

FEDERAL ENERGY REGULATORY COMMISSION

Washington, DC 20426

June 29, 2016

OFFICE OF ENERGY PROJECTS

Project No. 2485-071 – Massachusetts
Project No. 1889-085 – Massachusetts
FirstLight Hydro Generating Company

Gus Bakas
Director – Massachusetts Hydro
FirstLight Hydro Generating Company
Northfield Mountain Station
99 Millers Falls Road
Northfield, MA 01360

**Subject: Determination on Requests for Study Modifications and New Studies –
Turners Falls Hydroelectric Project and Northfield Mountain Pumped Storage
Project**

Dear Mr. Bakas:

Pursuant to 18 C.F.R. § 5.15 of the Commission's regulations, this letter contains the determination on requests for modifications to the approved study plan for the relicensing of FirstLight Hydro Generating Company's (FirstLight) Turners Falls Hydroelectric Project (Turners Falls Project) and Northfield Mountain Pumped Storage Project (Northfield Mountain Project). The determination is based on the study criteria set forth in sections 5.9(b), 5.15(d) and (e) of the Commission's regulations, applicable law, Commission policy and practice, and staff's review of the record of information.

Background

The study plan determination on non-aquatic studies for the projects as proposed by FirstLight was issued on September 13, 2013. A subsequent study plan determination was issued on February 21, 2014, to address the proposed aquatic studies. FirstLight filed study reports for ongoing and finalized studies on September 16, 2014, and September 14, 2015, and Commission staff issued determinations on requested study modifications and new studies associated with these study reports on January 22, 2015, and January 15, 2016, respectively. On March 1 and 2, 2016, FirstLight filed a study

report addressing 13 finalized studies¹ and 14 ongoing studies. As required in section 5.15 of the Commission's regulations, the study report describes FirstLight's progress in implementing the approved study plan, and an explanation of variances from the study plan and schedule. FirstLight held a study report meeting on March 16, 2016, and filed a meeting summary on March 31, 2016.

Comments

Comments on the study report and meeting summaries, including requests for study modifications, were filed by: the U.S. Fish and Wildlife Service (FWS), the National Marine Fisheries Service (NMFS), the Massachusetts Division of Fisheries and Wildlife (Massachusetts DFW), the Nature Conservancy (TNC), the Connecticut River Watershed Council (CRWC), and Karl Meyer. FirstLight filed reply comments on May 31, 2016.

A number of the comments received do not specifically request modifications to the approved studies, and are therefore not addressed herein. For example, some of the comments address the presentation of data; request additional analysis of existing available data; provide additional information; recommend protection, mitigation, and enhancement measures; address ongoing and future consultation; request information that was included in the study report; request information that FirstLight subsequently provided in its reply comments or agreed to provide in future addendums or reports;² or request additional information collection that is contingent upon the results of ongoing studies. In addition to the items listed above, this determination does not address requests for study modifications or additional studies that have been addressed in previous Commission letters. This determination only addresses new comments and requests that would require study modifications or additional studies.

Study Plan Determination

Pursuant to section 5.15(d) of the Commission's regulations, any proposal to modify a required study must be accompanied by a showing of good cause, and must

¹ The finalized studies include studies 3.2.1, 3.3.4, 3.3.6, 3.3.8, 3.3.9, 3.3.10, 3.3.11, 3.3.12, 3.3.20, 3.4.1, 3.5.1, 3.6.1, and 3.6.5. FirstLight also filed addendums to studies 3.3.2 and 3.3.18.

² In its reply comments filed on May 31, 2016, FirstLight states that it will conduct additional fieldwork for studies 3.3.10, 3.3.20, and 3.5.1. In addition, FirstLight states that it will file addendums to studies 3.3.8 and 3.5.1 on October 14, 2016, and supplemental reports for studies 3.3.10 and 3.3.20 on (or before) December 31, 2016.

include a demonstration that: (1) the approved study was not conducted as provided for in the approved study plan, or (2) the study was conducted under anomalous environmental conditions or that environmental conditions have changed in a material way. As specified in section 5.15(e), requests for new information gathering or studies must include a statement explaining: (1) any material change in law or regulations applicable to the information request, (2) why the goals and objectives of the approved study could not be met with the approved study methodology, (3) why the request was not made earlier, (4) significant changes in the project proposal or that significant new information material to the study objectives has become available, and (5) why the new study request satisfies the study criteria in section 5.9(b).

