# Relicensing Study 3.3.4

# EVALUATE UPSTREAM PASSAGE OF AMERICAN EEL AT THE TURNERS FALLS PROJECT

## Updated Study Report Summary

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

*Prepared for:*

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**SEPTEMBER 2015**

## 1.1 Study Summary

American eel are currently able to pass the Turners Falls Dam complex (as evidenced by documented presence of eels upstream), but the total number of eels attempting to pass Turners Falls and the proportion successfully passing the Turners Falls Project are unknown (letter from NOAA Fisheries, Comments on FirstLight Power Resources Notice of Intent to File License Application, February 27, 2013). The goal of this study is to identify and assess potential locations for upstream American eel passage at the Turners Falls Project. This study has two objectives:

- Identify concentrations of eels staging in pools or attempting to ascend wetted structures; and
- Assess whether eels can be passed in substantial numbers and whether sites are viable for permanent passage structures.

This is a two-year study, conducted in 2014 and 2015. In 2014, nighttime surveys were conducted to assess eel presence and abundance at the Turners Falls Project. The nighttime surveys were used to site the location of temporary eel ramps which were installed in July 2015 as discussed below.

*Consultation*: On February 21, 2014, the Federal Energy Regulatory Commission (FERC) issued its second Study Plan Determination Letter (SPDL), which approved the Revised Study Plan (RSP) 3.3.4 without modification. On September 15, 2014, as part of FirstLight's Initial Study Report (ISR) filing, it submitted its Interim Study Report summarizing the nighttime surveys and the proposed locations for the eel ramps to be installed in 2015. Stakeholder comments on the ISR filing were due November 14, 2014. On January 22, 2015, FERC issued its Determination on Requests for Study Modifications and New Studies. It approved the study with one modification—to check the traps more frequently during peak periods of migration.

On April 22, 2015, FirstLight emailed sketches of the eel traps to stakeholders and held a conference call on the following day to obtain concurrence on the eel trap locations. On May 7, 2015, FirstLight held an on-site meeting to finalize the temporary upstream eel ramps locations and layouts. Meeting minutes were circulated to stakeholders on June 8, 2015. Based on the site meeting, some changes were made to the ramps.

## 1.2 Study Progress Summary

Task 1: Systematic Surveys

A report summarizing the findings of the systematic surveys is included as Appendix A to this USR filing. This report was originally posted to the FirstLight website in March 2015.

Task 2: Trap Collections

In July 2015, temporary eel traps/passes were installed at Spillway Fishway, Cabot Fishway, and Cabot Emergency Spillway to collect eels moving upstream and to determine abundance of eel at each location. While traps at the Spillway and Cabot Fishways will be considered for locations for permanent eel passage structures, the trap at Cabot Emergency Spillway located below Emergency Gate 10 would be subject to washing out each time an emergency gate release occurred, and therefore, is not being considered as a permanent eel trap location.

Traps operate daily (24 hours per day) and are checked every two to three days or after rain events to quantify the catch. Recorded data include location, trapping interval, numbers of eels trapped, relative eel sizes, and hydraulic and environmental conditions during the trapping period.

The temporary traps/passes are constructed of ¾-in marine plywood and have ramp sections that are 24-in wide and 5-in tall and include a plywood cover to reduce predation. Although the RSP envisioned using 35-degree angles for the ramps, based on subsequent consultation with stakeholders and specifically eel expert Alex Haro, USGS, and site specific conditions, the Spillway fishway ramp was constructed at a 38-degree angle, the Cabot fishway ramp at a 40-degree angle and the Cabot Emergency Spillway ramp at a 34-degree angle at the top section and at a 43-degree angle at the bottom. Note that per the RSP, the ramps were to be designed at a 35-degree angle or less, thus this is a variance to the study plan. An attraction flow of approximately 0.3 liters per second is provided to the ramps with water pumped from the river. Each ramp is fitted with 1-inch Milieu-type substrate. As eels reach the end of the ramps, they drop into a 3-ft tall plastic holding tank where they remain until collection (Figure 1).

