

FEDERAL ENERGY REGULATORY COMMISSION
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OFFICE OF ENERGY PROJECTS

Project No. 2485-063 – Massachusetts
Project No. 1889-081– Massachusetts
FirstLight Hydro Generating Company

John S. Howard
Director – FERC Hydro Compliance
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. Howard:

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 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 proposed by FirstLight in support of its relicensing of the Turners Falls and Northfield Mountain Projects was issued on September 13, 2013. On February 21, 2014, a subsequent study plan determination was issued to address proposed aquatic studies. The study plan determinations required FirstLight to conduct 20 non-aquatic studies and 18 aquatic studies. FirstLight filed an Initial Study Report (ISR) on the 38 studies required by the study plan determinations on September 16, 2014. As required in section 5.15(c) of our regulations, the ISR describes FirstLight's progress in implementing the approved study plan, and an explanation of variances from the study plan and schedule. Of the 38 required studies, FirstLight filed final study reports for studies 3.1.1, *2013 Full River*

Reconnaissance, and 3.6.2, *Recreation Facilities Inventory and Assessment*. FirstLight held ISR Meetings on September 30, October 1, and October 15, 2014.¹

Study Plans

The February 21, 2014, study plan determination required FirstLight to file plans for four aquatic studies with its ISR.² Subsequently, in a letter issued on September 3, 2014, Commission staff required FirstLight to file a plan to study entrainment of American shad ichthyoplankton at the Northfield Mountain Project (Study 3.3.20) with its ISR Meeting Summary.

FirstLight filed plans for the four aquatic studies required by the Commission's February 21, 2014, letter and an additional modified plan to study the impacts of the Turners Falls Canal drawdown on fish migration and aquatic organisms (Study 3.3.18) with its ISR. On October 16, 2014, FirstLight filed a plan for study 3.3.20. On December 8, 2014, FirstLight filed an additional plan to evaluate upstream and downstream passage of American shad (Study 3.3.2). Combined, FirstLight has filed seven new or modified study plans.

Comments

Comments on the ISR and meeting summaries were filed by: the U.S. Fish and Wildlife Service (Interior); the National Marine Fisheries Service (NMFS); the National Park Service (NPS); the Massachusetts Division of Fisheries and Wildlife (Massachusetts DFW); the Franklin Regional Council of Governments, Connecticut River Streambank Erosion Committee (CRSEC); the University of Illinois at Urbana-Champaign (University of Illinois); the town of Northfield, Massachusetts (town of Northfield); the Connecticut River Watershed Council (CRWC); the Nature Conservancy; the Appalachian Mountain Club (AMC); American Whitewater (AW); New England FLOW (FLOW); Don Pugh; and Karl Meyer. FirstLight filed reply comments on December 15, 2014.

A number of the comments received do not specifically request modifications to approved studies, and are therefore not addressed herein. For example, some of the

¹ FirstLight filed a meeting summary for the September 30 and October 1 meetings on October 15, 2014. FirstLight filed a meeting summary for the October 15 meeting on November 4, 2014.

² The four required studies are 3.2.1, *Water Quality Monitoring Study*; 3.3.5, *Evaluate Downstream Passage of American Eel*; 3.3.6, *Impact of Project Operation on Shad Spawning, Spawning Habitat and Egg Deposition in the Area of the Northfield Mountain and Turners Falls Projects*; and 3.3.11, *Fish Assemblage Assessment*.

comments request raw data, address study conclusions, request further discussion of the study results, provide additional information, address ongoing and future consultation, request study modifications that were addressed in the initial study plan determination, and/or request information that was subsequently provided by FirstLight. This determination only addresses 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 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, the requested modifications to studies 3.3.9 and 3.3.13 are approved, and the requested modifications to studies 3.1.1, 3.1.2, 3.3.4, 3.3.14, and 3.6.2 are approved, in part. The requested modifications to studies 3.3.1, 3.3.12, and 3.6.1, and the requested new study to identify habitat suitability parameters for state-listed mussel species are not approved.

Of the seven new or modified study plans filed by FirstLight, two are approved with staff-recommended modifications (studies 3.3.6 and 3.3.20) and five are approved without modification (studies 3.2.1, 3.3.2, 3.3.5, 3.3.11, and 3.3.18). No additional modifications to the study plan are required. The specific modifications to the studies and the basis for modifying or not modifying the study plan are explained in Appendices B (Requested Modifications to Approved Studies), C (Requested New Studies), and D (Requested Modifications to New or Modified Study Plans). 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,

Jeff C. Wright
Director
Office of Energy Projects

Enclosures: Appendix A – Summary of Determinations on Requested Modifications to Approved Studies, New Studies, and Modifications to New or Modified Study Plans
Appendix B – Staff’s Recommendations on Requested Modifications to Approved Studies
Appendix C – Staff’s Recommendations on Requested New Studies
Appendix D – Staff’s Recommendations on Requested Modifications to New or Modified Study Plans

cc: Mailing List, Public Files

APPENDIX A

SUMMARY OF DETERMINATIONS ON REQUESTED: MODIFICATIONS TO APPROVED STUDIES, NEW STUDIES, AND MODIFICATIONS TO NEW OR MODIFIED STUDY PLANS

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

Study	Recommending Entity	Adopted	Adopted in part	Not Adopted
3.1.1 – 2013 Full River Reconnaissance Study	CRSEC, CRWC		X	
3.1.2 – Northfield Mountain/Turners Falls Operations Impact on Existing Erosion and Potential Bank Instability	CRSEC, CRWC		X	
3.3.1 – Conduct Instream Flow Habitat Assessments in the Bypass Reach and below Cabot Station	Massachusetts DFW			X
3.3.4 – Evaluate Upstream Passage of American Eel at the Turners Falls Project	Interior		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	FirstLight	X		
Study 3.3.12 – Evaluate Frequency and Impact of Emergency Water Control Gate Discharge Events and Bypass Flume Events on Shortnose Sturgeon Spawning and Rearing Habitat in the Tailrace and Downstream from Cabot Station	Karl Meyer			X
3.3.13 – Impacts of the Turners Falls Project and Northfield Mountain Project on Littoral Zone Fish Habitat and Spawning Habitat	FERC	X		
3.3.14 – Aquatic Habitat Mapping of Turners Falls Impoundment	Karl Meyer		X	
3.6.1 – Recreational Use/User Contact Survey	NPS, AMC, CRWC			X
3.6.2 – Recreation Facilities Inventory and Assessment	NPS, AMC, AW, FLOW, CRWC		X	

Requested New Studies (see Appendix C for discussion)

Study	Recommending Entity	Approved	Approved with Modifications	Not Required
Identify Habitat Suitability Parameters for State-listed Mussel Species in the Connecticut River through Quantitative Habitat Assessments	Massachusetts DFW			X

Requested Modifications to New or Modified Study Plans

(see Appendix D for discussion)

Study	Recommending Entity³	Approved	Approved with Modifications	Not Required
3.2.1 – Water Quality Monitoring Study		X		
3.3.2 – Evaluate Upstream and Downstream Passage of Adult American Shad		X		
3.3.5 – Evaluate Downstream Passage of American Eel		X		
3.3.6 – Impact of Project Operation on Shad Spawning, Spawning Habitat, and Egg Deposition in the Area of the Northfield Mountain and Turners Falls Projects	FERC, Karl Meyer		X	
3.3.11 – Fish Assemblage Assessment	Interior, the Nature Conservancy, Karl Meyer	X		
3.3.18 – Impacts of the Turners Falls Canal Drawdown on Fish Migration and Aquatic Organisms	Interior, Karl Meyer	X		
3.3.20 – Entrainment of American Shad Ichthyoplankton at the Northfield Mountain Pumped Storage Project	Interior		X	

³ Blank spaces indicate that there are no unresolved requests for study modifications.

