

Relicensing Study 3.6.7

RECREATION STUDY AT NORTHFIELD MOUNTAIN, INCLUDING ASSESSMENT OF SUFFICIENCY OF TRAILS FOR SHARED USE

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 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.

FERC issued its first study plan determination letter for the Turners Falls and Northfield Projects on September 13, 2013, approving the revised study plan (RSP) with certain modifications, including having to file with FERC a proposed methodology for collecting the trail design and condition characteristics. Accordingly, on December 11, 2013, FirstLight submitted a modified Recreation Study of Northfield Mountain, including Assessment of Sufficiency of Trails for Shared Use, which FERC subsequently approved by letter dated January 10, 2014. (Both the September 13, 2013 and January 10, 2014 FERC letters are hereafter referred to as the SPDL.) The study objectives were to:

- Determine whether the Northfield Mountain Tour and Trail Center (NMTTC) has met recreation needs and if improvements or additions are necessary at the NMTTC with a consideration of potential needs over the course of the 30 to 50 year new license; and
- Identify uses taking place on the current trail system and whether the current trail system is suitable and adequate for sustaining those uses, including evaluating the condition of existing trails e.g., erosion, drainage, width, slope, or obstacles.

The study area included the land and facilities located within the Northfield Mountain Project boundary, which are associated with the NMTTC. This included the approximately 25 miles of trails associated with the NMTTC, a portion of the New England National Scenic Trail, the Blue Connector Trail, the Upper Reservoir Mountaintop Observation area, climbing areas within the Project boundary, and the Visitor Center.

A review of existing information which included NMTTC program registration data, literature regarding best management practices for trail construction and maintenance, and data collected as part of Study 3.6.1 *Recreation Use and User Contact Survey* was conducted. A field investigation of the existing Northfield Mountain Trail System and associated facilities along with a detailed trail assessment of certain portions of the trails was conducted.

A desktop analysis was conducted utilizing field data, survey data and existing information. Study results determined that the NMTTC is a well-utilized regional recreation resource that provides a wide variety of opportunities, programs and amenities. The NMTTC supported an estimated 20,024 recreation days in 2014 which included participation in environmental and recreation programs as well as trail use. Overall, visitors to the NMTTC were satisfied with the amenities and programs available. Review of registration data indicates that participation in the programs provided at the Visitor Center and use of the NMTTC has remained relatively consistent in the near term, although there has been a downward trend over the long-term in the use of environmental programs, the Quinnetukut II riverboat cruises, and tours of the Turners Falls Fishway, despite the fact that the number of environmental programs offered has remained relatively constant.

The NMTTC trail system was determined to support a variety of uses including cross-country skiing, snowshoeing, hiking, biking, and horseback riding. The trail system supported an estimated 16,123

recreation days in 2014. Overall, it was found that the trail system is well designed, well maintained, and in good condition. Although the trails were originally designed primarily for hiking and skiing, the ski trail system can support mountain biking and horseback riding. The hiking and snowshoe trails, however, are not as suitable for use by mountain bikes or horses. The evaluation of the condition of the NMTTC trails also identified a few areas where measures to address drainage and erosion issues could be implemented to improve the long-term sustainability of the trails. Responses by trail users to survey questions regarding the NMTTC Trail System were overwhelmingly positive, with respondents agreeing (or strongly agreeing) that the trails are in good condition, well-maintained and groomed (in winter) and are sufficient in number and mix of difficulty. Additionally, it was determined that there are ample additional hiking and mountain biking opportunities in the area surrounding the NMTTC.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	I
1 INTRODUCTION	1-1
2 STUDY AREA	2-1
3 METHODS.....	3-1
3.1 Review of Existing Information.....	3-1
3.2 Field Work	3-1
3.3 Desktop Analysis	3-2
4 STUDY RESULTS AND DISCUSSION	4-1
4.1 Northfield Mountain Tour and Trail Center.....	4-1
4.1.1 Northfield Mountain Tour and Trail Center Recreation Use	4-5
4.1.2 Northfield Mountain Tour and Trail Center Use and User Survey Results	4-6
4.1.3 Northfield Mountain Tour and Trail Center Recent Historic Use	4-10
4.1.4 Trends in Use of Educational Programs	4-13
4.2 Northfield Mountain Trail System.....	4-18
4.2.1 Trail Survey	4-22
4.2.2 Trail Use (2014).....	4-28
4.2.3 Trail User Survey.....	4-28
4.2.4 Historic Trail Use.....	4-30
4.2.5 Existing Hiking and Mountain Bike Trails in the Northfield Mountain Area	4-30
5 CONCLUSION.....	5-1
5.1 Northfield Mountain Tour and Trail Center.....	5-1
5.2 Northfield Mountain Trail System.....	5-1
6 LITERATURE CITED	6-1

LIST OF TABLES

Table 4.1-1: Northfield Mountain Tour and Trail Center Available Activities and Programs Fall 2014- Summer 2015	4-2
Table 4.1.2-1: Visitor Center’s Facilities Cited as being Utilized by Recreationists Surveyed.....	4-6
Table 4.1.2-2: Visitor Ratings of NMTTC Amenities and Attributes	4-7
Table 4.1.2-3: Responses: What did you like most about your recreational experience today?.....	4-8
Table 4.1.2-4: Responses: What did you like least about your recreational experience today?	4-9
Table 4.1.2-5: Responses: What, if anything, enhanced your recreation experience today?.....	4-9
Table 4.1.2-6: Responses: What, if anything, detracted from your recreation experience today?.....	4-10
Table 4.1.3-1: NMTTC Program/Activity Registration Data	4-11
Table 4.1.4-1: Impacts to QII Riverboat Operations.....	4-15
Table 4.1.4-2: NMTTC Environmental Programs at NMTTC by Season, 2001 through 2015.....	4-16
Table 4.2-1: Northfield Mountain Trails.....	4-18
Table 4.2.1-1: Detailed Condition Assessment Trail Sections	4-24
Table 4.2.3-1: User Opinions on the NMTTC Trail System.....	4-29

Table 4.2.3-2: Responses: How Can Any of the Above Variables be Improved? 4-29

LIST OF FIGURES

Figure 2.0-1 Northfield Mountain Tour and Trail Center Amenities 2-1
Figure 4.1.1-1: Recreation Usage by Season, NMTTC, 2014 4-5
Figure 4.1.2-1: Visitor Overall Satisfaction with Available NMTTC Recreation Facilities 4-7
Figure 4.1.2-2: Number of Responses Received to Open-ended Questions on Recreation Experience. 4-10
Figure 4.1.3-1: Percent Breakdown of Average Program/Activity Registration, NMTTC, 2010 through
2014 4-12
Figure 4.1.3-2: Program/Activity Participation at NMTTC, 2005 and 2010 through 2014..... 4-13
Figure 4.1.4-1: Trends in Registration in Environmental Programs, 4-14
Available Years, 1986 through 2014 4-14
Figure 4.1.4-2: Trends in Participation for the QII Riverboat Tours, 1985 through 2014 4-14
Figure 4.1.4-3: Trends in Participation for the Fishway Tours, 1988 through 2014 4-15
Figure 4.1.4-4: Annual Environmental Programs Offered at NMTTC, 2002 through 2014 (excluding
2003)..... 4-17
Figure. 4.2-1: Northfield Mountain Trail System 4-21
Figure. 4.2.1-1 Northfield Mountain Assessed Trail Sections..... 4-23
Figure 4.2.4-1: Recreation Usage, Northfield Mountain Trail System, 2005 and 2010 through 2014... 4-30

LIST OF ABBREVIATIONS

ADA	Americans with Disabilities Act
AMC	Appalachian Mountain Club
CFS	Cubic Feet per Second
FERC	Federal Energy Regulatory Commission
FirstLight	FirstLight Hydro Generating Company
ILP	Integrated Licensing Process
IMBA	International Mountain Bicycling Association
MADCR	Massachusetts Department of Conservation and Recreation
MIAA	Massachusetts Interscholastic Athletic Association
NET	New England National Scenic Trail
NMTTC	Northfield Mountain Tour and Trail Center
PAD	Pre-Application Document
PSP	Proposed Study Plan
QII	Quinnetukut II Riverboat
RSP	Revised Study Plan
SPDL	Study Plan Determination Letter
USFS	United States Forest Service

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 the FERC. The PAD included FirstLight's preliminary list of proposed studies. On December 21, 2012, FERC issued Scoping Document 1 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 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 Mountain Visitor 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. 3.6.7, *Recreation Study at Northfield Mountain, including Assessment of Sufficiency of Trails for Shared Use*. FERC's Study Plan Determination Letter (SPDL) dated September 13, 2013, requested modifications be made to Study No. 3.6.7. The FERC modifications were a requirement that FirstLight submit within 90 days a proposed methodology for collecting trail design and condition characteristics. FirstLight filed a Modified Revised Study Plan on December 11, 2013 addressing the trail assessment methodology, which FERC approved by letter dated January 10, 2014. Both FERC letters are hereafter referred to as the SPDL.

As stated in the Study Plan, the study objectives were to:

- Determine whether the Northfield Mountain Tour and Trail Center, which is also known as the Visitor Center (NMTTC),¹ has met recreation needs and if improvements or additions are necessary with a consideration of potential needs over the course of the 30 to 50 year new license; and
- Identify uses taking place on the current trail system and whether the current trail system is suitable and adequate for sustaining those uses, including evaluating the condition of existing trails e.g., erosion, drainage, width, slope, or obstacles.

The Study Plan also stated that the study would culminate in a report discussing: recreational user survey responses from data collected from Study 3.6.1, *Recreation Use/User Contact Survey* pertinent to the Northfield Mountain trails and education programs; the educational programs offered, and if possible, trends in the use of the NMTTC's educational programs; maps showing trail and amenity locations; a description of trail conditions based on a field assessment; and a summary of FirstLight's trail maintenance program.

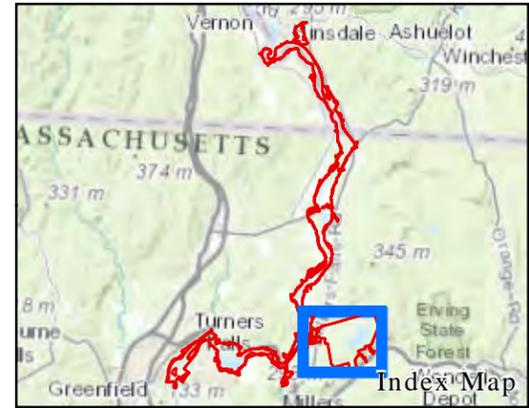
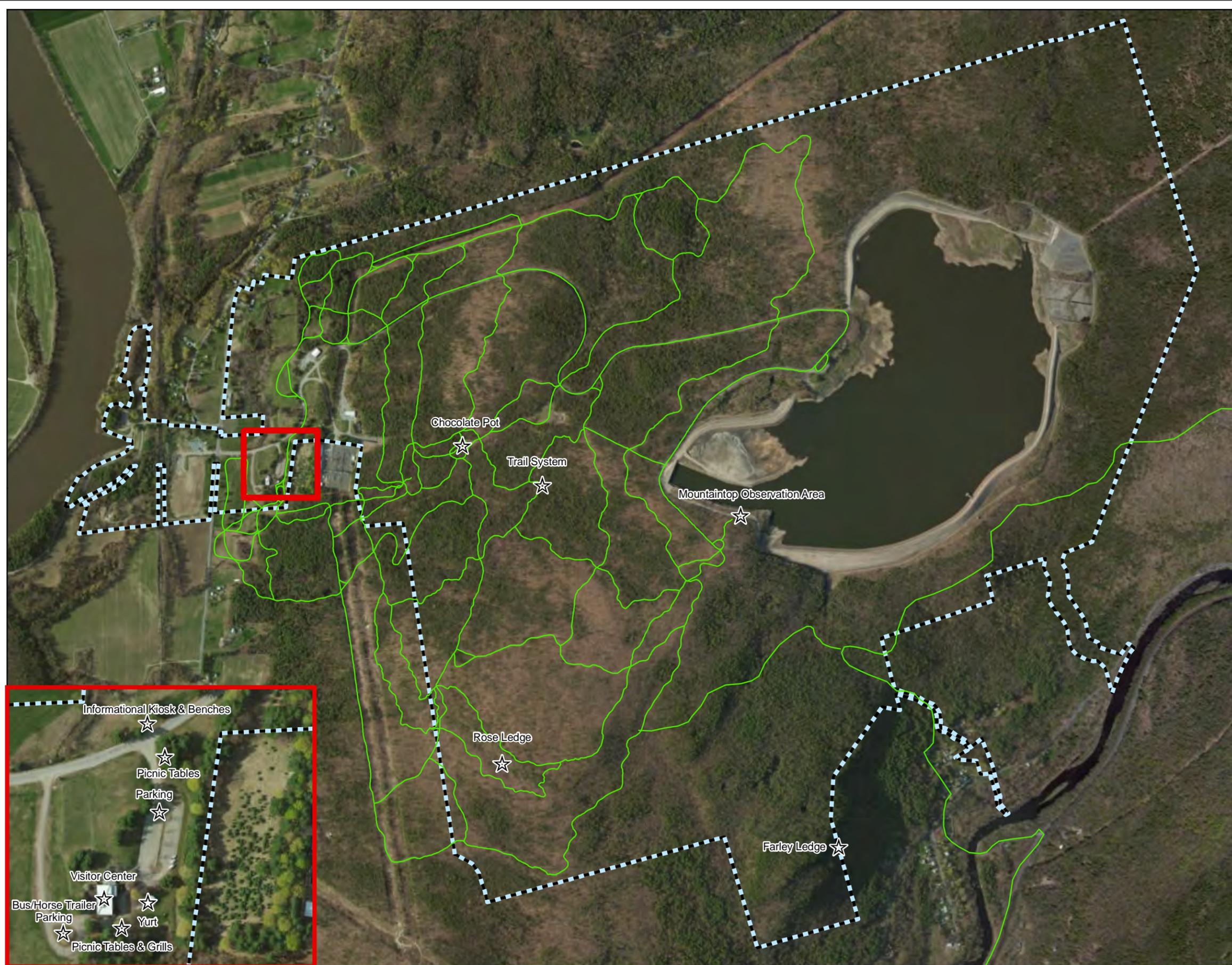
¹ For the remainder of this report, use of the term Visitor Center refers to the four-season facility from which FirstLight offers and operates its recreational and educational programs. The Northfield Mountain Tour and Trail Center includes the Visitor Center, Northfield Mountain Trail System, and associated amenities.

2 STUDY AREA

The study area ([Figure 2.0-1](#)) for this assessment included the land and facilities located within the Northfield Mountain Project boundary associated with the NMTTC and programs operated from the Visitor Center. The NMTTC is located within the Northfield Mountain Project Boundary which includes approximately 1,959 acres (including the 286 acre Upper Reservoir for the Northfield Mountain Project) east of Route 63.² The NMTTC encompasses the Visitor Center, the Northfield Mountain Trail System and associated amenities within the 1,959 acres.

The assessment included the following facilities and amenities: the approximately 25 miles of trails associated with NMTTC and managed by FirstLight; the portion of the New England National Scenic Trail (NET) within the Project boundary; the informal Blue Connector Trail connecting the NET with the Northfield Mountain Trail System; climbing areas within the Project boundary; the Visitor Center; and education (public and school, QII riverboat tours, and Turners Falls Fishway tours) programs through the Visitor Center.

²The 286 acre surface area represents the Upper Reservoir area at full pond elevation of 1000.5 feet.



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

Relicensing Study 3.6.7
 Recreation Study at Northfield Mountain, Including Assessment of Sufficiency of Trails for Shared Use

Figure 2.0-1
 Northfield Mountain Tour & Trail Center Amenities

Legend

- ☆ Recreation Amenity
- Trail
- ⊞ Northfield Mountain Project Boundary



Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapnyIndia, © OpenStreetMap



1 inch = 1,250 feet



Copyright © 2015 FirstLight Power Resources All rights reserved.