In addition to the temporary eel traps/passes described above, two Medusa traps were deployed at the Station No. 1 discharge in July 2015 to monitor for eels attempting to migrate up through Station No. 1. The traps consist of submerged 5 gallon buckets with ¾ inch holes drilled in them that contain mop heads and are designed to passively collect juvenile eels seeking refuge. The Medusa traps are being monitored on the same schedule and with the same data recording procedures as described above for the ramp-style traps/passes.

Eels collected from trap/pass will be transported to and released in the Turners Falls Impoundment.

Task 3: Data Analysis

Based on the trap monitoring, the bulk of eels are being captured at the Spillway Fishway. All field data will be compiled, entered into a database, assured for quality, and archived. Tabular and graphic summaries of eel abundance by location will be developed.

Task 4:

A final report will be completed by March 1, 2016.

**Figure 1. Temporary eel trap at Cabot Fishway.**

## 1.3 Variances from Study Plan and Schedule

Task 2 of the RSP indicated that temporary eel traps/passes would be installed and evaluated at the Cabot fishway attraction flow stilling basin, Spillway fishway attraction flow stilling basin and at Station No. 1 during the 2015 upstream eel migration period. Based on the findings from Task 1, and with concurrence from state and Federal agencies as well as other stakeholders (teleconference held on April 22, 2015; onsite meeting held on May 7, 2015), traps were not installed in these locations, but were installed in the nearby Cabot Fishway, Spillway Fishway, Cabot emergency spillway and Station No. 1 (medusa traps).

As noted above, although the RSP envisioned 35-degree angles for the ramps, based on subsequent consultation with stakeholders and site-specific analyses, the Spillway fishway ramp was constructed at a 38-degree angle, the Cabot fishway ramp at a 40-degree angle and the Cabot Emergency Spillway ramp at a 34-degree angle at the top section and at a 43-degree angle at the bottom.

## 1.4 Remaining Activities

- Continue monitoring temporary eel traps/passes through October 2015
- Data analysis
- Final Report

# Appendix A- Report Summarizing the Findings of Task 1

# Relicensing Study 3.3.4

# EVALUATE UPSTREAM PASSAGE OF AMERICAN EEL AT THE TURNERS FALLS PROJECT

## Study Report

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

*Prepared for:*

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GOMEZ AND SULLIVAN ENGINEERS

**MARCH 2015**

# EXECUTIVE SUMMARY

FirstLight Hydro Generating Company (FirstLight), a subsidiary of GDF SUEZ North America, Inc., is the current licensee of the Northfield Mountain Pumped Storage Project (Northfield Mountain Project, FERC No. 2485) and the Turners Falls Hydroelectric Project (Turners Falls Project, FERC No. 1889). FirstLight has initiated with the Federal Energy Regulatory Commission (FERC, the Commission) the process of relicensing the Northfield Mountain and Turners Falls Projects using the FERC's Integrated Licensing Process (ILP). The current licenses for the Northfield Mountain and Turners Falls Projects were issued on May 14, 1968 and May 5, 1980, respectively, with both set to expire on April 30, 2018. This report documents the results of Task 1 of Study No. 3.3.4 *Evaluate Upstream Passage of American Eel at the Tuners Falls Project*.

The Holyoke Hydroelectric Project (FERC No. 2004) is the first barrier to upstream eel migration on the Connecticut River. Between 2003 and 2013, the Holyoke Project passed approximately 100 to over 40,000 juvenile eel annually (Normandeau 2014). The 35-mile reach between the Holyoke and Turners Falls Projects contains American eel rearing habitat. American eel are currently able to pass the Turners Falls Dam complex and are known to ascend the Turners Falls fishways. However, the total number of eel attempting to migrate past the dam and the amount successfully passing the Turners Falls Project is unknown.

Per the Revised Study Plan (RSP), the study objectives were:

- to identify concentrations of eels staging in pools or attempt to ascend wetted structures; and
- to assess whether eels can be passed in substantial numbers and whether sites are viable for permanent passage structures.

FirstLight conducted a presence/absence study during the 2014 upstream eel migration season as envisioned for Task 1 of the study to identify and assess potential locations for upstream eel passage facilities at the Turners Falls Project. Eleven nighttime surveys were performed between June 11 and October 9, 2014. Field crews monitored several areas within the Turners Falls Project, including the Cabot Station discharge area and fishway, Station No. 1 discharge area, various canal discharge areas, the Turners Falls Dam and spillway fishway, and recorded the approximate number of eels, the date and time, eel behavior, and environmental conditions (i.e., weather, leakage, discharge).