As indicated in Appendix A, modifications to five studies are approved (3.3.6, 3.3.8, 3.3.9, 3.3.20, and 3.5.1) and the new study on the provision of data regarding entrainment of shad eggs, larvae, juvenile shad, and American eels is not approved. The specific modifications to the studies and the bases for modifying or not modifying the study plan are explained in Appendices B (Requested Modifications to Approved Studies) and C (Requested New Studies). Commission staff considered all study plan criteria in section 5.9 of the Commission's regulations.

Please note that nothing in this determination is intended, in any way, to limit any agency's proper exercise of its independent statutory authority to require additional studies.

If you have any questions, please contact Brandon Cherry at (202) 502-8328, or via e-mail at brandon.cherry@ferc.gov.

Sincerely,

Ann F. Miles
Director
Office of Energy Projects

Enclosures: Appendix A – Summary of Determinations on Requested Modifications to Approved Studies and New Studies
Appendix B – Staff's Recommendations on Requested Modifications to Approved Studies
Appendix C – Staff's Recommendations on Requested New Studies

cc: Mailing List, Public Files

APPENDIX A

SUMMARY OF DETERMINATIONS ON REQUESTED: MODIFICATIONS TO APPROVED STUDIES AND NEW STUDIES

Requested Modifications to Approved Studies (see Appendix B for discussion)

Study	Recommending Entity	Adopted	Adopted in part	Not Adopted
3.3.6 – Impact of Project Operations on Shad Spawning, Spawning Habitat, and Egg Deposition in the Area of the Northfield Mountain and Turners Falls Projects	FWS, NMFS, Massachusetts DFW, TNC, CRWC, Karl Meyer			X ¹
3.3.8 – Computational Fluid Dynamics Modeling in the Vicinity of the Fishway Entrances and Powerhouse Forebays	NMFS		X	
3.3.9 – Two-Dimensional Modeling of the Northfield Mountain Pumped Storage Project Intake/Tailrace Channel and Connecticut River Upstream and Downstream of the Intake/Tailrace	NMFS		X	
3.3.20 – Ichthyoplankton Entrainment Assessment at the Northfield Mountain Project	FWS, NMFS, TNC, CRWC		X	
3.5.1 – Baseline Inventory of Wetland, Riparian, and Littoral Habitat in the Turners Falls Impoundment, and Assessment of Operational Impacts on Special-Status Species	Massachusetts DFW, TNC	X		

¹Appendix B includes staff-recommended modifications to the study.

Requested New Studies (see Appendix C for discussion)

Study	Recommending Entity	Approved	Approved with Modifications	Not Required
Provision of Data Regarding Entrainment of Shad Eggs, Larvae, Juvenile Shad, and American Eels	CRWC			X

APPENDIX B

STAFF'S RECOMMENDATIONS ON REQUESTED MODIFICATIONS TO APPROVED STUDIES

Study 3.3.6 – Impact of Project Operations on Shad Spawning, Spawning Habitat, and Egg Deposition in the Area of the Northfield Mountain and Turners Falls Projects

Background

The objectives of study 3.3.6 included: (1) documenting American shad spawning locations in the Turners Falls impoundment, bypassed reach, power canal, and downstream of Cabot Station; and (2) evaluating the effect of changing the number of turbines operating at Cabot Station on downstream shad spawning activity. To determine how project operation varies during the shad spawning season, FirstLight analyzed five years of project operation data from May 1 to June 30 during evening and nighttime hours (i.e., 8 p.m. to 2 a.m.), which coincides with the shad spawning period. This analysis indicated that 84 percent of the changes in operation consisted of increasing or decreasing generation by one or two turbines, which would alter river discharge by 2,288 cubic feet per second (cfs) and 4,576 cfs, respectively. To identify spawning locations, FirstLight conducted splash count surveys in the study area during Phase 1 of the study.³ During Phase 2, FirstLight monitored several spawning locations downstream of Cabot Station that were identified during Phase 1 and recorded splash counts over a 15-minute interval (before count). FirstLight then increased or decreased generation at Cabot Station by 1 or 2 turbines, waited approximately 30 to 90 minutes for the resulting flows to stabilize, and recorded splash counts over another 15-minute interval (after count). FirstLight did not find a significant difference between the before and after counts; however, FirstLight reported that splash counts decreased as Cabot Station discharge and time after sunset increased.⁴

³ American shad frequently spawn near the surface during the evening. Ross et al. (1993) counted the number of splashes occurring during a 5-minute interval as an index of spawning activity. The number of splashes is not an exact measure of spawning activity because some spawning may occur below the surface.