3 METHODS

The methodology for Study 3.6.7 included three primary tasks: review of existing information, field work, and desktop analysis.

3.1 Review of Existing Information

The Licensee reviewed existing facility, program, and trail information for the NMTTC. Sources of information included registration data collected for various activities and programs administered from the NMTTC.

As part of the trail condition assessment, literature regarding best management practices for trail construction and maintenance was also reviewed, including the International Mountain Bicycling Association's (IMBA) *Trail Solutions: IMBA's Guide to Building Sweet Singletrack* ([IMBA, 2004](#)), the United States Forest Service's (USFS) *Trail Fundamentals and Trail Management Objectives* ([USFS, 2011](#)), the Appalachian Mountain Club's (AMC) *The Complete Guide to Trail Building and Maintenance*, ([Demrow & Salisbury, 1998](#)) the Student Conservation Alliance's *Lightly on the Land* ([Birkby, 2006](#)) and the Massachusetts Department of Conservation & Recreation's (MADCR) *Trail Guidelines and Best Practices Standards* ([MADCR, 2014](#)).

Prior to conducting field work associated with this study, a review of proposed trails, existing aerial photographs and readily available municipal property ownership records was conducted. Field maps of the study area were developed using FERC Project boundary data and shape files of the existing NMTTC Trail System.

Finally, to provide regional context, an internet search was conducted to identify existing hiking and mountain biking trails within 25 miles of the NMTTC area.

3.2 Field Work

Field work associated with this study included use and user contact surveys conducted as part of the *Recreation Use and User Contact Survey* (Study No. 3.6.1); a field review of the existing Northfield Mountain Trail System and associated facilities; and a detailed trail condition assessment.

Field work for Study No. 3.6.1 was conducted from January 2014 through December 2014. The methodology used for the *Recreation Use and User Contact Survey* consisted of spot counts, calibration counts, and user contact surveys conducted at the NMTTC parking area. Spot counts were conducted five times per month, which included three randomly selected weekdays and two randomly selected weekend days. For months containing a three-day holiday weekend (May- Memorial Day, July- July 4th, September- Labor Day) an additional spot count was conducted on one holiday weekend day. Spot counts were short stops at each recreation site to record the number of vehicles and people at each site. Calibration counts were conducted five times per month, which included three randomly selected weekdays and two randomly selected weekend days. For months containing a three-day holiday weekend, an additional calibration count was conducted on one holiday weekend day. Calibration counts typically consisted of two hours at each recreation site to record the number of vehicles and people at the site. The longer count was also used to record observed entrance and exit times and the number of people per vehicle. User contact surveys were administered to one member of each recreation group encountered during the spot and calibration counts.

The Licensee also conducted a field review of the current trail system, the Blue Connector Trail, climbing areas,³ and the existing portion of the NET that is within the Project boundary. This included locating the

³ Field visits to the Rose Ledge and Farley Ledge Climbing areas are discussed in the *Recreation Facilities Inventory and Assessment Addendum* (Study No. 3.6.2).

climbing areas with a GPS; photographing and recording the current features and typical conditions of the trails and climbing areas; and identifying potential improvement needs of the trails.

The field assessment of the NMTTC trail system was conducted between September and November 2014. As a first step, a rapid assessment of the entire NMTTC trail system, the portion of the NET within the Project boundary, and the Blue Connector Trail was conducted. During the rapid assessment of the entire trail system, staff utilized guidelines adopted from IMBA, AMC and MADCR to identify those portions of trails, which, in their best professional judgment, required a more detailed assessment. The guidelines included the following:

- Grade: guidelines for sustainable trails recommend a maximum sustainable grade, which may vary from 15% to 25% based on factors such as soils, rainfall, grade reversals;
- Cross slope: guidelines for sustainable trails recommend that trail tread should be outsloped by 5%;
- Width: recommended guidelines vary depending on the intended use of the trail. Hiking trails may vary in width from under a foot wide up to two feet wide. Horseback riding trails may vary from a minimum of one to two feet or wider depending on site specific variables. Bicycle trails may vary from six inches to five feet for a single lane. Cross-country ski trails vary from three to 14 feet;
- Surface material/firmness: recommended surface materials and firmness may vary from native to imported materials for tread stabilization depending on trail difficulty and desired recreational use experience; and
- Drainage: guidelines recommend directing water off of the trail tread which may include the need for drainage dips (structure should be no more than 6" deep), ditches, culverts, and turnpikes.

The trails and trail segments that were selected to undergo a more detailed assessment consisted of those with steep slopes, difficult alignments, observed drainage conditions/erosion, and areas subject to regular maintenance. These sections were surveyed using a measuring wheel, inclinometer, and measuring tape. This entailed walking each section to assess the condition of the trail segment.

3.3 Desktop Analysis

A desktop analysis was conducted utilizing field data, survey data, and existing information. Use and user survey data collected as part of the *Recreation Use and User Contact Survey* (Study No. 3.6.1) were evaluated and analyzed to identify current use of the Visitor Center and trails, and the opinions of recreation users of the NMTTC.

Recreation use estimates for the NMTTC were developed based on data obtained during the counts conducted as part of Study 3.6.1 and the records maintained by the Visitor Center. The count data include average persons per party by season, length of time at the site by season, number of recreationists observed, number of vehicles observed, and any non-recreational use observed. Use estimates, in terms of recreation days, were developed for each type of survey day (weekday and weekend day) during each season. Consistent with FERC's definition, a recreation day was defined as each visit by a person to the Project for recreational purposes during any portion of a 24-hour period. Within each season, use estimates were also developed for times when the Visitor Center was open and recording use and when the Visitor Center was closed, but trail-based use was still occurring. Seasonal use was calculated by multiplying each day type (for example, "summer weekday, closed NMTTC") by the number of that type of days per season. Recreation seasons were defined as follows:

- Winter: January, February, March, and December 2014,

Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)
STUDY NO. 3.6.7: RECREATION STUDY AT NORTHFIELD MOUNTAIN, INCLUDING ASSESSMENT OF
SUFFICIENCY OF TRAILS FOR SHARED USE

- Spring: April 1 through May 22, 2014,⁴
- Summer: Memorial Day weekend (May 23) through Labor Day weekend (September 1), 2014, and
- Fall: September 2 through November 30, 2014.

Detailed data on recreation activities are maintained by NMTTC for the days the Visitor Center is open. In 2014, the Visitor Center was open on 265 days. On the open days, data on the number of recreationists were collected for the following categories: environmental programs, trail use other than skiing and snowshoeing, cross-country skiing and snowshoeing, fishway tours, and riverboat use. The collected data were incorporated into the survey results. By combining the recorded use from the days the Visitor Center was open with survey-based estimates of use during times when the Visitor Center was closed, a comprehensive view of total use at the NMTCC was obtained.

⁴ The spring recreation season is considered to have begun when the trails were re-opened to hiking on April 1.

4 STUDY RESULTS AND DISCUSSION

4.1 Northfield Mountain Tour and Trail Center

The NMTTC is a four-season facility that provides a multitude of on-site recreational opportunities, environmental and educational programs, as well as management and oversight of other FirstLight Project recreation facilities. Physical features and amenities at the NMTTC include the following:

- Visitor Center: The Visitor Center is the hub of the NMTTC complex. The Visitor Center includes a self-guided interpretive display, meeting rooms, cross-country ski rental equipment, a lounge, and public restrooms. The Visitor Center also serves as the base of operations for FirstLight's recreation management staff. The Visitor Center is free to the public, and is typically open on the following schedule:
 - The start of cross-country ski season through March: Wednesday through Sunday (the 2014 cross-country ski season was open January 3-5th and then reopened February 6th through March 13th; the 2015 cross-country ski season was open on January 15, 2015 through March 20, 2015th)
 - April and May: Monday through Friday
 - June: Tuesday through Saturday
 - July through the last week of October: Wednesday through Sunday
 - Last week of October through the second week of November: Tuesday through Saturday
 - Second week of November until the start of ski season: Monday through Friday
- Trail system: The Northfield Mountain Trail System includes approximately 25 miles of trail, which are currently used for hiking, mountain biking, equestrian use, snowshoeing, and cross-country skiing. Approximately 18 miles of trail are maintained for cross-county skiing consisting of wide (8-10') level corridors with an improved base, and approximately 7 miles are narrow single track hiking and snowshoeing only trails on natural soils. Rock climbers also use the trails to access Rose Ledge for informal climbing.
- Parking: A paved parking area adjacent to the Visitor Center accommodates approximately 53 vehicles. Additional overflow parking is provided on a nearby mowed area. Horse trailers and buses utilize the cul-de-sac on the west side of the Visitor Center for parking.
- Mountain Top Observation Area: A wooden observation platform provides views of the Upper Reservoir from the southern shore of the reservoir. The platform is approximately 20 feet by 20 feet and is accessible from the Northfield Mountain Trail System's Summit Trail.
- Additional amenities: Picnic tables and grills, informational kiosks, and a yurt are located near the Visitor Center. The yurt can be rented for private functions. The Chocolate Pot, a small three-sided structure located near the center of the trail system, is available for hikers and other trail users to use as a shelter in the event of inclement weather.

[Figure 2.0-1](#) shows the location of the Visitor Center, trail system and other amenities.

FirstLight also offers a variety of public and school programs through the Visitor Center. Public programs are scheduled and offered year-round, many at no charge to participants, and include such activities as guided hikes, animal track identification, and winter tree identification. School programs are scheduled during the school year and offer opportunities for hands-on environmental education and recreation. Programs are designed to be school grade specific. A list of some of the many programs provided by FirstLight in the fall of 2014 through the summer of 2015 is provided in [Table 4.1-1](#). Per student fees or group fees are generally charged for the school programs.

Most of the programs are conducted at the Visitor Center, although some are offered off-site in conjunction with partner organizations. The off-site programs may include a series of speakers or education programs, which rotate from facility to facility over the course of several weeks. Information about the programs are available on the GDF Suez Recreation and Environmental Programs Web Page <http://www.gdfsuezna.com/recreation/>, on Facebook, or through a number of e-newsletters. Individuals can also call the Visitor Center for information on schedules, programs, and reservations.

Table 4.1-1: Northfield Mountain Tour and Trail Center Available Activities and Programs Fall 2014-Summer 2015

Activity/Program	Schedule	Public/School Program	Ages
Beyond the Schoolyard	Fall: Wednesday, Thursday, and Friday	School Program	Pre-K and Kindergarten
Woodchucks, Warblers and Whirligigs	Fall: Wednesday, Thursday, and Friday	School Program	Grades 1 and 2
From Seeds to Soil	Fall: Wednesday, Thursday, and Friday	School Program	Grades 4 and above
Trees are Terrific	Fall: Wednesday, Thursday, and Friday	School Program	Grades 4 and above
Incredible Insects	Fall: Wednesday, Thursday, and Friday	School Program	Grades 2 and 3
Quinnetukut II School Riverboat Ride	Fall: Friday	School Program	All Grades
Cross-Country Ski School	Call for availability	Public Program	8 and older
Cross-Country Skiing/Snowshoeing	Available when trails are open	Public Opportunity	All Ages
Winter World	Winter: Wednesday, Thursday, Friday	School Program	Pre-school to Grade 1
Pine Cones and Pizza	Winter: Wednesday, Thursday, Friday	School Program	Grades 2 and 3
Twigs and Tracks	Winter: Wednesday, Thursday, Friday	School Program	Grades 3 and above
The Hunter and the Hunted	Winter: Wednesday, Thursday, Friday	School Program	Grades 4 and above
Self-guided snowshoe hike	Winter: Wednesday, Thursday, Friday	School Program	Grades 3 and up
Moonlight Snowshoe/Hike for Fitness	January 3, 2015	Public Program	All Ages
Winter Trails Day	January 10, 2015	Public Program	8 and older
On the Trail of Fisher and Porcupine	January 24, 2015	Public Program	All Ages

Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)
STUDY NO. 3.6.7: RECREATION STUDY AT NORTHFIELD MOUNTAIN, INCLUDING ASSESSMENT OF SUFFICIENCY OF TRAILS FOR SHARED USE

Activity/Program	Schedule	Public/School Program	Ages
Winter Family Sunset-Moonrise Hike/Snowshoe	January 31, 2015	Public Program	6 and older
Introduction to Snowshoeing for Women	February 1, 2015	Public Program	16 and older
Wildlife Tracking with David Brown	February 8, 2015	Public Program	16 and older
Winter Fun for Wee Ones	February 21, 2015	Public Program	3 and older
Spring Forward with a Spring in Your Step	March 10, 2015	Public Program	All Ages
Late Winter Tree ID with Forester Helen Johnson	March 14, 2015	Public Program	All Ages
Early Spring at Barton Cove	March 21, 2015	Public Program	All Ages
Canalside Walk	March 25, 2015	Public Program	All Ages
River Walk	April 1, 2015	Public Program	All Ages
Hiking, Biking, Horseback Riding, Dog Walking	Seven days a week once trails are dry in the Spring	Public Opportunity	All Ages
Where the Sidewalk Ends	Spring: Wednesday and Friday	School Program	Pre-K and Kindergarten
Pond Probe	Wednesday, Thursday and Friday: April – August	School Program	Grades 1 and above
Signs of Spring	Spring: Wednesday and Friday	School Program	Grades 1 through 6
Incredible Insects	Wednesday and Friday after May 15 th	School Program	Grades 2 and 3
Fishway School Programs: Fins and Ladders	Wednesday, Thursday and Friday May 14 th to June 12 th	School Program	All Grades
Sky Dance: Woodcocks at Twilight	April , 2015	Public Program	10 and older
Earth Day Exploring Hidden Mysteries of Barton Cove	April 22, 2015	Public Program	6 and older
River Walk, Sunset Yoga	April 23, 2015	Public Program	16 and older
Trail Work Bootcamp	May 9, 2015	Public Program	7 and older
Celebrate Birds; Valley Bird Festival	May 30, 2015	Public Program	All Ages
Free Fish Printing for Families	June 6, 015	Public Program	5 and older
Summer Paddlesports Kick-off	June 13, 2015 Rain Date: June 14, 2015	Public Program	8 and older
Summer Solstice Sunset Kayak	June 21, 2015	Public Program	16 and older
Moonrise, Sunset and Mountain Views	July 1, 2015	Public Program	All Ages
Bald Eagle and Barton Cove Paddle	July 4, 2015	Public Program	12 and older

Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)
 STUDY NO. 3.6.7: RECREATION STUDY AT NORTHFIELD MOUNTAIN, INCLUDING ASSESSMENT OF
 SUFFICIENCY OF TRAILS FOR SHARED USE

Activity/Program	Schedule	Public/School Program	Ages
Astronomy Conjunction	July 10-11, 2015	Hosted Public Event	12 and older
Exploring Barton Cove with Elizabeth Farnsworth	July 11, 2015	Public Program	16 and older
Fire and Ice; Geologist Richard Little on Board the Quinnetukut II	July 12, 2015	Public Program	10 and older
Paddle with a Purpose; Alien Invaders	July 22 and August 8	Public Program	10 and older
Ahoy Matey! Kids Cruise on Board the Quinnetukut II	July 24 and August 15	Public Program	All Ages
Once in a Blue Moon Paddle	July 31, 2015	Public Program	16 and older
Woodland Fairy Fun	August 6, 2015	Public Program	4 and older
Shooting Stars and the Summer Triangle; The Perseid Meteor Shower	August 12, 2015	Public Program	All Ages
Full Sturgeon Moon Paddle	August 29, 2015	Public Program	16 and older

Other FirstLight Project recreation facilities and programs are managed from the NMTTC. These include the campgrounds at Munn’s Ferry Boat Camping Recreation Area and Barton Cove Nature Area and Campground; the Quinnetukut II Riverboat (QII) which operates from the dock at the Boat Tour and Riverview Picnic Area; and the Gatehouse Fishway Viewing Area.⁵

Tickets for the QII cruises are purchased at the Visitor Center. The narrated 12 mile cruise (approximately 1.5 hours) of the Connecticut River is operated Friday through Sunday from late June/early July to October. Some of the NMTTC programs include tours and activities on the QII. The QII can also be chartered by groups for special events.