FirstLight identified a primary location where eel congregated; the Turners Falls Spillway Fishway. This location accounted for 94%, of the 6,263 total eel observed during the study period. FirstLight is recommending installing a temporary trap at this site during 2015.

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| | |
|---|---|
| cfs | cubic feet per second |
| FERC | Federal Energy Regulatory Commission |
| FirstLight | FirstLight Hydro Generating Company |
| ILP | Integrated Licensing Process |
| PAD | Pre-Application Document |
| PSP | Proposed Study Plan |
| RSP | Revised Study Plan |
| SD1 | Scoping Document 1 |
| SD2 | Scoping Document 2 |
| SPDL | Study Plan Determination Letter |
| USGS | United States Geological Survey |
| VY | Vermont Yankee Nuclear Power Plant |

# 1 INTRODUCTION

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

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 (SD1) and preliminarily identified resource issues and concerns. On January 30 and 31, 2013, FERC held scoping meetings for the Northfield Mountain and Turners Falls Projects. FERC issued Scoping Document 2 (SD2) on April 15, 2013.

FirstLight filed its Proposed Study Plan (PSP) on April 15, 2013 and, per the Commission regulations, held a PSP meeting at the Northfield Visitors Center on May 14, 2013. Thereafter, FirstLight held ten resource-specific study plan meetings to allow for more detailed discussions on each PSP and on studies not being proposed. On June 28, 2013, FirstLight filed with the Commission an Updated PSP to reflect further changes to the PSP based on comments received at the meetings. On or before July 15, 2013, stakeholders filed written comments on the Updated PSP. FirstLight filed a Revised Study Plan (RSP) on August 14, 2013 with FERC addressing stakeholder comments.

On August 27, 2013 Entergy Corp. announced that the Vermont Yankee Nuclear Power Plant (VY), located on the downstream end of the Vernon Impoundment on the Connecticut River and upstream of the two Projects, will be closing no later than December 29, 2014. With the closure of VY, certain environmental baseline conditions will change during the relicensing study period. On September 13, 2013, FERC issued its first Study Plan Determination Letter (SPDL) in which many of the studies were approved or approved with FERC modification. However, due to the impending closure of VY, FERC did not act on 19 proposed or requested studies pertaining to aquatic resources. The SPDL for these 19 studies was deferred until after FERC held a technical meeting with stakeholders on November 25, 2013 regarding any necessary adjustments to the proposed and requested study designs and/or schedules due to the impending VY closure. FERC issued its second SPDL on the remaining 19 studies on February 21, 2014, approving the RSP with certain modifications.

## 1.1 Existing Information

The Holyoke Hydroelectric Project (FERC No. 2004) is the first barrier to upstream eel migration on the Connecticut River. Between 2003 and 2013, the Holyoke Project passed approximately 100 to over 40,000 juvenile eel each year (Normandeau 2014). There is eel rearing habitat in the 35 river mile reach between the Holyoke and Turners Falls Projects. American eel are currently able to pass the Turners Falls Dam complex and are known to ascend the Turners Falls fishways. However, the total number of eel attempting to migrate past the dam and the amount that successfully pass the Turners Falls Project is unknown.

## 1.2 Study Goals and Objectives

The evaluation of upstream passage of American eel at the Turners Falls Project will be conducted over the course of two years. The goal of the 2014 study was to identify and assess potential locations for upstream American eel passage at the Turners Falls Project and to determine the most suitable locations

for the installation of traps during the 2015 study. The overall objectives for the study for all study tasks are to:

- Identify concentrations of eels staging in pools or attempting to ascend wetted structures; and
- Assess whether eels can be passed in substantial numbers and whether sites are viable for permanent passage structures.

