

Relicensing Study 3.3.7

FISH ENTRAINMENT AND TURBINE PASSAGE MORTALITY STUDY

Initial Study Report Summary

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

Prepared for:



Prepared by:



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1.1 Study Summary

The purpose of this study is to assess fish entrainment and turbine mortality at the Turners Falls and Northfield Mountain Projects. This study will include both qualitative and quantitative approaches to characterize the risk of impingement and turbine entrainment and mortality of fish species in the vicinity of the Projects. The qualitative approach will utilize a desktop analysis to assess the potential for turbine entrainment and mortality and impingement of resident species, which will be based on the results of Study No. 3.3.11 (Fish Assemblage Assessment- slated for 2015). Entrainment and turbine mortality will be quantitatively estimated for juvenile and adult American shad and adult American eel based on data collected in hydroacoustic and radio telemetry monitoring that will be conducted as part of Study Nos. 3.3.2, 3.3.3, and 3.3.5.

This study will be initiated in 2015 as the Federal Energy Regulatory Commission (FERC) requested a one-year delay in schedule due to the timing of the decommissioning of the Vermont Yankee Nuclear Power Plant located upstream of the Turners Falls and Northfield Mountain Projects. Results from the Fish Assemblage Assessment (Study No. 3.3.11) will be necessary to complete the desktop analyses for resident species, and results from the hydroacoustic and radio telemetry monitoring of juvenile and adult American shad and adult American eel will be necessary to complete Tasks 2 and 3 herein.

In FERC's February 21, 2014 Study Plan Determination Letter it states "*We recommend that FirstLight consult with FWS, NMFS, MADFW, and the Watershed Council after the 2014 results of the Evaluate Downstream Passage of Juvenile American Shad study (study 3.3.3) are available to assess the need for a second year study to further evaluate American shad egg and larval (or juvenile) entrainment at the Northfield Mountain Project.*" Given that FirstLight is required to submit a study plan to evaluate ichthyoplankton entrainment at the Northfield Mountain Pumped Storage Project (resulting from the United States Fish and Wildlife Service study dispute); it is assumed that this recommendation is not necessary as FirstLight is currently consulting with the stakeholders to finalize a study plan.

1.2 Study Progress Summary

Task 1: Qualitative Assessment of Entrainment and Impingement

A preliminary assessment of entrainment risk was performed for resident species documented in the Turners Falls Impoundment by the Massachusetts Department of Fish and Game between 1971 and 1975 (MDF&G 1978) and the Midwest Biodiversity Institute in 2008 (Yoder et al. 2010). A Traits Based Assessment was performed to qualitatively assess the potential risk of entrainment/impingement for species based on habitat preference, life history strategies, behavior, morphology and demography. Based on these factors, species and lifestages of resident fishes were indexed across a range from the most to least prone to entrainment. For the susceptible species, the assessment assumed that the degree to which individuals become entrained depends on their physical swimming abilities, such that if the darting speed is greater than the intake velocity, the fish would escape entrainment; and conversely, if the darting speed is less than the intake velocity, then the fish is at risk for being entrained. For impingement, body lengths and widths of species in the area of the intakes were assessed to determine which fish would likely be physically excluded by the bar rack spacing at each intake structure and if these species would be able to overcome the influence of the intake velocity.

Preliminary results indicate that most of the common resident fish are unlikely to be in the area of the intakes due to their habitat preferences, and therefore, unlikely to be entrained or impinged. Two species, walleye and fallfish, prefer habitat that is found in front of the Northfield Mountain Project intake/tailrace and may be more susceptible to entrainment or impingement depending on length. Most of the common resident fish are likely to sustain their populations even if individuals of the population are entrained

because with the exception of largemouth bass, white suckers, walleye, white perch, and fallfish can double their numbers every 1.4 to 4.4 years (species summaries accessed at www.fishbase.org, 2012) and are not isolated populations due to the presence of upstream and downstream fish passage facilities.

Task 2: Quantification of Shad and Eel Entrainment

A preliminary desktop analysis of the potential for entrainment was performed for juvenile and adult American shad and adult American eel similar to the method described above for resident species. As these species are diadromous, the potential for entrainment is restricted to the seasons when they may be present in the vicinity of the Northfield Mountain Project intake/tailrace. The quantification of entrainment rates will be refined once results from Study Nos. 3.3.2, 3.3.3, and 3.3.5 are available.

Task 3: Estimation of Turbine Mortality Rate

A preliminary assessment of turbine mortality was performed for species susceptible to entrainment based on a turbine strike model and the consideration of fish lengths, turbine specifications, and station hydraulics. This preliminary assessment was performed using available literature; however, site-specific data collected during Study Nos. 3.3.2, 3.3.3, and 3.3.5 will be utilized to more accurately predict fish losses due to entrainment and turbine mortality.

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 have been no variances.

1.4 Remaining Activities

- Continue desktop analysis and incorporate species identified during the Fish Assemblage Assessment that will be conducted in 2015.
- Estimate turbine entrainment and mortality once data from the hydroacoustic and radio telemetry monitoring of juvenile and adult American shad and adult American eel are available in 2015.
- File Final Study Report.