# **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)

Prepared for:



Prepared by:



**JUNE 2015** 

# **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

# Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889) EFFECTS OF NORTHFIELD MOUNTAIN PROJECT RELATED LAND MANAGEMENT PRACTICES AND RECREATIONAL USE ON TERRESTRIAL HABITATS

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. 3.4.1¹ and Study No. 3.5.1²; 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

<sup>&</sup>lt;sup>1</sup> Study No. 3.4.1 Baseline Inventory of Terrestrial Wildlife and Botanical Resources.

<sup>&</sup>lt;sup>2</sup> 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.

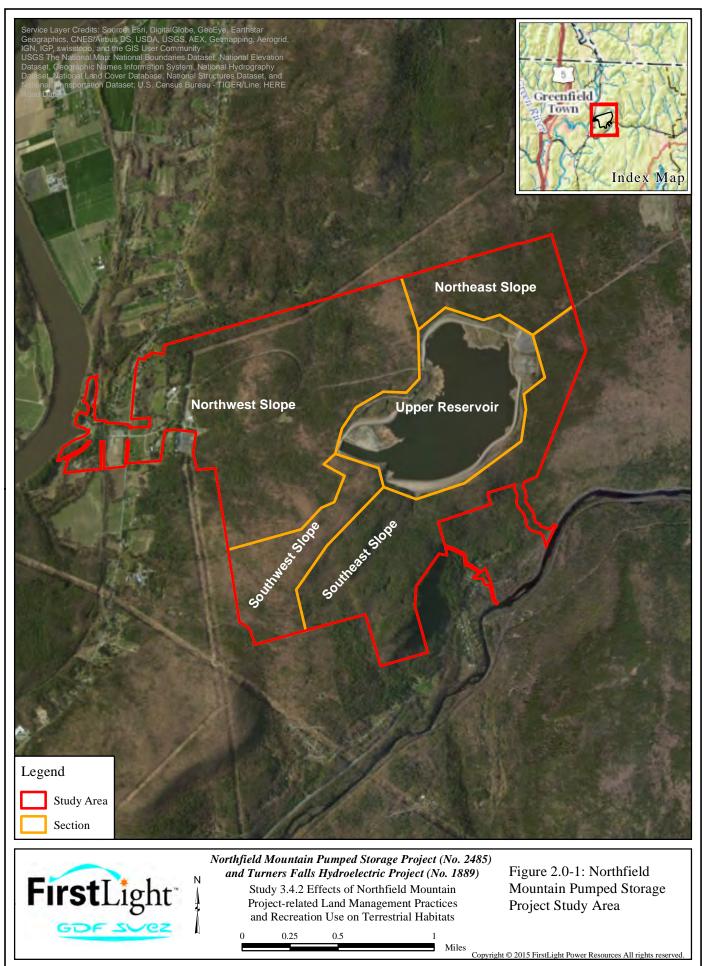
# 1.2 Study Goals and Objectives

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.



# 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<sup>3</sup> 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.

<sup>&</sup>lt;sup>3</sup> 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 13<sup>th</sup> 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 (<u>Swain & Kersey, 2011</u>). NHESP Quantitative Community Characterization Forms were completed in the field to quantitatively characterize representative habitats. These forms are provided in <u>Appendix B</u>. 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) (<u>DeGraaf, 2001</u>). 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 (<u>Cardoza & Mirick</u>, 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 (<u>Appendix E</u>). 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.

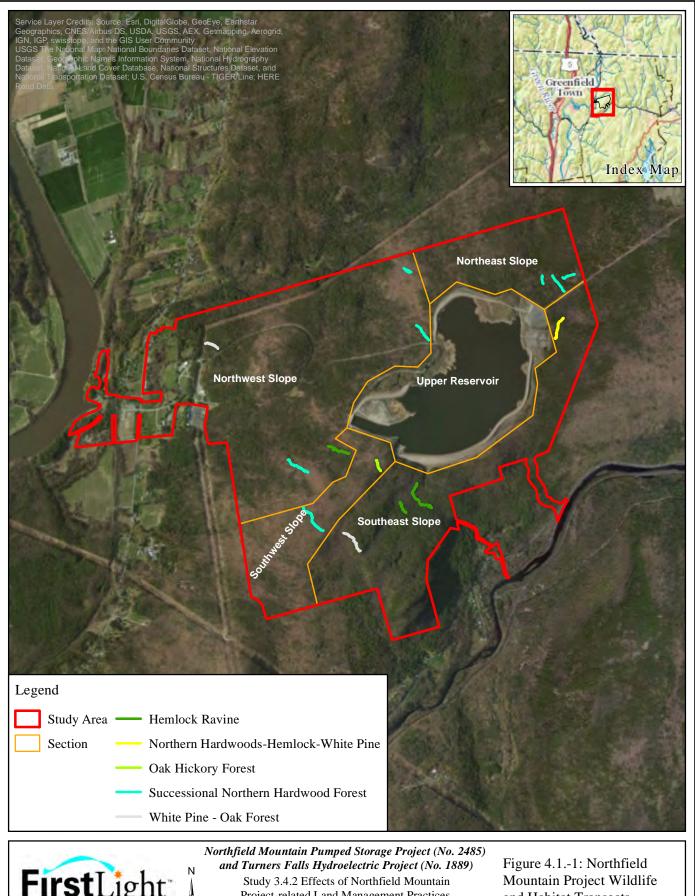
Biologist also deployed random dip net samplings to record any macroinvertebrates and amphibian larvae. <u>Table 4.1.4-1</u> details vernal pool indicator species and pool dimensions recorded for each vernal pool. Photos for documented vernal pools are provided in Appendix F.

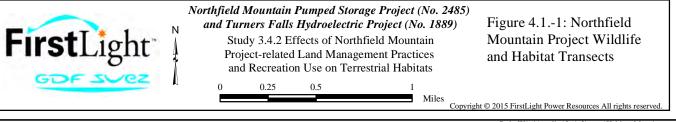
Table 4.1.4-1. Northfield Mountain Pumped Storage Project Vernal Pool Field Notes

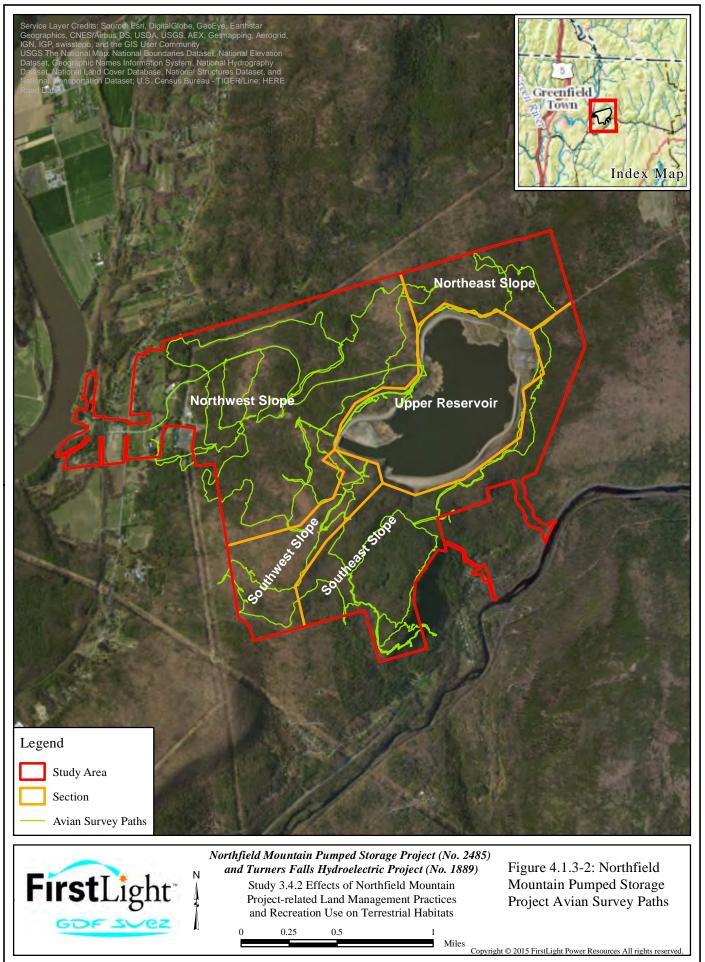
Pool	Egg Masses		Pool	Water	
ID	Spotted	Wood	Dimensions	Depth	
	Salamander	Frog	(Feet)	(Feet)	Comments
VP-2	0	0	200x50	3.0	Spotted salamander (Ambystoma maculatum) spermatophores man-made rock-quarry
VP-3	>66	40	45x72	1.5	
VP-4	25	0	120x30	2.0	
VP-5	50	25	100x40	1.0	
VP-6	32	0	100x45	1.0	
VP-7	25	0	125x75	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	

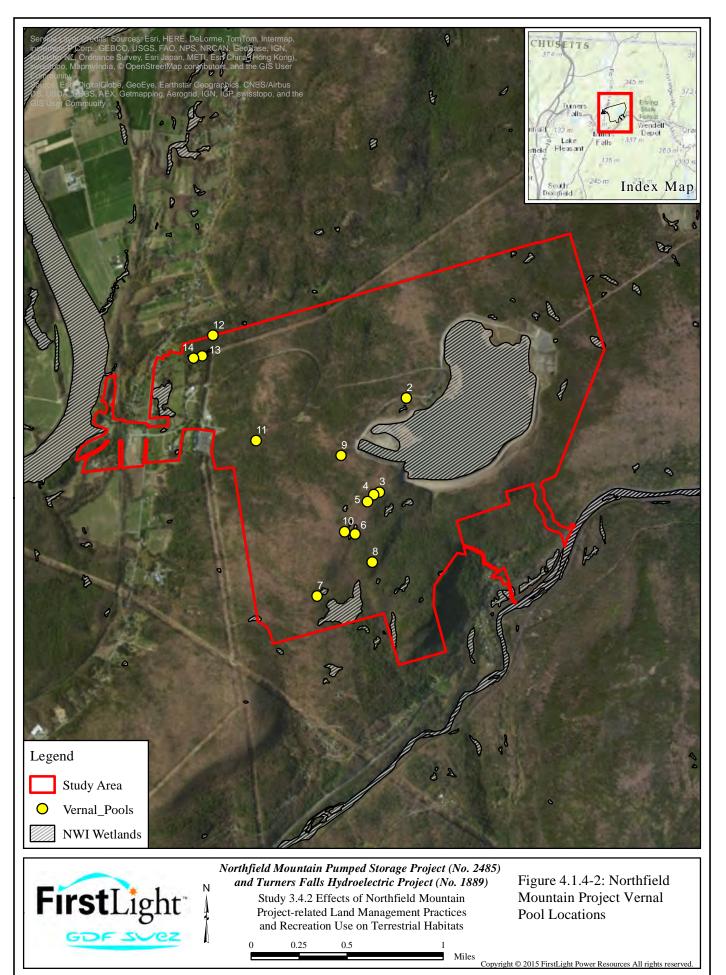


Figure 4.1.4-1: Example of Wood Frog Egg Masses Observed During April Vernal Pool Surveys









# 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.

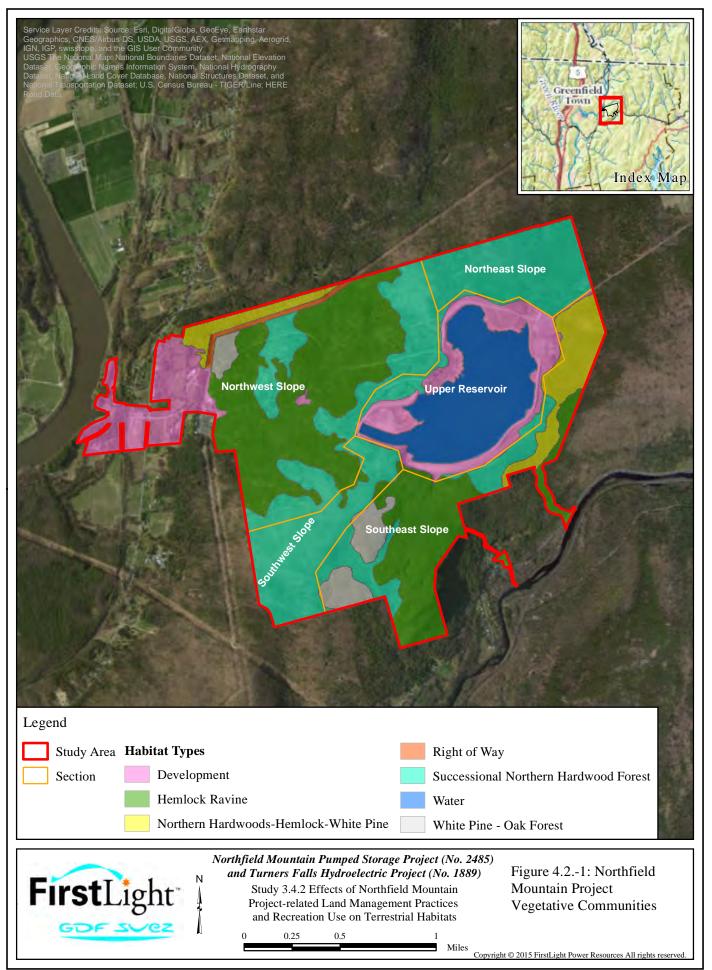
The primary terrestrial natural plant communities included:

- 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),

# EFFECTS OF NORTHFIELD MOUNTAIN PROJECT RELATED LAND MANAGEMENT PRACTICES AND RECREATIONAL USE ON TERRESTRIAL HABITATS

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



#### 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 (Ouercus 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 current (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.

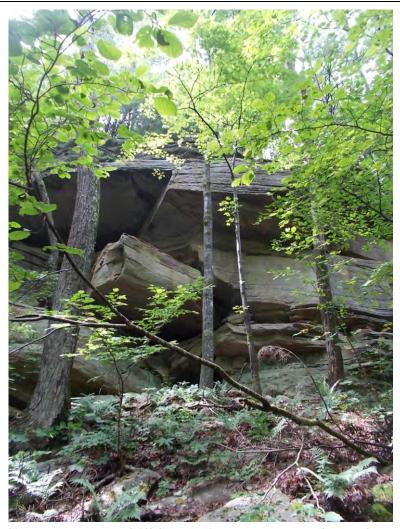


Figure 4.2.6-1: Circumneutral Rock Cliff Community- Farley Ledges (formed from granitic gneiss)

# 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 (<u>Figure 4.2.7-1</u>).

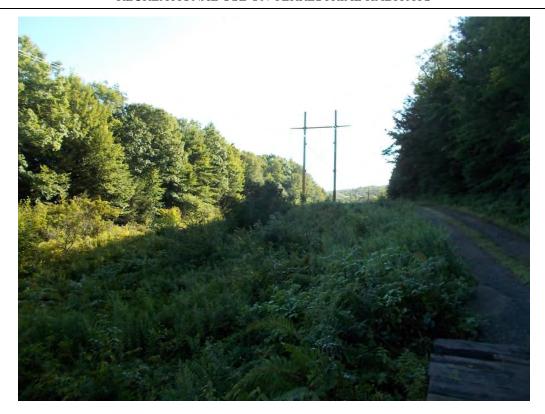


Figure 4.2.7-1. Representative view of the right-of-way community.

# 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



#### 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

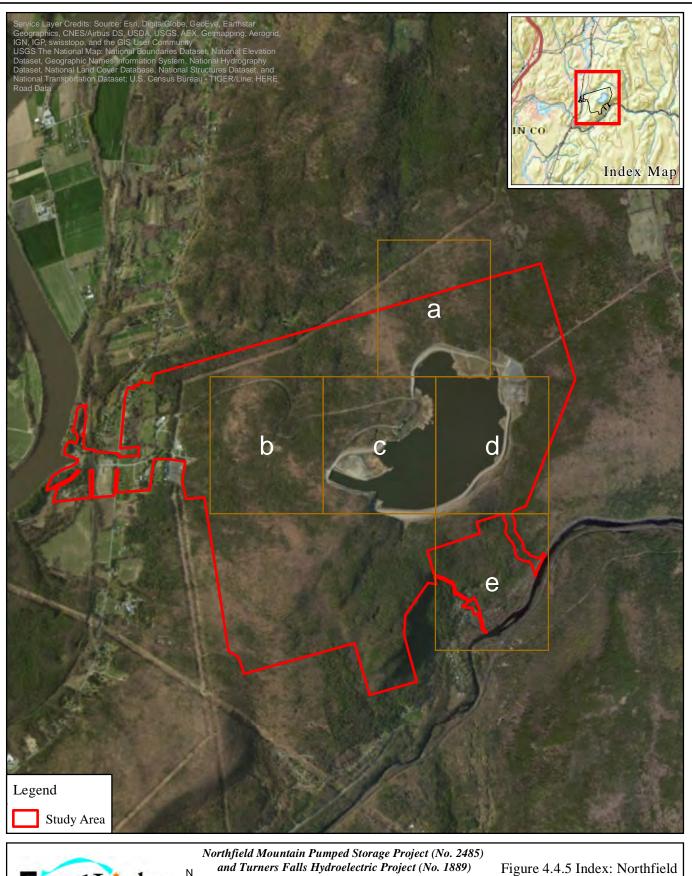


Figure 4.4-3: Example of Habitat Along Eversource Transmission Right-of-Way

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





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

Mountain Project Invasive Species Mapping



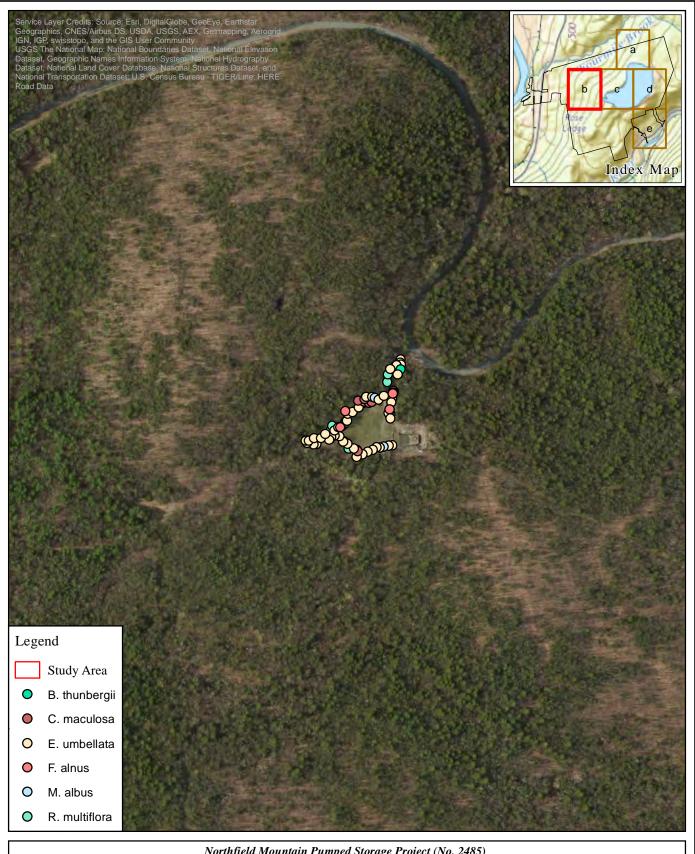


Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)