# 2 STUDY AREA AND SURVEY SITE SELECTION

Eel presence and abundance surveys were conducted at the following locations within the Turners Falls Project (Figure 2.0-1 and Figure 2.0-2):

- Cabot Station emergency spillway;
- Cabot fishway;
- Cabot log sluice;
- Cabot lower gate;
- United States Geological Survey (USGS) Conte Lab flume outfall ("Conte Discharge");
- Station No. 1 outfall;
- Small turbine and process water outfalls from the Cabot Canal ("Power Canal Outfalls");
- Spillway fishway attraction water stilling basin ("Spillway Water Stilling Basin");
- Spillway fishway and its lower pools ("Spillway Fishway"); and
- Turners Falls Dam and Tainter Gates ("Tainter Gates").

These locations were surveyed because they are areas where eel are likely to congregate or attempt to ascend project structures (i.e., wetted surfaces from leakage or spill, cracked concrete, bedrock).


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

Study 3.3.4

Evaluate Upstream Passage of American Eel at the Turners Falls Project

N

0 360 720 1,440 Feet

Figure 2.0-1 Approximate locations of nighttime eel surveys near Turners Falls Dam



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N

Study No. 3.3.4
Evaluate Upstream Passage of
American Eel at the Tuners Falls Project

0 150 300 600 Feet

Figure 2.0-2 Approximate locations of nighttime eel surveys near Cabot Station



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# 3 METHODS

FirstLight conducted nighttime surveys every one to two weeks beginning on June 11, 2014 and ending October 9, 2014 (Table 3.0-1) for a total of 11 surveys. The first survey occurred within one week of eel being observed at the Holyoke Hydroelectric Project. Surveys were conducted on foot, began at least 30 minutes after sunset, and lasted from 2.5 to 7 hours (Table 3.0-1). Surveys were performed following precipitation events when possible. During each survey, a field team of two biologists made visual observations of each site using headlights, flashlights, and binoculars and recorded the location, time and date, presence/absence of eel, estimated number of eel, eel behavior, and weather. Leakage and other physical conditions of potential migration pathways were recorded and photographed. The sites were monitored in random order during each survey in order to obtain a representative picture of eel presence and abundance at the various sites at different times throughout the night (i.e., soon after sunset, overnight).

The Cabot and Spillway Fishways were monitored from walkways along the top of the fishway walls. Leakage and attraction flow were provided at the fishways on survey nights. The Cabot Emergency Spillway was surveyed from the bridge above the spillway. The Tainter gates were surveyed from the platforms above the gates and crew members used a monocular (magnification 6x) to aid in observations. The remaining sites were surveyed on foot, from shore and/or wading.

Water temperature was collected using HOBO U20 Water Level Data Loggers equipped with temperature sensors. Five loggers were located throughout the upper bypass reach and sampled from June 10 to October 10, 2014. The average water temperature (combining data from all five loggers) on survey days is presented in Table 3.0-1.

**Table 3.0-1. Survey start and end dates and times and summary of environmental conditions during the 2014 upstream eel passage surveys.**

| Survey Number | Start Date | Start Time | End Date | End Time | Average Discharge during Survey[b] | Daily Average Water Temperature °C (°F ) | Weather Notes |
|---|---|---|---|---|---|---|---|
| 1 | 6/11/2014 | 20:55 | 6/12/2014 | 3:45 | 5,555 | 20.0 (68.0) | Cloudy, rain during day, humid |
| 2 | 6/26/2014 | 21:00 | 6/27/2014 | 0:30 | 30,864 | 22.5 (72.5) | Cloudy, rain in evening |
| 3 | 7/2/2014 | 20:55 | 7/3/2014 | 2:30 | 9,022 | 23.9 (75.0) | Thunderstorms, light rain |
| 4 | 7/10/2014 | 21:00 | 7/11/2014 | 2:30 | 16,361 | 24.4 (75.9) | Clear |
| 5[a] | 7/17/2014 | 21:00 | 7/18/2014 | 1:30 | 17,132 | 23.7 (74.7) | Clear |
| 5[a] | 7/21/2014 | 21:20 | 7/21/2014 | 22:30 | 14,417 | 23.6 (74.4) | Clear |
| 6 | 7/31/2014 | 20:35 | 7/31/2014 | 23:45 | 16,900 | 21.9 (71.4) | Partly cloudy |
| 7 | 8/7/2014 | 21:30 | 8/8/2014 | 0:30 | 10,342 | 23.3 (74.0) | Clear, afternoon rain showers |
| 8 | 8/21/2014 | 21:20 | 8/21/2014 | 23:50 | 9,232 | 22.0 (71.6) | Overcast, light rain |
| 9 | 9/4/2014 | 20:00 | 9/4/2014 | 23:00 | 11,072 | 24.1 (75.3) | Clear |
| 10 | 9/16/2014 | 20:15 | 9/16/2014 | 23:30 | 5,211 | 20.5 (69.0) | Partly cloudy, light rain in morning |
| 11 | 10/9/2014 | 19:00 | 10/9/2014 | 22:00 | 6,643 | 17.2 (63.0) | Full moon, clear and cool |