⁴ FirstLight suggests that some of the results be interpreted with caution because splash counts recorded closer together in time were more similar than those recorded farther apart in time (i.e., the splash count observations were autocorrelated). This suggests that the splash count observations were not statistically independent, which is a requirement for a regression analysis.

Requested Study Modifications

The U.S. Fish and Wildlife Service (FWS), the National Marine Fisheries Service (NMFS), the Massachusetts Division of Fisheries and Wildlife (DFW), the Connecticut River Watershed Council (CRWC), and Karl Meyer state that the study failed to meet its objectives because FirstLight did not wait long enough for river discharge to reflect the change in operation during Phase 2 of the study. In the 13 instances when the number of operating turbines changed, the after counts were collected before river discharge reflected the expected change (i.e., either 2,288 or 4,576 cfs). Several of the commenters point out that in 6 of the 13 instances where generation was changed, the changes to river discharge were the opposite of what would be expected (i.e., river discharge decreased after an increase in generation or vice versa). In addition, FWS, NMFS, Massachusetts DFW, and the Nature Conservancy (TNC) express concerns with how data analyses were conducted. CRWC and Karl Meyer state that the results of the study are inadequate for evaluating the effects of project operation on shad spawning activity and request that FirstLight repeat Phase 2 of the study. FWS and Massachusetts DFW indicate that ongoing study 3.3.1 may provide the information necessary to evaluate the effects of project operation on shad spawning habitat;⁵ therefore, they are not requesting that FirstLight repeat Phase 2 of study 3.3.6 at this time.

Comments on Requested Study Modifications

In its reply comments, FirstLight states that it conducted the study as required by the Commission's study determination letter. FirstLight also provided additional analyses indicating that splash counts generally decreased after project operation was changed. However, based on the additional analyses, FirstLight states that the decrease in spawning activity is more related to the length of time after sunset than the changes in project operation.

Discussion and Staff Recommendation

River discharge during the before and after counts ranged from 8,000 to 20,000 cfs; therefore, a change in generation of one or two turbines should have resulted in an approximately 20 to 30 percent change in discharge.⁶ However, during the study discharge changed by less than 7 percent during 10 of the 12 events that could have

⁵ Study 3.3.1 is an instream flow study that is designed to provide information about how project operation affects the suitability of shad spawning habitat.

⁶ See Table 4.3-1A in FirstLight's response to comments letter.

resulted in changes in discharge.⁷ In addition, FirstLight only collected data on two occasions when river discharge was the same during the before and after counts (i.e., control tests). The results of the study provide some anecdotal information about shad spawning behavior. However, because river discharge did not change as much as would be expected during tests of the effects of project operation and there were not enough control tests, it is not possible to determine what factors (i.e., changes in project operation or the amount of time after sunset) resulted in the documented changes in shad spawning activity.

Repeating Phase 2 of the study could provide more definitive results if the timing of changes to project operation is shifted early enough to result in significant flow changes during the after counts and if the number of control tests is significantly increased. However, ongoing study 3.3.1 will provide information about the physical characteristics of shad spawning habitat, and this information may be adequate to determine the likely effects of changes in project operation on shad spawning and obviate the need for repeating Phase 2 of study 3.3.6.

In addition to the information that will be provided by study 3.3.1, conducting a more detailed analysis of historical project operation data during the shad spawning period may be useful for evaluating the potential for project operation to affect shad spawning. Therefore, Commission staff recommends that FirstLight expand the operation analysis presented in section 4.1 of study 3.3.6 to include additional years (i.e., 2005-2009), operation of Station No. 1, and figures showing the temporal patterns in operational changes during the shad spawning period.⁸ In addition, FirstLight should provide the raw project operation data from 8 p.m. to 2 a.m. for May 1 to June 30 during each of the years from 2005 to 2015. This additional analysis will allow staff and stakeholders to determine when changes in project operation occur relative to peak spawning. This analysis would require minimal additional cost (section 5.9(b)(7)) and would provide information needed for staff's environmental analysis (section 5.9(b)(5)). FirstLight should file this information as an addendum to the study report by October 14,

⁷ One of the 13 times that FirstLight changed project operation occurred when river discharge exceeded project capacity; therefore, river discharge was unaffected by the change in project operation during this event.