APPENDIX B

STAFF'S RECOMMENDATIONS ON REQUESTED MODIFICATIONS TO APPROVED STUDIES

Study 3.1.1 - 2013 Full River Reconnaissance (FRR) Study

Background

The goal of the study was to conduct a reconnaissance-level survey along the entire Turners Falls Project shoreline to evaluate and classify streambank characteristics and the extent of erosion within the impoundment. The study is meant to characterize upper and lower streambanks by delineating streambank segments with similar height, slope, sediment type, and vegetative cover. Streambank segments were to be further classified by erosion type (e.g., undercut, slide), potential (e.g., tension cracks), stage, and extent. Streambank classifications were conducted via boat and land-based surveys. This study was conducted in accordance with a current license requirement that requires FirstLight to conduct an FRR every three to five years.⁴

Requested Study Modifications

The town of Northfield, Massachusetts (town of Northfield), states that the methodology used in preparing the FRR mischaracterizes the level of erosion within the Turners Falls impoundment based on conflicting visual observations. The town of Northfield requests that FirstLight conduct an appropriate level of scientific inquiry and analysis and engage in meaningful stakeholder involvement.

The Connecticut River Watershed Council (CRWC) states that the methods used in the FRR incorrectly calculate the length and percentage of eroded streambank features because it relies on a reconnaissance-level survey for segmenting and categorizing streambanks based on non-quantitative classifications (e.g., sediment type, vegetative cover). The CRWC states that the analysis of categorical data results in statistical errors that lead to false conclusions and FirstLight should remove the instances where categorical data are incorrectly analyzed. In particular, the CRWC suggests that the increase in the categorization of streambanks with none to little erosion reported in the FRR does not support the conclusion that there has been an increase in streambank stability. CRWC recommends that any estimate of the length of riverbed (or percent of total) exhibiting riverbank characteristics and erosion classifications derived from the categorical data include confidence intervals or error bars.

⁴ An FRR is required every three to five years under the Erosion Control Plan filed June 21, 1999, and approved by the Commission on July 8, 1999.

The Franklin Regional Council of Governments, Connecticut River Streambank Erosion Committee (CRSEC) indicates that the Quality Assurance Project Plan (QAPP)⁵ states that an appendix to the FRR report will include a comparison of the specific riverbank features and characteristics from the data logging files, or field data sheets collected during the field surveys to a photograph of that same segment of riverbank captured from the digital geo-referenced video. The CRSEC also states that FirstLight was required to provide a comparison of the 2007 and 2014 photo logs. The CRSEC indicates that this information was not included in the FRR study report and requests that FirstLight provide this information.

The CRSEC recommends that: (1) the methodology for assessing the extent of erosion be revised to eliminate the current segment-based analysis, (2) video and photos from 2008 and 2013 be assessed by a third-party chosen by the Commission to reanalyze the extent of erosion within the impoundment, and (3) the stages of erosion be re-calculated according to FirstLight's own definition of the stages, or re-defined to follow the recommendations of the Field Geology Services 2007 Fluvial Geomorphology study of the Turners Falls impoundment. The CRWC endorses the comments filed by the CRSEC.

The CRWC, CRSEC, and the town of Northfield indicate that Study 3.1.1 is incomplete.

Comments on Requested Study Modifications

In response to the CRSEC's requests for the information that was to be included in an Appendix to the FRR study report, FirstLight indicates that this information was omitted as an oversight. FirstLight indicates that it will prepare an appendix comparing specific riverbank features and characteristics from data logging files, or field data sheets, collected during the field surveys to a photograph of that segment of riverbank captured from the digital geo-referenced video and distribute it to stakeholders. FirstLight also indicates that omission of a comparison of 2007 and 2014 photo logs in the FRR study report was an oversight and an addendum to the FRR study report that includes this information will be prepared and distributed to the stakeholders.

In response to the CRSEC's request for study modifications, FirstLight states that the methods used for assessing the extent of erosion, including how stages of erosion were classified, are consistent with the approved FRR study plan. FirstLight states that it is not proposing to modify the FRR, because it followed the approved study plan and QAPP which was developed in consultation with the stakeholders and approved by the Commission.

⁵ The QAPP, developed in consultation with the stakeholders, is part of the FRR study to ensure consistency with data collection methods.

In response to the CRWC's proposed study modifications, FirstLight states that the methods used to prepare the FRR are appropriate for conducting a reconnaissance-level survey of streambank erosion. Further, FirstLight states that streambank erosion classifications are not quantitative in nature; therefore, developing confidence intervals or error bars would not be appropriate. FirstLight is not proposing to modify the FRR, because FirstLight indicates it followed the approved study plan and the QAPP that was developed in consultation with the stakeholders and approved by the Commission.

Discussion and Staff Recommendation

Based on a review of the information presented within the FRR, FirstLight conducted the FRR as required by the study plan determination (SPD). However, the FRR study report does not include all of the deliverables in the study plan. Specifically, the FRR study report does not include: (1) a comparison of the specific riverbank features and characteristics from data logging files, or field data sheets, collected during the field surveys to a photograph of that segment of riverbank captured from the digital geo-referenced video; and (2) a comparison of 2007 and 2014 photo logs. Therefore, we recommend that FirstLight file an addendum to the FRR study report that includes this information within 90 days of the date of this letter.

We recommend that FirstLight file the addendum after consultation with CRSEC and CRWC. FirstLight should include documentation of consultation, copies of comments and recommendations on the completed addendum after it has been prepared and provided to CRSEC and CRWC, and specific descriptions of how CRSEC and CRWC's comments are accommodated by the addendum. FirstLight should allow a minimum of 30 days for CRSEC and CRWC to comment and to make recommendations before filing the addendum with the Commission. If FirstLight does not adopt a recommendation, the filing should include FirstLight's reasons, based on project-specific information.

As indicated above, FirstLight conducted the FRR as required by the Commission. The methodology for classifying the type, stage, extent and potential for shoreline erosion by establishing shoreline segments with common riverbank characteristics (e.g., slope, height) based on visual observations and professional judgment of field personnel is consistent with the approved study plan and QAPP and is appropriate for a reconnaissance-level survey. Therefore, the modifications to the FRR requested by the CRSEC and CRWC do not meet the criteria for modification of an approved study (see section 5.15(d) of the Commission's regulations) because the completed study was conducted as required by the approved study plan and there were no anomalous or changing environmental conditions that occurred during the study. Additionally, the modifications requested by the CRSEC and CRWC are not necessary because the

approved methodology and techniques are common scientific practice for a reconnaissance-level study.⁶

In regard to CRSEC's request that the Commission use a third party to conduct additional analyses, the pre-filing portion of the Integrated Licensing Process includes steps for identifying and requiring studies (i.e., sections 5.9 to 5.13 of the Commission's regulations) that are conducted by license applicants or their designees. When the required studies have been completed and filed with the Commission, staff conducts an independent review of the results. If the results are invalid or additional study is needed, Commission staff can require the applicant to repeat the study, conduct an additional year of study, or conduct a new study. Commission staff has reviewed the FRR conducted by FirstLight and conclude that it was completed as required and provides the information necessary to inform a decision on issuing a new license. Therefore, staff concludes that at this time there is no need to conduct additional analyses using a third party that would be selected by the Commission.

Study 3.1.2 - Northfield Mountain/Turners Falls Operations Impact on Existing Erosion and Potential Bank Instability

Background

The goal of the study was to identify and evaluate causes of erosion in the Turners Falls impoundment. The causes of erosion within the impoundment will be identified by: (1) conducting a literature review and identifying data gaps; (2) developing a geomorphic understanding of the Connecticut River within the Turners Falls impoundment; (3) identifying potential causes of erosion; (4) performing field studies based on the data gaps that are identified; and (5) analyzing the data collected, including the development of a Bank-Stability and Toe-Erosion Model (BSTEM) as well as steady state one-dimensional (HEC-RAS) and two-dimensional (River2D) hydraulic models.⁷

Requested Study Modifications

The CRSEC requests that FirstLight provide a progress report by January 15, 2015,⁸ and follow-up progress reports as each study task is completed to provide confidence in the study results. The CRSEC requests that the progress reports include a

⁶ Rosgen, D.L. 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

⁷ The BSTEM model evaluates streambank erosion due to flowing water and fluctuations in water level. The HEC-RAS and River2D models will be used to calculate water velocities within the Turners Falls impoundment over a range of flow conditions.

⁸ The CRSEC requests a progress report by January 31, 2015, elsewhere in its comments.

complete list of existing data and literature sources reviewed by FirstLight. The CRWC endorses the comments filed by the CRSEC.