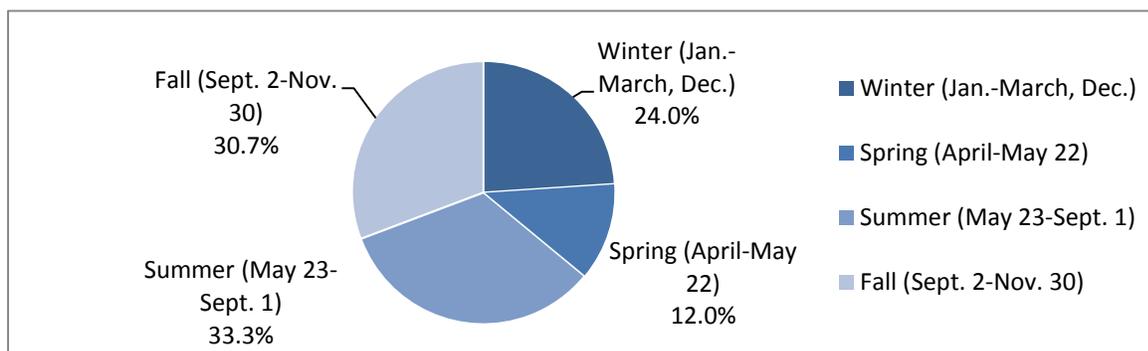
The Gatehouse Fishway Viewing Area at the Turners Falls Dam provides the public with an opportunity to view fish migration. The upper viewing platform is Americans with Disabilities Act (ADA) accessible and there is a closed-circuit TV feed from the viewing window to a TV monitor that enables those with limited mobility the opportunity to view the fish. The facility is open to the public during the fish migration season, typically late-May to mid-June, and is staffed with two seasonal employees during viewing times (Wednesday through Sunday from 9:00 am to 5:00 pm).

⁵ The QII and Gatehouse Fishway Viewing Area are included in this report due to program operations that are managed from the NMTTC. Campground use will be further discussed in the report for Study No. 3.6.1 - *Recreation Use/User Contact Survey*.

4.1.1 Northfield Mountain Tour and Trail Center Recreation Use

Recreation use information for the NMTTC was collected through the 2014 study period from January to December 2014. Based on data obtained during spot counts and calibrations at the NMTTC during the recreation study and visitor records maintained by FirstLight, it is estimated that 20,024 recreation days took place at the NMTTC throughout the year.⁶ Figure 4.1.1-1 below illustrates the estimated distribution of recreation use by season in 2014. Use was highest in the summer, with 6,659 recreation days (33%).⁷ Fall recreation days were slightly lower, with 6,157 (31%) of the total annual days.⁸ As shown, 24% of the recreation days (4,796 days) were made in the winter.⁹ Spring recreational days accounted for 2,412 (12%) of total annual days.¹⁰

Figure 4.1.1-1: Recreation Usage by Season, NMTTC, 2014



As mentioned above, the total number of recreation days at the NMTTC in 2014 was estimated to be 20,024, and can be divided into three broad categories: registered program use, trail use during the Visitor Center’s open days, and trail use during the Visitor Center’s closed times.

The staff at the NMTTC maintains records on registered program use and trail use occurring when the Visitor Center is open. In 2014, registered program use and trail use totaled 14,221 recreation days. Of the 14,221 user days when the Visitor Center was open, registered program use accounted for 6,823 recreation days. Registered program use included registrants for environmental programs (3,623 recreation days), recreational programs (278 recreation days), and ticketed cross-country skiers and snowshoers (2,922 recreation days). The trails also saw 7,398 recreation days on days that the NMTTC was open.¹¹ These 7,398 days of trail use are in addition to the cross-country skier and snowshoe use that occurs during the winter months.

⁶ A recreation day is defined by FERC as each visit by a person to the project for recreational purposes during any portion of a 24-hour period.

⁷ The summer recreation season began with Memorial Day weekend and continued through Labor Day. In 2014, the summer season spanned from May 22 through September 1.

⁸ In 2014, the fall recreation season began on September 2, the Tuesday after Labor Day, and continued through November 30.

⁹ The winter recreation season for 2014 included the months of January, February, March, and December. The winter recreation season, which ended when the trails closed on March 13, includes the entire cross-country ski season, as well as the “shoulder” weeks in mid to late March when the trails remained closed to all use.

¹⁰ The spring recreation season in 2014 began on April 1 when the trails were reopened to hiking use after the winter thaw. The season concluded on May 21, the Thursday before Memorial Day Weekend.

¹¹ The NMTTC “trail use” counts do not include ticketed ski and snowshoe use. Ski and snowshoe use are counted as “ticketed cross-country skier and snowshoe use.”

Recreation use on days when the Center was closed or after the Center closed for the day was calculated by using the parking lot spot counts and calibrations undertaken as part of the *Recreation Use and User Contact Survey*. 5,803 recreation days were spent at the NMTTC on days when the Center was closed or after the Center closed for the day.

A review of the self-reported activities indicates that non-program use at the NMTTC was almost exclusively trail-based. Therefore, total trail use, excluding ticketed cross-country skiing and snowshoeing, for 2014 was estimated to be 13,201 recreation days, with 7,398 days when the Center was open and an additional 5,803 days when the Center was closed. With ticketed cross-country skiing and snowshoeing included, total trail use at the NMTTC for 2014 was 16,123 recreation days.

While not located at the Center, the NMTTC coordinates the QII riverboat cruises and Turners Falls Fishway viewing programs for the Northfield Mountain and Turners Falls Projects. According to FirstLight’s records, from late June through October of 2014 (the months of operation), 2,733 recreation days were associated with the QII. The Turners Falls Fishway, which attracts recreationists in May and June when migratory fish are moving, accounted for 5,061 recreation days during 2014.

4.1.2 Northfield Mountain Tour and Trail Center Use and User Survey Results

The full results of the recreation user contact survey will be contained in the study report for Study 3.6.1 – *Recreation Use/User Contact Survey* that will be issued by the end of 2015. Portions of the recreation user contact survey pertinent to user opinions on the NMTTC facilities and amenities are included in this report. A total of 116 visitors to the NMTTC participated in the *Recreation Use/User Contact Survey*. Not all respondents answered all questions. Thus, the total number of responses for each question varies.

Visitors were asked if they used any of the facilities and amenities at the Visitor Center during their trip to use the trail system and, if so, which facilities and amenities. Of the 100 recreationists who answered this question, 85 responded that they did use the Visitor Center’s facilities. The respondents then were asked what facilities they use. As shown in [Table 4.1.2-1](#), the Visitor Center, restrooms, and ski/snowshoe equipment rentals were frequently cited.

Table 4.1.2-1: Visitor Center’s Facilities Cited as being Utilized by Recreationists Surveyed

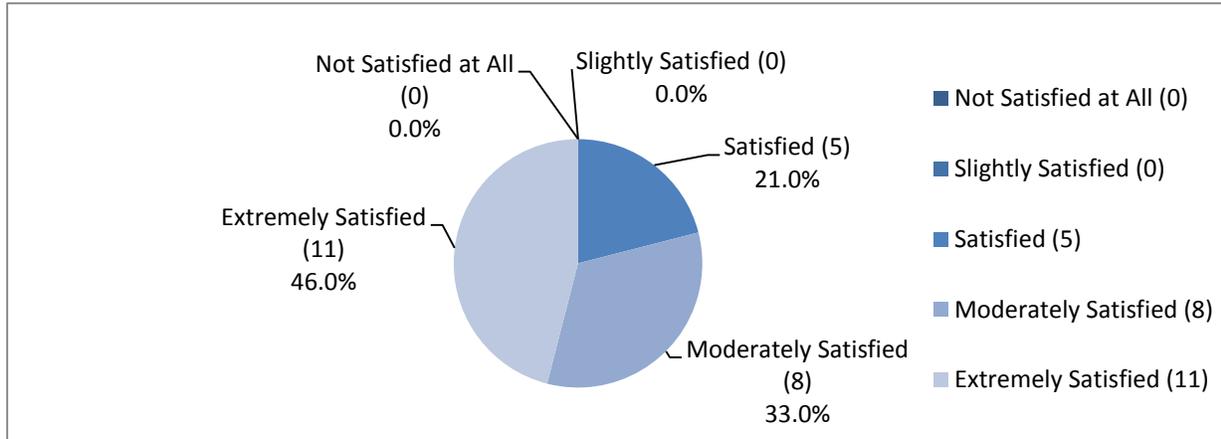
Facility/Amenity	Times Mentioned
Restrooms	39
Lobby/Lodge/Visitor Center/Museum	16
Ski Shop/Rentals	10
Trail Maps/Information	5
Other ¹²	5
Snacks/Eating Space	4
Warming Hut	4
Yurt	4
“All”	3
Chocolate Pot/Hot Chocolate	2
Drinking Fountain/Water	2

As part of the revised survey, beginning in late August visitors were also asked to rate their overall satisfaction on a scale of 1 (“not satisfied at all”) to 5 (“extremely satisfied”) with the available recreation

¹² “Other” comments include those comments that were mentioned by only one respondent.

facilities at NMTTC, and to explain any ratings of less than “satisfied.”¹³ “Extremely satisfied” was the most common response given. Of the 24 respondents, 46% responded that they were extremely satisfied. Another 33% of respondents reported their satisfaction level as a 4 out of 5 (moderately satisfied), with the remaining 21% being “satisfied.” There were no “slightly satisfied” or “not satisfied at all” ratings. [Figure 4.1.2-1](#) summarizes visitor overall satisfaction with the available NMTTC recreation facilities.

Figure 4.1.2-1: Visitor Overall Satisfaction with Available NMTTC Recreation Facilities



Visitors were requested to specifically rate certain amenities and aspects of the NMTTC (parking, facility condition, toilets/restrooms, variety of amenities, and overall quality) on a scale of 1 (“poor”) to 5 (“excellent”), and to explain any “poor” ratings. Again, the respondents consistently rated the amenities at NMTTC very favorably. Of the recreationists surveyed, 94% rated “parking” as a 4 or a 5. Similarly, “facility condition” and “toilets/restrooms” both were rated as a 4 or 5 by 93% of respondents. The “variety of amenities” available at NMTTC was also rated highly, with 81% of respondents rating the variety of amenities as a 4 or 5. “Overall quality” of the NMTTC amenities was rated a 4 or 5 by 92% of respondents. [Table 4.1.2-2](#) summarizes visitor survey ratings of the specific amenities and attributes.

Table 4.1.2-2: Visitor Ratings of NMTTC Amenities and Attributes

Amenity (Total Response)	Poor (1)	(2)	Fair (3)	(4)	Excellent (5)
Parking (109)	1%	2%	3%	32%	62%
Facility Condition (104)	0%	2%	6%	34%	59%
Toilets/Restrooms (28)	0%	0%	7%	36%	57%
Variety of Amenities (102)	0%	6%	13%	34%	47%
Overall Quality (110)	0%	1%	7%	30%	62%

Recreational users were also asked to explain any low ratings for the variables listed in [Table 4.1.2-2](#). Among all the surveys, only 12 scores of 1 or 2 were given for any of the amenities or attributes of the

¹³ The *Recreational Use/User Contact Survey* instrument was revised in late August 2014 to include questions, which had been inadvertently omitted from the earlier version of the survey. The data presented here includes analyses of the questions that were added during the survey’s revision and are related to the NMTTC. These questions address overall satisfaction, toilets/restrooms, hours of operation, and how variables can be improved.

NMTTC. All of these low ratings were received during the winter recreation season. Comments were provided by 11 of the 12 winter recreationists who gave a low rating. Eight (8) indicated that they would like food and/or beverage services. Two (2) winter use respondents indicated the need for additional parking, and one winter use respondent indicated they would like to see an increased variety of facilities (though none were specified). Three additional comments were received that were not associated with low ratings. These recreationists were visiting during the spring (1) or fall (2). Of the 3 comments received from respondents in other seasons, one also requested food services; one requested blow dryers in the restrooms; and one respondent suggested opening the Visitor Center on weekends in the spring.

Visitors were also asked if the NMTTC amenities serve their interests. Of the 98 visitors responding to this question, 94 (96%) responded “yes” and four (4%) responded “no.” Of the four (4) recreationists responding “no,” two (2) provided feedback. One visitor stated that the NMTTC amenities did not serve his or her interests because there were no vending machines. The other response provided was “usually locked.”

In addition to the questions above, respondents had the opportunity to provide responses to four (4) open-ended questions. One of these was “What did you like most about your recreational experience today?” A total of 111 responses were received from 100 different respondents. The responses included the Visitor Center exhibits, cross-country skiing and the grooming of the snow, and the trails. One respondent suggested that the NMTTC was a “world class touring center.” “Other” comments include responses that were only received from one individual. [Table 4.1.2-3](#) presents a summary of the responses received.

Table 4.1.2-3: Responses: What did you like most about your recreational experience today?

Facility/Amenity	Times Mentioned
Beauty/Scenery/Nature	20
Trails	17
Weather	13
Grooming/Snow	8
Not crowded/Quiet	8
Skiing/Skating/Sledding	8
Other	8
Location	5
Space	5
Hiking/Walking/Running	4
Other Recreationists	4
Signage/Information about Power Plant/Maps	3
Facility maintenance	2
Recreation/Exercise	2
Rock Climbing	2
Visitor Center	2

Recreationists were also asked “What did you like least about your recreational experience today?” Thirty-six (36) respondents chose to answer this question. Items that were liked least included the weather/poor snow conditions, limited hours, lack of signage, and overcrowding. “Other” comments referred to a wide variety of issues such as unleashed dogs, location, and “no bus tour.” [Table 4.1.2-4](#) presents a summary of the responses received.

Table 4.1.2-4: Responses: What did you like least about your recreational experience today?

Facility/Amenity	Times Mentioned
Weather/Ice/Lack of Snow/Slushy Snow	7
Limited Hours/Center Closed	5
Other	5
More Signage Needed	4
No Snack Shop/Poor Eating Area/Food Options	4
Crowded	3
Closed Trails/Slippery Trails	2
Fencing/Fenced-off Areas	2
Insects	2
Poor Snow Grooming	2

The recreation user survey asked “What, if anything, enhanced your recreation experience today?” A total of 74 comments were received from 67 respondents. Specific enhancements that respondents identified included the beauty of the area, trail grooming, the weather, trails, and the “variety of programs”. “Other” comments addressed a wide variety of areas, such as cross-county ski rentals, the boat ride, and birding. [Table 4.1.2-5](#) below presents a summary of the responses received.

Table 4.1.2-5: Responses: What, if anything, enhanced your recreation experience today?