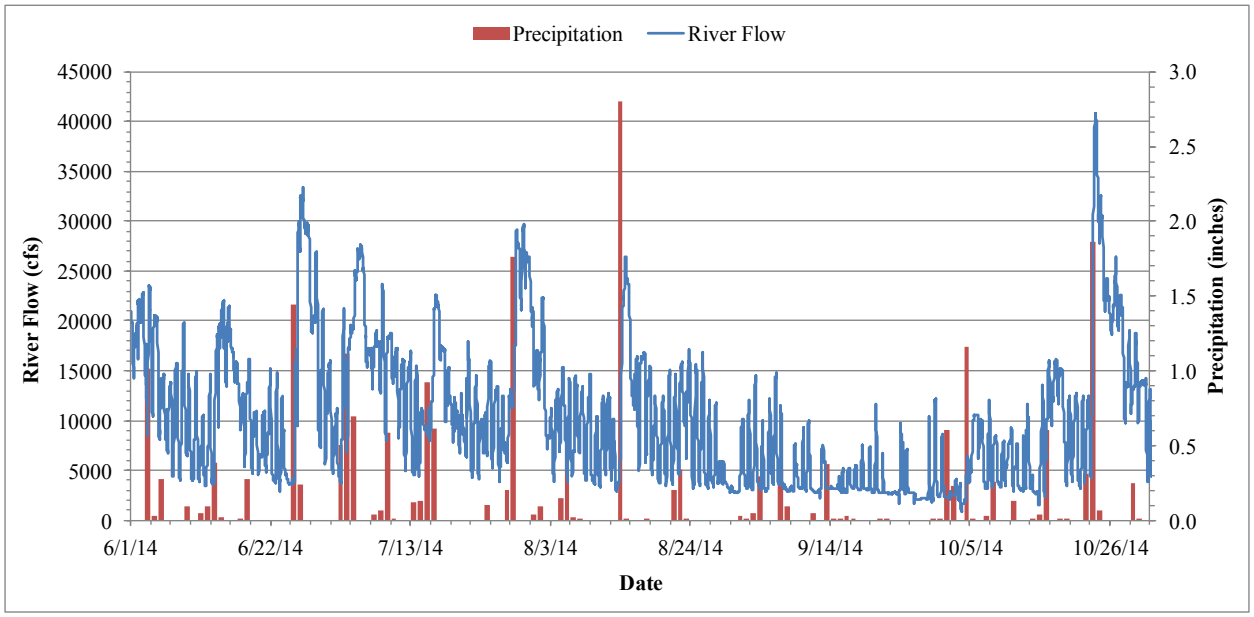
[a]The Turners Falls Fishway was not surveyed on July 17 but was the only site surveyed on July 21.
[b]Data from USGS Station Number 01170500 on the Connecticut River in Montague City, MA. Note that flows presented herein are an average of the 15 min flow data.