In addition, the CRSEC provides comments from the University of Illinois at Urbana-Champaign (University of Illinois) on the suitability of the BSTEM, HEC-RAS and River2D models for assessing the erosion within the Turners Falls impoundment. The comments do not request a specific study modification regarding the use of the BSTEM, HEC-RAS and River2D models, but the University of Illinois does state that these models have inherent limitations and their findings should be strongly qualified.

The CRSEC further states that task 4c of the study, which includes the identification and examination of fixed riverbank transects for further analysis, is incomplete as consultation between FirstLight and stakeholders is ongoing.

Comments on Requested Study Modifications

FirstLight states that it has met all Commission reporting guidelines, including filing a progress summary report and initial study report (ISR). FirstLight indicates that it will file the final report for Study 3.1.2 in the second quarter of 2016, but prior to that it will file GIS/CAD project boundary data sets during the first quarter of 2015, and it will include an update on Study 3.1.2 in its Updated Study Report that will be filed in September of 2015. Additionally, FirstLight provided a list of existing data and literature sources used in the study. Lastly, FirstLight states that it would be inappropriate to produce a partial report based on an incomplete analysis.

Discussion and Staff Recommendations

FirstLight did not propose to provide progress reports in its revised study plan (RSP), no commenters requested progress reports for Study 3.1.2, and the SPD did not require FirstLight to file progress reports for Study 3.1.2. However, because the study is ongoing and the final report will not be filed for up to 18 months (i.e., the second quarter of 2016), we recommend that FirstLight file a progress report after completion of each of the seven tasks included in the approved study plan. These progress reports should describe the activities that occurred during completion of the task, including any variances that were necessary to complete the task. The progress reports would not need to include preliminary study conclusions or raw datasets as the intent of the progress reports is to update stakeholders on the status of the study and identify variances from the approved study plan. In addition, the progress reports should include documentation of any ongoing consultation with stakeholders, including copies of comments and recommendations from consulted entities.

Regarding the University of Illinois' comments on the HEC-RAS, River2D and BSTEM models, Commission staff will carefully consider the limitations of these models when reviewing the findings in the final study report.

Study 3.3.1 - Conduct Instream Flow Habitat Assessments in the Bypass Reach and below Cabot Station

Background

Project operation alters river flows and affects aquatic habitat downstream of Turners Falls dam. The goal of this study is to assess the effects of a range of discharges from Turners Falls Dam, Station No. 1, and Cabot Station on aquatic habitat suitability for various fish and mussel species in 5 reaches within the bypassed reach, and in the Connecticut River downstream of Cabot Station. FirstLight has collected transect data (velocity, depth, etc.) and other information to model flows in reaches 1, 2, and 3. Transect data collection for reaches 4 and 5 is scheduled to commence in the summer of 2015, followed by habitat suitability modeling in late 2015.

Requested Study Modifications

Massachusetts Division of Fisheries and Wildlife (Massachusetts DFW) suggests that no transect data or mussel habitat modeling is required in reach 4 because no state-listed mussels were found there during the 2014 mussel survey conducted under study 3.3.16, *Habitat Assessment, Surveys, and Modeling of Suitable Habitat for State-listed Mussel Species in the CT River below Cabot Station*. Therefore, Massachusetts DFW requests that FirstLight reallocate transects from reach 4 to reach 5, where state-listed mussels are present.

Massachusetts DFW also states that the mussel survey report for reach 5⁹ contained new information including an update on the distribution and abundance of yellow lampmussel, and the documented occurrence of two new species, eastern pondmussel and tidewater mucket. Based on this new information, Massachusetts DFW suggests that FirstLight's study may not provide adequate information on moderate or low-density yellow lampmussel beds, and requests that transects be placed in reach 5 within high, medium, and low-density yellow lampmussel beds, as well as areas where no yellow lampmussels occur. Massachusetts DFW states that the final transect locations within reach 5 should be determined in consultation with the technical study team.

⁹ Rare Mussels Species Summary – 12 Year Final Report for Holyoke Gas and Electric. FERC Project No. 2004. Filed October 1, 2014.

Comments on Requested Study Modifications

FirstLight states that it anticipates a reasonable number of transects in reaches 4 and 5 will be selected in consultation with stakeholders, including transects for state-listed mussels.

Discussion and Staff Recommendation

It appears that Massachusetts DFW has misinterpreted the approved study plan regarding the habitat suitability analysis in reach 4. In the SPD, Commission staff stated that FirstLight's effects analysis in reach 4 is contingent on the results of their mussel survey to identify state-listed mussels *and suitable habitat* (Page B-17 in the SPD). In the ISR, FirstLight reported that its habitat assessment and survey for mussels (Study 3.3.16) yielded no detections of state-listed mussels in reach 4; however, it has not completed its report for the mussel habitat assessment at this time.

FirstLight has indicated it will collect transect data in reaches 4 and 5 and we expect that transect data collection will occur in reach 4 according to the SPD.

In reach 5, the existing transects from the Corps' HEC-RAS model overlap a substantial portion of yellow lampmussel habitat and the approved study plan does not necessarily require additional transects for mussel habitat in this reach. Additional transects in reach 5 depend on the outcome of an initial screening effort to determine potential effects on mussels which will consider the new information on yellow lampmussel abundance and distribution, as well as the documented occurrence of two additional mussel species in reach 5.

FirstLight's approved study plan is adaptive and includes consultation with Massachusetts DFW to determine changes to the plan based on the results of the 2014 mussel surveys in reach 4 and reach 5 (page 3-108 of the RSP). FirstLight's response to Massachusetts DFW indicates that data collection in reach 5 will be considered by the technical study team during transect selection. Because the existing study design provides a mechanism to modify the methods based on new information, there is no reason to require additional transects at this time.

Study 3.3.4 - Evaluate Upstream Passage of American Eel at the Turners Falls Project

Background

The goal of the study is to identify locations where American eels are concentrating and attempting upstream passage at the Turners Falls Project. Potential

locations for permanent upstream passage structures will be assessed by installing traps and checking them every 2-3 days during the upstream migration period.

Requested Study Modifications

The U.S. Fish and Wildlife Service (Interior) requests that FirstLight check the eel traps more frequently than every 2-3 days. Interior states that this would prevent eel mortality if the traps become overloaded during nights of high passage rates.

Comments on Requested Study Modifications

FirstLight states that based on its experience at other facilities, and in accordance with the approved study plan, it intends to check the traps every 2-3 days except for after rain events, when it will check the traps daily.

Discussion and Staff Recommendation

The 2-3 day trap check interval stated in the study plan is reasonable and is likely to prevent trap overloading during most of the collection period. FirstLight's proposal to check the traps more frequently after rain events would minimize the likelihood of overcrowding during these periods. However, it is possible that other factors (e.g., changes in water temperature or day length) could trigger significant eel movements that could overcrowd the trap for short periods during the collection period. In order to prevent overcrowding, we recommend that FirstLight check the trap more frequently during peak periods of the migration. If the number of eels trapped during a 2-3 day period increases to the point that the traps are full or overcrowded when checked, FirstLight should check the trap more frequently until the numbers of eels collected and the potential for overcrowding declines.

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

Northfield Mountain Project operation (i.e., pumping and generating) may interfere with fish migration due to project effects on velocities and flow fields at, and in proximity to, the Northfield Mountain Project intake/tailrace structure. The goal of the study is to model flow characteristics, including flow velocity, surrounding the Northfield Mountain Project intake/tailrace and assess the potential for velocities and flow fields to interfere with fish migration. The study includes 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.

FirstLight Proposed Study Modifications

In its ISR, FirstLight proposes to modify the study to include only three of the four transects required in the SPD. FirstLight states that the location for the fourth transect, which was added to the study by the SPD, is upstream of the Northfield Mountain Project intake/tailrace structure in an area that is dewatered under low flow conditions. FirstLight indicates that its proposed transect 3 is close enough to the intake entrance and would achieve the goals of the study and the fourth transect added by Commission staff.

Comments on FirstLight's Proposed Study Modifications

CRWC states that it is unclear what velocity conditions are present in the area that is typically underwater between the powerhouse and the intake/tailrace entrance without a fourth transect as required in the approved study plan.