Facility/Amenity	Times Mentioned
Beauty/Scenery/Nature	16
Weather	9
Not Crowded/Quiet	8
Other	8
Grooming/Snow	6
Trails	6
Facility Maintenance	5
Friends/Family	4
Location	4
Lodge/Visitor Center/Museum	2
Survey	2
Variety Of Programs	2
Yurt	2

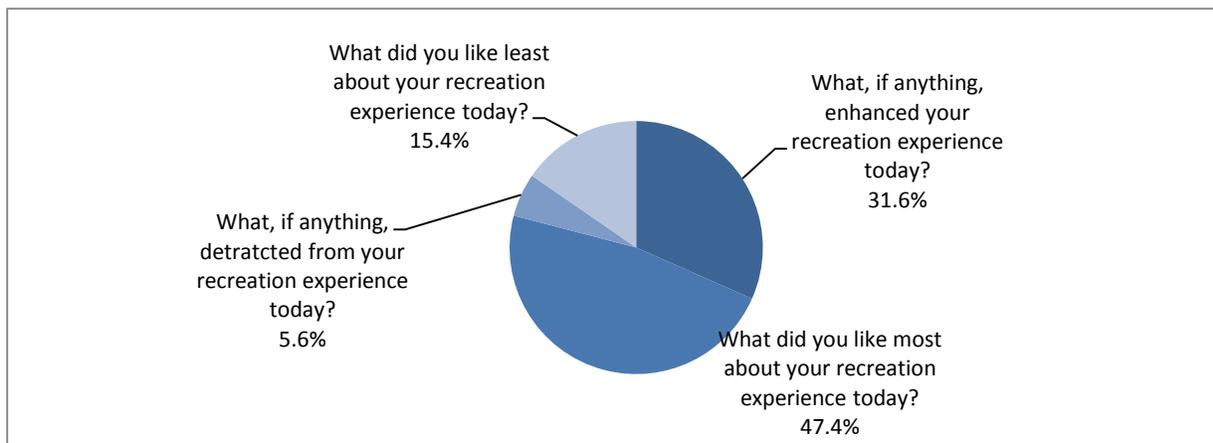
The fourth open-ended question asked recreationists “What, if anything, detracted from your recreation experience today?” Only 13 recreationists chose to respond to this comment, with each giving one response. These respondents mentioned the Center being closed, a lack of food or vending available, and slushy or no snow. [Table 4.1.2-6](#) below presents a summary of the responses received.

Table 4.1.2-6: Responses: What, if anything, detracted from your recreation experience today?

Facility/Amenity	Times Mentioned
Center Closed	3
No Food/Vending/Hot Chocolate	3
Slushy Snow/No Snow	2
Crowded	1
Survey	1
Trails Closed	1
Unleashed Dogs	1
Website Needs Updating	1

In summary, there were many more responses to the two positive questions (“what did you like most about your recreation experience today?” and “what, if anything, enhanced your recreation experience today?”) than responses to the two (2) negative questions (“what did you like least about your recreation experience today?” and “what, if anything, detracted from your recreation experience today?”). In total, 111 responses were received for the question about what was liked most.¹⁴ An additional 74 responses were given to the question regarding what enhanced the recreationists’ experiences. On the other hand, thirty-six (36) responses were received addressing what was liked least. Only 13 responses addressed the question: What, if anything, detracted from your recreation experience today? [Figure 4.1.2-2](#) below summarizes the number of responses received to the open-ended questions related to recreation experience.

Figure 4.1.2-2: Number of Responses Received to Open-ended Questions on Recreation Experience



4.1.3 Northfield Mountain Tour and Trail Center Recent Historic Use

To compare 2014 use levels with recent historic use of the NMTTC, registration data collected by FirstLight for NMTTC program use and trail use was compiled for the period 2010-2014. These data are shown in [Table 4.1.3-1](#).¹⁵ Registration data from the year 2005 was also available and is also included in the table.¹⁶

¹⁴ Respondents could provide more than one response to each of the open-ended questions.

¹⁵ Not all use at the NMTTC requires registration. Therefore registration participant data is not directly comparable to a FERC-defined recreation day. For example, these figures do not include recreation activity occurring when the NMTTC is closed.

¹⁶ Generally, use data for the period 2006 – 2009 were unavailable for analysis. Data for the number of environmental programs offered by FirstLight were generally available for the period 2001 – 2015 and are analyzed further within this section.

As shown, the average number of registrants over the five-year period from 2010 through 2014 was 20,430, six (6) percent lower than the 2014 figure of 21,737.

Total registrations for NMTTC programs and trail use was highest in 2012, with 27,485 registrants. In that year, registered trail use was roughly 9,000 visitors higher than in other years. According to FirstLight's records, much of the increase in trail use observed in 2012 was associated with a large cross-country meet in November of that year. The year 2010 experienced the lowest use in terms of registrations, with 13,999 users. The lower use in 2010 is attributable to the fact that recreation areas adjacent to the Upper Reservoir were temporarily closed while the Project was out of service from early May to mid-November. In the other years (2011, 2013-2014), total registrations were relatively constant and similar to the five year average of 20,430 registrants. [Table 4.1.3-1](#) below presents program and activity registration data for 2005 and 2010 through 2014.

Table 4.1.3-1: NMTTC Program/Activity Registration Data

Event	2005	2010	2011 ¹⁷	2012	2013	2014	2010-2014 Average
Participants in Environmental Programs	3,064	2,828	2,534	2,998	2,167	3,623	2,830
Riverboat Passengers ¹⁸	5,718	3,530	1,239	2,722	2,748	2,733	2,594
Skiers/Snowshoers ¹⁹	3,578	1,910	4,775	484	2,434	2,922	2,505
Trail Use ²⁰	9,433	548	6,322	16,060	7,484	7,398	7,563
Fishway Tours	4,845	5,183	4,464	5,221	4,760	5,061	4,938
Total	26,638	13,999	19,334	27,485	19,593	21,737	20,430

Note: The figures here do not include use occurring when the NMTTC was closed.

Annual registrants for fishway tours have been consistent over the past five years, averaging 4,938 visitors per year. This is consistent with the 2005 figure of 4,845 visitors. Fishway tours are typically offered on 15 days during May and June.

Environmental program registrations have been relatively consistent over the five-year period; however, 2013 was somewhat low in terms of environmental program registrations. After a lower than average number in 2013, the number of participants in 2014 was the highest of the five-year period. Environmental programs averaged 2,830 participants between 2010 and 2014. This is consistent with 3,064 participants in 2005.

Passengers on the QII were highest in 2010 with 3,530. The following year, 2011, saw the lowest level of use, with 1,239 passengers, as the QII operated less frequently due to the impacts from Hurricane Irene. The number of passengers aboard the QII has remained quite consistent over the previous three years. The QII had an annual average use of 2,594 passengers over the five-year period, which is lower than the 2005 figure of 5,718. Riverboat trips aboard the QII are available three times a day on Fridays, Saturdays, and

¹⁷ Impacts from Hurricane Irene contributed to the lower use levels in 2011. The number of riverboat passengers were considerably less in 2011 as the QII did not operate as often due to Hurricane Irene.

¹⁸ The riverboat operates from Friday to Sunday starting late June/early July (tours are not run during periods of high flow). There was a reduction in boat capacity from 60 to 44 passengers in 2012. This reduction is the result of a reconfiguration in seating due to a change in Coast Guard regulations.

¹⁹ Winter trail use in 2012 was low due to a lack of snow.

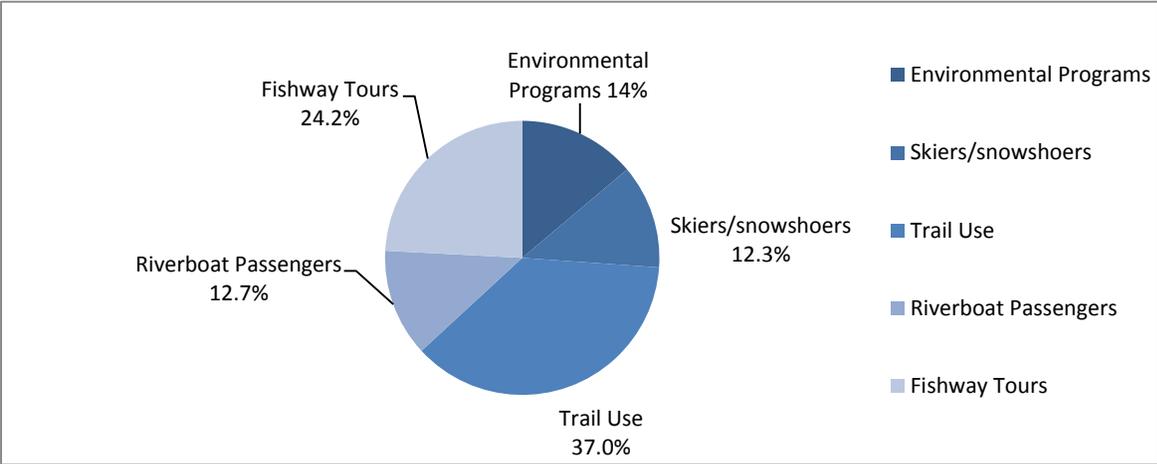
²⁰ Trails were closed for part of 2010 due to the high volume of truck traffic and construction vehicles associated with the hauling of sediment to the Upper Reservoir. Several running events, including the State High School Championship cross-country meet, were held in 2012, resulting in higher than typical usage levels.

Sundays from late June through October. As QII trips are dependent upon river flow conditions, trips occasionally must be cancelled. In a year with favorable river flow conditions throughout the season, roughly 150 trip times would be available.

Recreation use related to cross-country skiing and snowshoeing varies annually depending on snow conditions. Tickets sold to cross-country skiers and snowshoers averaged 2,505 from 2010 to 2014. During the period 2010 – 2014, the low for tickets sold was 484 in 2012, a poor snow year, and the high was 4,775 in 2011. In comparison, 3,578 tickets were sold to cross-country skiers and snowshoers in 2005, which was within the range of the 2010 – 2014 low to high. Cross-country skiing and snowshoeing are available, snow conditions permitting, from generally January through March.

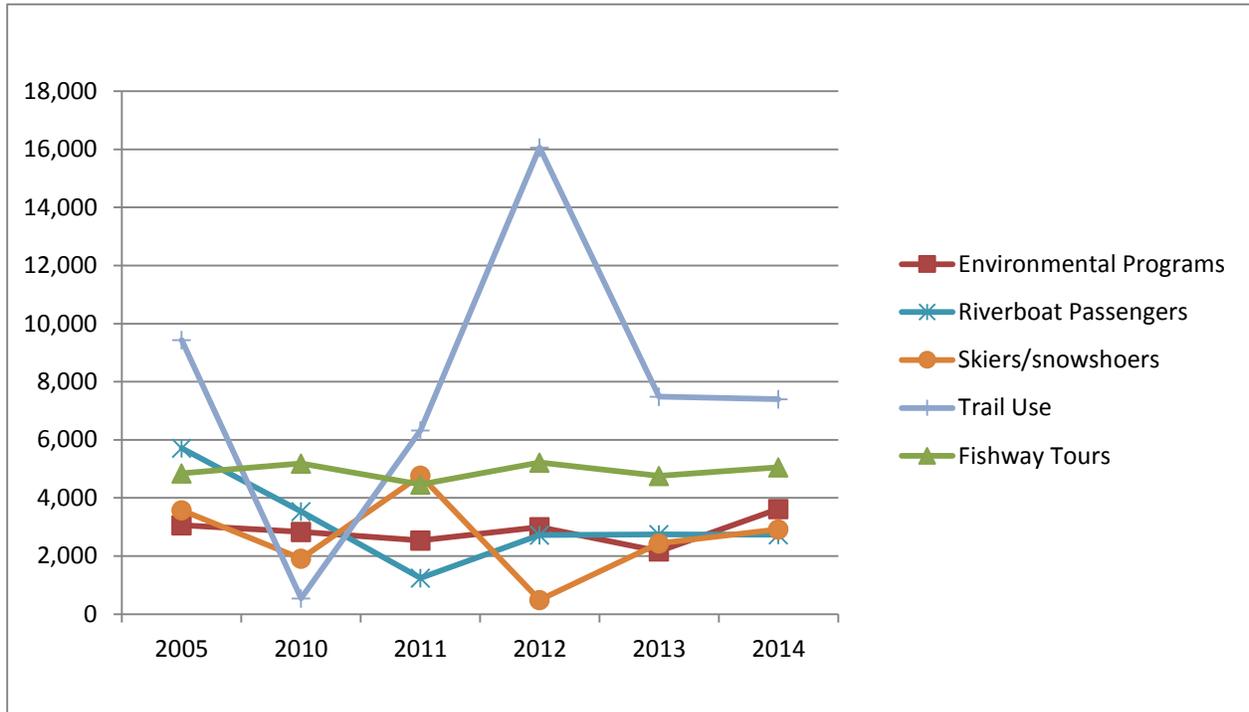
Registration data also provide additional insight into which of the facilities, programs, and activities are the most popular at NMTTC. A breakdown of the 2010-2014 average registrations by program type is provided in [Figure 4.1.3-1](#). As shown, out of the total number of users registered for a program or activity offered at or through the NMTTC, on average trail use was the most popular activity, accounting for 37% of the total registrants. Fishway tours were also popular, accounting for 24% of registrants over the past five years, followed by environmental programs (14%), riverboat passengers (13%), and cross-country skiers/snowshoers (12%).

Figure 4.1.3-1: Percent Breakdown of Average Program/Activity Registration, NMTTC, 2010 through 2014



[Figure 4.1.3-2](#) illustrates the participation levels of the various programs offered through the NMTTC in 2005 and from 2010 through 2014 as described throughout Section 4.1.3 of this Report.

Figure 4.1.3-2: Program/Activity Participation at NMTTC, 2005 and 2010 through 2014

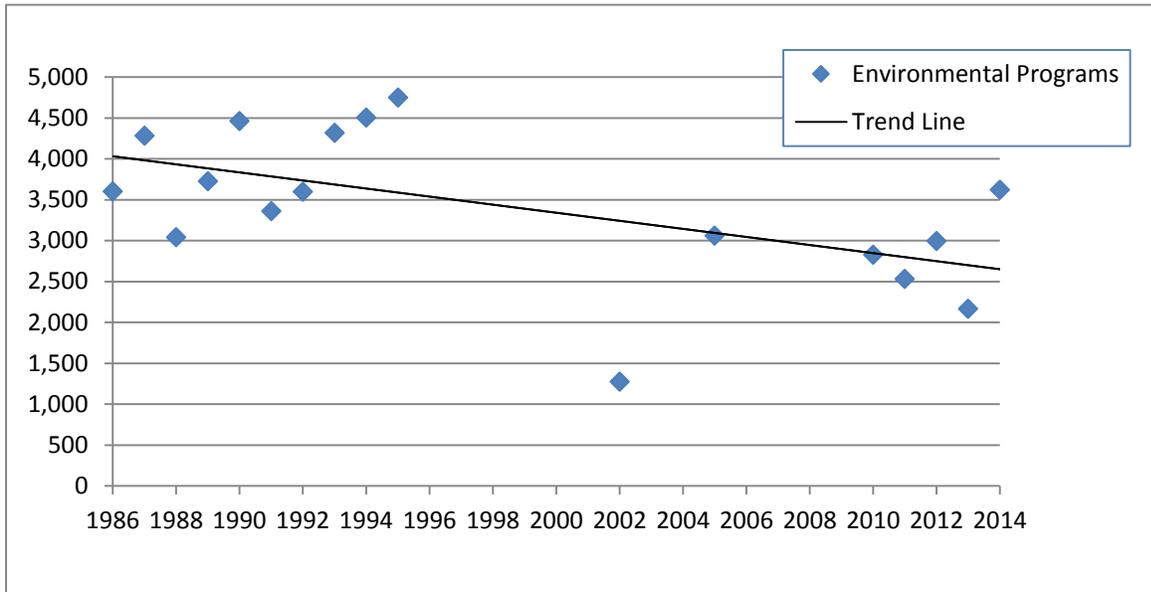


4.1.4 Trends in Use of Educational Programs

Consistent with the study plan, an effort was made to evaluate longer term trends in the use of “educational” programs offered through the NMTTC. Three different types of programs offered by the NMTTC have educational components and so were included in the trends analysis: environmental programs offered by FirstLight at the NMTTC; the QII riverboat trips; and the Fishway tours.