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

250 500 1,000 F

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





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

250 500 1,000 F

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



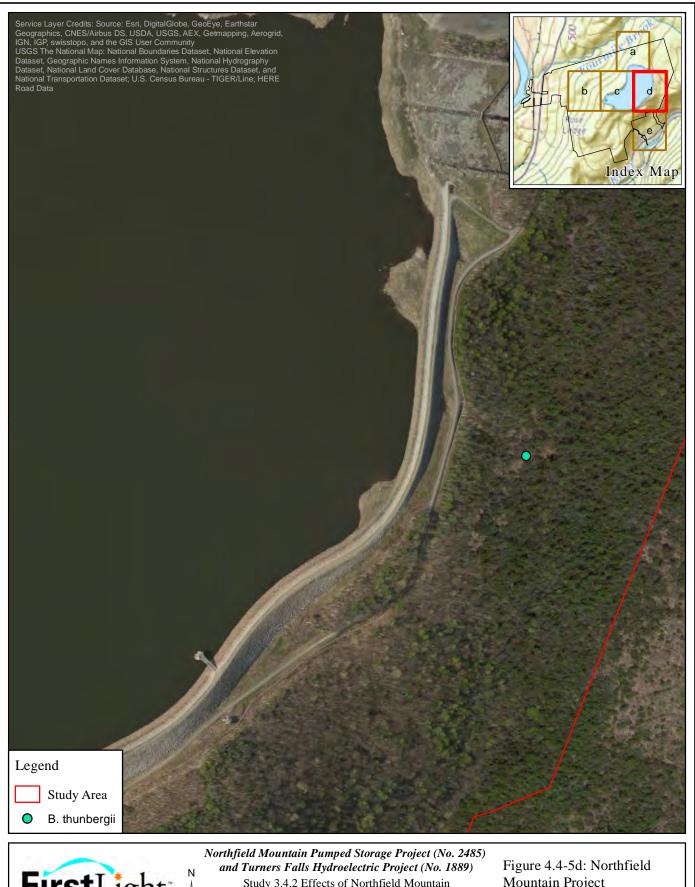


Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)

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

250 500 1,000

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

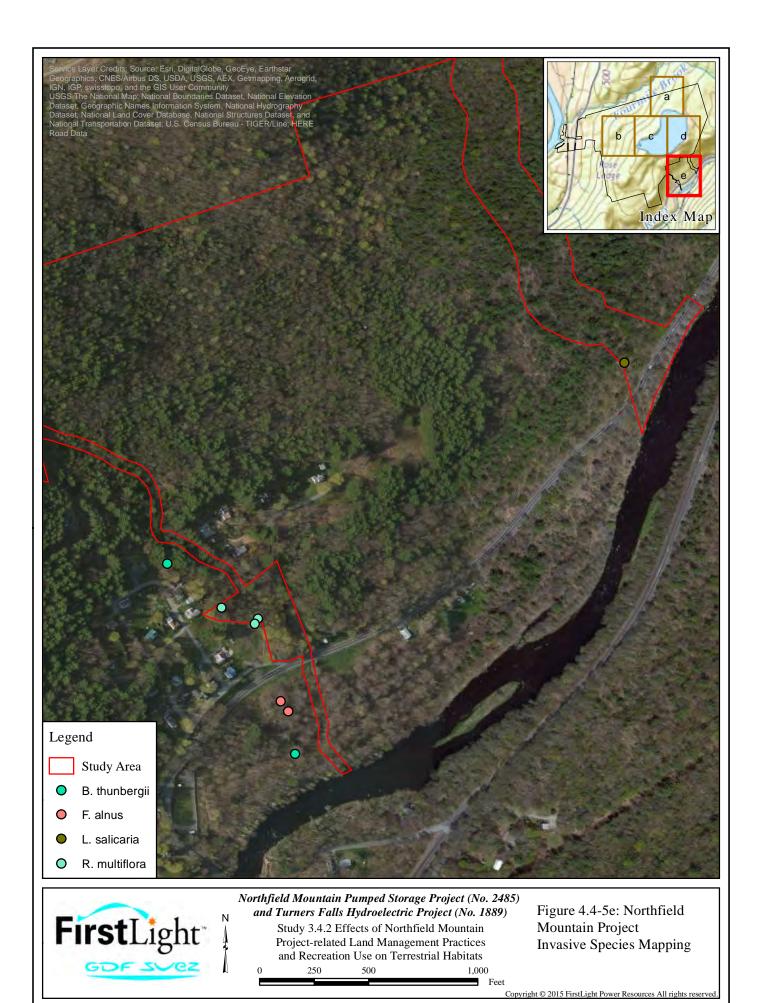




Study 3.4.2 Effects of Northfield Mountain Project-related Land Management Practices and Recreation Use on Terrestrial Habitats

1,000

Mountain Project **Invasive Species Mapping** 

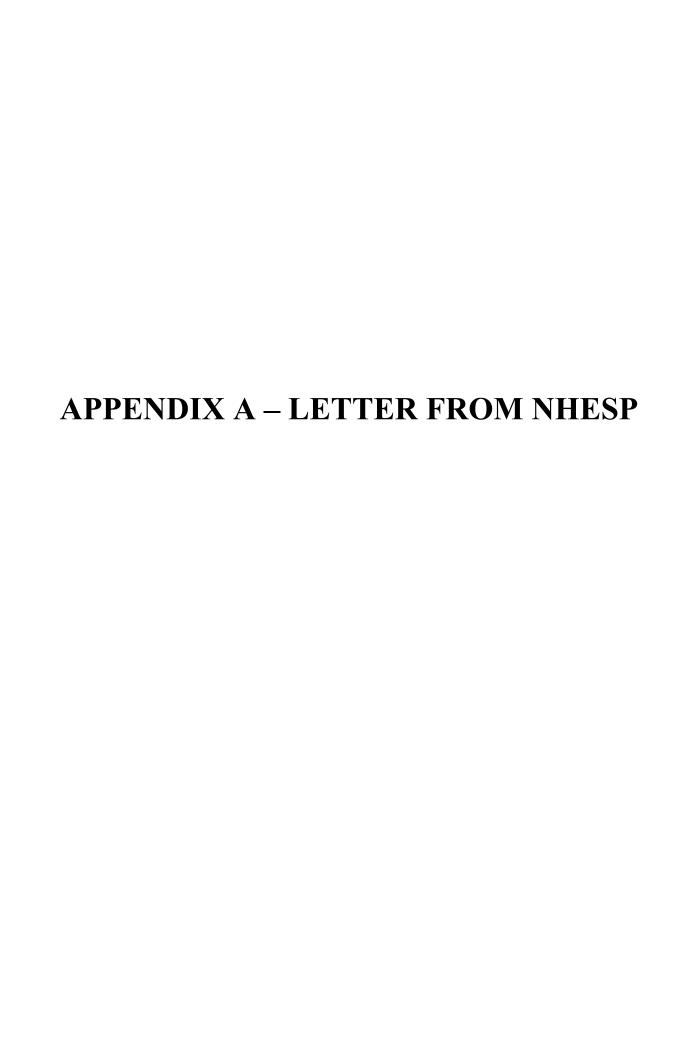


#### 5 DISCUSSION

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.

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*MassWildlife* 

Commonwealth of Massachusetts

### ision of Fisheries & Wildlife

Wayne F. MacCallum, Director

October 27, 2011

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

RE: Connecticut River Project Location:

> 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

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<b>-</b>				
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	В
Alasmidonta heterodon	Dwarf Wedgemussel	Invertebrate Animal	Endangered	В
Alasmidonta undulata	Triangle Floater	Invertebrate Animal	Special Concern	В
Amelanchier sanguinea	Roundleaf Shadbush	Vascular Plant	Special Concern	В
Ammodramus savannarum	Grasshopper Sparrow	Vertebrate Animal	Threatened	В
Aplectrum hyemale	Putty-root	Vascular Plant	Endangered	В
Arisaema dracontium	Green Dragon	Vascular Plant	Threatened	В
Asclepias verticillata	Linear-leaved Milkweed	Vascular Plant	Threatened	В
Carex tuckermanii	Tuckerman's Sedge	Vascular Plant	Endangered	В
Carex typhina	Cat-tail Sedge	Vascular Plant	Threatened	В
Cicindela duodecimguttata	Twelve-spotted Tiger Beetle	Invertebrate Animal	Special Concern	В
Cicindela marginipennis	Cobblestone Tiger Beetle	Invertebrate Animal	Endangered	В
Cryptogramma stelleri	Fragile Rock-brake	Vascular Plant	Endangered	В
Elatine americana	American Waterwort	Vascular Plant	Endangered	В
Gomphus fraternus	Midland Clubtail	Invertebrate Animal	Endangered	В

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

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

#### 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: <a href="http://www.mass.gov/dep/water/approvals/wpaform3.doc">http://www.mass.gov/dep/water/approvals/wpaform3.doc</a>.

#### 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: <a href="www.nhesp.org">www.nhesp.org</a> ("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.

Thomas W. French

**Assistant Director** 



Commonwealth of Massachusetts

# Division of Fisheries & Wildlife

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 12<sup>th</sup> 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:

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(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.

<u>5. Barton Cove Campground Office and Canoe Rental Facility</u>
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 of 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, Ph.D.

Assistant Director

cc: Robert Perry; FirstLight Hydro Generating Company

mas W. Frank

# APPENDIX B – NHESP COMMUNITY FIELD FORMS

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#### COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. June 2006

MA Natural Heritage & Endangered Species Program

A. Identifiers	Thatara Heritage & Endangered Species	rrogram
I. Site name: Manage Mount	2. Survey site name:	A-1
3. Town (LOCALJURIS): Aboth field N	1A 4. Directions: Take	- I-91 to exit 27 in
Greenfield, MA Follow Rle	2 east to the interior	of Rtc. 2 & Rtc 63,
Take Rte 63 2.5 m		1 1
-follow to Northfield A	H	
		*
5. GPS (if not below) Lat	LongMake and I	Model Trimble GEO-6000
	7. Survey date 7/15/14 8	3. Main Surveyor: Steve Knagp
	* 1	
	Transect A-/	
11. A topo map must also be attached with location	indicated. Reconnaissance diagram: Scale:	
. Vegetation / Habitat		
12. Observation point 1. GPS Pt	Observation point 2 GPS Pt	Observation point 3 GPS Pt
GPS Lat. 42.617 Long -72.432	GPS Lat. 42. 6/8 Long -72.4 32	GPS Lat. 42.6/8 Long -72, 43/
13. Community type: hem lock herdinas	Community type:	Community type:
14. Additional data: Site form2form 3	Additional data: Site form2 form 3	Additional data: Site form2 form 3
15. General description (physiognomy,	General description:	General description:
characteristic & dominant spp. of all layers)		
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Little disturbance in forest		1.
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Claving for upon 115: VOr		W. Company
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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:	Community type:Additional data: Site form2form 3	Community type: Additional data: Site form2form 3	Community type: Additional data: Site form2 form 3
General Description:  Same 45 pnf #1	General Description:  Same as part #1	General Description:  Some as 2011 #2	General Description:  Summer AS port. # 1



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.)

Community Name (onNIESP Swain & Rearsley, 2009):  NatureServe Association Name (Optonal):  Survey Date:  Today's Date:  Today's Date:  Survey Site Name:  Survey Or Name(s):  Survey Site Name:  Survey Fire Name:  Survey Site Name:  Survey or Name(s):  Transcriber (NHESP use only, YY-MM-DD XXX):  Directions to site:  Tata T-91 fo eyit 27 in Gran full.  MA. Follow Rtt 2 lost to 3 induction of Ut. 2 for Market Land MH.  GPS Point(s)  Yes No Latitude 42 lost  B. Community Description:  Vegetation Description (EODATA: Summarize the vegatation: dominant and/or characteristic species, indicator species, community structure, variants microhabital 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):  Land Account of the community, describe physical structures and land use practices; natural disturbances; embedded, adjacent, and nearby natural communities including aquatic features; notable landforms; scenic qualities):  Estimated size (acres)  GIS Acres (if available)  Physical Description (GENDESC: Describe the landscape surrounding the community, identification):  Land Account of the community describe physical structures and land use practices; natural disturbances; embedded, adjacent, and nearby natural communities including aquatic features; notable landforms; scenic qualities):  Managed Area Name:	A. Identifiers:	
NatureServe Association Name (Optional):  Survey Date:  Today's Date:  Today's Date:  Today's Date:  Survey Site Name:  Survey or Name(s):  Best Source (Field survey or secondary source used to complete this form, NHESP use):  Transcriber (NHESP use only, YY-MM-DD XXX):  Town Name:  Indicate the Advantage of the Long	Community Name (MNHESP: Swain & Kearsley, 2000):	lock for st ) Northern Hardwoods - Honlow
Surveyor Name(s):  Best Source (Field survey or secondary source used to complete this form, NHESP use):  Transcriber (NHESP use only, YY-M-DD XXX):  Transcriber (NHESP use only, YY-M-DD XXX):  Directions to site: Take T-91 to exit Trin (year field), MA. Follow Rive 2 least to minimum the properties of the properties	NatureServe Association Name (Optional):	White Fin
Surveyor Name(s):  Best Source (Field survey or secondary source used to complete this form, NHESP use):  Transcriber (NHESP use only, YY-M-DD XXX):  Transcriber (NHESP use only, YY-M-DD XXX):  Directions to site: Take T-91 to exit Trin (year field), MA. Follow Rive 2 least to minimum the properties of the properties	Survey Date: 7 / 4 / 14	Today's Date:
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Transcriber (NHESP use only, YY-MM-DD XXX):  Directions to site:		oh Dant Fal
Transcriber (NHESP use only, YY-MM-DD XXX):  Directions to site:	Best Source (Field survey or secondary source used to complete this form	n, NHESP use): Tredal States to
Directions to site: Take T-91 to exit 27 in Green field, MA. Follow Rec 2 and to industrion of the 2 and to the industrion of the 13 and the industrion of patches); intact natural processes, geology, hydrology, topography, and soil properties, especially if relevant to the community identification):    Daniel		J
industrion of fete, 2 to the 63. Take Pete 63. 25 North Twen less on the few Man Access Red. In Morth Gold MH.  GPS Point(s) Yes No Latitude 42. (a) 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):  Demonstrated Size (acres)  Figure 1. Separated 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):	Transcriber (NHESP use only, YY-MM-DD XXX):	
Advection of the table to the Cast Take BH. (3 25 north. Turn less onto the Man Access Rd. to Markfold MH.  GPS Point(s) Yes No Latitude 42. (alg 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):    Dominate		in Green field, MA. Follow Rte 2 east to the
GPS Point(s) Yes No Latitude 42.618 Longitude — 12.43    B. Community Description:  Vegetation Description (EODATA: Summarize the vegetation: dominant and/or characteristic species, indicator species, community structure, variants/microhabitait 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):  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):		131 1 - 3
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):    Down of	The state of the s	UH.
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):		Longitude 72.43/
Estimated size (acres)  GIS Acres (if available)  Physical Description (GENDESC: Describe the landscape 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):		
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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):	structure, variants/interonabitat reatures, univegetated surface; spatial of	distribution (i.e., size, number, and separation distance of patches); intact
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):		
Estimated size (acres)  GIS Acres (ifavailable)  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):	- Comine R Survision - Surviac	5 (75 6) Jellow as he was
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):	- Ked Mittle (T), Alla-A	Sign of Colon (T)
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):	- Should berry species, but	tole bush, Steraned contile
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):	- Intelligence - Why Singer Sign	cadarilla.
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):		
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):	Estimate	ed size (acres) GIS Acres (if available)
communities including aquatic features; notable landforms; scenic qualities):	Physical Description (GENDESC: Describe the landscape surro	unding the community, including the natural area. Both within and
- Back delle de hande in formet some en et - Address to est myste hand word Inchested - Address to dear on less to den	surrounding the community, describe: physical structures and land use	practices; natural disturbances; embedded, adjacent, and nearby natural
- Adjacent red briggle had grand his held Adjacent by Blacen lay have a site.	communities including aquatic features; notable landforms; scenic qual	ities):
- Adjacent red briggle had grand his held Adjacent by Blacen lay have a site.	- Pas Jun set	
And arrived by Sharing lay Filter - Mr.	- 1 by helle, as whance by four	t faller in
	adjacent red muste hader	had be halled
s community on conservation land (if known): Managed Area Name:	- I had word by Show on here	She was all
's community on conservation land (if known): Mo Managed Area Name:		
's community on conservation land (if known): Managed Area Name:		
s community on conservation land (if known): Managed Area Name:		
s community on conservation land (if known): Managed Area Name:		
's community on conservation land (if known): Managed Area Name:		
s community on conservation land (if known): Managed Area Name:		
	s community on conservation land (if known):	Managed Area Name:

Evidence of Disturbance/Threats to the anthropogenic disturbances that have decreased the erosion etc.), logging, mining, livestock grazing, puthe community. Discuss threats to the site and many	lantations orc	hards at	the community such as hydrologic alterations	COM: Describe the ditching, damming, and surrounding
			she line by	
		1		
Recreational Use (evidence of ATV's, OF				
Protection Comments (PROTCOM: Comme	ent on the legal	Inrotecta	pility of the site)	
		protoctu	of the site).	
General Comments (governments)				
General Comments (COMMENTS: Note the any additional field work needed. Comment on give	type of sampli	ng done;	observation point (form 1), releve plot (form 3),	plant list, etc.; note
The same same	124	37		
2				
Owner's Name (if known):			Telephone: ( )	
iddiess.				
s Owner: aware of community?yes	no unk	cnown:	Protecting community?	2.470.7
Owner Comments (OWNERCOM: e.g., contaction) C: Community Element Occurrence Community Size Rank: (Commence relation)	Ranking:	(Refer to	200000000000000000000000000000000000000	
Community Size Rank: (Compare relative  A – Excellent  B – Go	e size to other l	known oc	Currences configuration	
omments:				
Community Condition Rank: (Consider de iversity, ecological processes, abundance of exotic agmentation).	r , micrin	ar connec	avity, degree of anthropogenic disturbance inclu	ysiognomic iding
$\mathbf{A}$ Excellent $\mathbf{B}$ – Go	od C	- Mar	ginal <b>D</b> - Poor	
ommunity Landscape Context Rank: ( ithin the landscape, and the landscape condition)	Consider the si	ze and co	nnectivity of the natural landscape, the position	of the community
A - Excellent $B - Go$				or the community
	ou C	- Marg	rinal D - Poor	
summary of all factors listed above. Explain the back A - Excellent B - Good comments (EORANKCOM; Summarize the above	erm prospects the sis of your ranged C	for continuiting: ran	inal D Poor	level of quality?
Sammarize the above	and Justily th	e EO Rar	K assigned):	
her rare species and/on			Kerten and the second	
her rare species and/or natural commu SPECIES OR COMMUNITY	T/U?	rved at	this site (NHESP use) T/U = Transcribe	d/Updated?):
SA COMMONT I	1/0?	4	SPECIES OR COMMUNITY	T/U?
		5		
	-	6		

## Form 3: Quantitative Community Characterization MA Natural Heritage & Endangered Species Program

. Identifiers (general EOR information)

1. Community type (observed): Hem los	le borest 2 con	S Point: At
3. Assigned type (NHESP use): Northe	Washingade Hand to built a	Point:
5. Site name: Nor ha field Mou	Hardwoods- Herolock- Wirk B.A. Lat:	42. 6/8 N Long 72,43/
7. Ecoregion (DFW):	o. Quad name(s):	
9. Town: Northfield, MA	8. County name(s	
	10. Directions: Take I-91 to	exit 27 in Green fuld MA.
1000/100 100 100 100 100 100 100	1 11 to secron of Ktc. 2 2 Rt. 1	3. Take Ptc. 12 25
	of onto the Main Alers Rd.	& follow to Northfield My
11. Survey date7//5//4	12. Previous observations at this site:	
13. Surveyors: \$ = \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		
B. Environmental Description		
14. PLOT # A-	15. Photos taken Y N; Identfier 11- 114	16. Elevation (from topo): 350 (m) or ft
17. Topographic position:	18. Topographic sketch:	
Summit/Crest	= (lowers)	20. Slope Class (Percent):
High slopeStep in slope Mid slopeToe of slope	), ——, , , , , , , , , , , , , , , , , ,	Flat (<2%) Steep (48-95%)  Gentle (2-9%) Very Steep (>95%)
Mid slopeToe of slope	1/3	Gentle (2-9%) Very Steep (>95%) Moderate (10-25%) Abrupt (cliff or ledge
Rolling Terrain	1	Rather Steep (26-47%)
LevelChannel wall		
Basin floor Channel bed Other	Commence Box 6	21. Slope Shape:
Other	19. Slope aspect: Sa 4	Vertically: Concave Convex (Linear)
22 P		Horizontally: Concave Convex Linear
22. Downed Wood	25. Un-vegetated surface (check the single,	
(within or partially within plot)	most dominant feature):	28. Moisture regime:
-Max. diameter/length/decay class:		Very dry
-Average diameter for all downed wood ≥4 in.	Bedrock	DryWet
(estimate)	Large rocks (boulders > 24 in.) Small rocks (stones 10-24 in.)	MoistSaturated
Abundance of downed wood ≥4 in. diameter	Cobbles (2-9 in.)	
(using cover classes) 20%	Gravel (<2 in.)	Periodically inundated
23. Fuel load (< 1/4 inch in diameter):	Sand Litter	Permanently inundated
Low 1 Moderate = 2 High = 3	Bare soil	
Winderate - 2 High = 3	Water	
4. Snags ≥ 4" DBH: Species DBH height	Other:	20 0 11
4. Snags ≥ 4" DBH: Species DBH height		29. Soil type (if observed)
	26. Combined litter & duff depth:	sandloam
	inches	claypeatmuck
	201	mdek
	27. Parent material:	other
). Sphagnum hummocks overhanging	21 Poids	
ater: MA	31. Evidence of Land Use History:	32. Evidence of Disturbance:
(only if >25 m <sup>2</sup> and visible from plot)	stone walls, barbed wire, wolf trees	
GPS point (location):	cut stumps, multi-trunk trees,	Fires: fire scars, charcoal, standing snags
		Blowdowns: aligned downed trees
Size of habitat:	foundations, wells	Ice damage: broken tree tops
3 water depths (max. inches)	Other all all 10	
ircle: Moving channels or Pools of Water	-	Disease: adelgid, gypsy moth, beech bark
Comments:		Other:

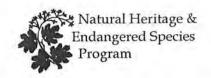
Semi-deciduous Semi-Evergreen Evergreen Perennial Annual  39. Photo Cover Type:	Forest Sparse woodlar Sparse woodlar Shrubland Dwarf shrubland Sparse dwarf she Herbaceous	d — Woodland  Scrub thicket  Sparse shrubland  Dwarf scrub thicket  rubland — Non-vascular  Sparsely vegetated	NUMBER: 36. Plot Dime  40. Strata/life forms height (m  T1 Emergent tree  T2 Tree canopy T3 Tree sub- canopy S1 Tall shrub S2 Short shrub H Herbaceous		Cover Class +<1% 1 =1-5% 2 =6-25 3 =26-50 4 =51-75
11. Plant Species & abundance: list each species	and the corresp		N Non-vascular V Vine / liana	- =	5 > 75%
LEMISER	- die corresp	onding cover class for each stratum.			
YO EN BUTTO	172	grade and the same	4/11		
Hall to	72				
Also a second	T2 1				
American Greek	19				
kombele					
hombry	51				
homore	52				
new oute	57				
Stored MARCE	107				
Table Water	52				
Jersnephell a	12		(9)		
Wase Ler	Tar I				
Star Flower	12/				
canada naviflying	1				-
Low sted stalk	H				
marked berry	44				
Squach been	120				
Strand warm dann	71				
Williamer	THE STATE OF				
1628.23 11.275					





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form 3
p+, #1

11. A topo map <u>must</u> also be attached with loca	ation 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:	Community type:Additional data: Site form2form 3	Community type: Additional data: Site form2 form 3	Community type:Additional data: Site form2 form 3
Some as pt #1	Same as pt & r	Same as pt #1	Same as pt. #1



# FORM 2: NATURAL COMMUNITY SUMMARY AND RANKING (A location map must accompany this form.)

A. Identifiers:
Community Name (MNHESP; Swain & Kearsley, 2000): Herdwood
NatureServe Association Name (Optional): Successional Marthern Herdwood
Survey Date: 7/5//4 Today's Date: 7/5//4
Survey Site Name: Transcrit ZA
Surveyor Name(s): Steve Koney South Donhoven
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: Morthfield, 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 exst onto Main Access good & follow to Northfield Mt.
GPS Point(s) × Yes_No Latitude Longitude
B. Community Description:
Vegetation Description (EODATA: <u>Summarize</u> 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):
Dominie Freeze Red maple, Beech red oak, white brech, Quaking aspen
- participal reason rea
Should the soul maple, hornbeam, witch have I Mt. Laurel
fruished stalk, Consinon form, loubuch bluebring, Str flows
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 - agad Shand Shand
Is community on conservation land (if known): Managed Area Name:

Evidence of Disturbance/Threats to than thropogenic disturbances that have decreased the	e quality and	d viability of the	commu	mity such as hydrologic alterations (dit	ching, damming,
erosion etc.), logging, mining, livestock grazing, p					and surrounding
the community. Discuss threats to the site and ma					
Kerty undestrict	A Fry	1 Miles	deal /	- Mar Lay	
-					
Recreational Use (evidence of ATV's, O	RV's, mou	ntain bikes, ho	rses, wa	alking trails, etc.):	
Protection Comments (PROTCOM: Comm	ent on the le	gal protectabili	ty of the	site):	
A SECTION OF THE PARTY OF THE P					
General Comments (COMMENTS: Note the any additional field work needed. Comment on q					
Our and a Manna gar				Talankanar ( )	
Owner's Name (ifknown):Address:				Telephone: ()	
Is Owner: aware of community?ye	s _no	unknown;	Protec	ting community?yesno	unknown
Owner Comments (OWNERCOM: e.g., con C: Community Element Occurrence	e Rankin	g: (Refer to co	mmunit	y ranking specifications for assistance.	
Community Size Rank: (Compare related A – Excellent B – Compare related B – Compare re	Good	C – Marg	irrences, inal	D - Poor	
Community Condition Rank: (Consider diversity, ecological processes, abundance of exot fragmentation).					
A – Excellent $B - C$	Good	C – Marg	inal	D - Poor	
Community Landscape Context Rank within the landscape, and the landscape condition		he size and con	nectivity	of the natural landscape, the position	of the community
	Good	C – Marg	nal	D - Poor	
Comments:					
Community EO Rank: (What are the lon A summary of all factors listed above. Explain the A - Excellent B - C	e basis of yo Good	ur ranking: rang C – Margi	e wide, nal	state wide, or locally.) <b>D</b> - Poor	level of quality?
Comments (EORANKCOM: Summarize the ab	ove and just	ify the EO Ran	k assigne	ed):	
		10-10-10			
					_
			-		
Other rare species and/or natural com-	munities	observed at	this sit	te (NHESP use) T/II = Transcribe	d/Updated?)
SPECIES OR COMMUNITY	T/I		1	CIES OR COMMUNITY	T/U?
1	1/4	4	5113		1,0,
2		5			
3		6			

#### Form 3: Quantitative Community Characterization

A. Identifiers (general EOR information)		
1. Community type (observed): Herclwood	ocl 2. GPS P	oint:
3. Assigned type (NHESP use): SUCCES	and Northern Herdubada. Lat:	42,6/7 N Long -72,445 W
5. Site name: Northfield Mt.	6. Quad name(s):	
7. Ecoregion (DFW):	8. County name(s):	Franklin CO.
	10. Directions: Take I-91 to intersection of Rte 2 & Rt. 62 Main Access Rd. 7 follows to	Devit 27 in Greenfield MA Take Pta. 63 25 miles Dentation Al
11. Survey date 7 15 1 2014  13. Surveyors: Steve Known S	12. Previous observations at this site:	
B. Environmental Description		
14. PLOT #	15. Photos taken N; Identfier 216 - 120	16. Elevation (from topo): 200 (m or ft
17. Topographic position: Summit/Crest High slope Mid slope Low slope Rolling Terrain Level Basin floor Channel bed Other	18. Topographic sketch:	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.  (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	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 Other:  26. Combined litter & duff depth: inches  27. Parent material:	28. Moisture regime: Very dryWetMoistSaturated Periodically inundatedPermanently inundated  29. Soil type (if observed)sandloamloam
30. Sphagnum hummocks overhanging water:  (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:
	l eneity, erosion / sedimentation, invasive species pres	sence/distribution, etc:

Semi-deciduous Semi-Evergreen Evergreen Perennial Annual	ForestWoodland Sparse woodlandScrub thicket ShrublandSparse shrubland Dwarf shrublandNon-vascular HerbaceousSparsely vegetated  39a. Field-Observed Cover Type:	40. Strata/life forms  T1 Emergent ti T2 Tree canop T3 Tree sub- ci S1 Tall shrub S2 Short shrub H Herbaceous N Non-vasculi V Vine / liana	y anopy	% cover + 	Cover Classes + <1% 1 = 1-5% 2 = 6-25% 3 = 26-50% 4 = 51-75% 5 > 75%
1. Plant Species & abundance: list each specie	s and the corresponding cover class for each stratum.				
Gritani Mest	5/				
Horrberg	5/				
Squishney	A				
Alvelo de	51.2				
Harri BCK	S1				
Red Weste	Tz				
Beech	T2				
Red Oak	TZ.				
System & Ma	4				
Monter land					
cold pe	N				
"Who he faire h	72				
New York from	A				
Twisted Stall	Н				
witch here!	51,2				
Claramon for	3.14				
lander blummer	$\mathcal{H}$				
Sellower I	H				
Austra, Herrin	72				





A. Identifiers	A Natural Heritage & Endangered Species Pro	ogram
	2. Survey site name:  4. Directions: Take  to the intersection of Rte. Z &  eust on to the Main Acces	3A I-91 to exit 27 in Gwenfield, Ple. 63. Take Rte. 63 s Rd & follow to
5. GPS (if not below) Lat  6. Sourcecode (NHESP use):  9. Other Surveyors: Sara h Drohova		del
B. Topography 10	Transect	
C. Vegetation / Habitat	TO SHARE WERE VALUE OF THE PARTY OF THE PART	
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: Hew lock forest  14. Additional data: Site form 2 x form 3 x	Community type:Additional data: Site form2k form 3k	Community type: Additional data: Site form2  form 3
15. General description (physiognomy, characteristic & dominant spp. of all layers)  Herm lock: Mt. Laure I  trillium  Mother News K forest wf  boulders  Till soils w/ 0-4" Duff	General description:  Sant 195 pr. 1. # 1	General description:

<ol> <li>A topo map <u>must</u> also be attached with locati</li> </ol>	on 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 form2form 3	Community type: form 3	Community type:form 3	Community type:
General Description:  Some A.5 A. #	General Description:	General Description:	General Description:



## FORM 2: NATURAL COMMUNITY SUMMARY AND RANKING (A location map must accompany this form.)

A. Identifiers:	
Community Name (MNHESP: Swain & Kearsley, 20	000): Hemlock Ravine
NatureServe Association Name (Optional):	
Survey Date: 7/16/14	Today's Date://6//4
Survey Site Name: Nog THETEL	D- (3A)
Surveyor Name(s): Strue Kove	200. Soral Dalata
Best Source (Field survey or secondary source used to c	complete this form, NHESP use):
Transcriber (NHESP use only. YY-MM-DD XXX):	Town Name: No the lot MA
Directions to site: Take I-91	to exit 27 in Greenheld Ath Follow Powle 2
east for the interestina	of Rte. 2 2 Rte 63. Take Rt. 63 25
miles north Turn east	
GPS Point(s)YesNo Latitude	42.603 Longitude -72.447
B. Community Description:	
	e the vegetation: dominant and/or characteristic species, indicator species, community
	urface; spatial distribution (i.e., size, number, and separation distance of patches); intact
natural processes, geology, hydrology, topography, and	I soil properties, especially if relevant to the community identification):
Mt. Laure	71 11
Hamtock, Formereneral -11	ism - mature handed fenced by boulders.
till soils w/ 0-4° Duff	tiell the state of
	Estimated size (acres) GIS Acres (if available)
	landscape surrounding the community, including the natural area. Both within and
	res and land use practices; natural disturbances; embedded, adjacent, and nearby natural
communities including aquatic features; notable landfo	
Nour for locked and Pac	s well-nots win a ravine
	The state of the s
Is community on conservation land (if known	n): No Managed Area Name: Northlight project
to a secondarie. Such a supplied and an entitle (miller)	

						pling, and exotic flora or fauna within	
the communit	y. Discuss threats to the si	te and managem	ent impli	cations.):	47-41 8	that of distribution	200
- 5 m	TELECTIFICAL INCH	aralla k	2,11	CCVAPLE Y	arry.	expected of the supplier	TELT SULL
Ood_	inverched.						
		-					
Recreation	nal Use (evidence of A	TV's, ORV's,	mountai	n bikes, ho	rses, wa	alking trails, etc.):	
Protection	Comments (PROTCO)	M: Comment on	the legal	protectabili	y of the	site):	
				The state of the s		point (form 1), releve plot (form 3),(	plant list, etc.; note
any additiona	I field work needed. Comm	nent on question	able iden			15,007	
Oromania N	Canala man					Talanhanar ( )	
Owner's N Address:	Jame (if known);					Telephone: ()	
		A				ting community?yesno	unknown
	and the second s		_			ting community:yesno _	
	ty Size Rank: (Com	pare relative size	to other	known occi	rrences,		.)
Comments	A Excellent	<b>B</b> – 0000		- Marg	Hai	D - F001	
Communit	ty Condition Rank: (					orth), abiotic condition, species and phree of anthropogenic disturbance incl	
fragmentation	A Excellent						
Comments		. D. I.	2011014	2	12.00		
	dscape, and the landscape	condition)				of the natural landscape, the position	of the community
Comments	A – Excellent	B – Good		C – Marg	nai	D - Poor	
						ence of this occurrence at the indicate	d level of quality?
1 Summary O	A Excellent			- Marg		D - Poor	
Comments						ed): poor 460055 - 15	cal H II
by ex	13ths PFO We	otlands -	1000	Char	(15	of impacts	
		+(enlock	O.C	ulsid -	Not	observed, but is t	himset.
Other rare	species and/or natur	al communit	ties obs	served at	this sit	e (NHESP use) T/U = Transcrib	ed/Updated?)
Julei Tale	- Francisco Contraction					_ \	
	CIES OR COMMUN	ITY	T/U?		SPE	CIES OR COMMUNITY	T/U?
	CIES OR COMMUN	ITY	170?	4	SPE	CIES OR COMMUNITY	T/U?
SPEC	CIES OR COMMUN	IITY	1707		SPE	CIES OR COMMUNITY	T/U?