# 4 RESULTS

### *4.1.1 Environmental Conditions*

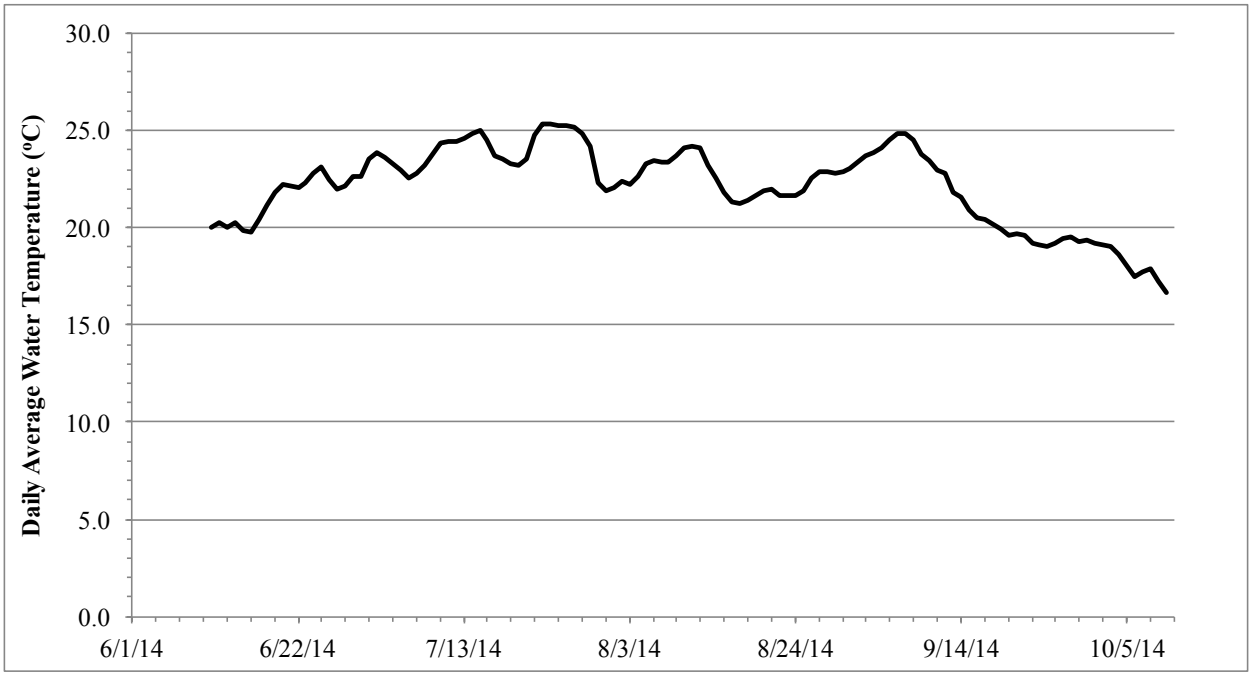
The river flow as measured at the USGS Gage on the Connecticut River at Montague throughout the study period (June 11 to October 9, 2014) ranged from 839 cfs on October 3 to 33,400 cfs on June 26, 2014 (Figure 4.1.1-1). River flow from the start of the study period until mid-August was variable as a result of spring runoff and rain events (Figure 4.1.1-1). River flow was lower and more uniform from late August to the end of the study period. Daily precipitation totals near Montague, MA ranged from 0 to 2.8 inches (Figure 4.1.1-1). Increases in river flow typically coincided with precipitation events of greater than 1.0 inch. The average daily water temperature in the bypass reach was 20.0°C (68.0°F) during the first survey (Table 3.0-1; Figure 4.1.1-2), increased to the maximum daily average temperature of 25.3°C (77.6°F) on July 25, and then decreased to 17.2°C (63.0°F) at the end of the study period.

**Figure 4.1.1-1. River flow[a] (cfs) and daily precipitation[b] (inches) from June to October 2014.**




[a]Data from USGS Station Number 01170500 (15-min interval) on the Connecticut River in Montague City, MA.
[b]Data from www.wunderground.com for Montague, MA.

**Figure 4.1.1-2. Daily average water temperature (°C) from June 11 to October 10, 2014 in the bypass reach of the Turners Falls Project.**




### *4.1.2 Eel Monitoring*

FirstLight observed approximately 6,263 eel during the eleven nighttime surveys in 2014 (Table 4.1.2-1). The first eel were encountered during the second survey on June 26. The highest concentrations of eel were observed at the Turners Falls Spillway Fishway (n=5,867) during July (Table 4.1.2-1 and Figure 4.1.2-1); most eel were observed on July 2, July 10, and July 17. Eel were documented climbing wetted areas on the upper gates, in pools, and in leakage flow (Photo 1).