Discussion and Staff Recommendation

In the SPD, Commission staff required FirstLight to add a fourth transect, equidistant between the Northfield Mountain Project's intake/tailrace structure and transect 1, which is located at the upstream end of the three transects proposed in the RSP. However, in its ISR, FirstLight presents new information showing that transect 4 would be located upstream of the intake opening (i.e., essentially directly over the intake structure) in an area that is occasionally dewatered. Additionally, the information provided by FirstLight indicates that its proposed transect 3 is closer to the entrance of the intake/tailrace structure than transect 4. Based on this new information, we conclude that the fourth transect is not necessary and recommend that FirstLight only be required to sample transects 1-3.

Study 3.3.12 - Evaluate Frequency and Impact of Emergency Water Control Gate Discharge Events and Bypass Flume Events on Shortnose Sturgeon Spawning and Rearing Habitat in the Tailrace and Downstream from Cabot Station

Background

During emergencies, FirstLight releases water from the control gates and/or the bypass flume at Cabot Station. The goals of this study are to determine the frequency with which the emergency water control gates are operated, describe the operation of the bypass flume that results in bypass flume spill events, and evaluate the impact of these events on sediment transport and bottom velocities within known shortnose sturgeon spawning and rearing habitat downstream of Cabot Station. The SPD approved the study as described in the RSP. The SPD required FirstLight to conduct an analysis of historical emergency water releases for the period 2005 through 2012. Afterwards, FirstLight is to

consult with stakeholders to determine the need for fieldwork, which would include measuring flow velocities and sediment transport during simulated emergency releases at the two locations.

Requested Study Modifications

Karl Meyer requests that FirstLight include data from 2013 and 2014 in the study and that FirstLight continue the study during the 2015 season, documenting the instances when the emergency gates are open as well as the reasons for them being open.

Comments on Requested Study Modifications

FirstLight responds that the approved period for historical analysis of emergency releases is 2005 through 2012.

Discussion and Staff Recommendation

FirstLight has not finalized the study report and indicates that it is continuing to consult with stakeholders to refine the data analysis presented in the ISR and to determine the need for fieldwork, as specified in the approved study plan. First light does not state when the data analysis and consultation will be complete. Because FirstLight has not provided the final report, which would include modifications that may be made in response to stakeholder comments regarding the analysis of historical data, we cannot determine the adequacy of the existing historical data for meeting the study goals or the need for fieldwork. We recommend that FirstLight complete the historical data analysis and conduct the required consultation by March 31, 2015, so that if fieldwork is necessary, it can be conducted during the 2015 field season.

Study 3.3.13 - Impacts of the Turners Falls Project and Northfield Mountain Project on Littoral Zone Fish Habitat and Spawning Habitat

Background

Project operation and associated water level changes potentially impact fish spawning success and spawning habitat quality and quantity, including habitat dewatering, nest/egg exposure, and/or nest abandonment in the Turners Falls impoundment. The goal of this study is to assess the timing and location of fish spawning in the littoral zone; delineate, qualitatively describe, and map shallow-water habitat types subject to inundation and exposure due to project operation; and evaluate potential impacts of impoundment fluctuation on nest abandonment, spawning fish displacement, and egg dewatering.

Clarification of SPD

The SPD required that FirstLight document water level elevations near locations where the depths of fish nests, egg masses, and suitable spawning habitat are observed. This will allow FirstLight to correlate depth measurements with real-time impoundment elevations. To achieve this, the SPD required that (see page B-64):

[d]uring the 2015 study season, FirstLight should deploy water level loggers at the same locations utilized during the 2014 field season for study 3.2.2 to capture the entire spawning and egg development period of target fish species.

However, the water level logger locations utilized in study 3.2.2 may not provide sufficient data to correlate habitat depths to real-time water levels because these locations may be too distant from some spawning areas. Therefore, we recommend that the locations of water level loggers be determined in the field during surveys to identify spawning habitat.

Study 3.3.14 - Aquatic Habitat Mapping of Turners Falls Impoundment

Background

The goal of the study is to map the distribution and abundance of aquatic habitat, evaluate the types of habitats that occur, and identify any potential effects of project operation on the habitat in the Turners Falls impoundment.

Requested Study Modifications

Karl Meyer requests that this study include mapping of the Turners Falls power canal because he considers it to be part of the Turners Falls impoundment.

Comments on Requested Study Modifications

First Light states that annual canal drawdowns provide an opportunity to observe aquatic habitat in the Cabot Canal.

Discussion and Staff Recommendation

Habitat in the power canal is highly modified and it is subject to occasional alteration from dredging. Photographs of the Turners Fall power canal show that it is highly uniform; therefore, habitat mapping is not necessary. Instead, we recommend that FirstLight use available photographs and other existing information to provide a general description of the habitat in the power canal in its updated study report.

3.6.1 - Recreational Use/User Contact Survey

Background

FirstLight proposes to conduct user counts and visitor surveys to determine the amount of recreation use at the Turners Falls and Northfield Mountain Projects and compile user opinions of recreation experiences and perceptions of project recreation facilities. The primary goals of this study are to: (1) assess recreation use and demand using traffic counts and user counts; and (2) assess recreational users' opinions and goals at the project, including effects of project operations on recreation and the adequacy of project recreation facilities and access, through on-site and mail-back surveys.

The study was scheduled to be completed in December 2014. At this time, full study results have not been compiled, nor has a full study report been filed.

Omitted Questions

Requested Study Modifications

The National Park Service (NPS), Appalachian Mountain Club (AMC), and CRWC express concern about the omission of requested modifications to questions in the on-site surveys that were required in the SPD. Specifically, as FirstLight noted in its ISR, the required changes to questions 11 and 15 in the general recreation survey and question 13 in the Northfield Mountain trail user survey were inadvertently omitted until August 2014.¹⁰ As a result, the surveys administered for the period of January 2014 through late August 2014 did not include these modified questions. From the period of the last week of August 2014 through December 2014 the corrected surveys were distributed.

AMC and CRWC state that the questionnaires should be re-administered from January to August 21, 2015, to collect the missing data.

Comments on Requested Study Modifications

FirstLight states that the omissions to the survey were not significant because both surveys (distributed from January to August) included open-ended questions that allowed respondents to comment on any project recreation topics, and a preliminary review of data indicate that many respondents have taken advantage of the open-ended questions to

¹⁰ Required changes that were omitted from the questionnaire include: (1) adding "in the past five years" to question 11, (2) adding "toilets and restrooms" and "river access" to the list of amenities in question 15, and (3) adding the variable "hours of operation" to the tabular list in question 13.

address these issues. Additionally, FirstLight suggests that collecting hundreds of corrected surveys from late August through December 2014 may be adequate.

FirstLight does not agree with AMC and CRWC that the revised survey needs to be re-administered in 2015.

Discussion and Staff Recommendation

Data collection during the period of August through December 2014 could result in an adequate sample size so that the omitted modifications are not significant. Further, information derived from the numerous (six questions on the general recreation survey and seven on the Northfield Mountain trail survey) variously-worded open-ended questions could also provide any needed information. However, because the final report is not available at this time, it is impossible to determine the significance of the omitted modifications to the questionnaire. Therefore, we do not recommend that FirstLight re-administer the survey at this time.

Tube Counter Placement at Poplar Street Access Site

Requested Study Modifications

CRWC states that the tube counter at the Poplar Street Access Site was located away from the majority of parking in an area that most people would never drive over. CRWC requests that the tube counter be better positioned and data be collected at the site for all of 2015.

Comments on Requested Study Modifications

FirstLight states that a map showing tube counter locations at each site will be provided in the final report. Additionally, FirstLight notes that spot counts and calibration counts were used at recreation sites to understand recreation use patterns. Therefore, FirstLight does not believe it is necessary to collect additional tube counting data for the Poplar Street Access Site.

Discussion and Staff Recommendation

Because the final report is not available at this time, we are unable to determine the adequacy of the location of the tube counter at Poplar Street Access Site. When the final report is available, we will review the location of the tube counter, as well as the types of users at Poplar Street Access Site and the results of the spot counts and visitor surveys, and determine if additional data collection is necessary.

Surveying Informal Access Use of Turners Falls Bypassed Reach

Requested Study Modifications

NPS and AMC state that when there is water in the bypassed reach, the general recreation survey should be distributed to whitewater boaters at the put-in downstream of Turners Falls dam. NPS and AMC state that when water is in the bypassed reach this area receives high recreational use.