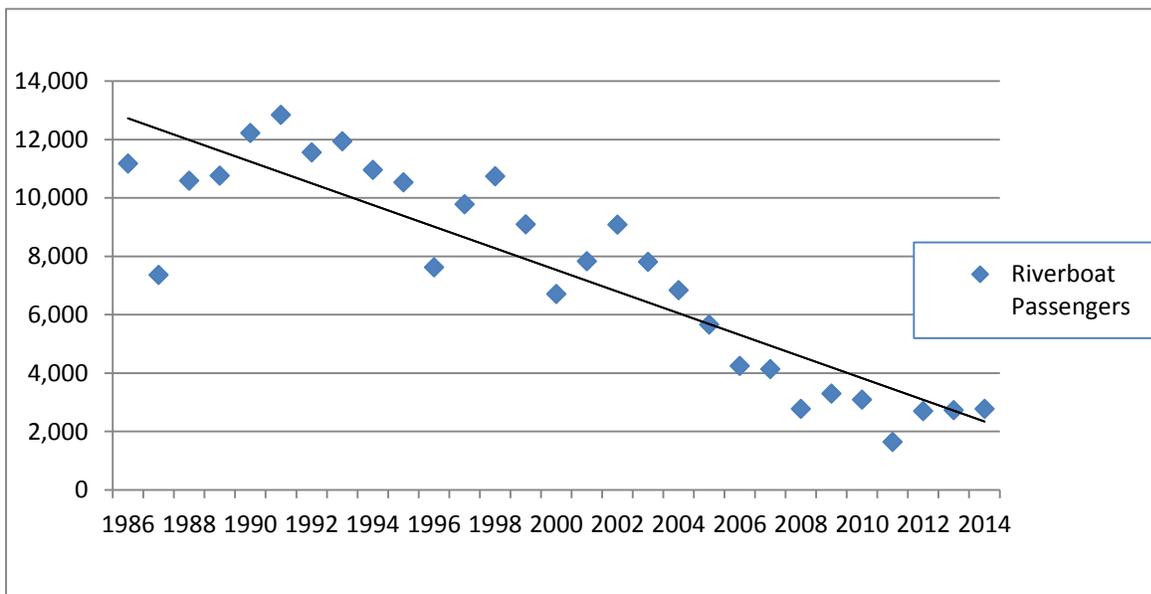
For longer term trends analysis of environmental programs offered by the NMTTC, data collected by FirstLight from 1986 to 2014 was utilized. These data include the ten-year period from 1986 through 1995, 2002, 2004, and the five-year period 2010 through 2014. Data from these years can be directly compared with each other. Data from other years were determined to be unsuitable for inclusion in trend analysis, as data collection methods varied in those years (FirstLight, personal communication). Of the years analyzed, registration in environmental programs was highest in 1995 with 4,751 participants. In 2004, environmental program registration was lowest with 1,278 registrants. [Figure 4.1.4-1](#) below illustrates the registration levels associated with the environmental programs for available years from 1986 through 2014.

**Figure 4.1.4-1: Trends in Registration in Environmental Programs,
 Available Years, 1986 through 2014**



In evaluating trends for the QII, data from the Riverboat logs covering 30 years from 1985 through 2014 were examined. Riverboat usage was at the highest in 1991, with 12,847 passengers. The year 2011, which was impacted by Hurricane Irene, saw the lowest level of use, with 1,644 passengers. Participation in the QII Riverboat Tours shows a downward trend over the last 30 years, with use numbers above 10,000 participants in the late 1980's to more recent use ranging between 2,000 to 4,000 participants. [Figure 4.1.4-2](#) below illustrates the participation levels associated with the riverboat from 1985 through 2014.

Figure 4.1.4-2: Trends in Participation for the QII Riverboat Tours, 1985 through 2014



Events impacting the QII Riverboat operations are summarized in [Table 4.1.4-1](#) below. These events include deck replacement, cessation of tours of the Northfield Mountain Project plant as a result of the

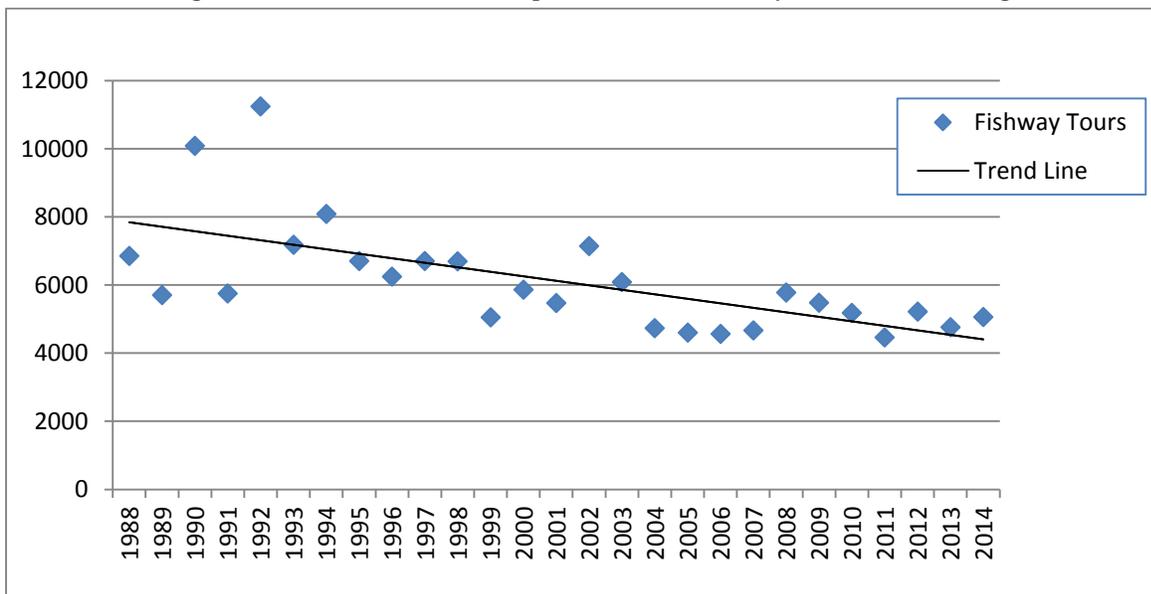
events of September 11, 2001, decrease in charter group business, high water flows, new safety measures implemented over time such as not allowing QII cruises when the spillway gates are open, and changes in US Coast Guard regulations regarding the maximum number of passengers allowed on the QII.

Table 4.1.4-1: Impacts to QII Riverboat Operations

Year	Impact
1998	High number of charter and school groups
2000	Replaced deck, September - October shortened season
2001	Cruises ceased after September 11
2002	Passengers no longer able to combine Power Plant tours with QII tours; Power Plant tours discontinued after September 11, 2001
2004	39% decrease in charter business
2005	High flows mid-season, High flows October
2006	Operational change, no cruises when spilling water
2008	11 of 50 days cancelled due to high water
2011	17 of 52 days cancelled due to high water, Hurricane Irene
2012	Operational change, USCG - required maximum passenger reduction from 60 to 44

Fishway tour data were available for the 27-year period from 1988 through 2014. Fishway tour participation was highest in 1992, with 11,239 visitors. The lowest level of participation recorded was in 2011, with 4,464 visitors. Fishway visitation fluctuates somewhat with the number of days the Fishway is open, which in turn, varies annually depending on the size, timing, and duration of the fish migration. On average, the Fishway is open 28 days per year. The number of open days in the past 27 years ranges from a low of 25 in 1991 to a high of 36 in 1990. [Figure 4.1.4-3](#) below illustrates the participation levels associated with the Fishway from 1988 through 2014.

Figure 4.1.4-3: Trends in Participation for the Fishway Tours, 1988 through 2014



As shown in [Figures 4.1.4-1](#) through [4.1.4-3](#), environmental programs registrations, QII use, and fishway viewing tour registrations have all seen a slight downward trend since the 1980s. Theoretically, such trends could be a result of a change in availability of the programs or tours, but that does not appear to be the case here. There have been some changes to the QII riverboat tours, as described above, but not all the decline

in use observed since the 1980s can be attributed to changes that have been made by FirstLight. Fishway viewing area availability and hours have not changed appreciably over time.

Finally, a review of NMTTC environmental program offerings demonstrates that there has been little or no change in the number of environmental programs offered by FirstLight at the NMTTC, over time. Annual and seasonal data on environmental programs offered at the NMTTC are available for winter 2002 through 2015 and for spring/summer/fall 2001 through spring/summer 2015. As shown in [Table 4.1.4-2](#) and [Figure 4.1.4-4](#), the total number of environmental programs offered by FirstLight has remained relatively constant, or has even increased slightly over the past 14 years, with an average of 28 programs offered annually. From a seasonal perspective, winter, spring/summer, and fall season program offerings have also remained constant, with an average of 8 winter programs, 13 spring/summer programs, and 7 fall programs offered, annually.

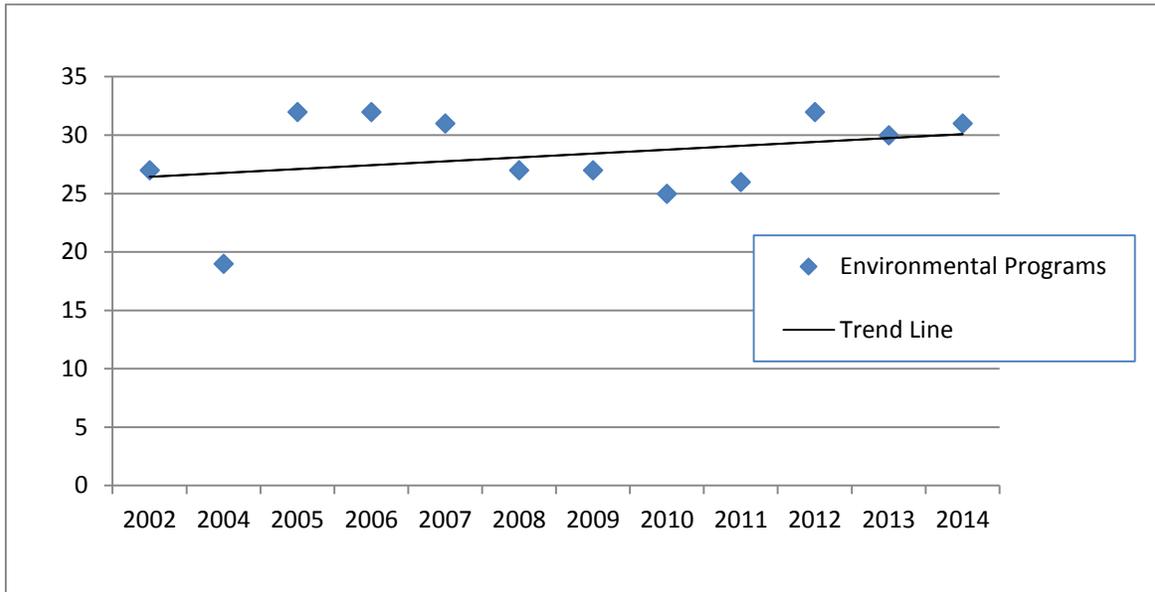
Table 4.1.4-2: NMTTC Environmental Programs at NMTTC by Season, 2001 through 2015

Year	Winter	Spring/Summer	Fall	Total
2001	n/a	13	8	n/a
2002	6	16	5	27
2003	n/a	11	8	n/a
2004	5	10	4	19
2005	11	12	9	32
2006	12	15	5	31
2007	9	14	8	31
2008	6	12	9	27
2009	8	11	8	27
2010	7	14	4	25
2011	9	11	6	26
2012	9	15	8	32
2013	8	14	8	32
2014	8	16	7	31
2015	7	12	n/a	n/a
Average (excluding years for which data are not available)	8	13	7	28

The total number of environmental programs per year has averaged 28 from 2002 through 2014. Program offerings have ranged from a low of 19 in 2004 to a high of 32 in 2005, 2012 and 2013. [Figure 4.1.4-4](#) below presents the number of environmental programs that have been offered annually from 2002 through 2014, as well as a trend line.²¹

²¹ Total figures for 2003 are unavailable.

Figure 4.1.4-4: Annual Environmental Programs Offered at NMTTC, 2002 through 2014 (excluding 2003)



4.2 Northfield Mountain Trail System

The Northfield Mountain Trail System ([Figure 4.2-1](#)) is comprised of 25 miles of trails that are open to the public for a variety of uses including cross-country skiing, snowshoeing, hiking, biking, and horseback riding. In the winter (typically December or January through March), trails are open for cross-country skiing and snowshoeing on Wednesday through Sunday from 9:00 AM until 4:30 PM when conditions permit. If there is no snow in the winter, the trails may be used for hiking only. Trails are generally closed to all uses from the end of ski season through early April or until they are dry enough for walking. Once the trails are dry and have had time to harden (typically by early April) the trails are opened to hiking, mountain biking, and horseback riding.

During warm weather months, the trails are open for hiking, biking, and horseback riding seven days a week. The trail system may be closed occasionally for special events; however, individuals may call the Visitor Center to verify that the trails are open. Also, a trail status board is available on the entrance road to the parking lot where individuals can find information on trail conditions or if a trail is closed for maintenance. All trails are a mix of organic materials (dirt, grass, herbaceous vegetation) and gravel. [Table 4.2-1](#) lists the NMTTC trails and provides general information about each trail.

Table 4.2-1: Northfield Mountain Trails

Trail Name	Use	Length (miles)	Winter Grooming	Difficulty²²
10 th Mountain	Ski, Hike, Bike, Horseback Ride	2.528	Yes	Ranges from Easier to Most Difficult
Angel's Roost	Ski, Hike, Bike, Horseback Ride	0.126	Yes	Easier
B-Bar-W	Ski, Hike, Bike, Horseback Ride	0.140	Yes	Easier
Bowl Loop	Ski, Hike, Bike, Horseback Ride	0.114	Yes	Easier
Bus Stop Loop	Ski, Hike, Bike, Horseback Ride	0.072	Yes	Easier
Cascades	Ski, Hike, Bike, Horseback Ride	0.246	Yes	Easier
Chocolate Pot Trail	Ski, Hike, Bike, Horseback Ride	0.126	Yes	More Difficult
Dilly Down	Ski, Hike, Bike, Horseback Ride	0.191	Yes	Easier and More Difficult
Ecstasy Ramble	Ski, Hike, Bike, Horseback Ride	0.231	Yes	More Difficult
Field 2 Connector	Ski, Hike, Bike, Horseback Ride	0.058	Yes	Easier
Field 2 Loop	Ski, Hike, Bike, Horseback Ride	0.226	Yes	Easier
Field Loop	Ski, Hike, Bike, Horseback Ride	0.430	Yes	Easier
Field Loops Crossover	Ski, Hike, Bike, Horseback Ride	0.192	Yes	Easier

²² Difficulty ratings apply to winter use of the cross-country ski trails. Snowshoe/hiking trails do not have ratings.

Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)
STUDY NO. 3.6.7: RECREATION STUDY AT NORTHFIELD MOUNTAIN, INCLUDING ASSESSMENT OF SUFFICIENCY OF TRAILS FOR SHARED USE

Trail Name	Use	Length (miles)	Winter Grooming	Difficulty²²
Hemlock Hill	Ski, Hike, Bike, Horseback Ride	1.437	Yes	More Difficult
Hemlock Hill A ²³	Ski, Hike, Bike, Horseback Ride	0.025	Yes	More difficult
Hill 'n Dale	Ski, Hike, Bike, Horseback Ride	0.668	Yes	More Difficult and Most Difficult
Hill 'n Dale A	Ski, Hike, Bike, Horseback Ride	0.087	Yes	Most Difficult
Instruction Loop	Ski, Hike, Bike, Horseback Ride	0.054	Yes	Easier
Jug End	Ski, Hike, Bike, Horseback Ride	0.939	Yes	More Difficult
Jug End A	Ski, Hike, Bike, Horseback Ride	0.022	Yes	More Difficult
Near Pasture Loop	Ski, Hike, Bike, Horseback Ride	0.140	Yes	Easier
Pond Loop	Ski, Hike, Bike, Horseback Ride	0.066	Yes	Easier
Rattlebone	Ski, Hike, Bike, Horseback Ride	0.447	Yes	Easier
Rattlebone A	Ski, Hike, Bike, Horseback Ride	0.020	Yes	Easier
Reservoir Road	Ski, Hike, Bike, Horseback Ride	2.609	Yes	Easier
Reservoir Road A	Ski, Hike, Bike, Horseback Ride	0.021	Yes	Easier
Ridge Runner	Ski, Hike, Bike, Horseback Ride	0.169	Yes	Easier
Rock Oak Ramble	Ski, Hike, Bike, Horseback Ride	1.696	Yes	Ranges from easier to most difficult
Rock Oak Ramble A	Ski, Hike, Bike, Horseback Ride	0.013	Yes	More Difficult
Rock Oak to Hemlock Connector	Ski, Hike, Bike, Horseback Ride	0.101	Yes	More Difficult
Sidewinder	Ski, Hike, Bike, Horseback Ride	0.734	Yes	More Difficult
Sidewinder A	Ski, Hike, Bike, Horseback Ride	0.042	Yes	More Difficult
Sugarbush	Ski, Hike, Bike, Horseback Ride	0.696	Yes	Easier
Sugarbush A	Ski, Hike, Bike, Horseback Ride	0.027	Yes	Easier
Talus Toe	Ski, Hike, Bike, Horseback Ride	0.241	Yes	More Difficult

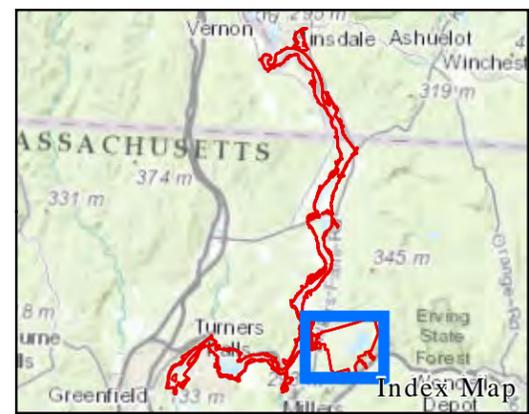
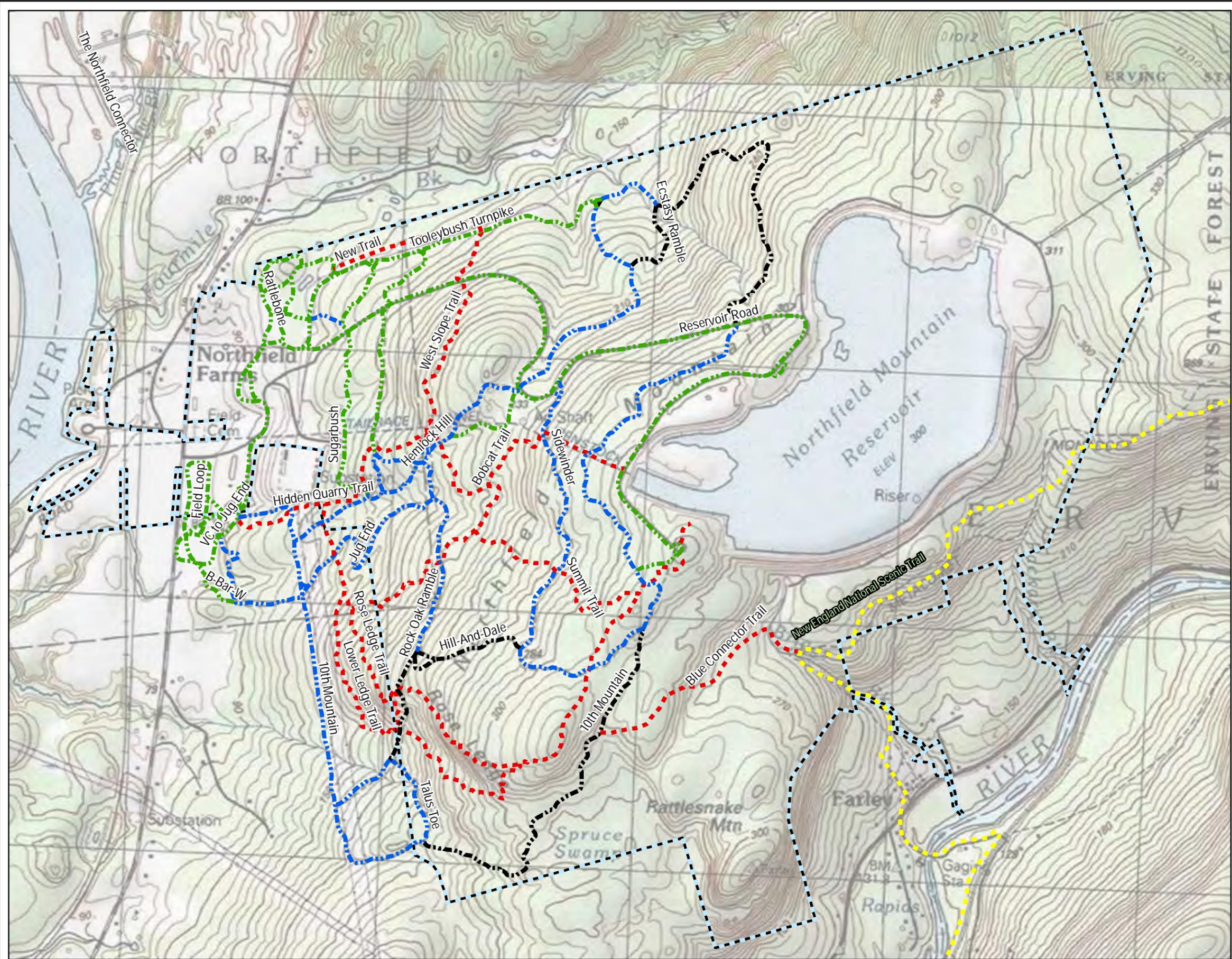
²³ Trails ending in an A indicate small connecting trails that stem off the main trail with the corresponding name.

Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)
STUDY NO. 3.6.7: RECREATION STUDY AT NORTHFIELD MOUNTAIN, INCLUDING ASSESSMENT OF SUFFICIENCY OF TRAILS FOR SHARED USE

Trail Name	Use	Length (miles)	Winter Grooming	Difficulty²²
Tooleybush Turnpike	Ski, Hike, Bike, Horseback Ride	3.396	Yes	Ranges from Easier to Most Difficult
VC Link	Ski, Hike, Bike, Horseback Ride	0.015	Yes	Easier
VC to Jug End	Ski, Hike, Bike, Horseback Ride	0.160	Yes	Easier
Bobcat Trail	Snowshoe, Hike	0.450	No	Not Rated
Hidden Quarry Trail	Snowshoe, Hike	0.384	No	Not Rated
Ledge Link Trail	Snowshoe, Hike	0.112	No	Not Rated
Lower Ledge Trail	Snowshoe, Hike	0.944	No	Not Rated
Observation Platform Connector	Snowshoe, Hike	0.063	No	Not Rated
Porcupine Pot Connector	Snowshoe, Hike	0.023	No	Not Rated
Porcupine Trail	Snowshoe, Hike	0.244	No	Not Rated
Rose Ledge Trail	Snowshoe, Hike	1.568	No	Not Rated
Summit Trail	Snowshoe, Hike	0.715	No	Not Rated
Switchyard Trail	Snowshoe, Hike	0.143	No	Not Rated
West Slope Trail	Snowshoe, Hike	1.453	No	Not Rated

FirstLight maintains all of the NMTTC trails. FirstLight’s maintenance of the trail system is on-going and maintenance, improvements, and repairs are conducted on an as-needed basis. General assessments of the trail system are completed in the spring, during the month of July, and in the fall. The trail system is also reviewed for potential maintenance needs after abnormal weather events. Spring maintenance may include upgrading trail tread in areas of need, trail grading, and culvert maintenance. July maintenance may include clearing culverts or completing maintenance needs that have arisen over the course of the summer. Fall maintenance includes clearing leaves from culverts and preparing the trails for winter. Maintenance is also completed at targeted locations throughout the year if a report of a potential issue is received from trail users. Winter maintenance of the trails includes grooming of the cross-country ski trails for both classical and free-style skiing when snow conditions permit. Finally, FirstLight conducts an active tree program that targets potential hazard trees and removes them as necessary.

The AMC oversees the management and maintenance of the NET.



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

Relicensing Study 3.6.7
Recreation Study at Northfield Mountain, Including Assessment of Sufficiency of Trails for Shared Use

Figure 4.2-1
Northfield Mountain Trail System

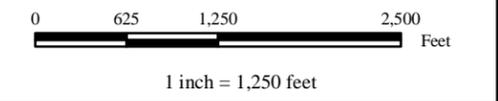
Legend

Trail Rating

- Most Difficult
- More Difficult
- Easier
- Snowshoeing/Hiking Only
- New England National Scenic Trail
- Northfield Mountain Project Boundary

Note:
Blue Connector Trail digitized based on best available imagery.

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapnyIndia, © OpenStreetMap



Copyright © 2015 FirstLight Power Resources All rights reserved.

4.2.1 Trail Survey

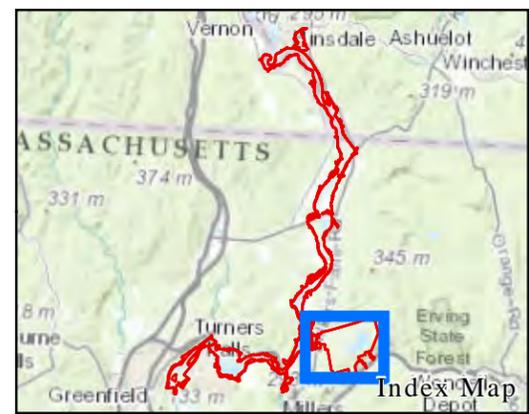
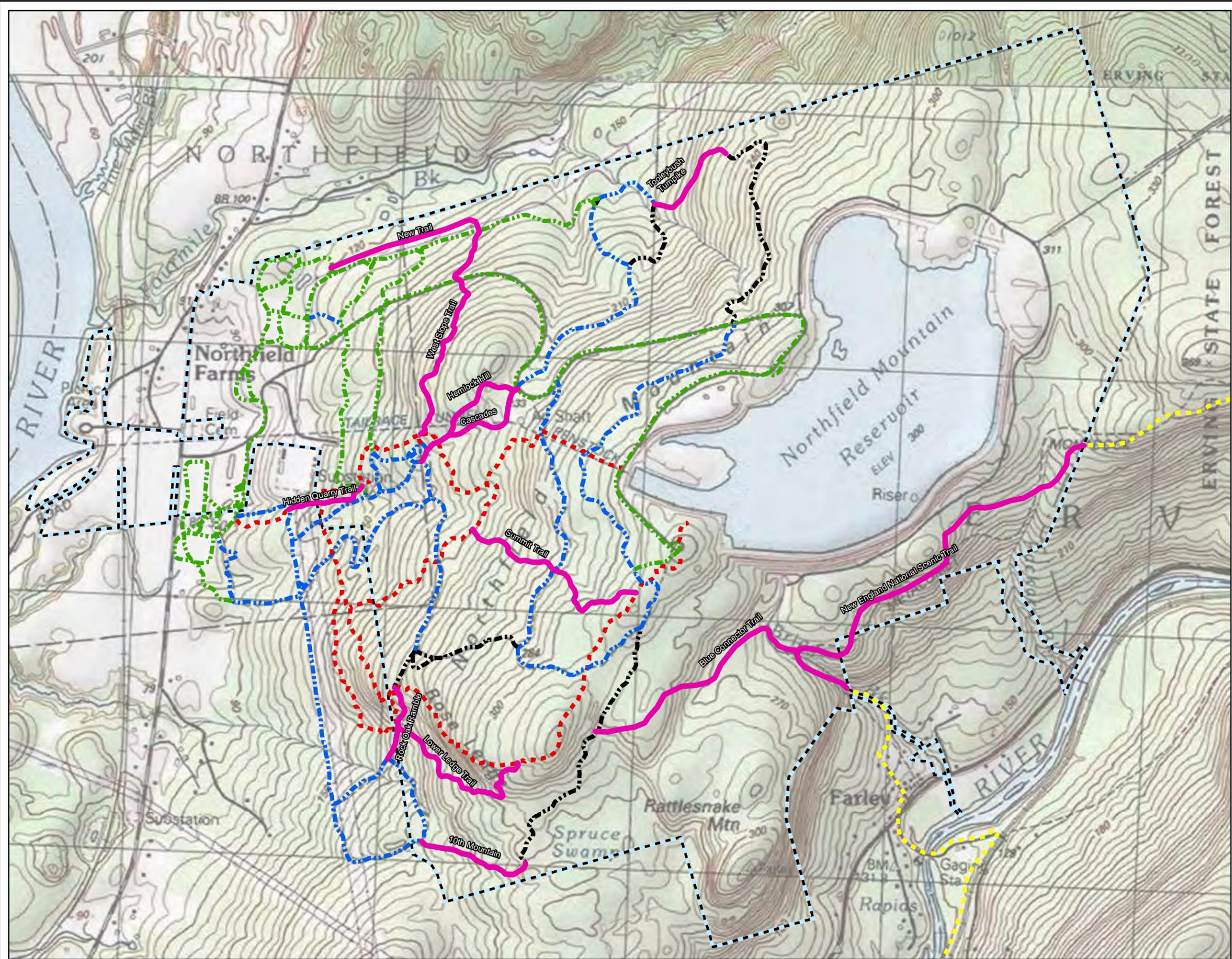
As part of this study a survey of the entire Northfield Mountain Trail System was conducted. The survey was designed to document trail attributes and conditions. As described in Section 3.2, the first step of the survey was a rapid assessment of the entire trail system (including the Blue Connector Trail and the portion of the NET located within the Project Boundary), which consisted of a visual review of each trail. Relying on standard methodologies adopted from IMBA, AMC and MADCR guidelines, best professional judgment was then employed to identify trails and trail segments, which required a more detailed assessment.

The trails and trail segments that were selected for more detailed in the field observation included those with steep slopes, observed drainage concerns/erosion, alignment issues, and trails requiring more frequent maintenance.

The cross-country ski trail system at NMTTC was designed and built in the 1970s to a very high standard for the time, with machine-built trails that are generally a minimum of 14 feet wide and constructed drainage structures including ditches and numerous culverts. Trail surfacing provides a stable platform for most types of recreation during all but mud season and the wettest periods of the year.

The vast majority of the cross-country ski trail system at Northfield is located on the contour and gently rolls as it gains and loses elevation. The standard today is to design trails on the contour, keeping grades under 10% as much as possible and not exceeding a maximum grade of 15-20%. The standard today is also to design trails so as to avoid fall line alignments. At the time that the NMTTC trail system was designed, trails were generally designed to get from point A to point B as quickly as possible, which often resulted in trails that went straight uphill (i.e., straight up the fall line). Because water follows the path of least resistance, or the fall line, over time fall line trails can become gullied as water runs down them with increasing volume and velocity. Thus trails built along a fall line require a greater degree of maintenance.

Overall, the trail survey found the Northfield Mountain Trail System to be well designed, well maintained and in good condition. Results of the rapid assessment found that approximately 21 miles of the existing 25 miles (84%) of trails were functioning as designed, were in good condition, and did not require additional survey. The rapid assessment identified approximately 4 miles (16%) of trails, which were in need of a more detailed condition assessment. [Table 4.2.1-1](#) lists those trails that were determined through the rapid assessment to require more detailed survey and what portion of the trail (in feet) was assessed in more detail. These included sections of the 10th Mountain Trail, Cascade Trail, Hemlock Hill Trail, Yellow Jacket Pass, Tooleybush Turnpike, Hidden Quarry Trail, West Slope Trail, Rose Ledge Trail, Upper Lower Ledge Trail, New Trail, and the Summit Trail. The Blue Connector Trail, which connects the Northfield Mountain Trail System with the NET, and the portion of the NET that is within the Project Boundary were also surveyed in greater detail. [Figure 4.2.1-1](#) illustrates these sections of trail. In general, the trails that were assessed in more detail are also in good condition and function as designed. Modifications to some sections to address erosion and drainage issues, however, could increase their sustainability over the long term. A summary of the findings for each of these trails is also included in [Table 4.2.1-1](#).