#### Form 3: Quantitative Community Characterization

MA	Natural Heritage & Endangered Species Pro	
A. Identifiers (general EOR information)	2 000	Point: 3-/4
1. Community type (observed): Hem lock		Oliti
3. Assigned type (NHESP use): Hem la		42.603 N Long -72.447 W
5. Site name: Marthield M		Franklin Co.
7. Ecoregion (DFW):	8. County name(s):	
9. Town: Northfield MA Follow Rie 2 east to fr Mosth Turn last onto	e Intersection of Rte. 2 2 RIC 63.	to exit 27 in Greenfillet, MA. Take Rt. 63 2,5 miles to Northfild Mt.
11. Survey date 7 /16/2014  13. Surveyors: Steve Knapp.	12. Previous observations at this site:	
B. Environmental Description		
14. PLOT #	15. Photos taken (V N; Identfier 944-99)	16. Elevation (from topo): 100 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 wall	18. Topographic sketch:  3-A  Bissi  19. Slope aspect: South	20. Slope Class (Percent):  Flat (<2%)  Gentle (2-9%)  Moderate (10-25%)  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:	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 Other:  26. Combined litter & duff depth:	28. Moisture regime: Very dryDryWetSaturated Periodically inundatedPermanently inundatedPermanently inundated  29. Soil type (if observed)sandloampeatmuck  other
30. Sphagnum hummocks overhanging water:  Note:  (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:

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

37. Leaf phenology: 38  Deciduous Semi-deciduous Semi-Evergreen Evergreen Perennial Annual  39. Photo Cover Type:	8. Physiognomic type:  X Forest Sparse woodland Shrubland Dwarf shrubland Sparse dwarf shrubland Herbaceous  39a. Field-Observed Co	WoodlandScrub thicketSparse shrublandDwarf scrub thicketNon-vascularSparsely vegetated  ver Type:	40. Strata/life forms  T1 Emergent tr T2 Tree canop: T3 Tree sub-c: S1 Tall shrub S2 Short shrub H Herbaccous N Non-vascula V Vine / liana	y anopy	+ + + + + + + + + + + + + + + + + + +	- Classes - <1% =1-5% =6-25% =26-50% =51-75% >75%
41. Plant Species & abundance: list each		er class for each stratum.				1
Hambolo	TZ TZ					
Red Maple	T3					
Rod oak	13					
bosch.	81/52					
Morntain Layrel	\$1/52					1
No & Pink	T2/3					
Scrazowillas	73					
MINKE SPEC	LI LI					
1/2 11 am	4					
1.6 Wyelestra	H					
witch horsel	52					
	Y					

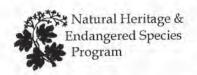






. Identifiers	Natural Heritage & Endangered Species P	rogram
1. Site name: White Pine - Oak for	rest 2. Survey site name:	44
	11. A. Directions: Take	I-91 to ext 27 in
Greenfield, MA. Follow Rte.	1 1 1	
Rte 63 2,5 mile mor	to. Turn east onto for	o Main Acress Rd &
follow to Northfield 1st		
	- in	
5. GPS (if not below) Lat		lodel Trimble GEO-6000
5. Sourcecode (NHESP use):	7. Survey date 7/14/20/4 8.	Main Surveyor: Steve Knapp
9. Other Surveyors: Sarah Drahi	ova I	T.A.
S. Topography 10	. Transect	
. Vegetation / Habitat		
12. Observation point 1. GPS Pt	Observation point 2 GPS Pt	Observation point 3 GPS Pt
GPS Lat. 42.60   Long -72.45	GPS Lat. 42,602 Long -72,452	GPS Lat. 42,602 Long -72,452
13. Community type:	Community type:Additional data: Site form2 form 3	Community type: form 3 form 3
15. General description (physiognomy, characteristic & dominant spp. of all layers)	General description:	General description:
White Pine Red Onk, Red mysle Mountain laurel	Same as pot. #1	Some as puttl
Landowsh telecherry		
Little die bonce	M	

11. A topo map <u>must</u> also be attached with location	on indicated, Reconnaissance diagram: Scale:		
Observation Point 4 GPS Pt	Observation Point 5 GPS Pt	Observation Point 6 GPS Pt	Observation Point 7 GPS Pt
Additional data: Site form2form 3  General Description:	Additional data: Site form2form 3  General Description:	Additional data: Site form2form 3	Additional data: Site form2form 3  General Description:
Same ws paut	Serve as point #1	Some as port. #1	Same 15pm, 4)



#### 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): Survey Site Name: Surveyor Name(s): Best Source (Field survey or secondary source used to complete this form, NHESP use): Town Name: Transcriber (NHESP use only. YY-MM-DD XXX): Directions to site: Take I-9/ the interestion of Rte 2 to Turn rash onto the Main Access Q1 & GPS Point(s) X Yes No Latitude 42.602 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): GIS Acres (if available) Estimated size (acres) 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): Managed Area Name: Is community on conservation land (if known):

Evidence of Disturbance/Threats to the	e Comm	unity/N	/anage	ement	Recommendations (MGMTCOM	1: Describe the
anthropogenic disturbances that have decreased the	quality an	d viability	v of the	commun	ity such as hydrologic alterations (ditc	hing, damming,
erosion etc.), logging, mining, livestock grazing, pl	antations,	orchards,	structure	es, tramp	ling, and exotic flora or fauna within a	ind surrounding
the community. Discuss threats to the site and man	nagement i	mplication	ns.):	1150	MISNIEZ SER SERVE	e - Myse
Briles, low threat of de	evelyon					
		_				
Recreational Use (evidence of ATV's, OR	V's, mou	ntain bik	ces, hor	ses, wal	king trails, etc.):	
sextending to be for health						
Protection Comments (PROTCOM: Comme	ent on the I	egal prote	ectability	of the s	не)	
General Comments (COMMENTS: Note the	type of sar	mpling do	one; obse	rvation	point (form 1), releve plot (form 3), pla	ant list, etc.; note
any additional field work needed. Comment on qu	estionable	identifica	tion.):_	N	courts today Alban	1
hikin low						
Owner's Name (if known):					Telephone: ( )	
Address:					2. 7. 7. 9. W. San - 1. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2.	North me
Is Owner: aware of community?yes						
Owner Comments (OWNERCOM: e.g., conta	act owner	prior to vi	isiting th	e site):		
Annah Santa Sa						
C: Community Element Occurrence	Ranki	ng: (Ref	er to cor	nmunity	ranking specifications for assistance.)	
Community Size Rank: (Compare relative						
A - Excellent B - C						
Comments:						
Community Condition Rank: (Consider of	levelopme	nt/maturit	ty (e.g.,	old grow	th), abiotic condition, species and phy-	siognomic
diversity, ecological processes, abundance of exoti	ic species,	internal co	onnectiv	ity, degr	ee of anthropogenic disturbance include	ding
fragmentation).	Land	0	Manai	nol	D - Poor	
	Good	C -	Margi	nai	D - 1 001	
Community Landscape Context Rank:	· /O! 4	adles ales	and ann	a a a tivitu	of the natural landecane, the nasition	of the community
within the landscape, and the landscape condition)		r the size	and com	iectivity	of the natural landscape, the position	of the community
A - Excellent B - C		C-	Margi	nal	D - Poor	
Comments:	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					
Community EO Rank: (What are the long	g-term pro	spects for	continu	ed existe	nce of this occurrence at the indicated	level of quality?
A summary of all factors listed above. Explain the	basis of y	our ranki	ng: rang	e wide, s	tate wide, or locally.)	The second
A - Excellent B - C			Margi		D - Poor	
Comments (EORANKCOM: Summarize the ab	ove and ju	stify the I	EO Rank	assigne	d);	
					max m	1/11, 1 10
Other rare species and/or natural com-			ed at	this sit	e (NHESP use) T/U = Transcribe	ed/Updated?):
SPECIES OR COMMUNITY	T	/U?	1	SPE	CIES OR COMMUNITY	T/U?
1			4			
2			5			
3			6			

### Form 3: Quantitative Community Characterization

A. Identifiers	(general	EOR	information)	)
----------------	----------	-----	--------------	---

A. Identifiers (general EOR information)	- December								
1. Community type (observed): Pine - 1	reedured 2. GPS P								
	e - Oak forest 4. Lat: 4. Cat:	12.602 N Long 72.453 W							
5. Site name: 4-A	45 A								
7. Ecoregion (DFW):	8. County name(s):	Franklin CO.							
Follow 1240 2 past to the	Town: North field, MA 10. Directions: Take I-9t to exit 27 in Greenfield MA Follow Rte 2 east to the intersection of Rt. 2 to Rt. less. Take Rt. 63 2.5 miles north Wen east anto the Main Acces 2 & follows to Northfield MT.								
11. Survey date 7/16/2014	12. Previous observations at this site:								
	an Dranover								
B. Environmental Description	600 655	100 at 10							
14. PLOT #	15. Photos taken (Y) N; Identfier 154-155	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	18. Topographic sketch:  19. Slope aspect: Sould	20. Stope Class (Percent):  Flat (<2%)  Gentle (2-9%)  Wery 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.  (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	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 Other:  26. Combined litter & duff depth: inches  27. Parent material:	28. Moisture regime: Very dryDryWet							
30. Sphagnum hummocks overhanging water:  (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:  33. Environmental Comments: vegetation homogeness	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:							

Deciduous Semi-deciduous Semi-Evergreen Evergreen Perennial	iognomic type: Forest	40. Strata/life forms height (m or f	
1. Plant Species & abundance: list each specie	s and the corresponding cover class for each stratum.		
Laws Halins	14 H		
The same of the sa	52		
Red disc	53,72		
dust be	72		
Yeld Mush	72		
parks fer	9		
Mt. Laurel	(5),2		
20,000 100	14		
Se Same Ak	L L		
(U) Section			
The sector of the E	5/, 52		
5-0-1-0	9		
The day of the set	4		
51 100 5 54	H		
CAMBIA SHO	\$2,T		
Wind Dik	52		
Witch hazel	9,2		
Conde romplan	H		
Apron Lagor	M		
Harlet Stille	H H		
layla lowary	1,50		





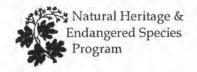


# COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY MA Natural Heritage & Endangered Species Program

A. Identifiers		
1. Site name: Oak History	freest 2. Survey site name:	15
3. Town (LOCALJURIS): Northfiel. MA	4. Directions: Tak	e I-91 to ext 27 in
Granfield MA. Follow	Rte 2 east to the intersec	tim of Rtc 2 2 Kt. las
	siles north Turn east on	the Main Access Rd. &
follow to Northfield	d NH	
CDC no 11	Laus Make and M	lodel Trimble GEO-CON
5. GPS (if not below) Lat 5. Sourcecode (NHESP use):	7/	Main Surveyor: Steve Known
	V Zh	Main Surveyor.
	Transect 45	
11. A topo map must also be attached with location		
. Vegetation / Habitat		
12. Observation point 1. GPS Pt	Observation point 2 GPS Pt	Observation point 3 GPS Pt
GPS Lat. 42.667 Long -72,449	GPS Lat. Long	GPS Lat. Long
13. Community type: <u>Oak maple</u> 14. Additional data: Site form2 form 3	Community type:Additional data: Site form2form 3	Community type: Additional data: Site form2 form 3
15. General description (physiognomy, characteristic & dominant spp. of all layers)	General description:	General description:
Reel Oak, Red maple,		
reer only, was respect		
Chest nut, hickory,		
Chestnut out	Same as pnt. #1	Same as pht. #1
Squishberry, lowbush blocking		
FORSY WI little disturbance		

Observation Point 4 GPS Pt GPS Lat. Long	Observation Point 5 GPS Pt	Observation Point 6 GPS Pt	Observation Point 7 GPS Pt GPS Lat. Long
Community type:Additional data: Site form2form 3	Community type:	Community type:	Community type:Additional data: Site form2 form 3
Same as pnt. #1	Sime as pnt. #1	Sum as put #1	Same as pat #

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



#### FORM 2: NATURAL COMMUNITY SUMMARY AND RANKING

(A location map must accompany this form.)
A. Identifiers:
Community Name (MNHESP: Swain & Kearsley, 2000): Oak Maple (A5)
NatureServe Association Name (Optional):
Survey Date: 17 July 2014 Today's Date: 17 July 2014
Survey Site Name: North Gield Mountain
Surveyor Name(s): Steve Knapp, Sarah Drahavas
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: Nochhod MA
Directions to site: Take I-91 to exit 27 in Greenfield MA. Follow Ric 2 east
to the intersection of Rte. Z & Rte 63. Take Rte. 63 25 miles no
Turn east porto Main Access Rd. & follow to NorthBeld Mf.
GPS Point(s)YesNo 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, Chestral Oak downance, little under story
- 1210 Mary 1 Part Service Ser
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 - agad hadavod facest Wat much disturbance.
Is community on conservation land (if known): Managed Area Name: North light project

anth	ropogenic disturbances that have decrease ion etc.), logging, mining, livestock grazing.	d the quality and vi	ability of th	e commu	nity such as hydrologic alterations (di	tching, damming,
	community. Discuss threats to the site and					
_	2 11 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2					
	creational Use (evidence of ATV's					
Pro	stection Comments (PROTCOM: Co	mment on the legal	protectabili	ty of the	site):	
	neral Comments (COMMENTS: Note additional field work needed. Comment of					
_						
	marka Nama (ks				Talankawa ( )	
Ada	rner's Name (ifknown):dress:				Telephone: ()	
	Owner: aware of community?					unknown
OW	ner Comments (OWNERCOM: e.g.,	contact owner prior	to visiting t	he site):		
C: 0	Community Element Occurre	nce Ranking:	(Refer to co	mmunity	ranking specifications for assistance	i -
	mmunity Size Rank: (Compare r					
	A - Excellent B					
	mments:					
diver	mmunity Condition Rank: (Consirsity, ecological processes, abundance of conentation).	der development/m exotic species, inter-	aturity (e.g., nal connecti	old grow vity, degr	th), abiotic condition, species and phy ee of anthropogenic disturbance inclu	siognomic ding
Cor	A – Excellent B mments: mmunity Landscape Context Ra	Good (	C – Marg	inal	D - Poor	
Cor withi	mmunity Landscape Context Ra in the landscape, and the landscape condit	nk: (Consider the ion)	size and cor	nectivity	of the natural landscape, the position	of the community
		Good (	C – Marg	inal	D - Poor	
	nments:			-		
Cor A sur	mmunity EO Rank: (What are the mmary of all factors listed above. Explain	long-term prospect the basis of your r	s for continuant sanking: rang	ied existe ge wide, s	nce of this occurrence at the indicated tate wide, or locally.)	l level of quality?
			C – Marg		D - Poor	
Cor	mments (EORANKCOM: Summarize th	e above and justify	the EO Ran	k assigne	d):	
-			_	11000		
Oth	er rare species and/or natural co	ommunities ob	served at	this sit	e (NUESPusa) T/II = Transcribe	ed/Undated?)
241	SPECIES OR COMMUNITY				CIES OR COMMUNITY	T/U?
1		,,,,,,	4			1,0.
2			5	77		
3			6			

# Form 3: Quantitative Community Characterization MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Community type (observed):      Oa A	mayole fores 2. GPS 1	Point: A5
3. Assigned type (NHESP use): Out -	11 11	42.60+ N Long -72.45
5. Site name: Nochafield	45 6. Quad name(s):	Toug (201)
7. Ecoregion (DFW):	8. County name(s):	Franklin Co
9. Town: Northfield, MA MA Follow Rt. 2 east miles north, Turn east	10. Directions: Take T-91	to exit 27 in Greenfield
11. Survey date 7/17/2014	12. Previous observations at this site:	
13. Surveyors: Swah Dr. hara	I & Steve Known	
3. Environmental Description	Sieve Many	
14. PLOT #	15. Photos taken (V) N; Identifier 965-966	16 Blood 10 11 1/20 0
17. Topographic position:		16. Elevation (from topo): 400 mor ft
	18. Topographic sketch:	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 - 6 (estimate)  -Abundance of downed wood ≥4 in. diameter  (using cover classes)  23. Fuel load (< 1/4 inch in diameter):  Low = 1 Moderate = 2 High = 3  24. Snags ≥ 4" DBH: Species DBH height    Red   Maple   18   18   18   18   18   18   18   1	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 Other:  26. Combined litter & duff depth: inches	28. Moisture regime: Very dryDryWetMoistSaturated Periodically inundatedPermanently inundatedPermanently inundated
30. Sphagnum hummocks overhanging water:  (only if >25 m² and visible from plot)  GPS point (location):  Size of habitat:  3 water depths	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

Semi-deciduous Semi-Evergreen Evergreen Perennial Annual	Physiognomic type:  Forest Sparse woodland Shrubland Dwarf shrubland Sparse dwarf shrubland Herbaceous  39a. Field-Observed C	Woodland Scrub thicket Sparse shrubland Dwarf scrub thicket Non-vascular Sparsely vegetated	40. Strata/life form:  T1 Emergent T2 Tree cane T3 Tree sub- S1 Tall shrub S2 Short shru H Herbaccot N Non-vascu V Vine / lian	tree py canopy b is	% cover + 5 3 3 2 1	Cover Classes + <1% 1 =1-5% 2 =6-25% 3 =26-50% 4 =51-75% 5 >75%
41. Plant Species & abundance: list each spec		ver class for each stratum.				
Red Marke	T <sub>2</sub>					
Chistrat Oak	T2					
Chestnut Oak	T2					
hickory	5/					Z- 10
Squash borry	H					
lowhush blue burn	14					
TOTAL PURS N SIVE SITTS	-/+					
						* mll
	3 - 1 Lulio -					





rev. June 2006

. Identifiers		
1. Site name: Northfield AAf	2. Survey site name:	A 6
Town (LOCALJURIS): Northfield	Mf. 4. Directions: Tal	
in Greenfield, MA. Follo		fresection of 14. 2 & Rt. 13
(11 1 11 11 11 11 11 11 11 11 11 11 11 1	les north. Turn east ont	on the Main Access Rel &
tollow to Northpelo, MI		
. GPS (if not below) Lat.	Long Make and Mo	odel Trimble GED- 6000
. Sourcecode (NHESP use):	7. Survey date 7/17/20/4 8.1	Main Surveyor: Steve Knapp
Other Surveyors: Sarah Drahev	2/	
Topography 10.	Transect A6	
Vegetation / Habitat		
12. Observation point 1. GPS Pt Ab	Observation point 2 GPS Pt	Observation point 3 GPS Pt
GPS Lat. 42.604 Long -72.444	GPS Lat. Long	GPS Lat. Long
13. Community type: Hem lock Payine 14. Additional data: Site form2 15 form 3	Community type:Additional data: Site form2 form 3	Community type:Additional data: Site form2form 3
15. General description (physiognomy, characteristic & dominant spp. of all layers)  Damina Hol by Aemlock	General description:	General description;
Duminated by hemlock  W/ Some red maple  Mot much Understory -  Some Starflower, hobble beg	Same as pt. #1	Some as pnt. #1
Rocky, bouldery adjacent to Stream		
augment to men.		