Comments on Requested Study Modifications

FirstLight states that the put-in area downstream of Turners Falls dam is not a formal recreation site and was not included as one of the required recreation survey sites. Further, FirstLight states that whitewater boaters were counted and/or surveyed at other recreation sites along the bypassed reach, including Station No. 1, Cabot Woods, and the Poplar Street Access Site. FirstLight believes it is unnecessary to survey recreational users at the bypassed reach put-in downstream of Turners Falls dam.

Discussion and Staff Recommendation

Study 3.6.3 was designed to assess the bypassed reach as a recreational feature and to assess the needs of recreational boaters, including identifying acceptable flows and the need for access points. In the SPD, Commission staff concluded that no informal recreation sites had been identified that, if surveyed, would result in a reasonable amount of additional information to justify surveying these areas; therefore, the put-in area downstream of Turners Falls dam was not included in the survey. As noted by FirstLight, recreational boaters using the bypassed reach should be accounted for by the three other sites that provide access to the bypassed reach that are currently being surveyed.

Additional surveying of visitors to the bypassed reach at the put-in area downstream of Turners Falls dam would not result in an amount of additional information that would justify the additional level of effort and cost (section 5.9(b)(7)). Therefore, we do not recommend requiring FirstLight to modify the study to include surveys of the informal put-in downstream of Turners Falls dam.

Surveying of Rock Climbers at Northfield Mountain

Requested Study Modifications

As part of the approved study plan, FirstLight was required to consult with the Western Massachusetts Climbers' Coalition (Climbers' Coalition) to identify climber survey locations and distribute surveys to climbers on project lands. In its interim report,

FirstLight stated that it selected three¹¹ survey locations based upon information on the Climbers' Coalition's website.¹² Subsequently, on September 19, 2014, FirstLight conducted a meeting with the Climbers' Coalition to discuss appropriate locations for continued data collection.

AMC and NPS stated that a lack of direct consultation between FirstLight and the Climbers' Coalition prior to beginning the study may have negatively impacted study results. AMC requests that rock climbers be surveyed a second season until September 18, 2015, to account for the study variance.

Comments on Requested Study Modifications

Climbers were surveyed at three parking lots that provide access to the project climbing areas. These three sites were surveyed from January 2014 through December 2014, with the exception of a period between August 25, 2014, and September 19, 2014. FirstLight states that the number of surveys anticipated to be collected from climbers as a result of surveys conducted at these three access sites should be more than adequate to evaluate climbers' perceptions of project facilities.

Discussion and Staff Recommendation

FirstLight did not consult with the Climbers' Coalition until September 19, 2014, and it is unclear if the consultation with the Climbers' Coalition informed or altered any sampling strategies. Because the final report is not available at this time, we are unable to determine the adequacy of the information collected in 2014. Therefore, we do not recommend requiring additional study at this time.

Survey of Cross-country Skiers at Northfield Mountain

Requested Study Modifications

AMC and NPS suggest that weather (i.e., snow conditions) during the 2013-2014 winter may have influenced the number of cross-country skiers and they recommend that surveys of cross-country skiers continue throughout the 2014-2015 winter to ensure that this group is adequately represented.

Comments on Requested Study Modifications

¹¹ FirstLight states in its interim report that four survey locations were selected, but in its response to comments filed December 15, 2014, it states only three locations were used. Specific locations were not described.

¹² See <http://climbgneiss.org/>.

FirstLight states that its recreation survey distribution followed a statistically sound, random sampling design in accordance with the approved study plan. Winter sampling occurred during January, February, March, and December of 2014. A total of 58 surveys were collected at Northfield Mountain during the months of January, February, and March. FirstLight states that the number of surveys should be sufficient to evaluate winter skiing conditions and facilities.

Discussion and Staff Recommendation

Because the final report is not available at this time, we are unable to determine the adequacy of the information collected in 2014. Therefore, we do not recommend requiring additional study at this time.

3.6.2 - Recreation Facilities Inventory and Assessment

Background

The objective of this study was to describe existing recreation facilities and complete a baseline condition assessment of each project recreation area within the Turners Falls and Northfield Mountain Project boundaries and the Poplar Street Access Site.¹³ The completed study report was filed September 16, 2014.

Describing the Limitations of Facilities

Requested Study Modifications

AMC and NPS state that the study does not accurately describe the limitations of the recreation sites and facilities. Specifically, they suggest that the study needs to contain information on potential recreation groups that are not well served by existing recreation sites and describe potential enhancement opportunities.

Comments on Requested Study Modifications

FirstLight states that the intent of the baseline inventory was to record the general condition and amenities of existing recreational facilities at the project.

Discussion and Staff Recommendation

¹³ The Poplar Street Access Site is located outside of the project boundaries, but was included in this study because it is the first recreation site downstream of the bypassed reach, is owned and operated by FirstLight, and is used as the put-in for the canoe portage.

Determining the types of activities that are currently excluded from a recreation site due to site design, facilities, and other constraints is difficult and highly subjective. The primary objective of this study was to inventory and assess the condition of existing recreation sites and facility amenities. Using this baseline data, all stakeholders can make their own assessment of the need to enhance facilities for a specific reason or recreational activity. Therefore, it is not necessary to modify the study or final report to identify types of activities that may be limited due to site design.

Rock Climbing Sites

Requested Study Modifications

AMC states that the Northfield Mountain Visitor Center inventory does not include access/facilities at the rock climbing areas.

Comments on Requested Study Modifications

FirstLight states that no specific facilities exist for rock climbers. Rock climbers access crags by utilizing general recreation infrastructure, specifically the trail system. Further, FirstLight states that it does not provide or promote any climbing routes, and that some parking areas and trailheads to the crags are outside of the project boundary.

Discussion and Staff Recommendation

Rock climbing at Northfield Mountain is an existing and ongoing recreational activity that occurs inside the project boundary. Rose Ledge and possibly other sites are natural recreation features that attract recreational activity to the project. These sites should be documented even if FirstLight is not managing these 'informal' sites. Therefore, we recommend that FirstLight be required to file an addendum to the report within 5 months of this letter, that provides a full inventory and assessment of all climbing areas within the in the project boundaries, including Rose Ledge.

Inventory and Assessment of the Put-in Downstream of Turners Falls Dam

Requested Study Modifications

AMC, American Whitewater, New England FLOW, and NPS recommend that FirstLight include an inventory and condition assessment of the informal put-in downstream of Turners Falls dam in the report.

Comments on Requested Study Modifications

FirstLight states that the site was assessed as part of study 3.6.4.

Discussion and Staff Recommendation

The put-in downstream of Turners Falls dam is an informal recreation site that may receive a high level of use from recreational boaters when there are adequate flows for boating in the bypassed reach. As part of studies 3.6.3 and 3.6.4, information on access points to the bypassed reach is being collected and should capture the potential of the site as a put-in for accessing the bypassed reach. Because this informal put-in site will be considered in several other studies (e.g., 3.6.3 and 3.6.4) and may, at times, receive high use, it would be appropriate (section 5.9(b)(5)) and require relatively little effort and cost (section 5.9(b)(7)) to include a full inventory and assessment of the site in the final report for study 3.6.2. Therefore, we recommend that FirstLight be required to file an addendum to the report within 5 months of this letter that includes a full inventory and assessment of the put-in site downstream of Turners Falls dam.

Seasons for Conducting Data Collection

Requested Study Modifications

CRWC states that the inventory was conducted during the non-peak use period and requests that the study be conducted during peak usage.

Comments on Requested Study Modifications

FirstLight does not address this comment.

Discussion and Staff Recommendation

The purpose of this study was not to assess the amount of use at recreation sites or the conditions of sites during a specific period (i.e., peak use). While the data inventory sheet does have a section for 'evidence of overcrowding,' this piece of information is not used to determine if a site is experiencing overcrowding, rather it is simply additional information that can be observed during the inventory. Information from study 3.6.1, in conjunction with other data, will be used to determine use, overcrowding, and demand at project recreation areas.

The goal of this study is to determine the baseline physical conditions (rather than social conditions) of recreation sites. Because these physical conditions are generally present throughout the year (e.g., erosion, damaged facilities, silt accumulation at boat ramps) the season or timing of data collection is less important. Therefore, we do not recommend modifying the study to include data collection during peak usage.