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

Relicensing Study 3.6.7
 Recreation Study at Northfield Mountain, Including Assessment of Sufficiency of Trails for Shared Use

Figure 4.2.1-1
 Northfield Mountain Assessed Trail Sections

Legend

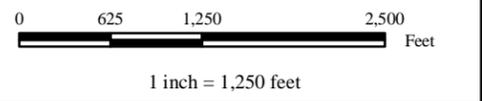
Trail Rating

- Most Difficult
- More Difficult
- ▲—▲— Easier
- ◆—◆— Snowshoeing/Hiking Only
- New England National Scenic Trail
- Assessed Trail Sections
- Northfield Mountain Project Boundary

N

Note:
 Blue Connector Trail digitized based on best available imagery.

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapnyIndia, © OpenStreetMap



Copyright © 2015 FirstLight Power Resources All rights reserved.

STUDY NO. 3.6.7: RECREATION STUDY AT NORTHFIELD MOUNTAIN, INCLUDING ASSESSMENT OF SUFFICIENCY OF TRAILS FOR SHARED USE

Table 4.2.1-1: Detailed Condition Assessment Trail Sections

Trail Name	Portion of Trail	Description of Trail	Length of Assessed Portion (feet)	Trail Condition
10 th Mountain Trail	Portion from Talus Toe to where the trail turns North.	Cross country ski trail that serves as the southern perimeter trail.	1,261	The majority of this trail is in good condition. The portion assessed contains one of the steeper sections of trail and the alignment is on the fall line. There were eight newly constructed drainage dips. Modifications to the drainage dips could increase their effectiveness.
Cascade Trail	Section just above the Chocolate Pot up to Reservoir Road.	Interior cross country ski trail, which is part of a loop of mostly beginner trails.	1,100	Most of this trail is in good condition. The portion assessed is close to a fall line orientation and grades are in the low teens. There are four drainage dips in this section that are effective in directing water flow. Minor modifications to two aprons could increase effectiveness.
Hemlock Hill	Portion between Reservoir Road and Rock Oak Ramble.	Longest intermediate level cross country ski trail in the trail system.	1,075	Much of the trail below the Chocolate Pot is steep and on the fall line. There are 14 drainage dips on this portion of the trail. Modifications to improve the depth of the drainage dips could increase their sustainability.
Rock Oak Ramble (Yellow Jacket Pass)	Portion between Rose Ledge Trail and Talus Toe Trail.	Expert rated section of cross country ski trail.	913	This portion of the trail is steep with slopes from 16 to 18% and has 10 culverts and five drainage dips. Several of the culverts require maintenance to ensure functionality. There is an inboard ditch that runs along the trail which is in good condition. Reconstructing the drainage dips so that they drain to the outside of the trail could reserve ditch capacity for sheet flow from the hill and allow for appropriate angles, aprons and berms.

STUDY NO. 3.6.7: RECREATION STUDY AT NORTHFIELD MOUNTAIN, INCLUDING ASSESSMENT OF SUFFICIENCY OF TRAILS FOR SHARED USE

Trail Name	Portion of Trail	Description of Trail	Length of Assessed Portion (feet)	Trail Condition
Tooleybush Turnpike (The Chute)	Junction of Ecstasy Ramble to where Tooleybush turns in a southeasterly direction.	The Chute is an expert rated ski trail.	1, 029	The majority of the Tooleybush Trail is in good condition. The Chute portion of the trail has the steepest sustained sections of trail on Northfield Mountain (20% for 200 feet). This section was observed to have four culverts and five drainage dips. Several of the culverts require maintenance to ensure functionality. Reconstruction of the drainage dips so they drain to the outside of the trail could alleviate the potential for clogging ditches and culverts with trail materials. Increasing the footprint of the drainage dips could increase effectiveness while maintaining a relatively low profile. Installation of an inboard ditch along a 250' section on the upper portion of the trail would also improve drainage.
Hidden Quarry Trail	Portion between Sugarbush and 10 th Mountain Trails.	Heavily used, short hiking trail near the Visitor Center.	933	This portion of the trail travels on an old quarry tote road. Approximately 500 feet of the old road has sunken; Installation of four drainage dips and improving the side ditching would repair this area. Moving a small section of trail slightly up hill would avoid a seasonally wet location.
West Slope Trail	Portion between Tooleybush Turnpike and the Chocolate Pot.	Hiking/snowshoeing trail that provides access to numerous trails.	2,761	This section is a rambling trail that generally follows the contour and is in good condition. In some of the steeper areas, wooden steps pinned with rebar have been installed. These steps appear to be nearing the end of their lifespan. Replacement of the steps with stone steps or other alternative would be more durable over the long term. Relocation of portions of the trail to avoid these steeper areas would eliminate the need for steps and would be more sustainable over the long term.

STUDY NO. 3.6.7: RECREATION STUDY AT NORTHFIELD MOUNTAIN, INCLUDING ASSESSMENT OF SUFFICIENCY OF TRAILS FOR SHARED USE

Trail Name	Portion of Trail	Description of Trail	Length of Assessed Portion (feet)	Trail Condition
Upper Lower Ledge Trail	Portion of Lower Ledge Trail between Yellow Jacket Pass and the Rose Ledge Trail.	Portion of hiking/snowshoeing trail that travels near the base of the Rose Ledge informal climbing area.	2557	This trail is a heavily used hiking trail in good condition with several short stretches of erosion. Preventive measures such as installation of drainage dips and rock steps, and a 70-foot relocation could improve this portion of the trail's long term sustainability.
New Trail (Portion of West Slope Trail)	Entire trail between Rattlebone and Tooleybush Turnpike.	Primitive hiking/snowshoeing trail that parallels Tooleybush.	2,579	This is a newer trail, which is in primitive, but functional condition. The trail contains duff and roots in some sections. Two short relocations of the trail to improve swale crossings could decrease the potential for bank erosion. Two additional short relocations on the east end of the trail could decrease the potential for trail erosion. One relocation would raise the trail above an existing wet area. The second relocation is a swale crossing that is well suited for a bridge to provide a sustainable crossing.
Summit Trail	Portion between Rose Ledge Trail and West Slope Trail.	Hiking and snowshoeing trail.	2,977	The bottom 2/3 of the trail is almost exclusively on the fall line with grades generally between 14-18% and some sections as high as 28%. The trail appears to receive very little use. Closing the trail to non-winter use may have a minor impact on use but could increase the sustainability of the trail. Another option to increase sustainability would be to relocate the bottom 2/3 to a more sustainable alignment if trail use during the spring, summer or fall increases.

STUDY NO. 3.6.7: RECREATION STUDY AT NORTHFIELD MOUNTAIN, INCLUDING ASSESSMENT OF SUFFICIENCY OF TRAILS FOR SHARED USE

Trail Name	Portion of Trail	Description of Trail	Length of Assessed Portion (feet)	Trail Condition
Blue Connector Trail	Entire Trail from 10 th Mountain Trail to New England National Scenic Trail.	Primitive footpath connecting the 10 th Mountain Division Trail to the New England National Scenic Trail.	3,996	This is a primitive footpath with no visible improvements aside from easy-to-follow blazes, located within the Project boundary. The trail is well laid out but is sparsely used. There is a steep section of trail that has a grade over 20% for approximately 120 feet. Installation of rock steps or a short relocation to a more gradual decent could increase sustainability. Relocating the Blue Connector Trail down the west side of Briggs Brook would eliminate a brook crossing.
New England National Scenic Trail	Portion of the trail within the Project Boundary.	National scenic trail that travels from Long Island Sound to the Massachusetts/New Hampshire border.	6,327	This section was constructed along an old woods road. Approximately 1,200 feet of trail were relocated recently. Portions of the relocated trail are steep and located along the fall line. The trail also crosses a seasonally wet area. Relocation of a portion of the trail would eliminate crossing the seasonally wet area, an area of steep grade and a portion of the old road bed that has sunken and could increase sustainability.

4.2.2 Trail Use (2014)

As discussed in more detail in Section 4.1.1 of this report, in 2014, 7,398 recreationists used the trails at the NMTTC during the Visitor Center's open hours. This trail use excludes ticketed cross-country skiing and snowshoeing. Based on the monthly records maintained by the NMTTC, trail use was greatest in the fall, with 4,525 recreationists using the trails from September through November. In 2014, there were 2,922 ticketed cross-country skiers and snowshoers. There were an additional 5,803 days of trail use in 2014 when the Center was closed. Therefore, total trail use at the NMTTC for 2014 was 16,123 recreation days.

4.2.3 Trail User Survey

During the period of January to December 2014, as part of the overall *Recreation Use and User Survey* (Study No. 3.6.1), 116 recreational users completed surveys at NMTTC. On a seasonal basis, the respondents represented 53 winter users, 13 spring users, 20 summer users, and 30 fall users. Twenty-two (22%) respondents were first-time visitors to NMTTC, meaning that approximately 78% were repeat visitors. Sixty-two of the 116 respondents (53%) lived within 25 miles of the NMTTC.²⁴

Visitors were asked their opinions of the NMTTC Trail System with respect to several trail attributes and conditions; the results are summarized in [Table 4.2.3-1](#). Not all respondents answered all survey questions. As shown, the responses regarding trail attributes and conditions were overwhelmingly positive. Ninety-four percent (94%) of respondents strongly agreed or agreed that the trails are in good condition, with 95% strongly agreeing or agreeing that the trails are well maintained. Ninety-three percent (93%) of respondents strongly agreed or agreed that the mix of easy, moderate and difficult trails is appropriate. Only a very small percentage of respondents indicated that trails were either too steep (4%) or too flat (1%).

Regarding the sufficiency of the existing trails, only 12% of respondents felt that more trails were needed, while 61% disagreed or strongly disagreed with this statement, and 26%²⁵ were neutral, indicating in total that 88% of respondents are satisfied with the existing number of trails. With respect to winter use, 85% of respondents agreed or strongly agreed that the grooming of winter trails is sufficient. An additional 10% of respondents were neutral on the issue.

Respondents also gave positive responses to the following: Trail signage/markings are adequate (82%); trailhead parking is sufficient (92%); and trail surface material is adequate (84%, with the remaining 16% neutral). Finally, 96% of the survey respondents agreed or strongly agreed that the hours of operations are adequate, with the remaining 4% neutral.²⁶ Visitor opinions of the NMTTC Trail System are summarized in [Table 4.2.3-1](#).

²⁴ A local visitor is defined as living within 25 miles of NMTTC based on the user ZIP code provided from the survey.

²⁵ Percentages do not total to 100% because of rounding.

²⁶ The question regarding the hours of operation was included in the revised Recreational Use/User Contact Survey as implemented in late August. Of the 32 surveys completed at the NMTTC between late August and the end of the year, 26 respondents provided ratings regarding the adequacy of the hours of operation.

Table 4.2.3-1: User Opinions on the NMTTC Trail System

Variable (Total Responses)	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Trails are in good condition (90)	50%	44%	3%	2%	0%
Trails are well maintained (89)	52%	43%	4%	1%	0%
Trails are too steep (88)	1%	3%	14%	49%	33%
Trails are too flat (88)	0%	1%	10%	51%	38%
More trails are needed (88)	1%	11%	26%	44%	17%
There is an appropriate mix of easy, moderate, difficult trails (87)	42%	51%	6%	1%	0%
Winter trail grooming is sufficient (68)	54%	31%	10%	4%	0%
Trail signage/markings are adequate (86)	35%	47%	6%	9%	3%
Trailhead parking is sufficient (87)	39%	53%	2%	5%	1%
Trail surface material is adequate (86)	36%	48%	16%	0%	0%
Hours of operation are adequate (26)	42%	54%	4%	0%	0%
Note: Figures may not total to 100% because of rounding.					

Recreationists were asked if any of the variables presented in the table above could be improved.²⁷ Nine (9) respondents provided feedback on this open-ended question, while an additional 23 respondents chose not to respond. [Table 4.2.3-2](#) below summarizes the suggestions respondents offered to improve the variables at the NMTTC.

Table 4.2.3-2: Responses: How Can Any of the Above Variables be Improved?

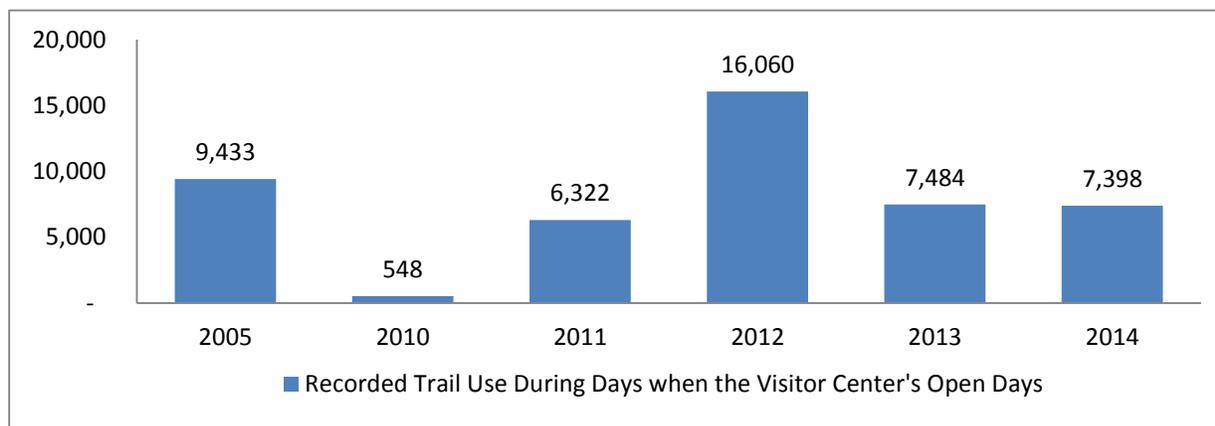
Improvement Suggested	Times Mentioned
More signage	4
More trails/more single track trails	2
Mislabeled/confusing signs	2
More switchbacks to ease steepness	1

²⁷ The question “How can any of the above variables be improved?” was included as part of the revised Recreational Use/User Contact Survey in late August. Of the 32 surveys completed at the NMTTC between late August and the end of the year, 9 respondents provided an answer to this question.

4.2.4 Historic Trail Use

Based on FirstLight records for 2005 and the period 2010 through 2014, recorded trail use during those days that the Visitor Center was open ranged from a low of 548 visitors in 2010 to a high of 16,060 in 2012.²⁸ Both of these years had special circumstances that affected the level of usage. In 2010, the trails were closed for much of the recreation season to allow for the high volume of trucks and construction vehicles that were associated with hauling sediment to the Upper Reservoir. The high usage in 2012 was associated with the hosting of three major scholastic cross-country events. While not as high as the trail use recorded in 2012, heavy trail use was observed in 2005, with 9,433 recreation days. This was also due to a scholastic cross-country event. Trail use in 2011, 2013, and 2014 was comparable, with 6,322 visitors in 2011, 7,484 visitors in 2013 and 7,398 visitors in 2014. Annual trail use is expected to spike again in 2016 when the MIAA All State Championships are scheduled to return to Northfield Mountain. After adjusting for special events and closures in various years, trail use has remained relatively consistent over the 2010 – 2014 period. [Figure 4.2.4-1](#) below illustrates the recreational usage by year for the Northfield Mountain Trail System.

