. June 2006

(A location map must accompany this form.)

A. Identifiers:

Community Name (MNHESP: Swain & Kearsley, 2000):

NatureServe Association Name (Optional): Successional - Northern Hardwood

Survey Date: 7/17/2014 Today's Date:

Survey Site Name: Harvested A7

Surveyor Name(s): Sarah Drahozal, Steve Knapp

Best Source (Field survey or secondary source used to complete this form, **NHESP use**): Field Survey

Transcriber (**NHESP use only**. YY-MM-DD XXX): Town Name: Northfield, MA

Directions to site: See form 1

GPS Point(s) X Yes No Latitude 42.621 Longitude -72.431

B. Community Description:

Vegetation Description (*EODATA*: **Summarize** the vegetation: dominant and/or characteristic species, indicator species, community structure, variants/microhabitat features, unvegetated surface; spatial distribution (i.e., size, number, and separation distance of patches); intact natural processes, geology, hydrology, topography, and soil properties, especially if relevant to the community identification):

Harvested forest - very disturbed w/ no herbaceous layer. Open canopy w/ Red oak, American beech, hemlock, Chestnut, Striped maple, & White pine

Estimated size (acres) GIS Acres (if available)

Physical Description (*GENDESC*: Describe the landscape surrounding the community, including the natural area. Both within and surrounding the community, describe: physical structures and land use practices; natural disturbances; embedded, adjacent, and nearby natural communities including aquatic features; notable landforms; scenic qualities):

Heavily harvested area near upper resivoir

Is community on conservation land (if known): No Managed Area Name: Northern light project boundary

Evidence of Disturbance/Threats to the Community/Management Recommendations (*MGMTCOM*: Describe the anthropogenic disturbances that have decreased the quality and viability of the community such as hydrologic alterations (ditching, damming, erosion etc.), logging, mining, livestock grazing, plantations, orchards, structures, trampling, and exotic flora or fauna within and surrounding the community. Discuss threats to the site and management implications.): Heavily harvested w/ logging trails

Recreational Use (evidence of ATV's, ORV's, mountain bikes, horses, walking trails, etc.): none

Protection Comments (*PROTCOM*: Comment on the legal protectability of the site): none

General Comments (*COMMENTS*: Note the type of sampling done; observation point (form 1), releve plot (form 3), plant list, etc.; note any additional field work needed. Comment on questionable identification.): Transect - plant list

Owner's Name (if known): _____ Telephone: (__)_____

Address: _____

Is Owner: aware of community? __yes _no __unknown; Protecting community? __yes __no __unknown

Owner Comments (*OWNERCOM*: e.g., contact owner prior to visiting the site): _____

C: Community Element Occurrence Ranking: (Refer to community ranking specifications for assistance.)

Community Size Rank: (Compare relative size to other known occurrences, configuration, patchiness)

A – Excellent (**B**) – Good **C** – Marginal **D** - Poor

Comments: large harvested area

Community Condition Rank: (Consider development/maturity (e.g., old growth), abiotic condition, species and physiognomic diversity, ecological processes, abundance of exotic species, internal connectivity, degree of anthropogenic disturbance including fragmentation).

A – Excellent **B** – Good **C** – Marginal (**D**) - Poor

Comments: heavily harvested

Community Landscape Context Rank: (Consider the size and connectivity of the natural landscape, the position of the community within the landscape, and the landscape condition)

A – Excellent **B** – Good **C** – Marginal (**D**) - Poor

Comments: _____

Community EO Rank: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality? A summary of all factors listed above. Explain the basis of your ranking: range wide, state wide, or locally.)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments (*EORANKCOM:* Summarize the above and justify the EO Rank assigned): _____

Other rare species and/or natural communities observed at this site (**NHESP use**) T/U = Transcribed/Updated?):

	SPECIES OR COMMUNITY	T/U?		SPECIES OR COMMUNITY	T/U?
1			4		
2			5		
3			6		

Form 3: Quantitative Community Characterization

June 2006

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

1. Community type (observed): Harvested
2. GPS Point: A7
3. Assigned type (NHESP use): Successional Northern Hardwood
4. Lat: 42.621 N Long -72.431 W
5. Site name: Northfield Mt.
6. Quad name(s):
7. Ecoregion (DFW):
8. County name(s): Franklin Co.
9. Town: Northfield, MA
10. Directions: See form 1
11. Survey date 7/17/2014
12. Previous observations at this site:
13. Surveyors: Sarah Drabowski & Steve Knapp

B. Environmental Description

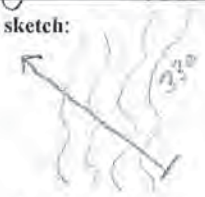
14. **PLOT #** A7

15. **Photos taken** (Y) N; **Identfier** 992-994

16. **Elevation (from topo):** 320 (m) or ft

17. **Topographic position**:
- ___ Summit/Crest
- ___ High slope ___ Step in slope
- ___ Mid slope ___ Toe of slope
- X Low slope
- ___ Rolling Terrain
- ___ Level ___ Channel wall
- ___ Basin floor ___ Channel bed
- ___ Other

18. **Topographic sketch:**



19. **Slope aspect:** North west

20. **Slope Class** (Percent):
- Flat (<2%) Steep (48-95%)
- (Gentle (2-9%)) Very Steep (>95%)
- Moderate (10-25%) Abrupt (cliff or ledge)
- Rather Steep (26-47%)

21. **Slope Shape**:

Vertically: Concave (Convex) Linear

Horizontally: Concave (Convex) Linear

22. **Downed Wood**
(within or partially within plot)

-Max. diameter/length/decay class: _____

-Average diameter for all downed wood ≥4 in. Ø (estimate)