Differentiating Between Portage Route and Put-in

Requested Study Modifications

AMC, NPS, and CRWC state that referring to Site 24 as the “Turners Falls Canoe Portage” is misleading and difficult to interpret, because a ‘portage’ refers to a trail or route rather than a specific site.

AMC and CRWC request the report be modified to consider Site 24 as the Poplar Street recreation site, rather than an entire portage route.

Comments on Requested Study Modifications

FirstLight states that Site 24 has been consistently utilized as the put-in for the canoe portage and therefore was named accordingly.

Discussion and Staff Recommendation

During this license proceeding, Site 24 has been referred to as “Poplar Street” put-in, access site, or portage. The data inventory sheet refers to the site as “Poplar Street Portage,” but the body of the report uses “Turners Falls Canoe Portage.” The description of Site 24 also has elements of a portage route and a put-in site. This inconsistency has led to confusion.

To reduce confusion, the portage route and the put-in (Poplar Street Access Site) at the end of a portage route should be considered two different sites. Therefore, we recommend that FirstLight file an addendum to the report within 5 months of this letter that treats the Poplar Street Access Site as a separate recreation facility from the canoe portage route. The description of Poplar Street Access Site should include a full inventory and condition assessment. The description of the portage route should include take-out and put-in locations, the process to call for portage assistance, and the route(s) used for the portage (including distance).

Cabot Woods Fishing Access Inventory and Assessment

Requested Study Modifications

The Cabot Woods Fishing Access site provides access to Rock Dam which is a feature of the bypassed reach that provides a unique recreational opportunity for both fisherman and recreational boaters.

AMC and NPS state that there is an omission in the report about the stairs that are (or once were) used to access the bypassed reach and Rock Dam from the Cabot Woods parking lot. AMC also states that there are inconsistencies between the body of the report

and the inventory data sheet for the Cabot Woods Fishing Access site. CRWC expresses concern about the description of the Cabot Woods Fishing Access site and access to the bypassed reach.

AMC and CRWC recommend that FirstLight correct the descriptions in the report and provide a detailed description of how visitors access the bypassed reach from the Cabot Woods Fishing Access site.

Comments on Requested Study Modifications

FirstLight does not directly address AMC's or CRWC's comments regarding the Cabot Woods Fishing Access site.

Discussion and Staff Recommendation

As indicated by the AMC, there are discrepancies between the body of the report and the data inventory sheets that make understanding the site difficult. Specifically, it is unclear how visitors access the bypassed reach from Cabot Woods. The body of the report does not address how users access the bypassed reach, while the data inventory sheet map seems to indicate (the writing is difficult to read) that there is staircase access. The body of the report states there is a picnic area, but the data inventory sheet map does not indicate where the picnic area is located. The body of the report also states there is an upper and lower parking lot; however, the data inventory sheet map does not indicate which parking lot is upper and which is lower. It is also unclear from the report how the Conte Fish Laboratory gate closing at 5:00 pm daily affects river access and possibly weekend access.

Therefore, we recommend that FirstLight file, within 5 months of this letter, an addendum to the report that addresses these discrepancies. The addendum should also describe how visitors access the bypassed reach from Cabot Woods and the condition of the route. Lastly, the addendum should include a legible site drawing or map that shows and labels all pertinent features, such as parking lots, gates, and river access routes.

Poplar Street Access Site and Gatehouse Fishway Viewing Area

Requested Study Modifications

AMC and CRWC note that no condition assessment was conducted at the Poplar Street Access Site. CRWC also points out that no condition assessment was conducted for the Gatehouse Fishway Viewing Area.

Comments on Requested Study Modifications

FirstLight does not address these comments.

Discussion and Staff Recommendation

According to body of the report, no condition assessment was made for the Poplar Street Access Site or the Gatehouse Fishway Viewing Area; however, the SPD required an assessment of the condition of these locations. In addition, the data inventory sheet for the Poplar Street Access Site indicates that no put-in exists, while the body of the report indicates that river access is the primary function of the site.

Therefore, we recommend that FirstLight be required to file, within 5 months of this letter, an addendum to the report that addresses these discrepancies. The addendum should include a condition assessment of both Poplar Street Access Site¹⁴ and the Gatehouse Fishway Viewing Area. Lastly, the addendum should include a legible site drawing or map that shows and labels all pertinent features, such as parking lots, gates, and river access routes.

Clarity of the Report

Requested Study Modifications

AMC, CRWC, and NPS identify numerous omissions, discrepancies, and clarity issues with the report. AMC and CRWC request that FirstLight redo portions of the study.

Comments on Requested Study Modifications

FirstLight provides numerous clarifications and additions to its report in its response to comments by stakeholders.

Discussion and Staff Recommendation

There are numerous discrepancies between the data inventory sheets and the body of the report. Further, many of the hand-written maps associated with the data inventory sheets are of poor quality and illegible. While FirstLight has clarified some of the discrepancies, the report does a poor job of summarizing the results of the site inventory and condition assessments.

Therefore, we recommend that FirstLight be required to file an addendum within 5 months of this letter that includes all information from FirstLight's responses to comments, legible site maps that show and label all pertinent features (e.g., river access

¹⁴ No condition assessment is necessary for the portage route.

routes, parking lots, structures), and Recreation Facilities and Recreation Amenities tables that list all sites and include basic facility information.¹⁵

¹⁵ See the Commission's *Project Recreation and Facilities Tables and As-Built Site Plan Drawing Guidance* at <https://www.ferc.gov/industries/hydropower/gen-info/guidelines/as-built-site-plan.pdf>.

APPENDIX C

STAFF'S RECOMMENDATIONS ON REQUESTED NEW STUDIES

Identify Habitat Suitability Parameters for State-listed Mussel Species in the Connecticut River through Quantitative Habitat Assessments

Recommended New Study

The Massachusetts Division of Fisheries and Wildlife (Massachusetts DFW) requests that FirstLight conduct a study to develop quantitative (category II) Habitat Suitability Index (HSI) criteria in order to model habitat persistence of state-listed mussel species.¹⁶ Massachusetts DFW suggests that existing data is insufficient to inform HSI criteria development because no quantitative data were collected in reach 4, and the data collected for the mussel survey in reach 5 were incomplete. The U. S. Fish and Wildlife Service (Interior) supports Massachusetts DFW's recommendation for additional data collection due to the lack of quantitative data in reaches 4 and 5.

Comments on Recommended Study

FirstLight states that a major component of the approved study plan for Study 3.3.16 is the use of binary HSI criteria developed using the Delphi technique (category I HSI criteria). FirstLight indicates that there is a large amount of information available, including qualitative and quantitative data useful for developing category I HSI criteria, for all three state-listed mussel species. FirstLight also notes that additional data collection may be necessary to validate category I HSI criteria if the Delphi team identifies a need for such data.

Discussion and Staff Recommendation

The study plan determination (SPD) approved FirstLight's proposal to utilize the Delphi technique to develop category I HSI criteria, a well-accepted practice in the scientific community (section 5.9(b)(6)). FirstLight's proposal included the use of quantitative field data, existing information, and expert opinion to develop category I HSI criteria. Since no state-listed mussels were discovered in reach 4, no quantitative data on habitat (depth, substrate, velocity) were collected for state-listed species. In addition,

¹⁶ Category II HSI criteria are based on frequency distributions of microhabitat attributes measured at locations used by the target species. Category I HSI criteria are developed by a team of experts (Delphi team) using professional judgment and existing information.

information provided for reach 5 by Holyoke Gas and Electric,¹⁷ lacked flow and velocity data within the documented yellow-lampmussel beds. Thus, Massachusetts and Interior suggest the limited results of surveys in reaches 4 and 5 constitute a need for additional quantitative data collection to develop category II HSI criteria.

The lack of some quantitative data from the project-affected area should not inhibit the development of category I HSI criteria if, as FirstLight indicates, a sufficient amount information exists for the Delphi team to consider. Commission staff considered the potential lack of information to develop HSI criteria, and we indicated in the SPD that the Delphi team could recommend additional data collection to validate their efforts if necessary. At this time, the Delphi team has not been formed and no attempt has been made at developing category I HSI criteria. Therefore, Massachusetts DFW's request is premature and we do not recommend requiring FirstLight to conduct this study at this time.

¹⁷ Rare Mussels Species Summary – 12 Year Final Report for Holyoke Gas and Electric. FERC Project No. 2004. Filed October 1, 2014.