At the Cabot Emergency Spillway, eel were primarily observed at the north end of the spillway and the northern-most gates (Photo 2). Eel congregated on wet surfaces at the edges of the main leakage flows. Eel were also observed climbing the emergency spill gates at the top of the spillway and the concrete walls near the gates. A limited number of eel (n=3 to 33) were documented at the Cabot Lower Gate (Photo 3), Cabot Fishway, Station No. 1, and the Turners Falls Spillway Water Stilling Basin (Table 4.1.2-1). No eel were observed at the Conte Discharge, any power canal outfalls, the Mill Hydro Discharge, the Paper Mill Discharge ("Power Canal Outfalls"), or the Tainter Gates during any survey. The estimated length of eel ranged from 200 to 300 mm (7.9 to 11.8 inches). Potential predators encountered during the surveys included a snapping turtle.

**Table 4.1.2-1. Estimated number of eel observed at each survey location during each survey and the total number of eel observed during the study period.**

| Station | 6/11 | 6/26 | 7/2 | 7/10 | 7/17 | 7/31 | 8/7 | 8/21 | 9/4 | 9/16 | 10/9 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cabot Lower Gate | 0 | 0 | 12 | 5 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | **33** |
| Cabot Emergency Spillway | 0 | 0 | 0 | 53 | 173 | 60 | 33 | 5 | 6 | 2 | 0 | **332** |
| Cabot Fishway | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **18** |
| Conte` Discharge | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Station No. 1 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | **3** |
| Mill Hydro Discharge[a] | 0 | 0 | 0 | 0 | 0 | - | - | - | - | - | - | **0** |
| Outfall 1[a] | 0 | 0 | 0 | 0 | 0 | - | - | - | - | - | - | **0** |
| Outfall 2[a] | 0 | 0 | 0 | 0 | 0 | - | - | - | - | - | - | **0** |
| Outfall 3[a] | 0 | 0 | 0 | 0 | 0 | - | - | - | - | - | - | **0** |
| Paper Mill Discharge[a] | 0 | 0 | 0 | 0 | 0 | - | - | - | - | - | - | **0** |
| Spillway Attraction Water Stilling Basin[b] | 0 | 0 | 0 | 6 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | **10** |
| Spillway Fishway[b] | 0 | 20 | 2,401 | 1,629 | 1,614 | 64 | 95 | 23 | 7 | 12 | 2 | **5,867** |
| Tainter Gates | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| **TOTAL** | **0** | **20** | **2,433** | **1,693** | **1,807** | **124** | **128** | **29** | **13** | **14** | **2** | **6,263** |

[a]Discontinued surveying these locations on July 31, 2014 because of a lack of eel and safety concerns.
[b]Surveyed on July 21, 2014.