-Abundance of downed wood ≥4 in. diameter (using cover classes) Ø

23. **Fuel load (< ¼ inch in diameter)**:
Low = (1) Moderate = 2 High = 3

24. **Snags ≥ 4" DBH**: Species DBH height

Ø

25. **Un-vegetated surface (check the single, most dominant feature):**
- ___ Bedrock
- ___ Large rocks (boulders > 24 in.)
- ___ Small rocks (stones 10-24 in.)
- ___ Cobbles (2-9 in.)
- ___ Gravel (<2 in.)
- ___ Sand
- ___ Litter
- X Bare soil
- ___ Water
- ___ Other: _____

26. **Combined litter & duff depth:**
Ø inches

27. **Parent material:** till

28. **Moisture regime**:
- ___ Very dry
- X Dry ___ Wet
- ___ Moist ___ Saturated
- ___ Periodically inundated
- ___ Permanently inundated

29. **Soil type** (if observed)
- ___ sand X loam
- ___ clay ___ peat
- ___ muck

other _____

30. **Sphagnum hummocks overhanging water:** NONE
(only if >25 m² and visible from plot)

GPS point (location): _____

Size of habitat: _____

3 water depths _____ (max. inches)

Circle: Moving channels or Pools of Water

Comments: _____

31. **Evidence of Land Use History:**

stone walls, barbed wire, wolf trees

cut stumps, multi-trunk trees,

foundations, wells

Other Timber harvest

32. **Evidence of Disturbance:**

Fires: fire scars, charcoal, standing snags

Blowdowns: aligned downed trees

Ice damage: broken tree tops

Disease: (adelgid), gypsy moth, beech bark

Other: Timber harvest

33. **Environmental Comments**: vegetation homogeneity, erosion / sedimentation, invasive species presence/distribution, etc:

Harvested

C. VEGETATION 34. **System:** X Terrestrial ___ Palustrine ___ Estuarine 35. **PLOT NUMBER:** A7 36. **Plot Dimensions:** 30'

37. **Leaf phenology:**
- X Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- ___ Perennial
- ___ Annual

38. **Physiognomic type:**
- X Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular
- ___ Sparsely vegetated

39. **Photo Cover Type:** _____ 39a. **Field-Observed Cover Type:** _____

40. **Strata/life forms**	**height (m or ft)**	**% cover**
T1 Emergent tree		+
T2 Tree canopy		2
T3 Tree sub- canopy		+
S1 Tall shrub		+
S2 Short shrub		+
H Herbaceous		+
N Non-vascular		+
V Vine / liana		+

Cover Classes
+ <1%
1 =1-5%
2 =6-25%
3 =26-50%
4 =51-75%
5 >75%

41. **Plant Species & abundance**: list each species and the corresponding cover class for each stratum.

Red Oak	T2				
American Beech	T2				
Hemlock	T2				
Chestnut	T2				
Striped maple	T2				
White Pine	T2				

A7

A7

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. June 2006

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: Northfield MA
2. Survey site name: AB
3. Town (LOCALJURIS): Northfield, MA
4. Directions: I-91 to exit 27 in Greenfield, MA Follow Rte 2 east to the intersection of Rt. 2 & Rt. 63. Take Rt. 63 2.5 miles north. Turn east onto Main Access Rd. ½ follow to Northfield MA.
5. GPS (if not below) _____ Lat. _____ Long _____ Make and Model Trimble GEO-6000
6. Sourcecode (NHESP use): _____
7. Survey date 7/17/2014
8. Main Surveyor: Steve Knapp
9. Other Surveyors: Sarah Dahowza

B. Topography

10. Transect AB

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

C. Vegetation / Habitat

12. Observation point 1. GPS Pt AB GPS Lat. 42.622 Long -72.43	Observation point 2 GPS Pt _____ GPS Lat. Long	Observation point 3 GPS Pt. _____ GPS Lat. Long
13. Community type: Black birch regen 14. Additional data: Site form2 X form 3 X	Community type: _____ Additional data: Site form2 ____ form 3 ____	Community type: _____ Additional data: Site form2 ____ form 3 ____
15. General description (physiognomy, characteristic & dominant spp. of all layers) Regen area dominated by young black birch. w/ some white birch Bisected by logging trails. Understory includes woodfern, Starflower, Rhododendron	General description: Same as pnt. #1	General description: Same as pnt. #1

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

Observation Point 4 GPS Pt_____ GPS Lat. Long	**Observation Point 5** GPS Pt_____ GPS Lat. Long	**Observation Point 6** GPS Pt_____ GPS Lat. Long	**Observation Point 7** GPS Pt_____ GPS Lat. Long
Community type:_____ Additional data: Site form2____form 3_____	Community type:_____ Additional data: Site form2_____form 3_____	Community type:_____ Additional data: Site form2____form 3_____	Community type:_____ Additional data: Site form2____ form 3_____
General Description: Same as pnt. #1	General Description: Same as pnt. #1	General Description: Same as pnt #1	General Description: Same as pnt. #1

Natural Heritage & Endangered Species Program

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

FORM 2: NATURAL COMMUNITY SUMMARY AND RANKING

rev. June 2006

(A location map must accompany this form.)