Observation Point 4 GPS Pt	Observation Point 5 GPS Pt	Observation Point 6 GPS Pt GPS Lat. Long	Observation Point 7 GPS Pt
Community type:	Community type:Additional data: Site form2form 3	Community type:	Community type: Additional data: Site form2 form 3
Same as put. #1	Same as port. #1	Same as put #1	Same as port #

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



# FORM 2: NATURAL COMMUNITY SUMMARY AND RANKING

Community Name (MNHESP Swain & Kearsley, 2000): Hemlack forest NatureServe Association Name (Optional): Hemlack faune Survey Date: 747 2014. Today's Date: Survey Date: 747 2014. Today's Date: Survey Date: 747 2014. Today's Date: Survey Site Name: A6 Survey Date: 747 2014. Today's Date: Survey Site Name: A6 Survey Date: 747 2014. Today's Date: Survey Date: 747 2014. Today's Date: 747 2014	A. Identifiers	(A location map must accompany this form.)
Survey Site Name: Alex Krapp Strah Dabyred Best Source (Field survey or secondary source used to complete this form, NHESP use): Field Survey  Franscriber (NHESP use only, YY-MM-DD XXX): Town Name: Murlafull MA  Directions to site: See from    BPS Point(s) X Yes No Latitude 42.664 Longitude 72.444  Community Description: (EODATA: Summarize the vegetation: dominant and/or characteristic species, indicator species, communiture, variants/microhabitat features, unvegetated surface; spatial distribution (i.e., size, number, and separation distance of patches); in stural processes, geology, hydrology, topography, and soil properties, especially if relevant to the community identification):  Hard for Application (GENDESC: Describe the landscape surrounding the community, describe; physical structures and land use practices; natural disturbances; embedded, adjacent, and nearby natural ununities including aquatic features; notable landforms; seenic qualities):  Medican and the second part of the	Community Non-	1)
Survey Site Name: Alex Krapp Strah Dabyred Best Source (Field survey or secondary source used to complete this form, NHESP use): Field Survey  Franscriber (NHESP use only, YY-MM-DD XXX): Town Name: Murlafull MA  Directions to site: See from    BPS Point(s) X Yes No Latitude 42.664 Longitude 72.444  Community Description: (EODATA: Summarize the vegetation: dominant and/or characteristic species, indicator species, communiture, variants/microhabitat features, unvegetated surface; spatial distribution (i.e., size, number, and separation distance of patches); in stural processes, geology, hydrology, topography, and soil properties, especially if relevant to the community identification):  Hard for Application (GENDESC: Describe the landscape surrounding the community, describe; physical structures and land use practices; natural disturbances; embedded, adjacent, and nearby natural ununities including aquatic features; notable landforms; seenic qualities):  Medican and the second part of the	Nature Comic Acres in the Manual Community Name (MNHESE	Swain & Kearsley, 2000): Hemlock forest
Survey Site Name: Alex Krapp Strah Dabyred Best Source (Field survey or secondary source used to complete this form, NHESP use): Field Survey  Franscriber (NHESP use only, YY-MM-DD XXX): Town Name: Murlafull MA  Directions to site: See from    BPS Point(s) X Yes No Latitude 42.664 Longitude 72.444  Community Description: (EODATA: Summarize the vegetation: dominant and/or characteristic species, indicator species, communiture, variants/microhabitat features, unvegetated surface; spatial distribution (i.e., size, number, and separation distance of patches); in stural processes, geology, hydrology, topography, and soil properties, especially if relevant to the community identification):  Hard for Application (GENDESC: Describe the landscape surrounding the community, describe; physical structures and land use practices; natural disturbances; embedded, adjacent, and nearby natural ununities including aquatic features; notable landforms; seenic qualities):  Medican and the second part of the	Survey Date:	Name (Optional): Hembock Raune
Surveyor Name(s): See Krapp, Seah Dahry See Surveyor Name(s): See Krapp, Seah Dahry See Source (Field survey or secondary source used to complete this form, NHESP use): Field Survey See See Source (Field survey or secondary source used to complete this form, NHESP use): Town Name: Machinely MA  Directions to site: See form    See Point(s) Yes No Latitude 42.664 Longitude 72.444  See Point(s) Yes No Latitude 42.664 Longitude 72.444  See Community Description: (GEOLATA: Summarize the vegetation: dominant and/or characteristic species, indicator species, communiture, variant-microtabilist features, unvegetated surface; spatial distribution (i.e., size, number, and separation distance of patches); in the survey of the search of the survey of the search of the survey		Today's Date:
Best Source (Field survey or secondary source used to complete this form, NHESP use):  Franscriber (NHESP use only, YY-MM-DD XXX):  Directions to site:  See form  Directions to directors in directors i	Survey Site Name:	F 6
Transcriber (NHESP use only YY-MM-DDXXX):  Town Name: Machifuld MA  Directions to site:  See from  Directions to site:  See point(s) & Yes, number, and separation distance of patches); in the separation di	Surveyor Name(s): S	eve Knupp. Scrah Drahmer.
Transcriber (NHESP use only, YY-MM-DD XXX):  Directions to site:  See form  Directions to site:  Directions to site:  See form  Directions to site seeies, indicator species, community and services, natural distribution (i.e., size, number, and services), indicator species, community including the community identification):  Directions to site seeies, indicator species, and services, number and services, natural distribution (i.e., size, number and services), indicator species, services, number and services, n	Best Source (Field survey or seco	indary source used to complete this form, NHESP use):
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Boar Hou I vaino. War thatich of Dales		
Boar Hou Hallie Ly Dales	ommunity on access	The V
The state of the s	om conservation	1 land (if known): hr) Managed Area Name: At his life and
barnary project		Trop inlight project

	community. Discuss threats to the site and manage	ment implicati	ions.):	LiHI	e threa T	
_						
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_						
	creational Use (evidence of ATV's, ORV's					
o	tection Comments (PROTCOM: Comment of	on the legal pro	otectabili	ity of the si	te);	
iei	neral Comments (COMMENTS: Note the type	e of sampling	done; ob	servation p		
y :	additional field work needed. Comment on question Transect					
w	ner's Name (if known):				Telephone: ()	
d	dress:					
(	Owner: aware of community?yes _	no _unkn	own;	Protecti	ng community?yesne	o _unknown
	ner Comments (OWNERCOM: e.g., contact of					
	Her Comments (OWNERCOM, e.g., contact of	wner prior to	visiting t	the site):		
	THE COMMENCOM, e.g., contact of	wner prior to	visiting t	the site):		
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# Form 3: Quantitative Community Characterization MA Natural Heritage & Endangered Species Program

Community type (observed): Hem loc		oint: A6
Assigned type (NHESP use): //em/a	k Rayine 4, Lat:	42,605 N Long -72,444 W
Site name: Northfield Mount	6. Quad name(s):  8. County name(s):	
Ecoregion (DFW):	8. County name(s):	Franklin CO.
Town: North Field, MA	10. Directions: See from 1	
	12. Previous observations at this site:	
	2 / 2/	
	each Denhoval	
Environmental Description	A 121 022	10 71 10 10 10 10 10 10 10 10 10 10 10 10 10
4. PLOT # A6	15. Photos taken (Y) N; Identfier 47/-973	16. Elevation (from topo): 240 mor ft
7. Topographic position:	18. Topographic sketch:	20. Slope Class (Percent):
Summit/Crest	Note 10 4	Flat (<2%) Steep (48-95%)  Gentle (2-9%) Very Steep (>95%)
High slopeStep in slope	0 000	Moderate (10-25%) Abrupt (cliff or ledge
Mid slopeToe of slope X Low slope	B. (a) PC	Rather Steep (26-47%)
Rolling Terrain		
LevelChannel wall		21. Slope Shape:
Basin floorChannel bed	19. Slope aspect:	Vertically: Concave Convex Linear
Other	15. Stope aspect.	Horizontally: Concave Convex Linear
A more at word		All and a second second
2. Downed Wood (within or partially within plot)	25. Un-vegetated surface (check the single,	28. Moisture regime:
A A CONTRACTOR OF THE PARTY OF	most dominant feature):	Very dry
Max. diameter/length/decay class:	Bedrock	Wet
Average diameter for all downed wood ≥4 in.  5 - /O (estimate)	Large rocks (boulders > 24 in.)	MoistSaturated
	Small rocks (stones 10-24 in.)	
Abundance of downed wood ≥4 in. diameter	Cobbles (2-9 in.) Gravel (<2 in.)	Periodically inundated
(using cover classes)	Sand	Permanently inundated
3. Fuel load (< 1/4 inch in diameter):	Litter	
Low = 1 Moderate = 2 High = 3	Bare soil	
Don (1) Induction 2 Tings 1	Water Other:	20. 0. 0
24. Snags ≥ 4" DBH: Species DBH height	Outer.	29. Soil type (if observed)
8	26. Combined litter & duff depth:	sandloamelaypeat
	2" inches	pear muck
	27. Parent material: +t//	other
30. Sphagnum hummocks overhanging	31. Evidence of Land Use History:	32. Evidence of Disturbance:
	And the second of the second o	ALC: A CONTRACT CONTR
(only if >25 m <sup>2</sup> and visible from plot)	stone walls, barbed wire, wolf trees	Fires: fire scars, charcoal, standing snags
	cut stumps, multi-trunk trees,	Blowdowns: aligned downed trees
GPS point (location):	foundations, wells	
Size of habitat:		Ice damage: broken tree tops
3 water depths (max. inches)	Other Trivils	Disease: adelgid, gypsy moth, beech bark
Circle: Moving channels or Pools of Water		Other: NIME
Comments:		Outer,
	geneity, erosion / sedimentation, invasive species pre	esence/distribution, etc:
	and the second s	

Deciduous	siognomic type:  Forest Woodland Sparse woodland Scrub thicket Shrubland Sparse shrubland Dwarf shrubland Dwarf scrub thic Sparse dwarf shrubland Herbaceous Sparsely vegetate  39a. Field-Observed Cover Type:	S1 Tall shrub S2 Short shrub H Herbaceous	opy	Cover Classes + <1% 1 = 1-5% 2 = 6-25% 3 = 26-50% 4 = 51-75% 5 > 75%
. Plant Species & abundance: list each speci	es and the corresponding cover class for each stratum			
Hemlack	72			
Ret maple	T2			
Star Hower	H			
Hobble bush	52			
THE VICE SON				
				-C 1 1 T.
*				
				_







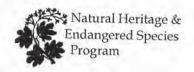
#### COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. June 2006

A. Identifiers	Natural Heritage & Endangered Species P	rogram
1. Site name: Northfield MH	2. Survey site name:	A.F
3. Town (LOCALJURIS): North field,  NA, Follow Rt. 2 000  63 2.5 miles north.  Abortoficles Mt.	MA 4. Directions: I-	
5. GPS (if not below) Lat^  6. Sourcecode (NHESP use):  9. Other Surveyors: Sava b Door		Main Surveyor: Steve Hangy
3. Topography 10.	Transect A7	
. Vegetation / Habitat	Total one s	0.000
12. Observation point 1. GPS Pt <u>A7</u> 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: Howelshed  14. Additional data: Site form 2 1/2 form 3 1/2	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 wif little	General description:	General description:
Very disturbed wif little  diff & no harbaccous  layer  Open anopy w/  Red onk, American beech,	Same as pt#1	Same as port, #1
hemlack, Chestnut, Stripped maple & white pine		

bservation Point 4 GPS Pt PS Lat. Long	Observation Point 5 GPS Pt	Observation Point 6 GPS Pt	Observation Point 7 GPS Pt
ommunity type:dditional data; Site form2form 3	Community type:form 3	Community type:Additional data: Site form2form 3	Community type: Additional data: Site form2 form 3_
Same as pnt. #1	Same as pnt. #1	Same as port. #1	Sime as pati #1

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



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

rev. June 2006

# FORM 2: NATURAL COMMUNITY SUMMARY AND RANKING (A location map must accompany this form.)

Community Name (	CARLEST AND A SHOP TO STATE OF SHIP				
Notura Com - 4	MNHESP: Swain & Kearsley.	2000):			
NatureServe Associ	ation Name (Optional):	Surres	ssional.	Northern	Hardwood
Survey Date:	7/17/2014	1000		s Date:	PEROCERCONS
Survey Site Name:	Hornested	A7	Today	s Date	
Surveyor Name(s):	Sarala Do	hrvzal,	Steve Kr	18.18	
	ey or secondary source used to	complete this form	STEVE IV	Field Su	
	s services in the back to	complete this form,	NHESP use):	FIELD SU	ney
Transcriber (NHESP us	se only YY-MM-DD XXX):		-	P Nr	1. 1. 1. 1. 1.
Directions to site:	See form 1	/	-	Town Name:	Northfield, MA
	Join!				
CDS Point(a) \ V					
P. Community D	sNo Latitude	42.621	_ Longitude	-72.43	
D. Community Des	cription:				
vegetation Descripti	on (EODATA: Summariz	e the vegetation: o	dominant and/or o	haracteristic spec	ies, indicator species, commun
F. Treases, Bearings,	ny drology, topography, and	SOII properties e	specially if rolow	est to the engineer	for the same of the Art
- Harvested	forest - Very	dishirb	ed W/	no hort	as clock, Chethut
Open and	on wol Red	Oak. An	nerican 1	real hou	alack M. Shoul
- 15to bood !	mante & 4	hite pine	VICTICON E	seech, per	TICKY CHESTRAIT
	The Table	more priese			
	- 1				
	,				
	,				
	,				
		Estimated	size (acres)	GIS A	PMC (Securitation
Physical Description	(GENDESC: Describe the la	androone summer	size (acres)	Con-Street Control of the Control of	Cres (if available)
Physical Description urrounding the community,	(GENDESC: Describe the ladescribe: physical structure	androone summer	31	Con-Street Control of the Control of	
	bull and a service of	andscape surround s and land use pra	ding the commun	Con-Street Control of the Control of	cres (if available)  natural area. Both within and lded, adjacent, and nearby natu
ommunities including aquat	iç features; notable landfor	andscape surround s and land use pra ns; scenic qualitie	ding the communactices; natural dises):	ity, including the sturbances; embed	
ommunities including aquat	iç features; notable landfor	andscape surround s and land use pra ns; scenic qualitie	ding the communactices; natural dises):	ity, including the sturbances; embed	
ommunities including aquat	bull and a service of	andscape surround s and land use pra ns; scenic qualitie	ding the communactices; natural dises):	ity, including the sturbances; embed	
ommunities including aquat	iç features; notable landfor	andscape surround s and land use pra ns; scenic qualitie	ding the communactices; natural dises):	ity, including the sturbances; embed	
ommunities including aquat	iç features; notable landfor	andscape surround s and land use pra ns; scenic qualitie	ding the communactices; natural dises):	ity, including the sturbances; embed	
ommunities including aquat	iç features; notable landfor	andscape surround s and land use pra ns; scenic qualitie	ding the communactices; natural dises):	ity, including the sturbances; embed	
ommunities including aquat	iç features; notable landfor	andscape surround s and land use pra ns; scenic qualitie	ding the communactices; natural dises):	ity, including the sturbances; embed	
ommunities including aquat	iç features; notable landfor	andscape surround s and land use pra ns; scenic qualitie	ding the communactices; natural dises):	ity, including the sturbances; embed	
ommunities including aquat	iç features; notable landfor	andscape surround s and land use pra ns; scenic qualitie	ding the communactices; natural dises):	ity, including the sturbances; embed	
ommunities including aquat	iç features; notable landfor	andscape surround s and land use pra ns; scenic qualitie	ding the communactices; natural dises):	ity, including the sturbances; embed	
ommunities including aquat	iç features; notable landfor	andscape surround s and land use pra ns; scenic qualitie	ding the communactices; natural dises):	ity, including the sturbances; embed	
ommunities including aquat	iç features; notable landfor	andscape surrounds and land use prains; scenic qualities prains; scenic qualities prains; scenic qualities prear	ding the commun actices; natural dises):	ity, including the sturbances; embed	natural area. Both within and Ided, adjacent, and nearby natu

antend	DOECTHE GISTUIT	ances mai nave o	ecreased the	OHALIEVS	grand variable	selital of th	O GOMAN	ministry needle on breedless	the artist of a consequence to	TCOM: Describe the s (ditching, damming,
the con	nmunity. Disc	uss threats to the	site and man	ntations	implied	ds, struct	ures, tra	ampling, and exotic f	lora or fauna w	s (ditching, damming, ithin and surrounding
	Herrites	horveste						le		
- /	Jan	V187 82 37	-6-	W/	I Della	ging	78.091	/3		
							_			
					-	-	-			
Recre	ational Use	(evidence of	ATV's, ORV	/'s, mo	untain	bikes, h	orses, v	walking trails, etc.)		
Prote	ction Comp	ments (PROTCO	OM: Commen	t on the	legal pr	rotectabil	ity of th	ne site):		
	none	attack to bush in			-	7.4.7.4	21.7.2			
General any add	ral Comme litional field we	nts (COMMENT ork needed. Com	S: Note the ty ment on ques	pe of sa tionable	ampling identif	done; ob	servatio	on point (form 1), relative to the second	eve plot (form 3	), plant list, etc.; note
Owne	r's Name (if	known);						Telephone	· ( )	
Addre	ess:								1	
		of communit	v2 vac	10.0	a sun lessa	Links	D.	Table of Washington		Control Control
3011	nor. awarc	or communit	y: _yes_	-110 _	_unkn	own;	Prote	cting community	?yesno	unknown
)wne	r Comment	S (OWNERCOM	e.g., contact	owner p	prior to	visiting t	he site)			
C: Co	mmunity l	Element Occ	urrence I	<b>Eanki</b>	ng: (R	efer to co	mmuni	ty ranking specificati	ons for assistan	ce.)
omn	nunity Size	Rank: (Com	pare relative	size to c	other kn	own occi	irrences	configuration, patel	niness)	
	A	-Excellent	B-Go	od	C-	- Marg	inal	D - Poor		
	nents:	large 1								
iversity ragmen	, coological pr	ittoff Rank: (occesses, abundan	Consider dev ce of exotic s	elopmer pecies, i	nt/matur internal	rity (e.g., connectiv	old gro /ity, deg	wth), abiotic condition	on, species and a disturbance in	physiognomic cluding
		- Excellent heavialg	B-Goo	d ded	C-	Margi	nal	D- Poor		
omm	unity Land	scape Contex	ct Rank: (C	onsider	the size	and con	nectivit	v of the natural lands	cape, the positi	on of the community
ithin th	ic ianuscape, ai	id the landscape	condition)					^	enpe, me positi	on or the community
		- Excellent	B-Goo	od	C-	Margi	nal	(D) Poor		
	ents:		1							
omn	unity EO	Rank: (What a	re the long-te	rm pros	pects fo	r continu	ed exist	ence of this occurren	ce at the indica	ted level of quality?
summa	ary or all factor	is fisted above. E	xplain the bas	sis of yo	our rank	ing: rang	e wide,	state wide, or locally	.)	
01222		- Excellent			C -	Margi	nal	D - Poor		
omm	ents (EORAN	KCOM: Summar	ize the above	and jus	tify the	EO Rank	assign	ed):		
ther	are checica	and/or natura	al ages		14					Make William
CI	DECIES OF	and/or natur	ar commu	nities	observ	ved at t	his si	te (NHESP use) T/U	= Transcri	
31	ECIES OF	R COMMUN	11 Y	T/1	U?		SPE	CIES OR COM	MUNITY	T/U?
						4	-			
						5				
3						6				