APPENDIX D

STAFF'S RECOMMENDATIONS ON MODIFICATIONS TO NEW OR MODIFIED STUDY PLANS

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

Background

In the study plan determination (SPD), Commission staff required FirstLight to consult with the agencies and file a modified study plan for conducting American shad spawning surveys from the Turners Falls impoundment downstream to the Route 116 bridge in Sunderland. The SPD specified that FirstLight should record environmental information (e.g., water temperature, dissolved oxygen, and depth) at observed spawning locations. FirstLight filed a modified study plan for conducting American shad spawning surveys with its initial study report (ISR) on September 16, 2014.

Surveying the Turners Falls Power Canal

Requested Study Modifications

The SPD required FirstLight to include the power canal in its American shad spawning surveys; however, the modified study plan filed by FirstLight does not include surveys of the power canal.

Comments on Requested Study Modifications

No stakeholders filed comments noting that the power canal was not included in the survey area described in the modified study plan; however, in a letter filed December 15, 2014, FirstLight indicates that it would include the power canal in the survey area.

Discussion and Staff Recommendation

Because shad may potentially spawn in the power canal, and project operation could affect spawning success, the SPD required FirstLight to conduct spawning surveys in the power canal. Because this information will be needed for Commission staff's analysis and will inform any licensing decision, we recommend that the modified study plan be revised to require FirstLight include the power canal in the shad spawning survey area.

Measurement of Water Temperatures

In its modified study plan, FirstLight indicates that it will measure water temperatures at observed shad spawning locations.

Requested Study Modifications

Karl Meyer requests that FirstLight install a water temperature logger in conjunction with each radio telemetry receiver¹⁸ in the power canal to: (1) collect continuous water temperature data, (2) provide additional data about the initiation of spawning, and (3) provide additional information about the potential effects of delayed migration through the power canal.

Comments on Requested Study Modifications

In its response, FirstLight indicates that it does not intend to install additional water temperature loggers, and its survey crews will record water temperature in areas where they observe shad spawning.

Discussion and Staff Recommendation

FirstLight proposes to commence the shad spawning survey when water temperatures are between 13 and 18 degrees Celsius (°C) or after 10,000 shad have passed the Holyoke Project (P-2004). FirstLight will record water temperatures in the power canal if the survey crew observes shad spawning in that area. Additionally, FirstLight will install water temperature loggers in the power canal as part of Study 3.2.1. These temperature loggers will record data from April 1 to November 15, 2015, which includes the upstream migration period for adult shad. The water temperature data FirstLight proposes to collect as part of the shad spawning survey and Study 3.2.1 should be sufficient to compare water temperature values and trends across shad spawning areas, and deploying the requested additional water temperature loggers would not provide any additional useful information (section 5.9(b)(6)) to justify the additional cost (section 5.9(b)(7)). Therefore, we do not recommend requiring FirstLight to install a water temperature logger with each radio telemetry receiver in the power canal.

American Shad Spawning Success

Consistent with the requirements of the SPD, the modified study plan does not include an evaluation of American shad spawning success.

Requested Study Modifications

¹⁸ FirstLight will install several radio telemetry receivers in the power canal as part of Study 3.3.2.

Karl Meyer requests that the study evaluate the effects of releases from head and spill gates on spawning success in the power canal.

Comments on Requested Study Modifications

FirstLight did not respond to Karl Meyer's request.

Discussion and Staff Recommendation

The objectives of FirstLight's study are to identify shad spawning locations and to evaluate the effects of project operation on spawning activity at any identified spawning locations. The SPD did not require FirstLight to evaluate American shad spawning success, and Karl Meyer did not specify a method or analysis to evaluate the effects of spill on shad spawning success. In addition, his comments do not specify how this information relates to the goals and objectives of the required study (i.e., Study 3.3.6). Determining juvenile shad production would require substantially greater effort than the proposed study and a variety of factors, unrelated to project operation, may affect shad reproductive success. For example, natural increases in streamflow can decrease water temperatures, which can affect juvenile shad production (Crecco and Savoy, 1984; 1987; Limburg, 1996; Savoy et al., 2004). In addition, the number of spawning adults may also be an important factor in juvenile shad production (Savoy et al. 2004). Collecting sufficient data to definitively separate the effects of project operation on shad spawning success from other factors is potentially infeasible, and any studies of project effects on juvenile shad production would be extraordinarily costly (section 5.9(b)(7)). Because collection of this information is potentially infeasible, would be extraordinarily costly, and is not needed to inform a licensing decision, we do not recommend requiring FirstLight to modify the study to evaluate shad spawning success in the power canal.

Study 3.3.11 - Fish Assemblage Assessment

Background

The goal of the study is to describe the occurrence, distribution, relative abundance, and habitat associations of resident and diadromous fish species in the Turners Falls Project area. In comments on the revised study plan, the National Marine Fisheries Service states that FirstLight should not conduct electrofishing surveys during the April-June period in the reach downstream of Cabot Station, because electrofishing could harm spawning shortnose sturgeon, which is a federally-listed endangered species. In the SPD, the Commission required FirstLight to consult with the agencies and file a modified study plan with its ISR that meets the goals of the study and protects spawning shortnose sturgeon.

Requested Study Modifications

The U.S. Fish and Wildlife Service (Interior) proposes modifying the study to require FirstLight to conduct snorkeling surveys in the reach downstream of Cabot Station, in order to avoid all effects on shortnose sturgeon during the spawning season. The Nature Conservancy and Karl Meyer support Interior's proposed study modification.

Comments on Requested Study Modifications

To avoid all effects on shortnose sturgeon during the April-June period in the reach downstream of Cabot Station, FirstLight states that it will rely on sampling from the project impoundment, sampling of the reach downstream of Cabot Station during other times of the year (after June 30), and existing data from a 2009 electrofishing survey of the area downstream of Cabot Station.

Discussion and Staff Recommendation

The goal of this study is to provide general information on fish species that are present in the impoundment and in the river downstream of the dam and Cabot Station. Based on the description in the modified study plan, FirstLight's proposed method will provide information on species occurrence, species distribution, relative abundance, and habitat associations that will adequately describe the existing fish community. Because FirstLight's proposed methods would achieve the goals of the study while avoiding effects on spawning sturgeon, we conclude that snorkeling is not necessary and the study plan filed with the ISR should be approved without modification.

Study 3.3.18 - Impacts of the Turners Falls Canal Drawdown on Fish Migration and Aquatic Organisms

Background

FirstLight annually dewateres the Turners Falls power canal for several consecutive days to allow for inspection and maintenance of the power canal and facilities. Dewatering the power canal may affect fish and other aquatic resources in the canal; therefore, the SPD required FirstLight to conduct two surveys of fish and other aquatic organisms (e.g., freshwater mussels and mudpuppies) while the power canal is dewatered: one survey immediately after dewatering and the second survey immediately prior to rewatering. FirstLight conducted the study during canal dewatering that occurred in September 2014; therefore, the results could not be included in the ISR (filed on September 16, 2014).

Requested Study Modifications

Karl Meyer and Interior state that a problem with a dam gate prevented the survey crew from entering the power canal immediately after dewatering. This delay resulted in the first survey taking two days to complete instead of one. Karl Meyer and Interior suggest that any predation that occurred overnight between the day when the first survey began and the following day when the first survey was completed could bias the study results. Additionally, Interior states that FirstLight operated large machinery in one of the pools prior to conducting the first survey, which could also bias the results. Lastly, Karl Meyer states that FirstLight removes large amounts of sediment from the power canal while it is dewatered approximately once every five years, which could result in harm to aquatic organisms. Karl Meyer suggests that FirstLight's scheduled dredge of the canal in 2014 did not occur, and states that dredging activity must be figured into the effects of the drawdown. Because of the potential biases, Karl Meyer and Interior request that FirstLight repeat the survey in 2015.

Comments on Requested Study Modifications

FirstLight states that any mortality that occurred overnight between the start of the survey and its completion the following day would produce conservative mortality estimates (i.e., higher than if the survey took place during a single day). In addition, FirstLight states that the pool where the machinery was operated was large enough that the activity did not interfere with the sampling effort. FirstLight suggests that repeating the study in 2015 would not provide different results and states that the commenters' requests for an additional year of study prior to fully analyzing the results are premature.