A. Identifiers:

Community Name (MNHESP: Swain & Kearsley, 2000): Successional Northern Hardwoods (Black Birch regen)
NatureServe Association Name (Optional): _____
Survey Date: 7/17/2014 Today's Date: _____
Survey Site Name: 4B
Surveyor Name(s): Steve Knapp, Sarah Dahlgren
Best Source (Field survey or secondary source used to complete this form, **NHESP use**): Field Survey

Transcriber (**NHESP use only**, YY-MM-DD XXX): _____ Town Name: Northfield, MA
Directions to site: See form 1

GPS Point(s) X Yes ___ No ___ Latitude 42.622 Longitude -72.43

B. Community Description:

Vegetation Description (*EODATA*: **Summarize** the vegetation: dominant and/or characteristic species, indicator species, community structure, variants/microhabitat features, unvegetated surface; spatial distribution (i.e., size, number, and separation distance of patches); intact natural processes, geology, hydrology, topography, and soil properties, especially if relevant to the community identification): _____

Regen area dominated by young black birch w/ some white birch. Understory includes Woodfern, Starflower, & rhododendron

Area is bisected by logging trails

_____ Estimated size (acres) GIS Acres (if available) _____

Physical Description (*GENDESC*: Describe the landscape surrounding the community, including the natural area. Both within and surrounding the community, describe: physical structures and land use practices; natural disturbances; embedded, adjacent, and nearby natural communities including aquatic features; notable landforms; scenic qualities): _____

Area of regen adjacent to harvested area

Is community on conservation land (if known): No Managed Area Name: Northern light project boundary

Evidence of Disturbance/Threats to the Community/Management Recommendations (*MGMTCOM*: Describe the anthropogenic disturbances that have decreased the quality and viability of the community such as hydrologic alterations (ditching, damming, erosion etc.), logging, mining, livestock grazing, plantations, orchards, structures, trampling, and exotic flora or fauna within and surrounding the community. Discuss threats to the site and management implications.): Area bisected by logging trails

Recreational Use (evidence of ATV's, ORV's, mountain bikes, horses, walking trails, etc.):

Protection Comments (*PROTCOM*: Comment on the legal protectability of the site): D

General Comments (*COMMENTS*: Note the type of sampling done; observation point (form 1), releve plot (form 3), plant list, etc.; note any additional field work needed. Comment on questionable identification.): Transect - plant list

Owner's Name (if known): _____ Telephone: (__)_____

Address: _____

Is Owner: aware of community? __yes _no __unknown; Protecting community? __yes __no __unknown

Owner Comments (*OWNERCOM*: e.g., contact owner prior to visiting the site): _____

C: Community Element Occurrence Ranking: (Refer to community ranking specifications for assistance.)

Community Size Rank: (Compare relative size to other known occurrences, configuration, patchiness)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community Condition Rank: (Consider development/maturity (e.g., old growth), abiotic condition, species and physiognomic diversity, ecological processes, abundance of exotic species, internal connectivity, degree of anthropogenic disturbance including fragmentation).

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community Landscape Context Rank: (Consider the size and connectivity of the natural landscape, the position of the community within the landscape, and the landscape condition)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community EO Rank: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality? A summary of all factors listed above. Explain the basis of your ranking: range wide, state wide, or locally.)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments (*EORANKCOM:* Summarize the above and justify the EO Rank assigned): _____

Other rare species and/or natural communities observed at this site (NHESP use) T/U = Transcribed/Updated?):

	SPECIES OR COMMUNITY	T/U?		SPECIES OR COMMUNITY	T/U?
1			4		
2			5		
3			6		

Form 3: Quantitative Community Characterization

MA Natural Heritage & Endangered Species Program

June 2006

Identifiers (general EOR information)

1. Community type (observed): Black Birch regen
2. GPS Point: A8
3. Assigned type (NHESP use): Successional Northern Hardwood
4. Lat: 42.682 N Long -72.43 W
5. Site name: Northfield Mountain
6. Quad name(s):
7. Ecoregion (DFW):
8. County name(s): Franklin Co.
9. Town: Northfield, MA
10. Directions: See form 1
11. Survey date 7/17/2014
12. Previous observations at this site:
13. Surveyors: Steve Knapp & Sarah Dahovzal

B. Environmental Description

14. **PLOT #**

15. **Photos taken** (Y) N; **Identfier** 995-996

16. **Elevation (from topo):** 330 (m) or ft

17. **Topographic position:**
___Summit/Crest
___High slope ___Step in slope
___Mid slope ___Toe of slope
X Low slope
___Rolling Terrain
___Level ___Channel wall
___Basin floor ___Channel bed
___Other

18. **Topographic sketch:**

19. **Slope aspect:** West

20. **Slope Class** (Percent):
Flat (<2%) Steep (48-95%)
(Gentle (2-9%)) Very Steep (>95%)
Moderate (10-25%) Abrupt (cliff or ledge)
Rather Steep (26-47%)

21. **Slope Shape:**
Vertically: Concave (Convex) Linear
Horizontally: Concave (Convex) Linear

22. **Downed Wood**
(within or partially within plot)
-Max. diameter/length/decay class: 5
-Average diameter for all downed wood ≥4 in. 8 (estimate)
-Abundance of downed wood ≥4 in. diameter (using cover classes) D

23. **Fuel load (< ¼ inch in diameter):**
Low = (1) Moderate = 2 High = 3

24. **Snags ≥ 4" DBH:**

Species	DBH	height
B		

25. **Un-vegetated surface (check the single, most dominant feature):**
___ Bedrock
___ Large rocks (boulders > 24 in.)
___ Small rocks (stones 10-24 in.)
___ Cobbles (2-9 in.)
___ Gravel (<2 in.)
___ Sand
X Litter
___ Bare soil
___ Water
___ Other:

26. **Combined litter & duff depth:** 0-1 inches

27. **Parent material:** Till

28. **Moisture regime:**
___Very dry
X Dry
___Moist
___Wet
___Saturated
___Periodically inundated
___Permanently inundated

29. **Soil type** (if observed)
___sand
___clay
X loam
___peat
___muck
other

30. **Sphagnum hummocks overhanging water:** None
(only if >25 m² and visible from plot)
GPS point (location):
Size of habitat:
3 water depths (max. inches)
Circle: Moving channels or Pools of Water
Comments:

31. **Evidence of Land Use History:**
stone walls, barbed wire, wolf trees
cut stumps, multi-trunk trees,
foundations, wells
Other historic timber harvest

32. **Evidence of Disturbance:**
Fires: fire scars, charcoal, standing snags
Blowdowns: aligned downed trees
Ice damage: broken tree tops
Disease: adelgid, gypsy moth, beech bark
Other: timber harvest

33. **Environmental Comments:** vegetation homogeneity, erosion / sedimentation, invasive species presence/distribution, etc:
Black birch regen

C. VEGETATION 34. **System:** X Terrestrial ___ Palustrine ___ Estuarine 35. **PLOT NUMBER:** AB 36. **Plot Dimensions:** 33'

37. **Leaf phenology:**
- X Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- ___ Perennial
- ___ Annual

38. **Physiognomic type:**
- X Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular
- ___ Sparsely vegetated

39. **Photo Cover Type:** _____ 39a. **Field-Observed Cover Type:** _____

40. **Strata/life forms**	**height (m or ft)**	**% cover**	**Cover Class**
T1 Emergent tree		+	+ <1%
T2 Tree canopy		3	1 =1-5%
T3 Tree sub- canopy		+	2 =6-25%
S1 Tall shrub		+	3 =26-50%
S2 Short shrub		1	4 =51-75%
H Herbaceous		1	5 >75%
N Non-vascular		+	
V Vine / liana		+	

41. **Plant Species & abundance:** list each species and the corresponding cover class for each stratum.

Black Birch	T2				
White Birch	T2				
Rhododendron	S2				
Wood fern	H				
Star flower	H				

A8

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. June 2006

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: Northfield Mtn. 2. Survey site name: A9

3. Town (LOCALJURIS): Northfield, MA 4. Directions: Take I-91 to exit 27 in Greenfield, MA. Follow Rte. 2 east to the intersection of Rte. 2 & Rte. 63. Take rte 63 2.5 miles north. Turn east onto Main Access Rd & follow to Northfield Mt.

5. GPS (if not below) _____ Lat. _____ Long _____ Make and Model Trimble GEO-6000

6. Sourcecode (NHESP use): _____ 7. Survey date 7/17/2014 8. Main Surveyor: Steve Knapp

9. Other Surveyors: Sarah Dabrozal

B. Topography 10. Transect

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

C. Vegetation / Habitat

12. Observation point 1. GPS Pt A9 GPS Lat. 42.622 Long -72.433	Observation point 2 GPS Pt_____ GPS Lat. Long	Observation point 3 GPS Pt._____ GPS Lat. Long
13. Community type: Hardwood 14. Additional data: Site form2 X form 3 X	Community type:_____ Additional data: Site form2____ form 3____	Community type:_____ Additional data: Site form2____ form 3____
15. General description (physiognomy, characteristic & dominant spp. of all layers) Medium-aged hardwood forest dominated by Black Birch & White Birch. Understory includes Striped maple, hobble bush, & Wood fern adjacent to harvested area	General description: Same as pnt #1	General description: Same as pnt. #1

11. A topo map must also be attached with location indicated. Reconnaissance diagram: Scale:

Observation Point 4 GPS Pt_____ GPS Lat. Long	**Observation Point 5** GPS Pt_____ GPS Lat. Long	**Observation Point 6** GPS Pt_____ GPS Lat. Long	**Observation Point 7** GPS Pt_____ GPS Lat. Long
Community type:_____ Additional data: Site form2____ form 3_____	Community type:_____ Additional data: Site form2____ form 3_____	Community type:_____ Additional data: Site form2____ form 3_____	Community type:_____ Additional data: Site form2____ form 3_____
General Description: Same as pt #1	General Description: Same as pt #1	General Description: Same as pt #1	General Description: Same as pt #1

Natural Heritage & Endangered Species Program

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
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Westborough, MA 01581
(508) 792-7270 ext. 200

FORM 2: NATURAL COMMUNITY SUMMARY AND RANKING

rev. June 2006

(A location map must accompany this form.)

A. Identifiers:

Community Name (MNHESP: Swain & Kearsley, 2000): Successional Northern Hardwoods

NatureServe Association Name (Optional):

Survey Date: 7/17/2014 Today's Date:

Survey Site Name: A9

Surveyor Name(s): Steve Knapp & Sarah Dubowski

Best Source (Field survey or secondary source used to complete this form, **NHESP use**): Field Survey

Transcriber (**NHESP use only**. YY-MM-DD XXX): Town Name: Northfield, MA

Directions to site: See form 1

GPS Point(s) X Yes No Latitude 42.622 Longitude -72.437

B. Community Description:

Vegetation Description (*EODATA*: **Summarize** the vegetation: dominant and/or characteristic species, indicator species, community structure, variants/microhabitat features, unvegetated surface; spatial distribution (i.e., size, number, and separation distance of patches); intact natural processes, geology, hydrology, topography, and soil properties, especially if relevant to the community identification):

Medium-aged hardwood forest dominated by black birch & white birch. Understory includes striped maple, hobble bush, & wood fern

Estimated size (acres) GIS Acres (if available)

Physical Description (*GENDESC*: Describe the landscape surrounding the community, including the natural area. Both within and surrounding the community, describe: physical structures and land use practices; natural disturbances; embedded, adjacent, and nearby natural communities including aquatic features; notable landforms; scenic qualities):

Adjacent to harvested area

Is community on conservation land (if known): no Managed Area Name: Northern light project boundary