## Form 3: Quantitative Community Characterization MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

1. Community type (observed): Harveste 3. Assigned type (NHESP use): Sirce 55/0. 5. Site name: Mochafield Mt. 7. Ecoregion (DFW):	6. Quad name(s):  8. County name(s):	
9. Town: Northfield, MA  11. Survey date 7/17/70/4	10.Directions: See form /	
13. Surveyors: Sarah Deahoute	1 & Steve Hagyp	
3. Environmental Description	0 00 001	
14. PLOT # A 7	15. Photos taken (V) N; Identifier 992-994	16. Elevation (from topo): 2 mor ft
17. Topographic position: Summit/Crest High slope Step in slope Mid slope Toe of slope  Low slope Rolling Terrain Level Channel wall Basin floor Other	18. Topographic sketch:	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.  (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	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 Other: inches  27. Parent material:	28. Moisture regime:  Very dry Dry Moist Saturated  Periodically inundated Permanently inundated  29. Soil type (if observed) sand clay peat muck other
30. Sphagnum hummocks overhanging water:  (only if >25 m² and visible from plot)  GPS point (location):  Size of habitat:  3 water depths	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: delgid, gypsy moth, beech bark  Other:

7. Leaf phenology: 38. Phy Deciduous Semi-deciduous Semi-Evergreen Evergreen Perennial Annual  9. Photo Cover Type:	siognomic type: Forest Woodland Sparse woodland Sparse shi Dwarf shrubland Dwarf ser Sparse dwarf shrubland Non-vascu Herbaceous Sparsely v  39a. Field-Observed Cover Type:	ket T1 Emergent u ubland T2 Tree canop ub thicket T3 Tree sub- c ular	y     2     1=1-5%       anopy     4     2=6-25%       t     3=26-50%       t     4=51-75%       ar     t
Plant Species & abundance: list each speci		stratum.	
Red Oak	T2		
American Beech	72		
Hemlock	72		
Ches thut	72		
Strand musile	72		
White Kine	T2		
			211







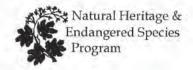
#### COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

MA Natural Heritage & Endangered Species Program

A. Identifiers		
1 02 1 1 1	2. Survey site name:  MA 4. Directions: I-  Refe 2 east to the interse  whiles morth. Turn east  the MA:	
		ndel Trienble GEO-6008  Main Surveyor: Steve Knapp
B. Topography 10.	Transect AR	
C. Vegetation / Habitat		
12. Observation point 1, GPS Pt <u>48</u> 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: <u>Black bisch Vegen</u> 14. Additional data: Site form 2 <u>k</u> form 3 <u>k</u>	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)  Regers area dominated by young black birch.  WI some white brech.  Bisserted by logging trails.  Vindusby includes  West-funt, Star flower,  Rhadodendan	Savne as pn. 41	General description:  Same as part. #1

Observation Point 4 GPS Pt GPS Lat. Long	Observation Point 5 GPS Pt	Observation Point 6 GPS Pt GPS Lat. Long	Observation Point 7 GPS Pt
Community type:	Community type:form 3	Community type:	Community type: form 3 form 3
Same as prit. #1	Sense is port. #1	Sence as print	Same as pat. #1

11. A topo map <u>must</u> also be attached with location indicated, Reconnaissance diagram: Scale:



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): Successional Northun Hordwoods (Black Bin	ch
NatureServe Association Name (Optional):	
Survey Date: 7/17/2014 Today's Date:	
Survey Site Name: 48	
Surveyor Name(s): Steve Knapo, Swah Dahareal	
Best Source (Field survey or secondary source used to complete this form, NHESP use): Field Survey	_
Franscriber (NHESP use only. YY-MM-DD XXX): Town Name: Nor-Public A. MA	_
Directions to site: See for 1	
GPS Point(s) Yes No Latitude 42.622 Longitude -72.43	=
B. Community Description:	
structure, variants/microhabitat features, unvegetated surface; spatial distribution (i.e., size, number, and separation distance of patches); in natural processes, geology, hydrology, topography, and soil properties, especially if relevant to the community identification):	ntact
Area is disected by begins trails	-
	-
Estimated size (acres) GIS Acres (if available)	
Physical Description (GENDESC: Describe the landscape surrounding the community, including the natural area. Both within and urrounding the community, describe: physical structures and land use practices; natural disturbances; embedded, adjacent, and nearby nature communities including aquatic features; notable landforms; scenic qualities):	ural
Acen of regen adjacent to horsested were	

