

# Relicensing Study 3.3.3

## EVALUATE DOWNSTREAM PASSAGE OF JUVENILE AMERICAN SHAD

### Initial Study Report Summary

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

*Prepared for:*



*Prepared by:*



SEPTEMBER 2014

## 1.1 Study Summary and Consultation Record to Date

The objective of this study is to obtain information to assess the effects of the Projects on downstream passage of juvenile American shad. The potential impact of project operations on juvenile shad outmigrants will be studied using a combination of approaches, including hydroacoustics, radio telemetry, and the use of HI-Z Turb'N tags (balloon tags). Hydroacoustics will be utilized to monitor the timing, duration, and magnitude of the juvenile shad migration at the forebay area of Cabot Station, downstream of the Gatehouse in the canal, and Northfield Mountain Project intake from August through October 2015. Radio telemetry techniques will be employed to assess downstream passage routes (i.e., past the Northfield Mountain Project, over the Turners Falls Dam, into the Turners Falls power canal, through Station No. 1 and Cabot Station powerhouses, and through the downstream fish bypass adjacent to Cabot Station) and occurrence of delays. Placement of the radio telemetry receivers and antennas will be tested prior to initiation of field studies to ensure that adequate and reliable data are collected. Finally, balloon tags will be used to empirically determine rates of survival for fish entrained through representative turbines at Station No. 1 (one of the larger turbines and the smaller turbine) and Cabot Station (one turbine- all turbines are identical), and for those that pass over the dam via the bascule gates and tainter gates. The turbine survival study will be conducted under near best efficiency conditions.

The radio telemetry and balloon tag components of the study will be conducted utilizing hatchery raised juvenile shad grown to at least 120 mm at the North Attleboro National Fish Hatchery under the care of the United States Fish and Wildlife Service (USFWS). As of August 9, 2014, USFWS reported that there is an abundance of shad growing in the hatchery tanks and pools, and a grab sample indicated a mean length of 47 mm, which represents a growth rate of approximately 1 mm per day.

As recommended by the Federal Energy Regulatory Commission (FERC) in its February 21, 2014 Study Plan Determination Letter (SPDL), a radio telemetry receiver and antenna will also be deployed in the Northfield Mountain Upper Reservoir to assess entrainment of tagged fish at the Northfield Mountain intake. Data collected from at this location will allow for a more accurate determination of entrainment and complement hydroacoustic and telemetry data collected at the intake/tailrace.

As requested by FERC, fieldwork will be conducted in 2015 following decommissioning of the Vermont Yankee Nuclear Power Plant located upstream of the Northfield Mountain Project.

In FERC's SPDL it states *"To ensure data collected through the turbine juvenile shad survival study are representative of typical turbine operating conditions during the juvenile shad outmigration season, we recommend that FirstLight consult with the FWS, MADFW, and the NMFS and establish the typical operating condition of each test turbine evaluated during the juvenile shad out-migration season. FirstLight should make recommendations regarding how these operating conditions would be incorporated into the study and file them for Commission approval with the Initial Study Report in September 2014. FirstLight should consider comments received, and if recommendations are not adopted, the filing should provide FirstLight's reasons based on project-specific information."*

On September 3, 2014 ([Appendix A](#)) FirstLight sent consultation correspondence to the agencies and stakeholders describing best efficiency conditions and verified that the Cabot units and Station No. 1 units are typically operated at or near best efficiency.

On September 4, 2014 ([Appendix A](#)) National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service (USFWS) and Trout Unlimited (TU) replied and requested graphical depiction of the past 5 years of operational data during the study period (August 15 through October). Data was requested in MW and cfs.

## 1.2 Study Progress Summary

### Task 1: Evaluation of Timing, Duration and Magnitude of Migration

In order to optimize the split beam transducers spatial coverage of the targeted areas, field testing was preliminarily performed in August 2014.

### Task 2: Evaluate Route of Passage

Field testing of the telemetry monitoring locations was performed on July 15 and 16, 2014. The objective of the preliminary evaluations was to confirm the feasibility of using radiotelemetry methods to monitor locations identified in the Revised Study Plan (RSP). The evaluations included those proposed monitoring locations that span large distances (i.e., wide sections of the river) to ensure that the proposed telemetry gear will detect tagged fish as they migrate through those areas. The range testing was conducted using a Lotek SRX 400 receiver and 4-element yagi antenna and a test tag with the following parameters:

- Frequency 149.320
- Width - 12mm
- Length - 40mm
- Mass - 8g
- Apparent mass in water - 3.5g

The test tag was deployed using a fishing pole and float to set the depth of the tag at approximately 5 ft. Water quality data were collected at the time of the testing including temperature, dissolved oxygen (DO), pH and conductivity. Conductivity in particular affects the radio signal transmitted by the tag and will affect the range of the monitoring system. The conductivity of the Connecticut River was 139  $\mu\text{S/L}$  at the time of testing (July 15, 2014) and 88  $\mu\text{S/L}$  within the Deerfield confluence (July 16, 2014).

Range testing was conducted at the following locations:

- Shearer Farms (RM 127.5),
- Northfield Mountain Project Intake (RM 127),
- Northfield Mountain Project Gill Bank (RM 126.5),
- Turners Falls Impoundment (RM 122),
- Station No. 1 Tailrace (RM 121),
- Rawson Island (RM 120.5),
- Cabot Station Tailrace (RM 120)
- Deerfield River Confluence (RM 119.5), and
- Montague Wastewater (RM 119.5)

The analysis of the range testing is ongoing but a preliminary review revealed that the monitoring stations as proposed in the RSP will be adequate to monitor fish movement through the study area, with one exception. An additional monitoring station at the Shearer Farms location will be necessary to monitor the full width of the river. This location will be monitored with two Lotek SRX 400 receivers and yagi antennas.