Evidence of Disturbance/Threats to the Community/Management Recommendations (*MGMTCOM*: Describe the anthropogenic disturbances that have decreased the quality and viability of the community such as hydrologic alterations (ditching, damming, erosion etc.), logging, mining, livestock grazing, plantations, orchards, structures, trampling, and exotic flora or fauna within and surrounding the community. Discuss threats to the site and management implications.): Adjacent to harvested area & Reservoir

Recreational Use (evidence of ATV's, ORV's, mountain bikes, horses, walking trails, etc.): 0

Protection Comments (*PROTCOM*: Comment on the legal protectability of the site): 0

General Comments (*COMMENTS*: Note the type of sampling done; observation point (form 1), releve plot (form 3), plant list, etc.; note any additional field work needed. Comment on questionable identification.): Transect - plant list

Owner's Name (if known): _____ Telephone: (__)_____

Address: _____

Is Owner: aware of community? __yes _no __unknown; Protecting community? __yes __no __unknown

Owner Comments (*OWNERCOM*: e.g., contact owner prior to visiting the site): _____

C: Community Element Occurrence Ranking: (Refer to community ranking specifications for assistance.)

Community Size Rank: (Compare relative size to other known occurrences, configuration, patchiness)

A – Excellent **B** – Good **C** – Marginal (**D** - Poor)

Comments: _____

Community Condition Rank: (Consider development/maturity (e.g., old growth), abiotic condition, species and physiognomic diversity, ecological processes, abundance of exotic species, internal connectivity, degree of anthropogenic disturbance including fragmentation).

A – Excellent **B** – Good (**C** - Marginal) **D** - Poor

Comments: _____

Community Landscape Context Rank: (Consider the size and connectivity of the natural landscape, the position of the community within the landscape, and the landscape condition)

A – Excellent **B** – Good (**C** - Marginal) **D** - Poor

Comments: _____

Community EO Rank: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality? A summary of all factors listed above. Explain the basis of your ranking: range wide, state wide, or locally.)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments (*EORANKCOM:* Summarize the above and justify the EO Rank assigned): _____

Other rare species and/or natural communities observed at this site (NHESP use) T/U = Transcribed/Updated?):

	SPECIES OR COMMUNITY	T/U?		SPECIES OR COMMUNITY	T/U?
1			4		
2			5		
3			6		

Form 3: Quantitative Community Characterization

June 2006

MA Natural Heritage & Endangered Species Program

entifiers (general EOR information)

1. Community type (observed): Hardwood forest 2. GPS Point: A9
3. Assigned type (NHESP use): Successional Northern Hardwood 4. Lat: 42.621 N Long -72.433 W
5. Site name: Northfield Mt. 6. Quad name(s):
7. Ecoregion (DFW): 8. County name(s): Franklin Co.
9. Town: Northfield, MA 10. Directions: See form 1
11. Survey date 7/17/2014 12. Previous observations at this site:
13. Surveyors: Steve Knapp & Sarah Drahovzal

B. Environmental Description

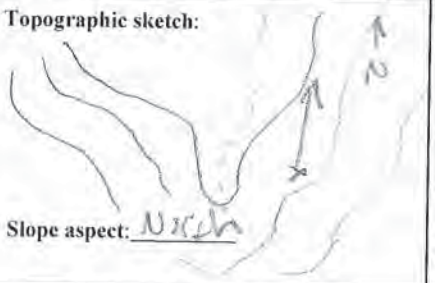
14. PLOT #

15. Photos taken Y N; **Identfier**

16. Elevation (from topo): (m) or ft

17. Topographic position:
- ___ Summit/Crest
- ___ High slope ___ Step in slope
- ___ Mid slope ___ Toe of slope
- X Low slope
- ___ Rolling Terrain
- ___ Level ___ Channel wall
- ___ Basin floor ___ Channel bed
- ___ Other

18. Topographic sketch:



19. Slope aspect: North

20. Slope Class (Percent):
- Flat (<2%) Steep (48-95%)
- (Gentle (2-9%)) Very Steep (>95%)
- Moderate (10-25%) Abrupt (cliff or ledge)
- Rather Steep (26-47%)

21. Slope Shape:

Vertically: Concave (Convex) Linear

Horizontally: Concave (Convex) Linear

22. Downed Wood
(within or partially within plot)

-Max. diameter/length/decay class: _____

-Average diameter for all downed wood ≥4 in. 5-10" (estimate)

-Abundance of downed wood ≥4 in. diameter (using cover classes) 1

23. Fuel load (< ¼ inch in diameter):

Low = (1) Moderate = 2 High = 3

24. Snags ≥ 4" DBH:

Species	DBH	height
0		

25. Un-vegetated surface (check the single, most dominant feature):
- ___ Bedrock
- ___ Large rocks (boulders > 24 in.)
- ___ Small rocks (stones 10-24 in.)
- ___ Cobbles (2-9 in.)
- ___ Gravel (<2 in.)
- ___ Sand
- X Litter
- ___ Bare soil
- ___ Water
- ___ Other: _____

26. Combined litter & duff depth: 4" inches

27. Parent material: till

28. Moisture regime:
- ___ Very dry
- ___ Dry ___ Wet
- X Moist ___ Saturated
- ___ Periodically inundated
- ___ Permanently inundated

29. Soil type (if observed)
- ___ sand X loam
- ___ clay ___ peat
- ___ muck

other_____

30. Sphagnum hummocks overhanging water: NONE

(only if >25 m² and visible from plot)

GPS point (location): _____

Size of habitat: _____

3 water depths _____ (max. inches)

Circle: Moving channels or Pools of Water

Comments: _____

31. Evidence of Land Use History:

stone walls, barbed wire, wolf trees

cut stumps, multi-trunk trees,

foundations, wells

Other NONE

32. Evidence of Disturbance:

Fires: fire scars, charcoal, standing snags

Blowdowns: aligned downed trees

Ice damage: broken tree tops

Disease: adelgid, gypsy moth, beech bark

Other: NONE

33. Environmental Comments: vegetation homogeneity, erosion / sedimentation, invasive species presence/distribution, etc:

C. VEGETATION 34. **System:** X Terrestrial __ Palustrine __ Estuarine 35. **PLOT NUMBER:** A9 36. **Plot Dimensions:** 30'

37. **Leaf phenology:**
- X Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- ___ Perennial
- ___ Annual

38. **Physiognomic type:**
- X Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular
- ___ Sparsely vegetated

39. **Photo Cover Type:** _____ 39a. **Field-Observed Cover Type:** _____

40. **Strata/life forms**

	height (m or ft)	% cover	Cover Cla.
T1 Emergent tree		+	+ <1%
T2 Tree canopy		4	1 =1-5%
T3 Tree sub- canopy		1	2 =6-25%
S1 Tall shrub		1	3 =26-50%
S2 Short shrub		1	4 =51-75%
H Herbaceous		1	5 >75%
N Non-vascular		+	
V Vine / liana		+	

41. **Plant Species & abundance**: list each species and the corresponding cover class for each stratum.

Black Birch	T2/T3				
White Birch	T2/T3				
Wood fern	H				
Striped maple	S1/2				
hobble bush	S1				

A9

APPENDIX C – MAMMAL SPECIES LIST

Table C.1: Northfield Mountain Pumped Storage Project 2014 Mammals List

Common Name	Scientific name
Beaver*	*Castor canadensis*
Black bear**	*Ursus americanus*
Bobcat	*Felix rufus*
Coyote**	*Canis latrans*
Deer mouse	*Peromyscus maniculatus*
Eastern chipmunk*	*Tamias striatus*
Eastern mole	*Scalopus aquaticus*
Fisher	*Martes pennanti*
Gray fox	*Urocyon cinereoargenteus*
Gray squirrel*	*Sciurus carolinensis*
Hairy-tailed mole	*Parascalops breweri*
Hoary bat	*Lasiurus cinereus*
House mouse	*Mus musculus*
Long-tailed shew	*Sorex dispar*
Masked shrew	*Sorex cinereus*
Meadow jumping mouse	*Zapus hudsonius*
Meadow vole	*Microtus pennsylvanicus*
Muskrat*	*Ondatra zibethicus*
New England cottontail	*Sylvilagus transitionalis*
Northern short-tailed shrew	*Blarina brevicauda*
Norway rat	*Rattus norvegicus*
Porcupine **	*Erethizon dorsatum*
Raccoon*	*Procyon lotor*
Red bat	*Lasiurus borealis*
Red fox**	*Vulpes vulpes*
Red squirrel*	*Tamiasciurus hudsonicus*
Silver-haired bat	*Lasionycteris noctivagans*
Star-nosed mole	*Condylura cristata*
Striped skunk	*Mephitis mephitis*
Virginia oppossum *	*Didelphis virginiana*
White-footed mouse	*Peromyscus leucopus*
White-tailed deer*	*Odocoileus virginianus*
Woodchuck	*Marmota monax*
Woodland jumping mouse	*Napaeozapus insignis*
Woodland vole	*Microtus pinetorum*

*** Denotes direct observation**

**** Denotes indirect observations**

APPENDIX D – REPTILE AND AMPHIBIAN SPECIES LIST

Table D.1: Northfield Mountain Pumped Storage Project 2014 Reptile and Amphibian List

Common Name	Scientific name
Frogs & Toads	
American bullfrog*	*Lithobates catesbeiana*
American toad*	*Anaxyrus americanus*
Fowler's toad	*Bufo fowleri*
Gray treefrog	*Hyla versicolor*
Green frog*	*Lithobates clamitans*
Northern leopard frog	*Lithobates pipiens*
Pickerel frog*	*Lithobates palustris*
Spring peeper*	*Pseudacris crucifer*
Wood frog*	*Lithobates sylvatica*
Salamanders	
Eastern red-backed salamander*	*Plethodon cinereus*
Northern dusky Salamander*	*Desmognathus fuscus*
Red -spotted newt*	*Notophthalmus viridescens*
Spotted salamander *	*Ambystoma maculatum*
Snakes	
Common ribbon snake	*Thamnophis sauritus*
Eastern garter snake*	*Thamnophis sirtalis*
Eastern ratsnake	*Pantherophis alleghaniensis*
Northern black racer	*Coluber constrictor*
Northern red-bellied snake	*Storeria occipitomaculata*
Northern ring-necked snake	*Diadophis punctatus edwardsii*
Northern watersnake*	*Nerodia sipedon*
Turtles	
Painted turtle*	*Chrysemys picta picta*
Snapping turtle*	*Chelydra serpentina*
Spotted turtle*	*Clemmys guttata*

*** Denotes Direct Observation**

APPENDIX E – BIRD SPECIES LIST

Table E.1: Northfield Mountain Pumped Storage Project 2014 Bird List
Bold X Indicates Commonly Observed Species