erosion	etc.), logging, mining, livesto	ock grazing, nl	antations orol	hards at	T the col	nent Recommendations (/ nmunity such as hydrologic alter trampling, and exotic flora or fau	MGMTCOM: Describe the ations (ditching, damming ma within and surrounding)
the com	munity. Discuss threats to th	e site and man	agement impl	ications.	):		and surrounding
	Hea bisected	bu	logar	20 4	corks.		
_			SU				
-							
Recrea	tional Use (evidence of	'ATV's, OR'	V's, mountai	in bikes	horses	walking trails at a ).	
Protect	tion Comments (promo	Valle and	9	7		walking trails, etc.):	
Troteet	don Comments (PROTE	OM: Commer	nt on the legal	protecta	bility of	the site):	
1			1)				
Genera	l Comments (COMMEN	TS: Note the t	una afras di		O Marie		
any addit	ional field work needed. Con	nment on ques	stionable iden	ng done; tification	observat .):	ion point (form 1), releve plot (form 1), releve plot (form 2)	orm 3), plant list, etc.; note
Owner's	s Name (if known):					Name of the second	
Address	e.			_		Telephone: ()_	
Is Owne	er: aware of communi	ty?yes _	no unk	nown;	Prote	ecting community?yes _	no polosom
C: Com	nity Size Rank; (Con	currence I	Ranking: (	Refer to	commun	ity ranking specifications for assis, configuration, patchiness)	stance.)
Comme	A – Excellent	B - G00	od C	- Mar	ginal	D - Poor	
Commu	nity Condition Panle						
diversity, e fragmentati	ion).		A CONTRACTOR OF THE PARTY OF	· coming	avity, uc	owth), abiotic condition, species a gree of anthropogenic disturbanc	and physiognomic e including
Commer	A - Excellent						
Commur within the la		The state of the s		ze and co	nnectivit	y of the natural landscape, the po	osition of the community
~~~~~	A – Excellent	$\mathbf{B}$ – Goo	d C-	- Marg	inal	D- Poor	
Commen					0		
A summary		re the long-ter xplain the bas	m prospects for	or contin	ued exist	tence of this occurrence at the inc	licated level of quality?
	A - LACCHEIN	B - (100)		- Maro	inal	D D.	
Commen	ts (EORANKCOM: Summar	ize the above	and justify the	EO Rar	k assign	ed).	
					- Mary Bitt		
Other rare	e species and/an	al a		Tayl.		De versante de la company	
SPE	CIES OR COMMUN	al commun	ities obser	ved at	this sit	te (NHESP use) T/U = Transc	cribed/Updated?):
1	CLES ON COMMUN	I I Y	T/U?		SPE	CIES OR COMMUNITY	T/U?
2				4			
3				5			
3				6			

## Form 3: Quantitative Community Characterization

MA Natural Heritage & Endangered Species Program June 2006 dentifiers (general EOR information) Community type (observed): 1. 3. 2. GPS Point: Assigned type (NHESP use): Northern Hurdwold 4. Lat: 42,626 N Long -7243 Site name: Northfield Mountain 5. \_6. Quad name(s): Ecoregion (DFW): Town: Northfield, MA 8. County name(s): Franklin Co 10.Directions: See form 1 11. Survey date 12. Previous observations at this site: 13. Surveyors: Um hover! B. Environmental Description 14. PLOT # 15. Photos taken V N; Identfier 95-996 16. Elevation (from topo): 330 mor ft 17. Topographic position: 18. Topographic sketch: Summit/Crest 20. Slope Class (Percent): High slope Step in slope Flat (<2%) Mid slope Steep (48-95%) Toe of slope Gentle (2-9%) X Low slope Very Steep (>95%) Moderate (10-25%) Abrupt (cliff or ledge) Rolling Terrain Rather Steep (26-47%) Level Channel wall Basin floor Channel bed Other 21. Slope Shape: 19. Slope aspect: MACH Vertically: Concave Convex Linear 22. Downed Wood Horizontally: Concave Convex Linear (within or partially within plot) 25. Un-vegetated surface (check the single, 28. Moisture regime: -Max. diameter/length/decay class: most dominant feature): -Average diameter for all downed wood ≥4 in. Bedrock Very dry (estimate) Dry Large rocks (boulders > 24 in.) Wet Small rocks (stones 10-24 in.) -Abundance of downed wood ≥4 in. diameter Moist Saturated (using cover classes) Cobbles (2-9 in.) Gravel (<2 in.) \_Periodically inundated 23. Fuel load (< 1/4 inch in diameter): Sand Permanently inundated Litter Low =  $\sqrt{1}$  Moderate = 2 High = 3 Bare soil Water 24. Snags ≥ 4" DBH: Species DBH Other: height 29. Soil type (if observed) 26. Combined litter & duff depth: sand loam O-1 inches clay peat muck 27. Parent material: other 30. Sphagnum hummocks overhanging 31. Evidence of Land Use History: water: 32. Evidence of Disturbance: (only if >25 m<sup>2</sup> and visible from plot) stone walls, barbed wire, wolf trees Fires: fire scars, charcoal, standing snags GPS point (location): cut stumps, multi-trunk trees, Size of habitat: Blowdowns: aligned downed trees foundations, wells (max. inches) 3 water depths Ice damage: broken tree tops Other Wistorie Circle: Moving channels or Pools of Water Disease: adelgid, gypsy moth, beech bark Comments:

THEY CO

ME WEG

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

Decidnous Semi-deciduous Semi-Evergreen Evergreen Perennial Annual	Physiognomic type:  Very Forest Sparse woodland Shrubland Dwarf shrubland Sparse dwarf shrubland Herbaceous  39a. Field-Observed		40. Strata/life forms  T1 Emergent T2 Tree canop T3 Tree sub S1 Tall shrub S2 Short shru H Herbaceou N Non-vascu V Vine / lian.	tree # 3	+<1% 1=1.5% 2=6-25% 3=26-50% 4=51-75% 5>75%
41. Plant Species & abundance: list each s		cover class for each stratum.			
Black Black	72 72				
White Birch					
Rhododendan	52 H				
Sterflower	H				
STATE TOWER	TT.				





### COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

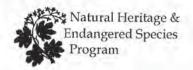
#### MA Natural Heritage & Endangered Species Program

4		 -
•	Ider	 1 63 146
6.00	luci	 

A. Identifiers		10
1. Site name: Northfield Mit. 3. Town (LOCALJURIS): North field	2. Survey site name:  4. Directions: Take	49
Green field, MA, Follows	7-77	
63 Take rte las	12 m	on east onto Main Access
Red & fullow to North	field Mt.	VI EBST ONTO ZURIN ACCES
	/	
5. GPS (if not below) Lat		lodel Trimbk GEO-6000
		Main Surveyor: Stepp Knd 20
9. Other Surveyors: Surah Drahovi	2/	-11
Topography 10	Transect	
11. A topo map must also be attached with location	indicated, Reconnaissance diagram: Scale:	
. Vegetation / Habitat		
12. Observation point 1. GPS Pt	Observation point 2 GPS Pt	Observation point 3 GPS Pt
GPS Lat. 42,622 Long -72,433	GPS Lat. Long	GPS Lat. Long
13. Community type: Hard Wood  14. Additional data: Site form 2 form 3	Community type: Additional data: Site form2 form 3	Community type: form 3
15. General description (physiognomy, characteristic & dominant spp. of all layers)	General description:	General description:
Medium aged hadwood forest dorning ted by Black Birch & White Breh.  Understorg includes Stripped mapte, hobble bush, & Wood film	Same as pnf #/	Same as port. #1
adjacent to hornested		

S Lat. Long	GPS Lat. Long	Observation Point 6 GPS Pt	Observation Point 7 GPS Pt
ditional data: Site form2form 3	Community type:Additional data: Site form2form 3	Community type:	Community type:
neral Description:	General Description:	General Description:	General Description:
Same as put #1	Some as port #1	Same U.S. pink.#1	Same as part =

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



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#### FORM 2: NATURAL COMMUNITY SUMMARY AND RANKING

(A location map must accompany this form.)

A. Identifiers: Community Name (MNHESP: S	wain & Kearsley, 2000):SUCCES	Signal 1	Inches Hademans
NatureServe Association Na	ime (Optional):	20211011 /2	2.3 TOTAL TERSONAL
Survey Date: 7/17/2		_Today's Da	ate:
Survey Site Name:	19	_ , , , , , , , , , , , , , , , , , , ,	
Surveyor Name(s): 54	Ve Knapp & Swaln	Drahow FRI	
Best Source (Field survey or second	ary source used to complete this form, NHE	SP use):	Field Survey
Transcriber (NHESP use only. YY	-MM-DD XXX):	Tow	n Name: Moch field M
Directions to site:	e from		
GPS Point(s) ×Yes No	Latitude 42.622 I	ongitude -	72,437
B. Community Description	:	Jongitude	14751
* Ward farn	le story includes	Srippia	maple, hobble bush,
Physical Description (GENDE)	Estimated siz  C: Describe the landscape surrounding physical structures and land use practic	the community, i	GIS Acres (if available)
ommunities including aquatic feature	s; notable landforms; scenic qualities):	cs, natural disturb	ances, embedded, adjacent, and hearby natura
Adjacont	to hervisted were		

anthr	opogenic d	isturbances that have	decreased the	quality and viab	oility of the	commun	Recommendations (MGMTCO ity such as hydrologic alterations (dit	ching, damming,
							ling, and exotic flora or fauna within	and surrounding
the c	ommunity.	Discuss threats to th	e site and mana	gement implica	tions.):	-	MA	
		Heljacent	to his	wester.	aren	1	Riservoir	
-				×				
Rec	reational	Use (evidence o	f ATV's, OR	/'s, mountain	bikes, ho	rses, wal	king trails, etc.):	
1		0						
Pro	tection C	Comments (PROT		it on the legal p			ite):	
							point (form 1), releve plot (form 3), pl	
_								
į	1112/25/							
		me (if known):					_ Telephone: ()	
Add	lress:							
Is C	wner: av	ware of commu	nity? yes	no unki	nown;	Protect	ing community?yesno	unknown
			ompare relative	size to other k	nown occu	irrences, o	ranking specifications for assistance.) onfiguration, patchiness) D Poor	
Con	nments:							
diver							h), abiotic condition, species and phy ee of anthropogenic disturbance include	
	nments:	A – Excellen	t <b>B</b> – Go	ood C	Margi	inal	D - Poor	
		and the second s	text Rank:	Consider the six	ze and con	nectivity	of the natural landscape, the position	of the community
withi	n the lands	cape, and the landsca		. 6	· ·			
		$\mathbf{A} - \text{Excellen}$	$\mathbf{B} - \mathbf{G}\mathbf{G}$	ood C	≠ Margi	nal	D - Poor	
Cor		EO Rank: (Wh	e. Explain the b	asis of your ran	iking: rang	e wide, st	nce of this occurrence at the indicated ate wide, or locally.)	level of quality?
		A – Excellen		/				
Con	nments (	EORANKCOM: Sum	marize the above	e and justify th	e EO Ranl	c assigned	):	
_								_
-					-			
-								
Oth	er rare s	pecies and/or na	tural comm	unities obse	erved at	this site	(NHESP use) T/U = Transcribe	d/Updated?)
	SPECI	ES OR COMMI	JNITY	T/U?		SPEC	CIES OR COMMUNITY	T/U?
1				11-4	4			
2					5			
3					6			

#### June 2006

#### Form 3: Quantitative Community Characterization MA Natural Heritage & Endangered Species Program

. Community type (observed): Hardu	land forder 2.0	GPS Point: A9
. Assigned type (NHESP use): 500005512 . Site name: Ab Angels Mat.	nal Northern Hydenast 4.1  6. Quad name	at: 42,621 N Long -72,433
. Ecoregion (DFW): . Town: Nochhold , MA	8. County nam 10. Directions: See form	e(s): Fantlin Co.
1. Survey date 7/17/2014 3. Surveyors: Steve Knapp Environmental Description 4. PLOT #	12. Previous observations at this site:  See h Dea hov Rel  15. Photos taken Y N; Identifier	16. Elevation (from topo): On or ft
7. Topographic position: Summit/Crest High slope Mid slope Low slope Rolling Terrain Level Channel wall Basin floor Other  2. Downed Wood	19. Slope aspect: N K d	20. Slope Class (Percent):  Flat (<2%) Gentle (2-9%) Wory Steep (>95%) Moderate (†0-25%) Abrupt (cliff or ledg Rather Steep (26-47%)  21. Slope Shape:  Vertically: Concave Convex Linear Horizontally: Concave Convex Linear
(within or partially within plot)  Max. diameter/length/decay class:  Average diameter for all downed wood ≥4 in.  (estimate)  Abundance of downed wood ≥4 in. diameter (using cover classes)  B. Fuel load (< ¼ inch in diameter): Low = 1 Moderate = 2 High = 3  B. 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 Other:  26. Combined litter & duff depth: inches  27. Parent material:	28. Moisture regime: Very dryDryWetSaturated Periodically inundatedPermanently inundatedPermanently inundated  29. Soil type (if observed)sandloamloamloam
Comments:	31. Evidence of Land Use History: stone walls, barbed wire, wolf trees cut stumps, multi-trunk trees, foundations, wells Other  geneity, erosion / sedimentation, invasive species	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:

37. Leaf phenology: 38. 1  X Deciduous Semi-deciduous Semi-Evergreen Evergreen Perennial Annual  39. Photo Cover Type:	Physiognomic type:  Forest  Sparse woodland  Shrubland  Dwarf shrubland  Sparse dwarf shrubland  Herbaceous  39a. Field-Observed Cove	Woodland Scrub thicket Sparse shrubland Dwarf scrub thicket Non-vascular Sparsely vegetated	40. Strata/life forms  T1 Emergent T2 Tree cano T3 Tree sub- S1 Tall shrub S2 Short shru H Herbaccou N Non-vascu V Vine / lian	tree py canopy b ss	% cover + 4 - - - - - - - - - - - - - - - - -	+ <1% 1 = 1-5% 2 = 6-25% 3 = 26-500 4 = 51-75% 5 > 75%
41. Plant Species & abundance: list each sp	ecies and the corresponding cover	class for each stratum.				
Black Bieh	T2/T3					
White Birch	72/73					
Wood for	<i>H</i>					
Stripped maple	51/2					
hobble bush	51					
						- 110







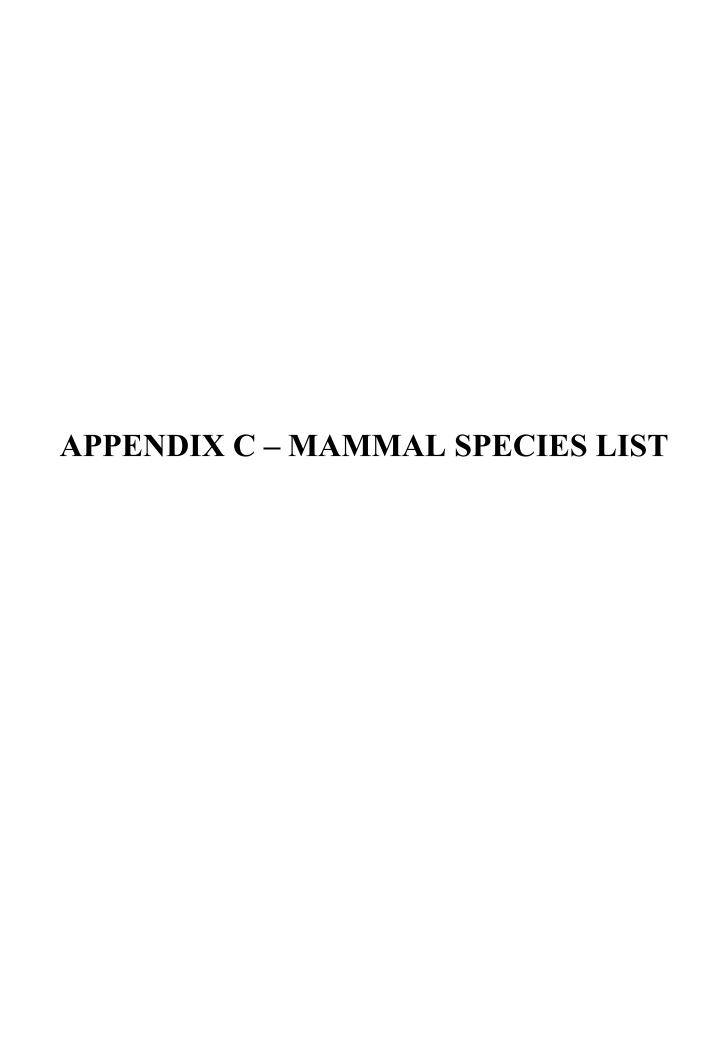


Table C.1: Northfield Mountain Pumped Storage Project 2014 Mammals List

Beaver*  Black bear**  Black bear**  Bobcat  Coyote**  Canis latrans  Deer mouse  Eastern chipmunk*  Eastern mole  Fisher  Gray fox  Gray squirrel*  Hoary bat  Lasiurus cinereus  House mouse  Long-tailed shew  Meadow vole  Meadow vole  Muskrat*  New England cottontail  Northern short-tailed shrew  Norway rat  Porcupine **  Red bat  Lasiurus breating  Red fox**  Red squirrel*  Castor canadensis  Urosus americanus  Peromyscus maniculatus  Tamias striatus  Scalopus aquaticus  Martes pennanti  Murocyon cinereoargenteus  Sciurus carolinensis  Hairy-tailed mole  Parascalops breweri  Lasiurus cinereus  Mus musculus  Long-tailed shew  Sorex dispar  Masked shrew  Sorex cinereus  Meadow jumping mouse  Microtus pennsylvanicus  Muskrat*  Ondatra zibethicus  Nordatra zibethicus  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	Common Name	Scientific name
Bobcat Coyote** Canis latrans Deer mouse Peromyscus maniculatus Eastern chipmunk* Tamias striatus Eastern mole Scalopus aquaticus Fisher Martes pennanti Gray fox Urocyon cinereoargenteus Gray squirrel* Hairy-tailed mole Hoary bat House mouse Long-tailed shew Sorex dispar Masked shrew Meadow jumping mouse Meadow vole Microtus pennsylvanicus Meadow vole Microtus pennsylvanicus New England cottontail Northern short-tailed shrew Raccoon* Red bat Red fox** Procyon lotor Red bat Red squirrel* Tamiasciurus hudsonicus Striped skunk Mephitis mephitis Virginia oppossum * Mordam vinginianus Meadow virginianus Mephitis mephitis Woodchuck Marmota monax Woodland jumping mouse Napaeozapus insignis	Beaver*	
Coyote**  Canis latrans  Deer mouse  Peromyscus maniculatus  Eastern chipmunk*  Tamias striatus  Eastern mole  Scalopus aquaticus  Fisher  Martes pennanti  Gray fox  Urocyon cinereoargenteus  Gray squirrel*  Hoary bat  Hoary bat  Lasiurus cinereus  House mouse  Mus musculus  Long-tailed shew  Masked shrew  Meadow jumping mouse  Mus musculus  Meadow vole  Microtus pennsylvanicus  Muskrat*  Ondatra zibethicus  New England cottontail  Northern short-tailed shrew  Norway rat  Raccoon*  Red bat  Red fox**  Red squirrel*  Tamiasciurus hudsonicus  Striped skunk  Neybitis mephitis  Virginia oppossum *  Didelphis virginianus  Woodchuck  Marmota monax  Napaeozapus insignis	Black bear**	Ursus americanus
Deer mouse  Eastern chipmunk*  Eastern mole  Scalopus aquaticus  Fisher  Martes pennanti  Gray fox  Urocyon cinereoargenteus  Gray squirrel*  Hoary squirrel*  Hoary bat  House mouse  Long-tailed shew  Meadow jumping mouse  Mus musculus  Northern short-tailed shrew  Norway rat  Raccoon*  Red bat  Red fox**  Red squirrel*  Eastern mole  Parascalopus aquaticus  Martes pennanti  Urocyon cinereoargenteus  Sciurus carolinensis  Lasiurus cinereus  Mus musculus  Sorex dispar  Masked shrew  Sorex dispar  Meadow jumping mouse  Zapus hudsonius  Meadow vole  Microtus pennsylvanicus  Muskrat*  Ondatra zibethicus  Nowlagus transitionalis  Northern short-tailed shrew  Blarina brevicauda  Norway rat  Rattus norvegicus  Procyon lotor  Red bat  Lasiurus borealis  Red fox**  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  Napaeozapus insignis	Bobcat	Felix rufus
Deer mouse  Eastern chipmunk*  Eastern mole  Scalopus aquaticus  Fisher  Martes pennanti  Gray fox  Urocyon cinereoargenteus  Gray squirrel*  Hoary squirrel*  Hoary bat  House mouse  Long-tailed shew  Meadow jumping mouse  Mus musculus  Northern short-tailed shrew  Norway rat  Raccoon*  Red bat  Red fox**  Red squirrel*  Eastern mole  Parascalopus aquaticus  Martes pennanti  Urocyon cinereoargenteus  Sciurus carolinensis  Lasiurus cinereus  Mus musculus  Sorex dispar  Masked shrew  Sorex dispar  Meadow jumping mouse  Zapus hudsonius  Meadow vole  Microtus pennsylvanicus  Muskrat*  Ondatra zibethicus  Nowlagus transitionalis  Northern short-tailed shrew  Blarina brevicauda  Norway rat  Rattus norvegicus  Procyon lotor  Red bat  Lasiurus borealis  Red fox**  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  Napaeozapus insignis	Coyote**	Canis latrans
Eastern mole  Fisher  Martes pennanti  Gray fox  Urocyon cinereoargenteus  Gray squirrel*  Sciurus carolinensis  Hairy-tailed mole  Hoary bat  House mouse  Long-tailed shew  Masked shrew  Meadow jumping mouse  Meadow vole  Meadow vole  Mealon tottontail  Northern short-tailed shrew  Norway rat  Porcupine **  Red bat  Red fox**  Red squirrel*  Erethizon dorsatum  Star-nosed mole  Scalopus aquaticus  Martes pennanti  Urocyon cinereoargenteus  Sciurus carolinensis  Hairy-tailed mole  Parascalops breweri  Lasiurus cinereus  Mus musculus  Sorex dispar  Sorex cinereus  Meadow jumping mouse  Zapus hudsonius  Microtus pennsylvanicus  Microtus pennsylvanicus  Microtus pennsylvanicus  Microtus pennsylvanicus  Microtus pennsylvanicus  Blarina brevicauda  Sylvilagus transitionalis  Northern short-tailed shrew  Blarina brevicauda  Rattus norvegicus  Frethizon 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  Woodcluck  Marmota monax  Napaeozapus insignis	Deer mouse	Peromyscus maniculatus
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	Eastern chipmunk*	Tamias striatus
Gray fox Gray squirrel* Sciurus carolinensis Hairy-tailed mole Hoary bat Lasiurus cinereus House mouse Long-tailed shew Masked shrew Meadow jumping mouse Mus ensylvanicus Muskrat* New England cottontail Northern short-tailed shrew Porcupine ** Red bat Red fox** Red squirrel* Tamiasciurus hudsonicus Silver-haired bat Striped skunk Mephitis mephitis Virginia oppossum * Miarotus cinereus Muskrat* Ondatra zibethicus Sylvilagus transitionalis Northern short-tailed shrew Blarina brevicauda Norway rat Rattus norvegicus 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 Woodcluck Marmota monax Napaeozapus insignis	Eastern mole	Scalopus aquaticus
Gray squirrel*  Hairy-tailed mole  Hoary bat  Lasiurus cinereus  House mouse  Long-tailed shew  Sorex dispar  Masked shrew  Meadow jumping mouse  Meadow vole  Mus musculus  Microtus pennsylvanicus  Muskrat*  Northern short-tailed shrew  Porcupine **  Raccoon*  Red bat  Red fox **  Red squirrel*  Tamiasciurus hudsonicus  Ned squirrel*  Tamiasciurus hudsonicus  Silver-haired bat  Striped skunk  Mephitis mephitis  Virginia oppossum *  Didelphis virginianus  Woodchuck  Marmota monax  Napaeozapus insignis	Fisher	Martes pennanti