⁸ For each individual year, FirstLight should prepare a histogram plotting the change in total project discharge (i.e., maximum discharge minus minimum discharge) between 8 p.m. and 2 a.m. against the date (i.e., May 1 to June 30). For all years pooled, FirstLight should prepare a histogram plotting the mean change in project discharge between 8 p.m. and 2 a.m. against the date (i.e., May 1 to June 30). FirstLight should also prepare similar histograms plotting percent change in discharge against the date for individual and pooled years.

2016. Because study 3.3.1 and the additional operational analysis may adequately describe the potential effects of the project on shad spawning, we do not recommend requiring FirstLight to repeat Phase 2 of study 3.3.6 at this time.

3.3.8 – Computational Fluid Dynamics Modeling in the Vicinity of the Fishway Entrances and Powerhouse Forebays

Background

The goal of study 3.3.8 was to evaluate flow field conditions (i.e., depth and velocity) in the vicinity of the fishway entrances and the powerhouse forebays and intakes at the Turners Falls Project. This information can be used to determine the effects of project operation on upstream and downstream fish passage effectiveness, including fish entrainment and impingement during downstream passage. The approved study plan required the development of separate three-dimensional (3-D) Computational Fluid Dynamics models for six locations, including the: (1) Station No. 1 forebay, (2) Station No. 1 intake rack, (3) Cabot Station forebay, (4) Cabot Station intake rack, (5) Cabot Station fishway entrance, and (6) Turner Falls dam spillway fishway entrance. However, during the study, the intake and forebay at each location were combined in a single model to reduce complexity and computation time, resulting in a total of four separate models which are referenced in the study report as: (1) Station No. 1 forebay and powerhouse entrance, (2) Cabot forebay and powerhouse entrance, (3) Cabot ladder entrance, and (4) Spillway ladder entrance. Key tasks of the study included conducting a bathymetric survey of each study area, compiling input datasets for each model, and calibrating and verifying the results of each model. The study also included developing and modeling alternative operational scenarios in consultation with stakeholders.

Model Verification

Requested Study Modifications

NMFS requests that FirstLight collect additional field data using an Acoustic Doppler Current Profiler to better verify the models describing the Station No. 1 forebay and powerhouse entrance, Cabot forebay and powerhouse entrance, and Cabot ladder entrance over a range of flow conditions instead of the single-flow scenario used to verify the models.⁹ NMFS also requests that FirstLight verify the Cabot Station forebay model with data collected during periods when water is being released from all discharge locations (i.e., releases through the powerhouse, existing fish weir, log boom emergency

⁹ NMFS states that no additional data is needed for the Spillway ladder entrance model given the difficulty in modeling high turbulent flow from the spillway and collecting field data at this location.

gate, and attraction flow emergency gate) instead of verifying the model during releases from only the powerhouse.

Comments on Requested Study Modifications

In its reply comments, FirstLight states that a single verification run was conducted for each model at a mid-range flow (i.e., between a low-flow scenario when one unit was generating and a high-flow scenario when all units were generating). FirstLight states that the approved study plan does not specify the methodology and flow rates for verifying the models or require evaluating flows from the existing fish weir, log boom emergency gate, and the attraction flow emergency gate. FirstLight states that the methodology used for verifying the models is appropriate.

Discussion and Staff Recommendation

FirstLight conducted the study as required by the approved study plan; however, FirstLight's model verification using only a single run at a mid-range flow does not demonstrate that the models are accurate across the entire range of flows that were modeled. In addition, FirstLight's verification of the Cabot Station forebay and powerhouse model when only the powerhouse is operating does not demonstrate that the model is reliable or accurate for modeling scenarios with flows being released through the existing fish weir, log boom emergency gate, and attraction flow emergency gate. Therefore, we recommend that FirstLight either conduct the additional verification testing requested by NMFS or provide other details or information that demonstrate that the models are reliable over the entire range of modeled flows, including scenarios where the existing fish weir, log boom emergency gate, and attraction flow emergency gate are operating.

Evaluation of Component Velocities

Requested Study Modifications

NMFS requests that FirstLight use a 3-D velocity probe to measure and evaluate sweeping and approaching velocities in front of the Station No. 1 and Cabot Station intake racks instead of further modeling. NMFS indicates that this information is needed to determine effects on fish entrainment and impingement during downstream passage.