**Figure 4.1.2-1. Estimated number of eel observed during the nighttime surveys.**

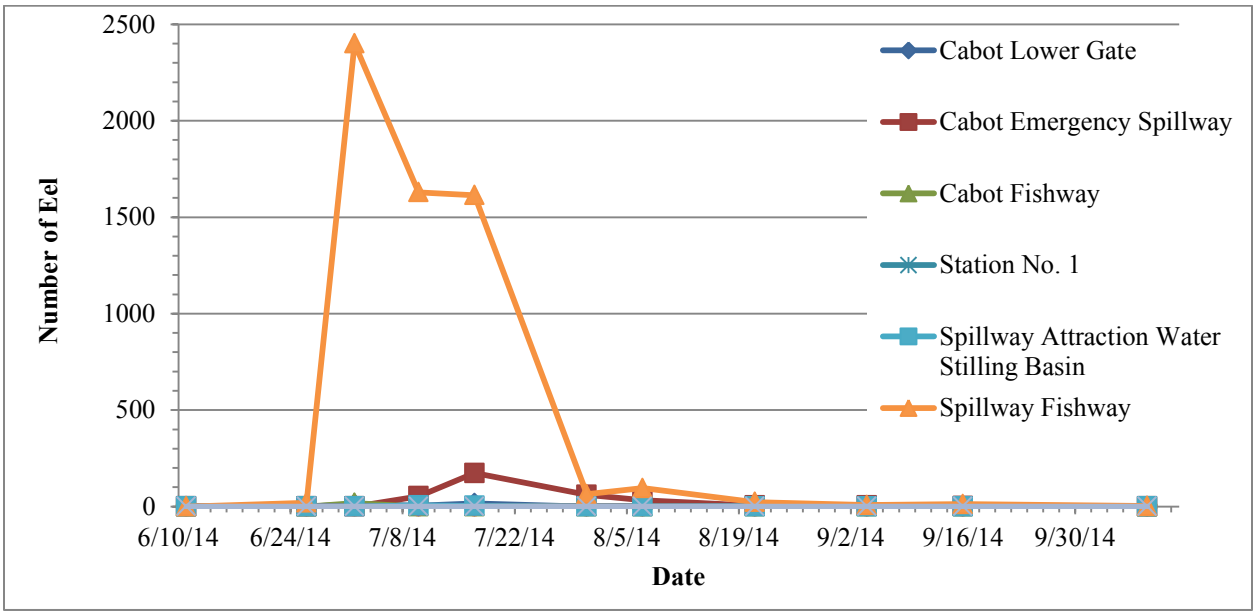


**Photo 1. Locations where eel were observed at the Cabot Emergency Spillway.**


**Photo 2. Eel congregating and climbing the upper gate at the Turners Falls Spillway Fishway**

**Photo 3. Discharge of the log sluice gate at Cabot Station.**

# 5 DISCUSSION

FirstLight documented approximately 6,263 juvenile American eel congregating and attempting to pass the Turners Falls Project during the 2014 upstream migration. FirstLight is recommending installing temporary traps in the Turners Falls Spillway Fishway during 2015. This location accounted for 94% of the 6,263 total eel observed during the study period. The traps will be designed and operated throughout the 2015 upstream eel migration season in accordance with the design specified in Study Plan No. 3.3.4 *Evaluate Upstream Passage of American Eel at the Turners Falls Project*. The contents of the traps will be checked every two to three days, more often after rain events, and more often during peak periods of migration, if the traps are full or overcrowded when checked. The collected eels will be counted and measured (length). All captured eels will be released into the Turners Falls Impoundment.

Surveys of the Cabot and Spillway fishways prior to July 2 were conducted while the fishways were in operation for upstream passage of anadromous fish, which made visual observations within the fishway ineffective. The 20 eels observed during the Spillway fishway survey on June 26, 2014 were located in leakage flows along the base of concrete retaining wall between the fishway and the power canal and not actually in the fishway itself. The fishways were dewatered on the morning of July 2, 2014. The 18 eels observed in the Cabot fishway during the July 2 survey were observed just hours after the fishway was dewatered. No further observations of eel were made at the Cabot fishway.

No eels were observed at the Cabot fishway in the 8 subsequent sampling events. This suggests that operational conditions at the fishway were more suitable for eel attraction than providing attraction flow and leakage only.

The June 11, June 26, July 2, August 7, and August 21 surveys followed or coincided with rain in the area. The high number of eel observed on July 2 coincided with precipitation and higher river flows. The July 10 and July 17 surveys followed rain events on July 9 and July 15-16, respectively. A low number of eel were observed during the August 21 survey which coincided with light rain. Low numbers of eel were observed along with low river flows and drier conditions during the late upstream passage season surveys in September and October.

The RSP provided that the areas identified as having eels present in sufficient numbers would be targeted as areas for assessment of the temporary traps in 2015. While the RSP anticipated trapping at the Cabot Stilling Basin, Station No. 1, and the Turners Falls Spillway Fishway in 2015, at a minimum, at the time it was believed that abundance of eel at these locations would be sufficient to warrant empirical evaluation by trapping. However, no eel were observed within the stilling basin and only three eel were observed in the Station No. 1 tailwater. Given the low recruitment to these two areas, further investigation is not warranted relative to the overall objective of assessing whether eels can be passed in substantial numbers and whether sites are viable for permanent passage structures. As such, all temporary traps will be placed in the Turners Falls Spillway Fishway in 2015, where 94% of the eel were observed in 2014.

# 6 LITERATURE CITED

Normandeau Associates, Inc. (2014.) Survey for Upstream American Eel Passage at Holyoke Dam, Connecticut River, Massachusetts, 2014. Final Report. March 1, 2014.