Hairy-tailed mole Hoary bat Lasiurus cinereus House mouse Mus musculus Long-tailed shew Sorex dispar Masked shrew Meadow jumping mouse Meadow vole Muskrat* New England cottontail Northern short-tailed shrew Porcupine ** Raccoon* Red bat Red fox ** Red squirrel* Tamiasciurus hudsonicus New England bat Sulvilagus transitionalis Northern short-tailed shrew Red squirrel* Tamiasciurus hudsonicus Silver-haired bat Striped skunk Mehret peromyscus leucopus White-footed mouse Woodcluck Musmusculus Musmusculus Miscretus Miscretus Miscretus Miscretus Muscretus	Gray fox	Urocyon cinereoargenteus
Hoary bat  House mouse  Mus musculus  Long-tailed shew  Masked shrew  Meadow jumping mouse  Meadow vole  Muskrat*  Ondatra zibethicus  New England cottontail  Northern short-tailed shrew  Raccoon*  Red bat  Red fox**  Red squirrel*  Red squirrel*  Tamiasciurus hudsonicus  Sturiped skunk  Mephitis mephitis  Virginia oppossum *  Woodland jumping mouse  Mus musculus  Mus musculus  Mus musculus  Norex dispar  Musculus  Norex cinereus  Musculus  Norex cinereus  Musculus  Norex cinereus  Musculus  Norex cinereus  Microtus pennsylvanicus  Microtus pennsylvanicus  Sylvilagus transitionalis  Northern short-tailed shrew  Blarina brevicauda  Norway rat  Rattus norvegicus  Percyon lotor  Red bat  Lasiurus borealis  Vulpes vulpes  Red squirrel*  Tamiasciurus hudsonicus  Lasionycteris noctivagans  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	Gray squirrel*	Sciurus carolinensis
House mouse  Long-tailed shew  Sorex dispar  Masked shrew  Meadow jumping mouse  Meadow vole  Microtus pennsylvanicus  Muskrat*  Ondatra zibethicus  New England cottontail  Northern short-tailed shrew  Norway rat  Porcupine **  Raccoon*  Red bat  Lasiurus borealis  Red fox**  Red squirrel*  Tamiasciurus hudsonicus  Sturnosed mole  Striped skunk  Virginia oppossum *  White-footed mouse  Woodland jumping mouse  Macrotus dispar  Microtus pennsylvanicus  Microtus pennsylvanicus  Microtus pennsylvanicus  Microtus pennsylvanicus  Melarina brevicauda  Norway rat  Rattus norvegicus  Procyon lotor  Red bat  Lasiurus borealis  Tamiasciurus hudsonicus  Lasionycteris noctivagans  Condylura cristata  Striped skunk  Mephitis mephitis  Virginiana  White-footed mouse  Peromyscus leucopus  Marmota monax  Napaeozapus insignis	Hairy-tailed mole	Parascalops breweri
Long-tailed shewSorex disparMasked shrewSorex cinereusMeadow jumping mouseZapus hudsoniusMeadow voleMicrotus pennsylvanicusMuskrat*Ondatra zibethicusNew England cottontailSylvilagus transitionalisNorthern short-tailed shrewBlarina brevicaudaNorway ratRattus norvegicusPorcupine **Erethizon dorsatumRaccoon*Procyon lotorRed batLasiurus borealisRed fox**Vulpes vulpesRed squirrel*Tamiasciurus hudsonicusSilver-haired batLasionycteris noctivagansStar-nosed moleCondylura cristataStriped skunkMephitis mephitisVirginia oppossum *Didelphis virginianaWhite-footed mousePeromyscus leucopusWhite-tailed deer*Odocoileus virginianusWoodchuckMarmota monaxWoodland jumping mouseNapaeozapus insignis	Hoary bat	Lasiurus cinereus
Masked shrewSorex cinereusMeadow jumping mouseZapus hudsoniusMeadow voleMicrotus pennsylvanicusMuskrat*Ondatra zibethicusNew England cottontailSylvilagus transitionalisNorthern short-tailed shrewBlarina brevicaudaNorway ratRattus norvegicusPorcupine **Erethizon dorsatumRaccoon*Procyon lotorRed batLasiurus borealisRed fox**Vulpes vulpesRed squirrel*Tamiasciurus hudsonicusSilver-haired batLasionycteris noctivagansStar-nosed moleCondylura cristataStriped skunkMephitis mephitisVirginia oppossum *Didelphis virginianaWhite-footed mousePeromyscus leucopusWhite-tailed deer*Odocoileus virginianusWoodchuckMarmota monaxWoodland jumping mouseNapaeozapus insignis	House mouse	Mus musculus
Masked shrewSorex cinereusMeadow jumping mouseZapus hudsoniusMeadow voleMicrotus pennsylvanicusMuskrat*Ondatra zibethicusNew England cottontailSylvilagus transitionalisNorthern short-tailed shrewBlarina brevicaudaNorway ratRattus norvegicusPorcupine **Erethizon dorsatumRaccoon*Procyon lotorRed batLasiurus borealisRed fox**Vulpes vulpesRed squirrel*Tamiasciurus hudsonicusSilver-haired batLasionycteris noctivagansStar-nosed moleCondylura cristataStriped skunkMephitis mephitisVirginia oppossum *Didelphis virginianaWhite-footed mousePeromyscus leucopusWhite-tailed deer*Odocoileus virginianusWoodchuckMarmota monaxWoodland jumping mouseNapaeozapus insignis	Long-tailed shew	Sorex dispar
Meadow voleMicrotus pennsylvanicusMuskrat*Ondatra zibethicusNew England cottontailSylvilagus transitionalisNorthern short-tailed shrewBlarina brevicaudaNorway ratRattus norvegicusPorcupine **Erethizon dorsatumRaccoon*Procyon lotorRed batLasiurus borealisRed fox**Vulpes vulpesRed squirrel*Tamiasciurus hudsonicusSilver-haired batLasionycteris noctivagansStar-nosed moleCondylura cristataStriped skunkMephitis mephitisVirginia oppossum *Didelphis virginianaWhite-footed mousePeromyscus leucopusWhite-tailed deer*Odocoileus virginianusWoodchuckMarmota monaxWoodland jumping mouseNapaeozapus insignis		Sorex cinereus
Muskrat*Ondatra zibethicusNew England cottontailSylvilagus transitionalisNorthern short-tailed shrewBlarina brevicaudaNorway ratRattus norvegicusPorcupine **Erethizon dorsatumRaccoon*Procyon lotorRed batLasiurus borealisRed fox**Vulpes vulpesRed squirrel*Tamiasciurus hudsonicusSilver-haired batLasionycteris noctivagansStar-nosed moleCondylura cristataStriped skunkMephitis mephitisVirginia oppossum *Didelphis virginianaWhite-footed mousePeromyscus leucopusWhite-tailed deer*Odocoileus virginianusWoodchuckMarmota monaxWoodland jumping mouseNapaeozapus insignis	Meadow jumping mouse	Zapus hudsonius
New England cottontailSylvilagus transitionalisNorthern short-tailed shrewBlarina brevicaudaNorway ratRattus norvegicusPorcupine **Erethizon dorsatumRaccoon*Procyon lotorRed batLasiurus borealisRed fox**Vulpes vulpesRed squirrel*Tamiasciurus hudsonicusSilver-haired batLasionycteris noctivagansStar-nosed moleCondylura cristataStriped skunkMephitis mephitisVirginia oppossum *Didelphis virginianaWhite-footed mousePeromyscus leucopusWhite-tailed deer*Odocoileus virginianusWoodchuckMarmota monaxWoodland jumping mouseNapaeozapus insignis	Meadow vole	Microtus pennsylvanicus
Northern short-tailed shrew  Norway rat  Porcupine **  Raccoon*  Red bat  Red fox**  Red squirrel*  Silver-haired bat  Striped skunk  Virginia oppossum *  White-footed mouse  Woodchuck  Woodland jumping mouse  Rattus norvegicus  Ret Rattus norvegicus  Erethizon dorsatum  Rattus norvegicus  Erethizon dorsatum  Lasiurus borealis  Tamiasciurus hudsonicus  Lasionycteris noctivagans  Condylura cristata  Mephitis mephitis  Virginia oppossum *  Odocoileus virginiana  White-tailed deer*  Napaeozapus insignis	Muskrat*	Ondatra zibethicus
Norway rat Porcupine **  Raccoon*  Raccoon*  Red bat  Red fox**  Red squirrel*  Silver-haired bat  Striped skunk  Virginia oppossum *  White-footed mouse  White-tailed deer*  Woodland jumping mouse  Rattus norvegicus  Erethizon dorsatum  Lasiurus borealis  Vulpes vulpes  Tamiasciurus hudsonicus  Silver-haired bat  Lasionycteris noctivagans  Condylura cristata  Mephitis mephitis  Virginiana  Mephitis mephitis  Virginiana  White-footed mouse  Peromyscus leucopus  Marmota monax  Napaeozapus insignis	New England cottontail	Sylvilagus transitionalis
Porcupine **  Raccoon*  Procyon lotor  Red bat  Red fox**  Red squirrel*  Silver-haired bat  Striped skunk  Virginia oppossum *  White-footed mouse  White-tailed deer*  Woodland jumping mouse  Procyon lotor  Lasiurus borealis  Vulpes vulpes  Tamiasciurus hudsonicus  Lasionycteris noctivagans  Condylura cristata  Mephitis mephitis  Virginia oppossum *  Didelphis virginiana  Whoodchuck  Marmota monax  Napaeozapus insignis	Northern short-tailed shrew	Blarina brevicauda
Raccoon*Procyon lotorRed batLasiurus borealisRed fox**Vulpes vulpesRed squirrel*Tamiasciurus hudsonicusSilver-haired batLasionycteris noctivagansStar-nosed moleCondylura cristataStriped skunkMephitis mephitisVirginia oppossum *Didelphis virginianaWhite-footed mousePeromyscus leucopusWhite-tailed deer*Odocoileus virginianusWoodchuckMarmota monaxWoodland jumping mouseNapaeozapus insignis		Rattus norvegicus
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	Porcupine **	Erethizon dorsatum
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	Raccoon*	Procyon lotor
Red squirrel*  Silver-haired bat  Star-nosed mole  Striped skunk  Virginia oppossum *  White-footed mouse  White-tailed deer*  Woodchuck  Woodland jumping mouse  Tamiasciurus hudsonicus  Lasionycteris noctivagans  Condylura cristata  Mephitis mephitis  Mephitis mephitis  Didelphis virginiana  Peromyscus leucopus  Odocoileus virginianus  Marmota monax  Napaeozapus insignis		Lasiurus borealis
Silver-haired bat  Star-nosed mole  Striped skunk  Virginia oppossum *  White-footed mouse  White-tailed deer*  Woodchuck  Woodland jumping mouse  Lasionycteris noctivagans  Condylura cristata  Mephitis mephitis  Didelphis virginiana  Peromyscus leucopus  Odocoileus virginianus  Marmota monax  Napaeozapus insignis	Red fox**	Vulpes vulpes
Star-nosed mole  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	Red squirrel*	Tamiasciurus hudsonicus
Striped skunkMephitis mephitisVirginia oppossum *Didelphis virginianaWhite-footed mousePeromyscus leucopusWhite-tailed deer*Odocoileus virginianusWoodchuckMarmota monaxWoodland jumping mouseNapaeozapus insignis	Silver-haired bat	Lasionycteris noctivagans
Virginia oppossum *Didelphis virginianaWhite-footed mousePeromyscus leucopusWhite-tailed deer*Odocoileus virginianusWoodchuckMarmota monaxWoodland jumping mouseNapaeozapus insignis	Star-nosed mole	Condylura cristata
White-footed mousePeromyscus leucopusWhite-tailed deer*Odocoileus virginianusWoodchuckMarmota monaxWoodland jumping mouseNapaeozapus insignis	Striped skunk	Mephitis mephitis
White-tailed deer*  Woodchuck  Woodland jumping mouse  Odocoileus virginianus  Marmota monax  Napaeozapus insignis	Virginia oppossum *	Didelphis virginiana
Woodchuck Marmota monax Woodland jumping mouse Napaeozapus insignis		Peromyscus leucopus
Woodland jumping mouse Napaeozapus insignis		Odocoileus virginianus
		Marmota monax
Woodland vole Microtus ninetorum	Woodland jumping mouse	
Woodiand voic Willout pinetorum	Woodland vole	Microtus pinetorum

<sup>\*</sup> Denotes direct observation

<sup>\*\*</sup> 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

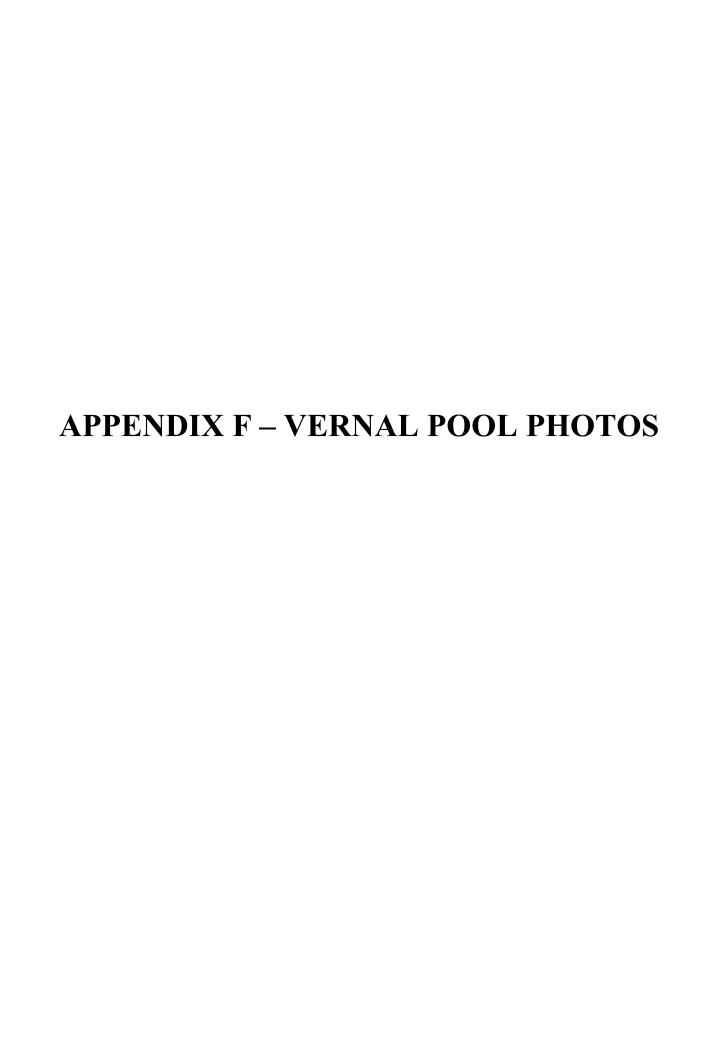
<sup>\*</sup> Denotes Direct Observation



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

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

		Northfield Mountain					
Species (continued)	CT River	Total area	NW Slope	NE Slope	SE Slope	SW Slope	Reservoi
Rock Pigeon	Х						
Bald Eagle	X	Х					Х
Coopers Hawk	X						
Broad-winged Hawk	X						
Osprey	X						
Peregrine Falcon		Χ			X		
Red-tailed hawk	X	Χ		X	X		
Turkey Vulture	X	Χ	Χ				Χ
Killdeer	X	Χ					Χ
Spotted Sandpiper	X	Χ					Χ
Greater Yellowlegs	Х						
Bank Swallow	X	Χ					Χ
Barn Swallow	Х						
Northern Rough-winged Swallow	Х						
Tree Swallow	Х	Х					Х
Chimney Swift	Х						
American Robin	Х	Х	Х		Х		Х
Hermit Thrush		Х	Х		Х	Х	
Veery	Х	Х	Х	Х	Х	Х	
Wood Thrush	Х	Х	Χ	Χ	Х	Х	
Blue-headed Vireo		Х	Χ		Х	Х	
Red-eyed Vireo	Х	Х	Х	Х	Х	X	Х
Warbling Vireo	Х						
Yellow-throated Vireo		Х	Χ				
Great Blue Heron	Х						
Green Heron	Х						
American Redstart	Х	Х	Х		Х		
Black and White Warbler	Х	Х	Х	Х	Х	Х	
Blackburnian Warbler		Х	Х	Х	Х		
Black-throated Blue Warbler		Х	X	X	X	Х	
Black-throated Green Warbler	Х	Х	Х	X	X	Х	
Blue-winged Warbler	X					,	
Chestnut-sided Warbler	X	Х	Х				
Common Yellowthroat	X	X	X				Х
Louisiana Waterthrush	X						
Oven Bird	, ,	X	Х	Х	Х	X	
Pine Warbler		X	X		X	X	
Prairie Warbler		X	X		Α		
Yellow Warbler	Х						
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







VP-3



VP-4



VP-5



VP-6



**VP-7** 



VP-8



VP-9



VP-10



VP-11



VP-12



VP-13



VP-14



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

Abies balsamea         balsam fir           Acer negundo         box elder           Acer pensylvanicum         striped maple           Achillea millefolium         yarrow           Achillea millefolium         yarrow           Acorus calamus         sweet flag           Alnus incana         speckled alder           Amplicarpaea bracteata         hog peanut           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           Arctivam minus         common burdock           Arctium minus         common burdock           Arctium minus         common burdock           Arctium minus         debeatherty           Asclepias sp.         milkweed           Asplenium platyneuron         ebony spleenwort           Berberis thunbergii         Japanese barberry           Betula alleghaniensis         yellow birch           Betula papyrifera         white birch           Betula papyrifera         white birch <t< th=""><th>Scientific Name</th><th>Common Name</th></t<>	Scientific Name	Common Name
Acer negundo         box elder           Acer pensylvanicum         striped maple           Acer rubrum         red maple           Achillea millefolium         yarrow           Achillea millefolium         yarrow           Acorus calamus         sweet flag           Almus incana         speckled alder           Amelanchier canadensis         eastern serviceberry           Amphicarpaea bracteata         hog peanut           Antennaria plantaginifolia         plantain-leaved pussytoes           Apocynum androsaemifolium         spreading dogbane           Apullegia canadenis         wild columbine           Aratia nudicaulis         wild sarsaparilla           Aratia nudicaulis         wild sarsaparilla           Arctium minus         common burdock           Arctium minus         common burdock           Arctium minus         common burdock		
Acer pensylvanicum red 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 papyrifera white birch Betula papyrifera white birch Betula palustris marsh marigold Carex crinita fringed sedge Carex intumescens bladder sedge Carex lurida shallow sedge Carex lurida Shallow sedge Carex lurida American hornbeam Carya ovata Shagbark hickory Castanea dentata American chestnut Celastrus orbiculatus oriental bittersweet Centaurea maculosa Chiaphila maculata striped wintergreen Cichorium intybus common chicory Circaea lutetiana enchanter's nightshade Corrus armonum silky dogwood Corydalis sempervirens Daucus carola Queen Anne's lace Dennstaendtia punctilobula		
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           Aratia mudicaulis         wild columbine           Aralia nudicaulis         wild sarsaparilla           Arctium minus         common burdock           Arctium minus         dearberry           Asclepias sp.         milkweed           Asclepias sp.         milkweed           Asplentium platyneuron         ebony spleenwort		
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 papyrifera white birch Betula papyrifera gray birch Bidens frondosa devil's begger-ticks Caltha palustris marsh marigold Carex crinita fringed sedge Carex lurida shallow sedge Carex lurida shallow sedge Carey ovata shagbark hickory Castanea dentata American hornbeam Carya ovata shagbark hickory Castanea dentata striped wintergreen Cichorium intybus common chicory Circaea lutetiana enchanter's nightshade Clematis virginiana virgin's bower Comptonia peregrina sweet fern Coptis trifolia goldthread Corydalis sempervirens pale corydalis Corylus americana American hazelnut Daucus carota Dennstaendtia punctilobula		· ·
Acorus calamussweet flagAlnus incanaspeckled alderAmelanchier canadensiseastern serviceberryAmphicarpaea bracteatahog peanutAntennaria plantaginifoliaplantain-leaved pussytoesApocynum androsaemifoliumspreading dogbaneAquilegia canadensiswild columbineArabis glabratower mustardAralia nudicauliswild sarsaparillaArctium minuscommon burdockArctium minuscommon burdockArctium minusdearberryAsclepias sp.milkweedAsplenium platyneuronebony spleenwortBerberis thunbergiiJapanese barberryBetula alleghaniensisyellow birchBetula lentablack birchBetula papyriferawhite birchBetula populifoliagray birchBidens frondosadevil's begger-ticksCaltha palustrismarsh marigoldCarex crinitafringed sedgeCarex intumescensbladder sedgeCarex luridashallow sedgeCarex luridashallow sedgeCarex luridashallow sedgeCarpinus carolinianaAmerican hornbeamCarya ovatashagbark hickoryCastanea dentataAmerican chestnutCelastrus orbiculatusoriental bittersweetCentaurea maculosaspotted knapweedChiaphila maculatastriped wintergreenCichorium intybuscommon chicoryCircaea lutetianaenchanter's nightshadeClematis virginianavirgin's bower </td <td></td> <td>•</td>		•
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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           Betula palustresus         gelow birch           Betula palustris         marsh marigold           Carex funda populifolia         gray birch		_
Amphicarpaea bracteatahog peanutAntennaria plantaginifoliaplantain-leaved pussytoesApocynum androsaemifoliumspreading dogbaneAquilegia canadensiswild columbineArabis glabratower mustardAralia nudicauliswild sarsaparillaArctium minuscommon burdockArctostaphylos uva-ursibearberryAsclepias sp.milkweedAsplenium platyneuronebony spleenwortBerberis thunbergiiJapanese barberryBetula alleghaniensisyellow birchBetula lentablack birchBetula papyriferawhite birchBetula populifoliagray birchBidens frondosadevil's begger-ticksCaltha palustrismarsh marigoldCarex crinitafringed sedgeCarex intumescensbladder sedgeCarex luridashallow sedgeCarex scopariabroom sedgeCarpinus carolinianaAmerican hornbeamCarya ovatashagbark hickoryCastanea dentataAmerican chestnutCelastrus orbiculatusoriental bittersweetCentaurea maculosaspotted knapweedChiaphila maculatastriped wintergreenCircaea lutetianaenchanter's nightshadeCircaea lutetianaenchanter's nightshadeCircaea lutetianavirgin's bowerComptonia peregrinasweet fernCoptis trifoliagoldthreadCornus amonumsilky dogwoodCorydalis sempervirenspale corydalisCorylus americana<		
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 intumescens         bladder sedge           Carex lurida         American hornbeam           Carex scoparia         broom sedge           Carex lurida         American chestnut           Castanea dentata         American chestnut           Celastrus orbiculatus		ž
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	Desmondium glutinosum	tick-trefoil

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           Fragura virginiana         wild strawberry           Frangula alnus         glossy buckthorn           Fraxinus pennsylvanica         green ash           Galtium asprellum         rough bedstraw           Gulutheria procumbens         eastern teaberry           Glyceria sp.         mannagrass           Hamamelis virginiana         American witch-hazel           Hemericum cacallis sp.         dalylly           Hepatica nobilis	Scientific Name	Common Name
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Lyinrum saiicaria   purple 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