Comments on Requested Study Modifications

FirstLight did not respond to NMFS's request to collect additional data using a 3-D velocity probe, but provided a detailed explanation of how it evaluated sweeping and approach velocities as part of model development.

Discussion and Staff Recommendation

The Station No. 1 and Cabot Station forebay and powerhouse models provide information about approach velocities and sweeping velocities that can be used to analyze fish passage conditions at the Station No. 1 and Cabot Station intakes. In addition, studies 3.3.2, 3.3.3, 3.3.5, and 3.3.7 will provide information about fish passage through the forebay and intake area. Because the required studies should provide the information needed for staff's analysis of project effects on fish passage (section 5.9(b)(5)), we do not recommend requiring FirstLight to collect additional data at the Station No. 1 and Cabot Station intakes using a 3-D velocity probe.

3.3.9 – Two-Dimensional Modeling of the Northfield Mountain Pumped Storage Project Intake/Tailrace Channel and Connecticut River Upstream and Downstream of the Intake/Tailrace

Background

The goals of study 3.3.9 were to model flow characteristics, including flow velocity, near the Northfield Mountain Project intake/tailrace and assess the potential for velocities and flow fields to interfere with fish migration. The study included the modeling of a 10-kilometer (km) reach of the Turners Falls impoundment, which extends 5 km upstream and downstream from the Northfield Mountain Project intake/tailrace.

Requested Study Modifications

NMFS requests that FirstLight provide more discussion of the effects of project operation on migratory species.

Comments on Requested Study Modifications

In its reply comments, FirstLight states that that it may provide additional analysis of the modeling results once the various studies related to migratory fish are completed.

Discussion and Staff Recommendation

A goal of study 3.3.9 was to assess the potential for velocities and flow fields to interfere with fish migration; however, conclusions regarding effects on migratory fish are not included in the study report because other studies that will describe migratory fish movements in the project area have not been completed. We recommend that FirstLight consult with the fisheries agencies after the other fish migration studies have been completed to determine if additional analysis of the modeling results is necessary to describe how velocities and flow fields near the Northfield Mountain Project intake/tailrace may be affecting fish migration.

Study 3.3.20 – Ichthyoplankton Entrainment Assessment at the Northfield Mountain Project

Background

FirstLight estimated the entrainment of American shad eggs and larvae at the Northfield Mountain Project by sampling ichthyoplankton from a service water pipe that diverts water from Unit 2 (Unit 2 diversion). For comparison with the samples collected from the Unit 2 diversion, FirstLight also collected boat-towed ichthyoplankton net samples in the Northfield Mountain Project intake/tailrace area while simultaneously collecting samples from the Unit 2 diversion.

At the March 16, 2016, study report meeting and during a conference call on April 25, 2016, stakeholders voiced concerns about the numbers of samples, sampling period, and the low numbers of eggs and larvae collected in the samples. Stakeholders noted that FirstLight's 2015 sampling collected far fewer shad eggs and larvae than an ichthyoplankton study conducted in 1992 (LMS, 1993).

To address these concerns, FirstLight agreed to conduct an additional year of sampling beginning on May 10, 2016. FirstLight states that it will collect Unit 2 diversion and boat-tow samples one night each week during the 2016 shad migration period.

Study Methods

Requested Study Modifications

Approximately 60,000 adult American shad passed upstream of the Turners Falls dam in 1992 when LMS (1993) conducted its study, whereas 58,000 shad passed upstream in 2015. In 1992, the resulting index of juvenile shad abundance was 7.2, whereas it was 8.5 in 2015.¹⁰ FWS suggests that because similar numbers of adult shad spawned and produced similar numbers of juveniles in 1992 and 2015, the estimates of entrainment at the Northfield Mountain Project should be similar. However, FirstLight estimated that approximately 2.4 million eggs and over 500 thousand larvae were entrained during the 2015 study, whereas LMS (1993) estimated that 1.2 million eggs and 12.4 million larvae during 1992. FWS suggests that FirstLight underestimated the total number of shad eggs and larvae entrained during the 2015 study and FirstLight should

¹⁰ See FWS's May 2, 2016, comment letter.

use the methods described by LMS (1993) during 2016.¹¹ FWS states that repeating the 2015 study may produce similarly uncertain results. TNC supports the comments made by FWS.