Figure 4.2.4-1: Recreation Usage, Northfield Mountain Trail System, 2005 and 2010 through 2014



4.2.5 Existing Hiking and Mountain Bike Trails in the Northfield Mountain Area

An internet search revealed a multitude of hiking and mountain biking trail opportunities within 25 miles of the NMTTC. The search found 133 properties with hiking and/or mountain biking opportunities within 25 miles of the NMTTC and its trail system. Of the 133 properties, 64 provide both hiking and mountain bike trails, 62 provide only hiking trails, and seven provide only mountain bike trails. These properties are owned and managed by various federal and state agencies, municipalities, land trusts and other non-profit organizations, college universities, land management companies, and private landowners. All but two of the properties are open to public trail use on a year-round basis.

²⁸ 2010 provided the lowest recorded number of visitors. Use in 2010, however, is not representative of typical use due to the temporary closure of the trails while the Project was out of service.

5 CONCLUSION

5.1 Northfield Mountain Tour and Trail Center

The land and facilities associated with the NMTTC, as well as programs operated from the Visitor Center were reviewed to determine whether the NMTTC has met recreation needs and if improvements or additions are necessary with a consideration of potential needs over the term of a new license. This portion of the study was conducted through the review of existing information on existing public programs, available registration data collected at the Visitor Center, and data collected as part of Study 3.6.1 - the *Recreation Use and User Contact Survey*.

The NMTTC was determined to be a well-utilized regional recreation resource that provides a wide variety of opportunities, programs and amenities, which supported an estimated 20,024 recreation days in 2014. Visitors to the NMTTC participated in environmental and recreation programs, and used the trail network for a variety of recreational activities. In 2014, recorded environmental and recreation program use totaled 3,901 recreation days.

Surveyed visitors were overwhelmingly satisfied with the amenities provided at the NMTTC. One hundred percent (100%) of respondents to the survey question asking about their overall satisfaction with the NMTTC said they were satisfied (21%), moderately satisfied (33%), or extremely satisfied (46%). Visitors' responses to the question "What did you like most about your recreational experience today?" included "world class touring center", the trails, the Visitor Center exhibits and the variety of programs. Visitors also reported liking most that the NMTTC was not crowded or was quiet. Surveyed visitors were asked to rate the variety of amenities at the NMTTC on a scale of 1 ("poor") to 5 ("Excellent"). Eighty-one percent (81%) of those who responded rated that the variety of amenities available at the NMTTC was a 4 or 5. In addition, there were many more responses to the two positive open-ended questions ("what did you like most about your recreation experience today?" and "what, if anything, enhanced your recreation experience today?") than responses to the two open-ended negative questions ("what did you like least about your recreation experience today?" and "what, if anything, detracted from your recreation experience today?"). Based on information from the survey responses, the vast majority of the visitors to the NMTCC are satisfied with the amenities and programs available.

With the exception of special circumstances such as use of the NMTTC for cross-county meets, Hurricane Irene, and construction associated with outage in 2010, recreation use associated with the NMTTC has remained relatively consistent over the past five years (2010 – 2014). Environmental program registration have been relatively consistent over the five-year period between 2010 and 2014.

Over the longer term, registration and use records available from FirstLight demonstrate that environmental program, QII and fishway viewing tour use has declined since the 1980s, with more of a decline in program and QII use, and a more moderate decline in fishway viewing use. These declines appear to reflect a true change in interest and participation, and are not a result of reduced program offerings, which have remained constant or increased slightly since 2001.

The results of the recreation user survey and the analysis of recreation use at the NMTTC demonstrate that the NMTTC and the related program offerings are meeting or exceeding area recreation needs and do not suggest that any improvements or additions are necessary at the NMTTC.

5.2 Northfield Mountain Trail System

A review of the Northfield Mountain Trail System was also conducted to identify uses taking place on the current trail system and whether the current trail system is suitable and adequate for sustaining those uses. This portion of the study was conducted through the review of available registration data collected at the

Visitor Center, data collected as part of Study 3.6.1 - the *Recreation Use and User Contact Survey*, and a field assessment of the NMTTC Trail System.

The NMTTC Trail System, supports cross-country skiing, snowshoeing, hiking, biking, and horseback riding. It was determined that the NMTCC Trail System supported an estimated 16,123 recreation days in 2014.

Data from the Recreation User Survey that was administered from January to December 2014 supports that the vast majority of visitors to the NMTTC Trail System are very satisfied with the number of trails and with the difficulty of the trails. Ninety-four percent (94%) of respondents strongly agreed or agreed that the trails are in good condition, with 95% strongly agreeing or agreeing that the trails are well maintained. Surveyed visitors also disagreed or strongly disagreed (61% of responses) that more trails are needed while another 26% of respondents remained neutral. The majority of respondents (85%) either agreed or strongly agreed that the grooming of winter trails is sufficient. The majority of respondents (96%) also agreed or strongly agreed that the hours of operations are adequate, while the remaining 4% were neutral. When asked how any of the trail variables could be improved, only nine (9) users chose to respond while an additional 23 recreationists chose not to respond.

Overall, the field survey found that the trail system is well designed, well maintained and in good condition. The trails were designed and built to a very high standard for the time that they were constructed (1970's). Although the trails were designed primarily for hiking and cross-country skiing, the trail assessment found that the cross-country ski trail system is well adapted to handle mountain biking and can accommodate horseback riding use while remaining in good condition. The hiking and snowshoe trails are not as suitable for mountain biking or horseback riding use. Of the 25 miles of trails provided at the NMTTC, only 4.2 miles were found to have conditions that were determined to need a more detailed condition assessment. The majority of the detailed condition assessment recommendations addressed drainage dips and culverts.

Based on the results of the study, the current trail system is currently well designed and is suitable and adequate for supporting a variety of uses. In addition, the desktop review of area trails determined that are ample hiking and mountain biking opportunities in the area, which are supplemented by the NMTTC trail system. The evaluation of the condition of the NMTTC trails identified a few areas where measures could be implemented to improve the long-term sustainability of the trails.

6 LITERATURE CITED

Demrow, C. and David Salisbury. (1998). AMC The Complete Guide to Trail Building and Maintenance (4th ed.). Appalachian Mountain Club Books.

Massachusetts Department of Conservation and Recreation (MADCR). 2012. Trails Guidelines and Best Practices Manual. Author.

Birkby, R.C. (2006). Lightly on the Land: The SCA Trail Building And Maintenance Manual (2th ed.). Student Conservation Association.

Trail Solutions: IMBA's Guide to Building Sweet Singletrack. 2004. International Mountain Bicycling Association: Boulder, CO.

U.S. Forest Service. (2011). Trail Fundamentals and Trail Management Objectives. Author.

INTERNET LOCATIONS CONSULTED:

City of Amherst Massachusetts. (2015). Conservation Areas and Trail Map. Retrieved December 31, 2014, from <http://www.amherstma.gov/1282/Conservation-Area-Trail-Map>.

City of Amherst Massachusetts. (2015). Trail Regulations. Retrieved January 5, 2015, from <http://www.amherstma.gov/620/Trail-Regulations.html>.

City of North Hampton Massachusetts. (1999). Rediscovering Northampton The natural History of City-Owned Conservation Areas. Retrieved January 7, 2015, from http://www.broadbrookcoalition.org/files/Rediscover_Northampton_sept_1999.pdf

Executive Office of Energy and Environmental Affairs Massachusetts. (2015). DAR State Forest. Retrieved January 7, 2015, from <http://www.mass.gov/eea/agencies/dcr/massparks/region-west/dar-state-forest-generic.html>.

Executive Office of Energy and Environmental Affairs Massachusetts. (2015). Dunn State Park. Retrieved January 7, 2015, from <http://www.mass.gov/eea/agencies/dcr/massparks/region-central/dunn-state-park.html>.

Executive Office of Energy and Environmental Affairs Massachusetts. (2015). Erving State Forest. Retrieved January 6, 2015, from <http://www.mass.gov/eea/agencies/dcr/massparks/region-central/erving-state-forest.html>.

Executive Office of Energy and Environmental Affairs. (2015). Federated Women's Club State Forest. Retrieved January 6, 2015, from <http://www.mass.gov/eea/agencies/dcr/massparks/region-central/federated-womens-club-state-forest.html>

Executive Office of Energy and Environmental Affairs Massachusetts. (2015). List of State Properties Open and Closed to Snowmobiles. Retrieved January 7, 2015, from <http://www.mass.gov/eea/agencies/dcr/massparks/recreational-activities/lists-of-state-properties-open-and-closed-to-snowmobile.html>.

- Mass Audubon. (2015). Arcadia Wildlife Sanctuary. Retrieved January 5, 2015, from <http://www.massaudubon.org/get-outdoors/wildlife-sanctuaries/arcadia/about>.
- Mass Audubon. (2015). Conway Hills Wildlife Sanctuary. Retrieved January 5, 2015, from <http://www.massaudubon.org/get-outdoors/wildlife-sanctuaries/conway-hills>.
- Mass Audubon. (2015). Cook's Canyon Wildlife Sanctuary. Retrieved January 5, 2015, from <http://www.massaudubon.org/get-outdoors/wildlife-sanctuaries/cook-s-canyon>.
- Mount Grace Land Conservation Trust. (2015). Arther Iversen Conservation Area. Retrieved January 6, 2015, from <http://www.mountgrace.org/conservation-areas/arthur-iversen-conservation-area-warwick>.
- Mount Grace Conservation Trust. (2014). Brush Mountain. Retrieved December 31, 2014, from <http://www.mountgrace.org/conservation-areas/brush-mountain-northfield>.
- Mount Grace Land Conservation Trust. (2014). Crosby Conservation Area. Retrieved December 31, 2014, from <http://www.mountgrace.org/conservation-areas/crosby-conservation-area-gill>.
- Mount Grace Land Conservation Trust. (2015). Retrieved January 1, 2015, from Fern Glenn Conservation Area. <http://www.mountgrace.org/conservation-areas/fern-glenn-conservation-area-winchendon>.
- Mount Grace Land Conservation Trust. (2015). Fox Valley Conservation Area. Retrieved January 5, 2015, from <http://www.mountgrace.org/conservation-areas/fox-valley-conservation-area-phillipston>.
- Mount Grace Land Conservation Trust. (2014). Giniusz. Retrieved December 31, 2014, from <http://www.mountgrace.org/conservation-areas/giniusz-erving>.
- Montachusett Regional Planning Commission. (2015). Royalston, MA: Formal Trail Inventory. Retrieved January 6, 2015, from http://www.mrpc.org/sites/montachusettRPC/files/file/file/royalston_trailinventory_85x111_0.pdf
- New England Mountain Bike Association. (2015). Catamount State Forest. Retrieved January 6, 2015, from <http://www.nemba.org/trails/massachusetts/catamount-state-forest>.
- New England Mountain Bike Association. (2015). Charlemont Trails. Retrieved January 6, 2015, from <http://www.nemba.org/trails/massachusetts/charlemont-trails>.
- New England Mountain Bike Association. (2015). Erving State Forest. Retrieved January 6, 2015, from <http://www.nemba.org/trails/massachusetts/erving-state-forest>.
- New England Wildflower Society. (2015). Arbutus Sanctuary, Winchendon, MA. Retrieved January 7, 2015, from <http://www.newenglandwild.org/visit/sanctuaries/arbutus-sanctuary-winchendon-ma.html>.
- North Quabbin Woods. (2014-2015). Battle-Dorrance Memorial Forest. Retrieved December 31, 2014, from <http://www.northquabbinwoods.org/battle-dorrance.html>.
- North Quabbin Woods. (2014-2015). Bearsden Conservation Area. Retrieved December 31, 2014, from <http://www.northquabbinwoods.org/bearsden.html>.

- North Quabbin Woods. (2014-2015). Birch Hill Dam. Retrieved December 31, 2014, from http://www.northquabbinwoods.org/birch_hill_dam.html.
- North Quabbin Woods. (2014-2015). Bullard Farm Loop. Retrieved December 31, 2014, from http://www.northquabbinwoods.org/bullard_farm_loop.html.
- North Quabbin Woods. (2014-2015). Cass Meadow Wildlife Management Area. Retrieved January 6, 2015, from http://www.northquabbinwoods.org/cass_meadow.html.
- North Quabbin Woods. (2014-2015) Chase Memorial Forest. Retrieved December 31, 2014, from http://www.northquabbinwoods.org/chase_memorial.html.
- North Quabbin Woods. (2014-2015). Chestnut Hill Trail. Retrieved December 31, 2014, from http://www.northquabbinwoods.org/chestnut_hill_trail.html.
- North Quabbin Woods. (2014-2015). Fiske Pond. Retrieved December 31, 2014, from http://www.northquabbinwoods.org/fiske_pond.html.
- North Quabbin Woods. (2014-2015). Fish Brook Wildlife Management Area. Retrieved December 31, 2014, from http://www.northquabbinwoods.org/fish_brook.html.
- North Quabbin Woods. (2014-2015). Fittz Family Memorial Forest. Retrieved December 31, 2014, from http://www.northquabbinwoods.org/fittz_family.html.
- Singletracks. (2015). Amherst Trail. Retrieved January 5, 2015, from <http://www.singletracks.com/bike-trails/amherst-trail.html>.
- Singletracks. (2015). Charlemont Trails. Retrieved January, 2015, from <http://www.singletracks.com/bike-trails/charlemont-trails.html>.
- Singletracks. (2015). Covered Bridge. Retrieved January 6, 2015, from <http://www.singletracks.com/bike-trails/covered-bridge.html>.
- Singletracks. (2015). DAR. Retrieved January 6, 2015, from <http://www.singletracks.com/bike-trails/dar.html>.
- Singletracks. (2015). Earl's Trails. Retrieved January 6, 2015, from <http://www.singletracks.com/bike-trails/earls-trails.html>.
- The Trustees of Reservations. (2015). Bear Swamp. Retrieved January 5, 2015, from <http://www.thetrustees.org/places-to-visit/pioneer-valley/bear-swamp.html>.
- The Trustees of Reservations. (2015). Brooks Woodland Preserve. Retrieved January 5, 2015, from <http://www.thetrustees.org/places-to-visit/central-ma/brooks-woodland-preserve.html>.
- The Trustees of Reservations. (2015). Bullitt Reservation. Retrieved January 5, 2015, from <http://www.thetrustees.org/places-to-visit/pioneer-valley/bullitt-reservation.html>.
- The Trustees of Reservations. (2015). Chapel Brook. Retrieved January 5, 2015, from <http://www.thetrustees.org/places-to-visit/pioneer-valley/chapel-brook.html>.

Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)
STUDY NO. 3.6.7: RECREATION STUDY AT NORTHFIELD MOUNTAIN, INCLUDING ASSESSMENT OF
SUFFICIENCY OF TRAILS FOR SHARED USE

- The Trustees of Reservations. (2015). Doane's Falls. Retrieved January 5, 2015, from <http://www.thetrustees.org/places-to-visit/central-ma/doanes-falls.html>.
- The Trustees of Reservations. (2015). Elliot Laurel. Retrieved January 5, 2015, from <http://www.thetrustees.org/places-to-visit/central-ma/elliott-laurel.html>.
- Town of Athol. (2013). Bearsden Conservation Area. Retrieved December 31, 2014, from <http://www.athol-ma.gov/egov/apps/locations/facilities.egov?view=detail;id=7>.
- Town of South Hadley Massachusetts. (2015). Land Use and Management Plan. Retrieved January 6, 2015, from http://southhadleyma.virtualltownhall.net/Pages/SouthHadleyMA_Conservation/landuse
- Town of Wendell Massachusetts. (2002-2015). Fiske Pond. Retrieved January 5, 2015, from <http://www.wendellmass.us/index.php/fiske-pond.html>.
- Town of Winchendon Massachusetts. (2015). Area Attractions for the Winchendon area and beyond. Retrieved January 6, 2015, from <http://www.toytownweb.com/areaattractions.html>.
- United States Army Corps of Engineers (USACE). (2015). Birch Hill Dam. Retrieved January 5, 2015, from <http://www.nae.usace.army.mil/Missions/Recreation/BirchHillDam.aspx>.