Though the monitoring location proposed at the Red Cliffe Canoe Club (RM 86.5, upstream of Holyoke Dam) was not tested in the evaluation, given the width of the river at the location (~1200 ft), it is anticipated that an additional receiver station, one on each side of the river, may be required to monitor the full width of the river. This area will be monitored using two Lotek SRX 400 receivers and yagi antennas.

Radio noise information is being collected in 2014 at Cabot Station to help determine which frequencies are best suited for use in the study. The frequencies used in the study (between 148 and 152 Mhz) will be selected to avoid high-noise frequencies, and to coordinate with the TransCanada studies. Noise data collection is ongoing and analysis of the data will be completed prior to purchasing tags.

Task 3: Turbine and Dam Passage Survival

FirstLight has confirmed that near best efficiency conditions are representative of typical operating conditions during the juvenile shad outmigration season (mid-August-October). Turbine conditions on the dates of testing will be recorded and included in the Final Study Report.

Task 4: Reporting

A final report will be completed in March 2016 per FERC's SPDL.

**1.3 Variances from Study Plan and Schedule**

To date, there are no variances from the RSP.

**1.4 Remaining Activities**

- Conduct field studies in 2015.

# **Appendix A**

## **Consultation Record**

## Consultation Correspondence

### Appendix A

September 3, 2014

To: John Warner, Melissa Grader, Ken Sprankle, William McDavitt, Jessica Pruden, Don Pugh, Andrea Donlon, Katie Kennedy, Ken Hogan, Mark Wamser, John Howard, Robert Stira

From: Chris Tomichek

Subject: Operational Conditions During Turbine Survival Testing

Study Plans 3.3.3, *Evaluate Downstream Passage of Juvenile American Shad* and 3.3.5 *Evaluate Downstream Passage of American Eels* both include turbine survival testing. FirstLight proposed to conduct this study “at or near best efficiency conditions.” FERC’s February 21, 2014 Study Plan Determination Letter points out that FirstLight did not indicate that this is the typical operational scenario for the turbines during the outmigration season (August 15 through October). FERC indicated to ensure data collected through the turbine juvenile shad/adult eel survival study are representative of typical turbine operating conditions during the outmigration that FirstLight consult with the FWS, MADFW, and the NMFS and establish the typical operating condition of each test turbine evaluated during the out-migration season. FERC required FirstLight to provide the results of the consultation and file them for FERC approval with its Initial Study Report on September 15, 2014.

FirstLight typically runs the Cabot units (all 6 units are identical) at an output of 10.3 Mw. There are some exceptions when units could be run at less than 10.3 Mw, but they are uncommon. One exception would be at times of low river flow just before the minimum flow releases are switched to Station No. 1. At times like this, operators may decide to run one unit at Cabot at less than 10.3 Mw rather than put No. 1 units online, depending on other factors.

At No.1 Station, the units are run either fully on or off. At times when available flow exceeds Cabot’s capacity, if the units at No. 1 are run, they are run at full output. Individual units are not run at intermediate outputs. Individual units may be turned off at extremely low river flow, when inflow to the Turners Project is less than the required minimum flow.

This email is to confirm that FirstLight typically operates their Units at or near best efficiency conditions. We would greatly appreciate your feedback by September 9, 2014. Please let me know if you have any comments or questions.

September, 4, 2014

To: John Warner, Melissa Grader, Ken Sprankle, Jessica Pruden, Don Pugh, Andrea Donlon, Katie Kennedy, Ken Hogan, Mark Wamser, John Howard, Robert Stira, Chris Tomichek

From William McDavitt

Subject: Re: Operational Conditions During Turbine Survival Testing

Chris,

It would be good to present "typical turbine operating conditions" during the outmigration season with some graphs and a narrative and then some sort of graphical depiction and narrative of the operating conditions during the study would be quite helpful. Being able to understand the operating conditions during the study and how far off of 'typical' these conditions are is information that I would find helpful in my evaluation. Being able to discern bias in the results, positively or negatively, is information that I think would be helpful for all stakeholders.

-Bill

September, 4, 2014

To: John Warner, William McDavitt, Ken Sprankle, Jessica Pruden, Don Pugh, Andrea Donlon, Katie Kennedy, Ken Hogan, Mark Wamser, John Howard, Robert Stira, Chris Tomichek

From Melissa Grader

Subject: Re: Operational Conditions During Turbine Survival Testing

To be a little more specific, we would either like to have actual operational data for Cabot Station for the past 5 years (hourly) for the outmigration season (Aug. through November) so that we can evaluate how often the station is operating at 10.3 MW versus other generation levels - or, if you want to crunch the numbers, then just provide us with graphical representations of those data.

This would be to better understand what you mean by "typically."

Thanks!

September, 4, 2014

To: John Warner, William McDavitt, Ken Sprankle, Jessica Pruden, Melissa Grader, Andrea Donlon, Katie Kennedy, Ken Hogan, Mark Wamser, John Howard, Robert Stira, Chris Tomichek

From Don Pugh

Subject: Re: Operational Conditions During Turbine Survival Testing

Data in cfs and MW, please.