NMFS requests that FirstLight collect more samples in 2016 than in 2015, particularly more samples from the intake/tailrace area.

Comments on Requested Study Modifications

FirstLight did not respond to FWS's request to use the LMS (1993) methodology for the 2016 study.

In response to NMFS's request for a larger number of samples, FirstLight states that it will collect three boat-towed ichthyoplankton net samples during each night it collects samples from the Unit 2 diversion.

Discussion and Staff Recommendation

Based on a comparison of the 1992 and 2015 data, FWS suggests that FirstLight underestimated total egg and larvae entrainment in 2015. However, there are two differences between the LMS (1993) and FirstLight 2015 studies that may partially explain the discrepancy in entrainment estimates. First, the Northfield Mountain Project operated in pump mode more frequently during the 1992 study period than in 2015.¹² Second, LMS (1993) assumed that the project would entrain all shad eggs and larvae collected upstream of, downstream of, and adjacent to the Northfield Mountain intake/tailrace area, which may not accurately reflect entrainment rates for all combinations of river discharge and project operation.¹³

When adjusted to the volume of water pumped during each study, entrainment during the LMS (1993) study was approximately 2.8 combined eggs and larvae per cubic meter of water pumped compared to 8.1 combined eggs and larvae per cubic meter

¹¹ LMS (1993) collected ichthyoplankton at three stations upstream of, downstream of, and adjacent to the Northfield Mountain intake/tailrace area.

¹² The Northfield Mountain Project operated in pump mode for 326,315 megawatt-hours (MWh) during the LMS (1993) study and 98,126 MWh for the FirstLight study. See FirstLight's March 28, 2014, letter for the Northfield Mountain Project operations data during the LMS (1993) study period. FirstLight provided operation data for the 2015 study period in their May 31, 2016, response to comments letter.

¹³ Study 3.3.9 includes data that demonstrates that water downstream of the Northfield Mountain intake/tailrace area is not entrained under all flow scenarios.

during FirstLight's study.¹⁴ These adjusted entrainment estimates indicate that the results of the two studies may be more similar than the extrapolated entrainment estimates suggest.

Regarding NMFS's request for a larger sample size in 2016, FirstLight is proposing to collect entrainment data one night per week throughout the entire shad migration period which typically begins in early May and ends in mid-July (i.e., typically an 11-week period). Collecting 11 nighttime samples would result in approximately 22 Unit 2 diversion samples (two per night) and 33 boat-towed net samples (three per night). In 2015, FirstLight collected 23 Unit 2 diversion samples and 12 boat-towed net samples. In addition to collecting more boat-towed net samples in the Northfield Mountain intake/tailrace area, FirstLight's 2016 study will also allow more comparisons of Unit 2 diversion samples with boat-towed net samples (i.e., 11 nights rather than the 4 nights from the 2015 study). These additional samples and comparisons should provide a better understanding of the accuracy of the Unit 2 diversion samples.

FirstLight's proposed methods for its 2016 study will use acceptable methods (EPRI, 2005a; 2005b; Kleinschmidt, 2010) that are consistent with current scientific practices (section 5.9(b)(6)). We expect that the proposed methods for 2016 will resolve the concerns resulting from the 2015 study and will provide Commission staff with sufficient information to inform potential license articles (section 5.9(b)(5)). Therefore, we recommend that FirstLight conduct the 2016 ichthyoplankton entrainment study as proposed.

Analysis of River Discharge

Requested Study Modifications

CRWC requests that FirstLight include river discharge in the analysis of shad egg and larvae densities and entrainment rate estimates as required by the January 22, 2015, determination letter on requested study modifications.

Comments on the Requested Study Modifications

¹⁴ Staff based these estimates on the data presented in tables 7a through 7c of LMS (1993) and table 4.3-5 of FirstLight's study report. However, it appears that the Northfield Mountain Project pumped over 13 times more water during the LMS (1993) study than during FirstLight's study. This difference in pumped volume seems unlikely given the 2015 pump operation data FirstLight included in its response to comments letter and the 1992 operation data provided in its March 28, 2014, letter. Staff could not determine the source of the discrepancy based on the available information.

FirstLight states that discharge from the upstream Vernon Project is not a component of the entrainment estimate, and river flow is never a component in this type of entrainment estimate.