Species	CT River	Northfield Mountain					
		Total area	NW Slope	NE Slope	SE Slope	SW Slope	Reservoir
Baltimore Oriole	X						
Brown-headed Cowbird	X						
Common Grackle	X						
Orchard Oriole	X						
Red-winged Blackbird	X						
Double-crested Cormorant	X						
American Crow	X	X	X		X		X
Blue Jay	X	**X**	X	X	X	X	
Common Raven	X	X			X		
Black-billed Cuckoo	X	X	X				
Yellow-billed Cuckoo	X						
Canada Goose	X						
Common Merganser	X						
Mallard	X						
Mute Swan	X						
Wood Duck	X						
American Goldfinch	X	X	X		X		
Chipping Sparrow		X	X		X	X	**X**
Eastern Towhee		X	X				
Field Sparrow		X					X
Indigo Bunting	X	X	X	X	X		**X**
Rose-breasted Grosbeak		X	X		X		
Song Sparrow	**X**	X	X				X
Eastern Kingbird	X						
Eastern Phoebe	X	X	X	X	X	X	
Eastern Wood-Pewee		X	**X**	X	X	**X**	
Great Crested Flycatcher	X	X	X		X	X	
Least Flycatcher	X						
Wild Turkey		X	X		X	X	X
Ruby-throated Hummingbird		X	X			X	
Belted Kingfisher	X						
Black-capped Chickadee	X	X	X		X	X	
Brown Creeper		X	X		X		
Cedar Waxwing	X	X	X	X		X	X
Eastern Bluebird		X					X
European Starling		X	X				
Gray Catbird	**X**	X	X				
Northern Cardinal	X	X	X				
Northern Mockingbird		X	X				
Red-breasted Nuthatch		X	X		X		
Scarlet Tanager	X	X	X	X	X	X	
Tufted Titmouse	X	X	X		X	X	
White-breasted Nuthatch	X	X	X	X	X	X	
Winter Wren		X	X		X		

Species (continued)	CT River	Northfield Mountain					
		Total area	NW Slope	NE Slope	SE Slope	SW Slope	Reservoir
Rock Pigeon	X						
Bald Eagle	X	X					X
Coopers Hawk	X						
Broad-winged Hawk	X						
Osprey	X						
Peregrine Falcon		X			X		
Red-tailed hawk	X	X		X	X		
Turkey Vulture	X	X	X				X
Killdeer	X	X					X
Spotted Sandpiper	X	X					X
Greater Yellowlegs	X						
Bank Swallow	**X**	X					X
Barn Swallow	X						
Northern Rough-winged Swallow	X						
Tree Swallow	X	X					X
Chimney Swift	X						
American Robin	X	X	X		X		X
Hermit Thrush		X	X		X	X	
Veery	X	X	X	X	X	X	
Wood Thrush	X	X	X	X	X	X	
Blue-headed Vireo		X	X		X	X	
Red-eyed Vireo	X	**X**	**X**	**X**	**X**	**X**	X
Warbling Vireo	X						
Yellow-throated Vireo		X	X				
Great Blue Heron	X						
Green Heron	X						
American Redstart	X	X	X		X		
Black and White Warbler	X	X	**X**	X	X	X	
Blackburnian Warbler		X	X	X	**X**		
Black-throated Blue Warbler		X	X	X	X	X	
Black-throated Green Warbler	X	**X**	**X**	**X**	**X**	X	
Blue-winged Warbler	X						
Chestnut-sided Warbler	X	X	X				
Common Yellowthroat	X	X	X				X
Louisiana Waterthrush	X						
Oven Bird		**X**	**X**	**X**	**X**	**X**	
Pine Warbler		X	X		X	X	
Prairie Warbler		X	X				
Yellow Warbler	X						
Downy Woodpecker	X	X	X				
Hairy Woodpecker		X	X		X	X	
Northern Flicker		X				X	X
Pileated Woodpecker	X	X	X	X	X	X	
Yellow-bellied Sapsucker	X	X			X	X	
Total Number Observed	**64**	**59**	**47**	**17**	**36**	**26**	**18**

APPENDIX F – VERNAL POOL PHOTOS

Northfield Mountain Pumped Storage Project 2014 Vernal Pool Photo Documentation

VP-2

VP-3

VP-4

VP-5

VP-6

VP-7

VP-8

VP-9

VP-10

VP-11

VP-12

VP-13

VP-14

APPENDIX G – PLANT SPECIES LIST

Table G.1: Northfield Mountain Pumped Storage Project 2014 Plant List

Scientific Name	Common Name
Abies balsamea	balsam fir
Acer negundo	box elder
Acer pensylvanicum	striped maple
Acer rubrum	red maple
Achillea millefolium	yarrow
Acorus calamus	sweet flag
Alnus incana	speckled alder
Amelanchier canadensis	eastern serviceberry
Amphicarpaea bracteata	hog peanut
Antennaria plantaginifolia	plantain-leaved pussytoes
Apocynum androsaemifolium	spreading dogbane
Aquilegia canadensis	wild columbine
Arabis glabra	tower mustard
Aralia nudicaulis	wild sarsaparilla
Arctium minus	common burdock
Arctostaphylos uva-ursi	bearberry
Asclepias sp.	milkweed
Asplenium platyneuron	ebony spleenwort
Berberis thunbergii	Japanese barberry
Betula alleghaniensis	yellow birch
Betula lenta	black birch
Betula papyrifera	white birch
Betula populifolia	gray birch
Bidens frondosa	devil's begger-ticks
Caltha palustris	marsh marigold
Carex crinita	fringed sedge
Carex intumescens	bladder sedge
Carex lurida	shallow sedge
Carex scoparia	broom sedge
Carpinus caroliniana	American hornbeam
Carya ovata	shagbark hickory
Castanea dentata	American chestnut
Celastrus orbiculatus	oriental bittersweet
Centaurea maculosa	spotted knapweed
Chiaphila maculata	striped wintergreen
Cichorium intybus	common chicory
Circaea lutetiana	enchanter's nightshade
Clematis virginiana	virgin's bower
Comptonia peregrina	sweet fern
Coptis trifolia	goldthread
Cornus amomum	silky dogwood
Corydalis sempervirens	pale corydalis
Corylus americana	American hazelnut
Daucus carota	Queen Anne's lace
Dennstaendtia punctilobula	hay-scented fern
Desmondium glutinosum	tick-trefoil