Discussion and Staff Recommendation

FirstLight indicates that it will file the results of the 2014 power canal survey during the first quarter of 2015. However, because the results of the study (including a detailed description of the methods used during the survey and problems encountered during the survey) are not available at this time, we cannot determine the validity or usefulness of the 2014 results or the need for an additional year of study. Therefore, we do not recommend requiring FirstLight to conduct an additional year of study at this time.

Study 3.3.20 - Entrainment of American Shad Ichthyoplankton at the Northfield Mountain Pumped Storage Project

Background

FirstLight proposes to estimate ichthyoplankton entrainment at the Northfield Mountain Project by sampling ichthyoplankton from a cooling water supply pipe that diverts water from Unit 2. FirstLight would begin sampling once 5,000 adult American shad pass upstream through the Turners Falls gatehouse or by May 21, whichever comes first. Sampling would end once no shad eggs or larvae are captured in three concurrent

weeks of sampling or by July 31, whichever comes first. FirstLight proposes to collect samples to calculate weekly entrainment estimates from 100 m³ of water every 2 hours during a single pumping cycle (e.g., 11pm to 7am). Additionally, FirstLight proposes to manipulate project operation to quantify entrainment with 1, 2, 3, or 4 units running during a single pumping cycle. FirstLight proposes to conduct these unit manipulation tests from June 1 through June 28, which is the expected peak of egg and larval density.¹⁹ During the same time period, FirstLight would also attempt to collect samples during three pumping cycles where the number of operating units is held constant over the entire pump cycle (i.e., “constant unit operation tests”).

FirstLight proposes to apply natural mortality rates for the Connecticut River reported by Savoy and Crecco (1988) to the numbers of entrained eggs and larvae estimated during the proposed study to calculate the number of adult shad that would be lost from the population due to entrainment mortality.

Effect of river discharge

FirstLight proposes to estimate ichthyoplankton entrainment densities by date, time, and number of units pumping.

Requested Study Modifications

Interior suggests that river discharge could affect ichthyoplankton densities and entrainment rates. Therefore, Interior states that FirstLight should include river discharge in its analysis of ichthyoplankton densities and its entrainment estimates.

Comments on Requested Study Modifications

FirstLight did not respond to Interior’s comments.

Discussion and Staff Recommendation

River discharge could potentially affect estimates of both ichthyoplankton densities and entrainment rates. For example, if the same number of adult shad spawn at high flow conditions and at low flow conditions and produce identical numbers of eggs and larvae at both conditions, the resulting high flow ichthyoplankton density estimate may be lower than the low flow estimate because the additional water associated with high river flow conditions “dilutes” the eggs and larvae. Similarly, river discharge may affect entrainment rates because a given level of pumping at the Northfield Mountain Project may remove a larger proportion of available water at low flow conditions than at

¹⁹ Ichthyoplankton density is the number of eggs or larvae collected in a sample divided by the volume of water sampled.

high flow conditions. Including river discharge in the analyses of ichthyoplankton density and entrainment rates would require minimal additional cost (section 5.9(b)(7)) and could inform the development of license requirements (section 5.9(b)(5)). Therefore, we recommend that FirstLight include river discharge in its analyses of ichthyoplankton density and entrainment rates.

Entrainment Assumptions

FirstLight proposes to estimate total weekly ichthyoplankton entrainment by multiplying the daily entrainment densities by the total volume of water pumped during that week. FirstLight's description of how it would calculate weekly entrainment rates is not entirely clear, but it appears that FirstLight would use only the entrainment rates measured during normal pumping operation and would exclude entrainment rates measured during unit manipulation tests and constant unit operation tests.

Requested Study Modifications

Interior states that FirstLight's proposed calculation of weekly entrainment rates assumes a linear relationship between entrainment and the volume of water pumped. Interior states that there is no reason to assume the relationship would be linear and indicates that any relationship defined by the observed data should be used. Additionally, Interior comments that FirstLight's calculation of weekly entrainment rates would assume that entrainment rates observed during sampling would represent entrainment rates for the nights sampling did not occur.

Comments on Requested Study Modifications

FirstLight states that assuming a linear relationship between entrainment and intake volume is a method accepted by the U.S. Environmental Protection Agency (EPA, 2014) as is the assumption of the representativeness of weekly samples.

Discussion and Staff Recommendation

EPA (2014) indicates that it is reasonable to assume a linear relationship between entrainment and cooling water intake volume when studying compliance with Section 316(b) of the Clean Water Act. While the Northfield Mountain Project is not a cooling water intake, FirstLight's proposal to apply this assumption to its study is reasonable. However, FirstLight could verify the relationship between entrainment and intake volume by plotting observed entrainment against intake water volume pumped during each sampled pumping cycle and quantifying the relationship with regression techniques. Verifying the relationship would require minimal additional cost (section 5.9(b)(7)) and could provide more reliable weekly entrainment estimates than estimates based on an inaccurately described relationship (sections 5.9(b)(5 and 6)). Therefore, we recommend

that FirstLight be required to examine the relationship between entrainment and intake water volume.

Regarding the adequacy of weekly sampling, Interior appears to suggest that estimating weekly entrainments based on one night of sampling is insufficient to achieve the study objectives. Interior did not indicate how many nights of sampling it would consider sufficient. FirstLight likewise did not provide any references indicating that weekly sampling was an approved method. However, EPRI (2014) analyzed entrainment monitoring reports for steam-electric power plants and found that sampling one day per week was the most common frequency for calculating weekly estimates, which suggests weekly sampling is sufficient to adequately estimate entrainment rates (section 5.9(b)(6)). Because FirstLight's proposed method is reasonable, we do not recommend modification of FirstLight's proposed calculation of weekly entrainment.

Bongo Net Samples

To validate that ichthyoplankton densities estimated from the cooling water supply pipe reflect the ichthyoplankton densities of water pumped into the Northfield Mountain Project, FirstLight proposes to sample the project intake channel with a bongo net. A bongo net consists of two circular net frames that are connected together. FirstLight would tow the bongo net behind a boat and filter approximately 100 m³ of water. Upon retrieval, FirstLight would retain and preserve the sample collected from the side of the net that filtered the largest volume based on flowmeters that would be attached to each side of the net. FirstLight proposes to discard the sample from the other side of the net. FirstLight would conduct these paired sampling events for three different pumping scenarios and collect three replicate samples for each scenario.

Requested Study Modifications

Interior requests that FirstLight retain the samples from both sides of the net but only enumerate ichthyoplankton from the net that filtered the largest volume.

Comments on Requested Study Modifications

FirstLight states that the ichthyoplankton sample becomes hazardous waste when the preservative is added. Therefore, FirstLight proposes to retain only one sample from the bongo net to reduce the amount of hazardous waste generated.

Discussion and Staff Recommendation

Interior does not provide a reason for retaining the ichthyoplankton samples from both sides of the bongo net. To achieve the study objective, FirstLight only needs to collect replicate ichthyoplankton samples from 100 m³ of water from both the cooling

water supply pipe and the Northfield Mountain Project intake area during each pumping scenario. Retaining and enumerating the sample from the side of the bongo net that filters the largest volume of water would satisfy the study objective; therefore, we do not recommend modifying the study to require preservation of both bongo net samples.

Second-Year Studies

Requested Study Modifications

Interior requests that FirstLight include the following additional language in the proposed study plan:

Pending 2015 study plan results, modeling of juvenile shad abundance estimates in 2016 may be appropriate. Additionally, upon review of this study's results and the results of Study 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, it may be appropriate to study the vertical distribution and abundance of early life stage shad (eggs and larvae) in the vicinity of the Northfield Mountain intake in 2016.

Comments on Requested Study Modifications

FirstLight states that it would like to limit the proposed study to ichthyoplankton because study 3.3.3 addresses juvenile shad passage at the project.

Discussion and Staff Recommendation

FirstLight's proposed study is consistent with ichthyoplankton entrainment studies conducted at other water intakes (section 5.9(b)(6)) and should provide the information needed for Commission staff's analysis. However, because FirstLight has not conducted the proposed ichthyoplankton entrainment study, it is impossible to determine the need for modeling juvenile shad abundance in 2016 or measuring the vertical distribution of eggs and larvae near the intake in 2016. Therefore, we do not recommend requiring FirstLight to conduct these additional studies at this time.

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