Discussion and Staff Recommendation

Analysis of the relationship between ichthyoplankton density, entrainment rates, and river discharge may not provide much additional information because FirstLight typically collected five or fewer shad eggs or larvae each night during the 2015 study. However, knowing the degree to which ichthyoplankton density and entrainment rates vary relative to changes in river discharge and the proportion of river discharge pumped into the Northfield Mountain Project's upper reservoir could inform the development of license requirements (section 5.9(b)(5)). Furthermore, conducting such analyses would require minimal additional cost (section 5.9(b)(7)). Therefore, as required by the January 22, 2015, letter, FirstLight should include river discharge in its analyses of 2015 and 2016 ichthyoplankton density estimates and entrainment rates in its supplemental report for the 2016 study.

Study 3.5.1 – Baseline Inventory of Wetland, Riparian, and Littoral Habitat in the Turners Falls Impoundment, and Assessment of Operational Impacts on Special-Status Species

Background

The objectives of study 3.5.1 were to characterize and describe wildlife and botanical resources within the project areas and to assess the potential effects of project-related water level fluctuations on the identified resources. For the study, FirstLight surveyed and mapped the locations of wetlands, invasive species, and associated wildlife; surveyed Massachusetts state-listed rare plant species; and analyzed how project operation affects Cobblestone Tiger Beetle and Puritan Tiger Beetle habitat in the project area.

Requested Study Modifications

For the state-listed rare plant survey portion of the study, Massachusetts DFW requests that the study report be revised to provide additional field data and analysis. Specifically, Massachusetts DFW requests that FirstLight provide: (1) copies of the maps of historic and potentially suitable habitat for state-listed plants used by FirstLight to develop its survey locations, (2) a description of habitat suitability preferences used for each of the identified state-listed plant species and a discussion of how these preferences were determined, (3) copies of data collected regarding plant health and vigor and any additional information collected regarding plant flowering and reproduction and habitat

quality, and (4) information on how plant population densities varied with water surface elevation. TNC supports the requests made by Massachusetts DFW.

Comments on Requested Study Modifications

FirstLight has not addressed Massachusetts DFW's comments regarding the state-listed rare plant survey; however, in response to other Massachusetts DFW comments requesting similar information, FirstLight states that it will provide additional information in an addendum to study 3.5.1.

Discussion and Staff Recommendation

Massachusetts DFW's request that FirstLight provide all pertinent data collected during the plant surveys could allow for a more complete evaluation of state-listed rare plant habitat in the project areas. Because this information could be useful for staff's analysis of project-related effects, staff recommends that the information requested by Massachusetts DFW be included in the addendum or FirstLight should indicate why the information cannot be provided.

APPENDIX C

STAFF'S RECOMMENDATIONS ON REQUESTED NEW STUDIES

New Study Request: Provision of Data Regarding Entrainment of Shad Eggs, Larvae, Juvenile Shad, and American Eels

Requested New Study

The Connecticut River Watershed Council (CRWC) requests that FirstLight provide project operational data for 15-minute increments from May 1 to November 30 during each of the years from 2005 to 2015, including the number of pumps operating at the Northfield Mountain Project and the amount of flow discharged from TransCanada's Vernon Project. CRWC indicates that the data is necessary to evaluate the effects of project operation on fish entrainment associated with studies 3.3.3 (*Evaluate Downstream Passage of Juvenile American Shad*), 3.3.5 (*Evaluate Downstream Passage of American Eel*), and 3.3.20 (*Ichthyoplankton Entrainment Assessment at the Northfield Mountain Project*).

Comments on Requested New Study

In its reply comments, FirstLight states that the approved study plan does not require a long-term comparison of project operation. In addition, FirstLight states that, to the extent that it deems the information to be necessary or relevant to an evaluation of project effects, it will discuss historic pumping data in its amended final license application.

Discussion and Staff Recommendation

As CRWC indicates in its request, historical project operation data may be useful in the analysis of project effects associated with a number of studies. However, because a number of these studies are incomplete,¹⁵ Commission staff cannot determine the scope of historical project operation data that will be adequate for staff's analysis at this time. After FirstLight finishes the remaining studies and files its amended final license application with the Commission, staff will determine if additional project operation data is needed for staff's analysis. If needed, staff will require FirstLight to file the data as part of an additional information request.

¹⁵ FirstLight states that it will file a supplemental report for study 3.3.20 on (or before) December 31, 2016, and final reports for studies 3.3.3 and 3.3.5 on October 14, 2016, and March 1, 2017, respectively.

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