Scientific Name	Common Name
Dianthus armeria	deptford pink
Dichanthelium clandestinum	deer-tongue grass
Dryopteris carthusiana	spinulose woodfern
Dryopteris marginalis	marginal wood-fern
Echium vulgare	viper's bugloss
Elaeagnus umbellata	autumn olive
Equisetum hyemale	scouring rush
Equisetum palustre	marsh horsetail
Erigeron sp.	fleabane
Euonymus alatus	burning bush
Eupatorium perfoliatum	boneset
Euthamia graminifolia	flat-top goldentop
Eutrochium sp.	joe-pye weed
Fagus grandifolia	American beech
Fallopia japonica	Japanese knotweed
Fragaria virginiana	wild strawberry
Frangula alnus	glossy buckthorn
Fraxinus pennsylvanica	green ash
Galium asprellum	rough bedstraw
Gaultheria procumbens	eastern teaberry
Glyceria sp.	mannagrass
Hamamelis virginiana	American witch-hazel
Hemerocallis sp.	daylily
Hepatica nobilis	hepatica
Hieracium caespitosum	hawkweed
Huperzia sp.	club moss
Hydrocotyle sp.	water pennywort
Hypericum canadense	Canada St. John's wort
Hypericum gentianoides	orangegrass
Ilex verticillata	winterberry
Impatiens capensis	common jewelweed
Iris versicolor	blue flag iris
Juncus effusus	soft rush
Juniperus virginiana	red cedar
Kalmia angustifolia	sheep laurel
Kalmia latifolia	mountain laurel
Lepidium campestre	field pepperweed
Lespedeza hirta	hairy bush clover
Leucanthemum vulgare	oxeye daisy
Lonicera oblongifolia	swamp honeysuckle
Lonicera sp.	Asian bush honeysuckle
Lotus corniculatus	bird's-foot trefoil
Lycopodium obscurum	ground pine
Lycopus americanus	water horehound
Lycopus uniflorus	northern bugleweed
Lysimachia borealis	starflower
Lysimachia quadrifolia	whorled loosestrife
Lythrum salicaria	purple loosestrife

Scientific Name	Common Name
Maianthemum canadense	Canada mayflower
Maianthemum racemosum	false Solomon's seal
Matteuccia struthiopteris	ostrich fern
Medeola virginiana	Indian cucumber
Melampyrum pratense	common cow-wheat
Melilotus albus	white sweet clover
Mitchella repens	partridge berry
Monotropa uniflora	Indian pipe
Onoclea sensibilis	sensitive fern
Osmunda claytoniana	interrupted fern
Osmunda regalis	royal fern
Osmundastrum cinnamomeum	cinnamon fern
Oxalis stricta	yellow woodsorrell
Parthenocissus quinquefolia	Virginia creeper
Phragmites australis	common reed
Phytolacca americana	American pokeweed
Pinus strobus	eastern white pine
Plantago major	common plantain
Polygonum sp.	smartweed
Polypodium virginianum	rock polypody
Polystichum acrostichoides	christmas fern
Populus deltoides	eastern cottonwood
Populus grandidentata	bigtooth aspen
Populus tremuloides	quaking aspen
Potentilla recta	rough-fruited cinquefoil
Potentilla simplex	common cinquefoil
Prunella sp.	self-heal
Prunus virginiana	chokecherry
Pteridium aquilinum	bracken fern
Quercus bicolor	swamp white oak
Quercus palustris	pin oak
Quercus alba	white oak
Quercus ilicifolia	scrub- oak
Quercus prinus	chestnut oak
Quercus rubra	northern red oak
Quercus velutina	black oak
Rhododendron sp.	rhododendron
Rhus glabra	smooth sumac
Rhus typhina	staghorn sumac
Rosa multiflora	multiflora rose
Rosa palustris	swamp rose
Rubia peregrina	wild madder
Rubus flagellaris	common dewberry
Rubus hispidus	swamp dewberry
Rudbeckia hirta	brown-eyed Susan
Rumex crispus	curled dock
Sassafras albidum	sassafras
Schizachyrium scoparium	little bluestem grass

Scientific Name	Common Name
Schoenoplectus americanus	Olney's three-square bulrush
Scirpus atrovirens	green bulrush
Scirpus microcarpus	barberpole sedge
Silene sp.	bladder campion
Sisyrinchium angustifolium	blue-eyed grass
Sium suave	water parsnip
Solanum dulcamara	bittersweet nightshade
Solidago spp.	goldenrod
Sphagnum sp.	sphagnum
Spiraea alba var. latifolia	white meadowsweet
Spiraea tomentosa	steeplebush
Streptopus amplexifolis	twisted stalk
Thelpteris palustris	marsh fern
Thelypteris noveboracensis	New York fern
Thlaspi arvense	field penny-cress
Tiarella cordifolia	foam flower
Toxicodendron radicans	poison ivy
Trifolium campestre	hop trefoil
Trifolium pratense	red clover
Trifolium repens	white clover
Trillium erectum	red trillium
Trillium sp.	trillium
Tsuga canadensis	eastern hemlock
Tussilago farfara	coltsfoot
Typha angustifolia	narrowleaf cattail
Vaccinium angustifolium	lowbush blueberry
Vaccinium corymbosum	highbush blueberry
Vaccinium vacillans	early lowbush blueberry
Veratrum viride	false hellebore
Verbascum sp.	mullein
Viburnum acerifolium	maple-leaf viburnum
Viburnum edule	squashberry
Viburnum lantanoides	hobblebush
Vicia cracca	cow vetch
Viola sp.	violet
Vitis riparia	river bank grape
Woodsia ilvensis	Rusty cliff-fern